

# CENTERED



Analyzing the existing data of mobility access, wind and solar direction analysis of the site, “CENTERED” integrates the past present and future of development. It demonstrates the potentials of the context while integrating a communal area that increase social activities and accommodate interest of researcher, student, and their families living in these area.

## Teacher's Biography



**Dr. Ing. Ova Candra Dewi, S.T., M.Sc.**

Dr.-Ing. Ir. Ova Candra Dewi, S.T., M.Sc., GP., IPU. joined the Architectural Sciences and Building Technology (ASBT) research cluster, Department of Architecture, Faculty of Engineering, Universitas Indonesia, in 2019. She is certified as a Greenship Professional (GP) of the Green Building Council Indonesia (GBCI) and certified Major Professional in Engineering - Indonesia (IPU). Her expertise and areas of interest include building systems, green building, waste management, and environmental sustainability. Working with an interdisciplinary background, Ova has developed and engaged research, classes and community to create a more sustainable built environment by minimizing the negative impact of design decisions.

## The Team



I Gusti Agung Sawitri Shintya Dewi



Dendang Belantara



© extra *Janella*  
JK. 0.1 m.  
UK: 2.17.19

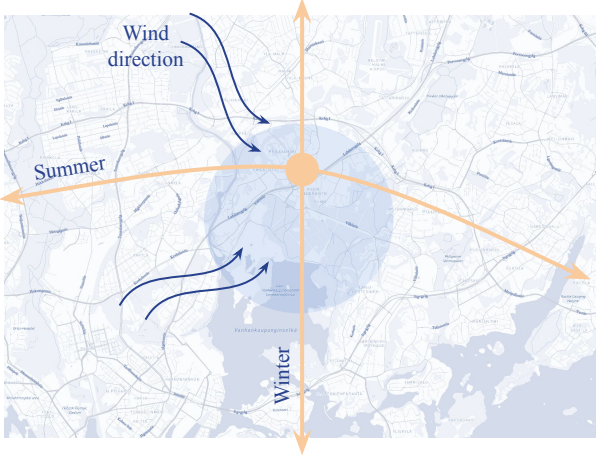
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- 80  
- 85  
- 90  
- 95  
- 100

10  
Sauna  
bike room  
common  
restroom  
one bedroom

# Site Analysis - Surroundings



The site is located in Viikki, Helsinki



The site is **near tram station** that makes it **easier for mobility** but also challenging because it **impacts the sound pollution**

The surroundings of the site is educational area that focus on biological sciences. Thus, it **leads to the needs of leisure and communal area that can accommodate their interests, also residencials**

Helsinki is the World's happiest city for the seventh year in a row (2019-2024). Through managing the environment and incorporating nature, Helsinki's recreation and activities center around nature and outdoor activities.

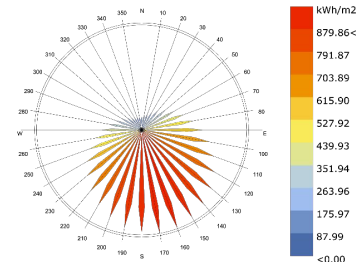
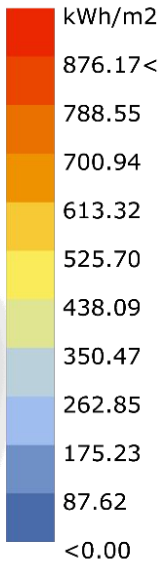
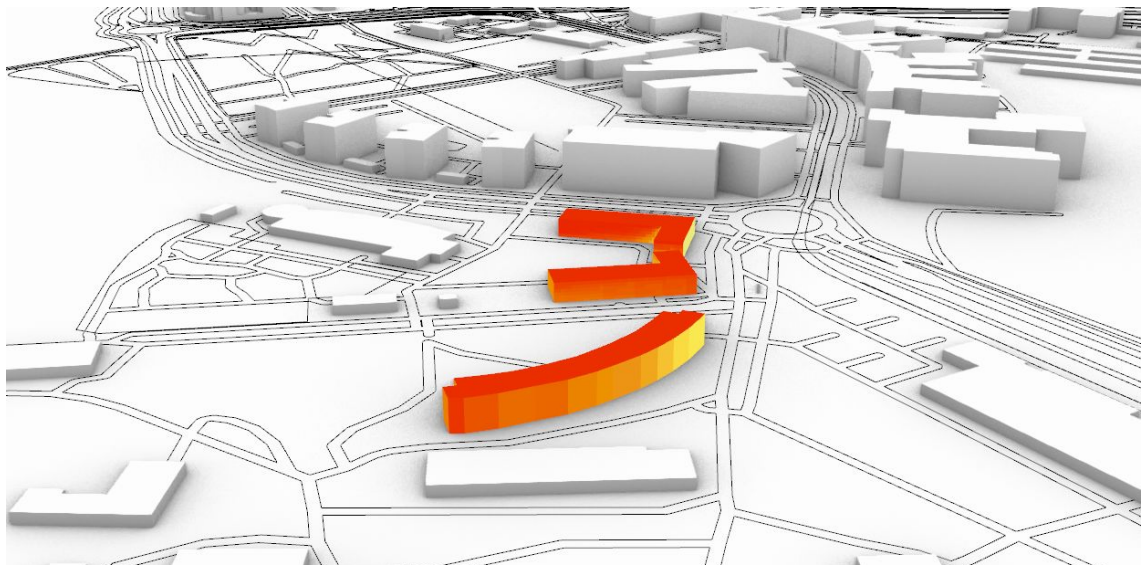
Quality of Life  
Natural Environment  
Work-life Balance

Education  
Social Cohesion  
Urban Planning

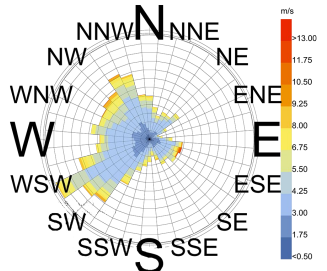
Saunas  
Seasonal variation  
Innovation and Creativity

Innovation and Creativity  
Safety and Security

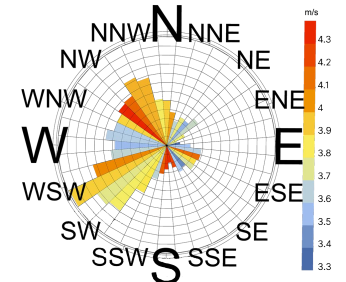
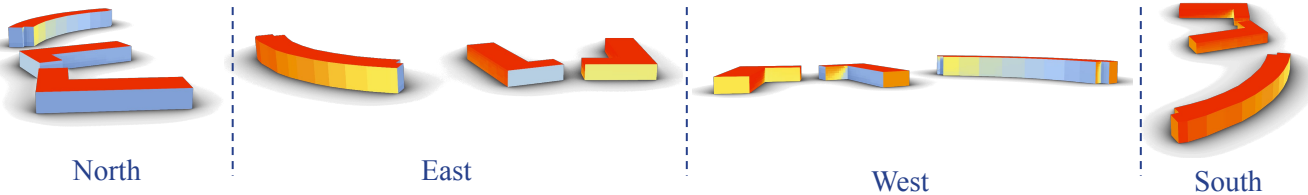
# Site Analysis - Existing Mapping



Solar Radiation Analysis



Wind Rose Analysis



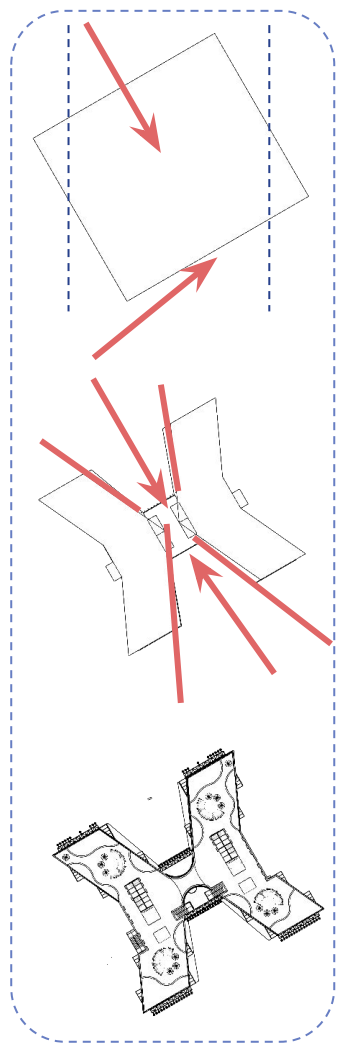
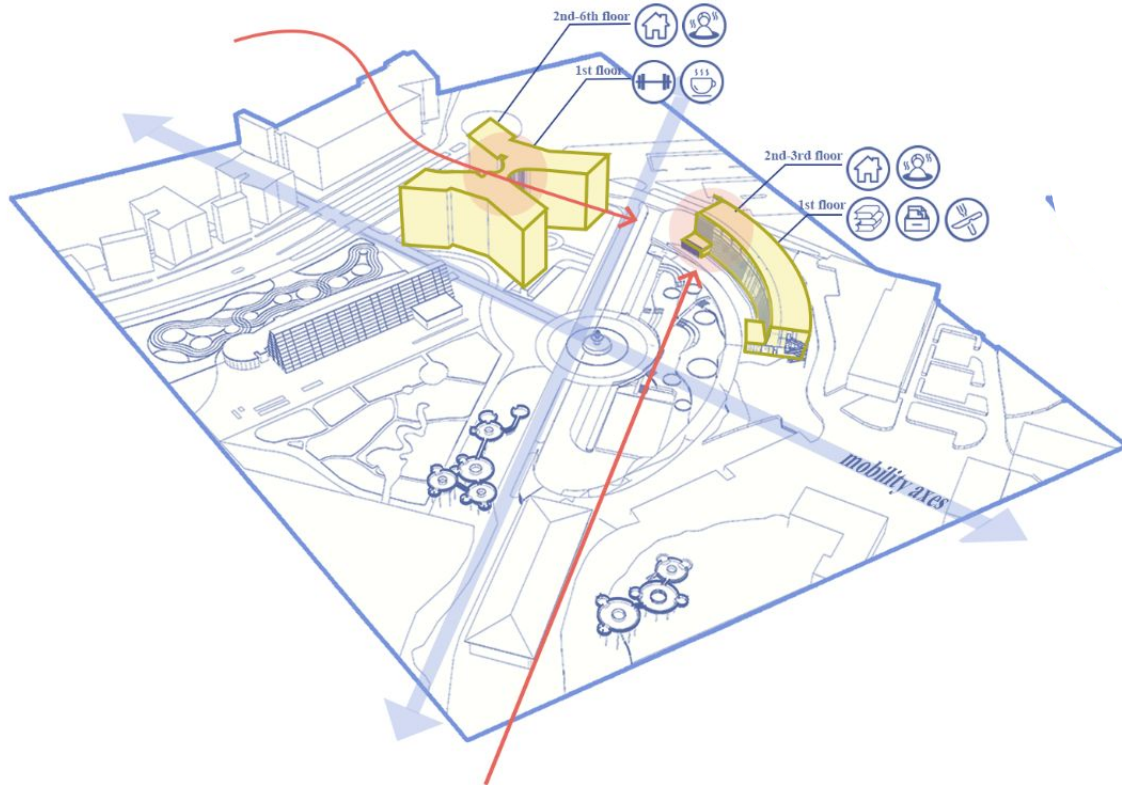
Average Wind Speed

Vikki, Helsinki has a humid continental climate with the average wind speed of **3.8 - 4.2 m/s**, with the maximum speed of **9-13 m/s** in a windy day mostly from the northwest direction.

# Programme - Injecting Site Analysis

## How far could we harvest the existing conditions in Helsinki?

Implementing the use of a movable facade responding to the wind speed while paying attention to the acoustic properties needed for a residential area



Implementing the **Bernoulli's Principle** to maximize the speed

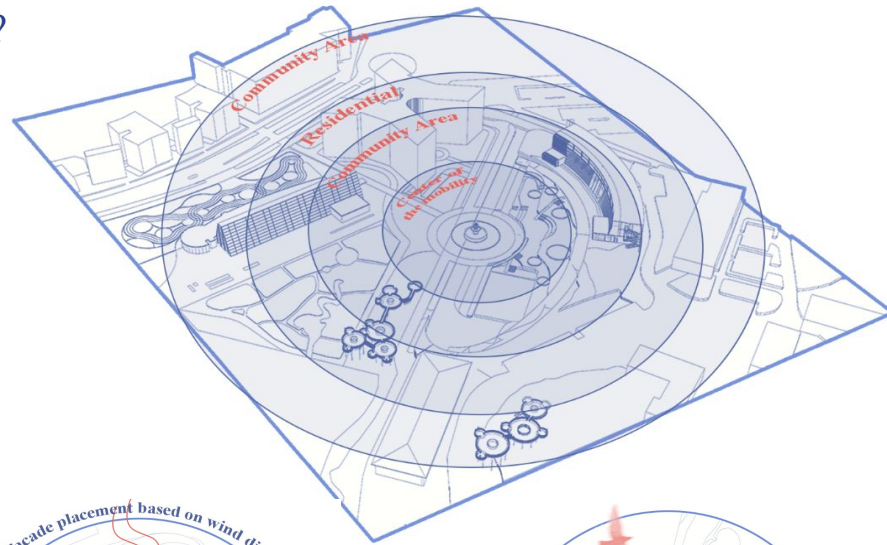
adapting building orientation to the wind rose

Designing the wind facade to capture the wind speed potential

Area with smaller pressure will have higher wind speed.

Injecting residential programme

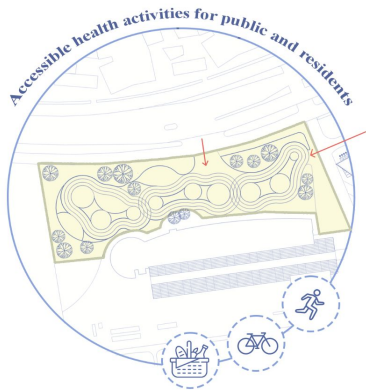
# Programme - Why Centered?



## Macro-centered

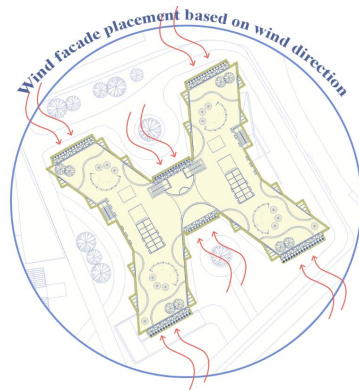
As a cohesive space, this area is **centered** to trigger social interaction through multiple programmatic layers, thus increasing the livelihood of the community while still accommodating residential needs with considerations for comfort and privacy.

## Micro-centered



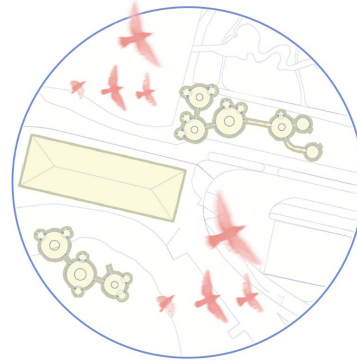
### Park

**Centered** communal health and leisure activities.



### Building B

Electricity efficiency **centered** around wind harvesting in building design.



### Museum: Bird Watching & Leisure Area

Creating an aviary **centered** around the museum area. Renews its focus, preserving heritage and fostering awareness of both cultural legacy and natural surroundings.



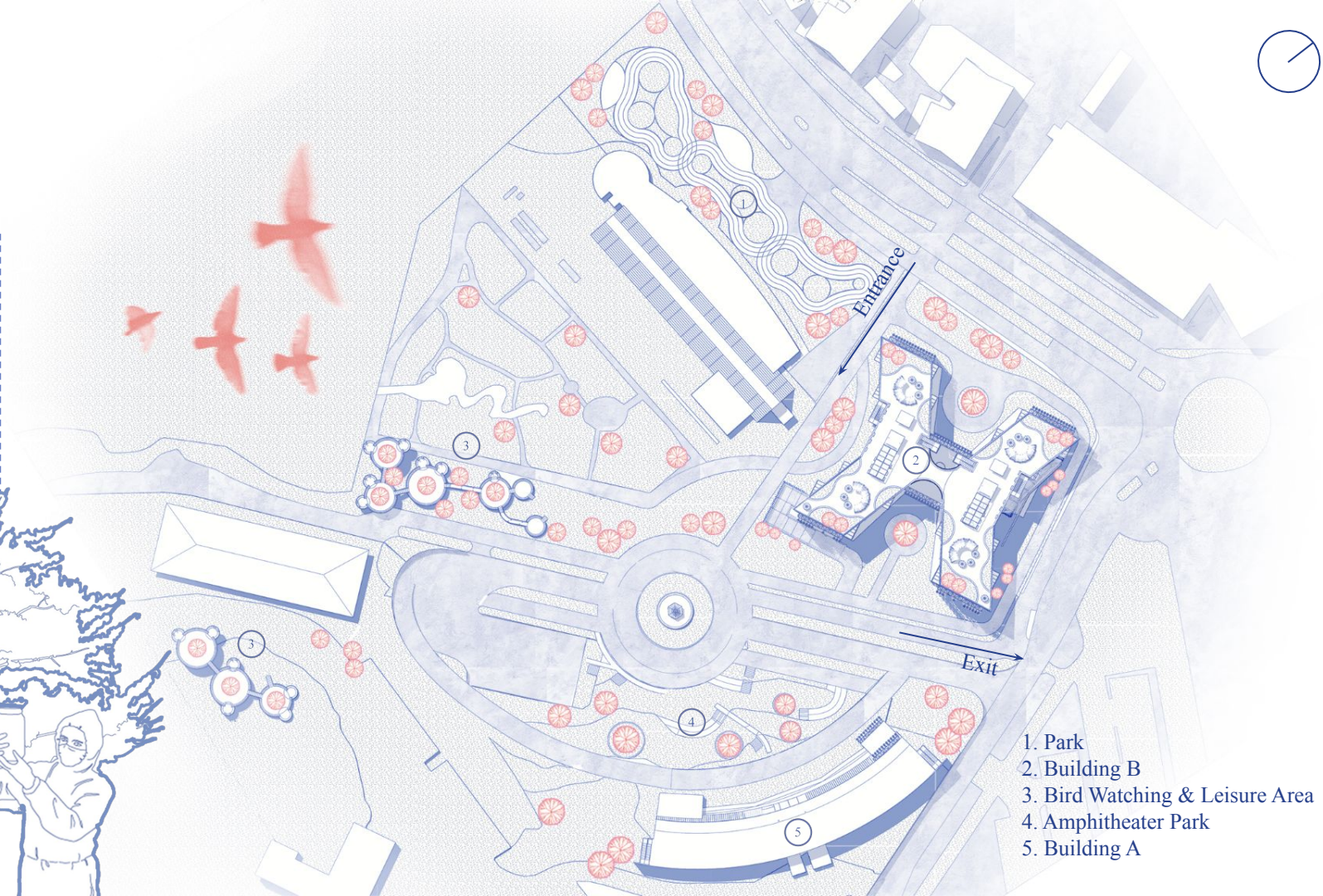
### Amphitheater Park & Building A

**Centered** layered green outdoor and indoor communal space.

# Master plan

Implementing the natives vegetations that benefits researchers and students for their studies :

*alnus glutinosa*  
*betula pendula*  
*populus alba*  
*pinus sylvestris*  
*fagus sylvatica*  
*alnus incana*  
*picea abies*  
*malus*  
*populus*

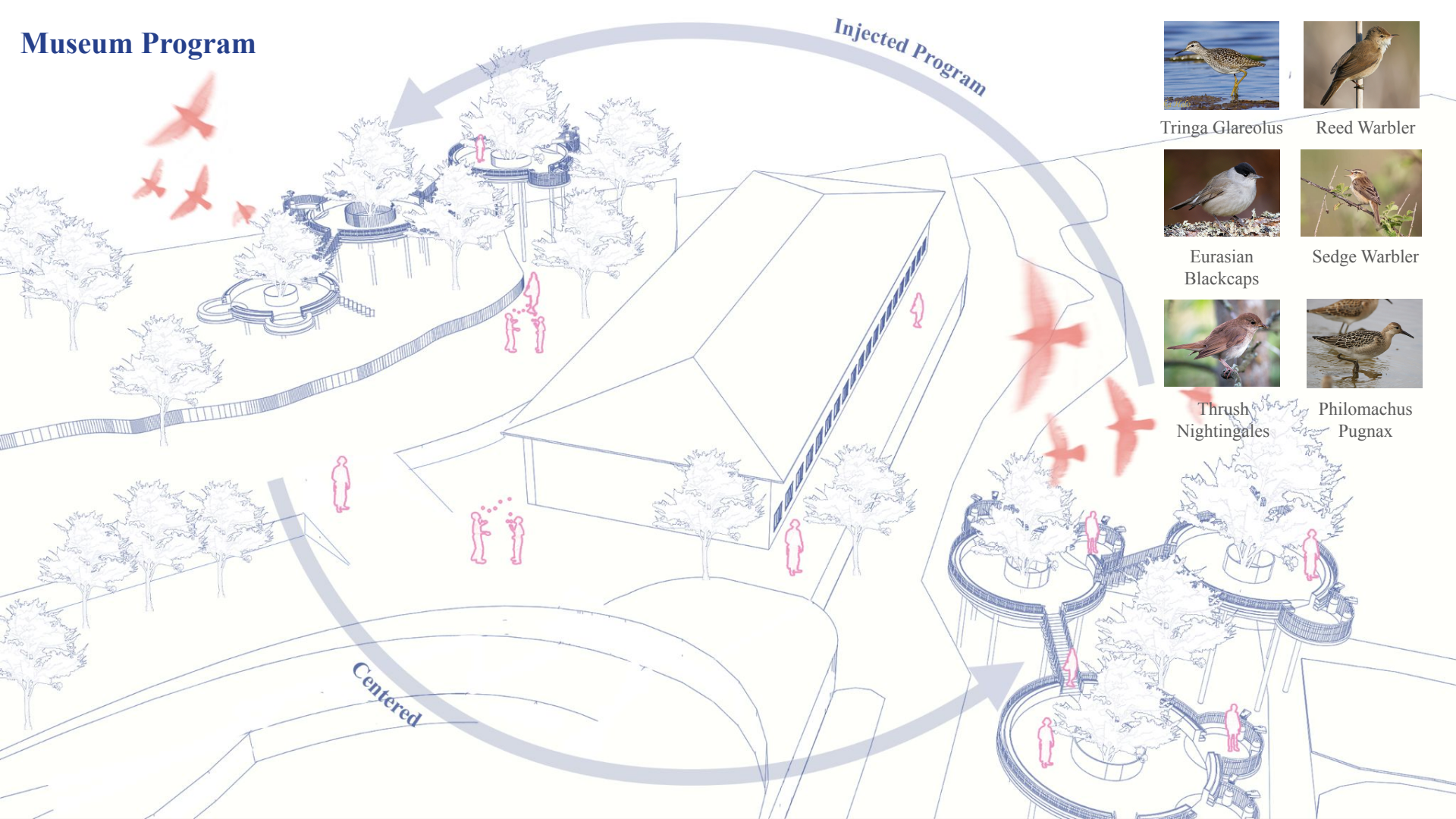


1. Park
2. Building B
3. Bird Watching & Leisure Area
4. Amphitheater Park
5. Building A

# Amphitheater Park



# Museum Program



## Museum & Bird Watching Area

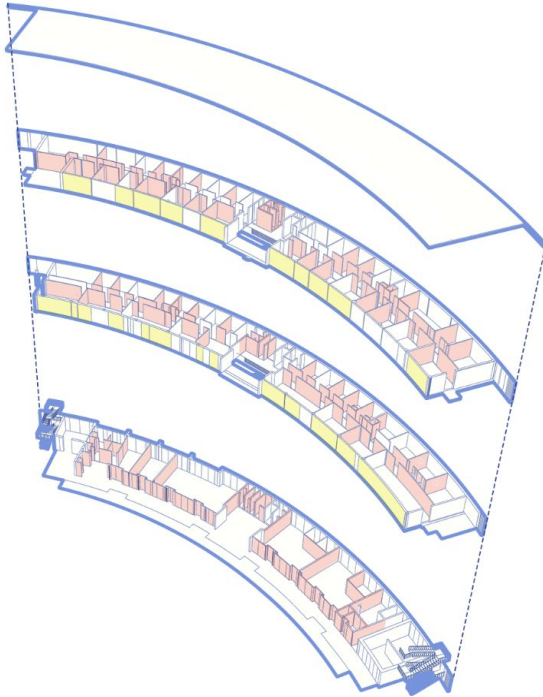
Revives the museum area to increase awareness of the natural surroundings and cultural heritage buildings



# Building A

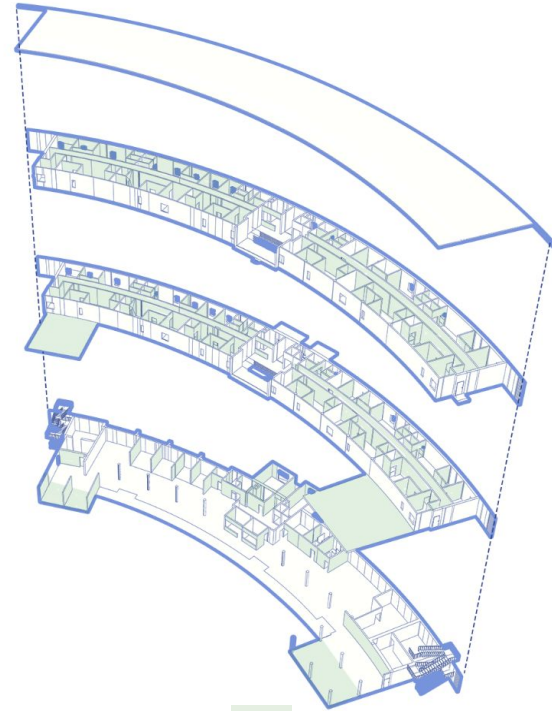


## Building A - Adaptive Reuse



### Demolished

Removal of the interior wall creates open space in the communal area at the 1st floor for lobby, cafeteria, and reading or study room. Meanwhile, the removal of interior wall at the 2nd and 3rd floor creates typical room for residential where **the dimension of the room is adjusted according to the existing walls**



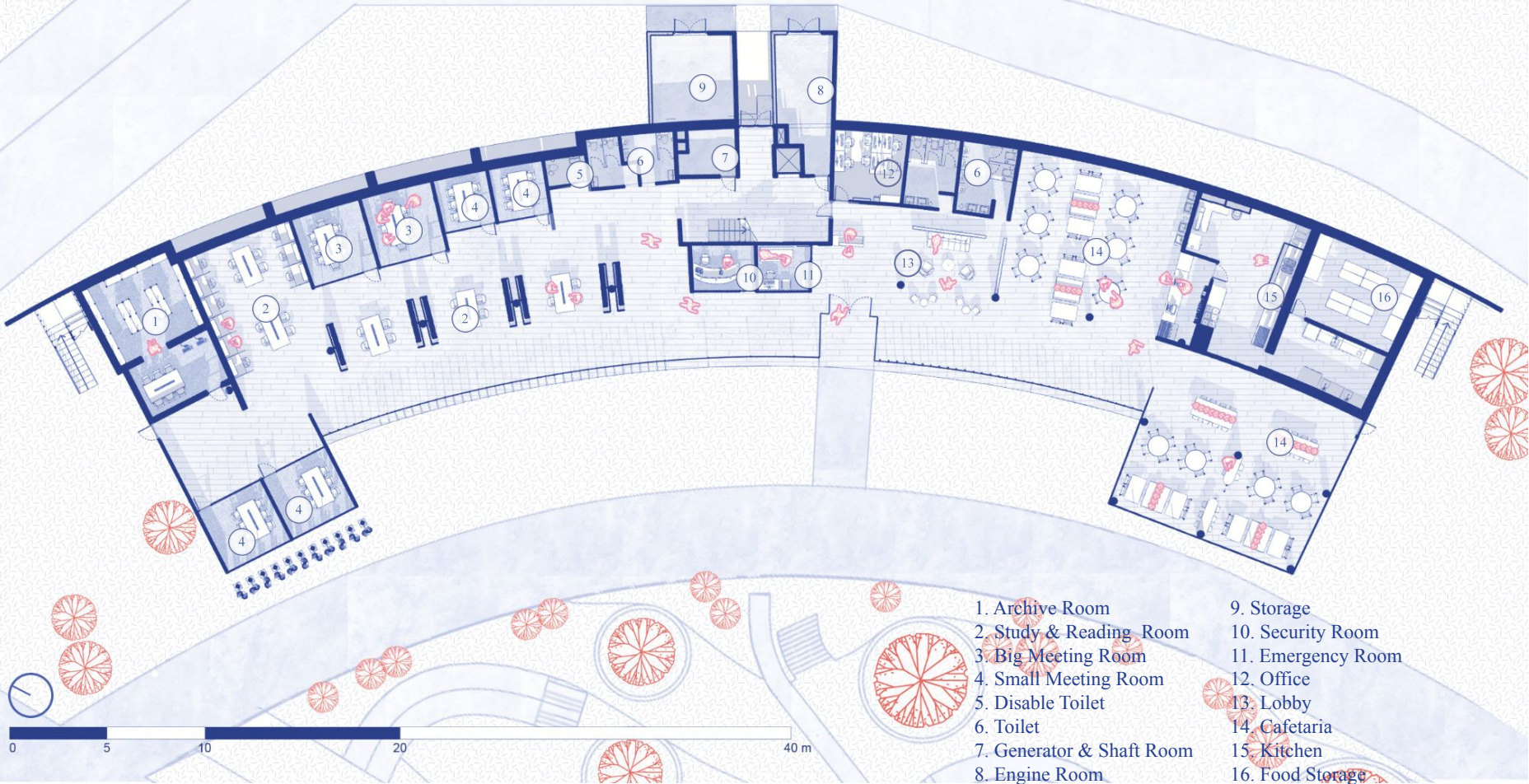
### Adding

Adding windows at the existing walls to allow natural sunlight in the unit

### New

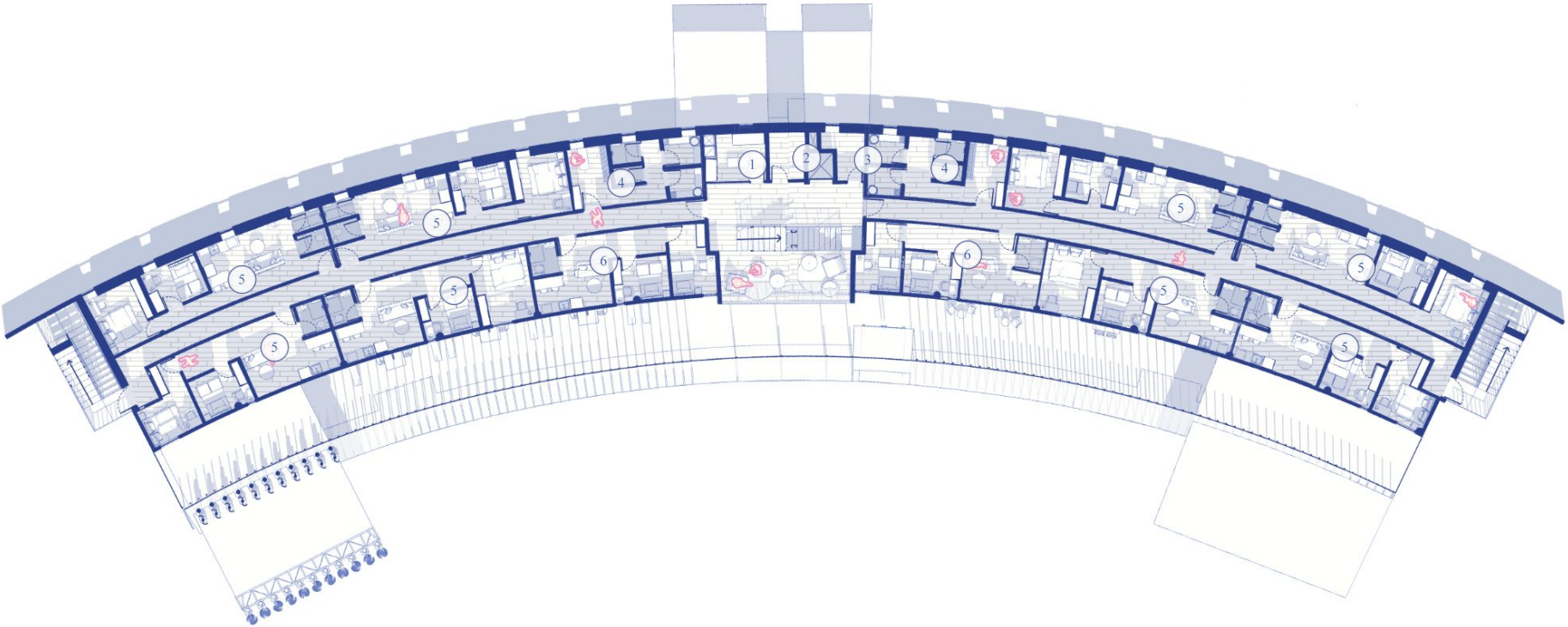
The extension of the building at the 1st floor, make more spacious space and create shading to reduce sun radiation during summer

# Plan - 1st Floor



- 1. Archive Room
- 2. Study & Reading Room
- 3. Big Meeting Room
- 4. Small Meeting Room
- 5. Disable Toilet
- 6. Toilet
- 7. Generator & Shaft Room
- 8. Engine Room
- 9. Storage
- 10. Security Room
- 11. Emergency Room
- 12. Office
- 13. Lobby
- 14. Cafeteria
- 15. Kitchen
- 16. Food Storage

# Plan - 2nd & 3rd Floor



- 1. Laundry Room
- 2. Storage
- 3. Janitor
- 4. Female & Male Sauna
- 5. Residential Unit A
- 6. Residential Unit B



Building A - Master Bedroom



Building A - Living Room & Kitchen





# Building A - Meeting room



# Building A - Cafe and Resto



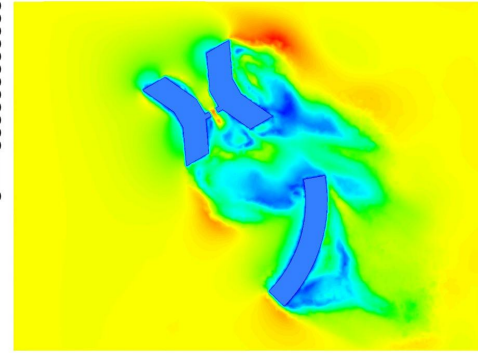
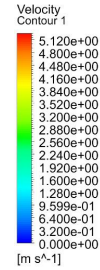
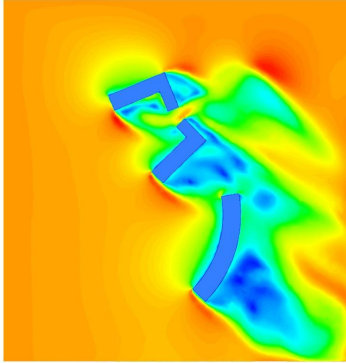
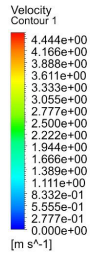
# Building B



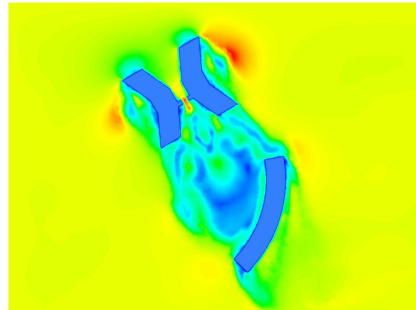
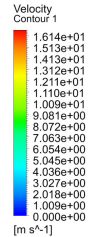
# Building B - North Entrance



# Building B - Concept Optimization

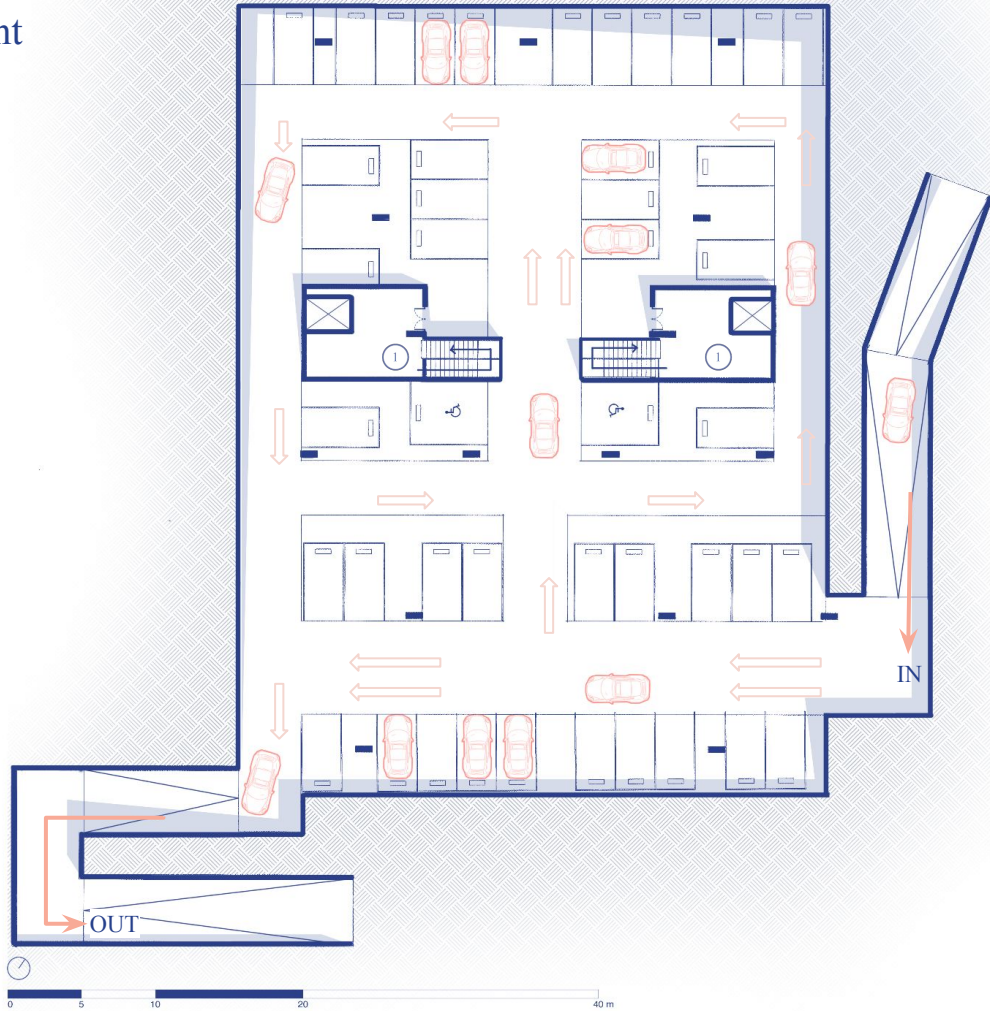


Using the average wind Helsinki of 4 m/s, the form could further speed up the wind speed until 5.12 m/s



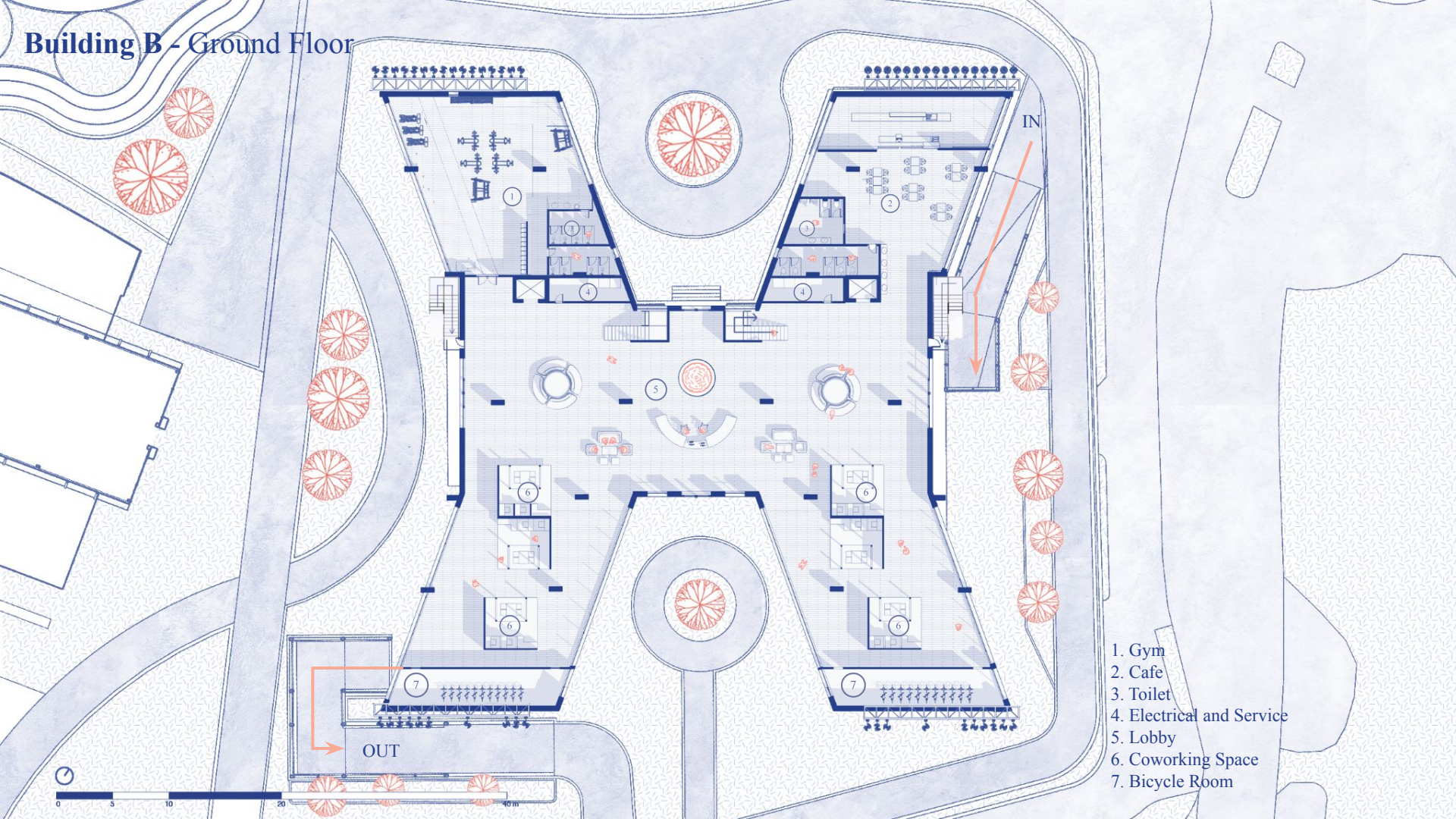
On a really windy day with the high wind speed recorded in Helsinki, from 11 m/s, the form could further speed up the wind speed till 16 m/s.

# Building B - Basement



1. Generator and Pump Room

# Building B - Ground Floor



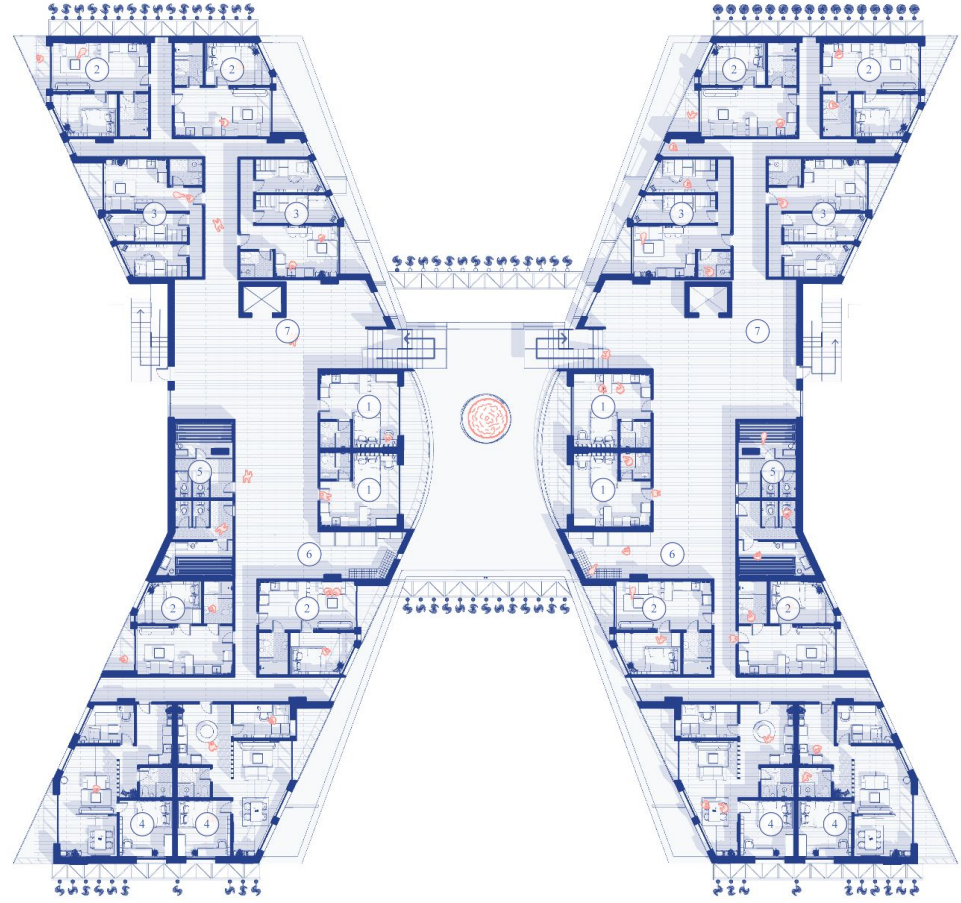
- 1. Gym
- 2. Cafe
- 3. Toilet
- 4. Electrical and Service
- 5. Lobby
- 6. Coworking Space
- 7. Bicycle Room



# Building B - Lobby



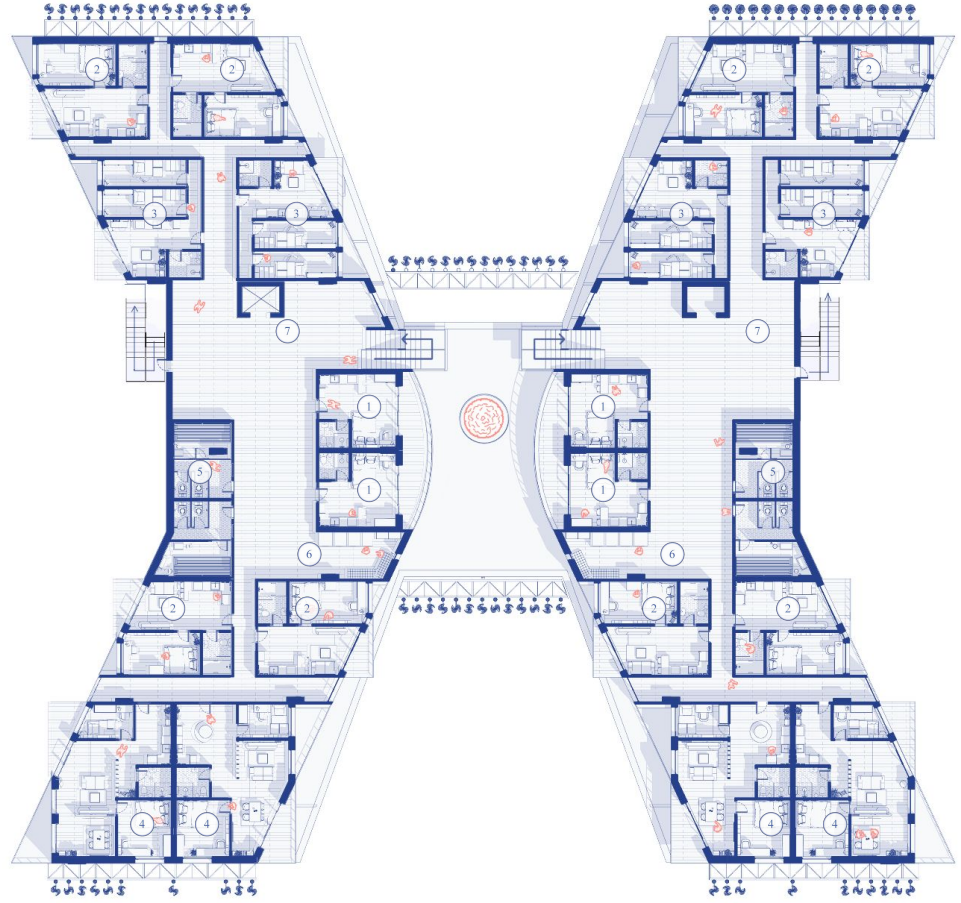
# Building B - 1st Floor



- 1. Studio
- 2. 1 Bedroom Unit
- 3. 2 Bedroom Unit A
- 4. 2 Bedroom Unit B
- 5. Sauna
- 6. Laundry Room
- 7. Communal Area



# Building B - 2nd Floor



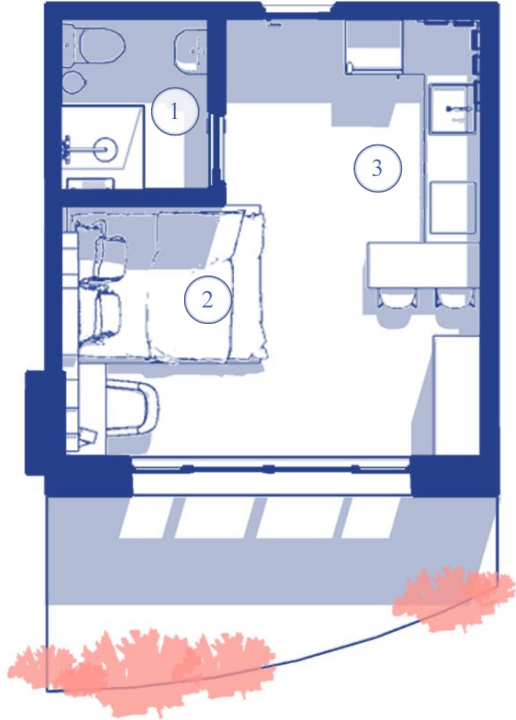
- 1. Studio
- 2. 1 Bedroom Unit
- 3. 2 Bedroom Unit A
- 4. 2 Bedroom Unit B
- 5. Sauna
- 6. Laundry Room
- 7. Communal Area



# Building B - Units

## Studio

21,15 m<sup>2</sup> + Balcony



## 1 Bedroom Unit

32.26 m<sup>2</sup> + Balcony



- 1. Toilet & Shower
- 2. Bedroom
- 3. Kitchen
- 4. Living Room

# Building B - Studio Unit



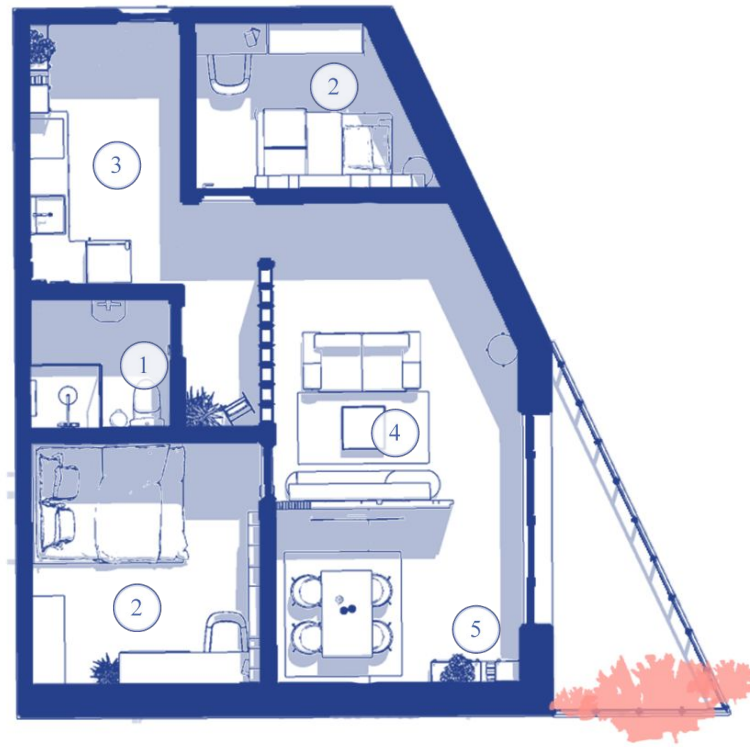
# Building - 1 Bedroom Unit



# Building B - Units



**2 Bedroom Unit A**  
36.27 m<sup>2</sup> + Balcony



**2 Bedroom Unit B**  
55.39 m<sup>2</sup> + Balcony

- 1. Toilet & Shower
- 2. Bedroom
- 3. Kitchen
- 4. Living Room
- 5. Dining Room



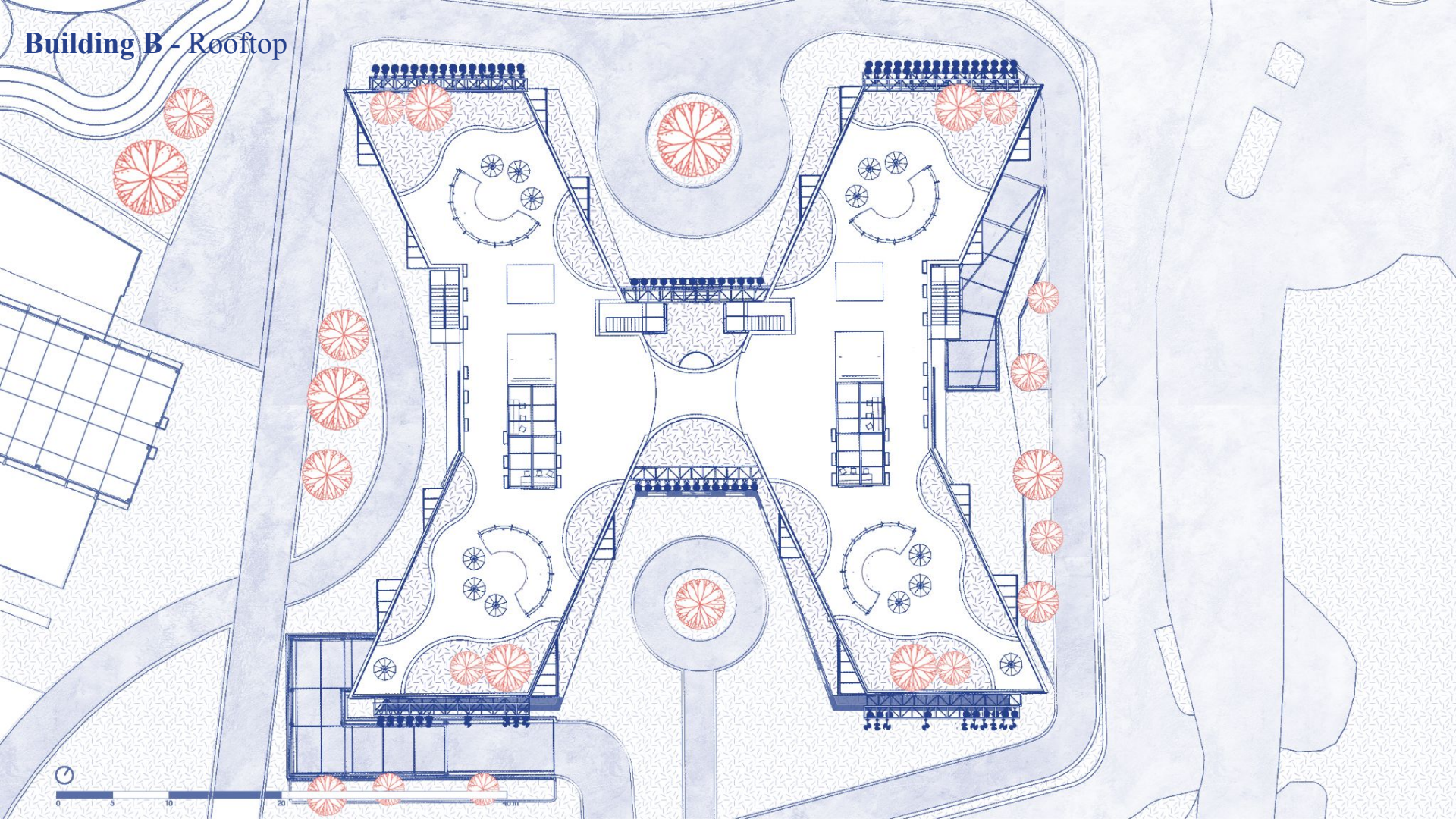
Building B - 2 Bedroom Unit A



# Building B - 2 Bedroom Unit B



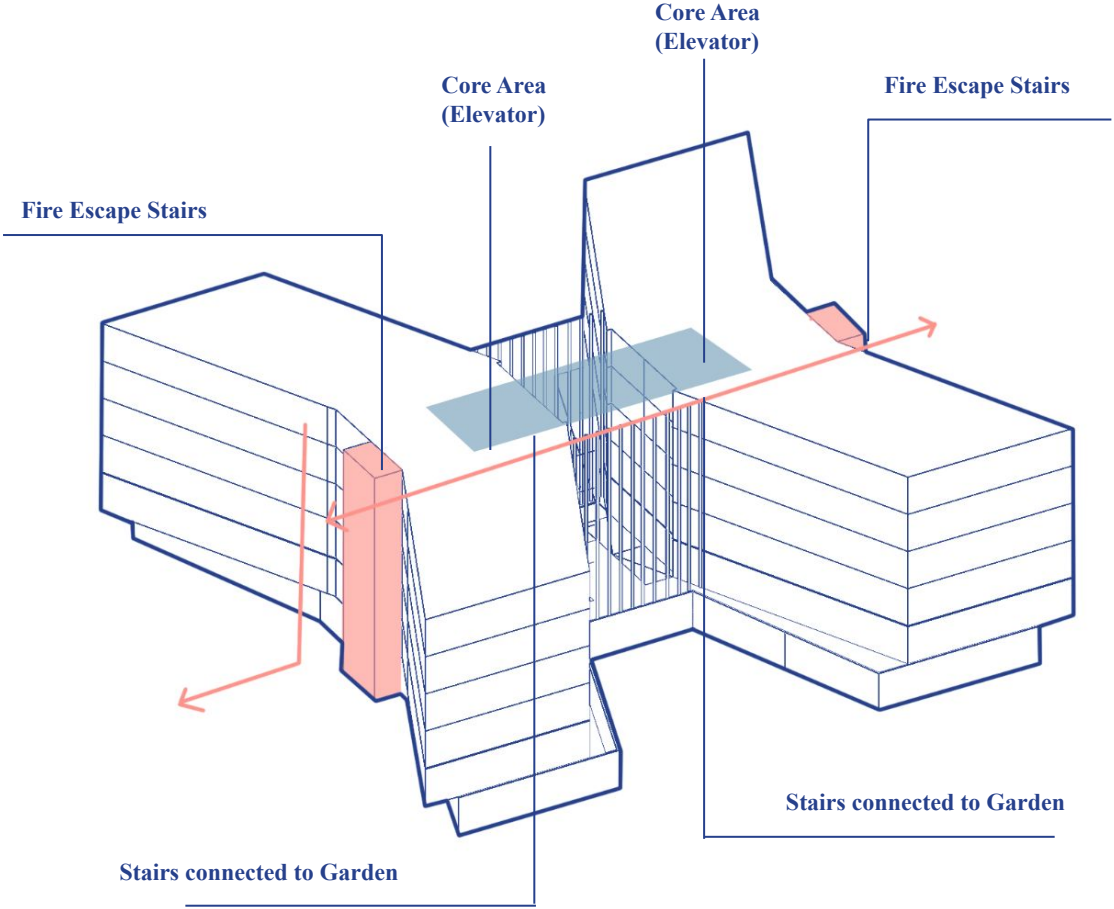
# Building B - Rooftop



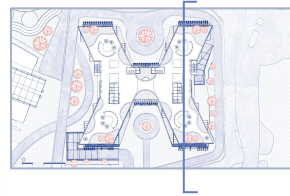
# Building B - Rooftop



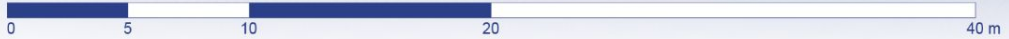
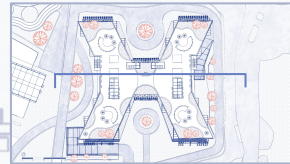
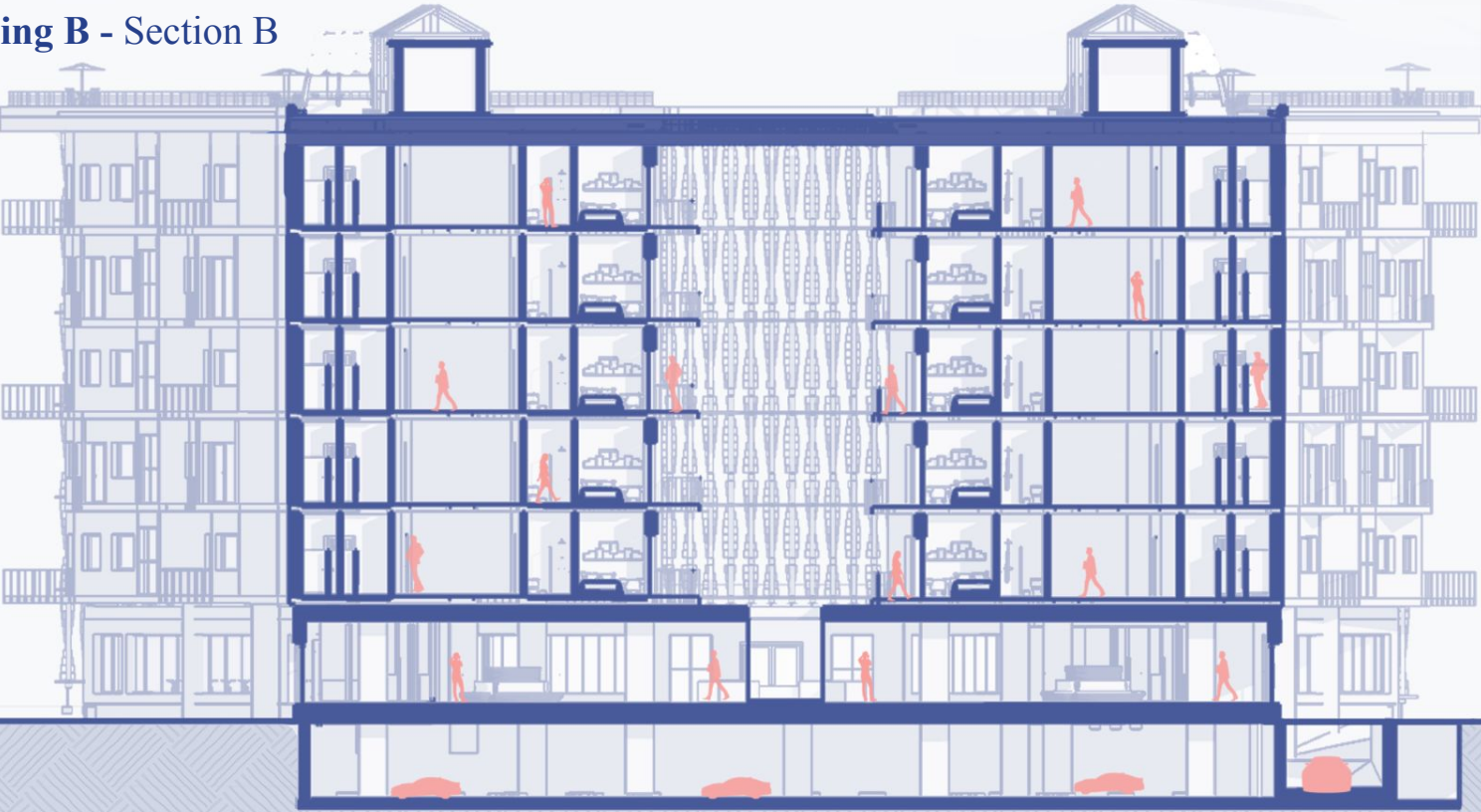
# Building B - Evacuation and Fire Escape



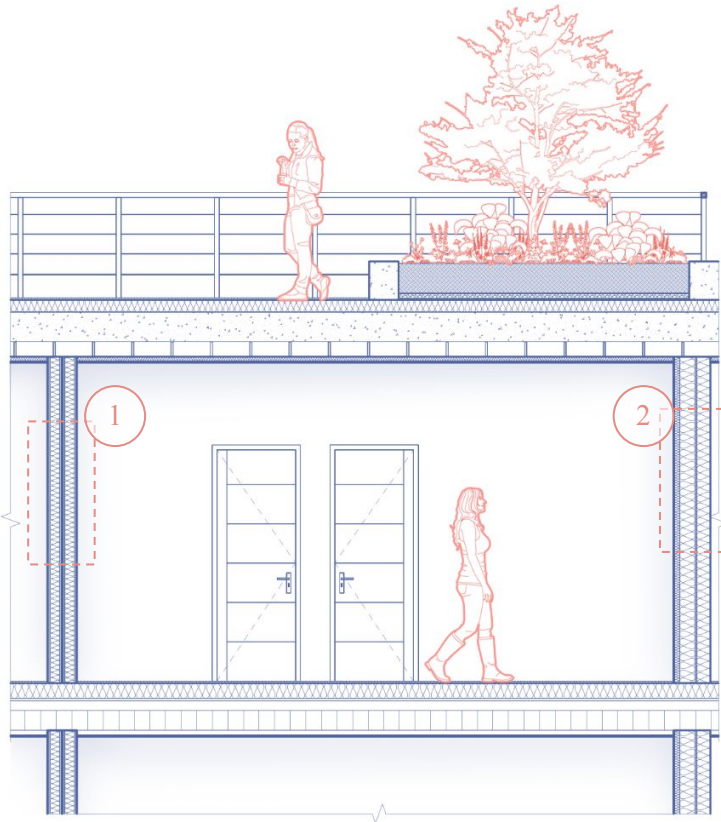
# Building B - Section A



# Building B - Section B



# Detail - Floor and Wall



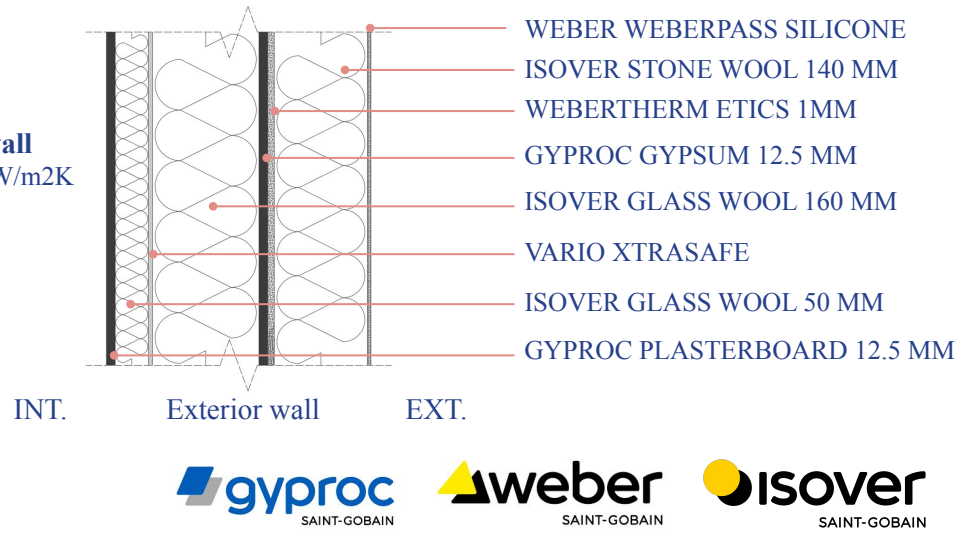
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**Interior wall**  
U-Value : 0.31 W/m<sup>2</sup>K

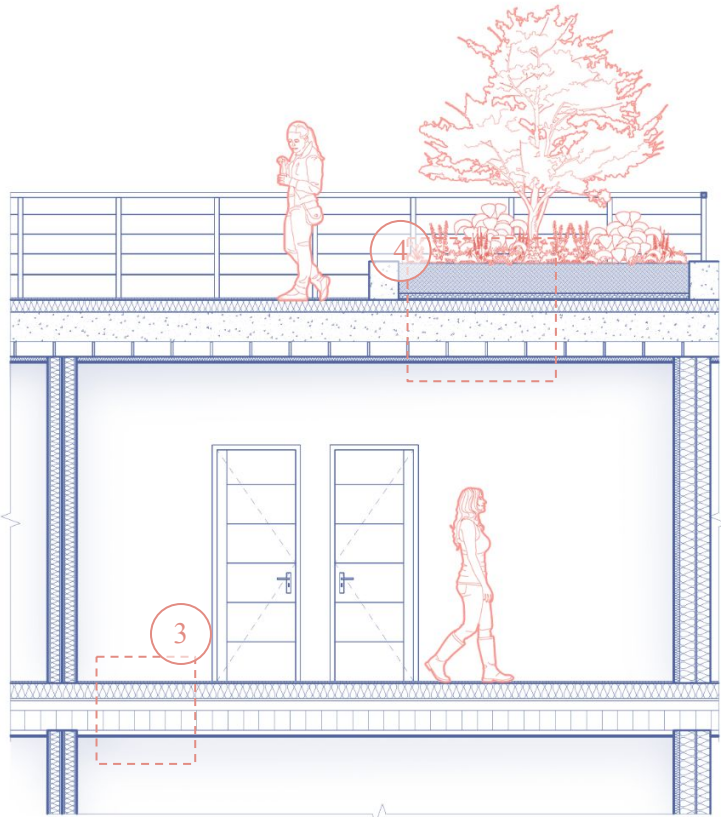


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**Exterior wall**  
U-Value : 0.09 W/m<sup>2</sup>K



# Detail - Floor to Floor and Rooftop

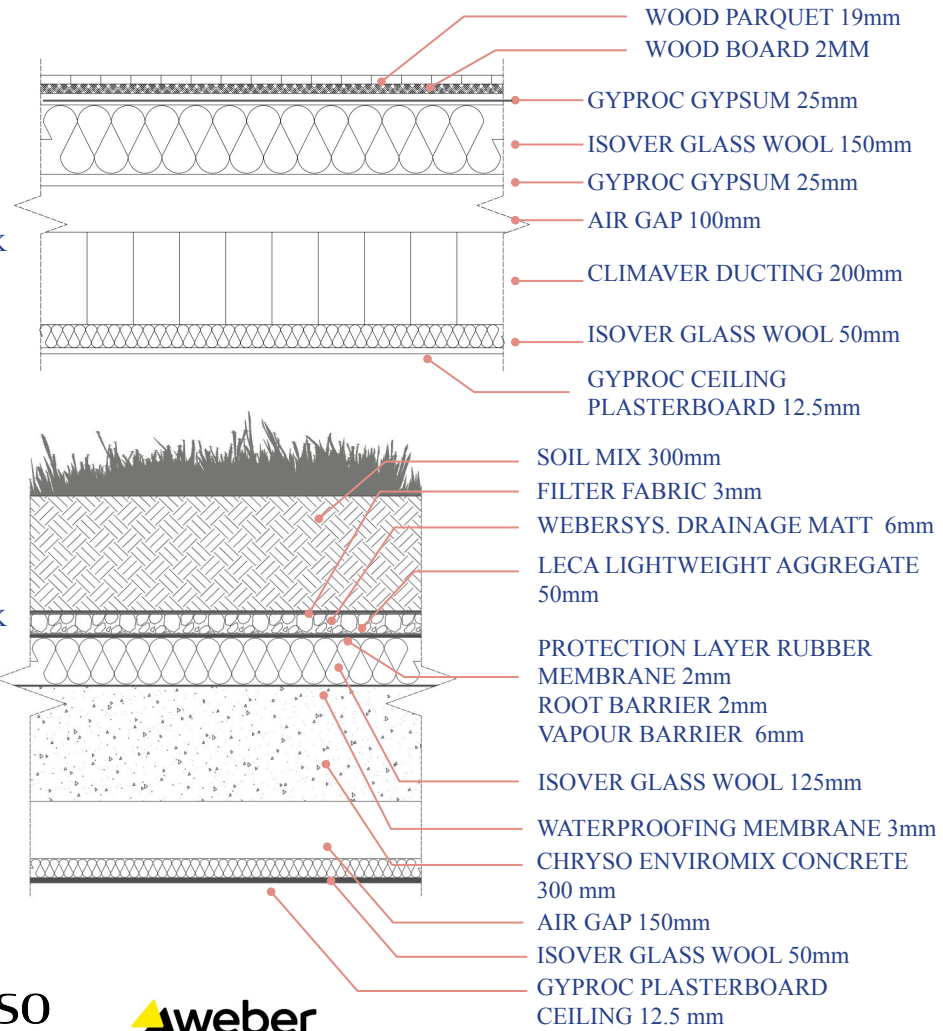


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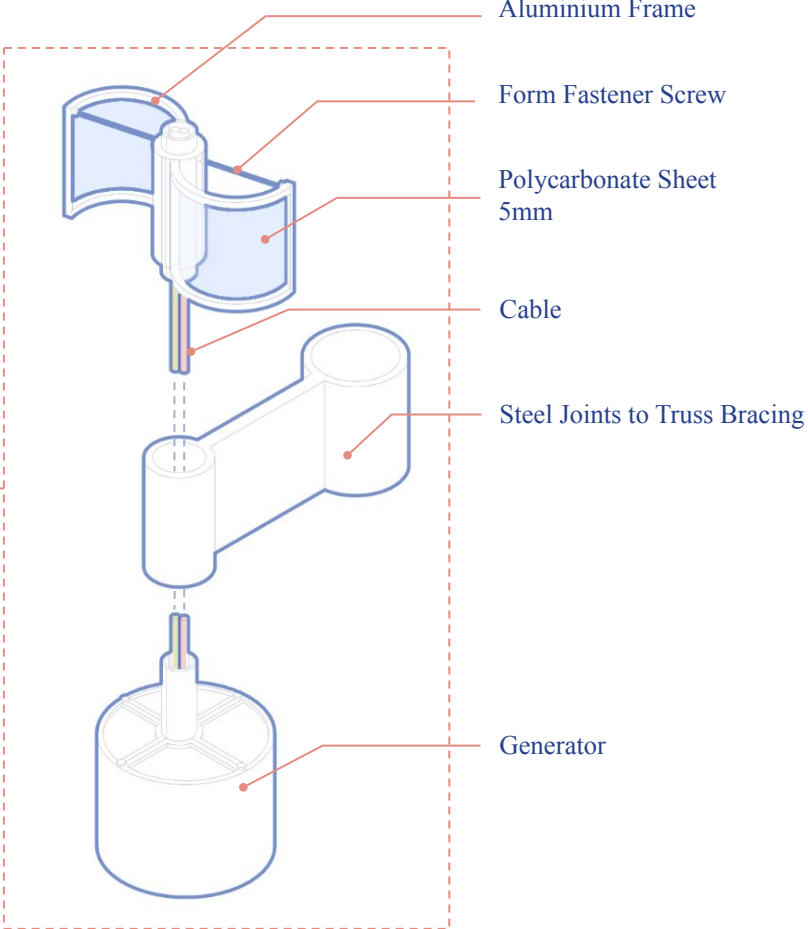
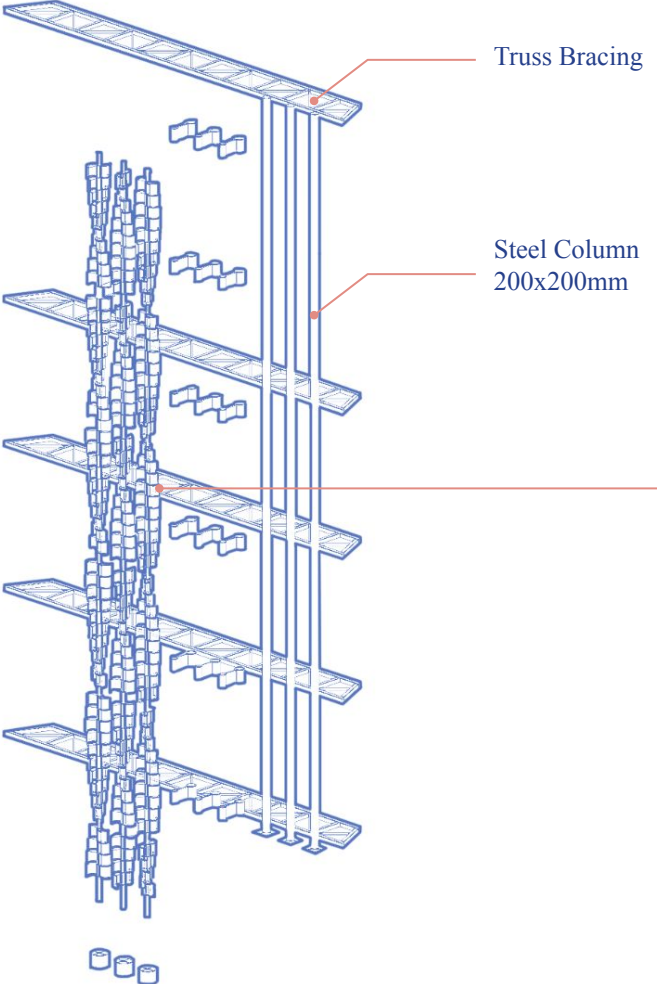
**Floor to Floor**  
U-Value : 0.14 W/m2K

4

**Green Roof**  
U-Value : 0.06 W/m2K



# Detail - Exploded Wind Facade Components

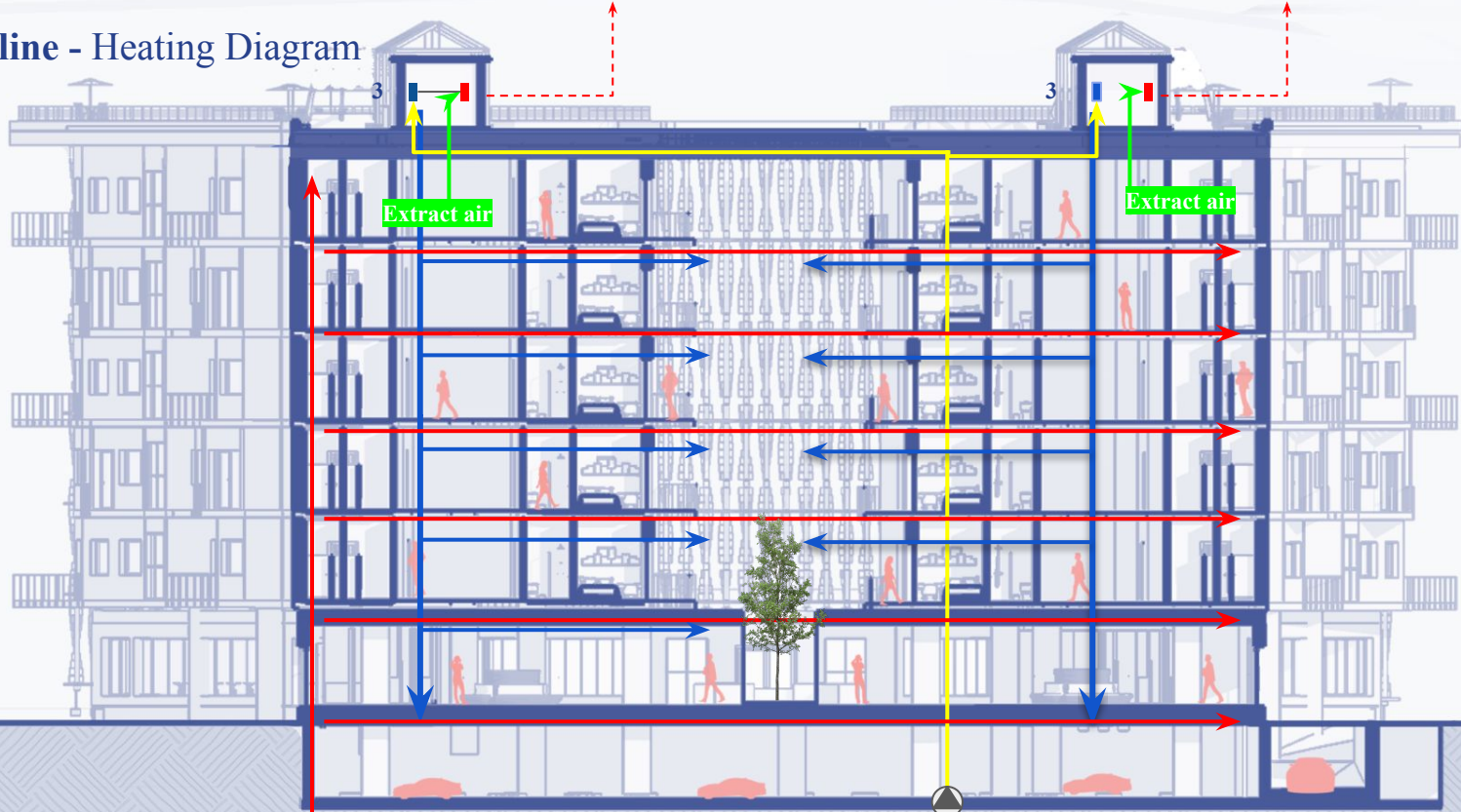


# One line - Wind Facade



- 1. Generator
- 2. Charge Controller
- 3. Battery Bank
- 4. Off Grid Inverter
- 5. Single Phase AC

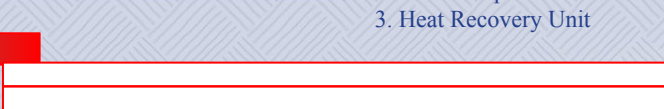
# One line - Heating Diagram



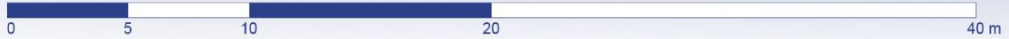
- 1. Ground Heat Exchanger
- 2. Heat Pump
- 3. Heat Recovery Unit



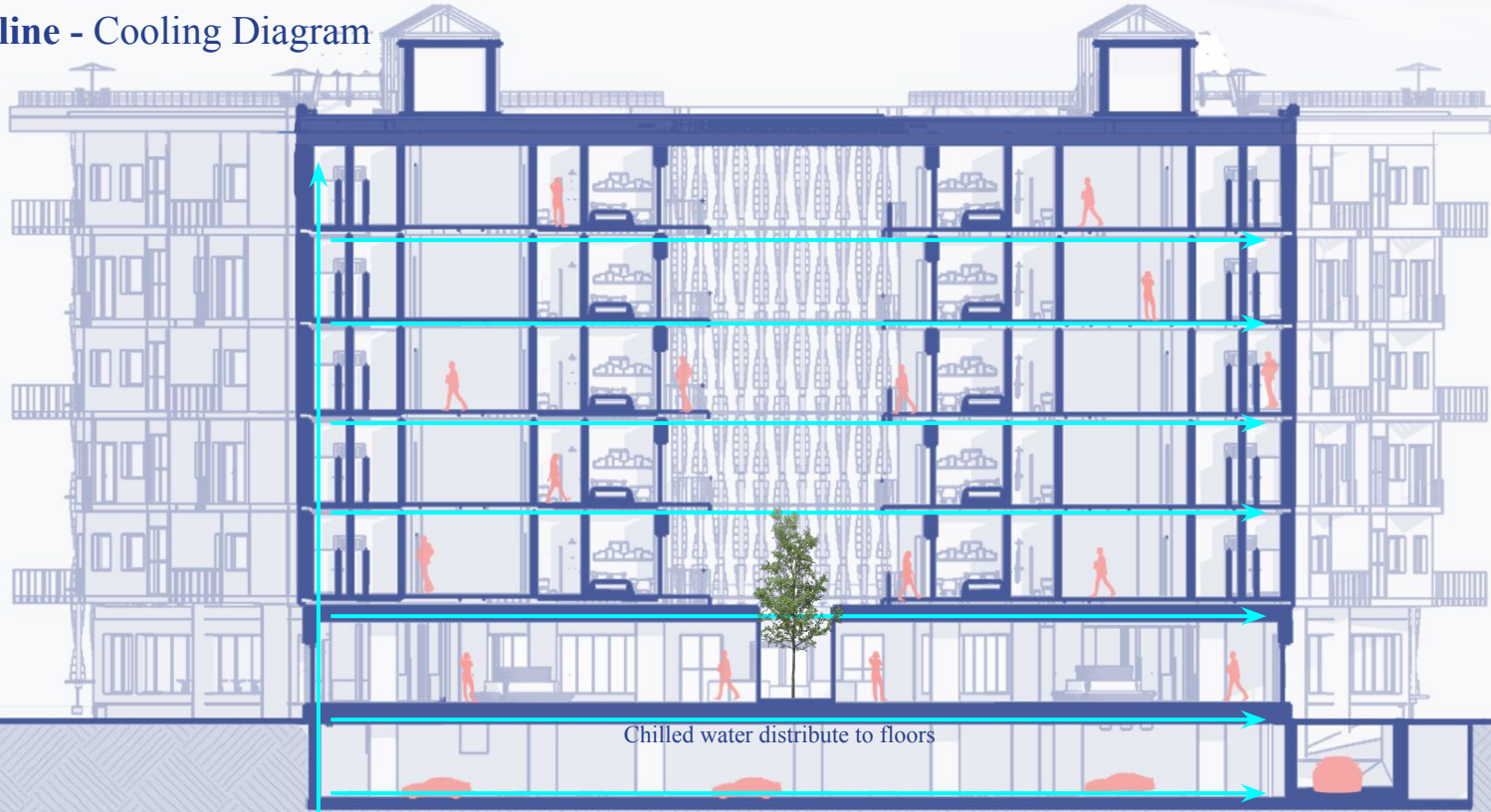
Both distributed to heat floors



Geothermal Horizontal Collector



# One line - Cooling Diagram



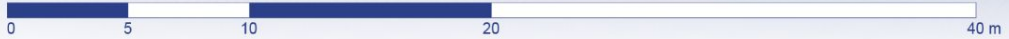
Chilled water distribute to floors

1. Water Pump



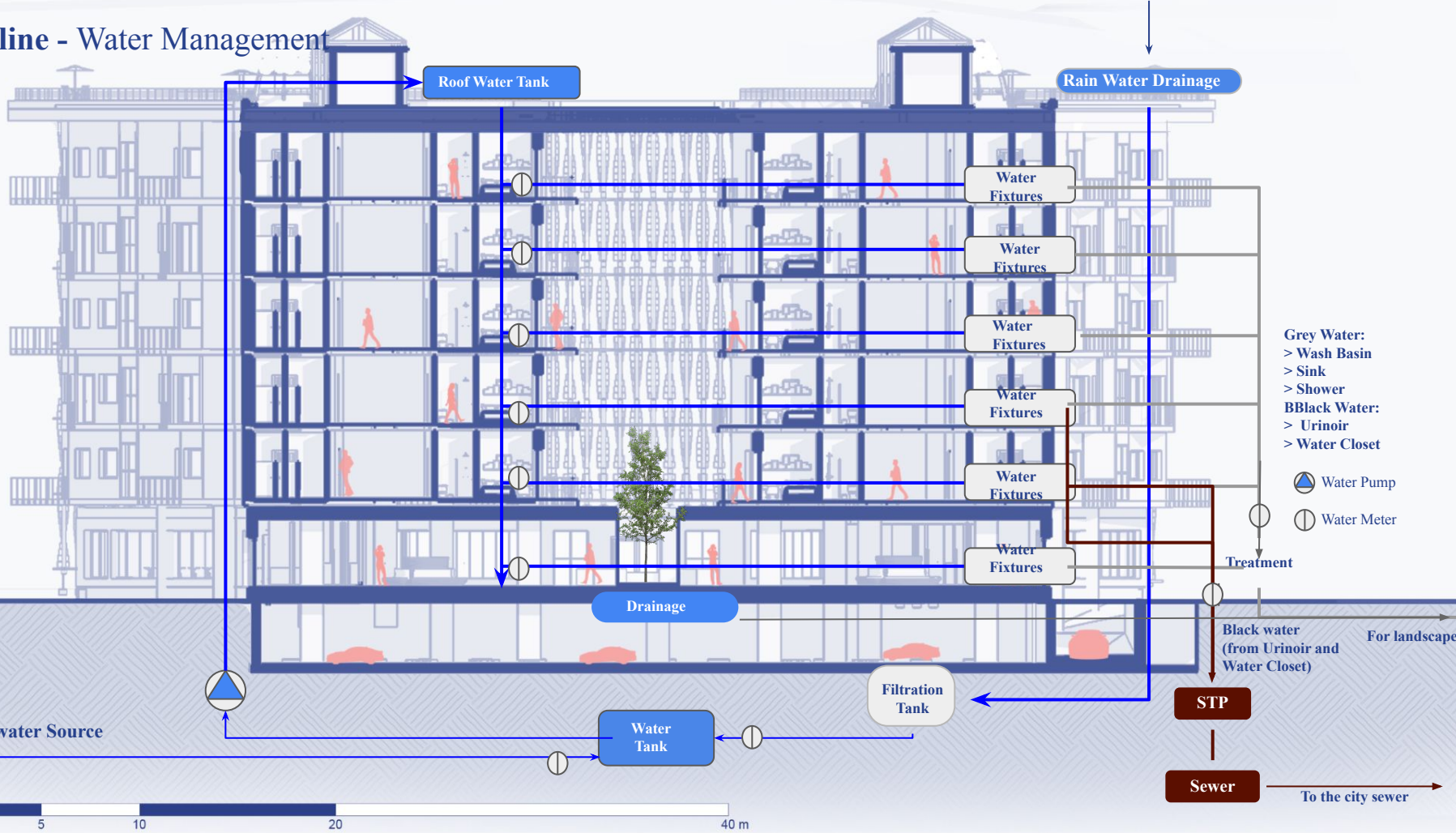
District Cooling

Water Pump

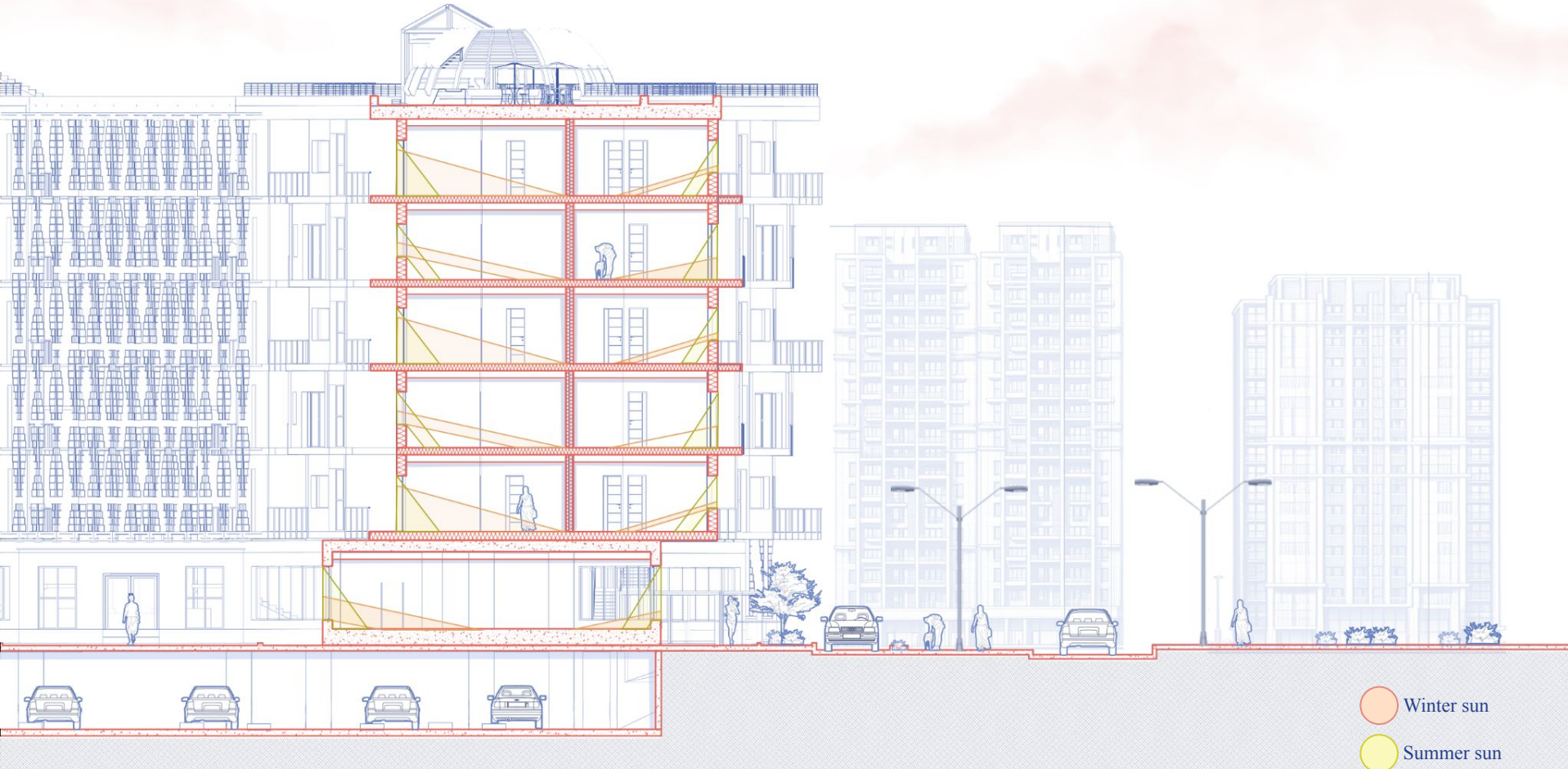


0 5 10 20 40 m

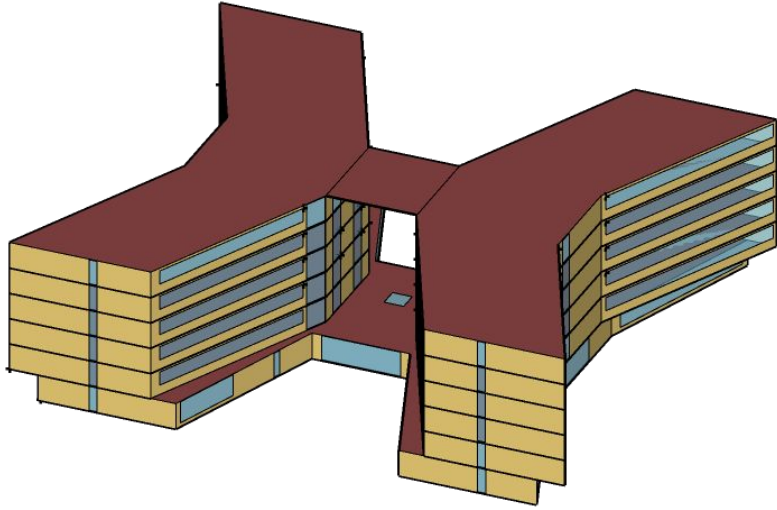
# One line - Water Management



# Section - Natural Lighting



# Energypus - Heating and Cooling Needs



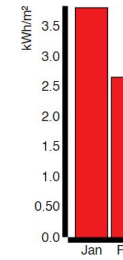
## Daylight Autonomy of Ground Floor

Lighting autonomy 300 Lux	Autonomy [%]	Required [%]	Comply
<b>TZ: SPACE 1 DAYLIGHTINGCONTROLS</b>	77,5	60,0 %	Yes

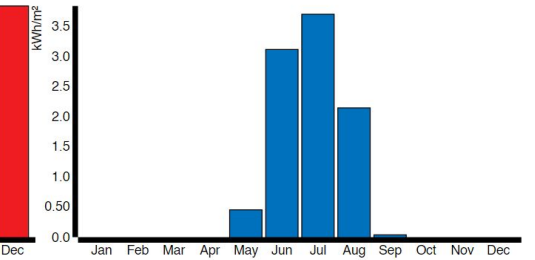
## Building Compliance

Indicator	Building [kWh/m <sup>2</sup> ]	Limit value [kWh/m <sup>2</sup> ]	Comply
Heating needs	14,6	15,0	Yes
Cooling needs	9,5	15,0	Yes

### Heating needs



### Cooling needs



### Heating needs (kWh/m<sup>2</sup>)

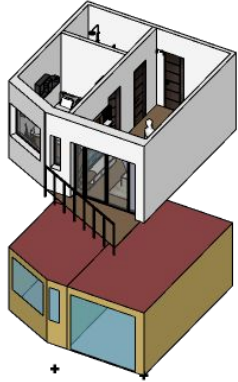
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Heating	3,81	2,66	1,05	—	—	—	—	—	0,06	0,25	2,89	3,85	14,57
Total	3,81	2,66	1,05	—	—	—	—	—	0,06	0,25	2,89	3,85	14,57

### Cooling needs (kWh/m<sup>2</sup>)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Cooling	—	—	—	—	0,45	3,12	3,7	2,15	0,04	—	—	—	9,46
Total	—	—	—	—	0,45	3,12	3,70	2,15	0,04	—	—	—	9,46

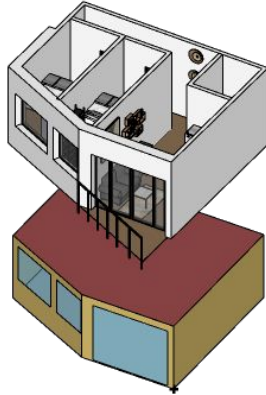
# Energyplus - Daylight Autonomy of Units

1 Bedroom



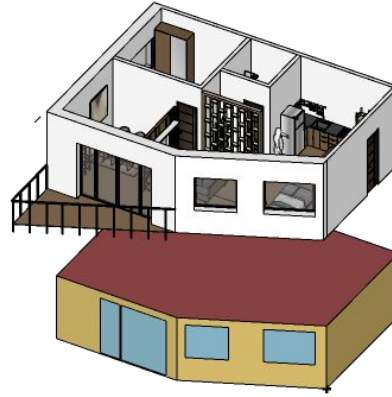
Space 3

2 Bedroom A



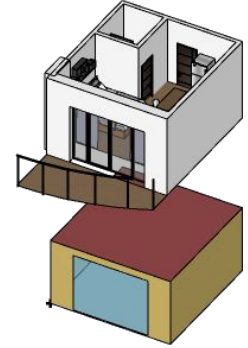
Space 4

2 Bedroom B



Space 5

Studio



Space 6

Lighting autonomy 300 Lux	Autonomy [%]	Required [%]	Comply
<b>TZ: SPACE 3 DAYLIGHTINGCONTROLS</b>	60,7	60.0 %	Yes
<b>TZ: SPACE 4 DAYLIGHTINGCONTROLS</b>	61,6	60.0 %	Yes
<b>TZ: SPACE 5 DAYLIGHTINGCONTROLS</b>	61,4	60.0 %	Yes
<b>TZ: SPACE 6 DAYLIGHTINGCONTROLS</b>	62,6	60.0 %	Yes

# CENTERED. In a recap.



Given the average consumption of 1500 kWh per person each year, then on an average day, The wind facade in Building B could contribute to **80%** of the daily electricity needs and A could contribute to **12%** of the daily electricity needs.

In a windy day with 11m/s, the facade could contribute to a total of **960 kWh+ daily**

