# How can police stations help solving housing crisis in the Netherlands?

Adapting 20th Century Heritage

Vacant Police Real Estate

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Delft University of Technology

2022, June


MORITZ

# RESEARCH

How can **adaptive transformation** and **waste reduction** strategies in architecture contribute to **solving housing crisis in a sustainable way** for the city of Groningen?

# HOUSING CRISIS

# Shortage of **419.000** new homes by **2025** in the Netherlands

Source: https://economics.rabobank.com/publications/2021/march/housing-shortage-and-low-interest-rates-are-driving-up-house-prices/#:~:text=The%20shortage%20in%202025%20is,solution%20to%20the%20housing%20shortage.

## Housing shortage in Groningen worse than even Amsterdam

by The Northern Times — January 7, 2020 in Economics 0

# Groningen **housing shortage** to rise to **10,000** homes **by 2025**

Source: https://northerntimes.nl/groningen-housing-shortage-projected-to-rise-to-10000-homes-by-2025/


**YOUNG PROFFESIONALS/STUDENTS**

23% Groningen population:
between the ages of 15 and 29

+

**COUPLES/FAMILIES**

unaffordable housing

+

**SENIOR CITIZENS**

more suitable rental units - free up more larger properties

Source: https://northerntimes.nl/groningen-housing-shortage-projected-to-rise-to-10000-homes-by-2025/

## UNDER - PERFORMING OFFICE SPACE

## DUTCH POLICE REAL ESTATE CHALLENGE

**700,000 m2** of real estate will be divested **by 2030**

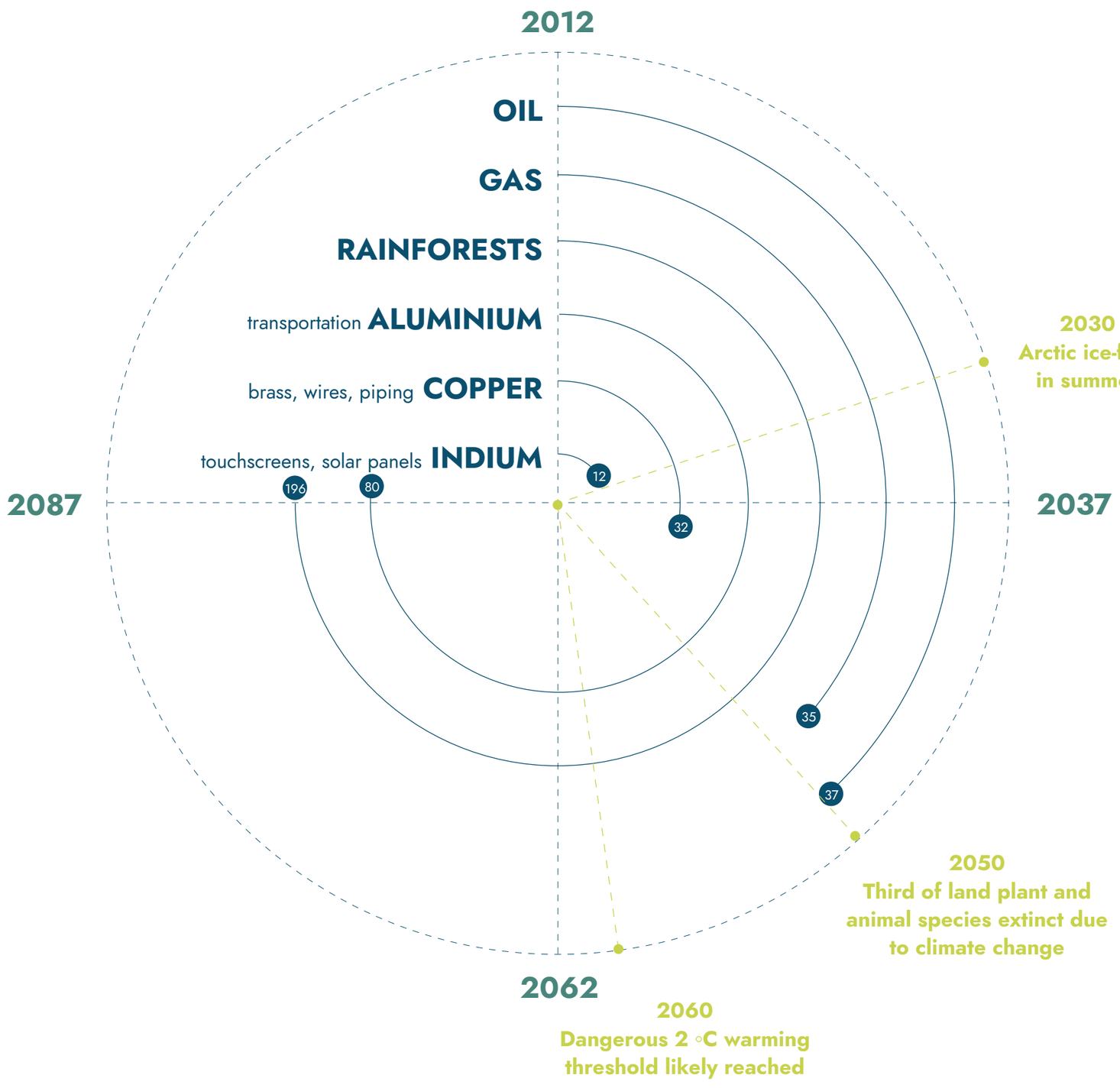
## NEED FOR AFFORDABLE HOUSING

**845,000 homes** must be built **by 2030**

# MATERIAL CRISIS

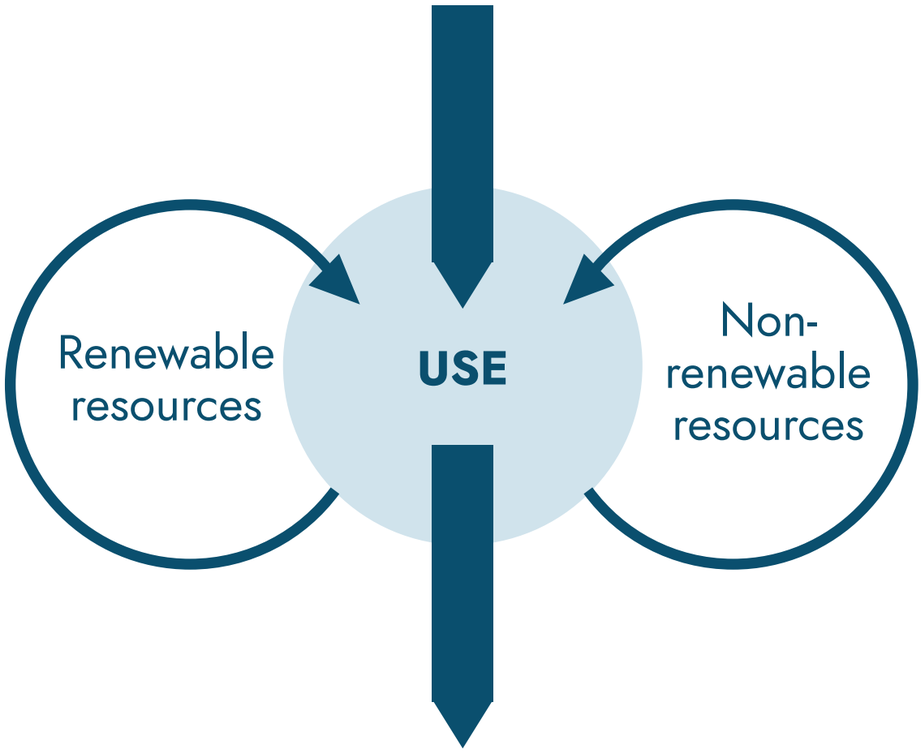
# MATERIAL DEPLETION

## Reserves are running out

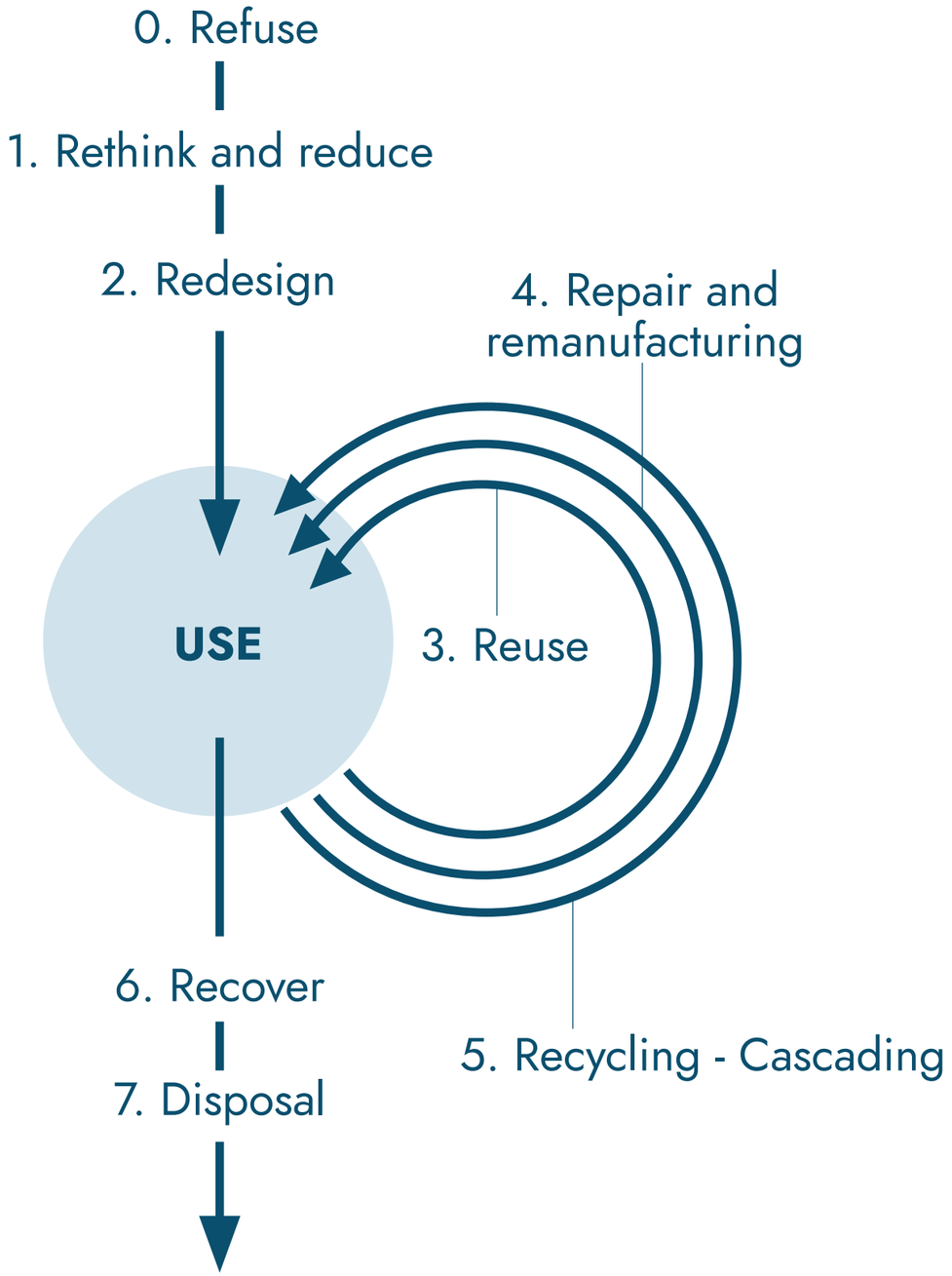



Source: https://www.bbc.com/future/article/20120618-global-resources-stock-check

## LINEAR RESOURCES

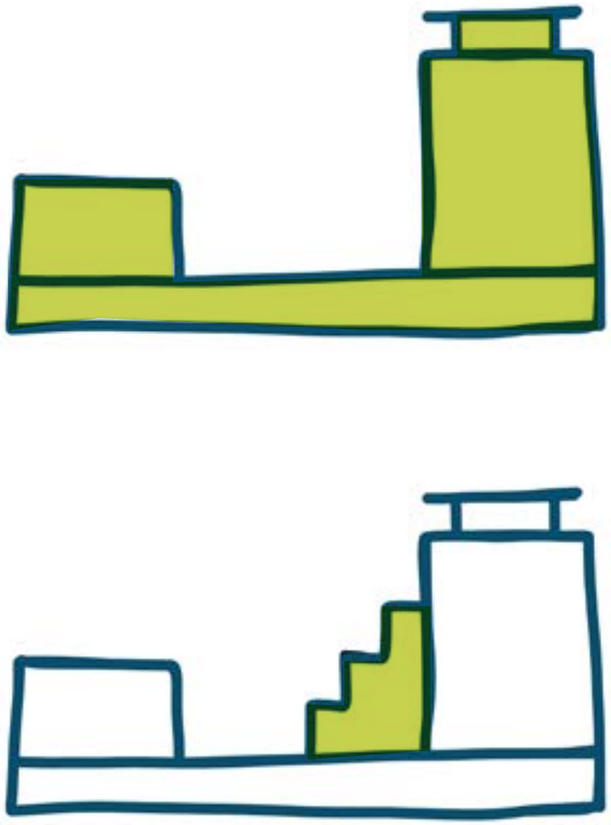



## CIRCULAR APPROACH




Source: Lugt, P. (2020). Tomorrow's timber. Towards the next building revolution. Material district.

# DESIGN STRATEGY

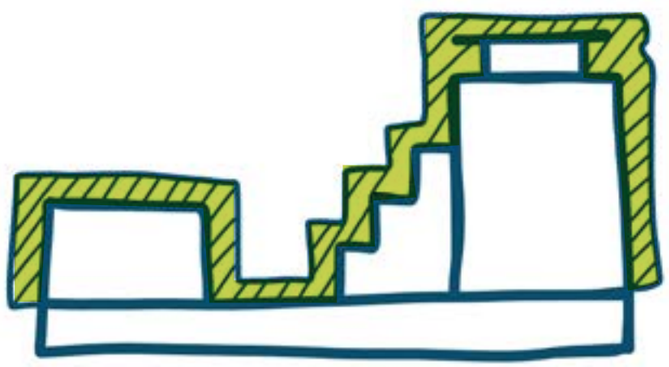


Keep as much as possible

+

Design for disassembly

+



Reuse as much as possible

# THINKING AHEAD:
# URBAN MINING

## EXPLORATION AND INVENTORIZATION → HARVESTING → DISTRIBUTION STORAGE

# HARVESTING MATERIALS: POLICE STATIONS

**KOUDENHORN HAARLEM**
200 km

**EENHEIDSBUREAU GRONINGEN**

**EENHEIDSBUREAU DEN HAAG**
240 km

**HUIS ‘t VELDE WARNSVELD**
150 km

**WITTE DE WITHSTRAAT ROTTERDAM**
250 km

**HAVENPOLITIE ROTTERDAM**
250 km

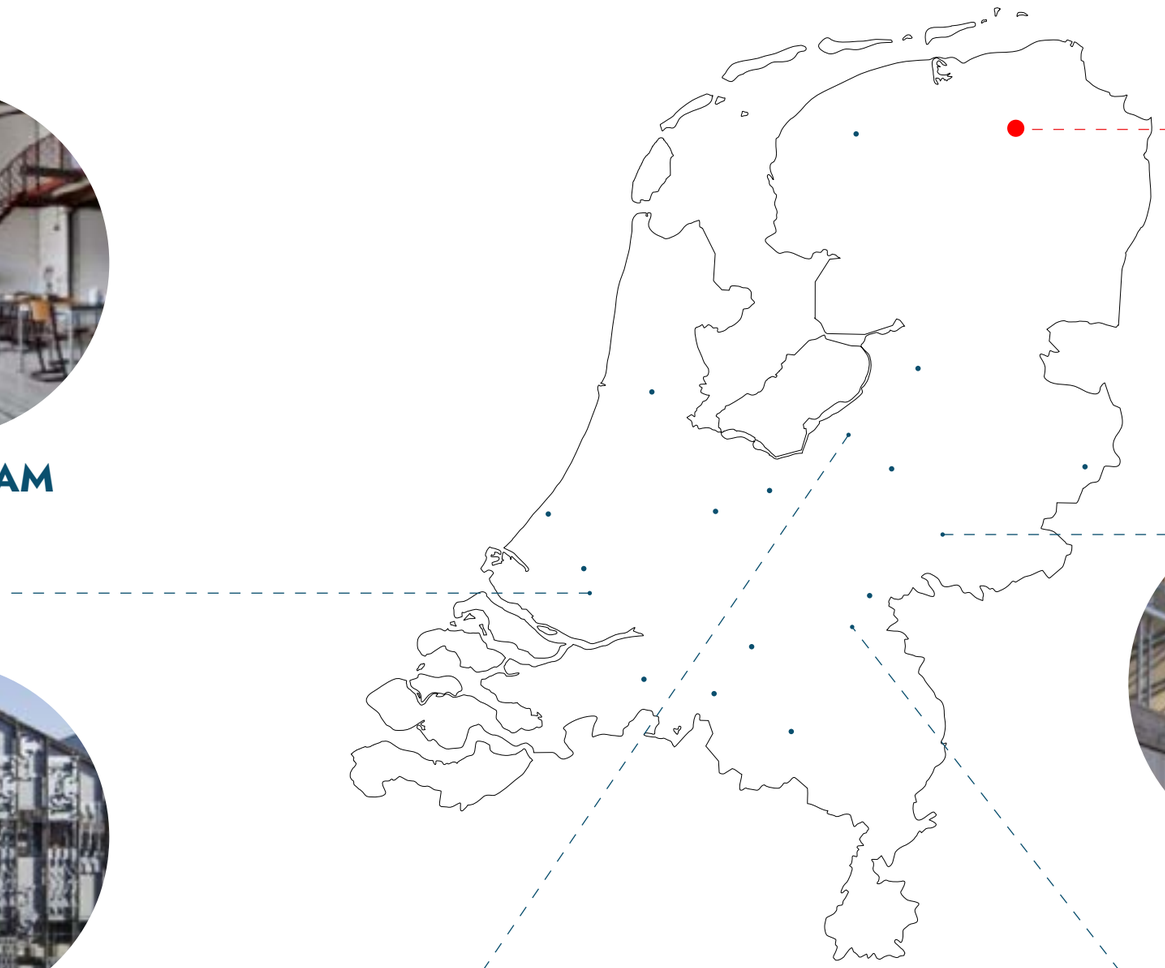
**POLITIEBUREAU ROTTERDAM**
250 km

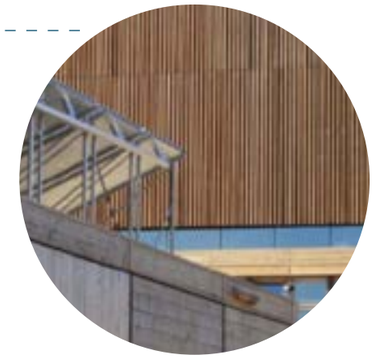
**EENHEIDSBUREAU EINDHOVEN**
250 km

# HARVESTING MATERIALS: OOGSTKAART

**ROTTERDAM**
250 km

**EENHEIDSBUREAU GRONINGEN**





**ARNHEM**
150 km

**ROTTERDAM**
250 km

**NUNSPEET**
120 km

**WIJCHEN**
185 km

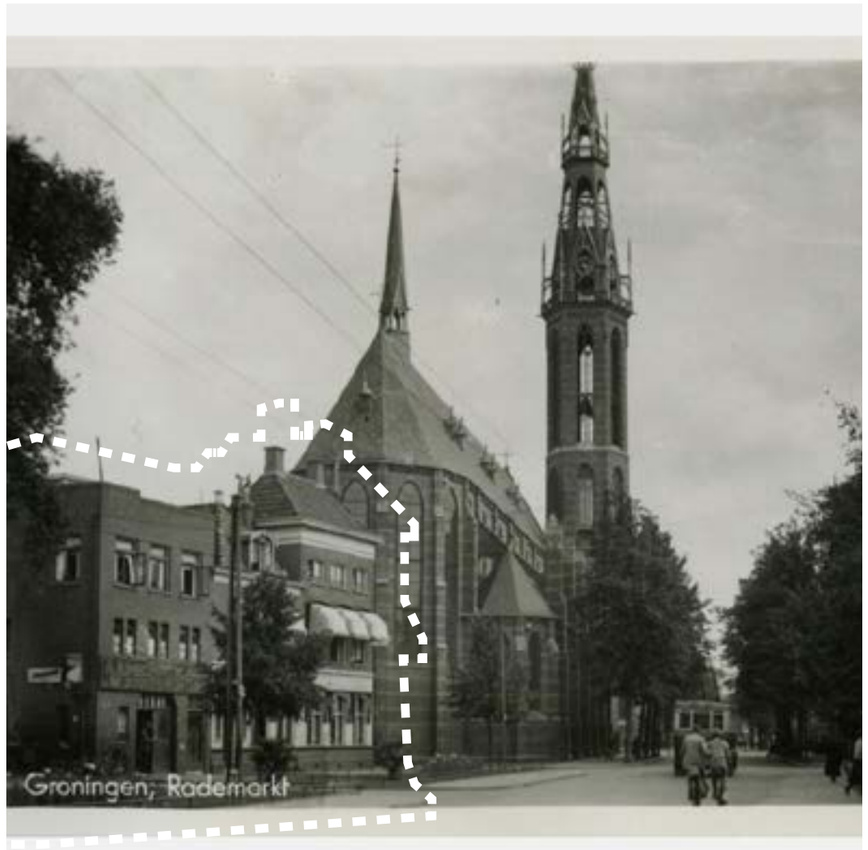
**ARNHEM**
150 km

# CONTEXT

# LOCATION

CENTRAL STATION

# HISTORICAL DEVELOPMENT




1935 - 1945
(St. Joseph Cathedral built in 1887)

1971 - 1972
(Municipal architect Ele de Haas)

Source: Beeldbankgroningen.nl

# RENOVATION IN 1996

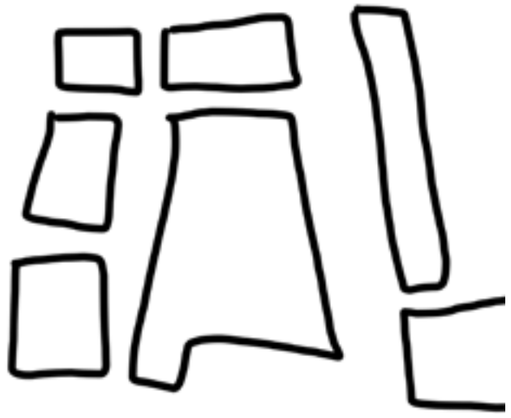
"The idea was to have an **open and inviting building**, which people would find easy to enter"

Source: De Zwarte Hond

# EXISTING

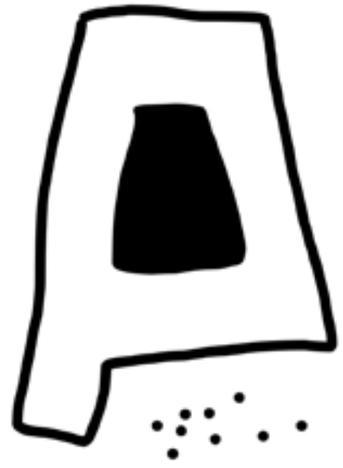
# EXISTING

# VALUES OF THE BUILDING



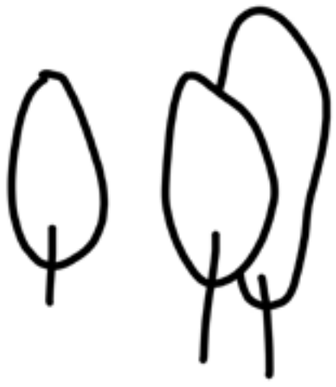
Urban context

Reflection on surroundings



Courtyard and front square

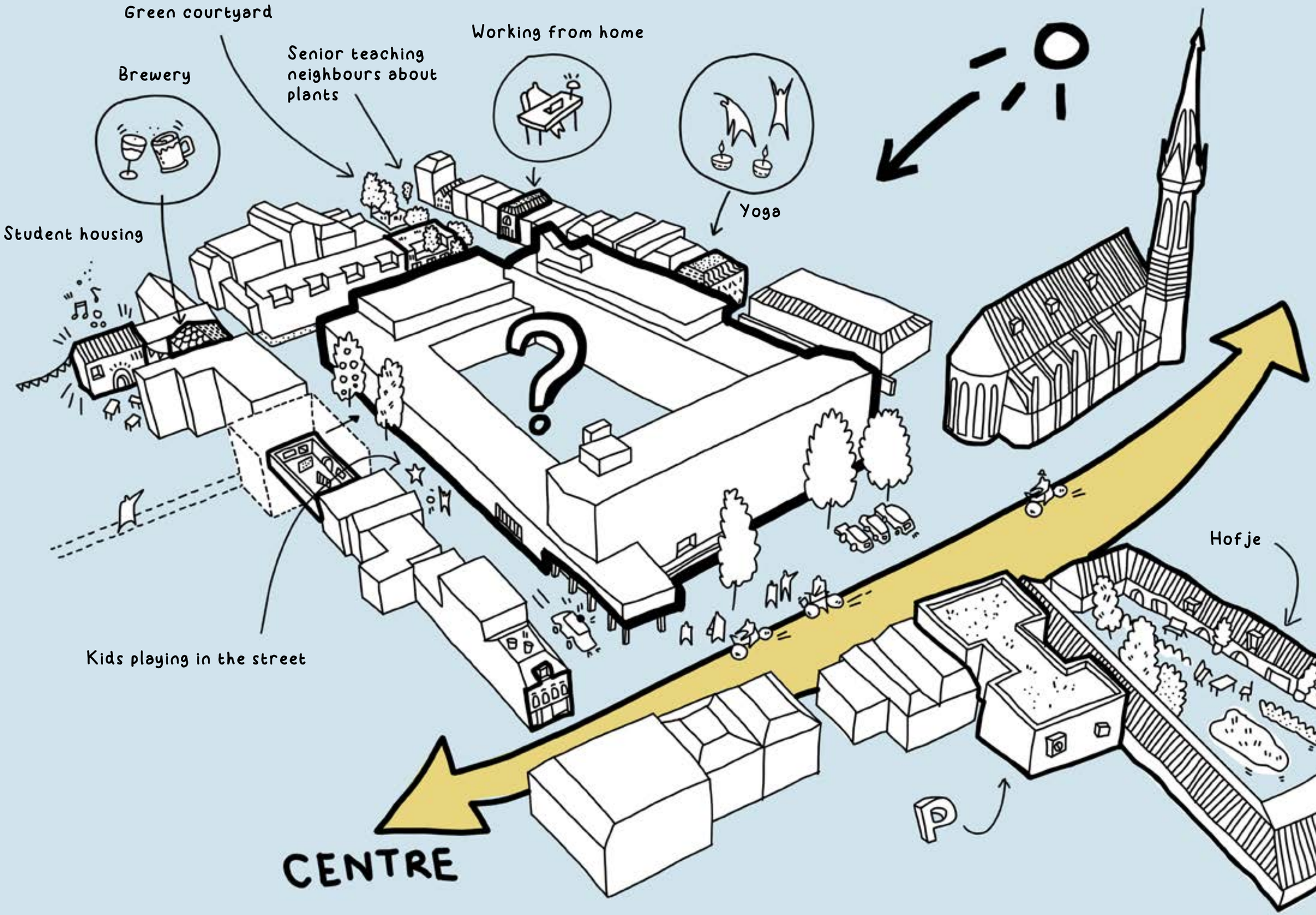
Structure



Greenery

Police identity

# NEIGHBOURHOOD

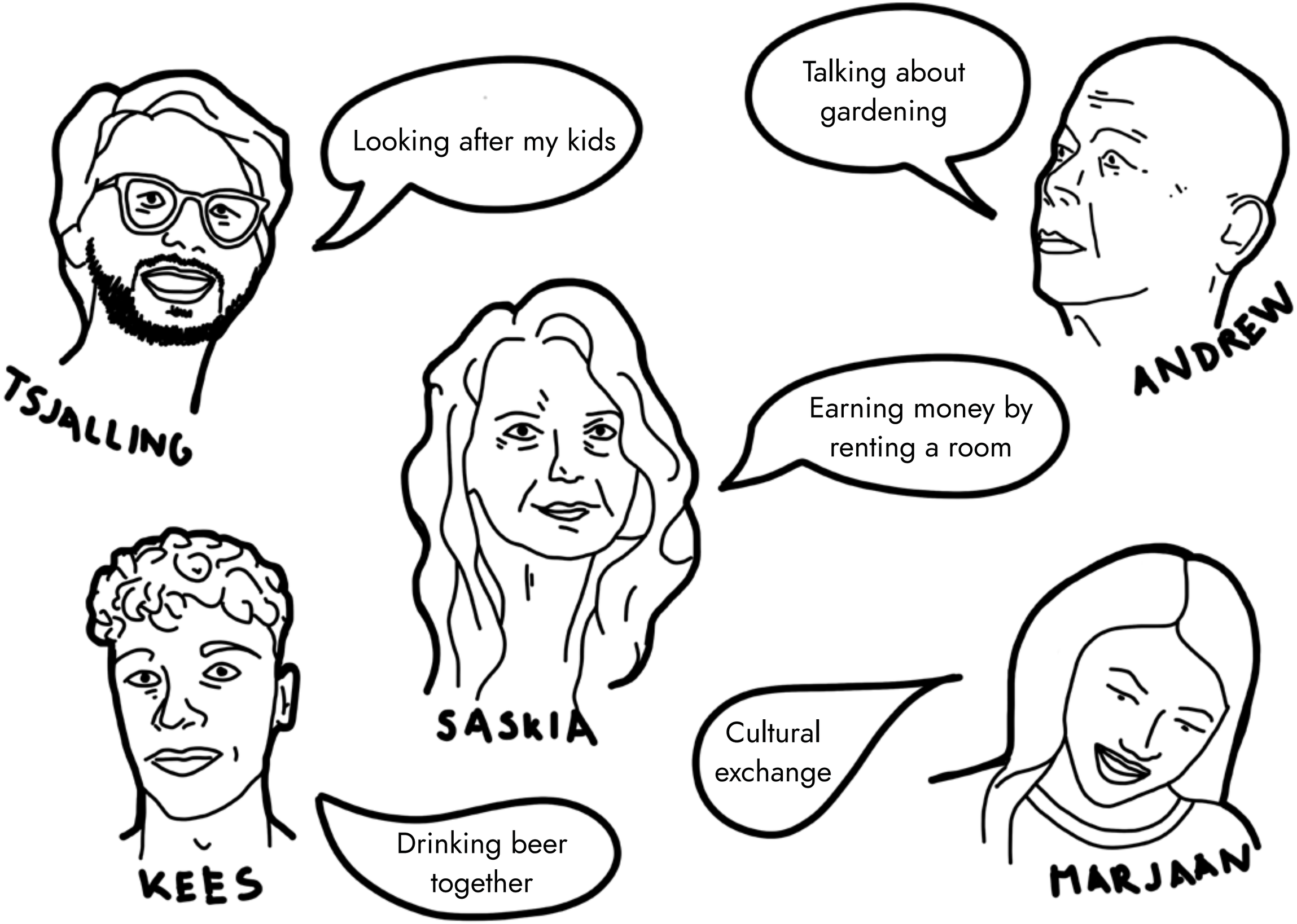



BLUE AND COLD
ISOLATED
BARRIER
PROTECTS FROM NOISE
MORE GREENERY!!!
SPEEDING CARS
DULL
SCARY
NO STUDENT HOUSING PLEASE

WHY?

# CONFLICT

# HOW DIFFERENT GROUPS COULD BENEFIT FROM EACH OTHER?

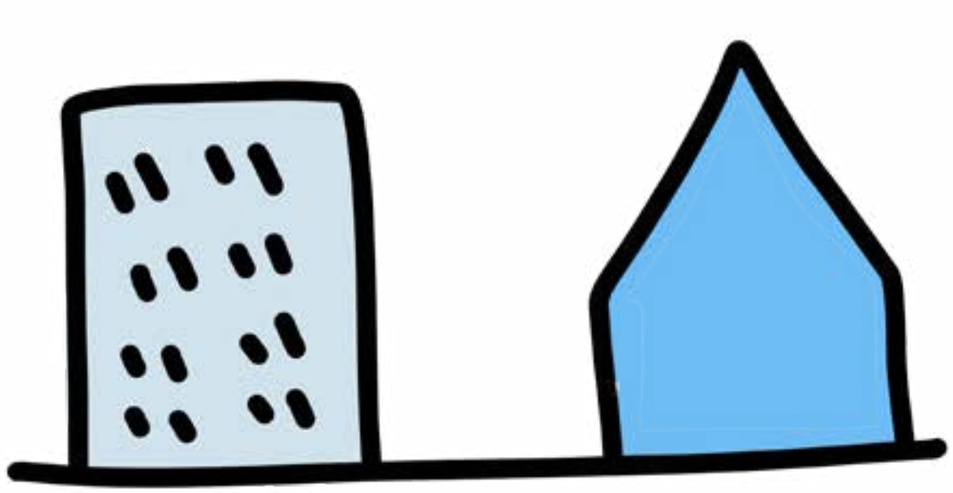


# FUNCTIONS

# PRIVATE

# HOUSING

# PROPOSAL



Housing



Student housing/
Young entrepreneurs

Renting and owning
Various target groups

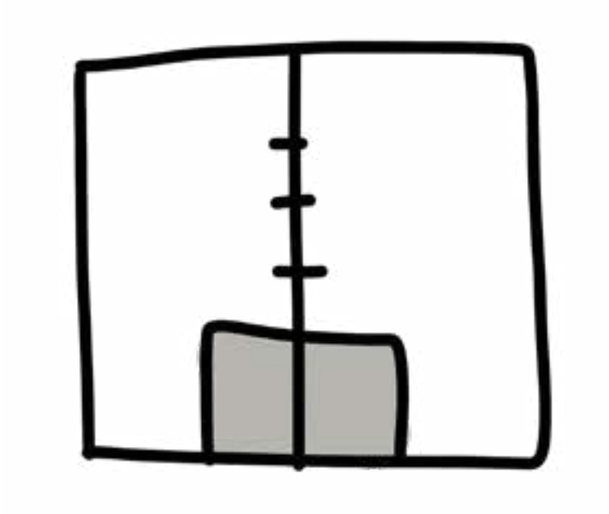
# < 43 m2

➡

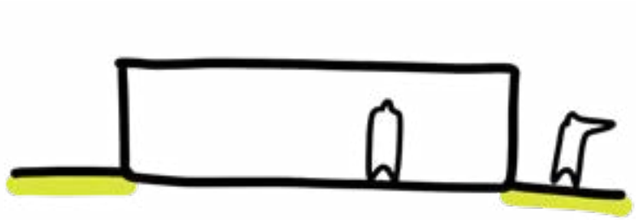
**no car parking**
**affordable**
**flexible**

# HOW TO MAKE APARTMENTS BIGGER WITHOUT INCREASING M2?

## Flexibility



## Adding without adding



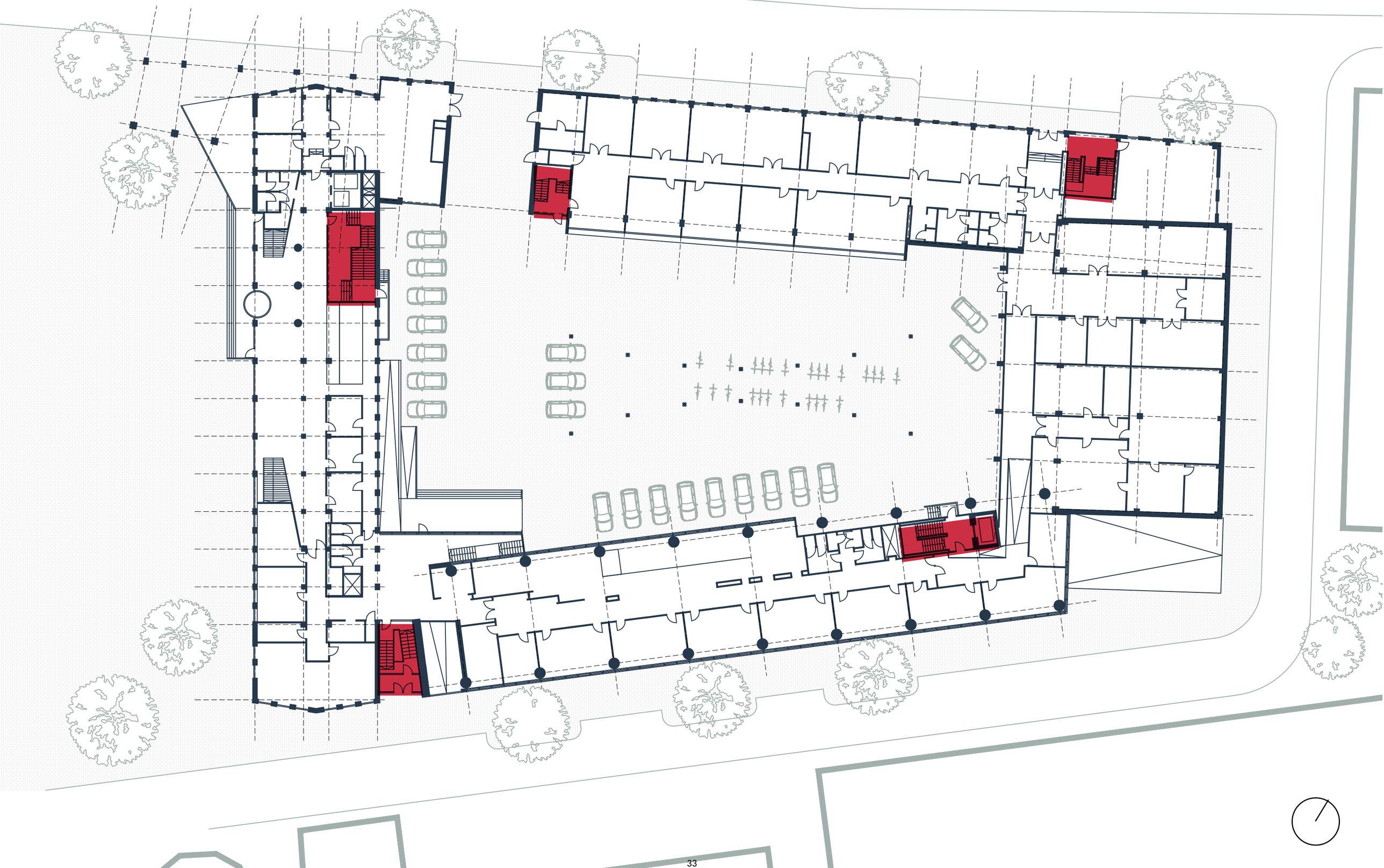
43 m2 + spacious terrace

43 m2 + spacious balcony

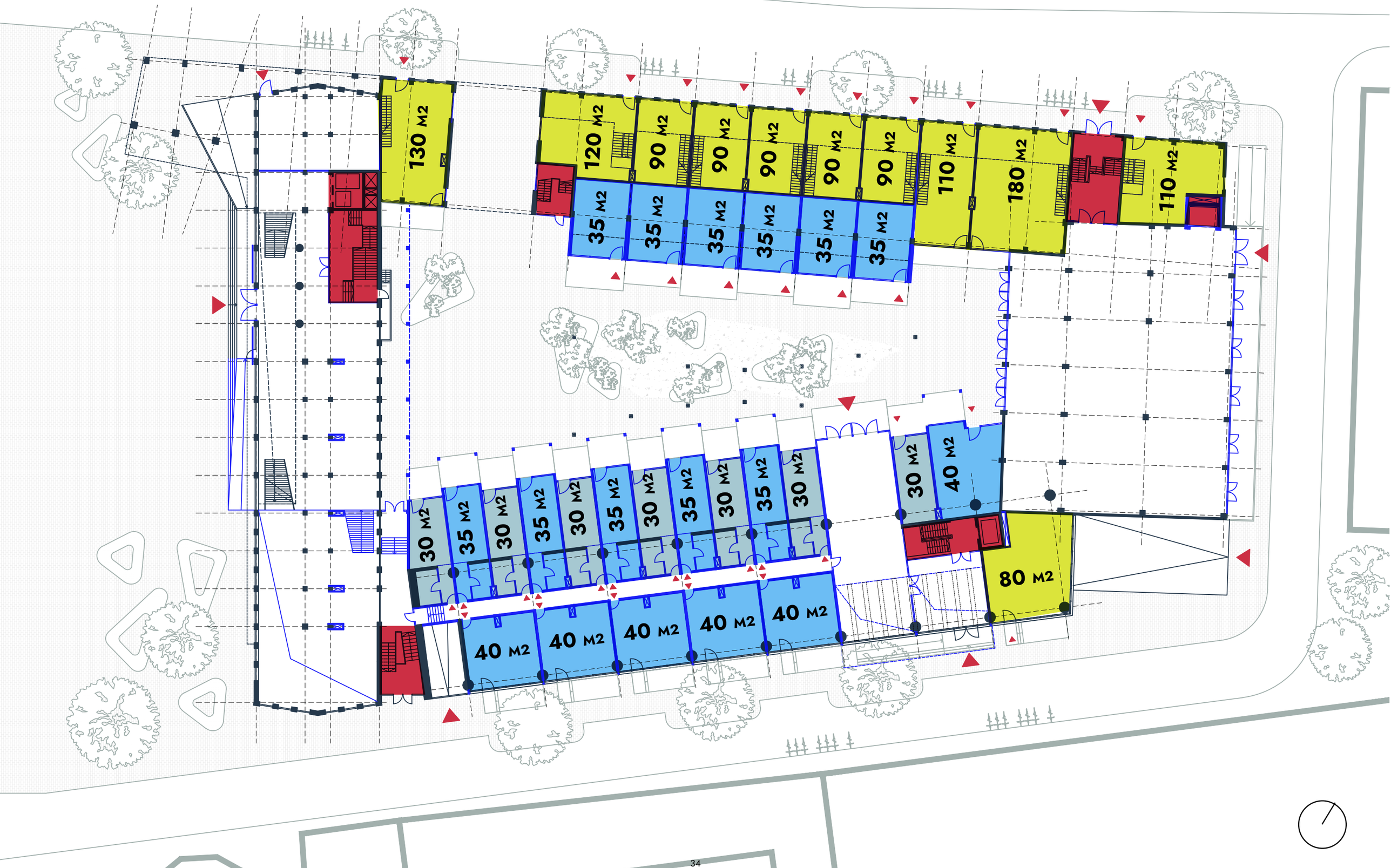
43 m2 + spacious winter garden

## Verticality

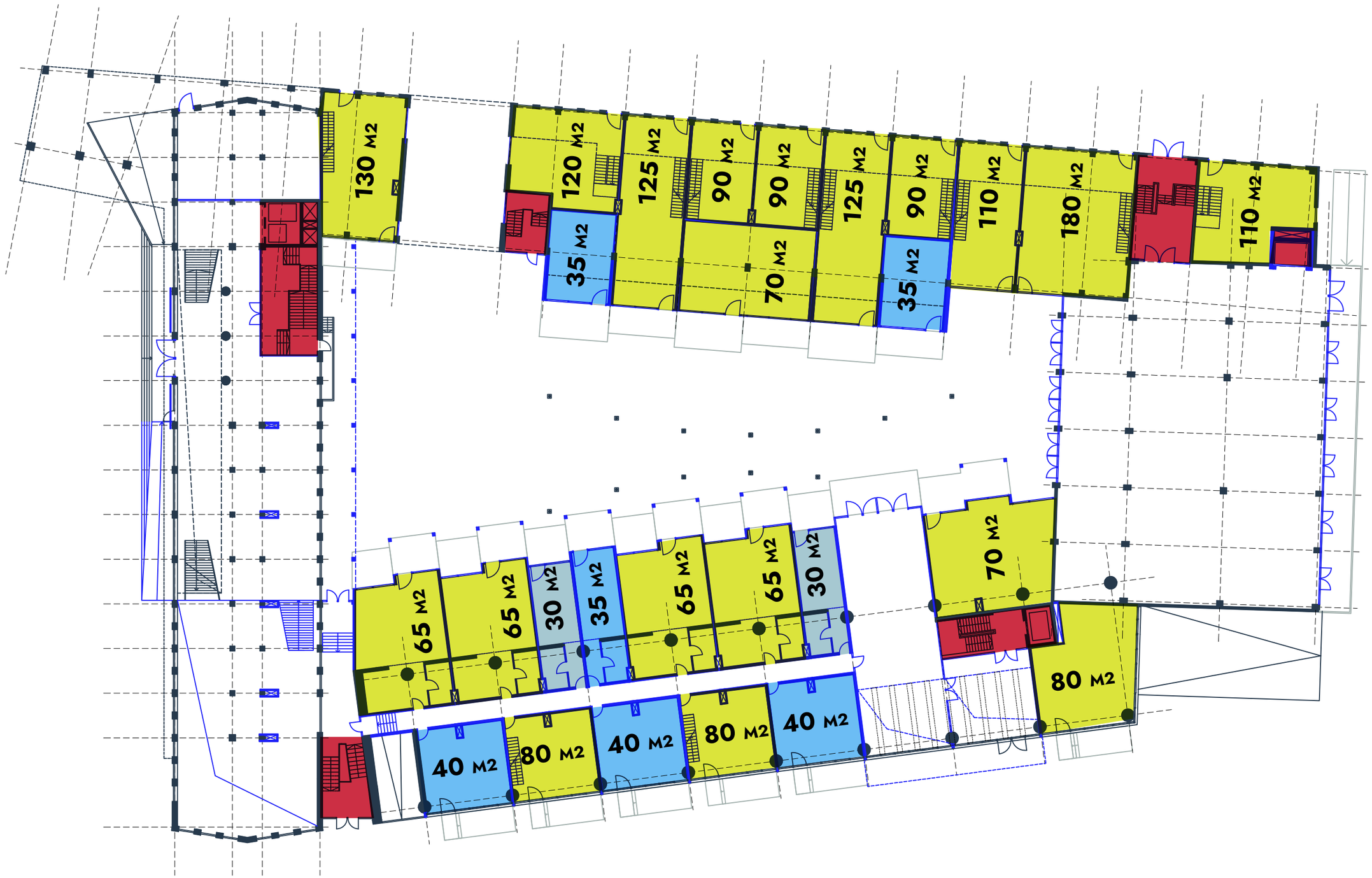
# 00 FLOOR EXISTING



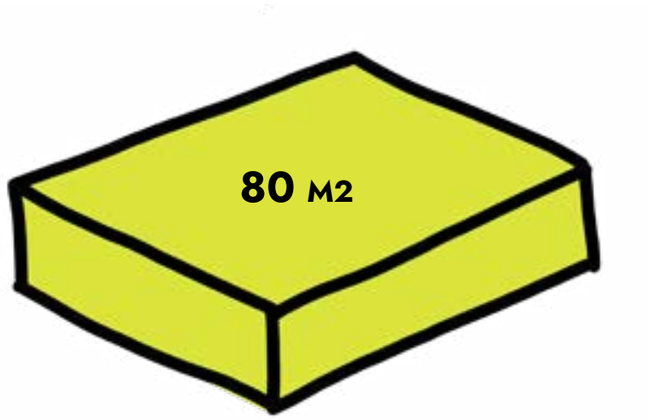
# 00 FLOOR PROPOSAL

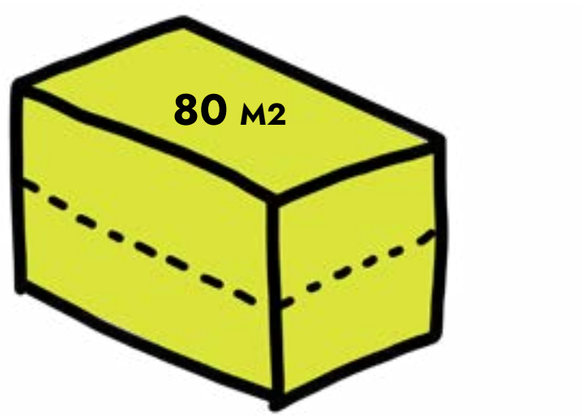


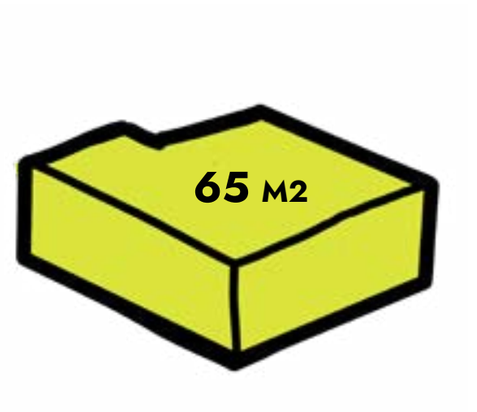
# 00 FLOOR PROPOSAL

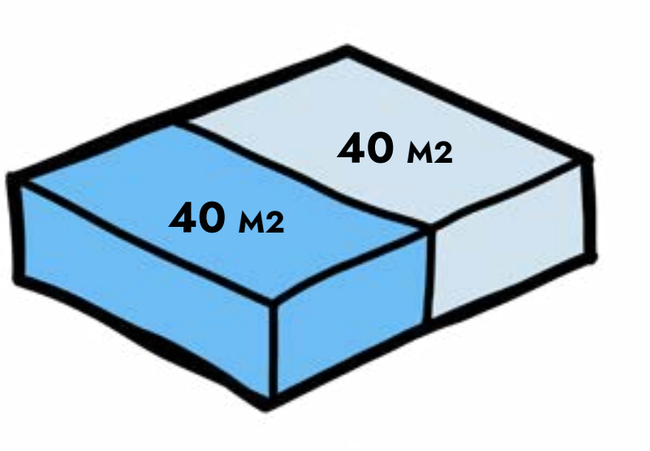


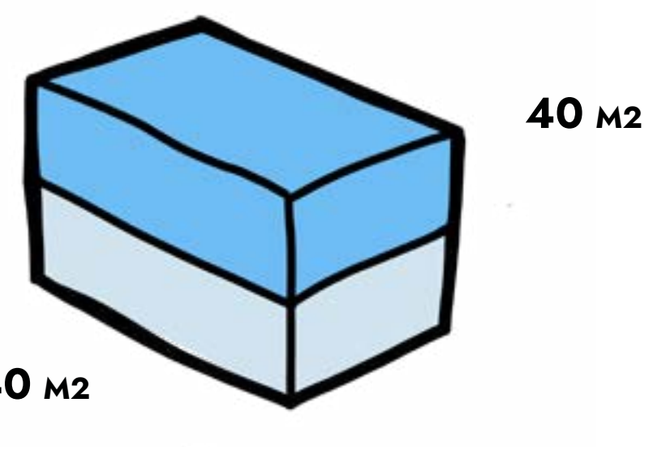
# FLEXIBILITY

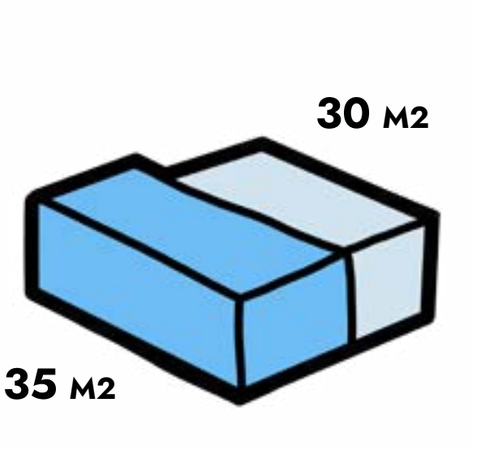


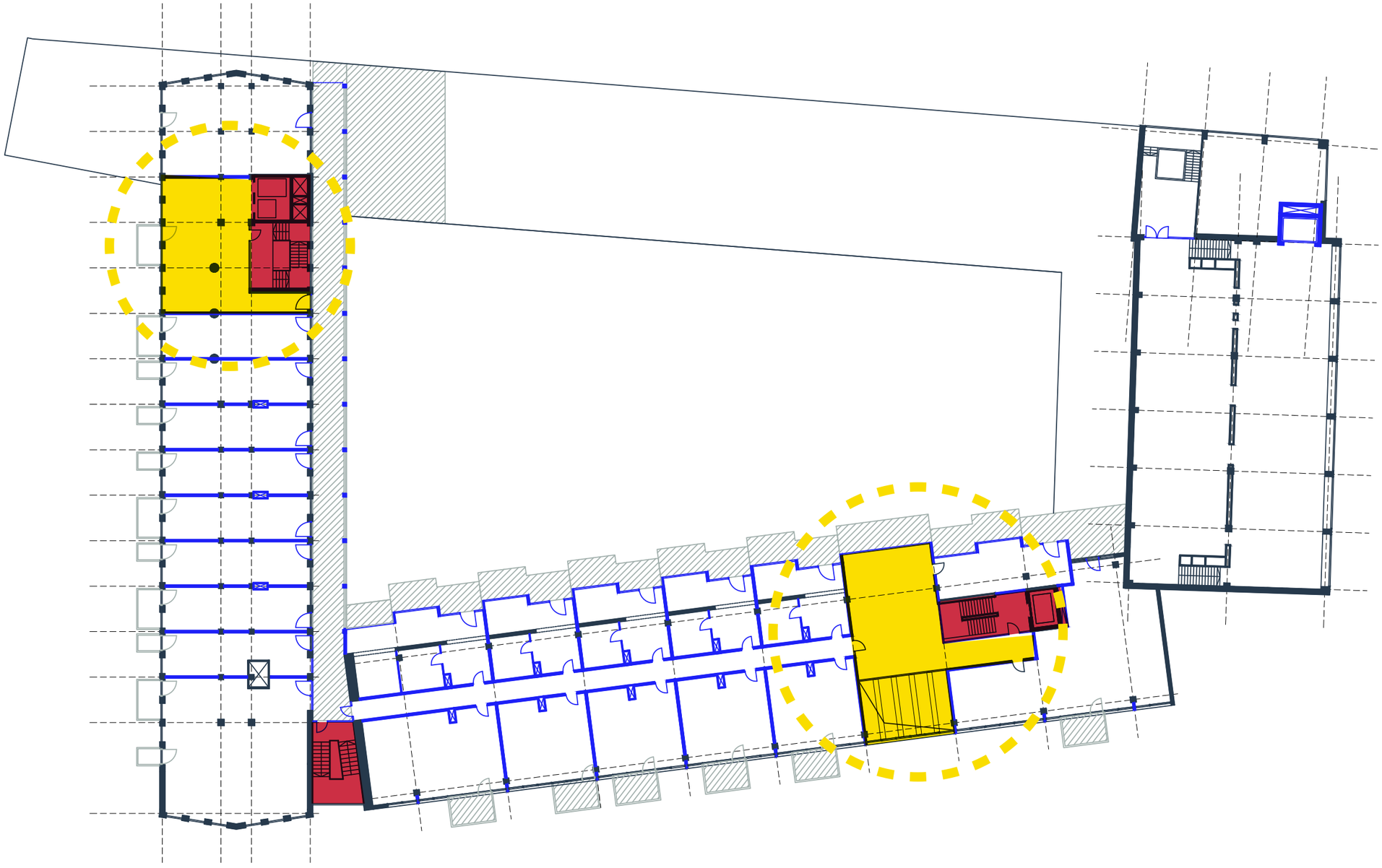



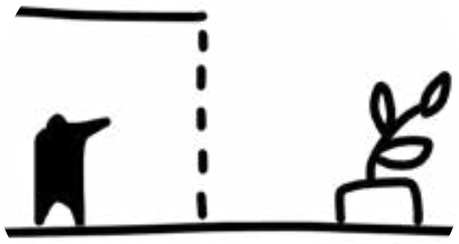
# COMMUNAL

## PLAY / LEARN / CHAT

# COMING HOME



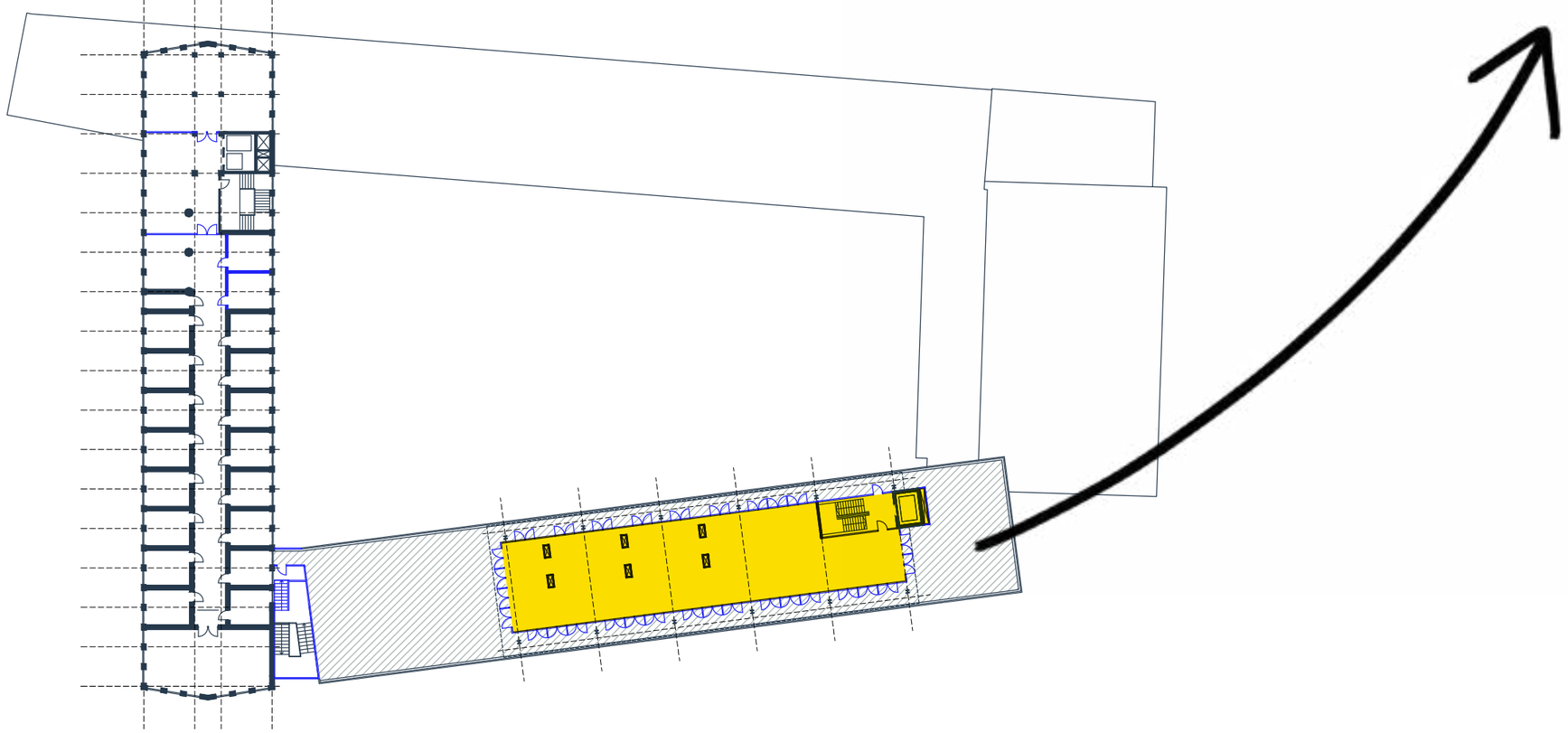
NEXT TO VERTICAL CONNECTIONS



DIRECT CONNECTION WITH OUTSIDE

PLACES TO SIT

# COMMUNAL SPACE



# < 43 m2

➡

**no car parking**
**affordable**
**flexible**

# PARKING

**How many new apartments need a car parking?**
**18**

**How many car parking places are in parking lot already?**
**51 + 19 shared**

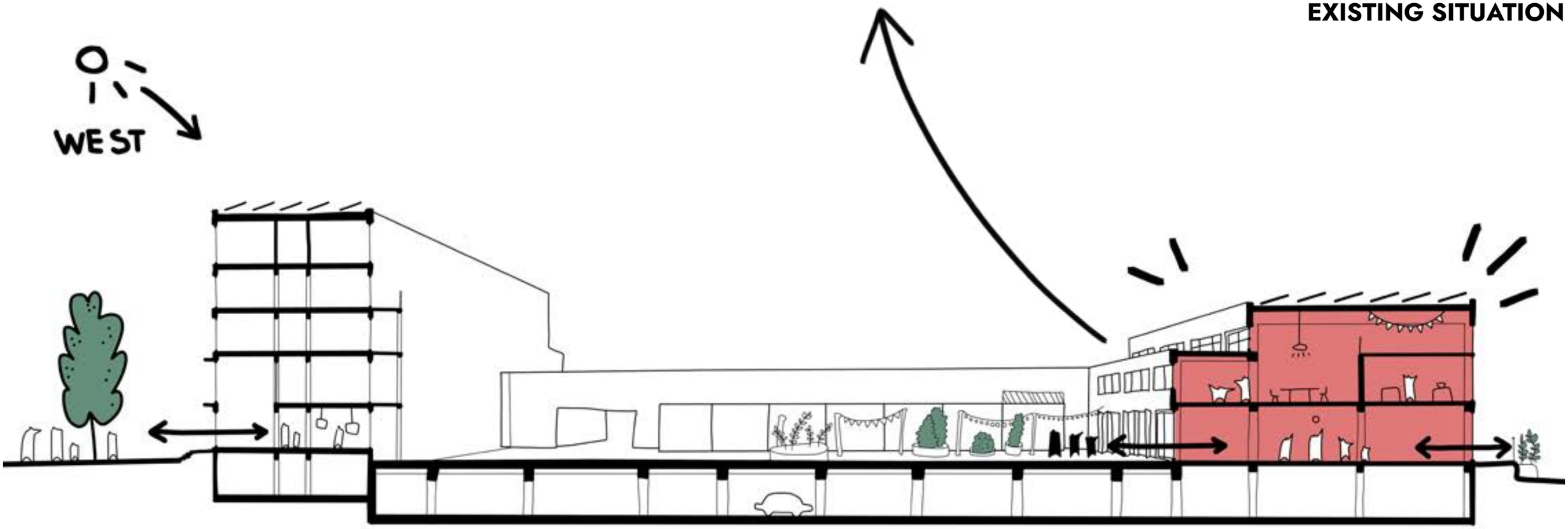
**52 places left for residents living around the block**

# -01 FLOOR PROPOSAL

# STREETS FOR PEOPLE

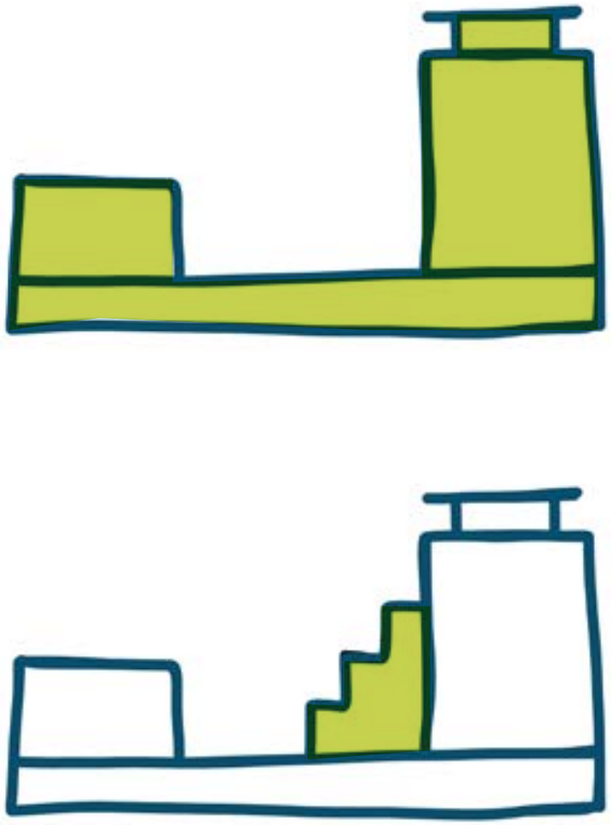
# COMMUNITY CENTRE

## EXISTING SITUATION



# DESIGN

# DESIGN STRATEGY

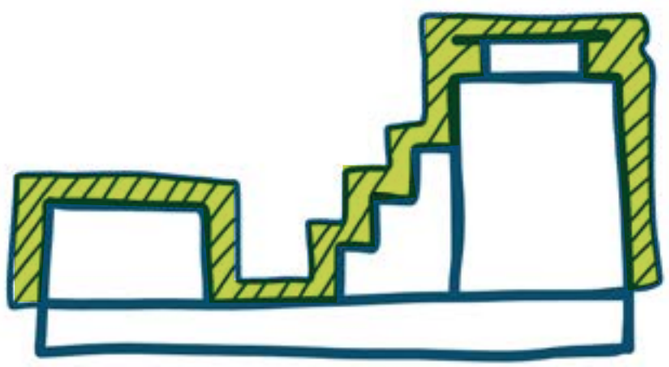


Keep as much as possible

+

Design for disassembly

+



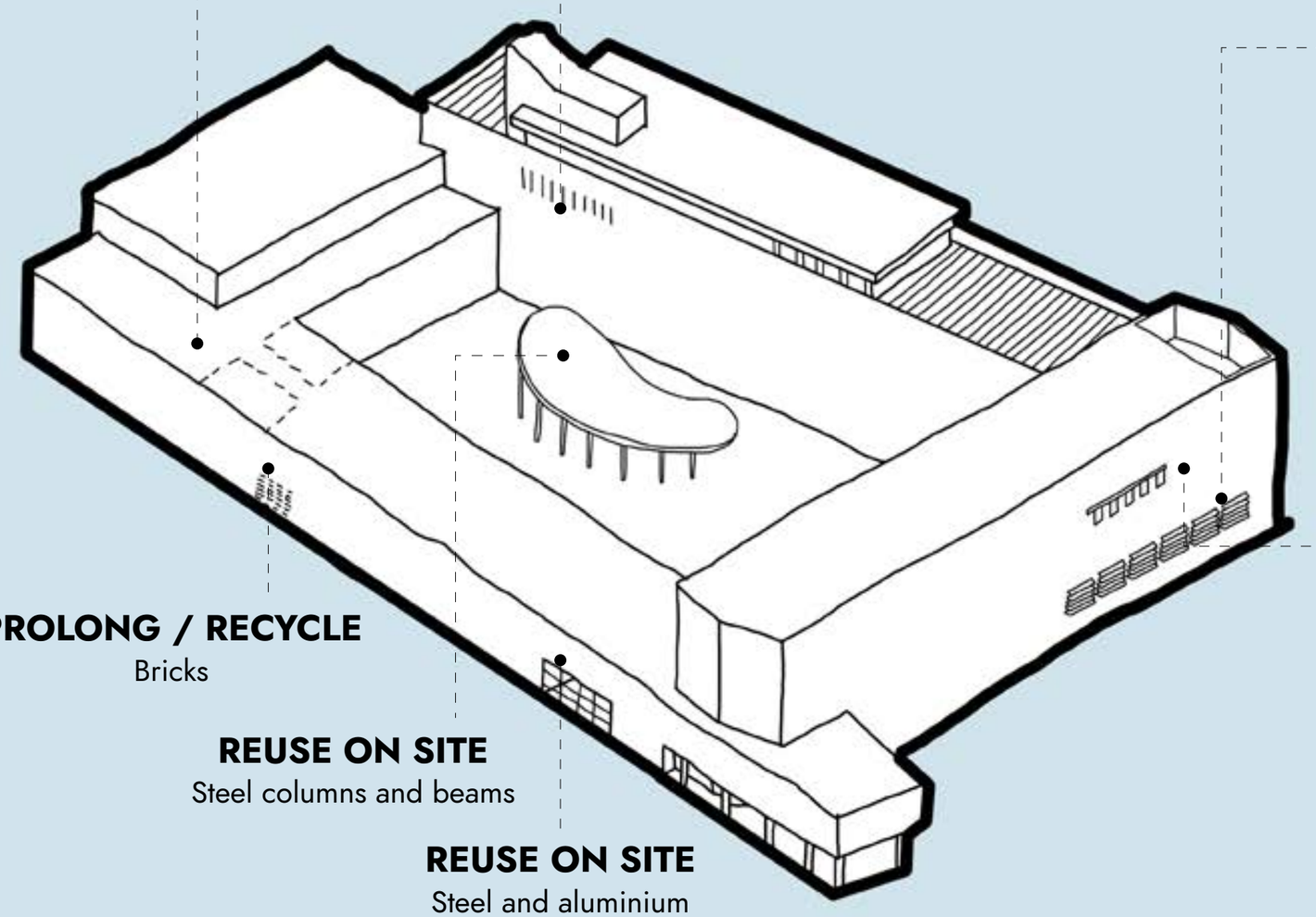
Reuse as much as possible

# EXISTING BUILDING

**REFURBISH AND REUSE ON SITE**
Wooden planks
70 x 1.7m x 0 0.1m

**REUSE / RECYCLE**
Bitumen panels 3000 m2

**RECYCLE**
Drywall partitions:
gypsium boards, aluminum frames



**REFURBISH AND REUSE**
Perforated metal panels
50 x 100 m2

**REFURBISH AND REUSE**
Window shadings
Various sizes

**PROLONG / RECYCLE**
Bricks

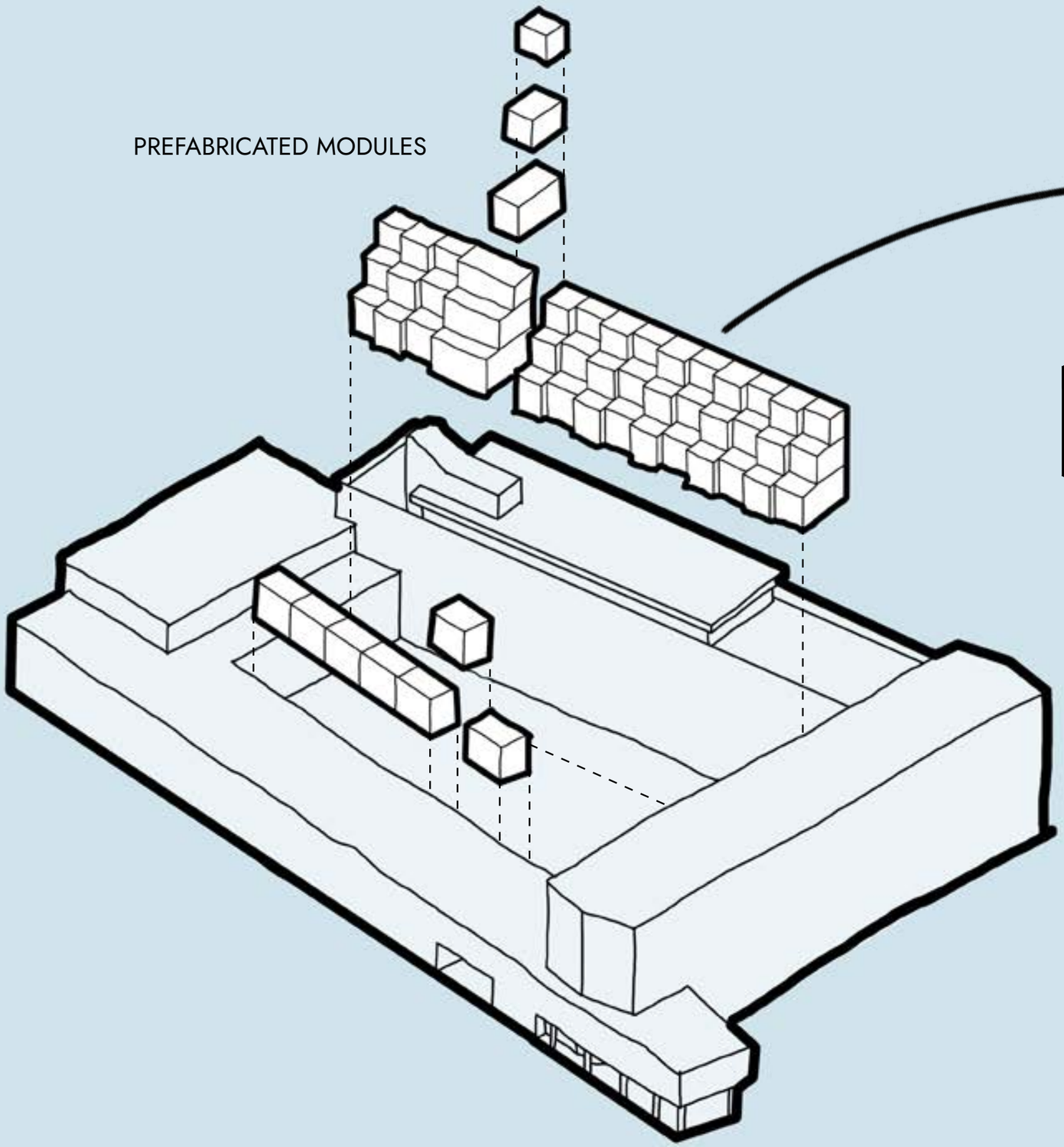
**REUSE ON SITE**
Steel columns and beams

**REUSE ON SITE**
Steel and aluminium

**RECYCLE / 200 m2 REFURBISHED AND REUSED ON SITE**
for office partition walls
Plastic double glazed windows
Various sizes

# BIO-BASED ADDITIONS

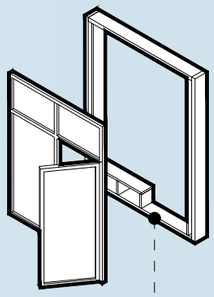
PREFABRICATED MODULES



Reused wood

Existing wall

Cellulose (paper) insulation

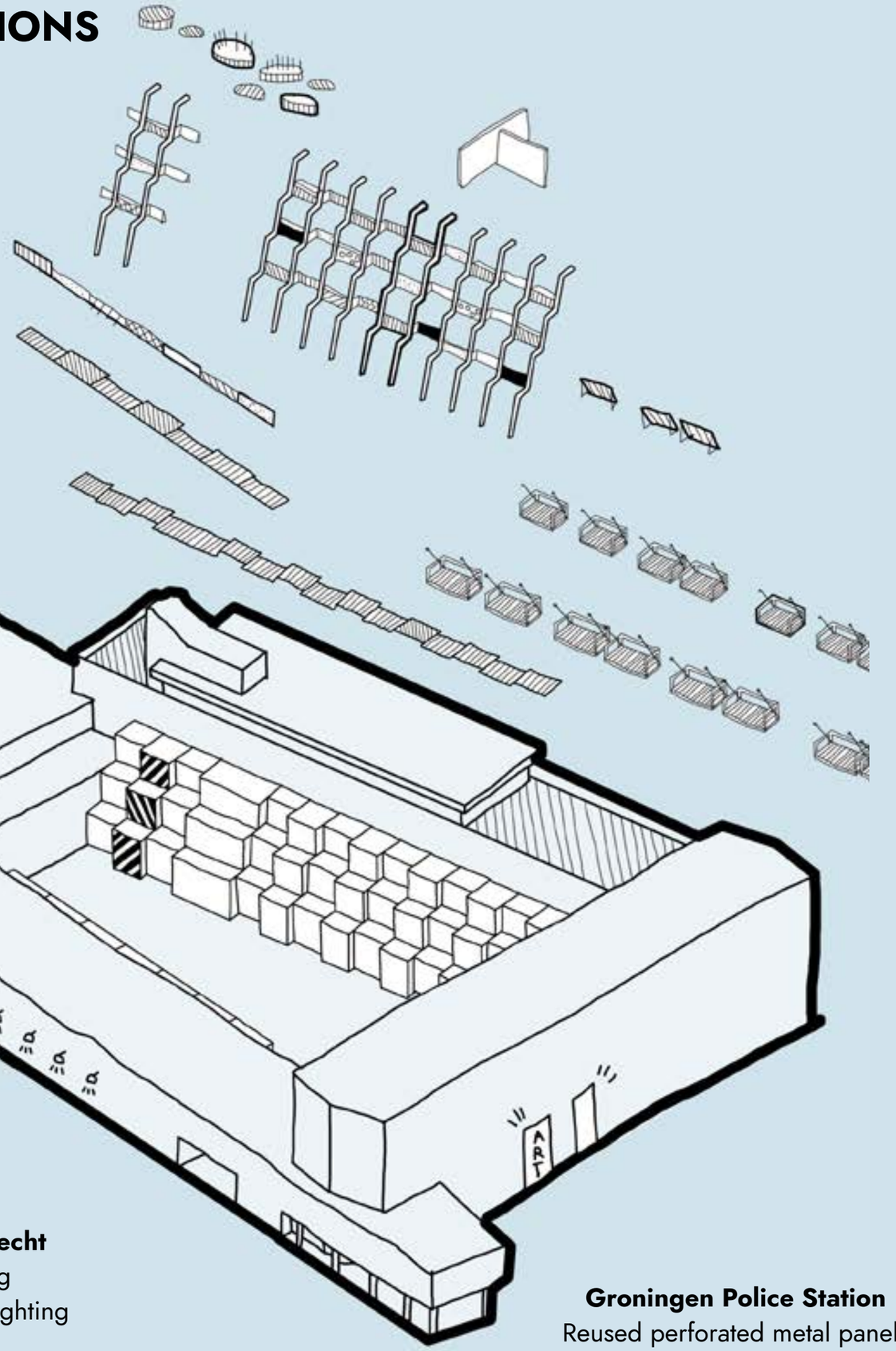


Wooden frame

Pressure treated fire retartand plywood

Frame dimensions allows to combine different units

# REUSED ADDITIONS



**Oogstkart - Arnhem**
Wooden planks
Reused for roof terrace

**Oogstkart - Utrecht**
Office lighting
Reused for street lighting

**Groningen Police Station**
Reused perforated metal panels

**HUIS ‘t VELDE WARNSVELD**
Wooden planks
Reused for facade cladding

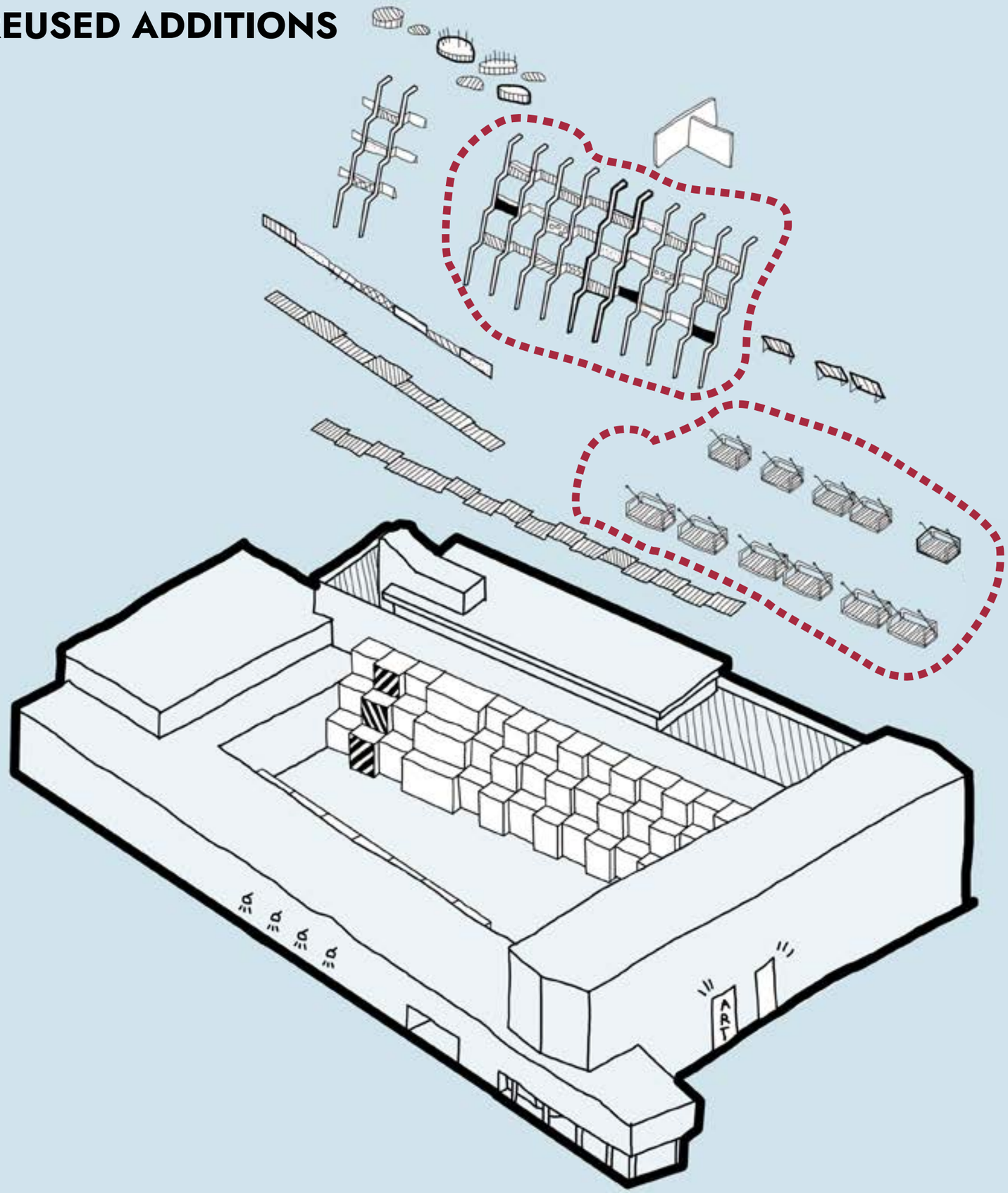
**HUIS ‘t VELDE WARNSVELD**
Wooden planks
Reused for facade cladding

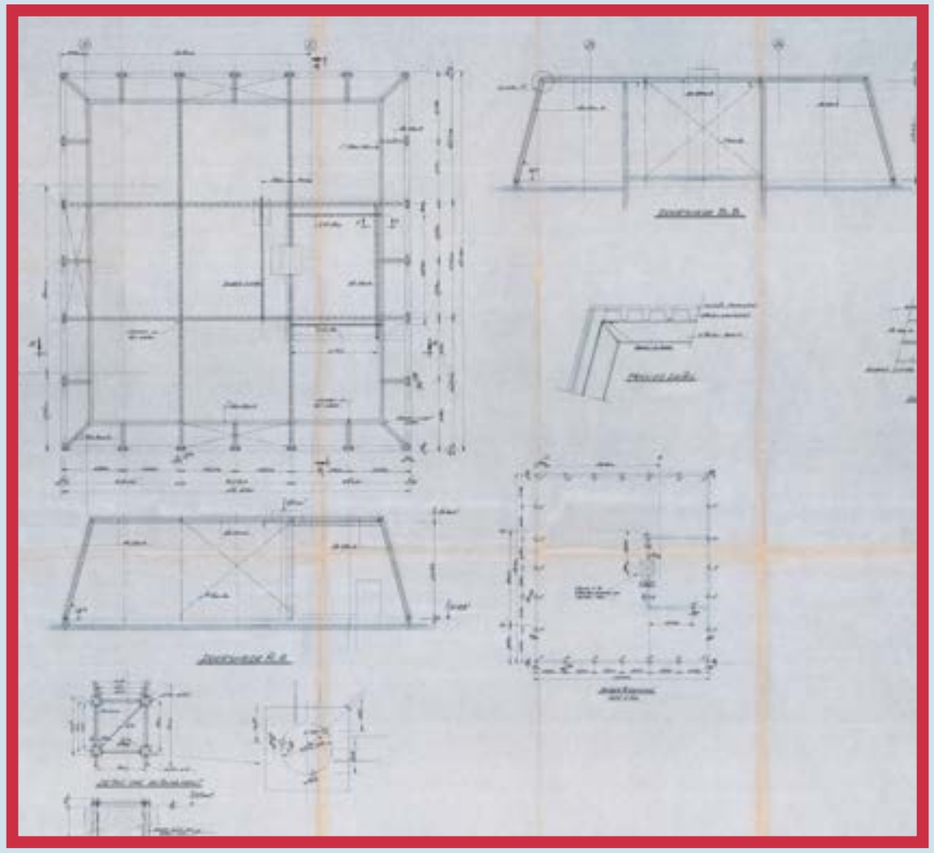
**EINDHOVEN POLICE STATION**
Steel railings
Reused for balconies

**HAARLEM POLICE STATION**
Aluminium cladding
Reused for facade cladding

**DEN HAAG POLICE STATION**
Steel beams

# REUSED ADDITIONS



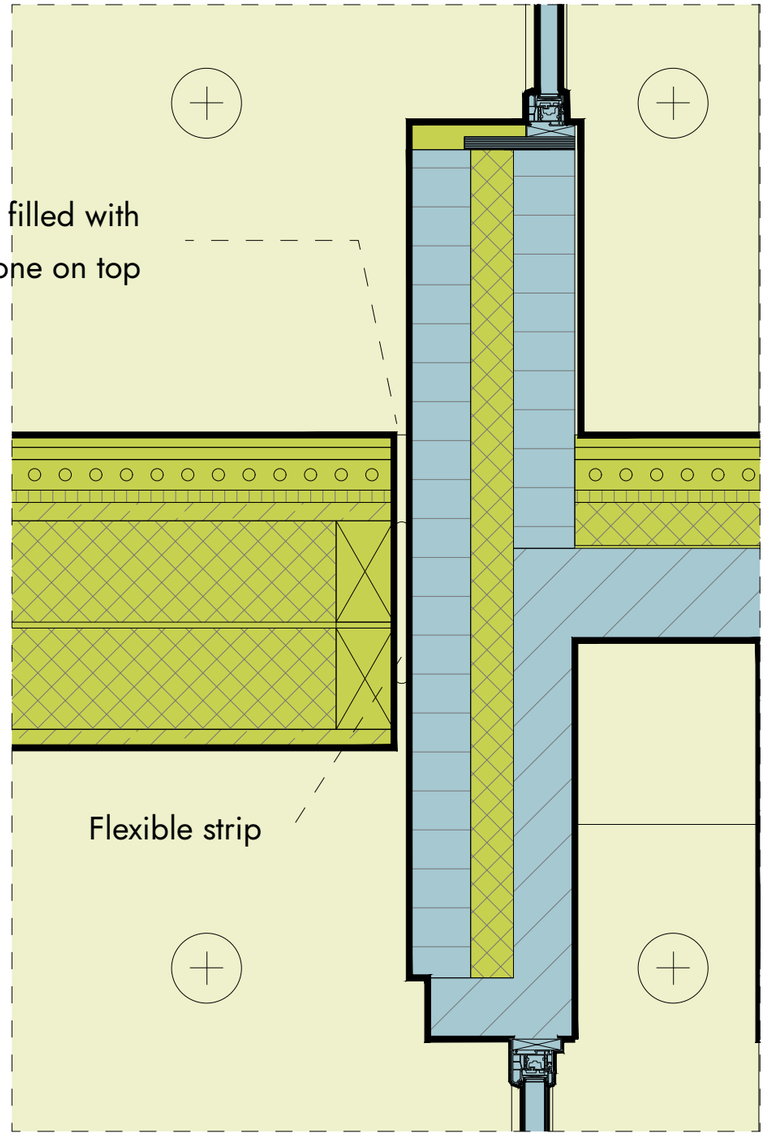


**DEN HAAG**
**POLICE STATION**

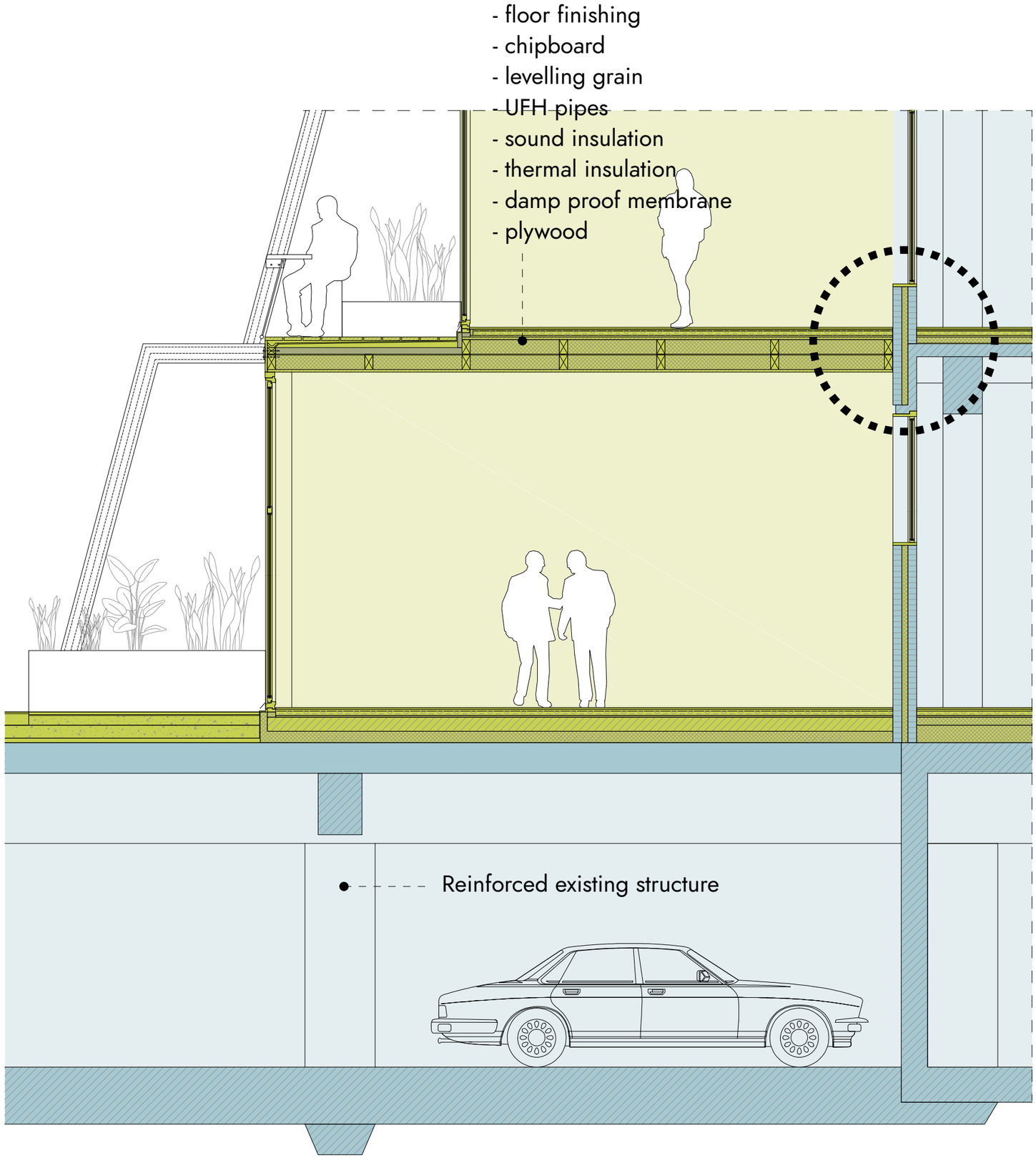
Steel H profiles
Reused for balconies and separations

Use of:
75 x L shaped H steel profiles
72 m H steel profiles

# DETAILING OF ADDITIONS




## CONNECTION DETAIL 1:10



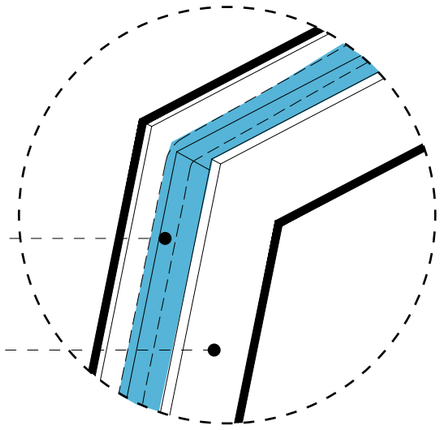

## SECTION 1:50

# DETAILING OF ADDITIONS

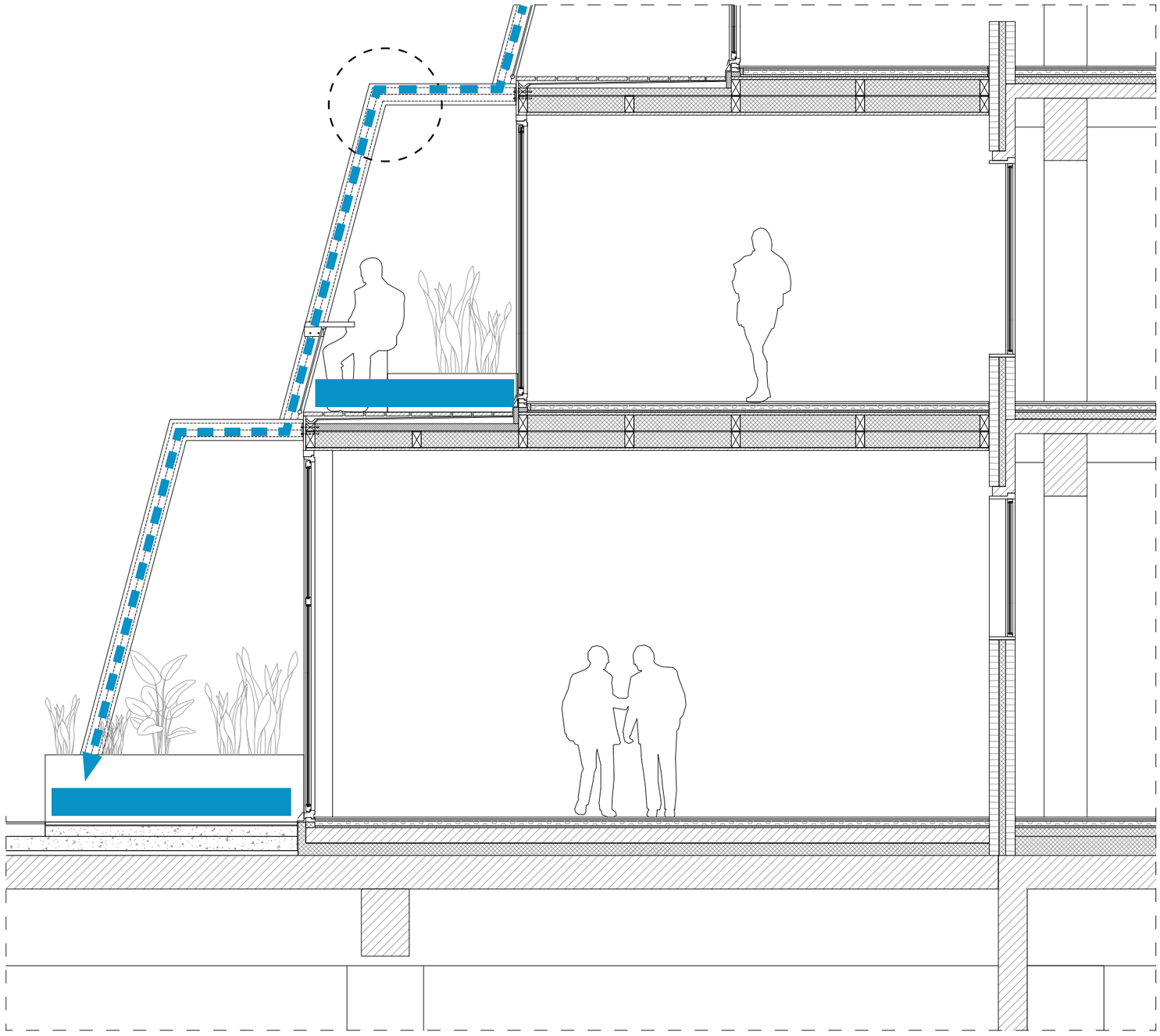
**REUSED**
Steel beams
(from Den Haag Police station)

Rain gutter

Reused H Profile
steel beam

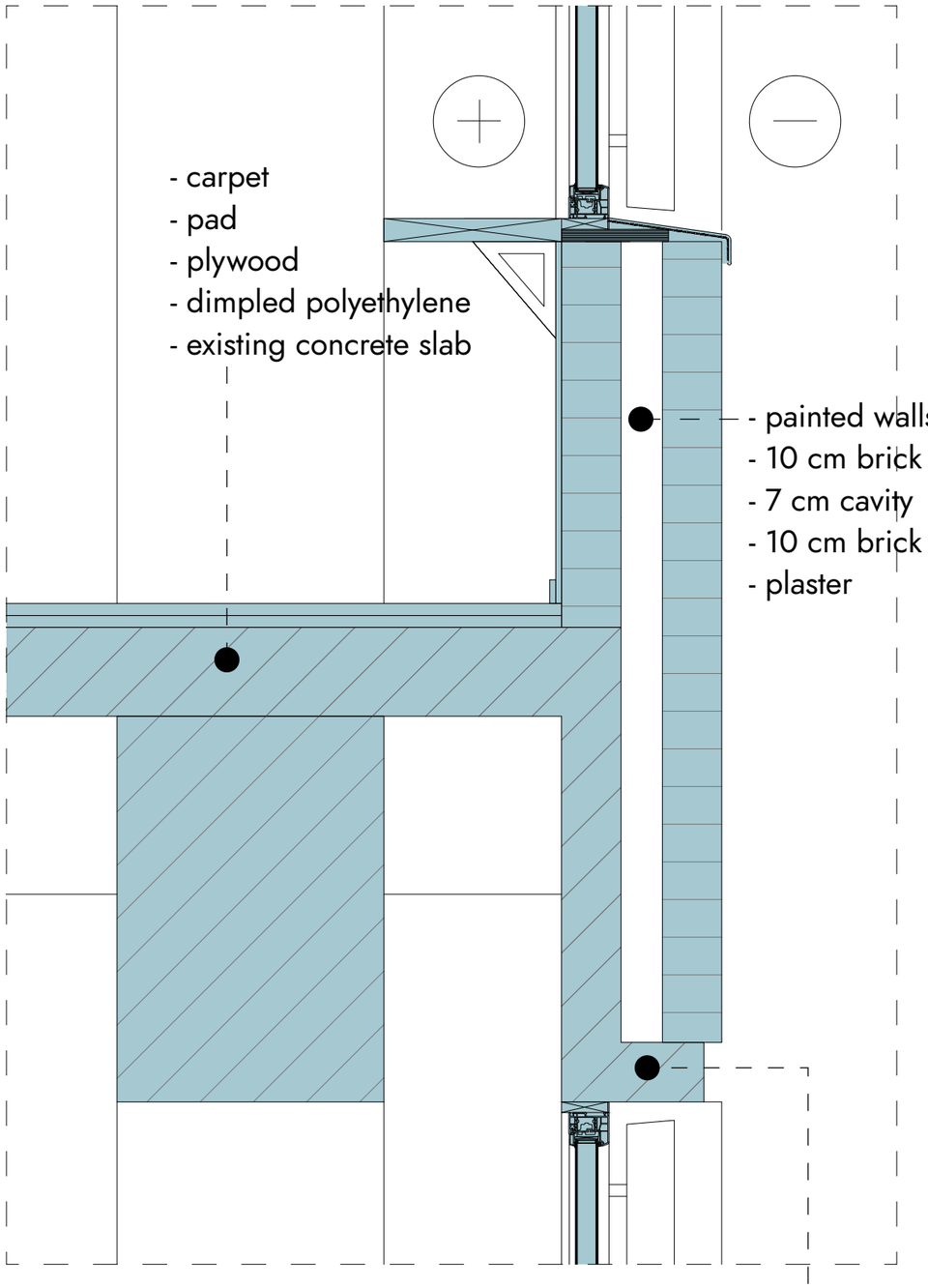


## RAINWATER



# SECTION

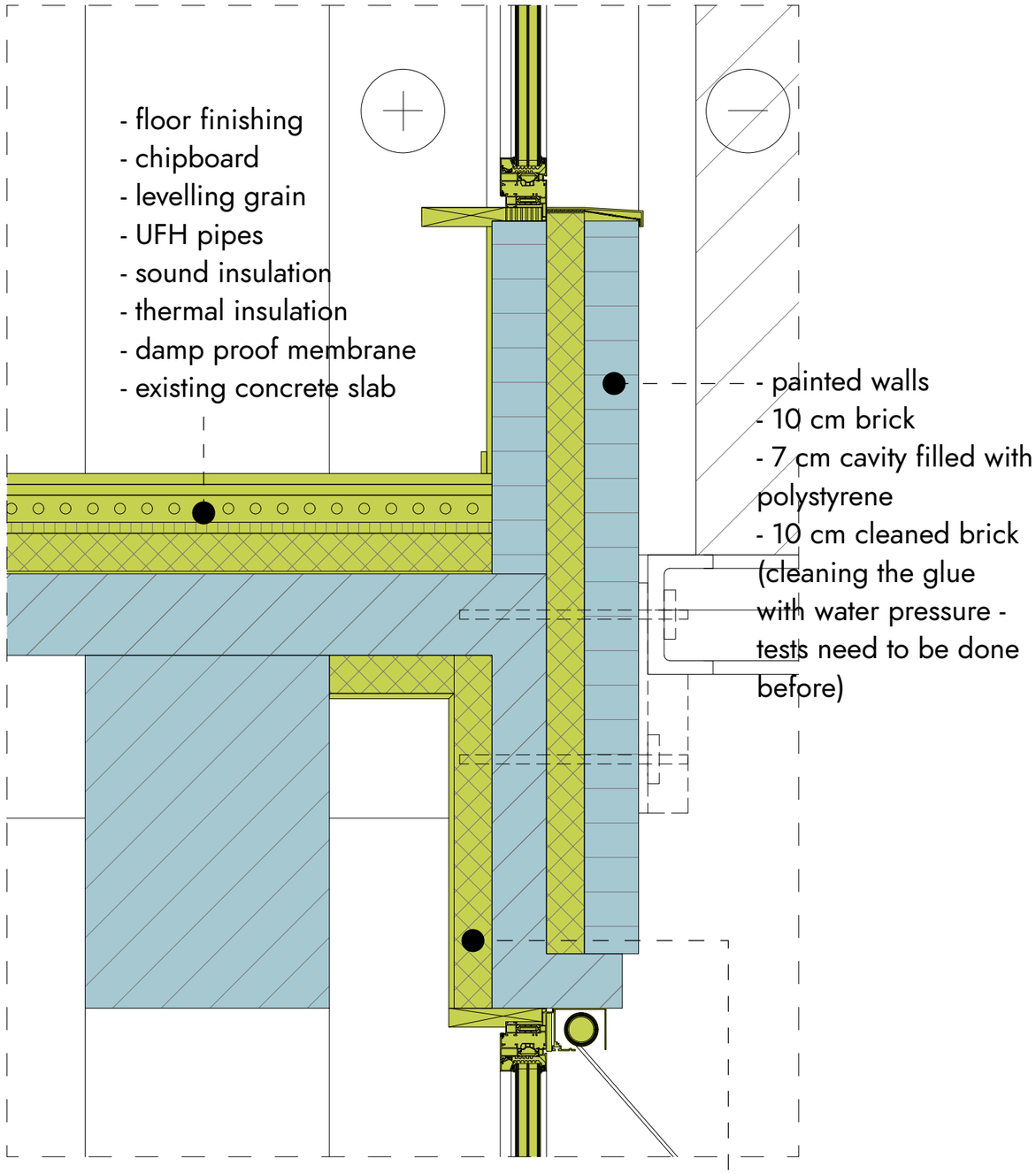
# FLOORS AND EXTERIOR WALLS




## EXISTING FLOORAND WALL DETAIL

Concrete elements supporting bricks above

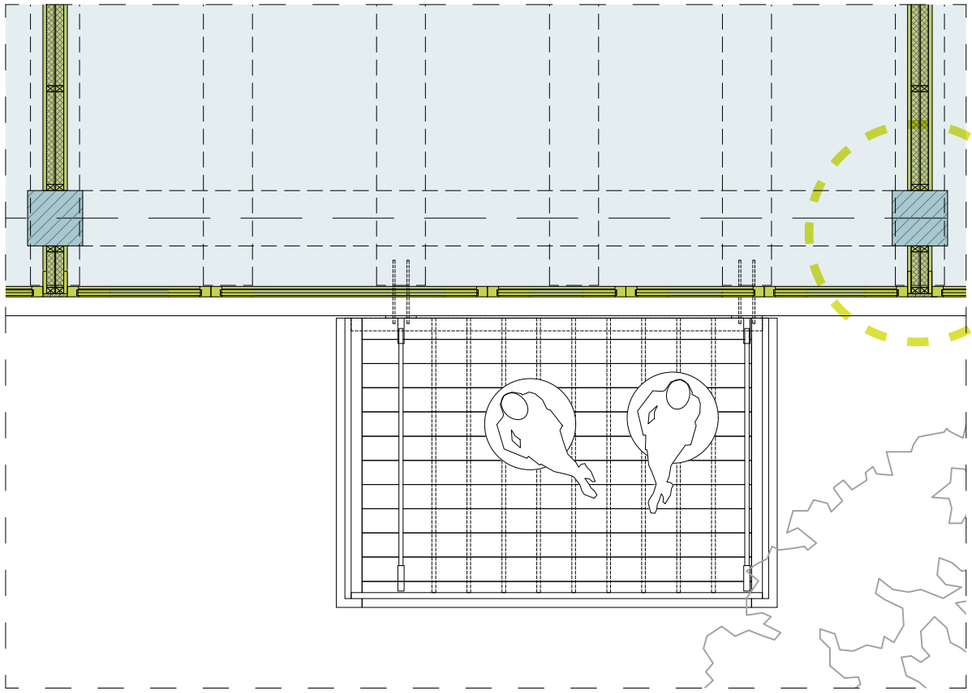
MIN Height in the apartments: 2.8 m
CRITICAL Height floor to beam 2.2 m




## PROPOSAL FLOOR AND WALL DETAIL

Additional thermal insulation on inside.
Prefabricated elements. Mounted on site.

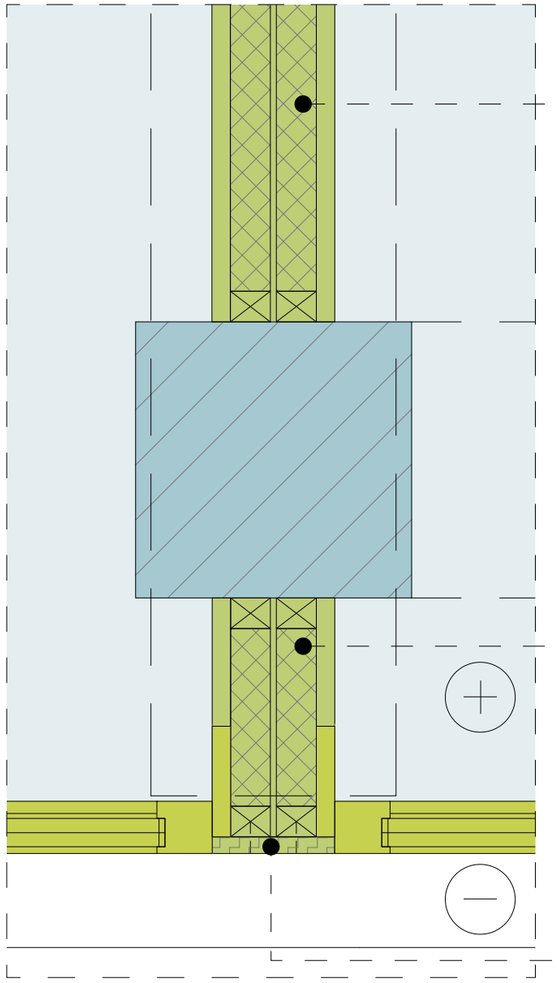
# INNER WALLS



**PROPOSAL BALCONY**

**“Circuwall” frame**
(Velux windows dimensions)

- Recycled “Velux” frames
- Recycled mattresses (sound insulation)
- Pressure treated fire retardant plywood



**Wooden frame and recycled mattress insulation**

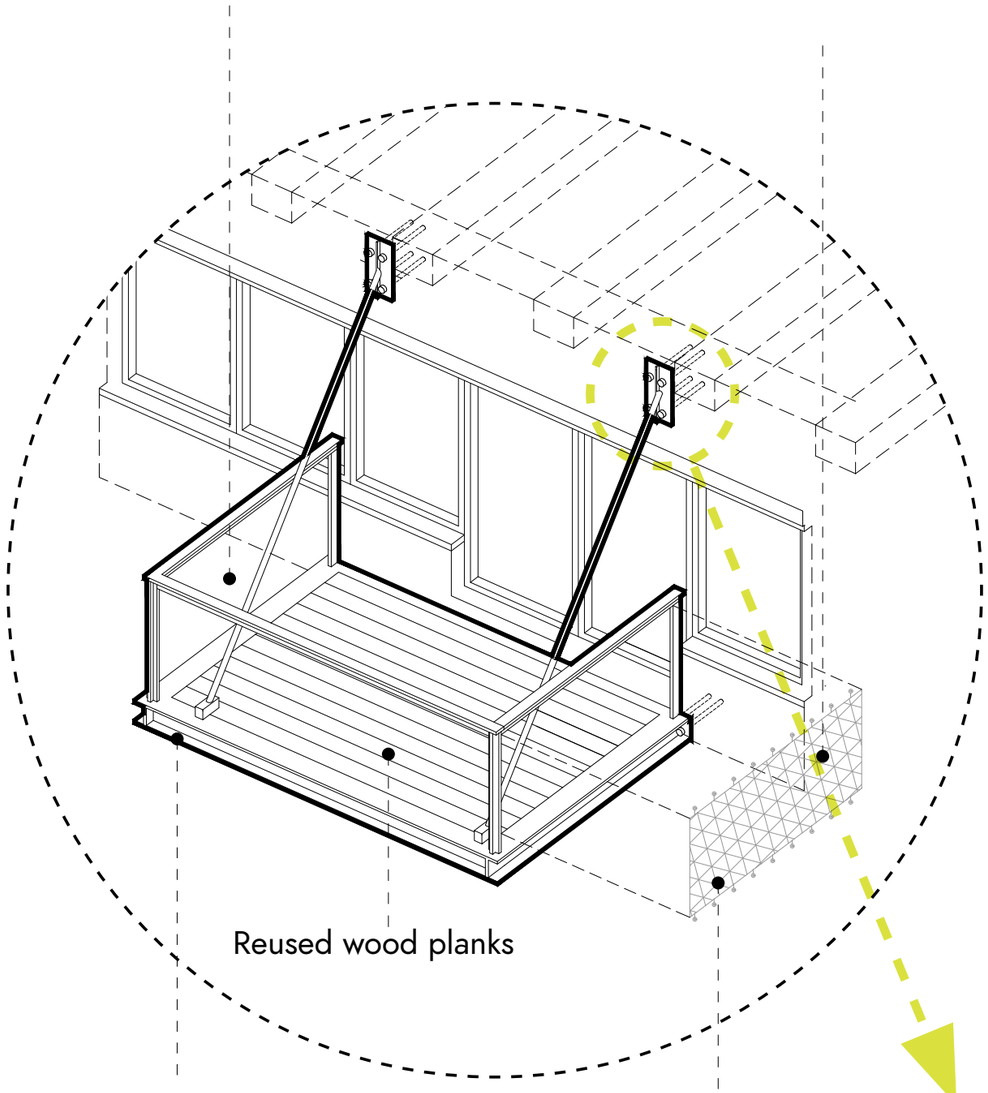
**Exterior wall cover:**
- Waterproof layer
- Aluminium plate

**PROPOSAL INNER WALL DETAIL**

# BALCONY

Closed side (more privacy)

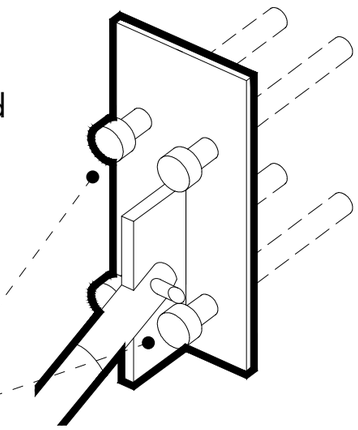
Transparent side (visual connection)



Reused wood planks

Reused steel beams

Railings from reused
available materials



Connecting to the slab

Connecting to the beam

# ROOF DETAIL

- bitumen waterproof layer
- wooden planks
- wooden beams
- steel beams
- ankers
- wooden beams
- insulation
- wooden planks

existing steel beams

- wooden planks (screwed)
- wooden beams
- rubber blocks
- waterproof layer
- insulation
- vapour barrier
- concrete slab

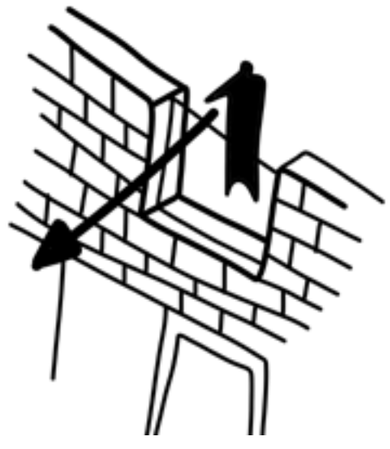
PROPOSAL STREET FACADE 1:60

PROPOSAL TOP FLOOR 1:20

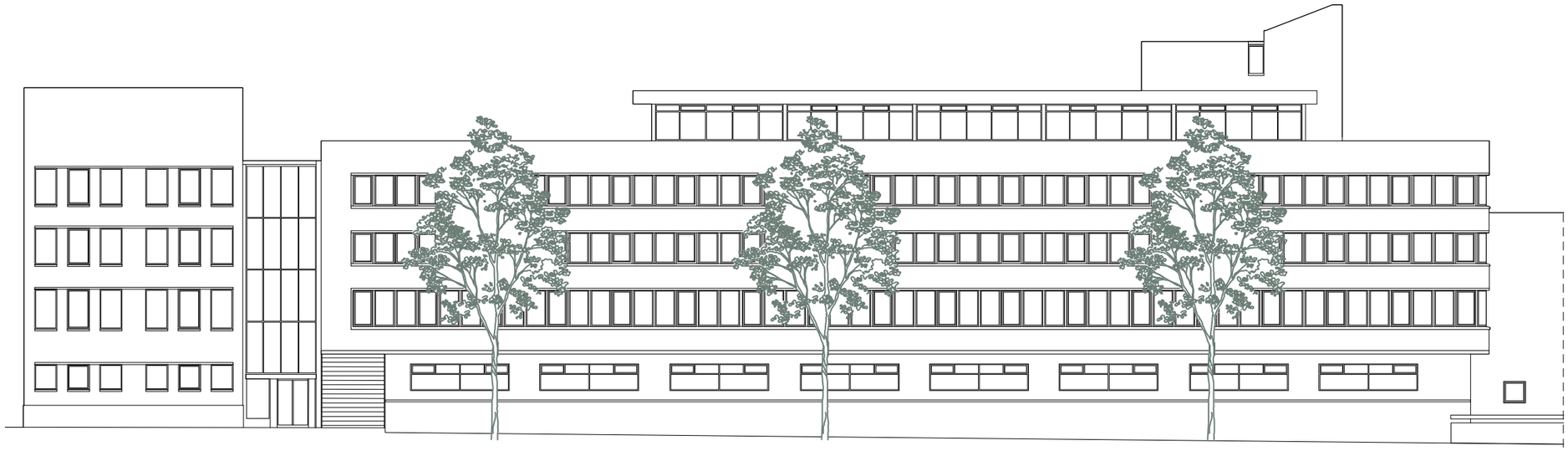
# PROPOSAL SOUTH FACADE

Human scale

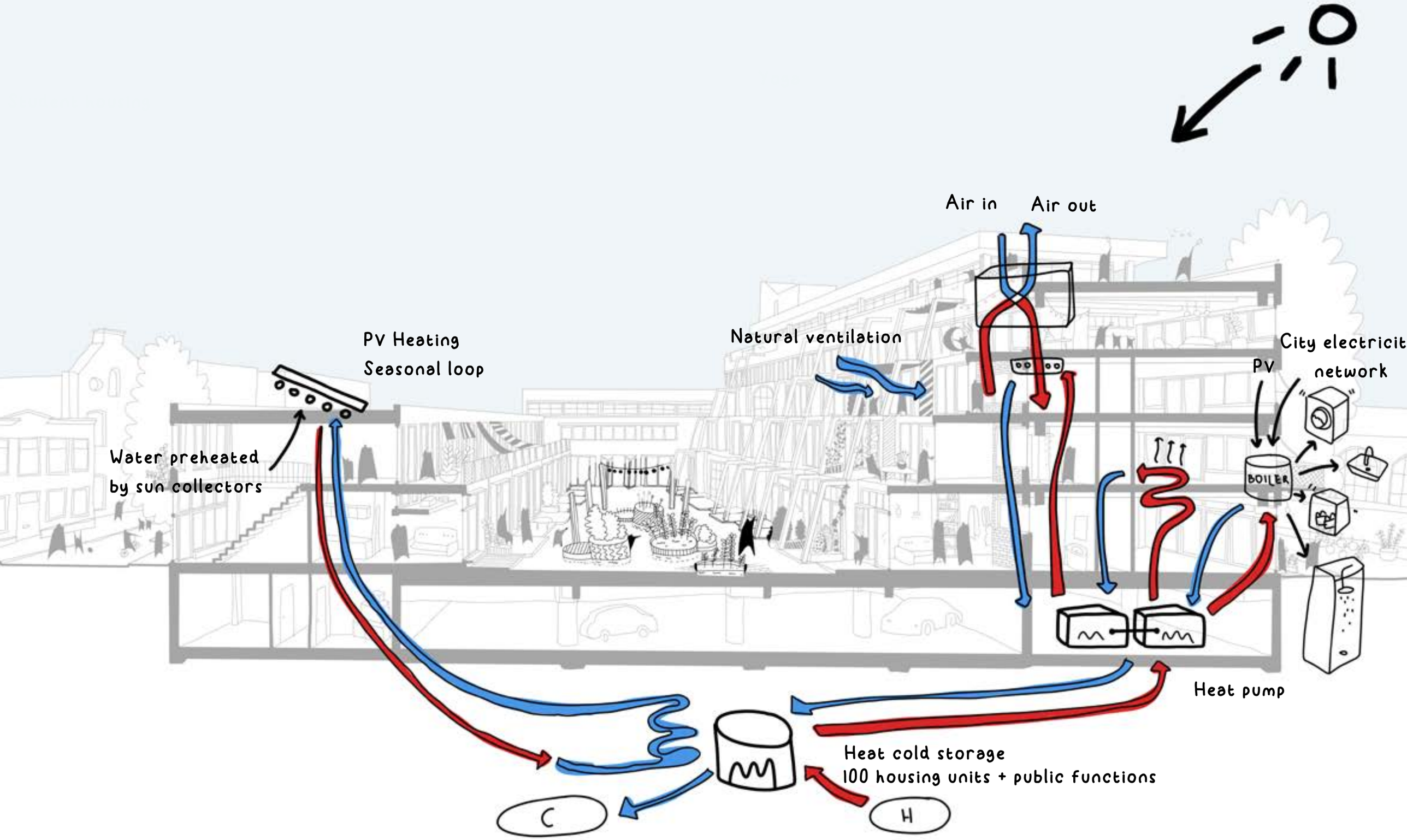
Existing nature



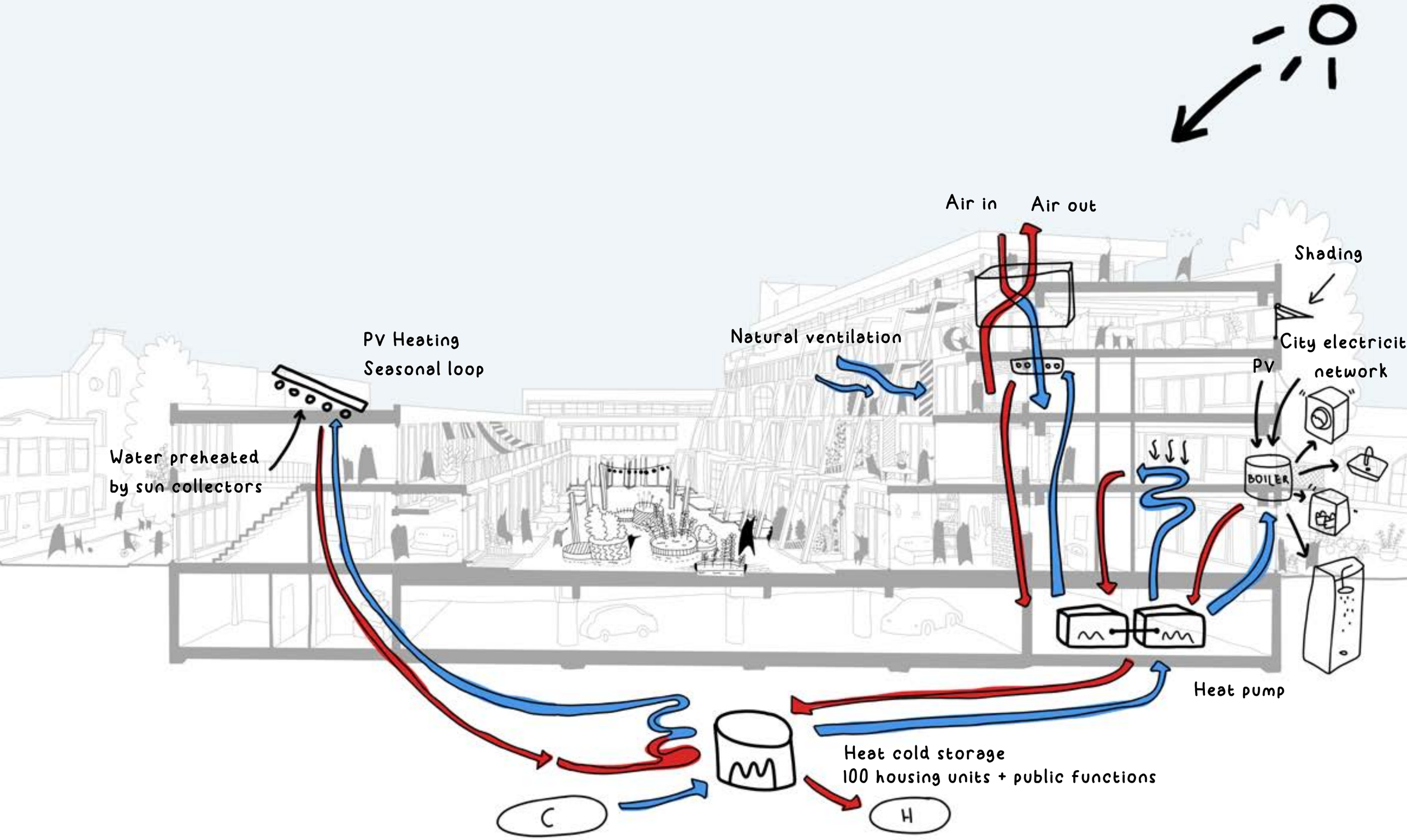
Visual connection



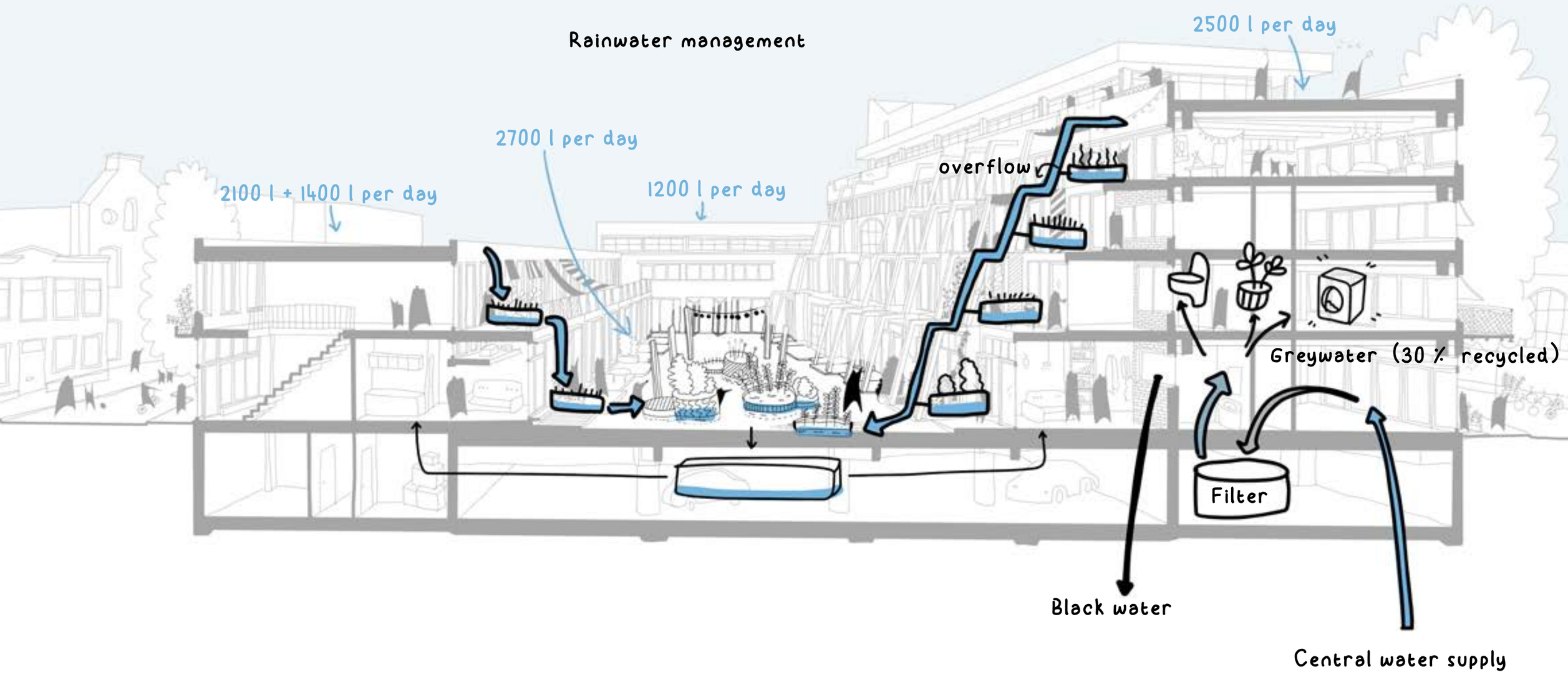
# CLIMATE DESIGN. WINTER



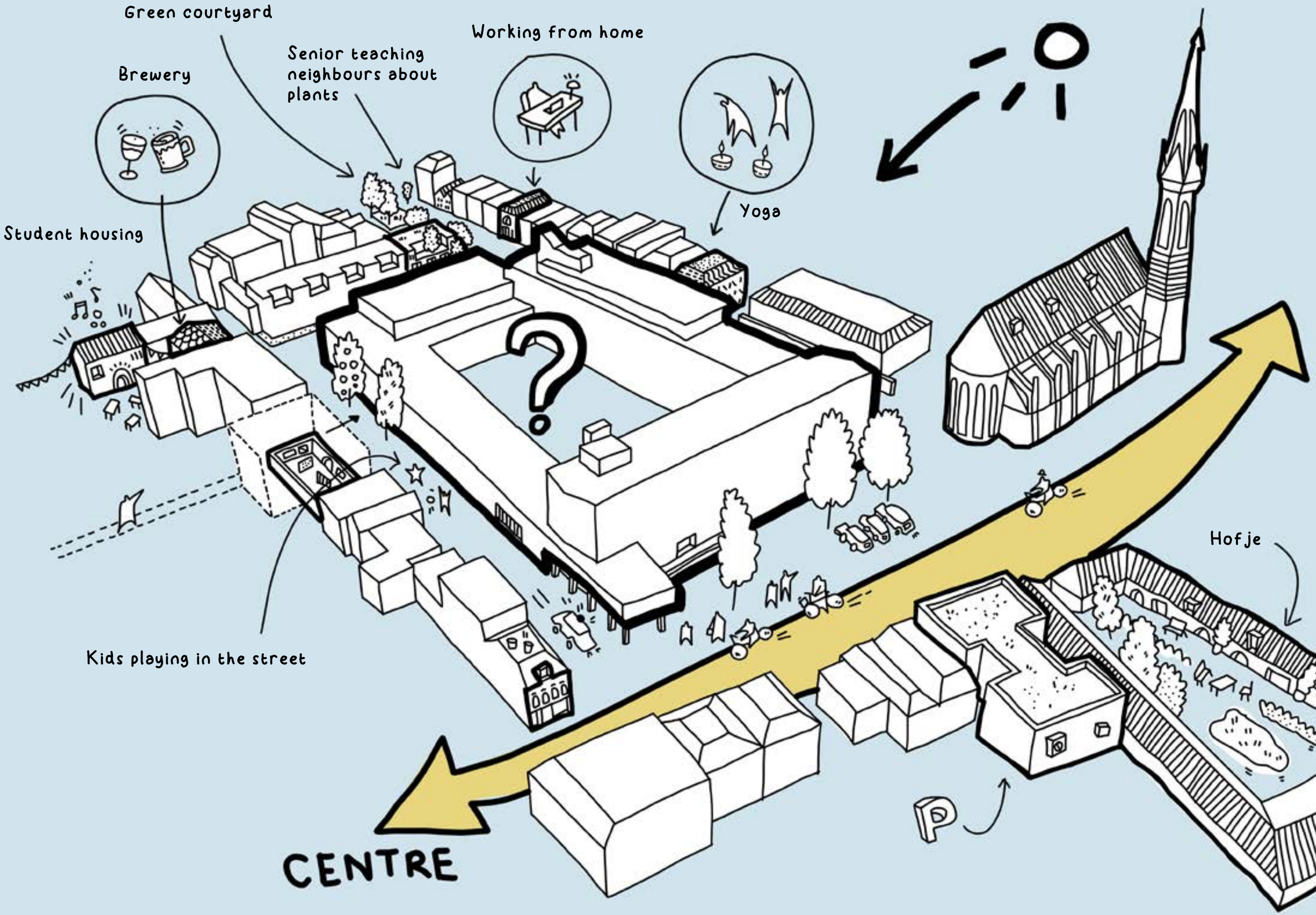
# CLIMATE DESIGN. SUMMER



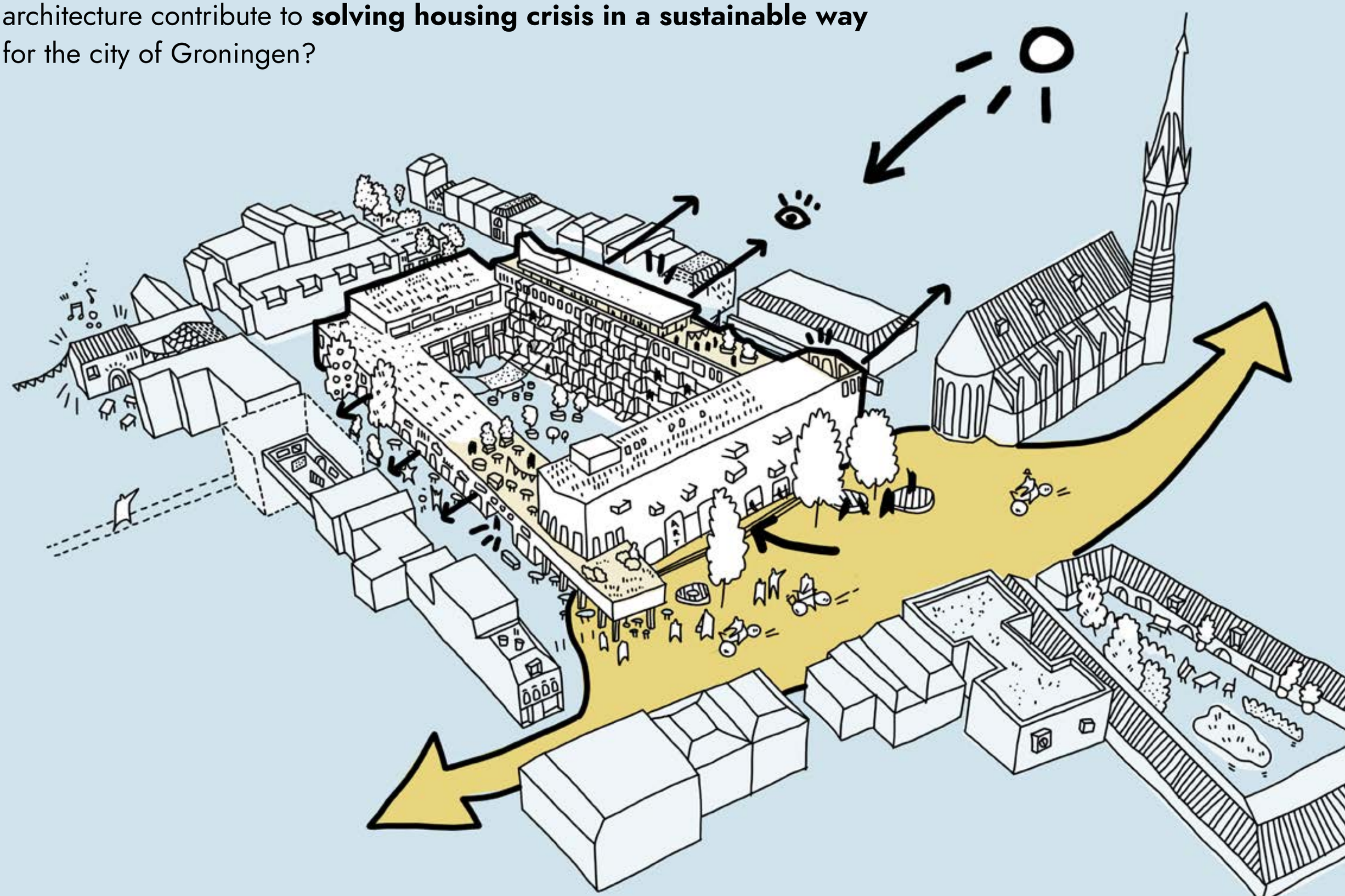
# RAINWATER AND GREYWATER MANAGEMENT



# NEIGHBOURHOOD



How can **adaptive transformation** and **waste reduction** strategies in architecture contribute to **solving housing crisis in a sustainable way** for the city of Groningen?



# NEIGHBOURHOOD. FEEDBACK


"Finally I would have a chance to meet my neighbours"

"Who is responsible for the communal space?"

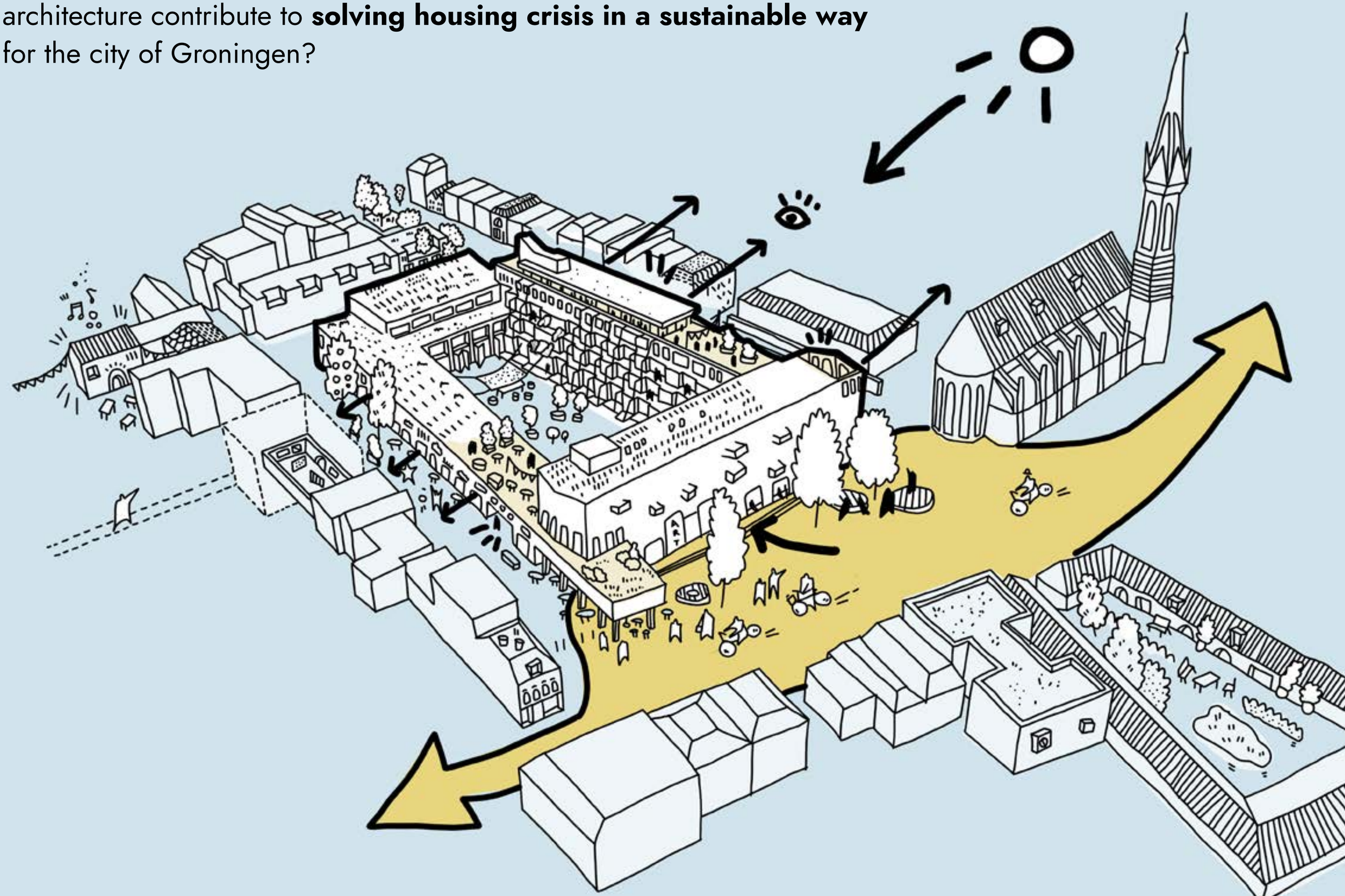

+ Social interaction
+ Community centre

“A tree of life”

“I would like it to happen”


SASkIA
"You've listened to what we told you"

How can **adaptive transformation** and **waste reduction** strategies in architecture contribute to **solving housing crisis in a sustainable way** for the city of Groningen?



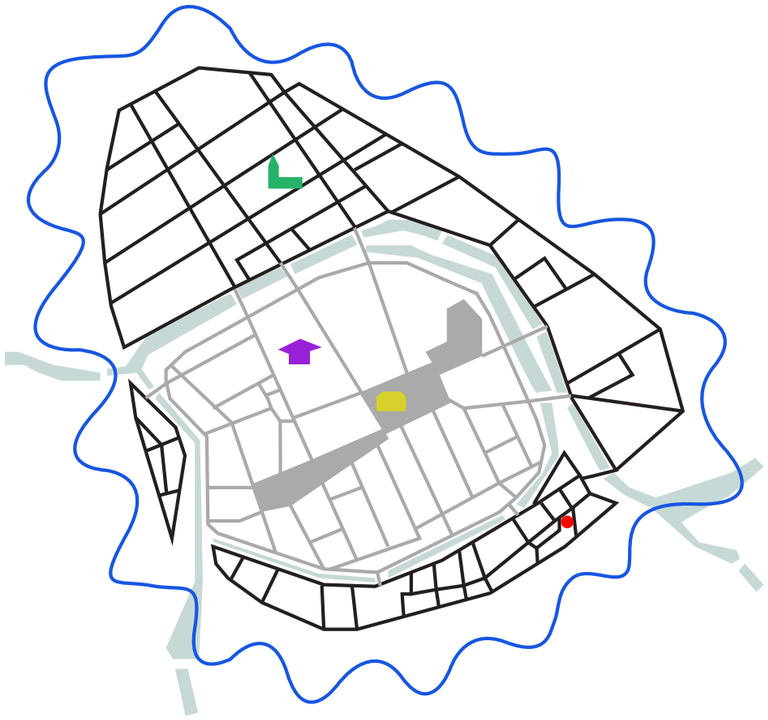
# ADDITIONAL INFORMATION

# RESEARCH QUESTION

How does the **interaction between buildings and residents influence the livability** in the inner part of Groningen?

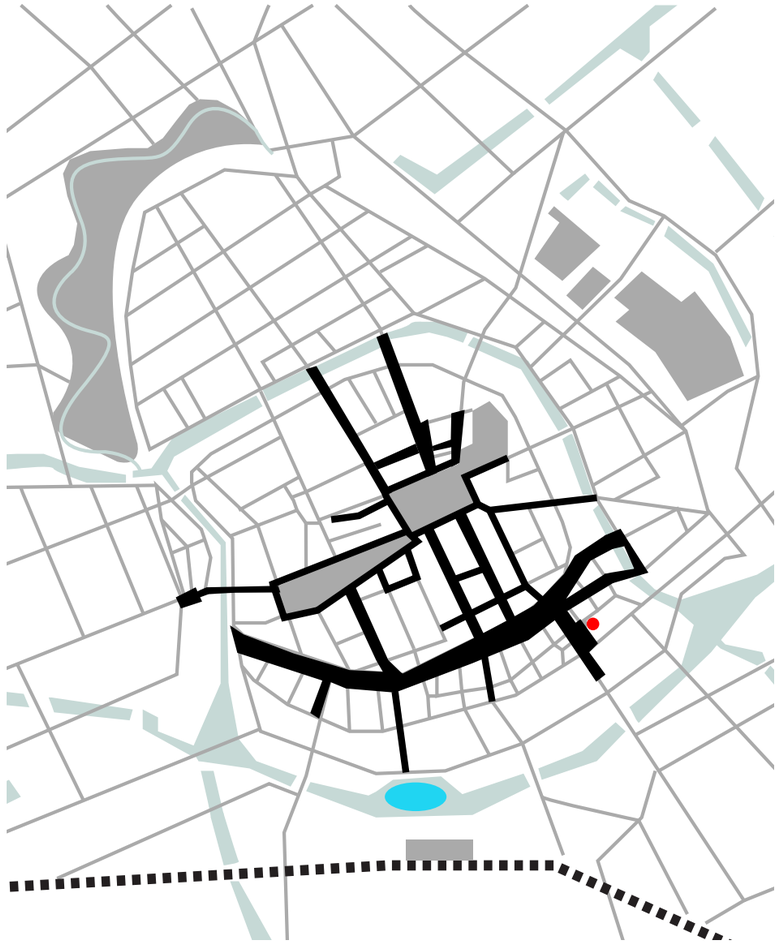
How can **adaptive transformation** and **waste reduction** strategies in architecture contribute to **solving housing crisis in a sustainable way** for the city of Groningen?

# HISTORICAL DEVELOPMENT



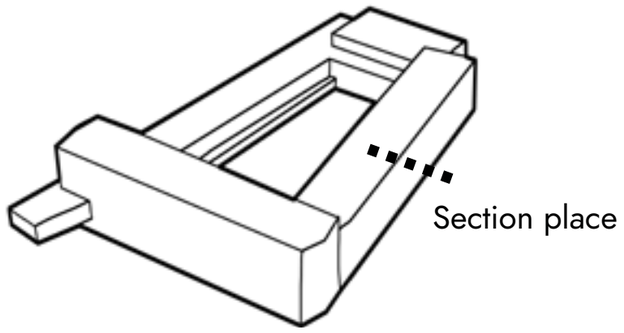
1560 - 1800
Sized city

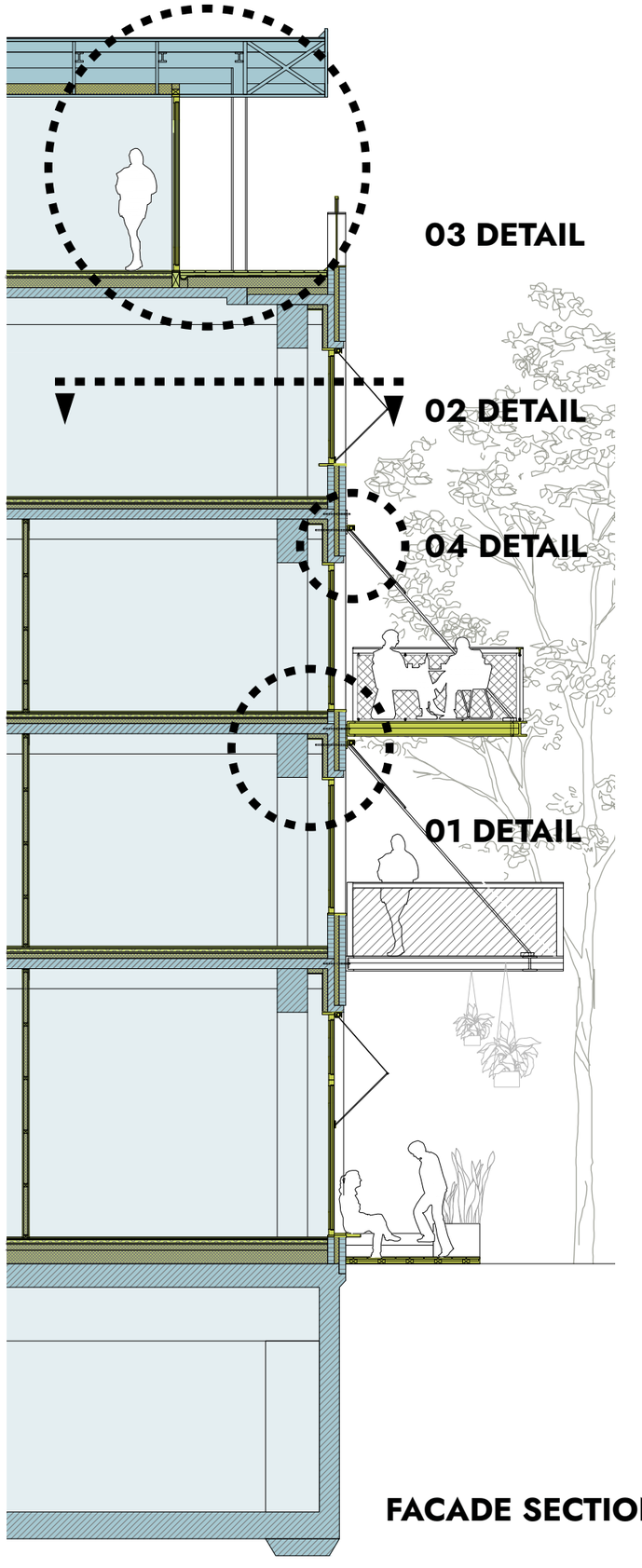
1800 - 1990



1990 - Vision

# FACADE PROPOSAL

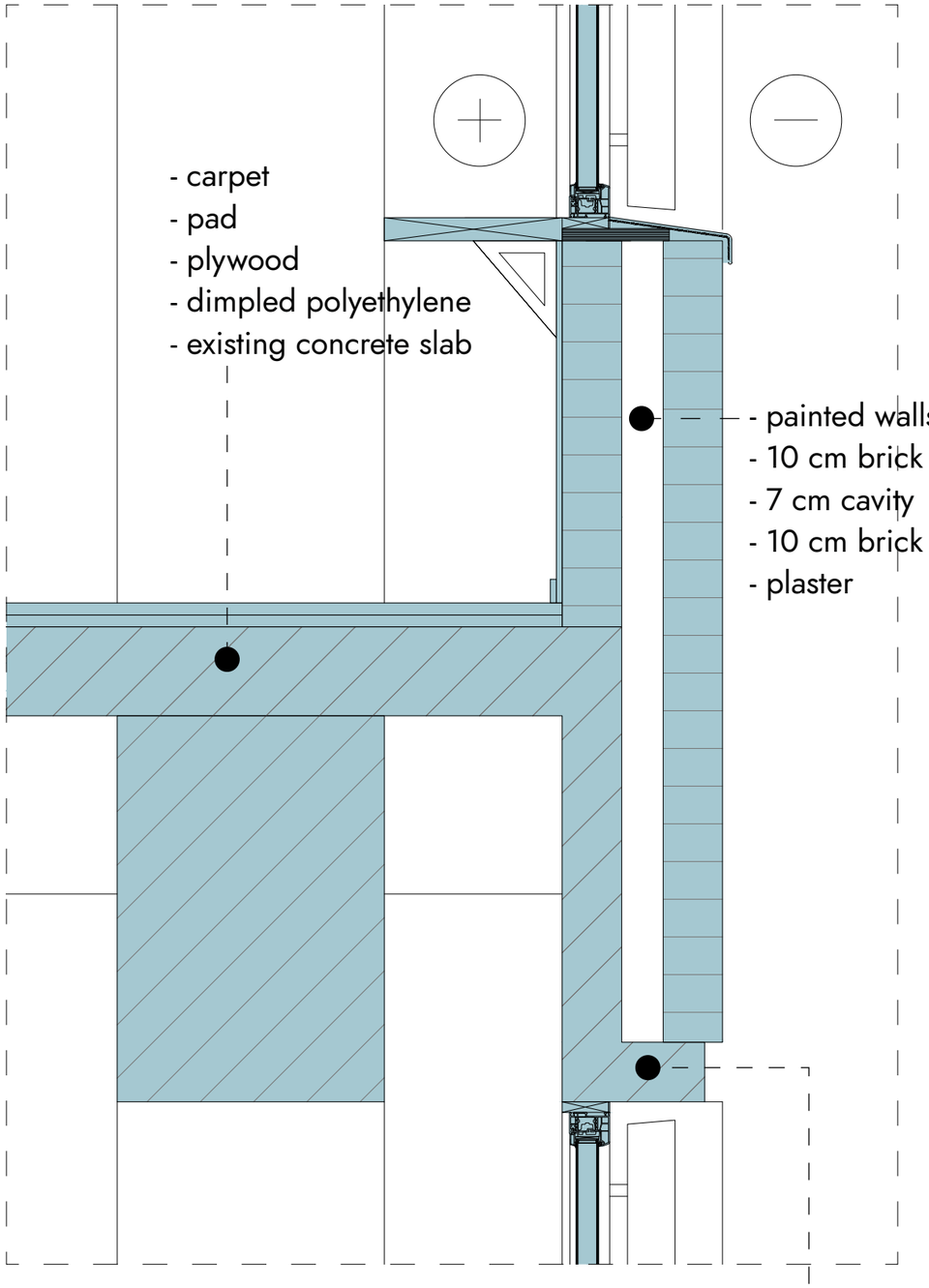



**FACADE SECTION PROPOSAL 1:60**

existing
new

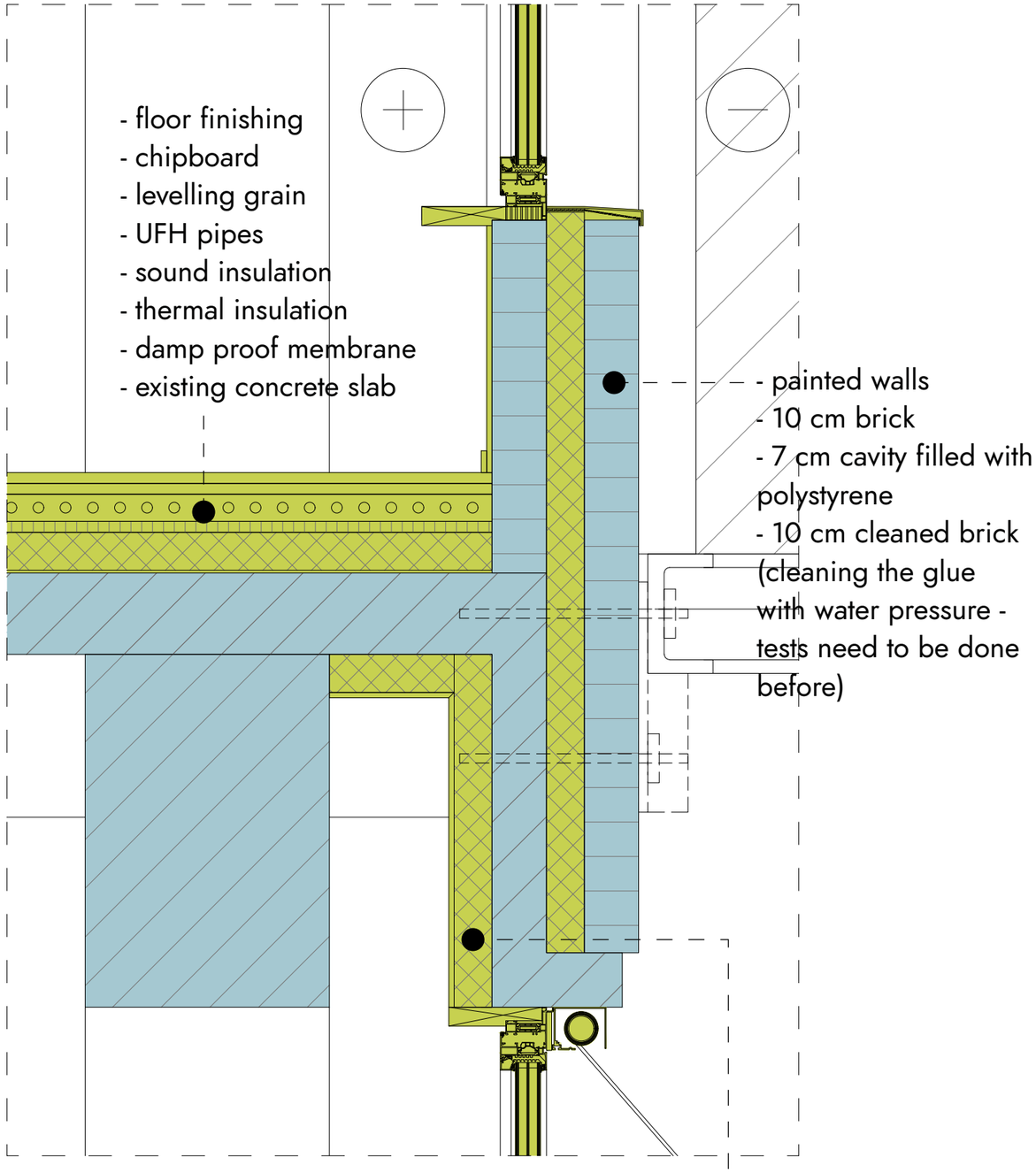
# 01 DETAIL. FLOORS AND EXTERIOR WALLS




## EXISTING FLOOR DETAIL 1:10

Concrete elements supporting bricks above

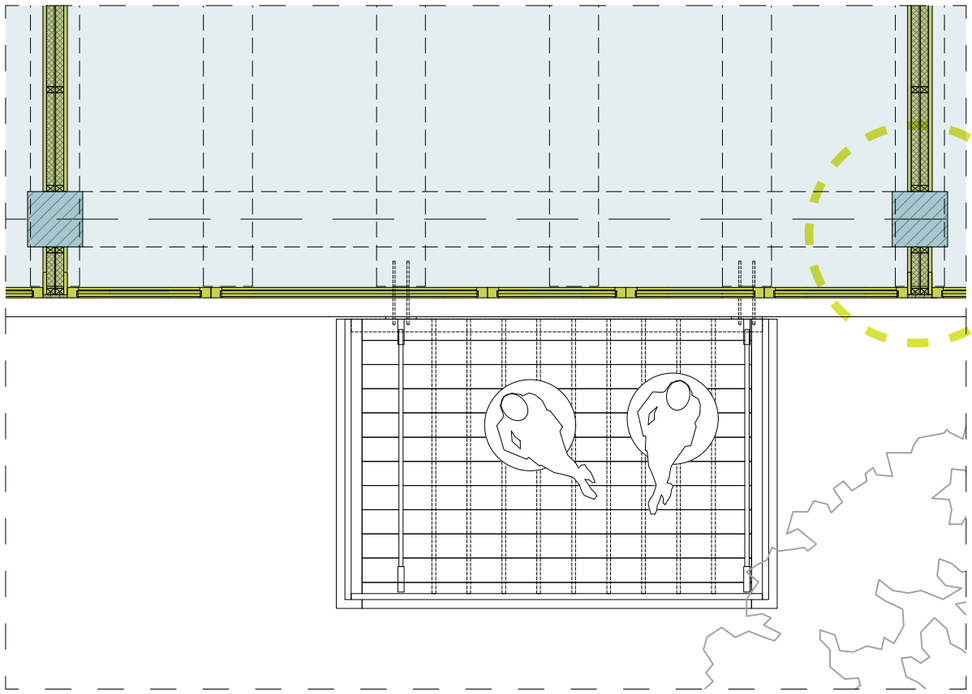
MIN Height in the apartments: 2.8 m
CRITICAL Height floor to beam 2.2 m



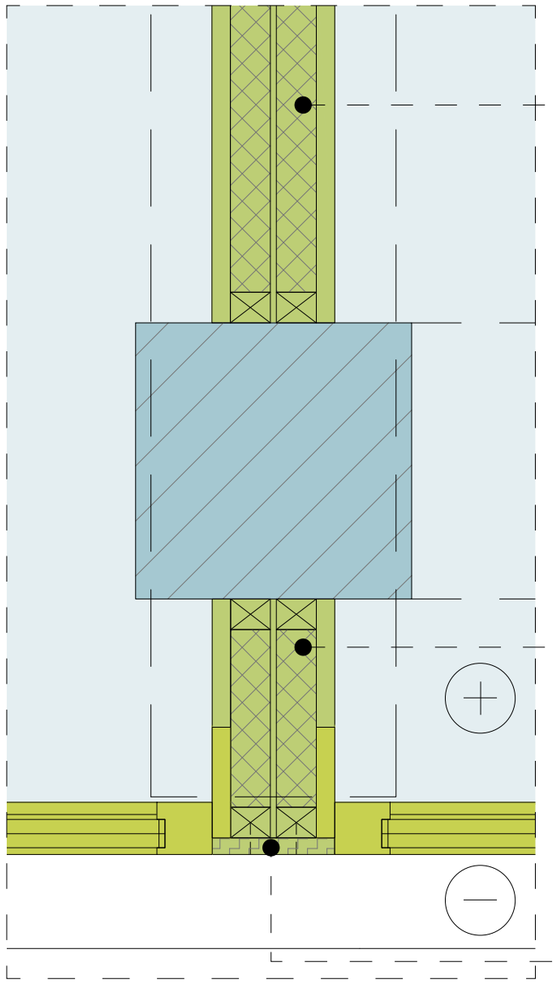

## PROPOSAL FLOOR DETAIL 1:10

Additional thermal insulation on inside.
Prefabricated elements. Mounted on site.

# 02 DETAIL. INNER WALLS



**PROPOSAL BALCONY 1:50**



**“Circuwall” frame**
(Velux windows dimensions)

- Recycled “Velux” frames
- Recycled mattresses (sound insulation)
- Pressure treated fire retardant plywood

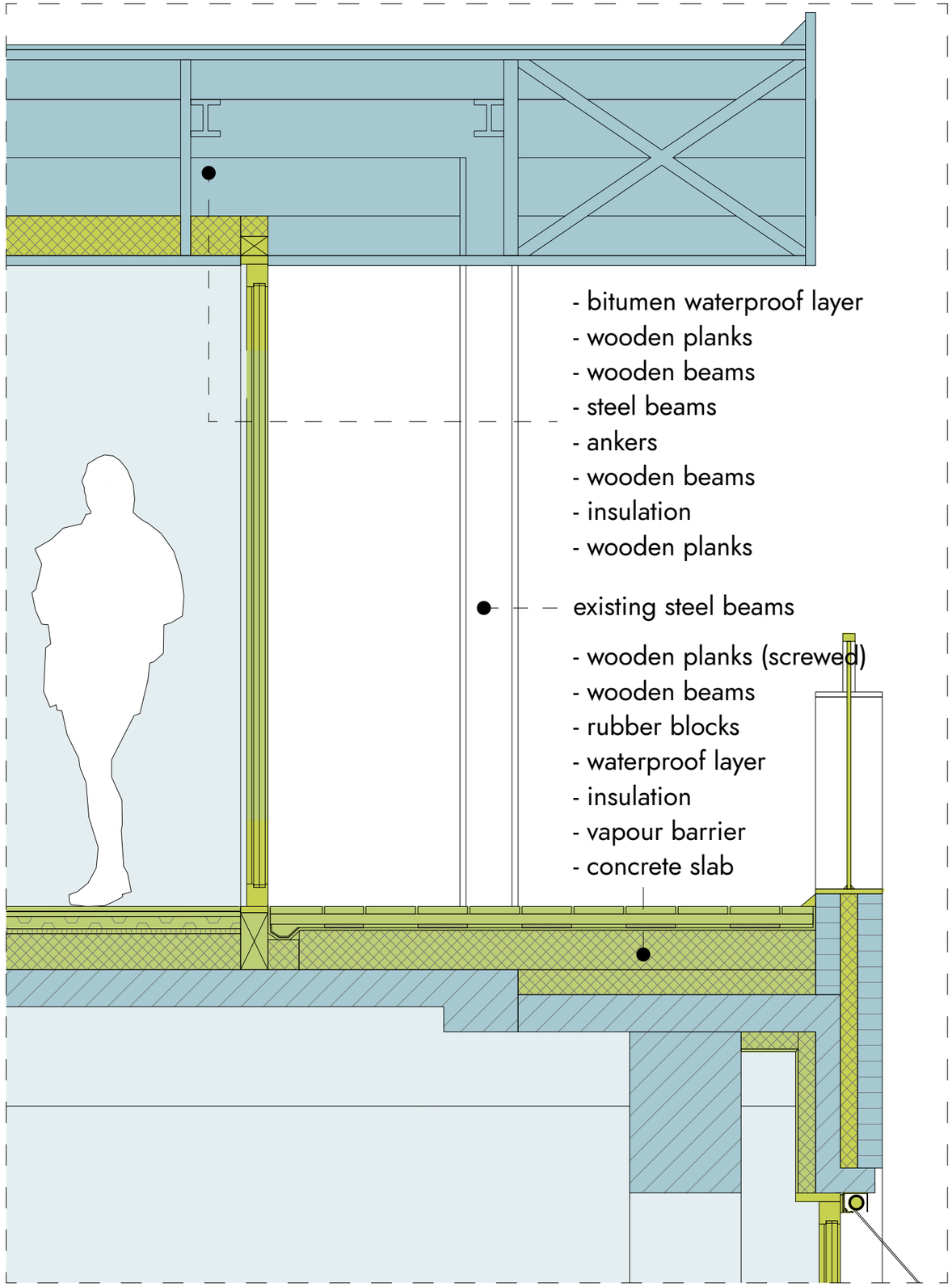
**Wooden frame and recycled mattress insulation**

**Exterior wall cover:**
- Aluminium plate

**PROPOSAL INNER WALL DETAIL 1:10**

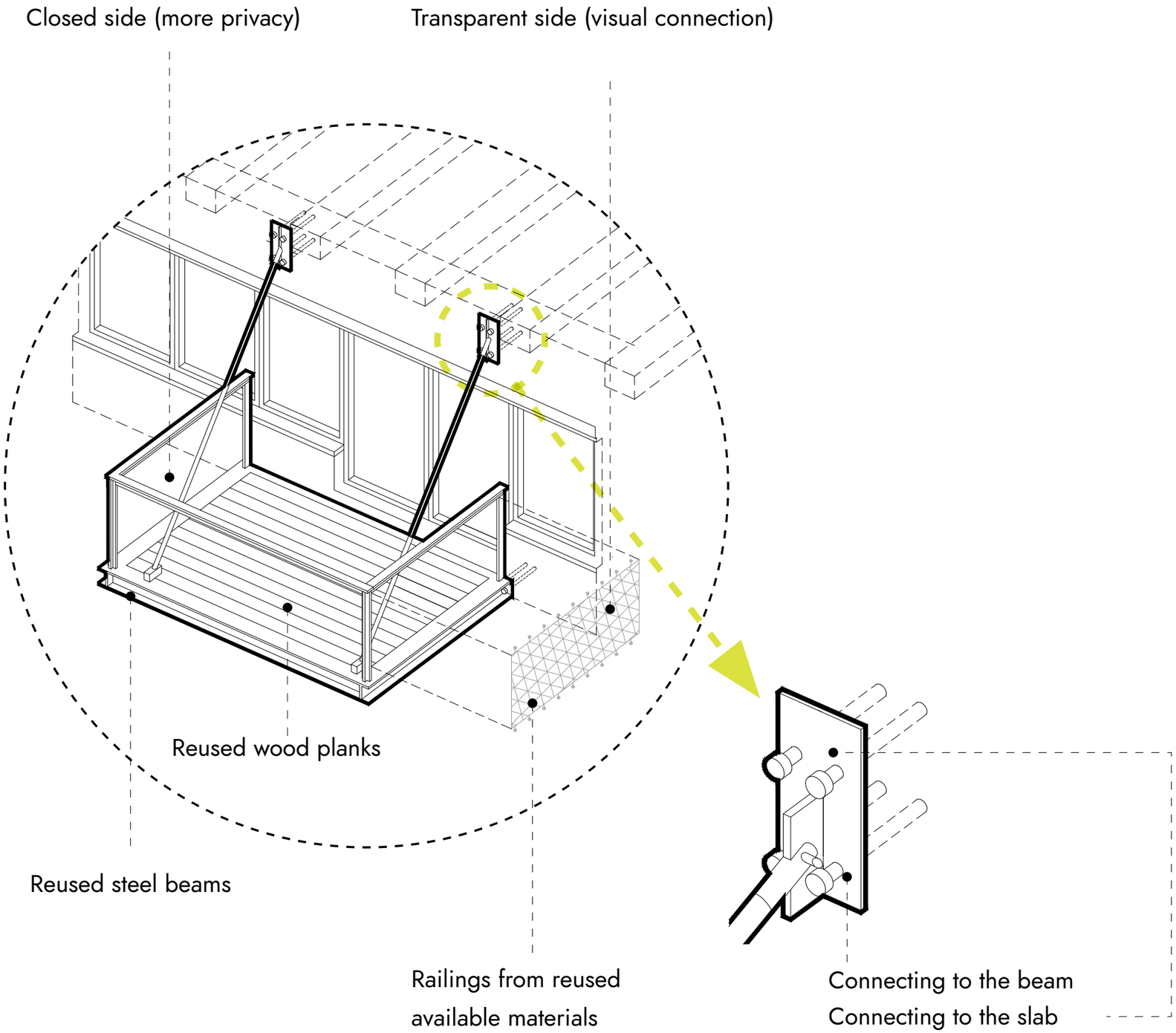
# 03 DETAIL. ROOF

PROPOSAL STREET FACADE 1:60

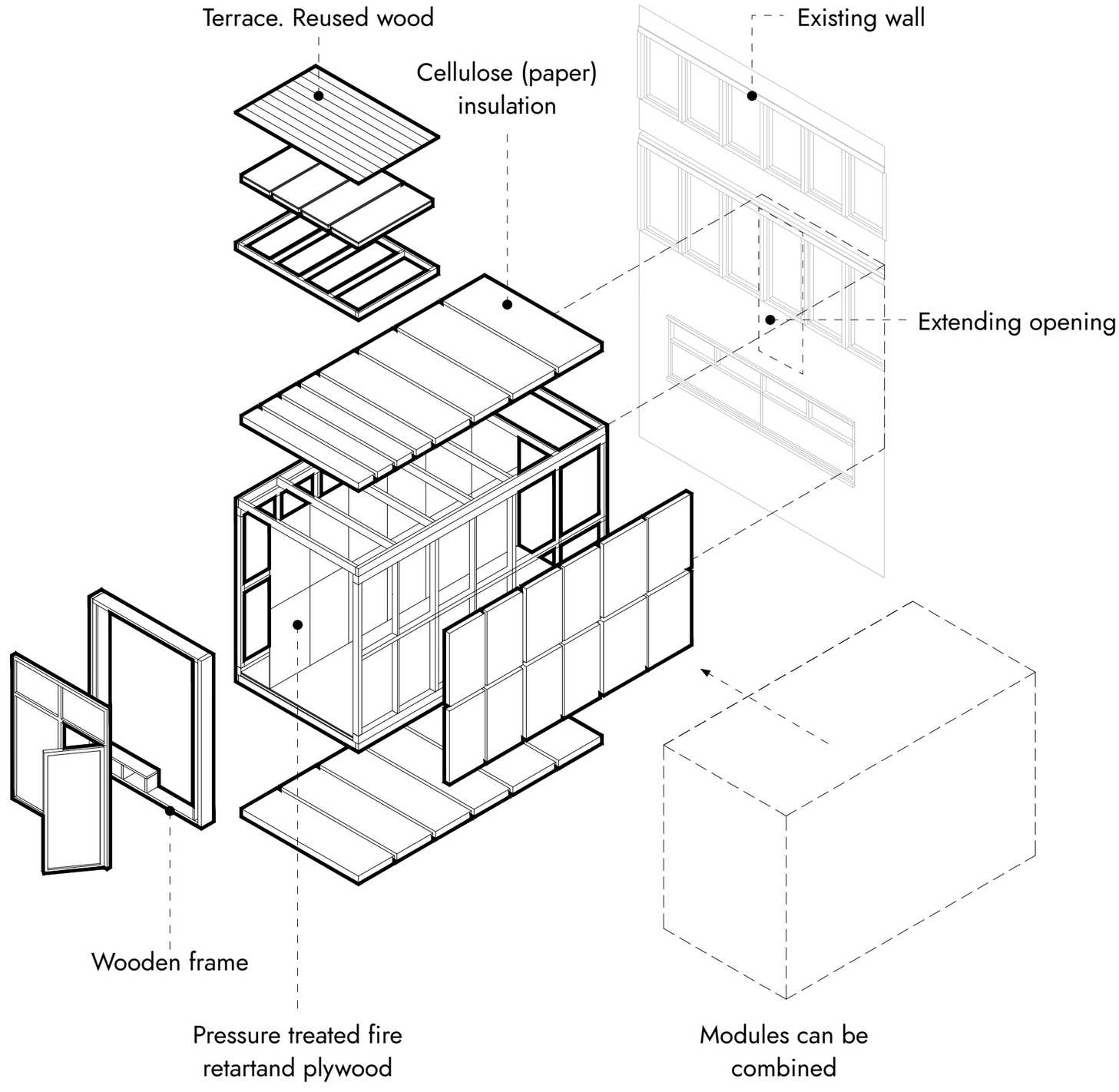



PROPOSAL TOP FLOOR 1:20

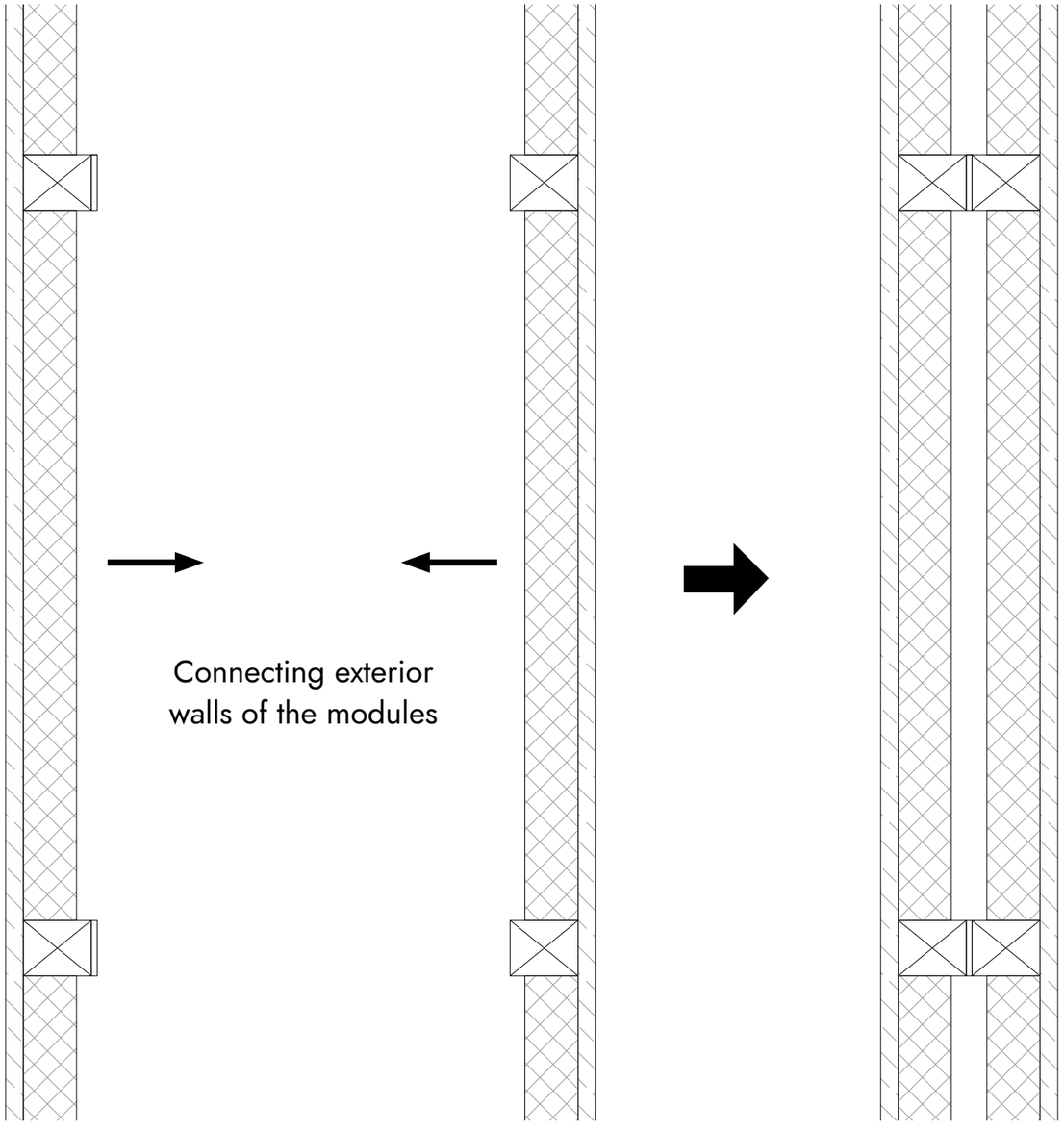
# 04 DETAIL. BALCONY



# BIO-BASED ADDITIONS



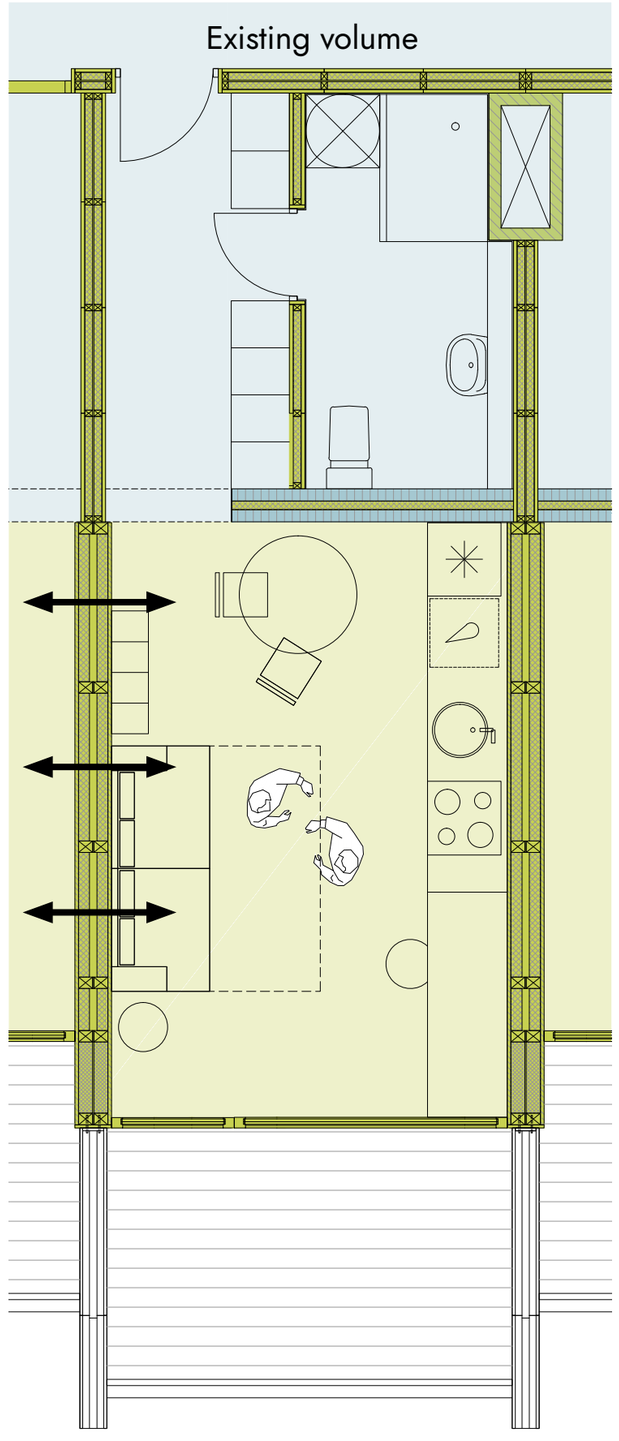
# BIO-BASED ADDITIONS



Connecting exterior
walls of the modules

Connected walls with a
gap in between

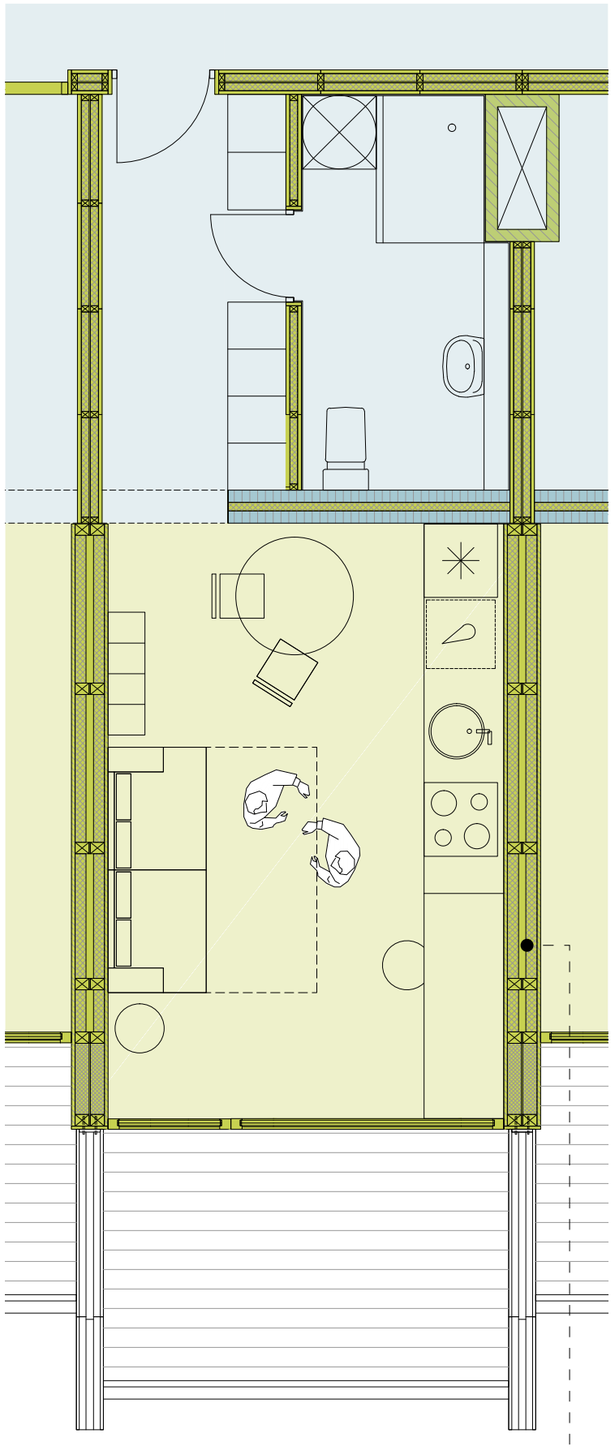
## WALLS OF THE MODULES 1:10

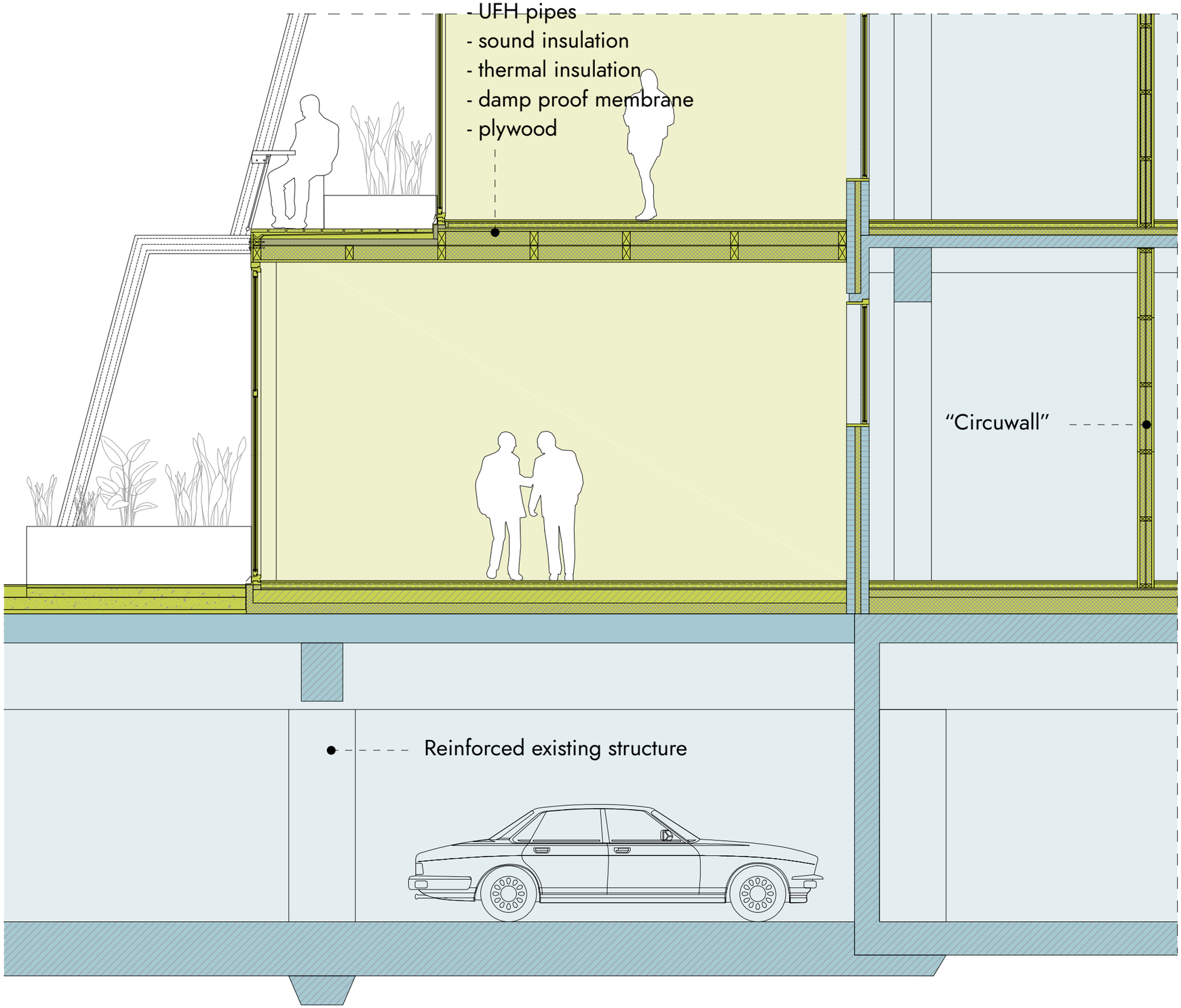



There is a possibility to combine
different units by removing
finishing layers and insulation
panels of the modules

## FLOORPLAN 1:50

# BIO-BASED ADDITIONS





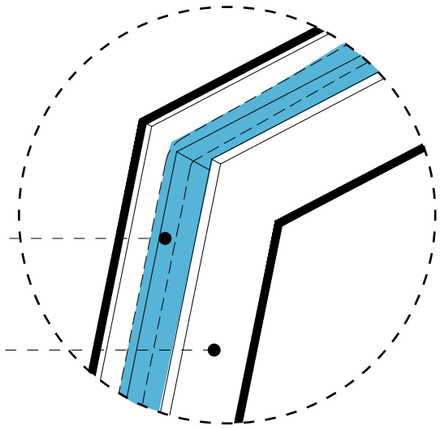

**FLOORPLAN 1:50** Different modules attached to each other **SECTION 1:50**

# DETAILING OF ADDITIONS

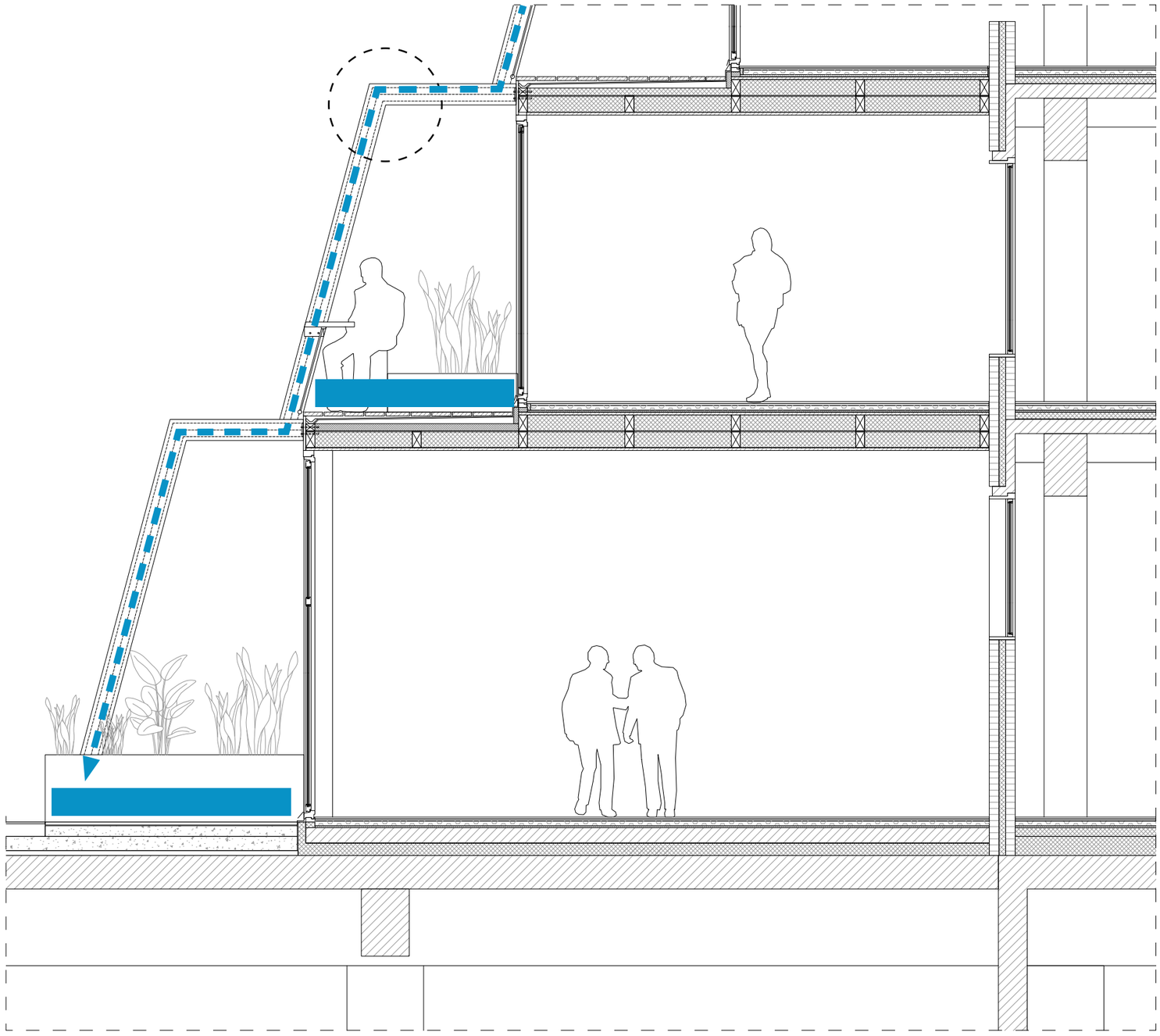
**REUSED**
Steel beams
(from Den Haag Police station)

Rain gutter

Reused H Profile
steel beam

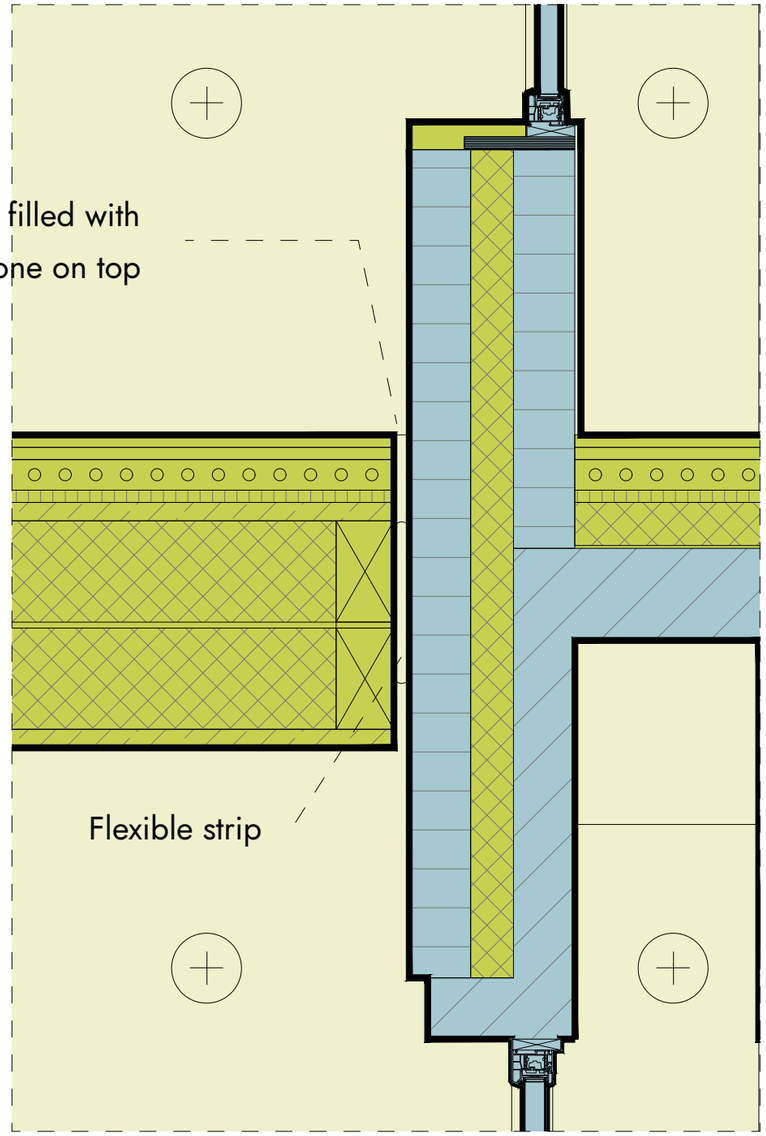


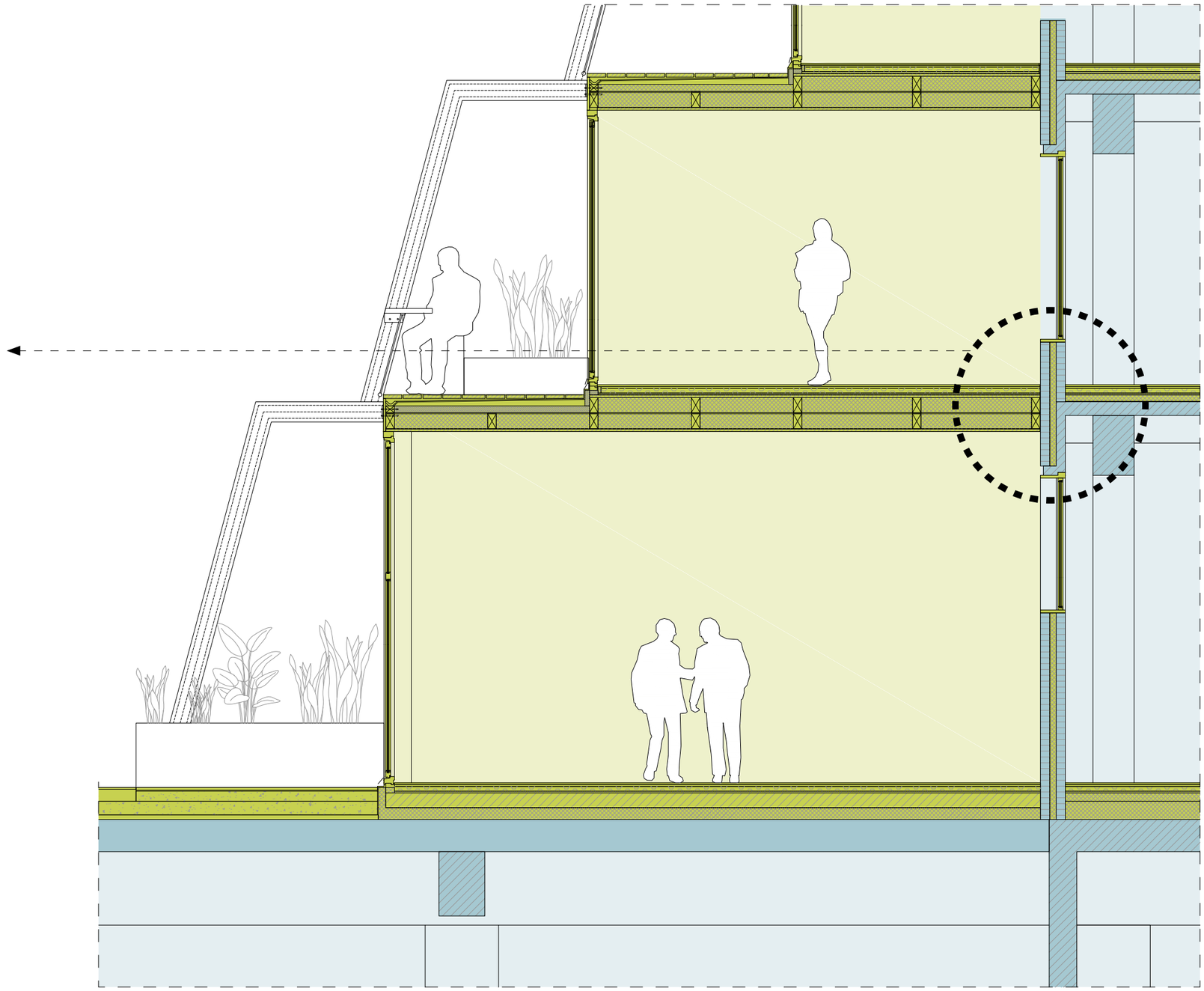
RAINWATER



**SECTION 1:50**

# DETAILING OF ADDITIONS

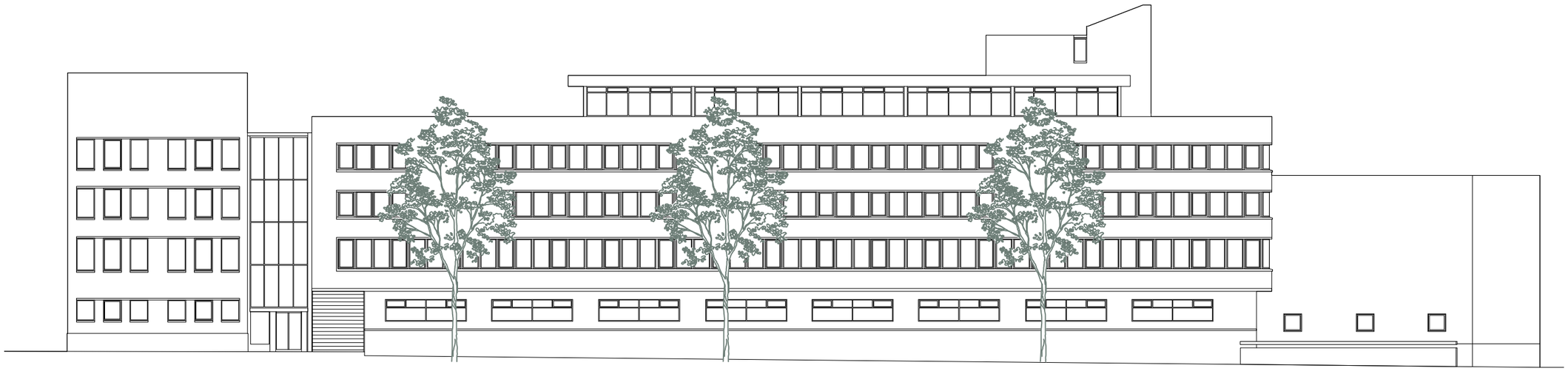


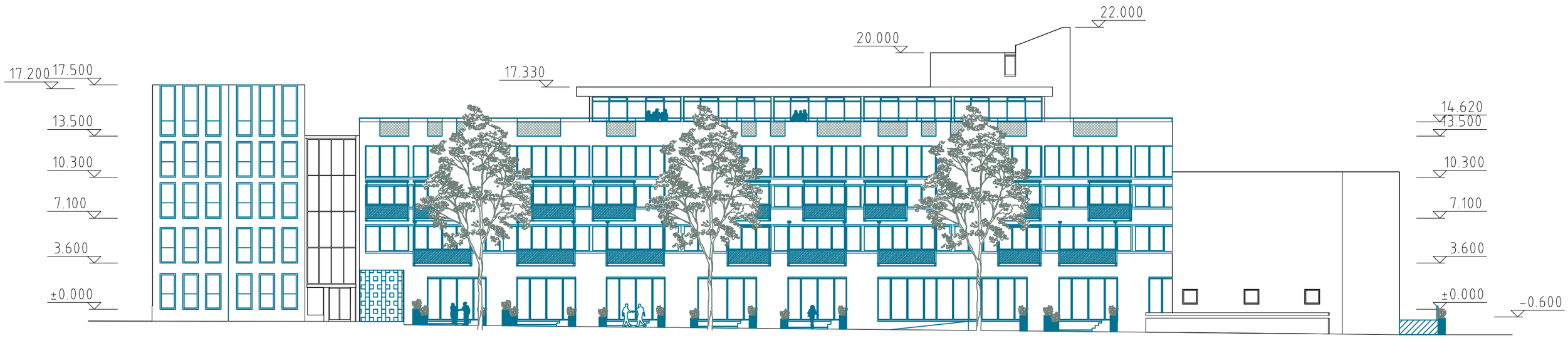
**CONNECTION DETAIL 1:10**

**SECTION 1:50**

# SOUTH FACADE

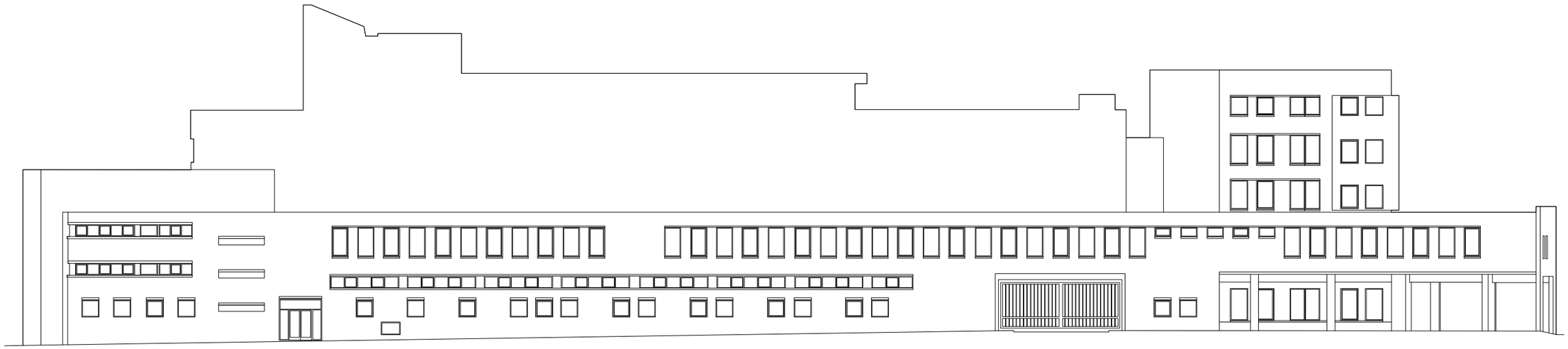


**EXISTING SITUATION 1:300**




**PROPOSAL 1:300**

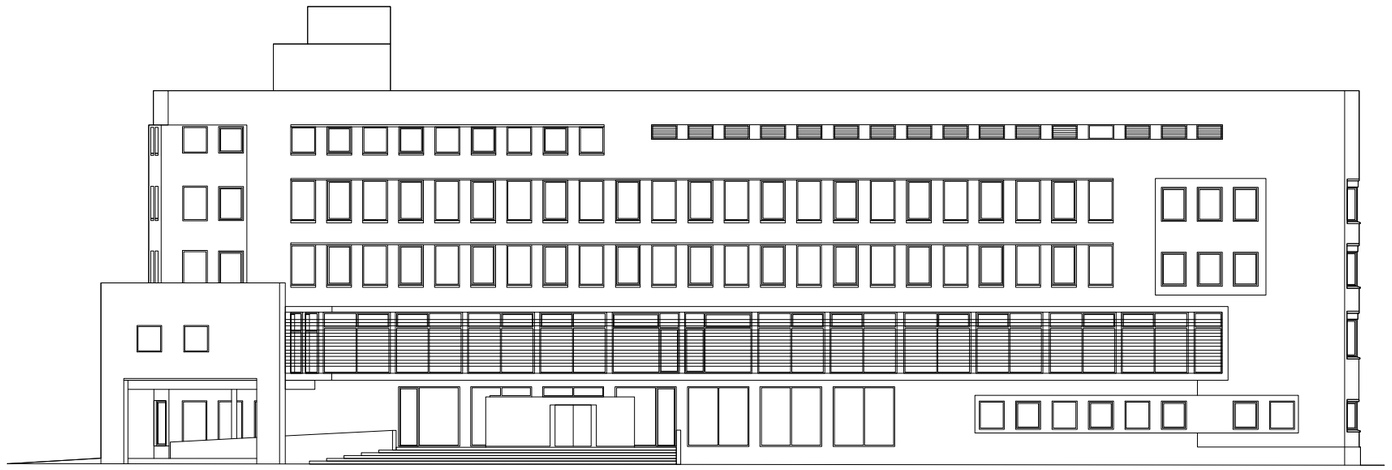
# NORTH FACADE



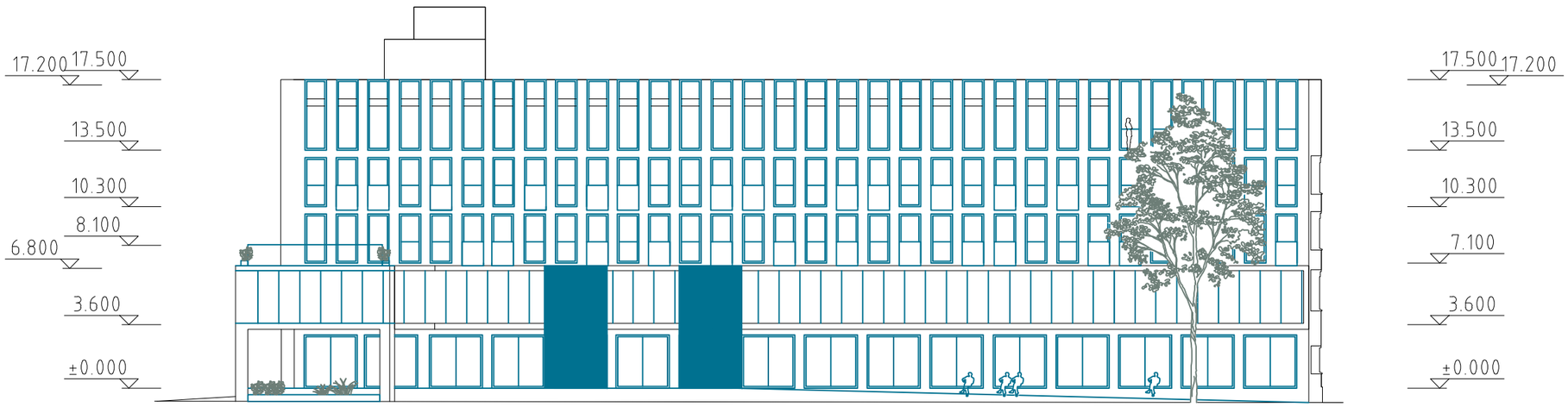
**EXISTING SITUATION 1:300**


**PROPOSAL 1:300**

# WEST FACADE

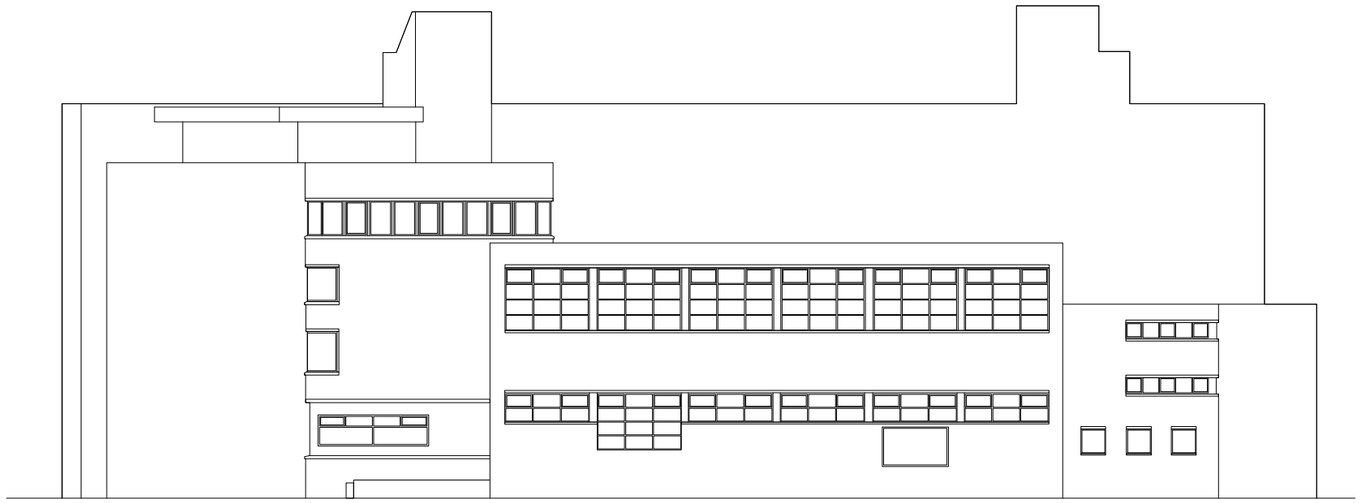


**EXISTING SITUATION 1:300**

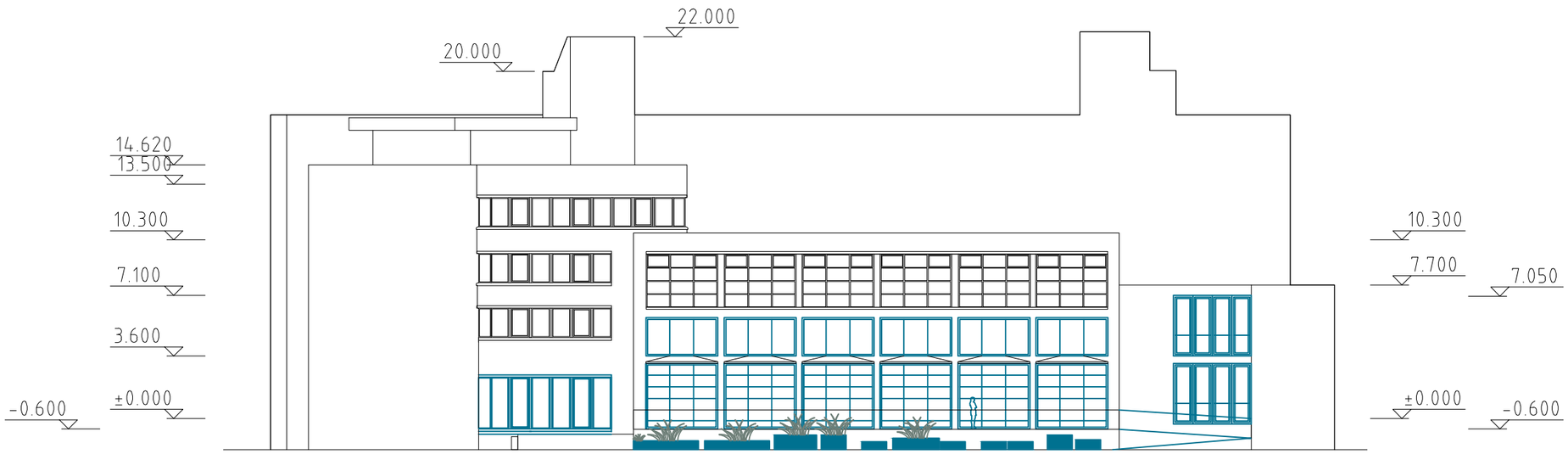



**PROPOSAL 1:300**

# EAST FACADE



**EXISTING SITUATION 1:300**




**PROPOSAL 1:300**