



ARCHITECTURE STUDENT CONTEST

19th INTERNATIONAL EDITION, HELSINKI 2024

University of Architecture, Civil Engineering and Geodesy
Bulgaria

UNITY
Team № 10



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Tutor:
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SUSTAINABILITY

CONNECTIVITY

BIODIVERSITY

UNITY

ZERO ENERGY

PREFAB

HABITAT



Site analysis

Observations:

Conclusion:

There is a compositional lack of UNITY between the different systems of the surrounding functional groups.

Close to the city center



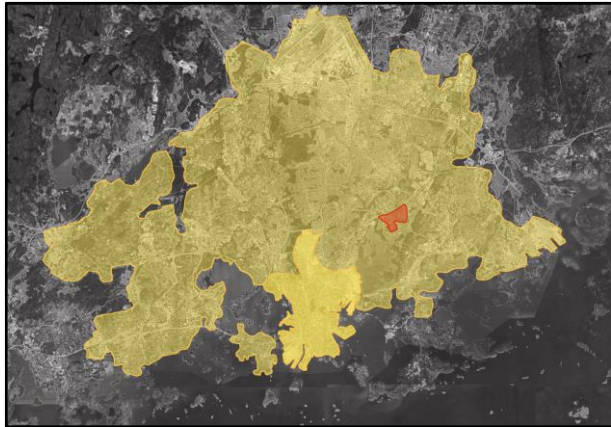
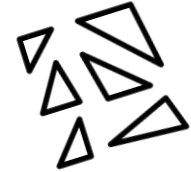
Connected with the city



Next to the nature park



Dispersed functional organization



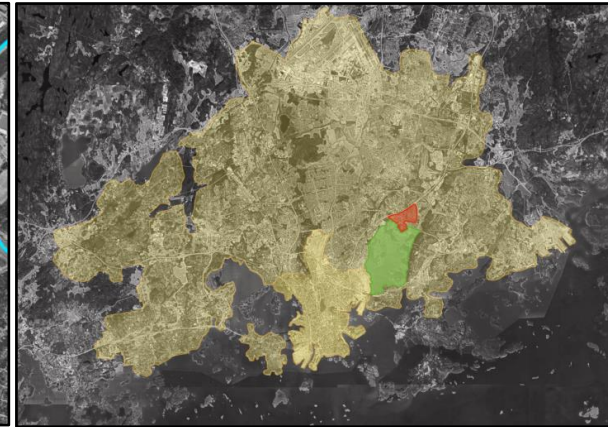
Location in Helsinki

- Legend :**
- Helsinki
 - Central Helsinki
 - Viikki



Main connections

- Legend :**
- Main road
 - High way
 - Viikki



The nature park

- Legend :**
- Helsinki
 - Nature park
 - The site



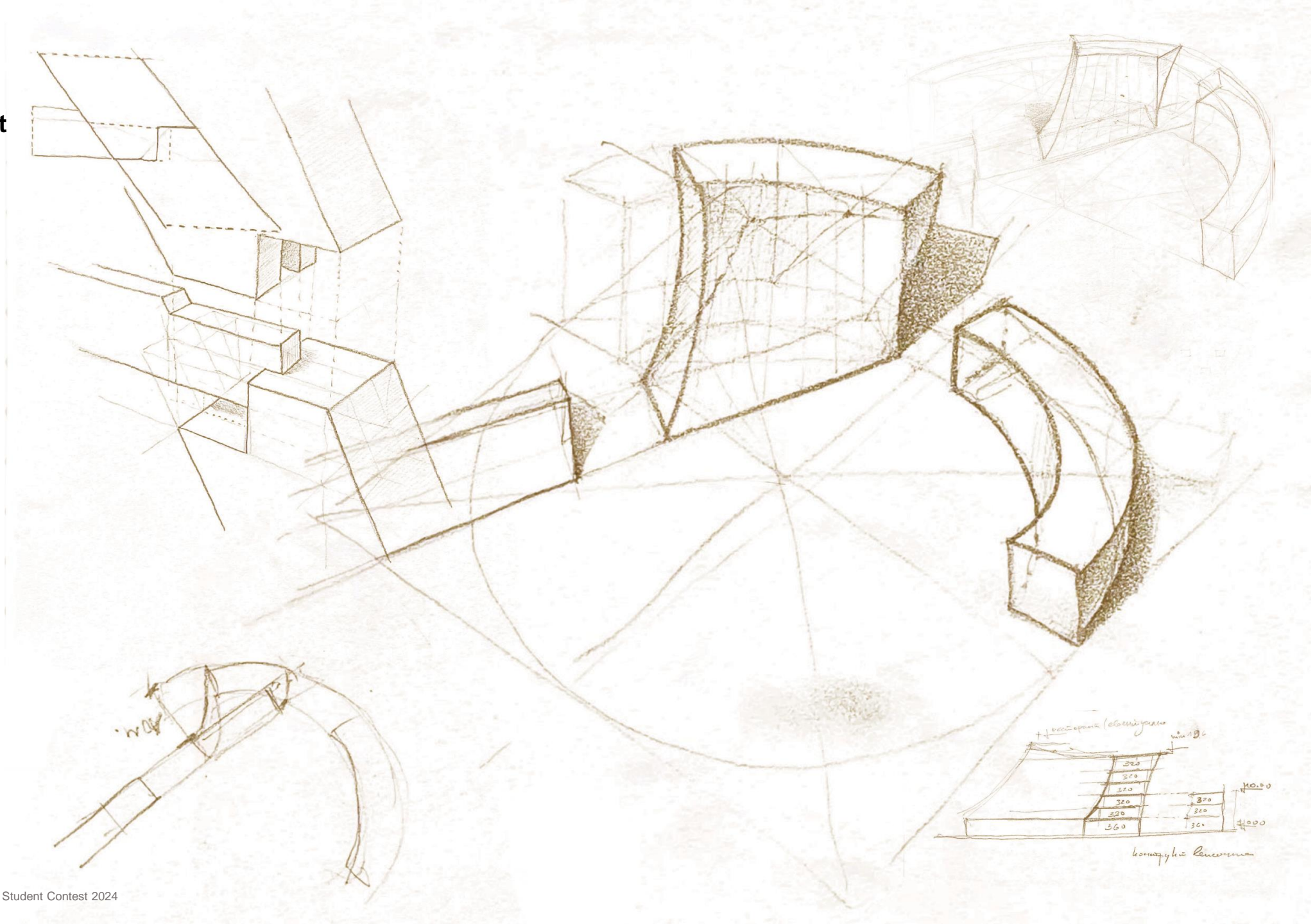
Functions

- Legend:**
- University of Helsinki
 - Veterinary clinic
 - The site

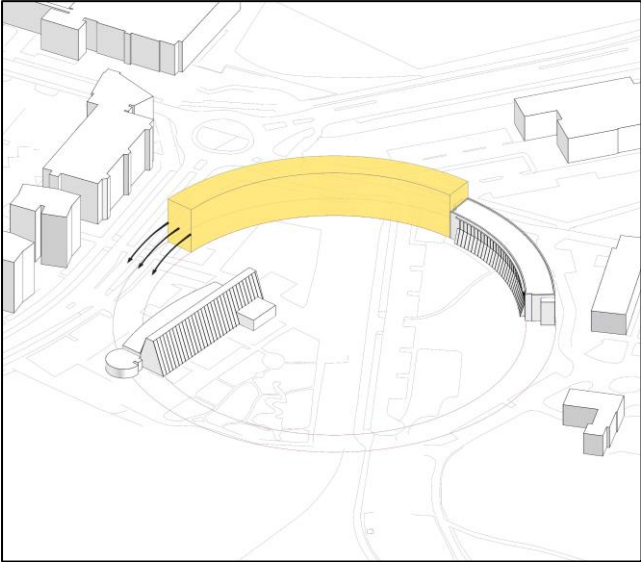
The project is located in Helsinki, Finland, 8 km. from the city center- in the university district- Viikki. South of the location is the nature park- Vanhankaupunginlahti, also known as the "bird paradise in the city center".

The project site is a cross point of residential, commercial, educational, scientific services and nature. Each has it's own organization system that doesn't interact with the systems of the rest. This results in a disperse urban character and a lack of compositional **UNITY**.

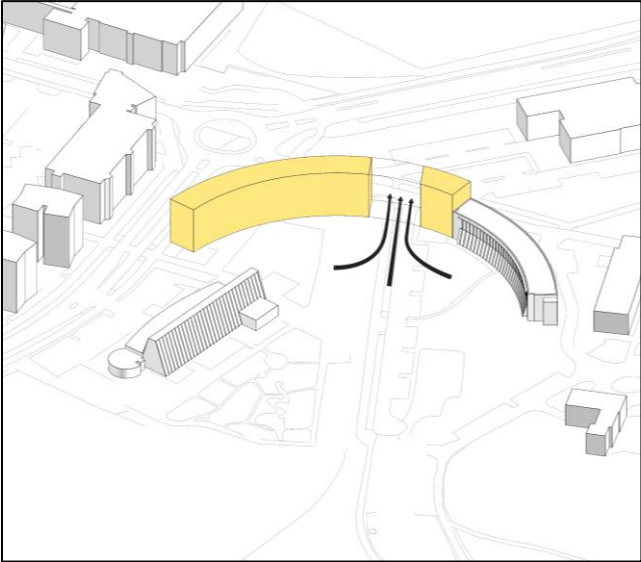
Concept



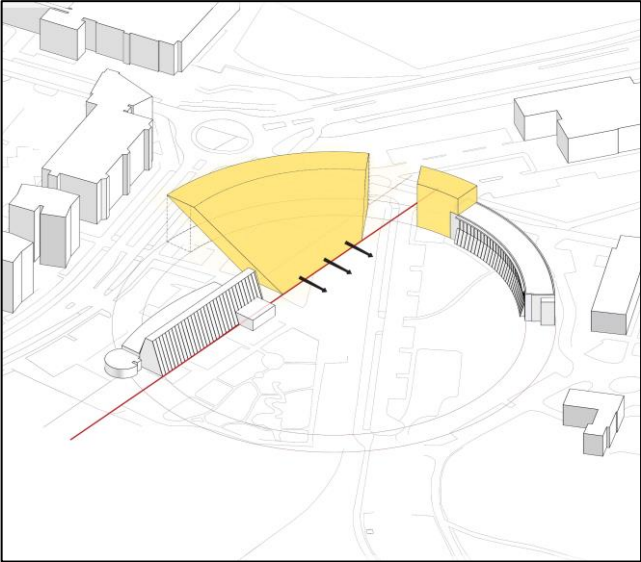
Composition strategy



Sliding along the continuation of the existing office building.



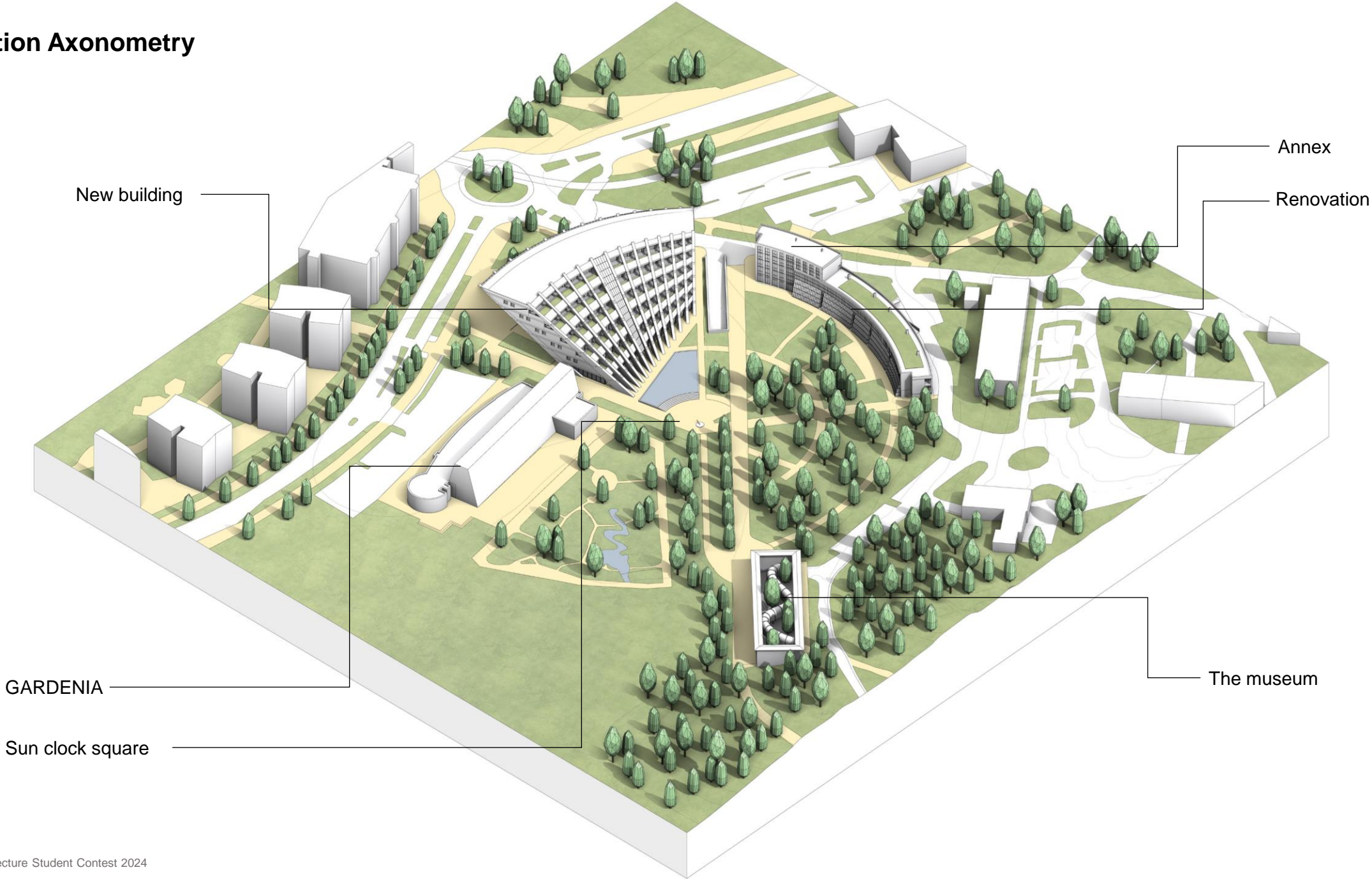
Keeping the existing urban connection.



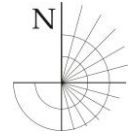
Aligning with the building of Gardenia

After different strategies were considered, was found such that was able to combine all the elements of the context. The new composition follows the continuations of the existing buildings creating a characteristic volume that unifies the whole space.

Situation Axonometry



Site plan



GARDENIA Building

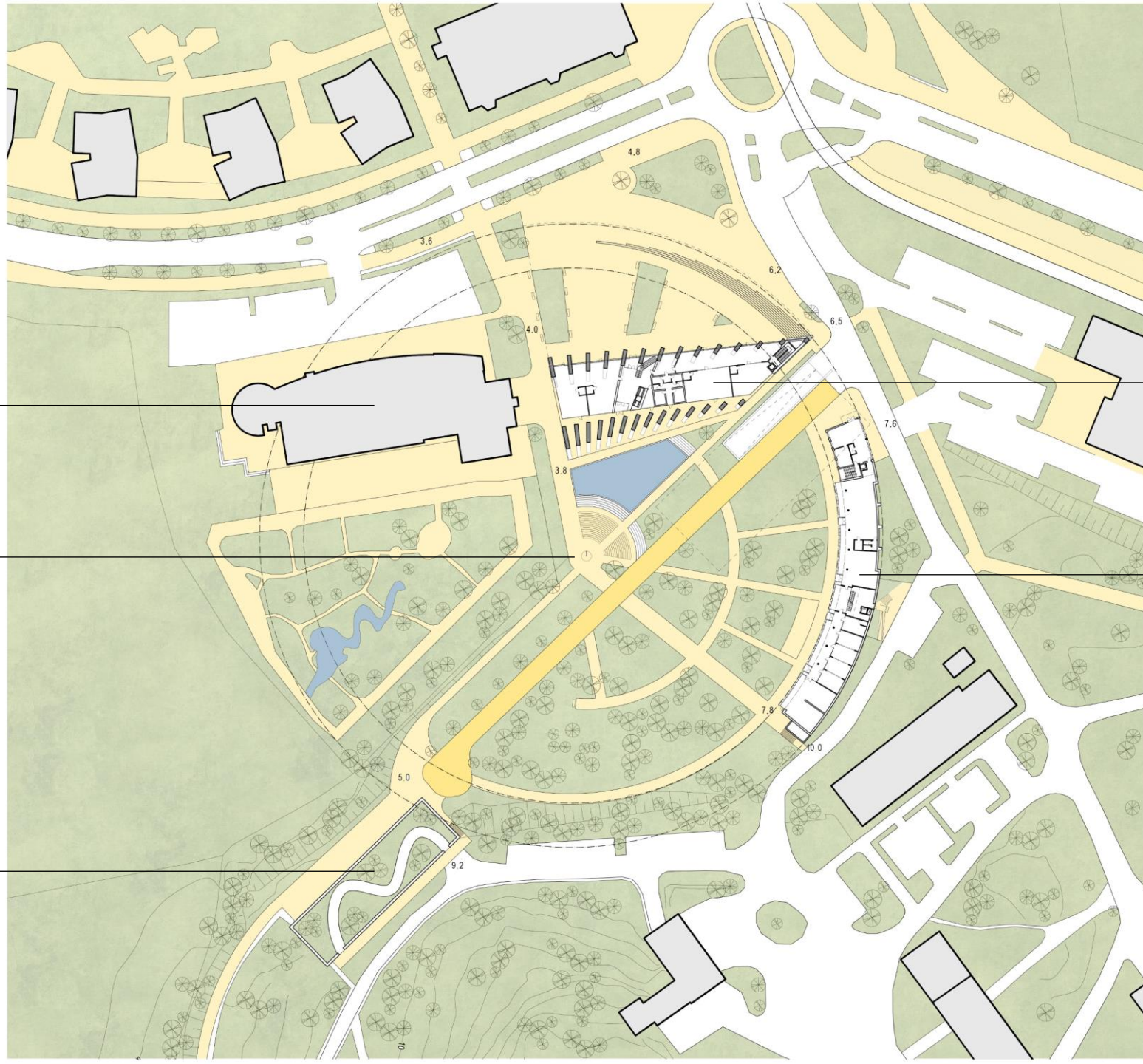
New building

Sun clock square

Renovation

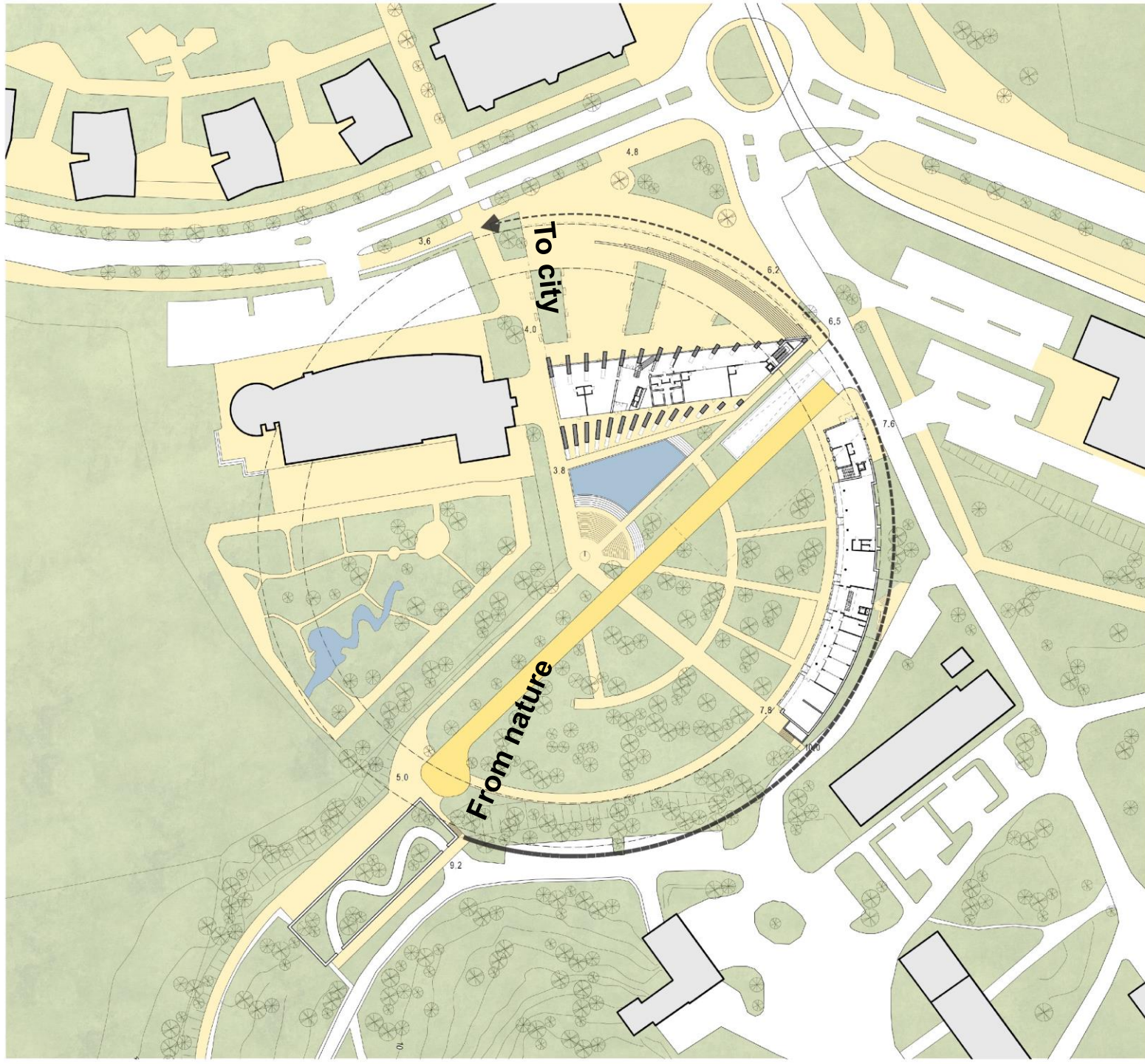
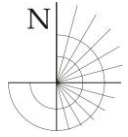
Museum





- Legend:**
-  Pedestrian alleys
 -  Pedestrian street
 -  Greenery
 -  Water



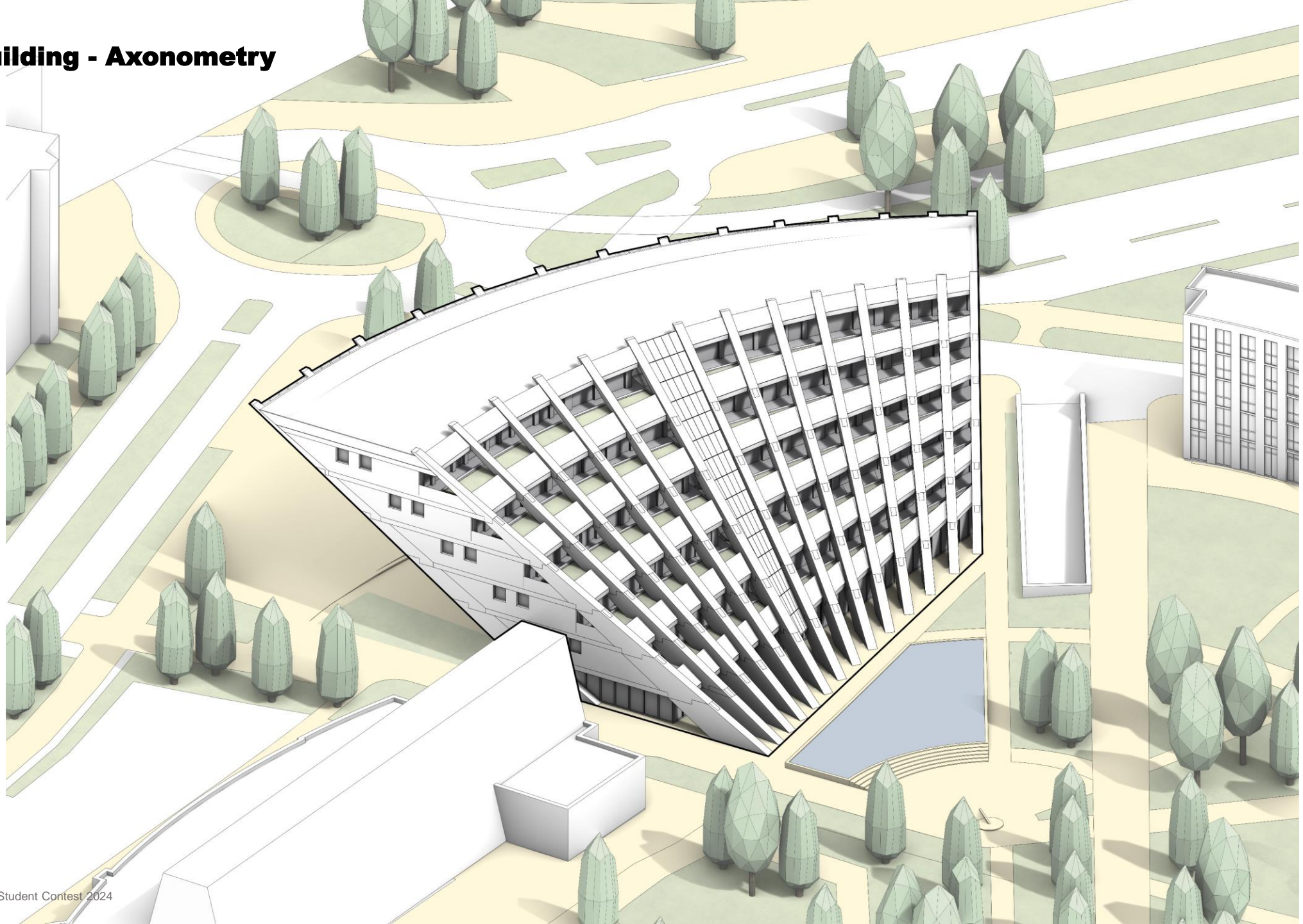
Site plan

A transition between nature and city



- Legend:**
-  Pedestrian alleys
 -  Pedestrian street
 -  Greenery
 -  Water

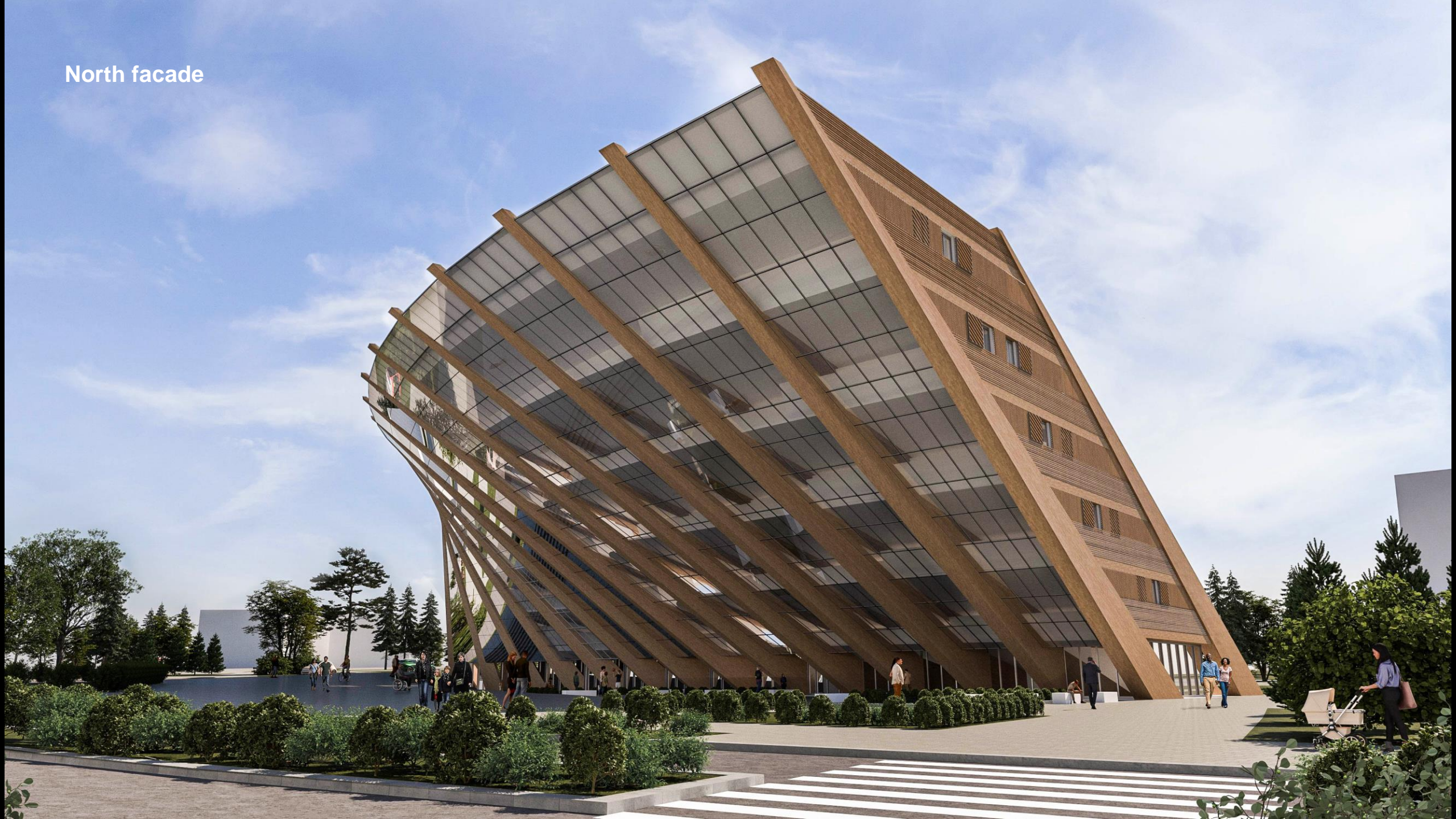
New building - Axonometry



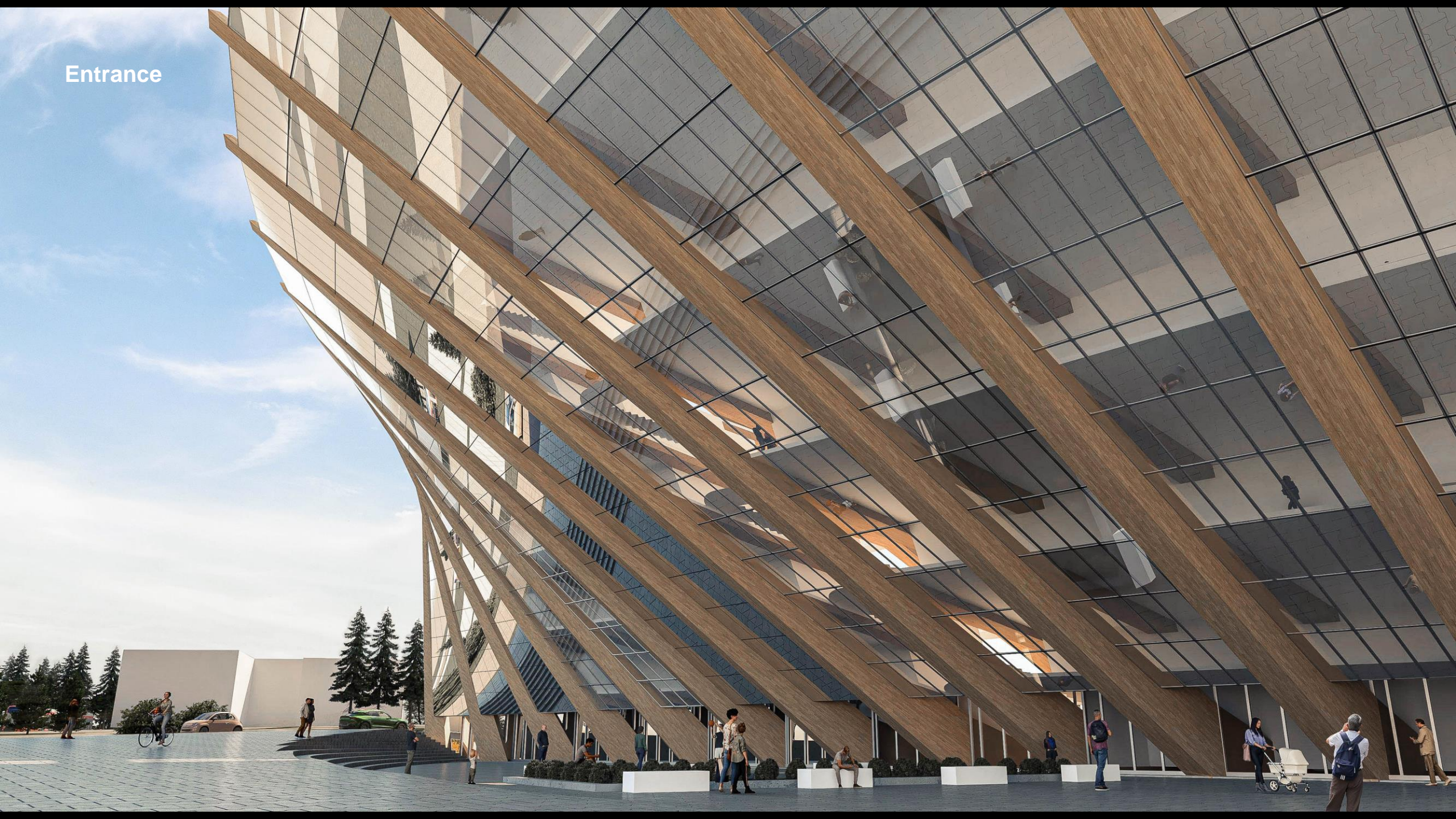
South facade



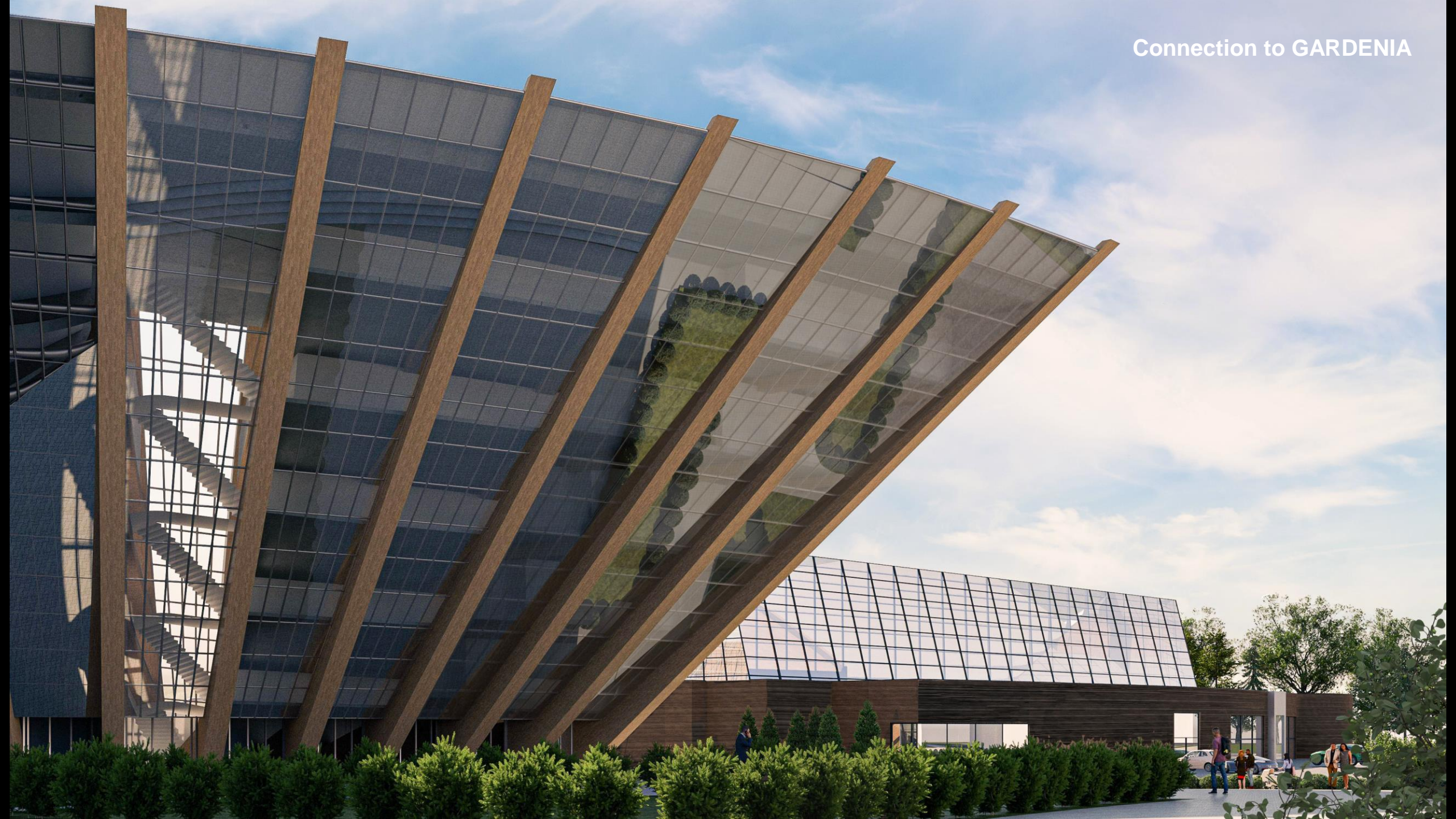
North facade



Entrance

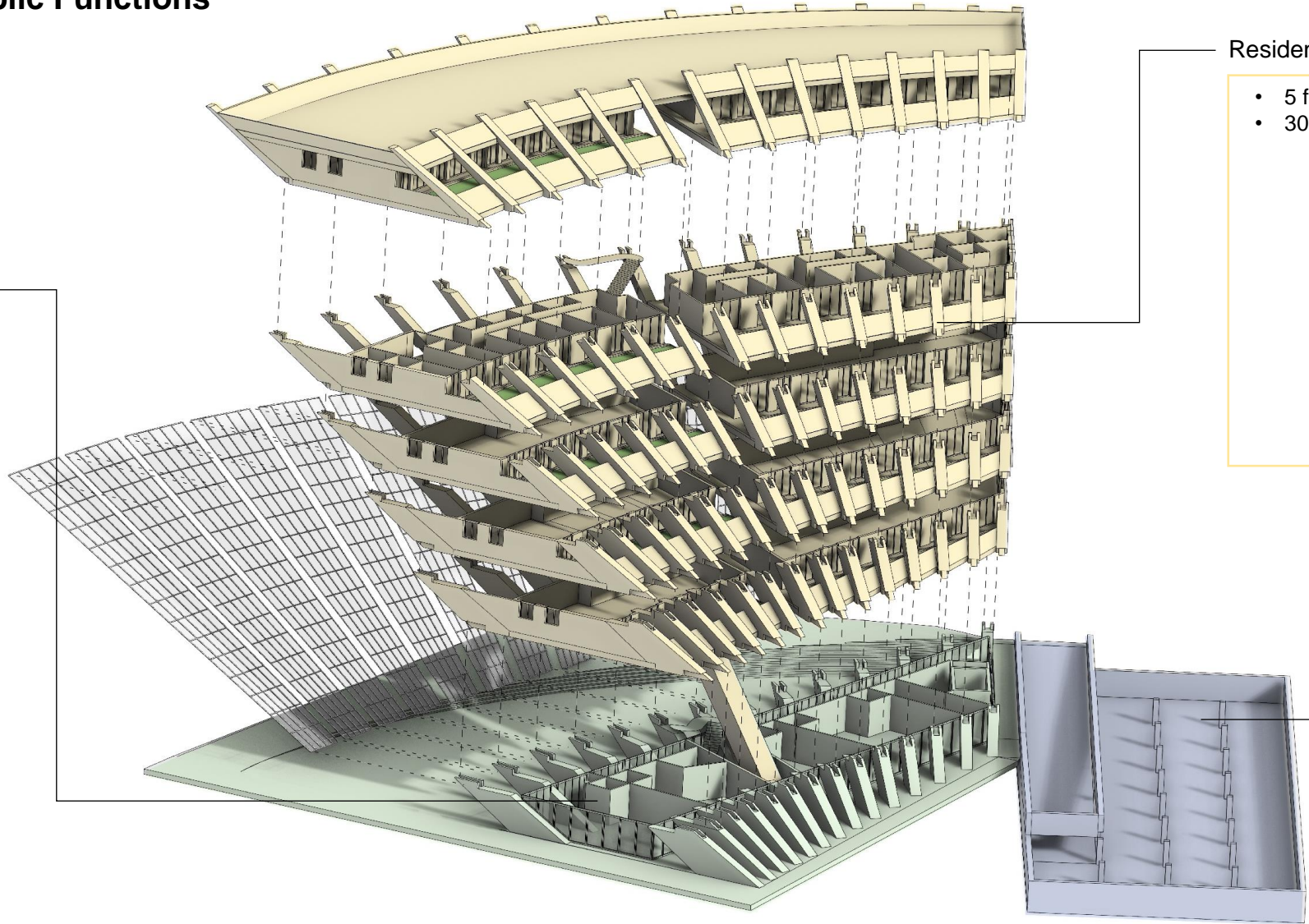


Connection to GARDENIA



New building




Residential & Public Functions





Commercial ground floor

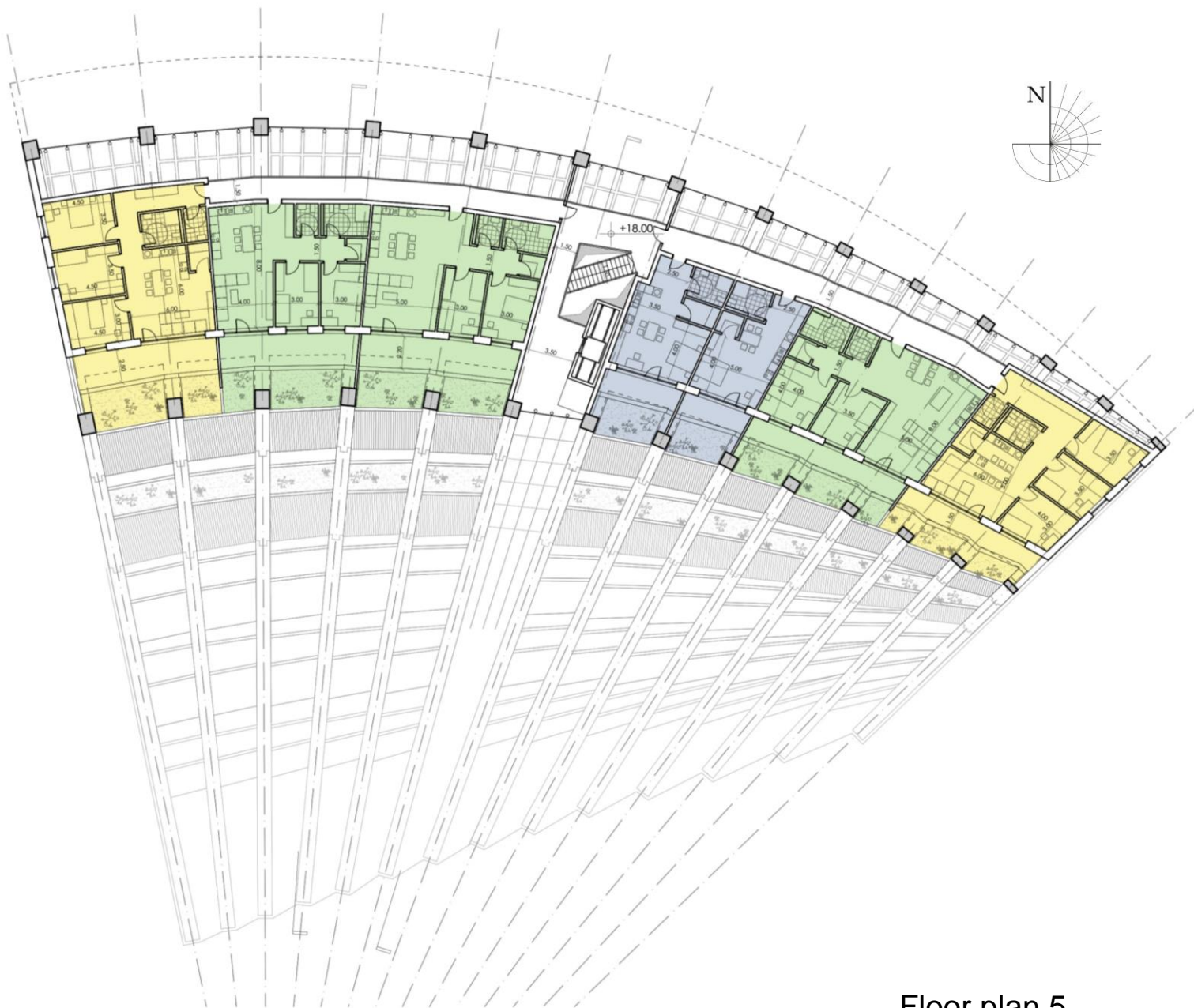
- Entrance to the residential part 
- Bike room 
- Common sauna 
- Relax zone 
- Shops 
- Connection to underground parking 

Residential floors

- 5 floors
- 30 apartments:
 - 15 x two bedrooms (50%)
 - 
 - 10 x three bedrooms (30%)
 - 
 - 5 x studios (10%)
 - 

Underground parking

- 35 parking slots (1 per 200 sq.m.)
 - 
- Natural ventilation
 - 



Floor plan 5

Typology of apartment units:

Three bedrooms



- Service zone
- Night zone
- Day zone



Two bedrooms



- Service zone
- Night zone
- Day zone



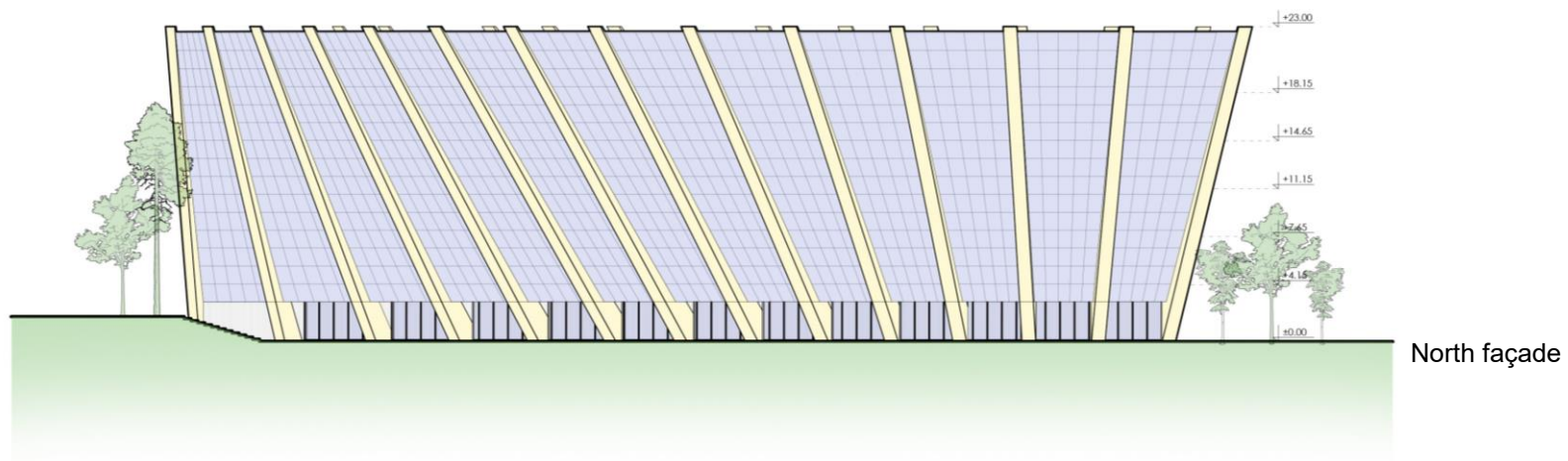
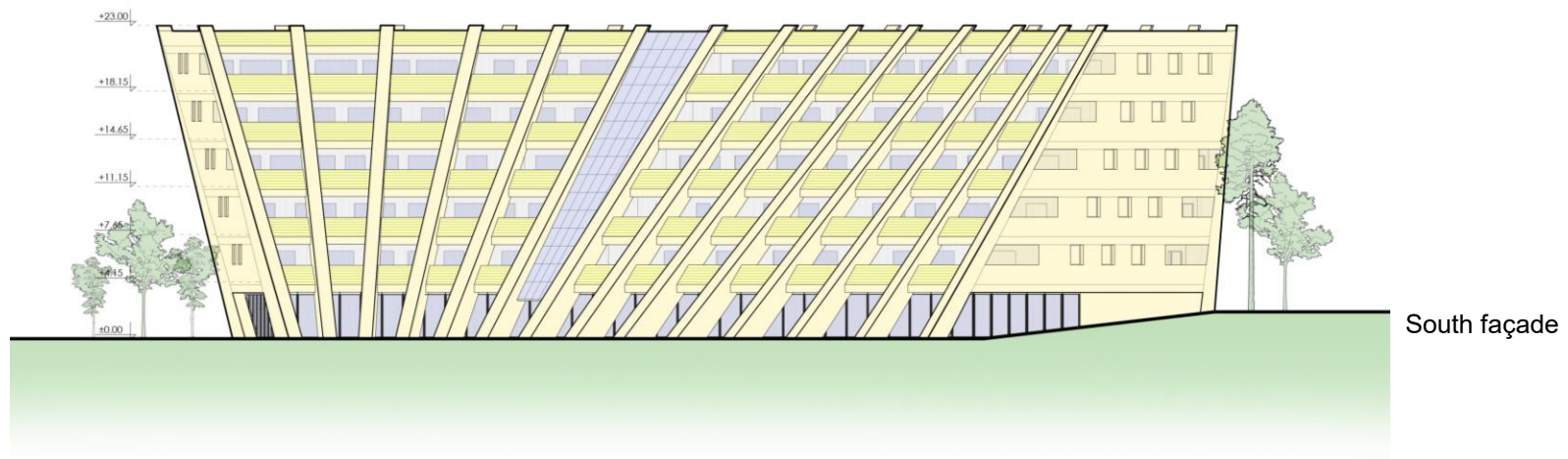
Studio



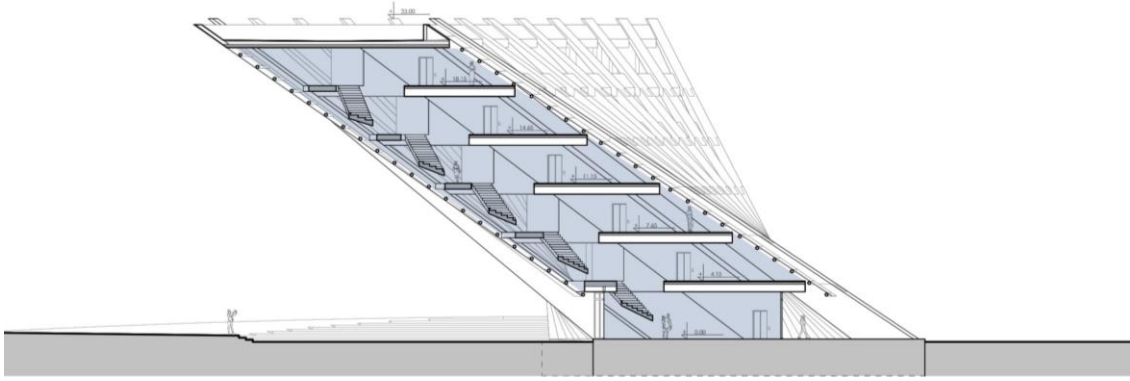
- Service zone
- Night zone
- Day zone



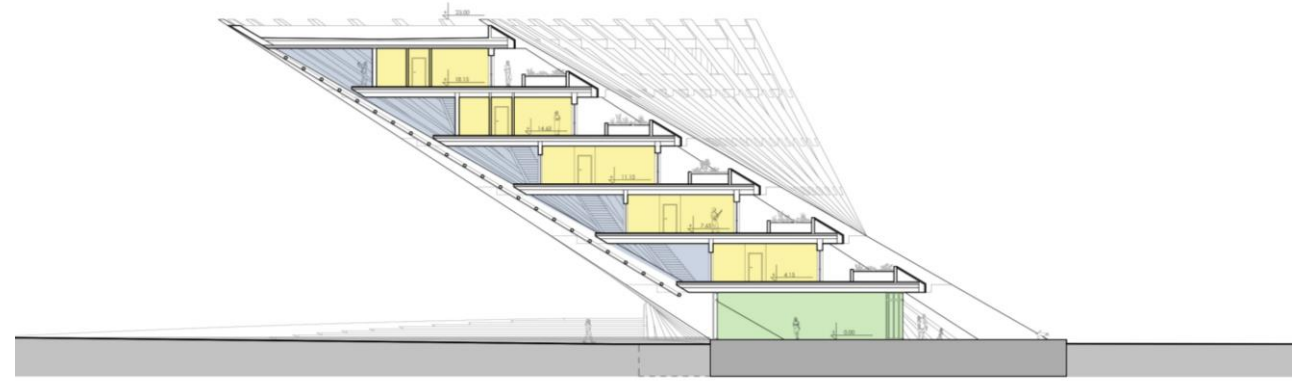
Façades



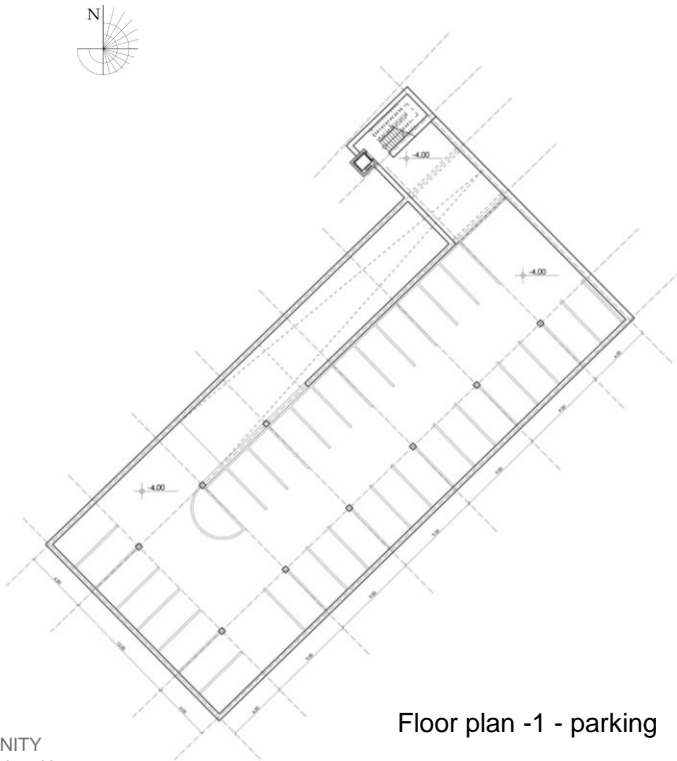
Drawings



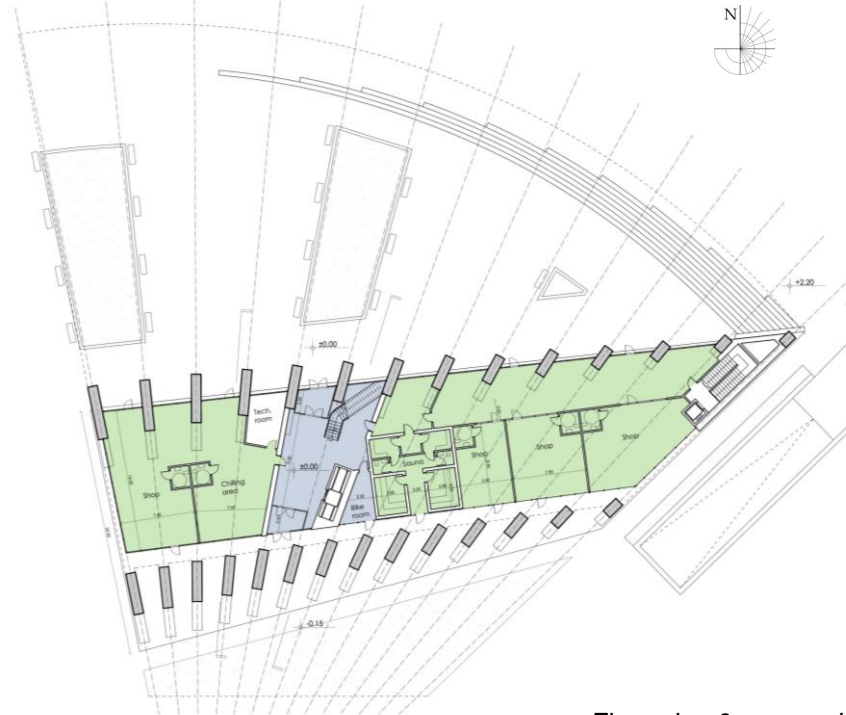
Section 1



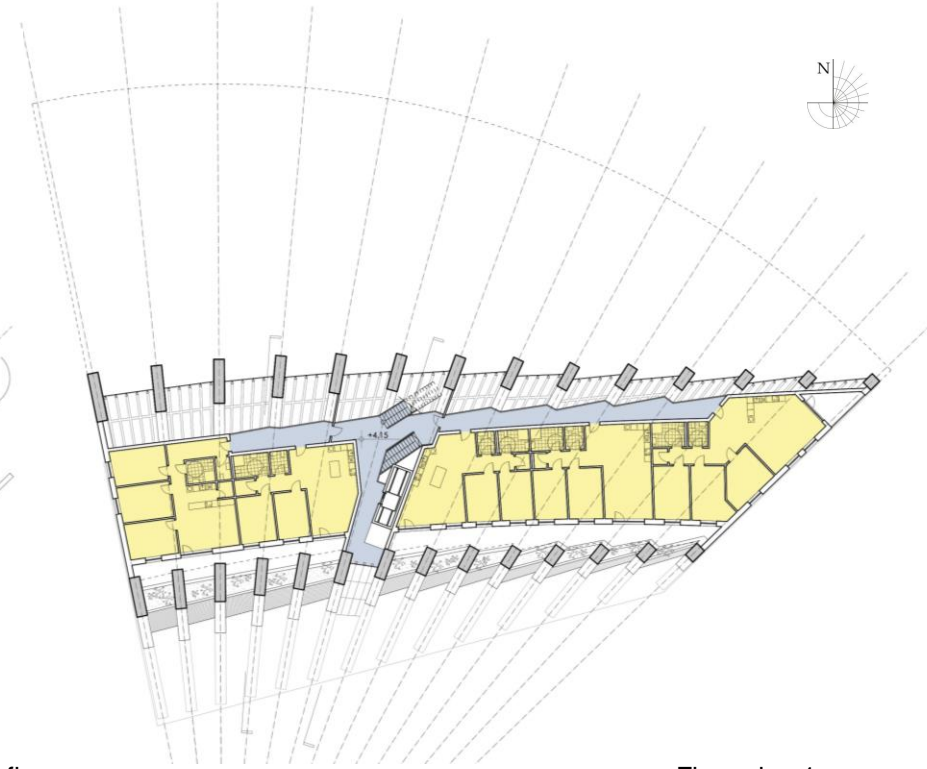
Section 2



Floor plan -1 - parking



Floor plan 0 – ground floor

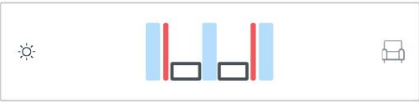


Floor plan 1

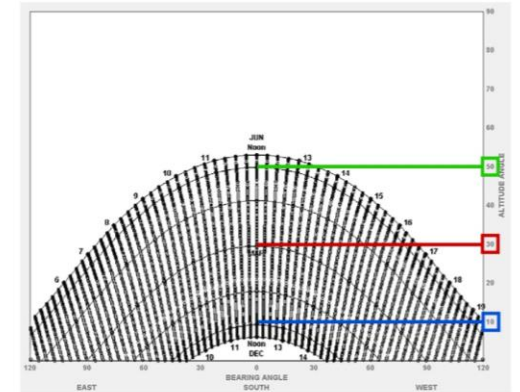
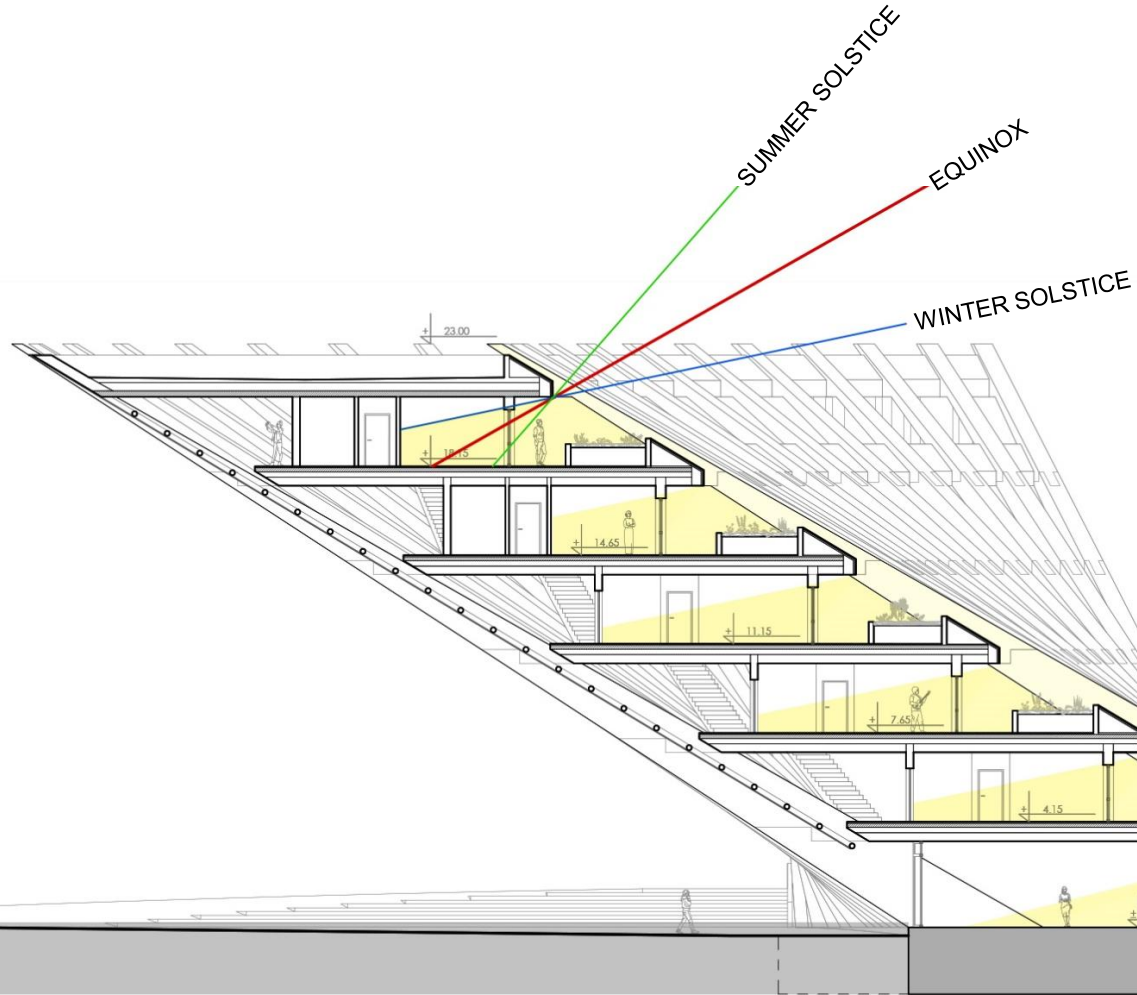
Day light strategy

Glazing:

Light transmittance: 73%
 Solar factor (g): 0,53
 $U_{\text{glass}} : 0,6 \text{ W/sq.m. K}$



| | |
|--|--|
| | Glazing 1 PLANICLEAR (4mm) - Annealed PLANITHERM XN |
| | Cavity 1 Argon 90% 16 mm |
| | Glazing 2 PLANICLEAR (4mm) - Annealed |
| | Cavity 2 Argon 90% 16 mm |
| | Glazing 3 PLANITHERM XN PLANICLEAR (4mm) - Annealed |



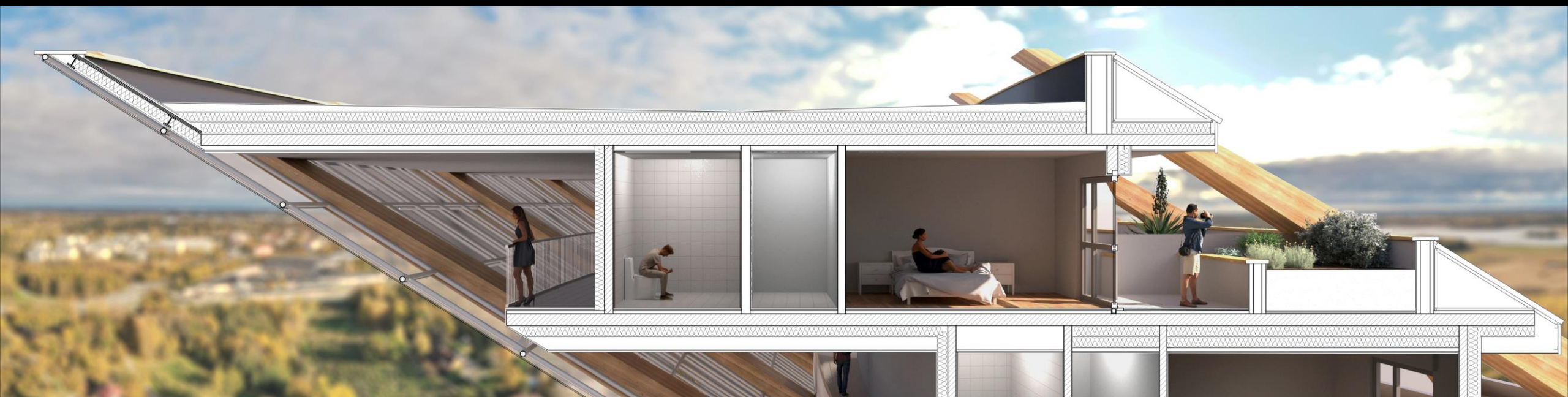
Sun diagram:
 Helsinki, Finland;
 Lat./Lon. 60,32° N/ 24.97°E

The floor shape and the building inclination- a function of the local **sun path**. Each apartment has an optimal natural illumination during the whole year.

Legend:

- Midday sun light in June (50° inclination)
- Midday sun light in March (30° inclination)
- Midday sun light in December (10° inclination)

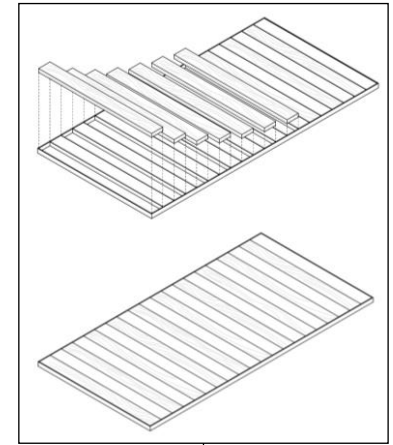




Energy efficiency strategy
Section with heated and unheated spaces

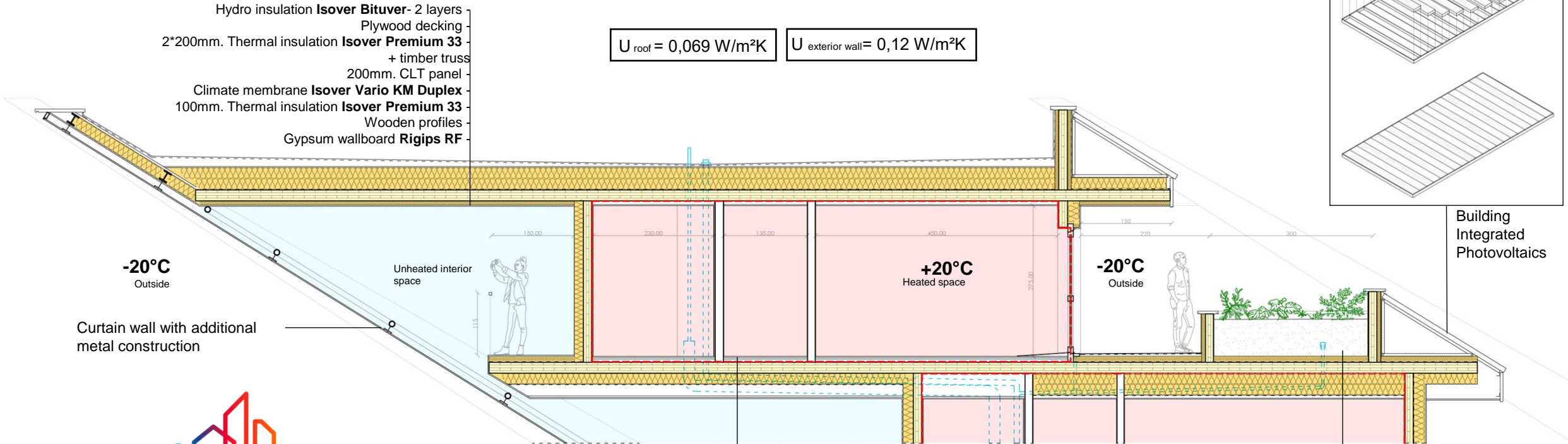


BIPV



Building Integrated Photovoltaics

$U_{\text{roof}} = 0,069 \text{ W/m}^2\text{K}$ $U_{\text{exterior wall}} = 0,12 \text{ W/m}^2\text{K}$



Hydro insulation **Isover Bituver**- 2 layers
Plywood decking
2*200mm. Thermal insulation **Isover Premium 33**
+ timber truss
200mm. CLT panel
Climate membrane **Isover Vario KM Duplex**
100mm. Thermal insulation **Isover Premium 33**
Wooden profiles
Gypsum wallboard **Rigips RF**

-20°C
Outside

Unheated interior space

+20°C
Heated space

-20°C
Outside

Curtain wall with additional metal construction



Finish- parquet
Base Screed **Weberfloor fibre 4310**
Acoustic insulation **Isover Flo**
200mm. CLT panel
200mm. Thermal insulation **Isover Premium 33**
Installation layer
Wooden profiles
Gypsum wallboard **Rigips RF**

Soil
FILTER LAYER made of a non-woven polyester fabric
DRAINING LAYER composed of round gravel and clayey material.
FILTER LAYER made of a non-woven polyester fabric
HDPE Membrane
Hydro insulation **Isover Bituver Antiradice System**
100mm. Thermal insulation **Isover Profi Terrace T**
200mm. CLT Panel
2*200mm. Thermal insulation **Isover Premium 33**
Climate membrane **Isover Vario KM Duplex**
Installation layer
Wooden profiles
Gypsum wallboard **Rigips RB**

- Legend:**
- - - - - Airtightness layer $n50 < 0,6 \text{ 1/h}$
 - Thermal insulation
 - Warm zone
 - Unheated zone
 - Vegetation
 - - - - - Drain pipes

$U_{\text{roof}} = 0,069 \text{ W/m}^2\text{K}$

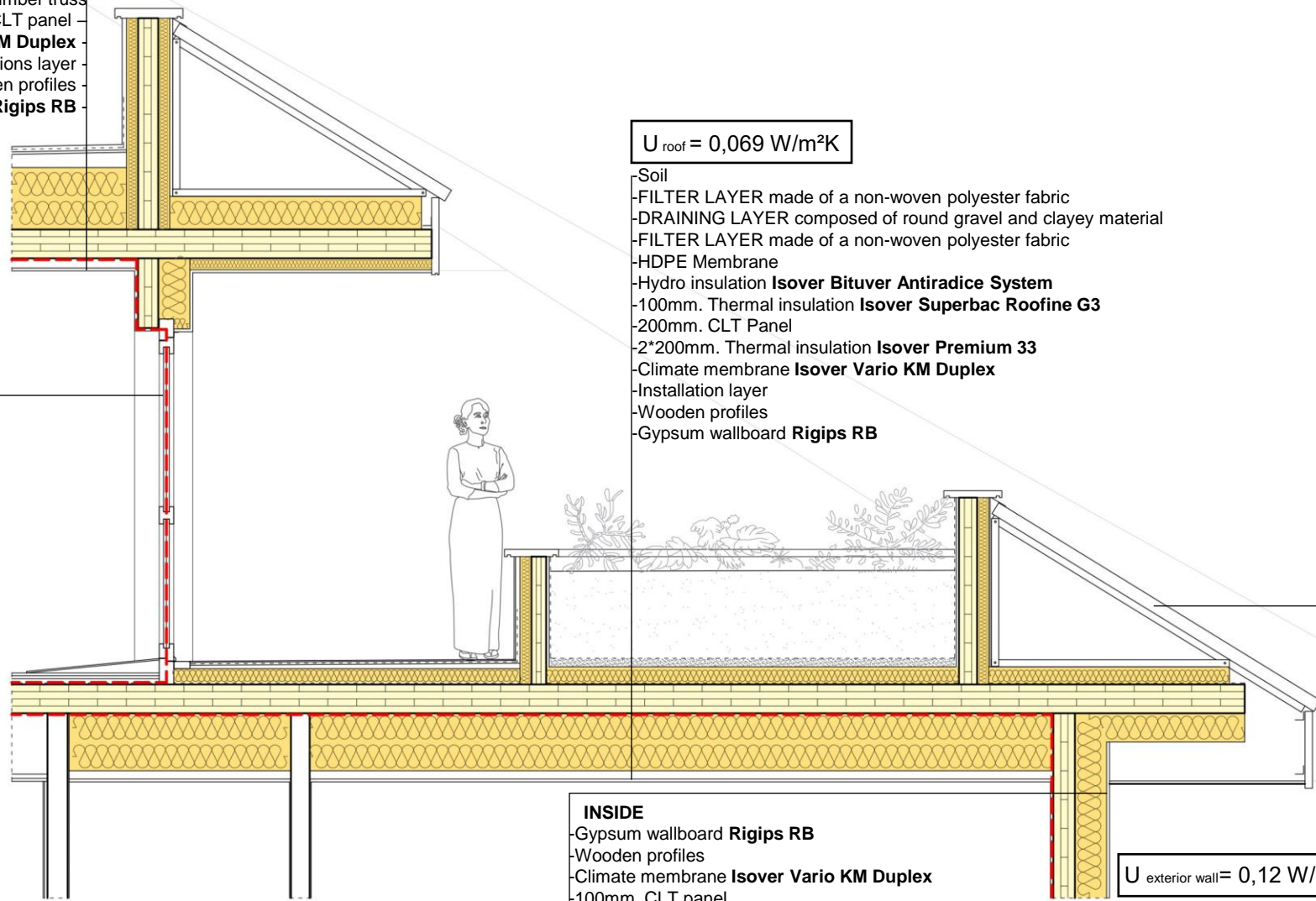
- Hydro insulation Isover Bituver- 2 layers
- Plywood decking
- 2*200mm. Thermal insulation Isover Premium 33
- + timber truss
- 200mm. CLT panel
- Climate membrane **Isover Vario KM Duplex**
- Installations layer
- Wooden profiles
- Gypsum wallboard **Rigips RB**

Terrace detail

Glazing:
 Light transmittance: 73%
 Solar factor (g): 0,53
 $U_{\text{glass}} : 0,6 \text{ W/sq.m. K}$



| | |
|--|--|
| | Glazing 1 PLANICLEAR (4mm) - Annealed PLANITHERM XN |
| | Cavity 1 Argon 90% 16 mm |
| | Glazing 2 PLANICLEAR (4mm) - Annealed |
| | Cavity 2 Argon 90% 16 mm |
| | Glazing 3 PLANITHERM XN PLANICLEAR (4mm) - Annealed |

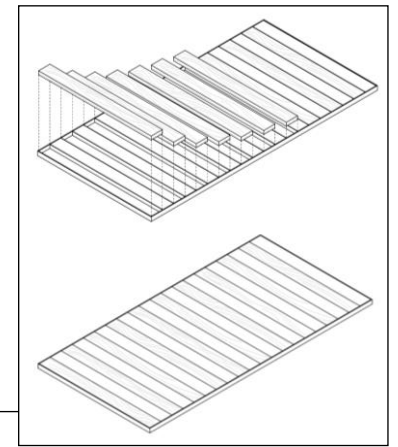


$U_{\text{roof}} = 0,069 \text{ W/m}^2\text{K}$

- Soil
- FILTER LAYER made of a non-woven polyester fabric
- DRAINING LAYER composed of round gravel and clayey material
- FILTER LAYER made of a non-woven polyester fabric
- HDPE Membrane
- Hydro insulation **Isover Bituver Antiradice System**
- 100mm. Thermal insulation **Isover Superbac Roofine G3**
- 200mm. CLT Panel
- 2*200mm. Thermal insulation **Isover Premium 33**
- Climate membrane **Isover Vario KM Duplex**
- Installation layer
- Wooden profiles
- Gypsum wallboard **Rigips RB**

BIPV

Building Integrated Photovoltaics



Solar panels with wooden boards

- INSIDE**
- Gypsum wallboard **Rigips RB**
 - Wooden profiles
 - Climate membrane **Isover Vario KM Duplex**
 - 100mm. CLT panel
 - 250mm. Thermal insulation **Isover PROFI FASSADE**
 - Lightweight adhesive render coat **Weberend LAC**
 - Weber PR 310 Primer**
 - White paint **Webersil TF**
- OUTSIDE**

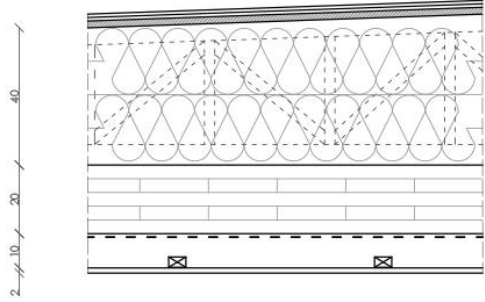
$U_{\text{exterior wall}} = 0,12 \text{ W/m}^2\text{K}$

--- Airtightness layer $n50 < 0,6 \text{ 1/h}$
 ■ Thermal insulation

Details & Material usage



Roof layers $U = 0,069 \text{ W/m}^2\text{K}$

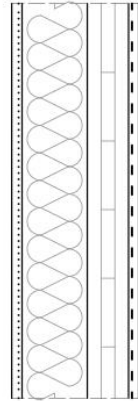


Outside

- Hydro insulation Isover Bituver - 2 layers
- Plywood decking
- 2*200mm. Thermal insulation Isover Premium 33 + timber truss
- 200mm. CLT Panel
- Climate membrane Isover Vario KM Duplex
- Installations layer
- Wooden profiles
- Gypsum wallboard Rigips RB

Inside

Exterior wall layers $U = 0,12 \text{ W/m}^2\text{K}$



Outside

- White paint Webersil TF
- Weber PR 310 Primer
- Leightweight adhesive render coat Weberend LAC
- Weber standard Meshcloth
- Thermal insulation Isover Extreme 31
- CLT Panel
- Vapor retarder Isover Vario KM Duplex
- Aluminum profiles
- Gypsum wallboard Rigips RB

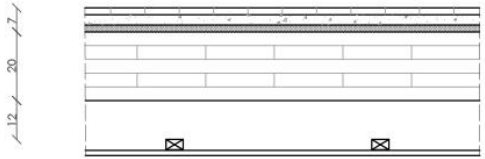
Inside

Interior wall layers



- White paint Weber Premium Gold
- Adhesive render coat Weberend LAC
- Gypsum wallboard Rigips RB
- Thermal insulation Isover AKUSTO
- Wooden stud
- Gypsum wallboard Rigips RB
- Adhesive render coat Weberend LAC
- White paint Weber Premium Gold

Floor layers

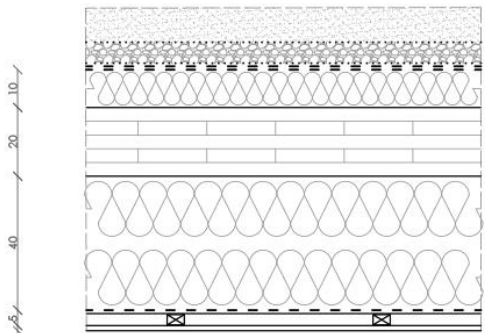


Upper floor

- Finish- Parquet
- Base screed Weberfloor fibre 4310
- Acoustic insulation Isover Flo
- CLT Panel
- Installation layer
- Wooden profiles
- Gypsum wallboard Rigips RB

Lower floor

Garden layers $U = 0,067 \text{ W/m}^2\text{K}$

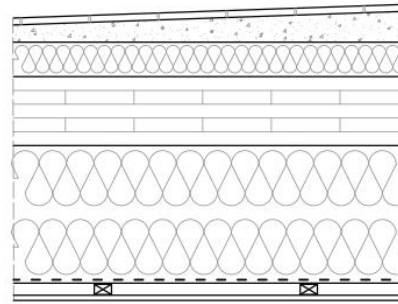


Outside

- Soil
- FILTER LAYER made of a non-woven polyester fabric.
- DRAINING LAYER composed of round gravel and clayey material.
- FILTERING LAYER made of a non-woven polyester fabric.
- HDPE Membrane
- Hydro insulation Isover Bituver Antiradice System
- 100mm. Thermal insulation Isover Superbac Roofine G3
- 200mm. CLT Panel
- 2*200mm. Thermal insulation Isover Premium 33
- Climate membrane Isover Vario KM Duplex
- Installation layer
- Wooden profiles
- Gypsum wallboard Rigips RB

Inside

Terrace layers $U = 0,067 \text{ W/m}^2\text{K}$



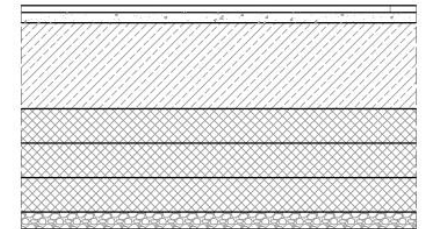
Outside

- Finish- Tiles, with adhesive Weberset SPF
- Hydro insulation Isover Bituver
- Cement mortar for inclination Weberfloor fibre 4310
- Thermal insulation Isover Profi Terrace T
- CLT Panel
- Thermal insulation Isover Premium 33
- Vapor retarder Isover Vario KM Duplex
- Installation layer
- Wooden profiles
- Gypsum wallboard Rigips RB

Inside

Foundation layers

- Finish- Tiles
- Base screed Weberfloor fibre 4310
- Concrete foundation
- 3*100mm XPS
- Gravel



Building Integrated Photovoltaics

Solar panels with a wooden boards that contribute for the architectural presence

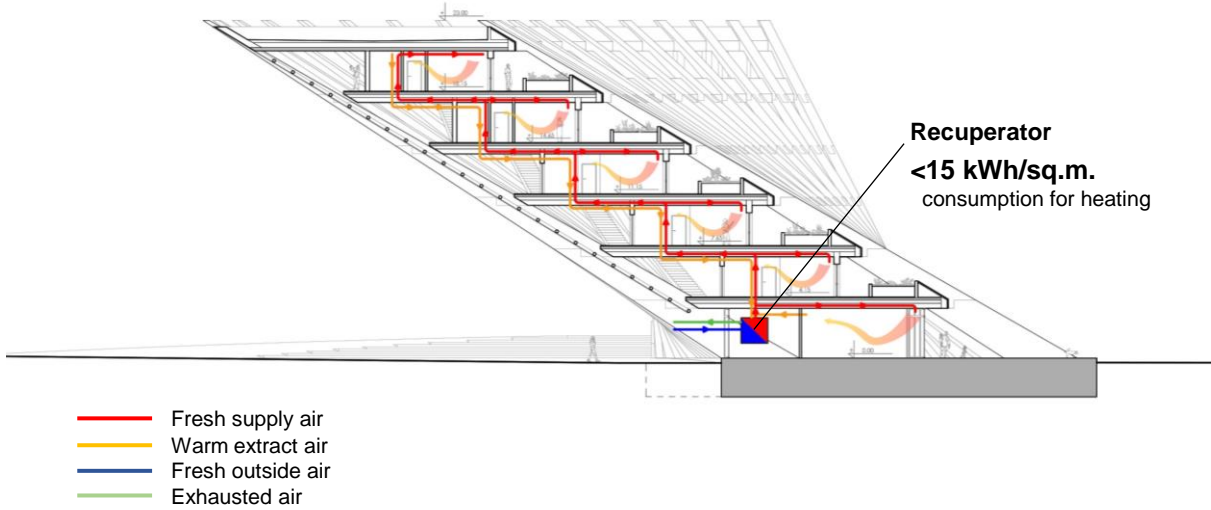


Strategies for sustainability

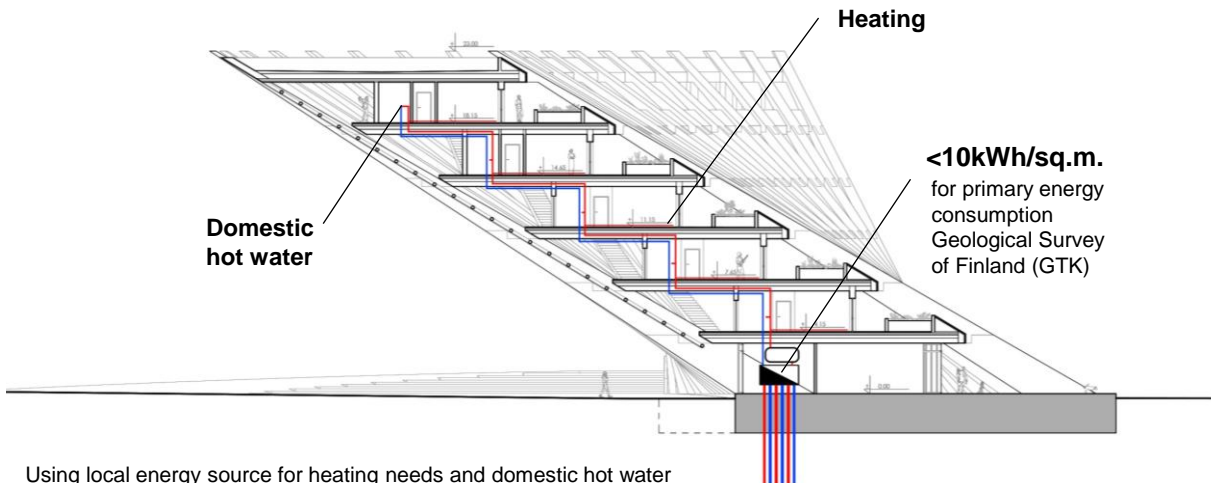
THE BUILDING AIMS TO BE ZERO ENERGY

+25kWh/sq.m. electricity generation
-25kWh/sq.m. energy consumption

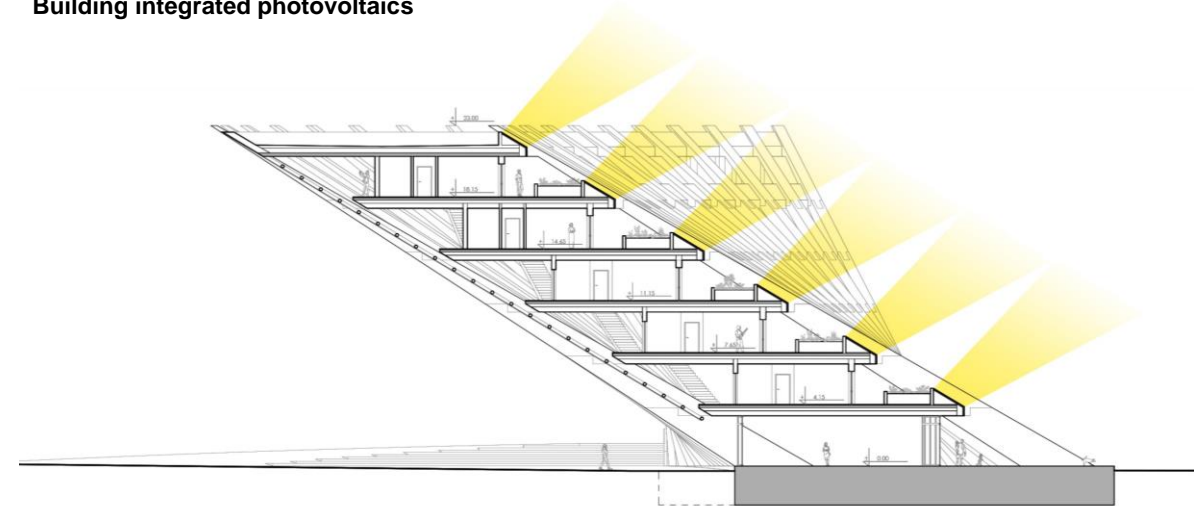
Ventilation with heat exchanger recuperation



Geothermal heat pump



Building integrated photovoltaics

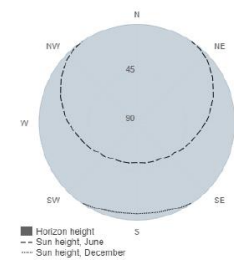


Sun radiation in Helsinki

Simulation outputs

Slope angle: 42 (opt) °
 Azimuth angle: 3 (opt) °
 Yearly PV energy production: 907.27 kWh
 Yearly in-plane irradiation: **1123.65 kWh/m²**
 Year-to-year variability: 49.00 kWh
 Changes in output due to:
 Angle of incidence: -2.82 %
 Spectral effects: NaN %
 Temperature and low irradiance: -7.69 %
 Total loss: -19.26 %

Outline of horizon at chosen location:



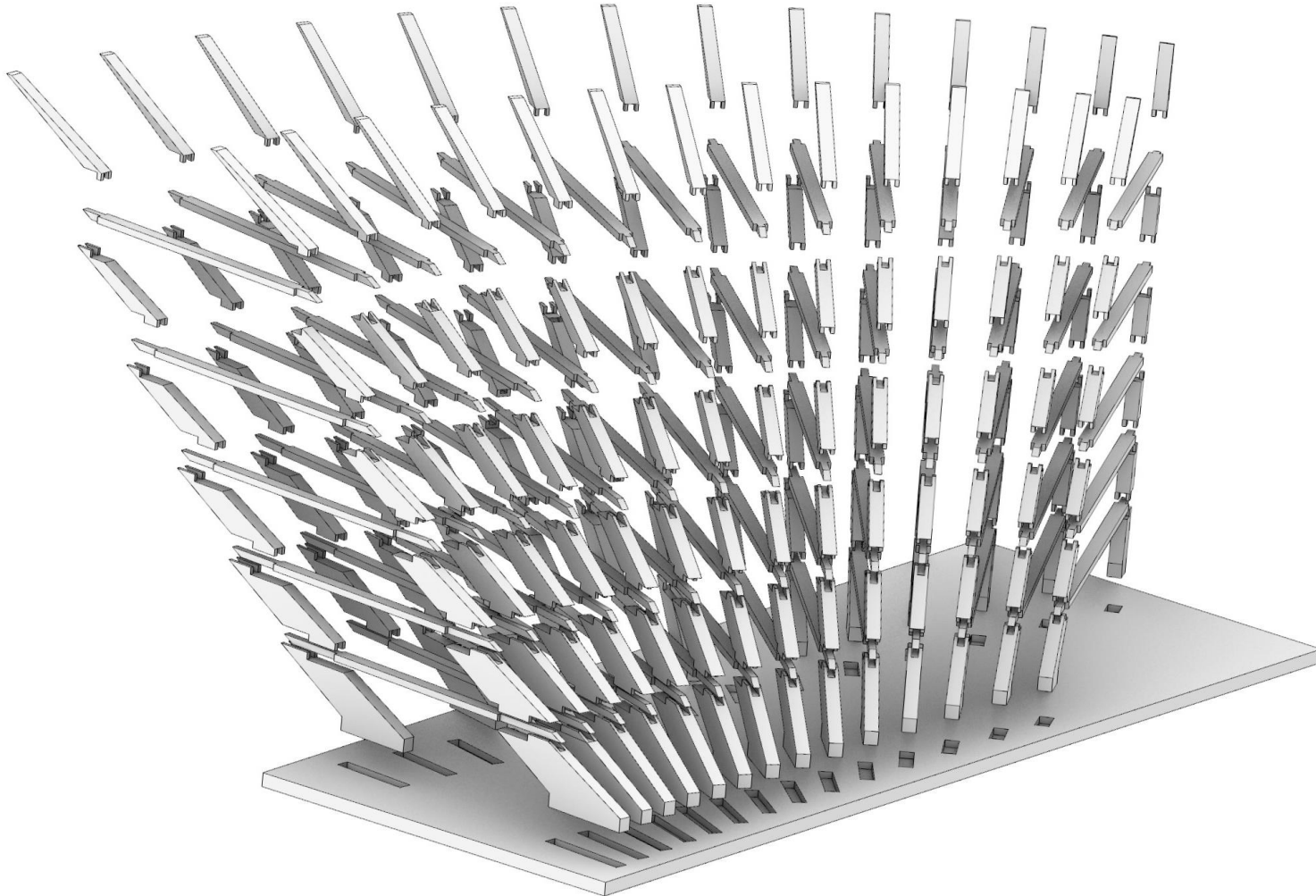
Photovoltaics area 600 sq.m.
 Photovoltaics nominal power ~250W/sq.m.
 Annual solar irradiation 1123,65 kWh/sq.m.
 Building area 6900 sq.m.

$$(600 \times 250) \times 1123,65 / 6900 =$$

+25kWh/sq.m. electricity generation

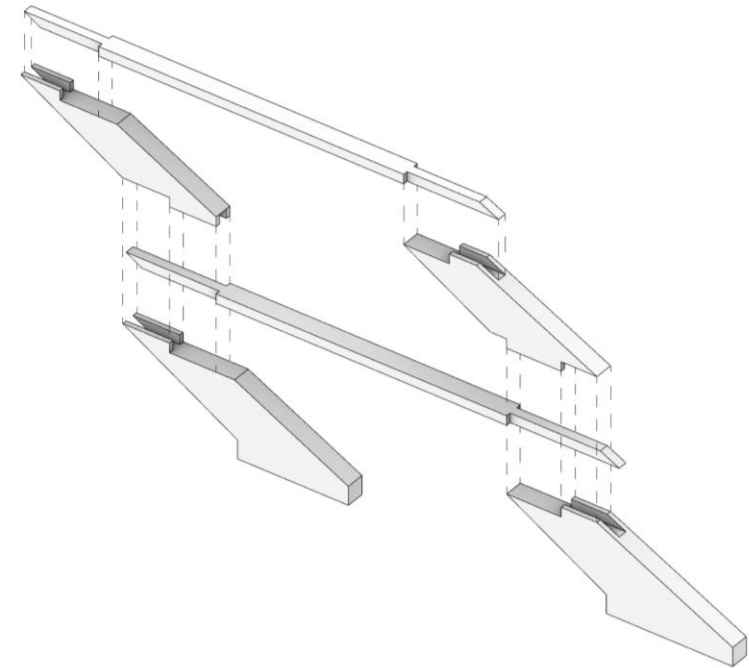
Structure sustainability concept

Timber, Prefabricated, Modular



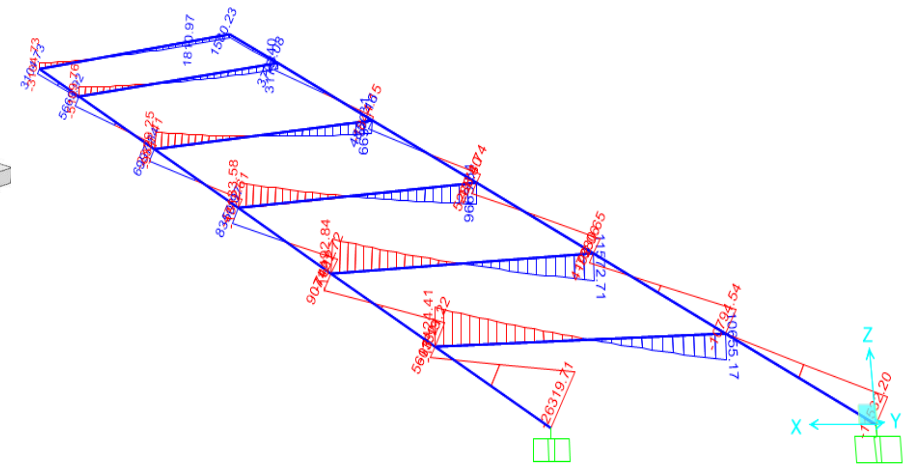
Prefabricated structure of GLULAM elements

Wood is used as a traditional and sustainable material for Finland.



Joint between the elements

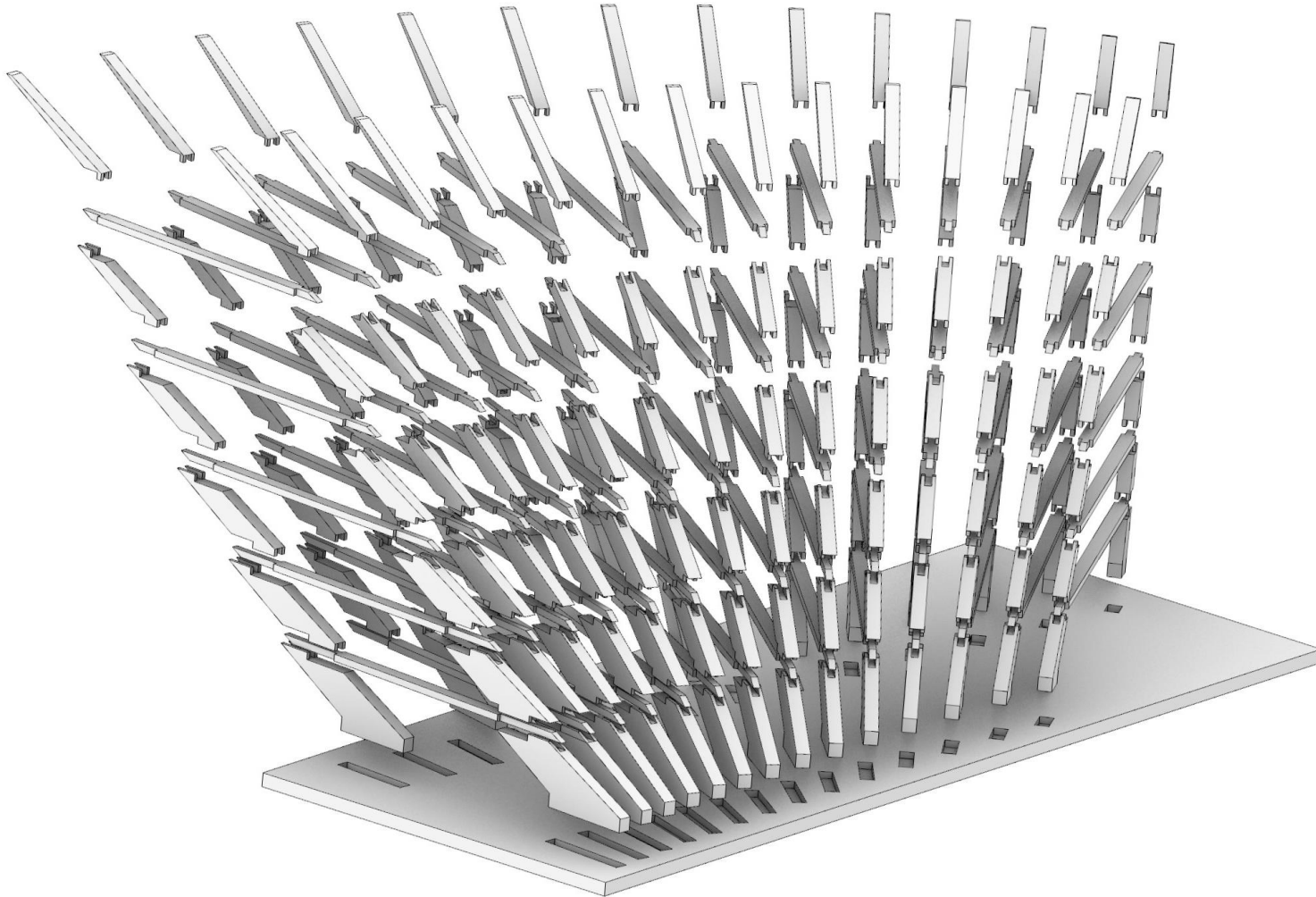
Fixed connection that enhances the efficiency of the structure



Statics scheme
Moment diagram

Structure sustainability concept

Timber, Prefabricated, Modular



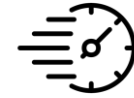
Wood is used as a traditional and sustainable material for Finland.

Prefabricated structure
of GLULAM elements

Advantages of prefab construction:



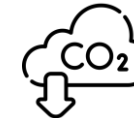
Precision



Speed



Lower cost



Fewer carbon emissions



Safer working site



Longevity



Recyclable

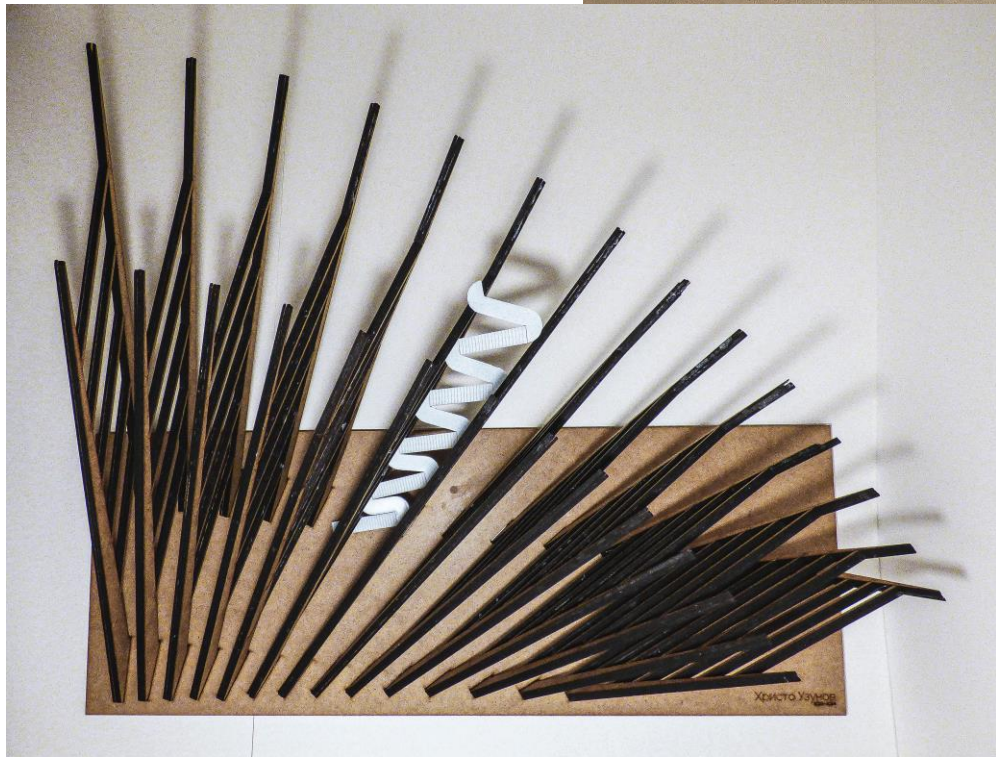


Off-site production

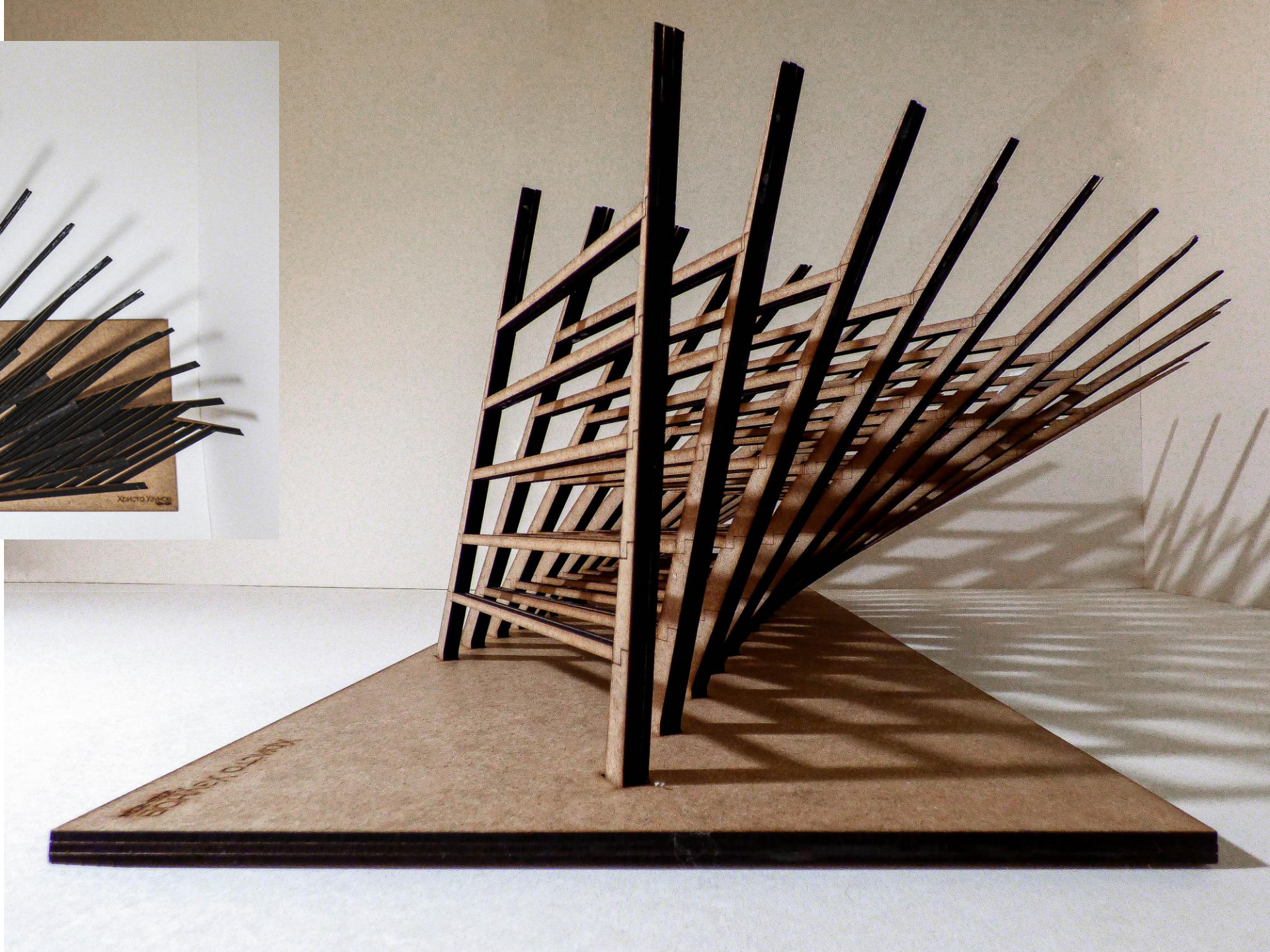


Structure prototype
1:100

UNITY
Hristo Uzunov
Saint-Gobain Architecture Student Contest 2024



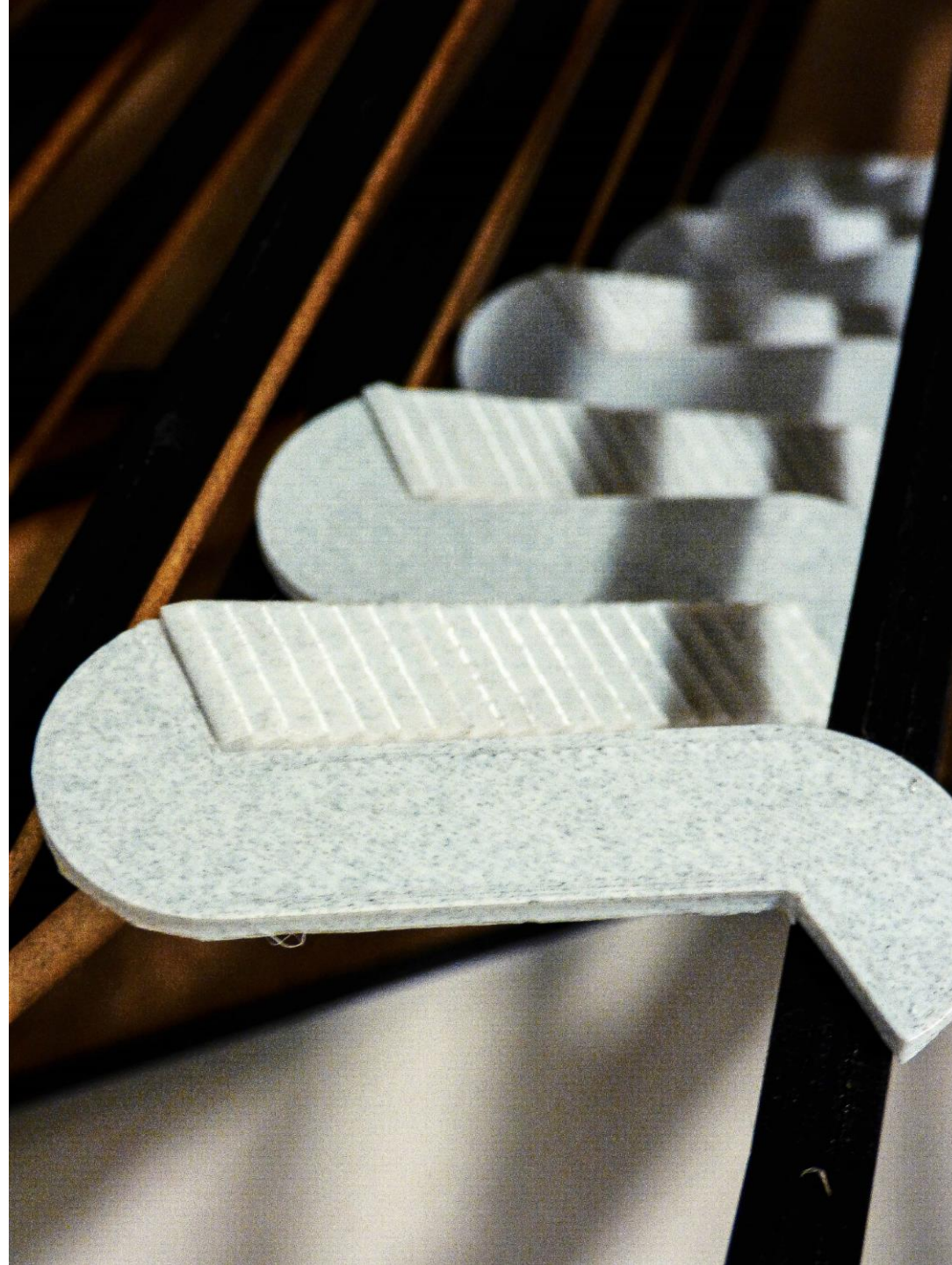
Timber frames
shape and orientation





Timber frame elements

Joints



Stair

shape and connection with
the frames

Energy efficiency calculations

Heating demand:

14,2 kWh/sq.m.
< 15 kWh/sq.m.

Lighting autonomy
 (300 Lux): **>60%**

(Complies with the requirements for sustainability)



International SG SAVE Energy needs verification

Building description

| | |
|----------------------|------------------------------|
| Building description | |
| Building name | |
| New / Refurbishment | New |
| Building type | |
| Surface | 6870,1 m ² |
| Volume | 10530,7 m ³ |
| Weather file | FIN_Helsinki.029740_IWEC.epw |

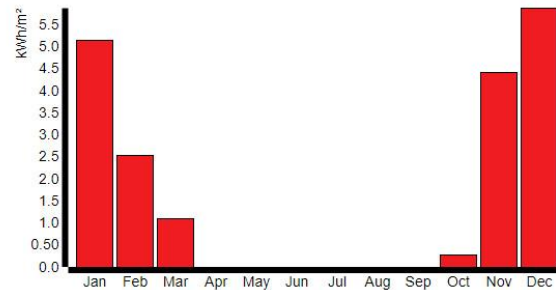
| Compliance | | | |
|---------------|--------------------------------|-----------------------------------|--------|
| Indicator | Building [kWh/m ²] | Limit value [kWh/m ²] | Comply |
| Heating needs | 14,2 | 15,0 | Yes |
| Cooling needs | 0,0 | 15,0 | Yes |

| Lighting autonomy 300 Lux | Autonomy [%] | Required [%] | Comply |
|---------------------------------|--------------|--------------|--------|
| TZ: SPACE 4 DAYLIGHTINGCONTROLS | 72,0 | 60,0 % | Yes |
| TZ: SPACE 7 DAYLIGHTINGCONTROLS | 61,3 | 60,0 % | Yes |

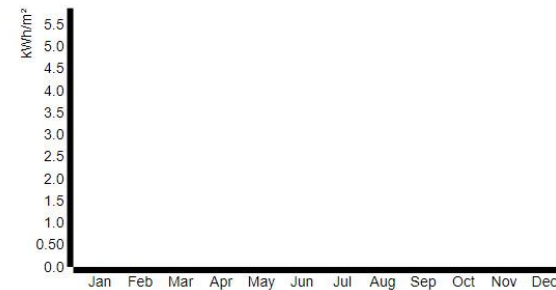
| Summer comfort (overheating % of season) | Overheating [%] | Required [%] | target [%] | Comply |
|--|-----------------|--------------|------------|--------|
| TZ: SPACE 4 | 0,0 | 10,0 % | 5,0 % | Yes |
| TZ: SPACE 7 | 0,0 | 10,0 % | 5,0 % | Yes |

Graphs

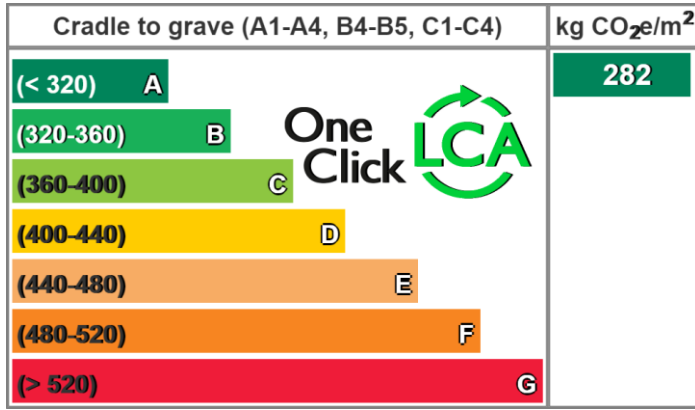
Heating needs



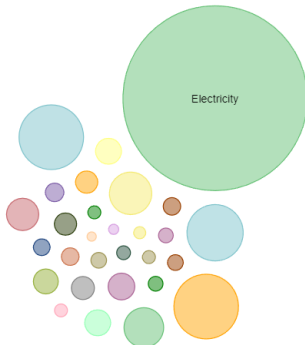
Cooling needs



Building life-cycle impact



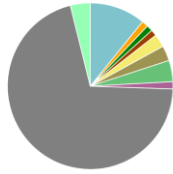
Bubble chart, total life-cycle impact by resource type and subtype, Global warming
 Hover your mouse over legends or the chart to highlight impacts. Bubble minimum and maximum sizes constrained for readability



- Ready-mix concrete, high strength
- Reinforcement for concrete (rebar)
- Sand, soil and gravel
- CLT, glulam and LVL
- Regular gypsum board
- Sealants (silicone and others)
- Wall and floor tiles
- Concrete slabs (hollow and solid)
- Structural steel and steel profiles
- Wood and wood board doors
- Natural stone
- Pipes (water, heating, sewage)
- HVAC equipment with refrigerant
- Elevators and escalators
- Water
- Ready-mix concrete for foundations and internal walls
- XPS (extruded polystyrene) insulation
- Ready-mix concrete for external walls and floors
- Stone wool insulation
- Plain wood/timber (softwood and hardwood)
- Mortar (masonry/bricklaying)
- Plastic membranes
- Bitumen and other roofing
- Glass facades and glazing
- Paints, coatings and lacquers
- HVAC components and equipment
- Ventilation ducts and channels
- Energy production systems from renewable energy
- Electricity

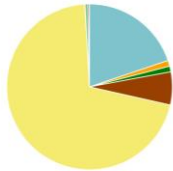
Global warming kg CO₂e - Classifications

- 1.1 Foundations (substructure) - 10.9%
- 1.2.2 Upper floors - 1.3%
- 1.3.2 Internal walls, partitions and doors - 1.2%
- 2.1.5 Floor coverings and finishes - 1.2%
- 2.3 Energy system - 2.5%
- 2.3.1 Heating plant and distribution - 3.0%
- 2.3.3 Electricity generation and distribution - 4.1%
- 3. External works - 1.4%
- Electricity use - 70.6%
- Other classifications - 3.9%



Global warming kg CO₂e - Life-cycle stages

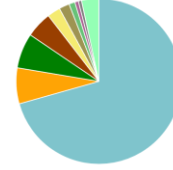
- A1-A3 Materials - 19.8%
- A5 Construction - 1.1%
- B6 Energy - 70.6%
- C2 Waste transport - 0.5%
- C4 Waste disposal - 0.0%
- A4 Transport - 1.1%
- B4-B5 Replacement - 6.4%
- B7 Water - 0.1%
- C3 Waste processing - 0.3%



Global warming kg CO₂e - Resource types

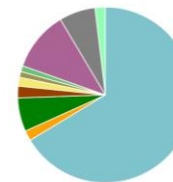
This is a drilldown chart. Click on the chart to view details

- Electricity - 70.6%
- HVAC components and equipment - 7.0%
- Ready-mix concrete for foundations and internal walls - 6.9%
- Ready-mix concrete, high strength - 5.1%
- Energy production systems from renewable energy - 2.5%
- CLT, glulam and LVL - 2.0%
- Glass facades and glazing - 1.2%
- Stone wool insulation - 0.7%
- Paints, coatings and lacquers - 0.6%
- Other resource types - 3.4%

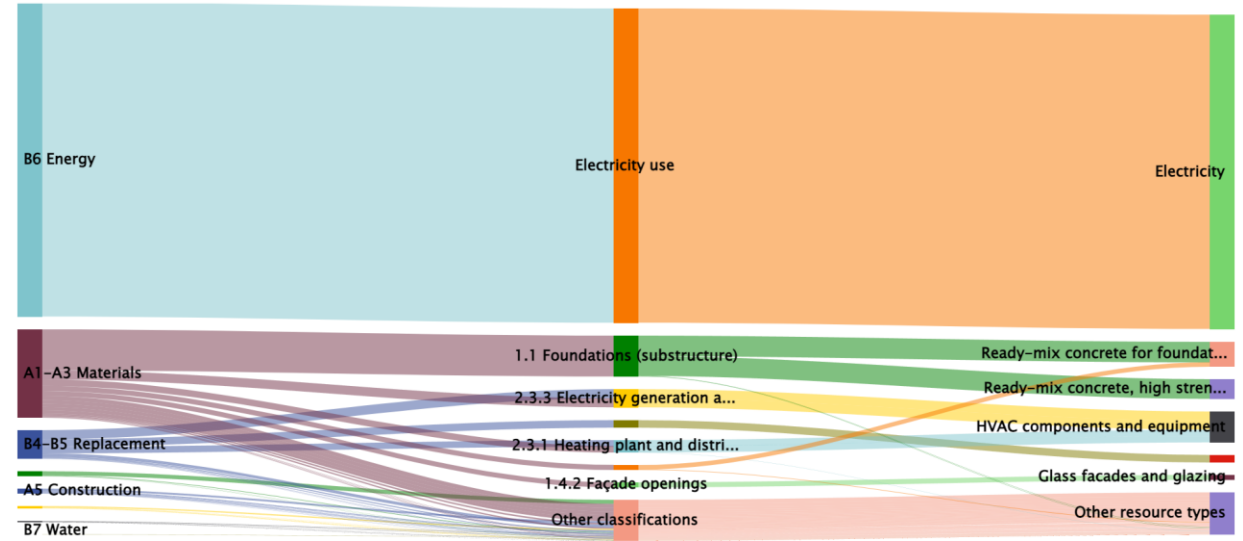


Mass kg - Classifications

- 1.1 Foundations (substructure) - 66.4%
- 1.2 Load bearing structural frame - 1.9%
- 1.2.2 Upper floors - 6.2%
- 1.2.3 External walls - 2.2%
- 1.3.2 Internal walls, partitions and doors - 1.6%
- 1.3.3 Stairs and ramps - 1.1%
- 2.1.5 Floor coverings and finishes - 1.1%
- 3. External works - 11.1%
- Water consumption - 6.7%
- Other classifications - 1.9%

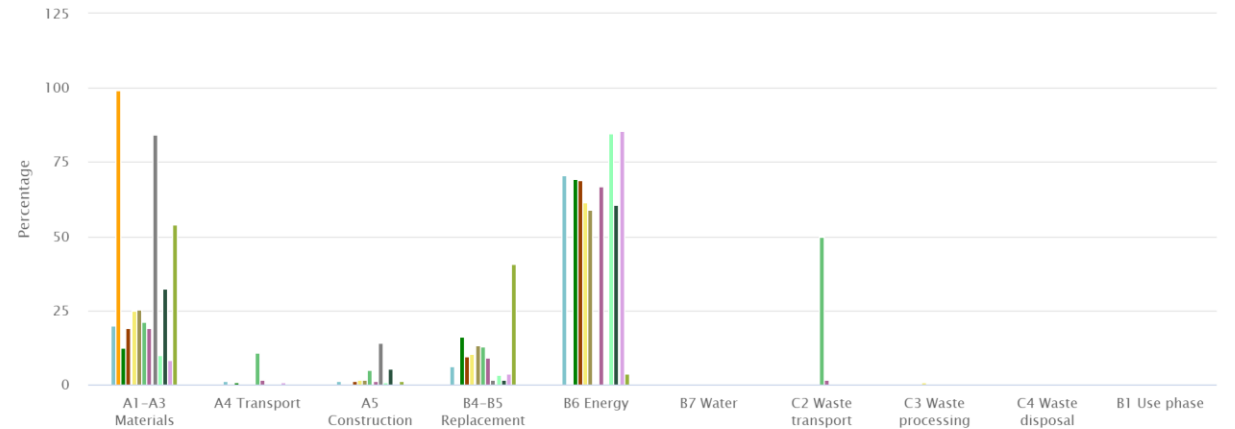


Sankey diagram, Global warming

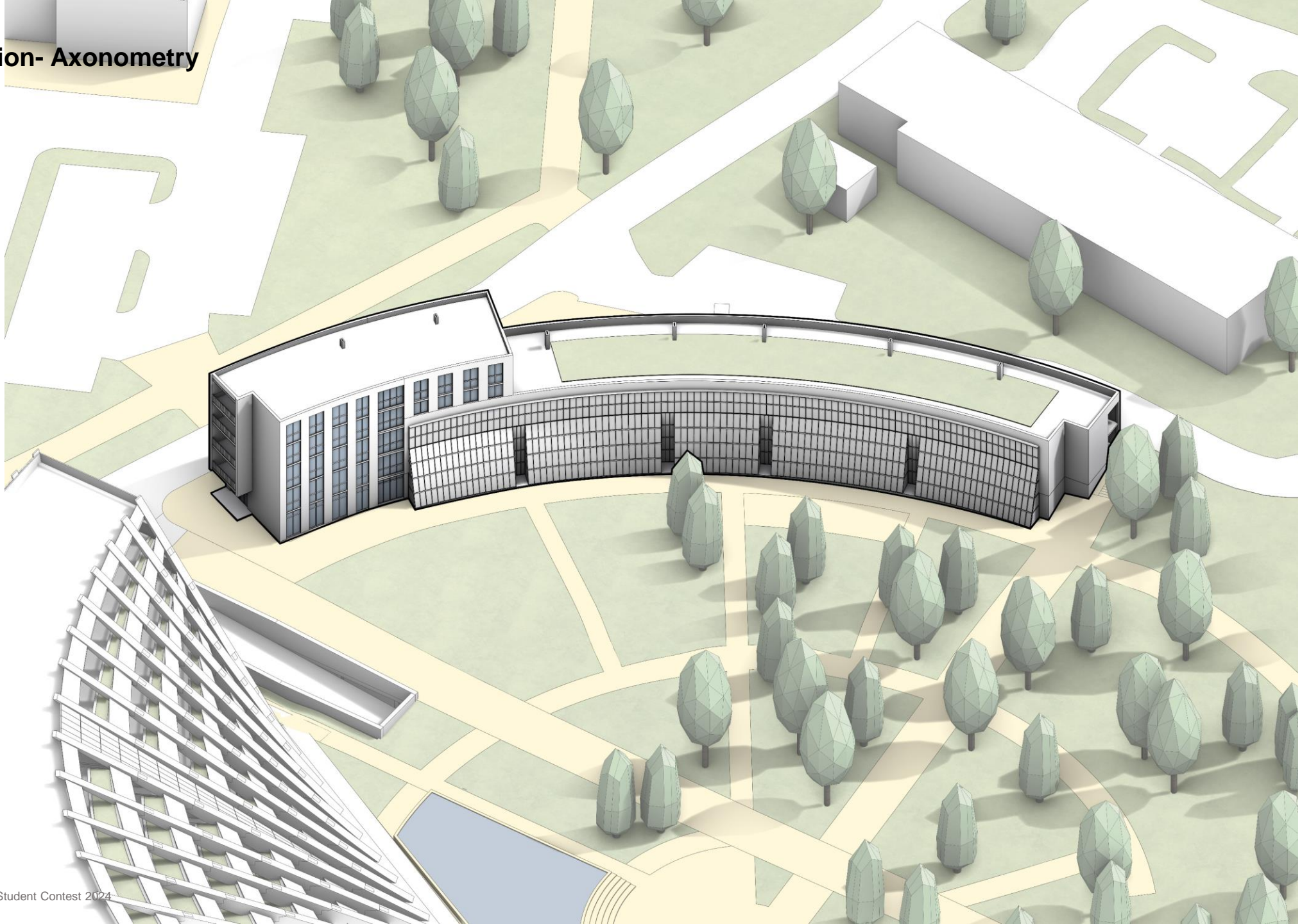


Results by life-cycle stage

- GWP
- AP
- ADPE
- Total use of primary energy ex. raw materials
- Bio-CO₂ storage
- EP
- ADPF
- PERT
- ODP
- POCP
- PERM
- PENRT



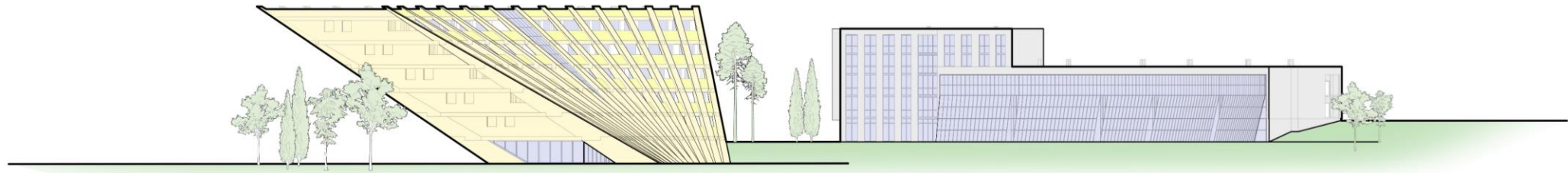
Renovation- Axonometry





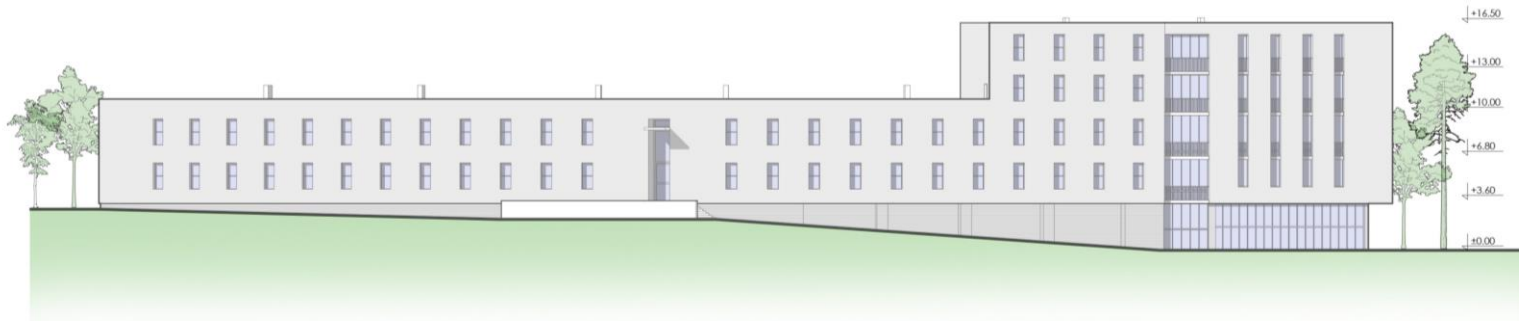


Connection between the buildings



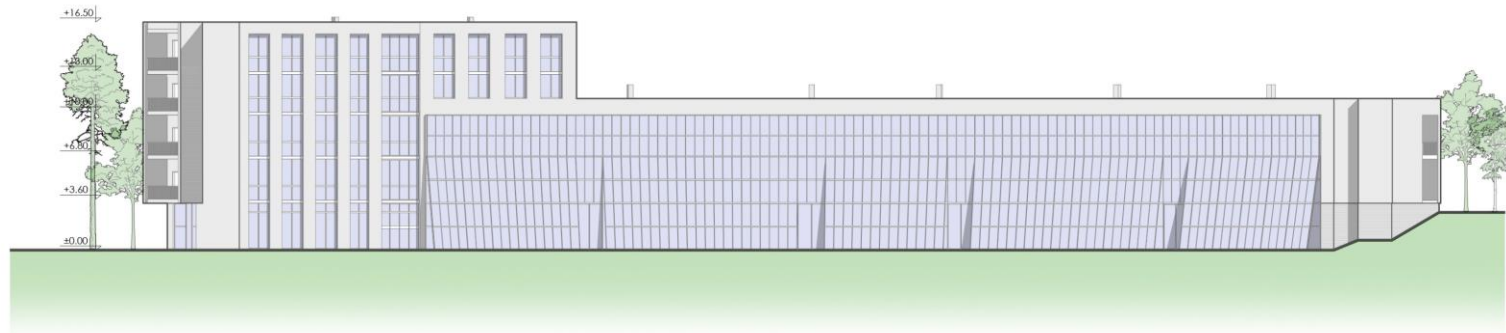
Silhouette

The renovation of the office building fits in the concept of **UNITY** and respects the appearance of what has already been built.



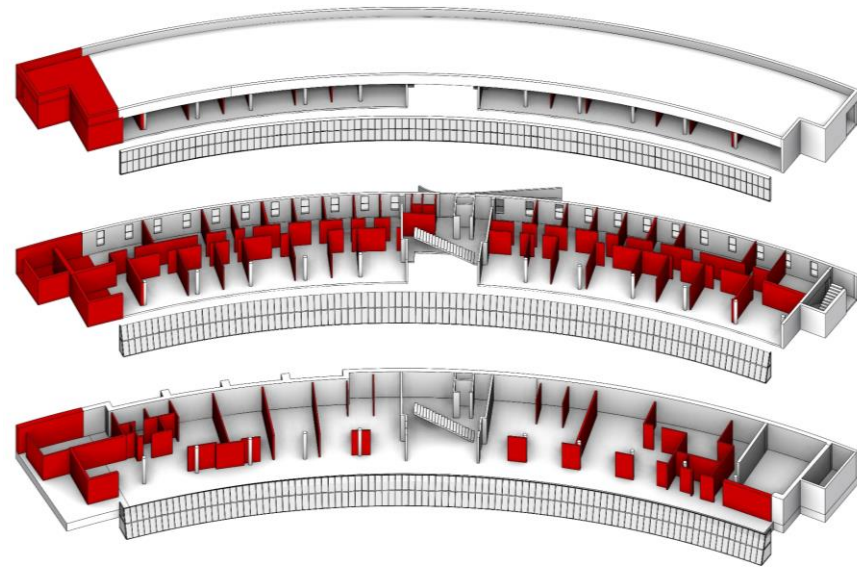
The annex follows the continuation of the old volume.

East facade

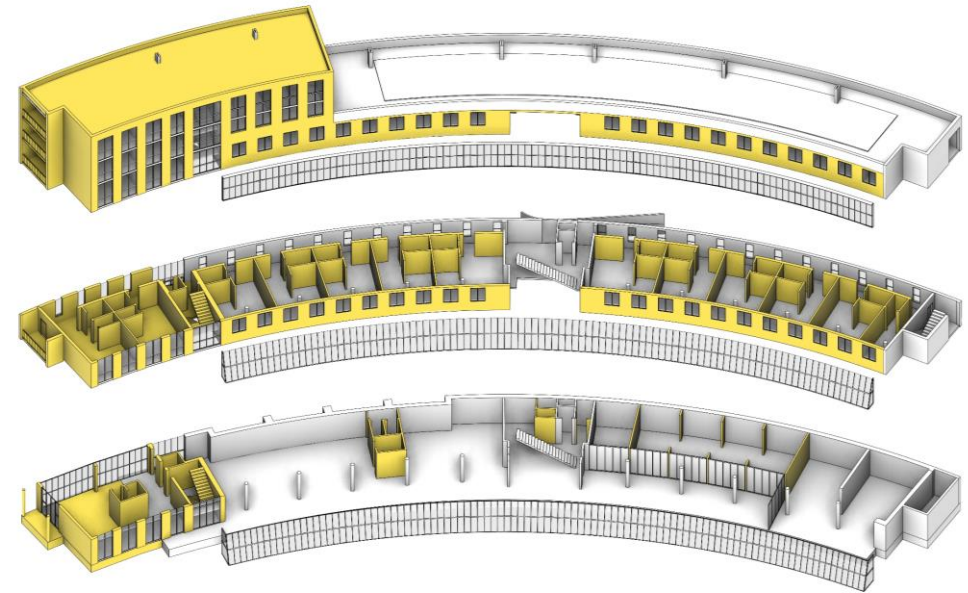


West facade

Reuse strategy



Demolition



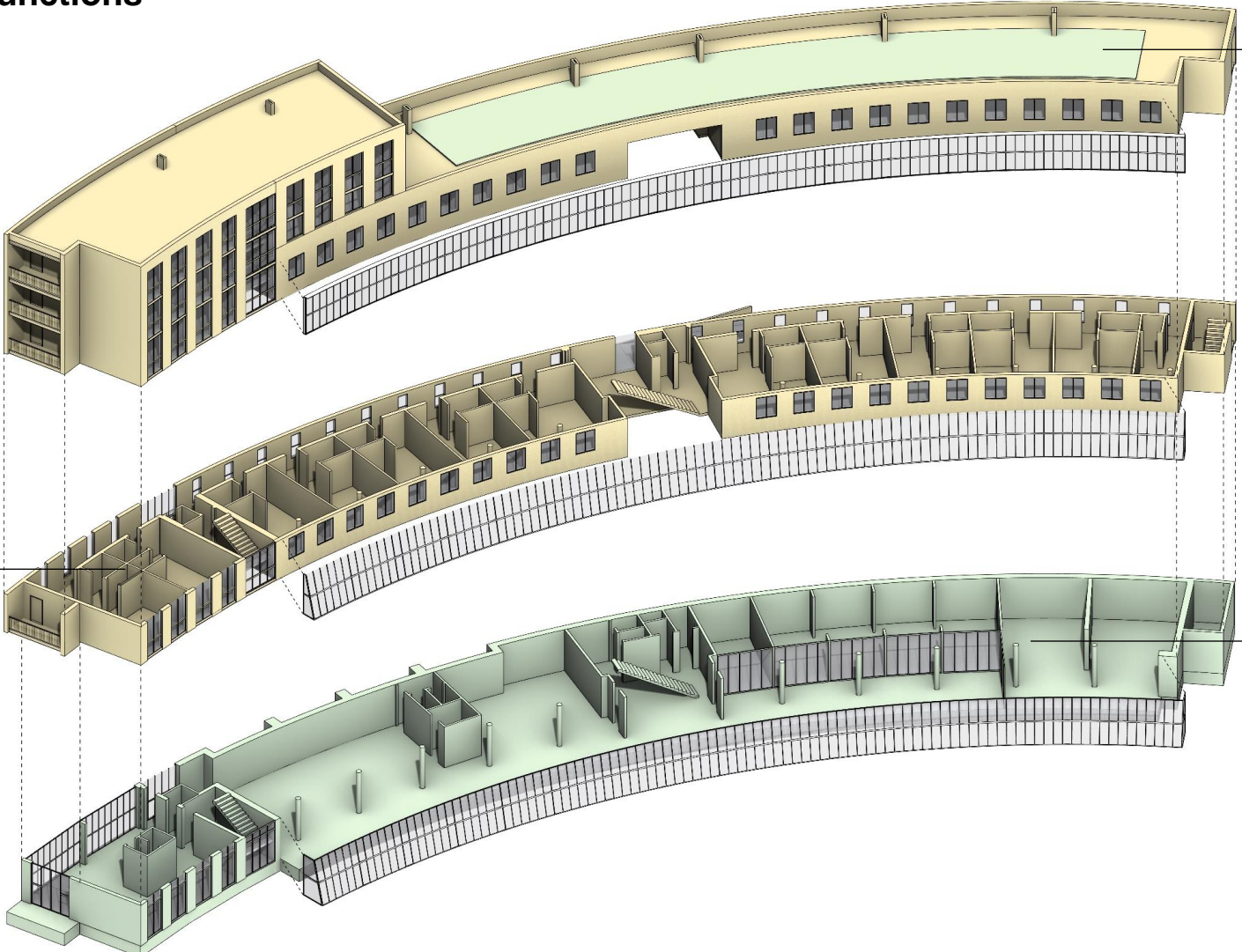
New elements

Legend:


- Preserved
- Demolished
- New

Dismantling operations are minimal and are mostly interior in order to preserve the façade as much as possible and adapt the function. An annex of the building has been added so that the building take part of the **UNITY** concept.

Renovation Residential & Public Functions



Residential floors

- 4 floors
 - 32 studios
- 

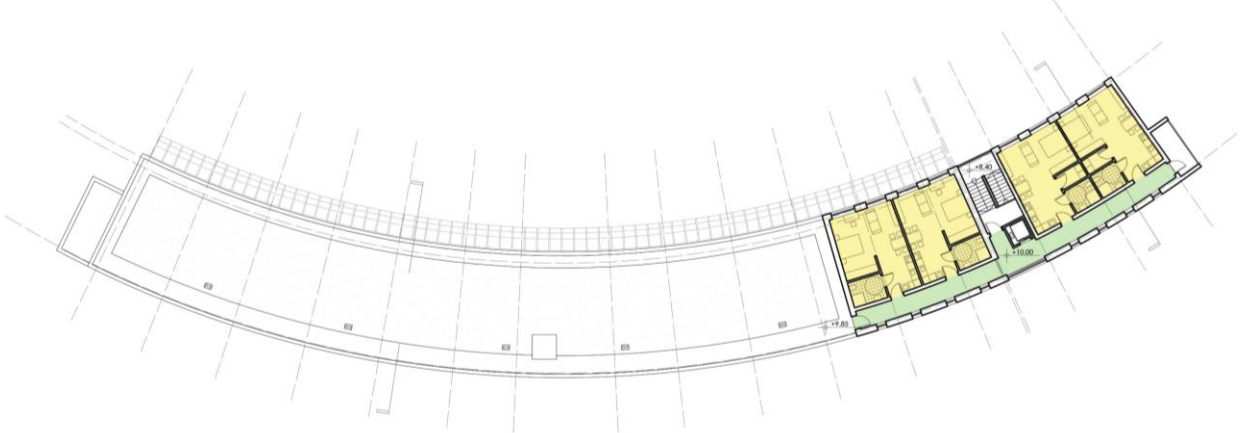
Green roof



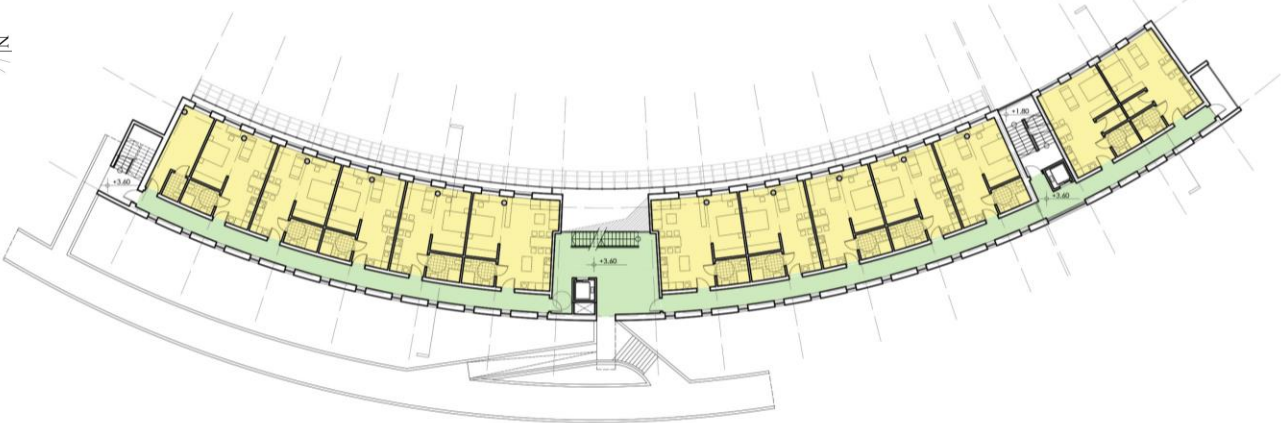
Public ground floor

- Reception 
- Bike room 
- Cafe 
- Common work space 
- Meeting rooms 
- Reading area 

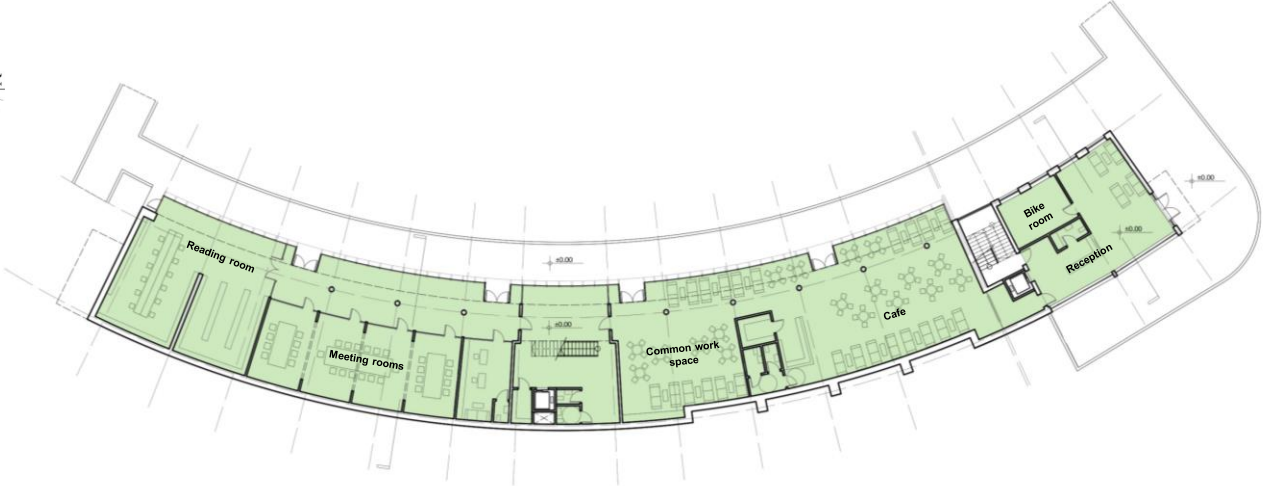
Floor plans



Floor plan 4, 5 floors


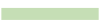


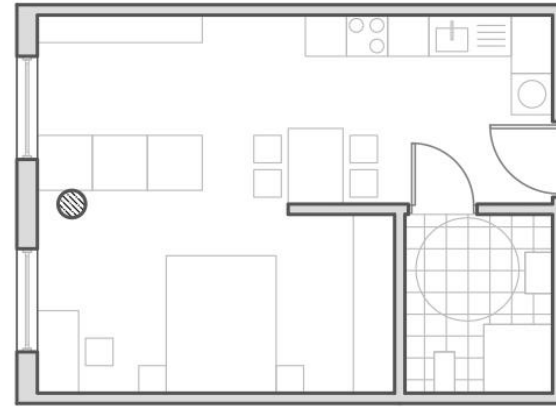
Floor plan 2, 3 floors







Floor plan ground floor

Legend:

-  Heated indoor private spaces
-  Heated indoor public spaces



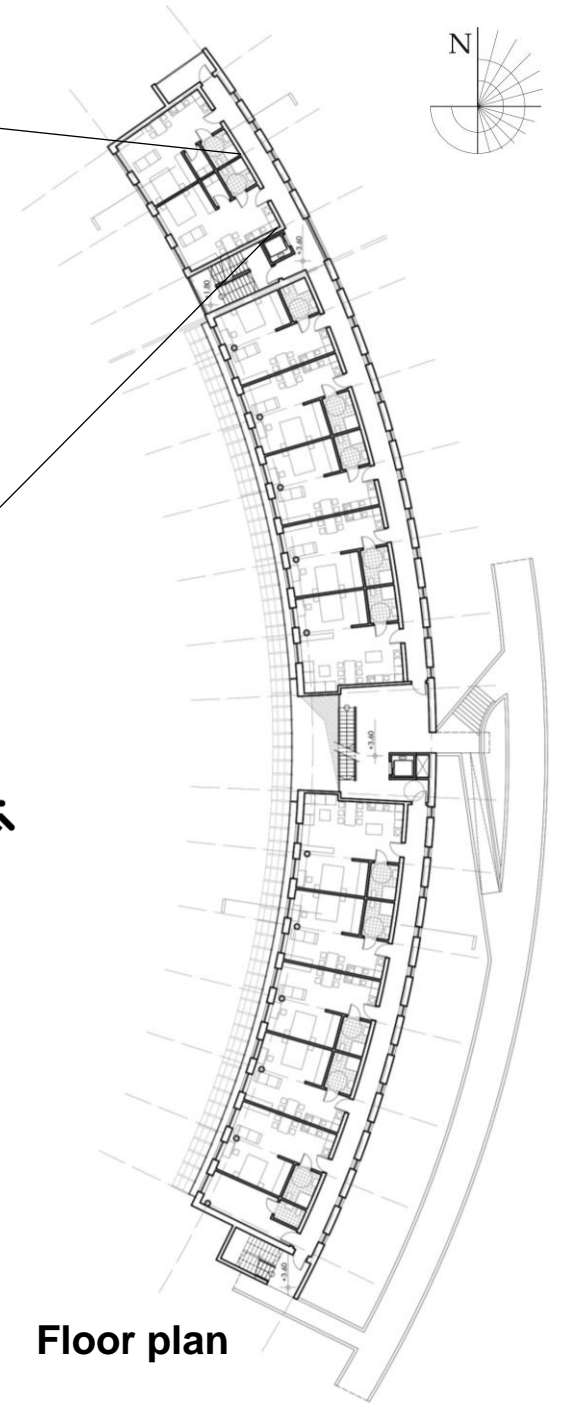
Living unit:

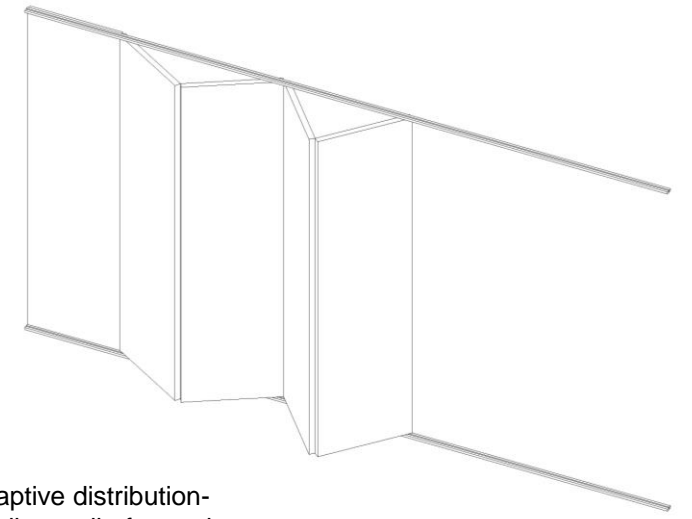
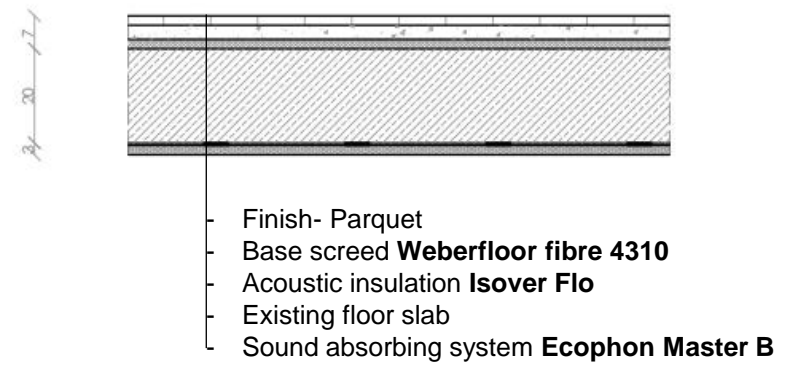
- 45 sq.m. \uparrow m²
- View to the garden 
- Individual accessible bathroom 
- Individual kitchen 
- Zone day and zone night 
- Designed for temporary or permanent accommodation of students, visiting lecturers and researchers.

$U_{\text{exterior wall}} = 0,12 \text{ W/m}^2\text{K}$

$U_{\text{roof}} = 0,069 \text{ W/m}^2\text{K}$

Floor plan





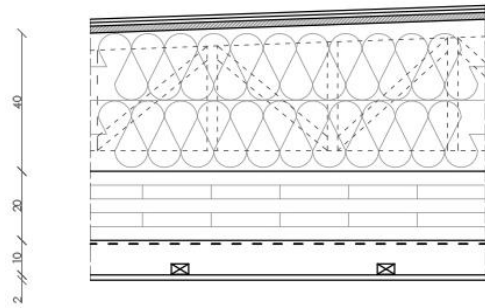
Adaptive distribution-
Folding wall of sound
absorbing panels

Meeting room

Details & Material usage



Annex roof layers



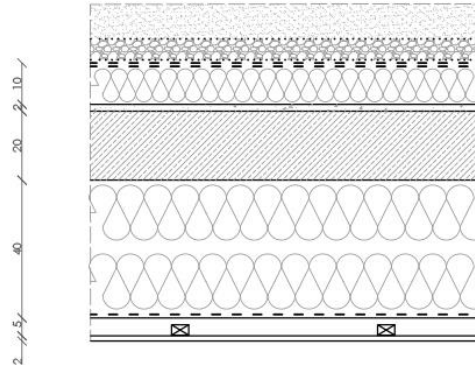
Outside

- Hydro insulation Isover Bituver- 2 layers
- Plywood decking
- 2*200mm. Thermal insulation Isover Premium 33 + timber truss
- 200mm. CLT Panel
- Climate membrane Isover Vario KM Duplex
- Installations layer
- Wooden profiles
- Gypsum wallboard Rigips RB

Inside

$$U = 0,069 \text{ W/m}^2\text{K}$$

Reconstruction roof layers



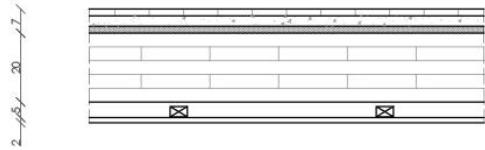
Outside

- Soil
- FILTER LAYER made of a non-woven polyester fabric.
- DRAINING LAYER composed of round gravel and clayey material.
- FILTERING LAYER made of a non-woven polyester fabric.
- HDPE Membrane
- Hydro insulation Isover Bituver Antiradice System
- 100mm. Thermal insulation Isover Superbac Roofline G3
- Cement mortar Weberfloor fibre 4310
- Existing structure
- 2*200mm. Thermal insulation Isover Premium 33
- Climate membrane Isover Vario KM Duplex
- Installation layer
- Wooden profiles
- Gypsum wallboard Rigips RB

Inside

$$U = 0,069 \text{ W/m}^2\text{K}$$

Annex floor slab layers



Upper floor

- Finish- Parquet
- Base screed Weberfloor fibre 4310
- Acoustic insulation Isover Flo
- CLT Panel
- Wooden profiles
- Gypsum wallboard Rigips RB

Lower floor

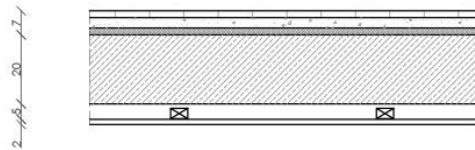
Outside

- Grey paint Webersil TF
- Weber PR 310 Primer
- Leightweight adhesive render coat Weberend LAC
- Weber standard Meshcloth
- Thermal insulation Isover Extreme 31
- CLT Panel
- Vapor retarder Isover Vario KM Duplex
- Aluminum profiles
- Gypsum wallboard Rigips RB

Inside

$$U = 0,12 \text{ W/m}^2\text{K}$$

Reconstruction floor slab layers

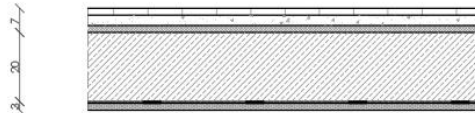


Upper floor

- Finish- Parquet
- Base screed Weberfloor fibre 4310
- Acoustic insulation Isover Flo
- Existing structure
- Wooden profiles
- Gypsum wallboard Rigips RB

Lower floor

Meeting room ceiling layers

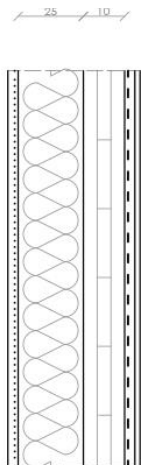


Upper floor

- Finish- Parquet
- Base screed Weberfloor fibre 4310
- Acoustic insulation Isover Flo
- Existing structure
- Connecting absorber glue
- Sound absorbing system Ecophon Master B

Lower floor

Annex exterior wall layers



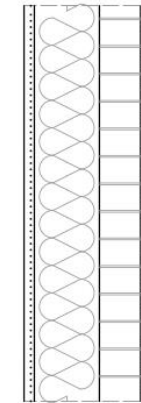
2 // 10 // 2



- White paint Weber Premium Gold
- Adhesive render coat Weberend LAC
- Gypsum wallboard Rigips RB
- Thermal insulation Isover AKUSTO
- Wooden stud
- Gypsum wallboard Rigips RB
- Adhesive render coat Weberend LAC
- White paint Weber Premium Gold

Interior wall layers

25 // 12



Outside

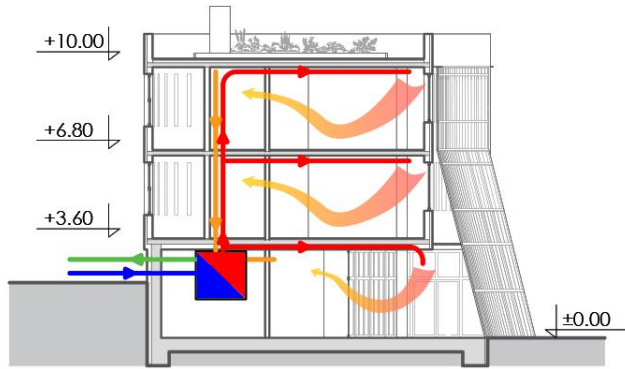
- Finish- paint Webersil TF
- Weber PR 310 Primer
- Leightweight adhesive render coat Weberend LAC
- Weber standard Meshcloth
- Thermal insulation Isover Extreme 31
- Existing structure
- Vapor retarder Isover Vario KM Duplex
- Wooden profiles
- Gypsum wallboard Rigips RB

Inside

$$U = 0,12 \text{ W/m}^2\text{K}$$

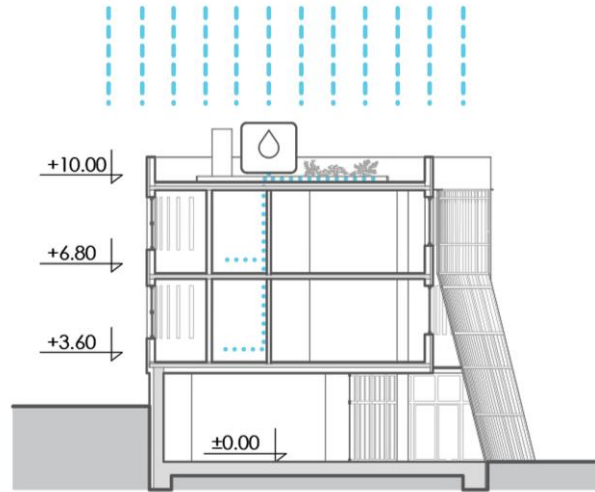
Reconstruction exterior wall layers

Technical systems



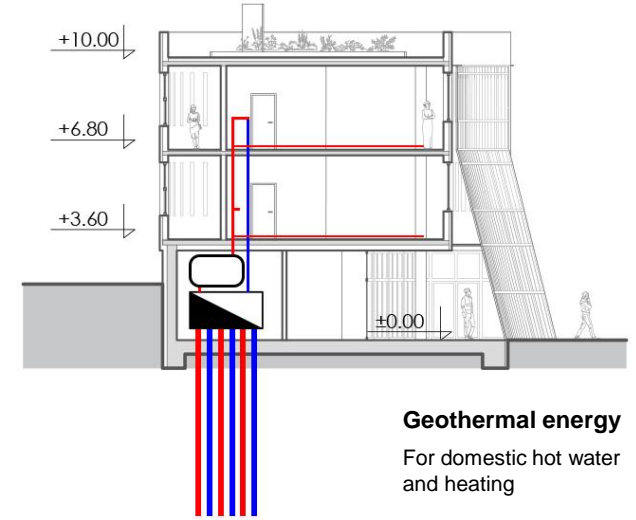
Ventilation with recuperator

- Fresh supply air
- Warm extract air
- Fresh outside air
- Exhausted air



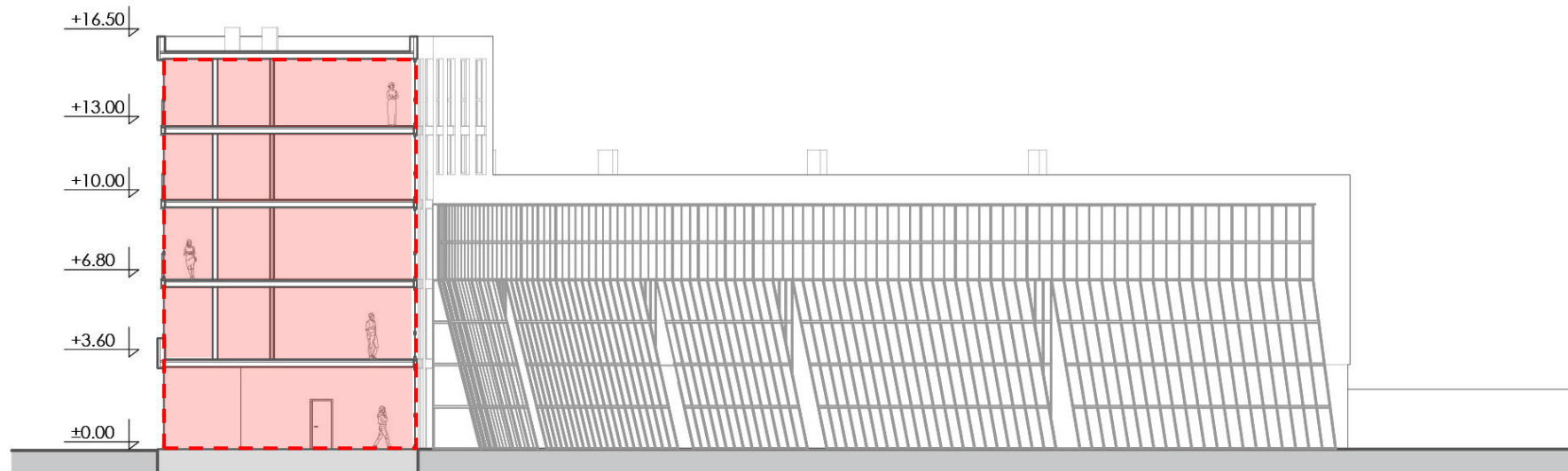
Rainwater usage

For blackwater and irrigation



Geothermal energy

For domestic hot water and heating

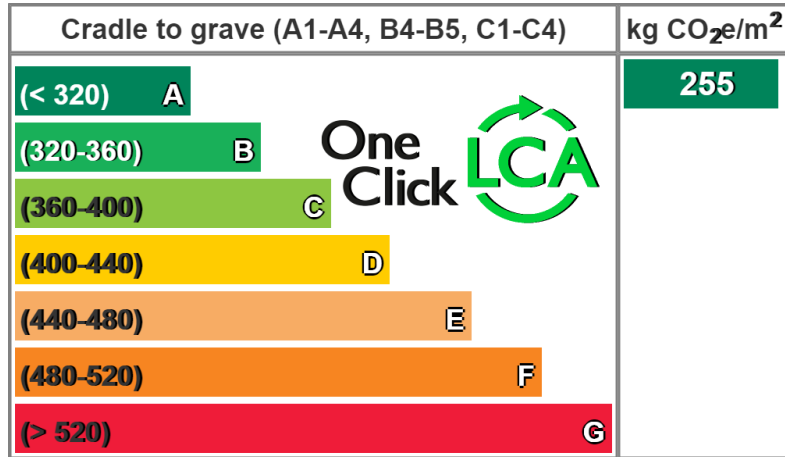


Annex- Section

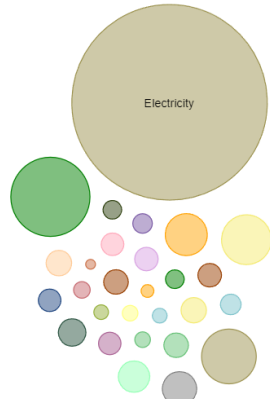
— Heated indoor spaces

- - - Airtightness layer $n_{50} < 0,6$ 1/h

Building life-cycle impact



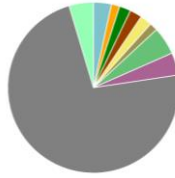
Bubble chart, total life-cycle impact by resource type and subtype, Global warming
 Hover your mouse over legends or the chart to highlight impacts. Bubble minimum and maximum sizes constrained for readability



- Ready-mix concrete for lightweight applications (domestic and auxiliary)
- Ready-mix concrete for external walls and floors
- Ready-mix concrete for foundations and internal walls
- Plastic membranes
- Wood and wood board doors
- Plain wood/timber (softwood and hardwood)
- Sealants (silicone and others)
- Wall and floor tiles
- Paints, coatings and lacquers
- Other precast concrete products
- Structural steel and steel profiles
- Wooden frame windows
- Pipes (water, heating, sewage)
- Electricity
- EPS (expanded polystyrene) insulation
- Reinforcement for concrete (rebar)
- CLT, glulam and LVL
- Glass wool insulation
- Regular gypsum board
- Stone wool insulation
- Mortar (masonry/bricklaying)
- Resilient flooring
- Oriented strand board (OSB)
- Textiles and wallpapers
- Metal and industrial doors
- HVAC components and equipment
- Elevators and escalators
- Water

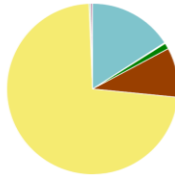
Global warming kg CO_{2e} - Classifications

- Not defined - 3.4%
- 1.2.2 Upper floors - 1.6%
- 1.2.3 External walls - 2.2%
- 1.3.2 Internal walls, partitions and doors - 2.3%
- 1.4.2 Façade openings - 2.2%
- 2.1.5 Floor coverings and finishes - 1.5%
- 2.3.1 Heating plant and distribution - 5.2%
- 2.3.3 Electricity generation and distribution - 4.3%
- Electricity use - 72.8%
- Other classifications - 4.6%



Global warming kg CO_{2e} - Life-cycle stages

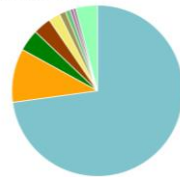
- A1-A3 Materials - 15.9%
- A5 Construction - 1.1%
- B6 Energy - 72.8%
- C2 Waste transport - 0.2%
- C4 Waste disposal - 0.0%
- A4 Transport - 0.2%
- B4-B5 Replacement - 9.4%
- B7 Water - 0.1%
- C3 Waste processing - 0.3%



Global warming kg CO_{2e} - Resource types

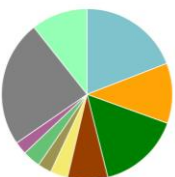
This is a drilldown chart. Click on the chart to view details

- Electricity - 72.8%
- HVAC components and equipment - 10.1%
- CLT, glulam and LVL - 4.1%
- Elevators and escalators - 3.4%
- Wooden frame windows - 2.2%
- Wood and wood board doors - 1.2%
- Regular gypsum board - 0.9%
- Plain wood/timber (softwood and hardwood) - 0.6%
- Ready-mix concrete for foundations and internal walls - 0.5%
- Other resource types - 4.1%

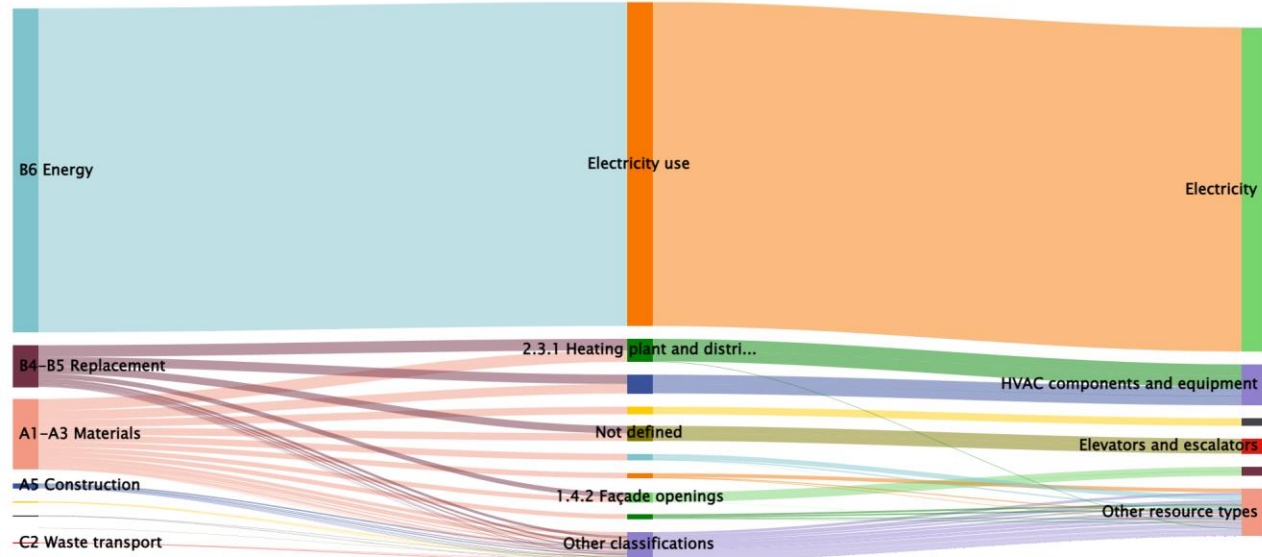


Mass kg - Classifications

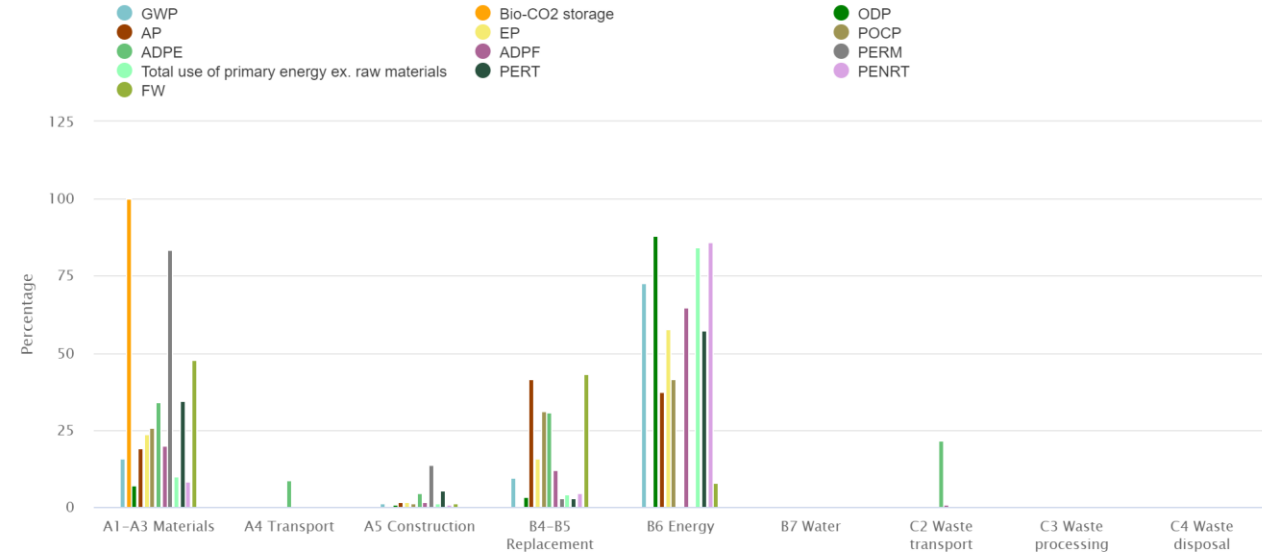
- 1.1 Foundations (substructure) - 19.1%
- 1.2.2 Upper floors - 11.4%
- 1.2.3 External walls - 15.6%
- 1.3.2 Internal walls, partitions and doors - 7.6%
- 1.4.1. External wall systems, cladding and shading devices - 3.3%
- 1.4.2 Façade openings - 2.6%
- 2.1.5 Floor coverings and finishes - 3.4%
- 2.3.1 Heating plant and distribution - 2.4%
- Water consumption - 23.9%
- Other classifications - 10.7%



Sankey diagram, Global warming



Results by life-cycle stage



The museum of Viikki renovation

Biodiverse “bird paradise in the city”.

The location of the Viikki neighborhood in relation to the nearby nature park suggests its strong connection to nature. The museum, a massive stone building, penetrates the space of nature, which is most likely the reason for its current state.

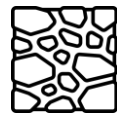
Location



Viikki and the nature park

Legend:

-  Helsinki
-  Nature park
-  Viikki




A peaceful transition between nature and stone.

Current state

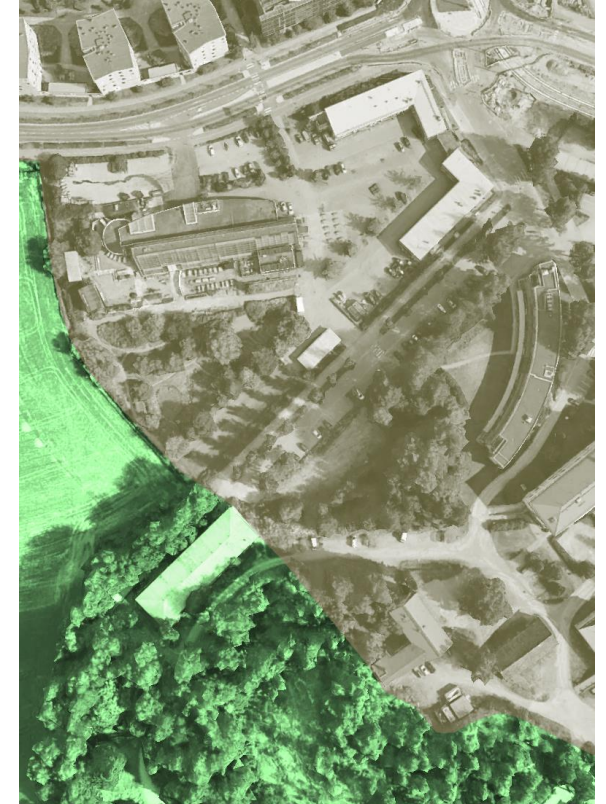


 Nature

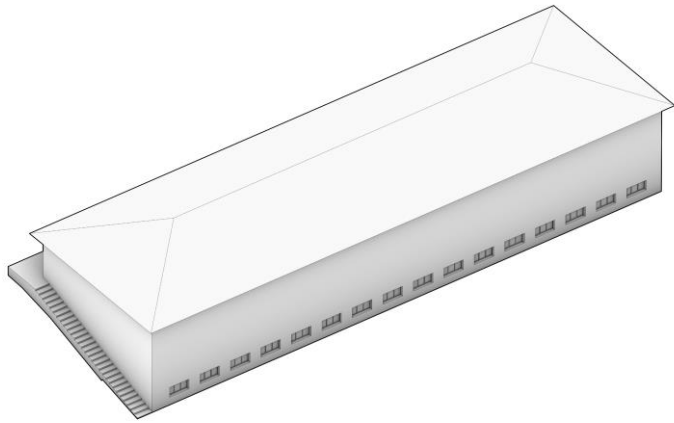
 Civilization

 The museum

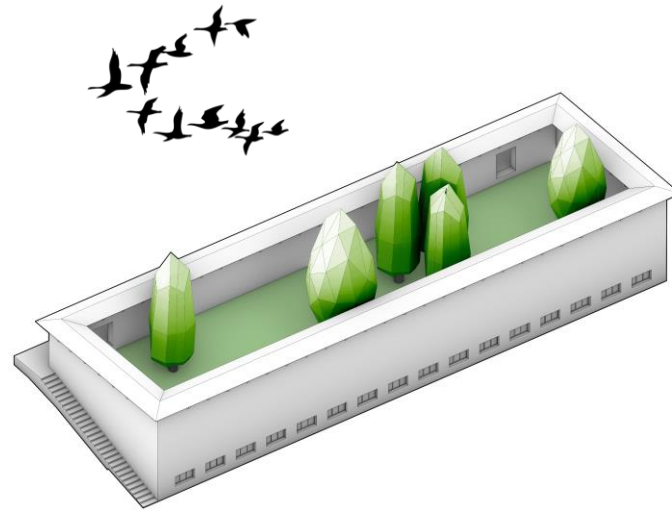
New development



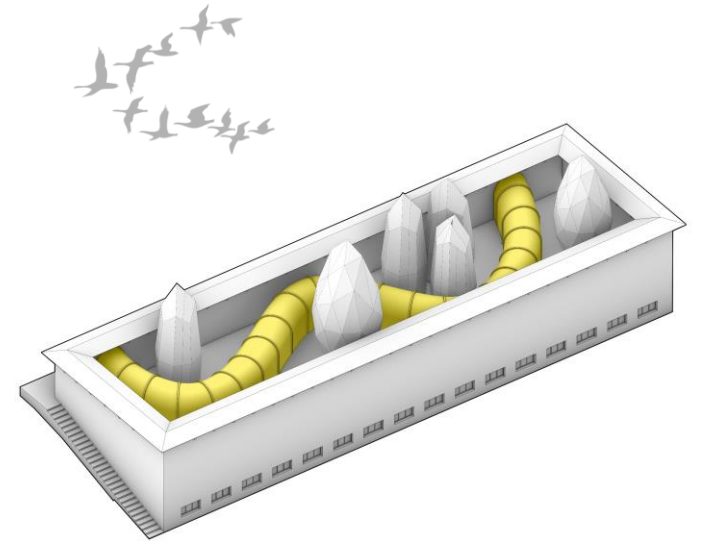
Museum Concept



The original stone structure
is preserved



Let the nature enter



Make room for the people

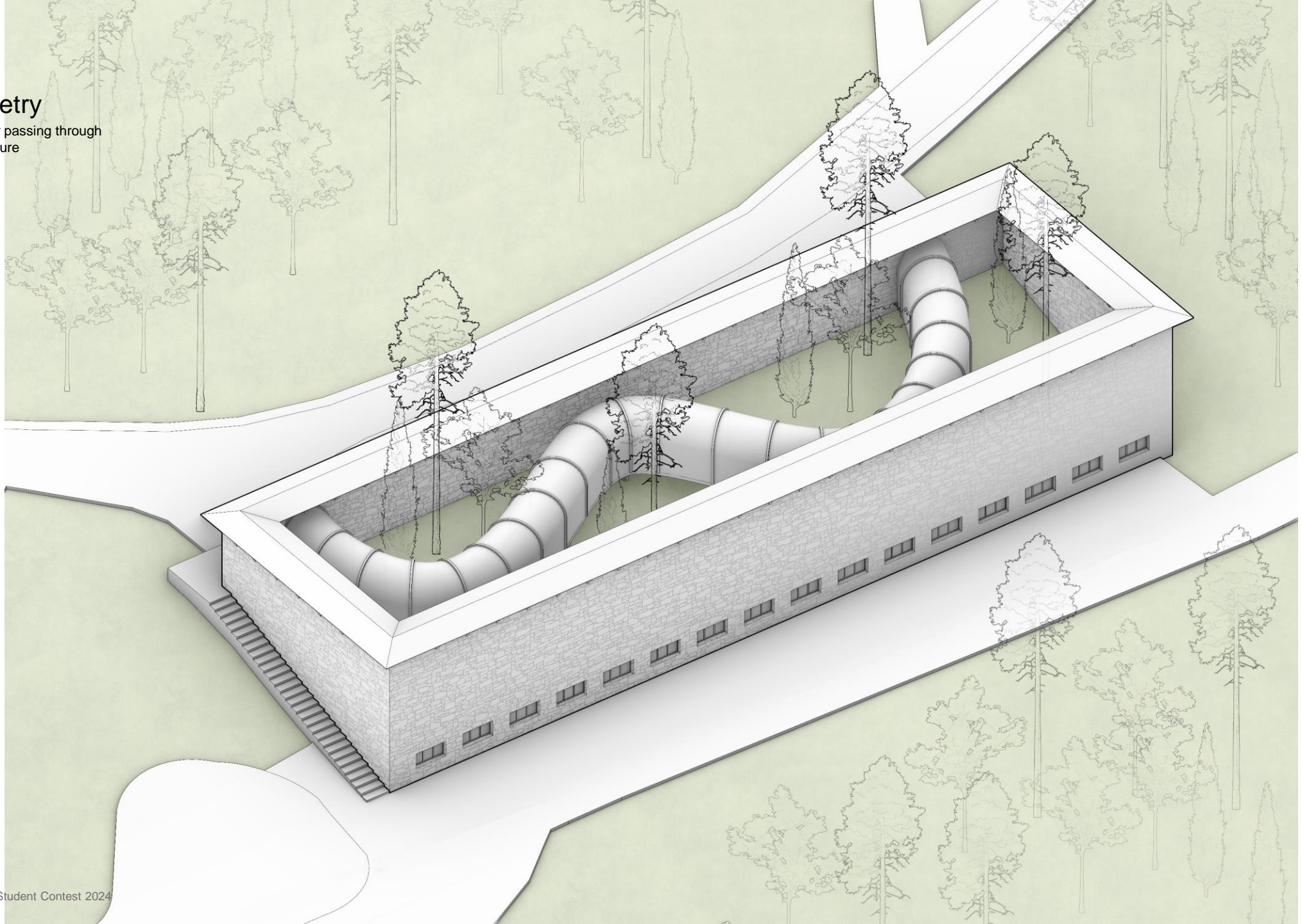
A glass corridor passing through
the stone structure

The concept for the conservation of the museum of Viikki is the building to become a transition between nature and civilization- a space where there is room for all. Thus the museum will become part of “the bird paradise in the center of the city” and will preserve it’s function of a museum- museum for **live, free, migrating birds.**

Result

Axonometry

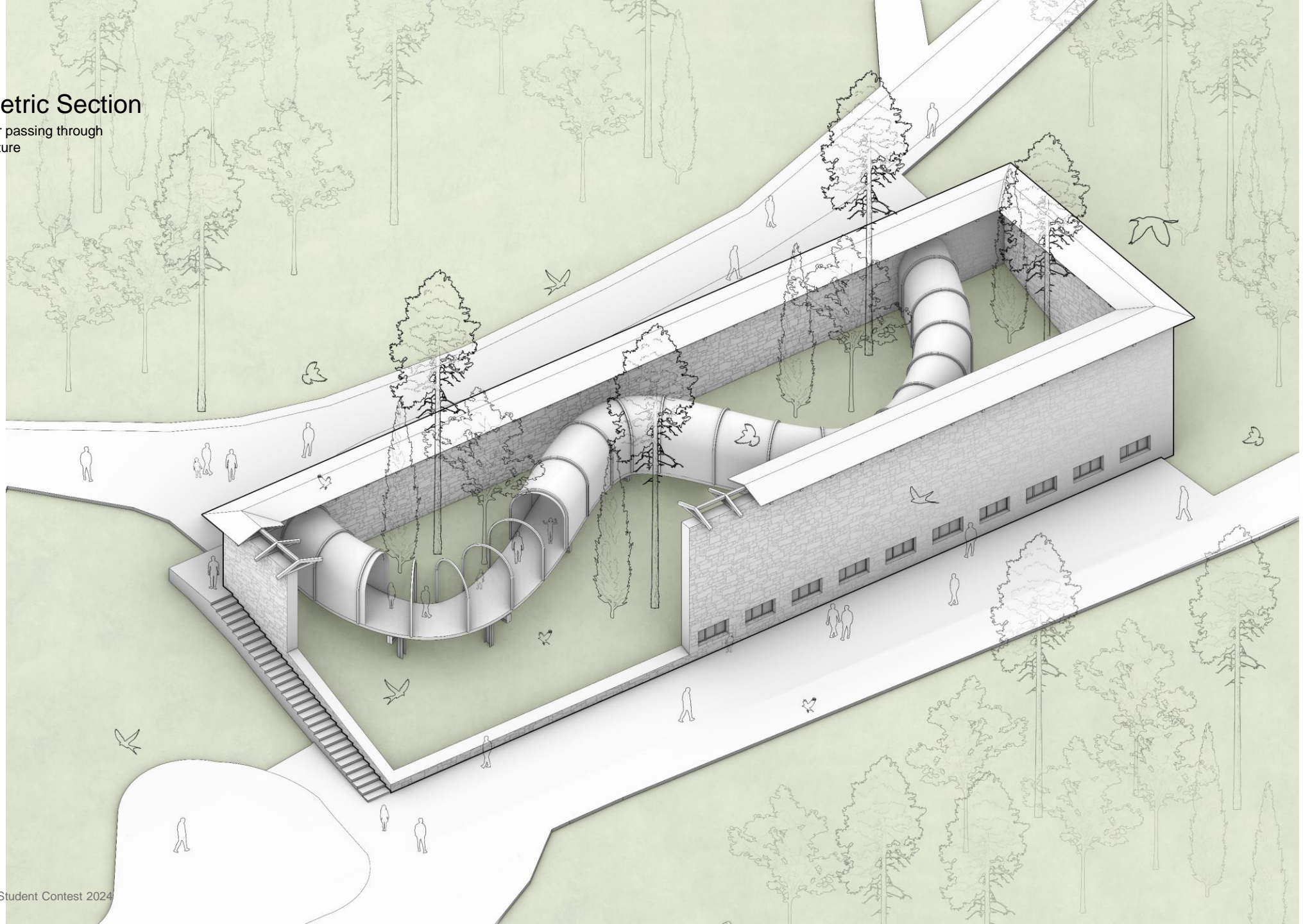
A glass corridor passing through the stone structure



Result

Axonometric Section

A glass corridor passing through the stone structure



SUSTAINABILITY

CONNECTIVITY

BIODIVERSITY

UNITY

ZERO ENERGY

PREFAB

HABITAT

