

CIRCULAR TOWER

As the essence of contemporary architecture has inevitably to integrate sustainability needs, the Circular Tower's building envelope intertwines with transparent volumes used as **greenhouses**.

The latter represent a **bioclimatic system**, able to provide pleasant natural light, and ensure high thermal comfort to the internal space. At the same time, thanks to the photovoltaic glass they are made of, and to their orientation, they are able to supply energy granting both self-consumption and self-sufficiency.

The Circular Tower is situated in a **green area** between the anthropic element and the river. A further conditioning element is the cycling path which allows to have a direct access to the building's ground floor, where the hall is located.

The upper floors, destined to research activities, present an **elevator** which enables to easily make the containers, hosting particular laboratories, interchangeable. An exhibition space and two events rooms locate right below the panoramic terrace.

The core idea behind the development of the Circular Tower is a particular attention towards the most compelling environmental and sustainability needs, in fact reflected in the choice of recycled and recyclable materials, and in the building system made of structural wood. The latter, differently from concrete and steel systems, presents a quantity of CO₂ able to **reduce the climatic impact** of the construction.

The use of stormwater storage systems in conjunction with the purification and potable of graywater, allows the Circular Tower to be self-sufficient in terms of **water**, thus reducing the consumption of natural resources.

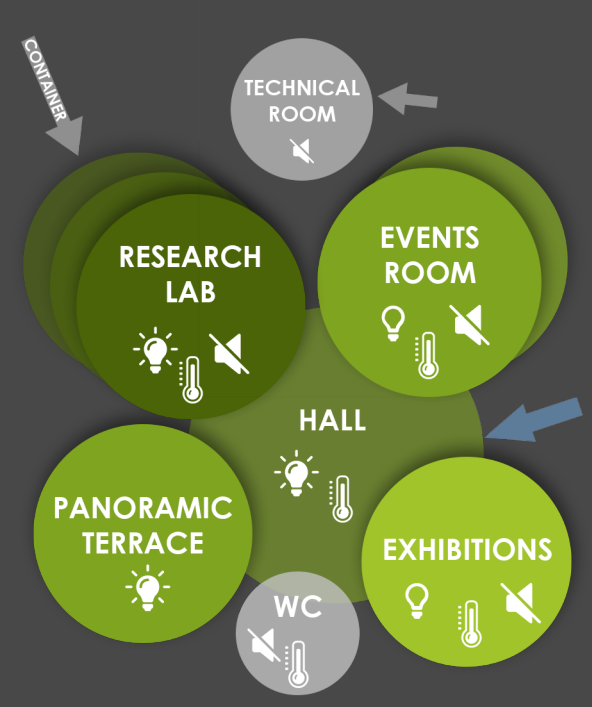
TERRITORIAL FRAMEWORK



TERRITORIAL ELEMENTS

- Administrative boundary
- Emme river
- Railway
- Highway
- Ring road
- Fast road
- Urban area

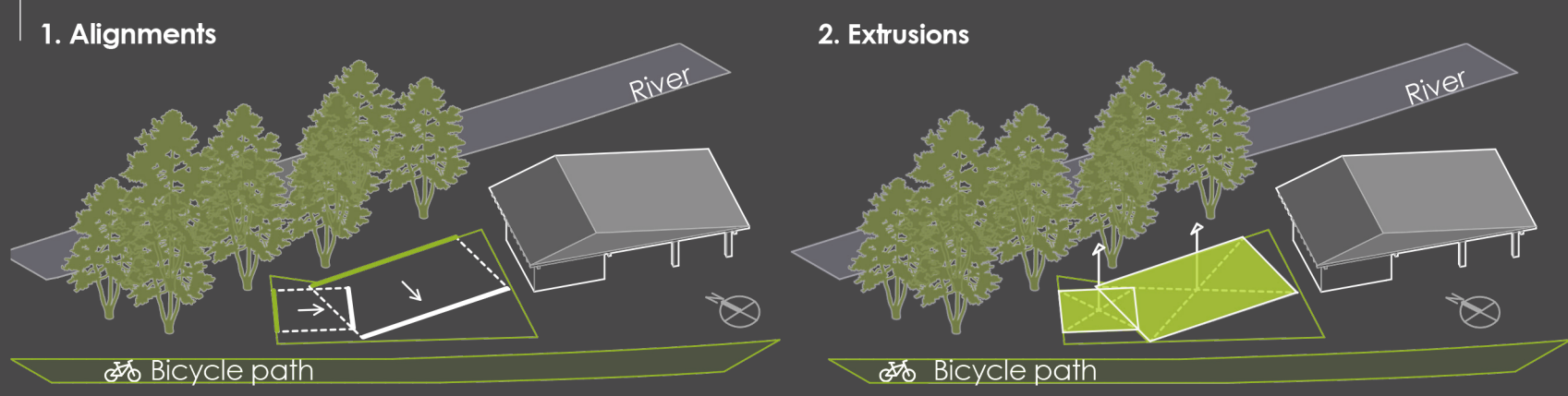
PLANTS BUBBLE DIAGRAM



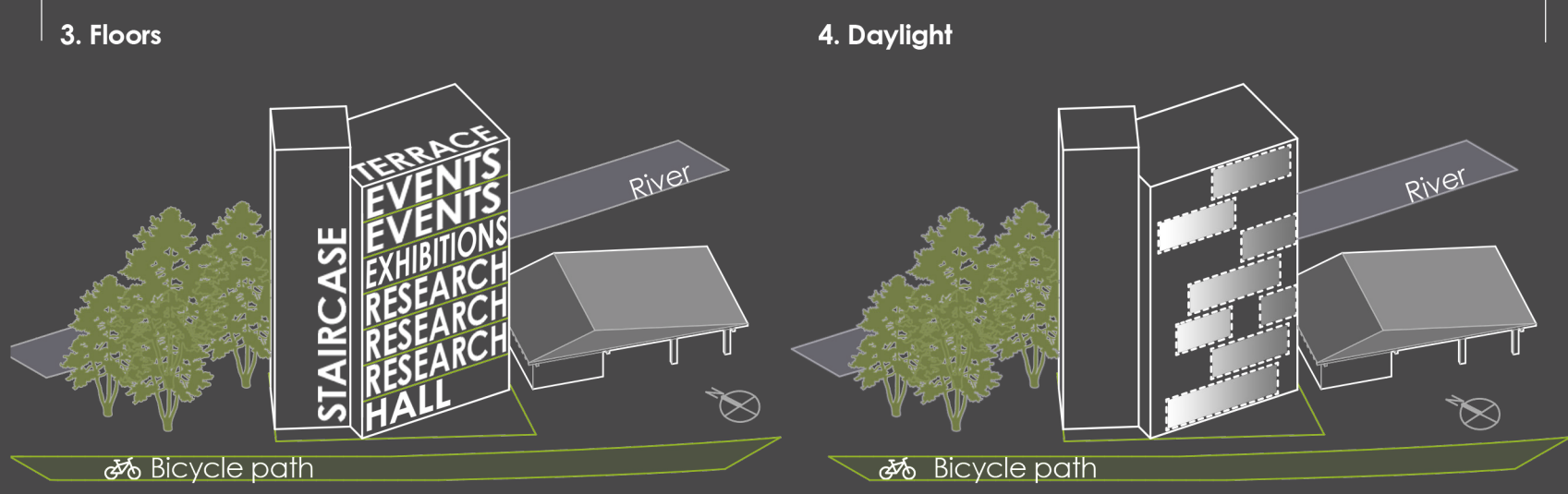
REQUIREMENTS

- Quiet environment
- Heated compartment
- Filtered light
- Natural light
- Main access
- Service access

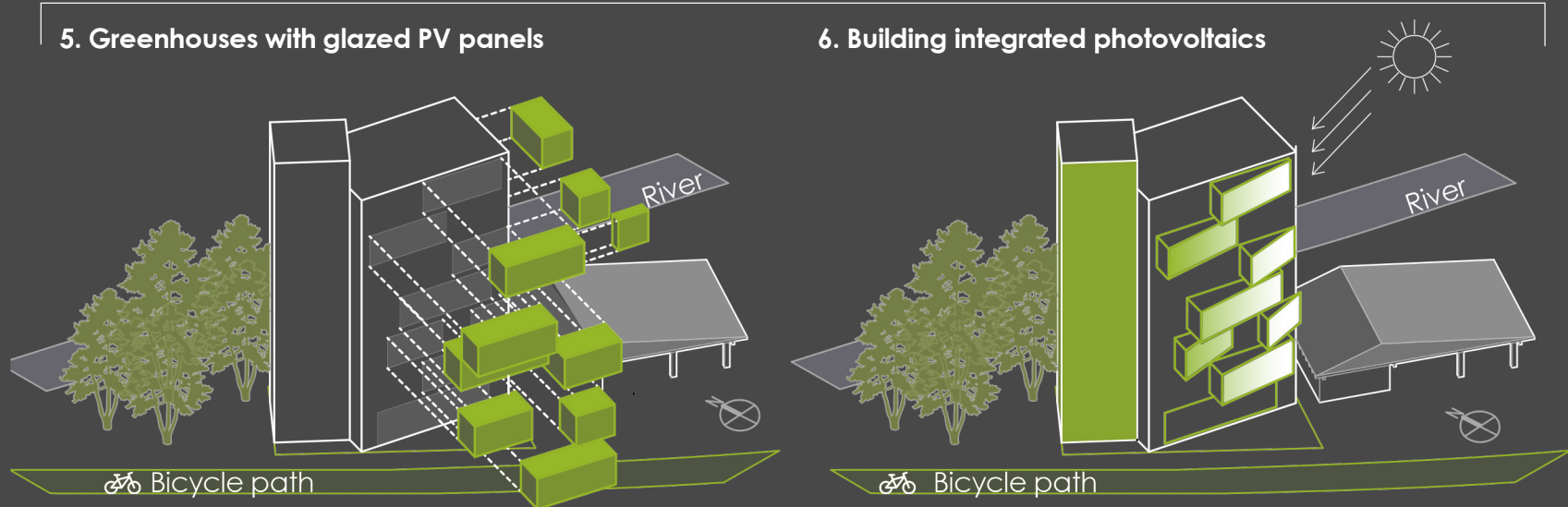
VOLUMES



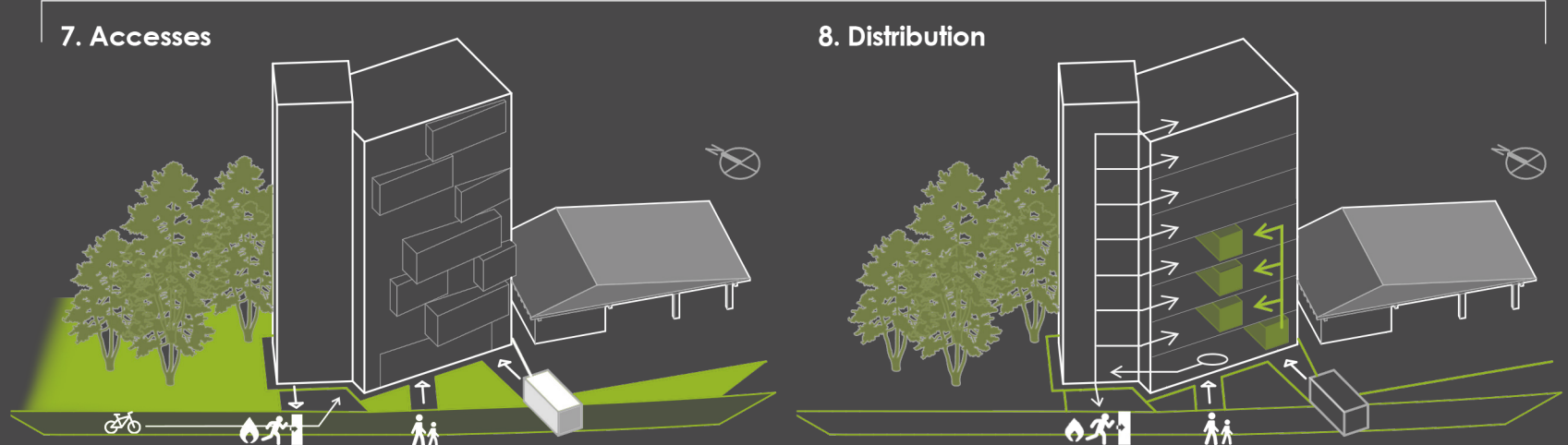
FUNCTIONS



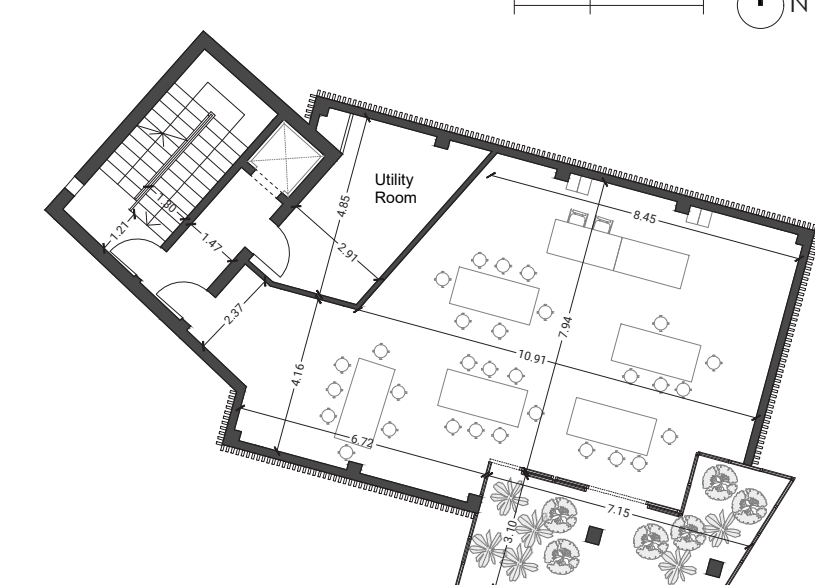
ENERGY



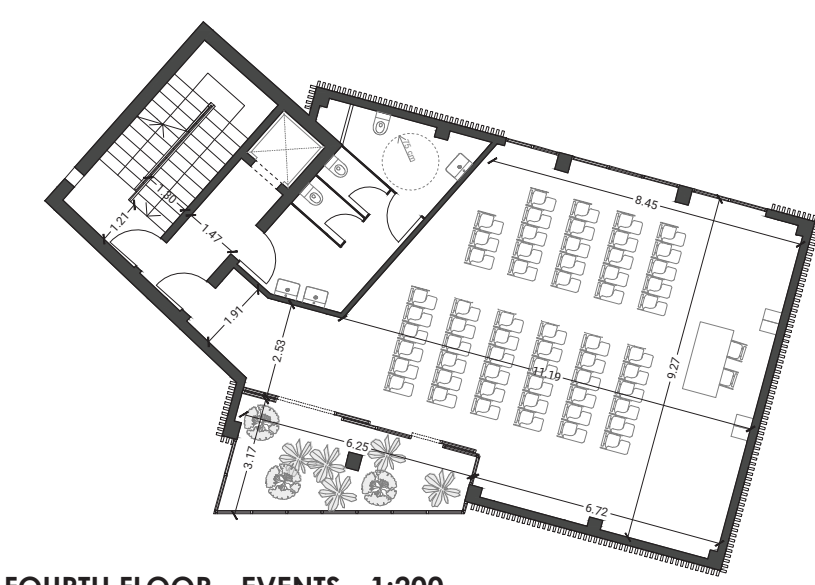
ACCESSIBILITY



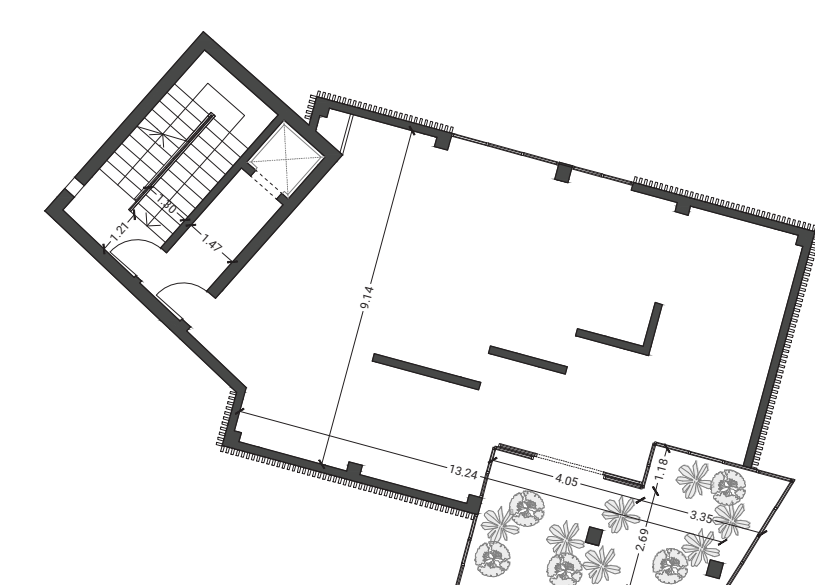
SIXTH FLOOR - EVENTS - 1:200



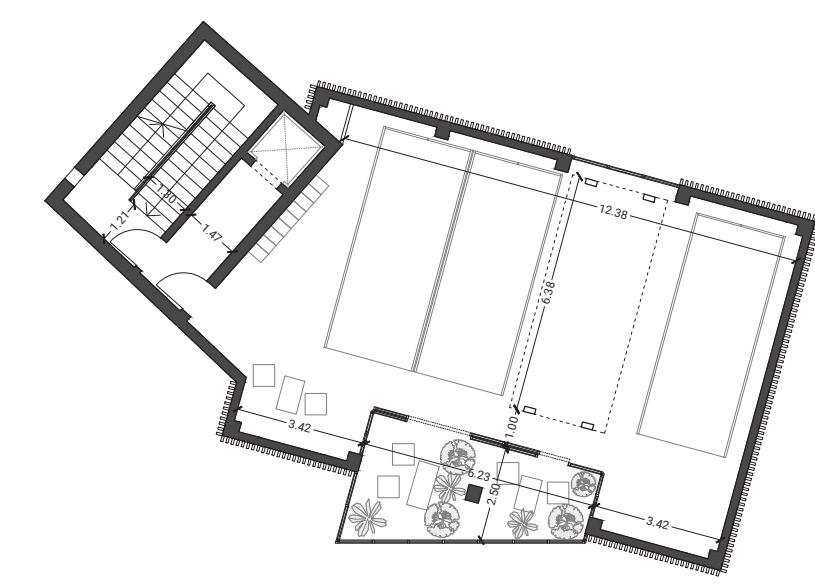
FIFTH FLOOR - EVENTS - 1:200



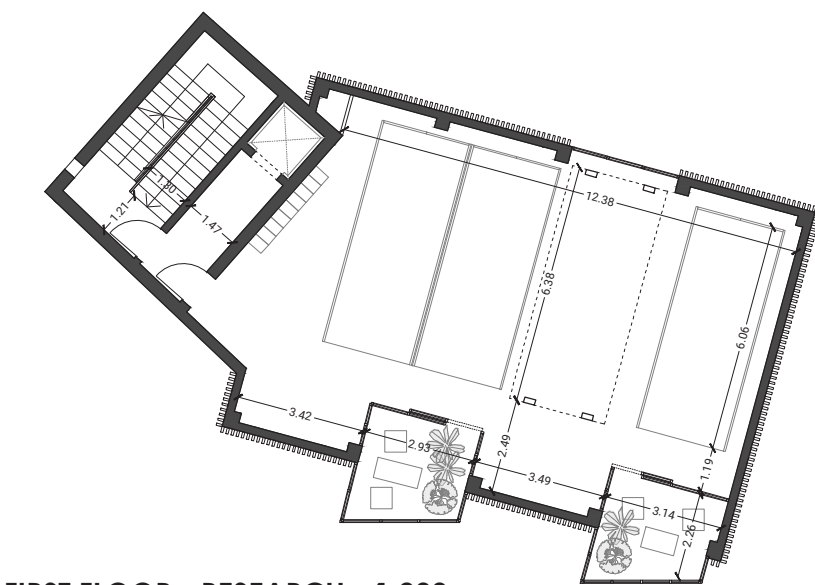
FOURTH FLOOR - EVENTS - 1:200



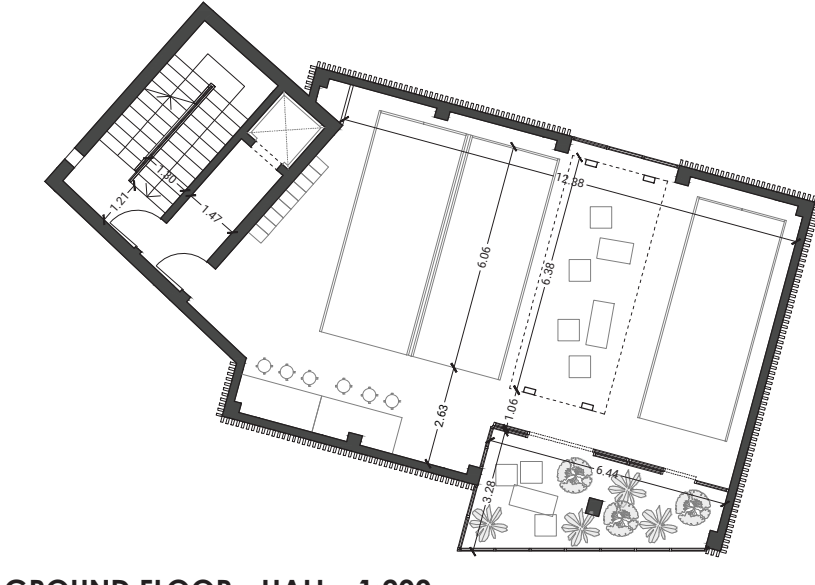
THIRD FLOOR - EXHIBITION - 1:200



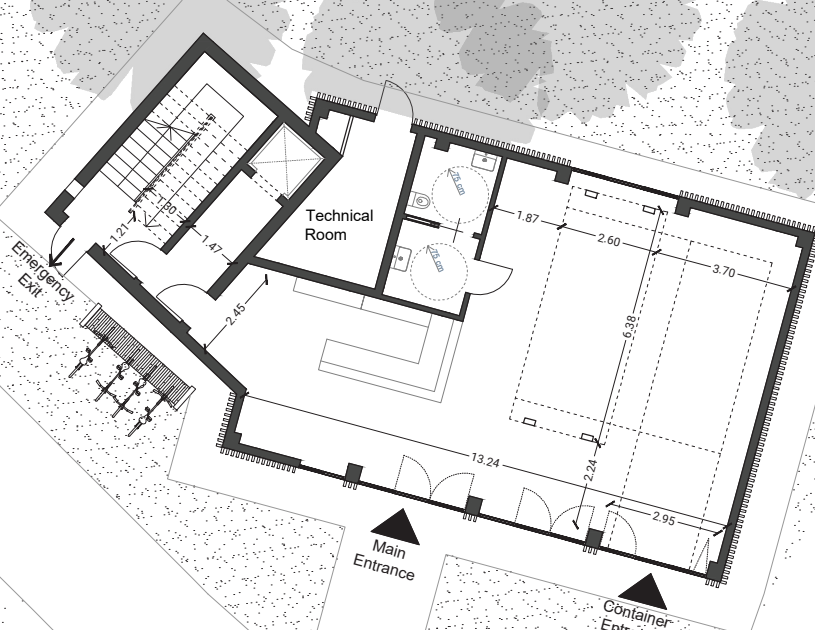
SECOND FLOOR - RESEARCH - 1:200



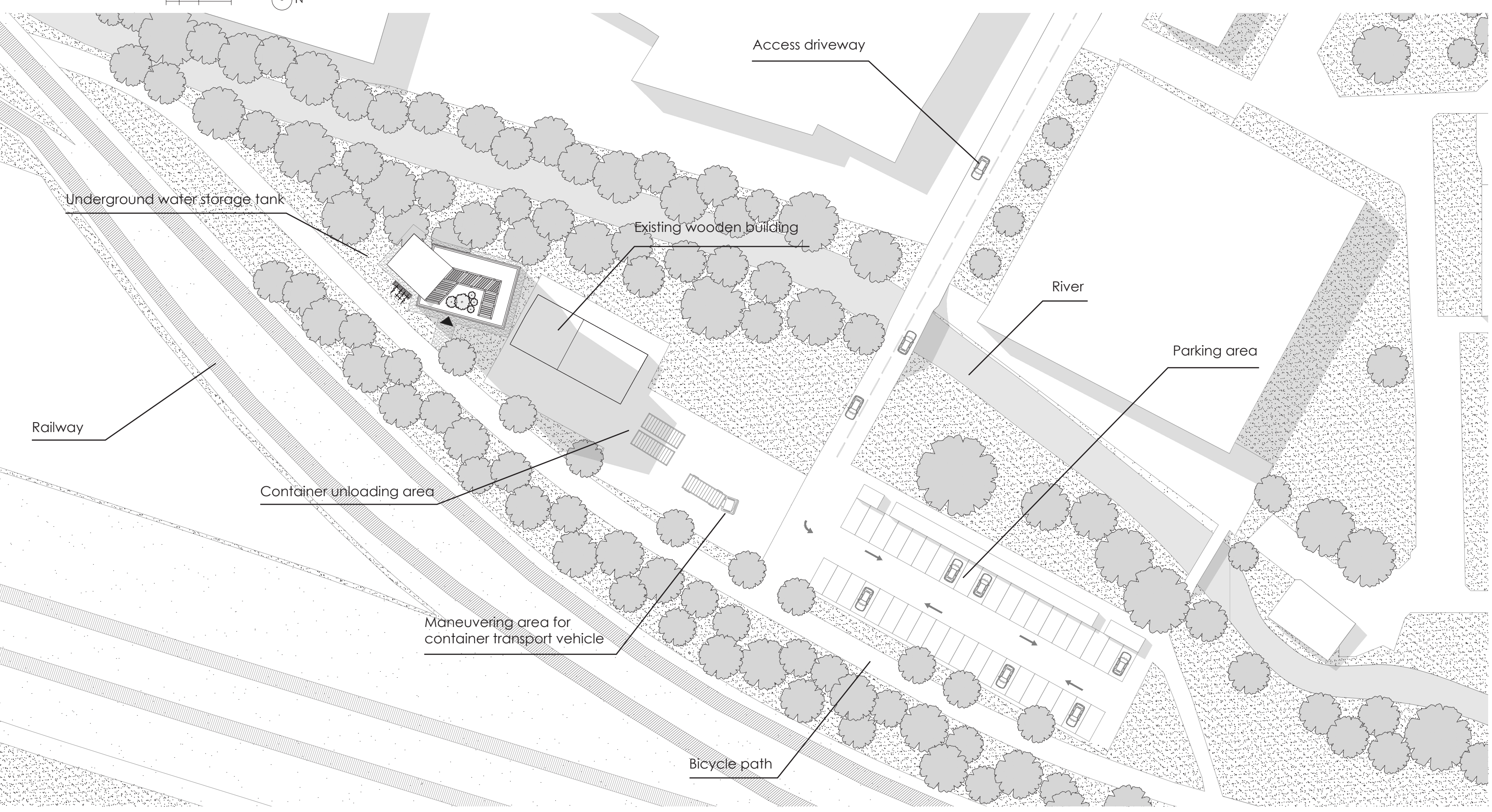
FIRST FLOOR - RESEARCH - 1:200



GROUND FLOOR - HALL - 1:200

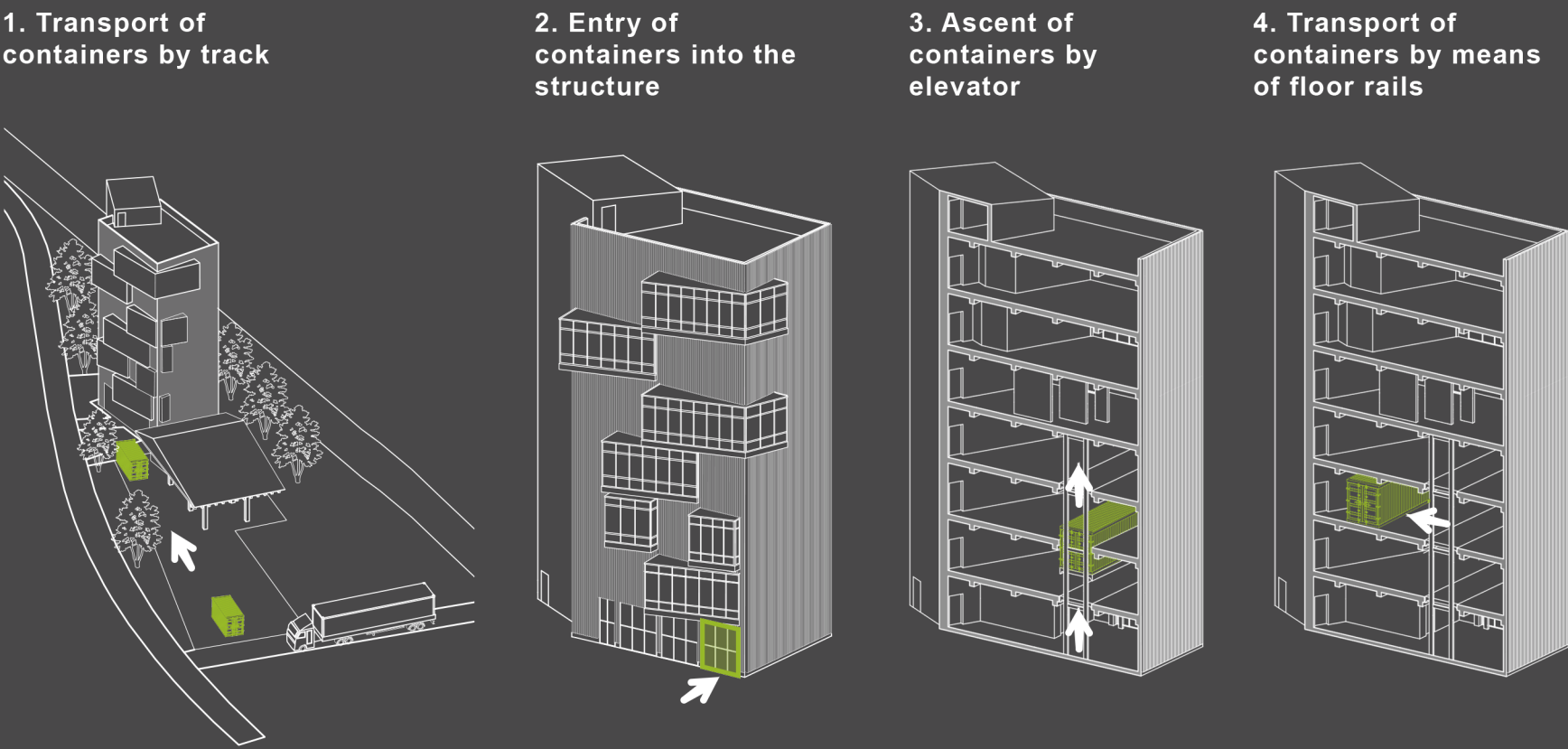


MASTERPLAN - 1:500

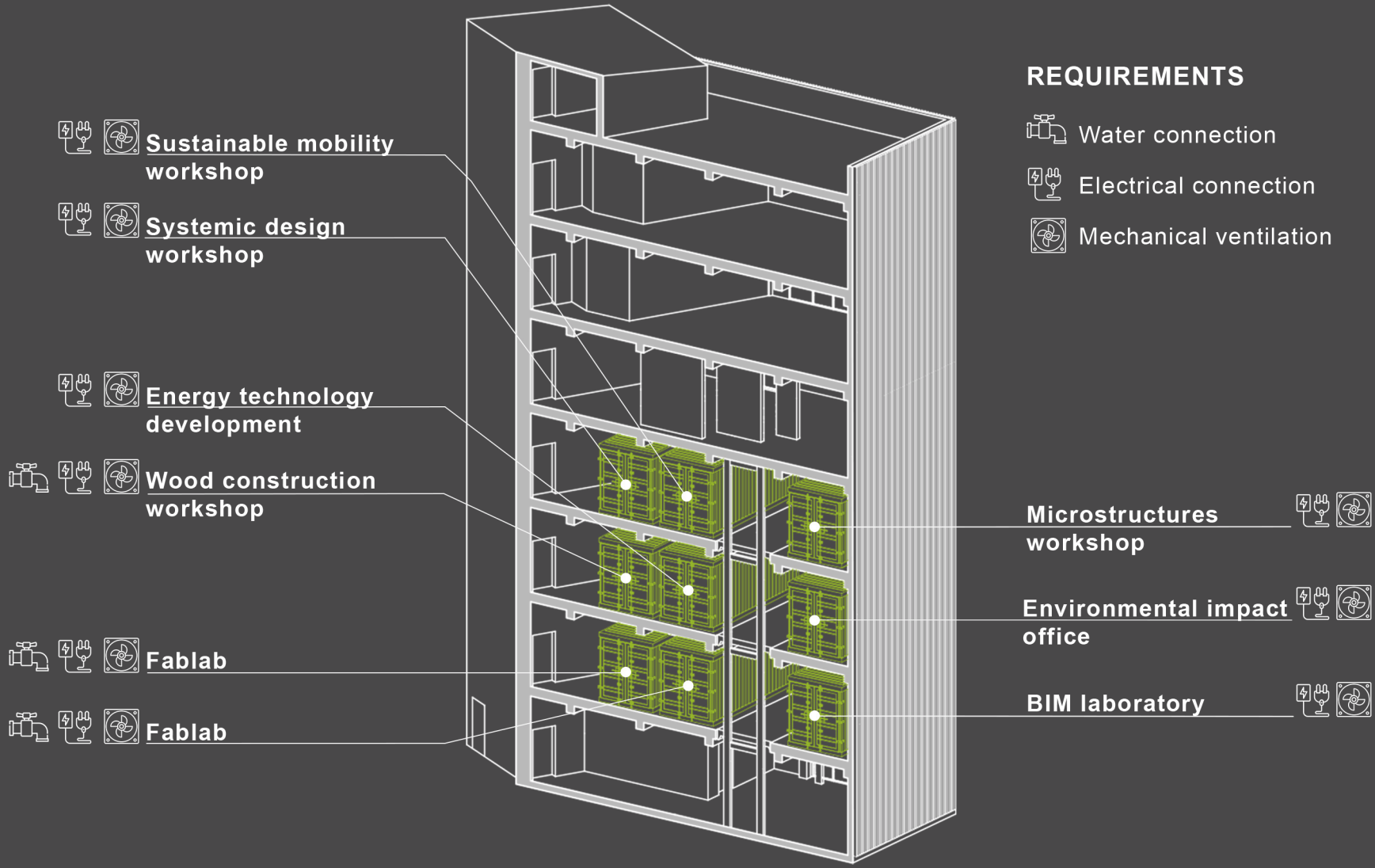


FLEXIBILITY

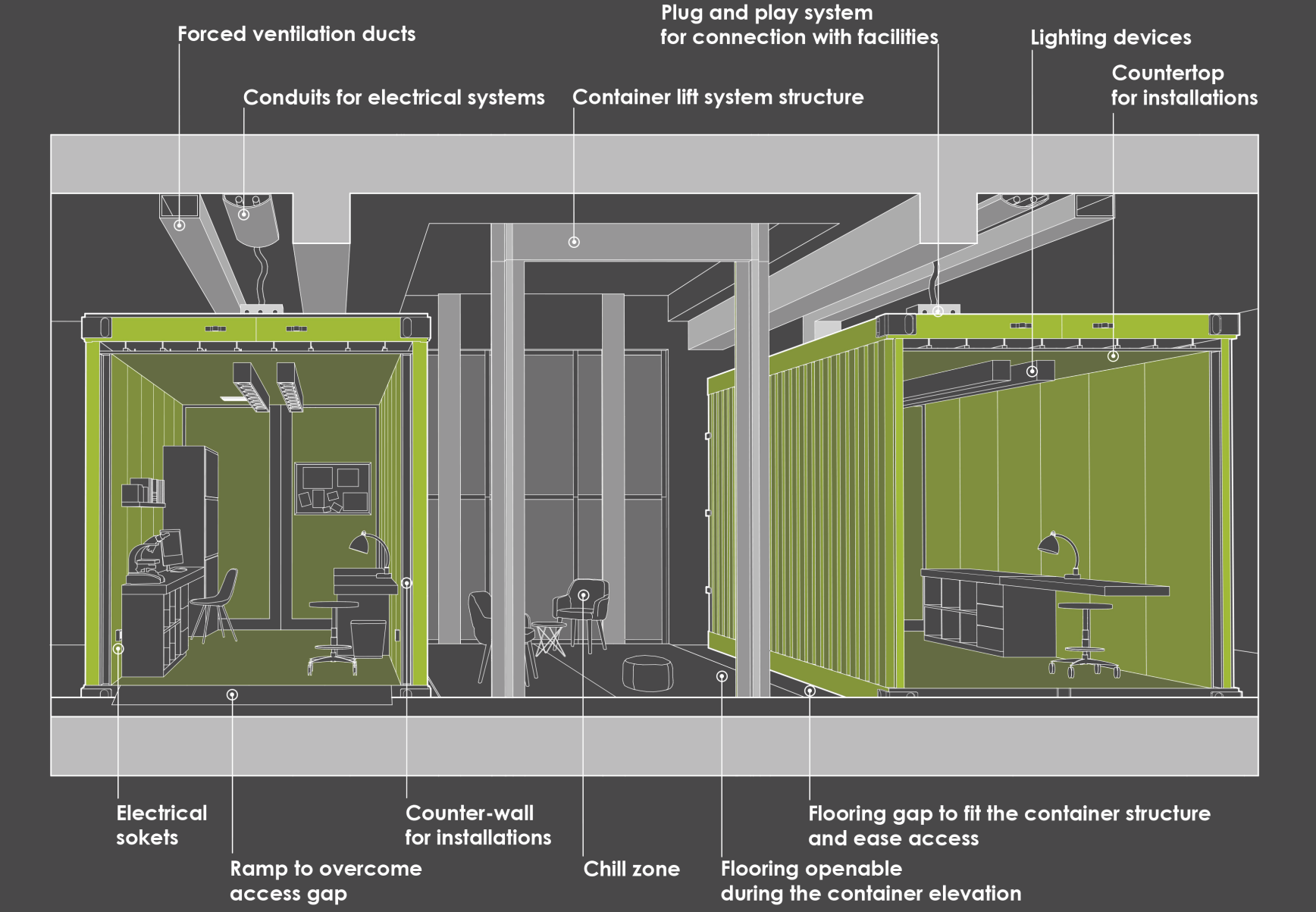
MOVEMENTS AND FUNCTIONS OF CONTAINERS



CONFIGURATION LAYOUT AND HYPOTHESIZED FUNCTIONS OF THE CONTAINER



CONTAINERS' INSTALLATION AND FUNCTIONING



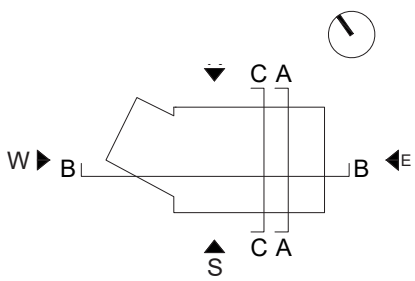
INTERNAL VIEWS



PERSPECTIVE SECTION AA



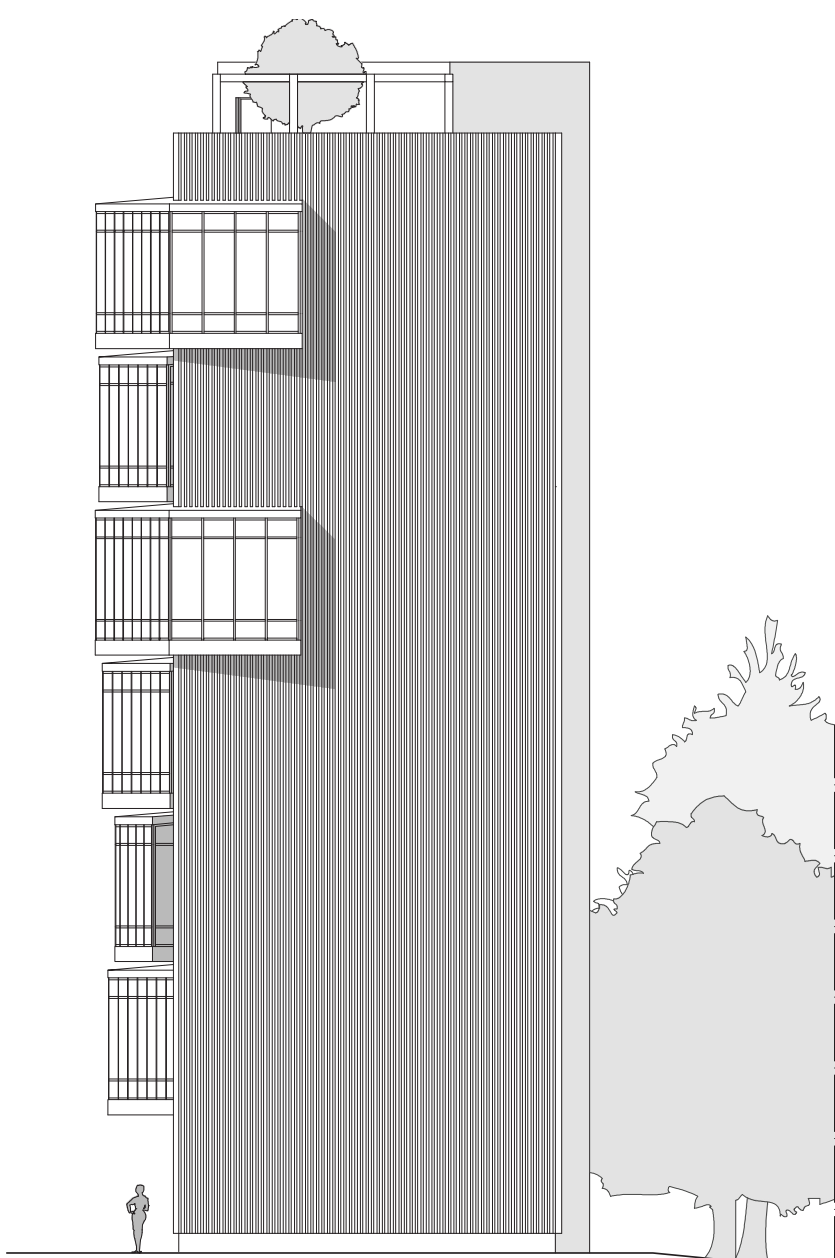
KEY PLAN



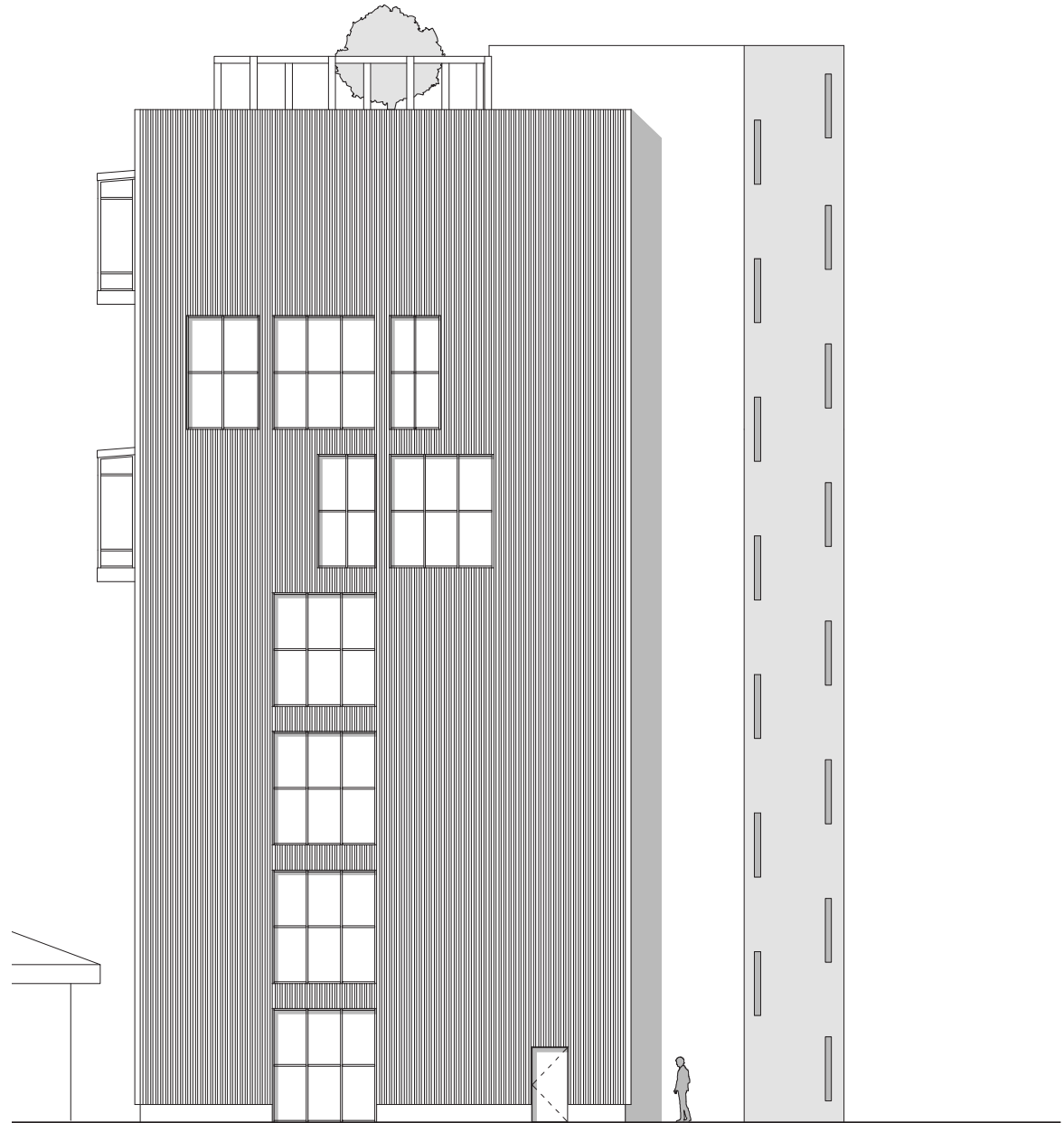
SOUTH ELEVATION - 1:200



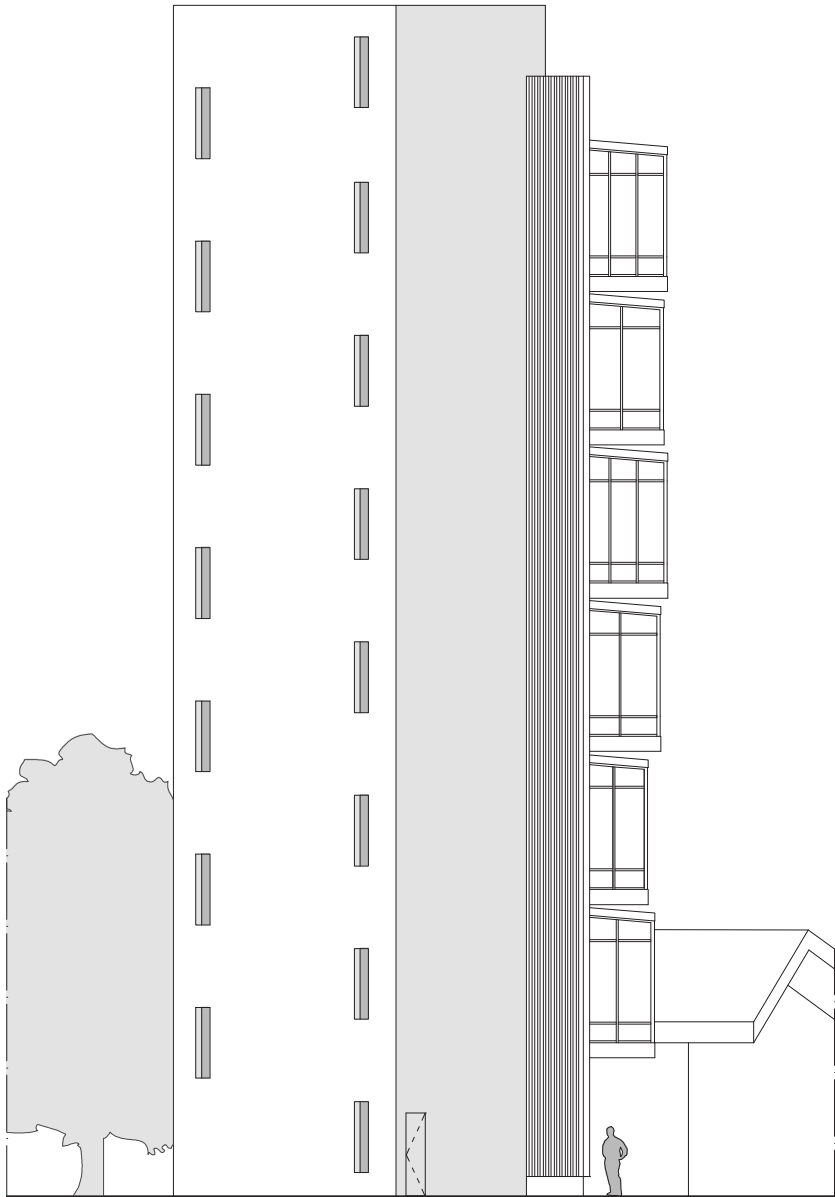
EAST ELEVATION - 1:200



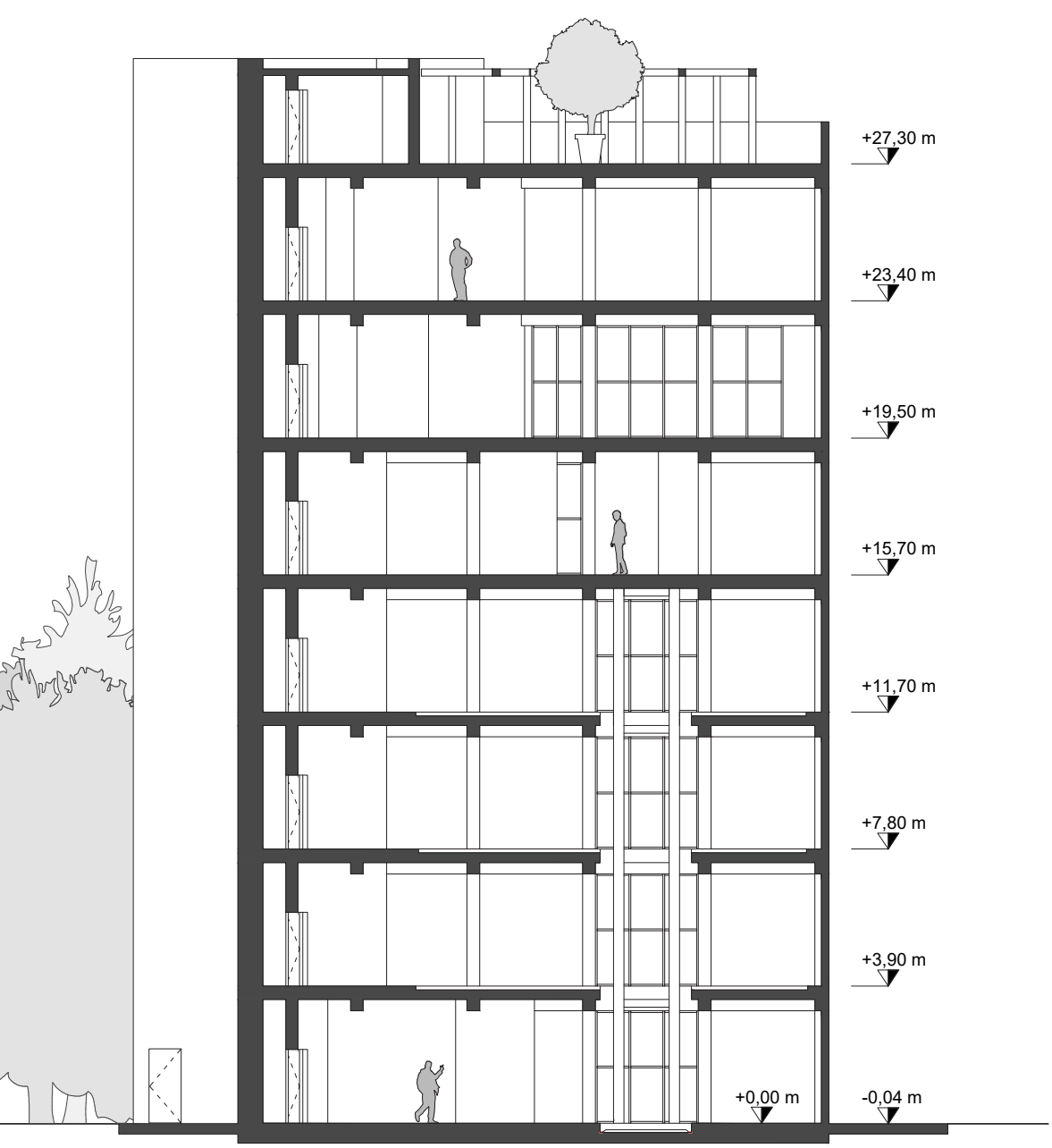
NORTH ELEVATION - 1:200



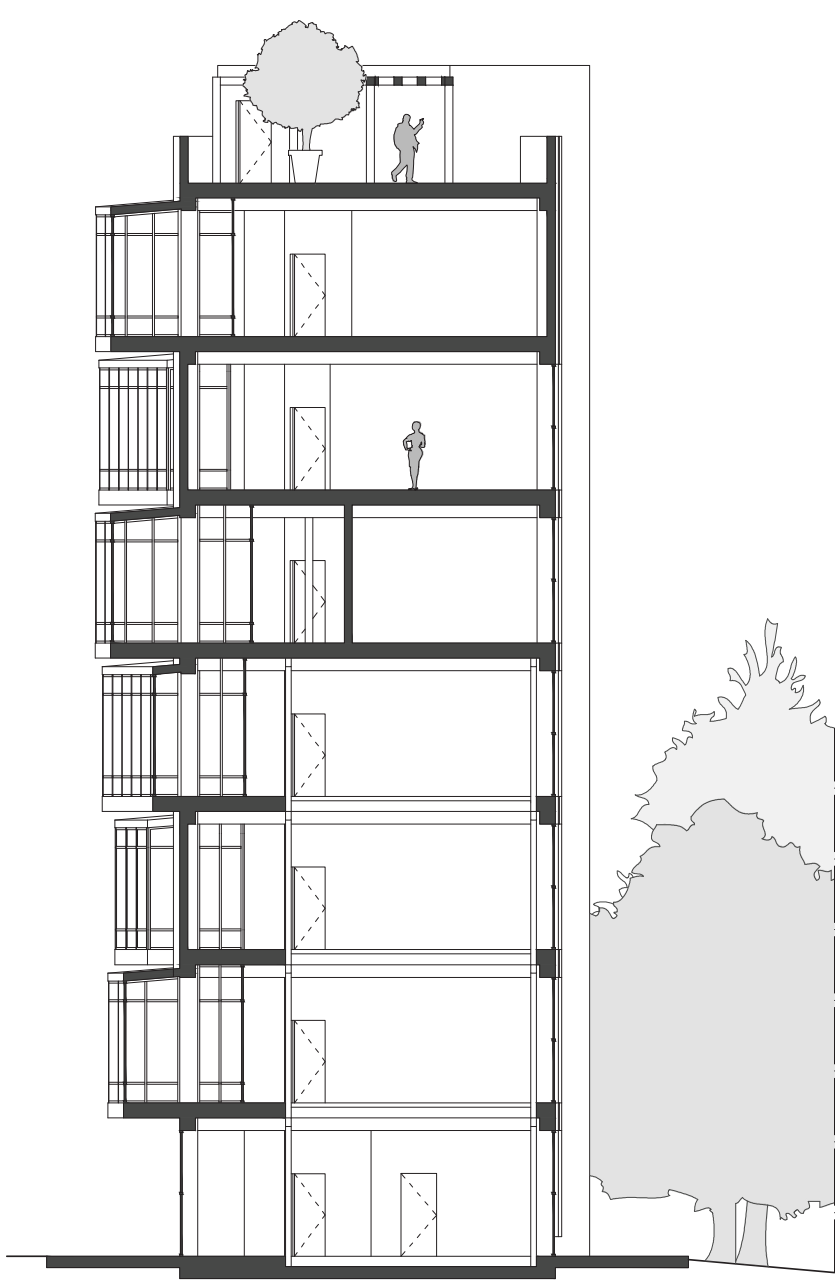
WEST ELEVATION - 1:200



SECTION BB - 1:200

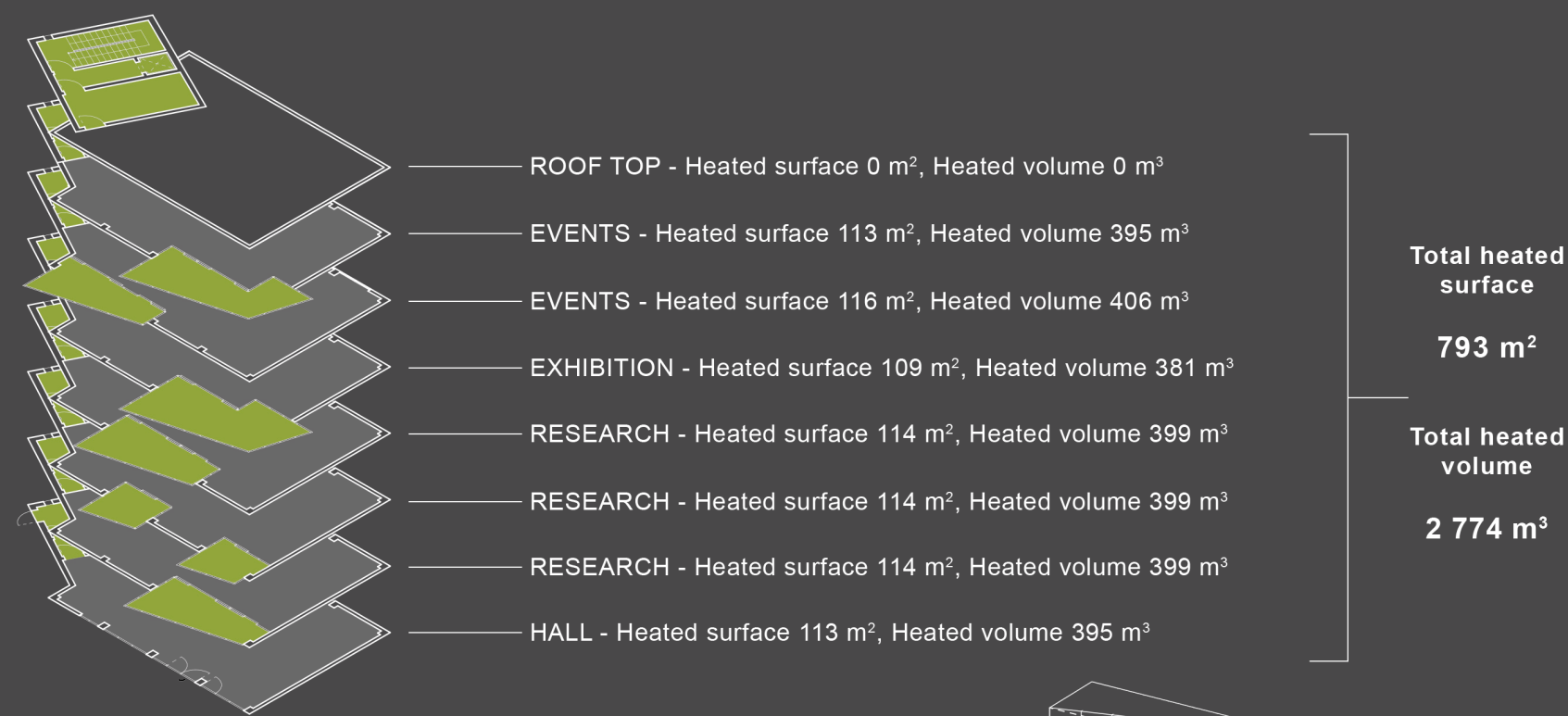


SECTION CC - 1:200

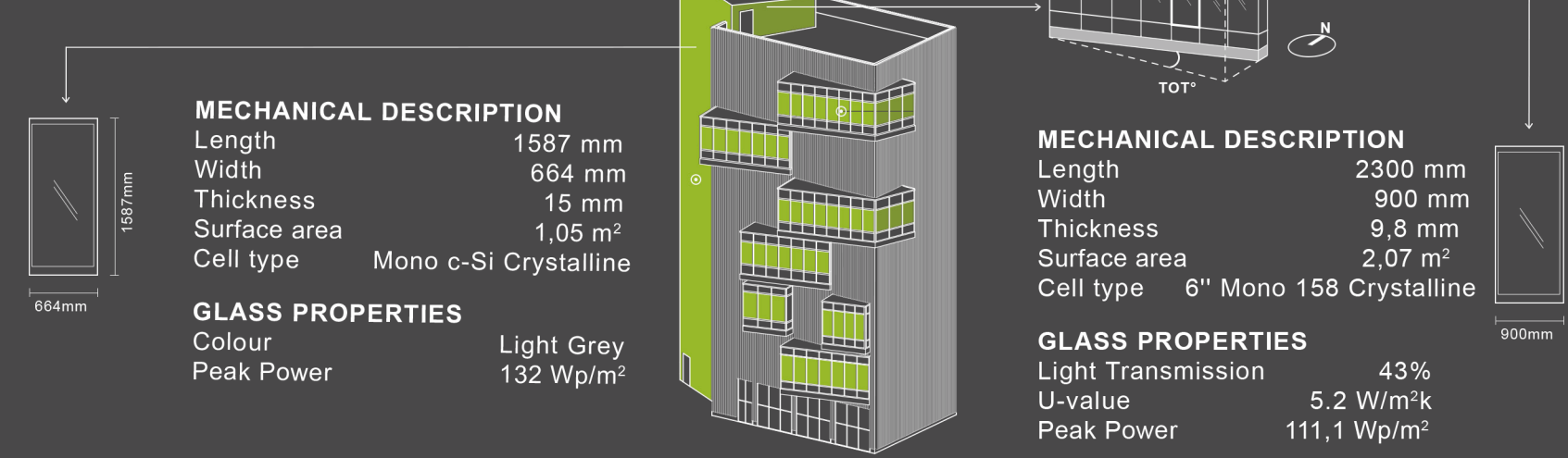


ENERGY AND RESOURCES

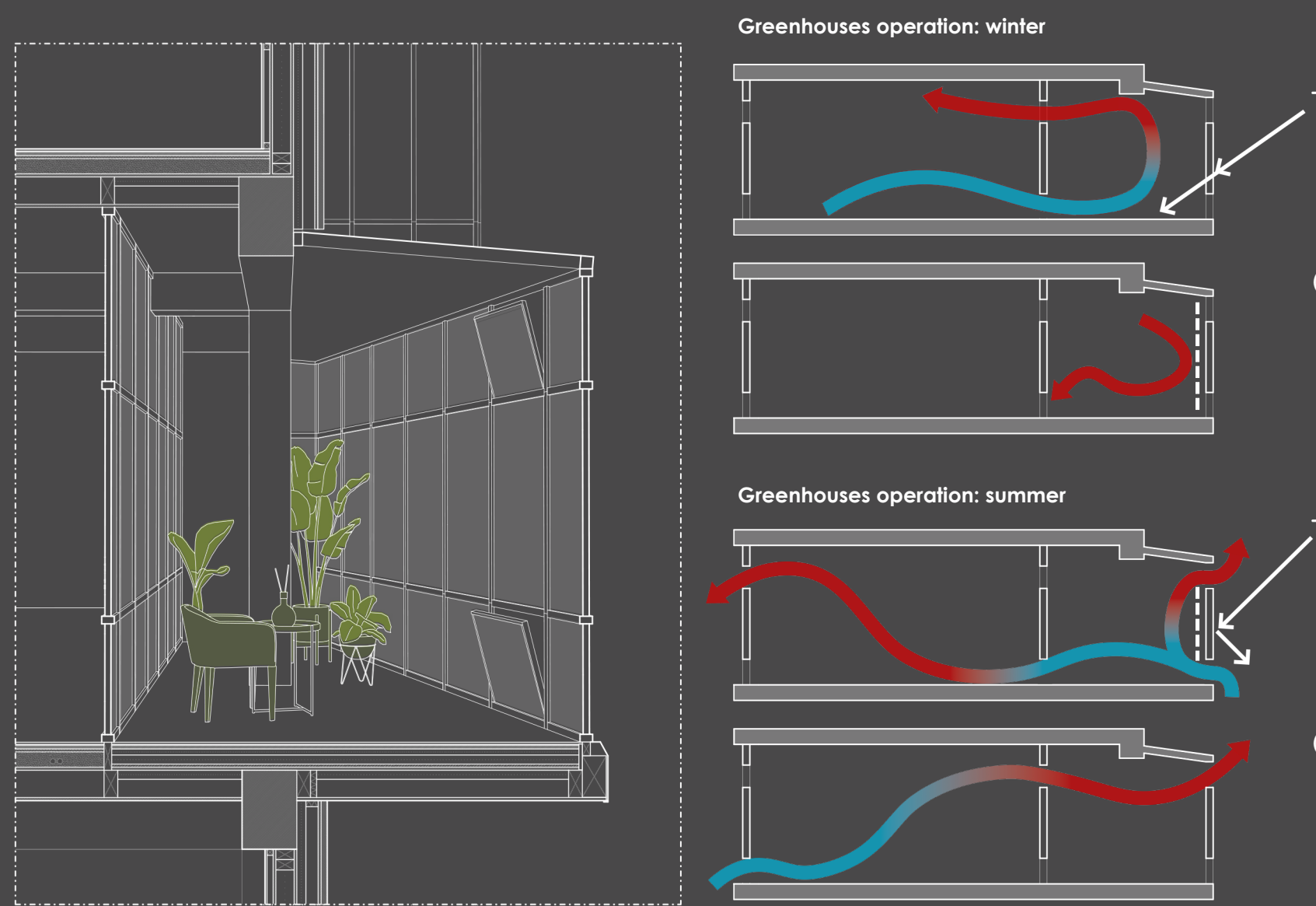
THERMAL ZONES



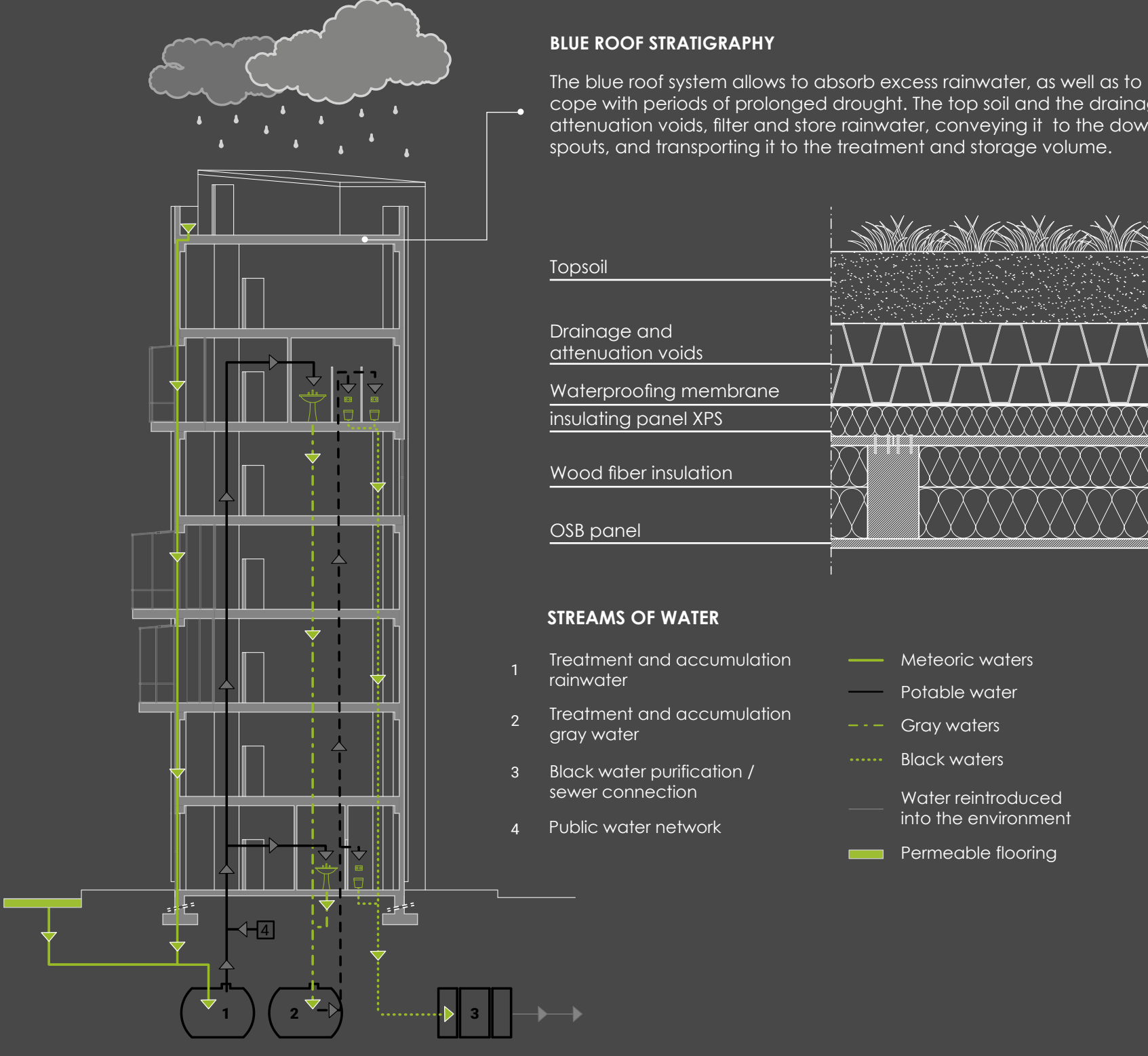
PHOTOVOLTAIC ELEMENTS



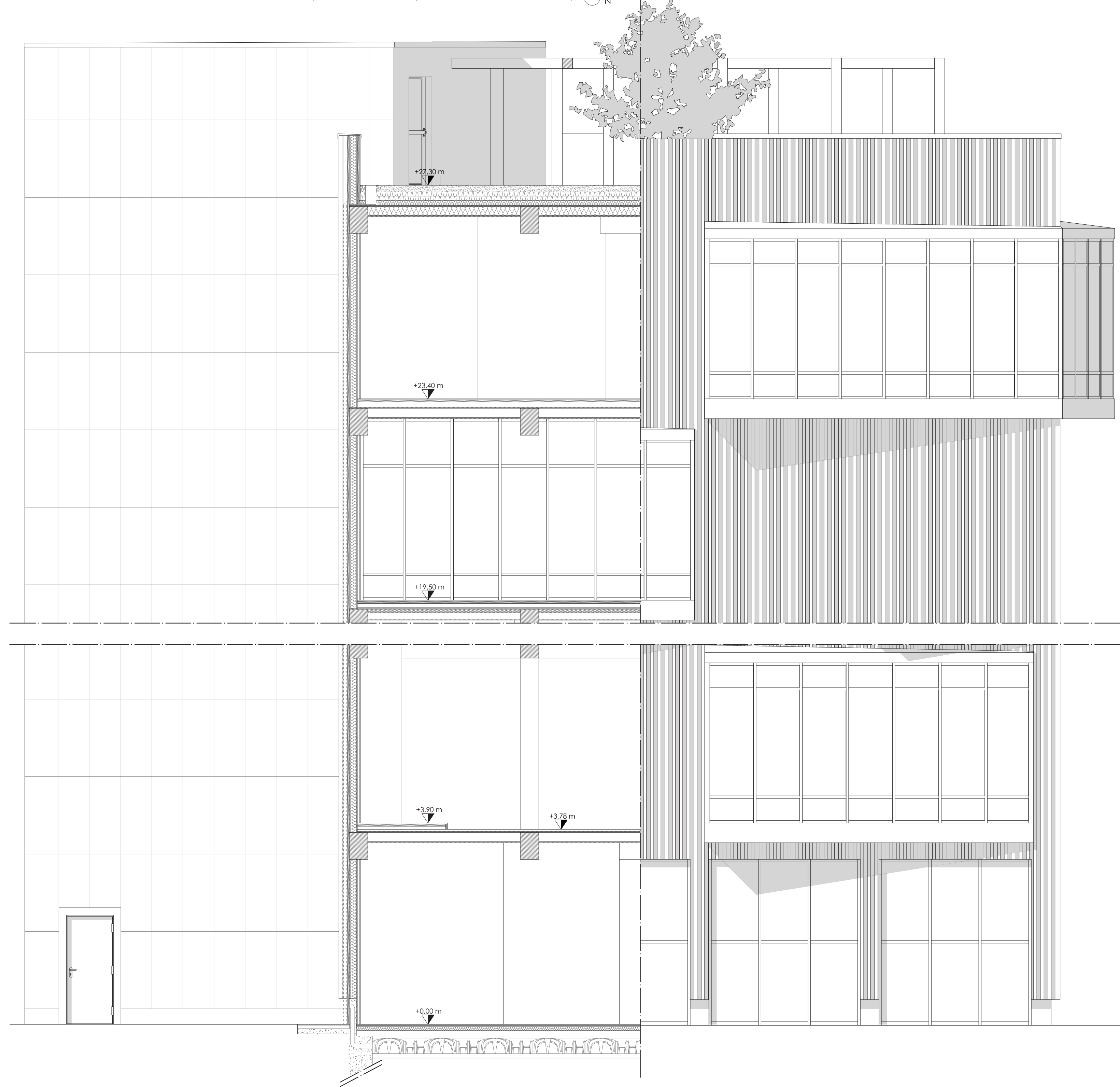
GREENHOUSES



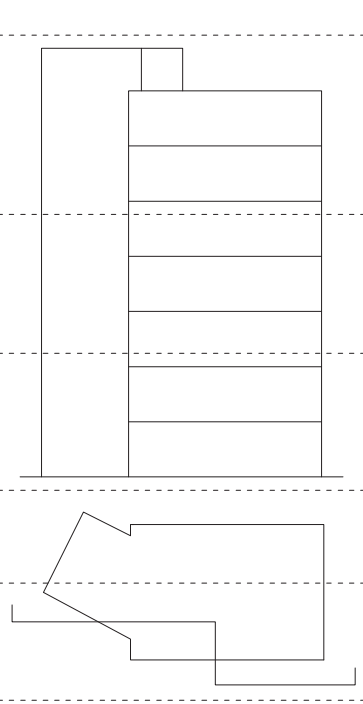
WATER CYCLE



SECTION, ELEVATION AND FIRST FLOOR PLANT - SCALE 1:50



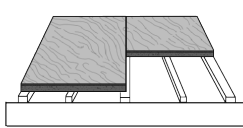
KEY PLAN



CHARACTERISTICS OF THE CHOSEN MATERIALS

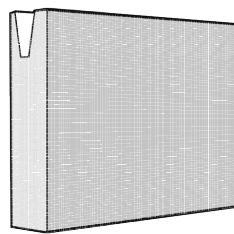
WOODEN ELEMENTS

Recycled, recovered and recyclable material:
100%, being disassembled from the structure it is possible to install it again, reuse it in the production processes of other wooden elements or dispose of it using it as an oxidizer.
Percentage coming from renewable sources:
100%
Disassembly:
The wooden elements are assembled by means of dry joints and therefore easily removable.



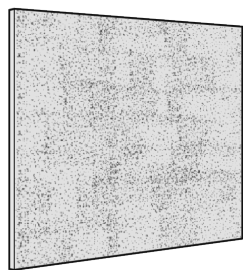
INSULATED IN WOOD FIBER

Recycled, recovered and recyclable material:
100%, recovered in central a biomass, reused or re-input into production process.
Environmental certification:
EPD
Percentage coming from renewable sources:
Coniferous wood 82,2%
Disassembly:
The entire construction system includes the same fixing solution among the different elements. The panels are removed from uprights / "C" guides in turn unscrewed from the "C" slides that host them.



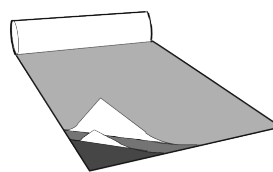
PLASTER FIBER SHEETS

Recycled, recovered and recyclable material:
The slab is made up of 55% gypsum by desfoliation of flue gases recycled pre-consumption and 19% fiber waste paper recycled post-consumption.
Environmental certification:
EPD, LEED, ITACA, BREEM
Percentage coming from renewable fonts:
Recyclable paper 19%
Disassembly:
The panels are removed from uprights / "C" guides and in turn unscrewed from the "C" slides that host them.



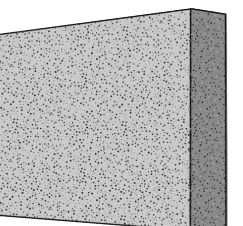
BREATHABLE MEMBRANE

Recycled, recovered and recyclable material:
0%
Percentage coming from renewable sources:
0%
Disassembly:
The membrane is anchored to the insulation layer by a spikes' based fixing system. Therefore to remove it will be sufficient to simply get rid of spikes.



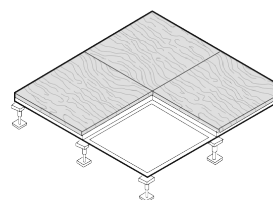
CORK PANELS

Recycled, recovered and recyclable material:
100% cork
Environmental certification:
EPD, FSC
Percentage coming from renewable sources:
100% oak cork
Disassembly:
Cork, being a material with natural origin, and being laid without using any glue, could be easily removed by simply removing the granulate.

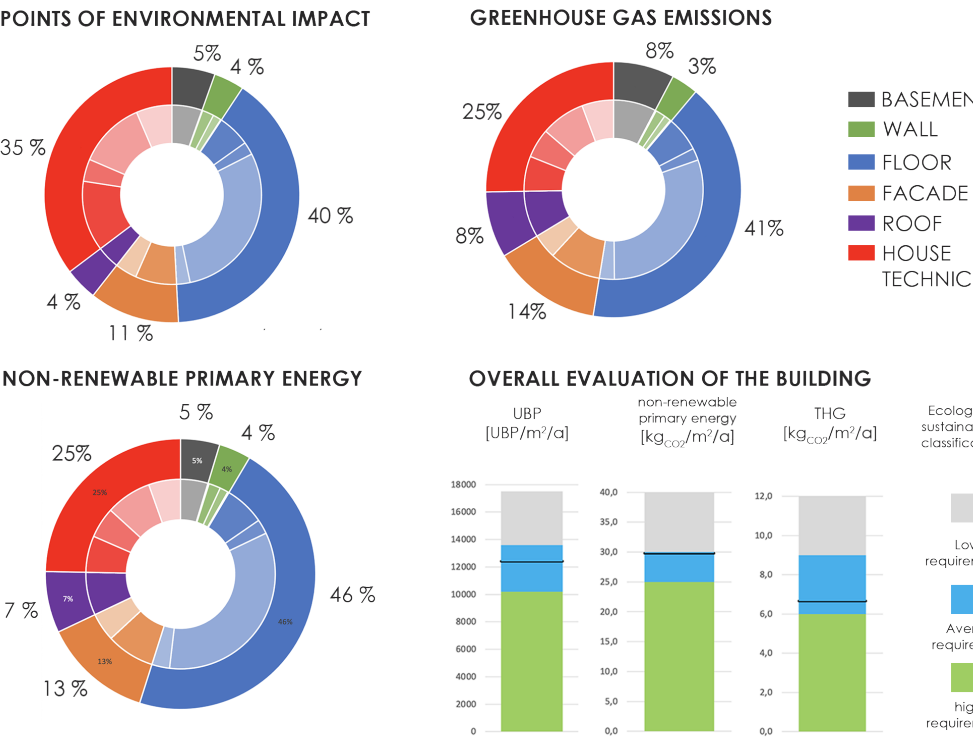


WOODEN FLOOR

Recycled, recovered and recyclable material:
100%. It can be recycled assuming heat recovery in a biomass power plant, it can still be reused (A5) with the same function and it can even undergo down-recycling.
Environmental certification:
E1, FSC
Percentage coming from renewable sources:
Oak wood 100%
Disassembly:
The parquet is disassembled thanks to the finishing with tongue-and-groove joints.



CALCULATION OF THE ENVIRONMENTAL IMPACT WITH ZPF



ASSEMBLY

CONSTRUCTION PHASES

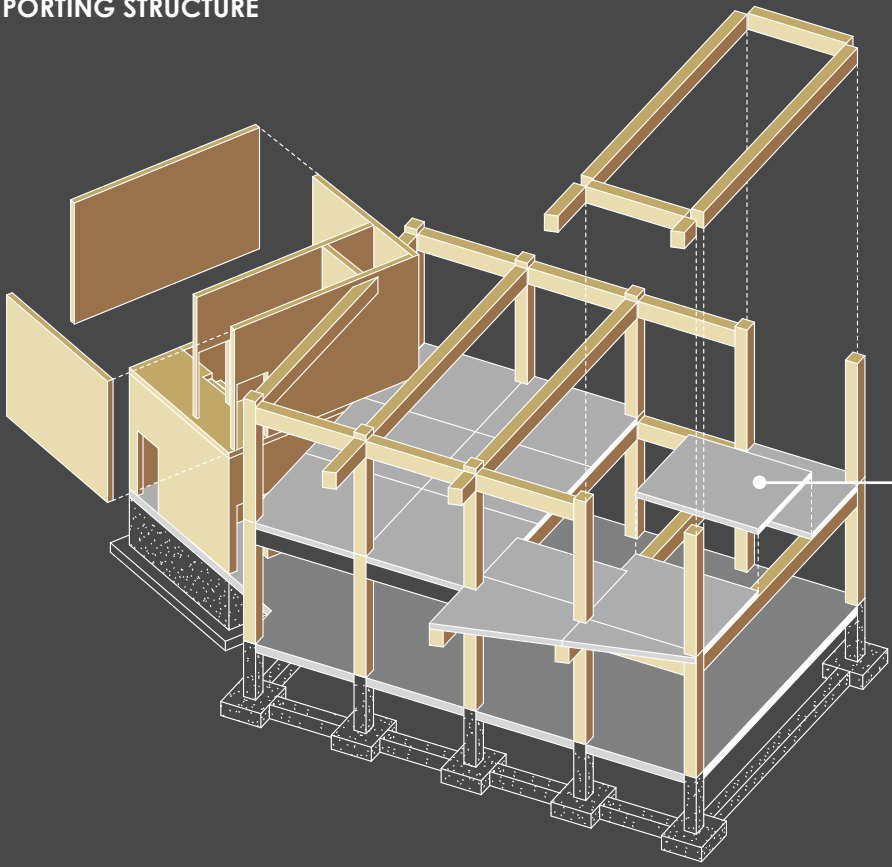
Following the construction of the reinforced concrete foundations, the primary structural elements are laid floor by floor, including beams, pillars for the main volume of the building and CLT walls and floors for the stairwell.

To create the building envelope and the inter-floor slabs, pre-assembled panels will be mounted, designed to be quickly laid on site, to reduce construction time, but also in anticipation of easy removal.

The materials that make up the panels have been chosen on the basis of their marketing in formats optimized for deconstruction, on the basis of their environmental impact and also for their thermal and acoustic performance.

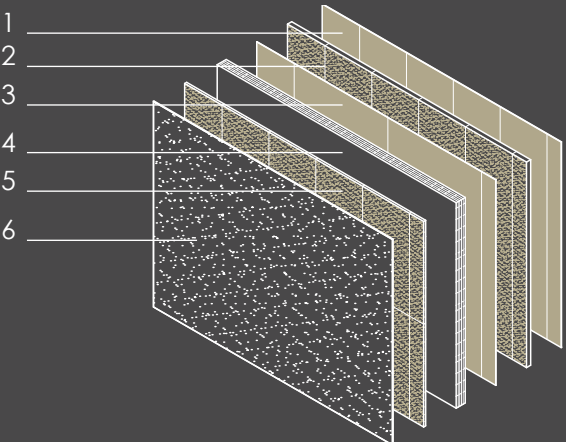
In this way at the end of the useful life of the building there will be the possibility to separate the different components of the panels in order to reuse them and / or recycle them.

2. INSTALLATION OF THE PREFABRICATED FLOORS AND CONTINUATION OF THE CONSTRUCTION OF THE SUPPORTING STRUCTURE



1. 14mm Plank oak flooring
 2. 5mm Decoupling layer for floating floor
 3. 25mm Dry screed with gypsum fiber slabs
 4. 20mm Wood fiber insulating panel
 5. 100mm Substrate in mineralized wood panels
 6. 5mm Separation layer
 7. 18mm OSB panel
 8. 18mm OSB panel
- T = 385 mm

FLOOR: INDOOR-INDOOR

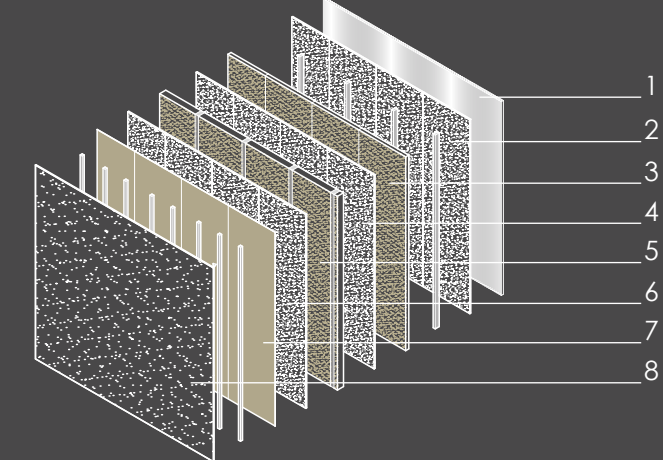
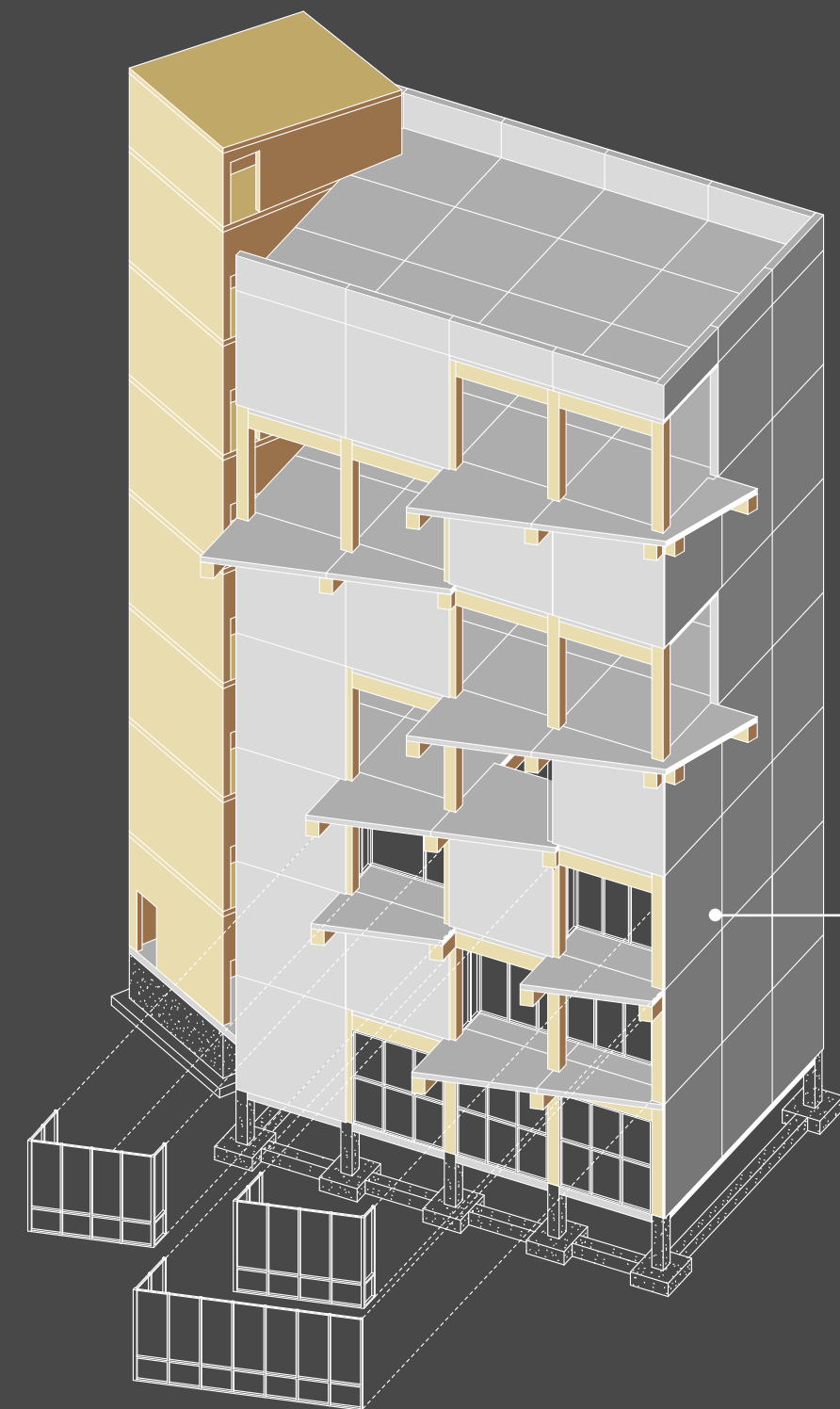


3. INSTALLATION OF THE PREFABRICATED WALLS AND COMPLETION OF THE CONSTRUCTION OF THE SUPPORTING STRUCTURE

1. 18mm OSB panel and 13mm external finish
2. 80mm Wood fiber insulation panel
3. 5mm Breathable airtight membrane
4. 180mm Cross laminated timber 5 layers
5. 40mm Wood fiber insulation
6. 13mm Plasterboard type F (GKF)

U= 0,212 W/m2k T=333mm

4. INSTALLATION OF THE TRANSPARENT ENVELOPE

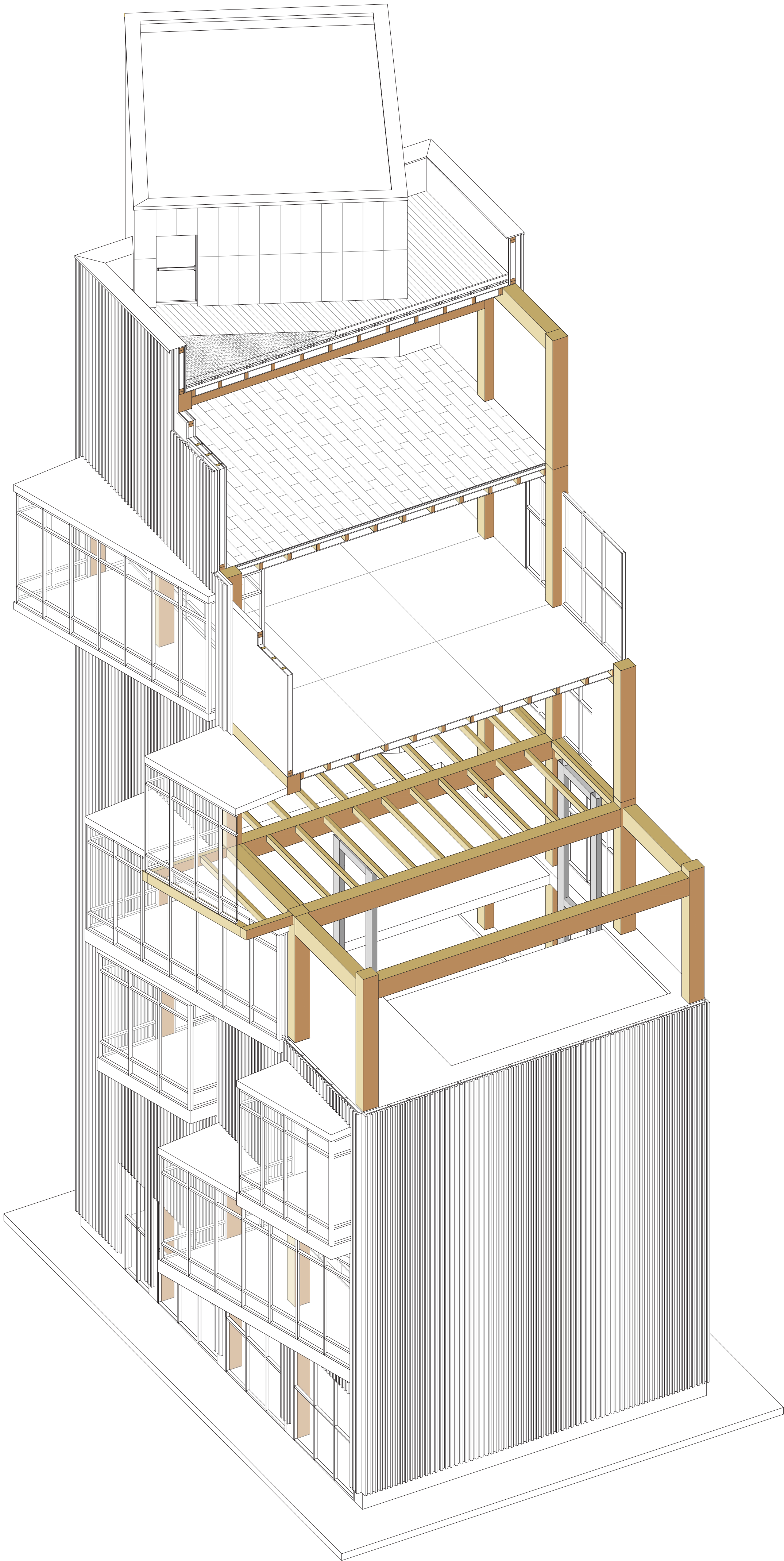


WALL: INDOOR-OUTDOOR

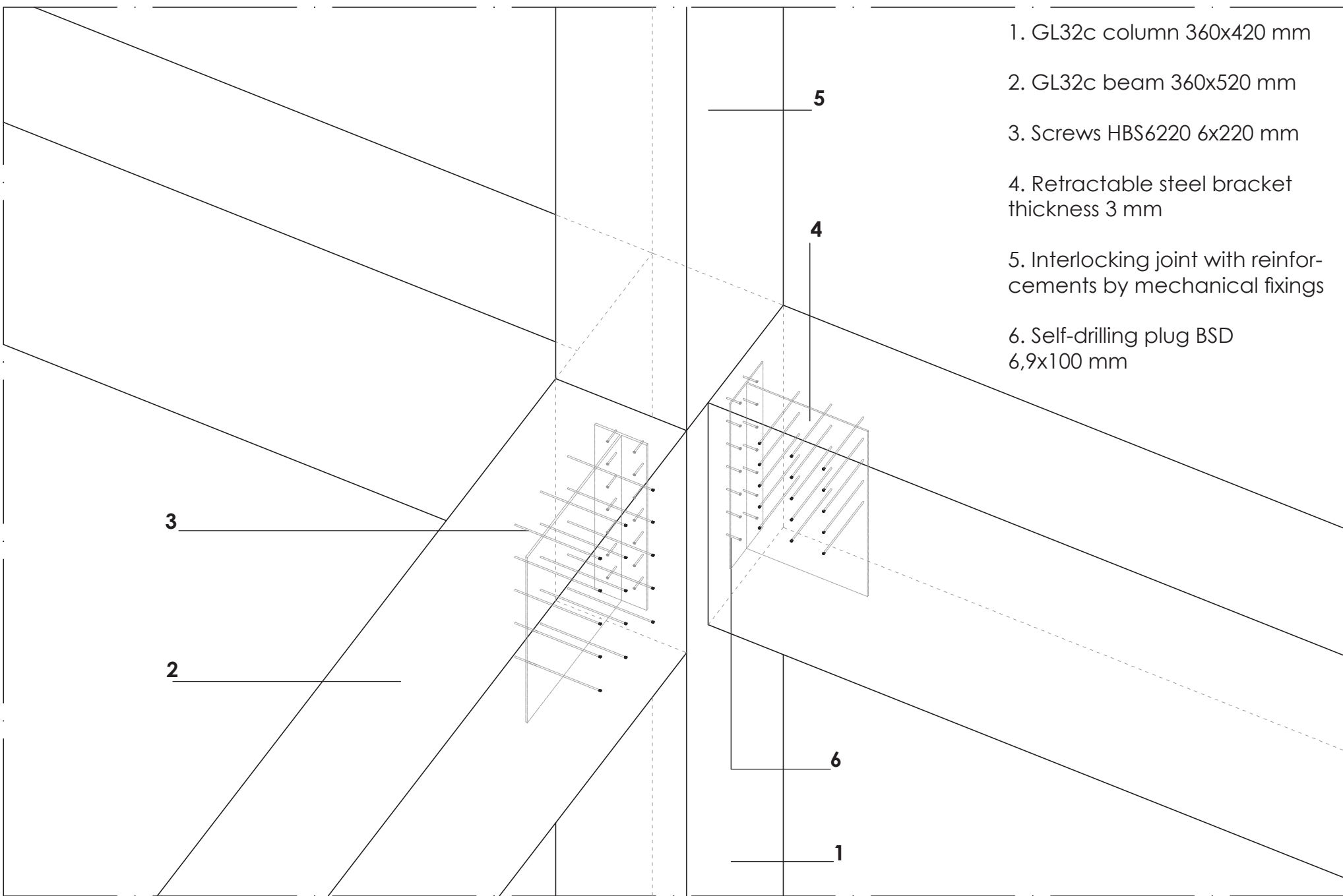
1. 40mm Fir wood strips
2. 18mm OSB panel
3. 60mm Wood fiber insulation panel
4. 18mm OSB panel
5. 120mm Wood fiber insulating panel
6. 18mm OSB panel
7. 5mm Breathable airtight membrane
8. 13mm Plasterboard type F (GKF)

U= 0,196 W/m2k T=269mm

CONSTRUCTIVE AXONOMETRY

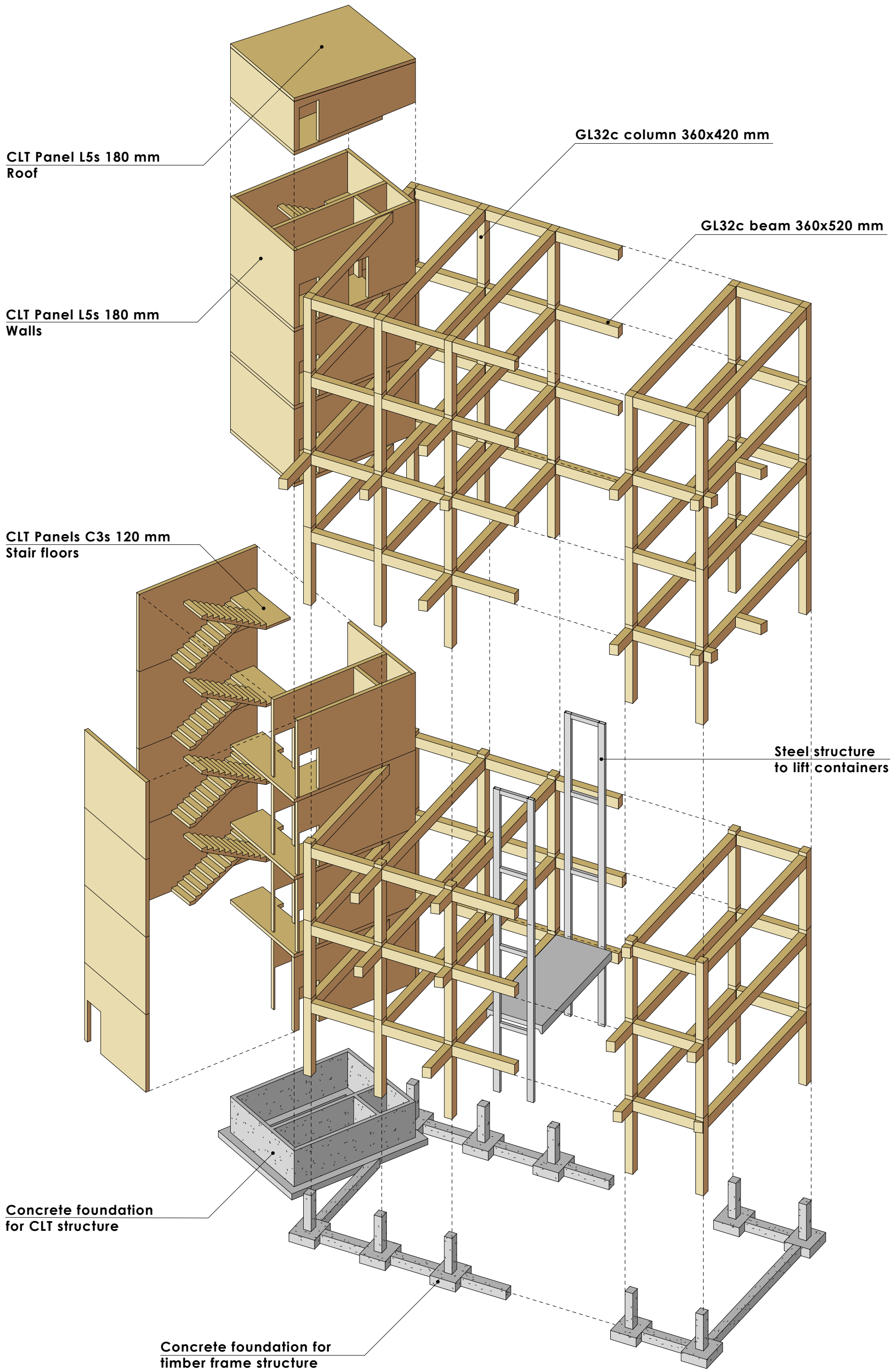


AXONOMETRIC DETAIL OF THE BEAM-COLUMN JOINT



1. GL32c column 360x420 mm
2. GL32c beam 360x520 mm
3. Screws HBS6220 6x220 mm
4. Retractable steel bracket thickness 3 mm
5. Interlocking joint with reinforcements by mechanical fixings
6. Self-drilling plug BSD 6,9x100 mm

STRUCTURAL AXONOMETRIC EXPLODED VIEW - PRIMARY ELEMENTS



CLT Panel L5s 180 mm
Roof

GL32c column 360x420 mm

GL32c beam 360x520 mm

CLT Panel L5s 180 mm
Walls

CLT Panels C3s 120 mm
Stair floors

Steel structure
to lift containers

Concrete foundation
for CLT structure

Concrete foundation
for timber frame structure