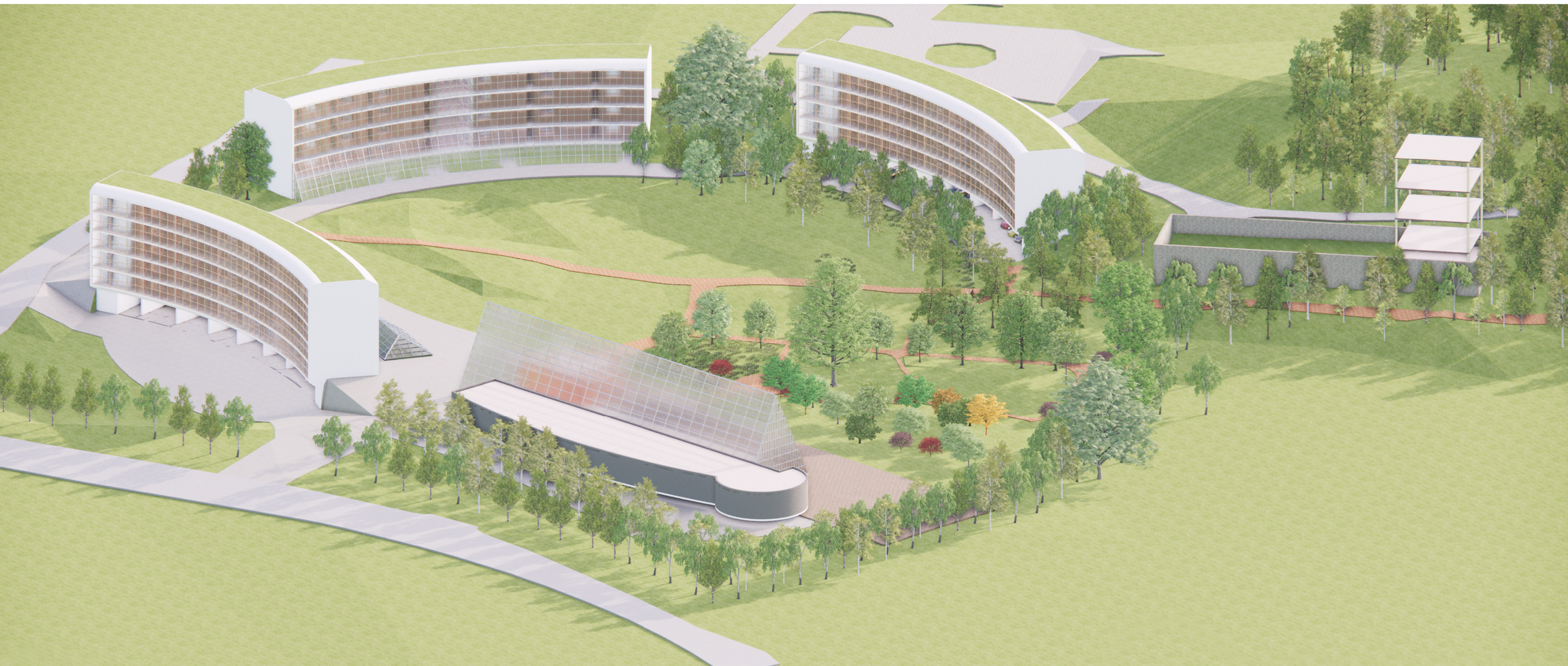


HUG FERNÁNDEZ

AINA MITJÀ



## WHITE LIGHT

ECOLOGICAL REDEVELOPMENT OF A SITE



**AINA MITJÀ I GARCIA**



**HUG FERNÁNDEZ RIOS**

Participation number: 17603  
Escola Tècnica Superior d'Arquitectura del Vallès, UPC  
Spain

The proposal is located on the outskirts of Helsinki, in the Vikki district in an environment where nature plays a key role. The site is surrounded by experimental fields, school farms, a nature and next to a bay.

The new buildings seek to follow the logic of existing buildings, extending the curvature of the current office building and repeating the glazed façade of the Gardenian, generating a cohesive whole.

The central space is dominated by a large sea of grass between the houses and a tree mass that mixes the Japanese garden with the nearby forest.

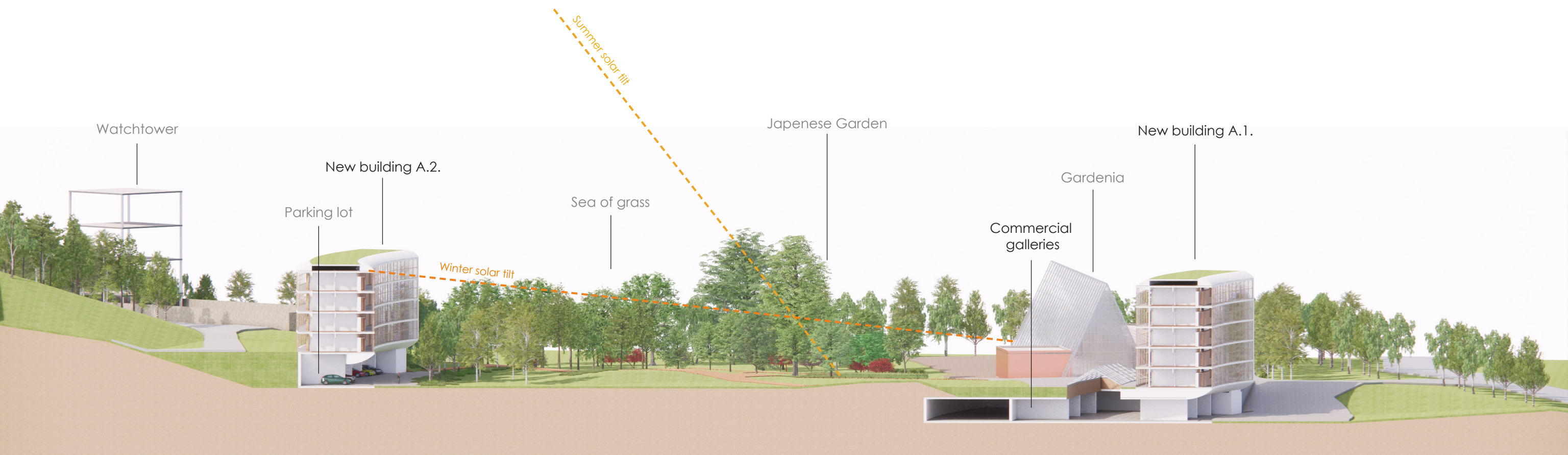
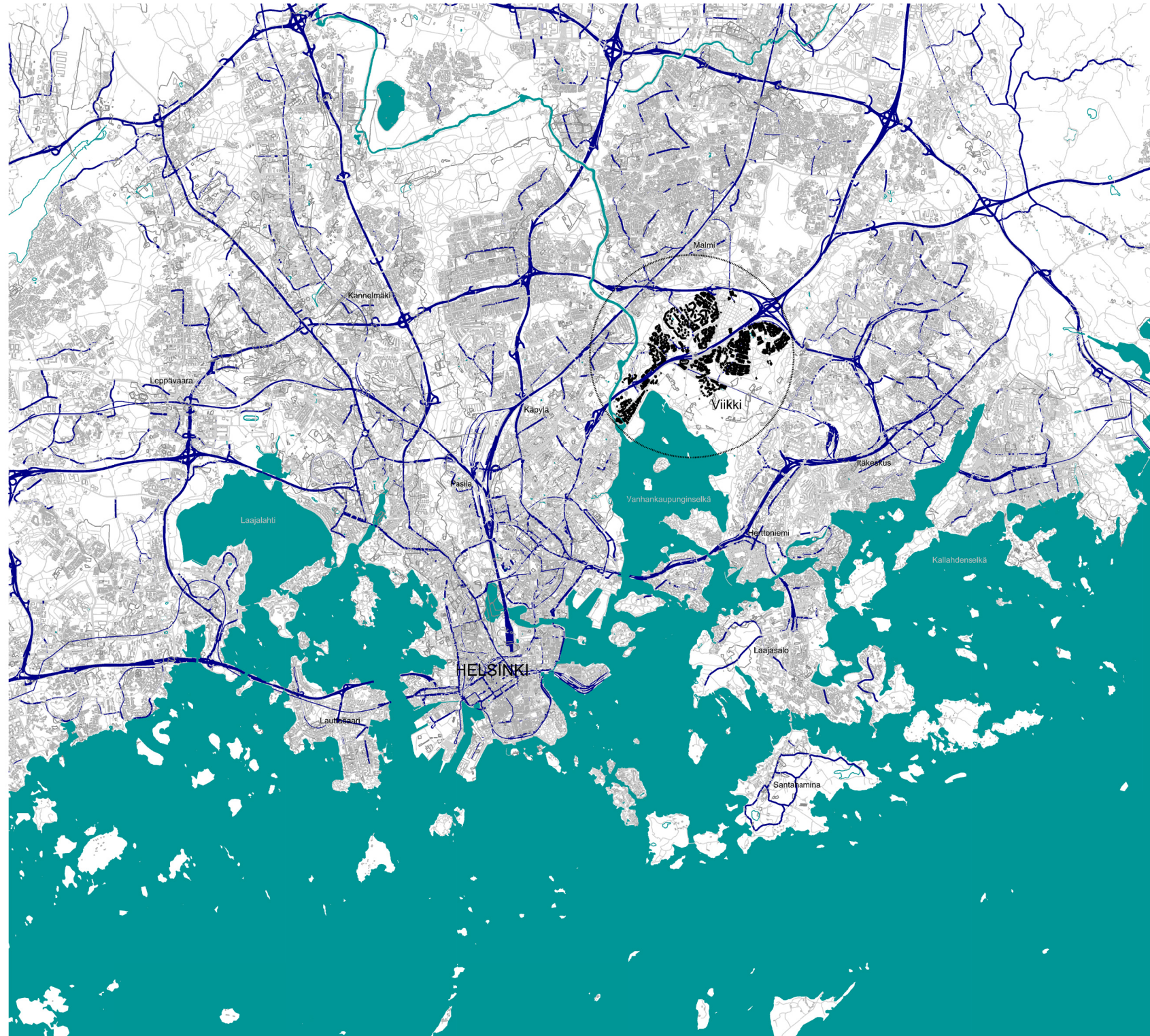




Photo credit: Mira Lainiola, extract from City of Helsinki website

**WHITE LIGHT**  
SOURROUNDINGS



Helsinki is the capital of Finland. It is in the southern part of Finland, on the northern shore of the Gulf of Finland. Helsinki city has 665,000 inhabitants. Together with the neighboring cities (Espoo, Vantaa and Sipoo), the population of the capital region rises to 1.6 million inhabitants.

Helsinki is a green city by the sea. Green areas currently cover about 40 percent of Helsinki city's land area, offering residents recreation, exercise opportunities, interesting natural sites, and pleasant places to rest. They also maintain the diversity of nature and the cultural environments of different eras.

The framework of Helsinki's green recreation network consists of three main parts: the "green fingers" extend radially from the seashores and the city core all the way to the countryside, while the "blue palm" is maritime Helsinki with its beaches, islands, and water areas. The green lines as transverse connections complete the green area network covering the entire city. These "green fingers" will continue to strengthen the Helsinki of the future, thus the green area structure must be nurtured and further developed to meet the needs of the Helsinki residents of the future as well.

Helsinki has 60 nature conservation areas with a total area of 955 hectares. The largest nature reserve is the Viikin-Vanhankaupunginlahti area (306 hectares), and it is located less than 700 meters away from the contest task site.

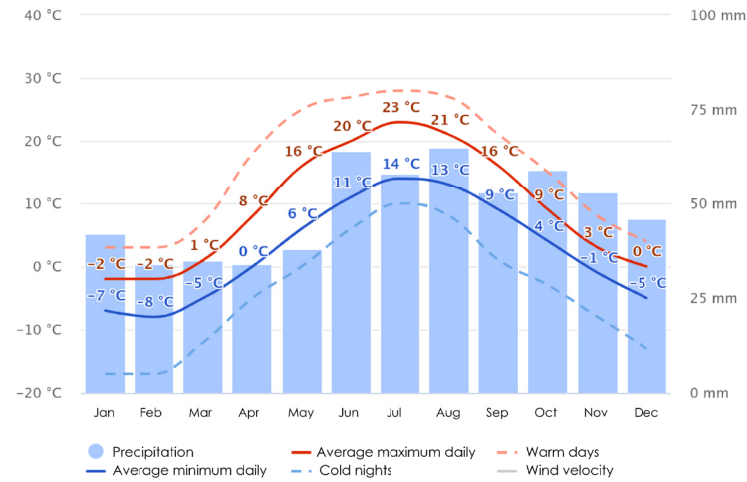
## WHITE LIGHT

GENERAL HELSINKI MAP

Scale 1:8500

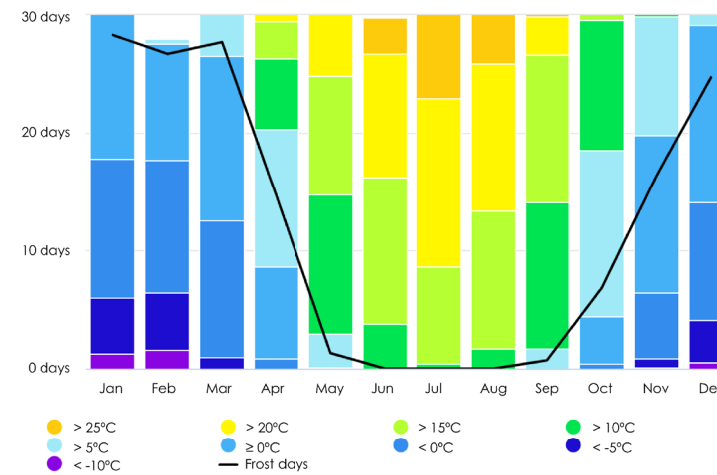
### AVERAGE TEMPERATURE AND PRECIPITATION

Throughout the year the temperature usually varies from -8 °C to 22 °C and is rare to be below -20 °C or above 26 °C. The warm season lasts three months, from June to August, with average daily maximum temperature of about 16 °C. The cold season is four months, from late November to late March, with a low daily maximum average of 2 °C.



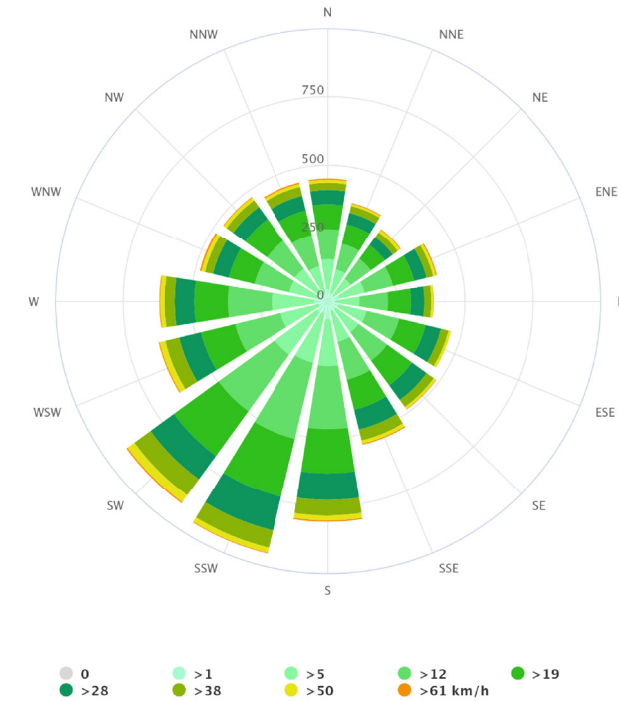
### MAXIMUM TEMPERATURES

The coldest month in Helsinki is February, with a minimum average of 8 °C and a maximum of 2 °C. The warmest month of the year is July, with a maximum average of 21 °C and a minimum of 13 °C.



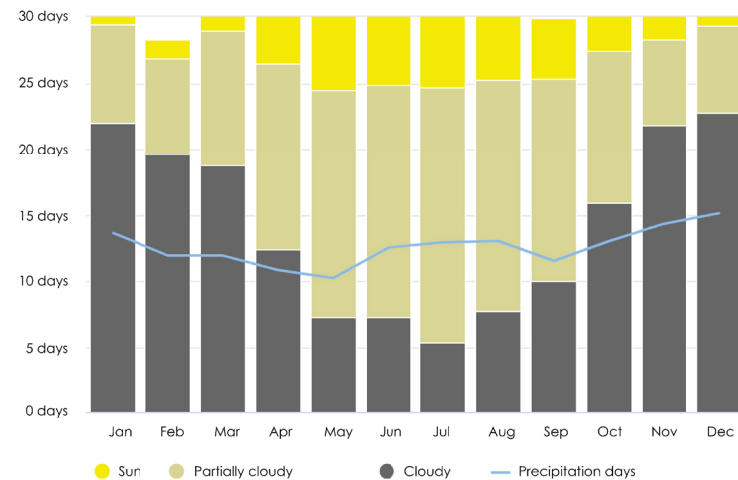
### WIND ROSE

The prevailing wind direction in Helsinki experiences variations during the year. The most frequent wind comes from the south for 2 months, from January 27 to March 27, and for 1.3 months, from November 2 to December 10, reaching its maximum point of 35% on November 24. On the other hand, the prevailing western wind is recorded for 7.2 months, from 27 March to 2 November, and for 1.5 months, from 10 December to 27 January, with a maximum of 40% on 2 June.



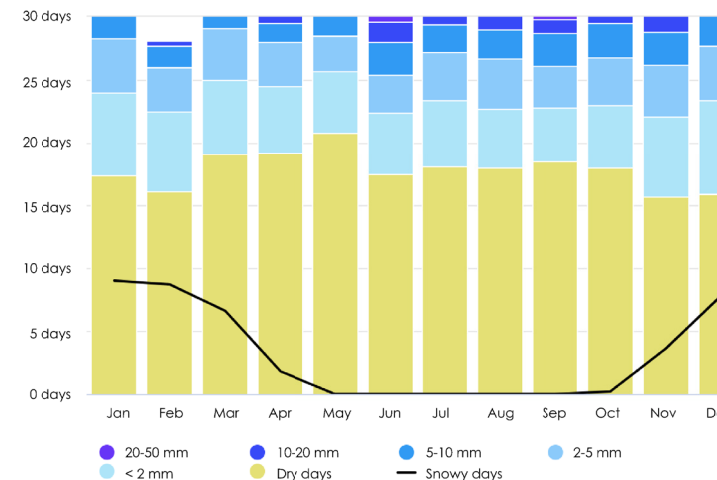
### CLOUDY SKY, SUNNY AND PRECIPITATION

In Helsinki the average percentage of cloud-covered sky varies considerably over the year. The least cloudy interval of the year begins at the end of April until the beginning of October, a total of 5.6 months. The sunniest month is July with 57% of the time. The cloudiest part of the year is the remaining 6.4 months, with January as the cloudiest with 74% of the time.



### PRECIPITATION AMOUNT

In Helsinki, the probability of wet days varies throughout the year. The wettest season extends from June 13 to January 25, with November being the rainiest month. The driest season runs from January 25 to June 13, with March being the month with the least wet days. For 11 months, the most common precipitation is only rain, while for 4.1 weeks, especially in January, the most common precipitation is only snow.



### WHITE LIGHT

HELSINKI WEATHER AND CLIMATE DATA



- ① Viikki Library
- ② Governor Park
- ③ Viikki Arboretum

- ④ Viikki campus, University of Helsinki
- ⑤ University of Helsinki Viikki Normal School
- ⑥ Wetland rainwater areas of Säynäslahtenpuro

- ⑦ Area of the architectural project
- ⑧ University Veterinary Hospital
- ⑨ Viikki Research Farm

Viikki, located about 8 kilometres northeast of central Helsinki, is a district with a population of 12,000, noted for its history dating from 1543. Near the former Helsinki and near the entrance of the Vantaa River in the Gulf of Finland, Viikki has experienced substantial growth since the 1960s, when the University of Helsinki moved natural science education to the area.

Recognized as the first ecologically planned district in Finland, "Eko-Viikki" reflects the commitment to preserve a sustainable and healthy natural environment. The Science Park, with more than 6,000 students, is a leading research centre in life sciences, agriculture and forest sciences, as well as hosting innovative companies.

Nature plays a crucial role in Viikki. The area has extensive green areas, experimental fields, an important "arboretum" with more than 250 different species of trees and shrubs, and the Viikki-Vanhankaupunginlahti nature reserve of 338 hectares. This reserve, located less than 1 kilometer from the venue of the contest, is internationally recognized as one of the 96 most important bird areas in Finland and is part of the Natura 2000 system.

With the new master plan for Helsinki and the Raide-Jokeri light train project, Viikki embarks on a next phase of development until the 2030s. Housing and service construction is planned for around 6,000 people near train stops, attracting more companies as Viikki consolidates as a core of sustainable innovation. This unique district, which merges history, sustainability and research, remains an open natural environment in the heart of the city.

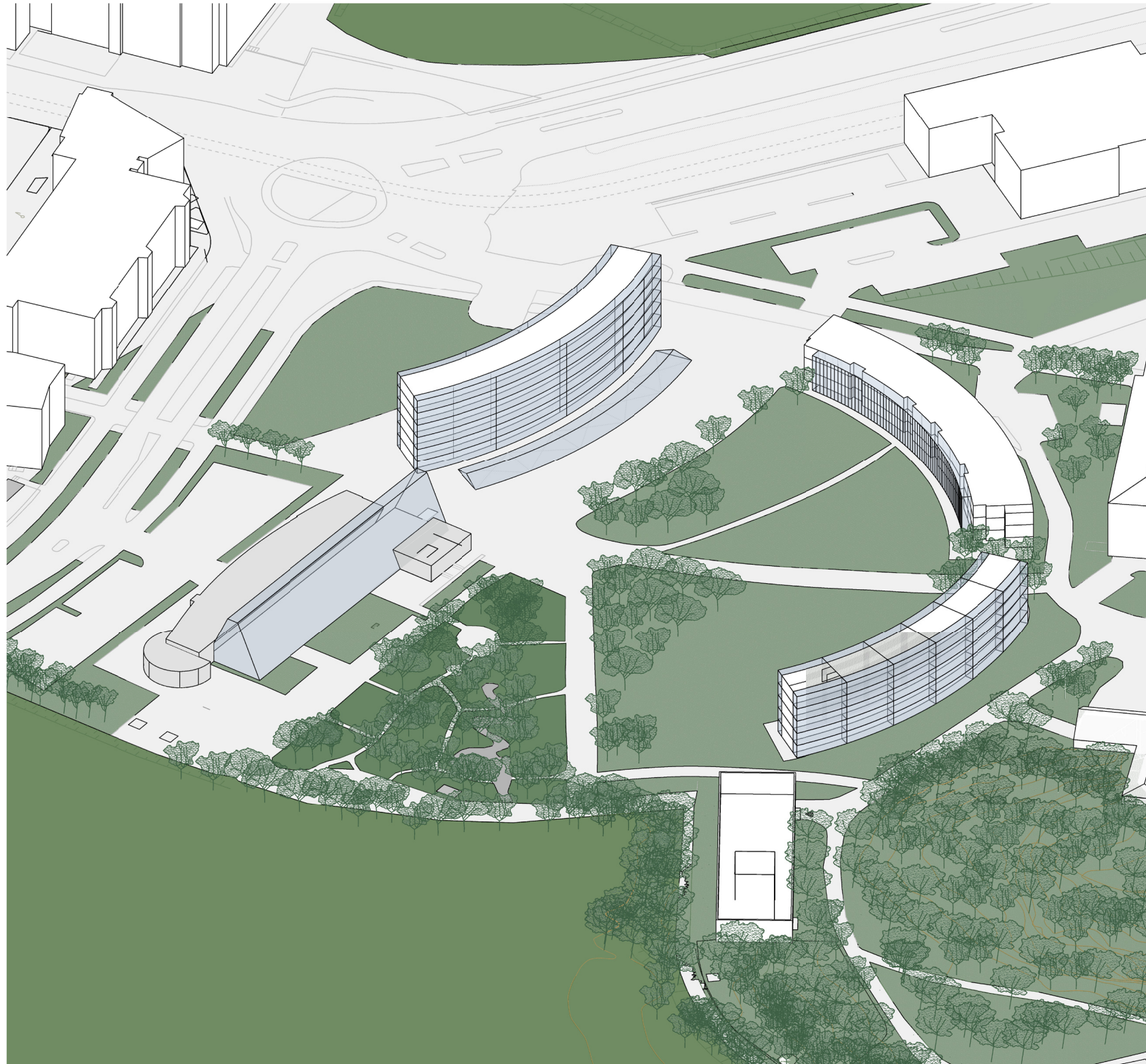
**WHITE LIGHT**

URBANIZATION PLAN

Scale 1:4500

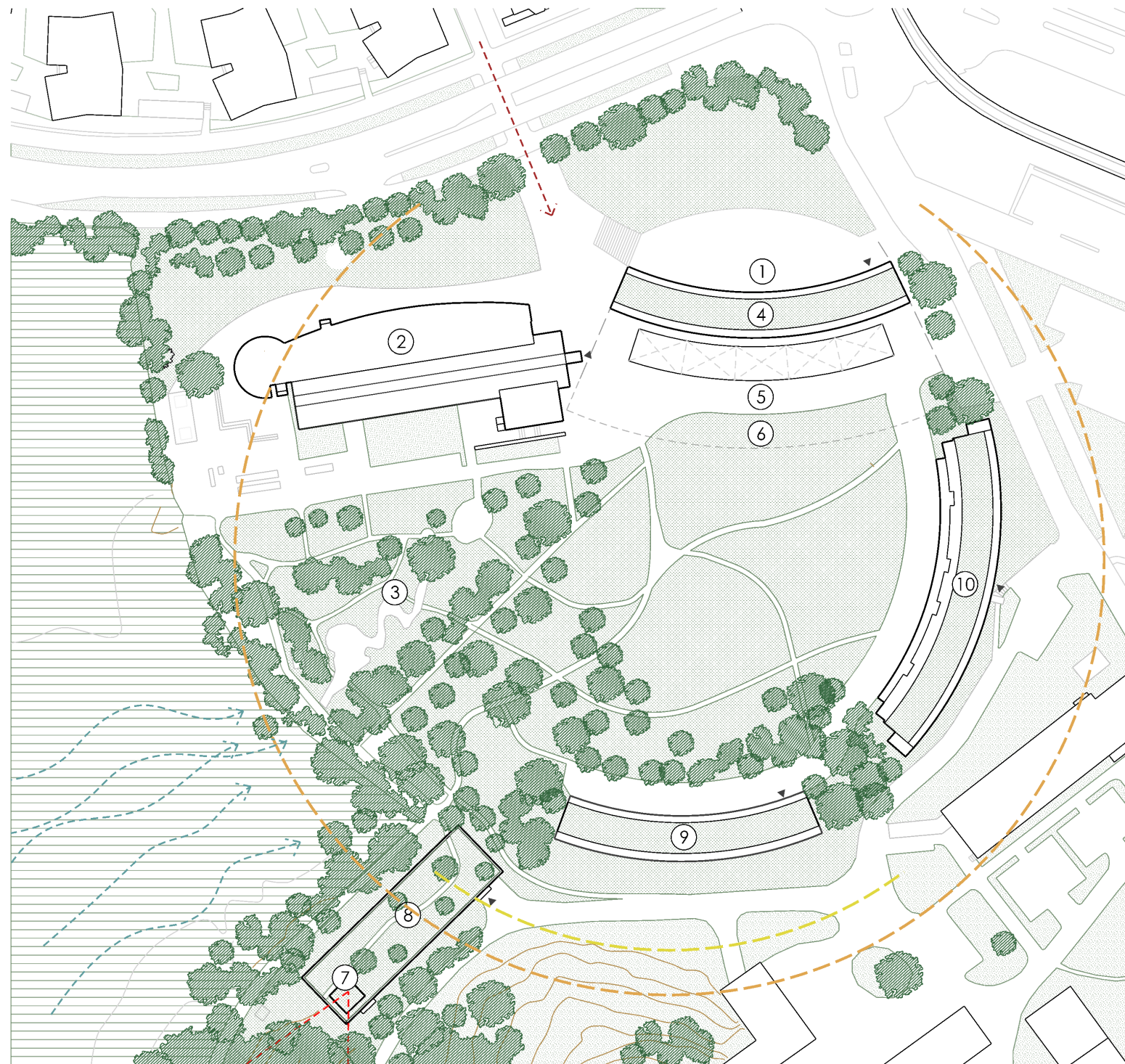


**WHITE LIGHT**  
MASTERPLAN



A connection is generated between the Garden Center, which has the Japanese Garden attached, with the newly built residential A.1 building. This has adjoining commercial galleries that are accessed from the back of the building where the ground floor is transformed into underground in front of the building thanks to the unevenness of the terrain. Where it is told with skylights to generate a space with contact with the outside as an indoor "place".

**WHITE LIGHT**  
URBANIZATION AXONOMETRY Scale 1:800



▶ Building entrance    ~-> Wind dominant direction    — Solar summer tour    — Solar winter tour    -.-> Pedestrian acces

A connection is generated between the Garden Center, which has the Japanese Garden attached, with the newly built residential A.1 building. This has adjoining commercial galleries that are accessed from the back of the building where the ground floor is transformed into underground in front of the building thanks to the unevenness of the terrain. Where it is told with skylights to generate a space with contact with the outside as an indoor "place". In addition, building B with a residential program is rehabilitated and next to it following the form that the building generates is placed the new building A.2 with a completely residential program. The proposal eliminates indoor circulation and parking areas so that it is a very green, open space, and free of motor vehicle circulation. However, a underground car park is generated on floor -1 under the galleries in order to supply the entire area, apart from the existing outdoor parking area that is maintained.

- ① Existing outdoor parking area
- ② Gardenia
- ③ Japonese Garden
- ④ Building A.1, commercial ground floor and 5 floors residential
- ⑤ Underground commercial galleries
- ⑥ Underground parking area
- ⑦ Bird and fauna watchtower
- ⑧ Old Museum
- ⑨ Building A.2, 5 floors residential
- ⑩ Building B, residential

Buildings A		
room for:		
1 person	12	21% ≈ 20%
2 people	28	48% ≈ 50%
3 people	18	31% ≈ 30%
<b>total</b>	<b>58</b>	

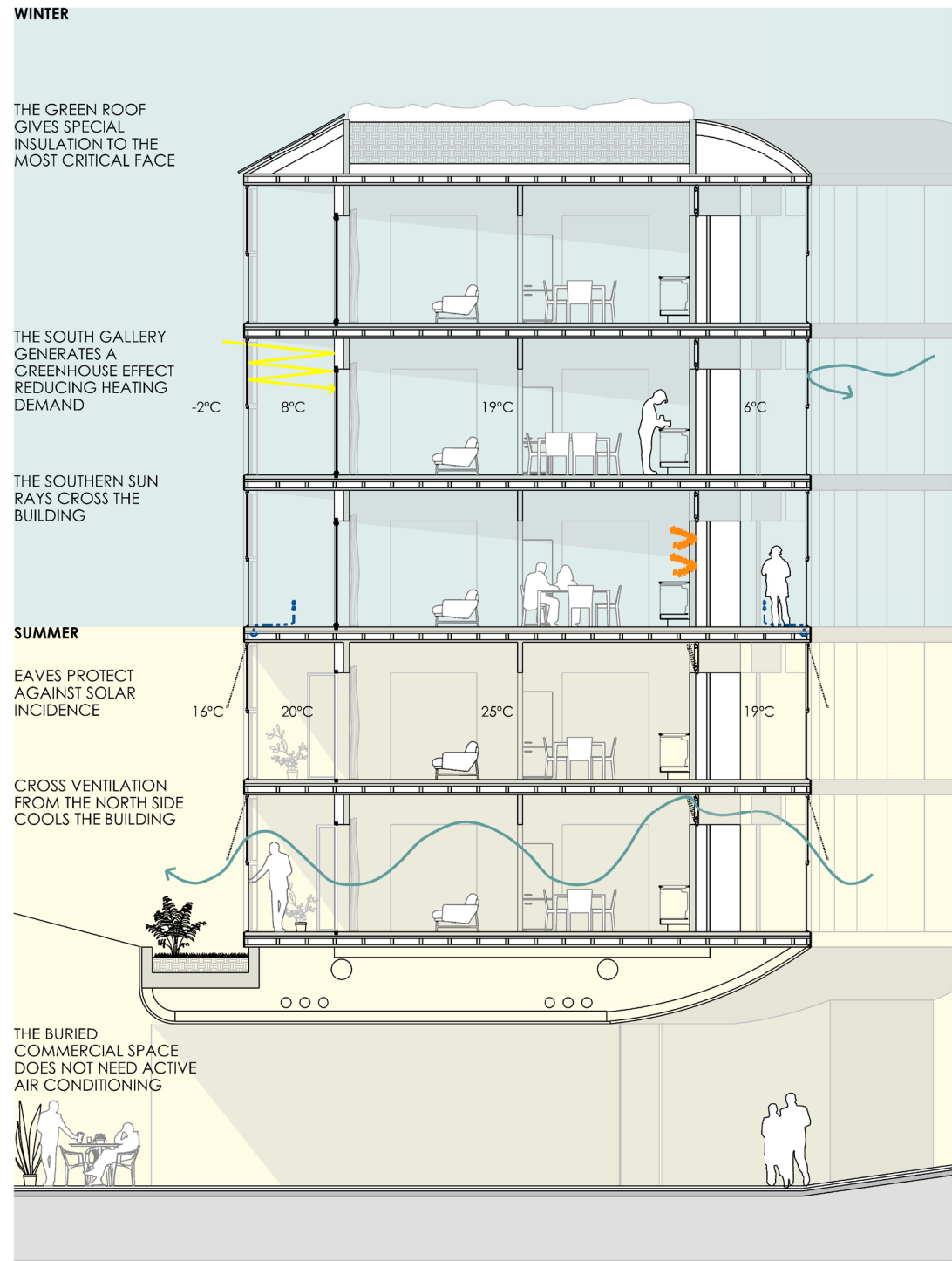
**WHITE LIGHT**

MASTERPLAN

Scale 1:500

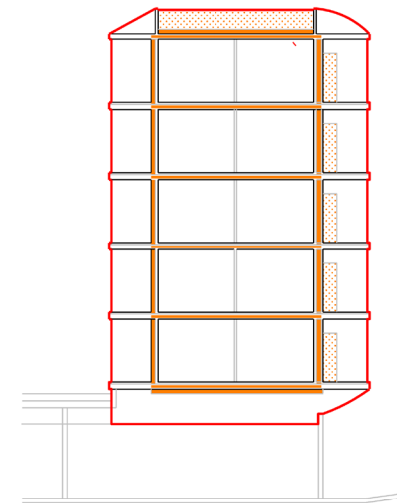
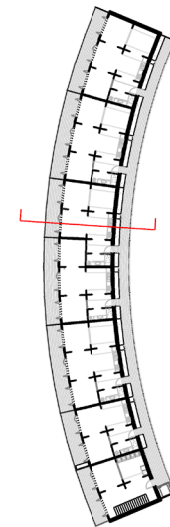


**WHITE LIGHT**  
NEW BUILDINGS



PLACEMENT SECTION

Scale 1:100



THERMAL ENVELOPE Scale 1:250

The building is formed by a thermally isolated CLT box, which opens to the south to allow as much light as possible to enter, and closes hermetically in the other directions.

This box is covered on the different sides according to the needs of each one. In the south there is a fully glazed gallery that will minimize the heating needs in autumn and spring. The gallery will reduce the annual period of need of active cooling systems.

On the north side there are access corridors in the houses that provide a double skin. The exterior glass closure protects from the cold north wind before touching the skin of the homes. The layout of some cabinets offers a thermal cushion and a storage space at the same time.

On the roof appears a thick vegetal layer that generates a high insulation in the wall that presents more energy losses. On the lower side there is an underground commercial area, which will not need active air conditioning thanks to the thermal stability provided by the land.

The summers in Helsinki are warm with cool nights. For this reason, the cross ventilation from the north facade can already be enough to maintain a comfort temperature. The high cold conditions in Helsinki make natural ventilation unfeasible for the rest of the year.

This is why we propose a passive house system, sheltering the building and applying mechanical ventilation that can be controlled.

**WHITE LIGHT**  
PASSIVE SYSTEMS

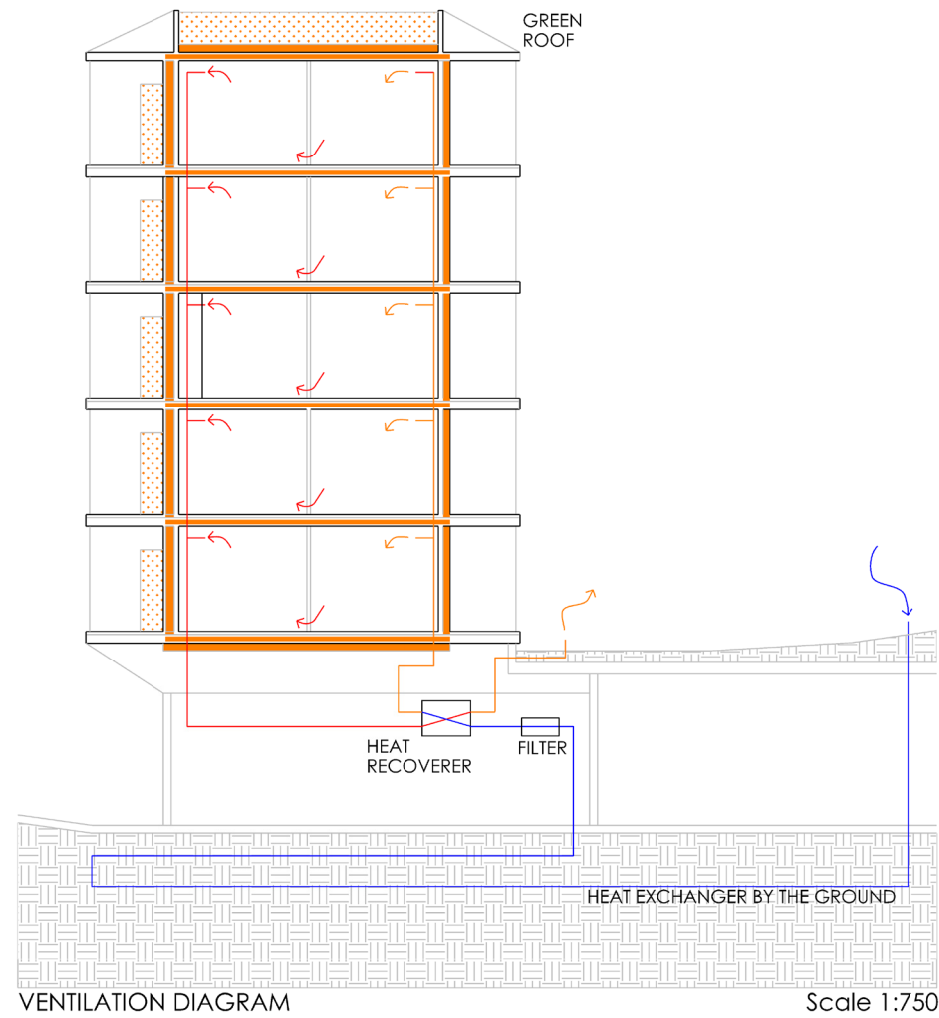
## ACTIVE SYSTEMS

### VENTILATION

The high cold conditions in Helsinki make natural ventilation unfeasible for much of the year, due to the energy losses that this would entail.

This is why the passiv house system has been extended to the Nordic countries, consisting of a lot of sheltering the building and applying mechanical ventilation that can be controlled.

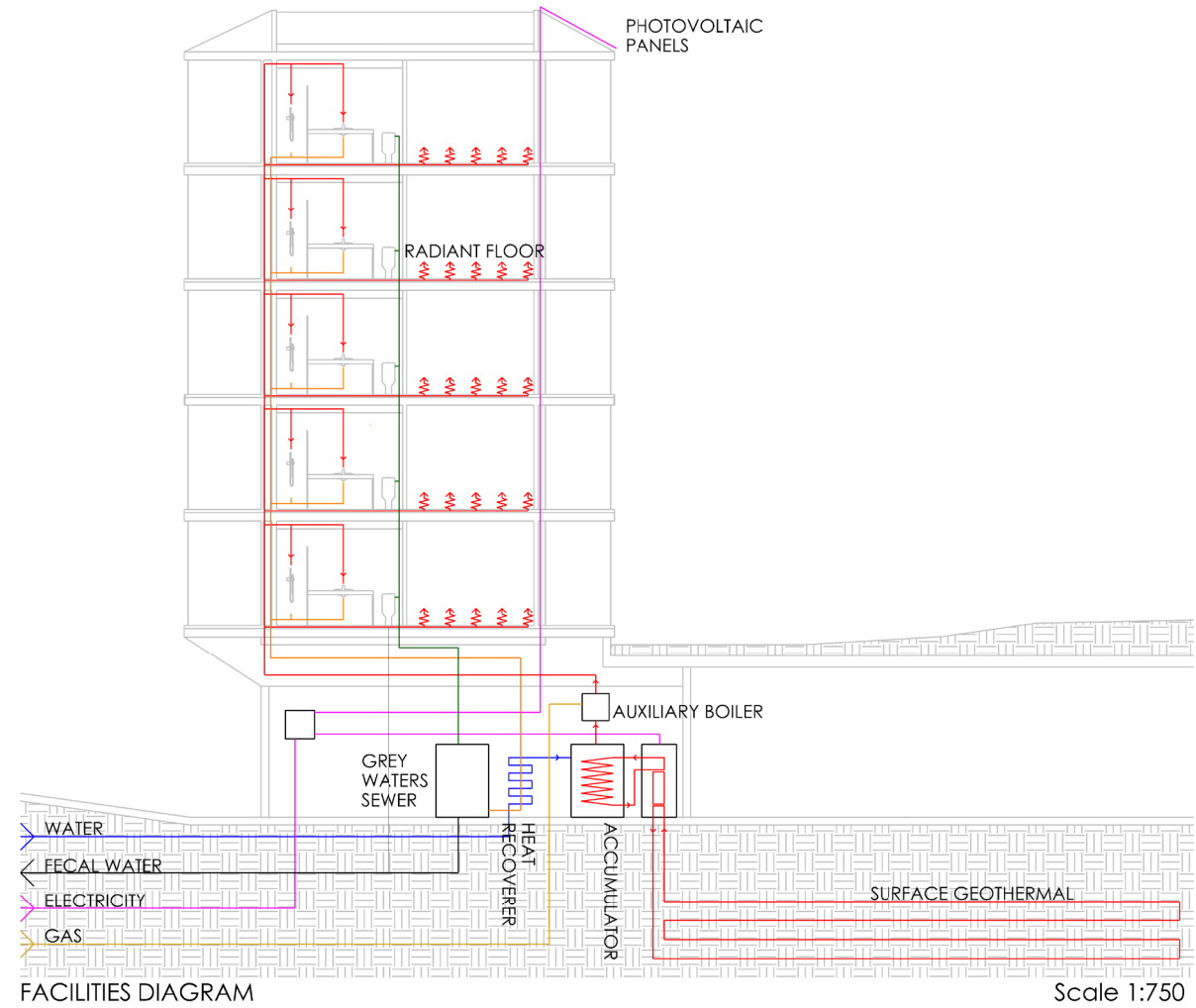
To reduce the energy losses of this ventilation, we propose a Canadian well that stabilizes the temperature of the inlet air and a heat exchanger to recover part of the energy that takes the return air.



### HEAT PRODUCTION

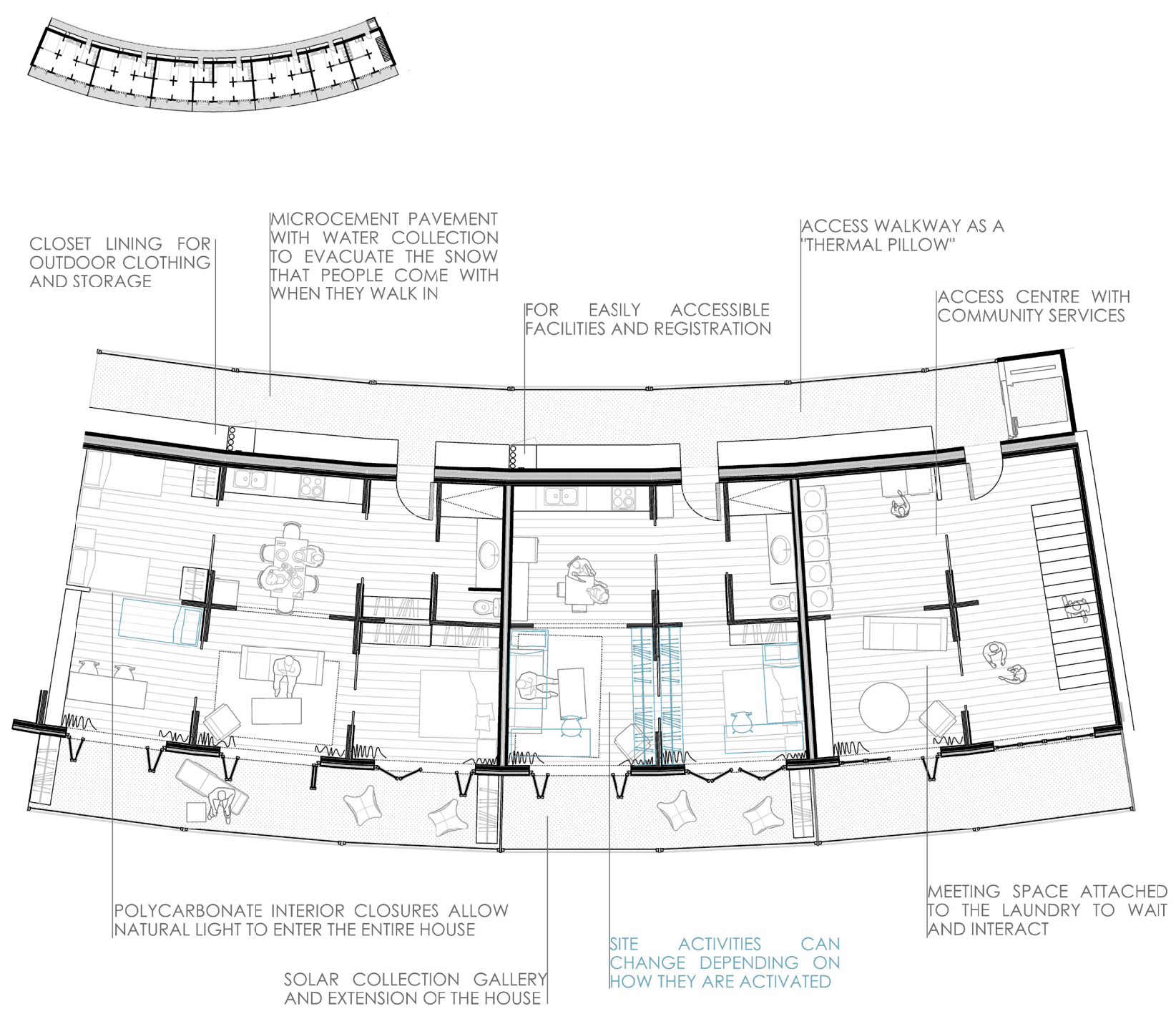
To climatize the building we propose a geothermal surface below the commercial gallery, since only going down between 2 and 3 meters you reach the water table, making this system very efficient. The geothermal heat pump would be supplied by photovoltaic solar panels, making this system practically non-energy from the grid and practically autonomous. To ensure the amount of sanitary hot water required a support gas boiler would be required.

The gray waters would be reused by first passing through a heat exchanger with the entry of sanitary cold water into the accumulator and then storing in a boner to reuse the water by the toilet cisterns, passing first through an accumulator.





**WHITE LIGHT**  
HOUSING UNIT



In Helsinki the lack of natural light is one of the main generators of depression in the country, so we intend to squeeze as much as possible the light that exists.

The structure in crosses of CLT defines the spaces leaving large openings between them, the floor is all connected by sliding doors giving freedom to use it as residents want.

In this way the southern rooms can be extensions of the common area during the day as offices, taking advantage of natural light, and at night close to become rooms.

The interior divides are polycarbonate, allowing natural light to reach the northern rooms.

The south façade is resolved with two skins that leave a gallery in the middle. In this way we can improve the insulation of the façade and reduce the opaque part, so that more light passes inside.

At the same time, this walkway gives an extension to the habitable building during summer, autumn and spring, generating a very bright space with excellent views or residents can relax.

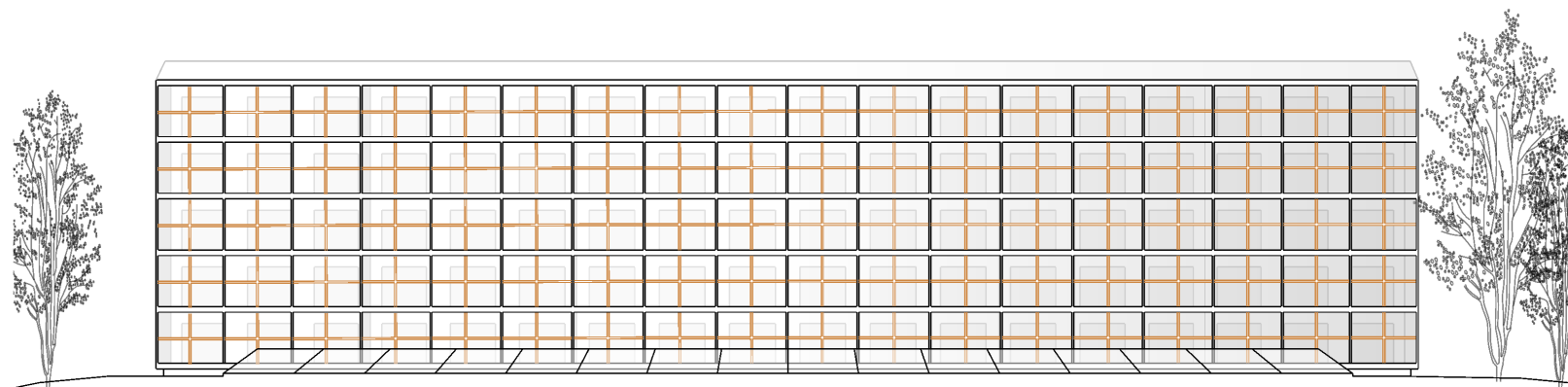
The north-facing walkway is lined with metal cabinets in the house where residents can store all their outdoor clothes. This way, the snow does not enter the interior, but it remains in the footbridge where it is collected with boners.

Next to the access centers, community spaces appear generating meeting spaces for residents. Depending on the floor we find different uses, having in order of plants: a bike parking, a sauna, a laundry, a meeting or rest space, and a community work space or coworking.

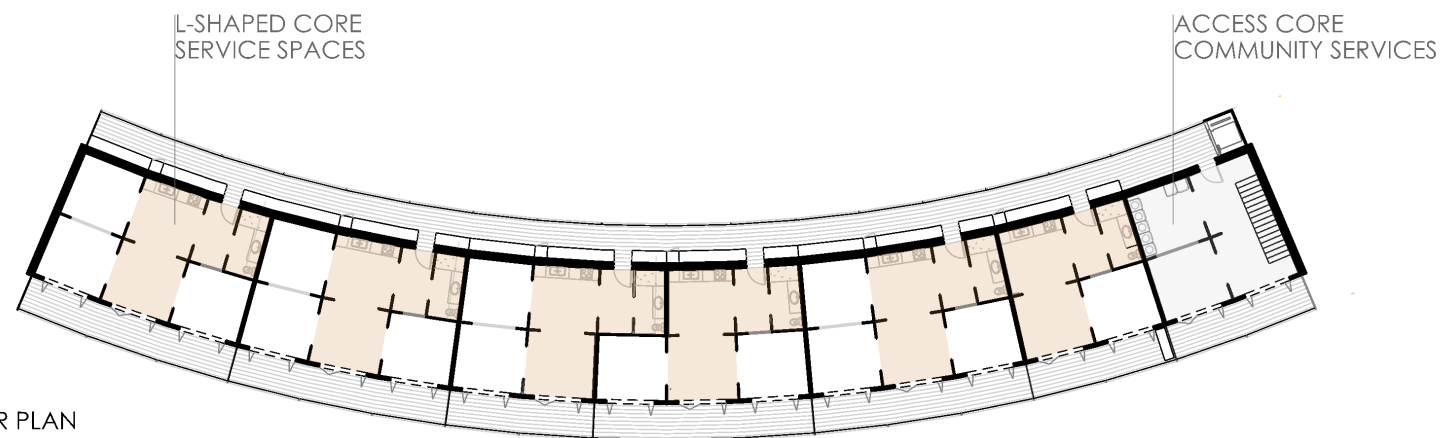
**WHITE LIGHT**

HOUSING UNIT

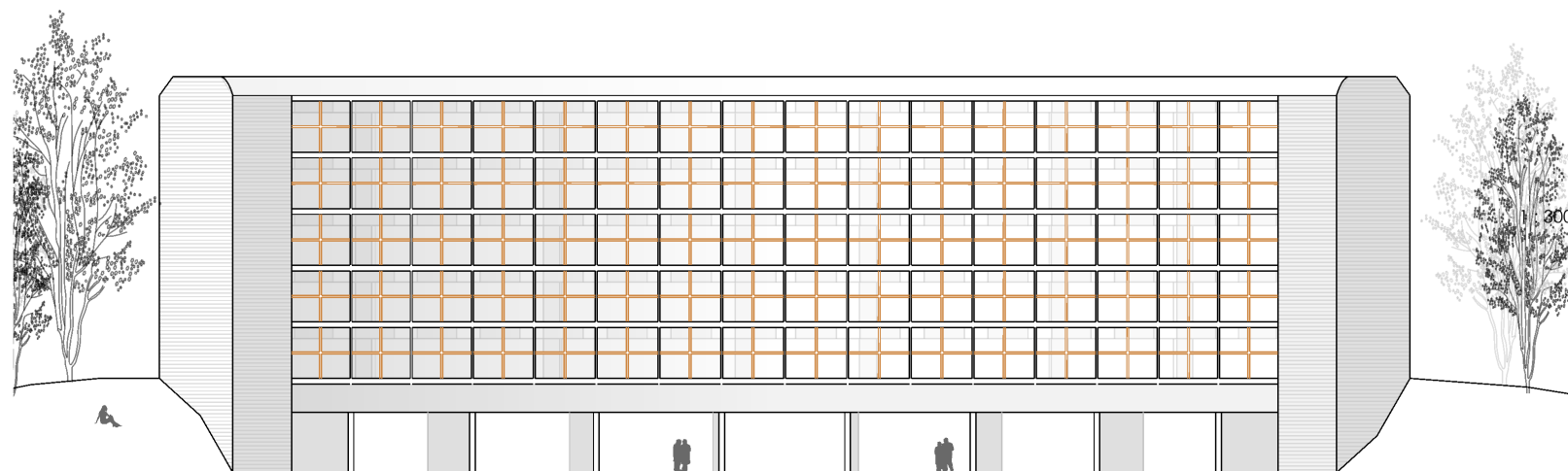
Scale 1:100



SOUTH ELEVATION



TYPE FLOOR PLAN



NORTH ELEVATION

## STRUCTURE

The 75% of Finland is covered by forests of fir and poplar pines, making it one of the main producers of wood on a global scale.

This makes timber construction in the country especially sustainable, since it is very close and renewable.

We propose a dry CLT structure. This is formed by crosses of 160 by 120 cm and forms a kind of curved grid that gives us flexibility to insert the homes.

## LAYOUT

The houses are formed by an L-shaped nucleus where the common spaces are located, and then it is expanded with 1 2 or 3 rooms.

The exterior of the house is resolved with glass to take advantage of all the views towards the Vikki nature reserve and the possible light.

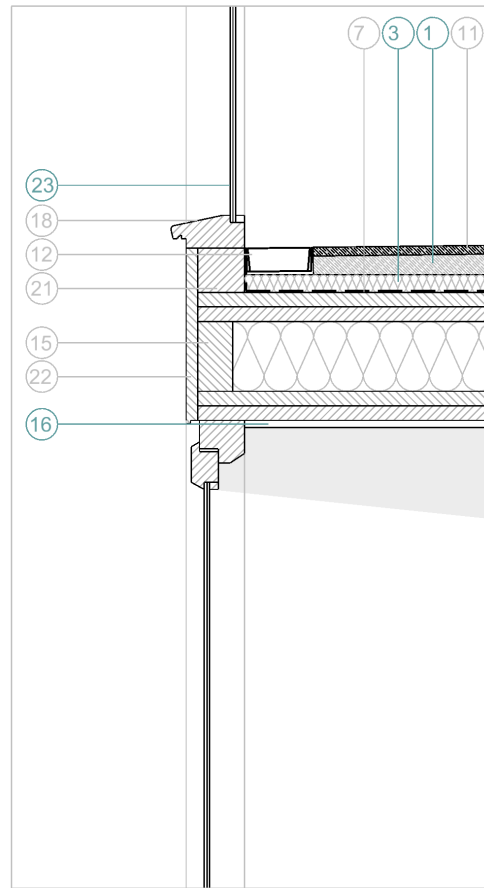
The interior has all the walls and ceilings of white plaster cardboard to achieve maximum light and a parquet floor to achieve a warm pavement.

## WHITE LIGHT

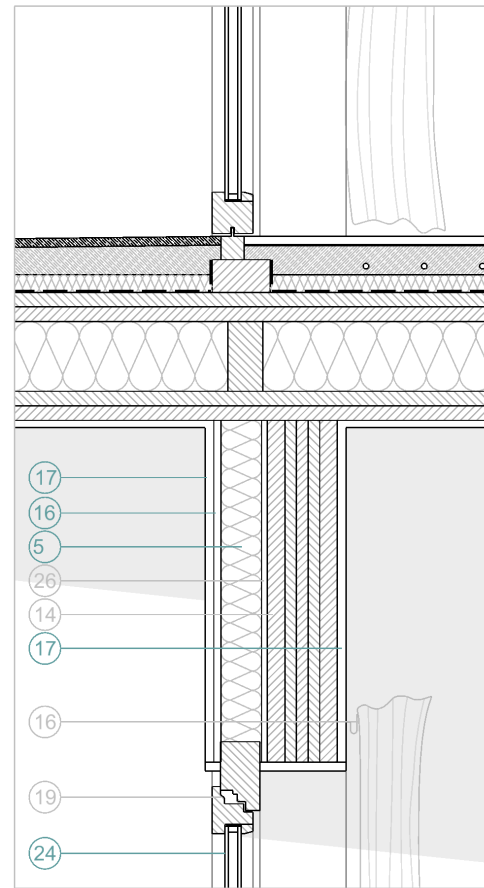
BUILDINGS A- New construction Scale 1:300



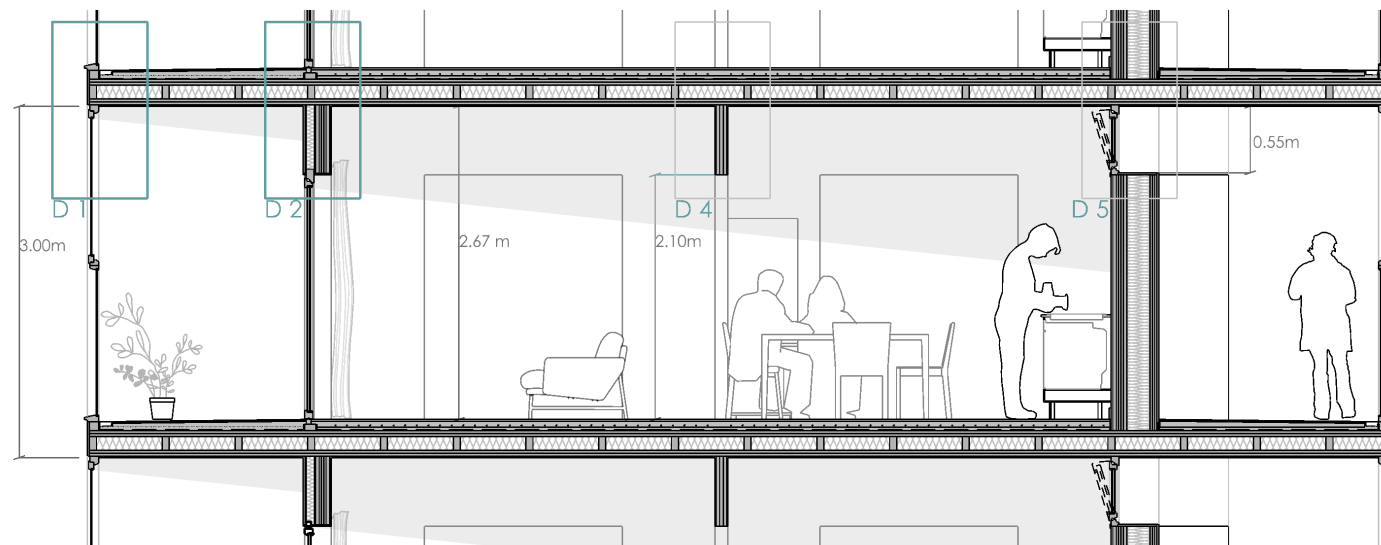
**WHITE LIGHT**  
HOUSING UNIT



D 1 TROBADA FORJAT AMB FAÇANA



D 2 TROBADA FORJAT AMB TANCAMENT SUD



MORTARS  
**1. SELF-LEVELING MORTAR WEBERFLOOR 150 DURA 5 cm**  
**2. HIGH CONDUCTIVITY SELF-LEVELING MORTAR WEBERFLOOR RADIANTE 5 cm**



ISOLATIONS  
**3. PANEL SOLADO 3 cm**  
**4. ECO 032 2x10cm**  
**5. ARENA APTA 6.5 cm**  
**6. THERMAL CURTAIN**

PAVEMENTS  
**7. WATERPROOF SHEET**  
**8. GROUND RADIANT SYSTEM**  
**9. FOAM 0.2 cm**  
**10. PARQUET 1,4 cm**  
**11. MICROCEMENT FLOORING 1.5 cm**  
**12. STAINLESS DRAIN GRATE 4cm**

CLT  
**13. TRILAYER COUNTERLAMINATE 6cm**  
**14. FIVE LAYERS COUNTERLAMINATE 12 cm**  
**15. ALVEOLAR COUNTERLAMINATE PANEL 220 cm**



PLASTERBOARD  
**16. Gyproc GNE 13 Normal Ergo**  
**17. Gyproc GFE 15 PROTECT F Ergo**

CARPENTRY  
**18. EXTERIOR WOOD CARPENTRY**  
**19. WOOD CARPENTRY IN ACCORDION**  
**20. OSCILLATING WOODEN CARPENTRY**  
**21. WOODEN TACON**  
**22. WOODEN COUNTER**

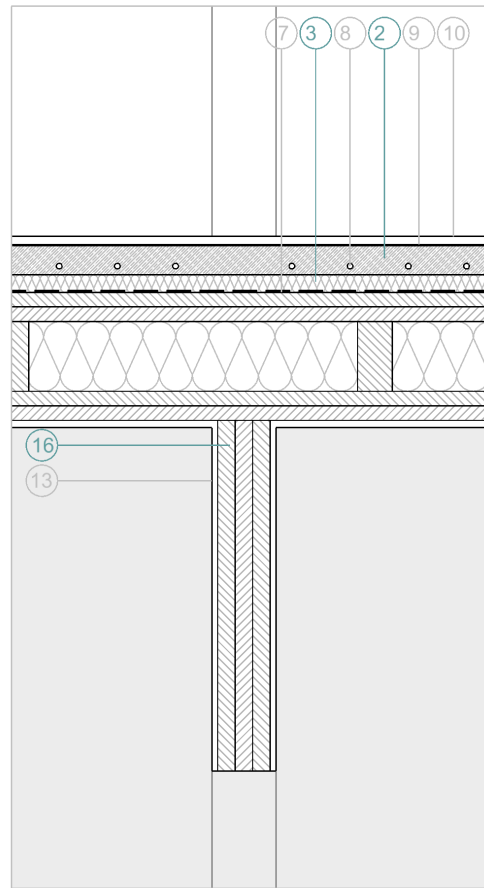


GLASS  
**23. SAFETY LAMINATED GLASS STADIP®**  
**24. LOW EMISSIVE DOUBLE GLAZING WITH HIGH LIGHT TRANSMISSION PLANITHERM® XN**  
**25. LOW EMISSIVE DOUBLE GLASS CLIMALIT ECOLÓGICO®**

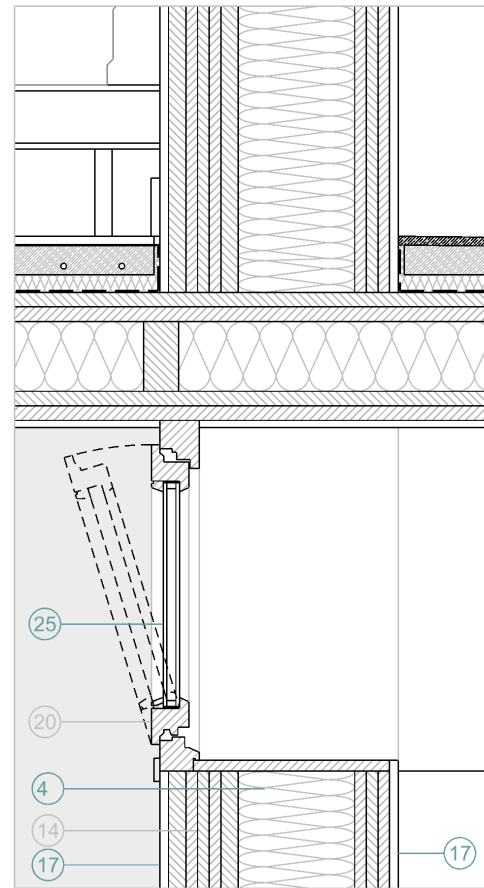
**26. AIR CHAMBER**

**WHITE LIGHT**  
 CONSTRUCTIVE DETAILS

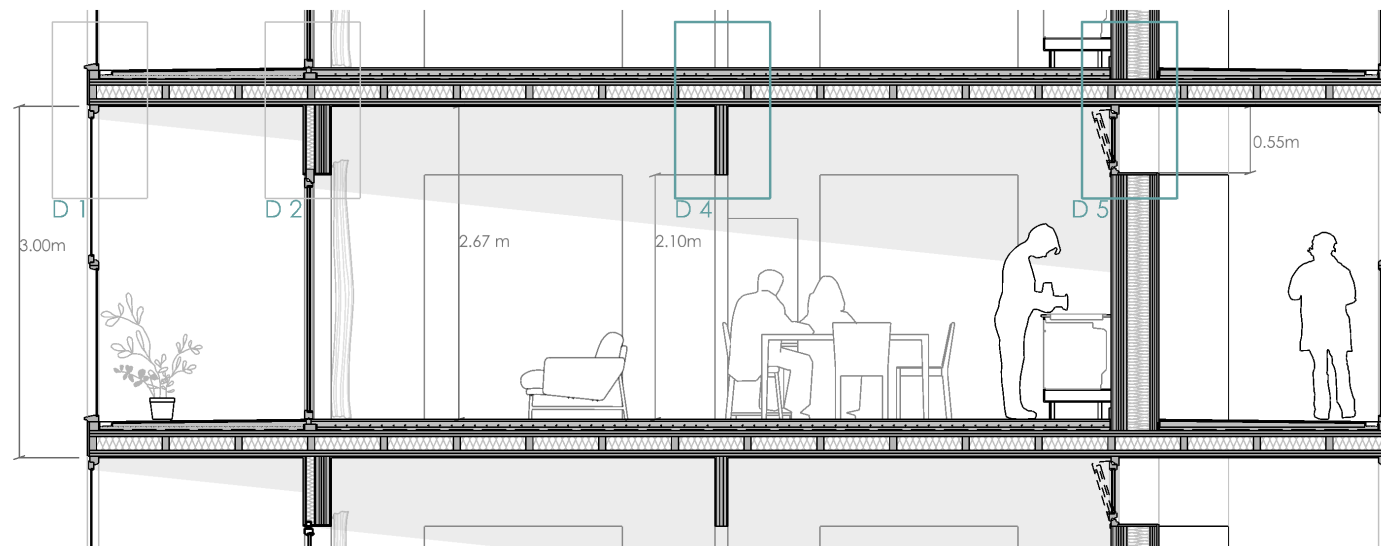
Scale 1:10



D 2 TROBADA FORJAT AMB TANCAMENT INTERIOR



D 4 TROBADA FORJAT AMB TANCAMENT NORD



MORTARS  
**1. SELF-LEVELING MORTAR WEBERFLOOR 150 DURA 5 cm**  
**2. HIGH CONDUCTIVITY SELF-LEVELING MORTAR WEBERFLOOR RADIANTE 5 cm**



ISOLATIONS  
**3. PANEL SOLADO 3 cm**  
**4. ECO 032 2x10cm**  
**5. ARENA APTA 6.5 cm**  
**6. THERMAL CURTAIN**

PAVEMENTS  
**7. WATERPROOF SHEET**  
**8. GROUND RADIANT SYSTEM**  
**9. FOAM 0.2 cm**  
**10. PARQUET 1,4 cm**  
**11. MICROCEMENT FLOORING 1.5 cm**  
**12. STAINLESS DRAIN GRATE 4cm**

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PLASTERBOARD  
**16. Gyproc GNE 13 Normal Ergo**  
**17. Gyproc GFE 15 PROTECT F Ergo**

CARPENTRY  
**18. EXTERIOR WOOD CARPENTRY**  
**19. WOOD CARPENTRY IN ACCORDION**  
**20. OSCILLATING WOODEN CARPENTRY**  
**21. WOODEN TACON**  
**22. WOODEN COUNTER**



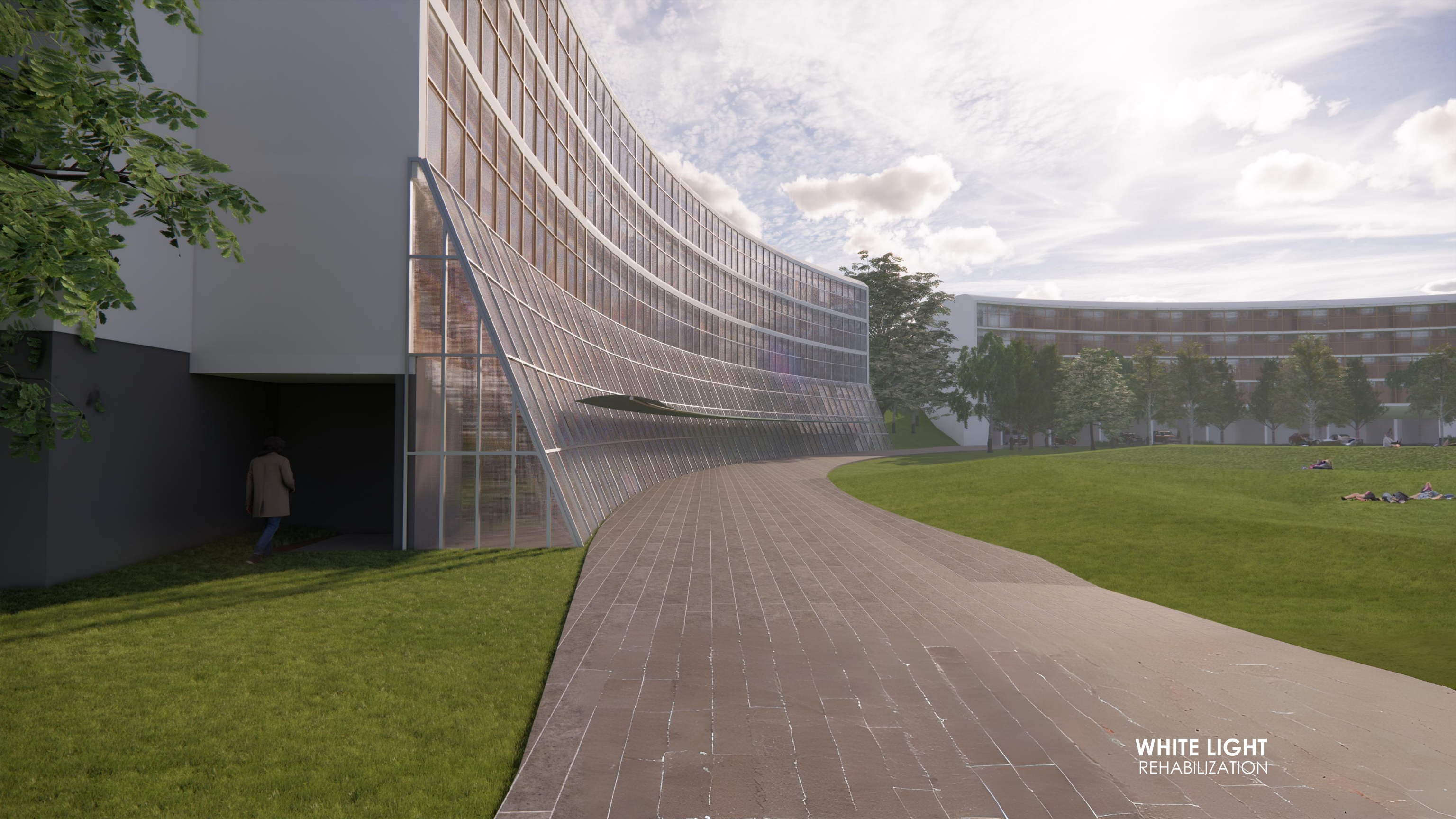
GLASS  
**23. SAFETY LAMINATED GLASS STADIP®**  
**24. LOW EMISSIVE DOUBLE GLAZING WITH HIGH LIGHT TRANSMISSION PLANITHERM® XN**  
**25. LOW EMISSIVE DOUBLE GLASS CLIMALIT ECOLÓGICO®**

**26. AIR CHAMBER**

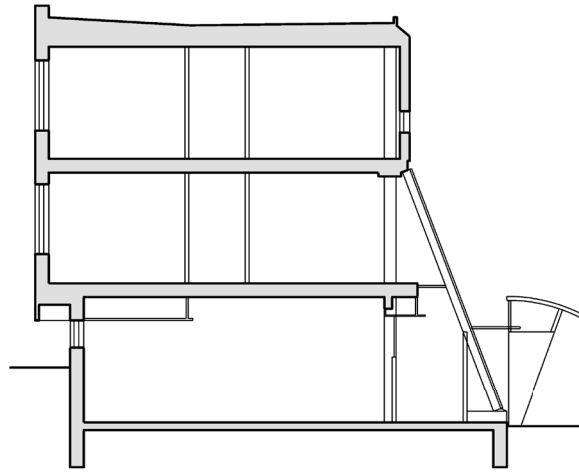
**WHITE LIGHT**

CONSTRUCTIVE DETAILS

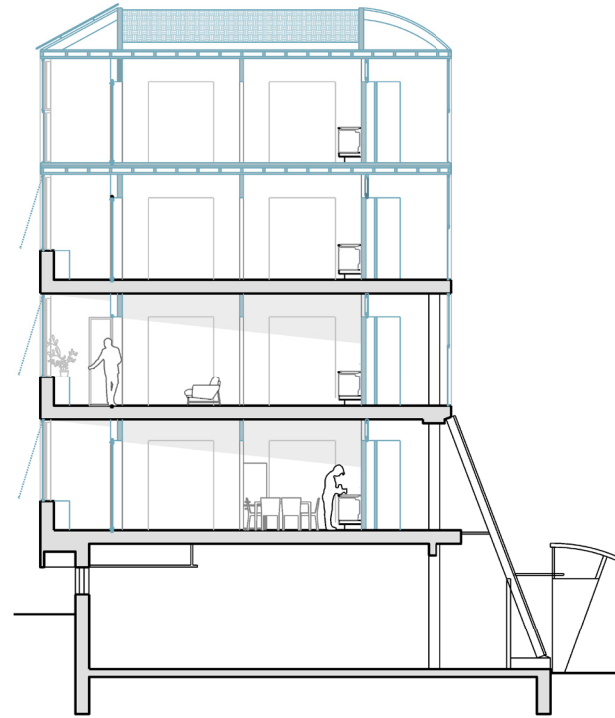
Scale 1:10



**WHITE LIGHT**  
REHABILITATION



ORIGINAL STATUS SECTION  
Escala 1:150



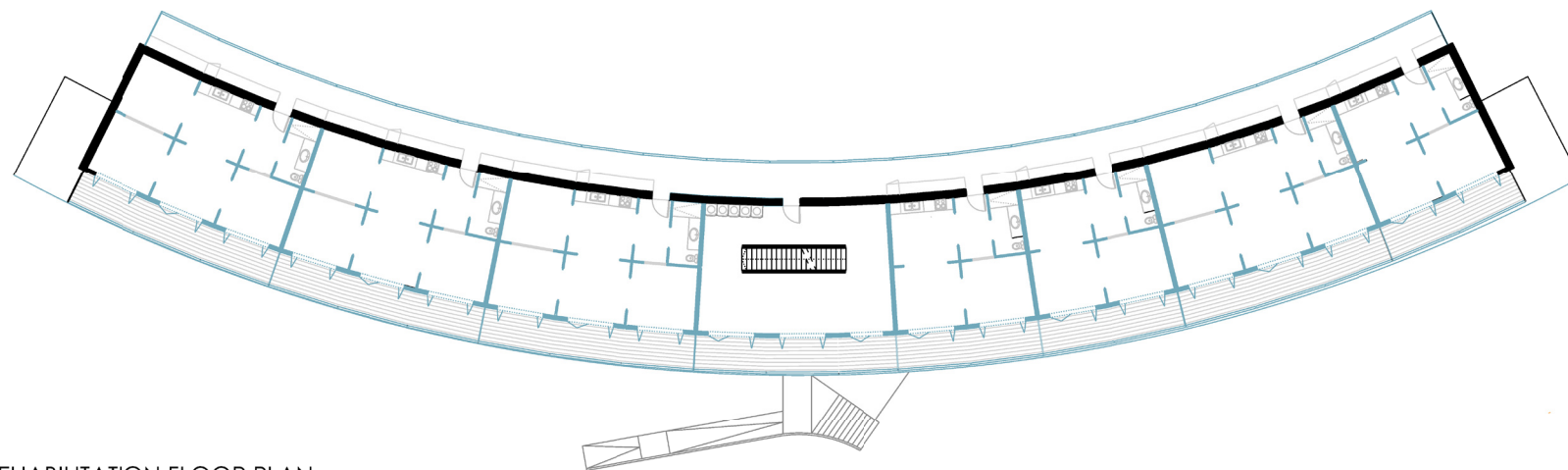
REHABILITATION SECTION  
Escala 1:150

The pre-existing building in the area is rehabilitated as proposed in the competition rules in order to offer a more residential program.

It is adopted in the same way as newly built buildings. It has two galleries on both sides making thermal cushion inside. In this way, an internal redistribution and changes in the existing exterior gallery are generated in order to reuse it. And on the other side, it i build an additional gallery to the existing structure to generate a double thermal insulation on both sides.

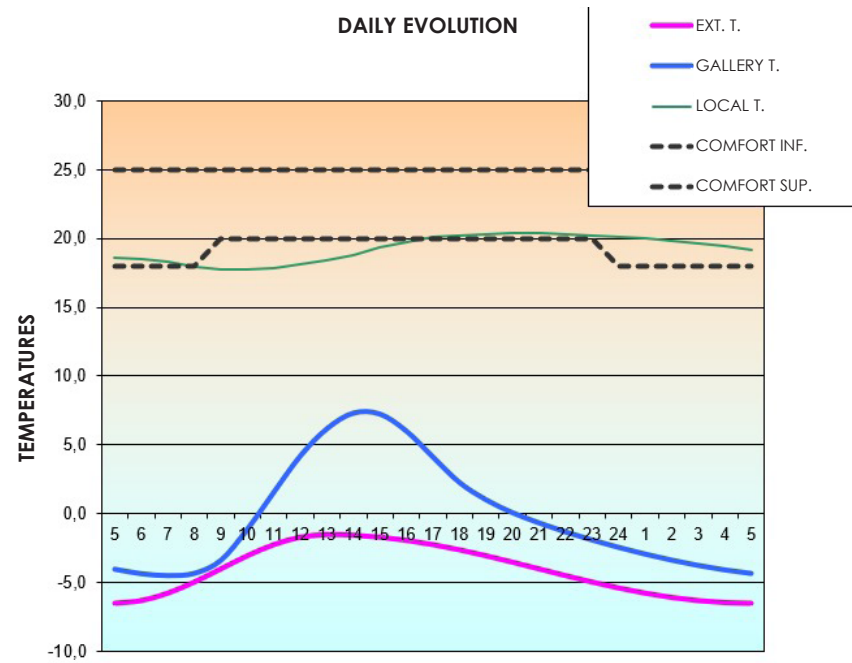
In addition, two more floors are built above the existing roof to achieve more housing units.

The entrance and a communal area are placed in the central part to take advantage of the entrance and the existing stairs from the outside of both sides.

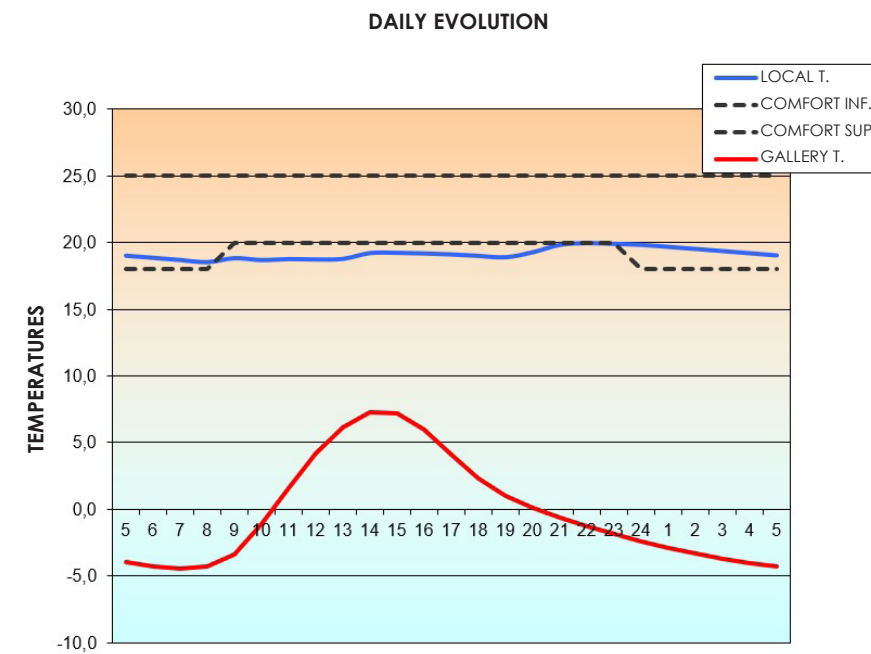


REHABILITATION FLOOR PLAN  
Escala 1:300

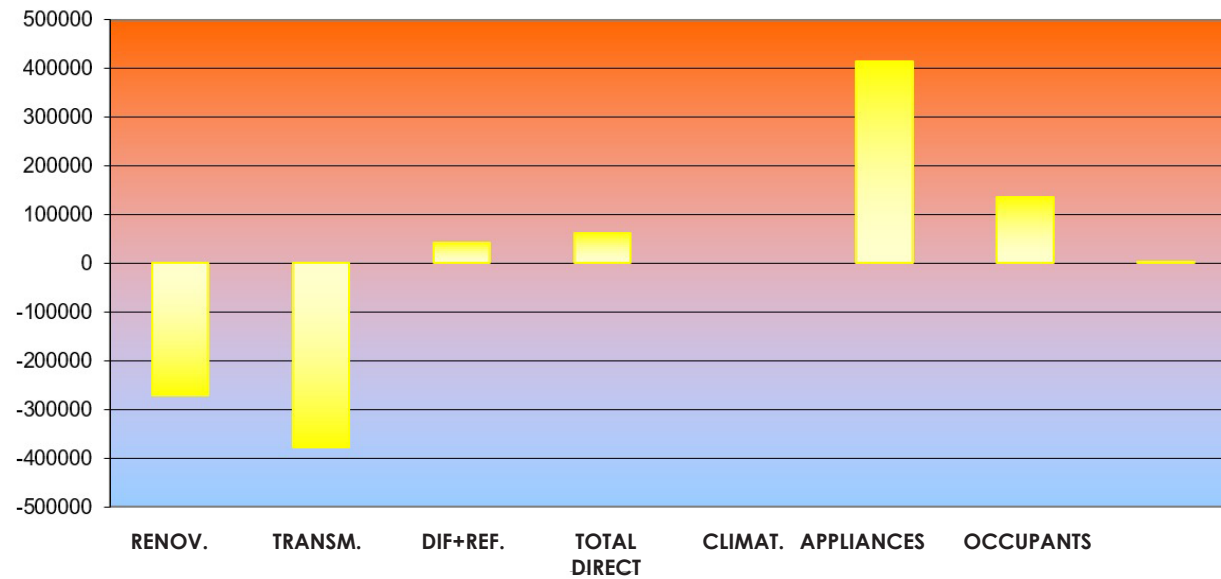
**WHITE LIGHT**  
BULIDING B - REAHABILITATION



Medium indoor temperature = -0,3°C  
 Medium exterior temperature = -4°C  
 General transmittance during the day = 0,37 W/m²K  
 General transmittance during the night = 0,28 W/m²K



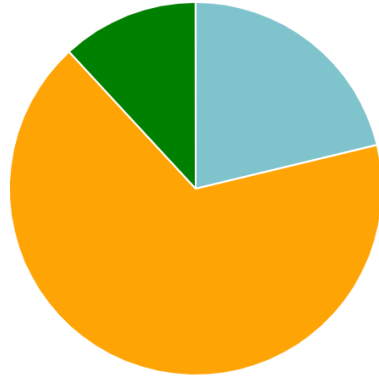
Medium indoor temperature = 19,1°C  
 General transmittance during the day = 0,37 W/m²K  
 General transmittance during the night = 0,28 W/m²K



Month of december:  
 Ventilation losses = -271 KWh  
 Loss by transmission = -379 KWh  
 Gains for solar radiation = 104 KWh  
**Gains for climate control = 0 KWh**  
 Gains for appliances = 413 KWh  
 Gains for occupant = 135 KWh

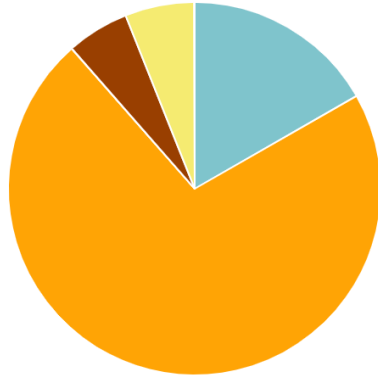
### Mass kg - Classifications

- 1.3.2 Internal walls, partitions and doors - 21.2%
- 1.4.2 Façade openings - 66.9%
- 1.5 Roof - 11.9%



### Global warming kg CO2e - Life-cycle stages

- A4 Transport - 16.7%
- B4-B5 Replacement - 71.8%
- B6 Energy - 0.0%
- C2 Waste transport - 5.4%
- C3 Waste processing - 6.0%
- C4 Waste disposal - 0.0%

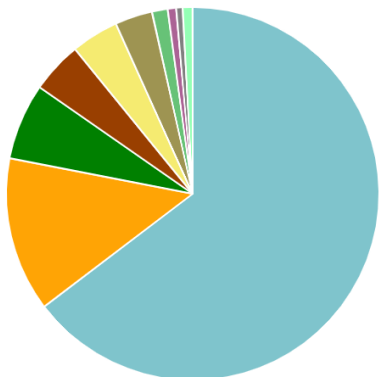


Cradle to grave (A1-A4, B4-B5, C1-C4)		kg CO <sub>2e</sub> /m <sup>2</sup>
(< 320) A		184
(320-360) B		
(360-400) C		
(400-440) D		
(440-480) E		
(480-520) F		
(> 520) G		

### Global warming kg CO2e - Resource types

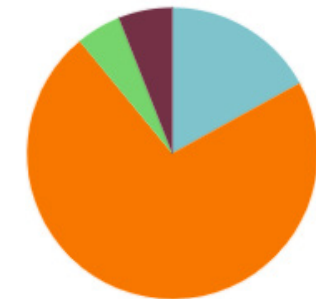
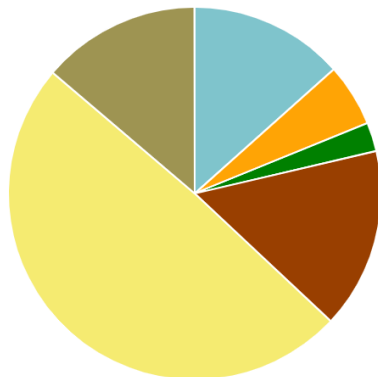
This is a drilldown chart. Click on the chart to view details

- Regular glass panes - 64.7%
- Ready-mix concrete for lightweight applications (domestic and auxili) - 6.6%
- CLT, glulam and LVL - 4.5%
- Textiles and wallpapers - 4.1%
- Bitumen and other roofing - 4.1%
- Ready-mix concrete for foundations and internal walls - 3.2%
- Plastic membranes - 1.4%
- Oriented strand board (OSB) - 0.7%
- EPS (expanded polystyrene) insulation - 0.6%
- Other resource types - 0.8%



### Global warming kg CO2e - Classifications

- 1.1 Foundations (substructure) - 13.4%
- 1.2 Load bearing structural frame - 5.5%
- 1.2.2 Upper floors - 2.5%
- 1.3.2 Internal walls, partitions and doors - 15.6%
- 1.4.2 Façade openings - 49.3%
- 1.5 Roof - 13.8%
- Electricity use - 0.0%



- A4 Transport- 17 %
- B4-B5 Replacement- 72 %
- C2 Waste transport- 5 %
- C3 Waste processin...- 6 %



**WHITE LIGHT**  
GENERAL SECTION

Scale 1:500



ARCHITECTURE STUDENT CONTEST  
EDITION 2024 HELSINKI

PARTICIPATION NUMBER: 17306

**HUG FERNÁNDEZ**

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