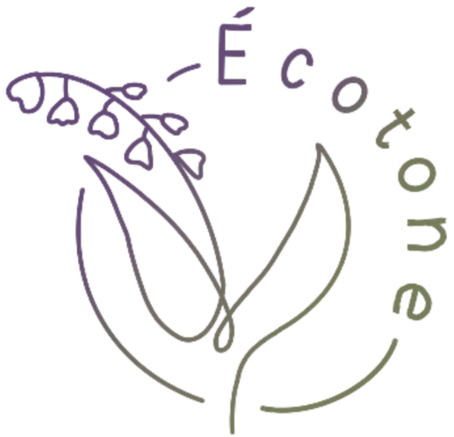
ARCHITECTURE STUDENT CONTEST

19th INTERNATIONAL EDITION, HELSINKI 2024



ECOTONE

How to make several ecosystems coexist together

SAINT-GOBAIN

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France, Bordeaux

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France, Bordeaux

Nicole Manzanares
France, Bordeaux

Ecotone

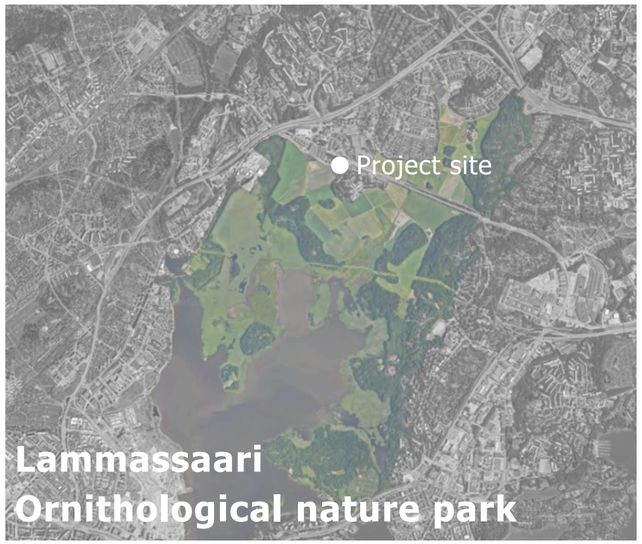
TRANSITION ZONE BETWEEN TWO ECOSYSTEMS, WHERE ENVIRONMENTAL CONDITIONS ARE INTERMEDIATE.

University of Helsinki
Vikki Campus

- Agriculture & Forestry
- Veterinary Medicine
- Pharmacy
- Biological & Environmental Sciences
- Library

Agricultural fields

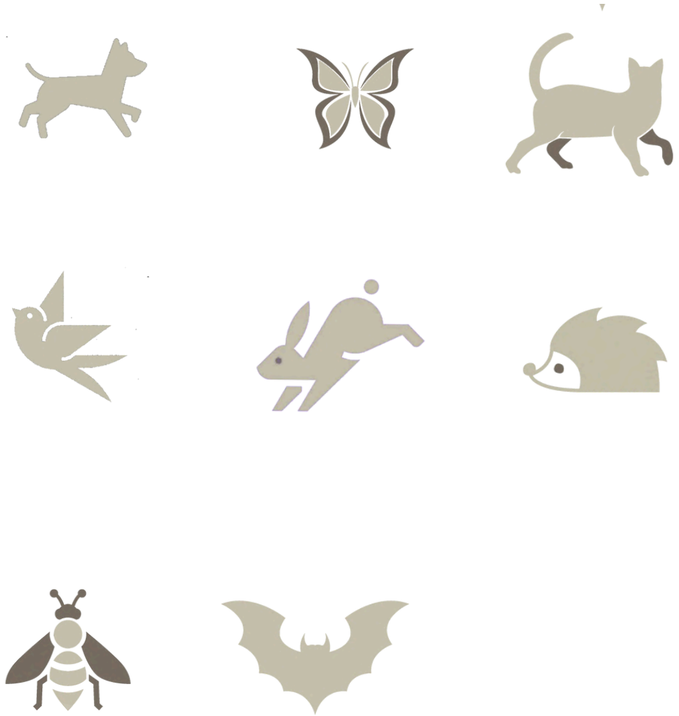
Lammassaari



Ecotone

TRANSITION ZONE BETWEEN TWO ECOSYSTEMS, WHERE ENVIRONMENTAL CONDITIONS ARE INTERMEDIATE.

Some of the fauna present on the site :



Human movement

Fauna movement

1. Trace a new main axe

2. Create new dynamics on this axe

3. Landscape : pathways and terraces

4. Create a high vegetation stratum : trees

5. Create a medium vegetation stratum : bushes

6. Create a low vegetation stratum : flowers

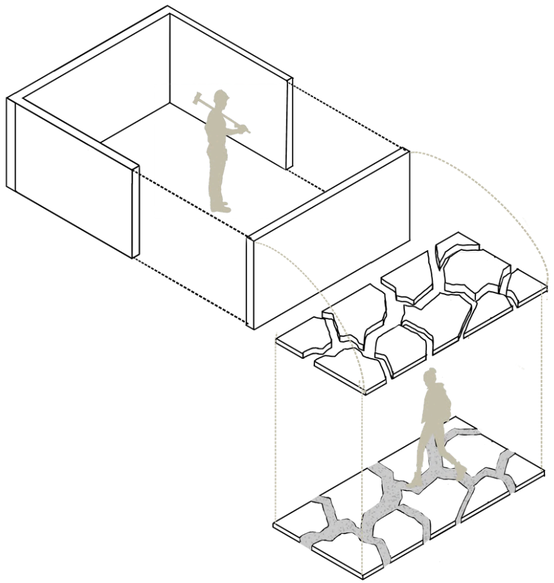
7. Integrate our new buildings

8. Plant green roofs

Wide array of site features

Global urban strategies

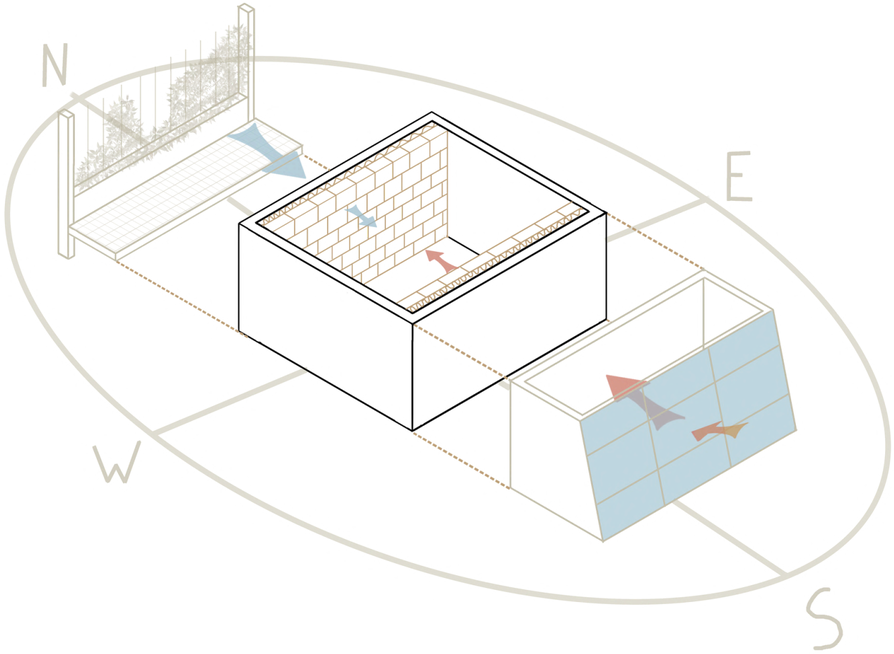
CONSERVATION OF EXISTING BUILDINGS AND RE-USING MATERIALS



Minimise our impact:

- using existing structures
- re purposing deconstructed items
- recycling deconstructed items

OPTIMISING THE BUILDINGS' ORIENTATION



South facades:

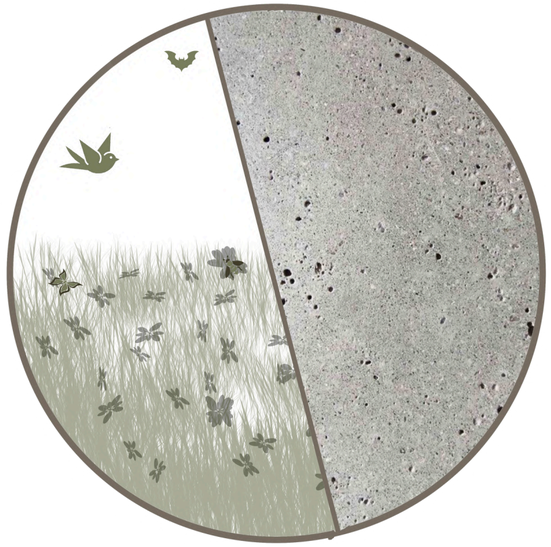
- Double skin to capture light and free calories

North facades :

- Inertia mass to regulate internal heat and inhabited passageway

Natural cross ventilation

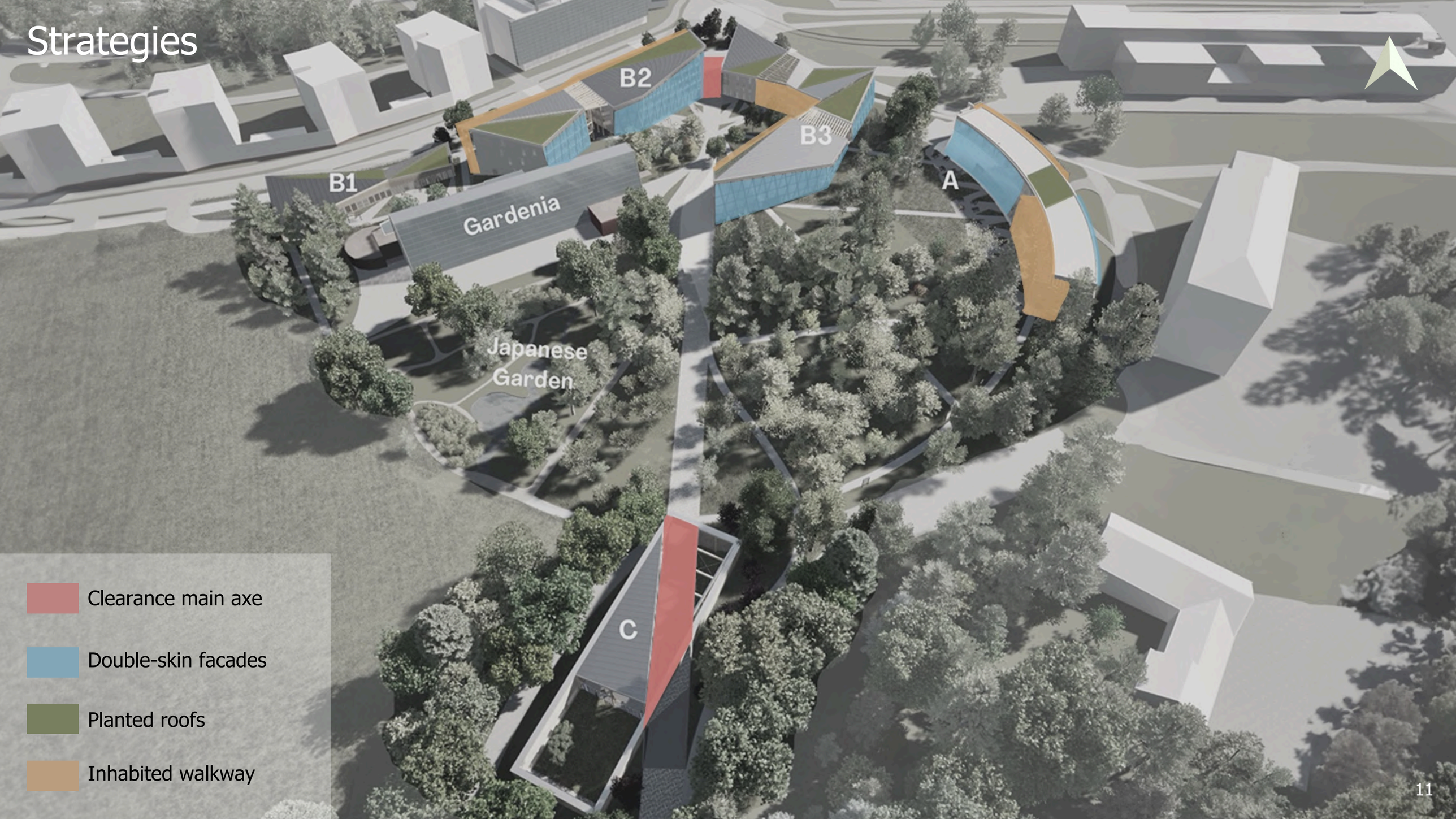
DUALITY OF PLANT AND MINERAL

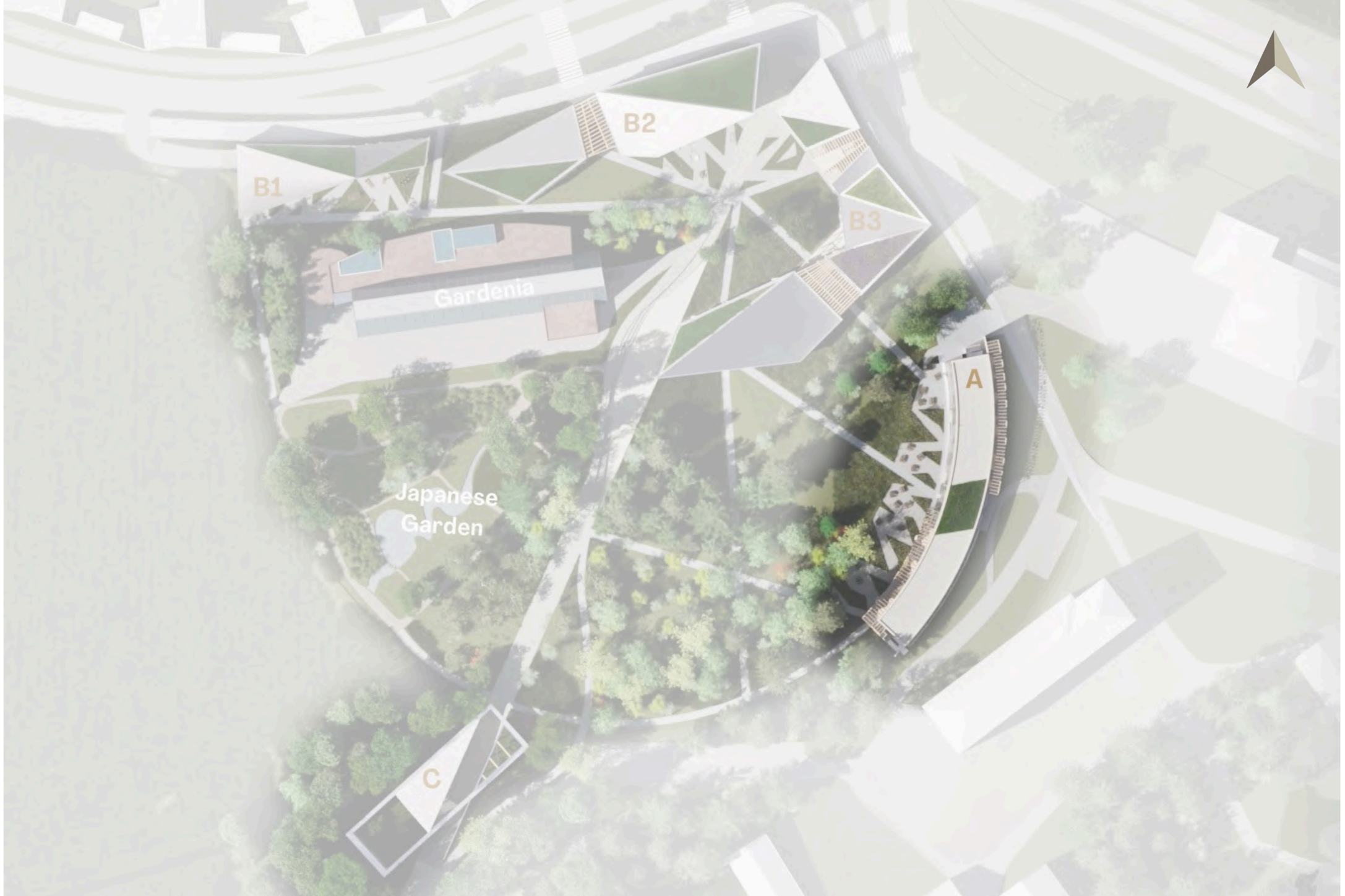


Create interactions between:

- mineral / natural materials
- fauna / human habitats
- ...

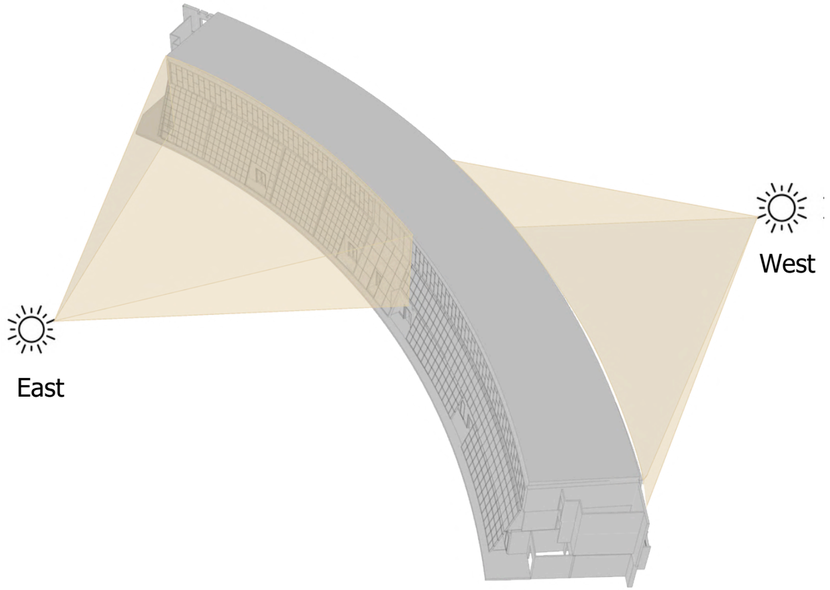
Strategies


B2
B3
B1
Gardenia
A
Japanese
Garden
C
Clearance main axe
Double-skin facades
Planted roofs
Inhabited walkway

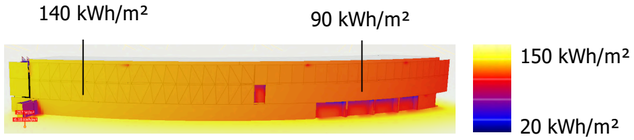

B1
B2
B3
Gardenia
Japanese
Garden
A
C

Strategy of intervention on building A

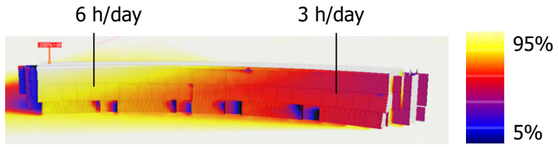
MAJORITY LIGHT CONTRIBUTION



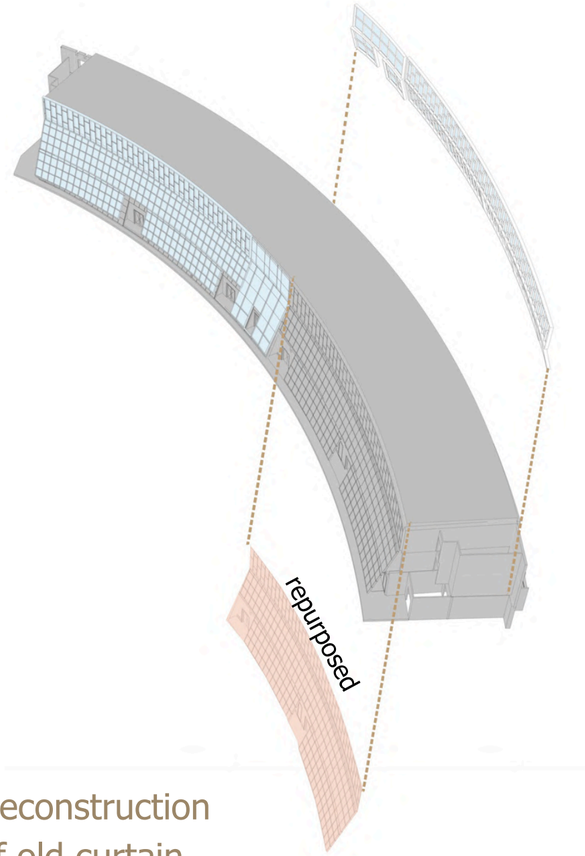
Solar irradiance (kWh/m²) East facade - summer :



Sunshine (h/day) West facade - winter :



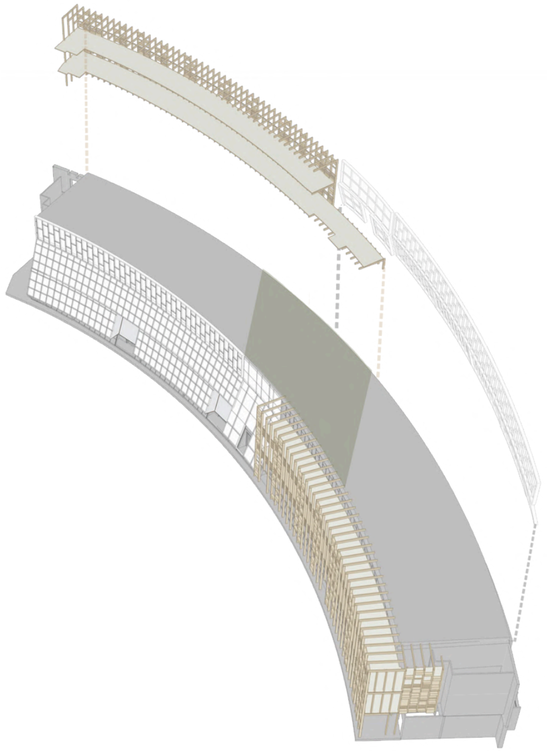
DOUBLE-SKIN FACADES



Deconstruction of old curtain wall and re purposing of the materials.

Addition of double skin to maximize solar gain.

BIODIVERSITY WALKWAY



Graft of a outdoor walkway that will house fauna and flora as well as provide outdoor workspaces for researchers

Biodiversity walkway

PLANTS

a. Ionicera tatarica

b. Geranium magnificum Rosemoor

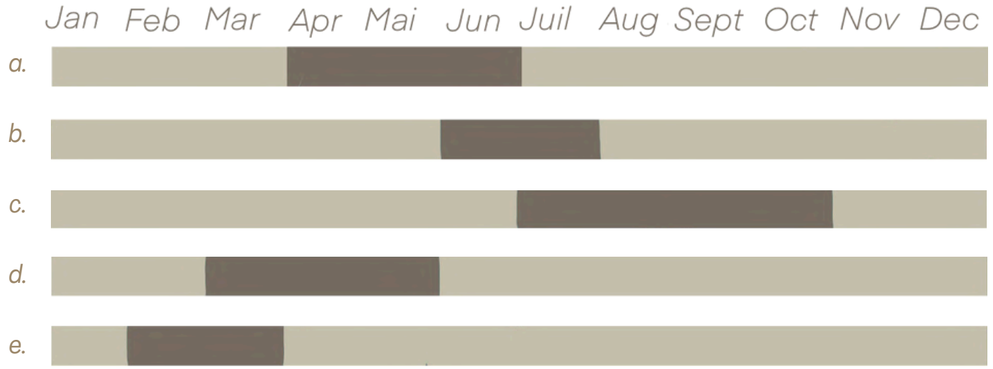
c. Erica tetralix

d. Anemone patens

e. Anemone hepatica

Deyopteris sieboldii

BLOOMING TEMPORALITY



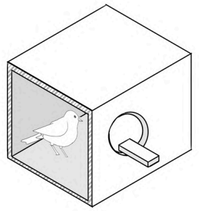
Situation plan

Part shade

Melliferous plants

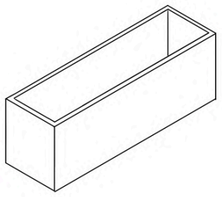
Few roots

Scented

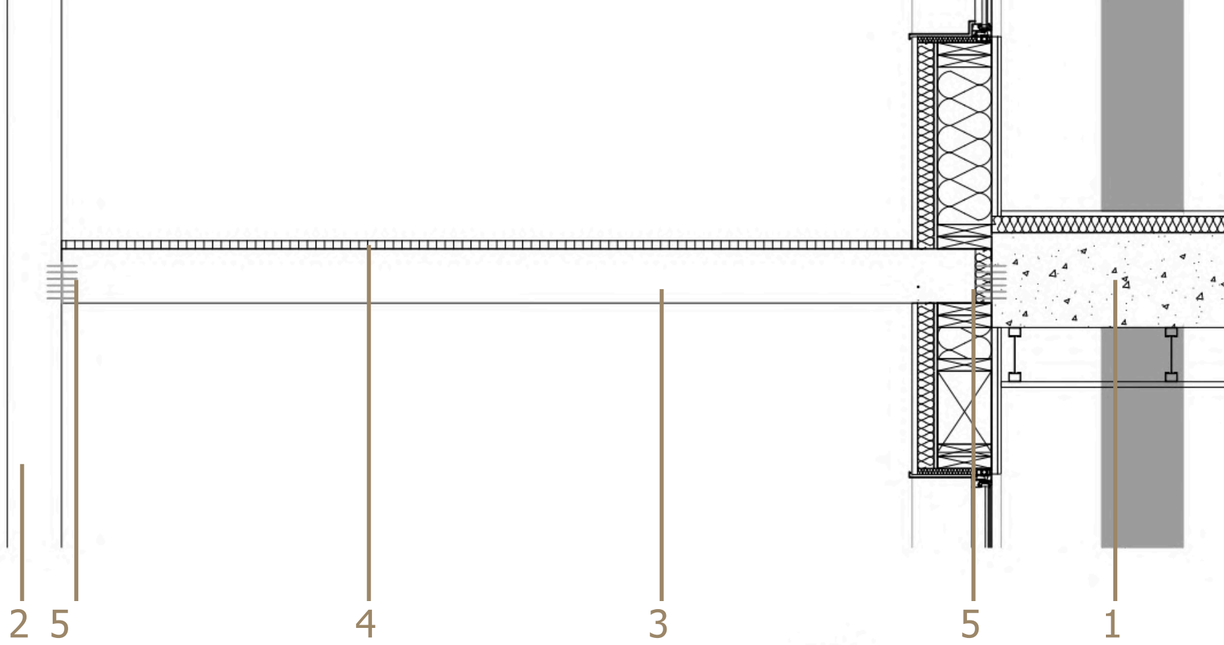


Nesting box

Cables :
support for climbing plants



Planter



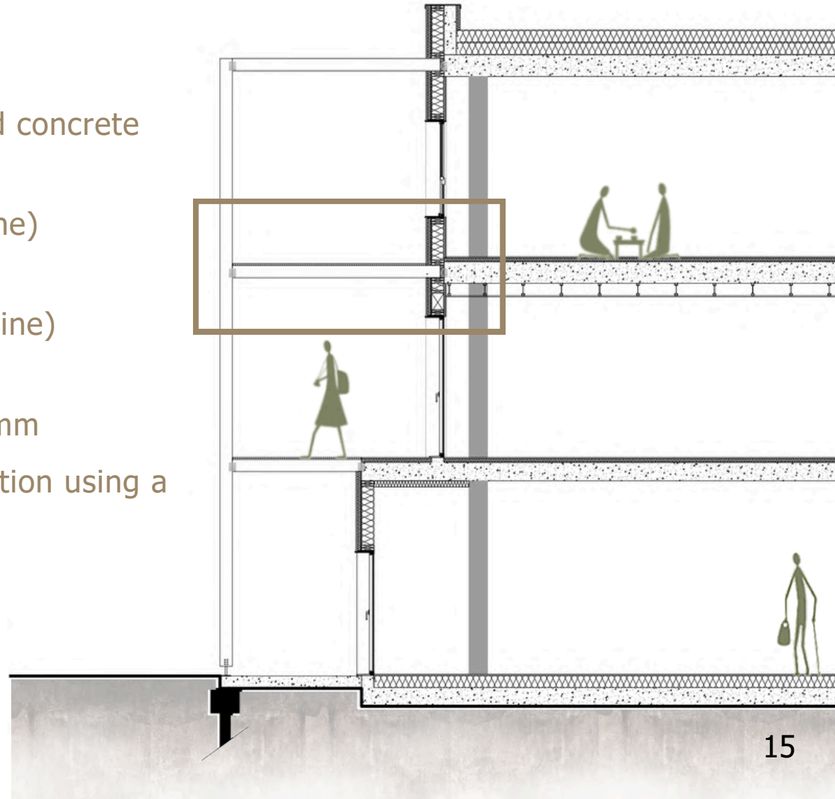
1 : Conservation of the old concrete supporting structure

2: Wooden post (scots pine) 80 x 20 mm

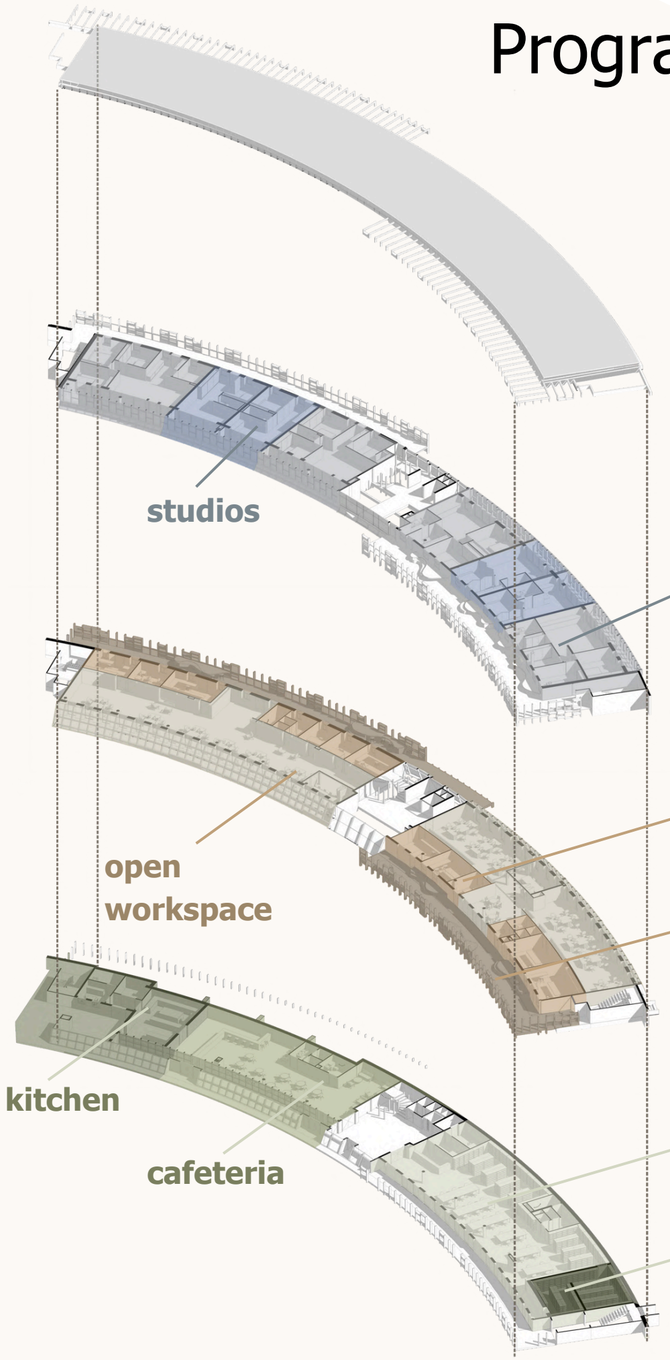
3: Wooden beam (scots pine) 80 x 20 mm

4: Steel grating floor 20 mm

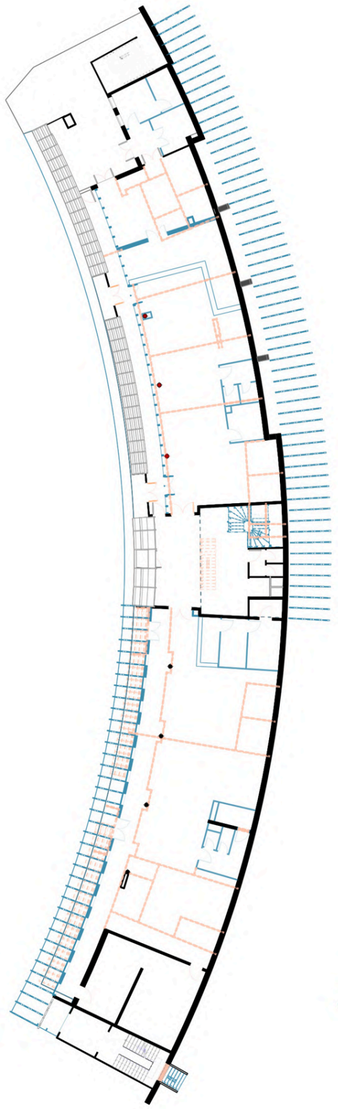
5: Wood/concrete connection using a RICON® type assembly



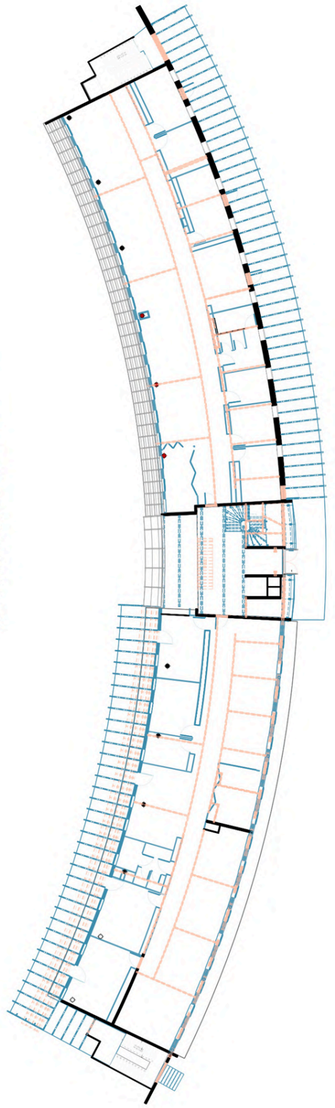
Program



GROUND FLOOR



SECOND FLOOR



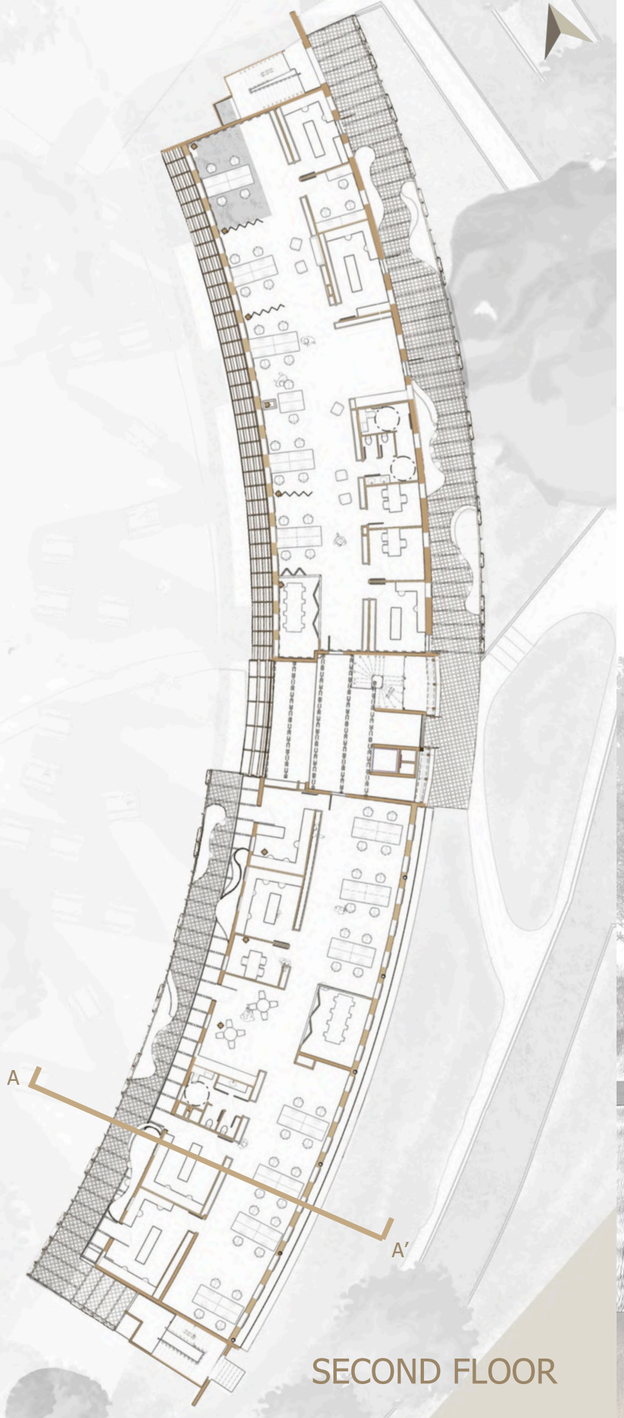
THIRD FLOOR

deconstruction

construction

GROUND FLOOR

INDOOR / OUTDOOR RELATIONSHIP IN OFFICES AND LABORATORIES



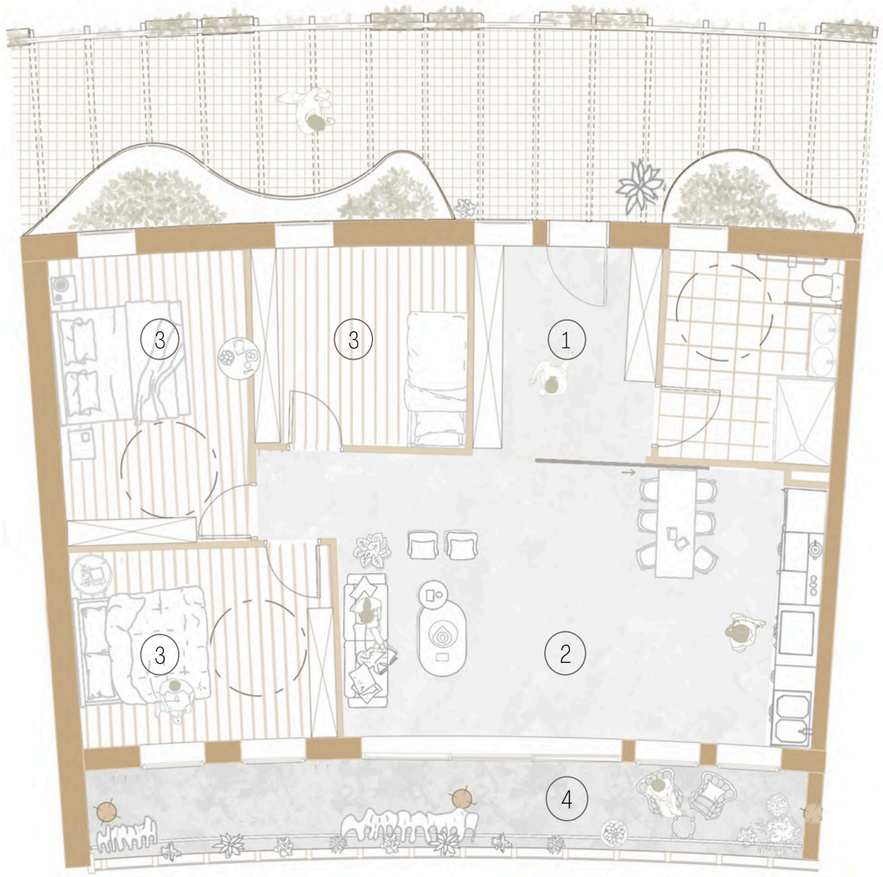
SECOND FLOOR

SECTION AA'

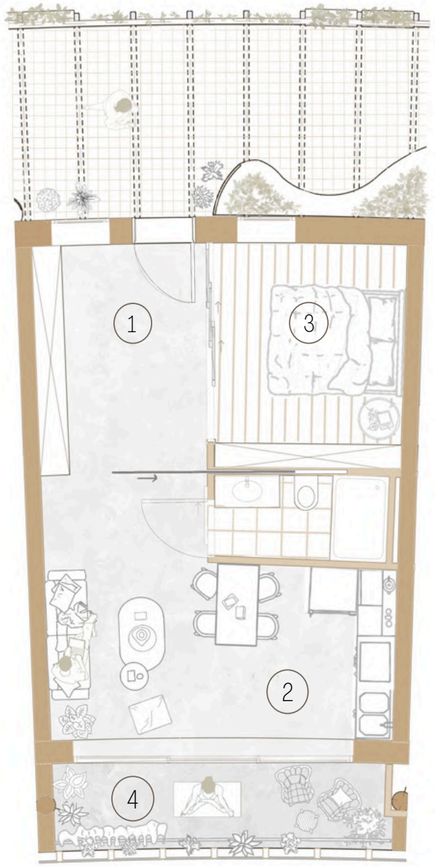
THIRD FLOOR

TYPES OF APARTMENTS

1. Mudroom
   (Buffer space for removing shoes, coat,... and regulating indoor-outdoor thermal transfer)
2. Living room and kitchen
3. Bedroom
4. Conservatory

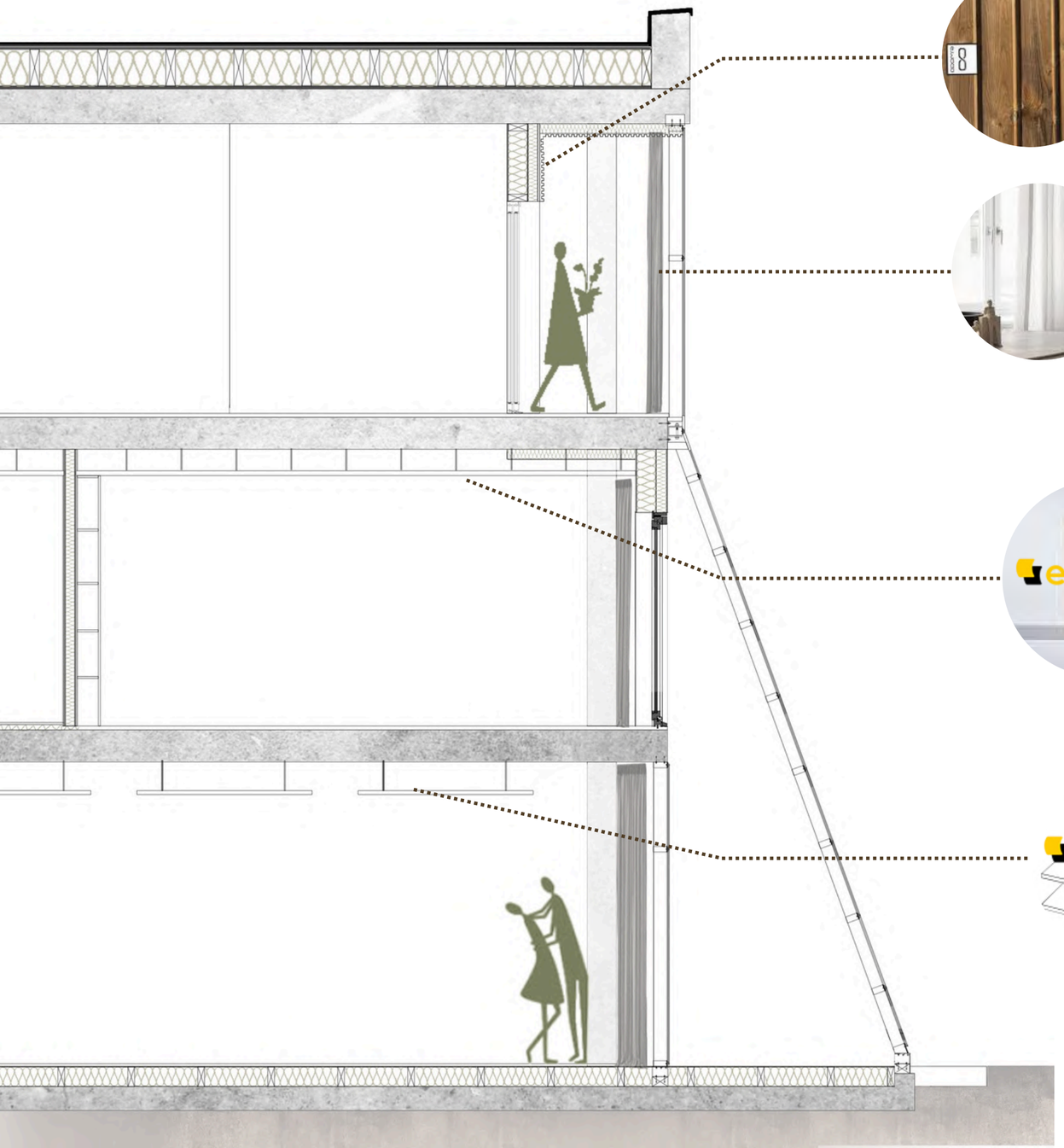


Typology co-living



Typology studio

ACOUSTIC CORRECTIONS



EWOOD : Pine wood cladding class 4 brown-lars 21*132 mm long available

Goten Made-to-Measure Sheer Linen Curtain White

Optimum sound comfort in living spaces: **0.4 s < Tr < 0.8 s**

without Tr = 1.5 s
adding 42 m² **pine wood cladding** and 11 m² **curtains** Tr = 0.42 s

Ecophon Fade™ Duo 1200x1200x15 mm

Optimum sound comfort in offices: **0.4 s < Tr <0.8 s**

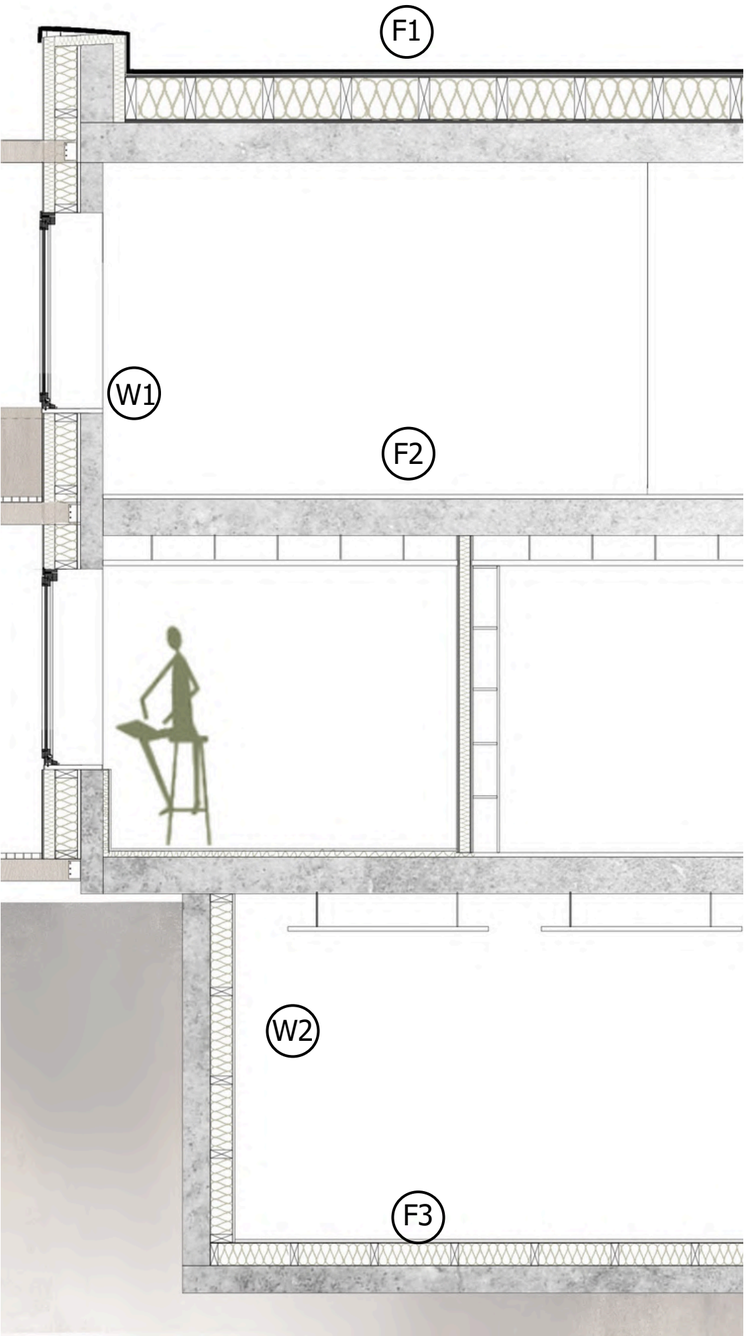
without Tr = 1.56 s
adding **200 m²** Tr = 0.51 s

Ecophon Solo™ Rectangle 1800*1200*400 mm

Optimum sound comfort in cafeteria: **0.6 s < Tr < 1 s**

without Tr = 1.85 s
adding **15 panels** 1800*1200*400 Tr = 0.65 s

STRUCTURE: BUILDING A, WALL COMPOSITION



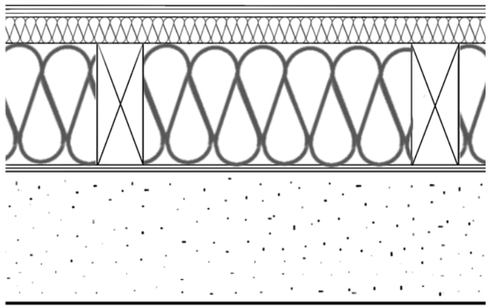
F1 Roof

Total thickness 80 cm

Thermal resistance R=10.69 m².K/W

U=0.09 W/m-2.K-1

Sound insulation 61 dB



EPDM
reinforcing mesh
ISOVER : wood fiber insulation 400 mm
vapour control layer
bonding primer
concrete 350 mm

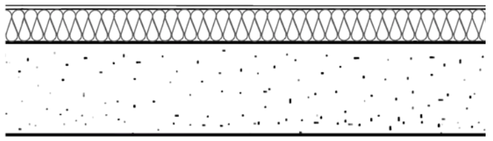
F2 Interior slab

Total thickness 33.4 cm

Thermal resistance R=2.24 m².K/W

U=0.45 W/m-2.K-1

Sound insulation 60 dB



lino floor covering
ISONAT: wood fiber insulation 70 mm
concrete 250 mm

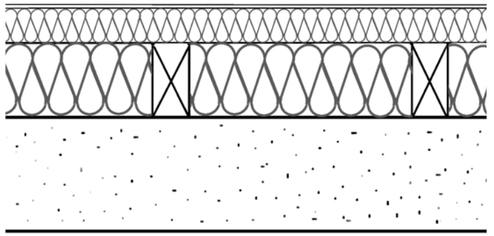
F3 Bottom slab

Total thickness 50.4 cm

Thermal resistance R= 5.42 m².K/W

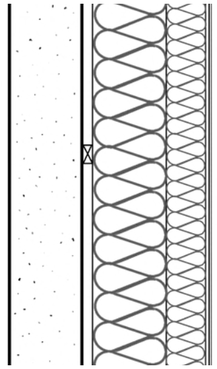
U=0.18 W/m-2.K-1

Sound insulation 59 dB



lino floor covering
ISOVER : wood fiber insulation 90 mm and 50 mm
concrete 350 mm

int ext



W1 Concrete interior insulation

Total thickness 57 cm

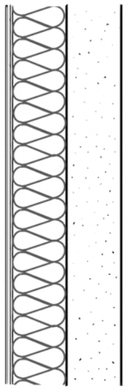
Thermal resistance R= 9.53 m².K/W

U= 0.11 W/m-2.K-1

Sound insulation 58 dB

concrete
air gap
ISOVER wood fiber insulation 300 mm
reinforcing mesh
lime coating

int ext



W2 Concrete exterior insulation

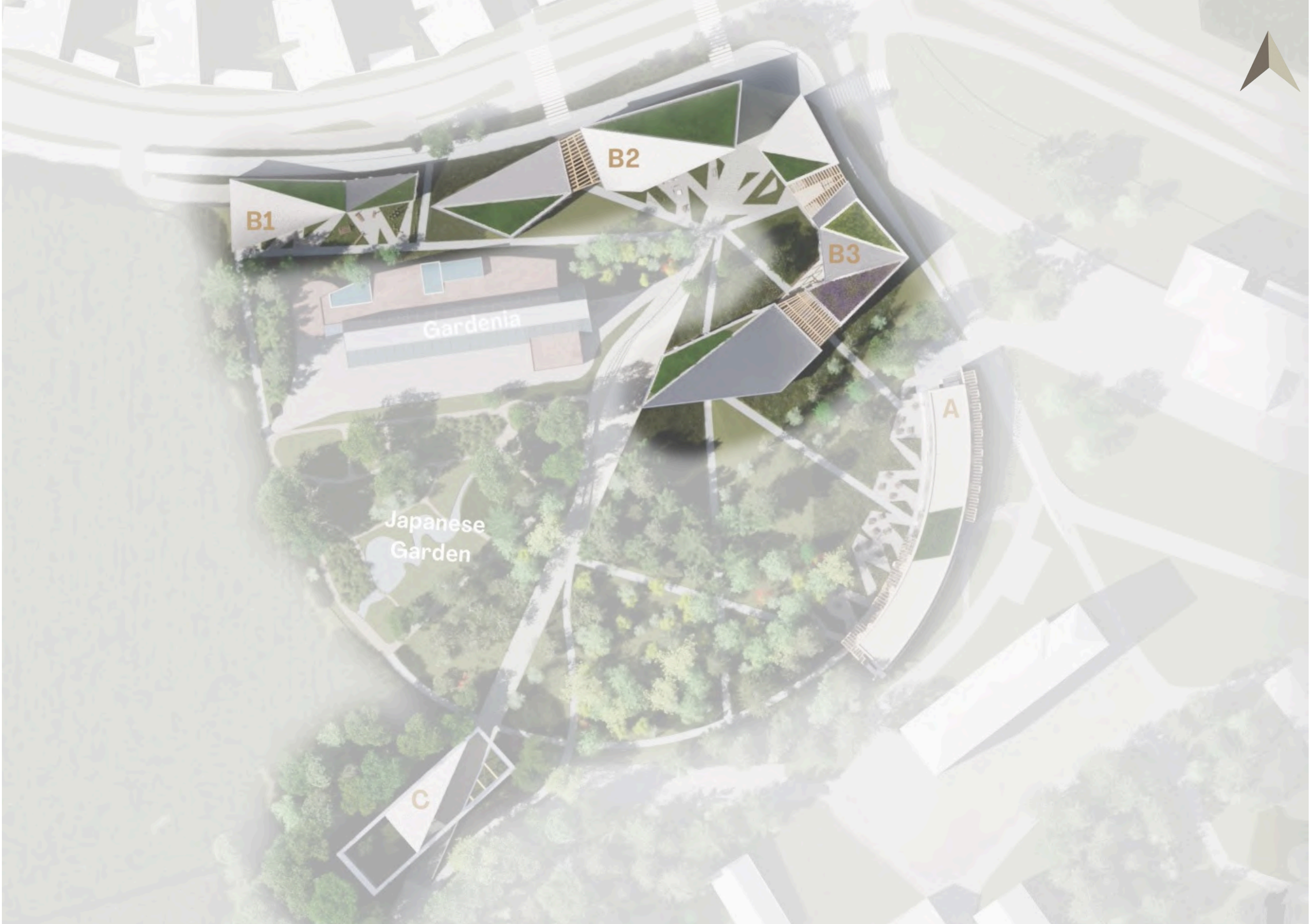
Total thickness 42.1 cm

Thermal resistance R= 4.69 m².K/W

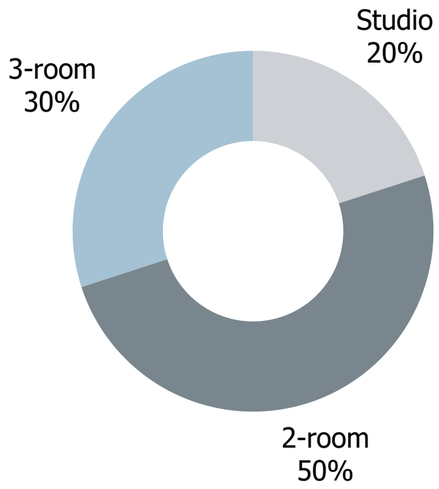
U=0.21 W/m-2.K-1

Sound insulation 41 dB

KERTO : wood panelling
ISOVER : wood fiber insulation 200mm
concrete


B1
B2
B3
Gardenia
Japanese
Garden
A
C

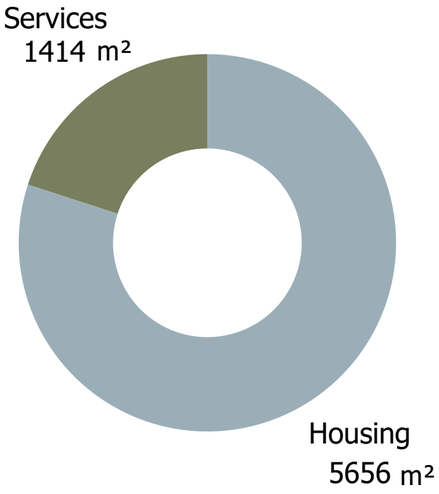
Buildings B : program

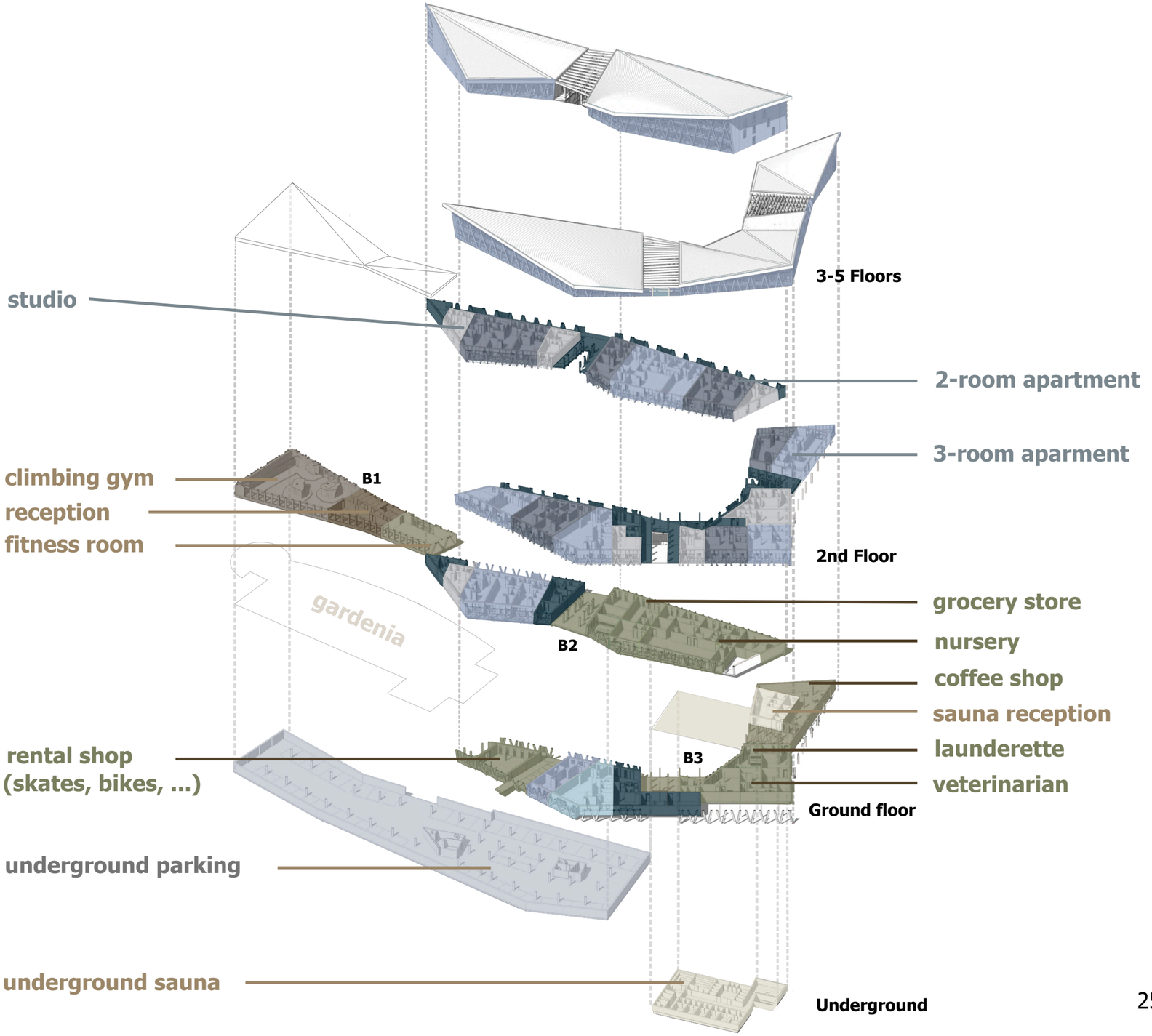


studio : 35 m² to 52 m²

2-room apartment : 53 m² to 78 m²

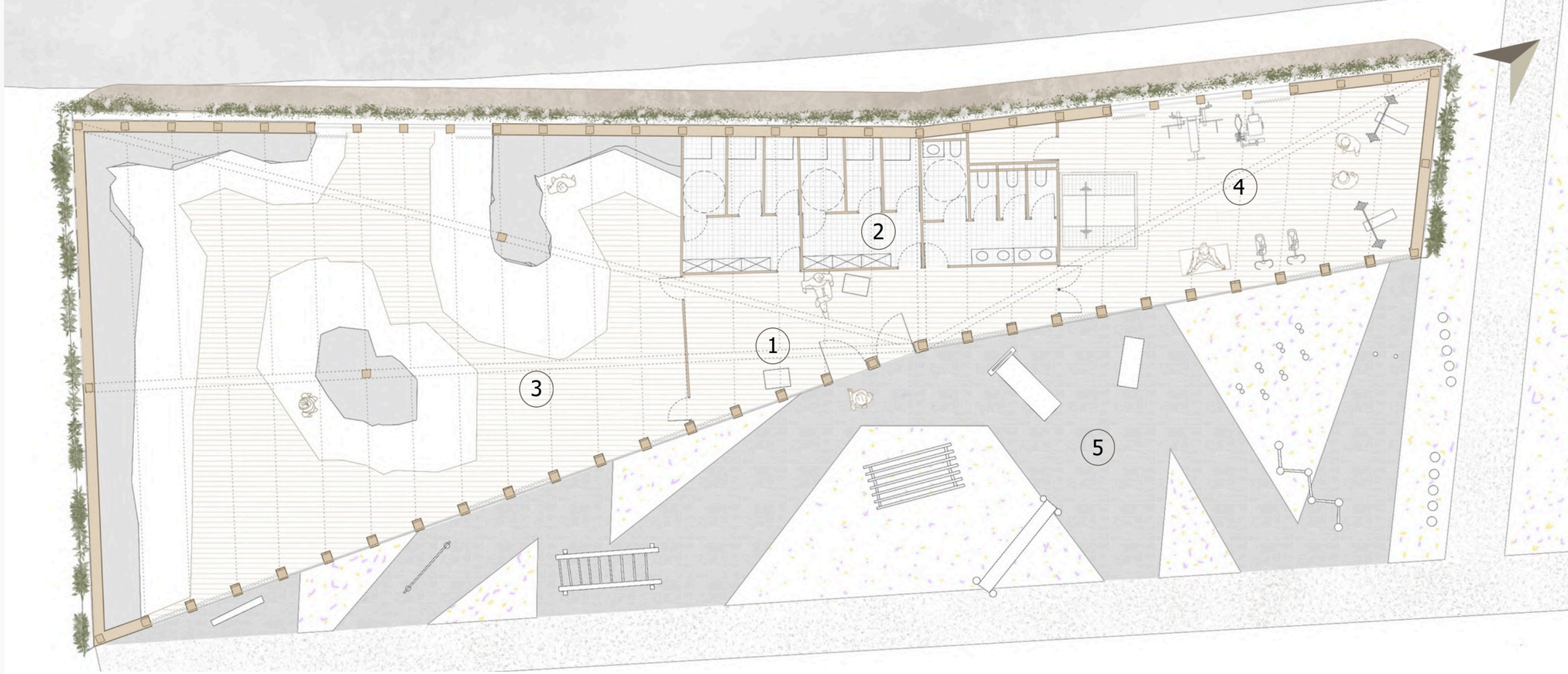
3-room apartment : 79 m² to 124 m²



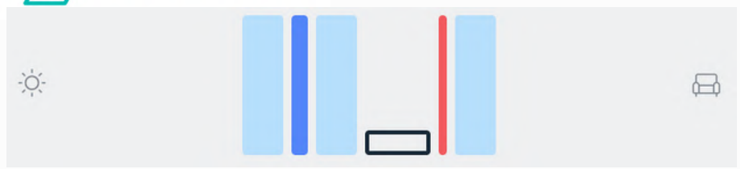


Building B1

1. Reception
2. Changing room
3. Climbing wall
4. Gym
5. Urban fitness facility



LIGHTING : BUILDING B1

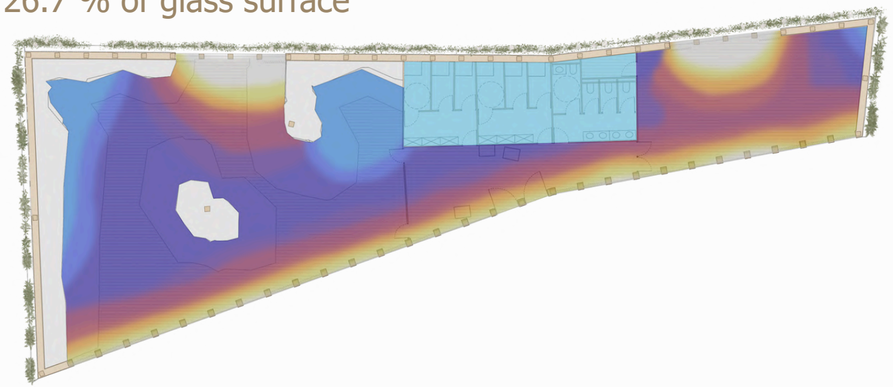


66.1 ORAÉ ORAÉ SI (20 Argon 90) 10 ORAÉ

Light transmittance (TL) : 80%
RLe and RLi : 11 %
Thermal transmittance : 1.1 W/(m².K)

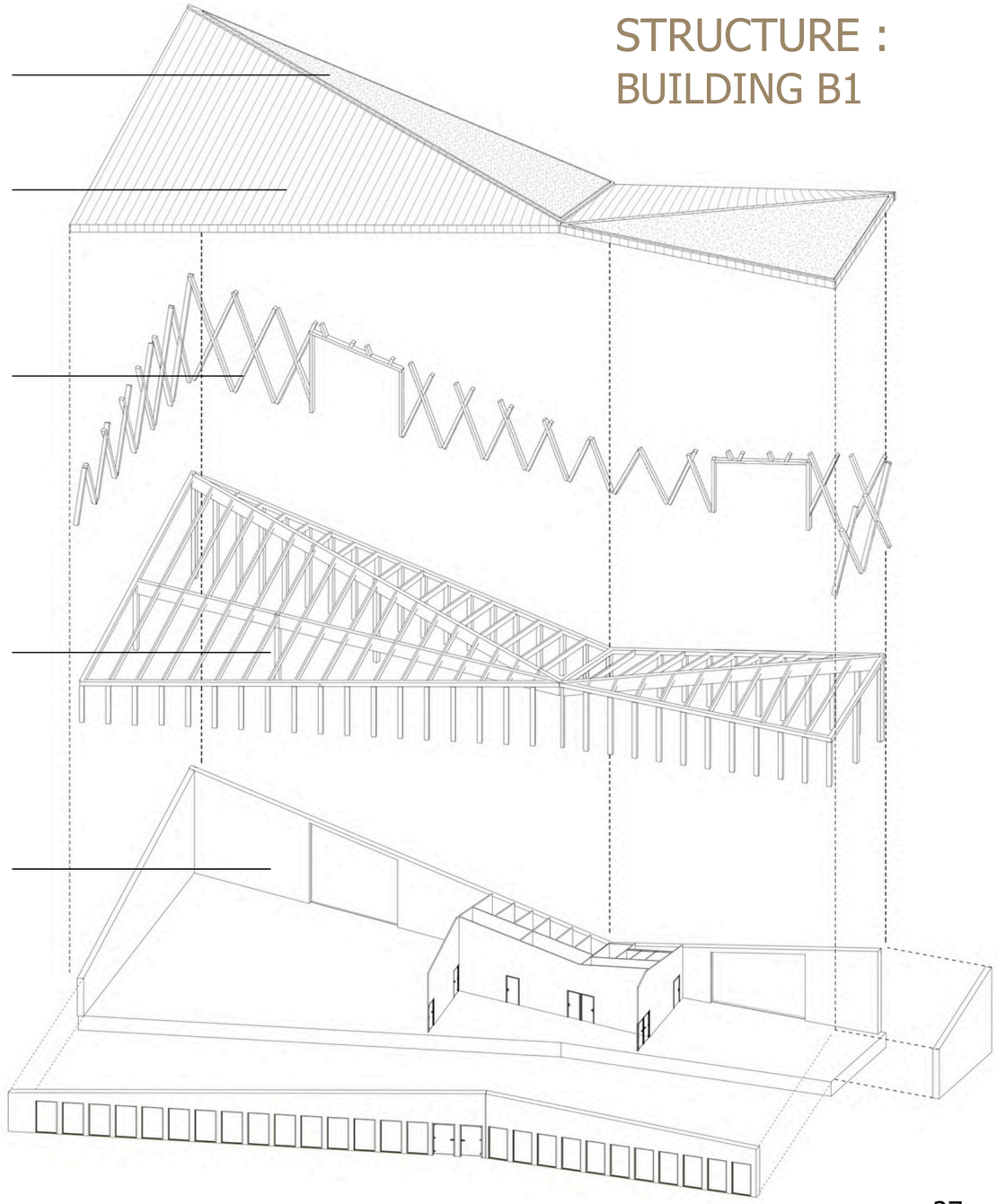
Simulated acoustic values :
Rw : 48 dB
Ra : 47 dB
Ra,tr : 44 dB

26.7 % of glass surface

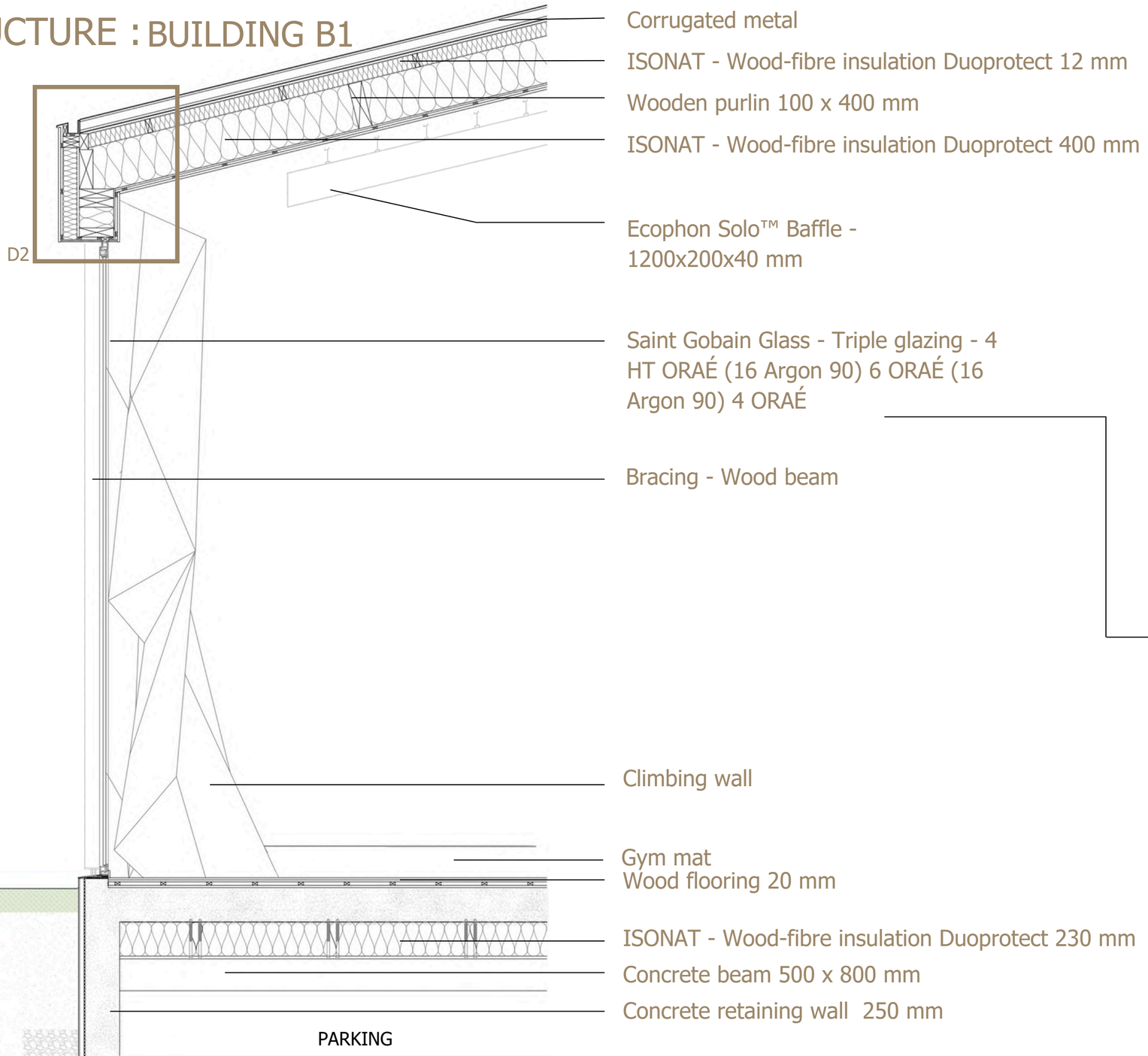


+1 % +15 %

STRUCTURE : BUILDING B1



STRUCTURE : BUILDING B1



Corrugated metal

ISONAT - Wood-fibre insulation Duoprotect 12 mm

Wooden purlin 100 x 400 mm

ISONAT - Wood-fibre insulation Duoprotect 400 mm

Ecophon Solo™ Baffle -
1200x200x40 mm

Saint Gobain Glass - Triple glazing - 4
HT ORAÉ (16 Argon 90) 6 ORAÉ (16
Argon 90) 4 ORAÉ

Bracing - Wood beam

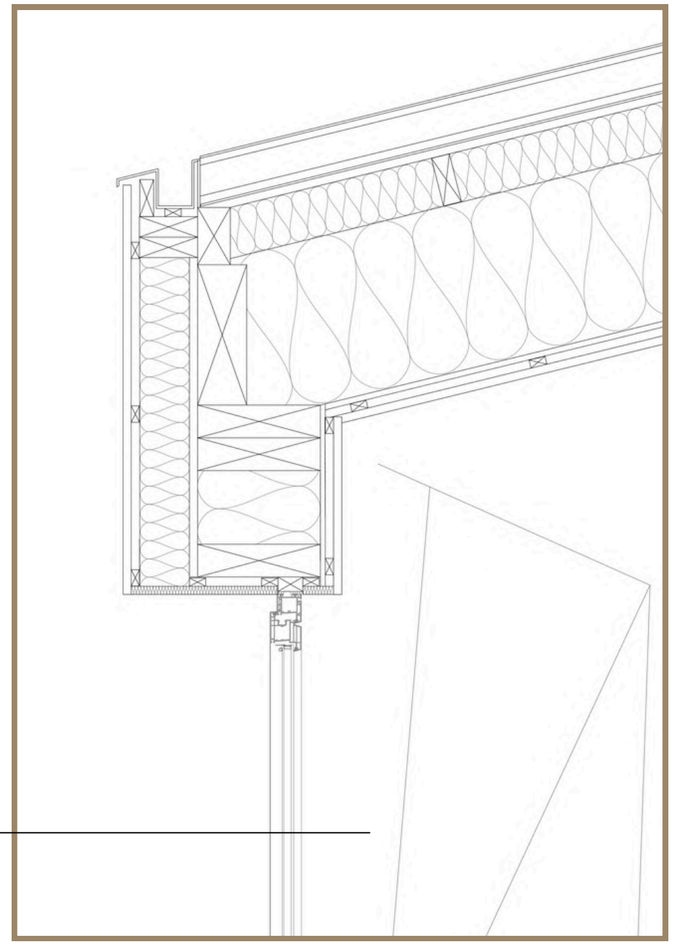
Climbing wall

Gym mat
Wood flooring 20 mm

ISONAT - Wood-fibre insulation Duoprotect 230 mm

Concrete beam 500 x 800 mm

Concrete retaining wall 250 mm



Details D2

Kerto® LVL Q-panel

Calumen

ORAÉ

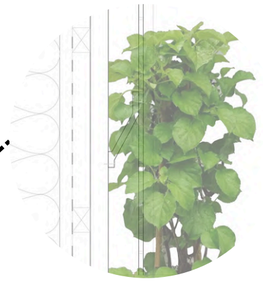
ecophon SAINT-GOBAIN

gyproc SAINT-GOBAIN

Isonat

Leca SAINT-GOBAIN

GREEN FACADE: SUPPORT



Plant/wall attachment

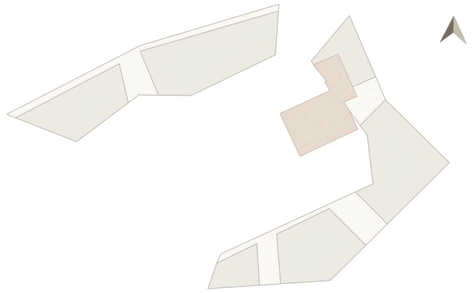
Hydrangea petiolaris 'Flying Saucer'

Lolium arundinaceum

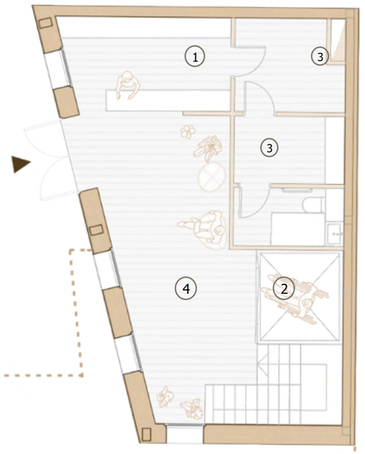
Pine
bark

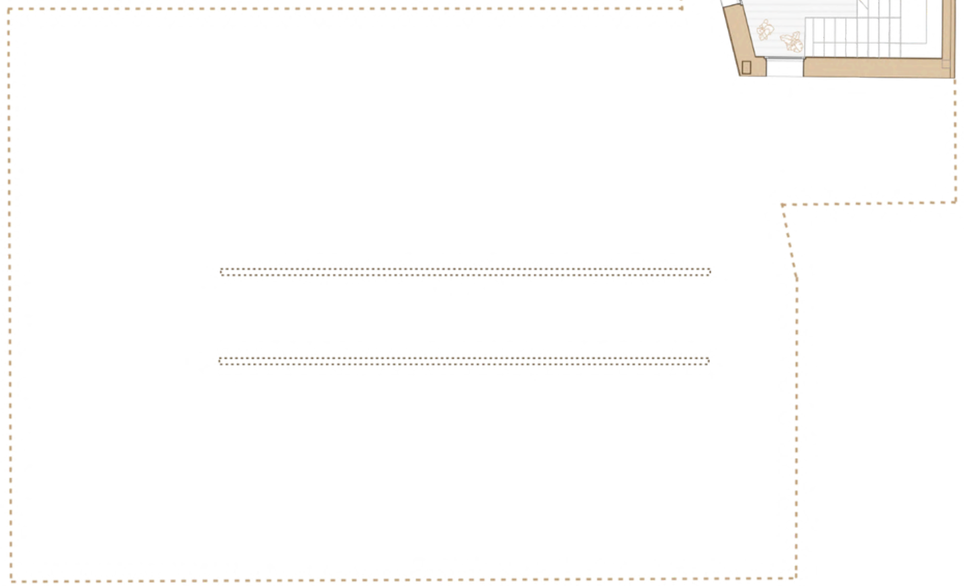
Sauna

The sauna, which is an important feature of the Finnish culture, is located underground to take advantage of the soil's natural warmth and re-purpose excavated materials, symbolising the project's core.



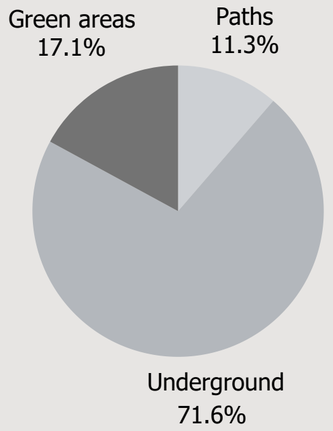
Situation plan



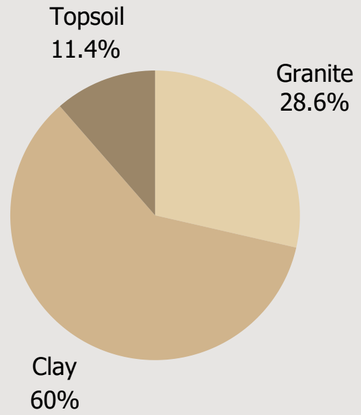


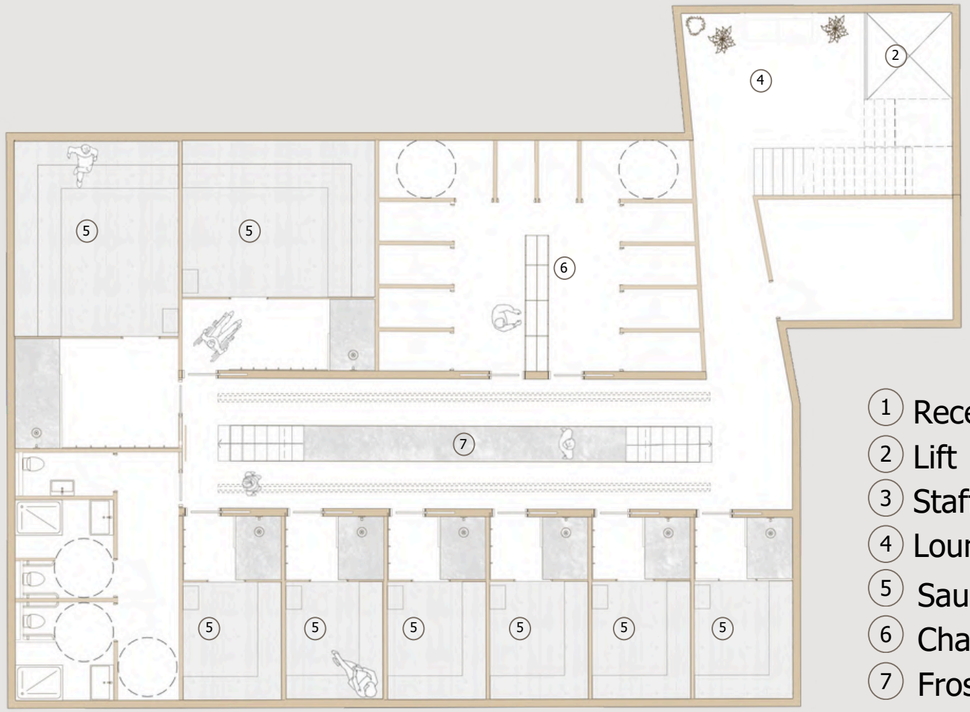
Ground floor

Distribution of areas to be disbursed in the project



Distribution of disbursed materials

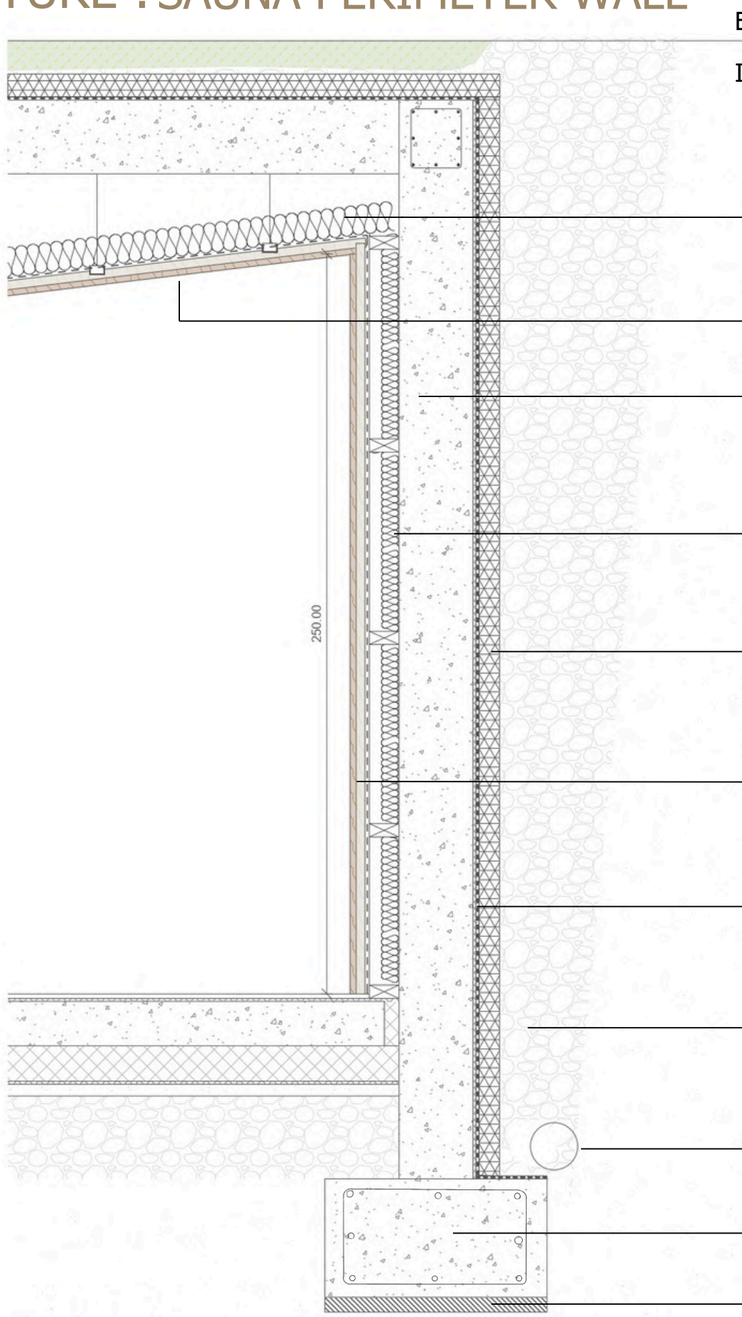




Underground

1 Reception
2 Lift
3 Staff room
4 Lounge area
5 Sauna
6 Changing room
7 Frosted river

STRUCTURE : SAUNA PERIMETER WALL



ISONAT® - Wood-fibre insulation Flex 40 200 mm

Wood covering 20 mm

CHRYSO EnviroMix® - Concrete retaining wall 250 mm

ISONAT® - Wood-fibre insulation Flex 40, 100 mm

Webertherm natura - natural cork insulation 80 mm

Wood covering 20 mm

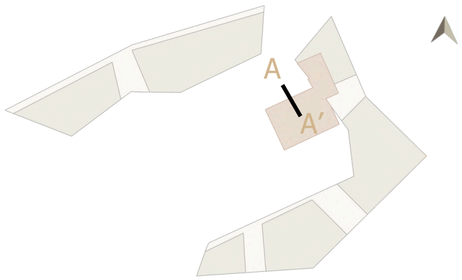
Sealing film

Leca®-sora PUH 4-5mm loose

Drain system

Concrete threaded footing

Clean-lined concrete



Roof

Total thickness 57 cm

Thermal resistance R= 6.9 m².K/W

U= 0,14 W/-2.K-1

Wall

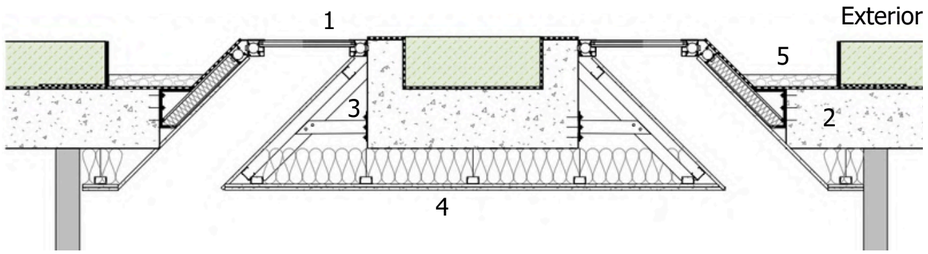
Total thickness 53cm

Thermal resistance R= 5.9 m².K/W

U= 0,19 W/-2.K-1

Section AA'

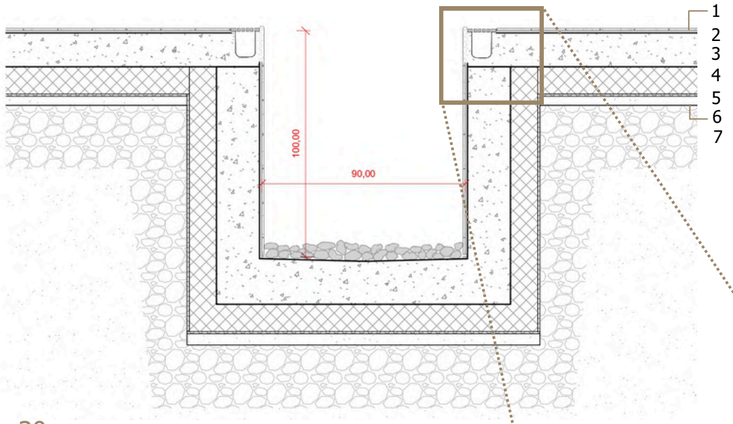
SECTION: ZENITHAL OPENING

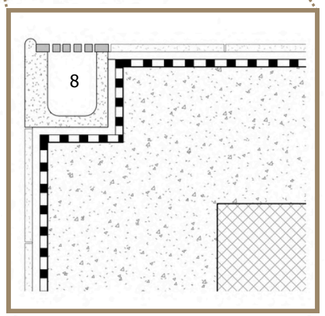


Int : Underground

1 : LITE-FLOOR® XTRA GRIP 4029 40 mm
2 : Concrete slab 250 mm
3 : Moulded metal rafters with metal piece to support Placo® cladding
4 : Insulated Placo® ceiling 150 mm
5 : Sterile strip over sealing film

SECTION: FROSTED RIVER

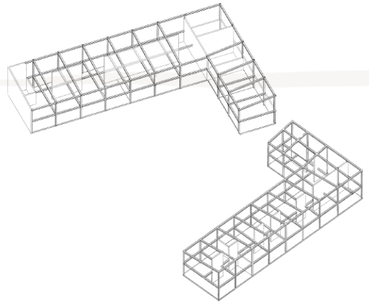




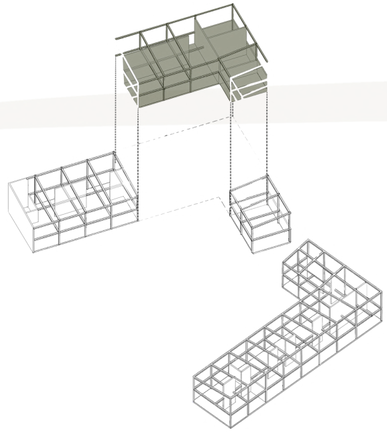
1 : Stone tile 30 mm
2 : Concrete slab 200 mm
3 : Sealing film
4 : ISOVER - Jackodur Rigid polystyrene insulation 160 mm
5 : Sand 20 mm
6 : Hardcore layer (gravel) 50 mm
7 : Natural granite floor
8 : Overflow channel

Detail D3

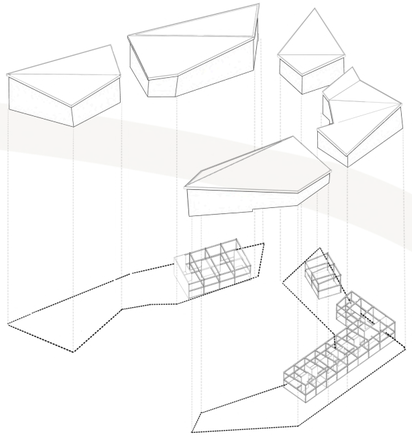
Strategy of intervention on buildings B2 and B3



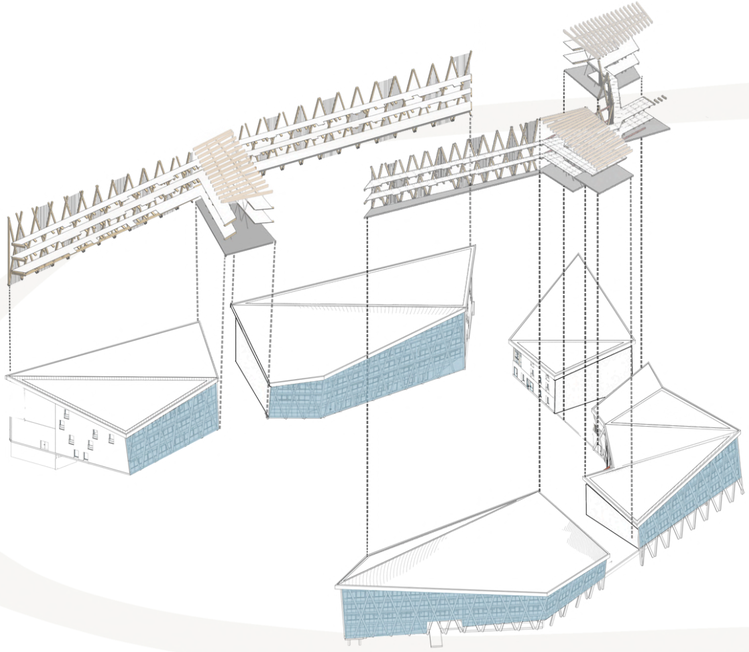
ANALYSIS OF EXISTING STRUCTURES



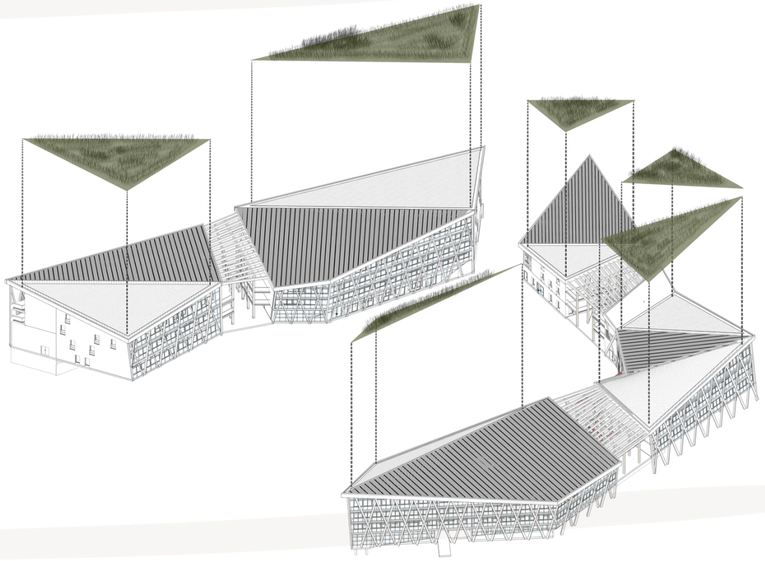
DECONSTRUCTION FOR THE MAIN AXE



ENVELOPING THE OLD STRUCTURE AND CREATING NEW VOLUMES

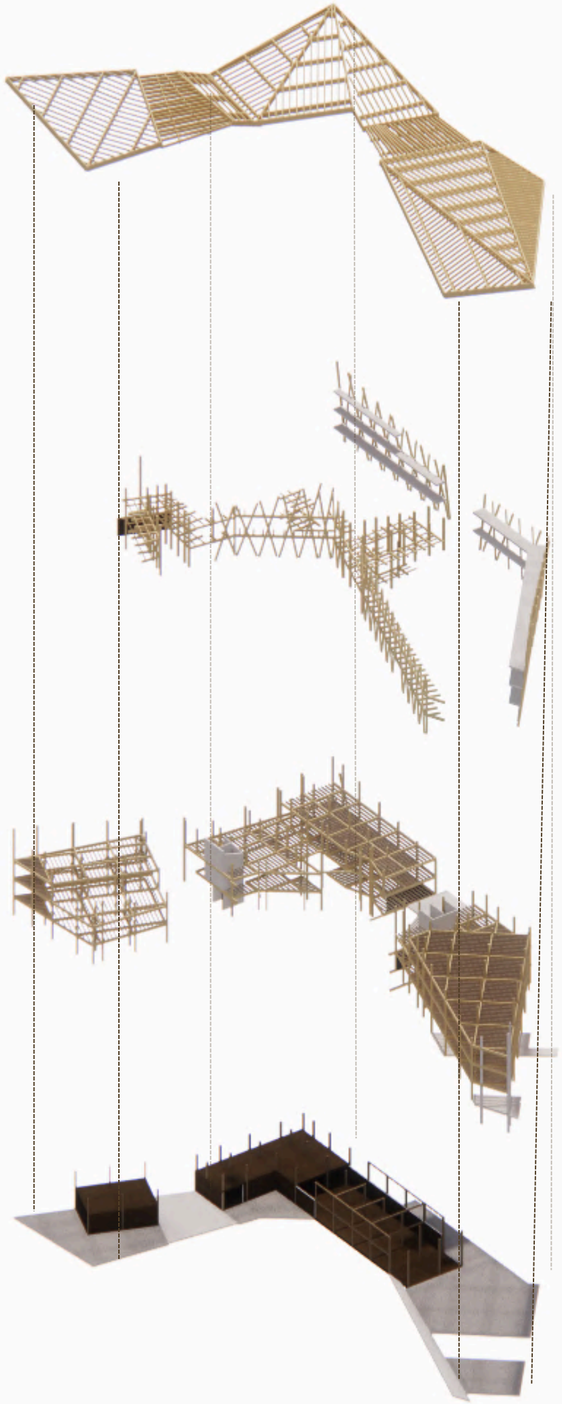


DOUBLE SKIN-FACADE SOUTH AND INHABITED WALKWAY NORTH



PLANTED ROOF

STRUCTURE: BUILDING B2 & BUILDING B3

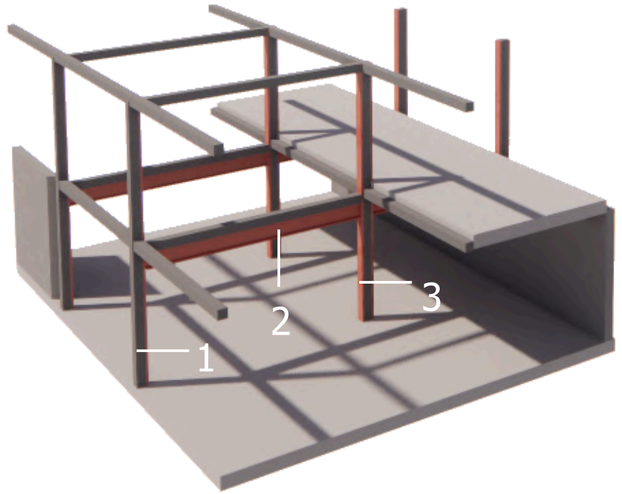


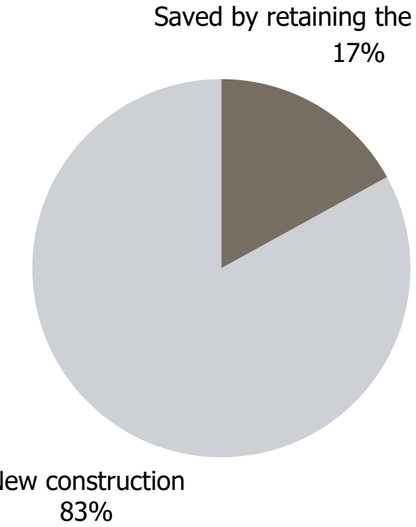
Wooden framework

Load-bearing facade and bracing with crossed posts

Timber post-and-beam load-bearing system and timber-concrete composite floor

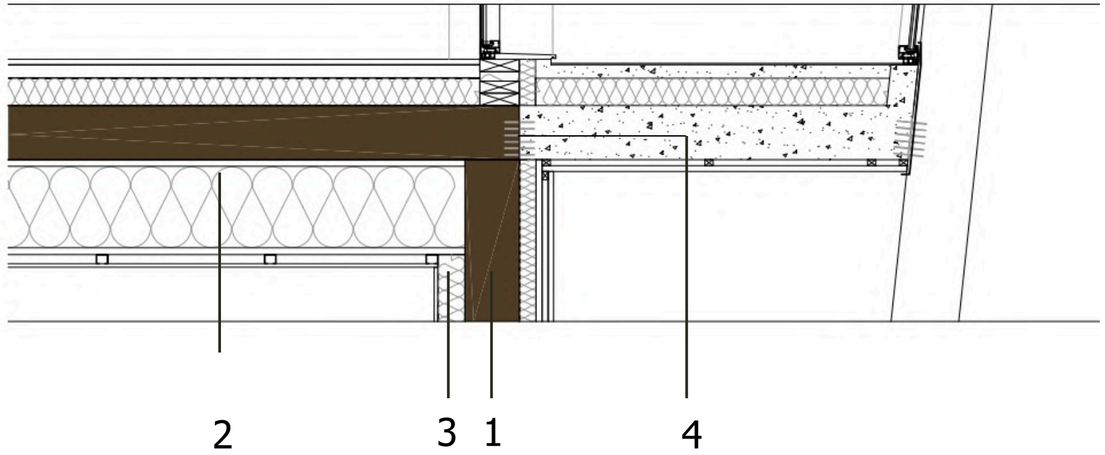
Partial conservation of the existing structure





Economy of carbon emissions through the preservation of existing structures

Linking old and new buildings



1 : Conservation of the existing concrete posts and concrete floor structure
2 : HEA 350 for reinforcing the existing structure
3 : HEA support
4 : Wood/concrete connection using a RICON® type assembly

GROUND FLOOR

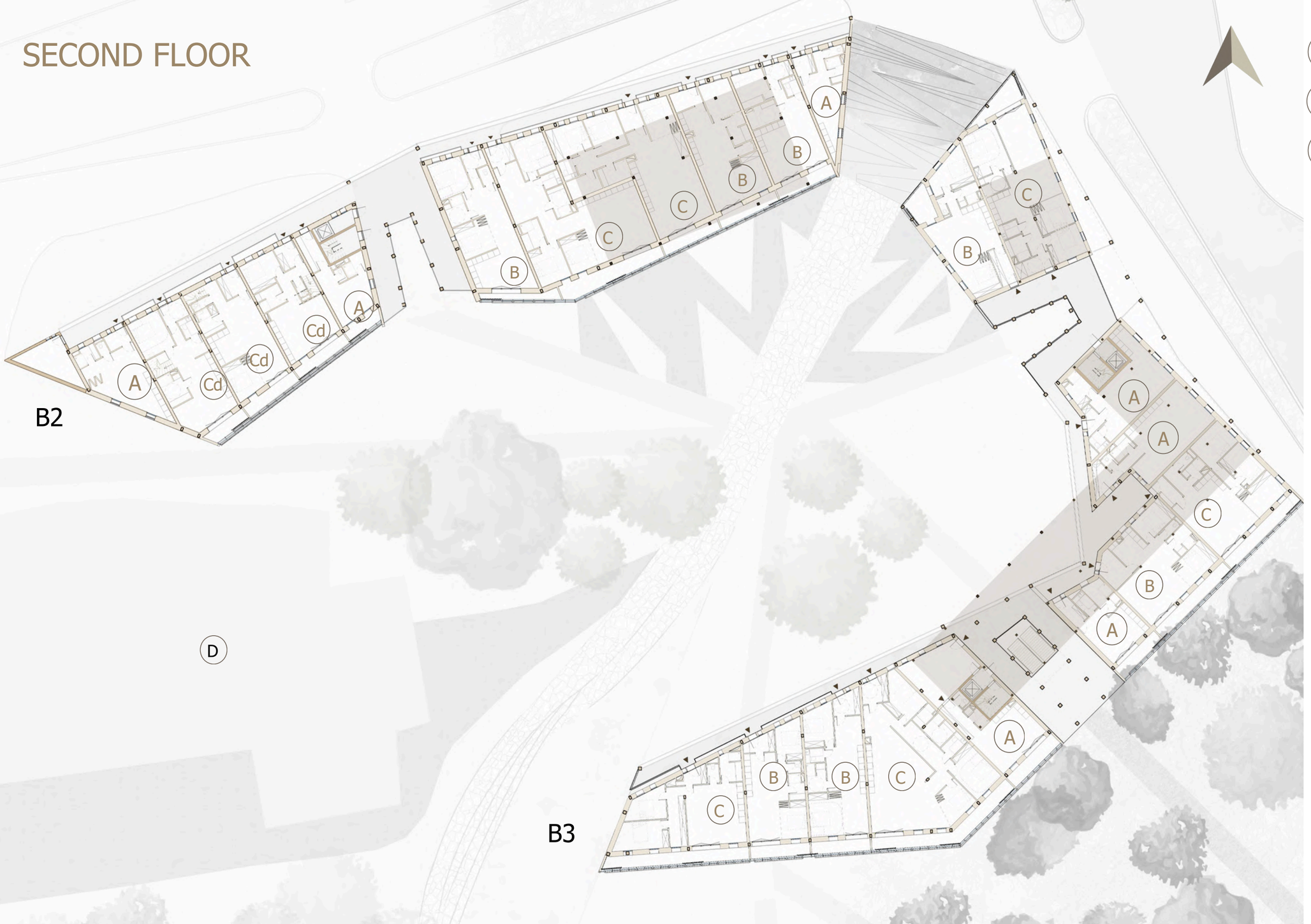
1 Sauna reception
2 Nursery
3 Veterinary annex
4 Cafe
5 Atelier
6 Launderette
7 Bike
8 Technical room
9 Hall
10 Common space
11 Services
12 Grocery store

A Studio
B 2-room apartment
C 3-room apartment

C Gardenia :
brewery /restaurant

Footprint of the former structure

SECOND FLOOR



A Studio

B 2-room apartment

C 3-room apartment

Ad Studio duplex

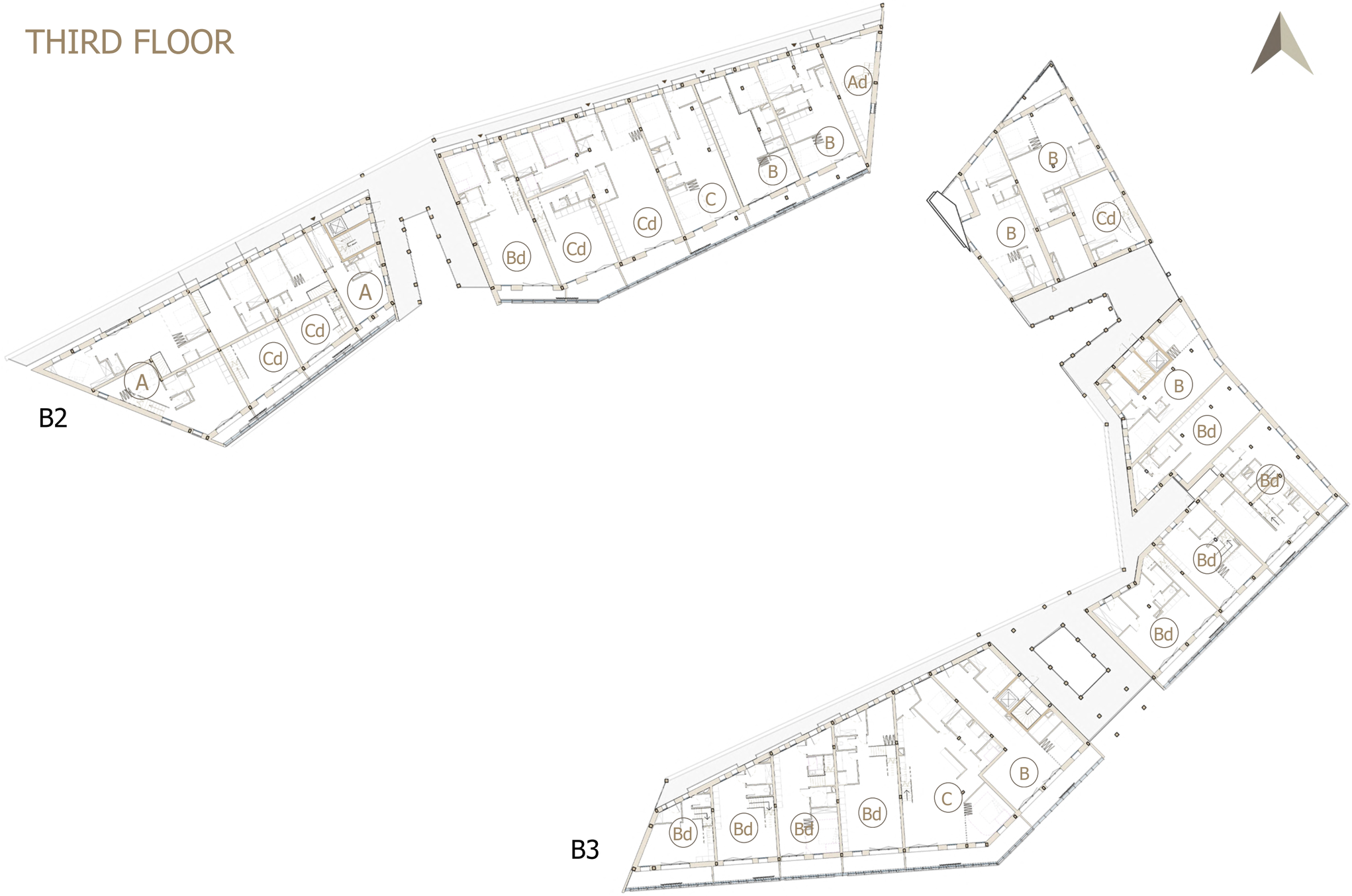
Bd 2-room apartment duplex

Cd 3-room apartment duplex

D Gardenia :
brewery /restaurant

Footprint of the former structure

THIRD FLOOR



A Studio

B 2-room apartment

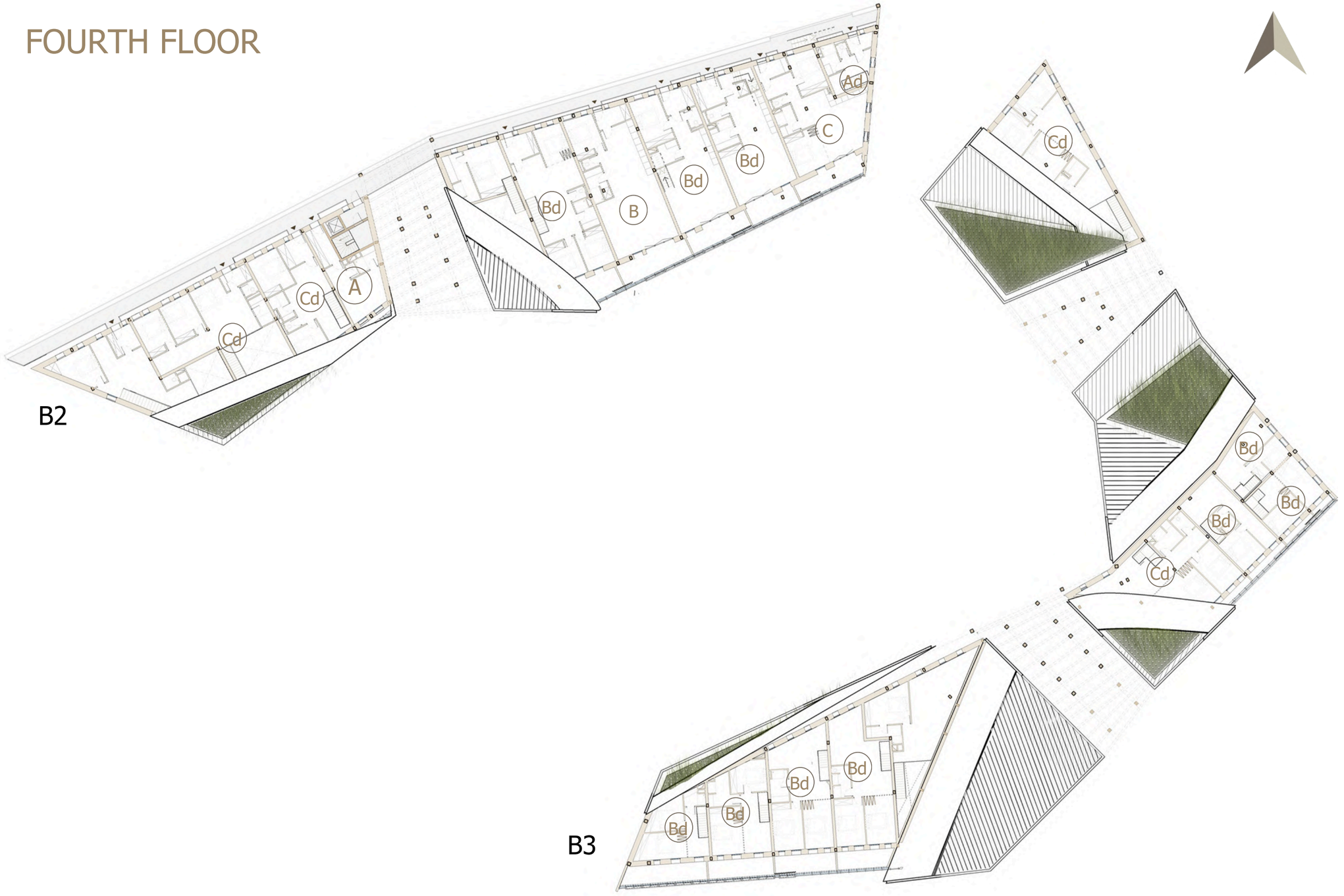
C 3-room apartment

Ad Studio duplex

Bd 2-room apartment duplex

Cd 3-room apartment duplex

FOURTH FLOOR



A Studio

B 2-room apartment

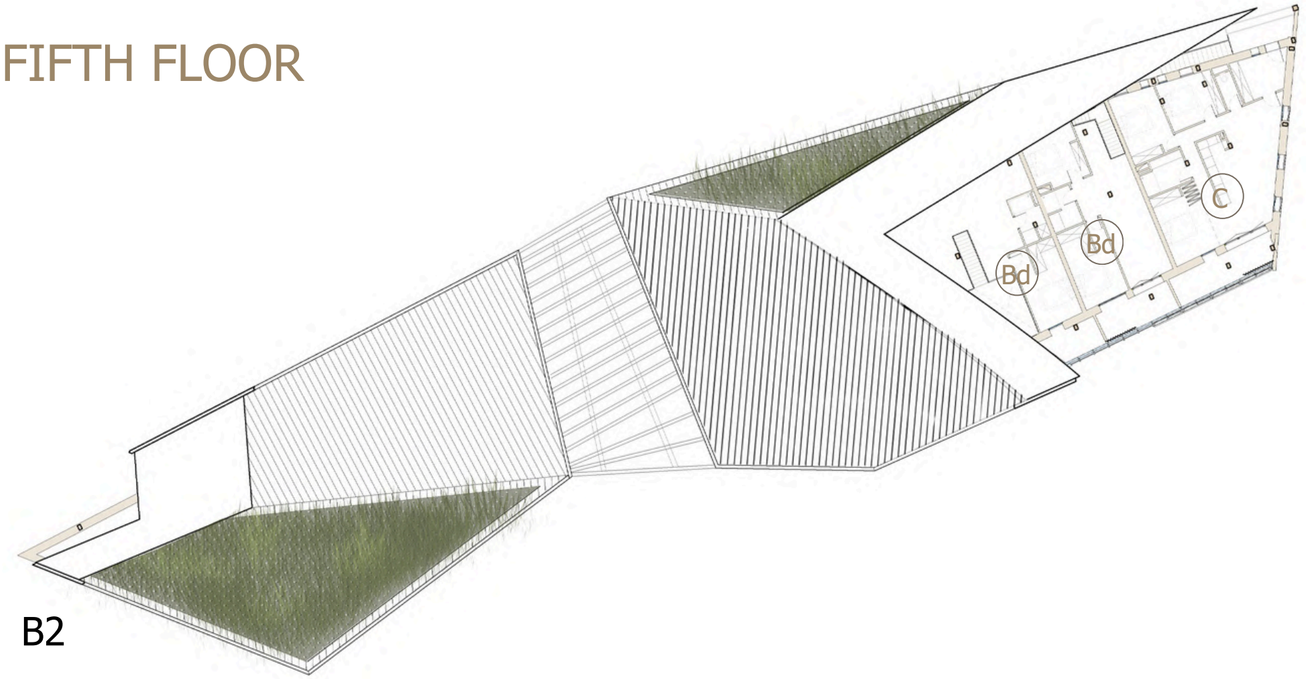
C 3-room apartment

Ad Studio duplex

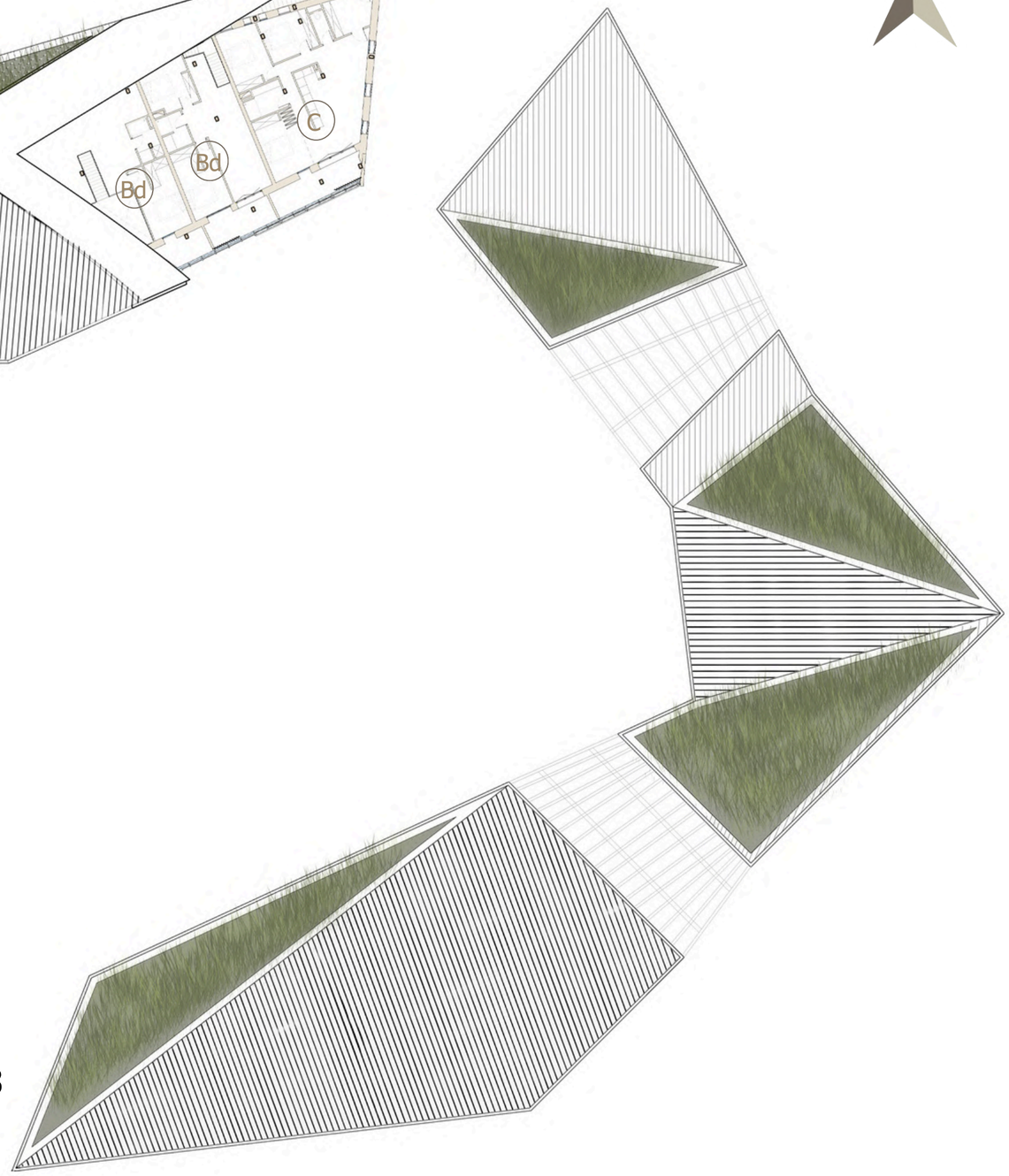
Bd 2-room apartment duplex

Cd 3-room apartment duplex

FIFTH FLOOR



B2

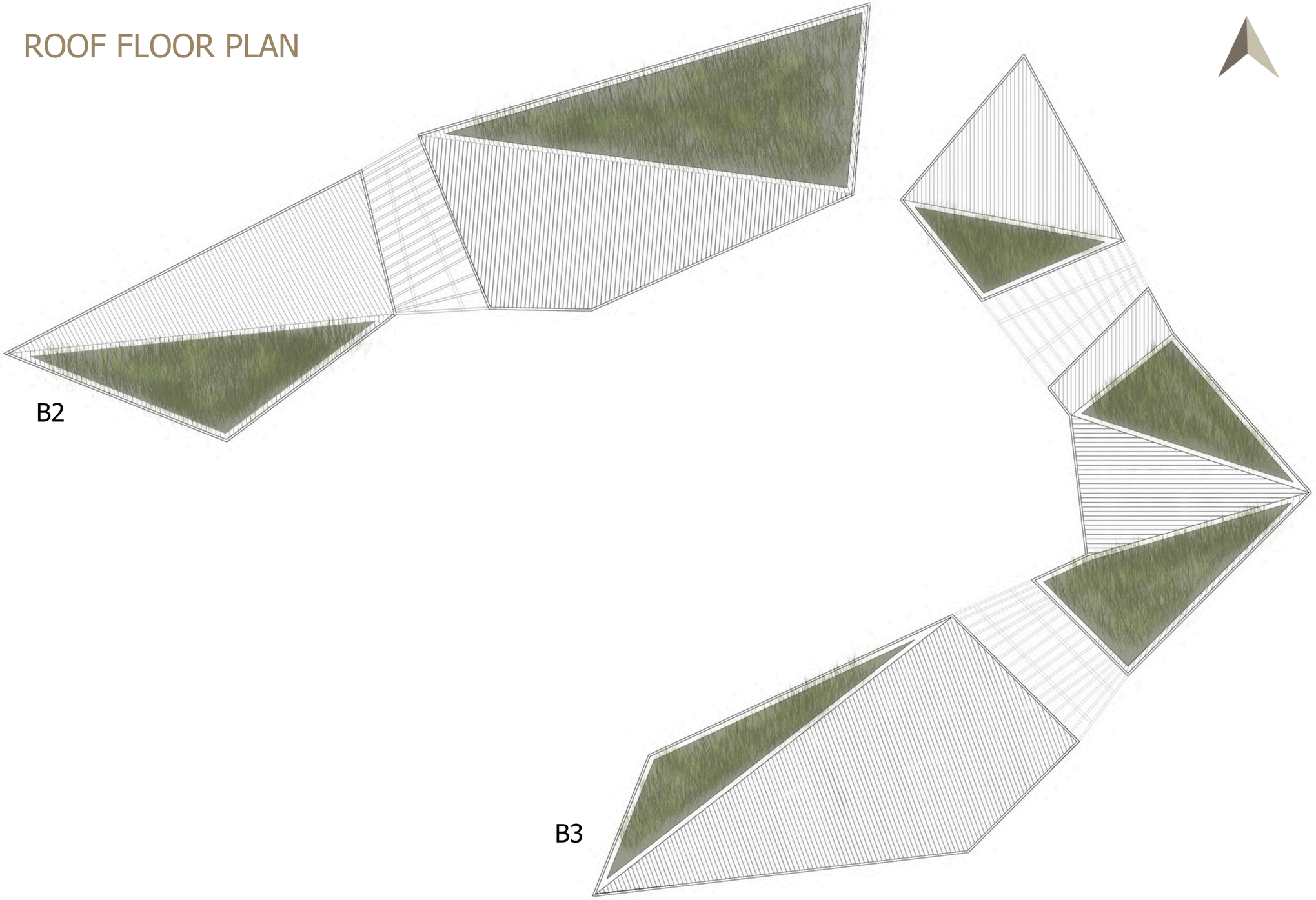


B3

- A Studio
- B 2-room apartment
- C 3-room apartment

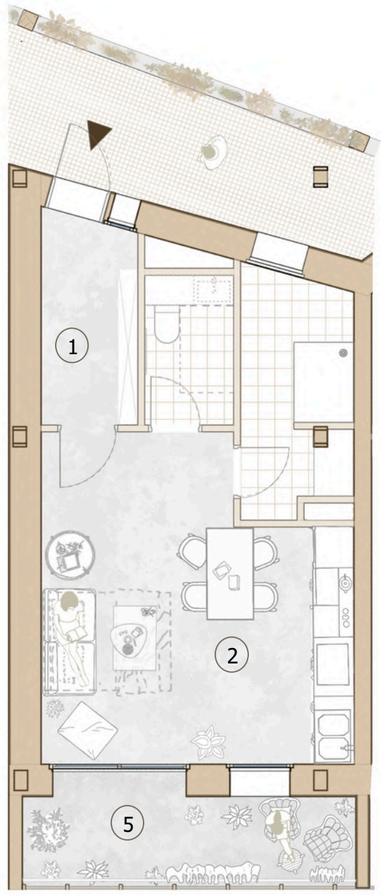
- Ad Studio duplex
- Bd 2-room apartment duplex
- Cd 3-room apartment duplex

ROOF FLOOR PLAN

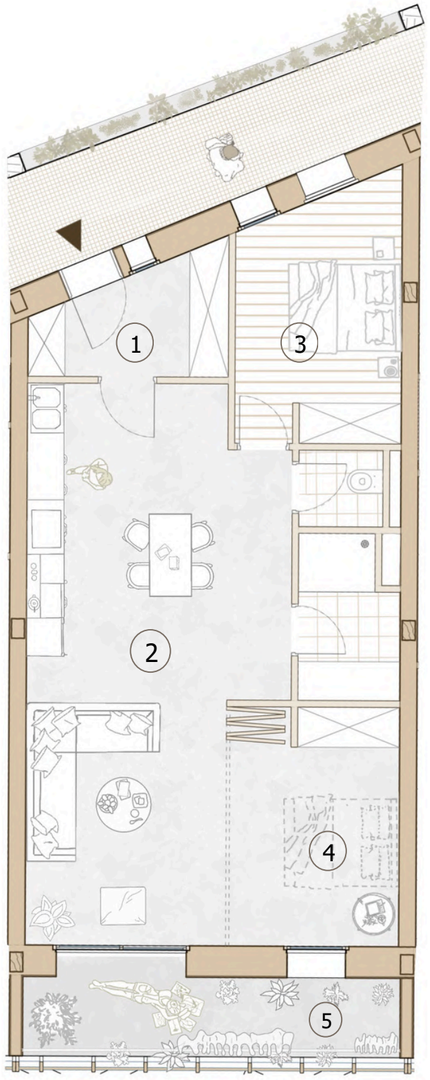


TYPES OF APARTMENTS

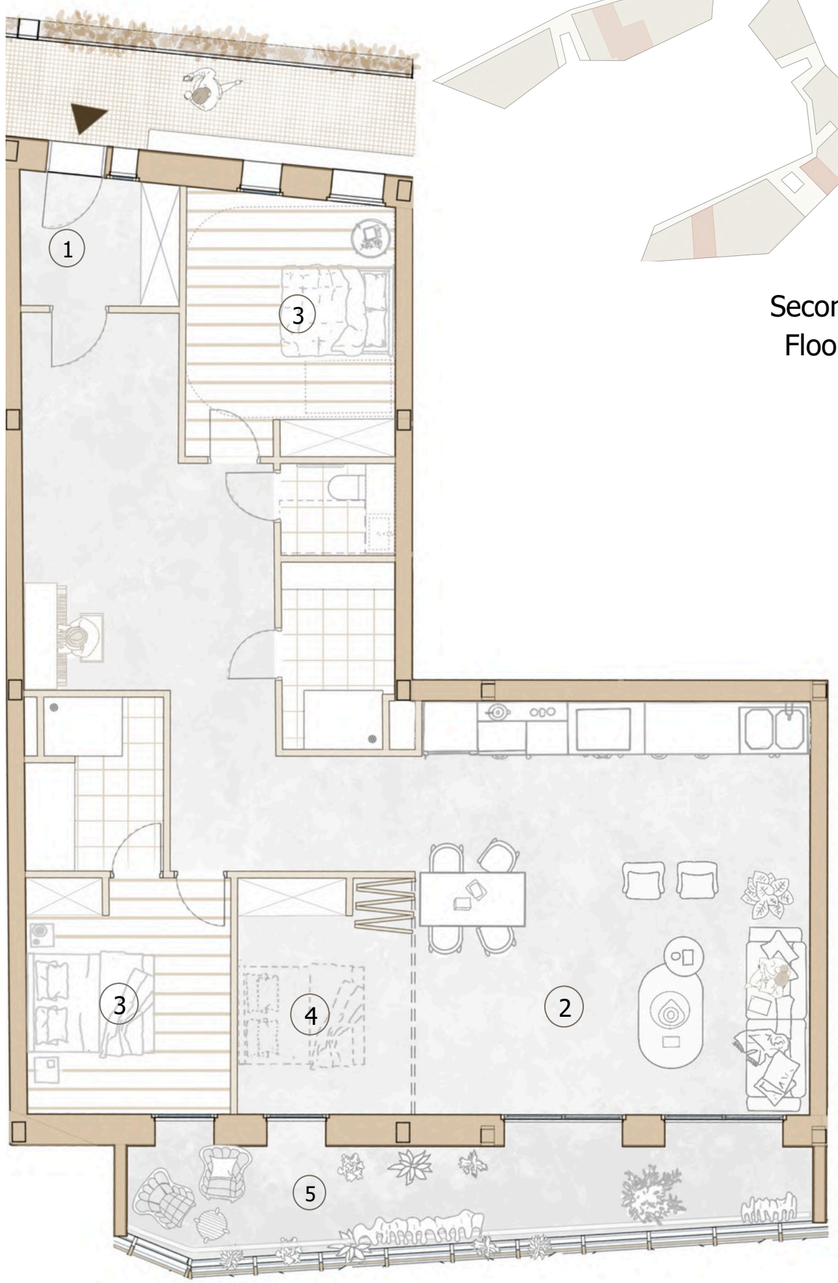
1. Mudroom
2. Living room and kitchen
3. Bedroom
4. Spare room
5. Conservatory



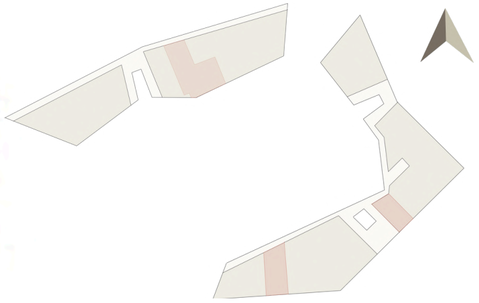
Typology studio



Typology 2-room

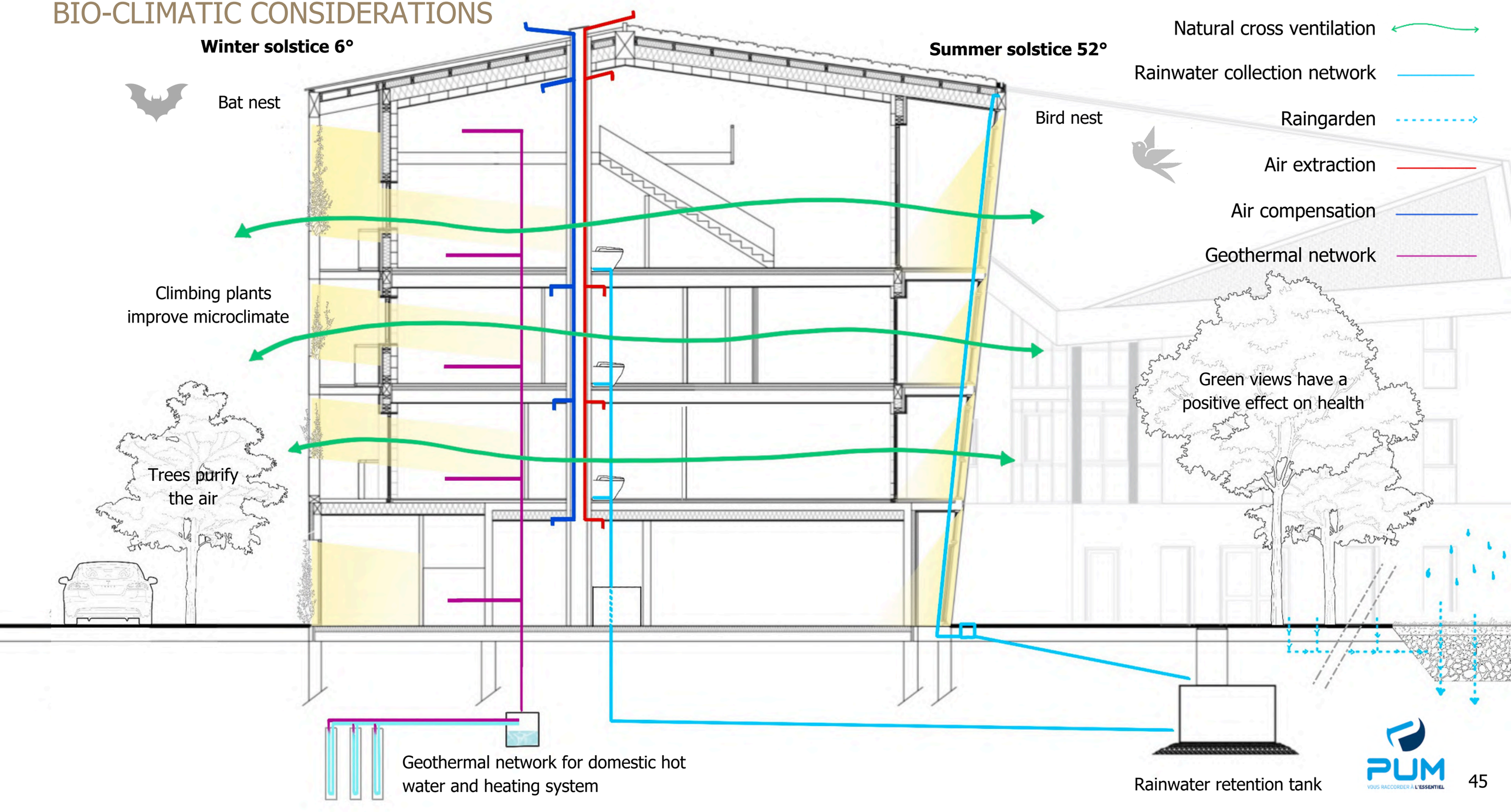


Typology 3-rooms

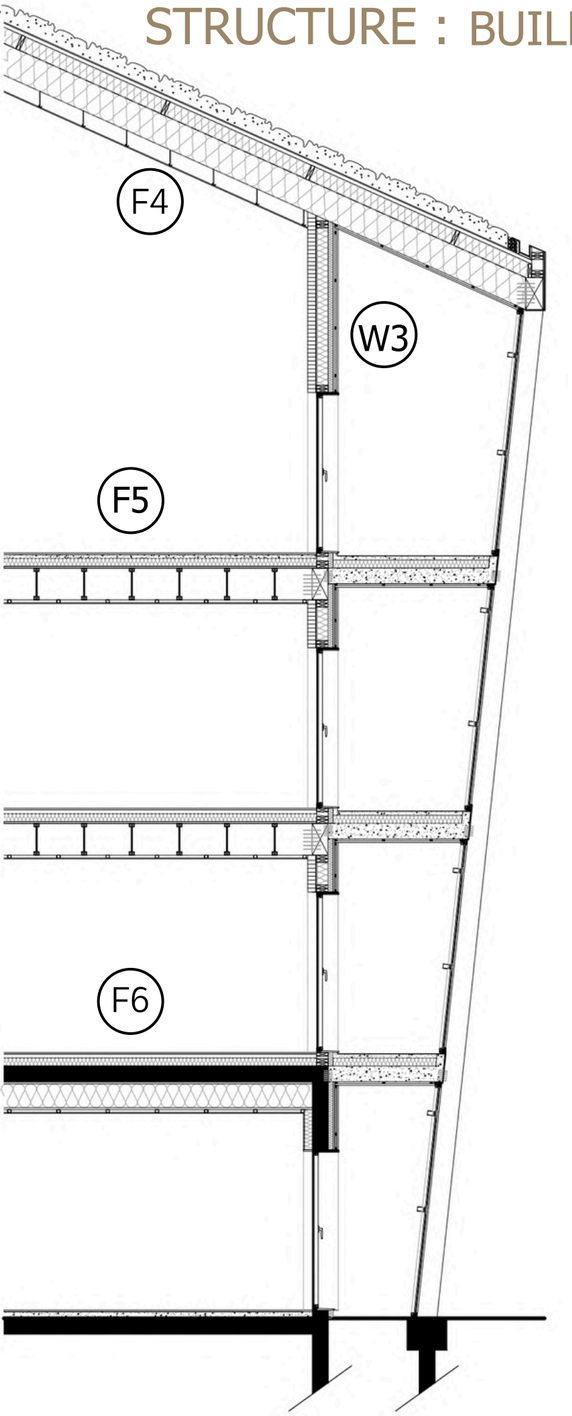


Second Floor

BIO-CLIMATIC CONSIDERATIONS



STRUCTURE : BUILDING B WALL COMPOSITION



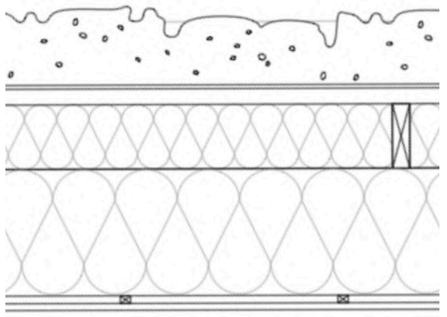
F4 Planted roof

Total thickness 119 cm

Thermal resistance R= 14.09 m².K/W

U= 0.07 W/m-2.K-1

Sound insulation 32 dB



vegetation
200 mm substrate
geotextile
100 mm drainage layer
root-proof membrane
steel sheet
600 mm wood fiber insulation
Vapour barrier
20 mm furring strips
21 mm Kerto board

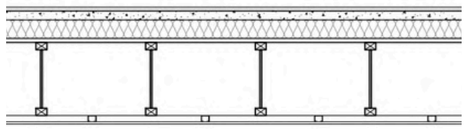
F5 Slab between apartments

Total thickness 65 cm

Thermal resistance R= 2.6 m².K/W

U= 0.38 W/m-2.K-1

Sound insulation 60 dB



wood parquet
70 mm concrete screed
120 mm wood fiber insulation
plasterboard
I wood beams 60 x 350
false ceiling

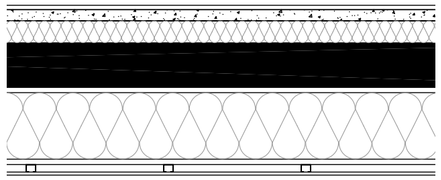
F6 Slab old structure

Total thickness 78 cm

Thermal resistance R= 13.42 m².K/W

U= 0.07 W/m-2.K-1

Sound insulation 56 dB



wood parquet
70 mm concrete screed
100 mm wood fiber insulation
200 mm original concrete slab
400 mm wood fiber insulation
plasterboard

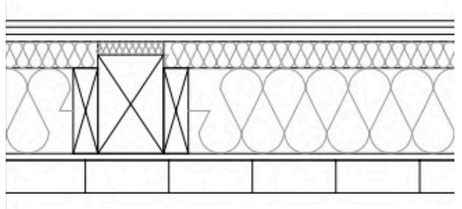
W3 Timber-framed wall conservatory

Total thickness 48 cm

Thermal resistance R= 7.04 m².K/W

U= 0.14 W/m-2.K-1

Sound insulation 48 dB



wood cladding
double furring strips
100 mm wood fiber
400 mm wood fiber
air gap
compressed earth bricks

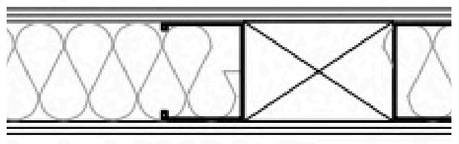
W4 Wall between apartments

Total thickness 22.8 cm

Thermal resistance R= 5.49 m².K/W

U= 0.18 W/m-2.K-1

Sound insulation 68 dB



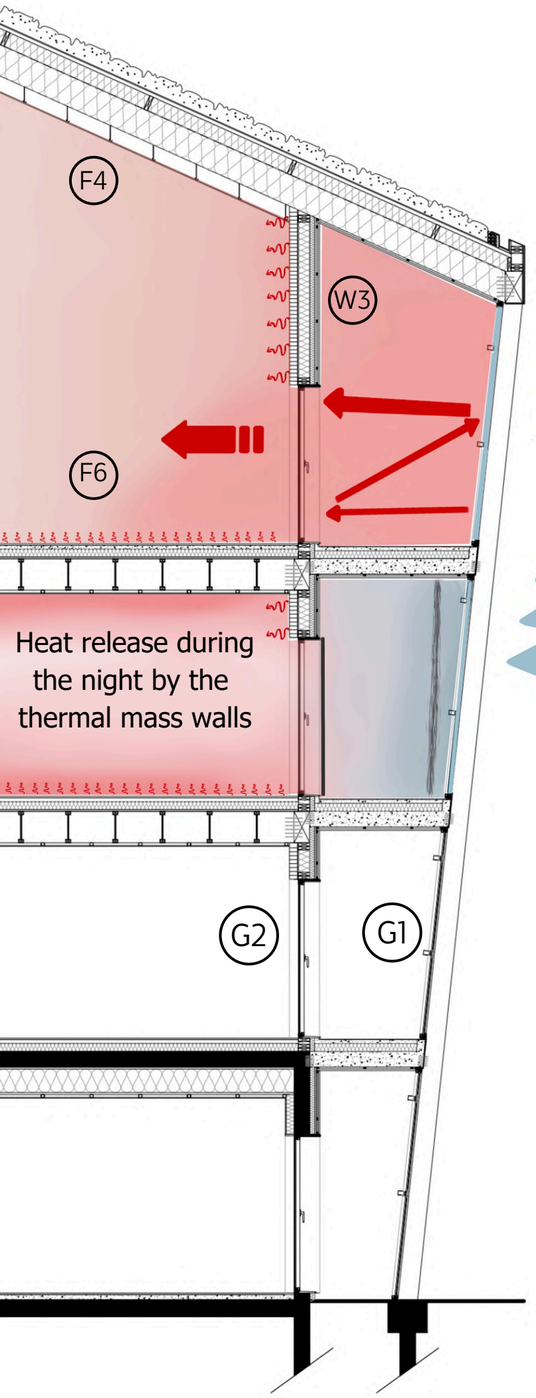
plasterboard x2
20 mm wood fiber
plasterboard x2

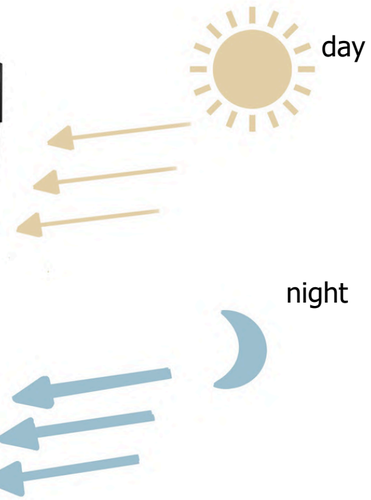
gyproc SAINT-GOBAIN
ORAÉ
Isonat
Kerto® LVL Q-panel

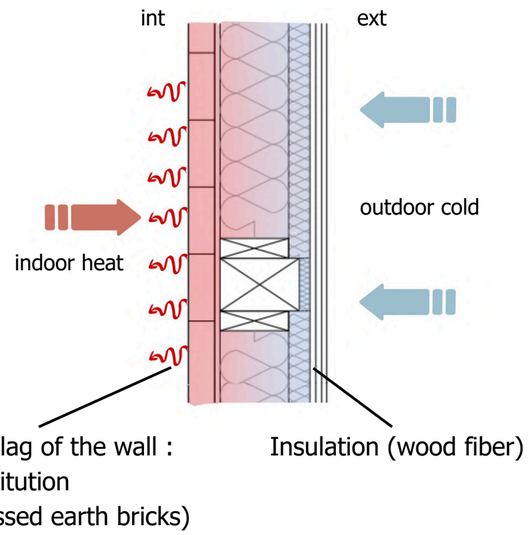
EXTERNAL INSULATION & MAIN THERMAL MASS WALL

Inertia properties

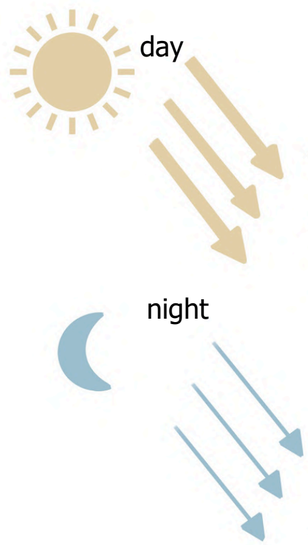
Winter

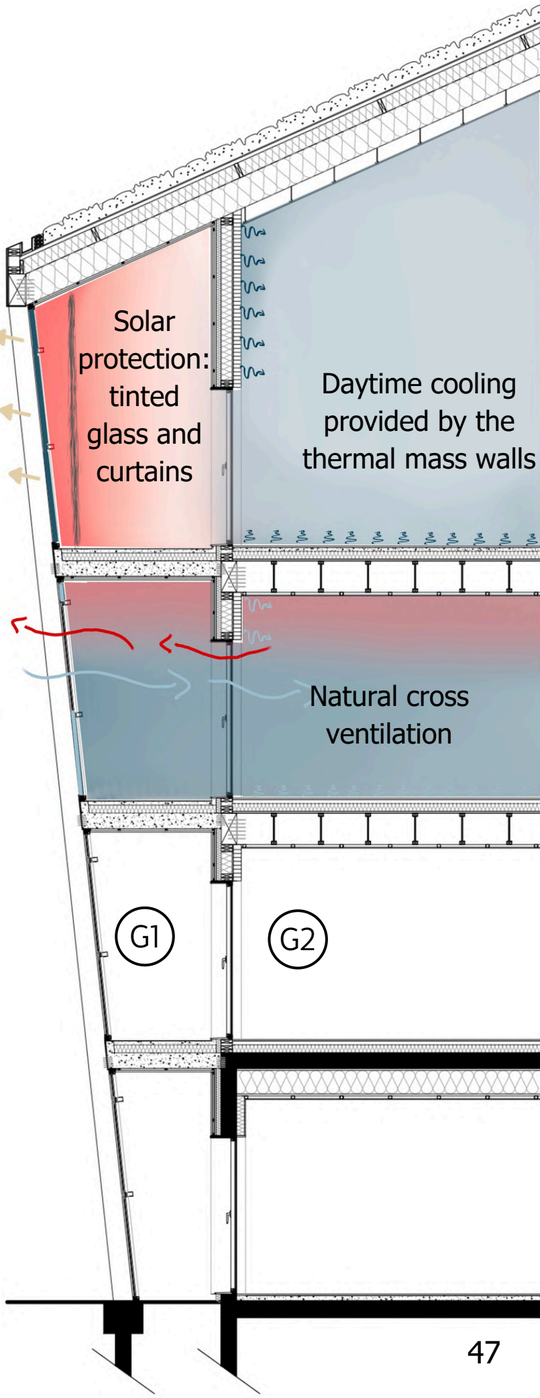






Summer





Thermal mass :

>400 : High thermal mass
150<x<400: Medium thermal mass

W3 : 431.1 kJ/m².K
F4 : 537.5 kJ/m².K
F5 : 223.3 kJ/m².K

Thermal Lag :

Compressed earth bricks : 7 h - 8 h
Wood fiber insulation : 12 h
Substrate : 6 h

SageGlass® SAINT-GOBAIN

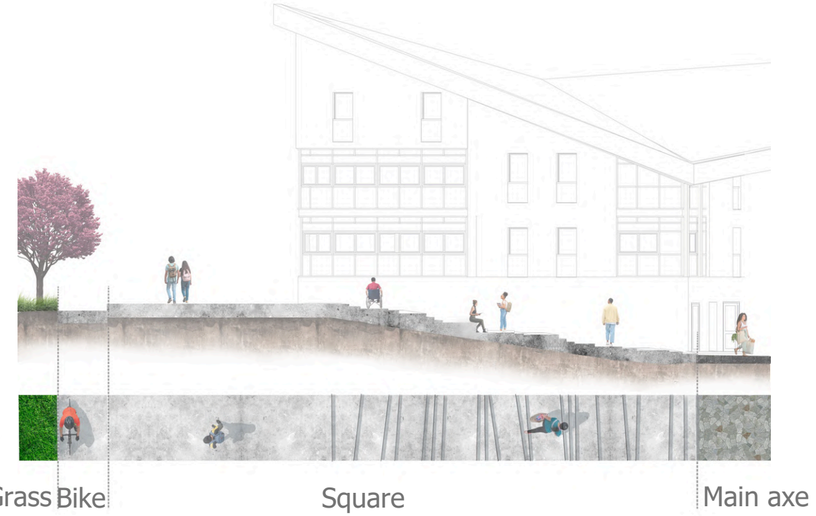
G1 6 (16 Argon 90) 4 ORAÉ (16 Argon 90) 4 COOL-LITE SKN 183 #2 / ECLAZ #5

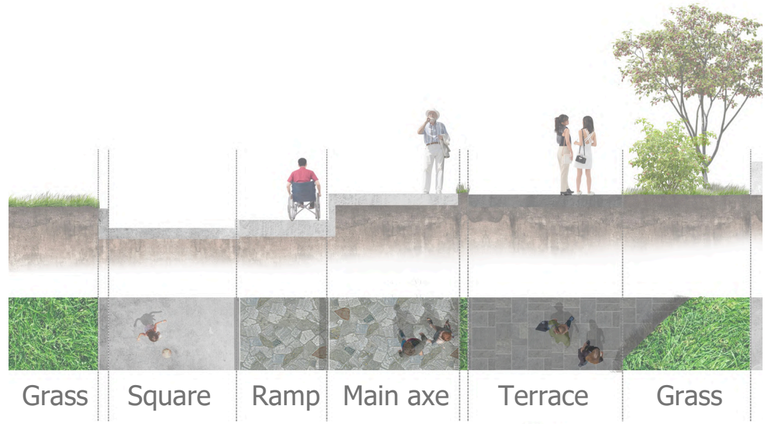
Light transmittance (TL) : 69 %
RLe and RLi :14 % & 16 %
Solar factor (g) : 0.37
Thermal transmittance : 0.5 W/(m².K)

G2 6 ORAÉ (16 Argon 90) 4 ORAÉ - ECLAZ #3

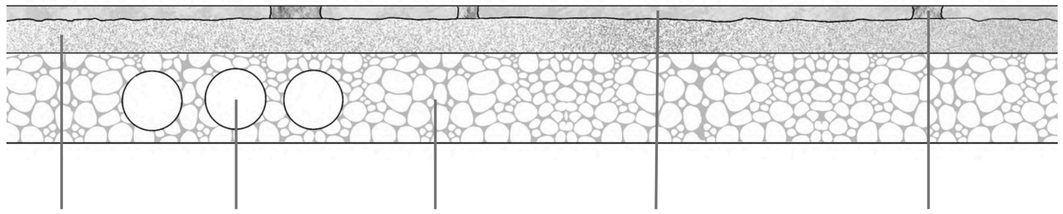
Light transmittance (TL) : 83 %
RLe and RLi :12 % & 11 %
Solar factor (g) : 0.69
Thermal transmittance : 1.1 W/(m².K)

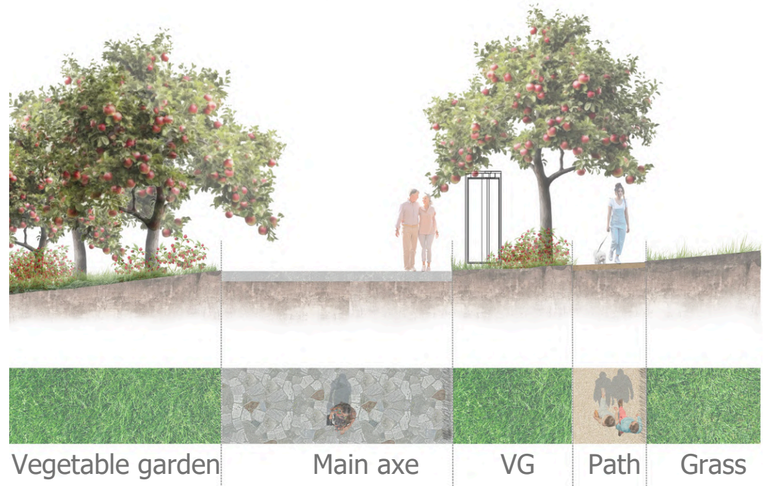
Main axe



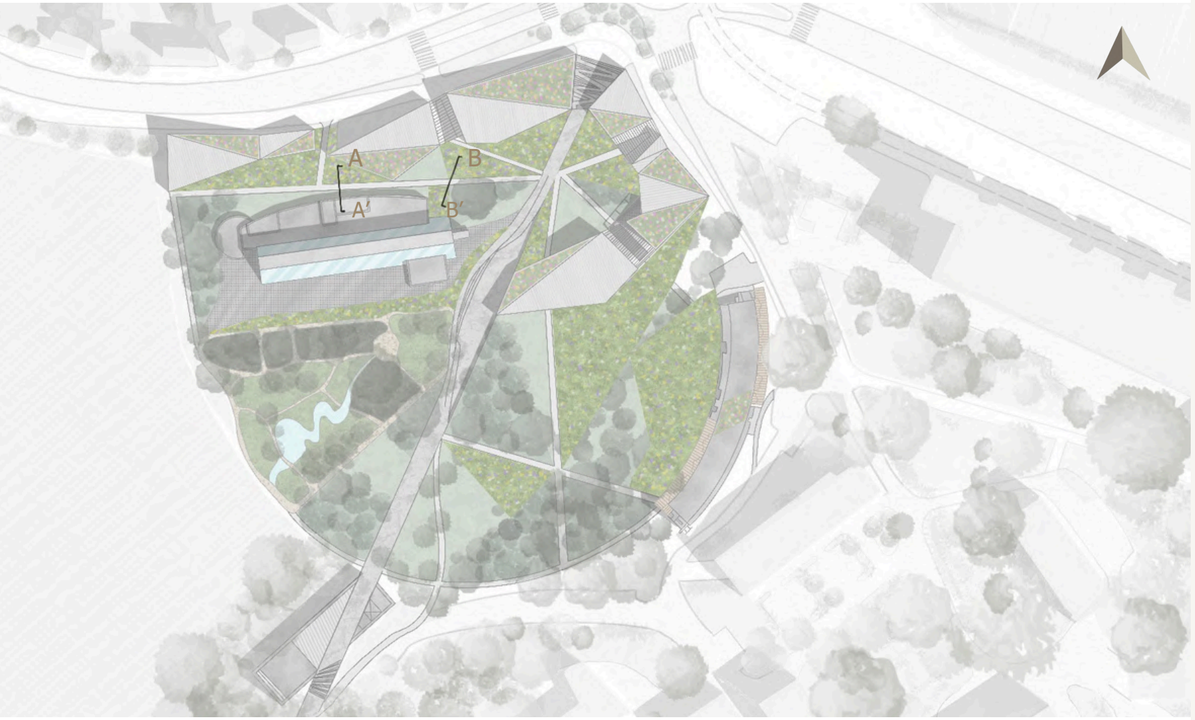


MAIN AXE PATHWAY SECTION





LOW VEGETAL STRATUM



Part-shade

Melliferous plants

Beehives

Events

Section AA'

BLOOMING & ABSCISSION TEMPORALITY

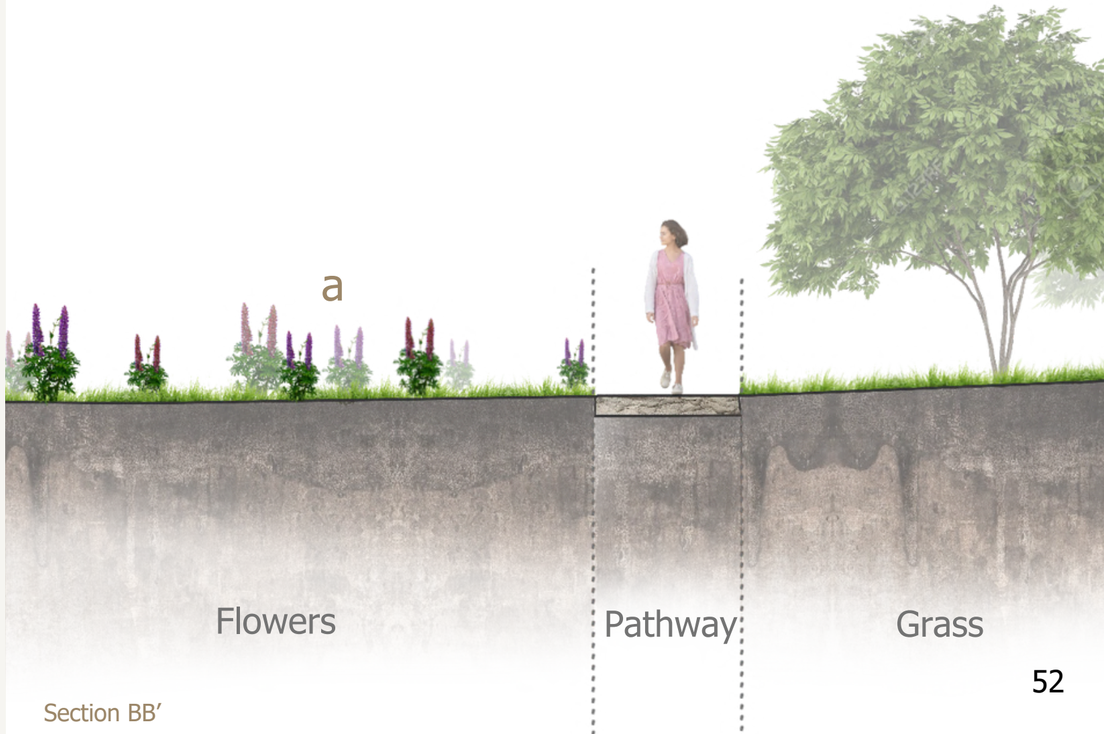
Jan Feb Mar Apr Mai Jun Juil Aug Sept Oct Nov Dec

a. Lupinus x russellii

b. Ajuga reptans

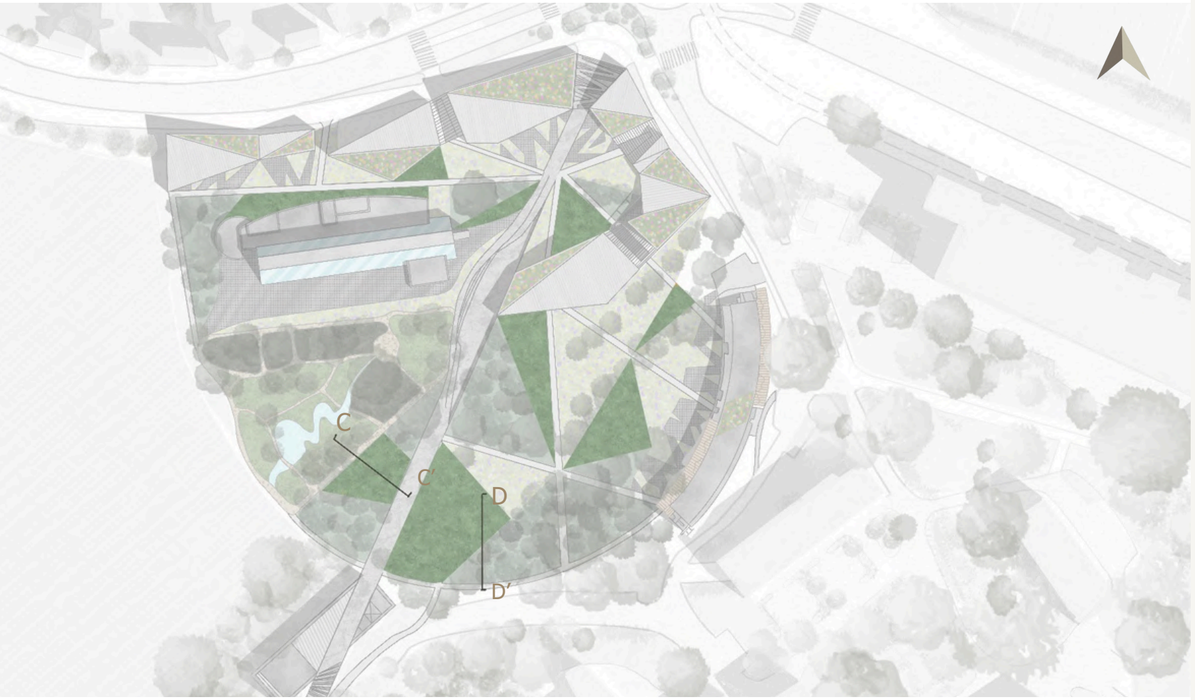
c. Anaphalis margaritacea

d. Impatiens parviflora



Section BB'

MEDIUM VEGETAL STRATUM

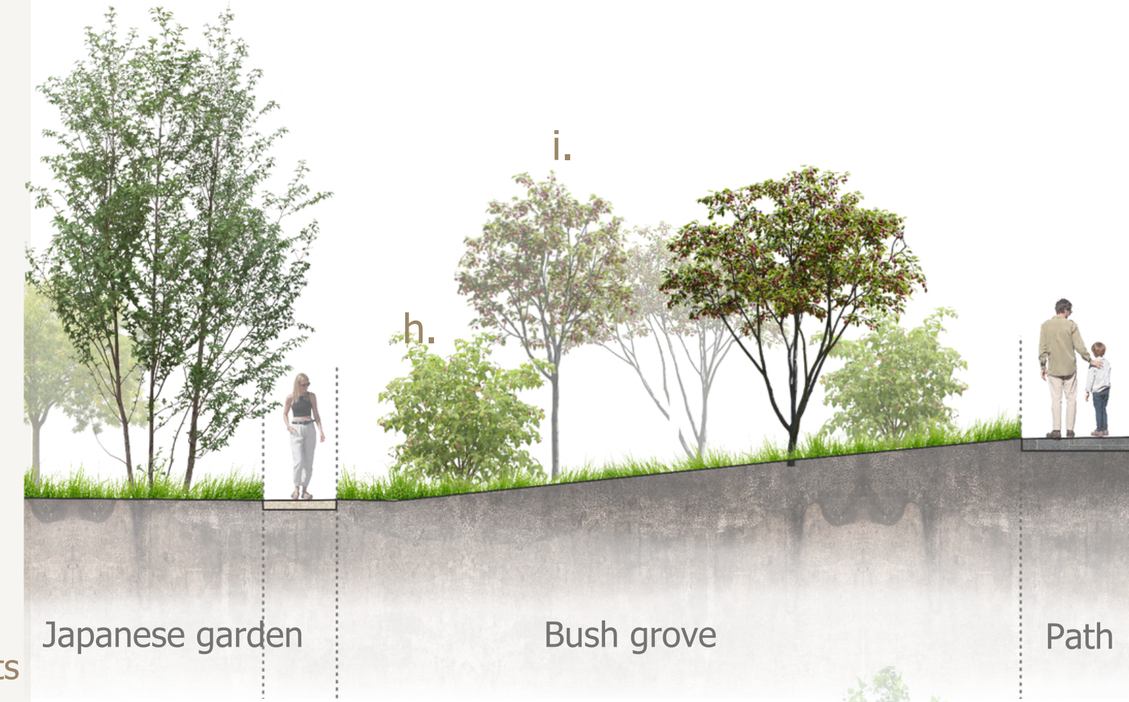


Part-shade

Melliferous plants

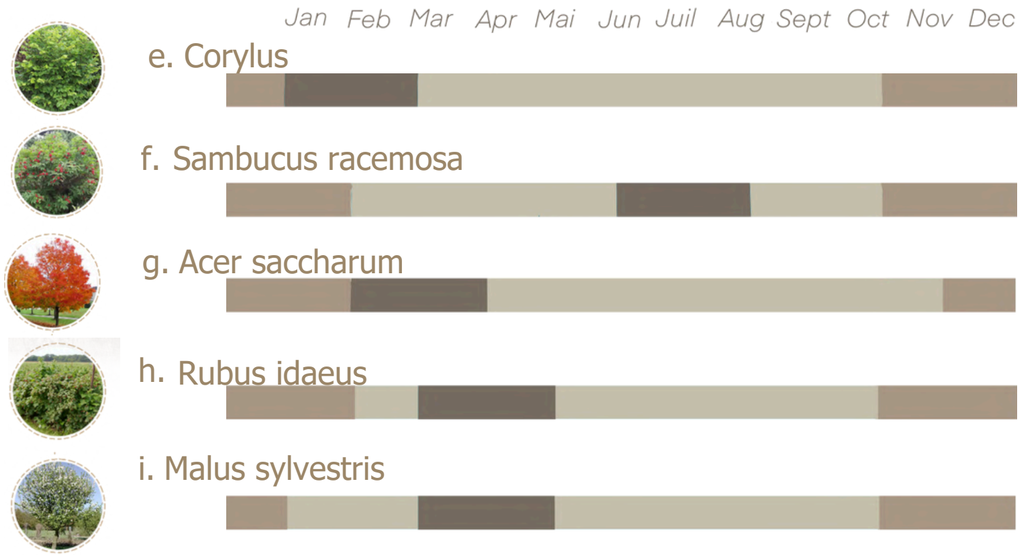
Vegetable garden

Insects



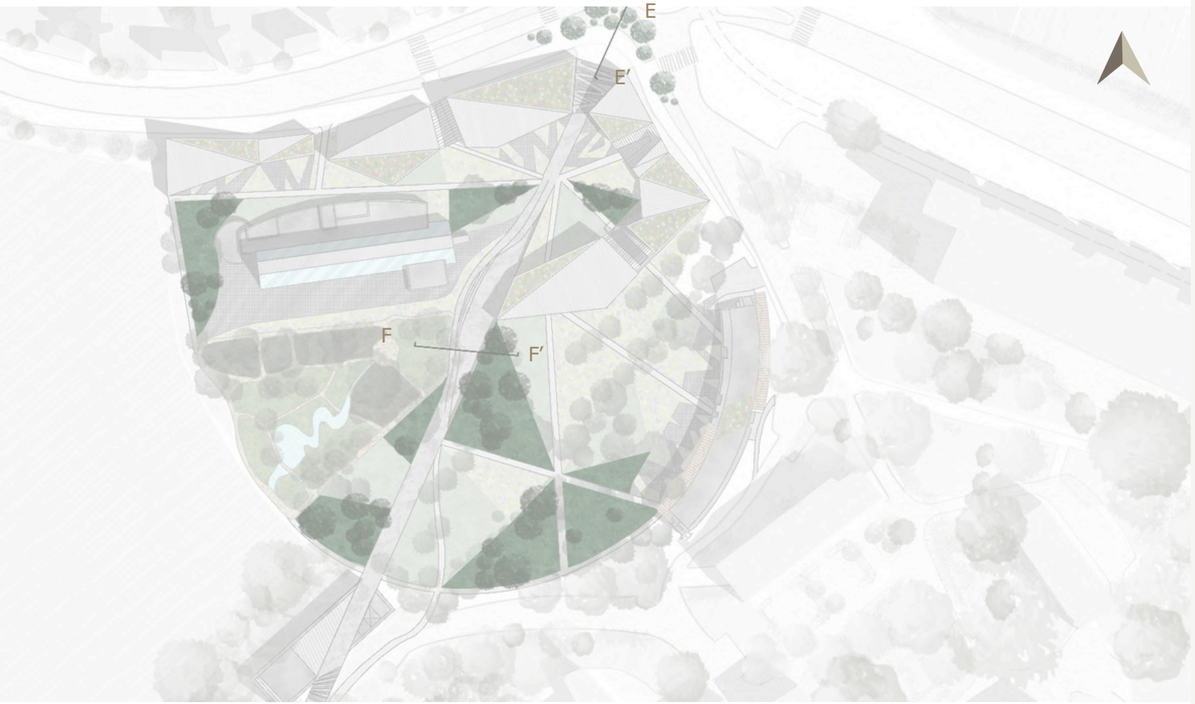
Section CC'

BLOOMING & ABSCISSION TEMPORALITY



Section DD'

HIGH VEGETAL STRATUM



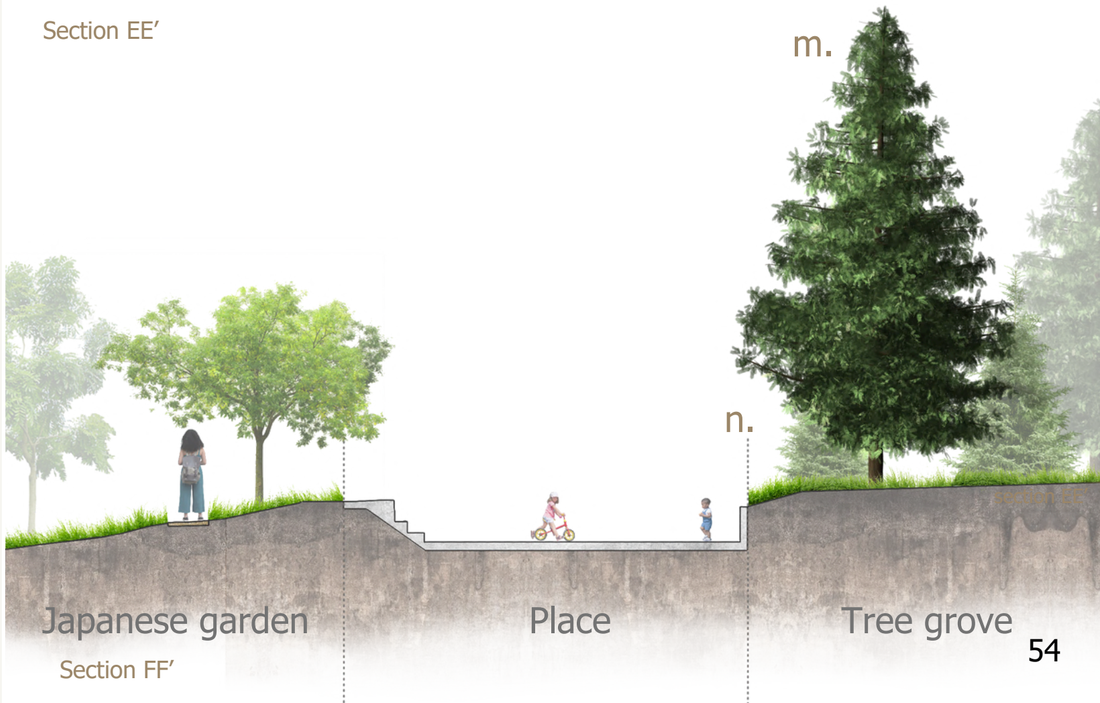
Sun

Wind breaker

Mammals

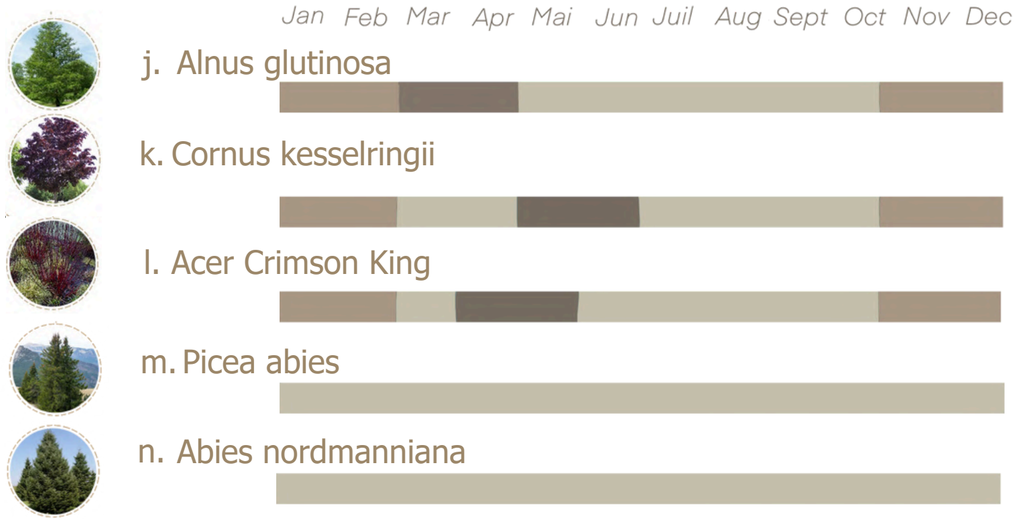
Events

Section EE′

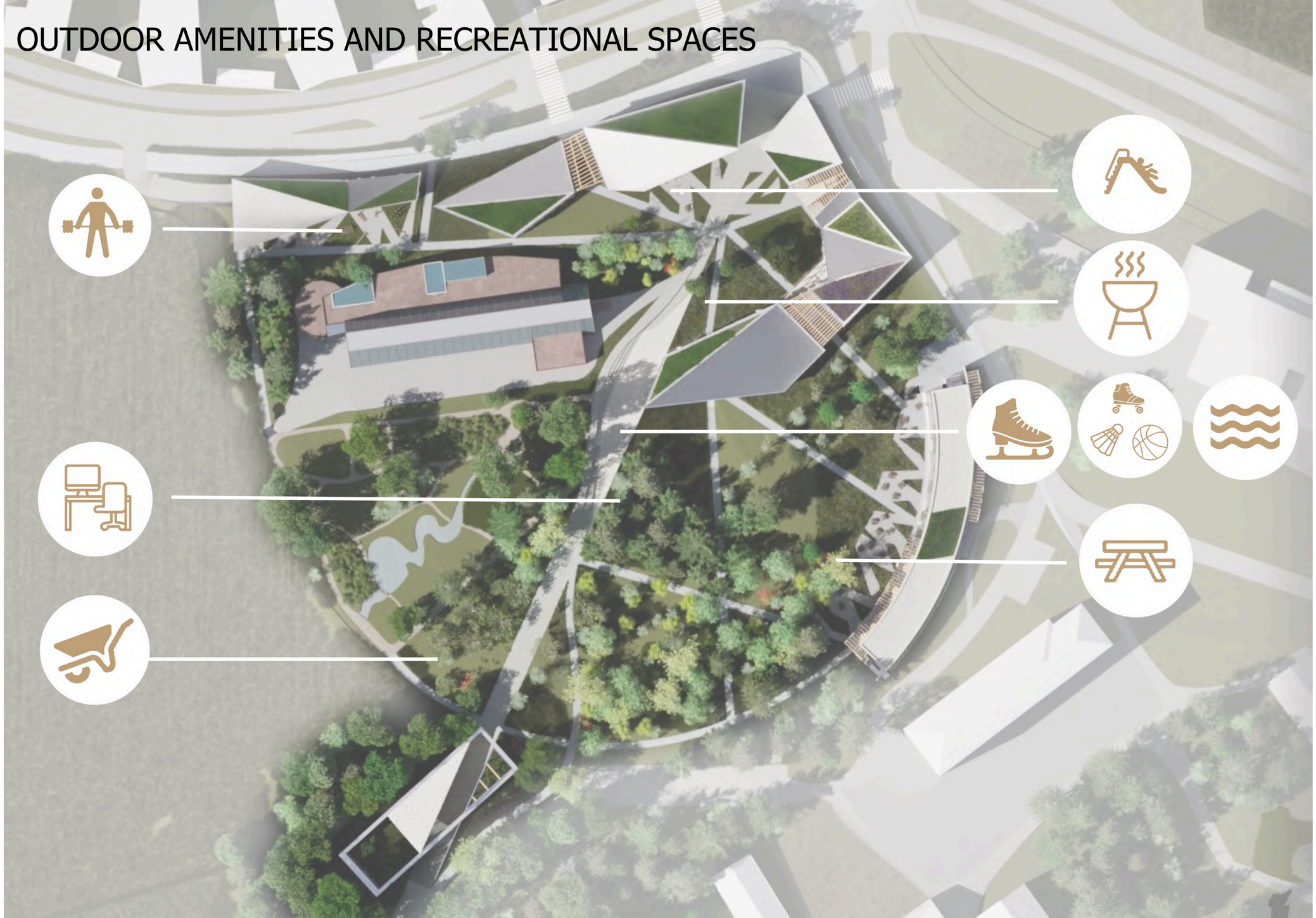


Section FF′

BLOOMING & ABSCISSION TEMPORALITY

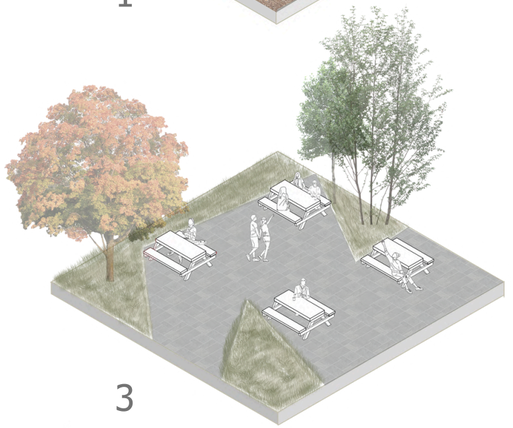


OUTDOOR AMENITIES AND RECREATIONAL SPACES



OUTDOOR AMENITIES AND RECREATIONAL SPACES

1



3

5

2

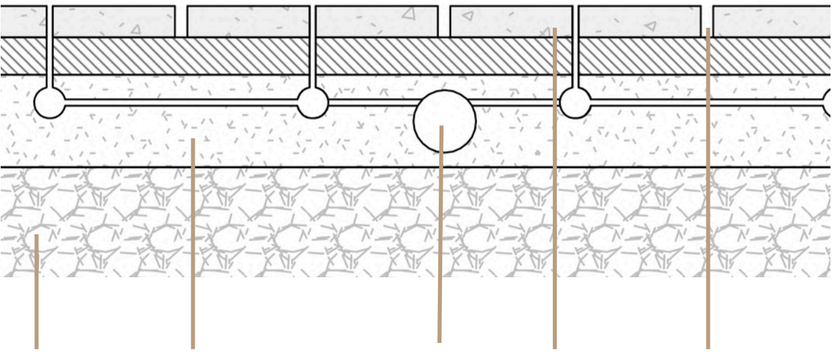
4

6

1 : Kids playground
2 : Barbecue area
3 : Picnic area
4 : Urban gym
5 : Vegetable garden
6 : Outside offices

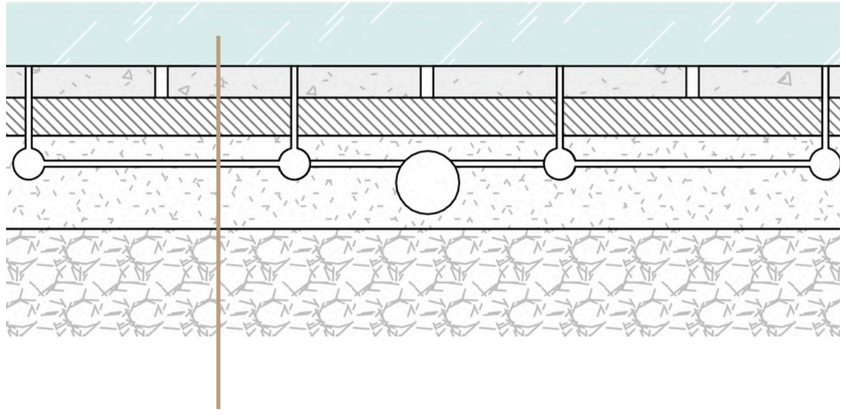
Versatile square

SECTION IN AUTUMN:
MULTI-FUNCTIONAL SQUARE



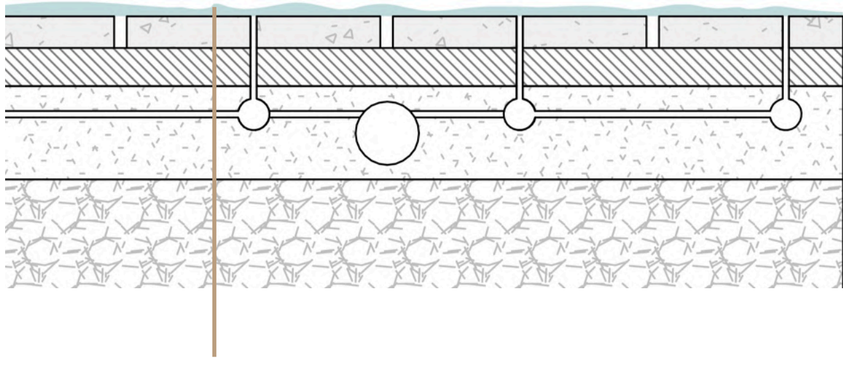
Gravel
Sand
Water outlet
Concrete
Draining pavers

SECTION IN WINTER: ICE SKATING RING



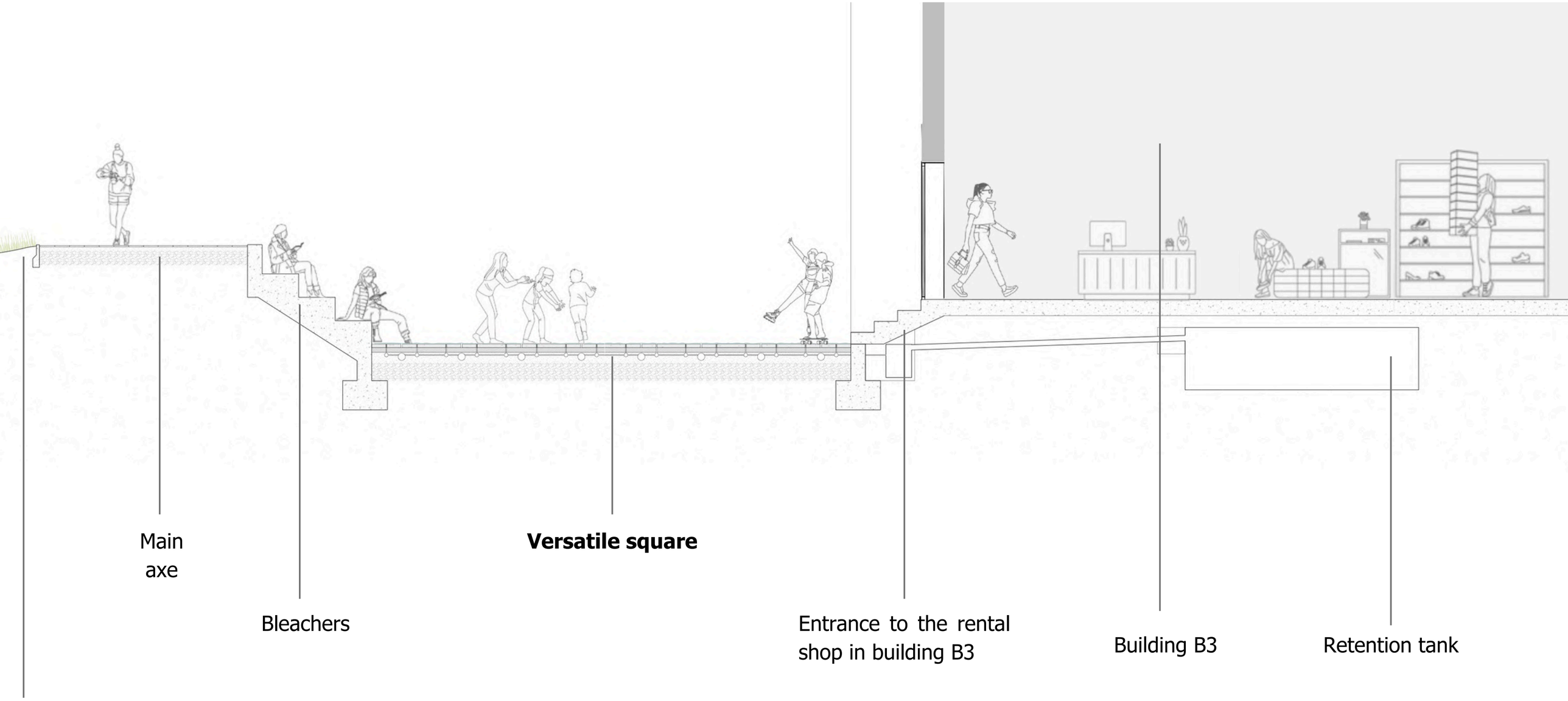
15 cm ice for skating

SECTION IN SUMMER: COOLING POND

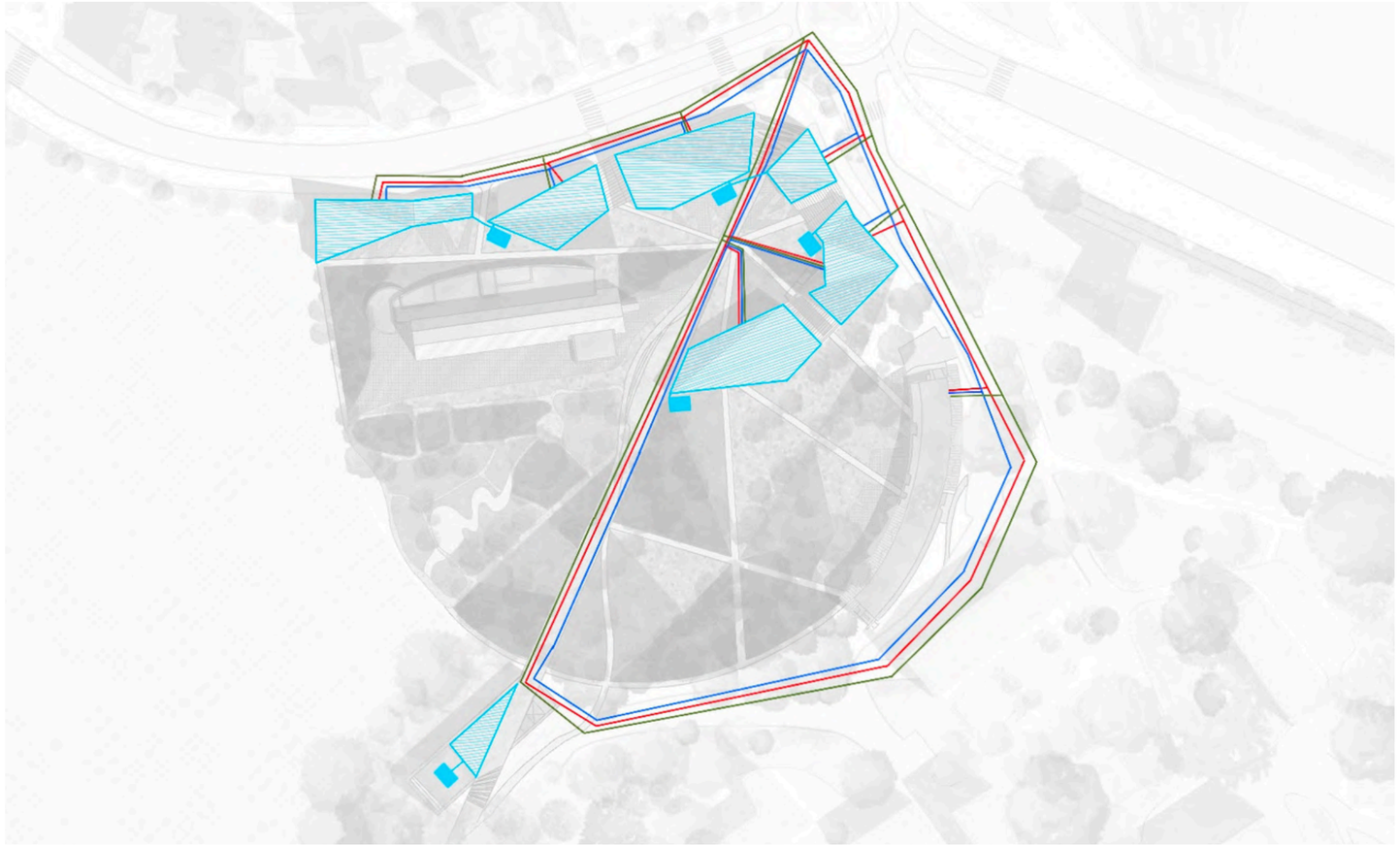


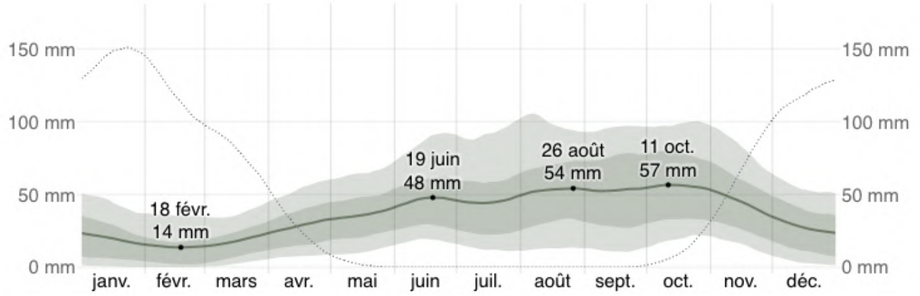
Thin layer of water for cooling

STRUCTURE : SLAB COMPOSITION



Rainwater and domestic wastewater collection network





Annual rainfall in Helsinki in 2023, Weather Park

- Filtered water supply network
- Electricity network
- Wastewater recovery network
- Rainwater collection network

5 underground "NIDAPLAST" honeycomb storage tanks: total capacity of 100 m3

Water collected from roofs

- 20 to 50 L of water recovered per month per m² of roof in winter
- 30 to 80 L of water recovered per month per m² of roof in summer

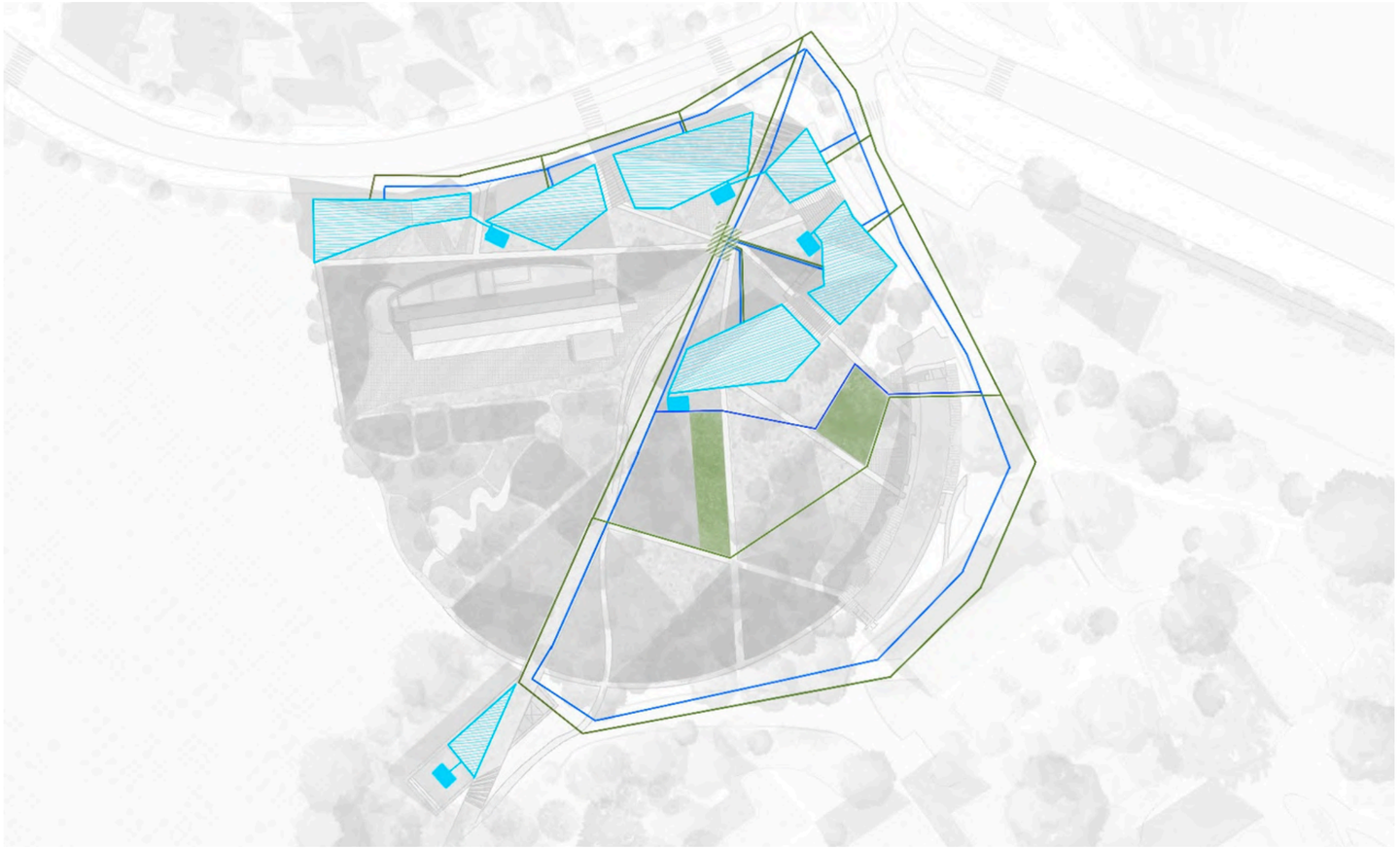
Storage in one of the 5 holding tanks

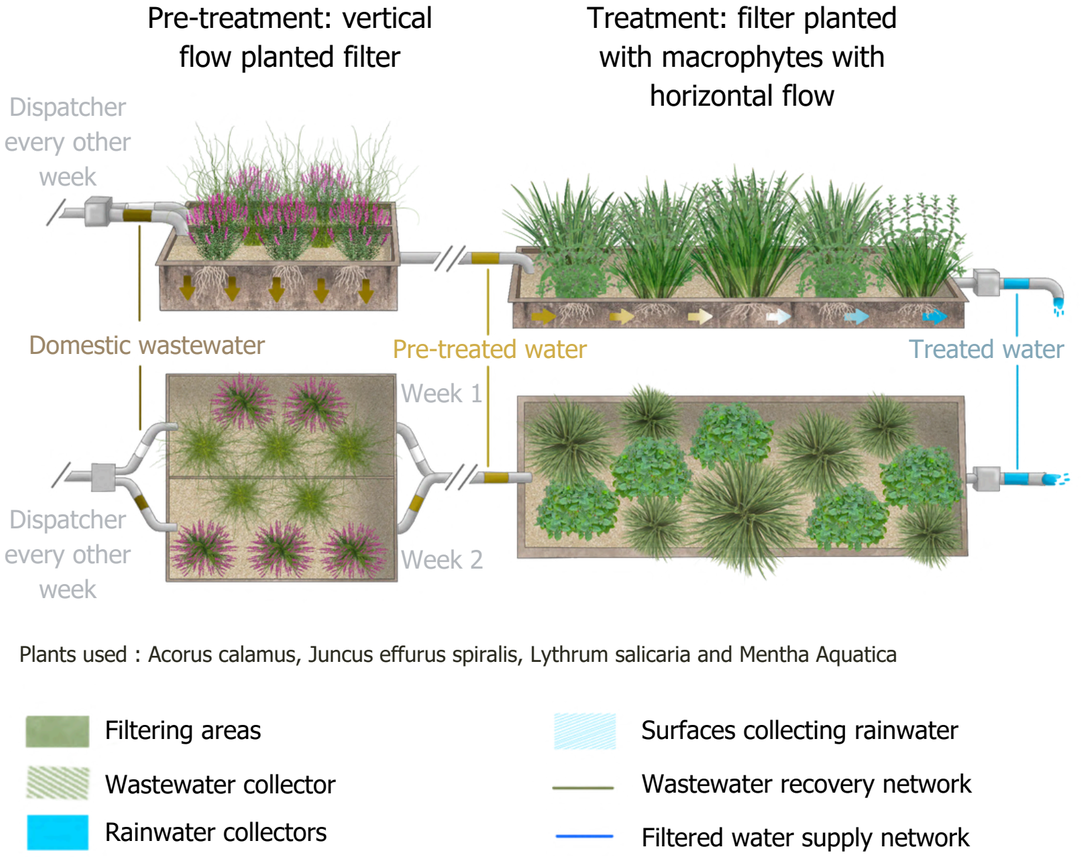
Pump system

- Non-potable water for housing: laundry, toilets
- Water used for gardening
- Fill the pond in summer and winter as needed

Use of the city water system in case of shortage

Rainwater and domestic wastewater collection & purification network





Water recovered from domestic wastewater

- Sanitary installations: 10 325 L collected per day
- Household chores: 4 900 L collected per day
- Others : 2 100 L collected per day

438 m² of plant filtration (3 m² per inhabitant)

Pump system

- Non-potable water for housing: laundry, toilets
- Water used for gardening
- Fill the pond winter as needed

Use of the city water system in case of shortage

Use of the phyto-purification system as soon as possible

EXHIBITION PANELS

Informative exhibition panels distributed throughout the site

Panels explain project's landscape features, biodiversity, and architectural aspects

Focus on interaction between fauna, flora, and built environment

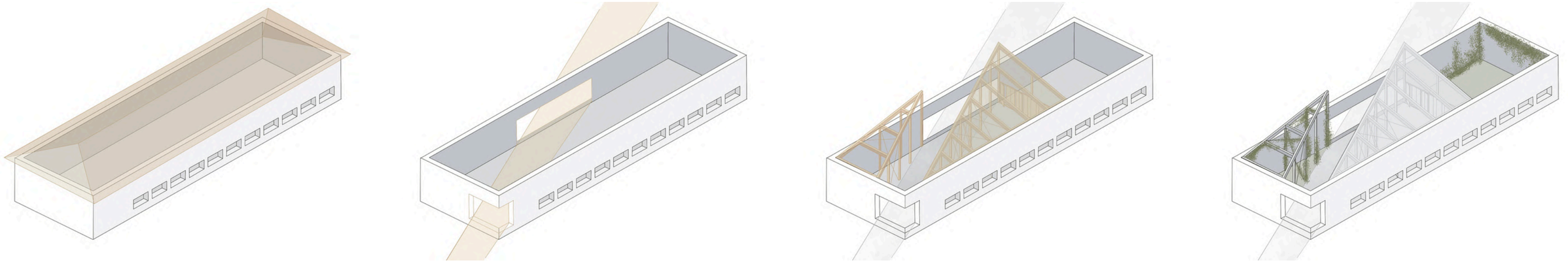
Promote understanding of ecosystem dynamics and sustainable construction

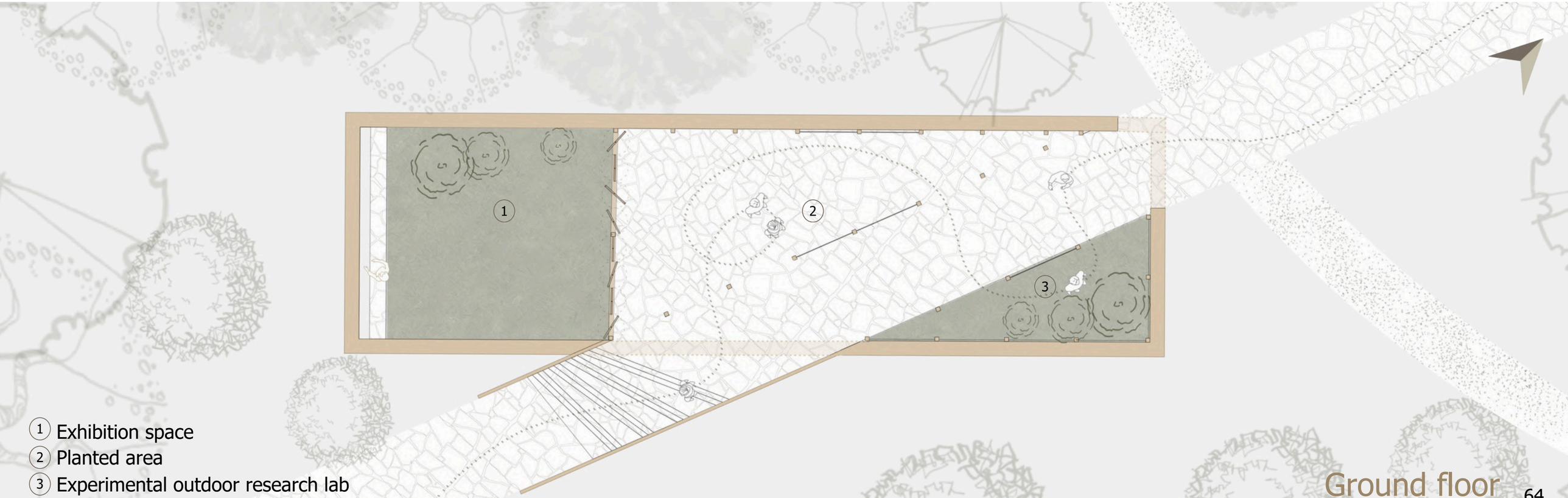
Encourage engagement and appreciation of nature and design

Inform and raise awareness among visitors


B1
B2
B3
Gardenia
A
Japanese
Garden
C

Old museum

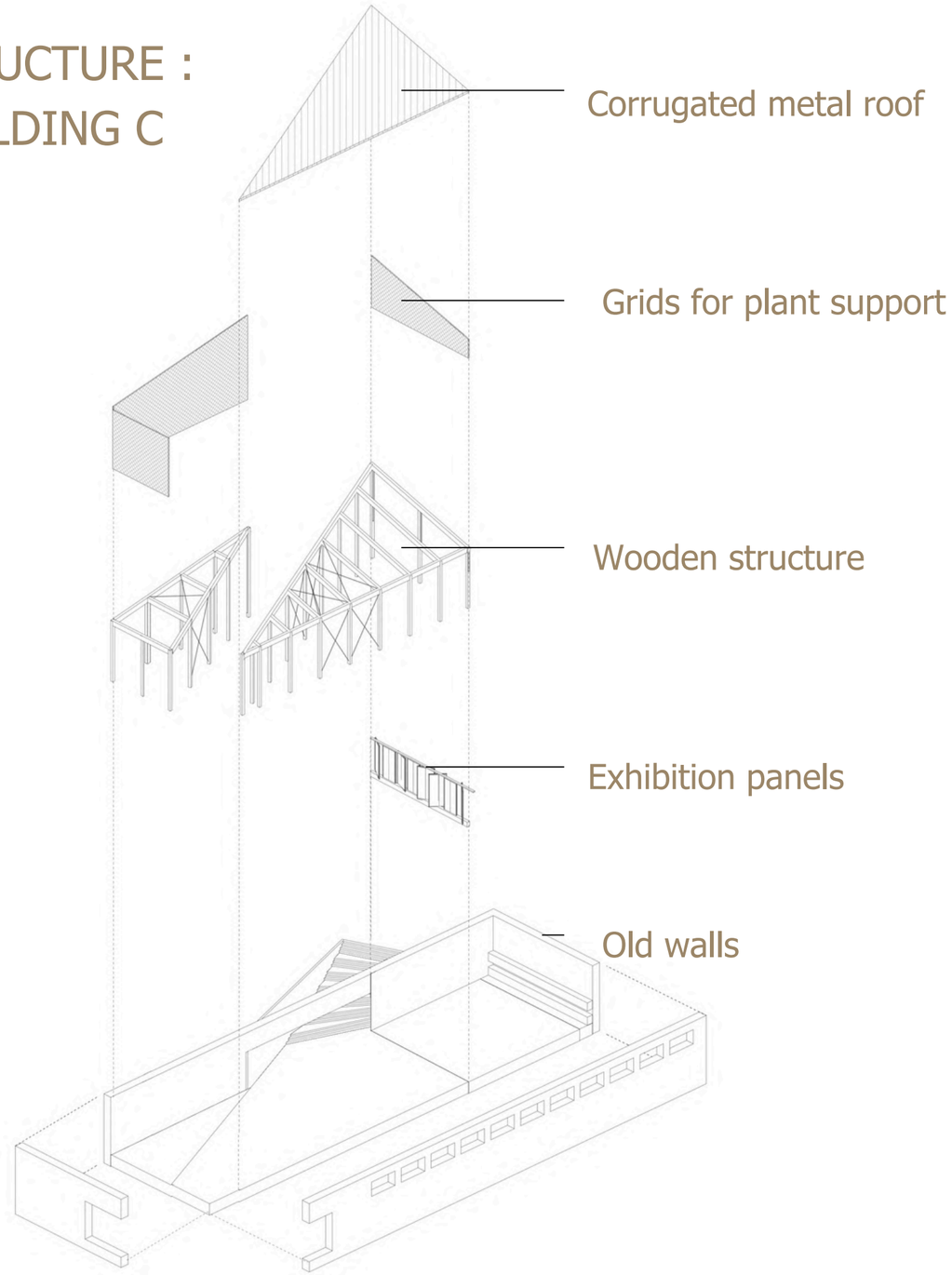


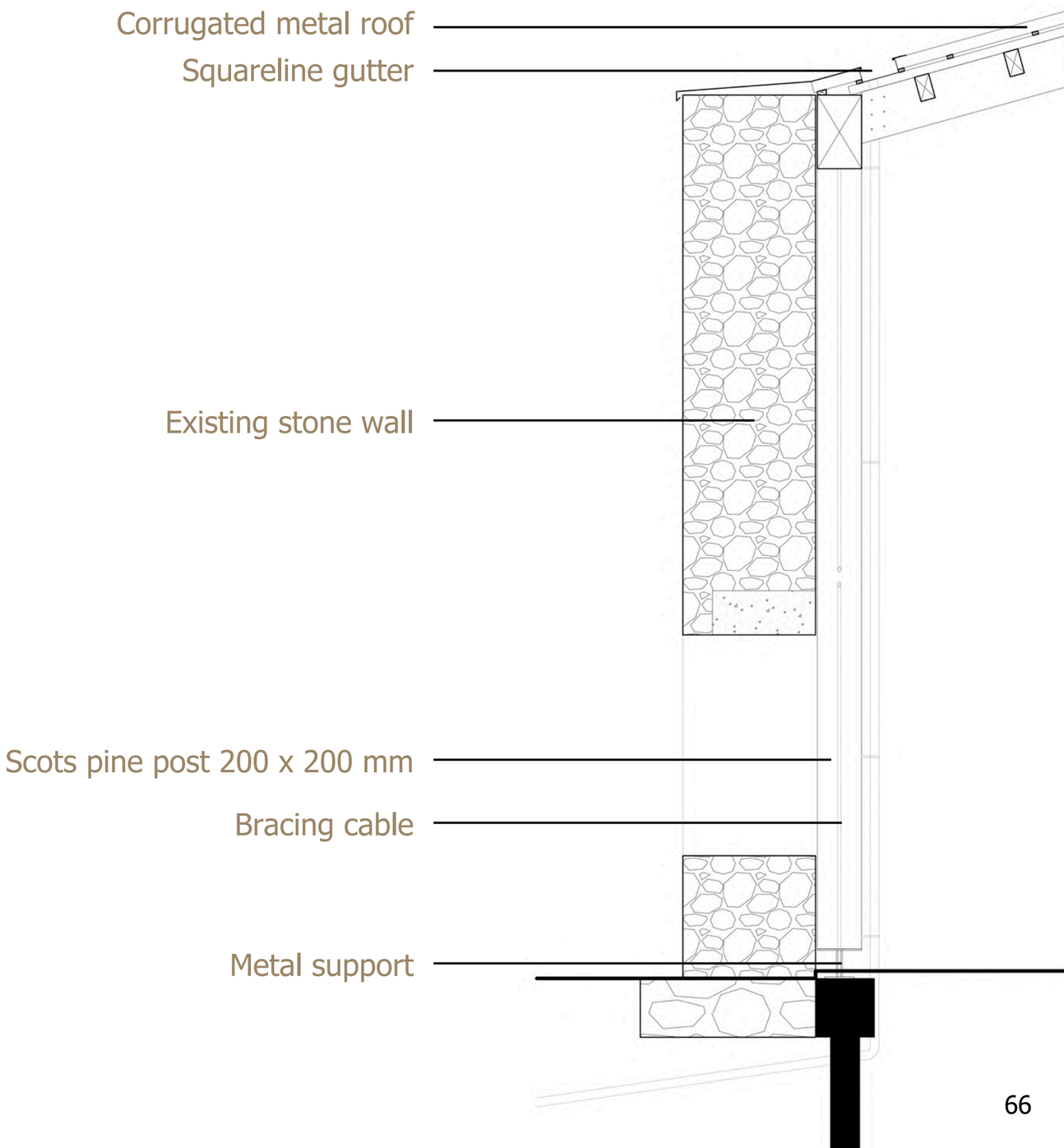


1. Exhibition space
2. Planted area
3. Experimental outdoor research lab

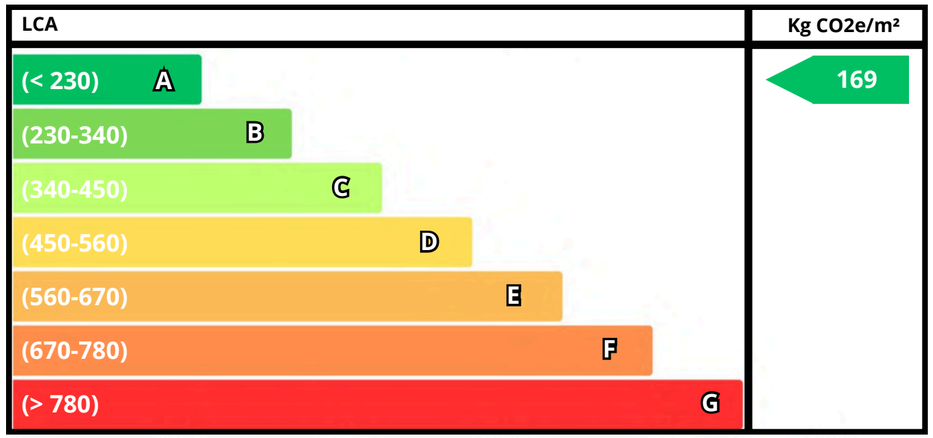
Ground floor

STRUCTURE : BUILDING C



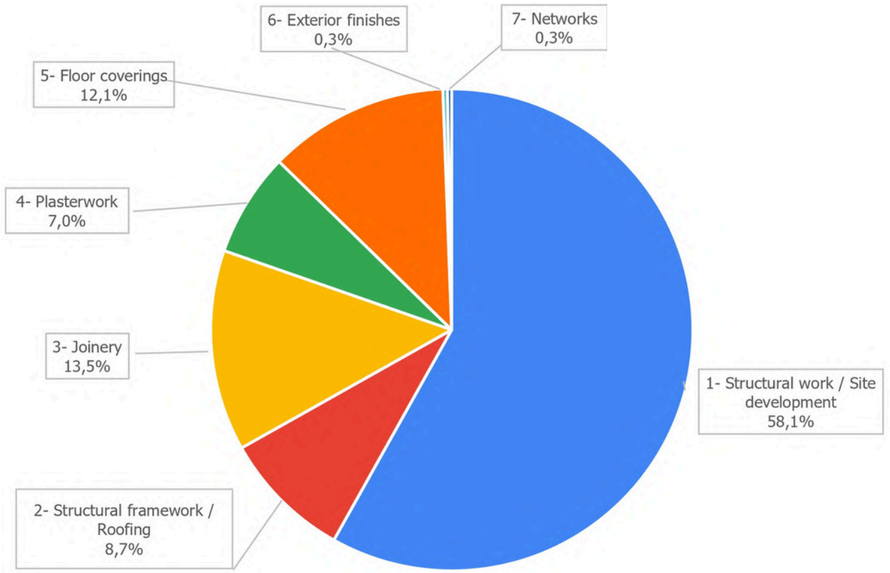


Circular projet & LCA

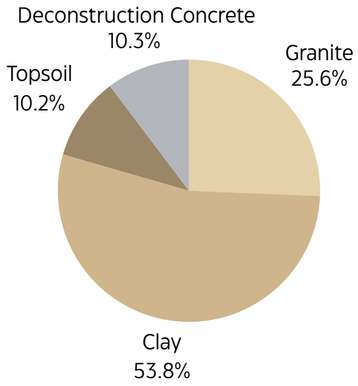


https://www.base-inies.fr/iniesV4/dist/tableau-de-bord

Overall LCA by categories



Structural work / Site development
Structural framework / Roofing
Joinery
Plasterwork
Floor coverings
Exterior finishes
Networks

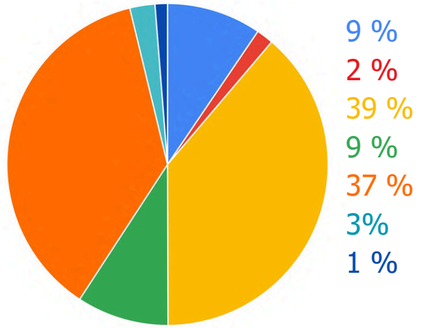


Working with what's already there

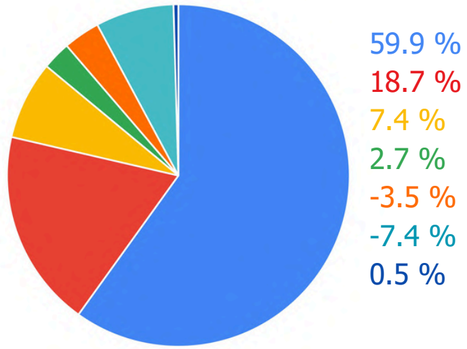
3% of clay is re-puposing for BTC, 97% is used in backfill
42% of topsoil is re-purposing for green roof, 48% is used for green areas
35% of granite is re-purporsing for paths
100% of concrete deconstruction is re-purposing for paths

440 m² of glass is recycling by Saint-Gobain Glass Recycling Network
3725 m² of plaster partitions is recycling by Saint-Gobain

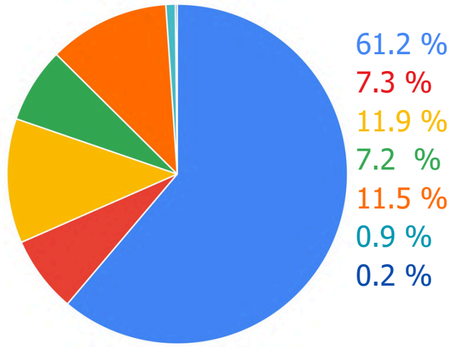
LCA Building A renovation : 71 kg COe/m²



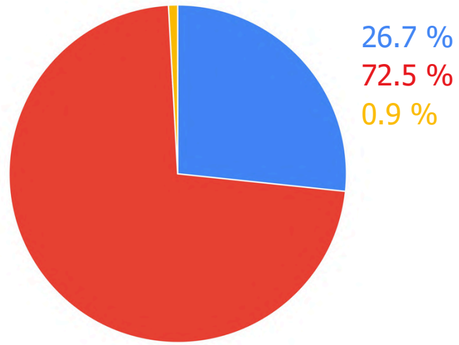
LCA Building B1 construction : 366 kg COe/m²



LCA Building B2-3 construction : 193 kg COe/m²



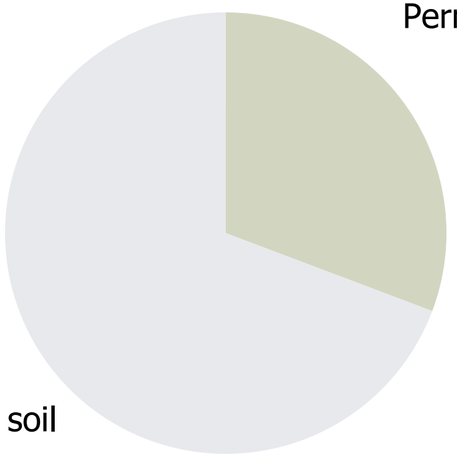
LCA Building C renovation : 48 kg COe/m²



+ 29 vegetal species accommodated

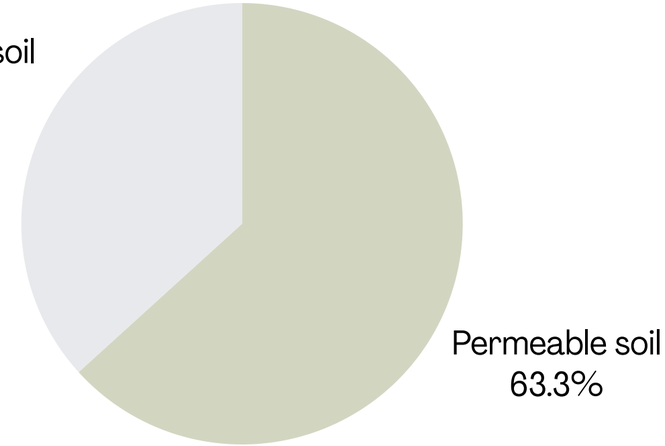
INITIAL STATE OF THE PLOT

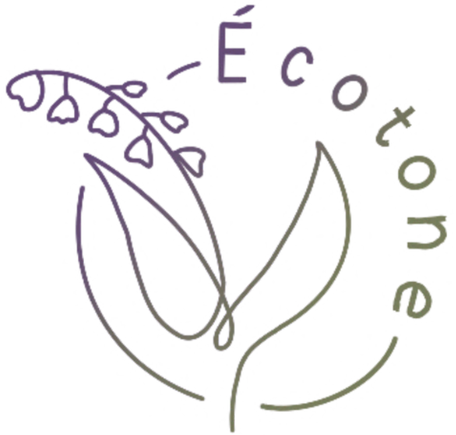
Urban density =
7123 m² of services and
0 m² of housing



PROJECTED STATE OF THE PLOT AFTER INTERVENTION

Urban density =
5360 m² of services and
13 706 m² of housing





ECOTONE

How to make several ecosystems coexist together

We would like to thank Aline Barlet, Pierre Cara, Lucie Chalot, Dominique Lefaivre, Jon Lefaivre, Régis Le Normand and the ISA BTP team for their support during this project.