ARCHITECTURE
STUDENT
CONTEST

21st Edition - **International stage, Belgrade**

Team 06 - France

OUR TEAM

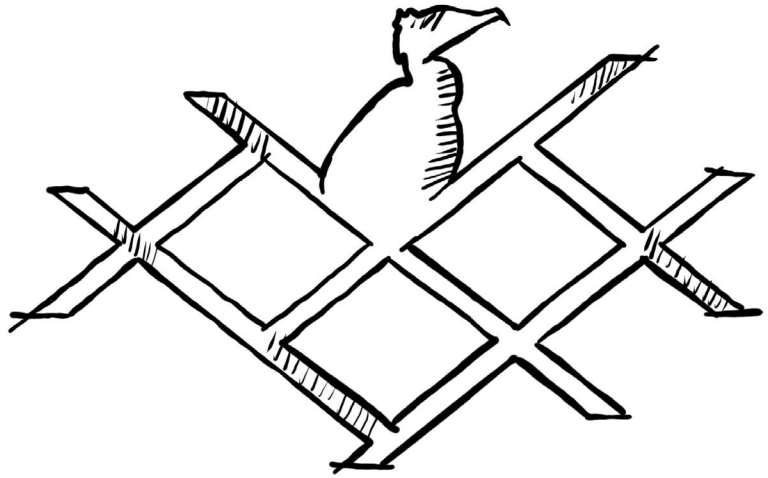
National Bordeaux School of Architecture and Landscape

Referent teacher - Aline BARLET

Fritz ARCINIEGA RIEDL

Clément JEGO

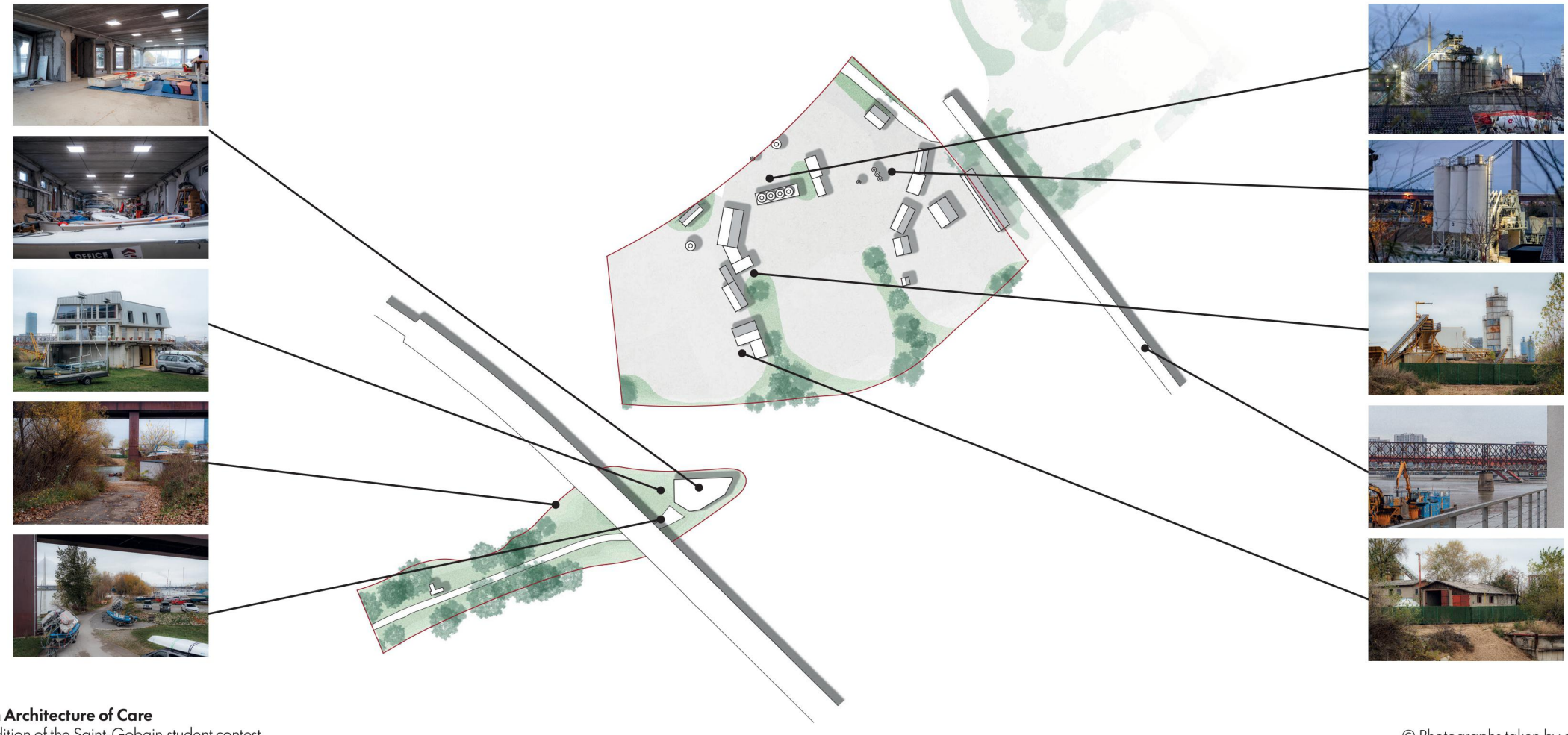
Damien LARROQUE



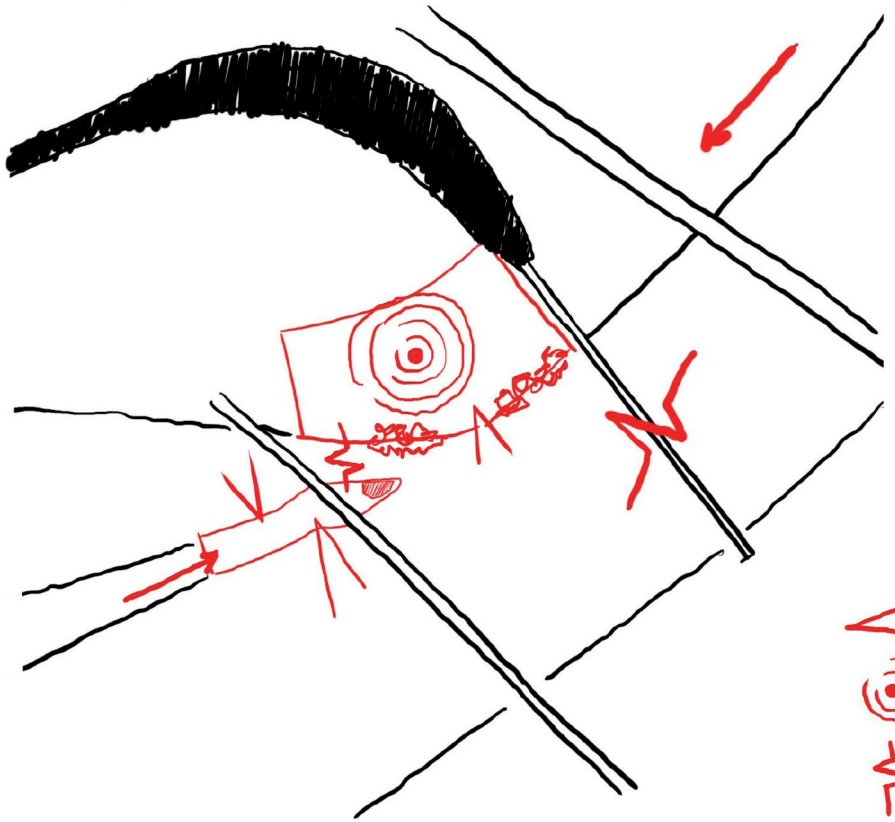
THE BIRD'S NEST

AN ARCHITECTURE OF CARE THROUGH THE LANDSCAPE

EXISTING SITE



SITE CHALLENGES AND RESOURCES FOR THE PROJECT

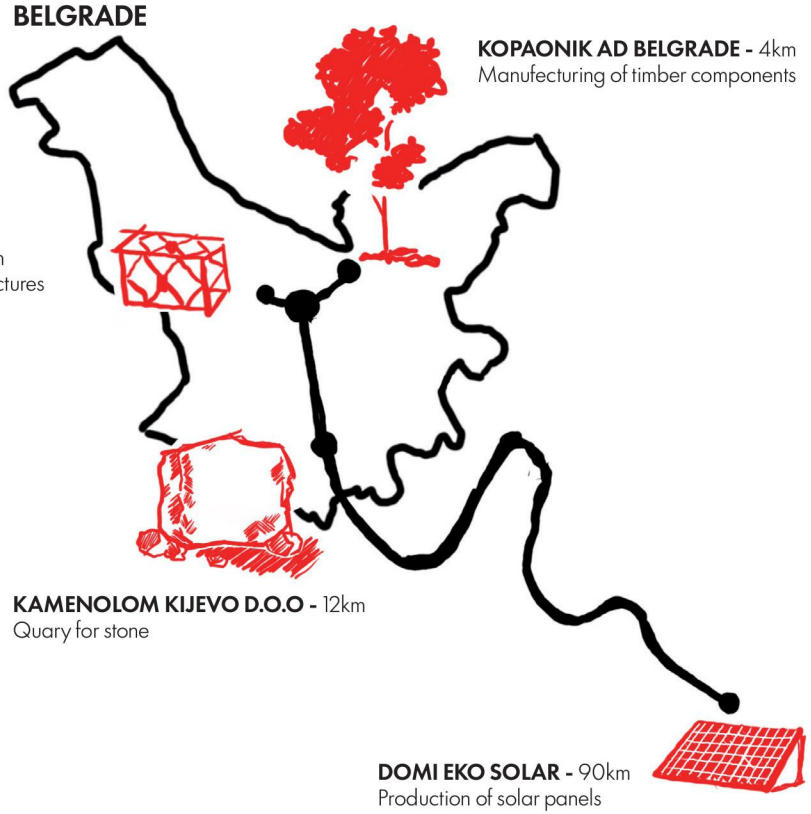


Lack of views

Landlocked

Missing connexions

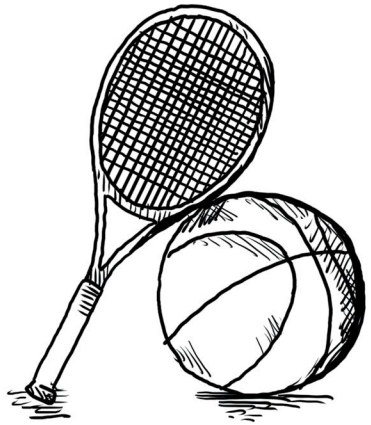
Extension to be carried out



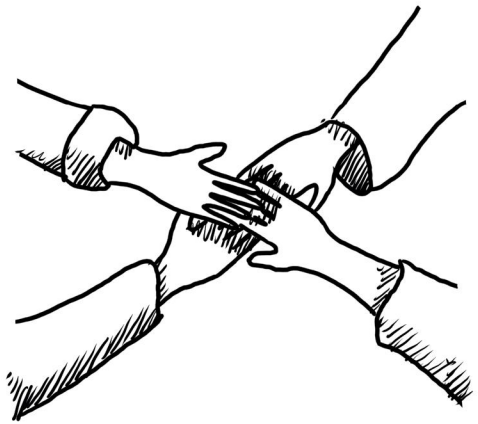
PROJECT CONCEPTS

Guiding principles for an architecture of care

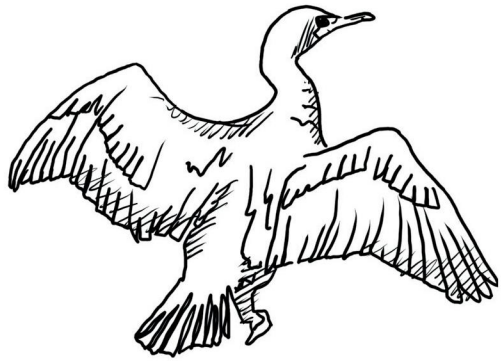
Based on the findings from the site and program analysis, the project aims to implement a **care-oriented architecture**. This architecture promotes the well-being of its users, both **athletes and visitors**, through the activation of **three keys components** . These ones will contribute to the physical and mental health of users and will be **applied across all aspects of the project.**



SPORT

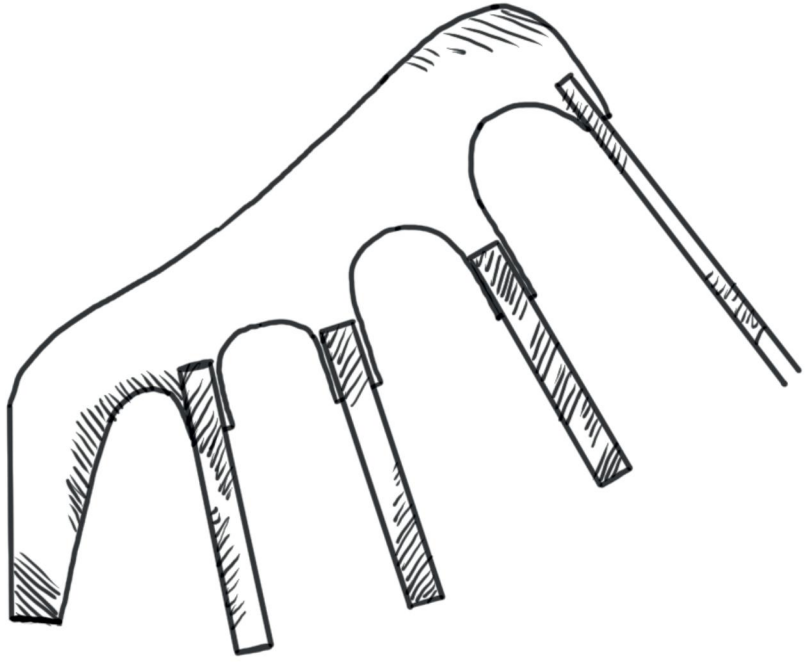


COMMUNITY



BIODIVERSITY

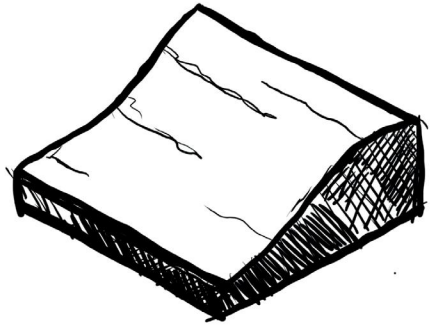
ZONE A - **SPORTS COMPLEX**



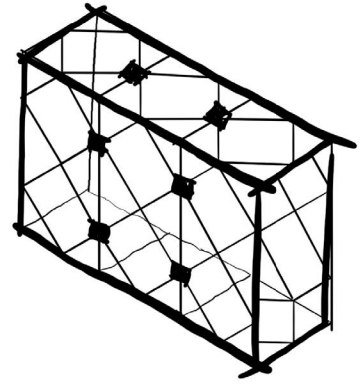
LINK OUR CONCEPT TO THE SITE

Architectural resources

The site serves as a **resource** for us. Firstly, as a source of inspiration for the design of our architecture. The project is inspired from **two existing elements** to harmonise with its surroundings : the structure of the **old railway bridge**, which will form the basis of our residential buildings, and the **embankment,** which will serve as a living base.



Embankment to design a base



Railway bridge to design the accomodations

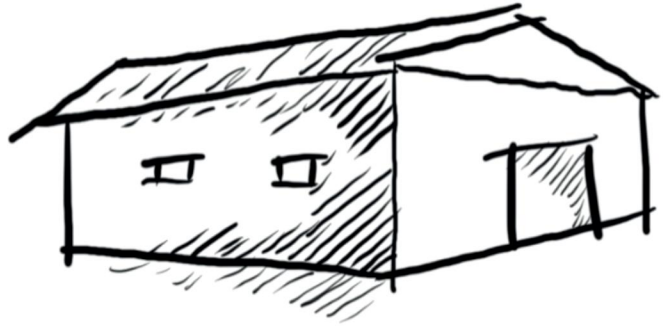
LINK OUR CONCEPT TO THE SITE

Constructive resources

As well as inspiring our architecture, the site also serves as **a source of building materials and knowledge**. The embankments that will form our base will be created using **materials found on site**. Moreover, **Mostogradnja**, a company located near to the site and specialising in the construction of **bridges and engineering structures**, also represents a resource that can be mobilised for the project.

Excavated soil for foundations

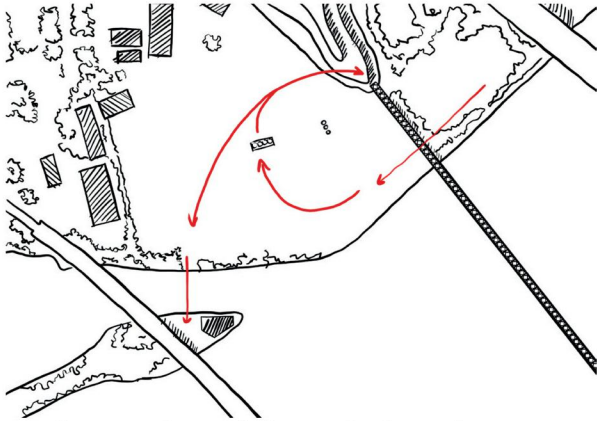
Sand from the cement works



Rubble from the demolition

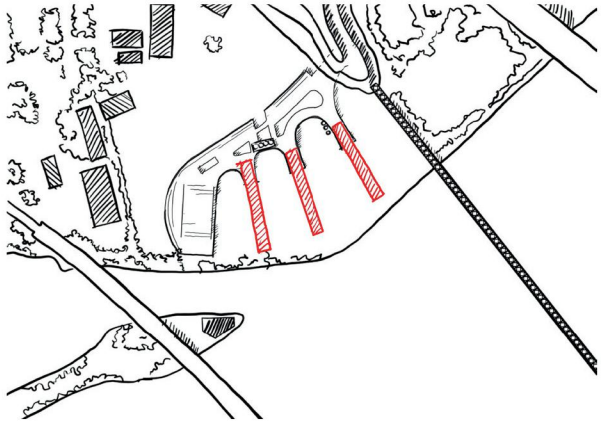
IMPLEMENTATION STRATEGY

Deconstruction of the existing buildings
The materials that can be re-used are kept to be use in the projet.

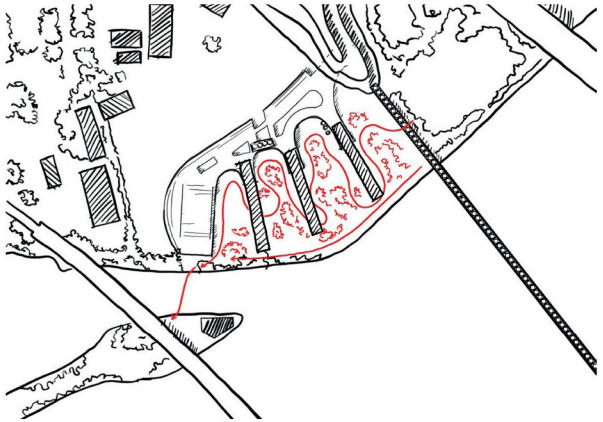


Connexion of the existing elements
The mains access of the site are connected to enhance its connectivity.

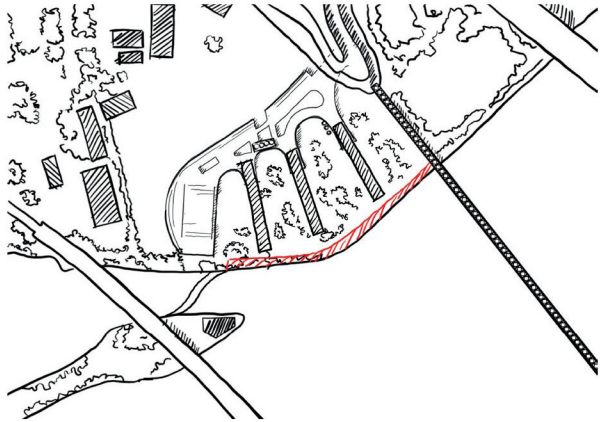
Creation of an embankment
The ground rises to form a built-up area. The roof remains accessible.



Construction of bridge-like structures
These are placed on the embankment to free up space on the rest of the site.



Creation of a park
The design on stilts creates a landscape that extends the existing park.

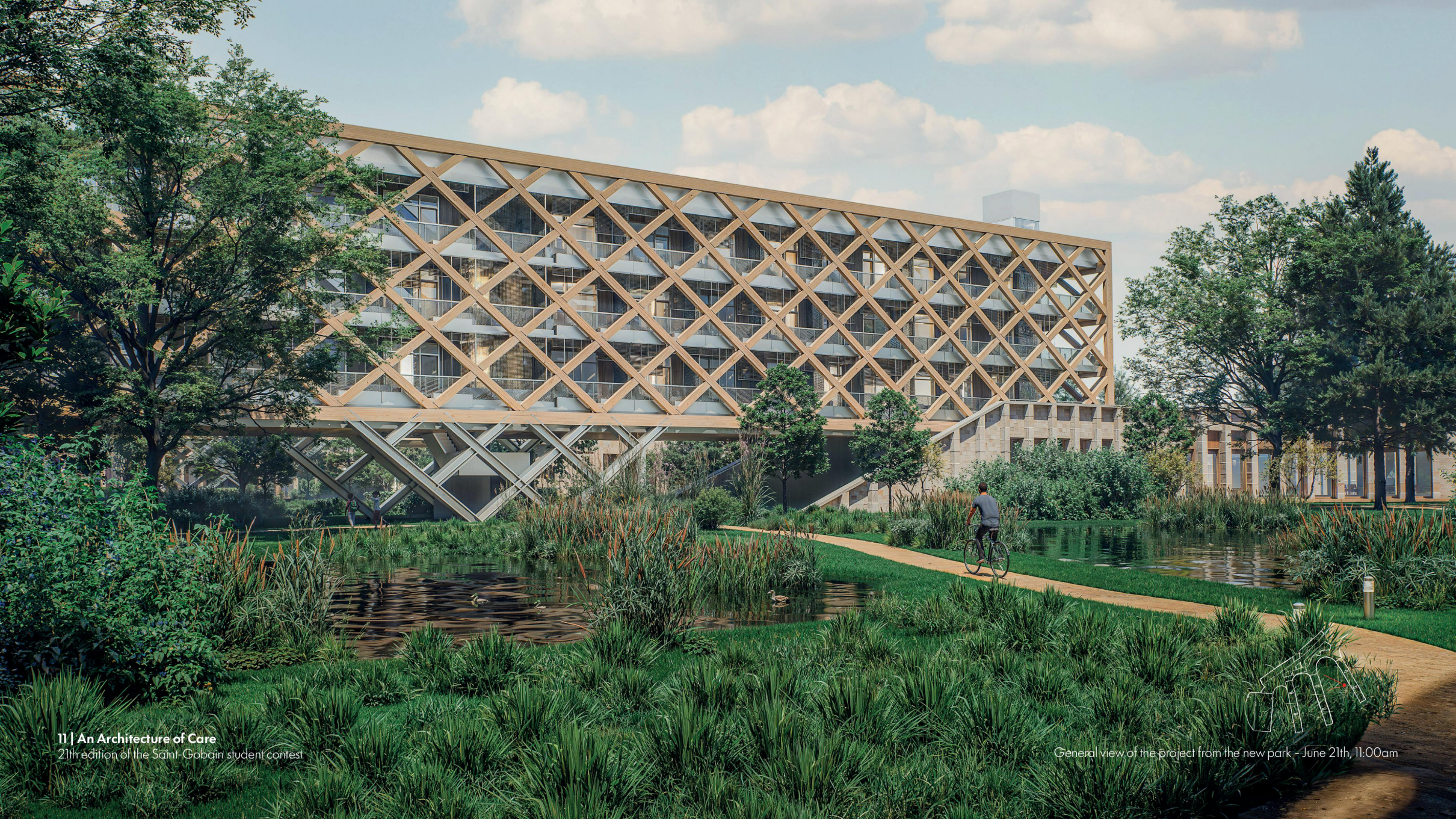


Creation of a green corridor
Dense vegetation follows the riverbanks to provide habitats for cormorants.

MASTERPLAN
Site A - Sports complex

1 - Sava River
2 - Existing linear park along the river
3 - Former railway bridge & future pedestrian bridge
4 - Inhabited base / embankment / sports facilities
5 - Multi-sports hall
6 - Stilt accomodations
7 - Reconverted existing silos
8 - Park & open-air museum

10m 60
0 30

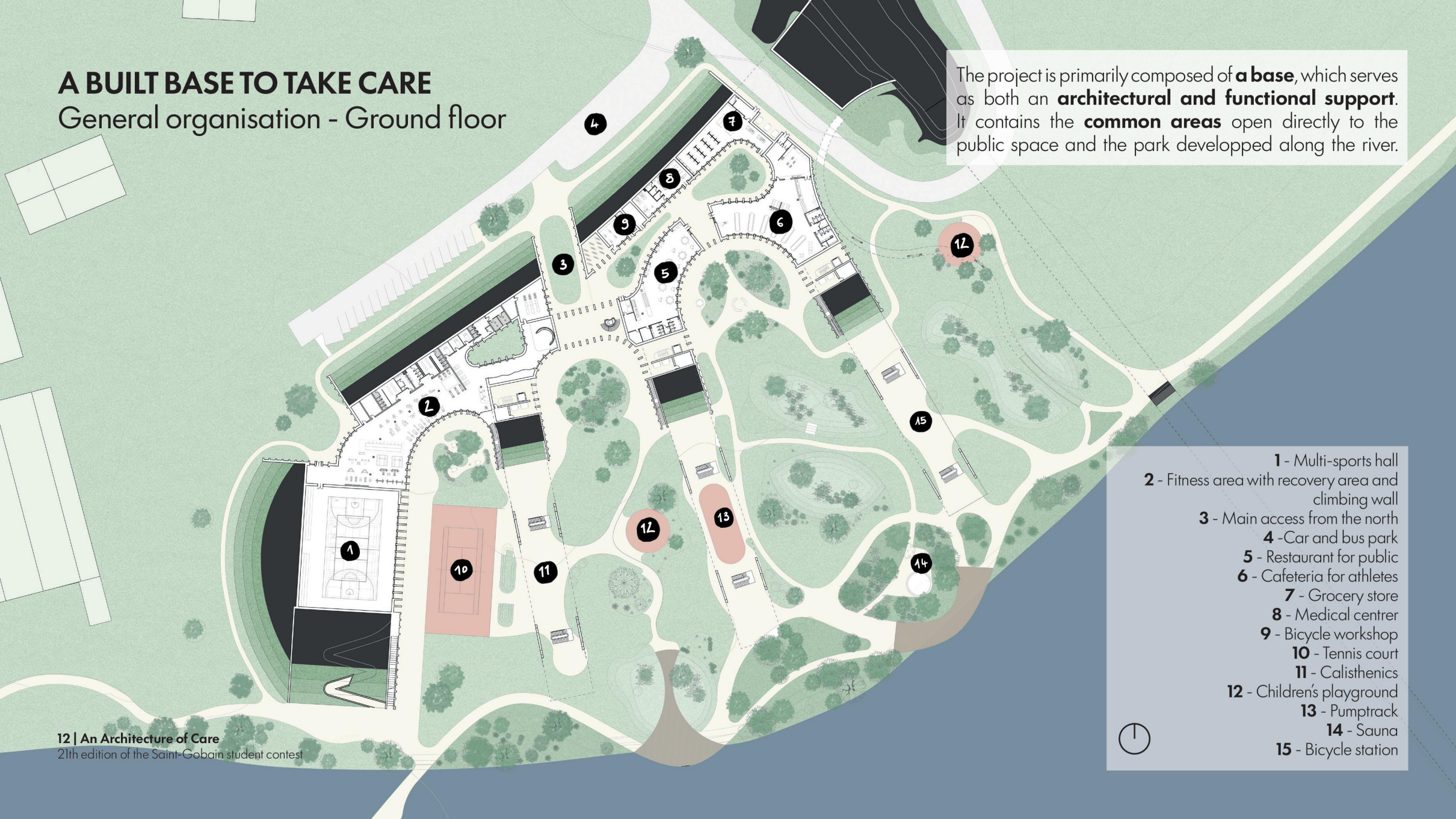


General view of the project from the new park - June 21th, 11:00am

A BUILT BASE TO TAKE CARE

General organisation - Ground floor

The project is primarily composed of **a base**, which serves as both an **architectural and functional support**. It contains the **common areas** open directly to the public space and the park developped along the river.

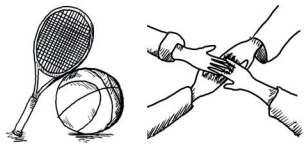


1 - Multi-sports hall
2 - Fitness area with recovery area and climbing wall
3 - Main access from the north
4 -Car and bus park
5 - Restaurant for public
6 - Cafeteria for athletes
7 - Grocery store
8 - Medical centrer
9 - Bicycle workshop
10 - Tennis court
11 - Calisthenics
12 - Children's playground
13 - Pumptrack
14 - Sauna
15 - Bicycle station

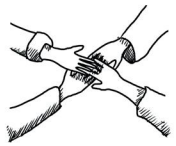
View from the fitness area - March 21st, 9:00am

View from the restaurant - March 21st, 9:00am

A BUILT BASE TO TAKE CARE
General north/south section



SPORTS AND COMMUNITY
The base contains the sports and community functions

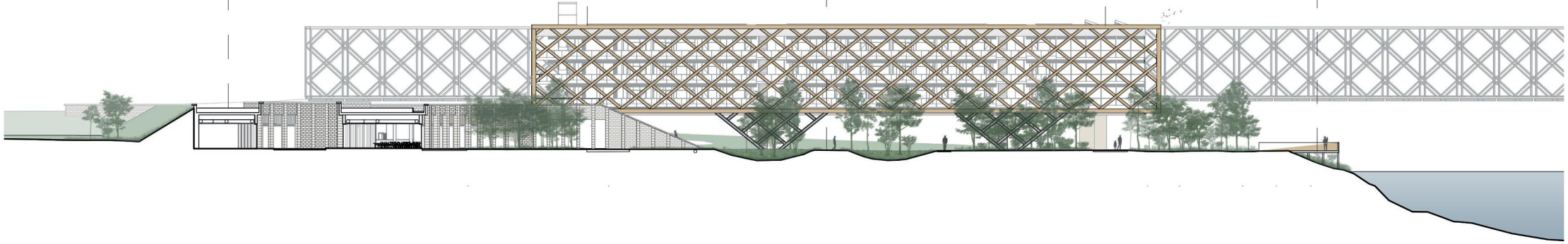


ACCOMMODATE
The bridge-like buildings accomodate the athletes

BIODIVERSITY, SPORTS & CULTURE
The park supports biodiversity installation, sports and cultural facilities

NUTRITION
Greenhouses and areas of the park produce food

OBSERVE
Viewpoints open to the landscape while maintaining biodiversity protection

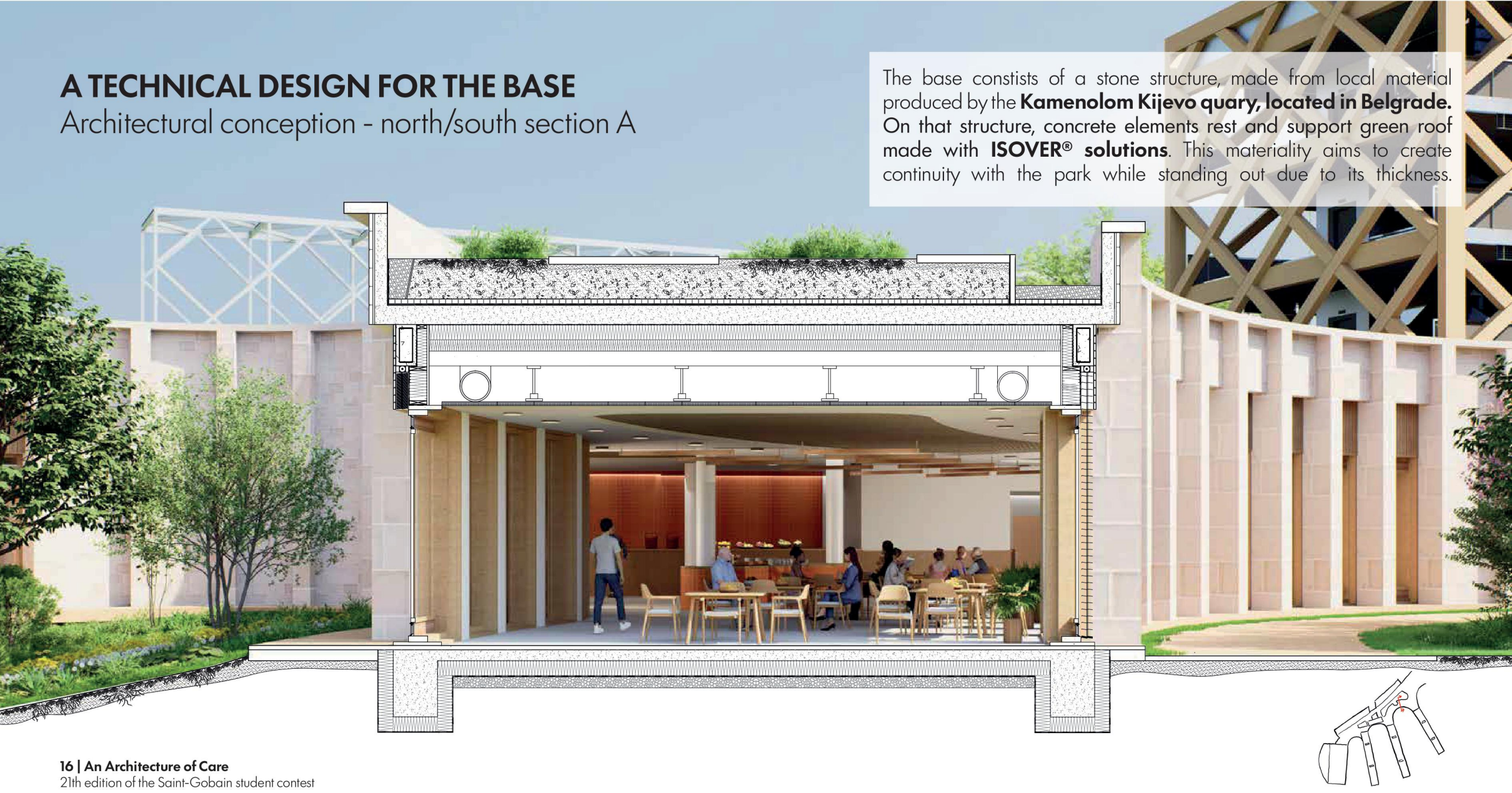


2m 12
0 6

A TECHNICAL DESIGN FOR THE BASE

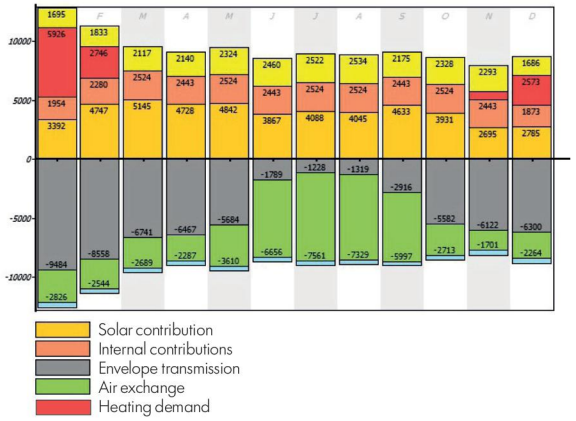
Architectural conception - north/south section A

The base constists of a stone structure, made from local material produced by the **Kamenolom Kijevo quary, located in Belgrade.** On that structure, concrete elements rest and support green roof made with **ISOVER® solutions**. This materiality aims to create continuity with the park while standing out due to its thickness.



A TECHNICAL DESIGN FOR THE BASE

Winter strategy - north/south section A

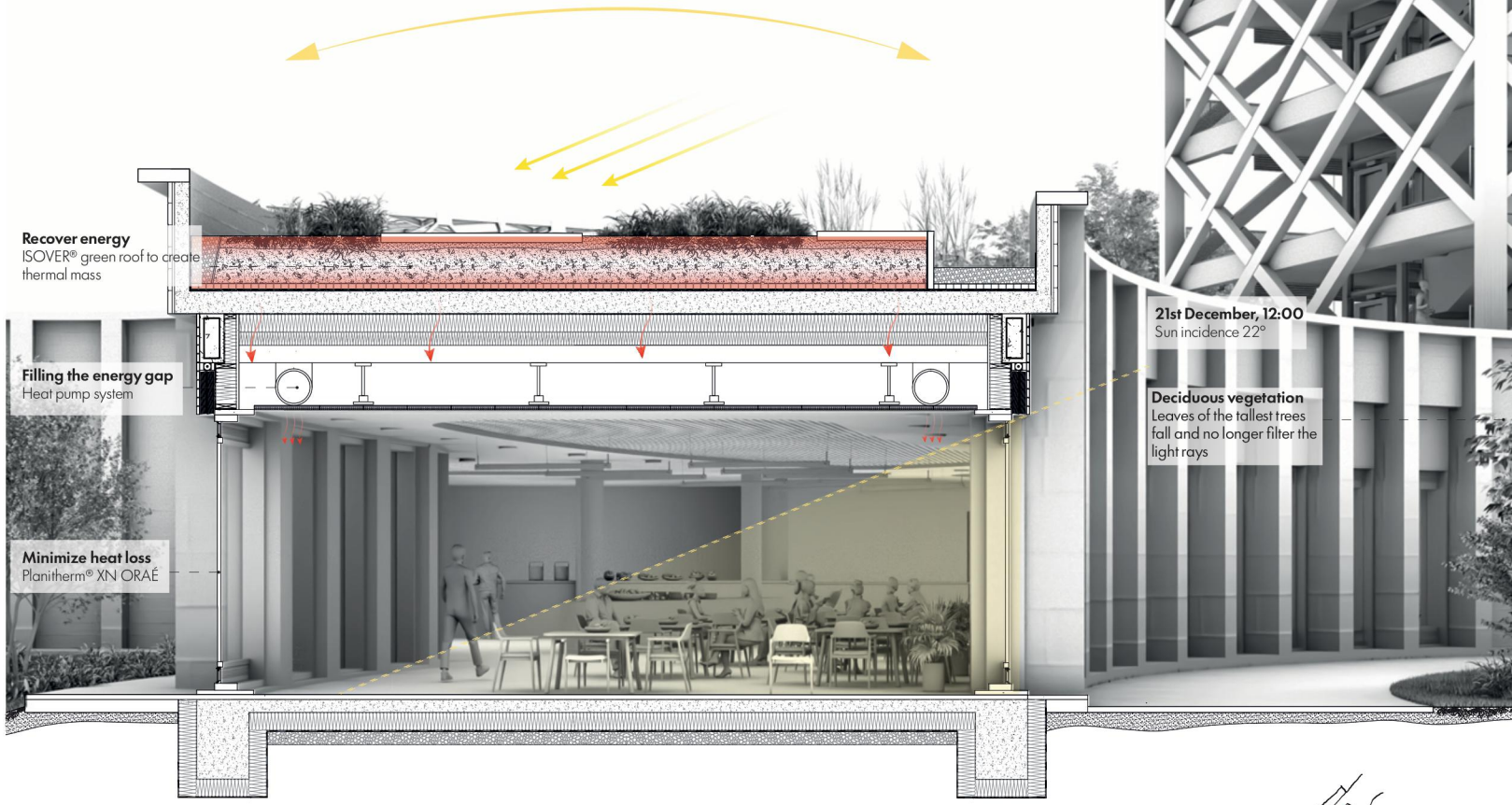


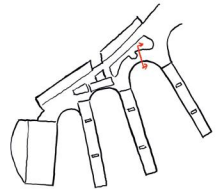
In winter, the buildings' design aims to **maximise sunlight**. The south-facing windows, as well as providing optimal light, help to achieve this. The sunlight penetrates deep into the interior during the winter mounths.

Also, the building aims to **minimise heat loss** through the use of high performance **PLANITHERM®** glass and **ISONAT®** insulation. Finally, a flat roof allows to benefit from thermal mass, which helps to archieve inertria objectives.

glassolutions SAINT-GOBAIN

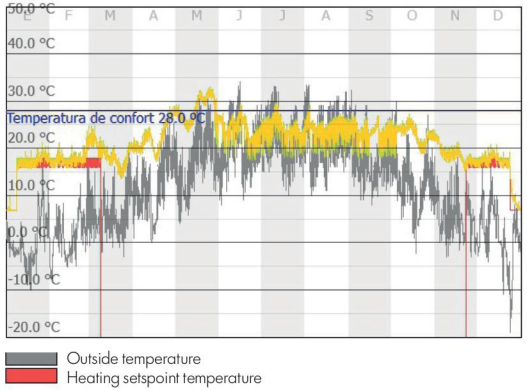
ISOVER SAINT-GOBAIN





A TECHNICAL DESIGN FOR THE BASE

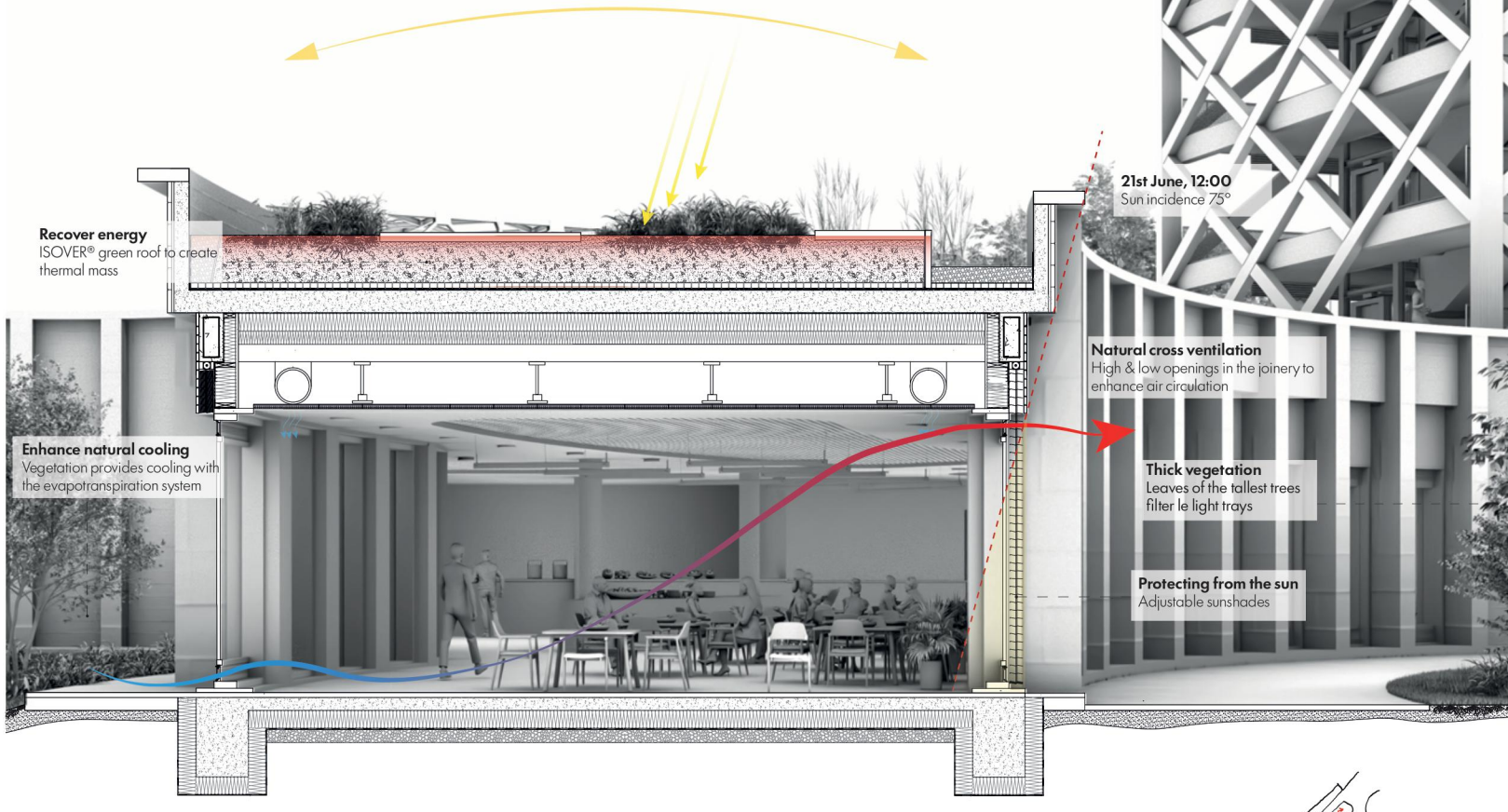
Summer strategy - north-south section A

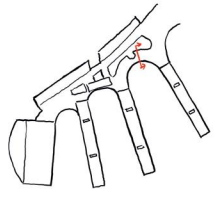


7% discomfort in the building : 361h > 28°c

In summer, the aim is twofold : to **prevent heat** build-up during the day whilst allowing it to **escape at the night**. The **set-back facade** helps to reduce solar gain for part of the year. This set back is complemented by **adjustable sunshades**.

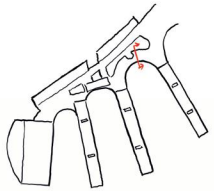
The building's **dual orientation** and the presence of **vegetation** near to the windows facilitate **night-time ventilation**. Openings in the joigney allow for safe ventilation.





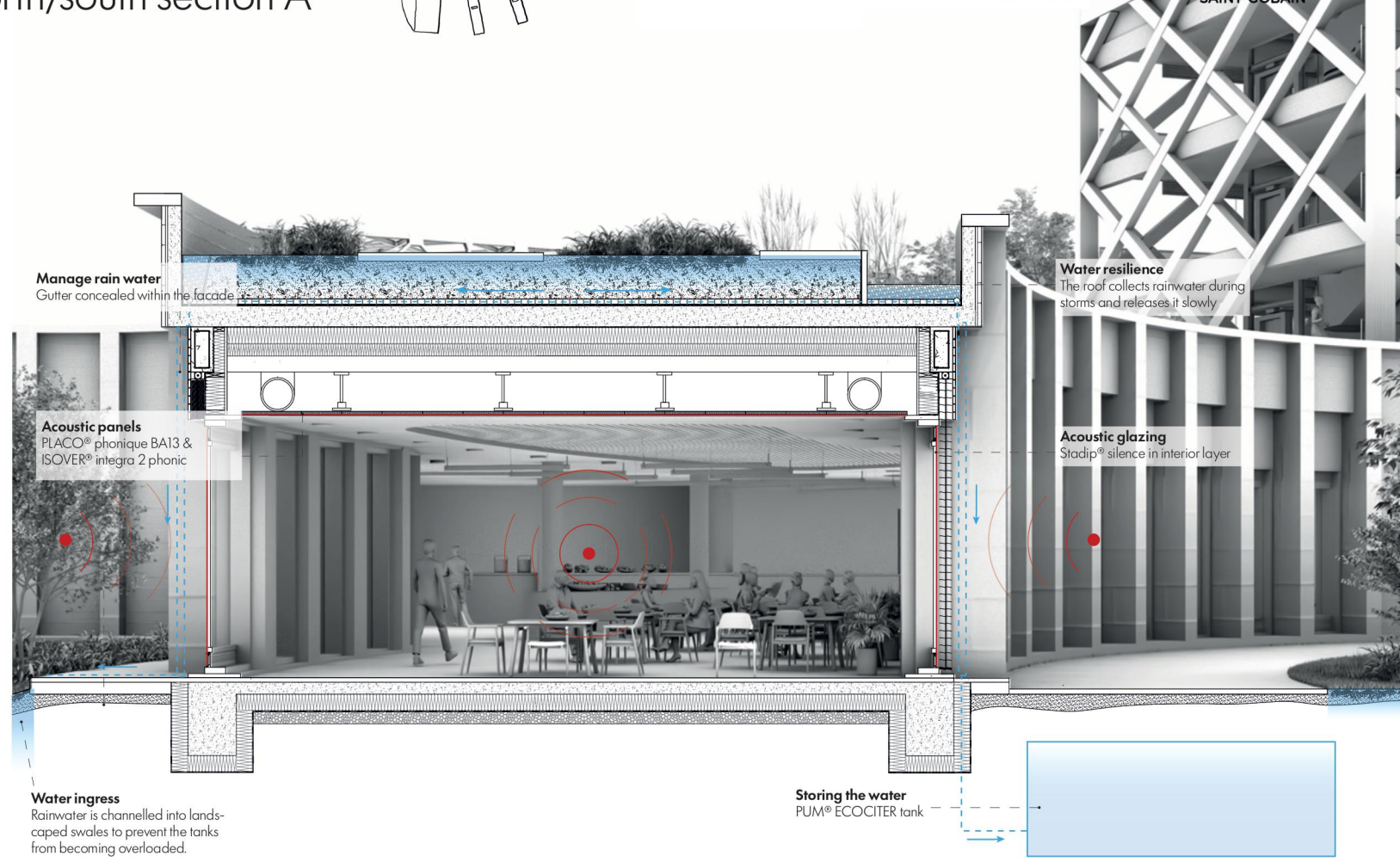
A TECHNICAL DESIGN FOR THE BASE

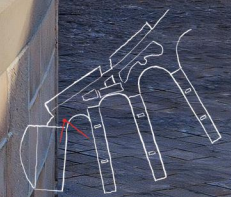
Water and sound management - north/south section A



The green roof was designed as a way to **restore the areas made impermeable** by the creation of the base. It consists to support **intensive cultivation**. Planted areas are delineated and made inaccessible to the public via **market pathways**. This roof also allows for optimized water management **facilitating drainage and storage**.

The acoustic management of the base aims to solve two problems. First, **reverberation control** to prevent disruption to interior comfort, with **PLACO® suspended acoustic panels**. Second, **external sound** management to limit noise that could compromise the use of some spaces, by integrating **STADIP® silence glasses**.



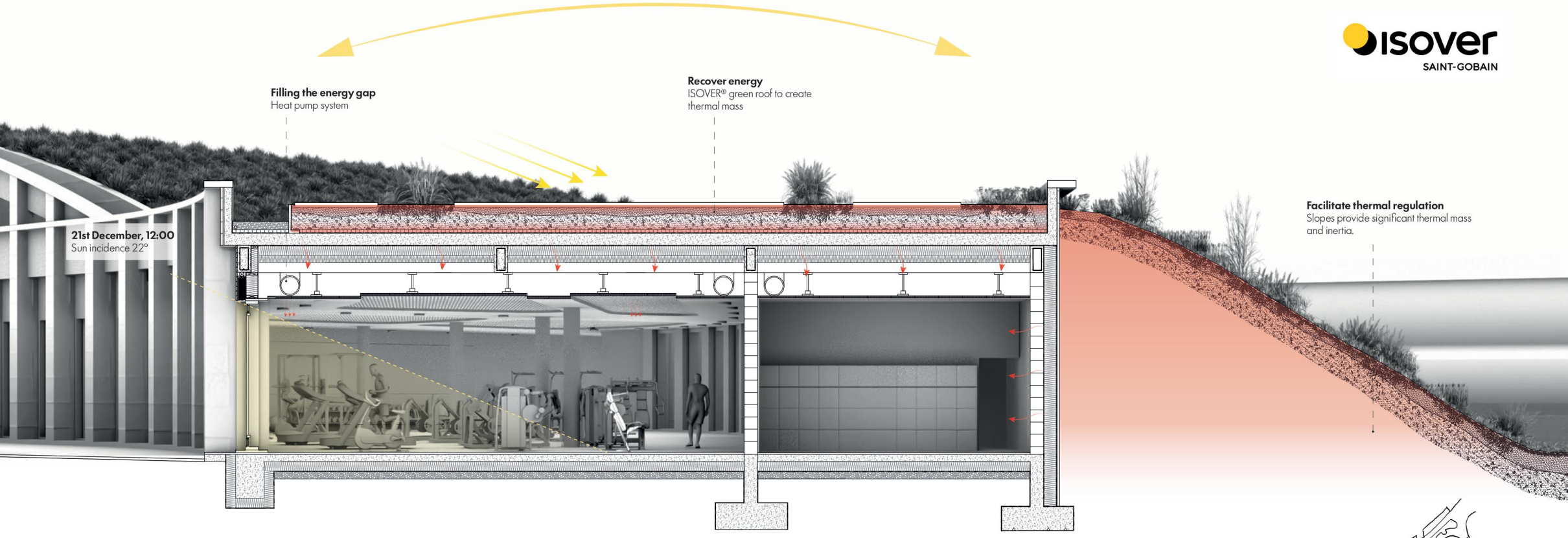


View from the top of the base - June 21st, 7:00pm

A TECHNICAL DESIGN FOR THE BASE

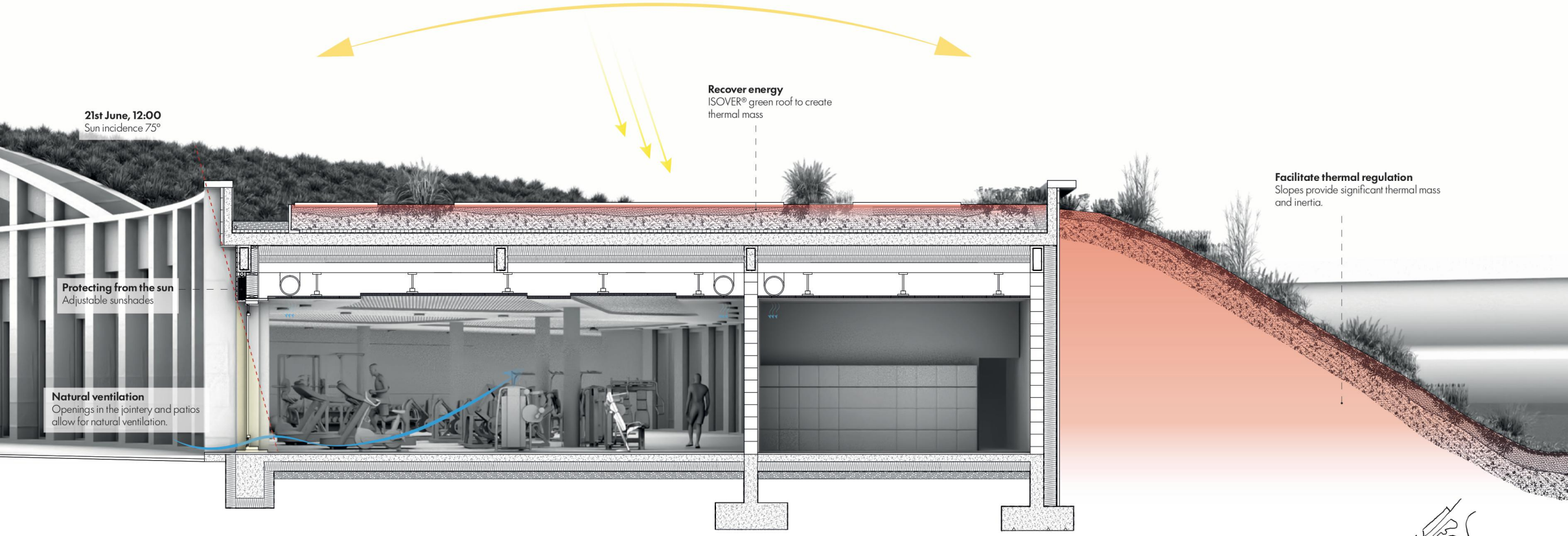
Winter strategy - south-north section B

Beyond their aesthetic and architectural aspect, **the embankments offer a technical advantage.** They constitute a large mass with significant **thermal inertia**, and benefits. This system allows **passive regulation** of interior temperatures : cooling in summer and providing warmth in winter.



A TECHNICAL DESIGN FOR THE BASE

Summer strategy - south/north section B



A TECHNICAL DESIGN FOR THE BASE

Water management - south/north section B

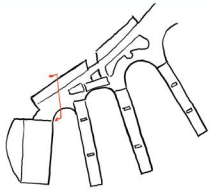
Acoustic panels
PLACO® phonique BA13 &
ISOVER® integra 2 phonic

Water resilience
The roof collects rainwater during storms and releases it slowly

Water ingress
Rainwater is channelled over the slopes to prevent the tanks from becoming overloaded.

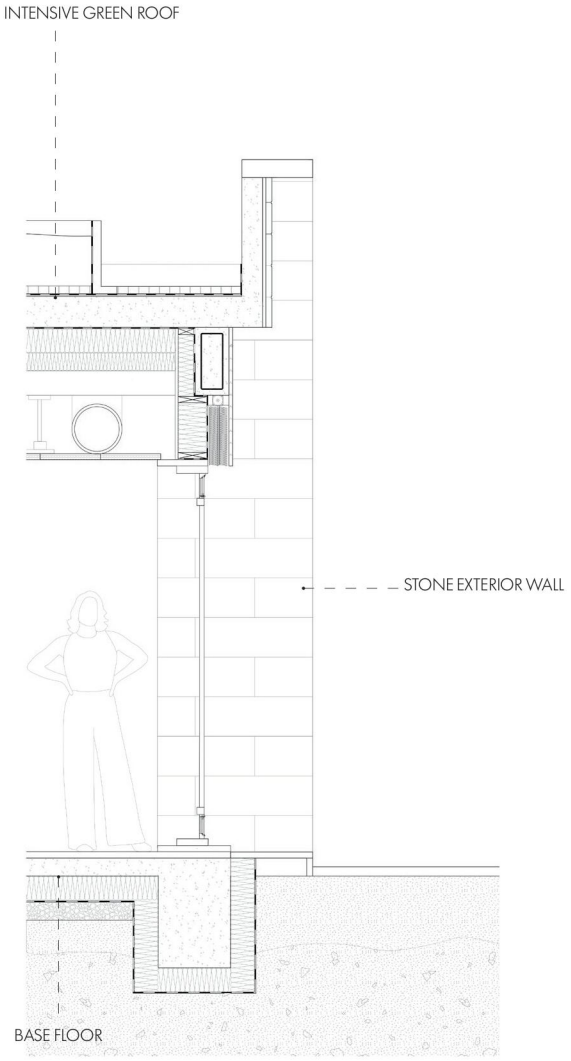
Manage rain water
Gutter concealed within the facade

Storing the water
PUM® ECOCITER tank

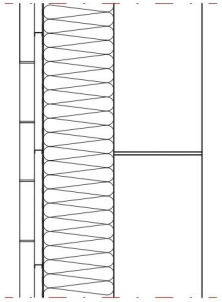


A TECHNICAL DESIGN FOR THE BASE

Technical details and facade

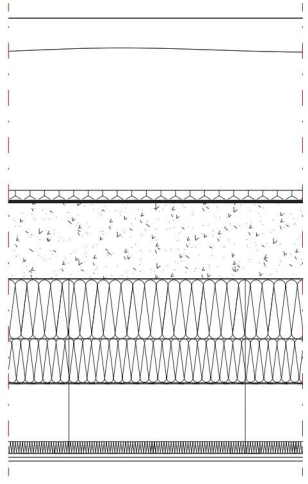


chryso SAINT-GOBAIN isover SAINT-GOBAIN placo SAINT-GOBAIN



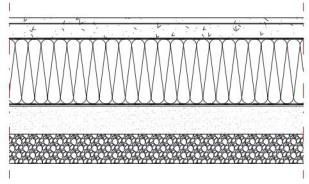
STONE EXTERIOR WALL
U= 0.15 W/(m²K) ; REI 120

Limestone tiles	60mm
Ventilated air gap	30mm
Isover Vario Xtra - Hydroregulatory membrane	2mm
Isonat® Flex 55	240mm
Limestone blocks	300mm



INTENSIVE GREEN ROOF
U= 0.1 W/(m²K) ; REI 120

Leca Garden substrate	500mm
Filter layer	9mm
Protective geotextile layer	2mm
Alveolar drainage layer	25mm
Waterproofing membrane resistant to roots	2mm
Isover Vario Xtra	2mm
Chryso® low carbon reinforced concrete slab	250mm
Isonat® Flex 55	350mm
Isover Vario Xtra	2mm
Isover integra 2 phonic	
Air gap	200mm
Isonat® Flex 55	40mm
2x Placo BA13 Habito®	26mm



BASE FLOOR
U= 0.13 W/(m²K)

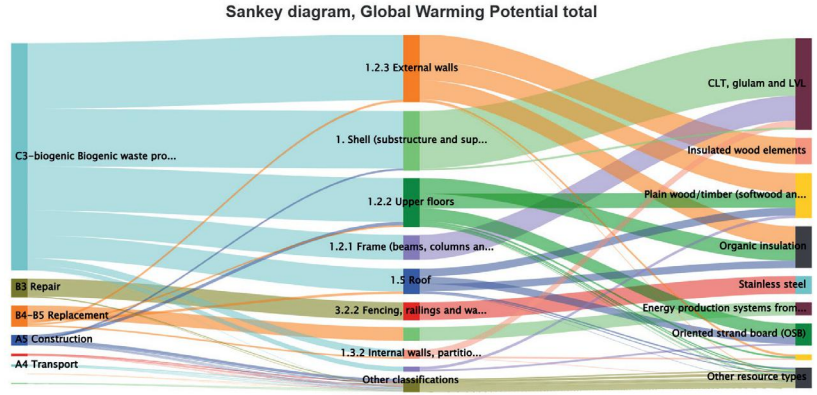
Polished concrete floor	20mm
Chryso® low carbon concrete slab,	50mm
Isonat® Multisol 110	250mm
Waterproofing membrane	2mm
Protective geotextile layer	2mm
Dry sand	100mm
Gravel layer	100mm

LIFE CYCLE AND BUILDING CIRCULARITY

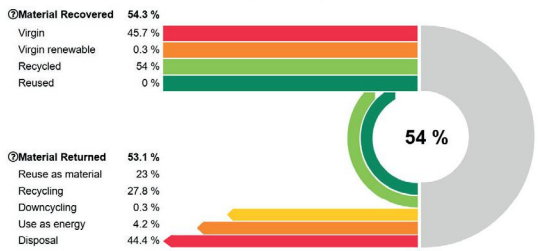
Base

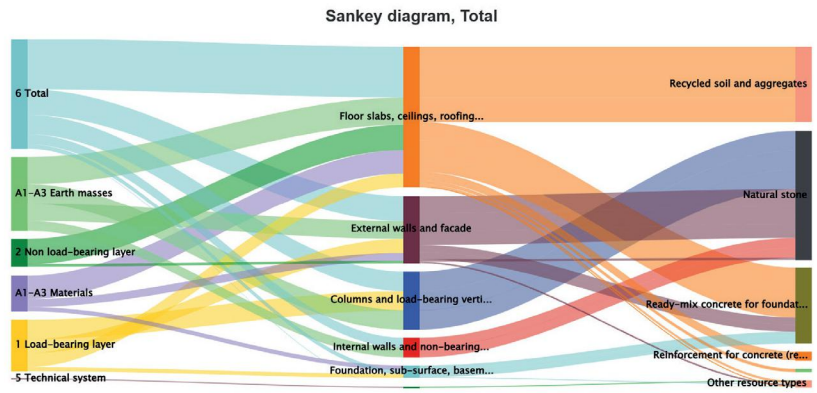
LIFE CYCLE

Cradle to grave (A1-A4, B4-B5, C1-C4)	kg CO_2e/m^2
(< 340) A (340-410) B (410-480) C (480-550) D (550-620) E (620-690) F (> 690) G	257

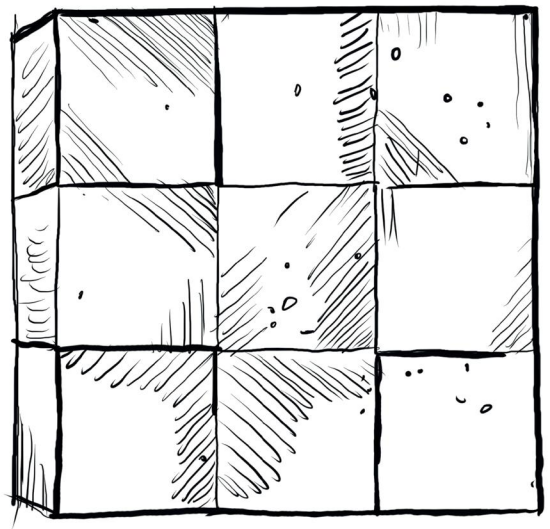


BUILDING CIRCULARITY





The base is made of **stone**. This material is not commonly used due to its cost and potential carbon footprint resulting from the distance between its extraction site and its applications' one. In this project, the **stone would come from a nearby quarry**.

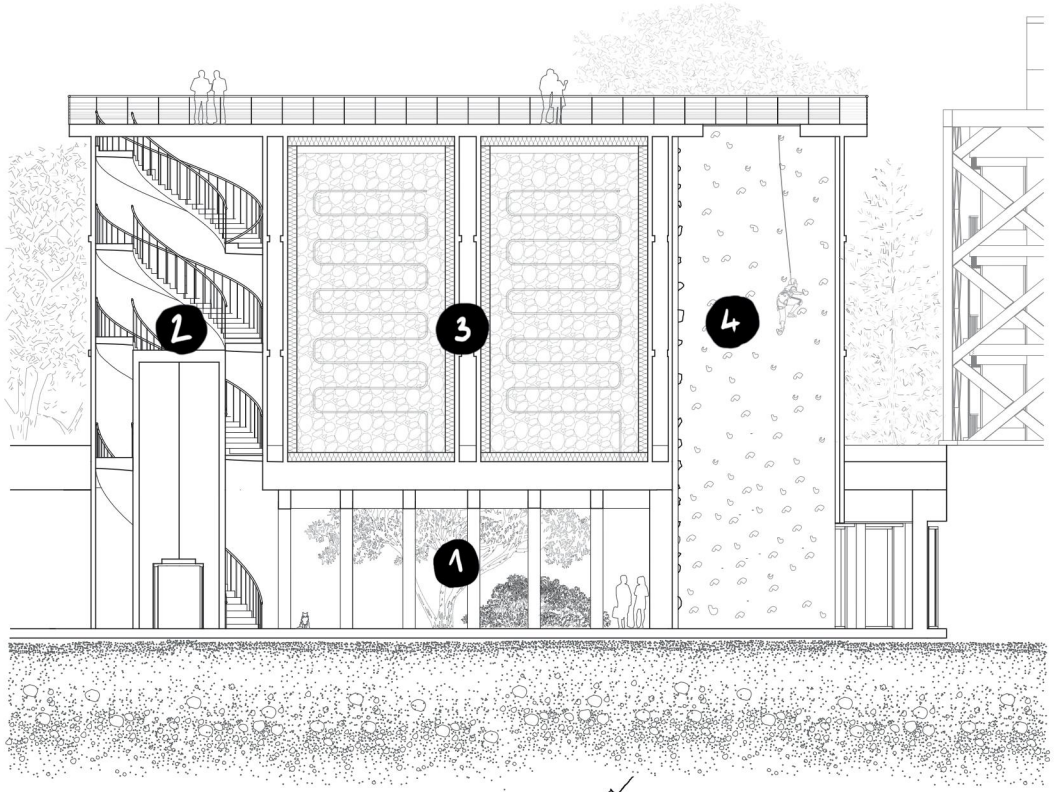


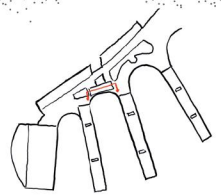
STONE ADVANTAGES

Stones are **breathable** materials, promoting good indoor **air quality** and a sense of well-being. They are compatible with bioclimatic design and **thermal inertia** strategy. Also, stones are materials that are very **easy to maintain**, which gives it a long lifespan and reduces its carbon footprint over time.

A TECHNICAL DESIGN FOR THE BASE

Re-using silos as an energy solution





1 - Site entrance from the north
2 - Vertical circulation to link the ground floor to the top of the embankment
3 - Sand battery solution
4 - Climbing wall | Fitness area

Beyond their symbolic role in the project, the silos also serve **a technical function**. They will provide domestic hot water and heating for the entire site. To achieve this, the project will utilize **a sand battery system**, already implemented in various regions worldwide (Finland etc).

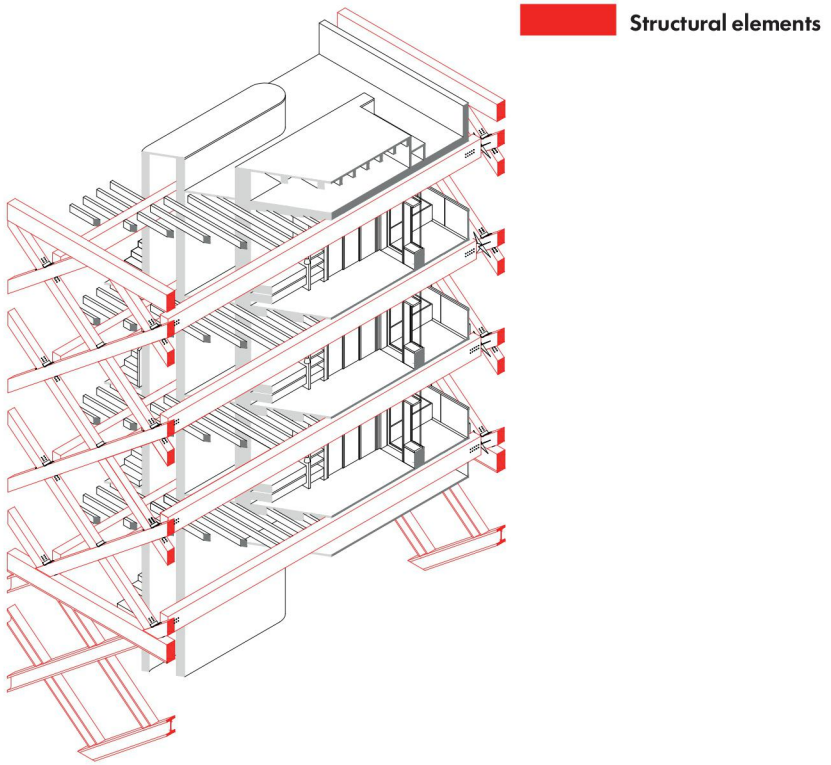
This system relies on **intermittent energy** (solar, wind, tidal...) to **heat a thermal mass** contained within the silos during their peak production. This mass will retain the accumulated heat for extended periods **before releasing it into the buildings.**

Schematic diagrams of the sand battery solution

View of the silos from the banks of the Sava - March 21th, 10.00am

LIVING ABOVE THE LANDSCAPE, WITH A BRIDGE-LIKE STRUCTURE - Structural and constructive principles

The project aims to address a need : the **permeabilization of the soil**. To archieve this goal, the housing units occupy **3 stilts structures**. These structures rests on **2 loard-bearing facades** (east/west). A secondary transverse structure supporting the floors. North and south facades contribute to the structures' bracing. Through this design, the **athletes live above the landscape** afforded by this architecture.

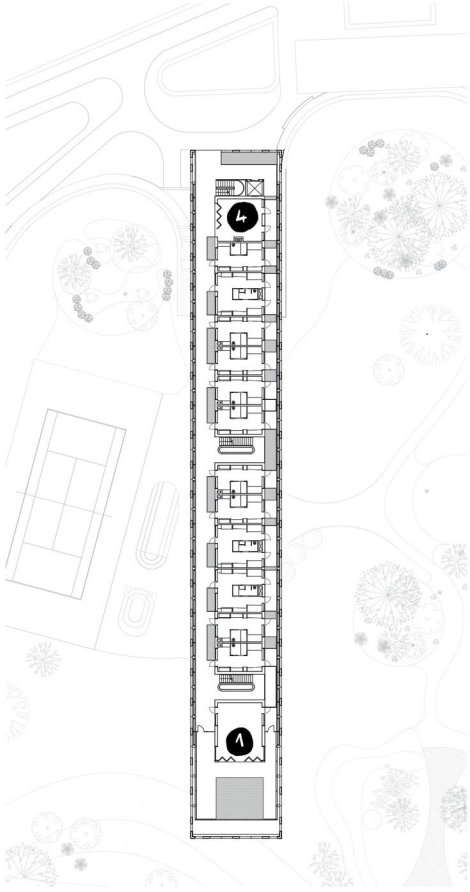


Technical detail of the bridge-like structures

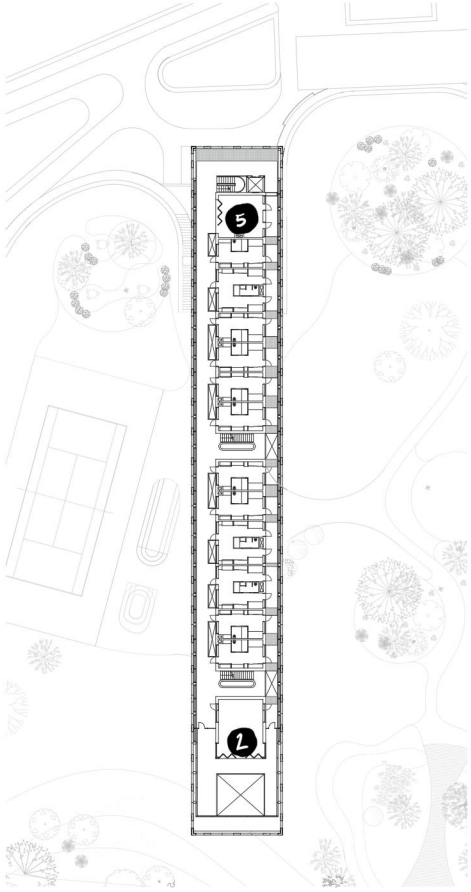
View of one bridge-like building from the park -

LIVING ABOVE THE LANDSCAPE, WITH A BRIDGE-LIKE STRUCTURE

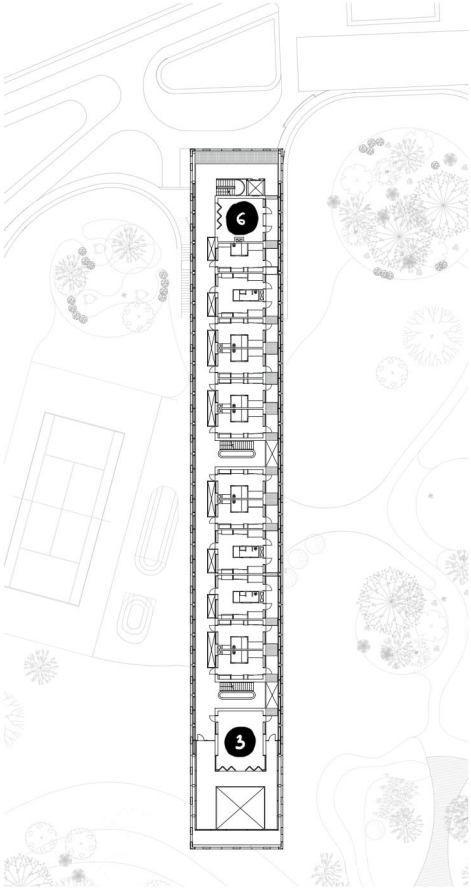
Levels organisation



1ST FLOOR - 5m



2ND FLOOR - 8.20m



3RD FLOOR - 11.40m

The residential buildings are arranged along a north-south axis, allowing east-west-facing accommodation. Access is provided via **three vertical circulations** and a connection between the top of the embankment and the level 1 on the north facade.

The site can accommodate **130 inhabitants**, in both single (60%) and double rooms (40%).

The rooms are complemented by **communal areas**. Those on the south facade are extended by a greenhouse which serves as a **winter garden**.

1 - Greenhouse - Kitchen
2 - Greenhouse - Multipurpose space
3 - Greenhouse - Living room
4 - Laundry
5 - Co-working room
6 - Library / quiet room

LIVING ABOVE THE LANDSCAPE, WITH A BRIDGE-LIKE STRUCTURE - roofs principles

SOLAR PANELS PRODUCTION

1 roof is occupied by **DOMI EKO ®** solar panels. There are placed on an **ISOVER ® green roof**, with an angle of **38°**, to higher their efficency.

Surface : **500m²** reached by the effective area
Annual production : over **100 000 kWh/an**

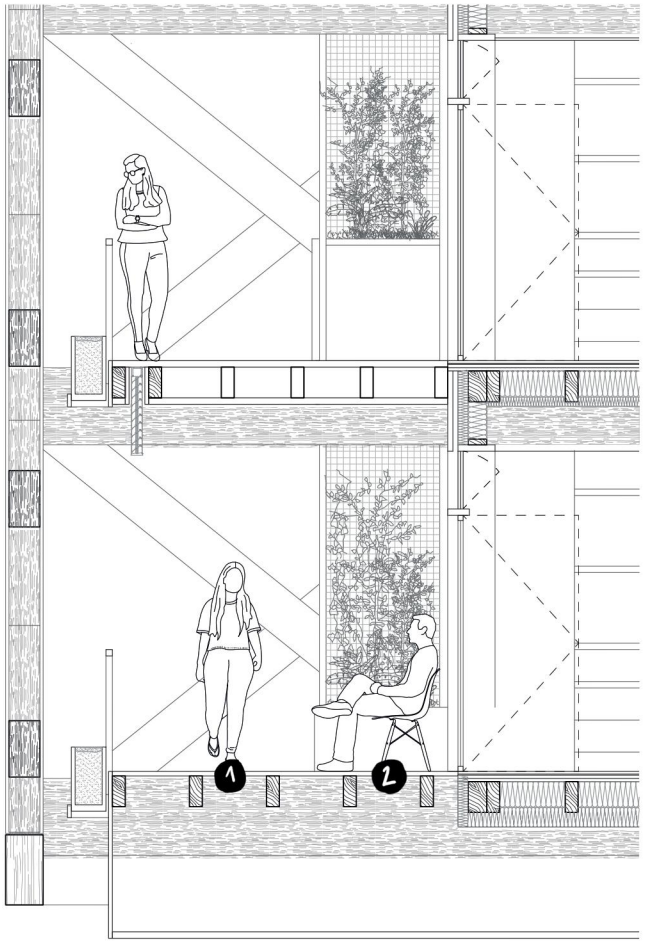
These solar panels serves two goals. First, it helps offsets electricity needs for lighting and uses. But it also contributes to the **sand battery system**.

1 - Sporty roof with a peripheric race track
2 - Technical roof with solar panels
3 - Rooftop with panoramic bar overlooking the city

FROM COLLECTIVE TO INDIVIDUAL

Corridors organisation

To cross the building, a **walkway** extends along the **east side**. It connects the three vertical circulation cores to the common spaces and the private spaces. To **preserve intimity,** a **transition** is implemented between the **corridor and the interior** spaces. This space can also be used as a waiting zone or a terrace by the residents.



1 - Walkway
2 - Transition / waiting space

View in one of the corridors - March 21th, 4:30pm

FROM COLLECTIVE TO INDIVIDUAL

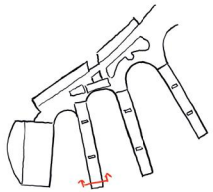
Layout of the greenhouses / shared areas

View of the kitchen

View of the first living room

View of the second living room

Communal spaces contribute **to create a sporting community** within the accommodations. They are places for **discussion and sharing** but also areas where athletes can participate in their daily routine.

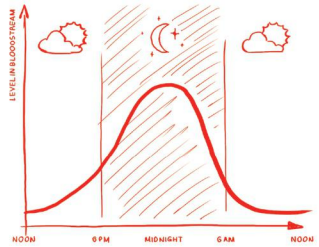


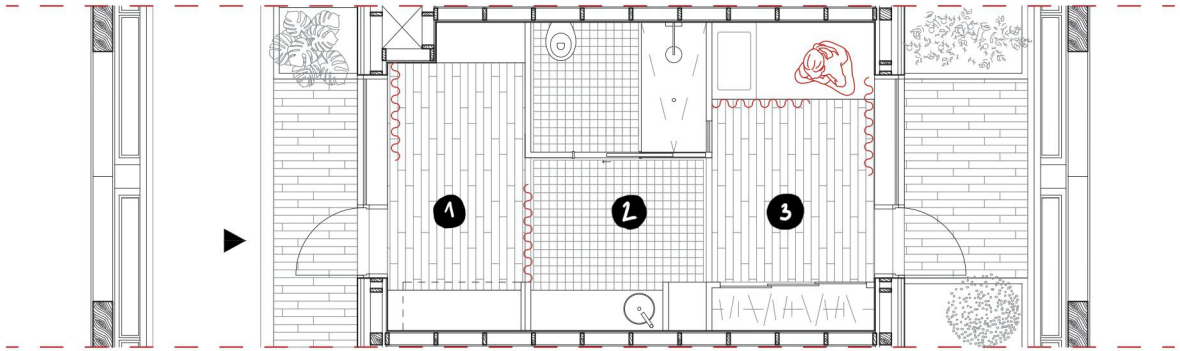
Perspective section of a greenhouse towards the common areas

FROM COLLECTIVE TO INDIVIDUAL

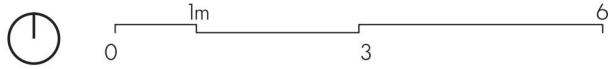
Single / PRM room organisation

The bedrooms are divided into **three distinct areas**. Each area is positioned to provide lighting suited to its function and to align with the **circadian rhythm :** wake up with the morning sun (east), evening activities (west). A private balcony complements the interior space.





1 - **Modular space** to practice activites such as student or freelance work, art, stretching...
2 - Technical / **water space**
3 - **Rest area**

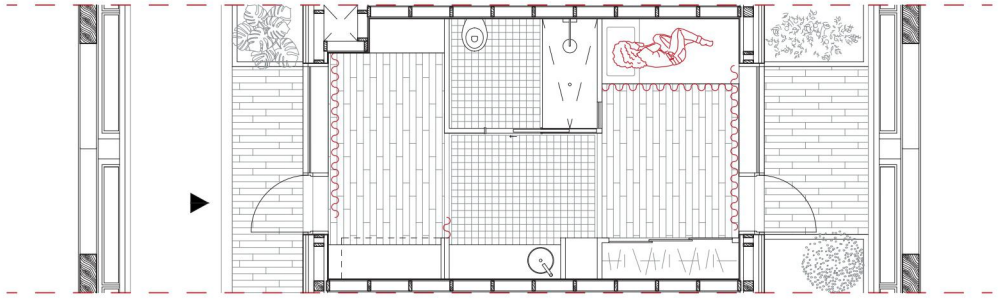


View of the single room - December 1st, 9:00 am

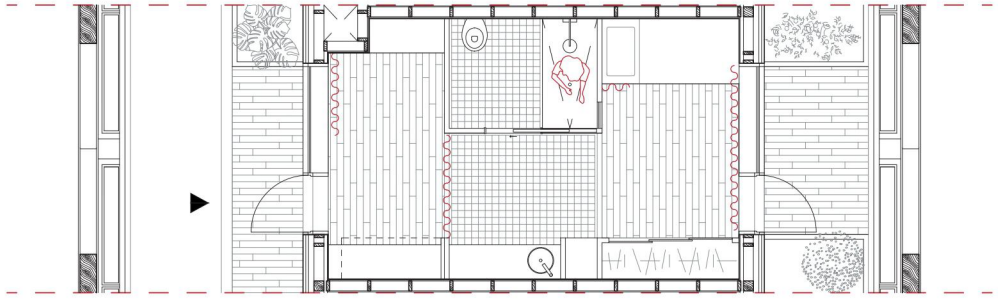
FROM COLLECTIVE TO INDIVIDUAL

Single / PRM room organisation

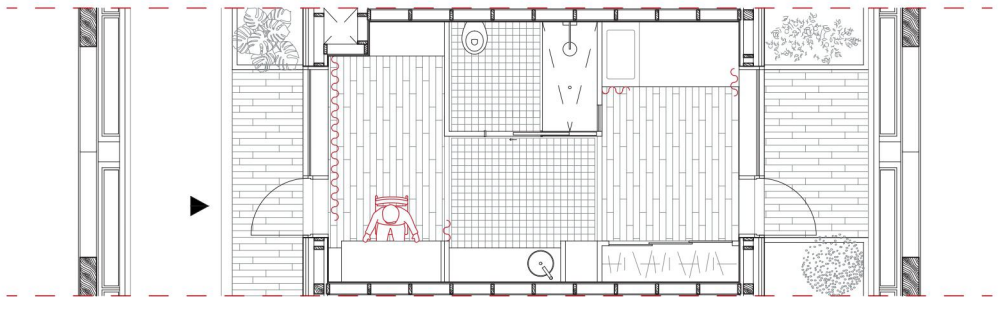
The rooms **adapt** to their purpose. **Curtains** can be used to divide the space, provide privacy or offer shelter. The room can be tailored **to suit every moment of the day.**



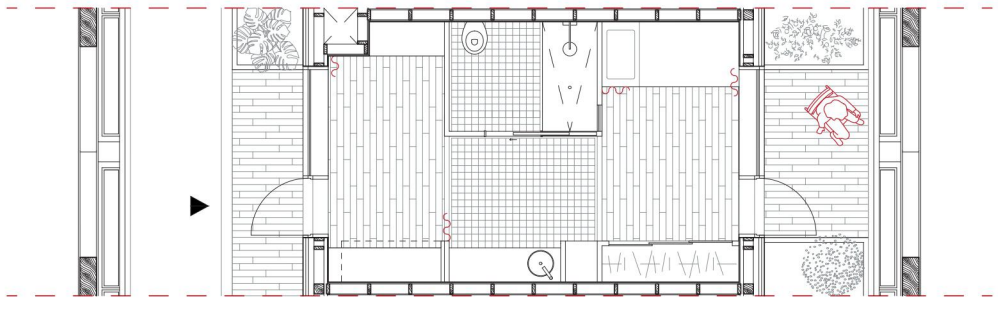
Night-time scenario



Shower scenario



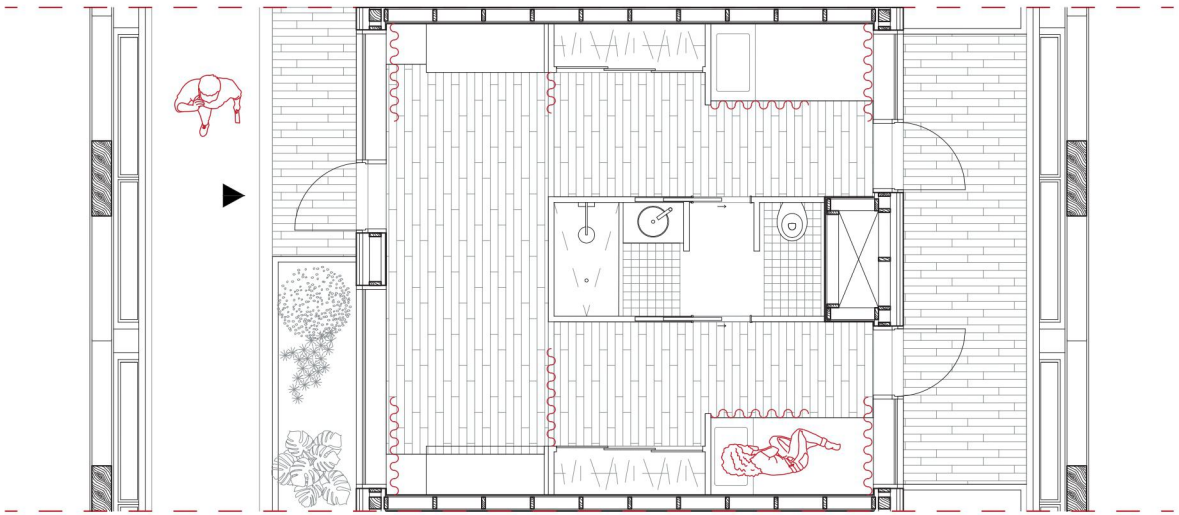
Study scenario



Relaxation scenario

FROM COLLECTIVE TO INDIVIDUAL
Double room organisation

As single rooms, the double rooms are divided into **three distinct areas**. The flexible living space and the bathroom are shared. Each housemate has their **own sleeping area**.

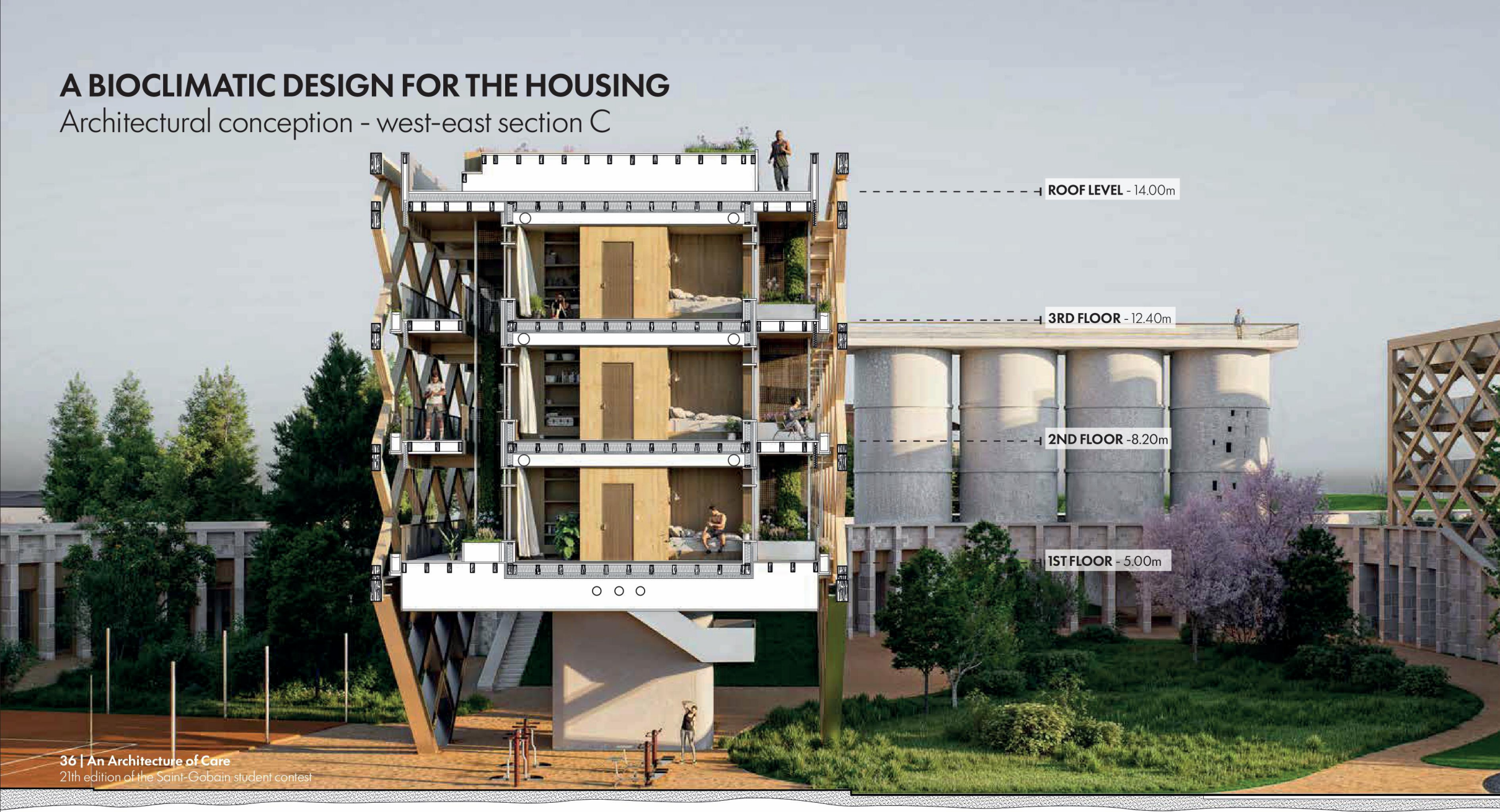


0 3 1m 6

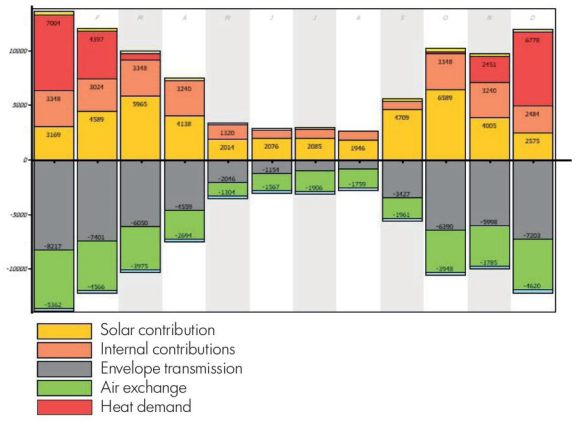
View of one of the sleeping areas in the double rooms - December 1st, 9:00am

A BIOCLIMATIC DESIGN FOR THE HOUSING

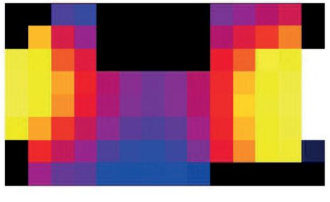
Architectural conception - west-east section C

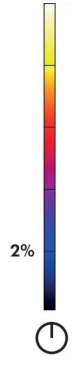


A BIOCLIMATIC DESIGN FOR THE HOUSING - Winter strategy

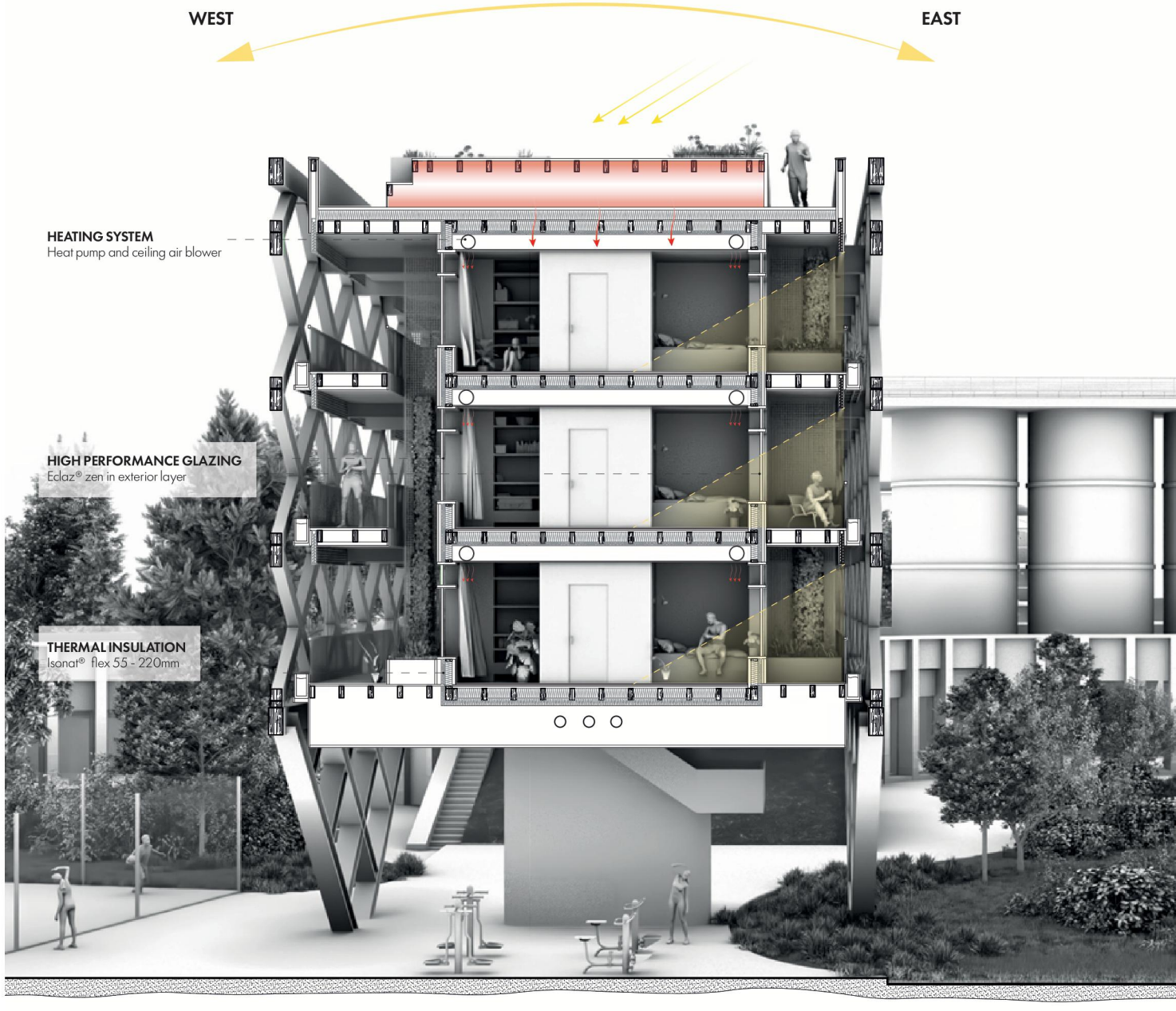


In winter, the **dual orientation** of apartments allows them to benefit from sunlight for a large part of the day. The timber frame structure is insulated with **ISONAT® wood fiber** to minimize heat loss. Technical spaces are located centrally where direct sunlight is less frequent.

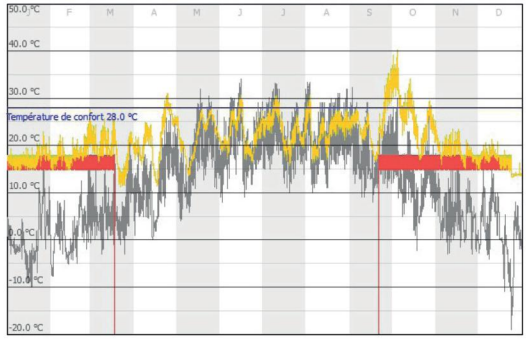




FIJ map of a unit
80% of the daylight factor exceeds **2%**



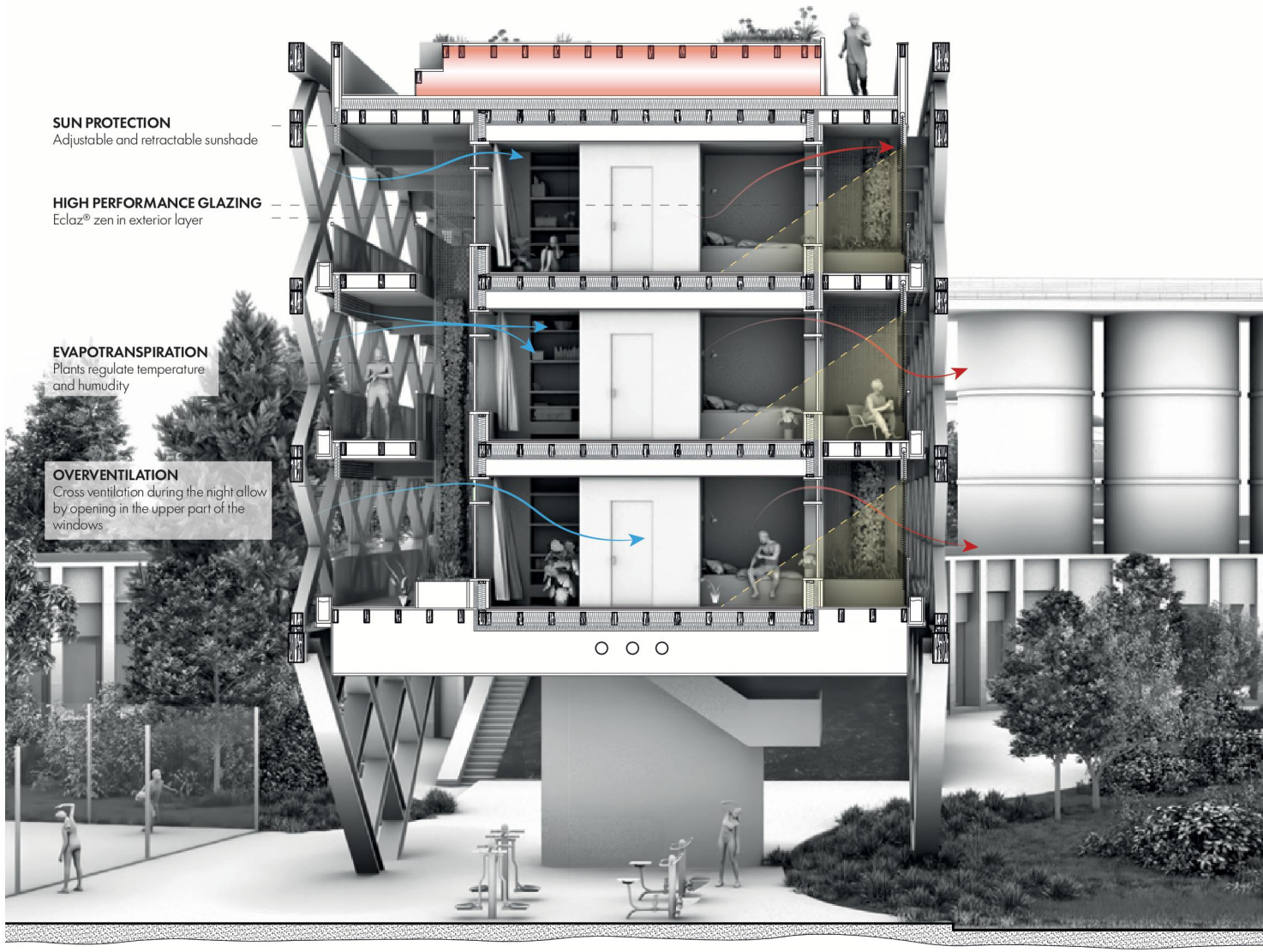
A BIOCLIMATIC DESIGN FOR THE HOUSING - Summer strategy



6% discomfort in the building : 395h > 28°c

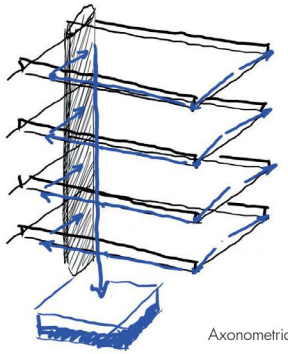
In summer, due to its east-west orientation, **vertical protection** is necessary to limit heat gains. **Sunshades** are installed along the walkway. They protect the units but also the outdoor spaces (corridor, terrasse).

Like the base, this **dual orientation** and the presence of **vegetation** in the walways maximizes ventilation and **nighttime cooling**. The upper part of the windows opens to allow air circulation.



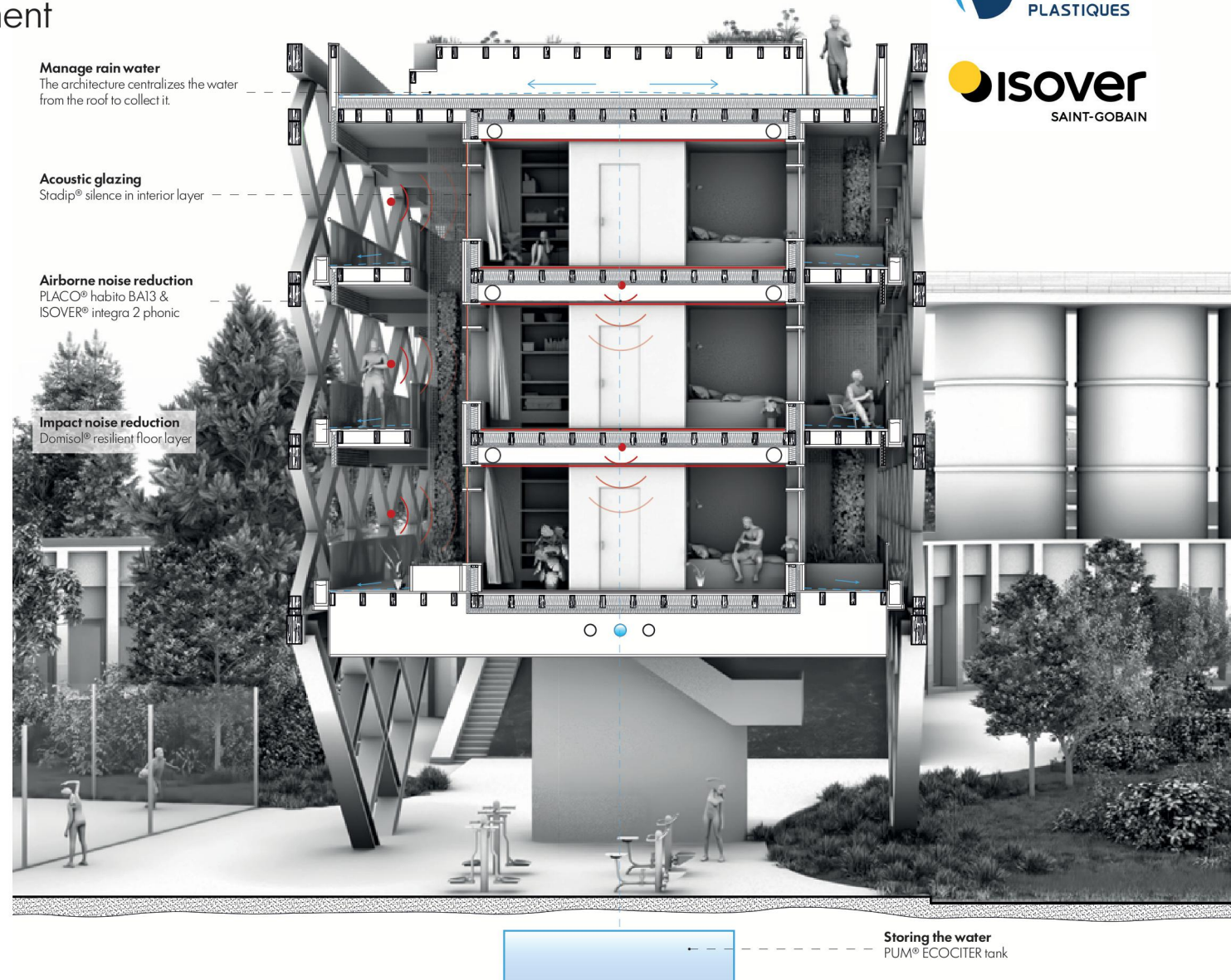
A BIOCLIMATIC DESIGN FOR THE HOUSING - Water and acoustic managment

Rainwater collected **from the roofs** is centralized and then channeled down **along the vertical circulations**. Then, the water is storaged in **PUM® ECOCITER tanks**, filtered and can be used for specific purposes such as watering the park and the greenhouses but also for toilet flushing.



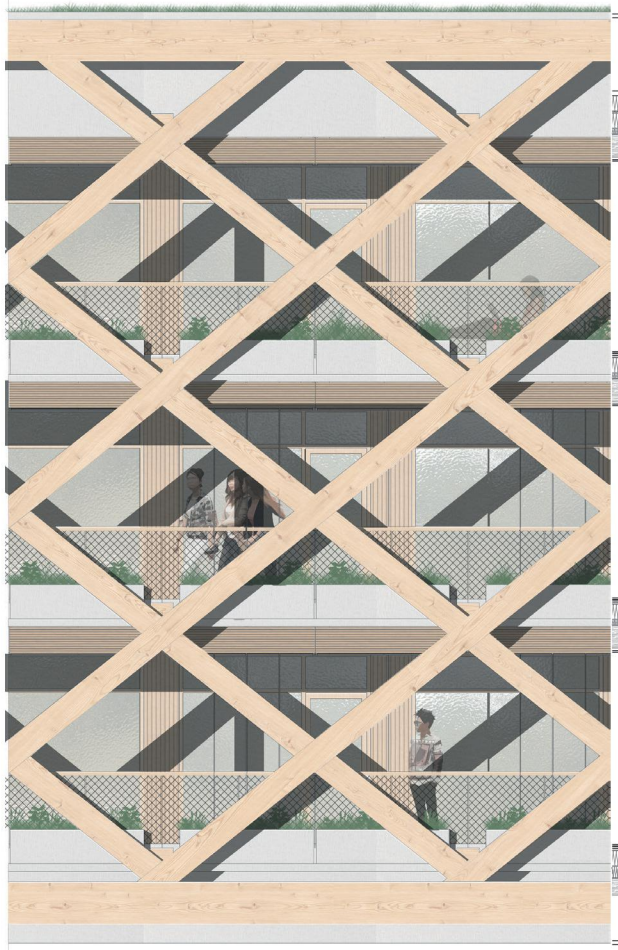
Axonometric diagram of rainwater managment

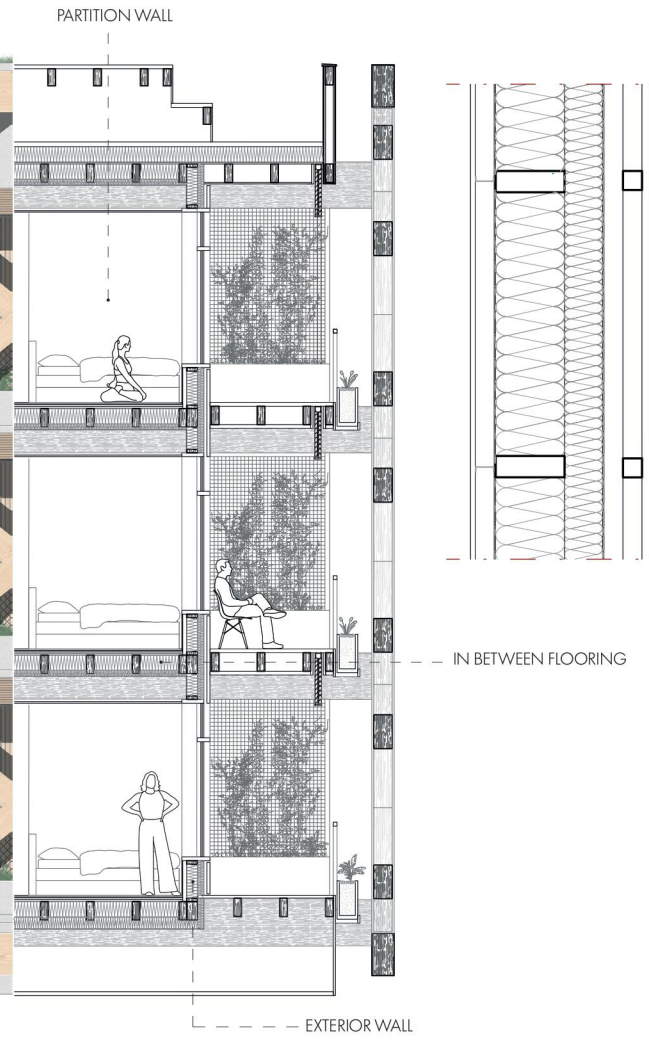
The acoustic management of the accommodation aims to solve two problems. First, the external noises from the corridors, for example by night, which are dwindled by integrating **STADIP® Silence glass** and secondly, the vibration transferred by the floor that will be reduced with Isover **DOMISOL® solution**.

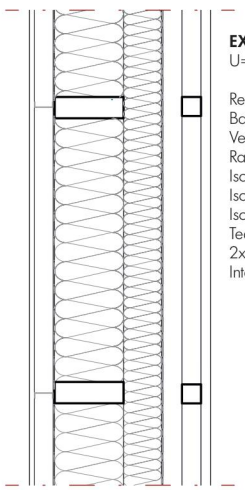


A BIOCLIMATIC DESIGN OF THE HOUSING

Technical details and facade

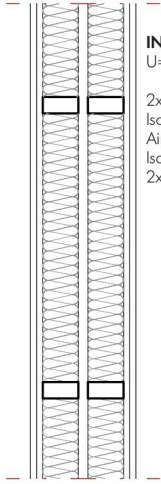






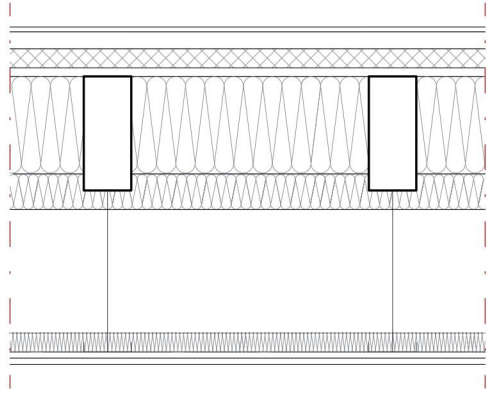
EXTERIOR WALL
U= 0.14 W/(m²K) ; EI 60 ; DnT,A ≥ 53dB

Reclaimed cladding	20mm
Battens (40x40mm, distance 600)	40mm
Ventilated air gap / battens (40x40mm, distance 600)	40mm
Raiscreen	
Isonat® Flex 55	80mm
Isonat® Flex 55 / timber studs (45x145mm, distance 600)	145mm
Isover® Vario Xtra	2mm
Technical gap	40mm
2x Placo BA13 Habito®	26mm
Interior finishing	



INTERNAL / PARTITION WALL
U= 0.22 W/(m²K) ; EI 60 ; DnT,A = 55dB

2x Placo BA13 Habito®	26mm
Isonat® Flex 55 / timber studs (80x45mm, distance 600)	80mm
Air gap	20mm
Isonat® Flex 55 / timber studs (80x45mm, distance 600)	80mm
2x Placo BA13 Habito®	26mm



IN BETWEEN FLOORING
U= 0.14 W/(m²K) ; EI 60 ; DnT,A = 56dB

Finishing	
2x OSB	36mm
Isover Domisol® LR	40mm
OSB	18mm
Isonat® Flex 55 / glulam (100x240mm, distance 600)	280mm
Isover Integra® 2 phonic	
Air gap	260mm
Isonat® Flex 55	40mm
2x Placo BA13 Habito®	36mm
Finishing	

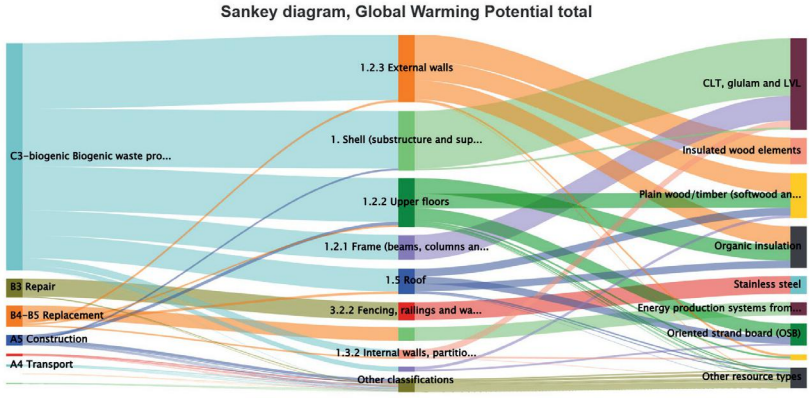
LIFE CYCLE AND BUILDING CIRCULARITY

Accomodations

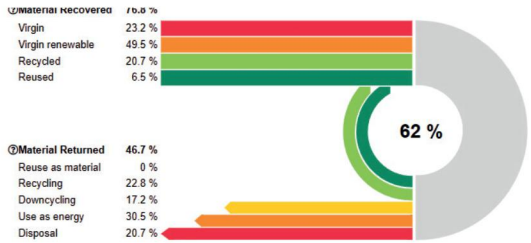
LIFE CYCLE

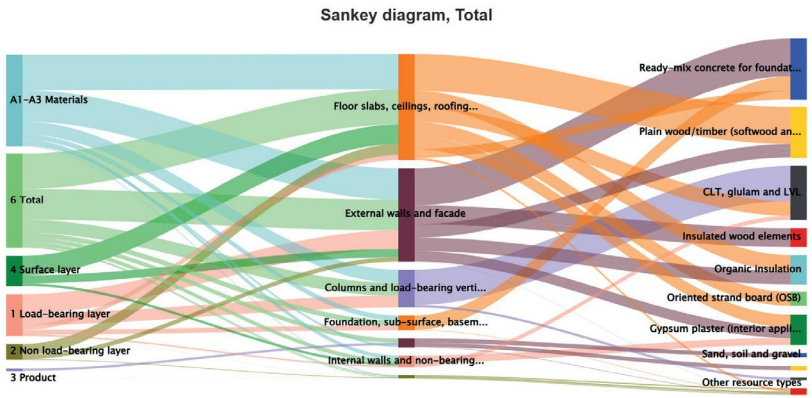
Cradle to grave (A1-A4, B4-B5, C1-C4)	kg CO_2e/m^2
(< 420) A	222
(420-485) B	
(485-550) C	
(550-615) D	
(615-680) E	
(680-745) F	
(> 745) G	

One Click LCA

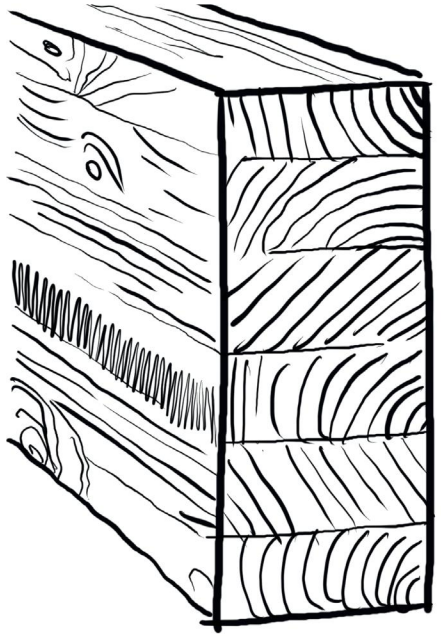


BUILDING CIRCULARITY





Choosing **wood** as the main component of residential buildings contributes to a **low carbon footprint**. Indeed, during its life cycle, wood captures CO^2, making its production positive from a carbon perspective.



WOOD ADVANTAGES

Wood has several advantages. First, it allows for carbon storage throughout its growth and this storage is sustained after harvesting. It is also a renewable material, and its harvesting is intended to be below the cycle of naturel growth.

A LANDSCAPE MADE POSSIBLE BY THE ARCHITECTURE

Landscape composition

The landscape reconstructed in the project blends **different endemic plant layers**. The park also aims to become an **open-air museum**. It would combine live **sporting activities** with **artistic installations** promoting local sports such as tennis, basketball or skateboarding.

A LANDSCAPE MADE POSSIBLE BY THE ARCHITECTURE

Landscape plan

The parks' design aims to create **unique pathways**, offering a **diverse range of experiences**. The vegetation is adapted to its location and consists of suitable species. The pathway acts as an open-air museum. Dense groves along the Sava river also serve as a buffer for the **comorants' habitat**.

Art installations

Wetlands
White willow, black poplar, reeds, dogwood.

Dense grove
Horn beam, pedunculate oak, wild cherry, acer campestre, hawthorn, dogwood, austrian black pine.

Permaculture
Apple tree, cherry tree, pear tree, walnut tree, plum tree

Tennis court

Calisthenic zone

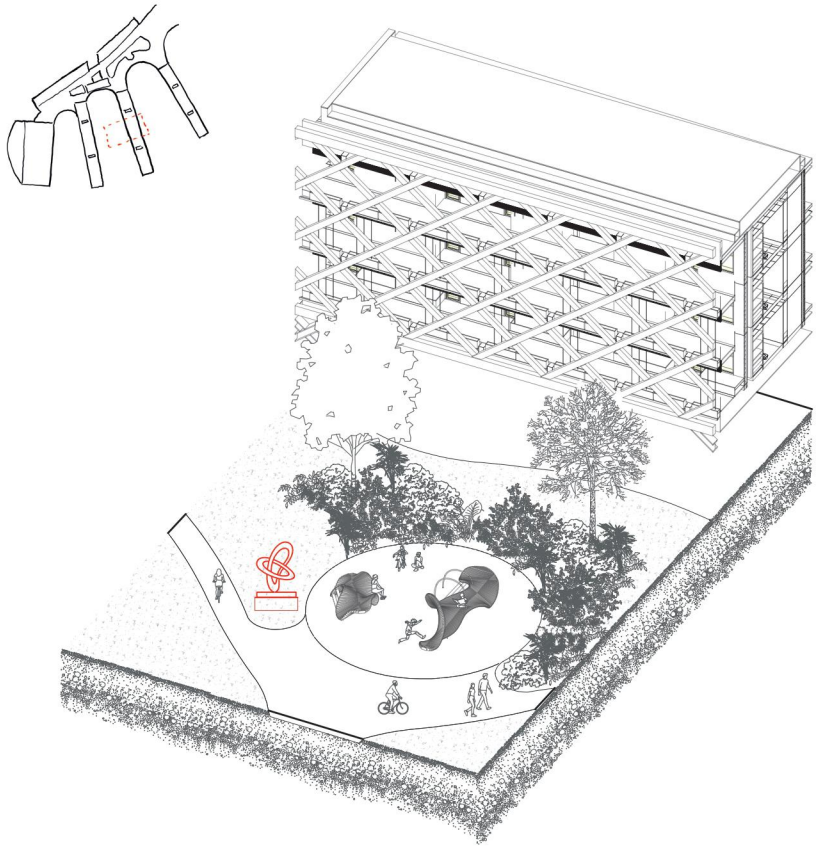
Children's zones

Pump track

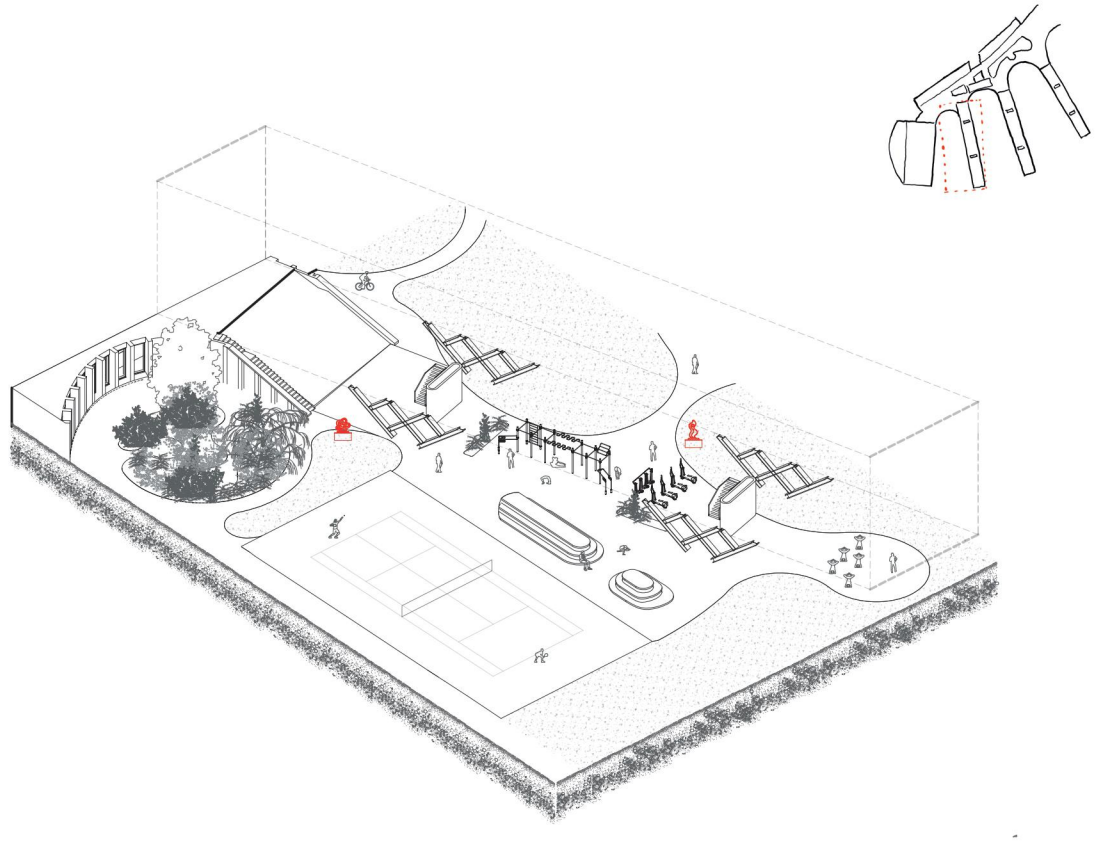
A LANDSCAPE MADE POSSIBLE BY THE ARCHITECTURE

Axonometric view of the park's facilities

The park is divided into several **zones**, each with its own particular uses. The sports areas **contribute to the open-air museums' design** as a living element. They complement the exhibited works.



ZONE 1 - **Children's playground**

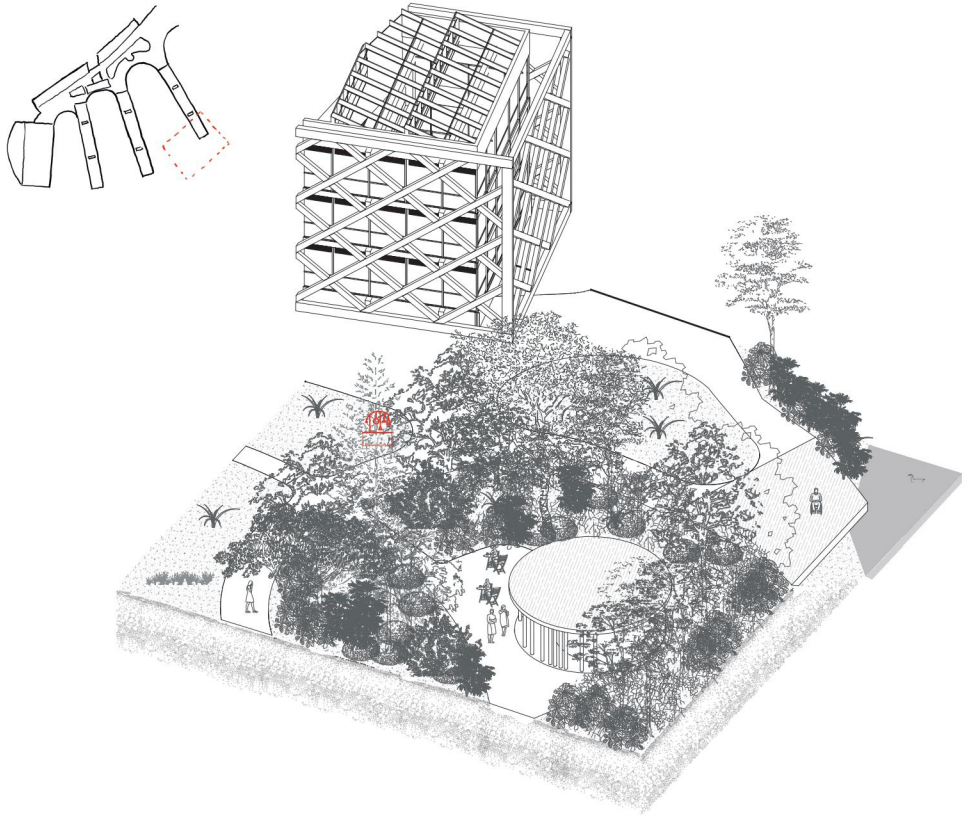


ZONE 2 - **Sports area** (tennis court and calisthenics)

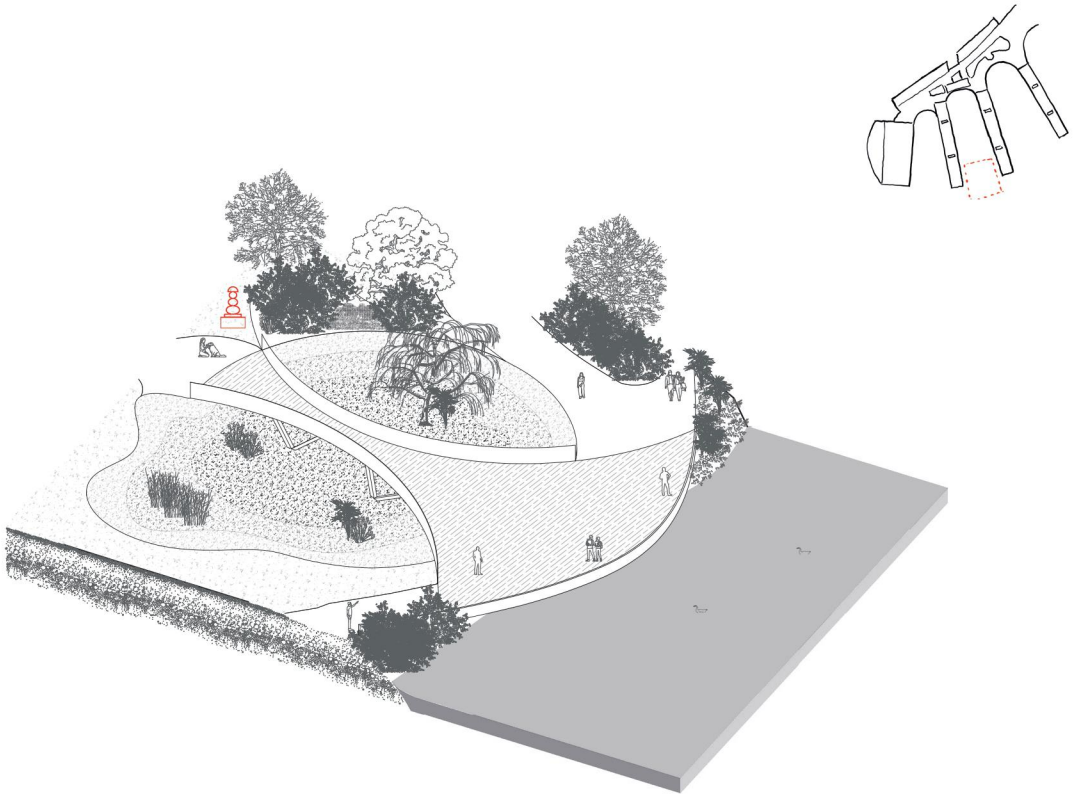
A LANDSCAPE MADE POSSIBLE BY THE ARCHITECTURE

Axonometric view of the park's facilities

Each zone of the park **uses the vegetal layers to adapt** to their own specific constraints such as shade, privacy, habitats for biodiversity or resilience to the water.



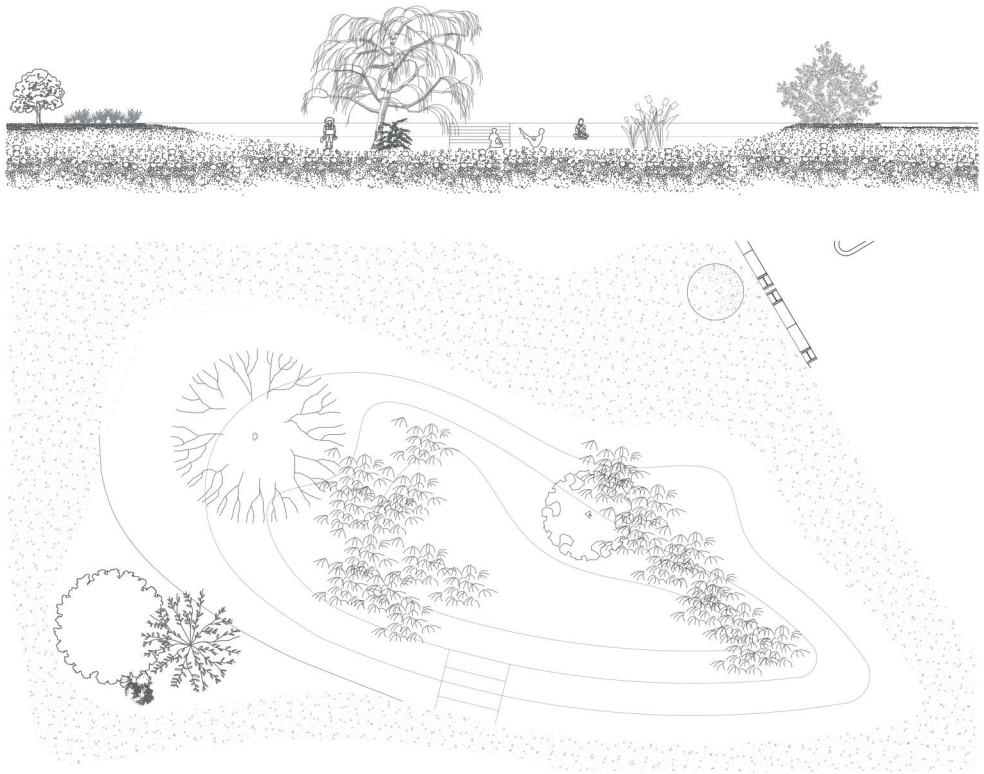
ZONE 3 - **Relaxation area** (dense grove and sauna)



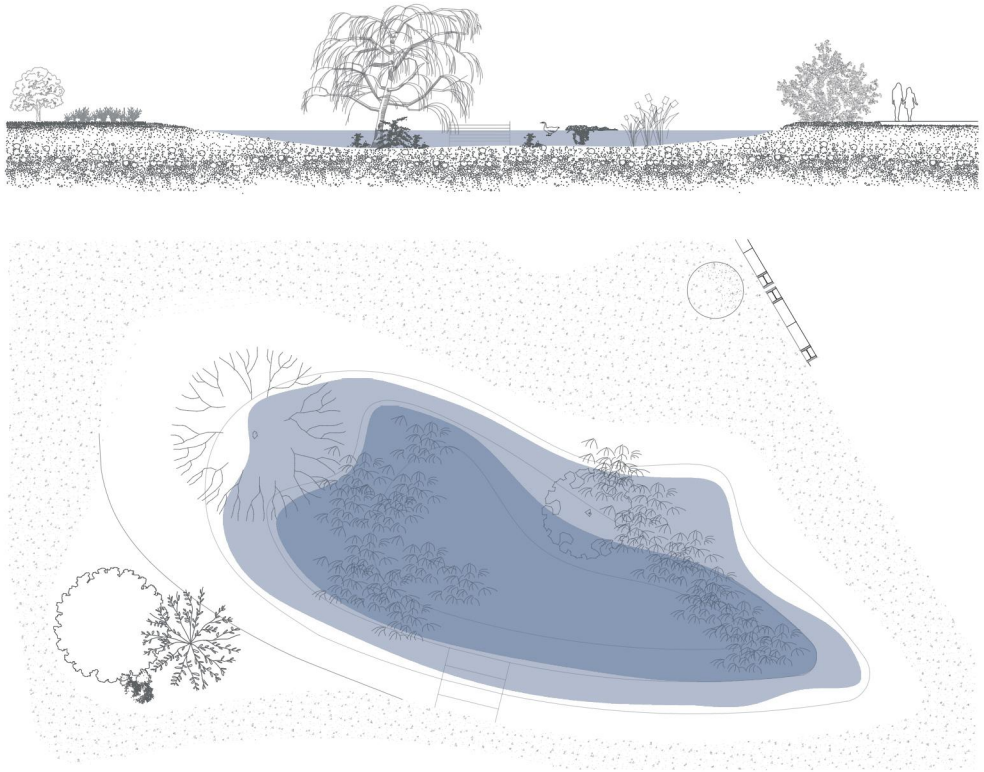
ZONE 4 - **Retention basin and viewpoints to the river**

A LANDSCAPE OF RESILIENCE
Water reception

To mitigate the risk of **flooding**, the project aims to create a largely **permeable zone**, including **retention basins**. These areas will be able to absorb excess water while also serving as an event. Appropriate vegetation has been selected to occupy these areas.



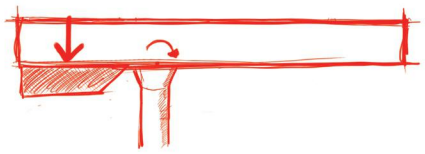
Retention basin - **Dry temporality**



Retention basin - **Wet temporality**

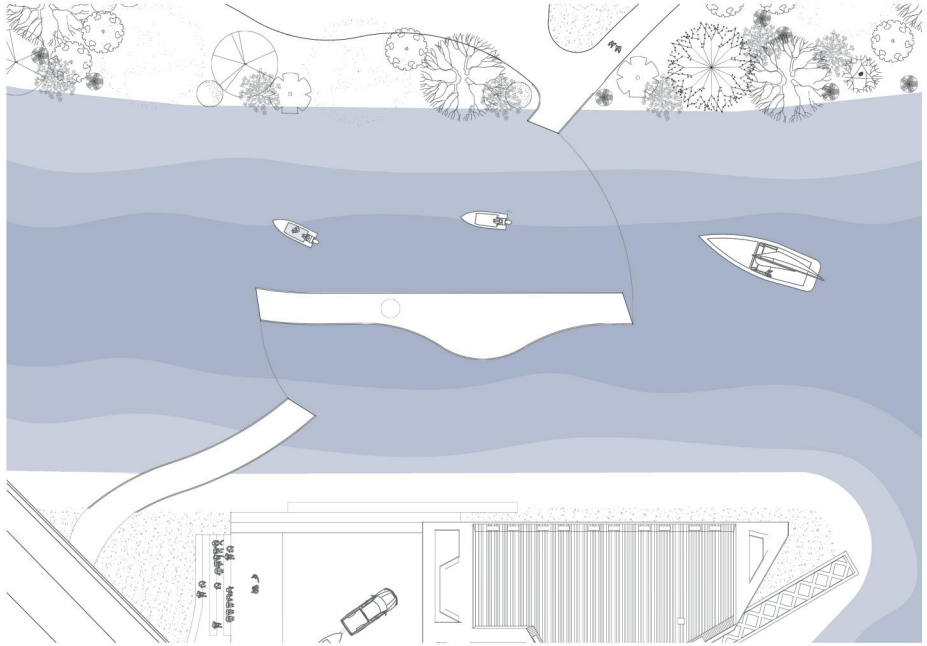
LINK THE TWO SITES TO A SINGLE PROJECT

Mobile footbridge conception



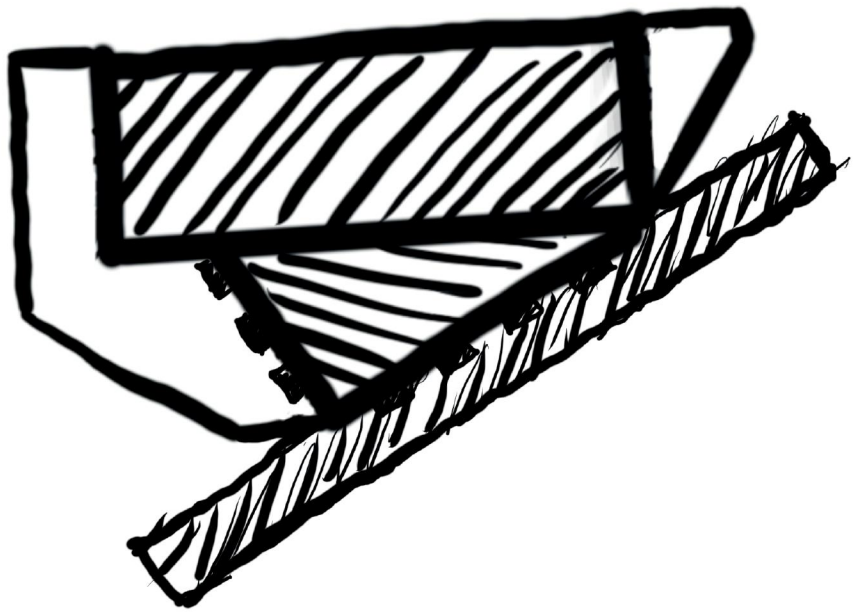
To **connect the two sites**, a bridge was built extending from the park. However, there was one constraint : the bridge **had to be movable** to allow boats to pass. The bridge incorporates a **counterweight system and an offset center**.

New footbridge - **Closed version**



New footbridge - **Opened version**

ZONE B - **YACHTING CLUB**



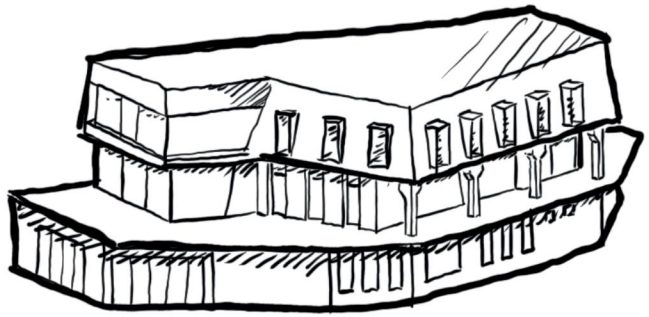
MINIMIZE OUR INTERVENTION

Strategic grafts

Our work on the existing aims to achieve improvements through a **limited number of interventions**. The projet chooses to enhance the yachting clubs' functionality, its openness towards the river and its connection to the rest of the site, in a way of **preserving its architectural identity.**

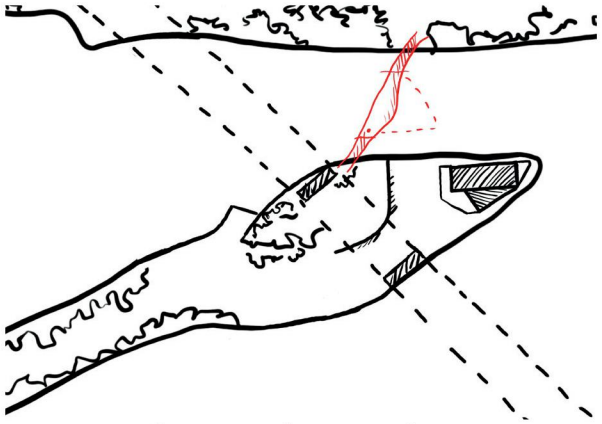
Connect with
the new sports complex

Open to the Sava River



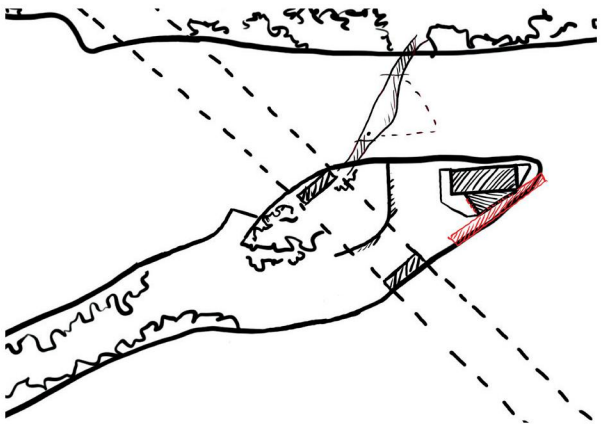
Enhance the architecture

IMPLEMENTATION STRATEGY

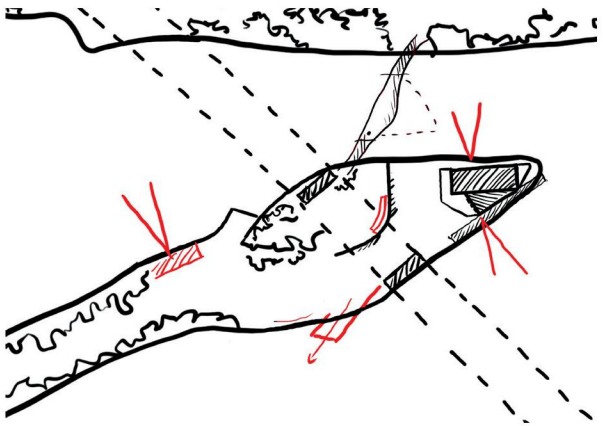


Connect the two sites
Creation of a mobile footbridge that allows boats to pass through.

Enhance the functionnality of the yachting club
The interiors are being redesigned to facilitate the use of the building.



Architectural grafts additions
Elements are added to the facade to improve the building's accessibility and comfort.



Improved connections to the river
The exterior areas are being redesigned to facilitate the use of the site.

MASTERPLAN
Site B - Yachting club

1 - Sava River
2 - Site entrance
3 - Yacht club
4 - Forecourt / outdoor technical area
5 - Mobile footbridge - Connexion with site A
6 - Existing boat ramp
7 - New boat ramp - access to the main river branch
8 - Existing car park

10m 60
0 30

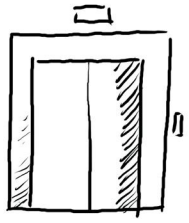
51 | An Architecture of Care
21th edition of the Saint-Gobain student contest

View of the yachting club and it's surronding - June 21th, 4:30pm

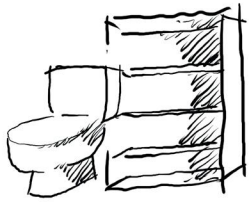
A RELATION BETWEEN EXISTING / RENOVATION

Axonometry of the grafts

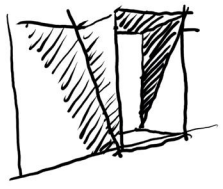
The architectural additions are chosen strategically. Each one acquires a function that contributes to the buildings' functional improvement while preserving the sites' identity.



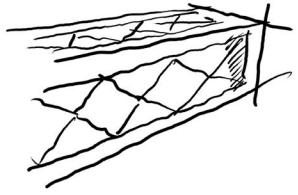
Elevator addition
to make the building accessible to PRM



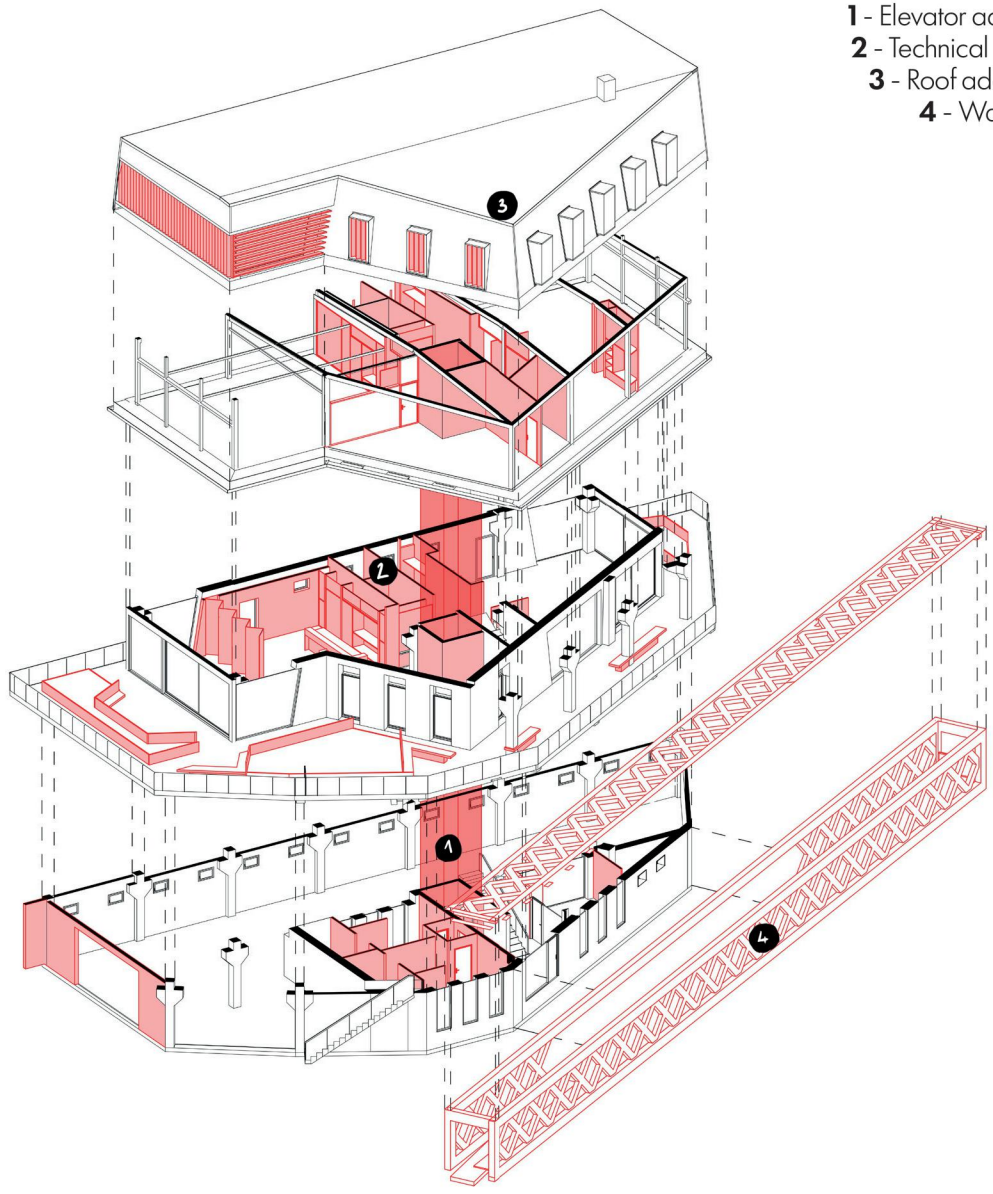
Technical blocks
to accommodate uses and delimit spaces



Roof additions
to protect one self from the sun



Walkway creation
to enhance the entrance and provide views

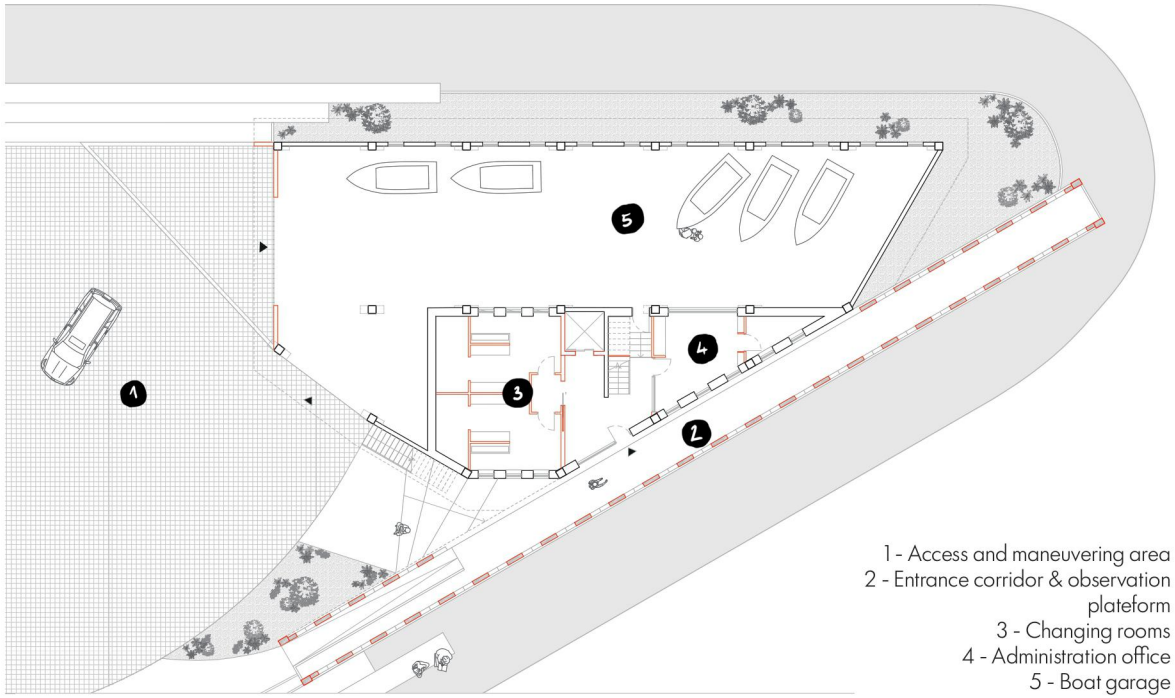


1 - Elevator addition
2 - Technical blocks
3 - Roof additions
4 - Walkway

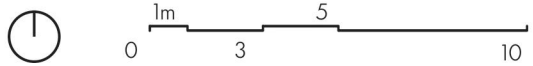
A RELATION BETWEEN EXISTING / RENOVATION

Ground floor plan

A facilitated access for the public now follows the addition **walkway** added against the south facade. A **lobby** facilitates circulation within the interior spaces. The **forecourt** is enlarged and its surface replaced with **grass pavers to allow infiltration of water**. A **new garage entrance** is also created on the west side.



1 - Access and maneuvering area
2 - Entrance corridor & observation plateform
3 - Changing rooms
4 - Administration office
5 - Boat garage

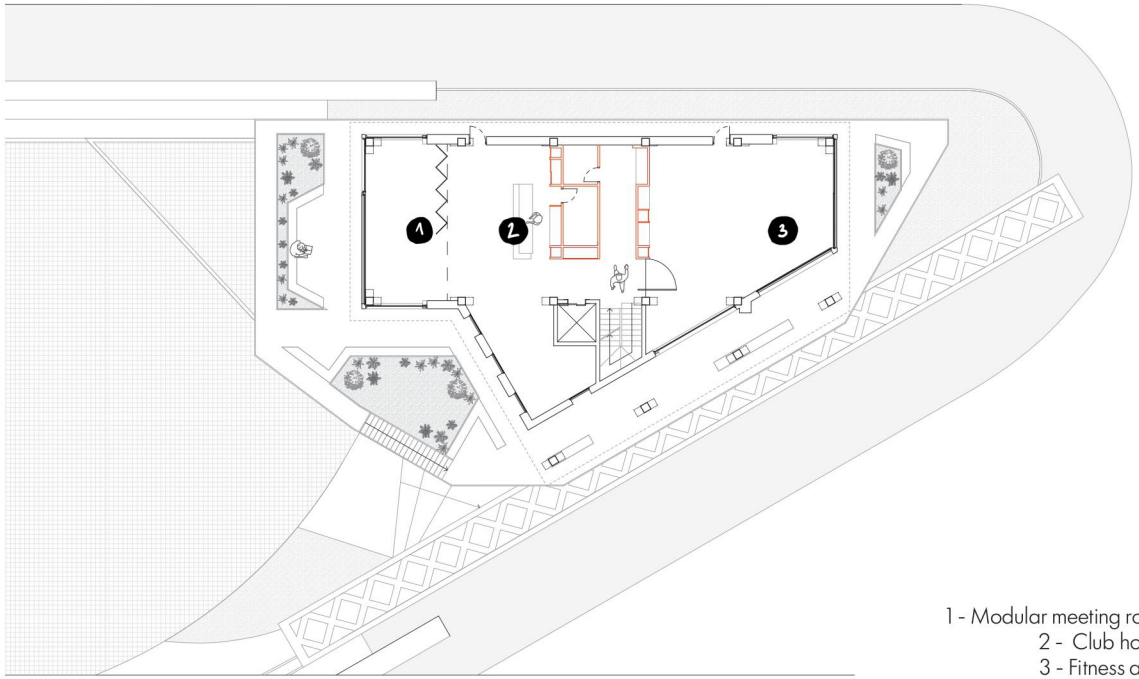


View inside the new pontoon - March 21st, 12:00am

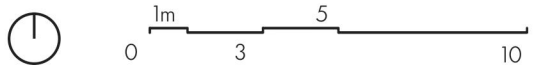
A RELATION BETWEEN EXISTING / RENOVATION

First floor plan

Upstairs, the space is divided in two with the addition of **a central block**. This block is composed by restrooms and storage. To the west, the **new club house** benefits from a large open area. This space can be transformed into **a meeting room** if needed. To the east, **a training room** offers a **view of the river** during workouts.



1 - Modular meeting room
2 - Club house
3 - Fitness area

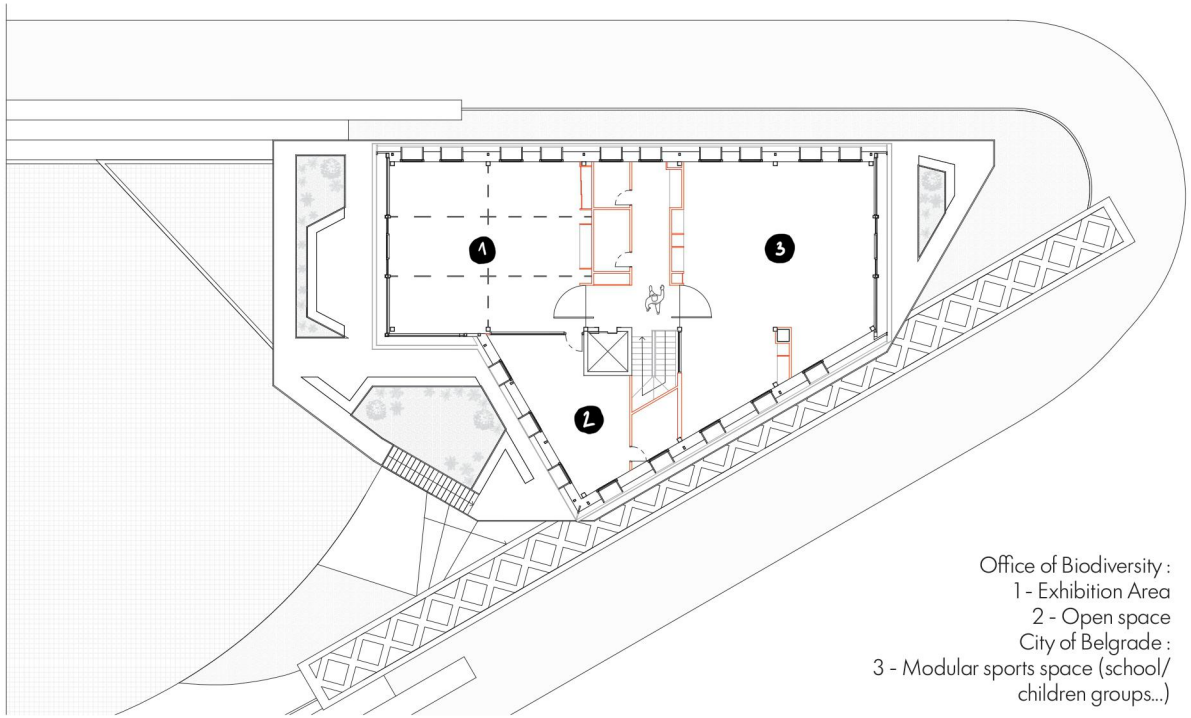


View of the club house zone - March 21st, 4:30pm

A RELATION BETWEEN EXISTING / RENOVATION

Second floor plan

The second floor follows the same design. However, it accomodates activities unrelated to the yacht club. The western area is dedicated to the **preservation of local flora and fauna**, with an exhibition hall and an open space. To the east, a **modular space** can welcomed the public, such as the children who currently use the building for their gym.



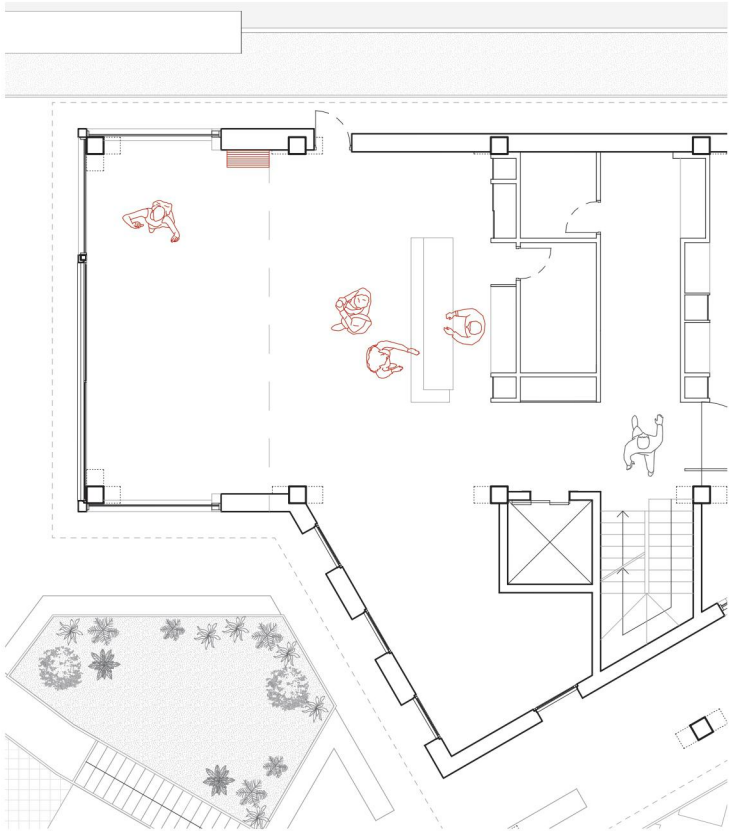
Office of Biodiversity :
1 - Exhibition Area
2 - Open space
City of Belgrade :
3 - Modular sports space (school/ children groups...)

0 3 1m 5 10

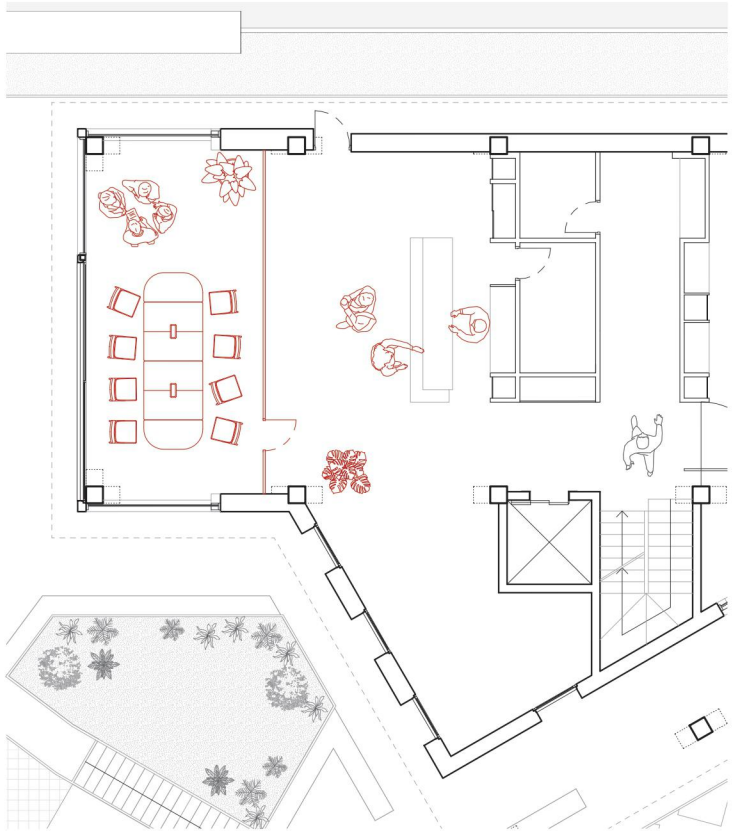
View of the office of biodiversity during an exhibition - March 21st, 4:30pm

A RELATION BETWEEN EXISTING / RENOVATION

Modular strategy - First floor



Scenario 1 - **Regular use of the club house**



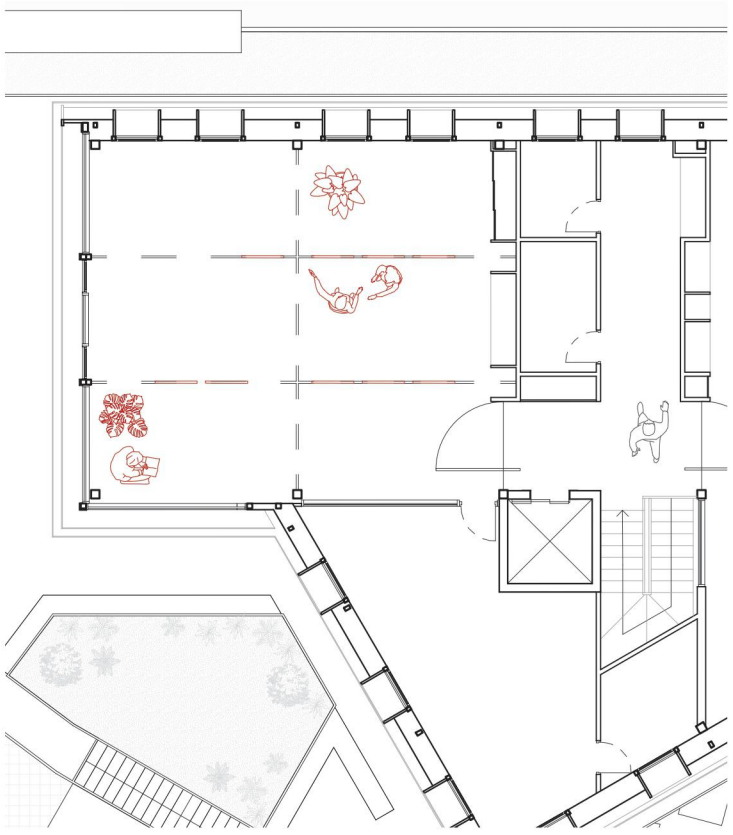
Scenario 2 - **Space partitioning for a meeting**

To **maximize the functionality** of the yacht club, some spaces are designed with **modularity** in mind. The clubhouse can therefore be both a large space to host events and can also **be partitioned** in two to create a meeting room.

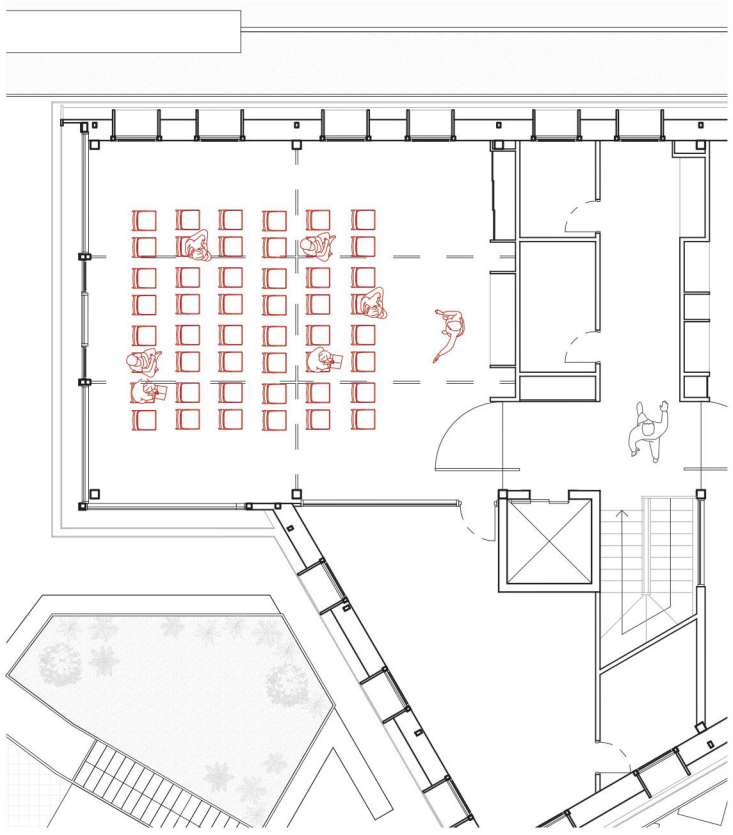
This modularity is designed in conjunction with the **thick walls** surrounding the technical unit. These walls can **accommodate furniture**, allowing for the transformation of spaces.

A RELATION BETWEEN EXISTING / RENOVATION

Modular strategy - Second floor

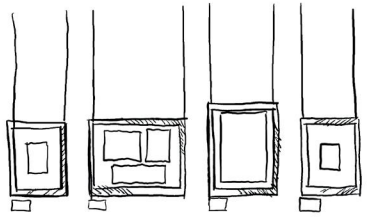


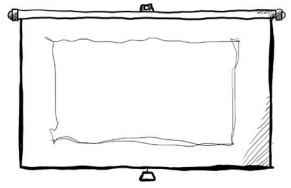
Scenario 1 - **Exhibition**



Scenario 2 - **Conference**

Similarly, on the second floor, the **exhibition space** can accomodate various types of events. For **displays**, developed using suspended rails, but also as a **conferences space**. This is possible thanks to the ability of project visuals and deploy chairs stored within the **storage band**. In this space, modularity also aims to multiply installations to serve the function of this part of the building.

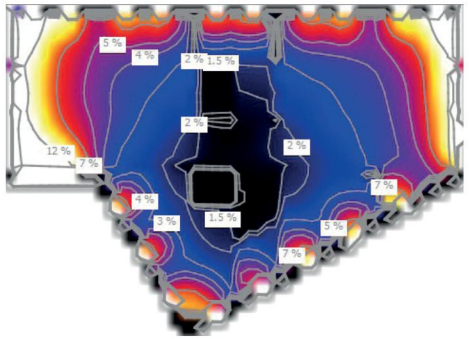




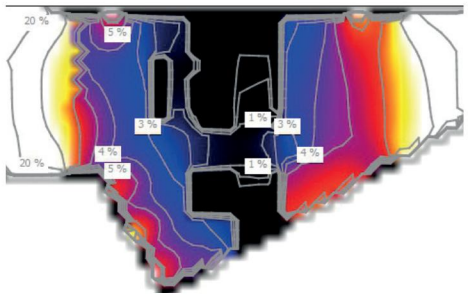
A RESILIENCE APPROCH OF THE RENOVATION

Architectural conception - cross section

A RESILIENCE APPROCH OF THE RENOVATION - Solar conception



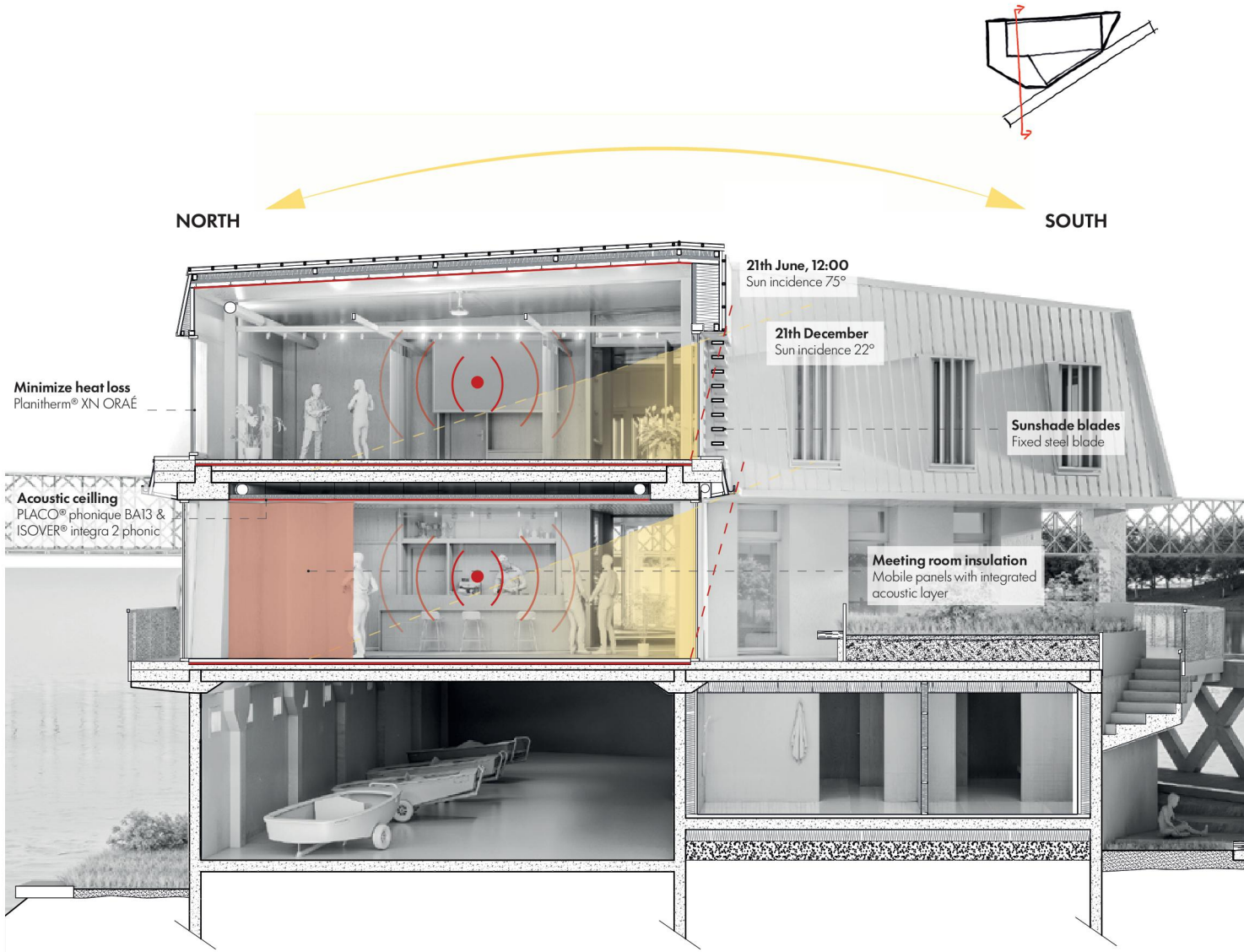
FLJ map of the second floor



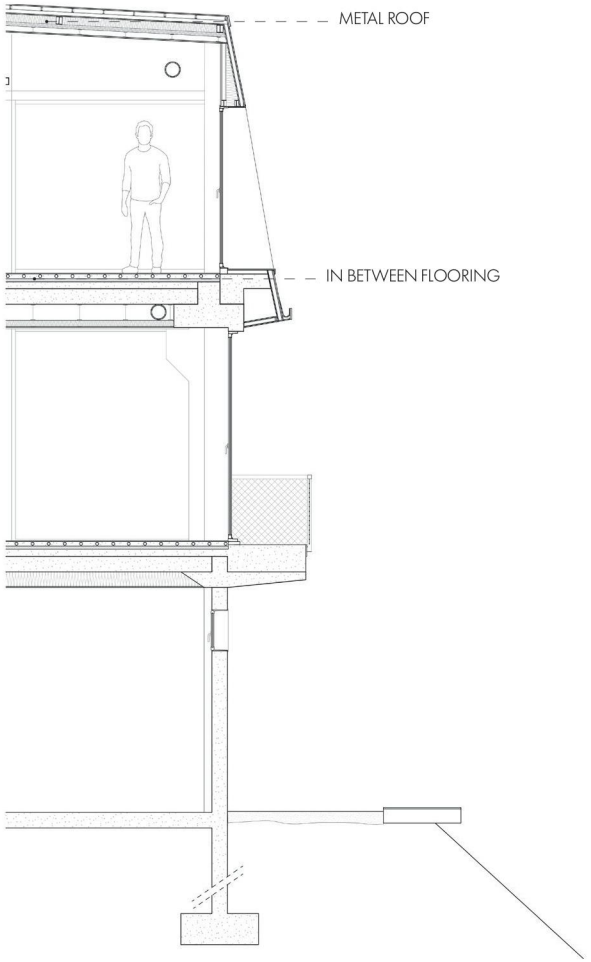
FLJ map of the first floor

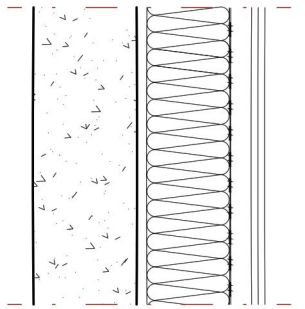
70% (1st floor) and 80% (2nd floor) of the daylight factor exceeds **2%**

To limit overheating of the building, while maintaining good solar gains in winter and brightness, **roof extensions** are **adapted to their orientation** to offer appropriate protection : vertical or horizontal ones.



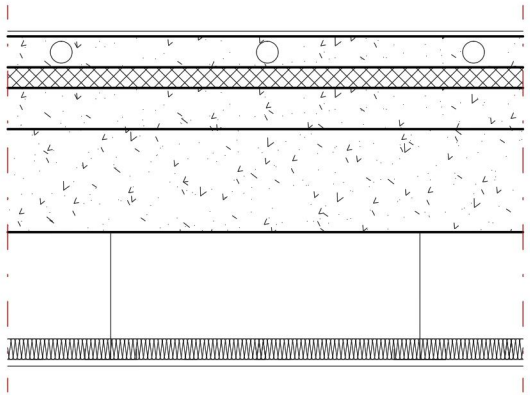
A RESILIENCE APPROCH OF THE RENOVATION
Technical details





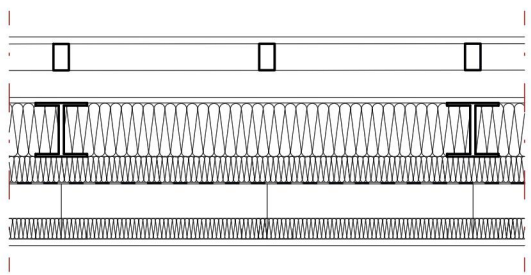
CONCRETE WALL - Interior insulation
U= 0.23 W/(m²K) ; REI 120

Exterior finishing	
Existing precast concrete wall	200mm
Air gap	20mm
Isonat® Flex 55	150mm
Isover Vario Xtra	2mm
Air gap	40mm
2x Placo BA13 Phonic®	26mm



IN BETWEEN FLOORING
REI 120 ; DnT,A ≥ 53dB

Polished concrete floor	20mm
Chryso® low carbon screed / subfloor heating system	60mm
Domisol® LR	40mm
Existing topping slab	80mm
Existing precast slab	200mm
Isover® integra 2 phonic	
Air gap	200mm
Isonat flex 55	40mm
Placo BA13 Phonic®	13mm



METAL ROOF - Interior insulation
U= 0.19 W/(m²K) ; REI 60

Existing shading seam metal roofing	
Battens (50x30mm, distance 600)	50mm
Ventilated air gap / battens (50x30mm, distance 600)	50mm
Existing support	20mm
Isonat® Flex 55 between existing metal structure	150mm
Battens (40x40mm, distance 600)	40mm
Isover Vario Xtra	2mm
Isover Integra 2 phonic	
Air gap	60mm
Isonat flex 55	40mm
2 x Placo BA13 Phonic®	26mm

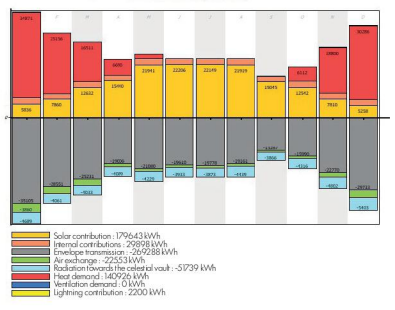
THERMAL UPGRADE
Existing / modified comparaison

Before renovation
Total annual energy consumption :

Heating demand : **140 926 kWh/year**
Lightning demand : **2539 kWh/year**
Domestic hot water demand : **300 kWh/year**

Total : 143768 kWh/year

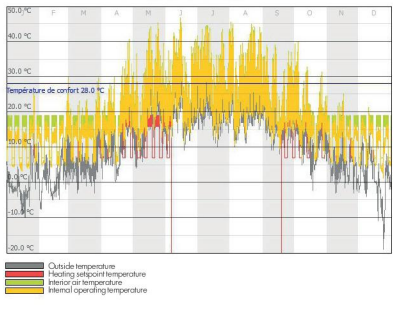
Energy balance



Heating demand : **140 926 kWh/year**
Solar contribution : **179 643 kWh/year**

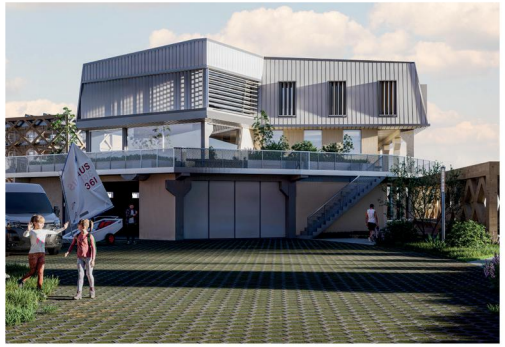
34% discomfort in the building : 800h > 28°c

Heat & cold comfort



Before the renovation, **solar protections** and **insulation** were virtually **non-existent**.

The building therefore suffered from both significant **overheating** in summer and an **high heating costs** in winter.

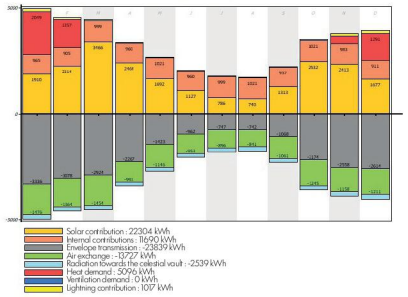


After renovation
Total annual energy consumption :

Heating demand : **5096 kWh/year**
Lightning demand : **3185 kWh/year**
Domestic hot water demand : **608 kWh/year**

Total : 8889 kWh/year

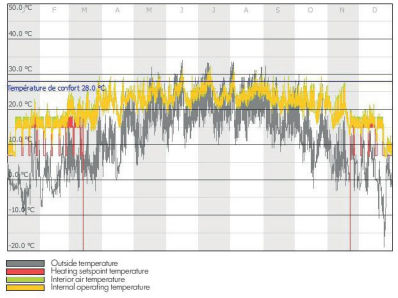
Energy balance



Heating demand : **5096 kWh/year**
Solar contribution : **22304 kWh/year**

6% discomfort in the building : 193h > 28°c

Heat & cold comfort



After the renovation, **insulation** was added throughout the entire building. This significantly **reduced heating needs**, as heat loss through the walls is much less pronounced.

In summer, **overheating is also greatly reduced** thanks to the addition of **solar shading**.

General view of the project from the railway bridge - June 21st, 12:00am