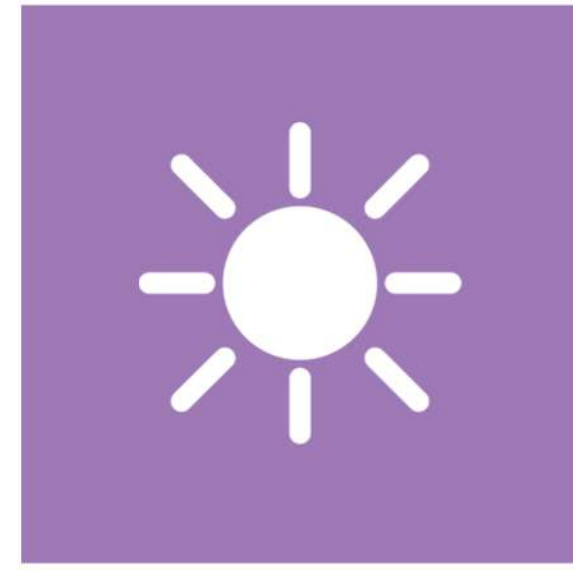


eng. *FRAMELESS* / fr. *SANS CHÂSSIS*

# ZERORAMOWY

Zero energy, zero emission, zero barriers. ZERORAMOWY (*FRAMELESS*) aims to improve the living standard of Warsaw and meet the Carbon-neutral Poland 2050 objective. Our concept distinctly incorporates with the already existing landscape and conversates with its architecture based on respect for the history of the place. We focused on integrating both social and ecological ideas to achieve our objectives - cohousing, multicomfort and zero energy which are the foundations of healthy and accessible habitat.



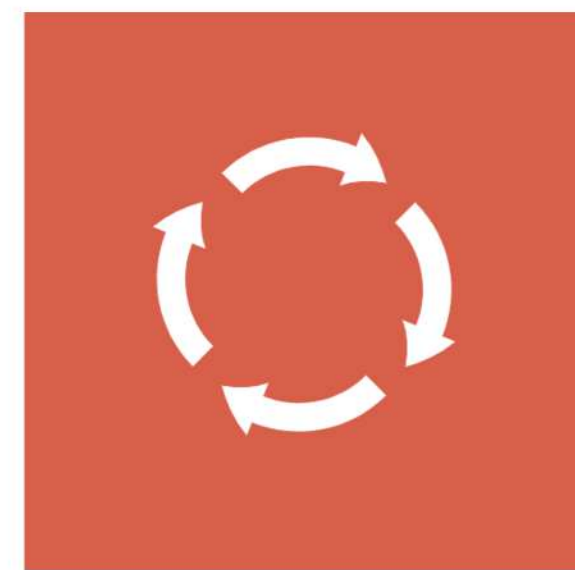
URBAN LAYOUT



GREENERY



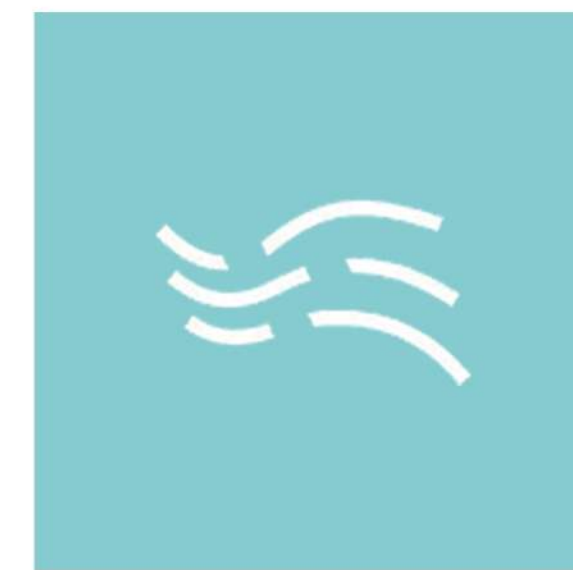
MODULARITY



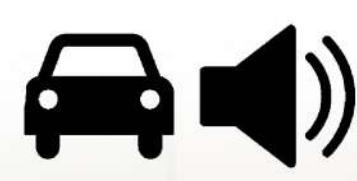
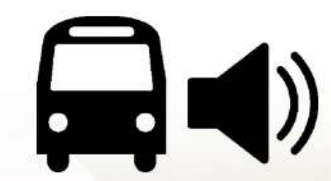
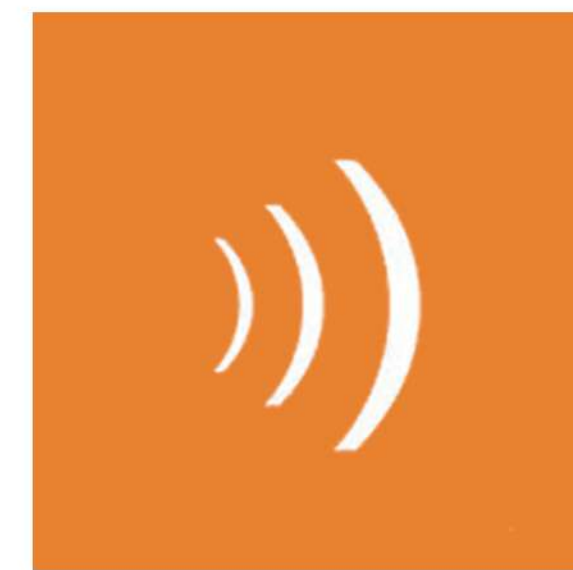
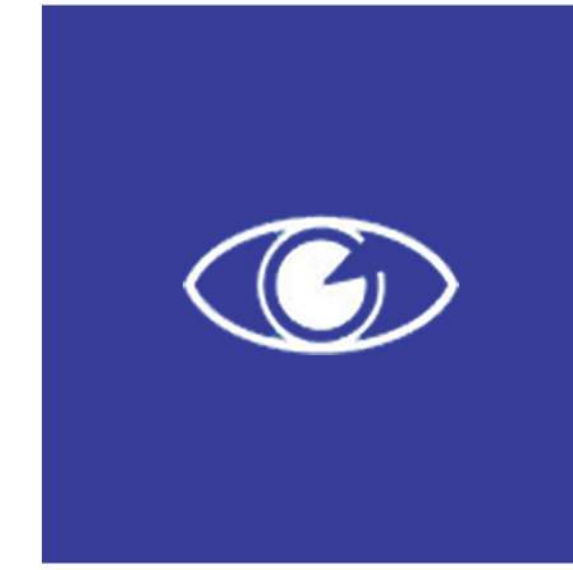
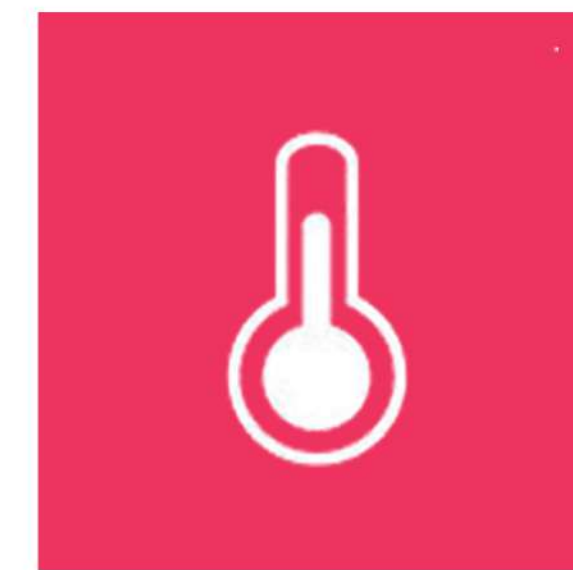
RECYKLING



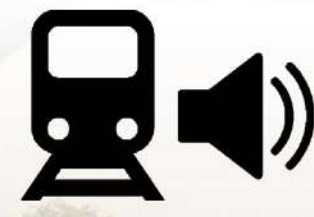
COHOUSING



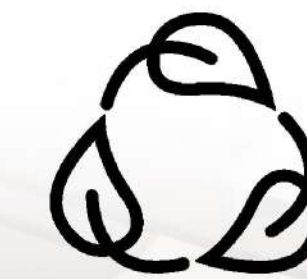
MULTICOMFORT



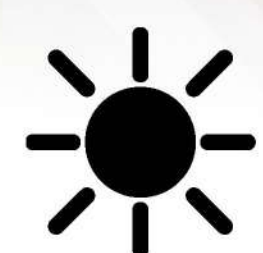
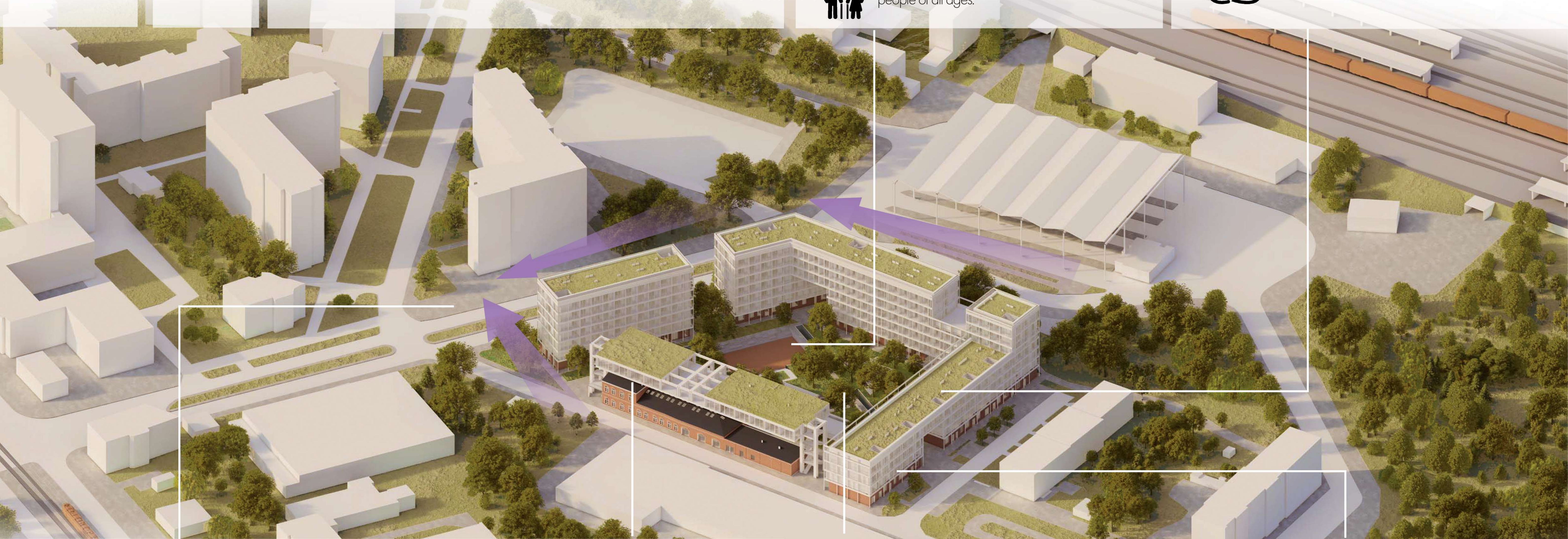
The ambient noise is minimized by glass coatings, double skin facade and rows of trees (1-2 dB less). It improves acoustic comfort.



The ageing of society is an alarming issue among highly developed countries. We consider cohousing as the perfect solution. Everyday spaces integrate people of all ages.



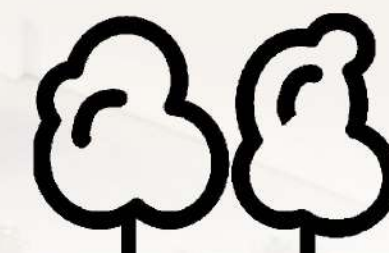
Green roofs, retention basins, trees - have an important impact on the microclimate of the estate and its surrounding.



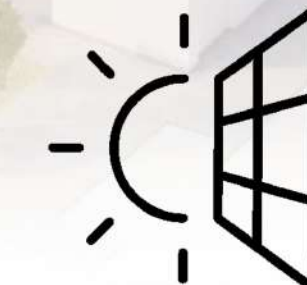
Our concept takes into account the already existing urban layout to fully adjust this place not only to the needs of its future inhabitants but also to the present inhabitants of the whole neighbourhood.



We designed the overhang structure to connect new architecture with the historic building without altering the factory construction. The construction's spine features a Vierendeel truss. The ground floor is built from re-claimed bricks.



Our construction respects the original layout of the trees. Both existing and newly planted trees increase the acoustic and visual comfort and reduce carbon dioxide emissions.

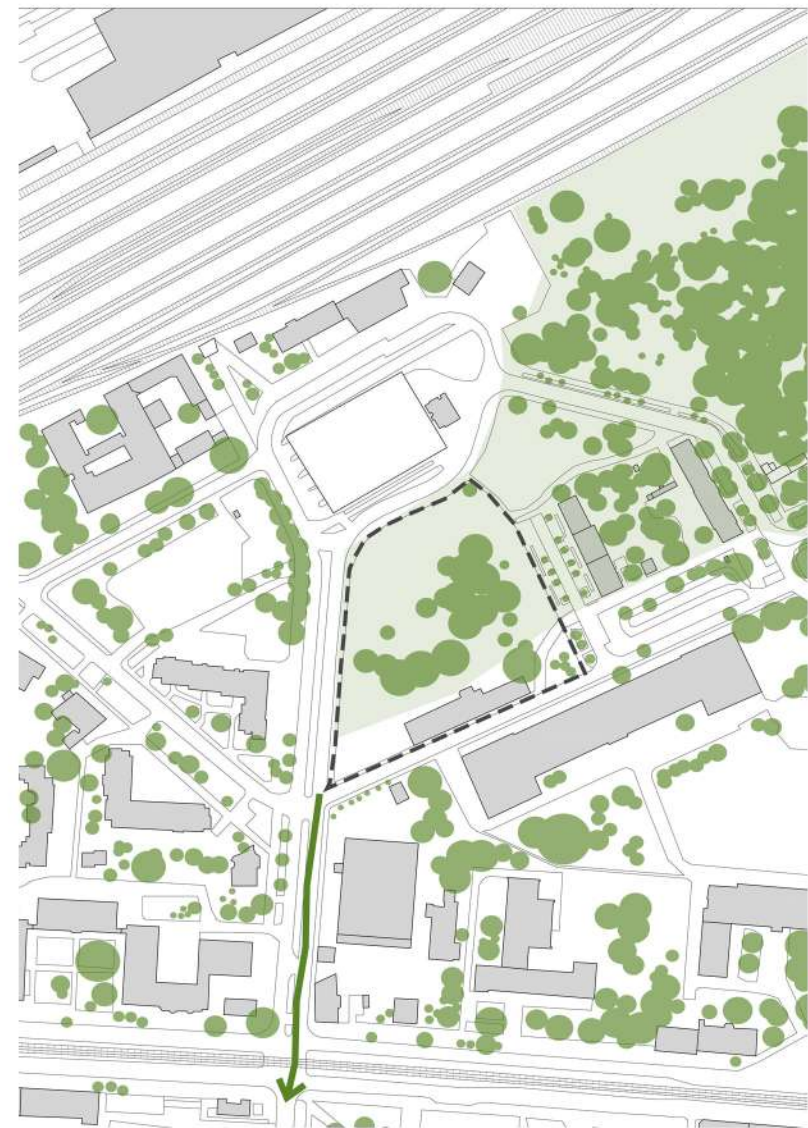


Solar gains are collected by the perovskite quantum dots located on the elevation. Rainwater is retained in underground reservoirs equipped with the additional grey water recycle system.



# GREENERY OF THE PLACE

Keeping the area green enhances the visual comfort. Green roofs, blue-green infrastructure and retention basins improve the microclimate and provide a habitat for the existing fauna and flora. It promotes mental and physical health and reduce exposure to air pollutants, noise and excessive heat. Preserving trees provides additional shading in summer and allows more daylight during winter. Rainwater is retained in underground reservoirs equipped with the additional grey water recycle system.



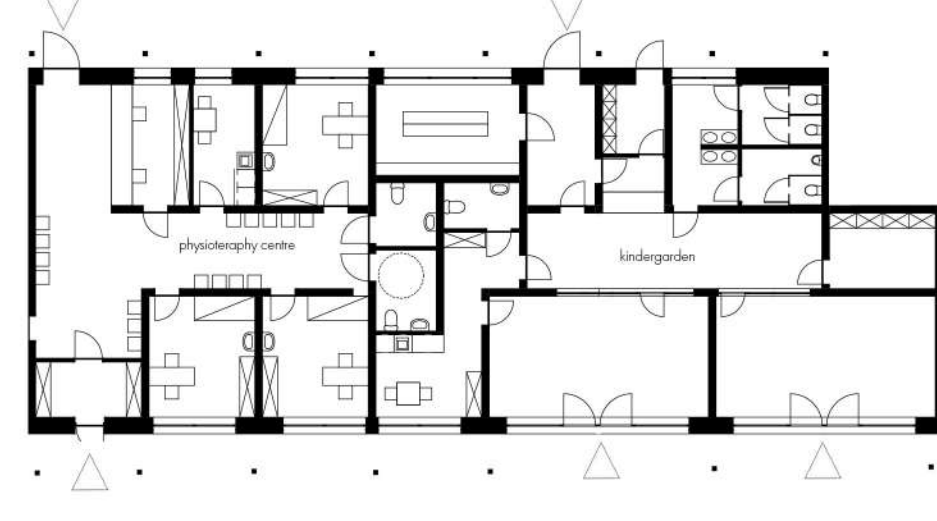
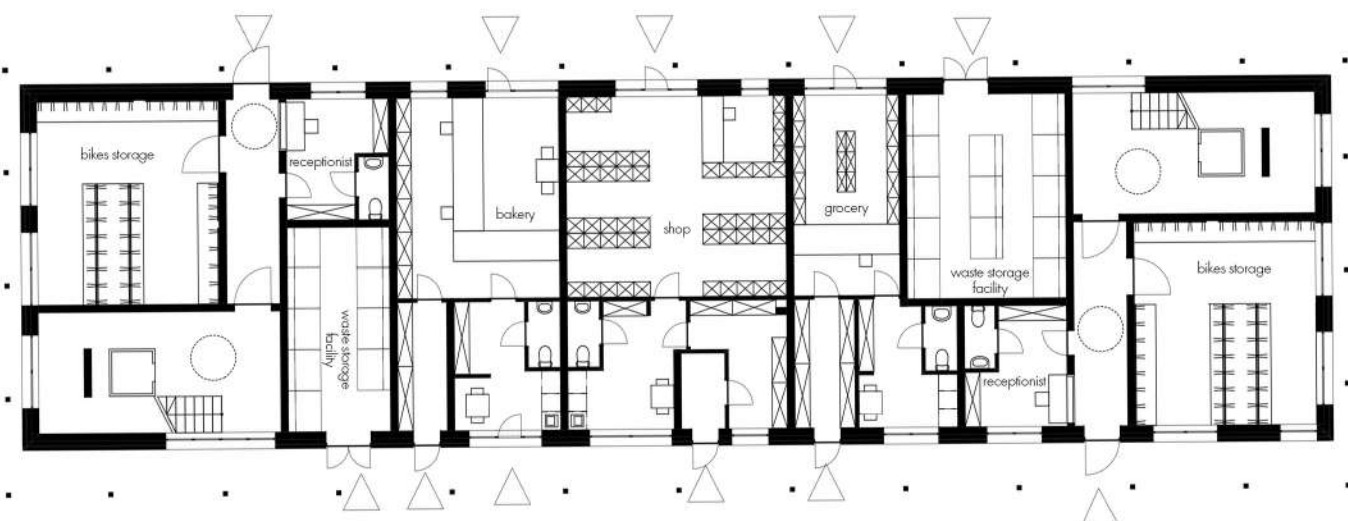
analysis of the greenery



analysis of the urban layout



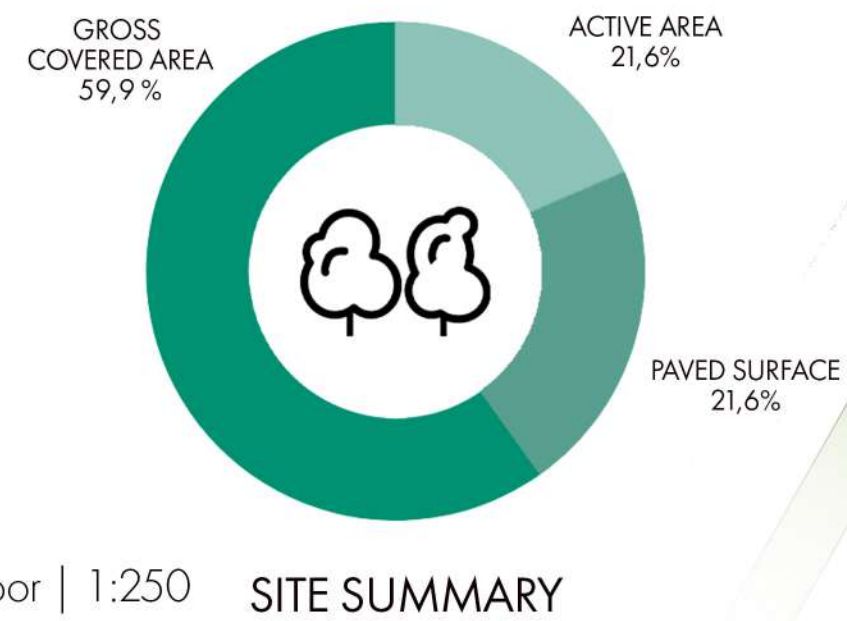
analysis of the existing services and people's paths



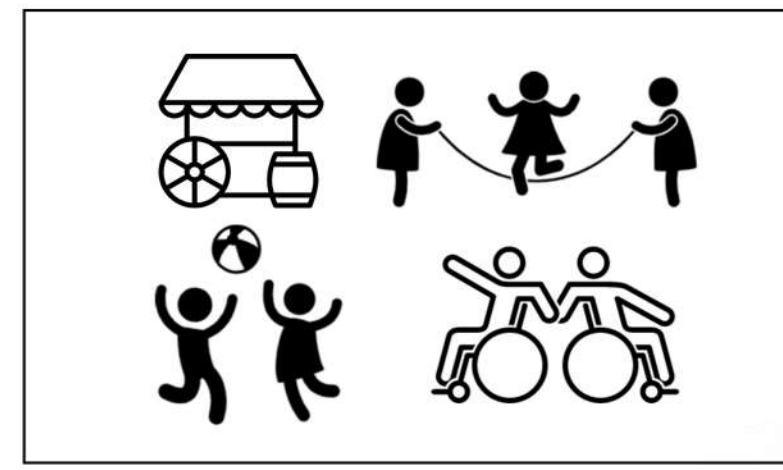
part of the ground floor | 1:250

## SERVICES

We planned new services on the ground floor based on inhabitant's needs, for example: physiotherapy centre, bakery or kindergarten.



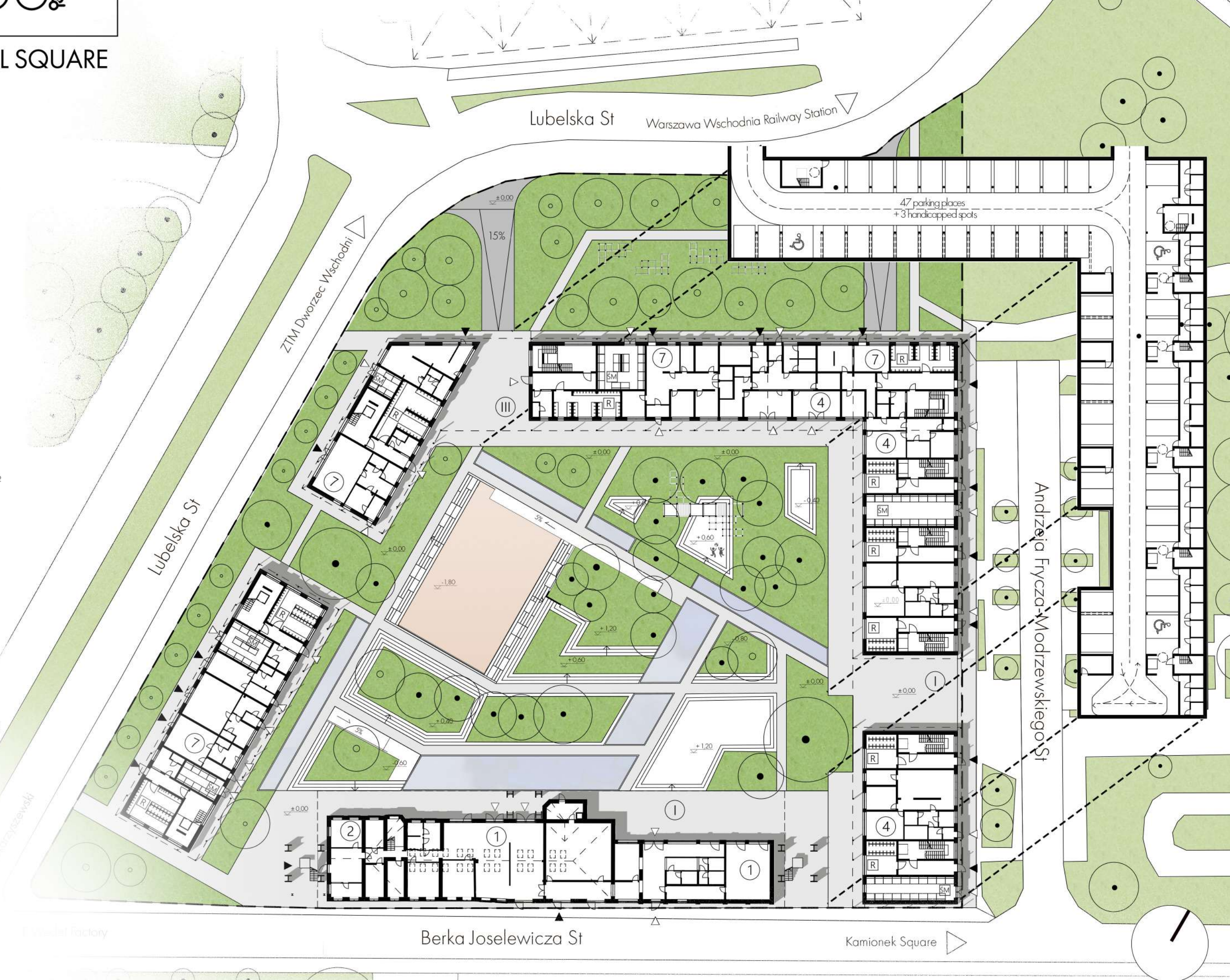
SITE SUMMARY



## MULTIFUNCTIONAL SQUARE

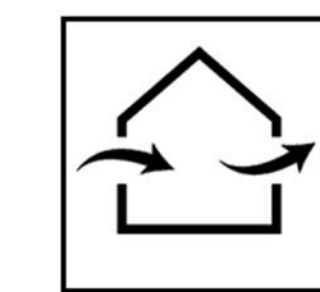
SITE SUMMARY	
AREA NAME	AREA
SITE AREA	12 773,8 m <sup>2</sup>
ACTIVE AREA	
water	461,1
extensive greenery	3 739,7
green roofs	3 879,0
	8 079,8 m <sup>2</sup>
PAVED SURFACE	
multifunctional square	390,2
pavements	3 563,8
playground platforms	142,4
other platforms for sitting	358,2
entrances	290,8
	5 074,2 m <sup>2</sup>
GROSS COVERED AREA	
residential building	3 363,2
old factory	1 292,0
	4 655,2 m <sup>2</sup>
SUM	30 583,0 m <sup>2</sup>

The courtyard is a vibrant place. We designed a multifunctional square, which is an excellent place to spend time with friends, play games and other activities such as workshops or estate events.

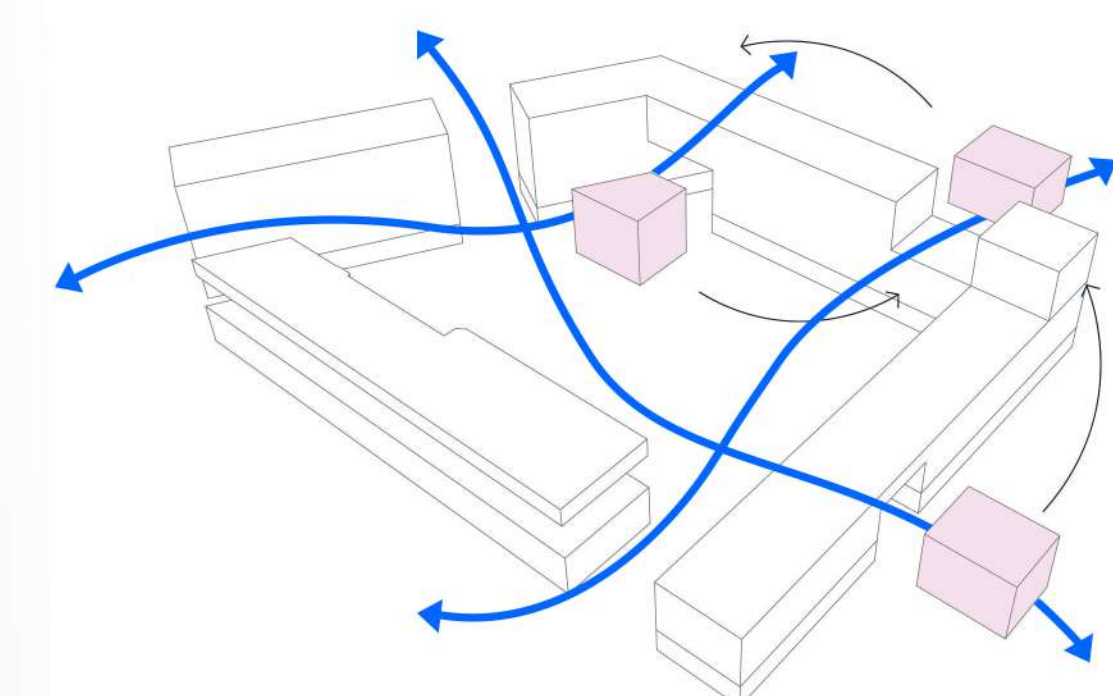


site plan | 1:500

## MODULARITY



Our modularly designed form increases the visual comfort and improves the air-ventilation. Thanks to the modular layout of the rooms, our building can easily serve a different purpose in the future.

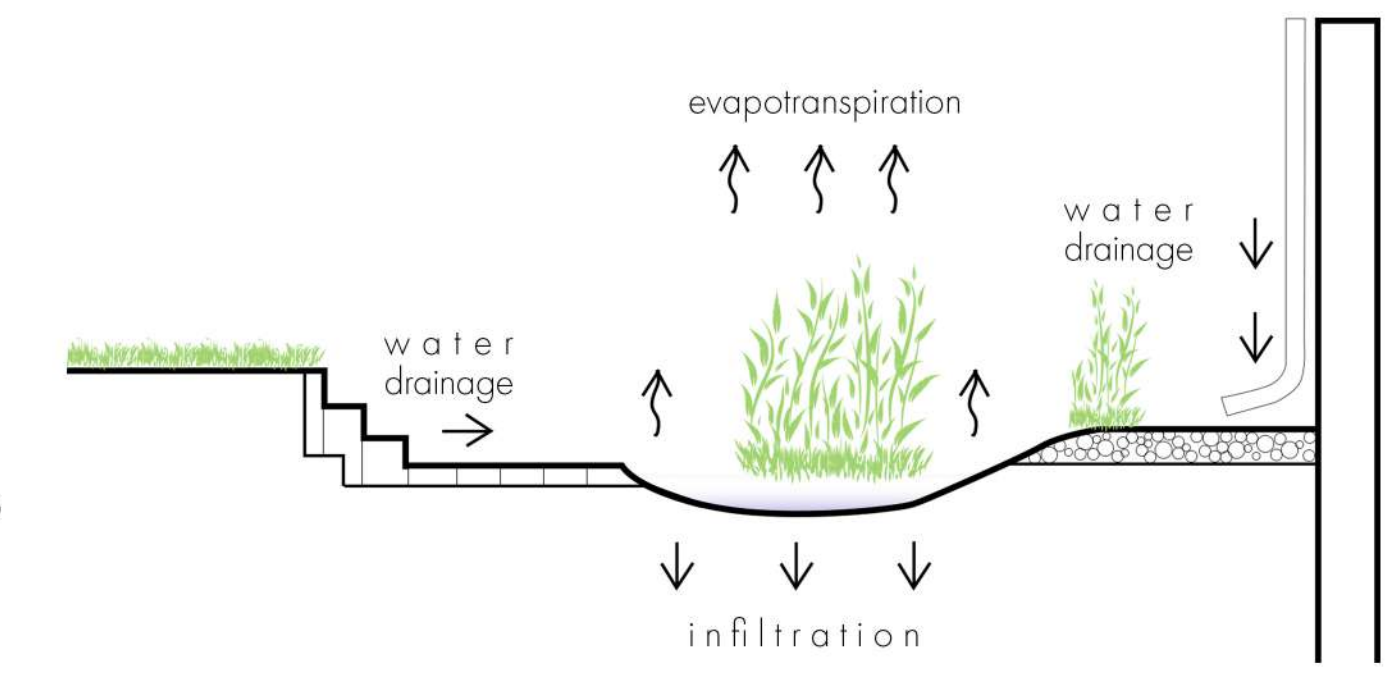


form evolution diagrams



## RETENTION BASINS

The microclimate of the environment is improved by natural rain gardens. Retention basins limit the run-off of water to the sewage system and collect rainwater.



## LEGEND

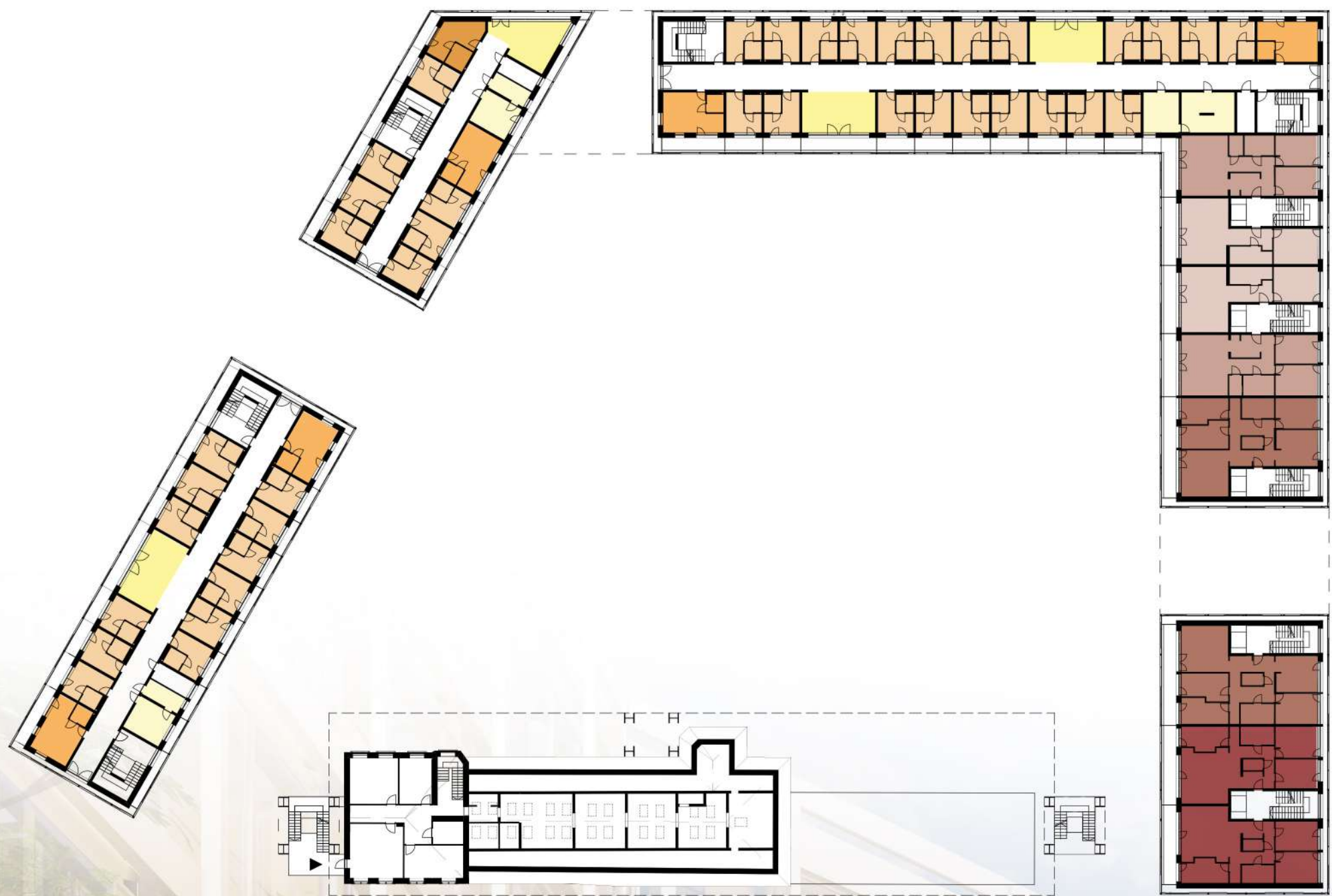
- plot boundary
- buildings boundary
- roof boundary
- active area
- impervious surface
- paved surface
- rain garden
- main entrances
- other entrances to building
- existing trees
- designed trees
- number of levels
- number of overhanging levels
- bikes storage
- waste storage facility
- stair platforms and ramps
- multifunctional square
- dog's park
- playground of the estate





# ZERO BARRIERS

Zeroramowy is a project with neither barriers nor boundaries. It attends to a variety of inhabitants' needs. We adapted flats and dormitories for people with special needs to facilitate everyday activities and to tighten social bonds. The dorm rooms provides single rooms, double rooms and rooms for people with disabilities. The residential part provides four types of housing, most of them is also designed for people disabilities or the elderly.



1 floor plan 1:500



## COHOUSING

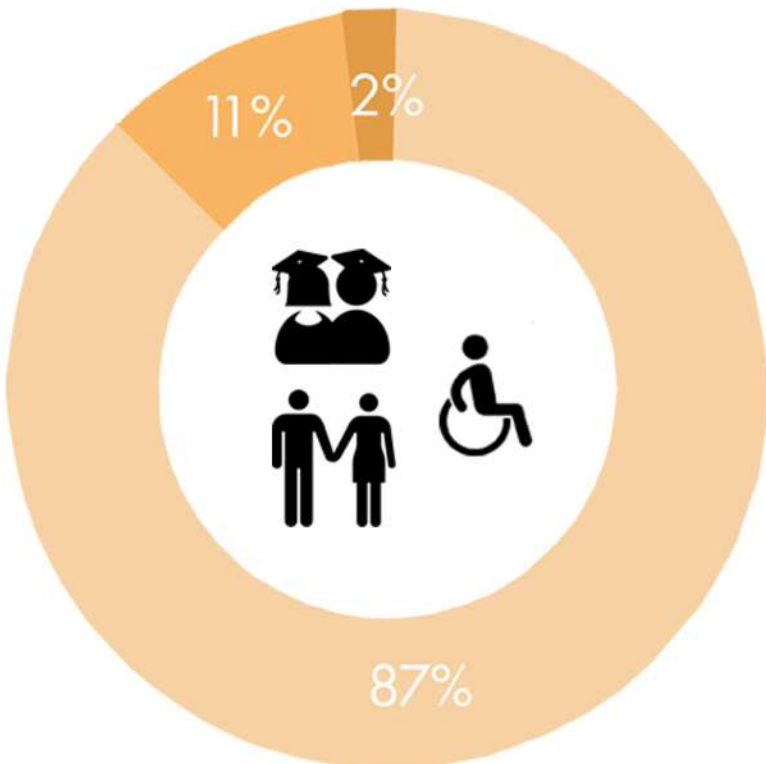
The ageing of society is an alarming issue among highly developed countries. Based on data from the demographic development for the city of Warsaw, we consider cohousing as the perfect solution. Older people can share their experience with the younger generation, and young people can help them with everyday activities, e.g. shopping, new technologies. In addition, there is a student zone in the overhang of the factory, where students have tutoring rooms and open study zones to exchange their ideas and experience.

## EXTRA SHARED KITCHENS

We also designed shared kitchens (more equipped than kitchens in rooms), which integrates young people. Talking and cooking together helps to meet other students and establish relationships.



- single room for disabled person 18,2m<sup>2</sup>
- double room 20,2 m<sup>2</sup>
- single room 14m<sup>2</sup>
- shared kitchen
- laundry room and drying room



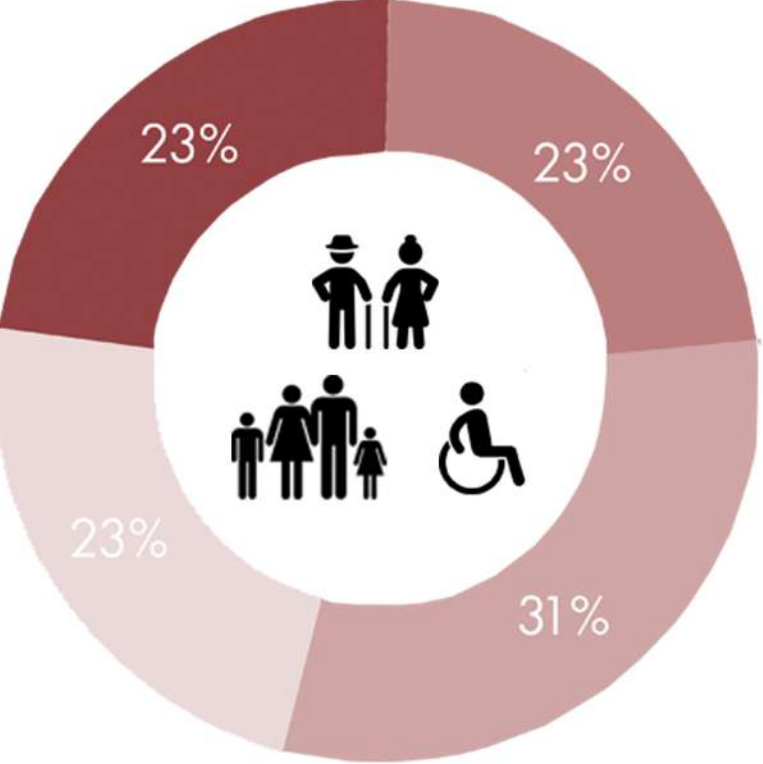
1 FLOOR - DORMITORIES

number of single rooms 40  
number of double rooms 5  
number of single rooms for disabled 1

NUMBER OF ROOMS 46

4 FLOOR - DORMITORIES  
number of single rooms 48  
number of double rooms 5

TOTAL 53



1 FLOOR - APARTMENTS

number of studio apartments (with disabled) 2  
number of 2+1 apartment (with disabled) 2  
number of 2+2 apartment (with disabled) 2  
number of 2+2 apartment 2

TOTAL 8

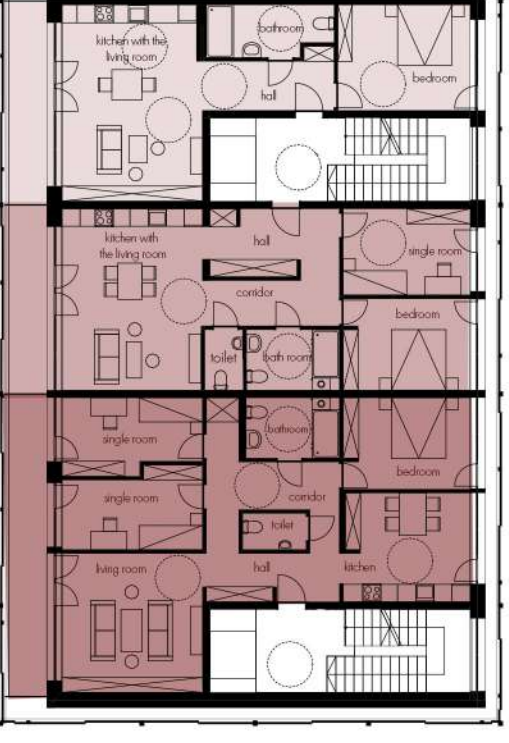
TOTAL

DORMITORIES  
number of single rooms 250  
number of double rooms 30

TOTAL NUMBER 280

APARTMENTS  
number of studio apartments (with disabled) 6  
number of 2+1 apartments (with disabled) 8  
number of 2+2 apartments (with disabled) 6  
number of 2+2 apartments 6

TOTAL NUMBER 26



- studio apartment 61,2m<sup>2</sup>
- 2+1 apartment 80,9 m<sup>2</sup>
- 2+2 apartment 105,1m<sup>2</sup>
- 2+2 apartment 89,7m<sup>2</sup>

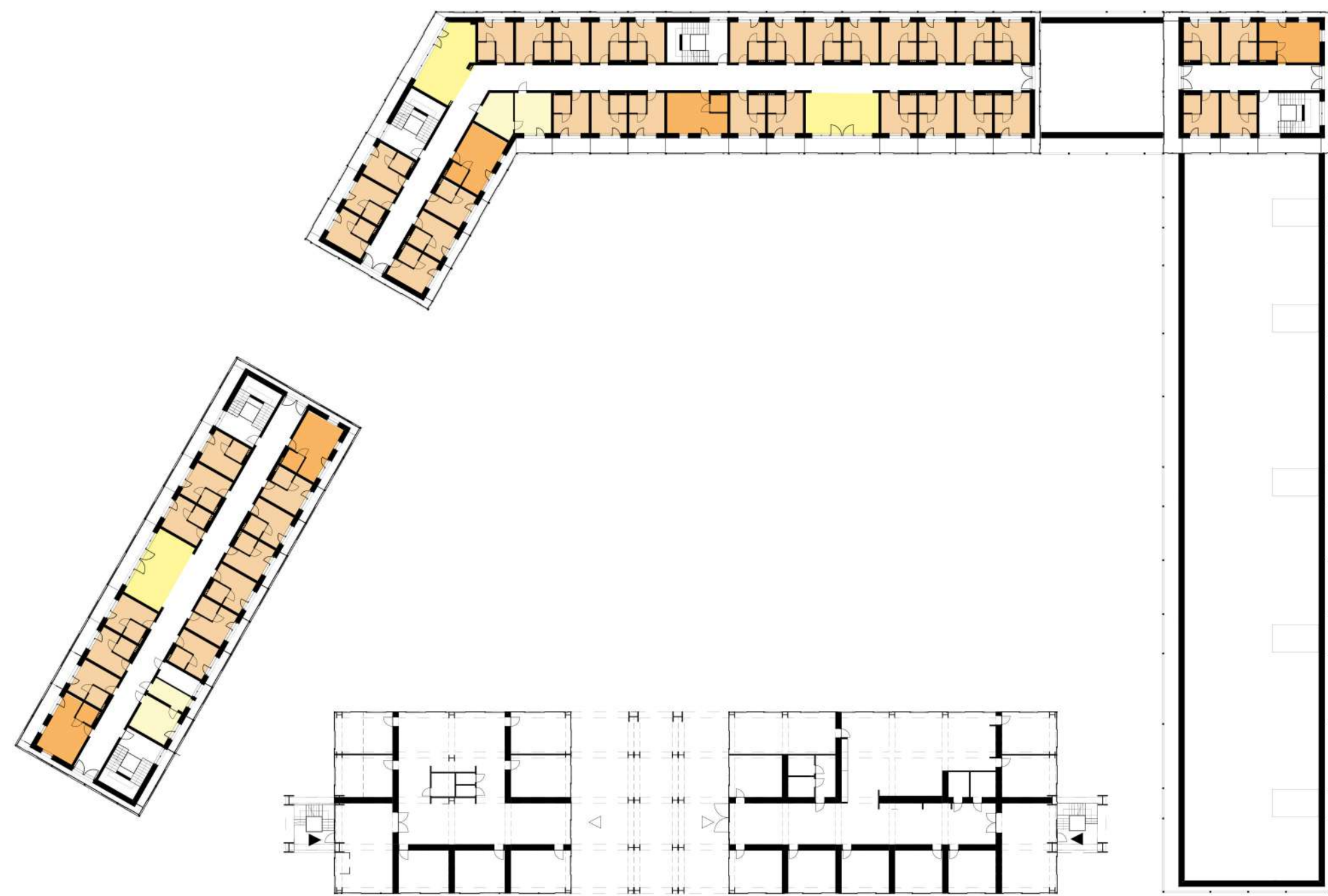
residential modules 1:250



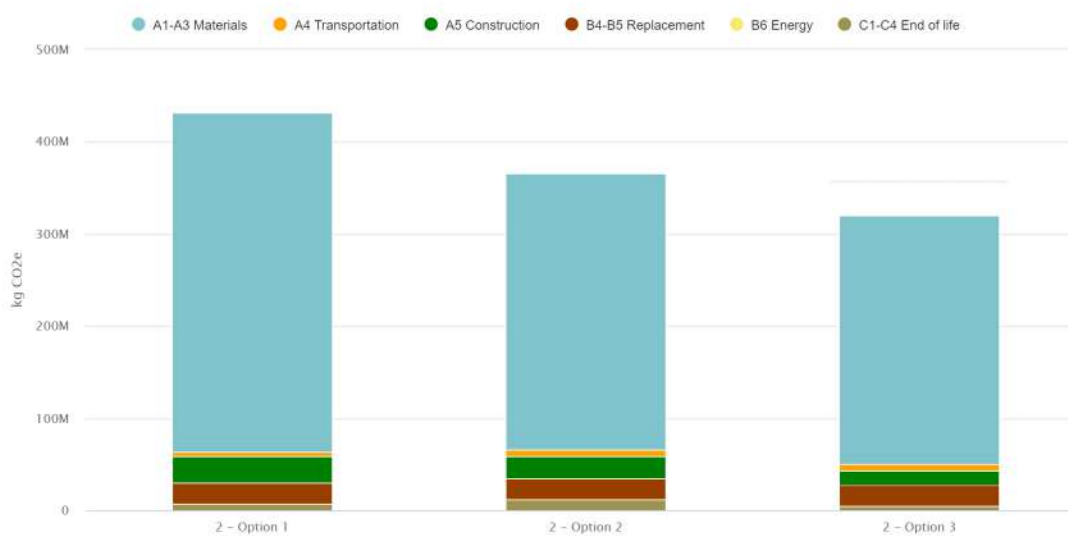
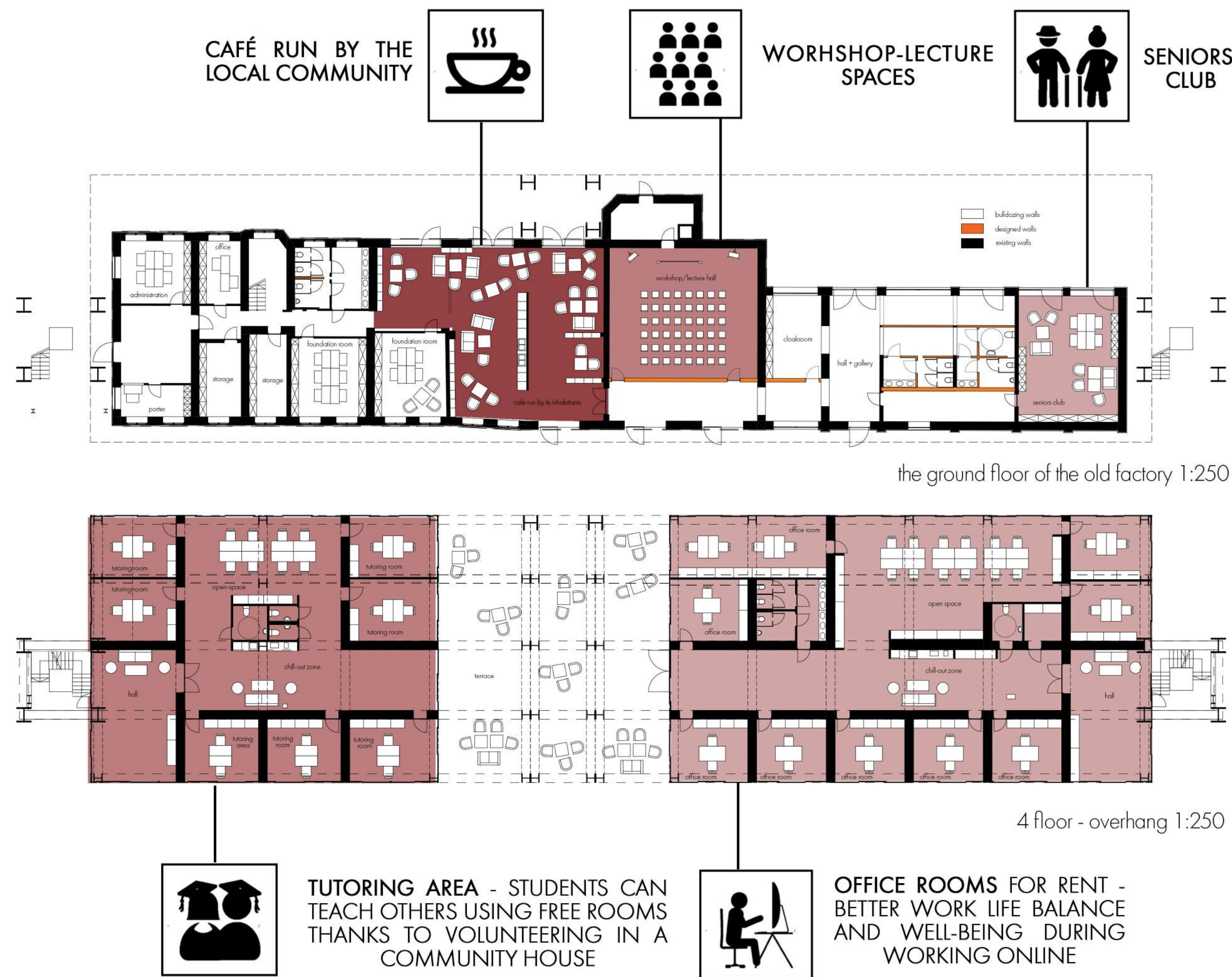


# RECYKLING

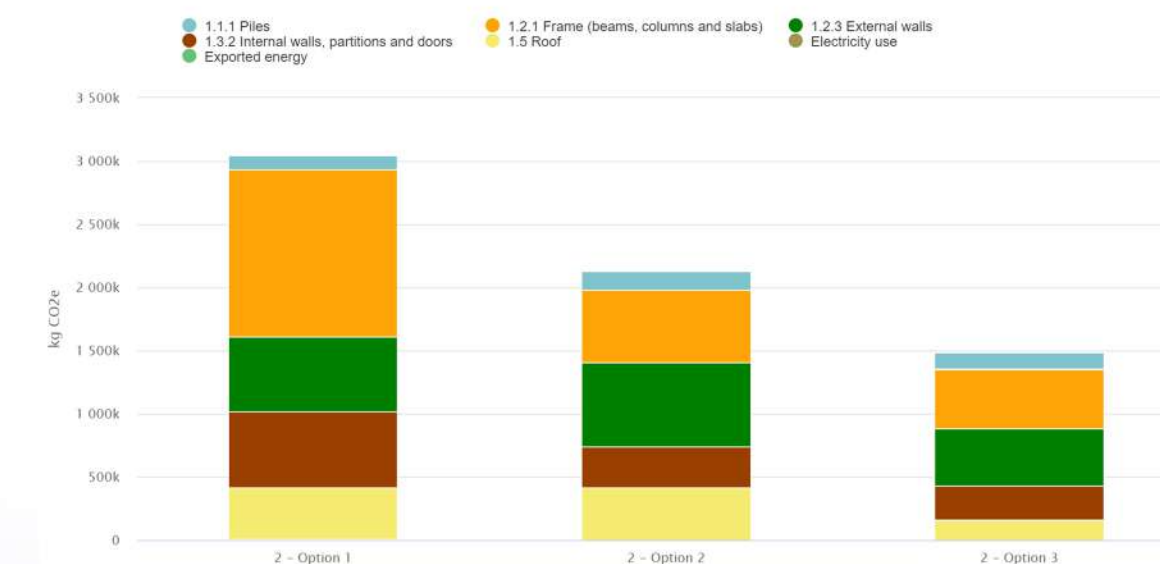
Our conversation with the existing architecture is based on respect for the history of the place. The existing factory will be renovated and converted into a community house with a cafe, workshop space and a senior club. The ground floor is built from re-claimed bricks. In addition, we used Saint Gobain's ecological and low-emission materials to optimize our design.



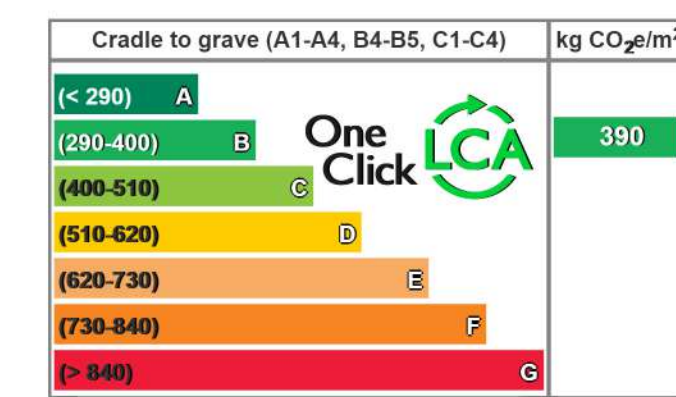
4 floor plan 1:500



elements and life-cycle stages



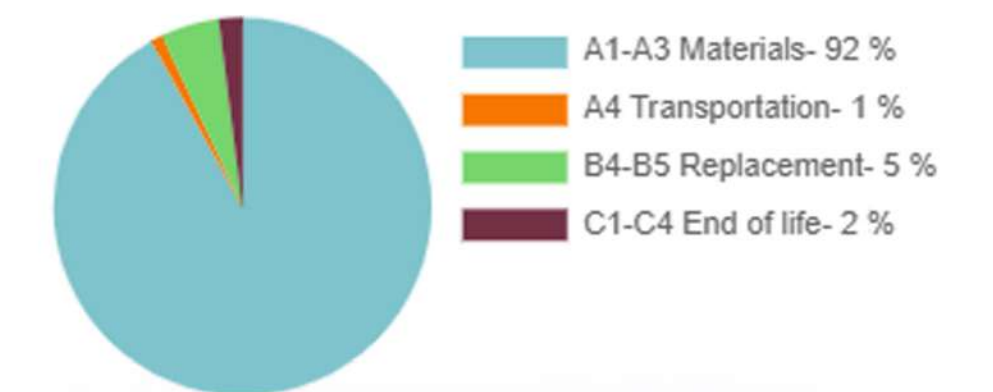
elements



embodied carbon benchmark

## LIFE CYCLE ASSESMENT

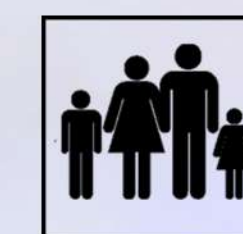
We executed the early design optimization using LCA comparison. While searching for materials we took into consideration: local production, EPDs and embodied carbon value. We don't have to worry about the future of our building. It can be easily recycled or even reused. We also use re-claimed brick from the site - almost zero emission footprint. We based on low-carbon concrete and recycled materials.



embodied carbon by life-cycle stage



## DORMITORIES



## APARTMENTS



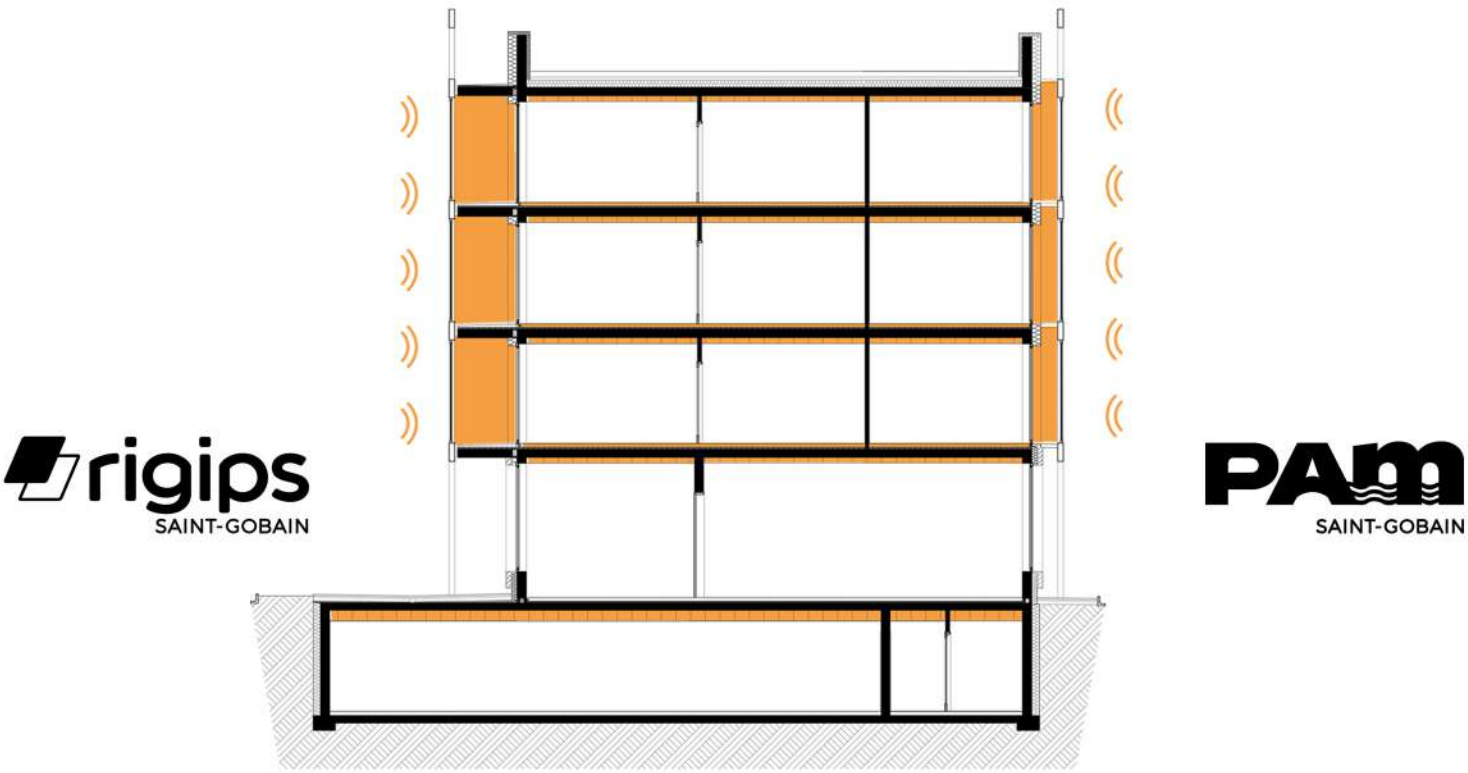
south elevation 1:200





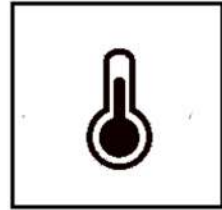
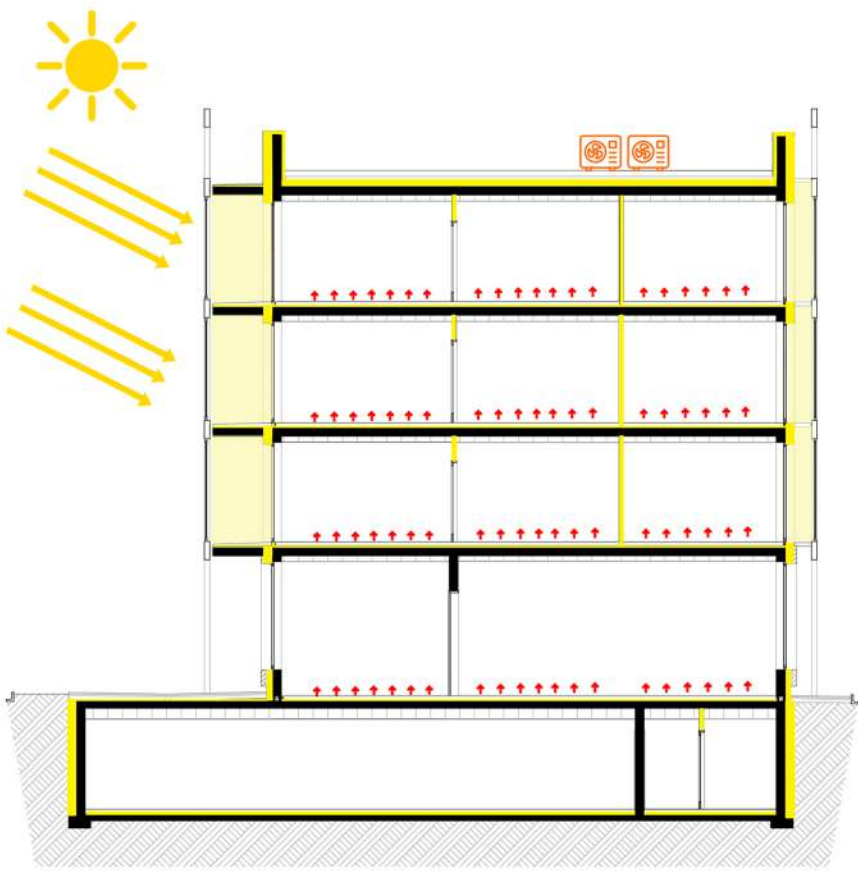
A-A longitudinal section 1:300

# MULTICOMFORT



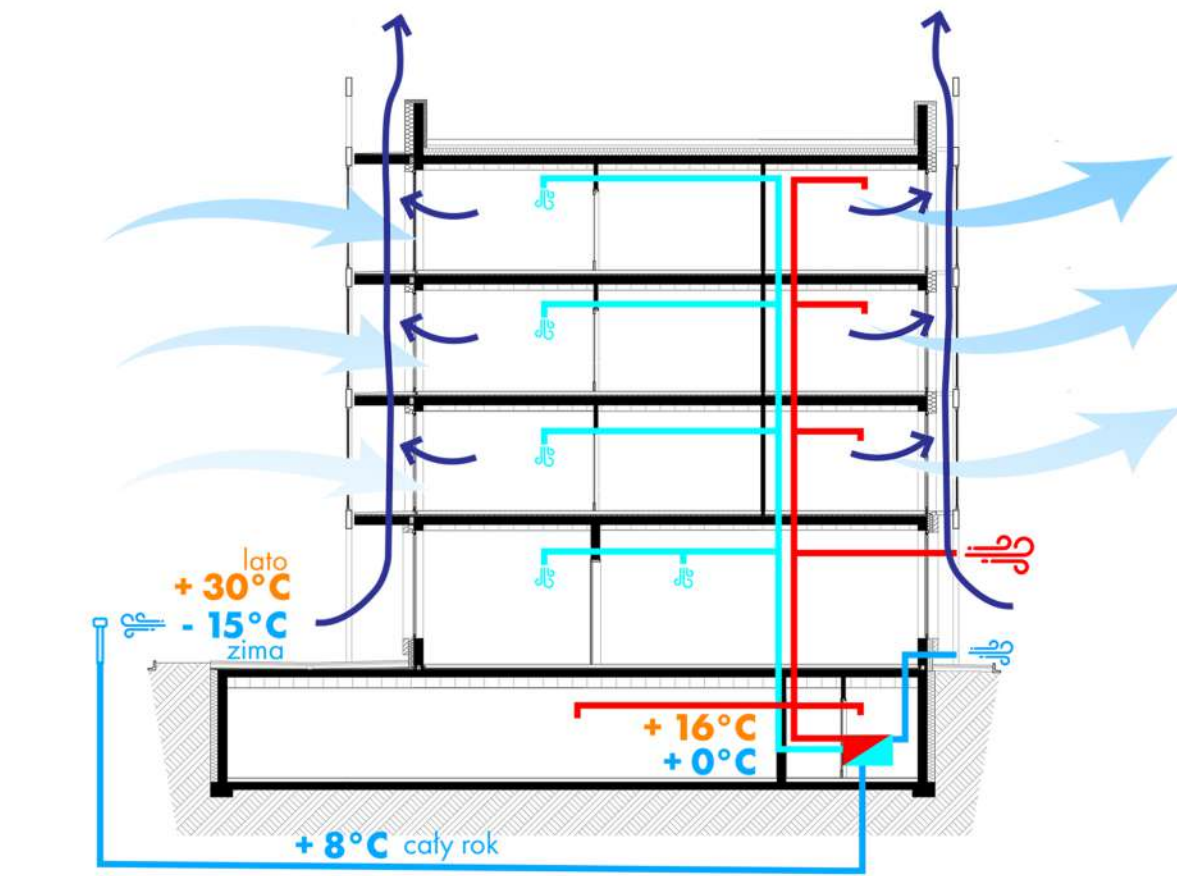
## ACOUSTIC COMFORT

An advanced window system and double skin façade reduce urban road traffic noise. Floating floors and false ceilings absorb impact noise as well as airborne noise. Rigips acoustic panels control noise reverberation. Climaver self-supporting ducts reduce the ventilation noise.



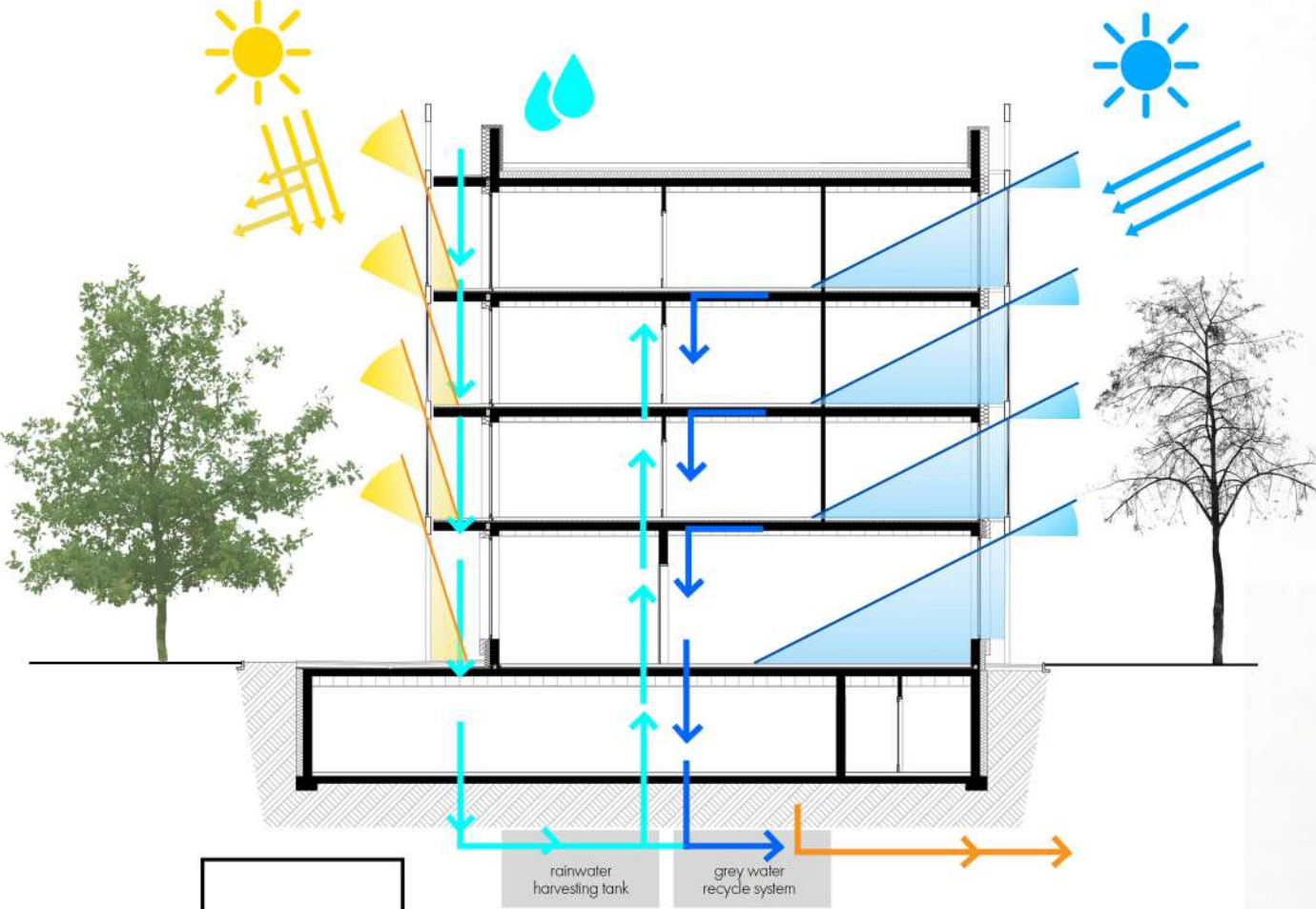
## THERMAL COMFORT

Isover insulation materials and Weber membranes prevent heat loss. A double skin façade allows indoor temperature to be controlled. It reduces heat loss and summer heat gain. Dwellings are equipped with floor heating. Everything runs on air heat pumps located on the roof. An innovative windows system provides airtightness which reduces thermal energy consumption. Solar gains are collected by the perovskite quantum dots located on the elevation.



## IAQ COMFORT

Dwellings are cross ventilated. A controlled mechanical ventilation system provides fresh and filtered air. The air filters with carbon dioxide controllers improve the air quality. Heat recovery is provided by a recuperation system and amplified by the earth heat exchanger.

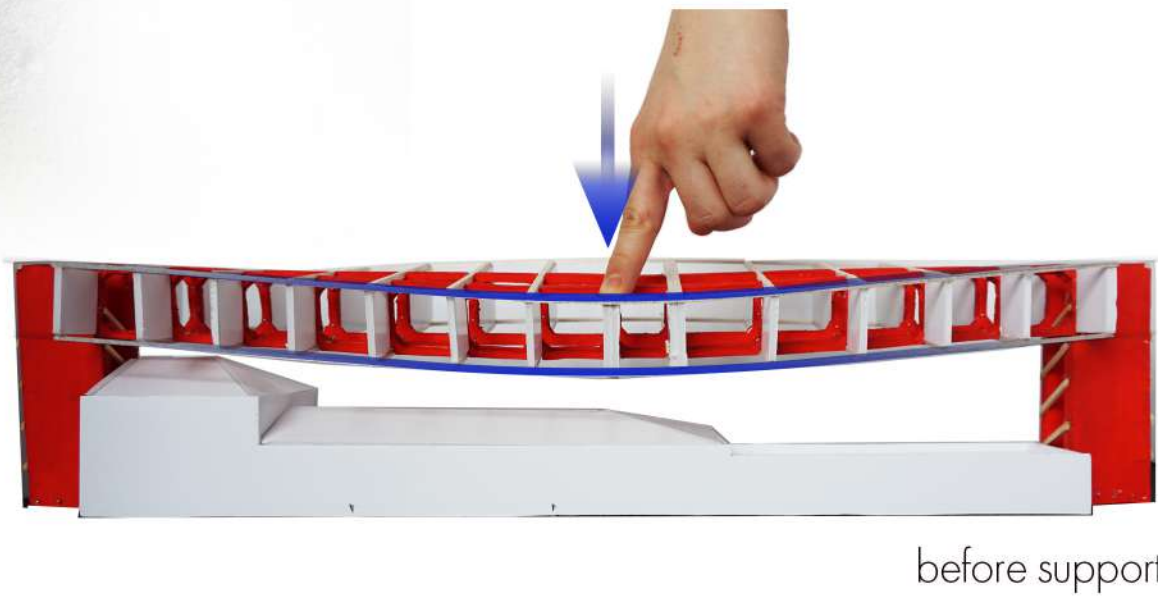


## VISUAL COMFORT

Room zoning and the building's orientation is based on the diurnal cycle of the sun. Everyday spaces are well daylighted thanks to the optimization of the façade glazing coatings. Accordingly, we placed wider loggias on the south side. It all conduces to the elevated mood, better health and productivity of the occupants.

# THE VIERENDEEL TRUSS

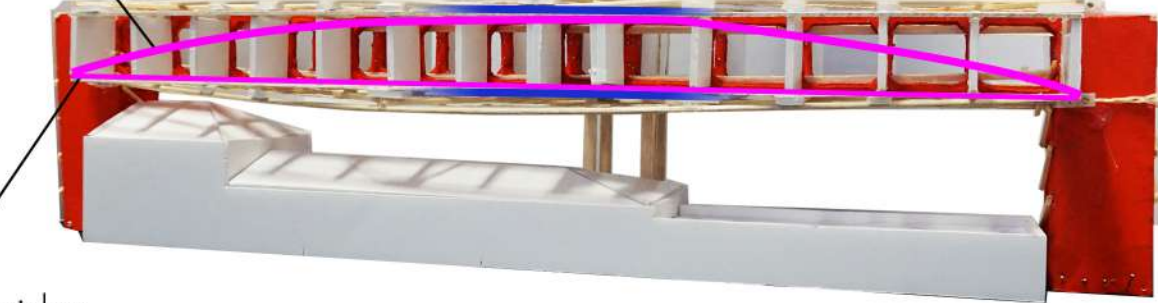
We designed the overhang structure to connect new architecture with the historic building without altering the factory construction. The construction's spine features a Vierendeel truss. We showcase a variety of solutions to improve additional stiffness of the structure. They differ in technology and design. We examined all the cases and chose the middle four-column support with extra



before support

similar to a thrust line arch, strengthening Vierendeel beam

2 arch both sides of the Vierendeel's beam



after support

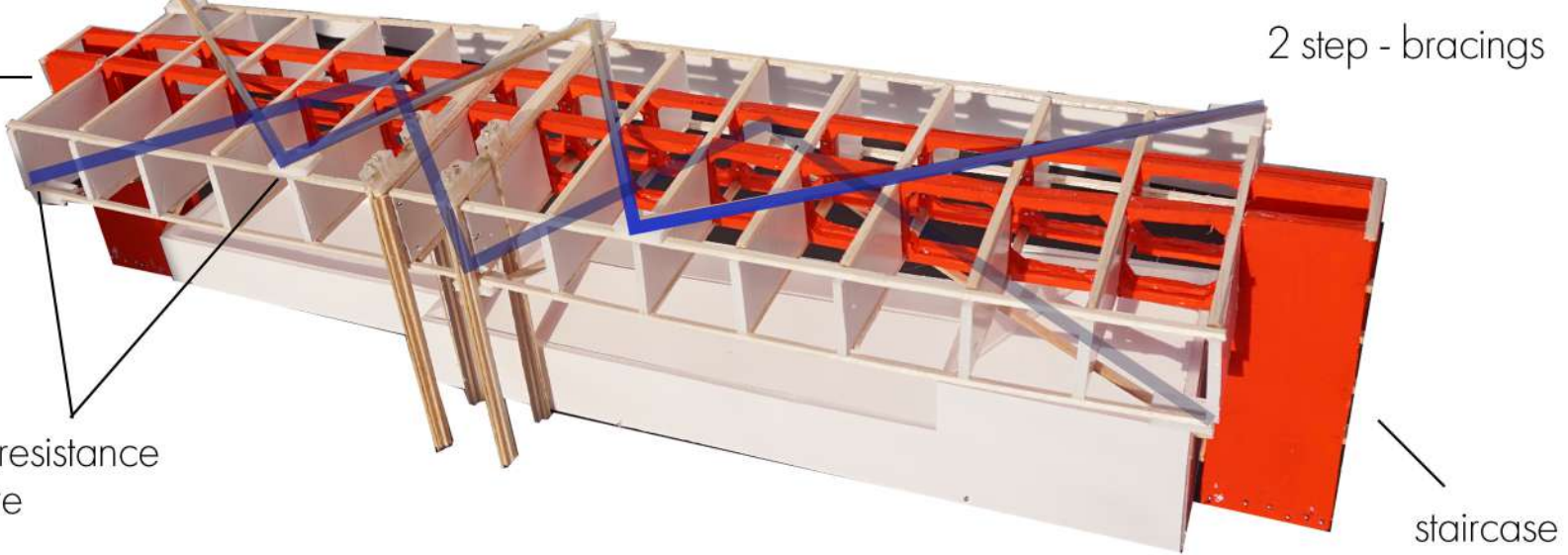


1 step - adding 4 column

The Vierendeel truss is supported on 2 staircases

The Vierendeel truss

bracings for torsional resistance of the structure

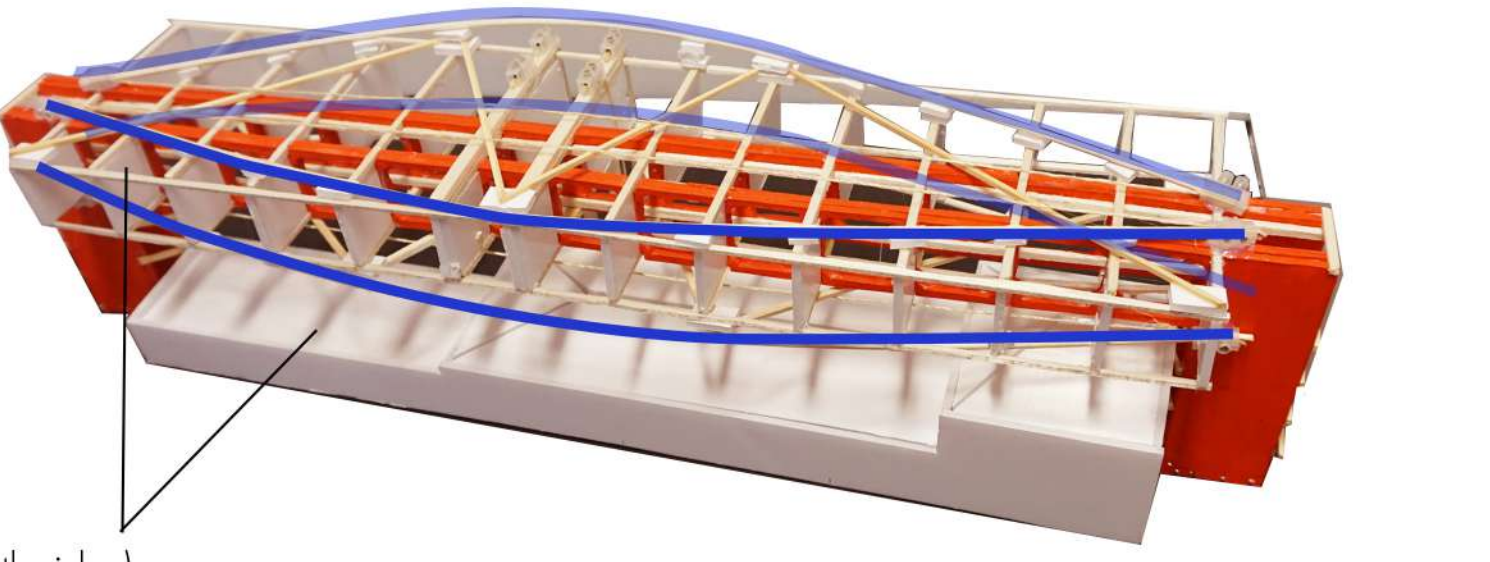


four-column support in the middle of Vierendeel truss

2 step - bracings

We have made a physical model of the overhang structure to examined the stiffness and strenght of our concept. As a result constructional structure uplift.

two arches up and town (both sides)



3 step - extra arches







# SUSTAINABILITY

The idea of ecologic and sustainable design is developed through the second skin of the building. We planned wider loggias on the south side to prevent over-heating in summer, but to capture solar heat in winter. Inhabitants can easily regulate their own comfort by siding second skin glass panels. Thanks to the proper glazing coatings we reach the maximum daylight transmission and minimize solar energy transmission. In addition, excellent U-value ensures thermal insulation.

Solutions:

- low-emission glazing coatings - CLIMAPLUS COOL-LITE® SKN, ECLAZ®
- minimize use of concrete and chose low-carbon materials - ULIBAT® Low Carbon Concrete
- re-claimed brick from the site - almost zero carbon footprint
- perovskite quantum dots on the elevation - change solar energy into electricity

External wall

$$R = 8,48 \text{ m}^2\text{K/W}$$
$$U = 0,12 \text{ W/m}^2\text{K}$$

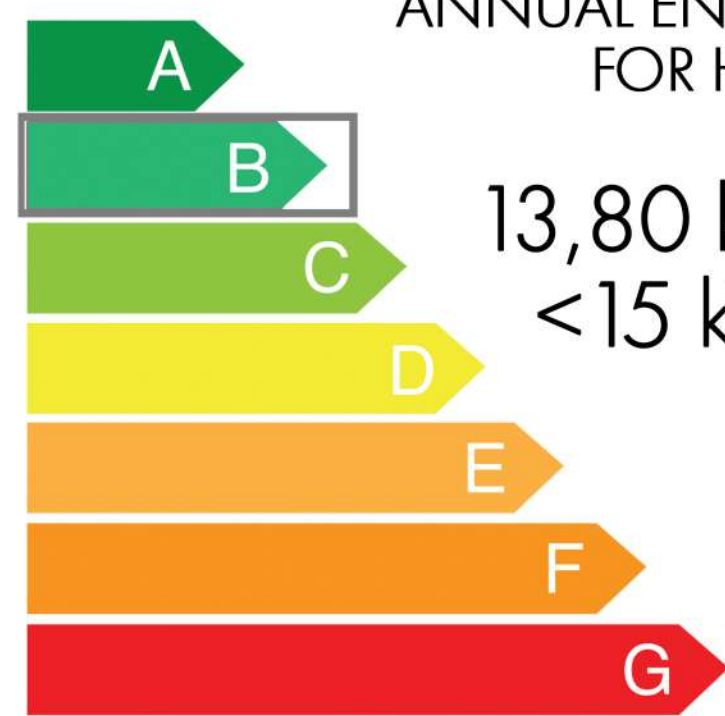
Extensive green roof

$$R = 8,14 \text{ m}^2\text{K/W}$$
$$U = 0,12 \text{ W/m}^2\text{K}$$

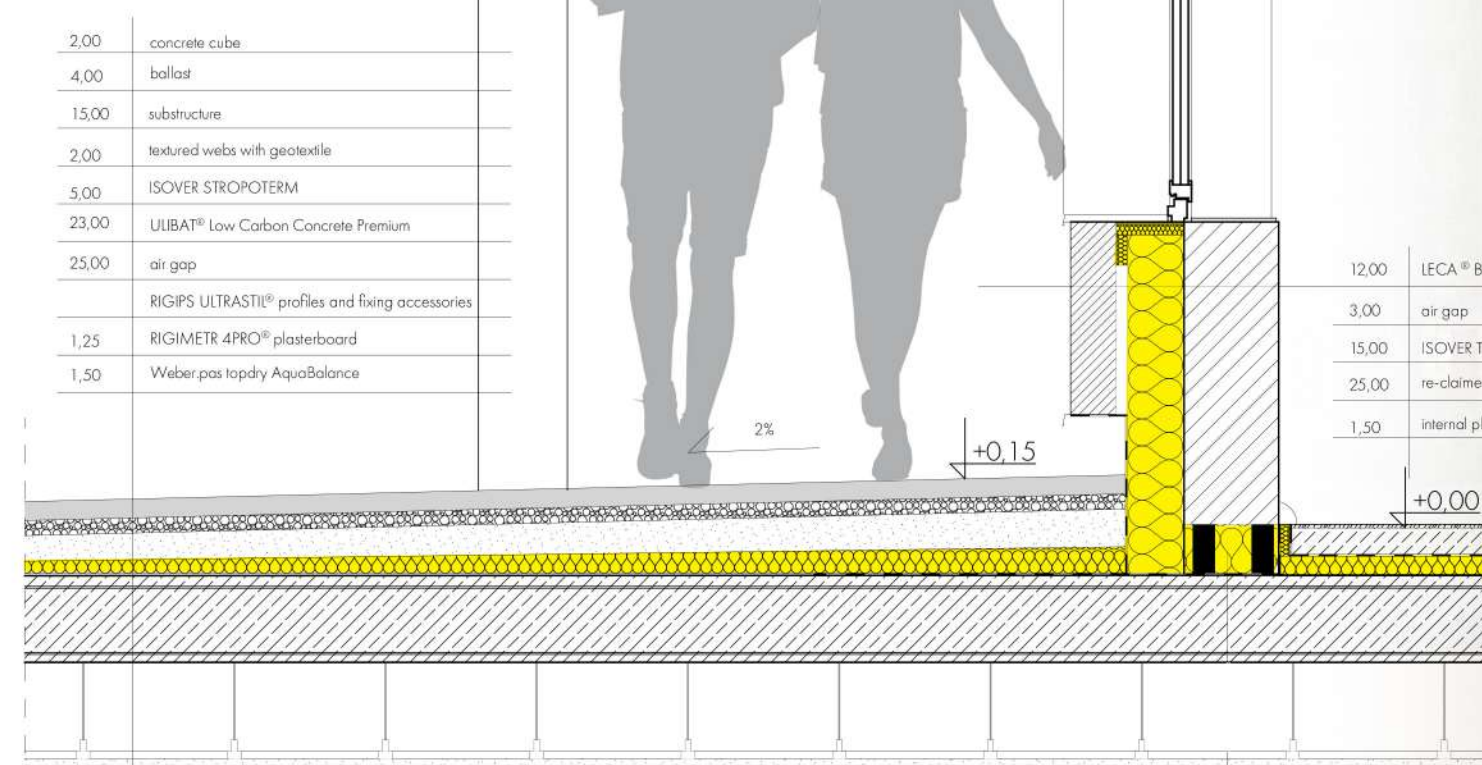
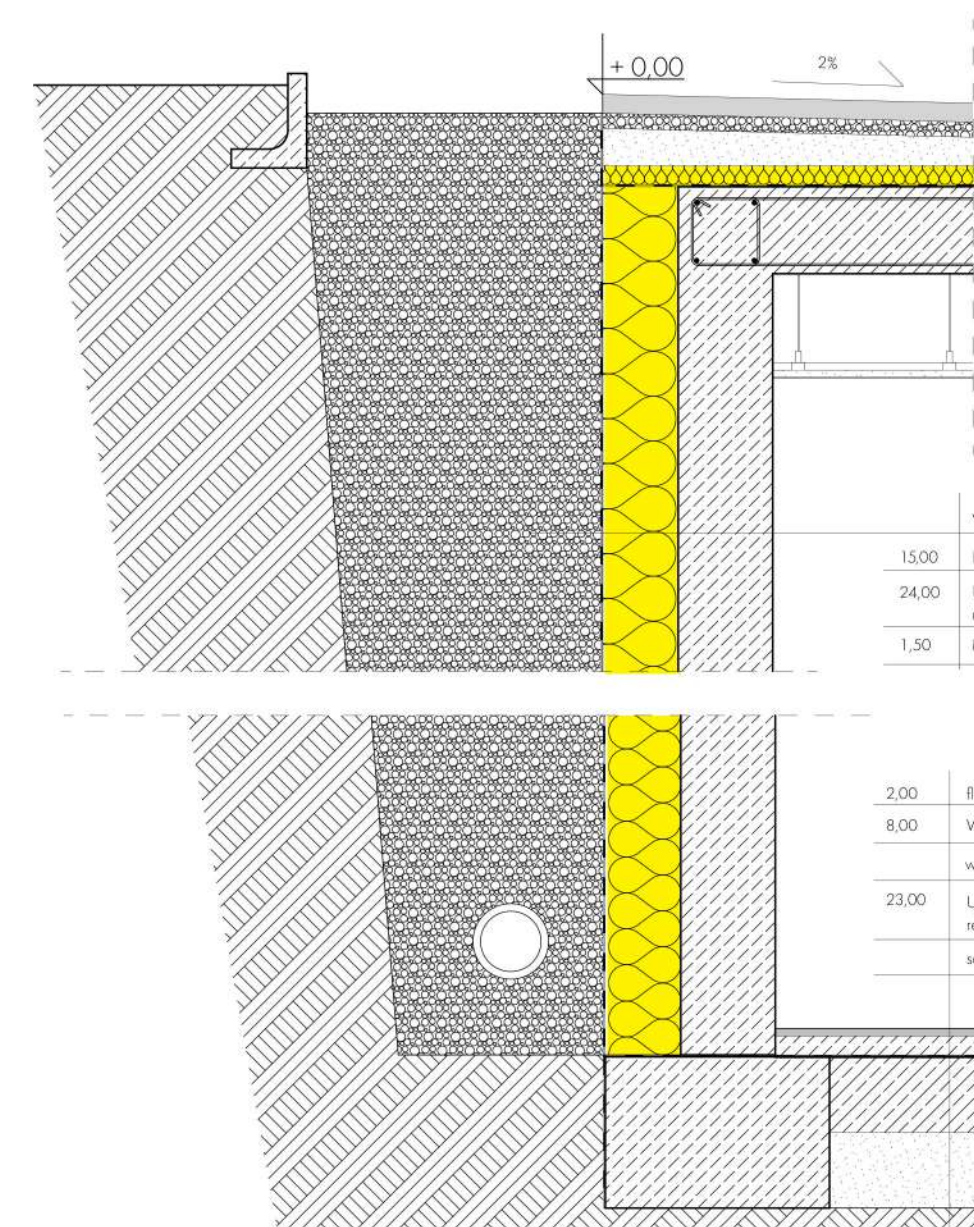
Floor on the ground

$$R = 8,48 \text{ m}^2\text{K/W}$$
$$U = 0,12 \text{ W/m}^2\text{K}$$

ANNUAL ENERGY DEMAND  
FOR HEATING

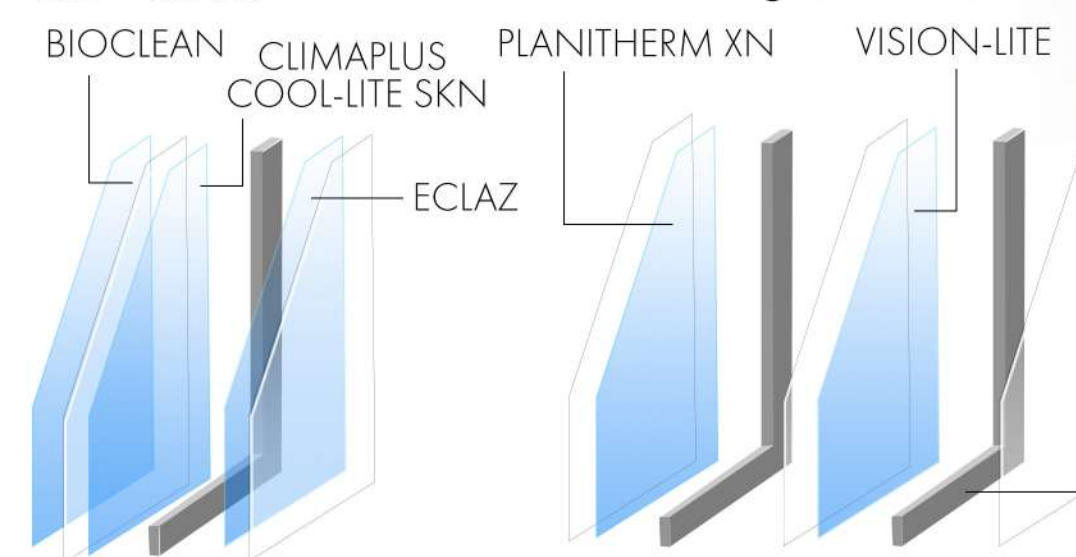


13,80 kWh/m²  
<15 kWh/m²



$U_g = 0,5 \text{ W/m}^2\text{K}$   
 $R_w = 33 \text{ dB}$

$U_t = 74\%$ ,  $g = 50\%$   
base glass PLANICLEAR



SECOND SKIN LOGGIA EXTERNAL WINDOW

CLIMAVER®

distance frame - Ultimate  
SWISSPACER

GLASSOLUTIONS  
SAINT-GOBAIN

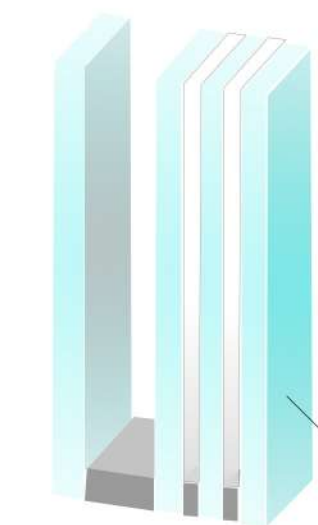
weber  
SAINT-GOBAIN

ISOVER  
SAINT-GOBAIN



## FIRE SAFETY

Façade is made of non-combustible materials. We used Vetro Tech façade glazing. The extensive green roof system improves the fire safety as well.

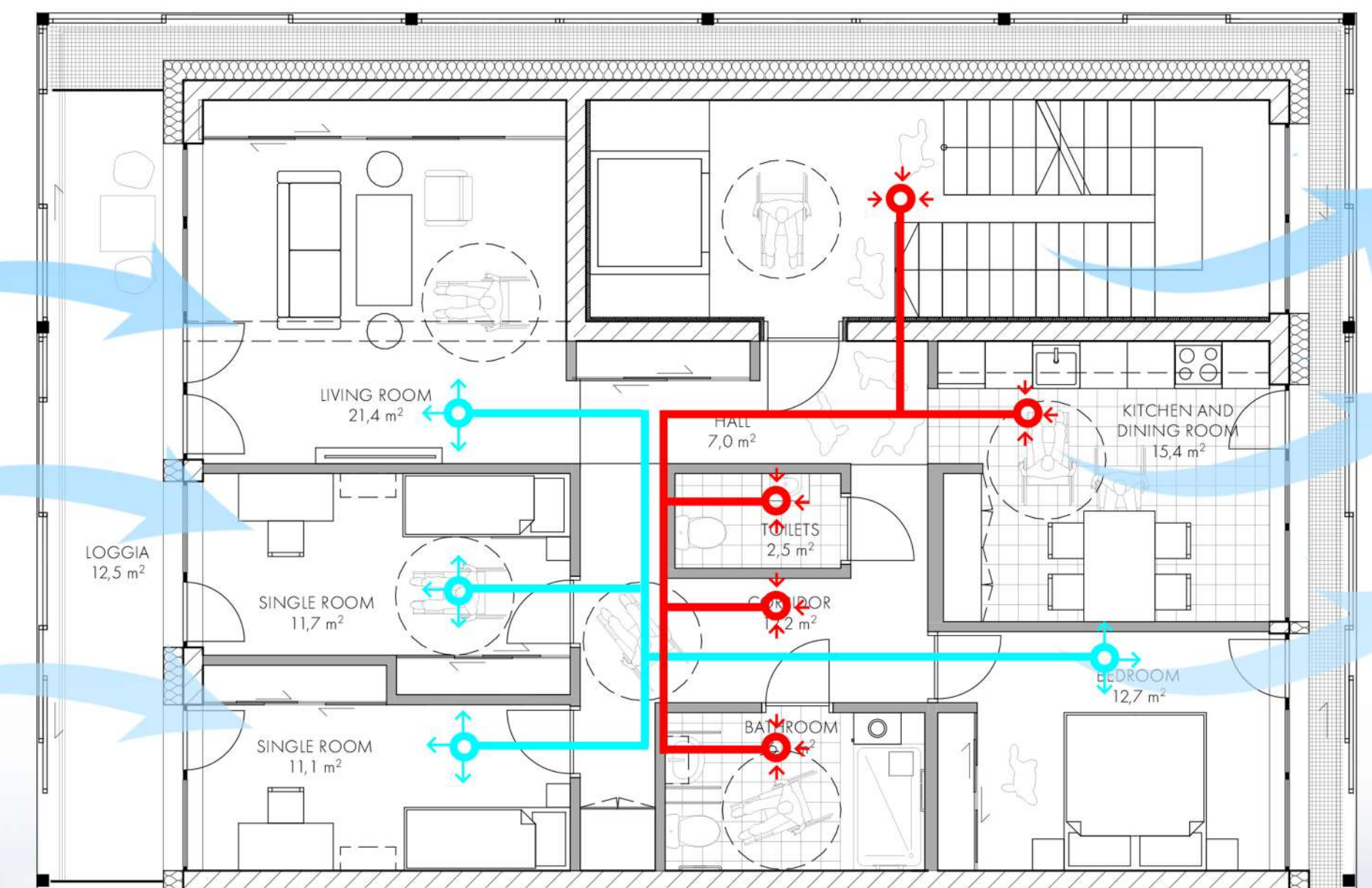


Green roof  
RE30/RE15 BROOF (11)

Facade  
EI 60  
 $U_g = 0,7 \text{ W/m}^2\text{K}$   
 $g = 0,5$

CONTRAFAM 60-3 CLIMATOP

vetrotech  
SAINT-GOBAIN



2+2 apartment with disabled - floor plan 1:80



c-c cross-section 1:80