

ARCHITECTURE
STUDENT
CONTEST

— Helsinki 2024 —

TEAM 09 - ITALY

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Emanuele Tomatis



Professor
L. E. Malighetti
Architectural Design and Urban
Planning



Professor
F. Pittau
Technical solutions and
Sustainability



VIHREÄ

VIIKKI INCLUSIVE HOUSING:
REGENERATION OF AN ECO-BASED
AREA



V

VIHREÄ

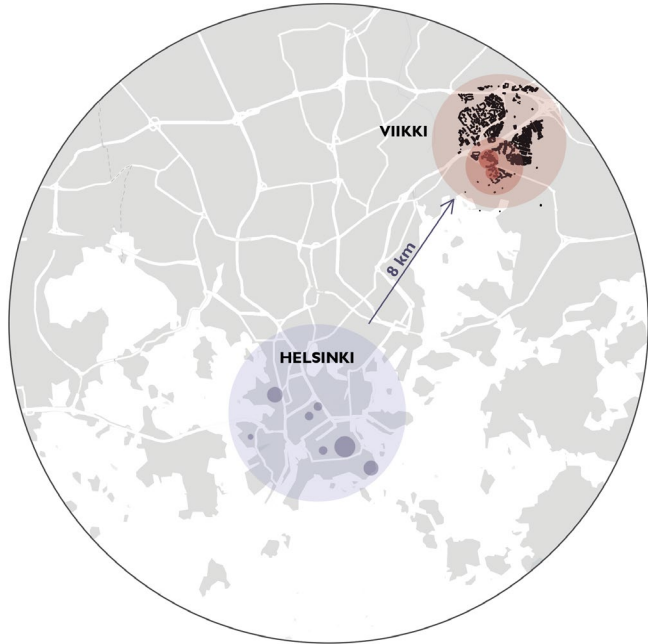
VIIKKI INCLUSIVE
HOUSING: REGENERATION
OF AN ECO-BASED AREA

A

CONTEXT



88 % Finnish
5.2% Swedish
0,04% Sámi



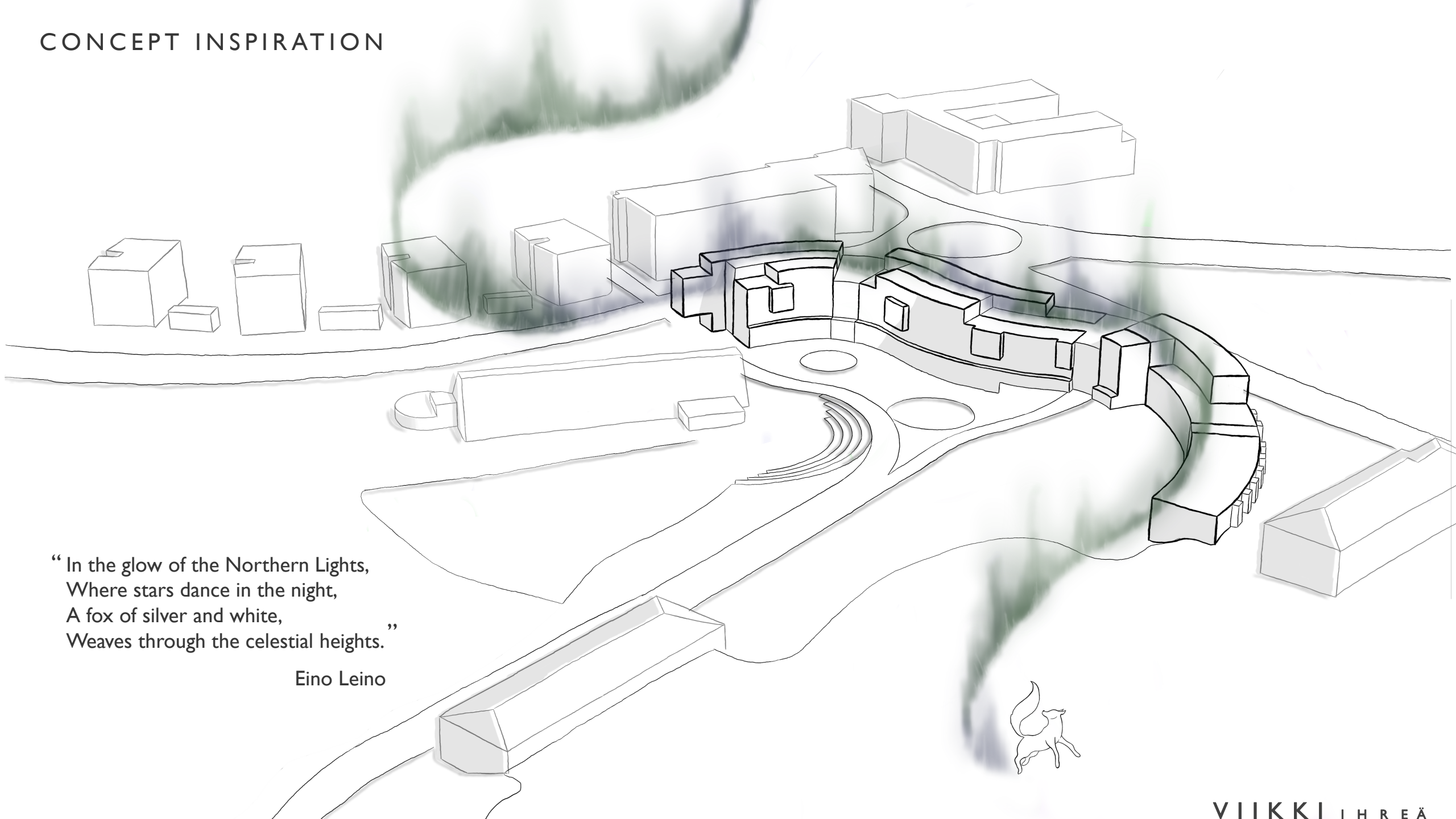
HELSINKY UNIVERSITY
Viikki Research Campus (veterinary medicine, agriculture and forestry, pharmacy)

ECO-VIIKKI
First ecologically planned district in Finland

PROJECT AREA
Strategic Area between neighborhood and the nature

NATURAL RESERVE
Connection with greenery and the sea

CONCEPT INSPIRATION

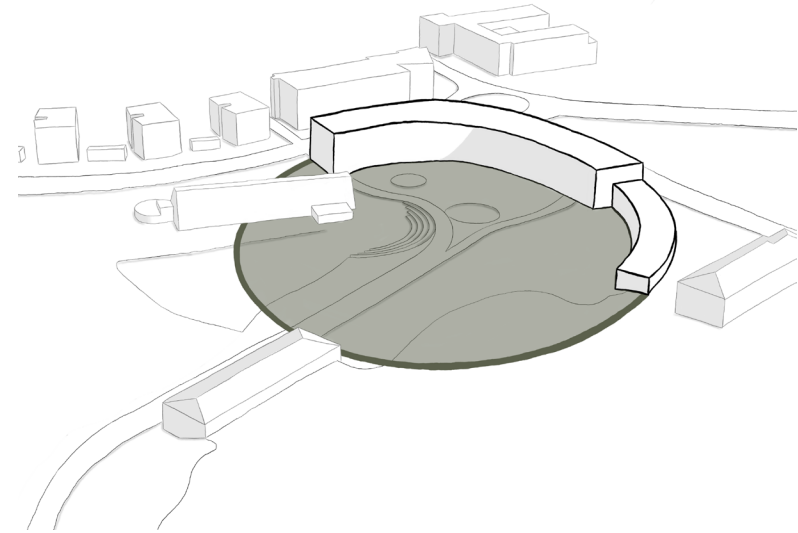


“In the glow of the Northern Lights,
Where stars dance in the night,
A fox of silver and white,
Weaves through the celestial heights.”

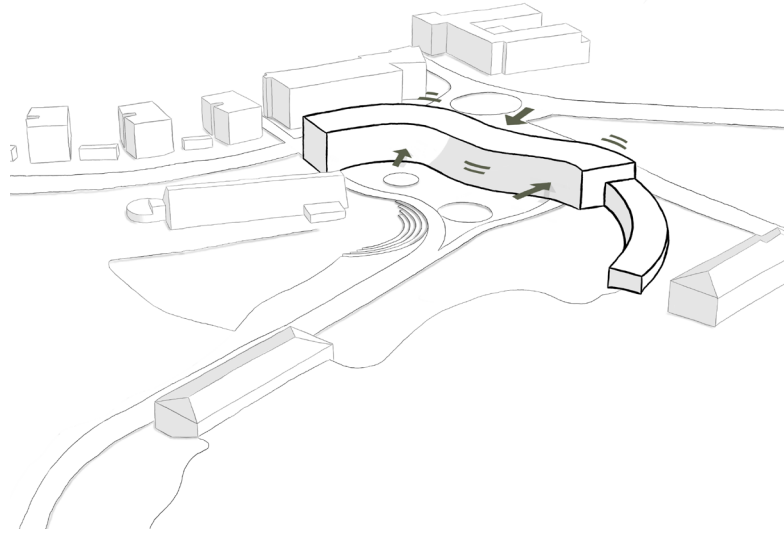
Eino Leino



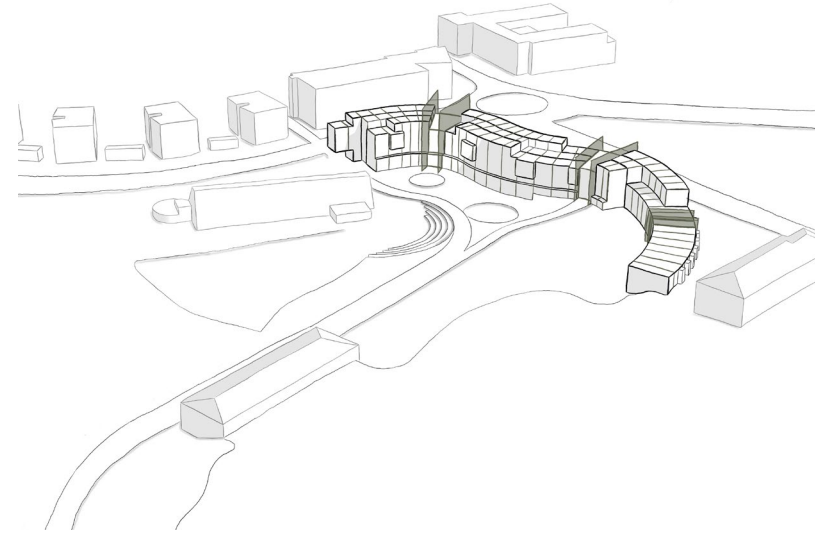
CONCEPT DIAGRAM



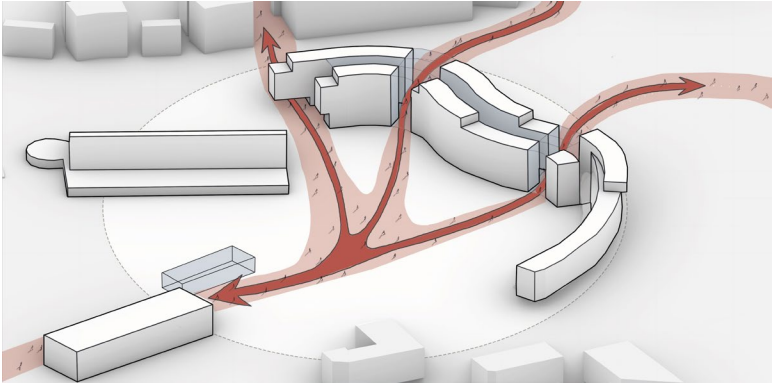
INCLUSIVITY



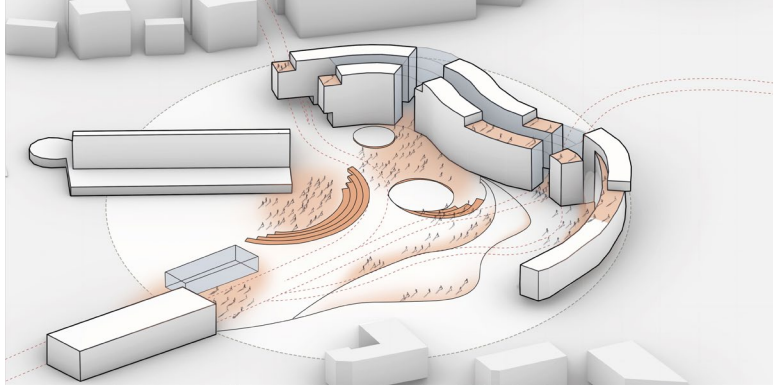
PERMEABILITY



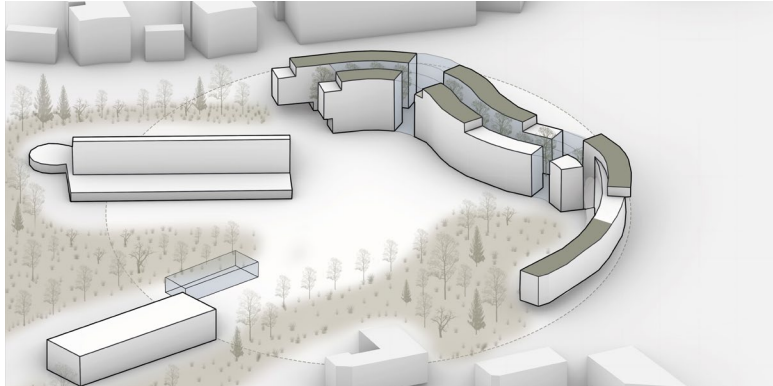
MODULARITY



PATHS

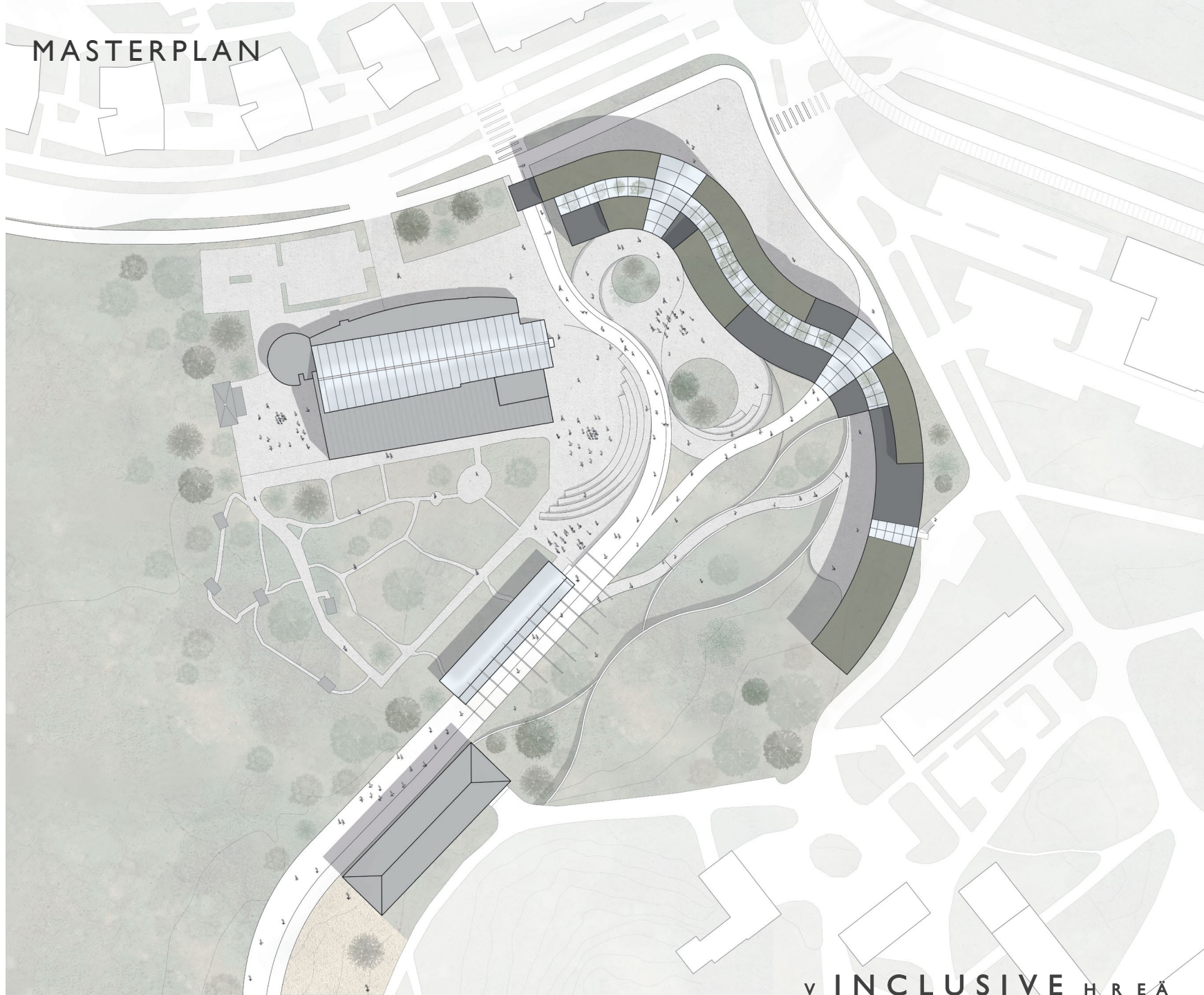


SQUARES



NATURE

MASTERPLAN



OUTDOOR SPACES

SPORT AND ACTIVITIES



BIKE SHARING



HORSE Paddock



OPEN-AIR THEATRE



PLAYGROUND

NATURE AND RELAX



GREENHOUSE



JAPANESE GARDEN



RELAX PODS

FOOD



BREWERY



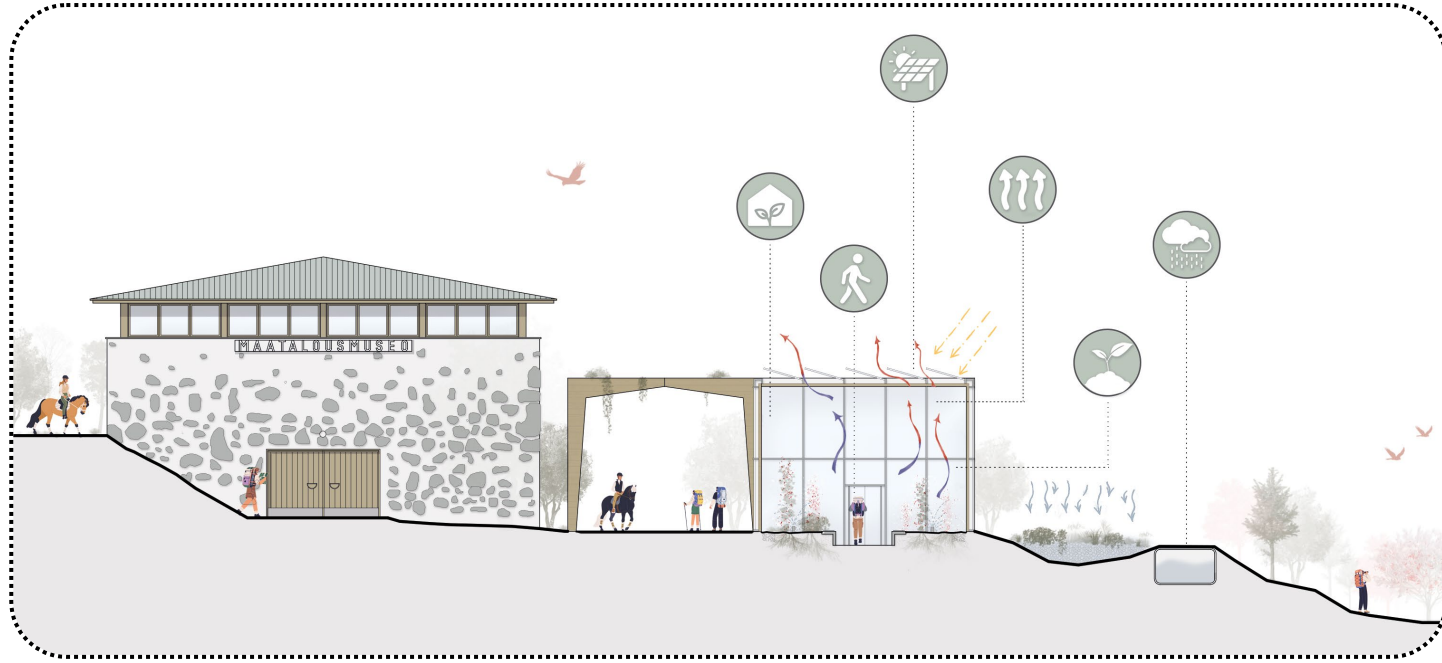
PICNIC AREA



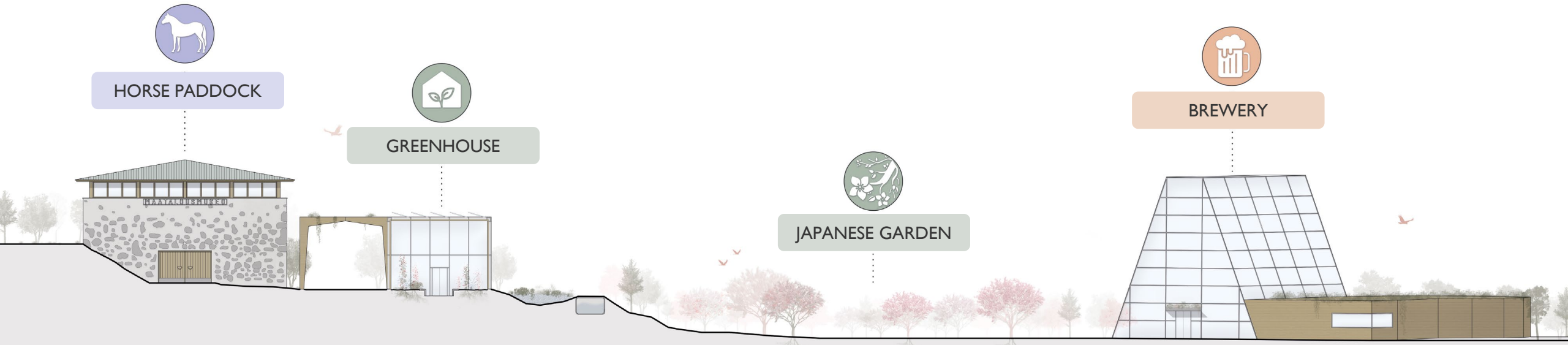
PARKING LOT



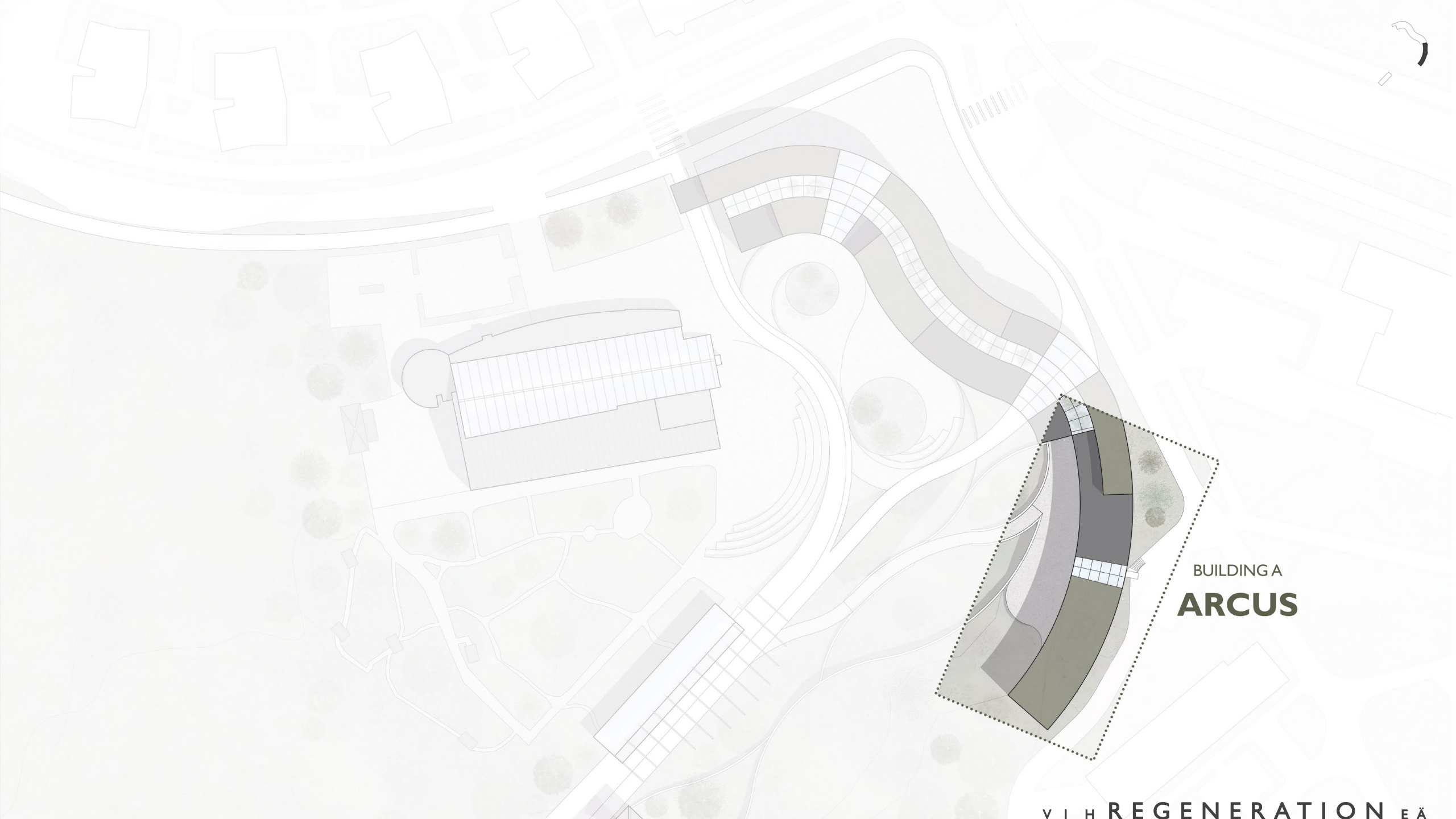
AREA C



-  GREENHOUSE
-  COVERED PATH
-  PHOTOVOLTAIC PANELS
-  NATURAL VENTILATION
-  NORDIC GREENHOUSE PLANTS
-  RAINWATER COLLECTION TANK



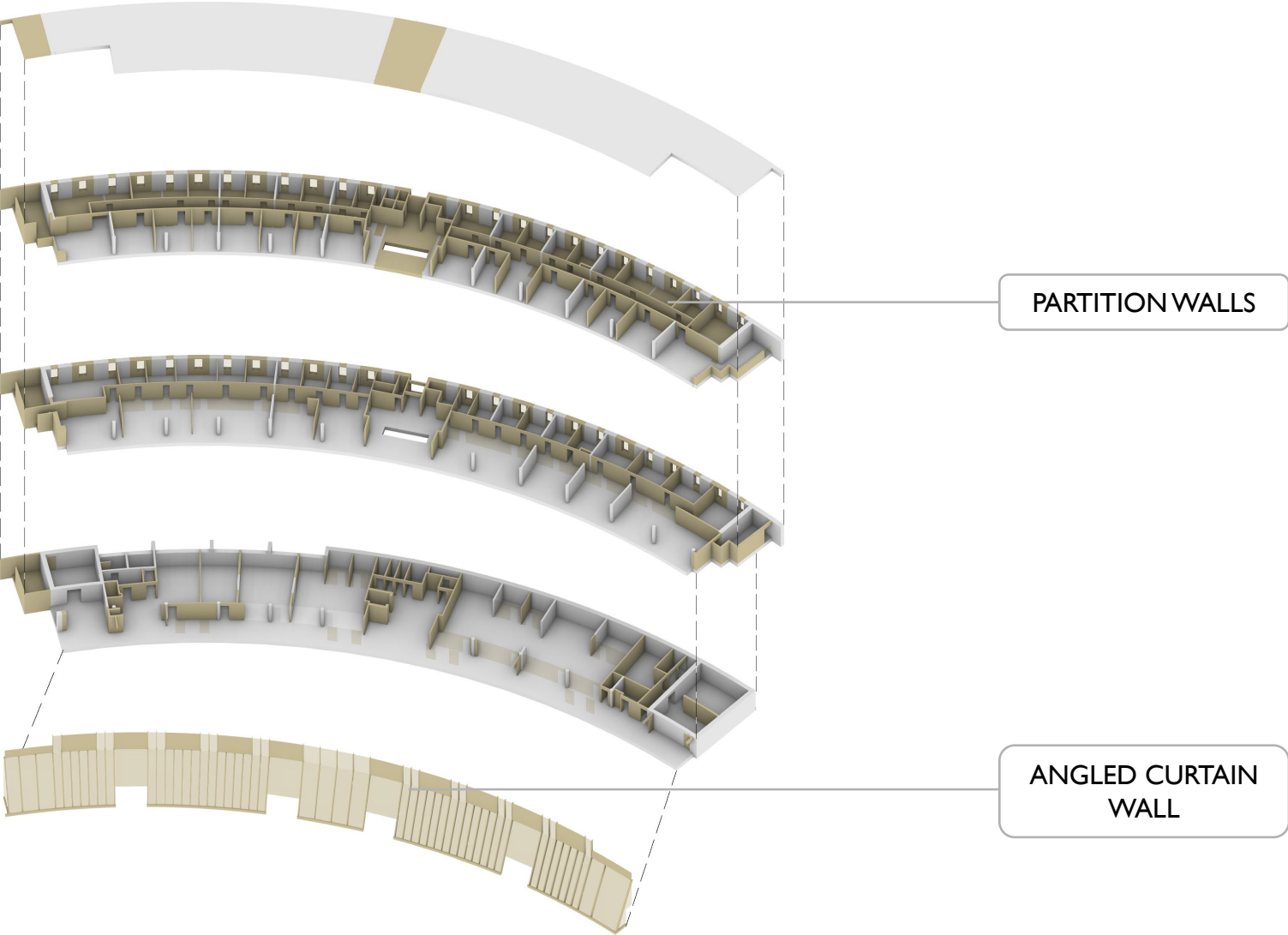




BUILDING A
ARCUS



DEMOLITION



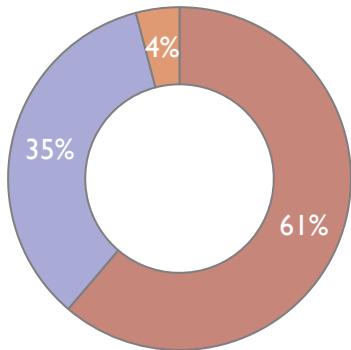
REUSE STRATEGY



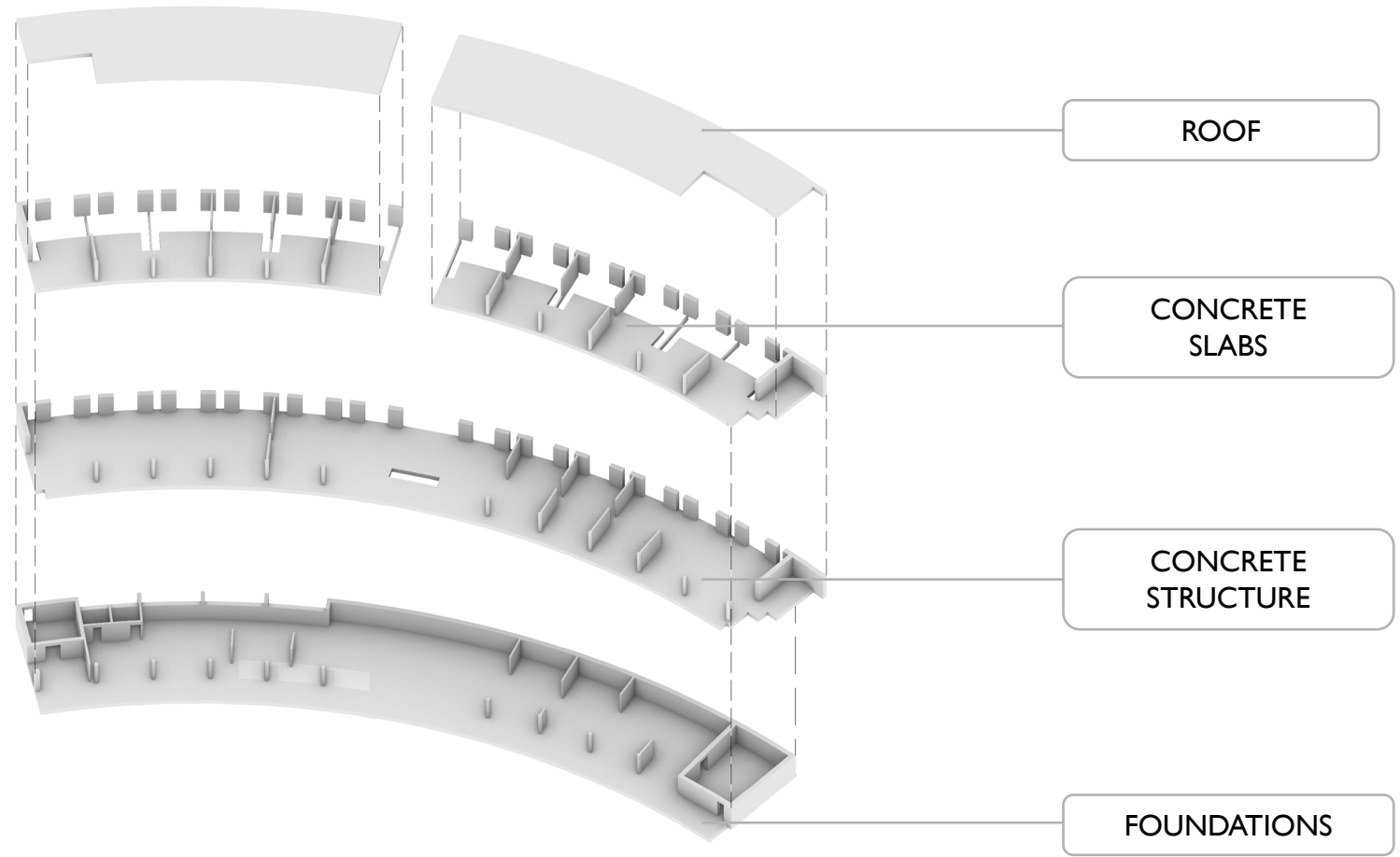
MAINTAINING

SAVING
8.8 kg CO_{2eq}/m²

That would result from the demolition, waste transport and processing of the maintained elements

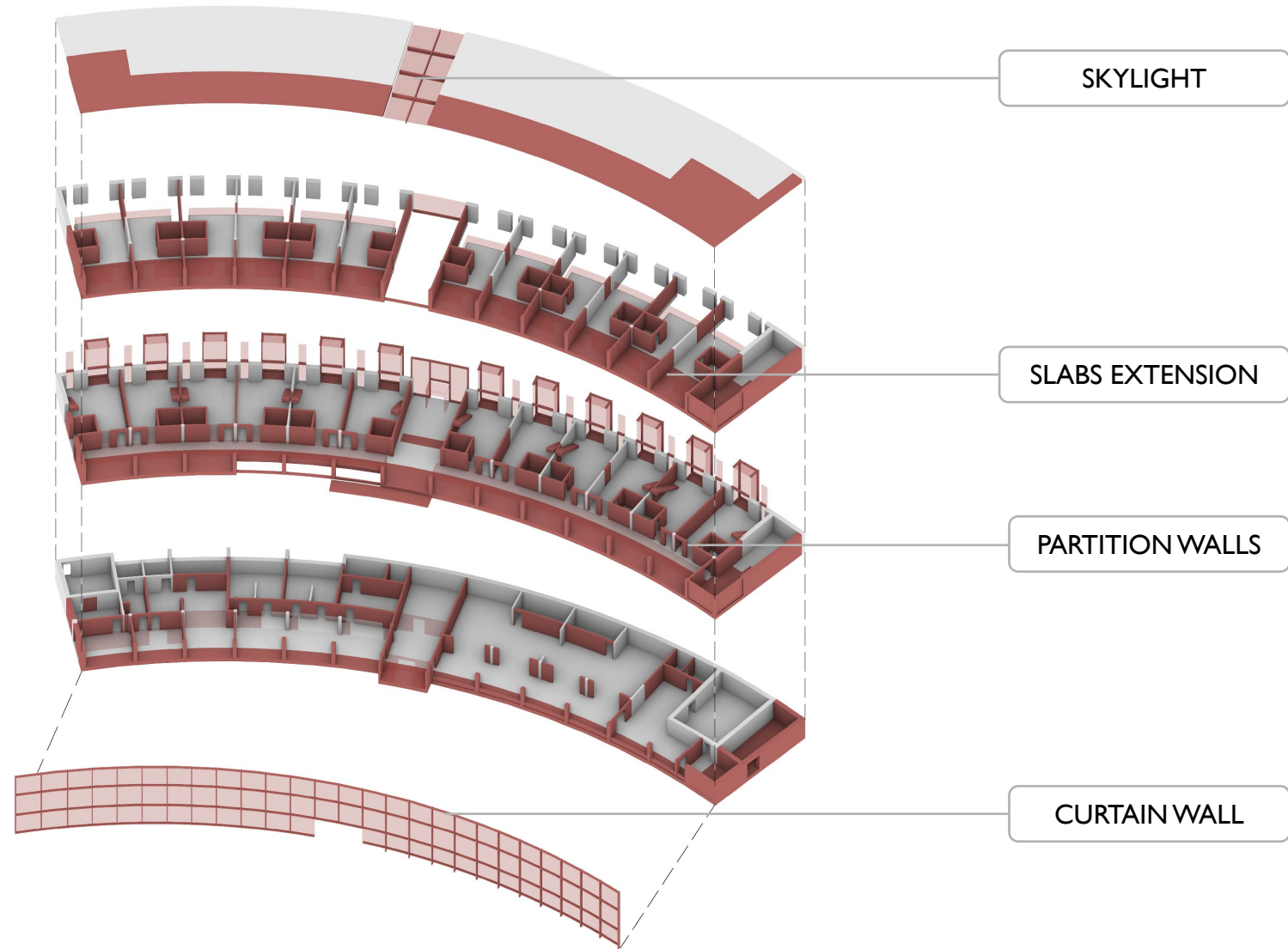


- DEMOLITION (C1)
- WASTE TRANSPORT (C2)
- WASTE PROCESSING (C3)





CONSTRUCTION



PROGRAM ZONING



RESIDENCES



SAUNA



SHARED SPACES



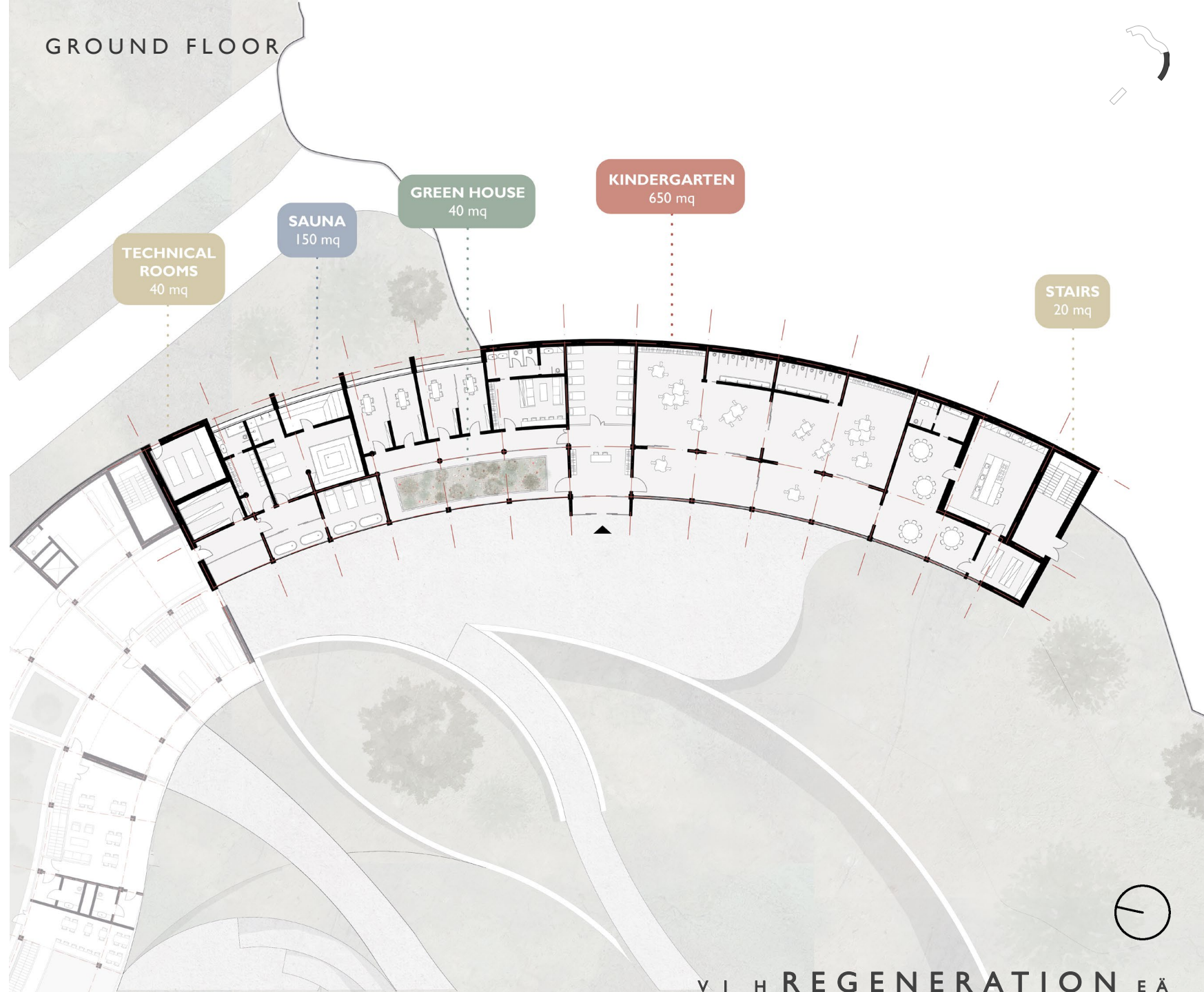
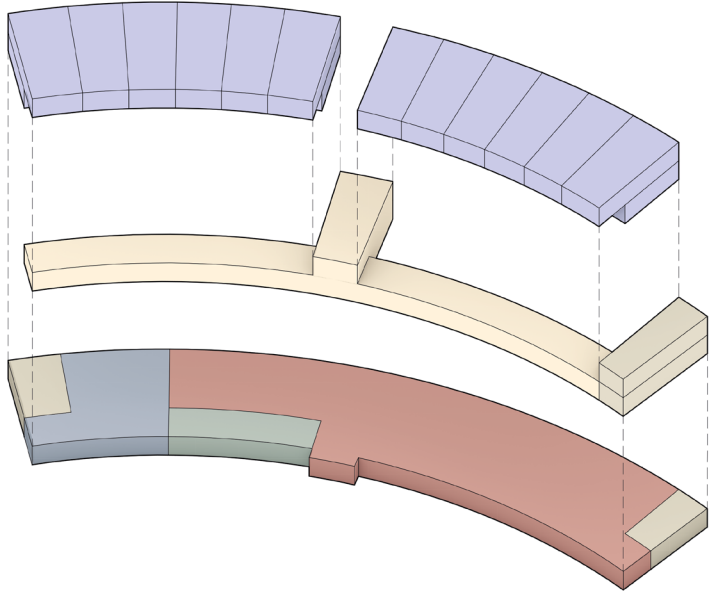
GREEN HOUSE



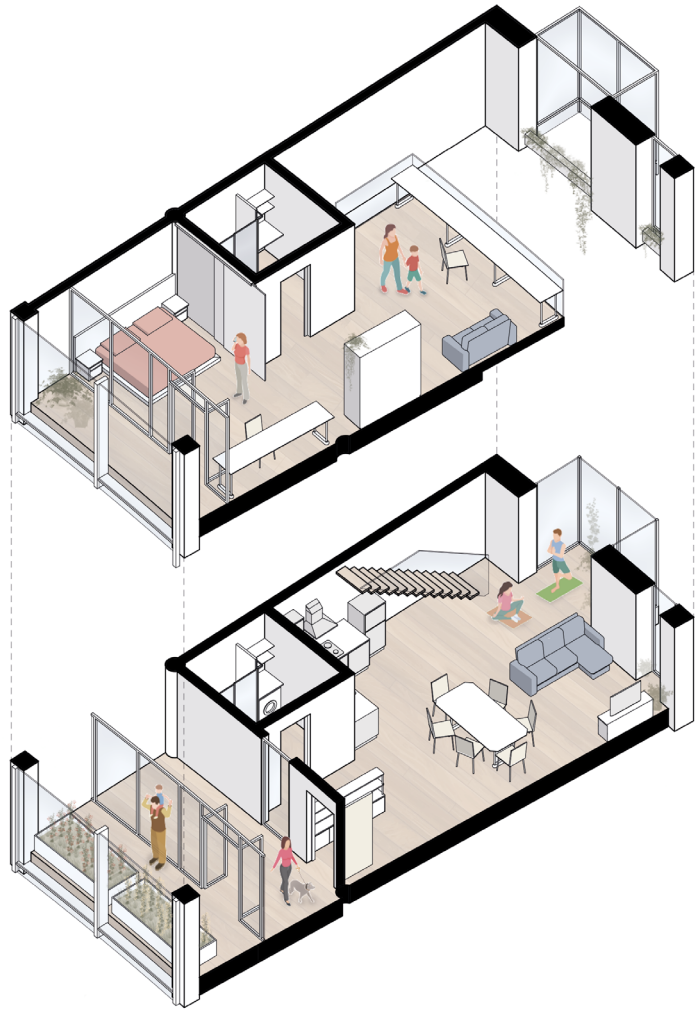
KINDERGARTEN



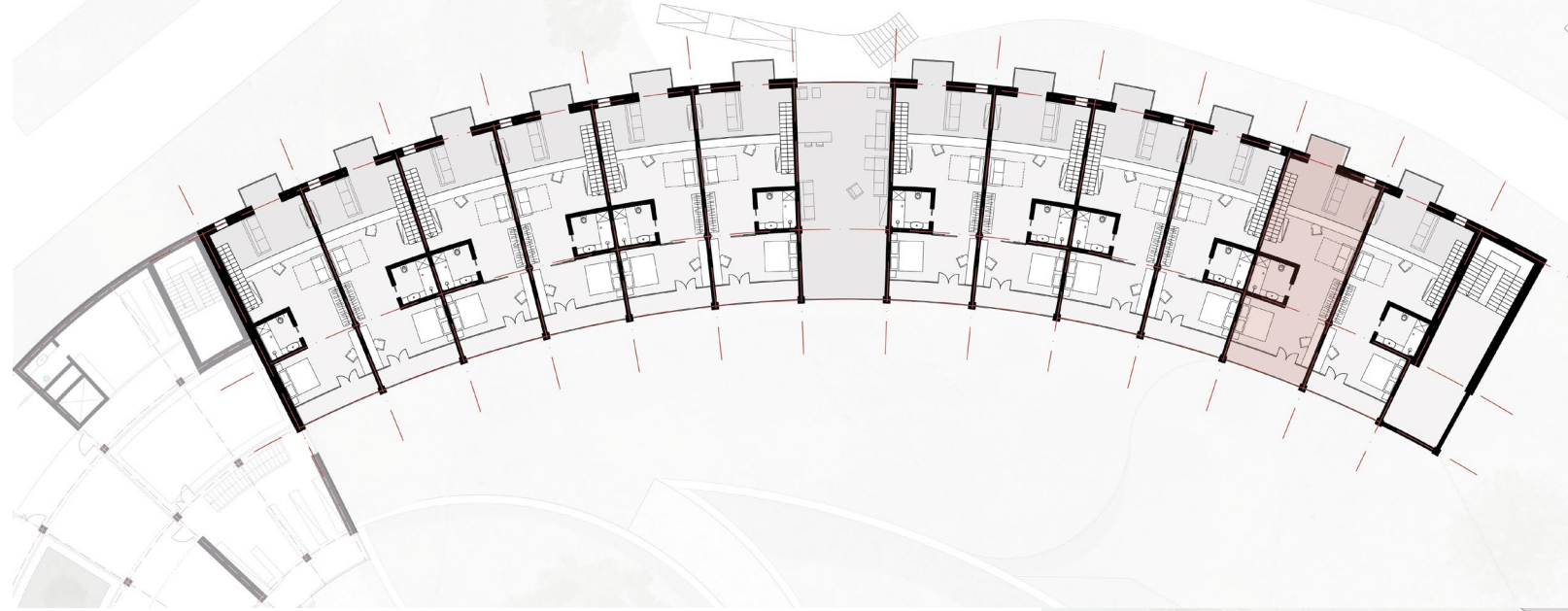
TECHNICAL ROOMS



DUPLEX UNITS



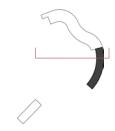
SECOND FLOOR



FIRST FLOOR



EAST FAÇADE AND SECTION

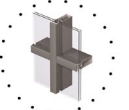


PLANITHERM INFINITY



Light Transmission 72%
Solar Factor (g) 0.38
U_g (W/m²K) 0.6

COOL-LITE XTREME 70/33



Light Transmission 71%
Solar Factor (g) 0.33
U_g (W/m²K) 0.6

DEFENDER PICO GLASS RAILING



Glass: PLANICLEAR 88-4 D/G41
System: DF88PICOKIT
Profile: CIPRAL88

WEBER IP610 HP

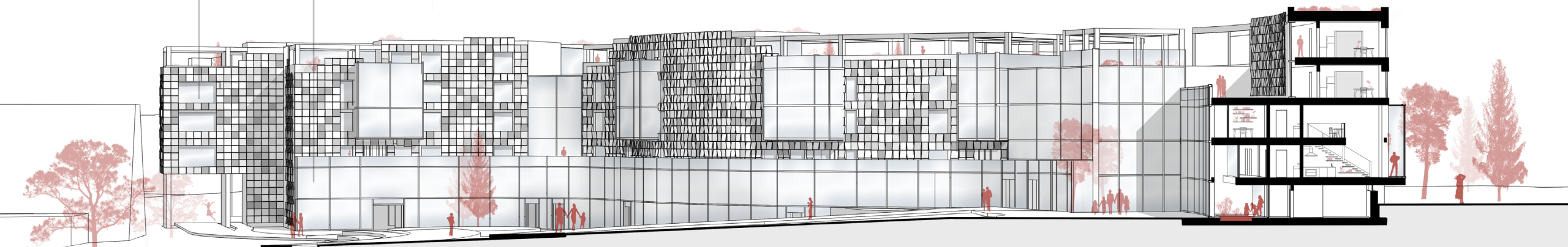


Grain Size < 1.4 mm
R_c ≥ 2.5 N/mmm²
R_b ≥ 1.6 N/mmm²

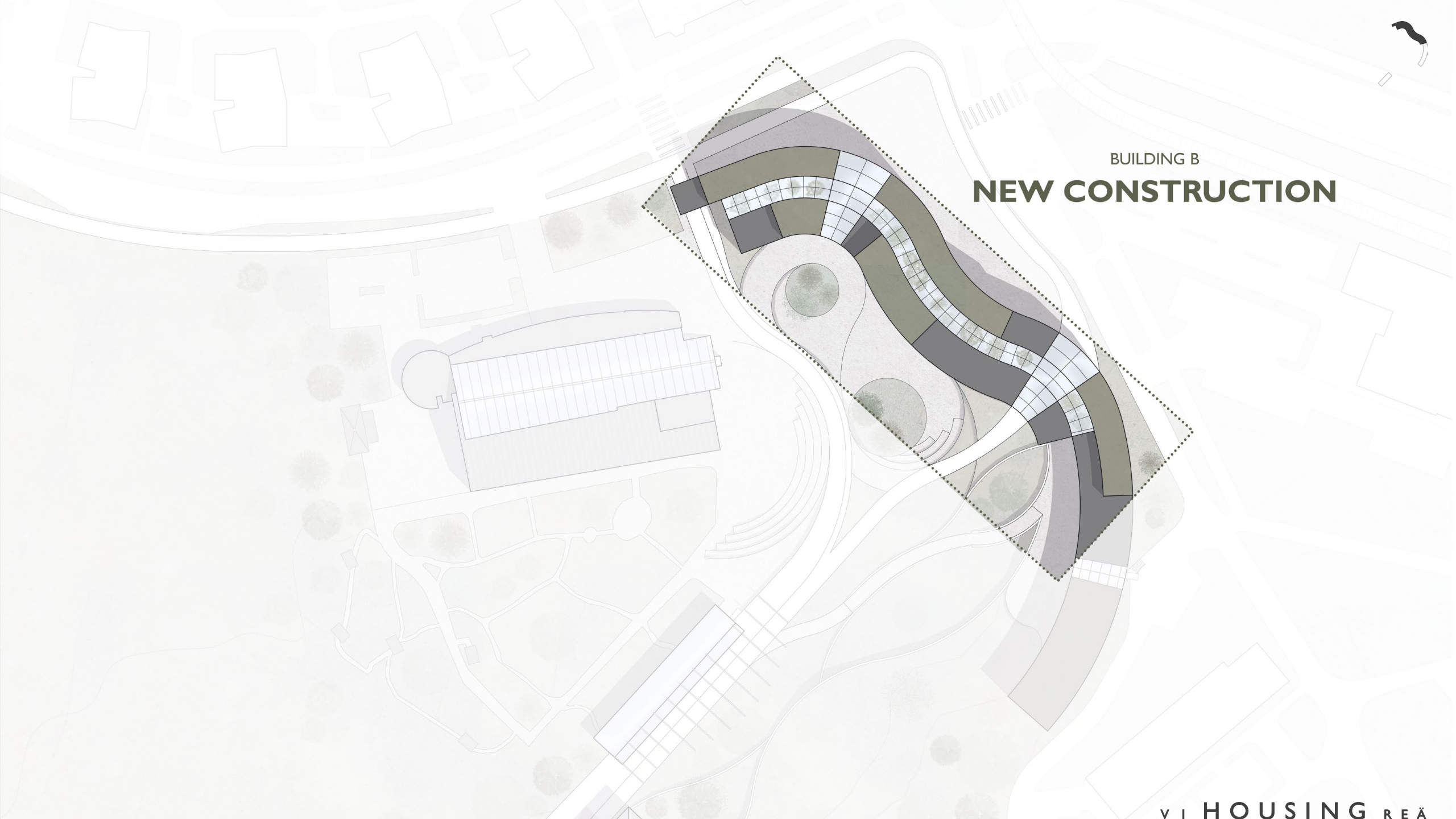
BIRCH BARK COVERING



100% Recycled
Water Resistant
Biogenic Material

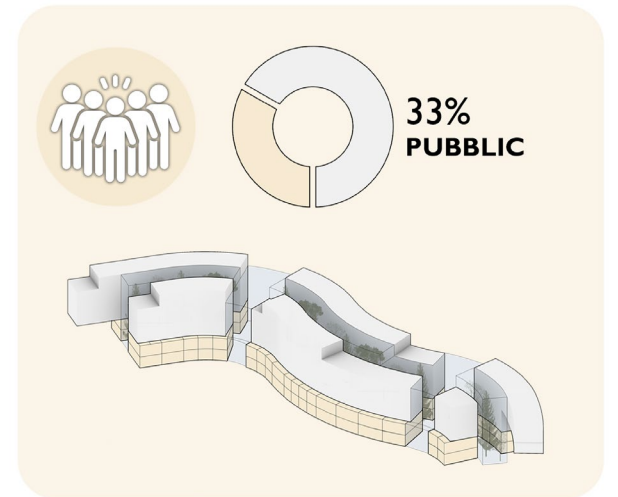
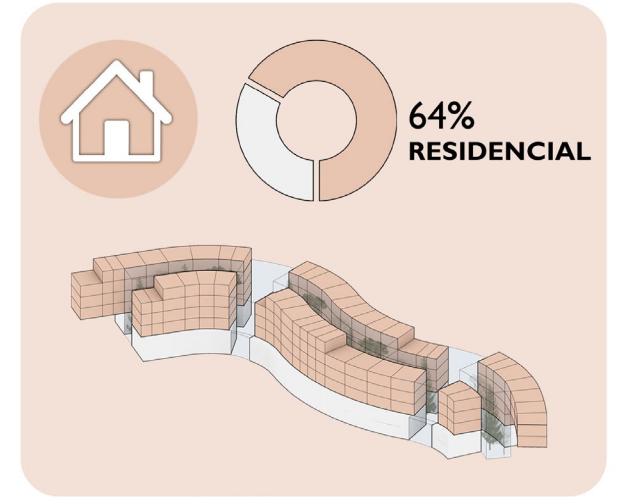
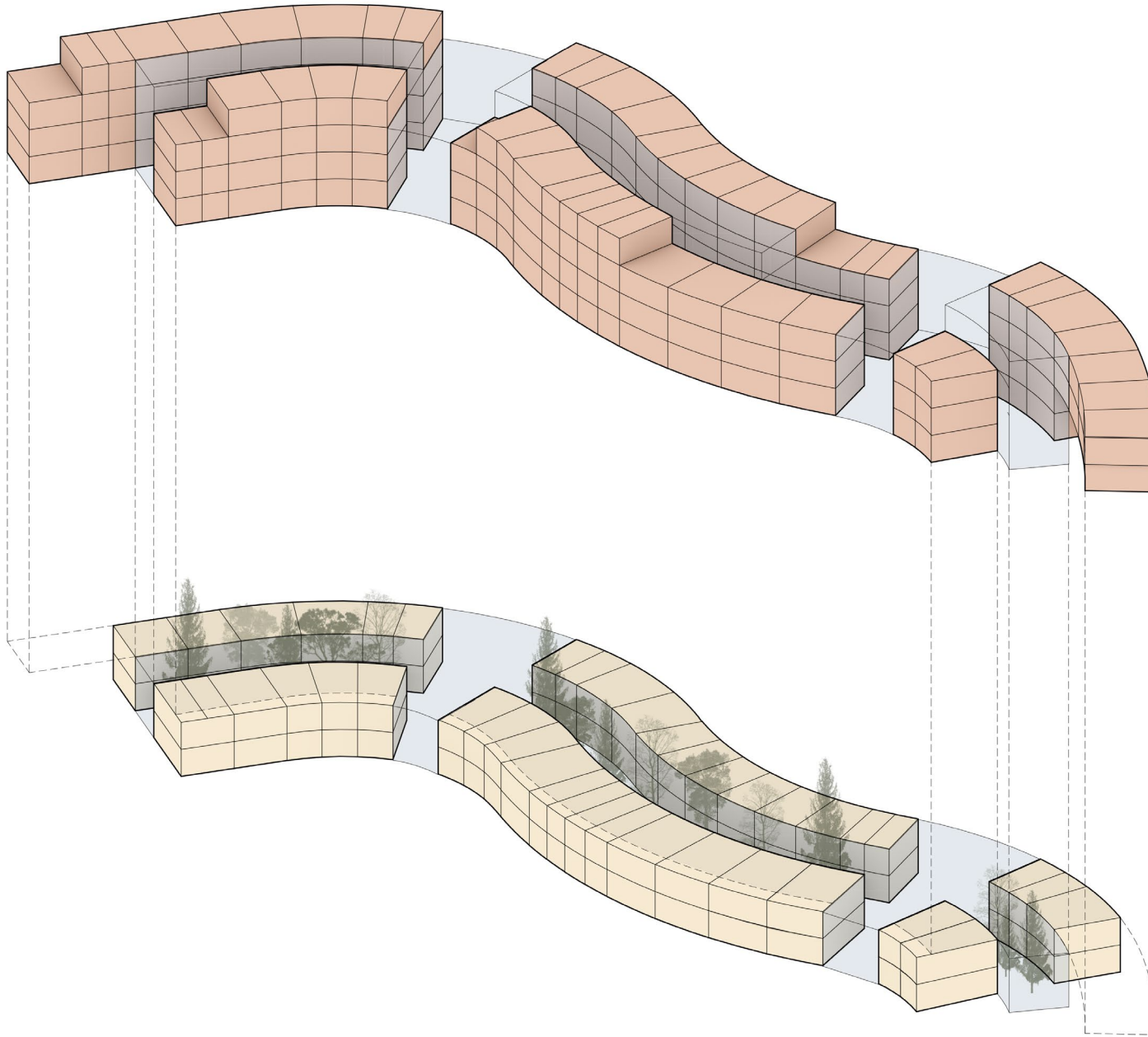




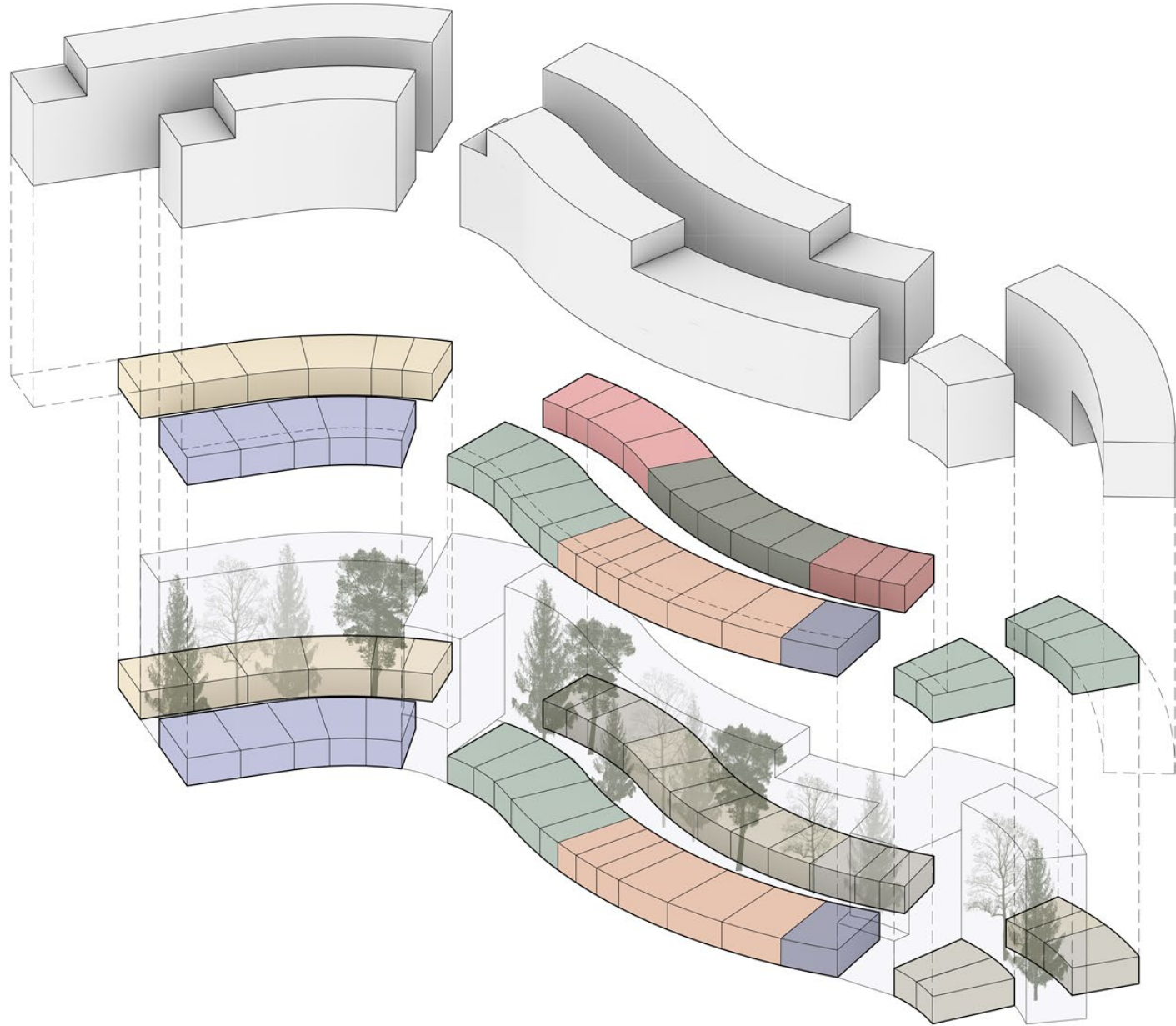


BUILDING B
NEW CONSTRUCTION

PROGRAM ZONING



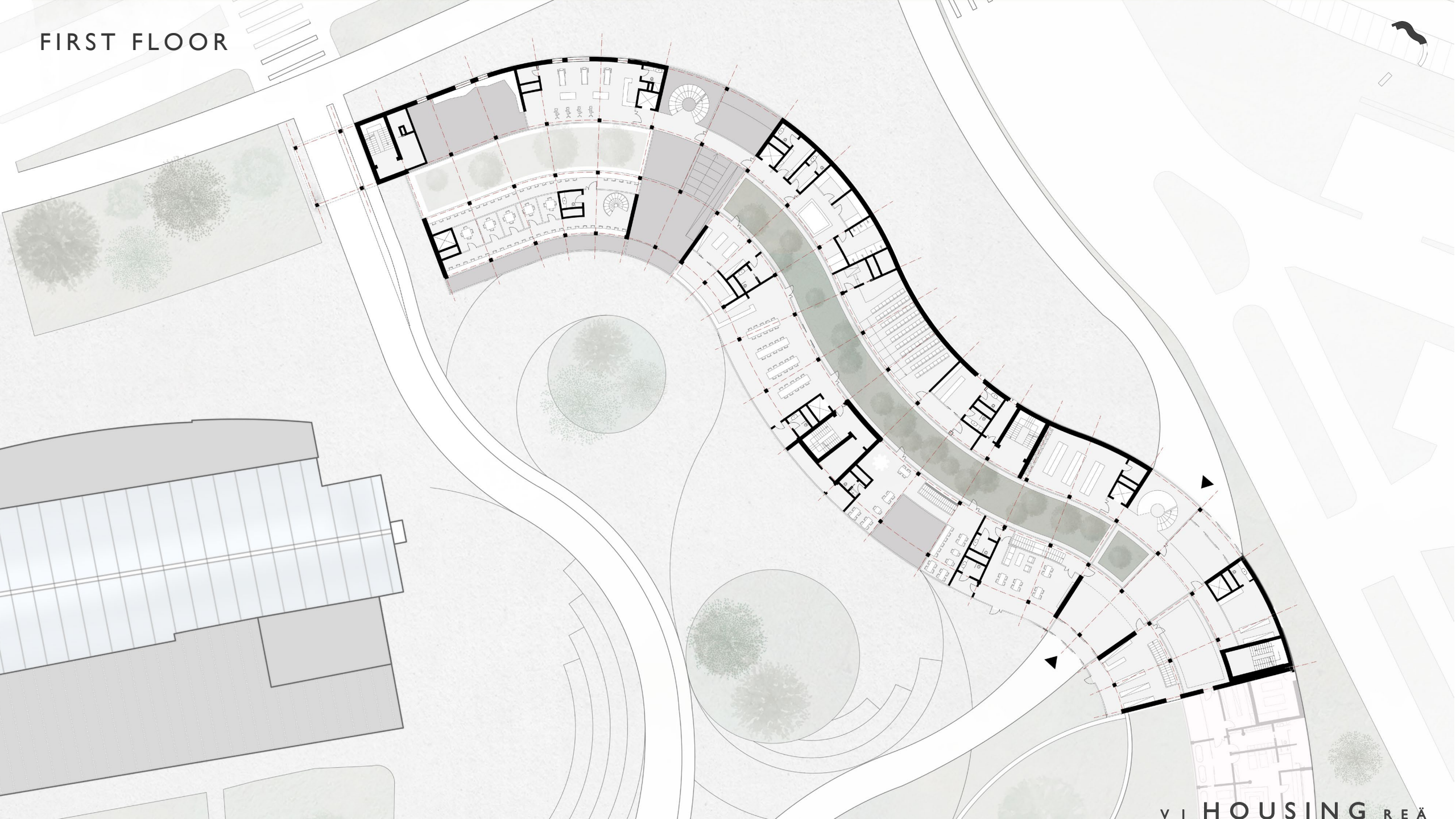
PROGRAM ZONING



SPORTS 20%
FOOD 20%
SHOPS 20%
COWORK 15%

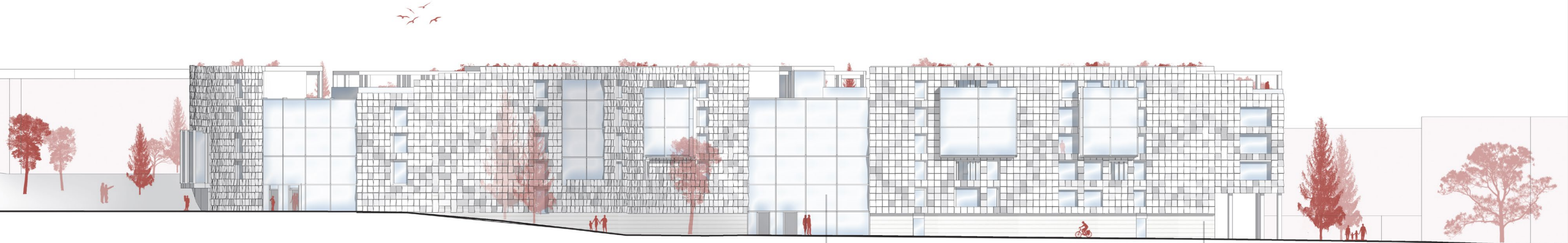
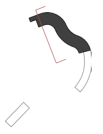
-  COWORKING AND STUDY
-  SPORT (Gym and Rock Climbing)
-  FOOD COURT (Bar, Restaurant)
-  SAUNAS
-  LAUNDRY ROOMS
-  AUDITORIUM
-  SHOPS (Bicycles, Clothes, Bird-Watching)
-  STORAGE / SHELTER
-  TECHNICAL ROOMS

FIRST FLOOR

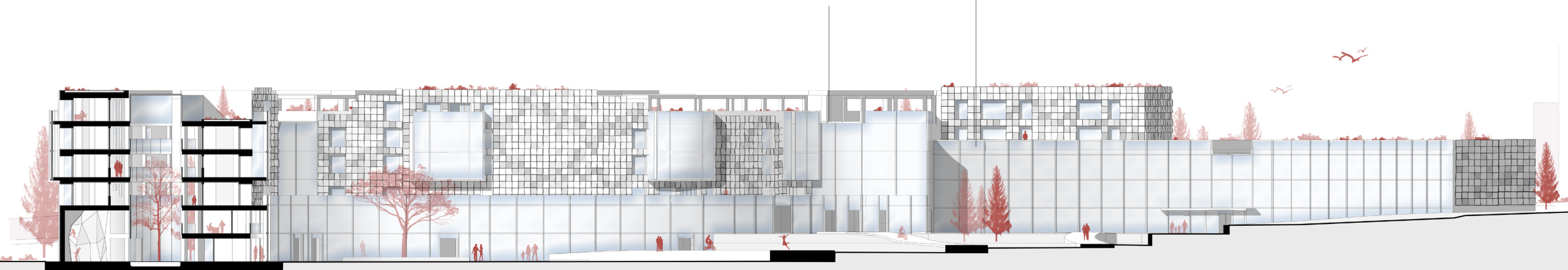


VI HOUSING REA

NORTH FAÇADE



CROSS SECTION



**COOL-LITE
XTREME 70/33**



Light Transmission 71%
Solar Factor (g) 0.33
Ug (Win2K) 0.6

**DEFENDER PICO
GLASS RAILING**



Glass: PLANCLEAR 88.4 DG41
System: DF88PICOKIT
Profile: CIPRAL88

**BIRCH BARK
COVERING**

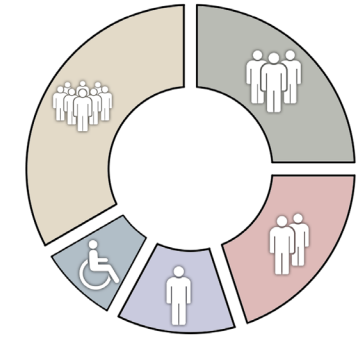
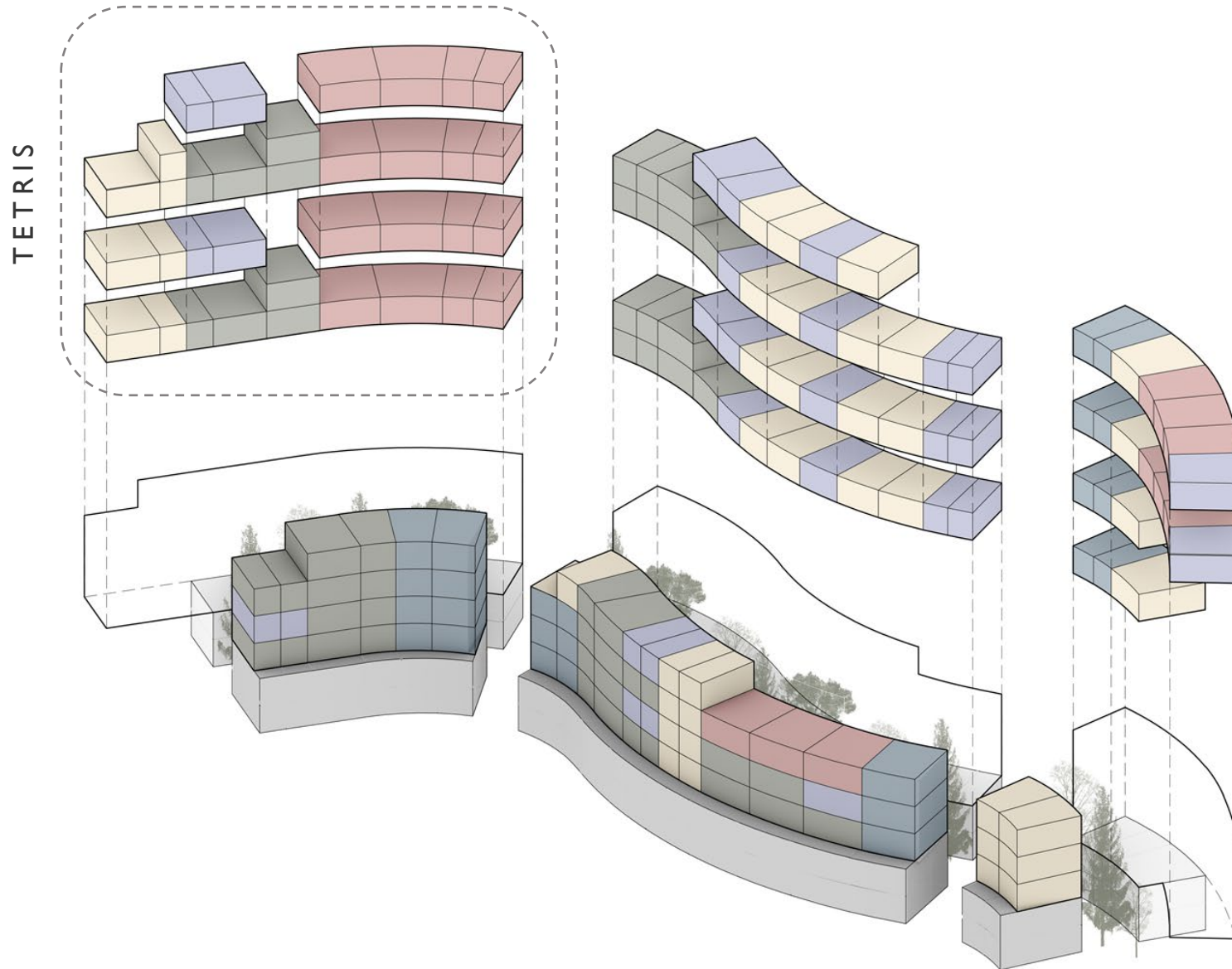






100% Recycled
Water Resistant
Biogenic Material



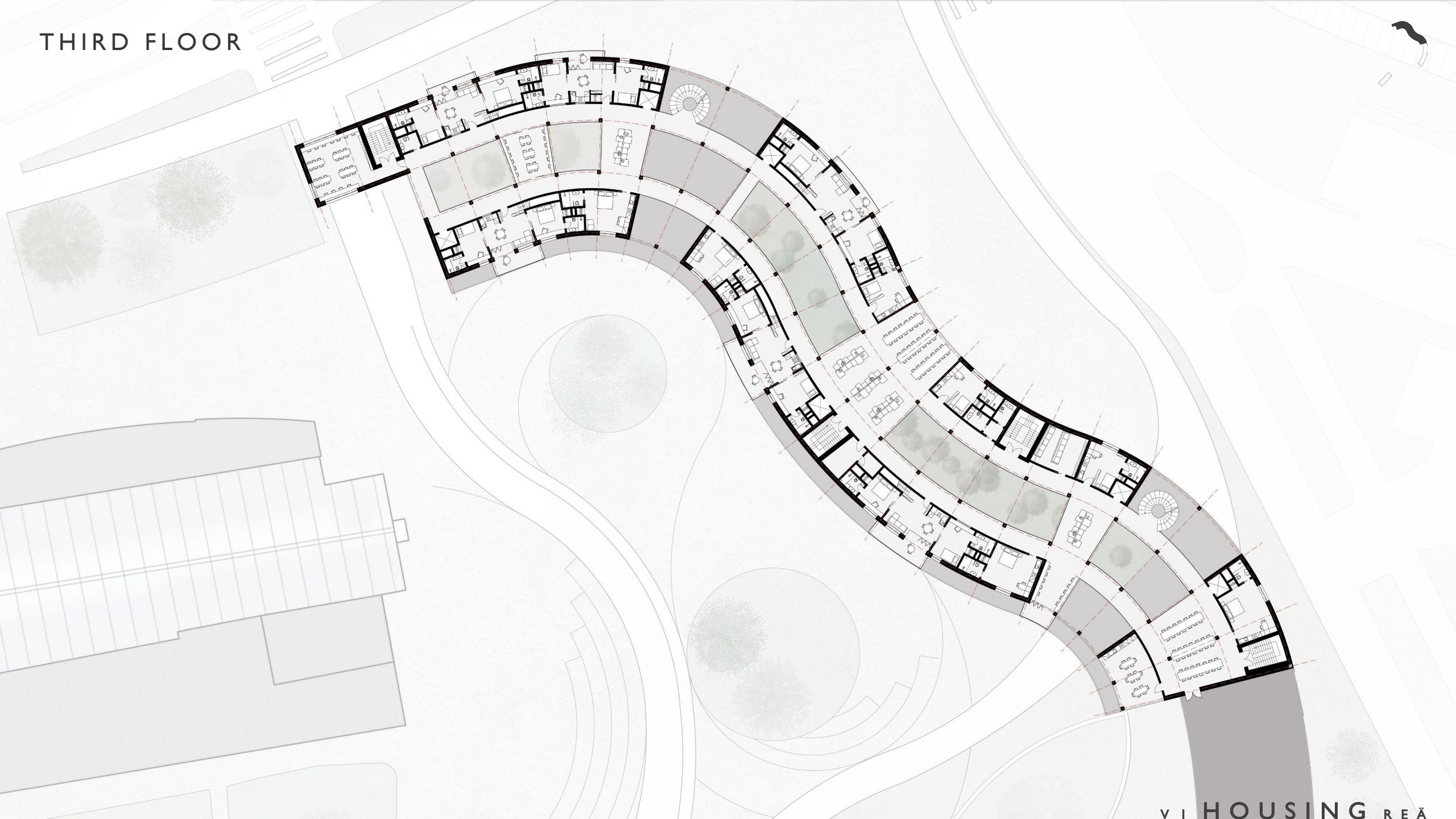


PROGRAM ZONING



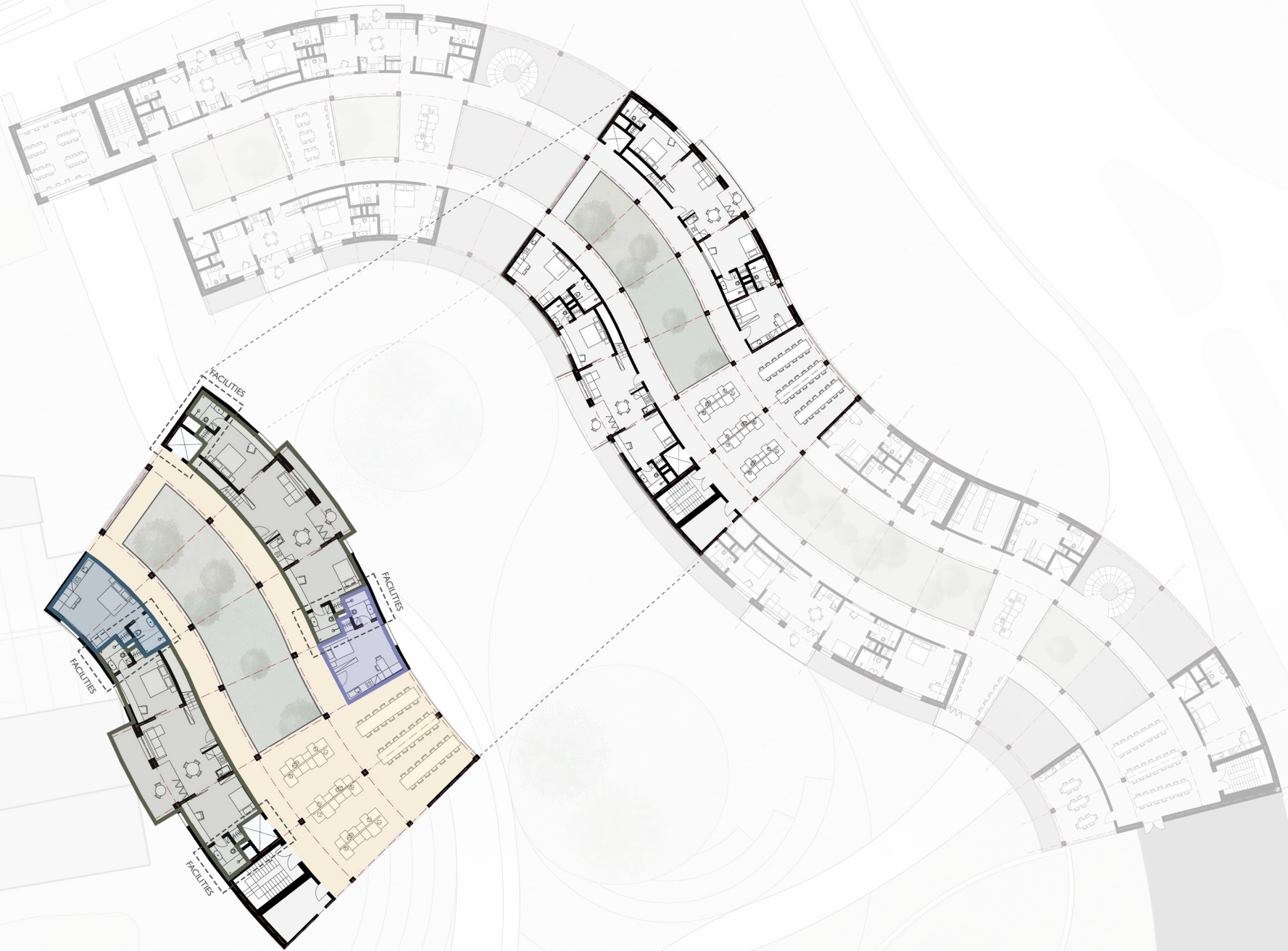
-  1 BEDROOM UNIT (Accessible)
-  1 BEDROOM UNIT
-  2 BEDROOM UNIT
-  3 BEDROOM UNIT
-  SHARED SPACE
-  PUBLIC FLOORS

THIRD FLOOR



UNITS TETRIS

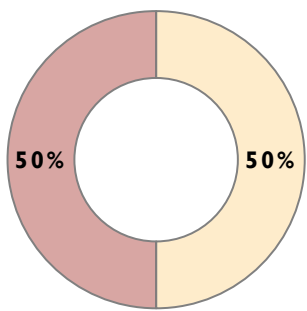
-  1 BEDROOM UNIT (Accessible)
-  1 BEDROOM UNIT
-  3 BEDROOM UNIT
-  SHARED SPACE



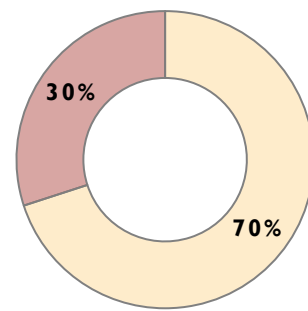
UNITS FLEXIBILITY



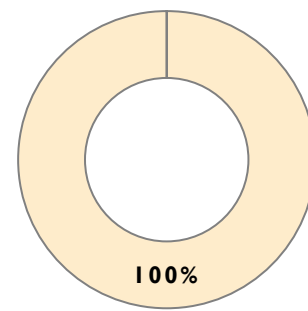
**PRIVATE
SETUP**

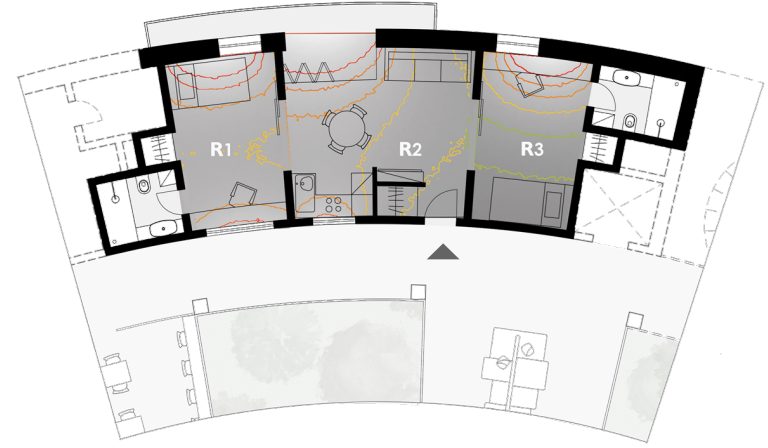
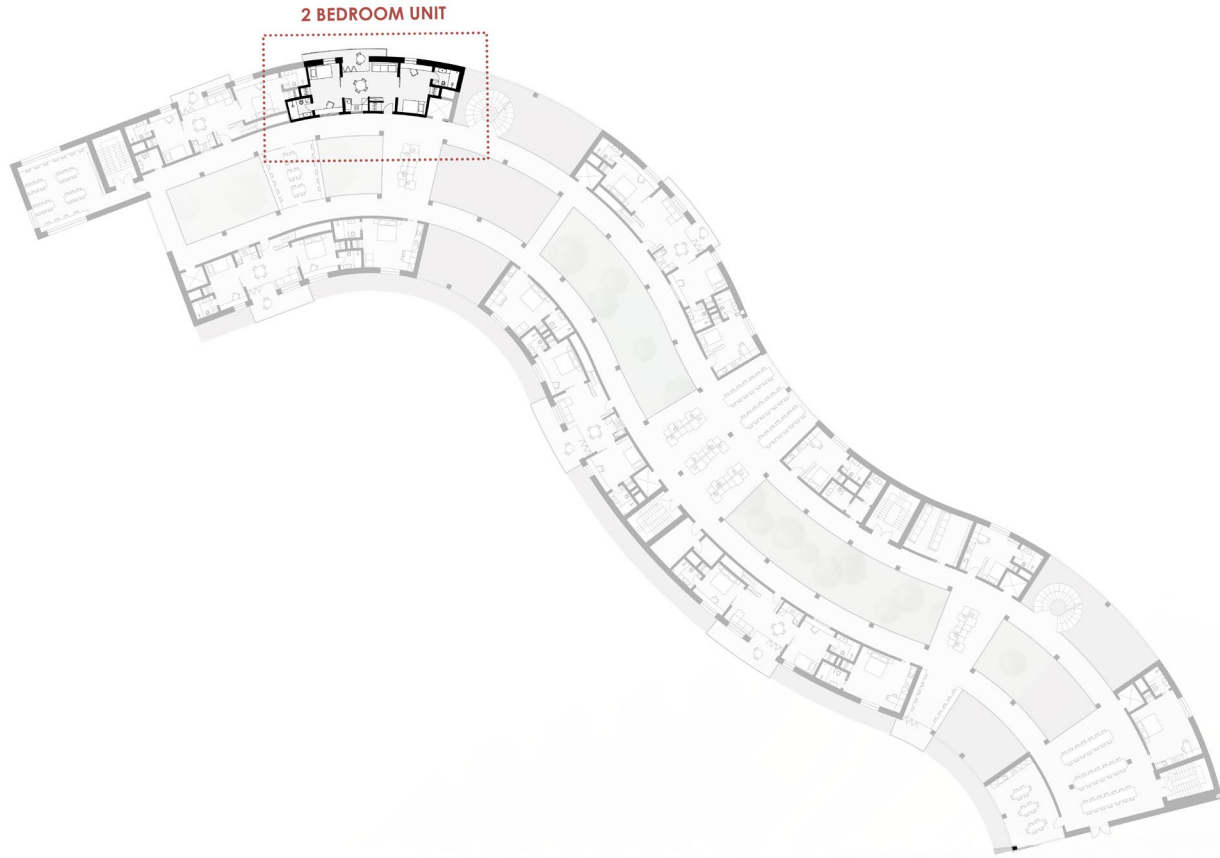


**MIXED
SETUP**



**SHARED
SETUP**

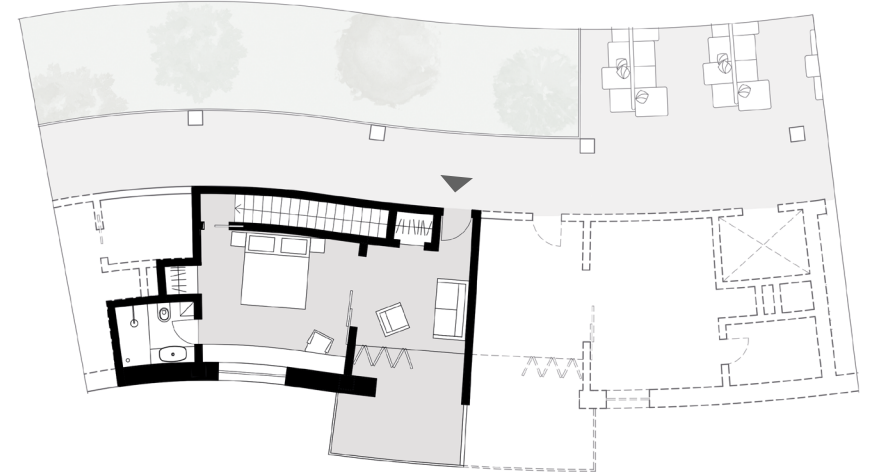
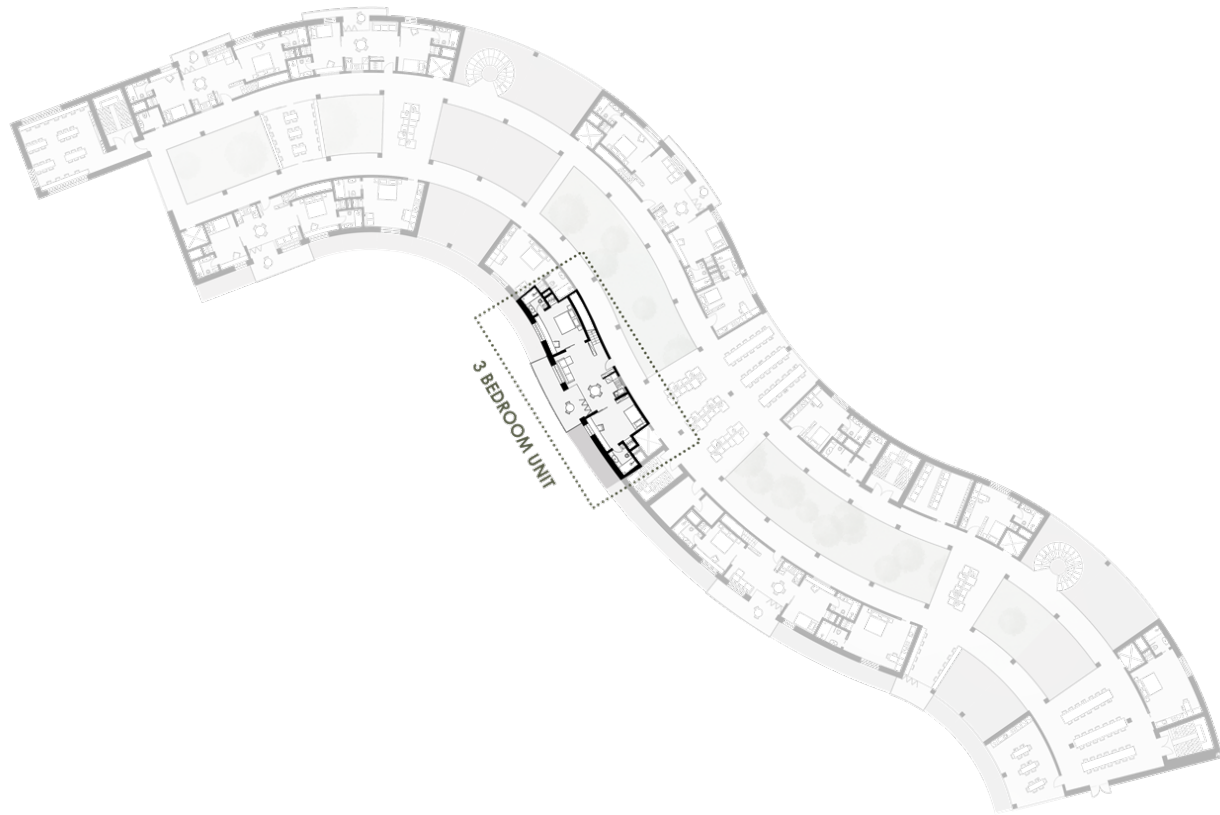




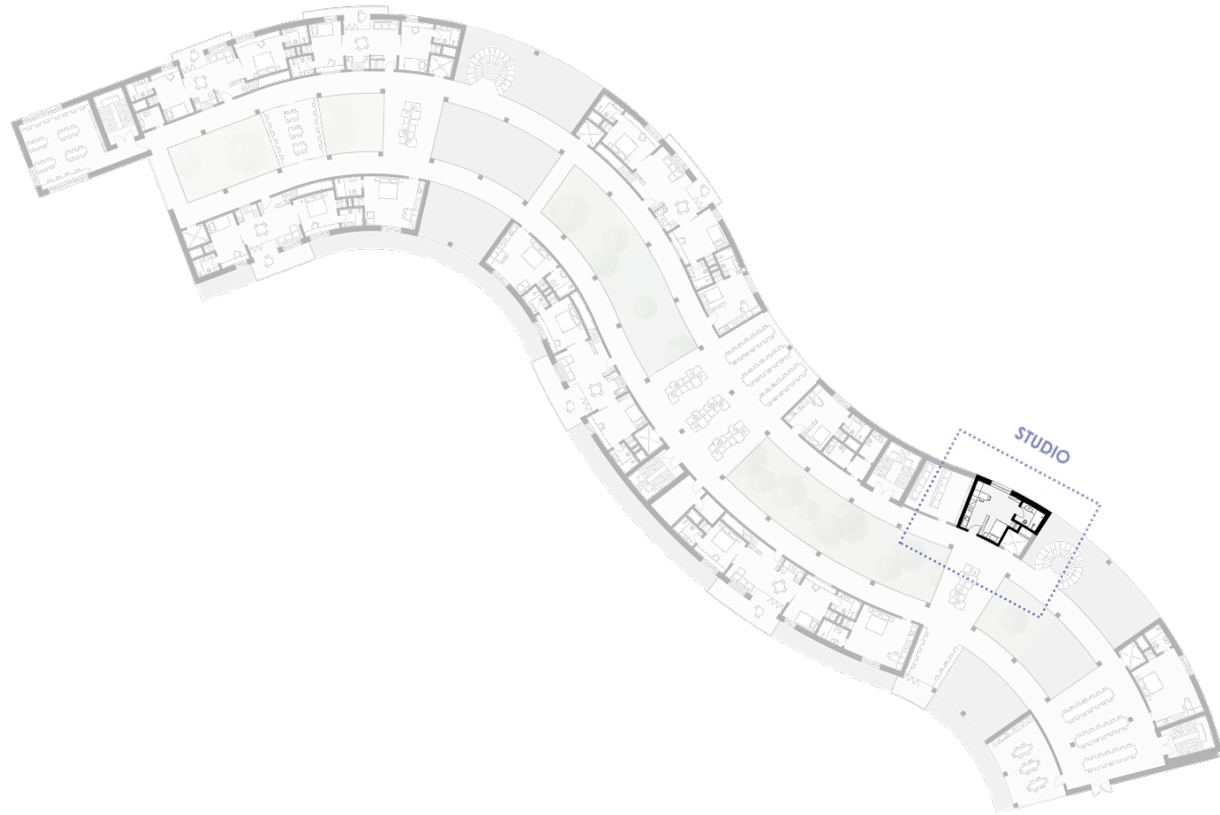
8%	ROOM 1 DAYLIGHT FACTOR (%) 6,03 UNIFORMITY INDEX (-) 0,42
7%	
6%	ROOM 2 DAYLIGHT FACTOR (%) 6,12 UNIFORMITY INDEX (-) 0,29
5%	
4%	ROOM 3 DAYLIGHT FACTOR (%) 4,23 UNIFORMITY INDEX (-) 0,24
3%	
2%	AVG UNIT DAYLIGHT FACTOR (%) 5,47 UNIFORMITY INDEX (-) 0,38
1%	

HOUSING ABACUS

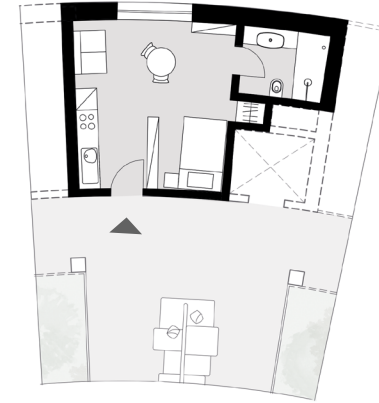
3 BEDROOMS 95mq



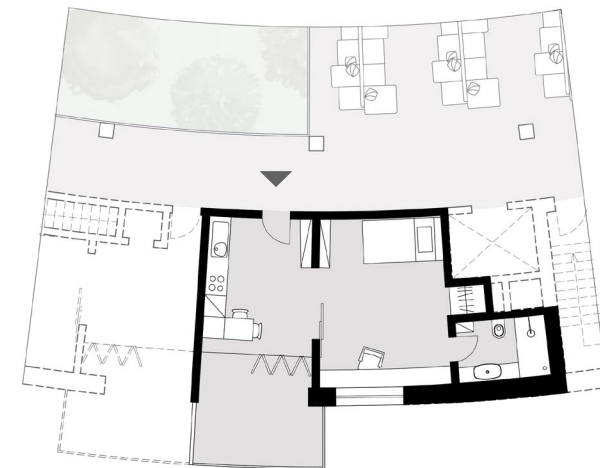
HOUSING ABACUS

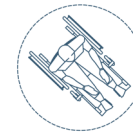
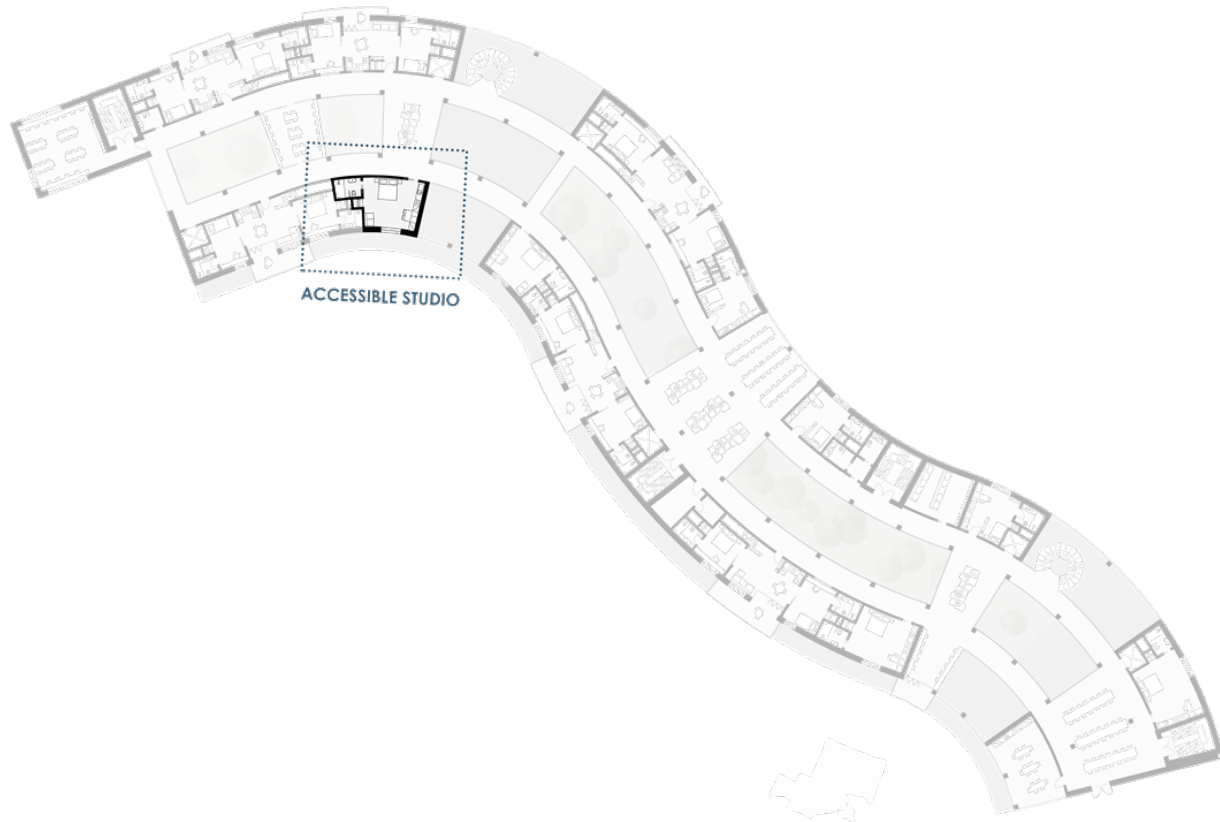


STANDARD STUDIO 25mq



DELUXE STUDIO 32mq





ROOM ACESIBILITY

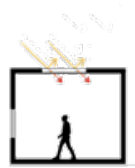
- ACCESSIBLE ENTRANCE
- WIDE PATHS
- LOWERED FURNITURE
- BRAILLE LABELS AND TACTILE SIGNS
- VISUAL AND AUDIBLE ALARMS
- ACCESSIBLE CONTROLS

TOILET ACCESSIBILITY

- ROLL-IN SHOWER
- GRAB BARS
- EMERGENCY CALL BUTTON



PASSIVE STRATEGIES



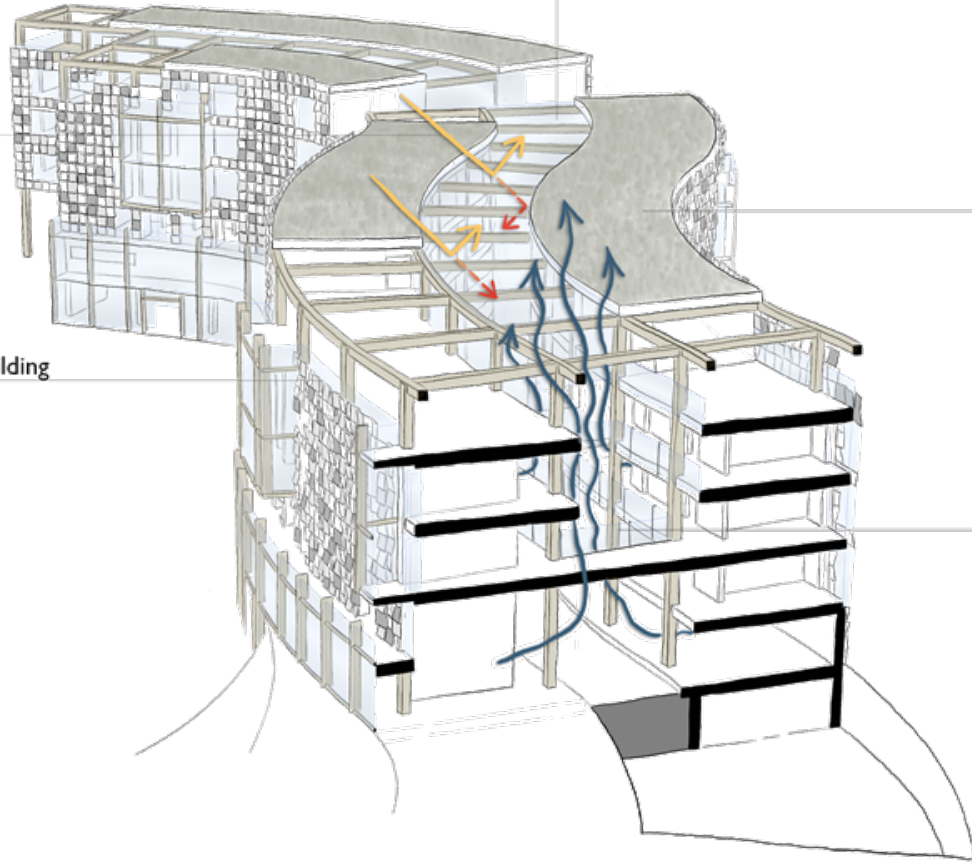
GREENHOUSE EFFECT

It uses solar energy to naturally heat interiors, reducing reliance on artificial heating



PARIETODYNAMIC WALL

The air in the cavity of the ventilated facade is used to regulate the internal temperature of the spaces, reducing the heating load of the building



ZENITAL LIGHT

The skylight allows all units to have a dual exposure, facilitating uniformity of illumination



GREEN ROOF

It provides natural insulation, reduces stormwater runoffs, improves air quality and mitigate urban heat island effects



CHIMNEY EFFECT

It enhances natural ventilation, improving air quality and reducing the need of mechanical cooling, promoting energy efficiency



ACTIVE STRATEGIES



AUTOMATED SKYLIGHT

It provides improved ventilation and temperature control, regulating humidity and preventing overheating



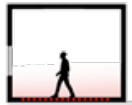
MVHR

Mechanical Ventilation with Heat Recovery maintains optimal humidity levels for a healthy living environment



PHOTOVOLTAIC PANELS

The new solar installation will supply more than 60% of the annual electric demand of the complex



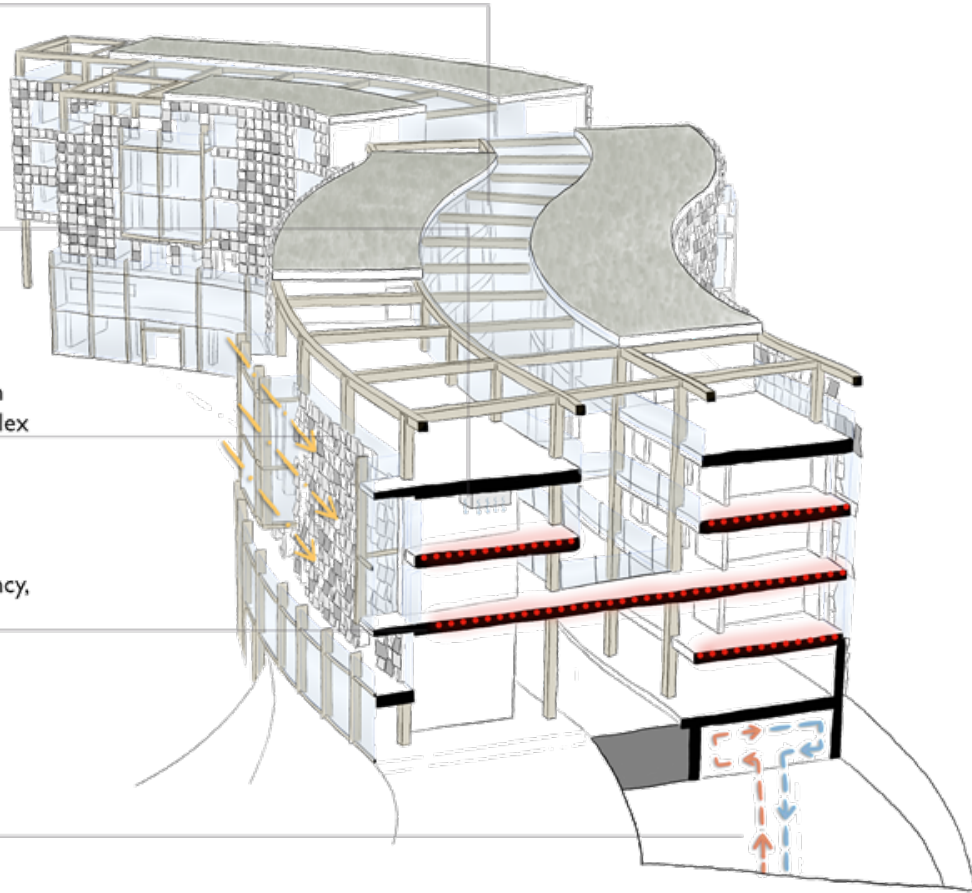
FLOOR HEATING SYSTEM

It provides even heat distribution, energy efficiency, and improves indoor air quality



GEOTHERMAL SYSTEM

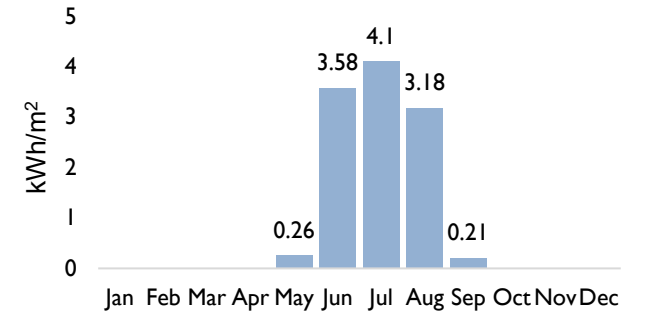
It provides sustainable heating and cooling, resulting in lower energy costs, carbon emissions, consistent indoor climate control



260 000 kWh/year

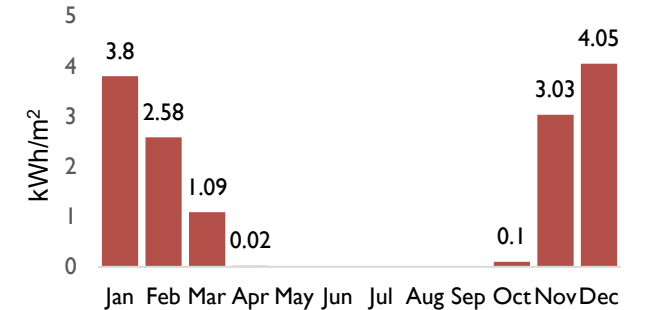
COOLING DEMAND

11,3 kWh/m²



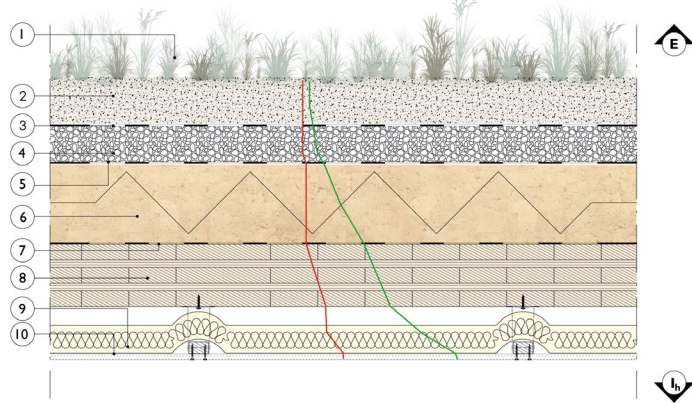
HEATING DEMAND

14,6 kWh/m²



ENVELOPE DETAILS

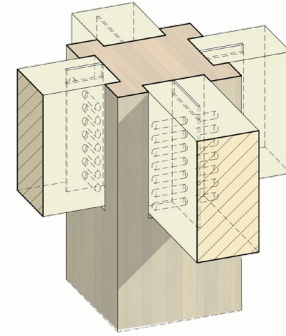
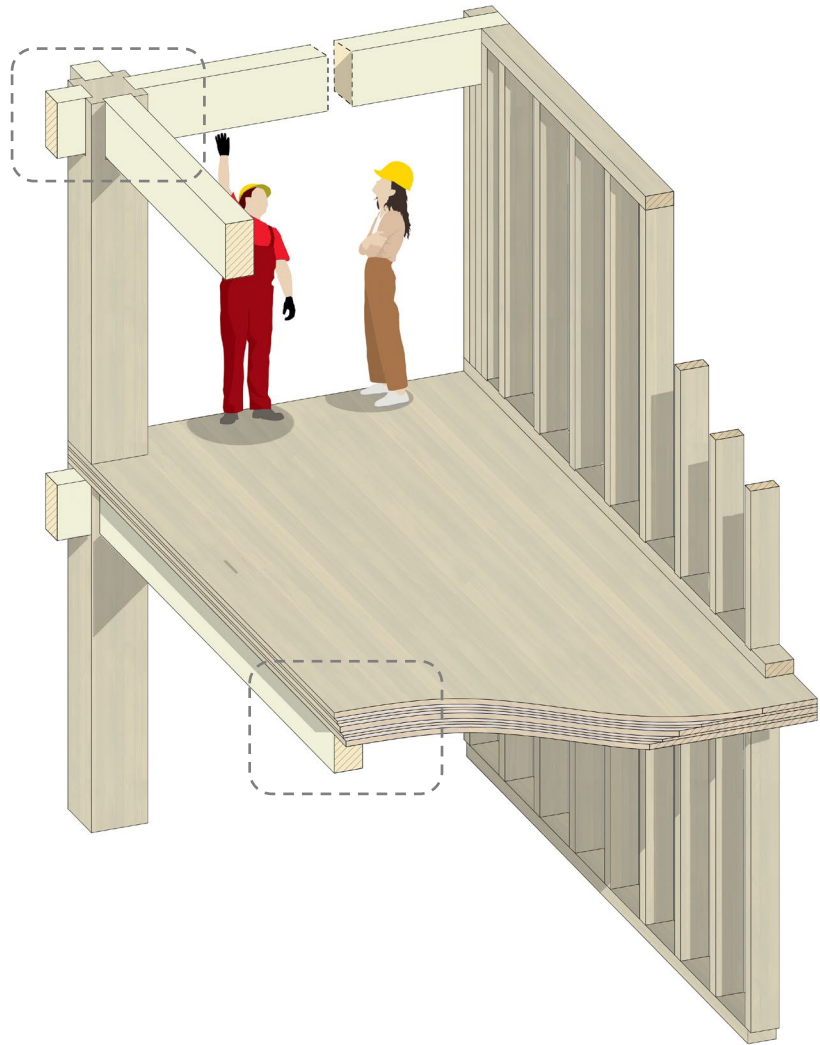
GREEN ROOF



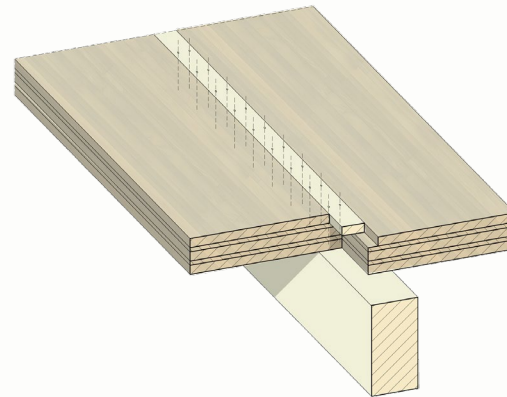
1 GREEN	- cm
2 EXPANDED CLAY SUBSTRATE	12 cm
3 FILTER MAT	0,4 cm
4 EXPANDED CLAY DRAINAGE	10 cm
5 ANTI-ROOT MEMBRANE	0,4 cm
6 CORK PANELS	20 cm
7 WATER-RESISTANT MEMBRANE	0,4 cm
8 CLT PANELS	15,8 cm
9 MINERAL WOOL PANEL	7 cm
10 PLASTERBOARD	1,25 cm



TIMBER STRUCTURE



CONNECTION COLUMN-BEAMS
THROUGH GUSSET PLATE



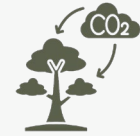
CONNECTION CLT PANELS
SCREWED JOINT

WHY CLT and TIMBER FRAME?

LOCAL MATERIAL



LOW CARBON FOOTPRINT



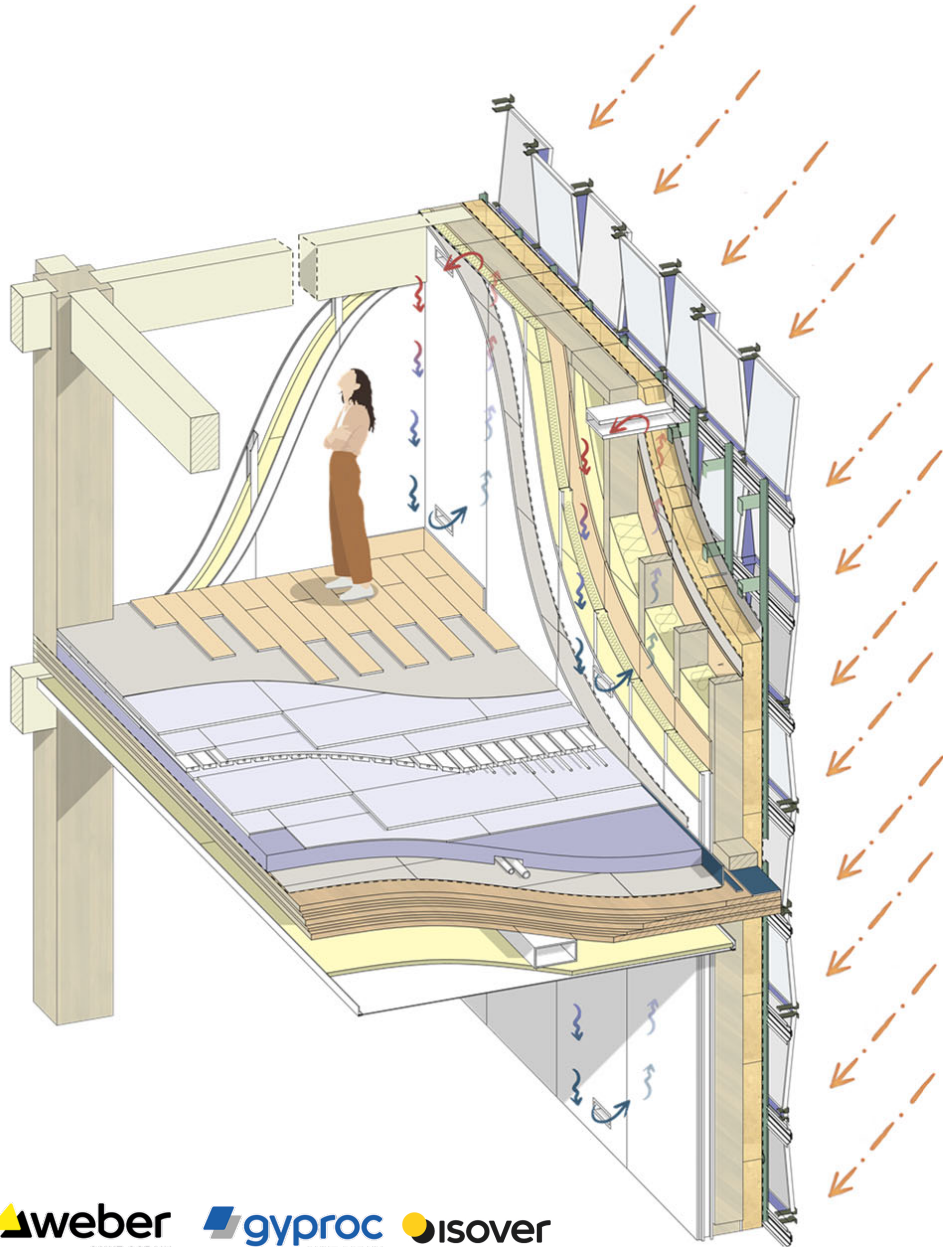
PREFABRICATION



THERMAL INSULATION



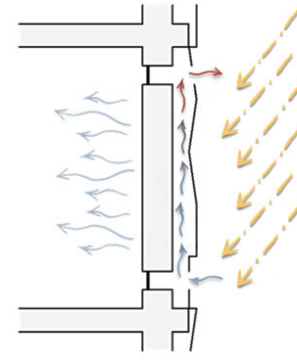
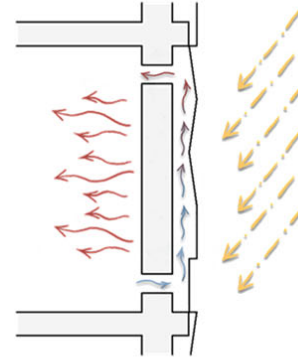
PARIETODYNAMIC FAÇADE



WINTER

SUMMER

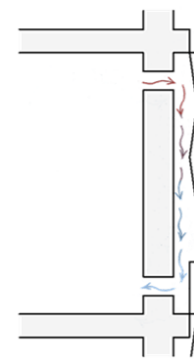
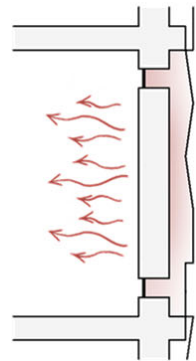
DAY



SUNLIGHT
RAISING WARM FLOW
HEAT REALISING

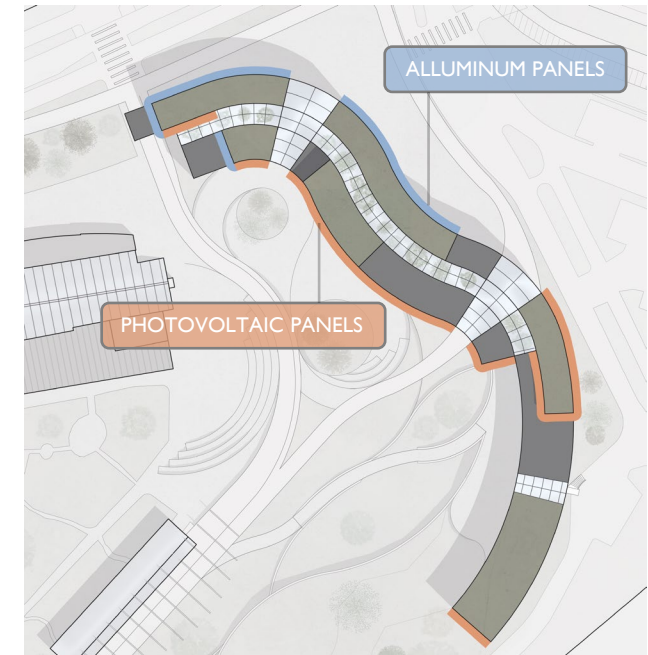
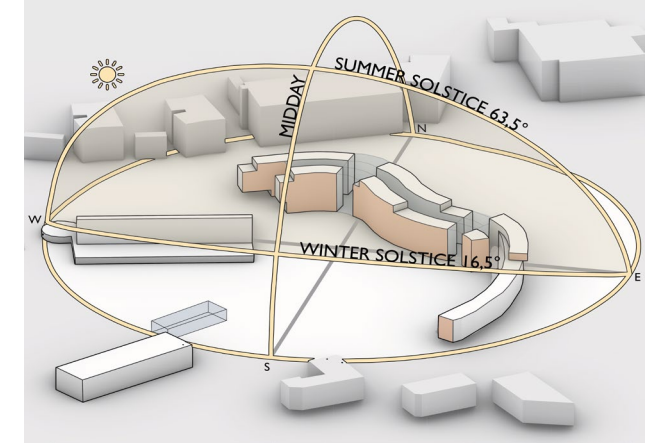
SUNLIGHT
RAISING WARM FLOW
HEAT EXTRACTION

NIGHT

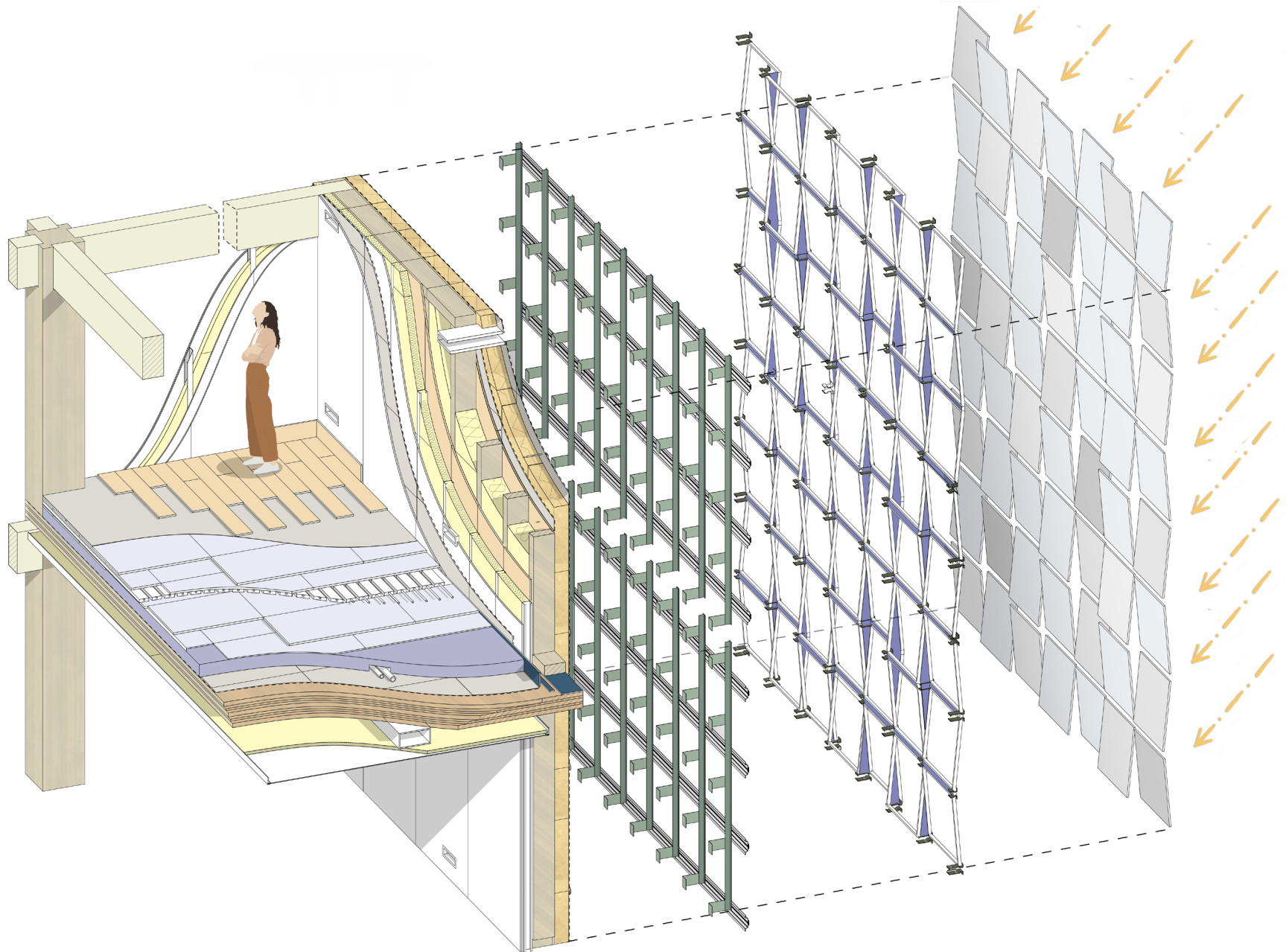


STILL AIR
THERMAL INERTIA
CONFORT TEMPERATURE

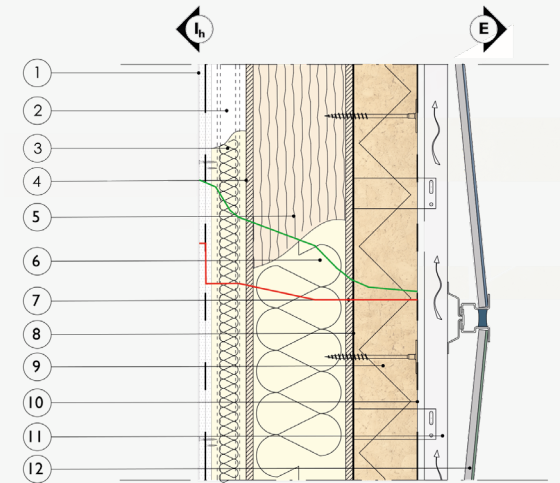
HEAT EXTRACTION
LOWERING WARM FLOW
CONFORT TEMPERATURE



PHOTOVOLTAIC FAÇADE



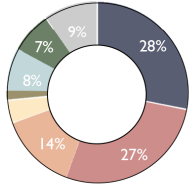
PHOTOVOLTAIC WALL



- | | | |
|----|---|-------------|
| 1 | PLASTERBOARD | 2 x 1,25 cm |
| 2 | METAL FRAME | 7,5 cm |
| 3 | GLASS WOOL PANEL | 7 cm |
| 4 | FIBER-REINFORCED PANEL | 1,5 cm |
| 5 | TIMBER-FRAME STRUCTURE | 20 cm |
| 6 | GLASS WOOL PANEL | 2 x 9,5 cm |
| 7 | FIBER-REINFORCED PANEL | 1,5 cm |
| 8 | ANCHORING SYSTEM | - cm |
| 9 | CORK PANEL | 7 cm |
| 10 | WATER RESISTANT MEMBRANE | 0,4 cm |
| 11 | ALLUMINUM SUPPORT | - cm |
| 12 | PHOTOVOLTAIC PANELS WITH SILICON JOINTS | 2 cm |

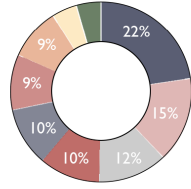
LIFE CYCLE ASSESSMENT

GLOBAL WARMING (kg CO_{2eq}) CLASSIFICATIONS

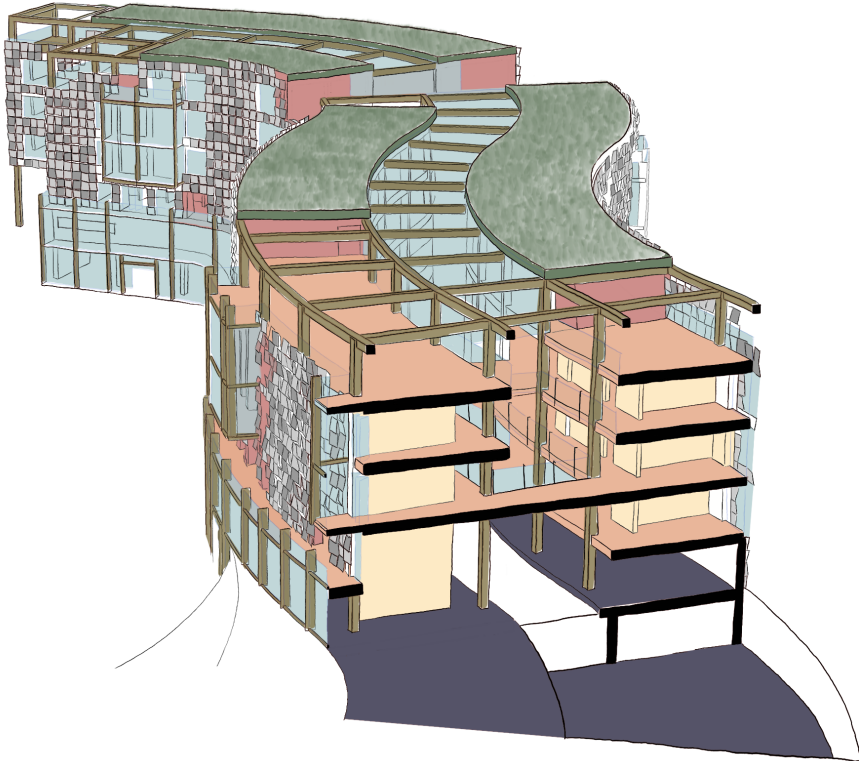


- FOUNDATIONS
- EXT WALLS
- ENERGY SYSTEMS
- SLABS
- INT WALLS
- GREEN ROOF
- WINDOWS
- STRUCTURE

GLOBAL WARMING (kg CO_{2eq}) RESOURCE TYPE



- CONCRETE
- GYPSUM BOARDS
- ENERGY SYSTEMS
- CLT
- REINFORCEMENT BARS
- SCREED
- ETICS
- GLUE



Cradle to grave (A1-A4, B4-B5, C1-C4)	kg CO _{2e} /m ²
(< 305) A	265
(305-345) B	
(345-385) C	
(385-425) D	
(425-465) E	
(465-505) F	
(> 505) G	

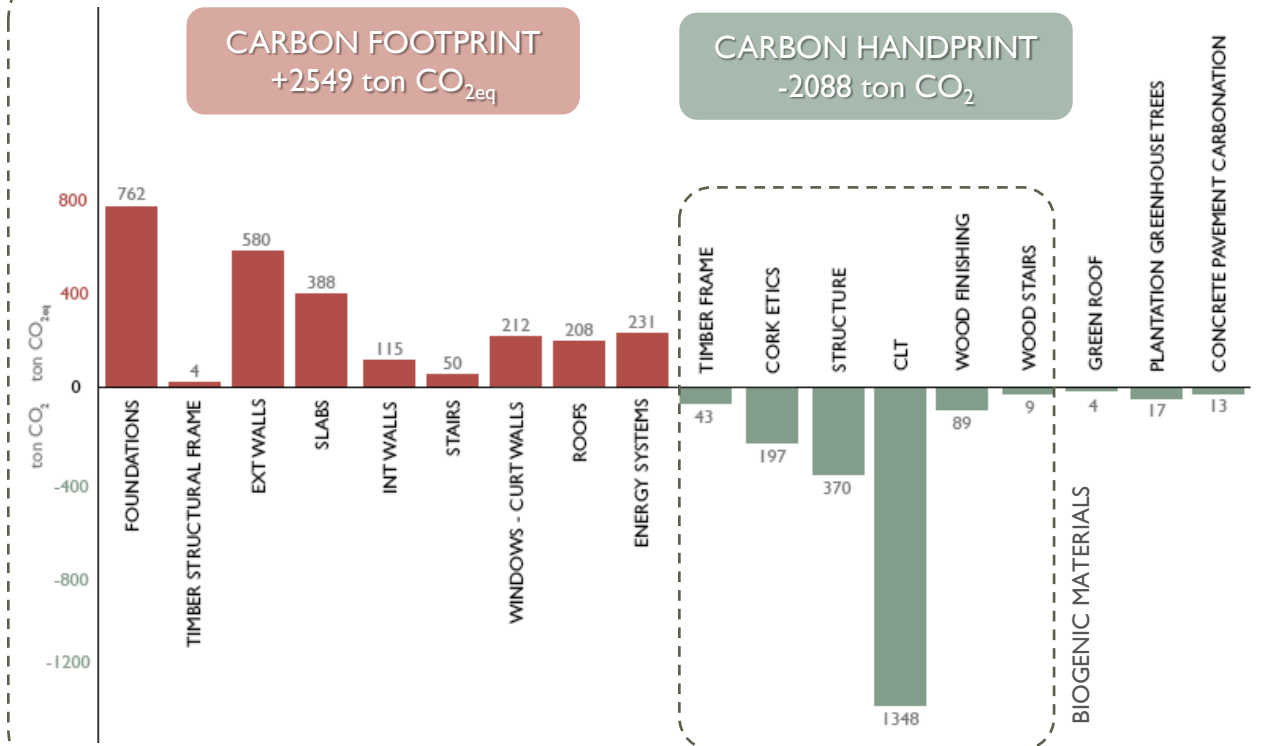
One Click LCA

WE ACHIEVED CLASS A!
265 kg CO_{2eq}/m² = **2549 ton CO_{2eq}**

HOW DO WE AIM TO CARBON NEUTRALITY?



CARBON FOOTPRINT-HANDPRINT BALANCE



VIHREÄ

VIIKKI INCLUSIVE HOUSING:
REGENERATION OF AN ECO-BASED
AREA

