Adaptability in Architecture

Empowering influence of the user

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P5 | Graduation Presentation

AR3AD100 | Advanced Housing Design | TU Delft

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Anne Kockelkorn
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Ruurd Kuijlenburg

Merwevierhaven

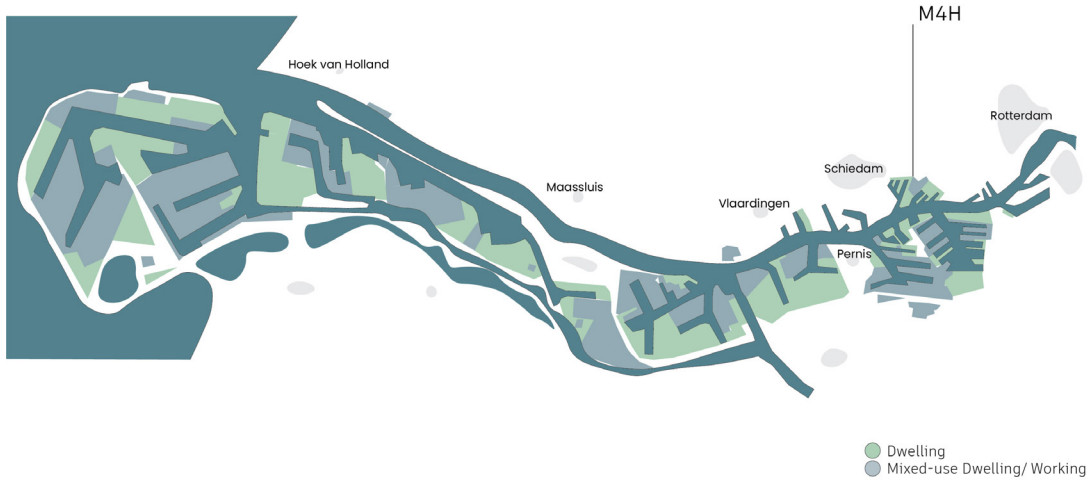
The Netherlands

Rotterdam

Merwevierhaven

Future vision on Rotterdam's harbour

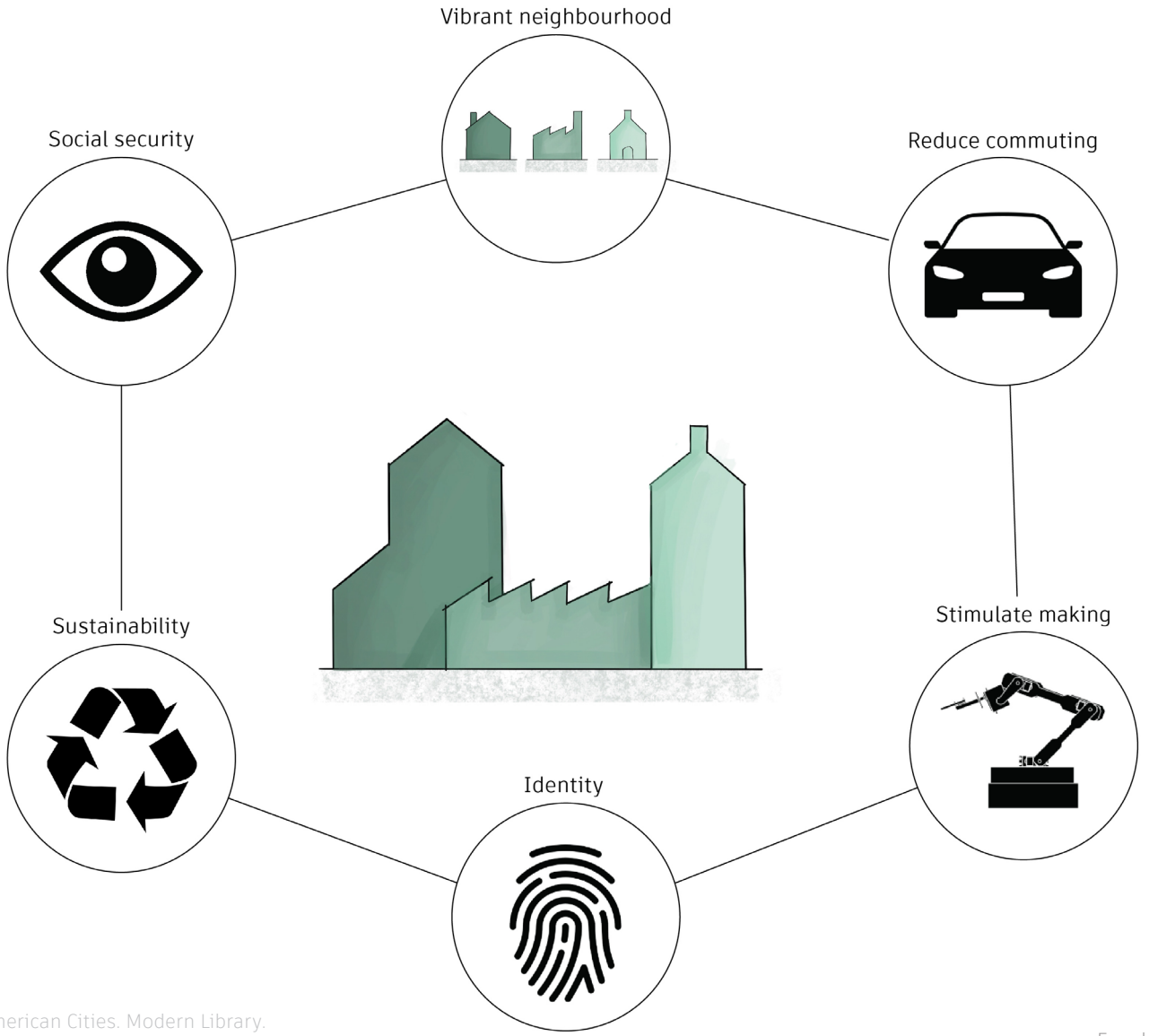
Current situation



Future vision

Merwevierhaven

Work and live



Sources:
Jacobs, J. (1961). Death and Life in Great American Cities. Modern Library.

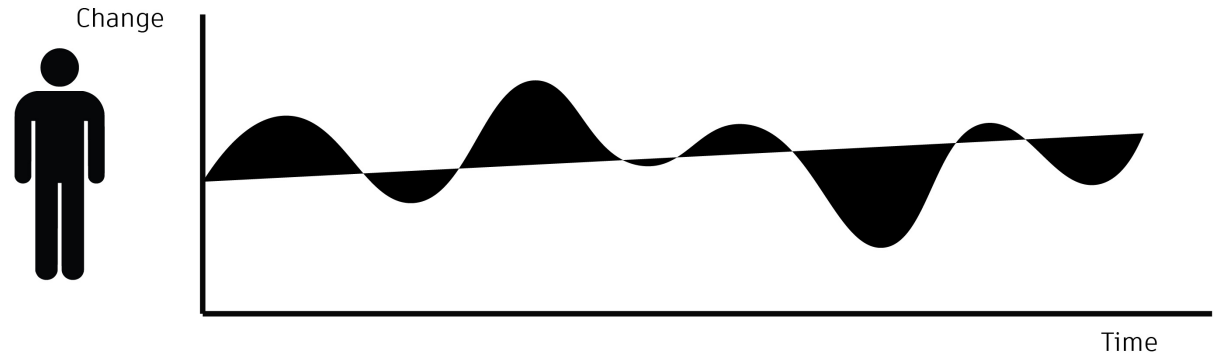
Merwevierhaven

Today

Future

Source
Crossing Keileweg. From “Kraaijvanger,” by Plotvis (https://www.kraaijvanger.nl/nl/projecten/crossing-keileweg/)
Het Makersveld. From “DELVA”, by A2 Studio (https://delva.la/projecten/m4h/)

Project development

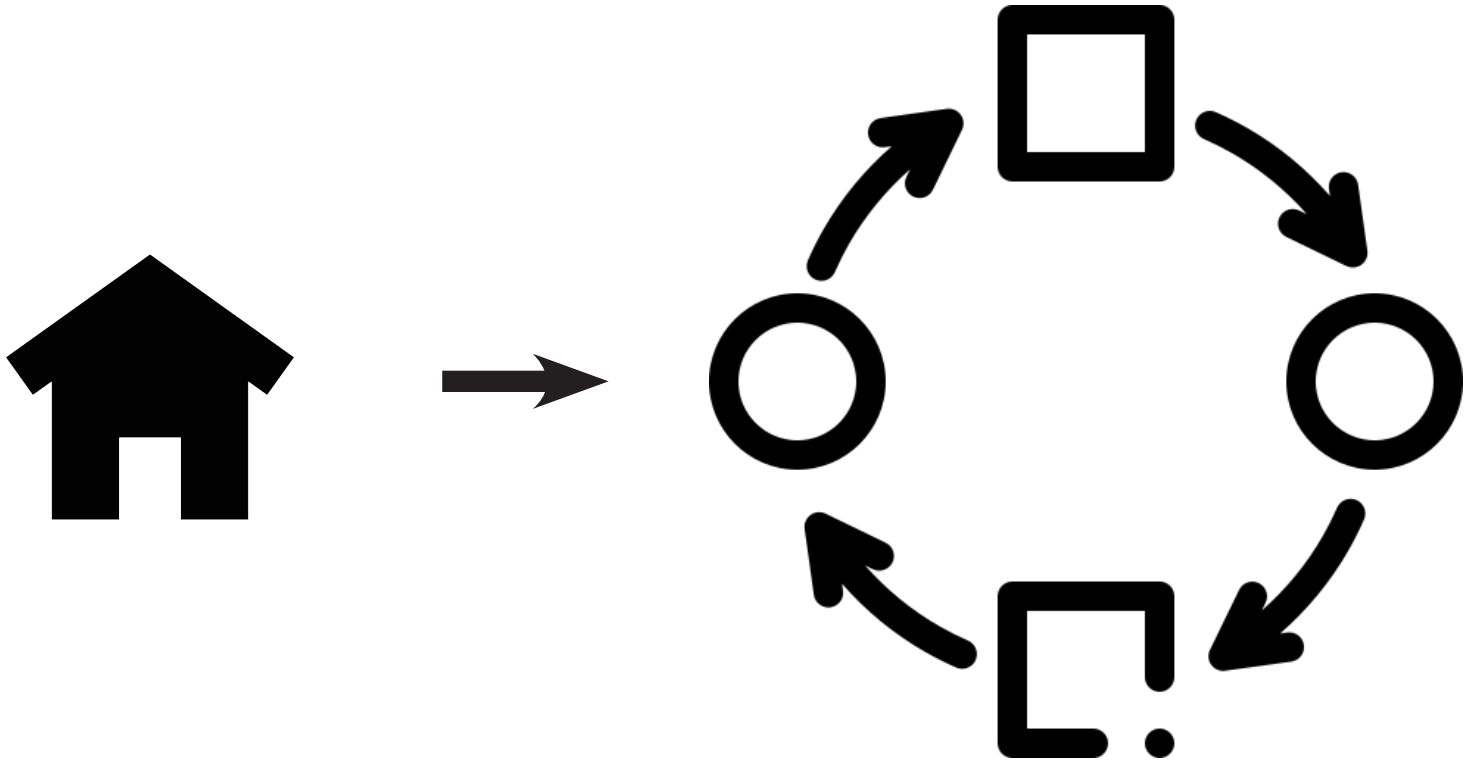


Build for the future

Open Building

Flexible architecture

Adaptable architecture



The user

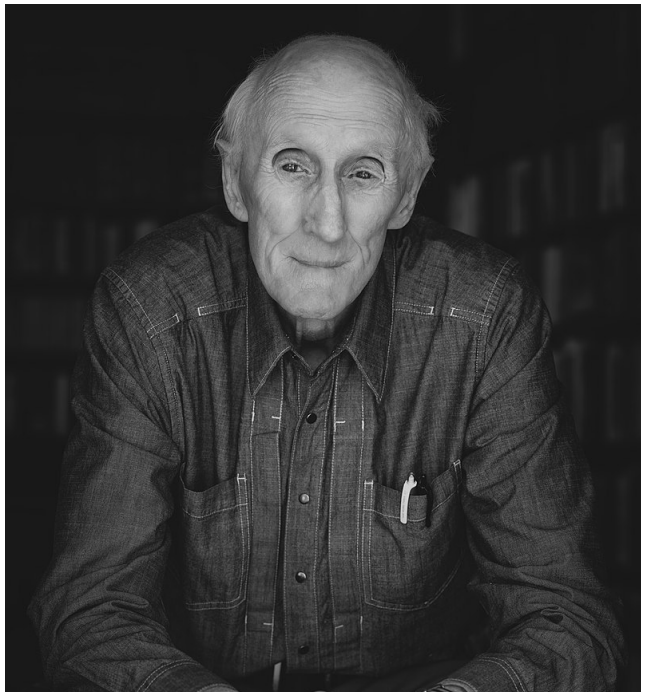
Empowerment of the user

“How can design strategies with implementation of adaptable architecture in building projects create more user-oriented dwellings?”

Behind the scene | History

Main actors

John Habraken



Stewart Brand

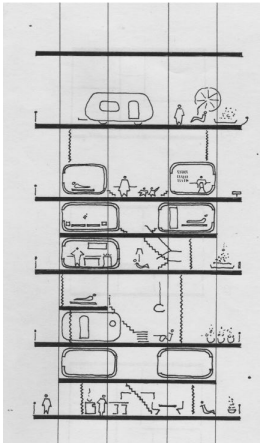
Behind the scene | History

Main actors

John Habraken

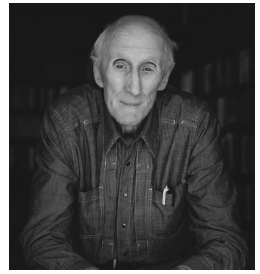
Date: 1961

Criticism on mass housing
Focus on the needs of the individual
"Supports: An Alternative to Mass Housing"



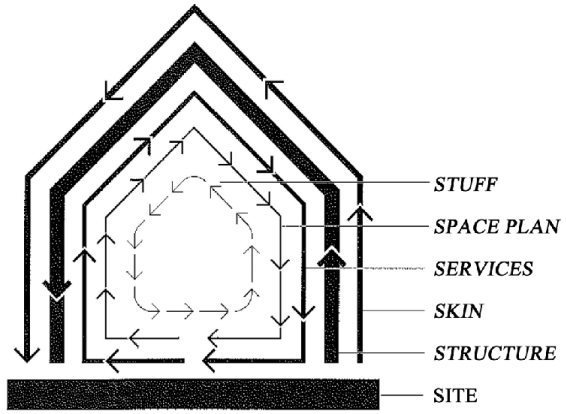
"The Support is a construction in which several dwellings can be assembled, each of which can be built, rebuilt or demolished independently of the other dwelling within it." (Habraken, 1961, p.84)

Stewart Brand



Date: 1994

Lifetime of buildings
Adaptability of buildings
"Shearing Layers of Change"



"Buildings are based on predictions, but all predictions are wrong." (Brand, S., 1997, p.178)

Sources:
Habraken, J. (1961). Supports: An Alternative to Mass Housing. Scheltema & Holkema.
Brand, S. (1994). How Buildings Learn. What happens after they're built. Penguin Books.

Design tools

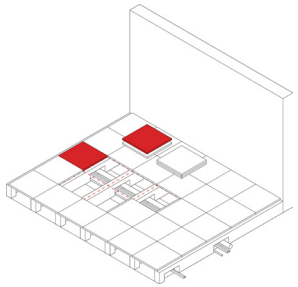
Case studies

	Architect	Location	Year completed	Program	Ownership	
Het Schetsblok	ANA Architecten	Amsterdam, The Netherlands	2018	25 apartments	Private	
Patch22	Frantzen et. al.	Amsterdam, The Netherlands	2016	26 apartments 2 offices	Private	
Zollhaus	Enzmann Fischer Partner AG	Zurich, Switserland	2020	53 apartments 12 collective spaces	Cooperative	
Unite	Sophie Delhay Architecte	Dijon, France	2019	40 apartments 1 collective space	Private	

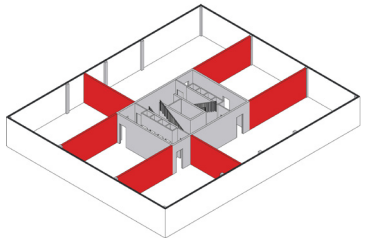
Design tools

Case studies

Flexibility ← → Adaptability

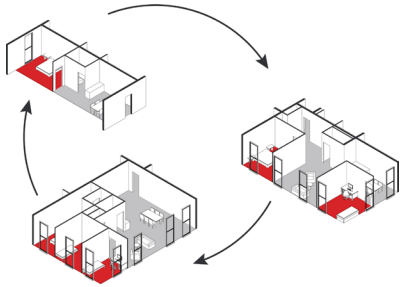


Complete flexible structure



Open floorplans

Variety in use of space



Flow between dwellings

Patch 22

Het Schetsblok

Unite

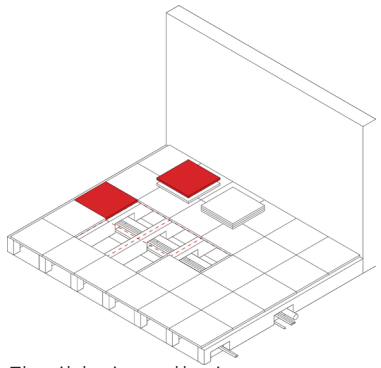
Zollhaus

Design tools

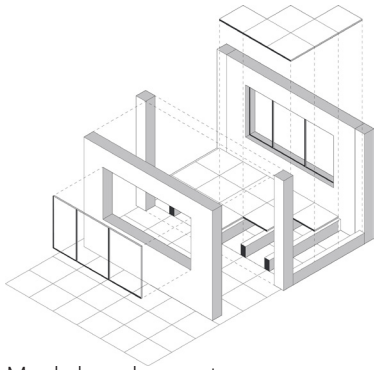
Theory and practise

Flexibility

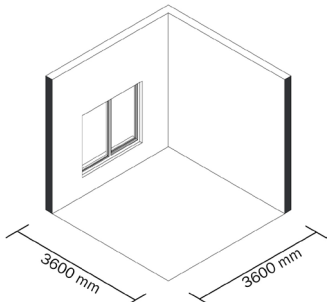
Adaptability



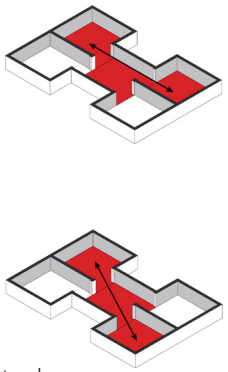
Flexible installations



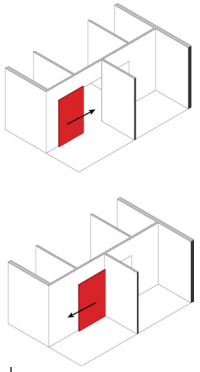
Modular elements



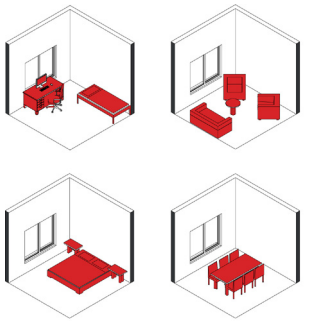
Ideal space measurements



Neutral zone



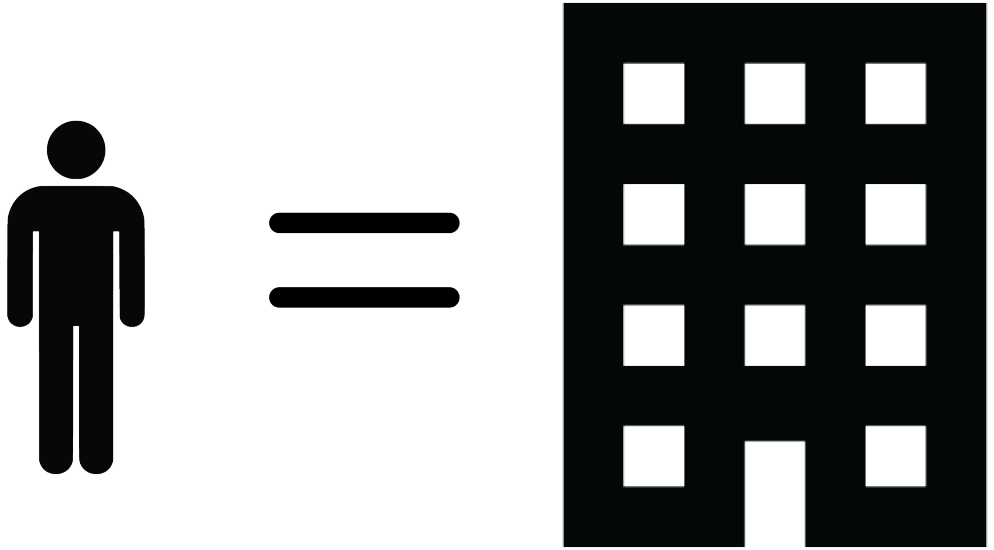
Sliding doors

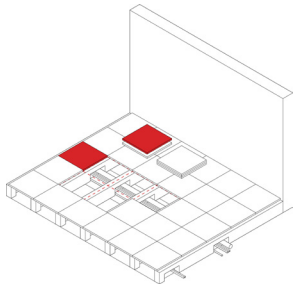


Variety in use of space

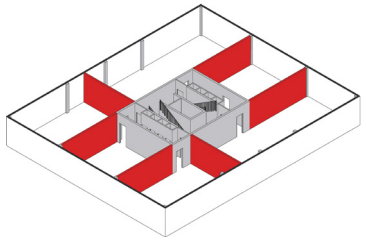
Concept

One size fits all?



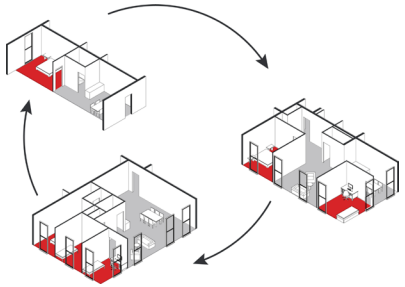


Complete flexible structure



Open floorplans

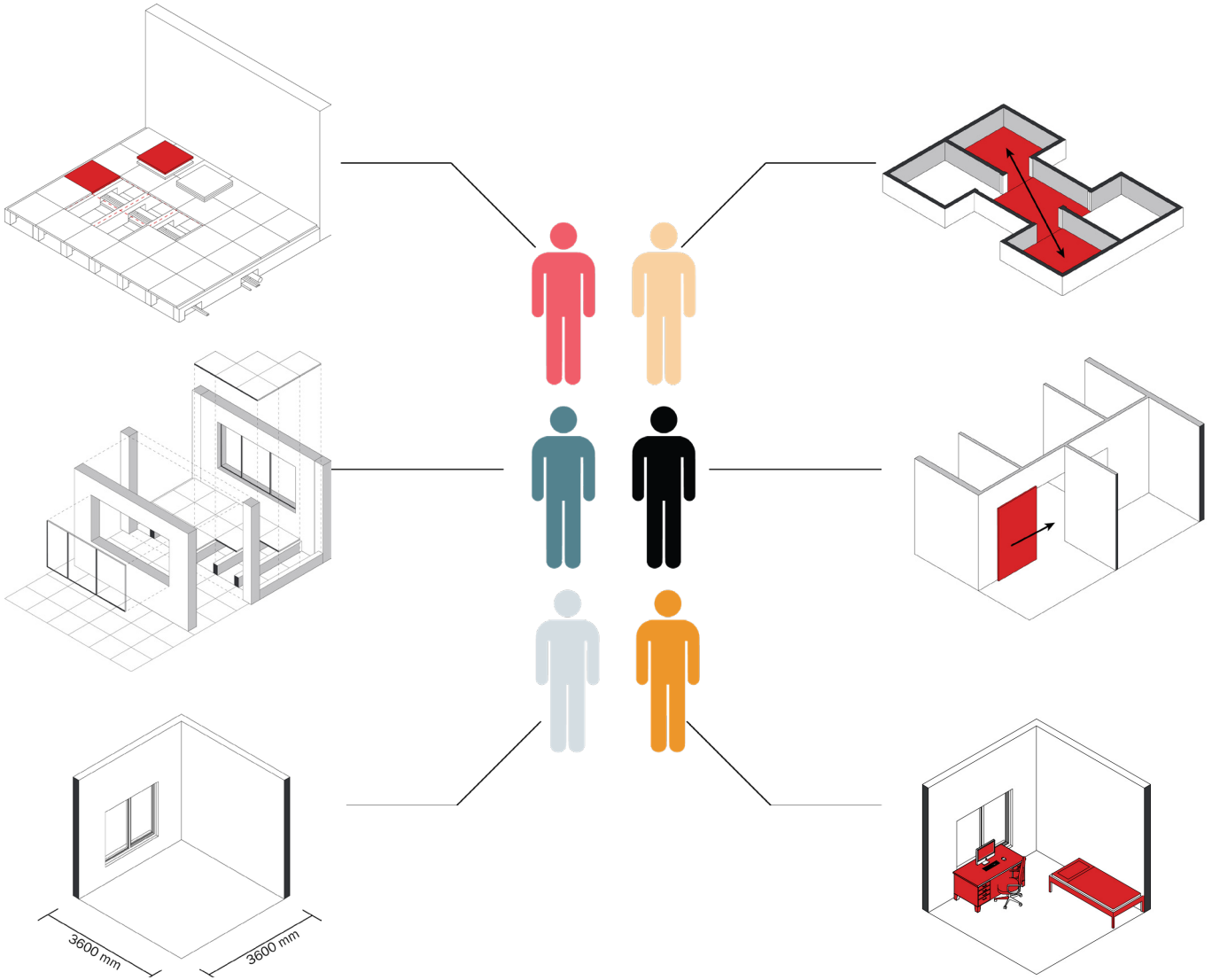
Variety in use of space



Flow between dwellings

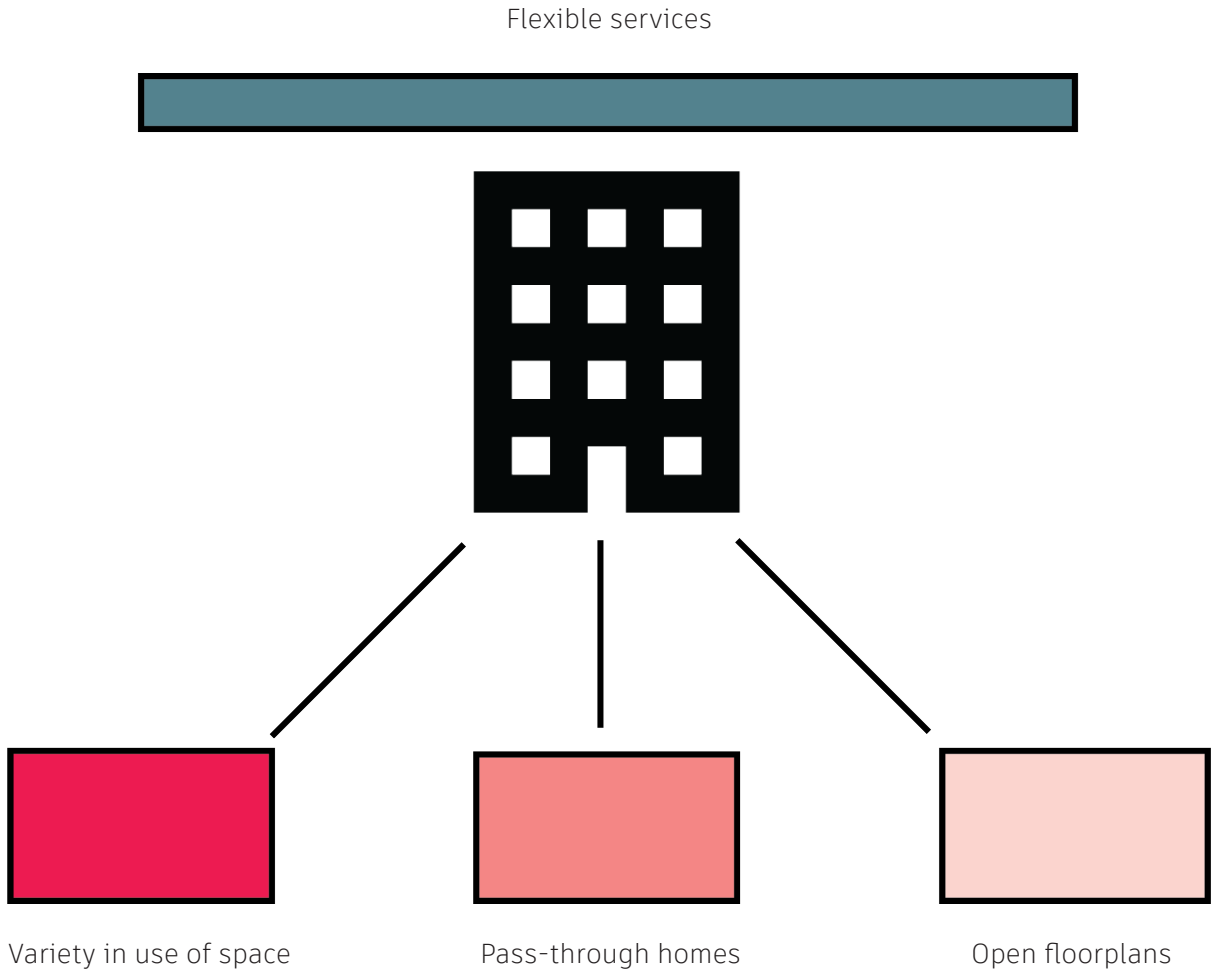
Concept

Different users - different solutions



Concept

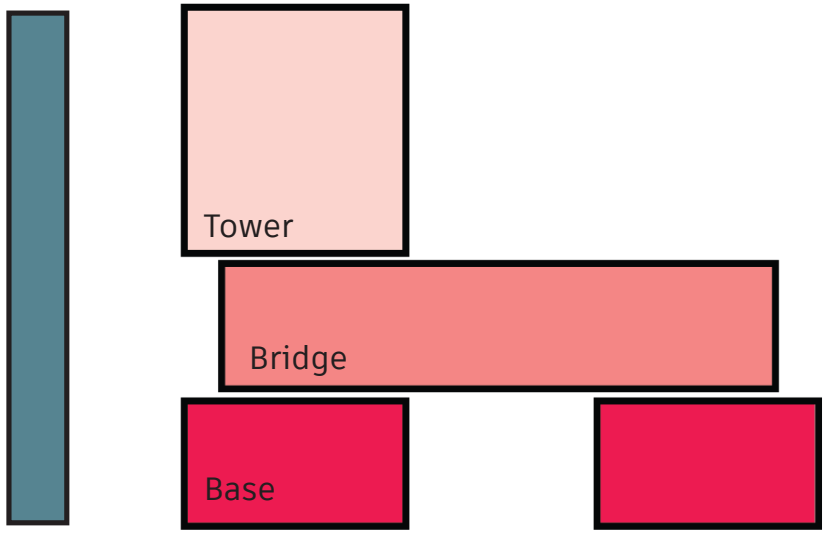
Four forms



Concept

Together one building

Flexible services



Open floorplans

Pass-through homes

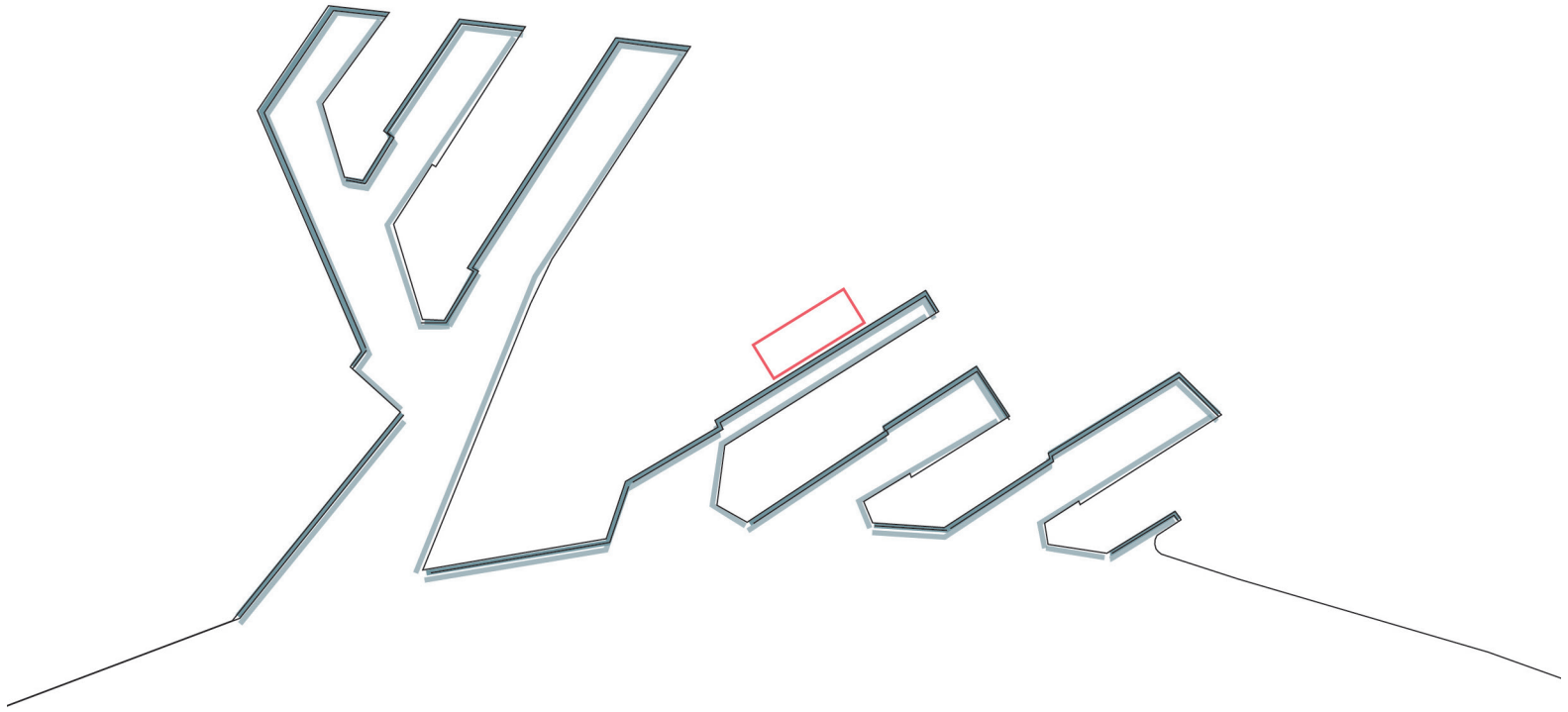
Variety in use of space

Merwevierhaven

Location

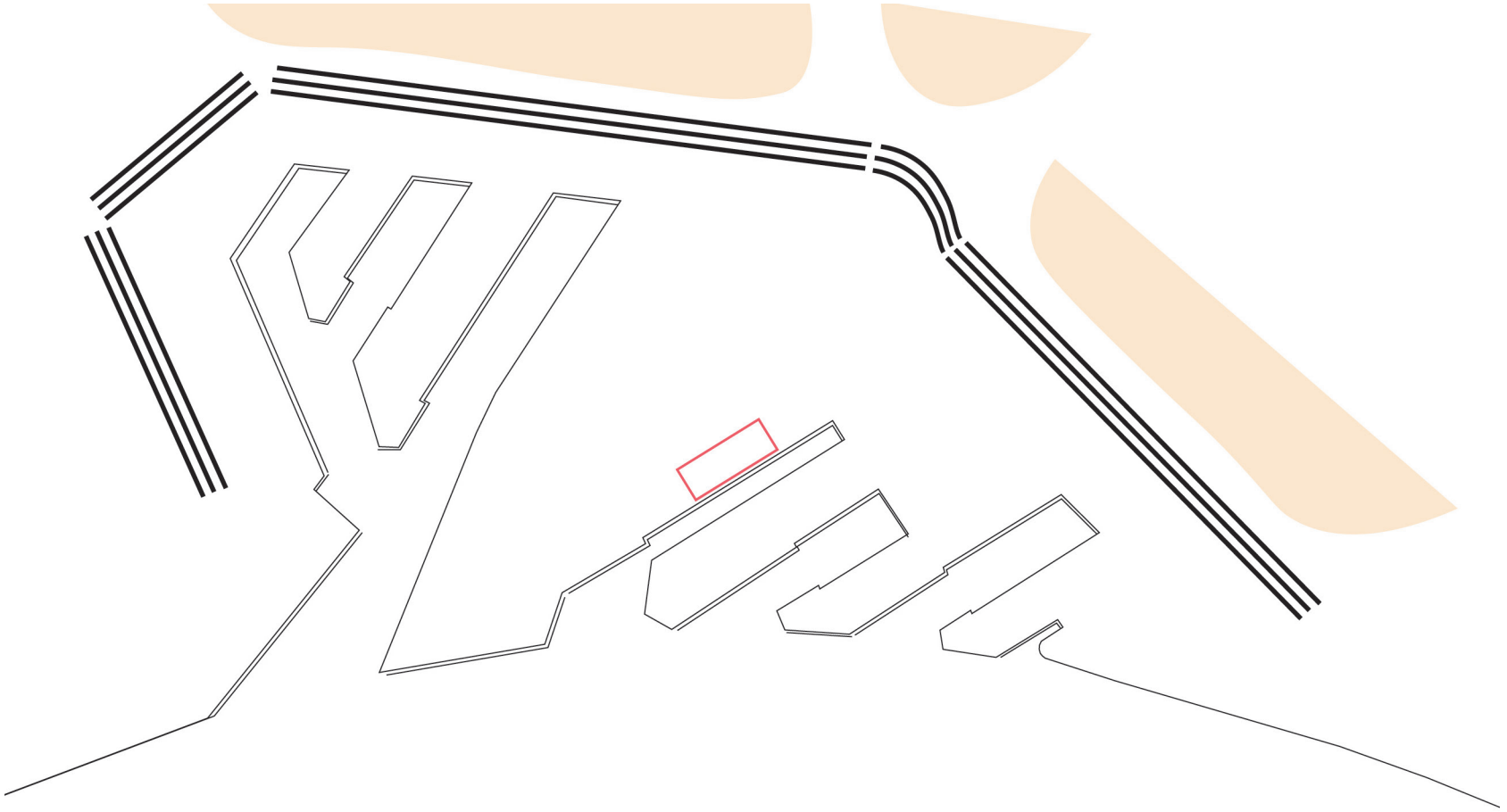
Site analysis

Water



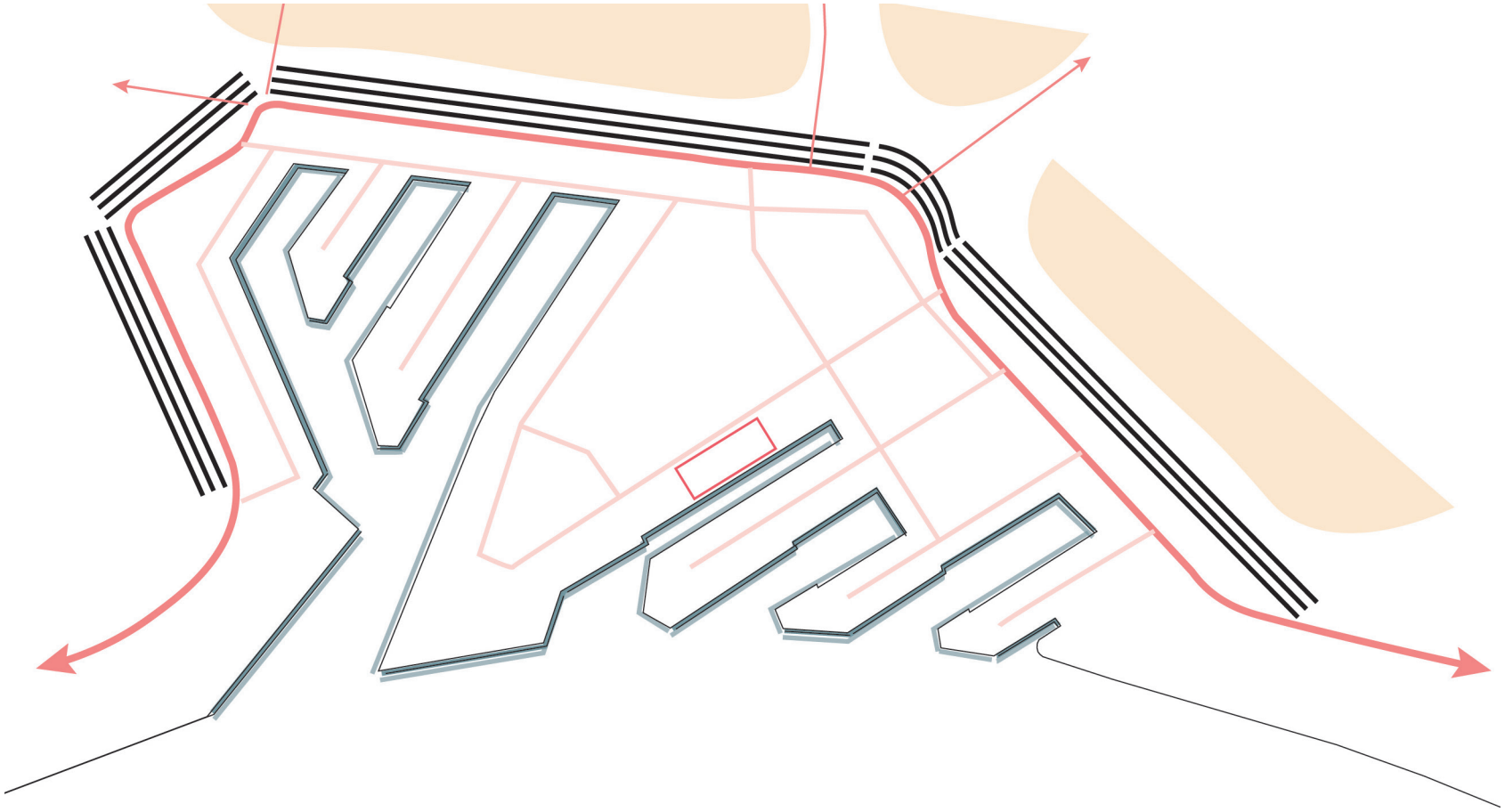
Site analysis

Barriers



Site analysis

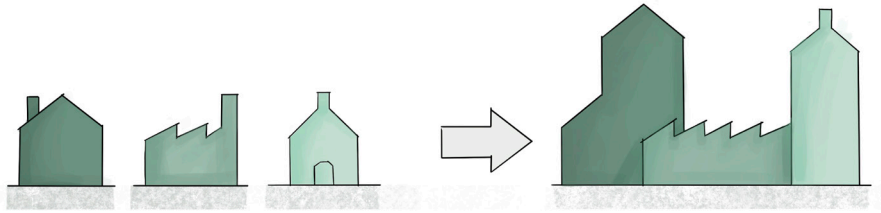
Accessibility



Ambitions

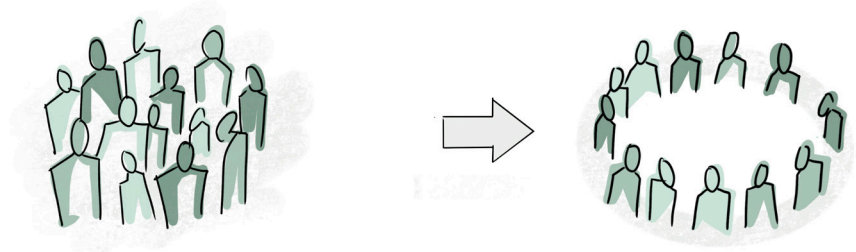
Programming

Living		10.000 m2
Work	Factory	2.500 m2
	Office	1.500 m2
	Workshops	1.000 m2
Facilities		4.000 m2
Total:		19.000 m2



User

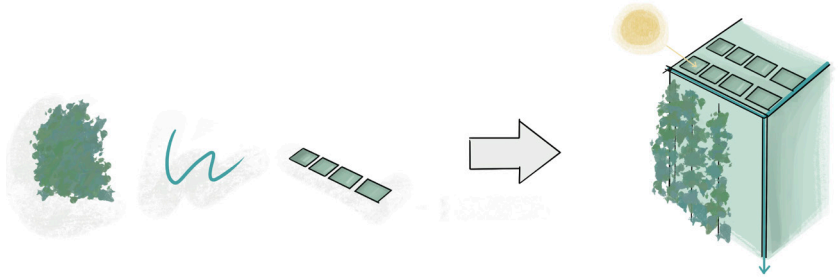
Young professionals
Families
Elderly



Sustainability

BENG

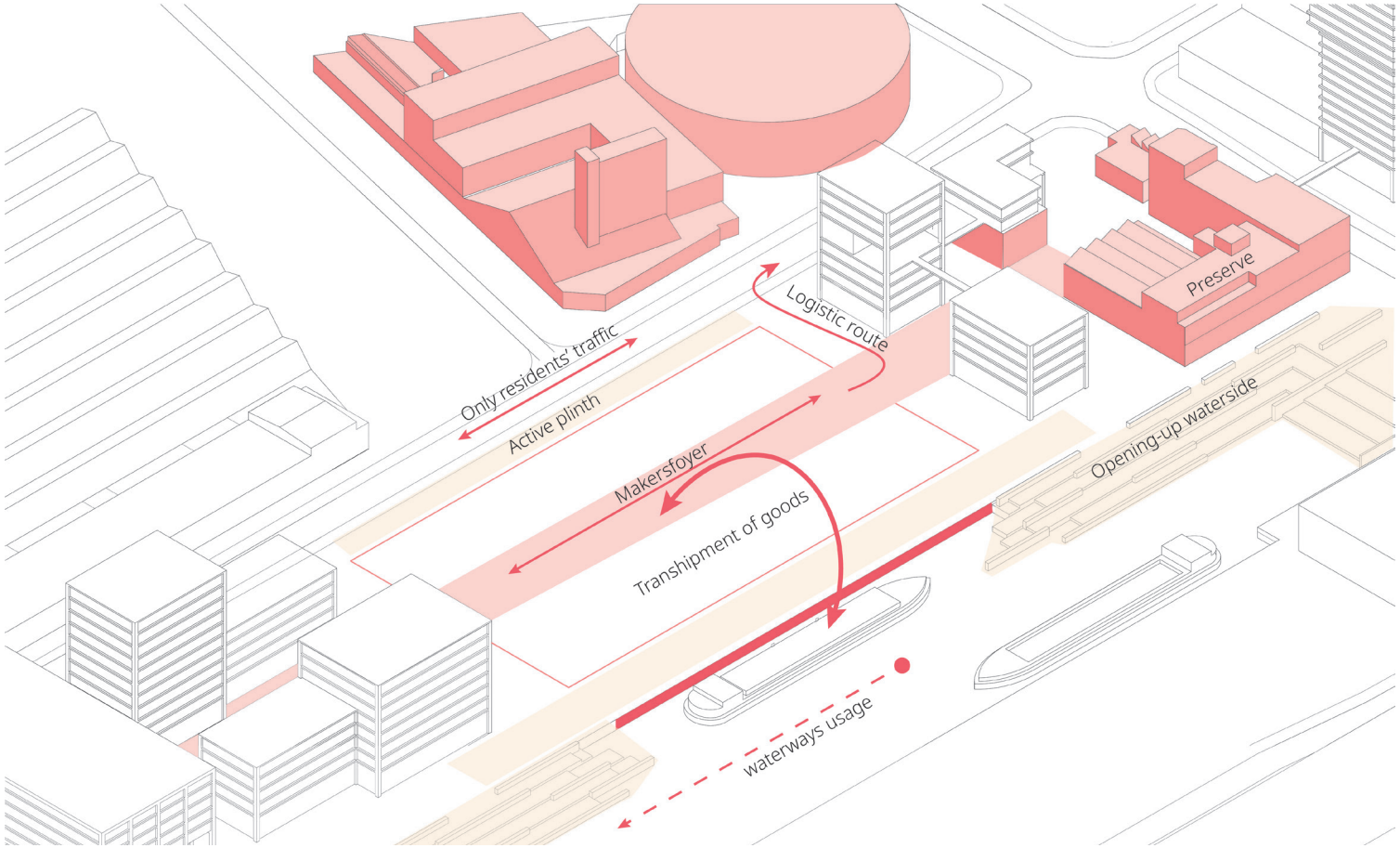
Solar panels
Wind turbines
Green



Urban masterplan

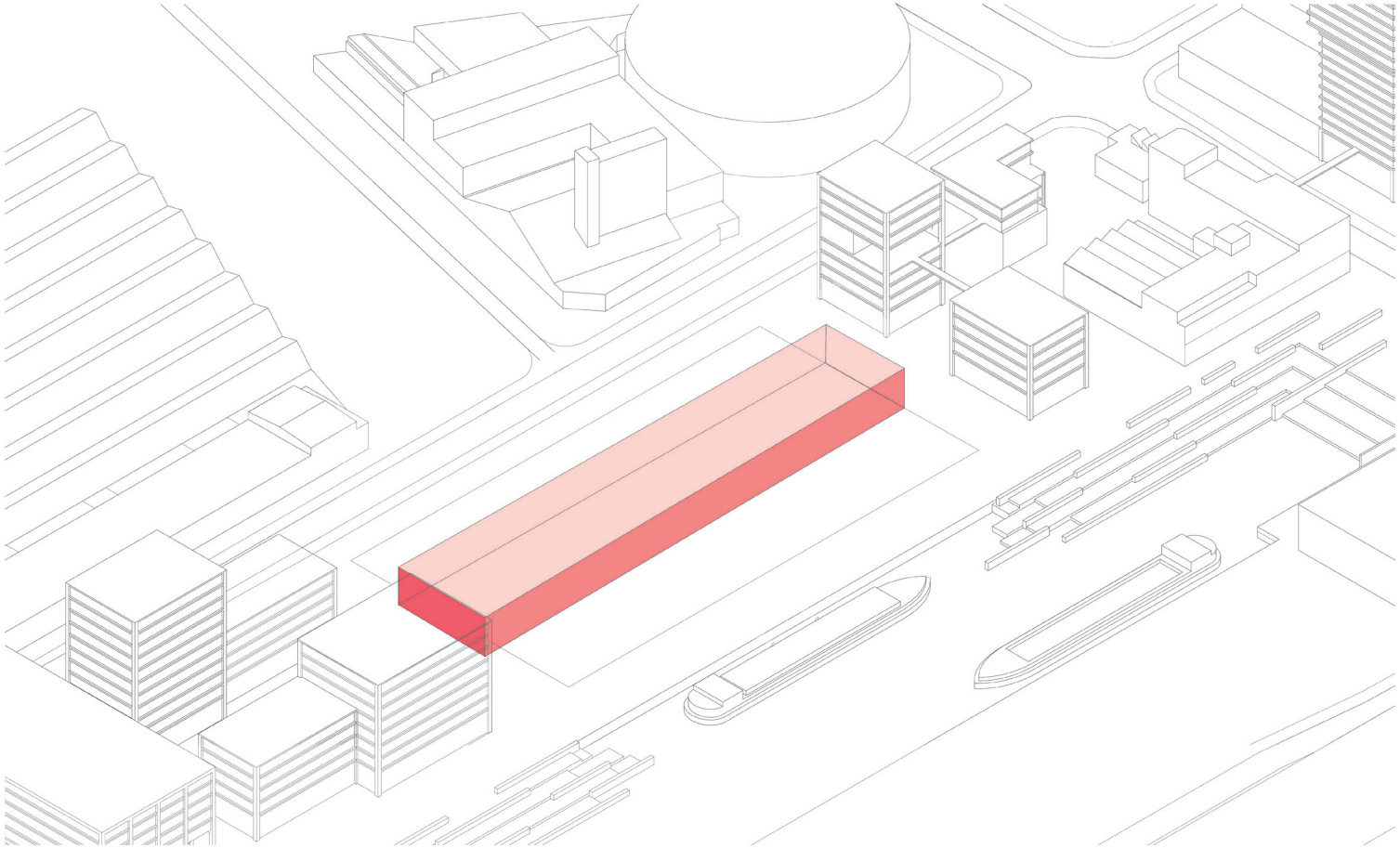
Project side

Makersfoyer



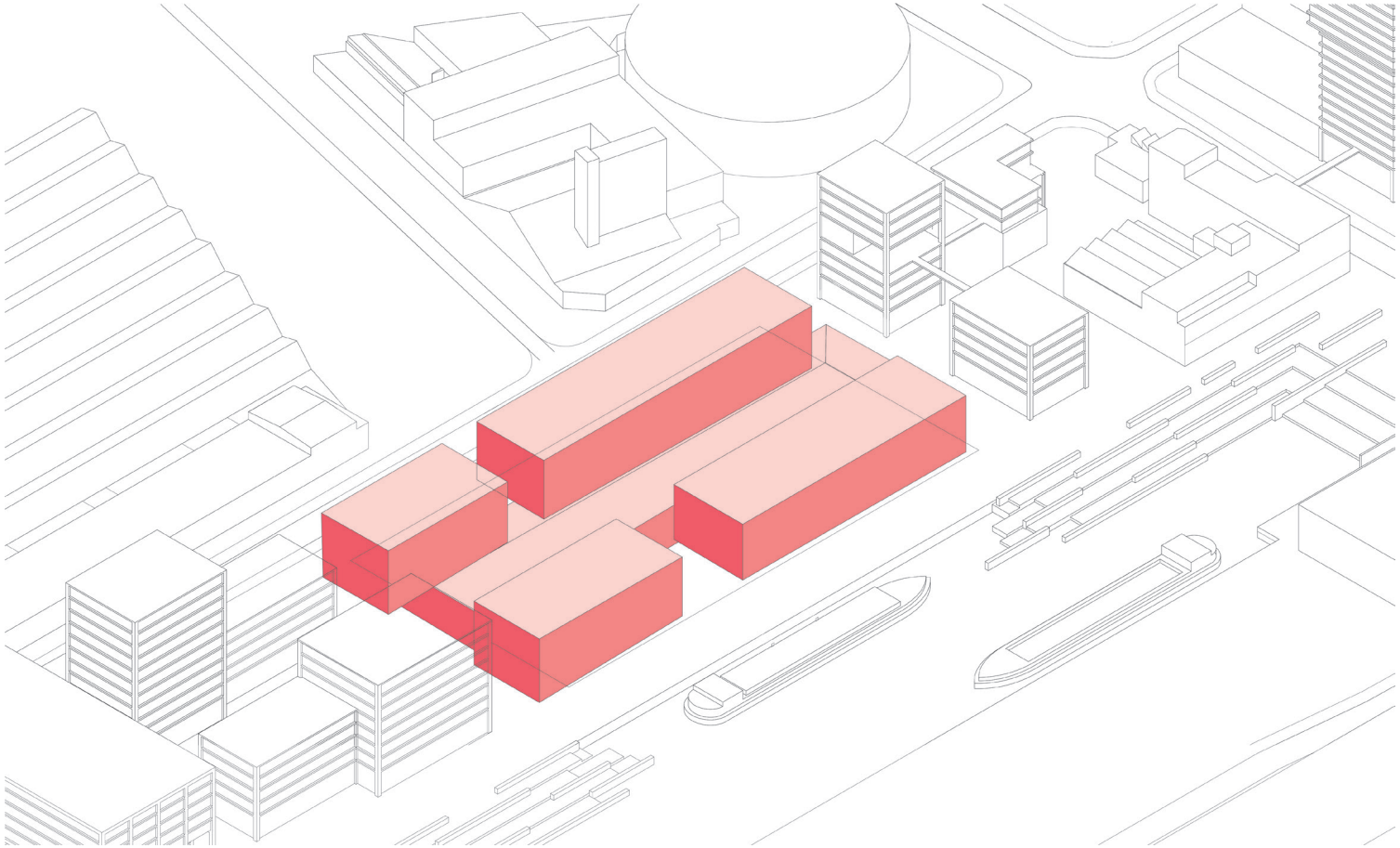
Factory

Factory hall



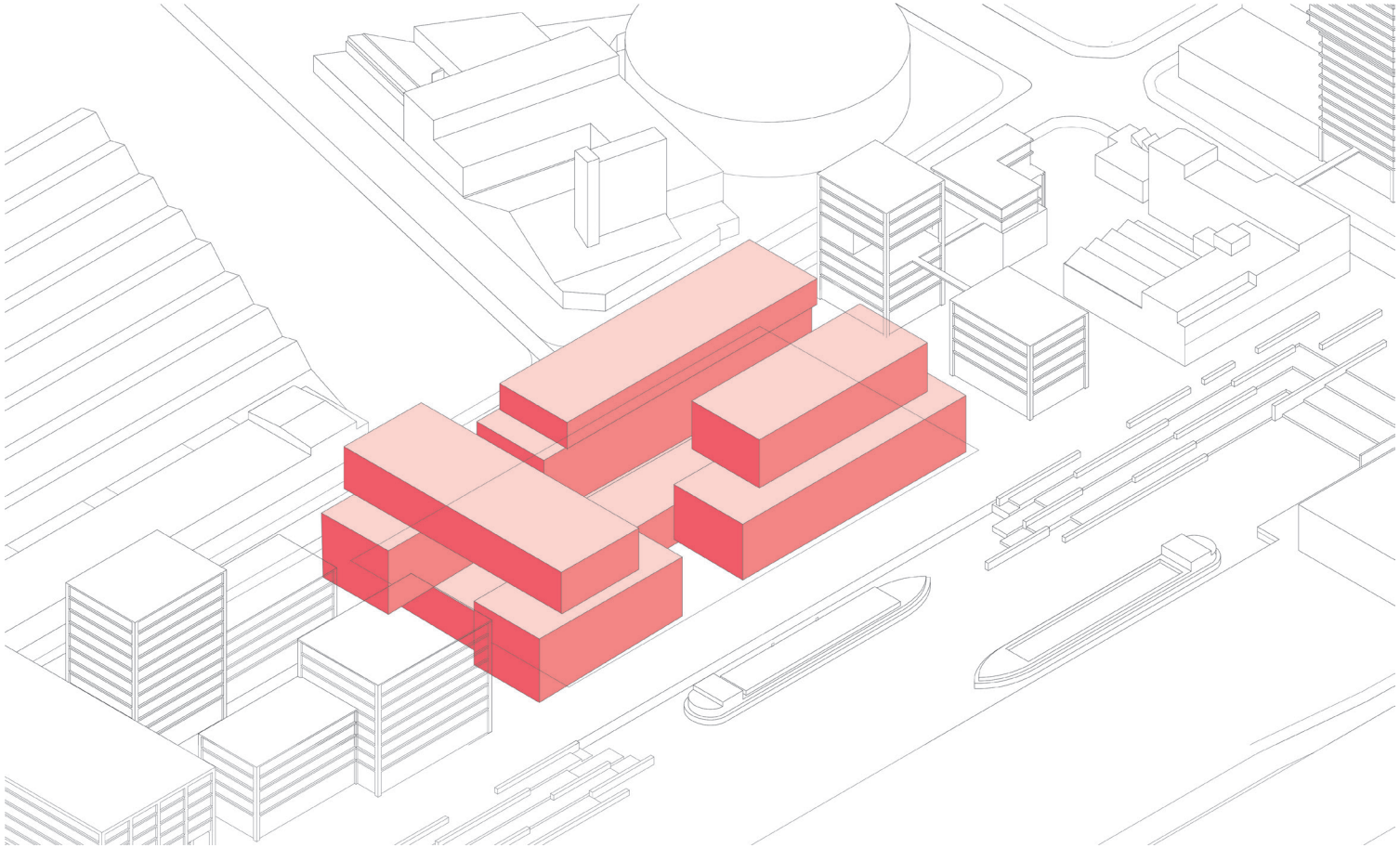
Base (level 0-4)

Rotterdamse laag



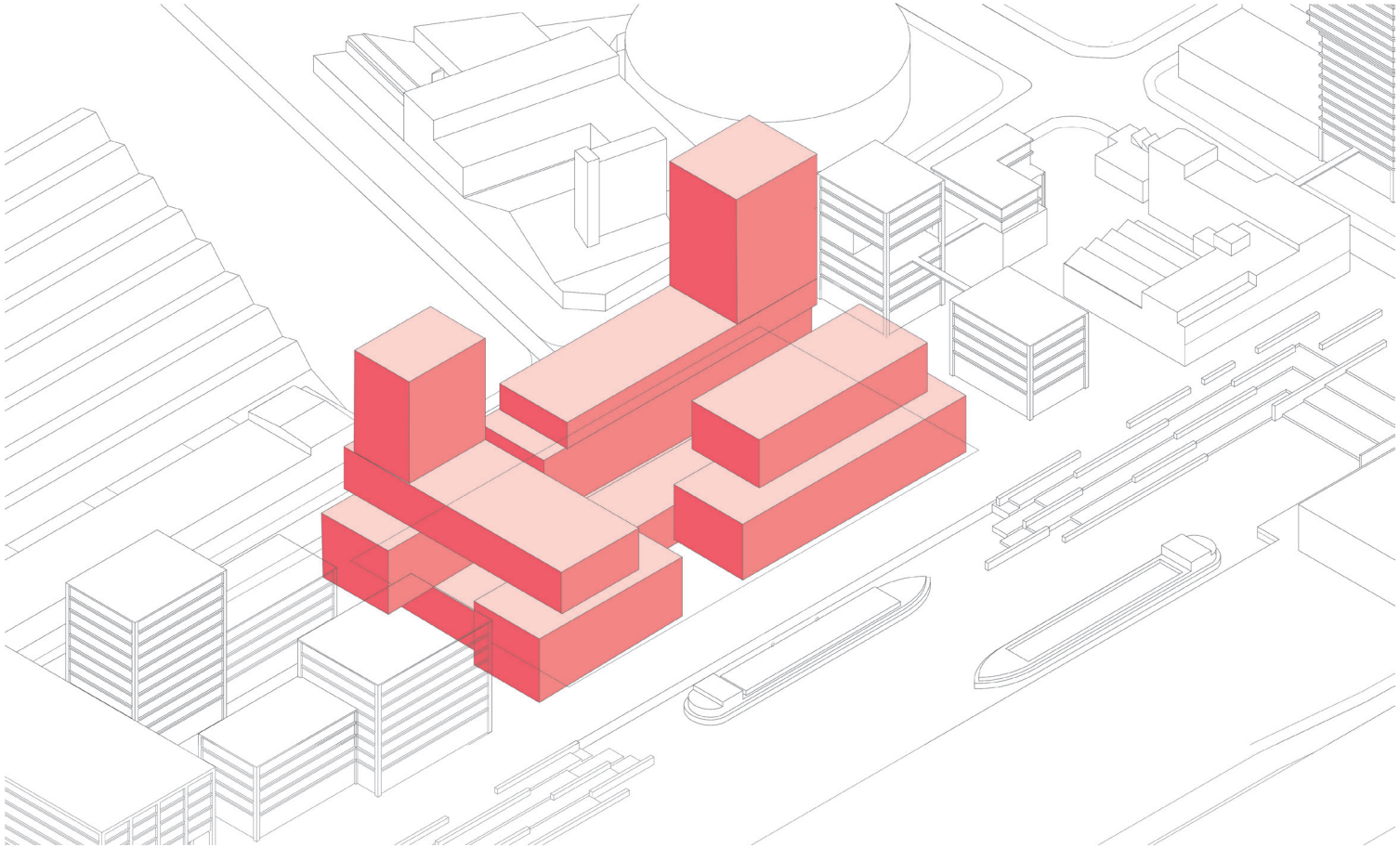
Bridge (level 5-8)

Community



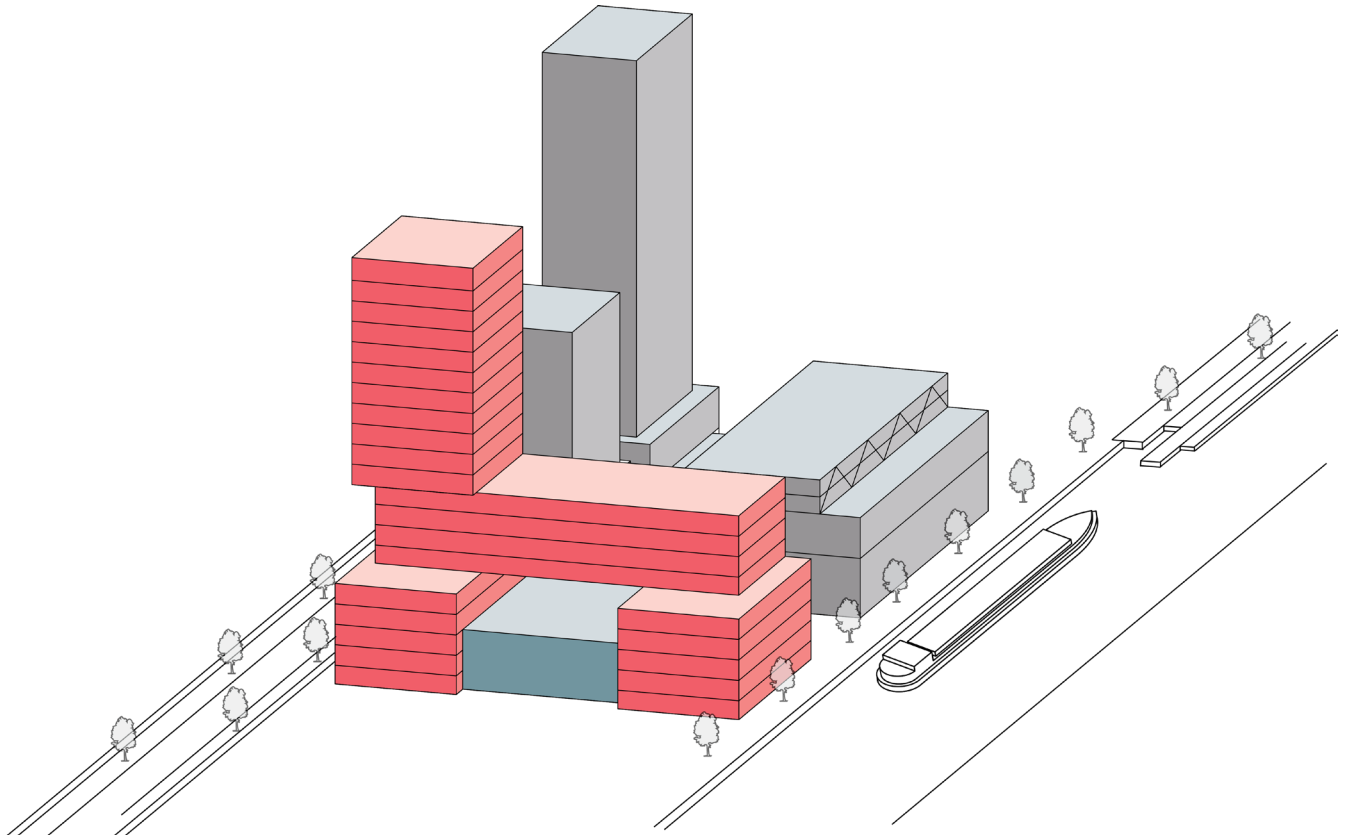
Tower (level 9-19)

Identity

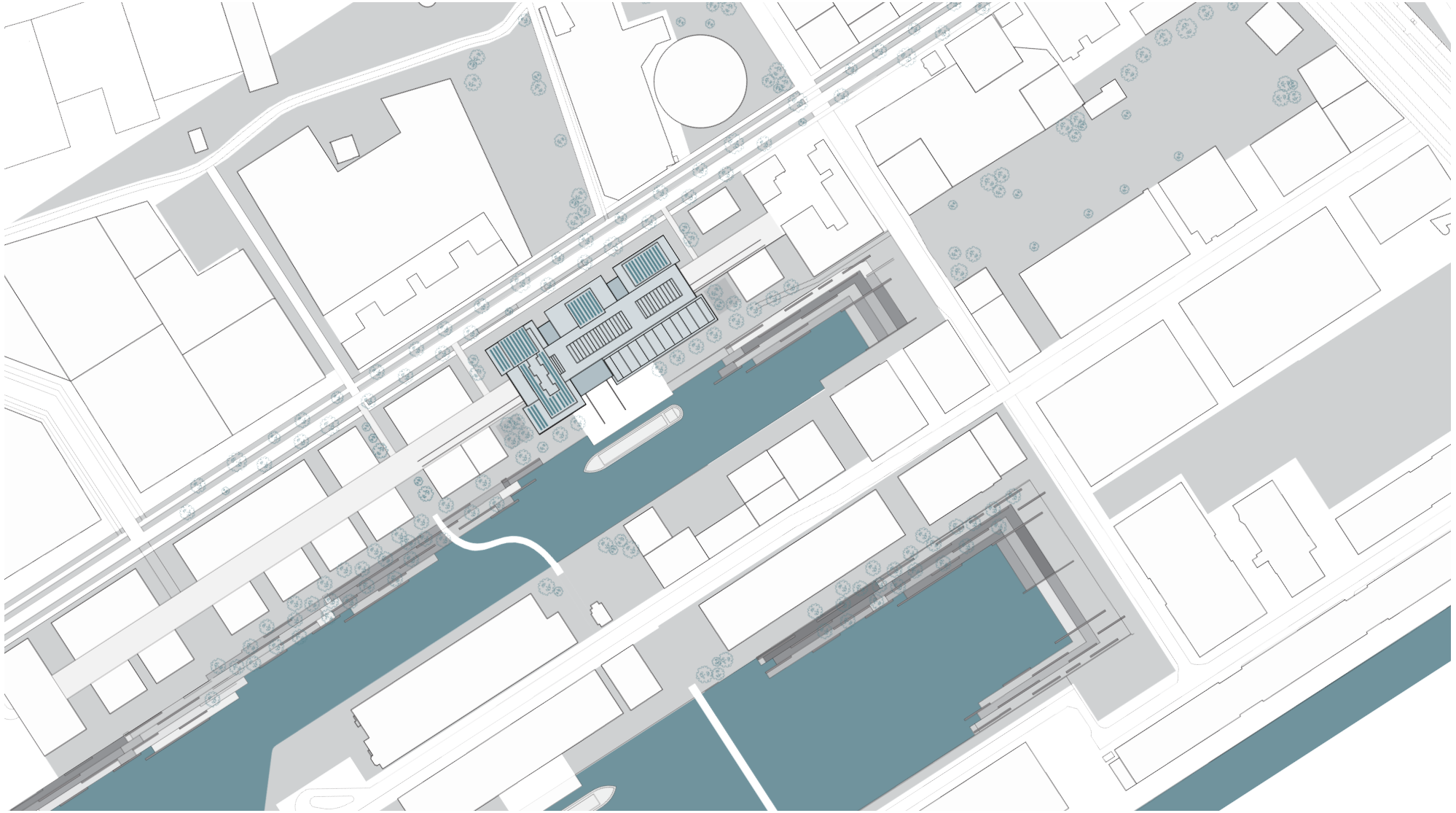


Project design

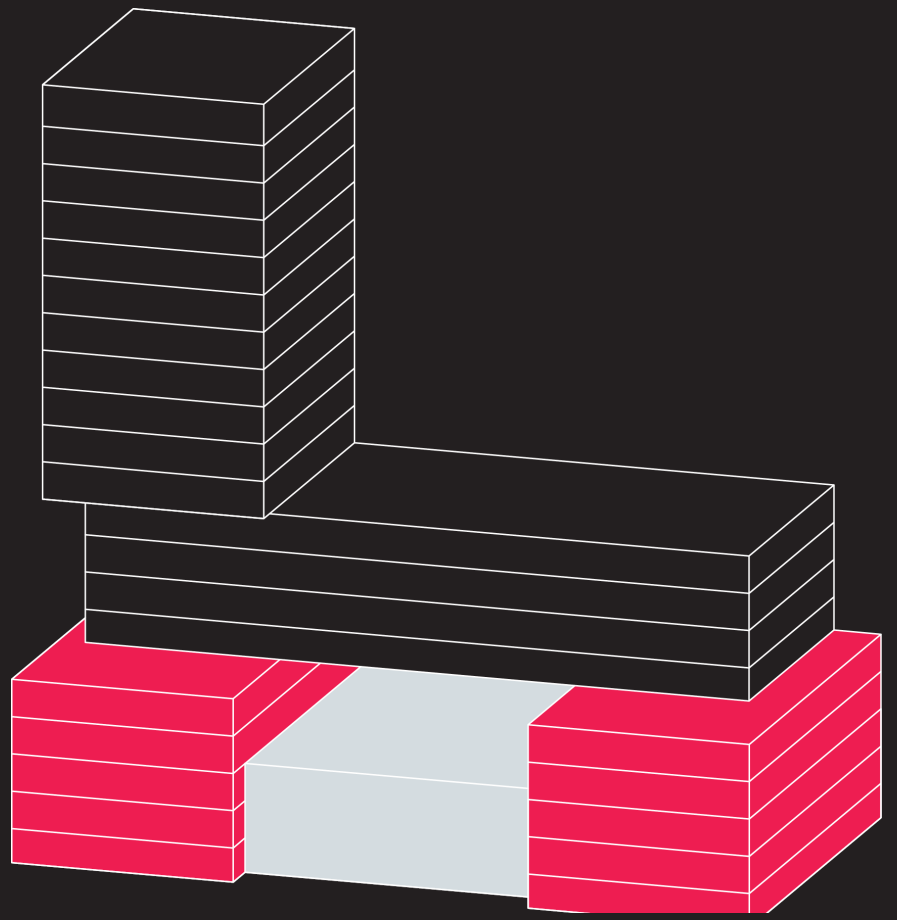
Volumes



Site plan



Base



Base

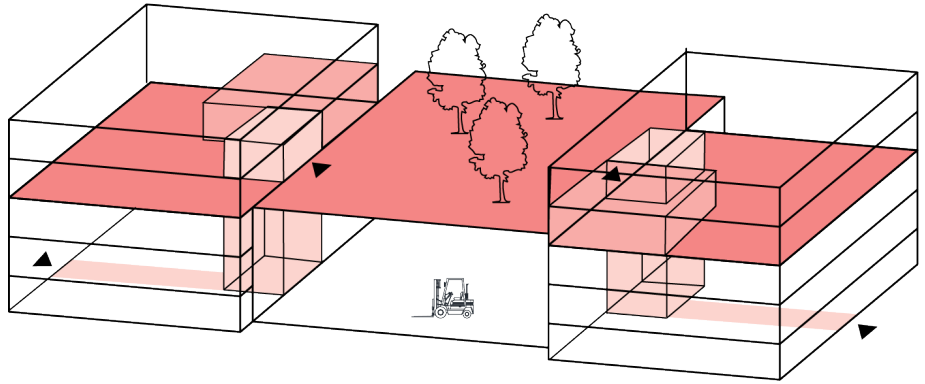
Living and working

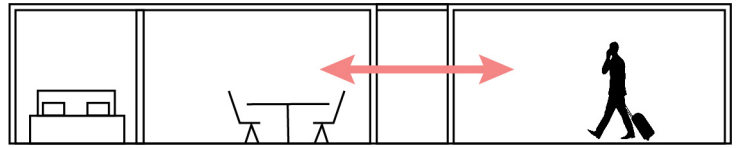
Shared office/work facilities

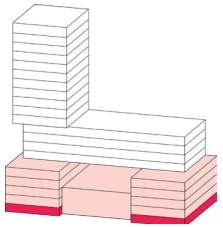
Public park

Developer

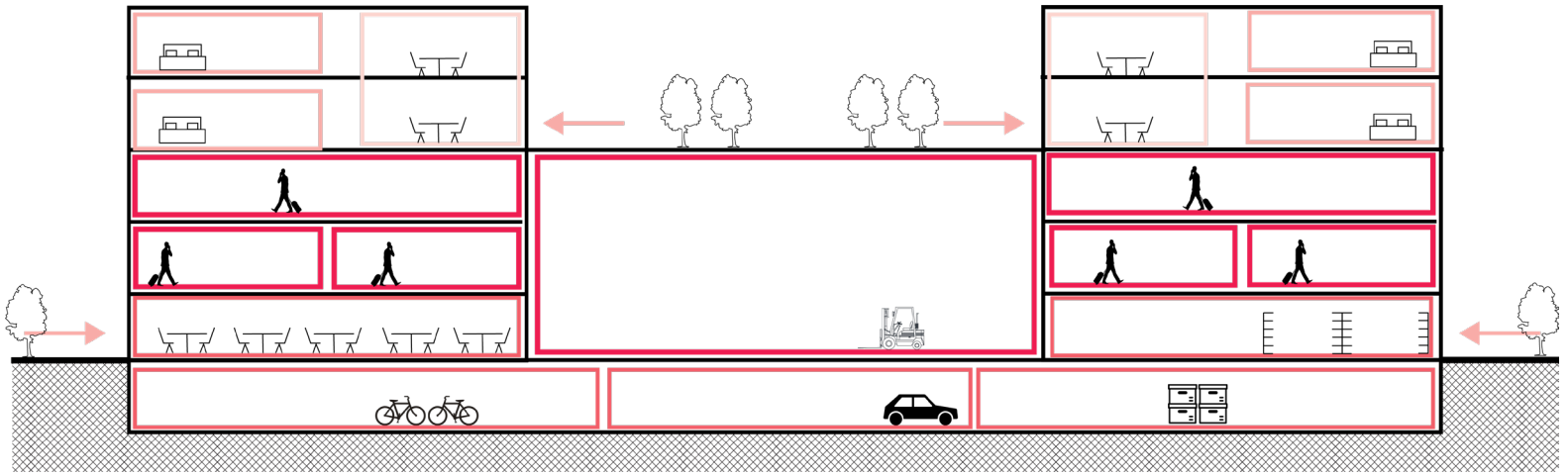
People who want to live near their work, starters, one-and-two person households







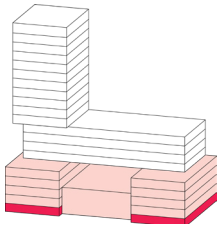
Zoning | Base



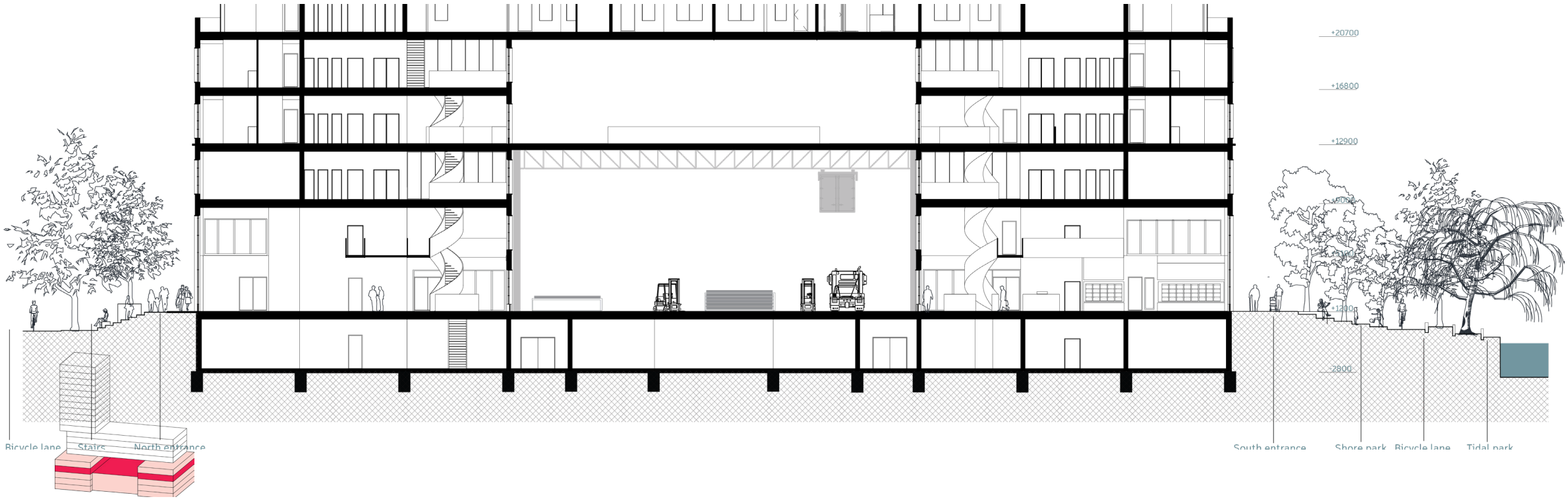
Ground floor

Legend:

- Private use
- Shared use



Section - Base



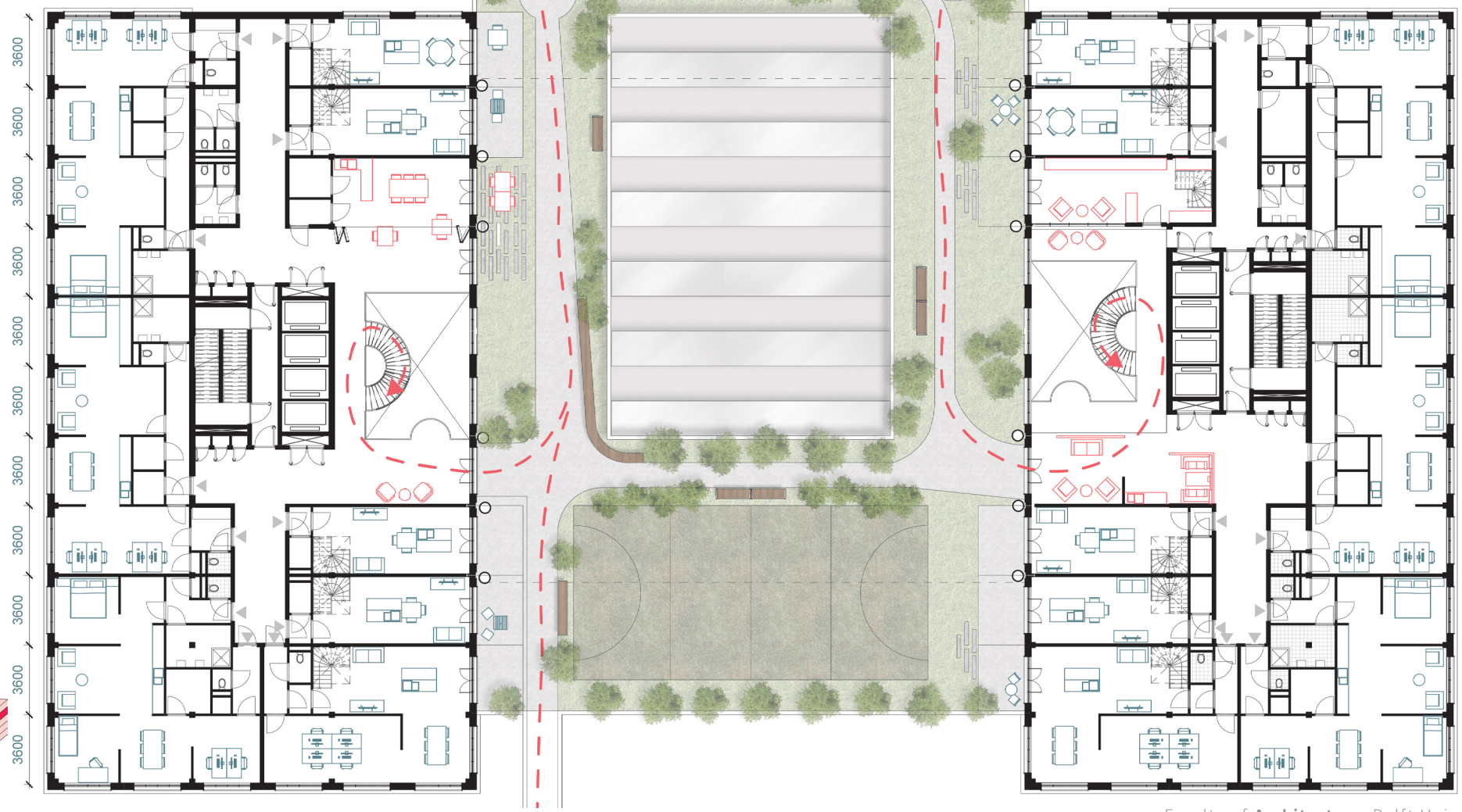
Entrance

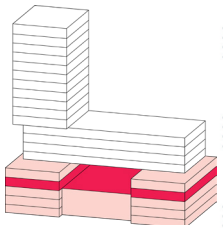
Entrance

3rd floor (+13m)

Legend:

- Private use
- Shared use





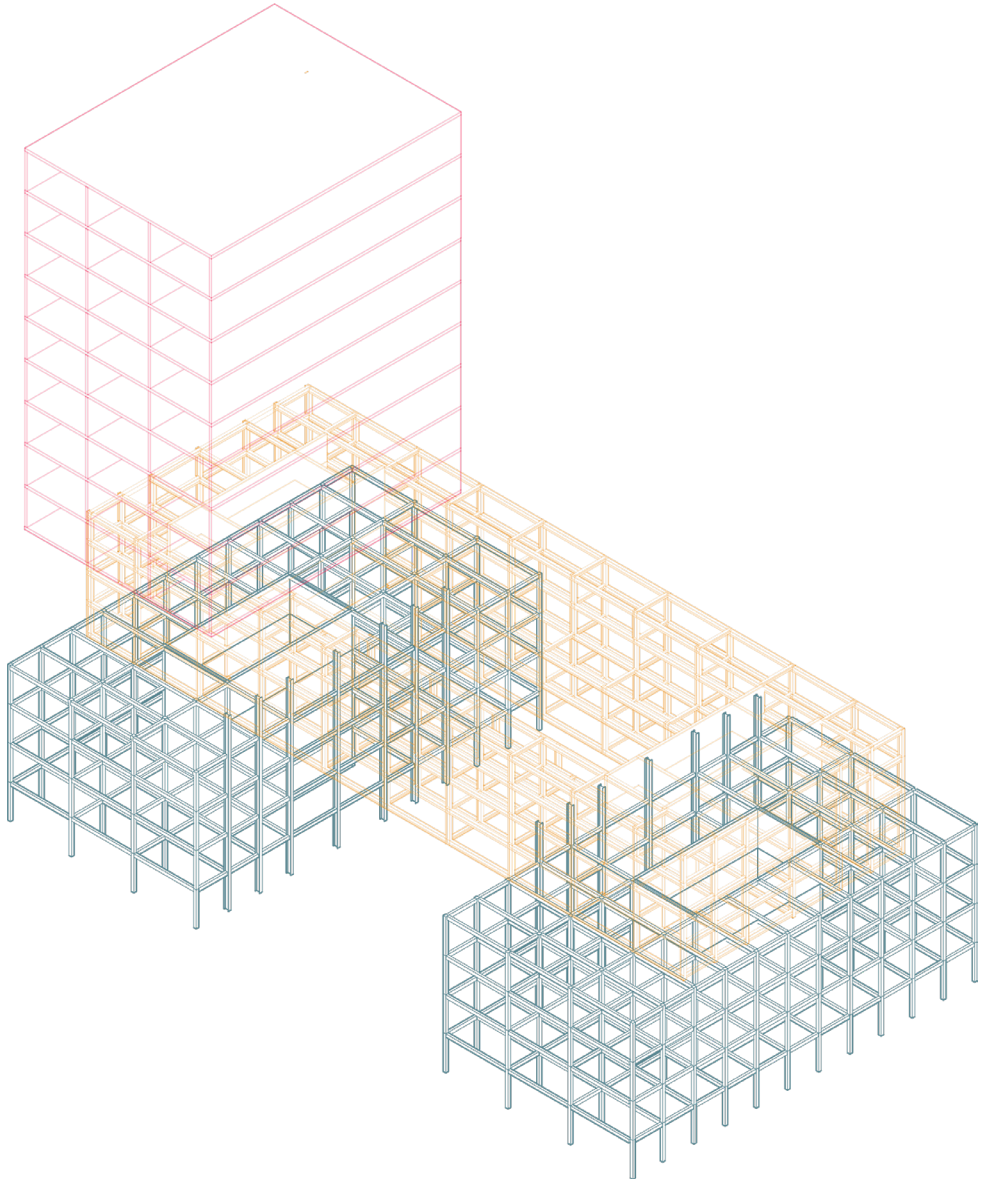
Public park

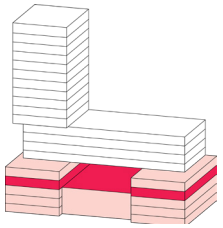
Structure | Base

Concrete open structure

Flexibility in floorplans

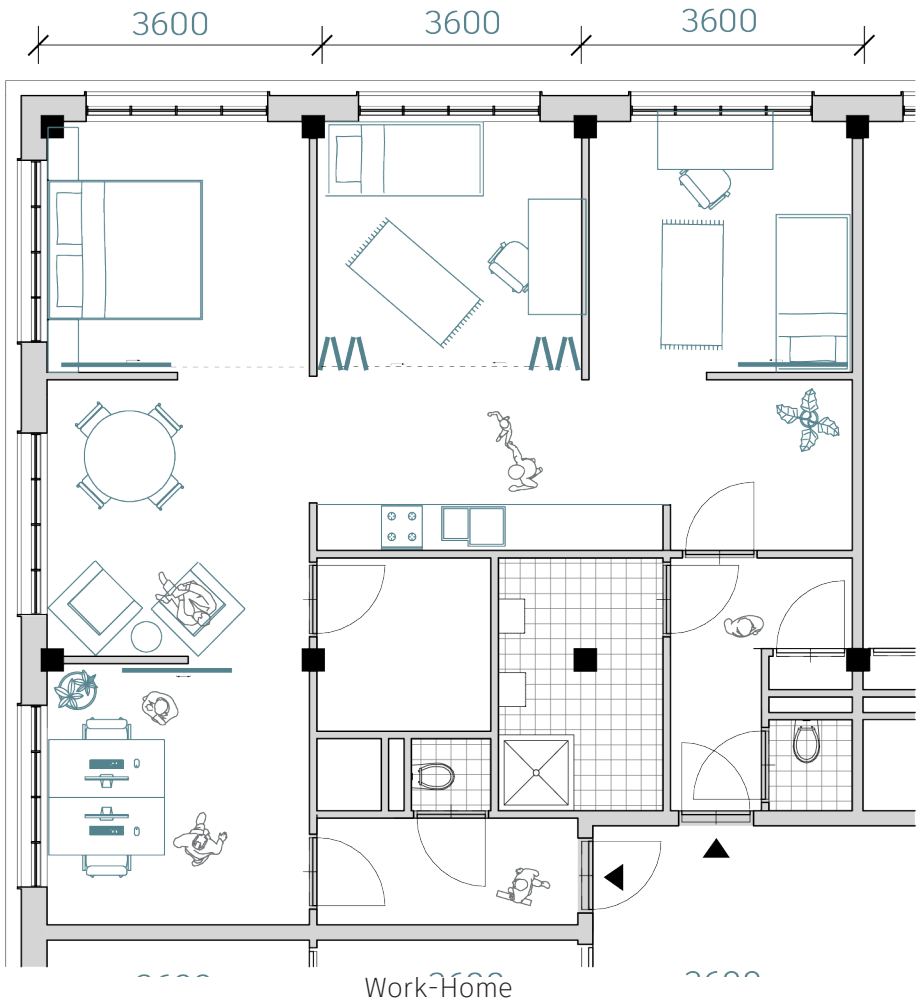
Withstand rising sea level



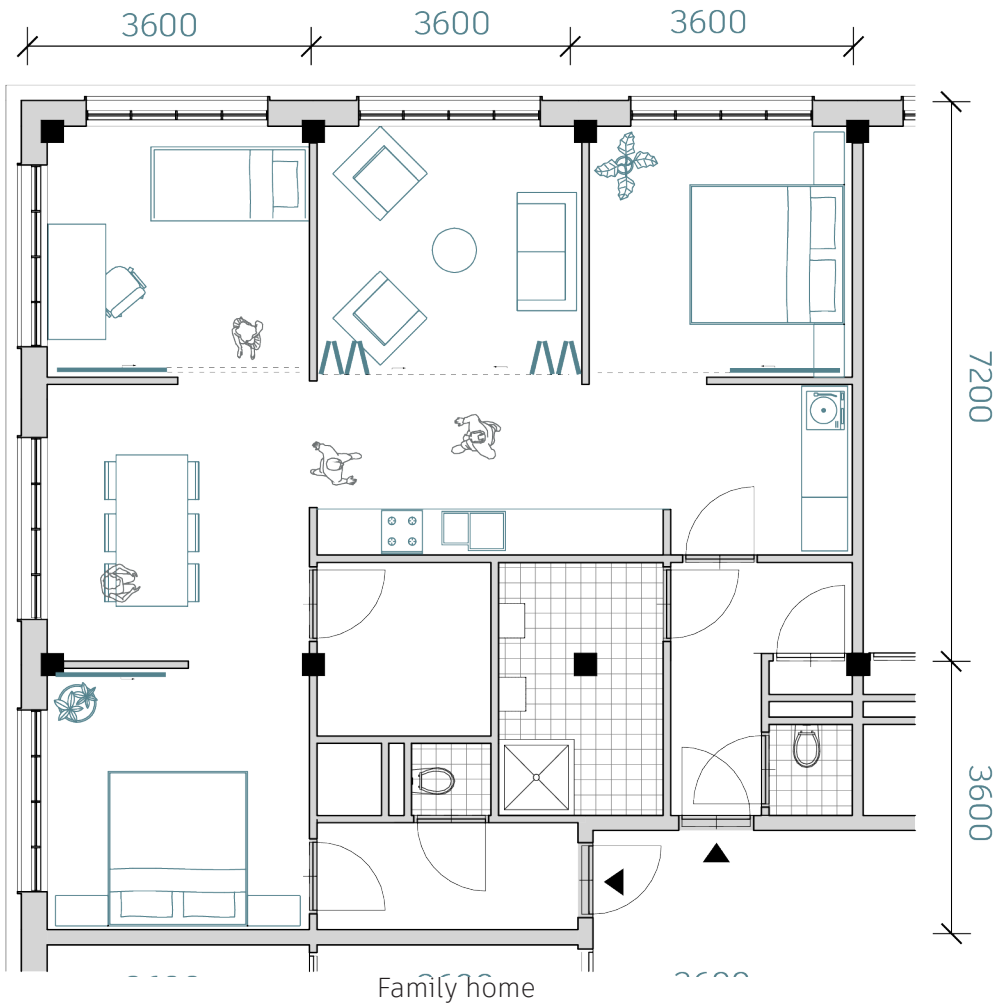


3rd floor (+13m) | Work-Home

Day-time



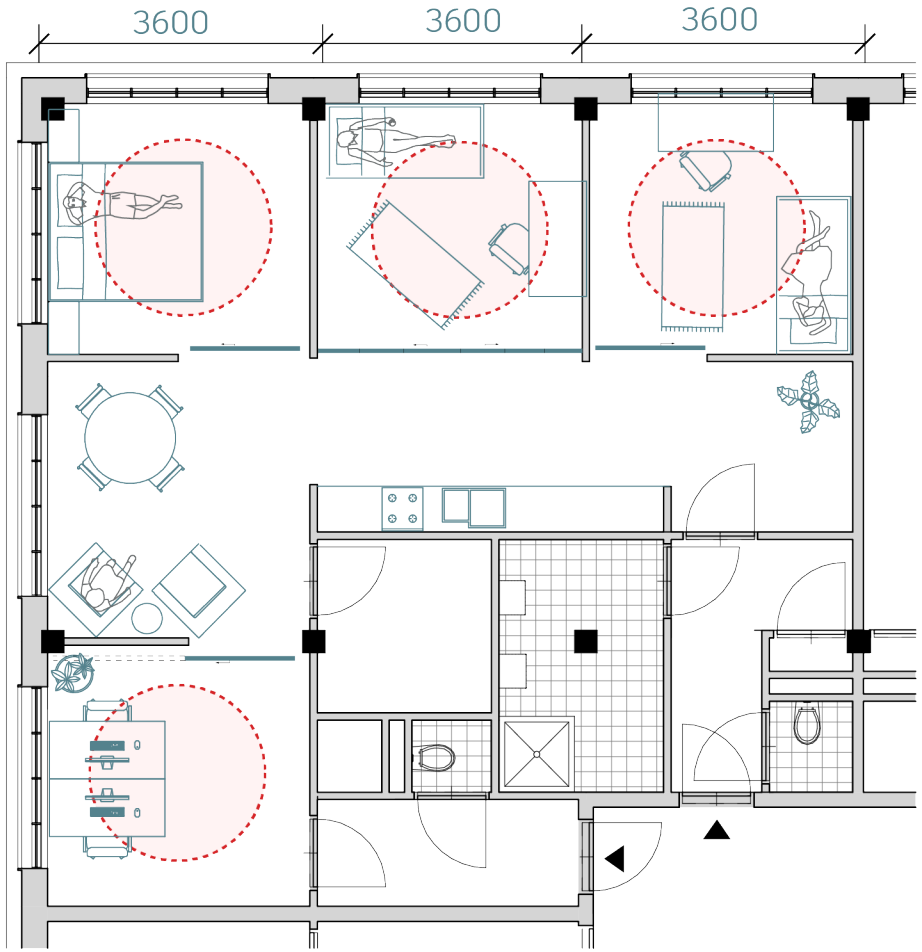
Work-Home



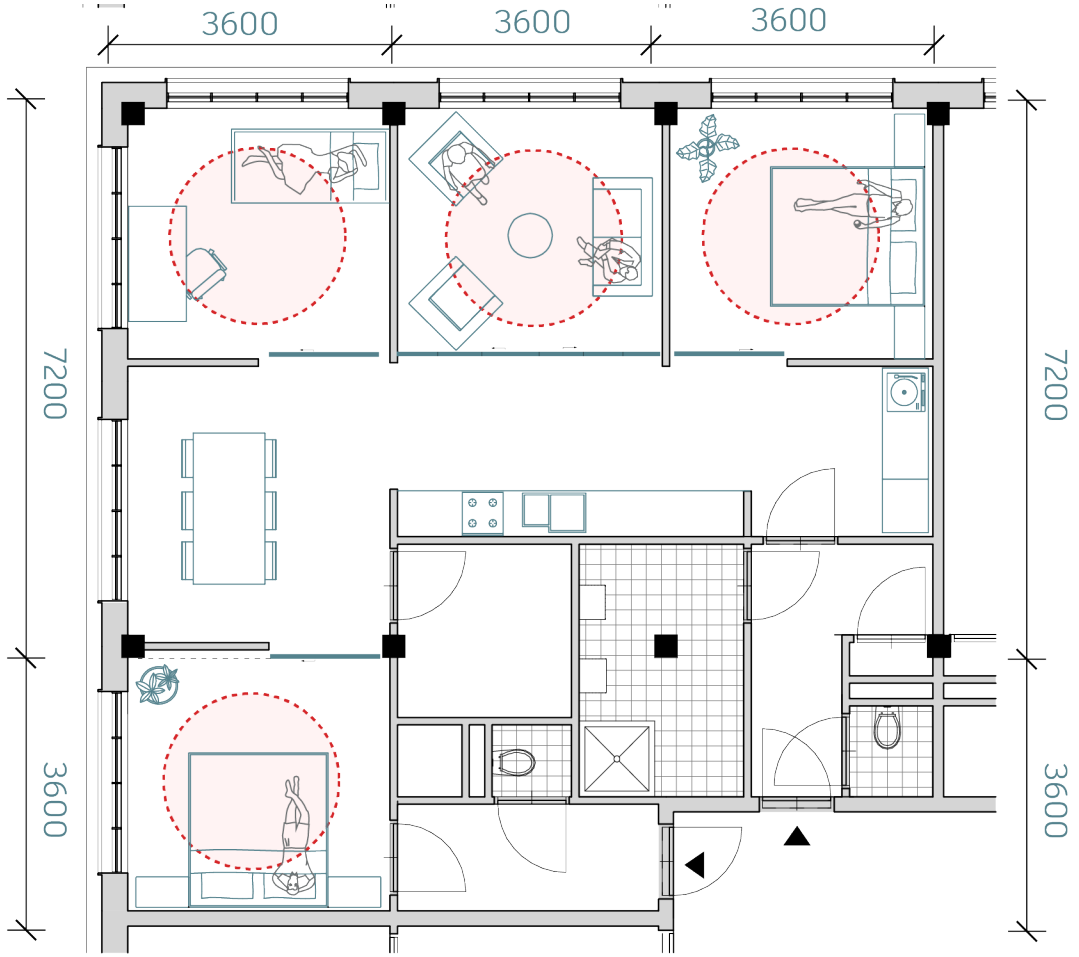
Family home

3rd floor (+13m) | Work-Home

Night-time

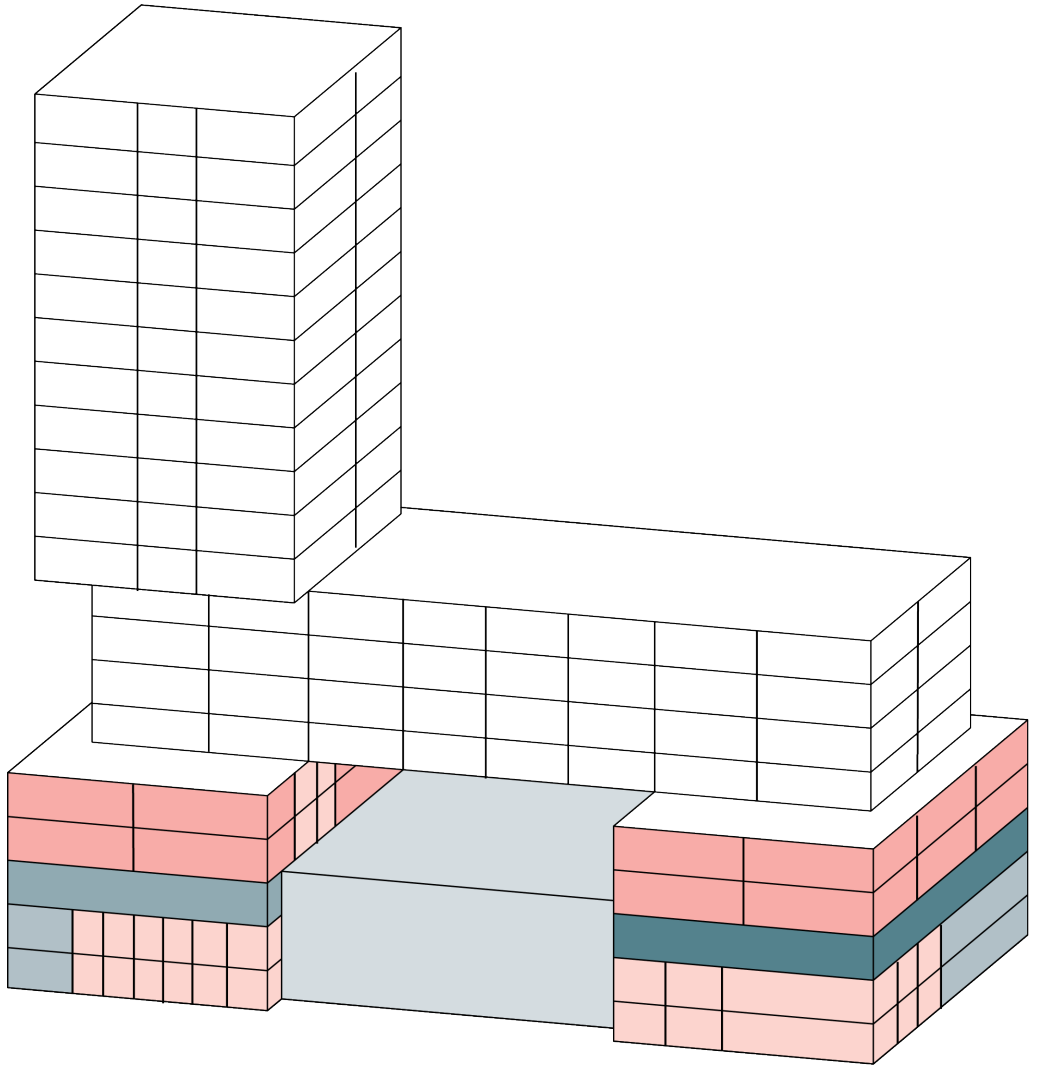


Work - Home



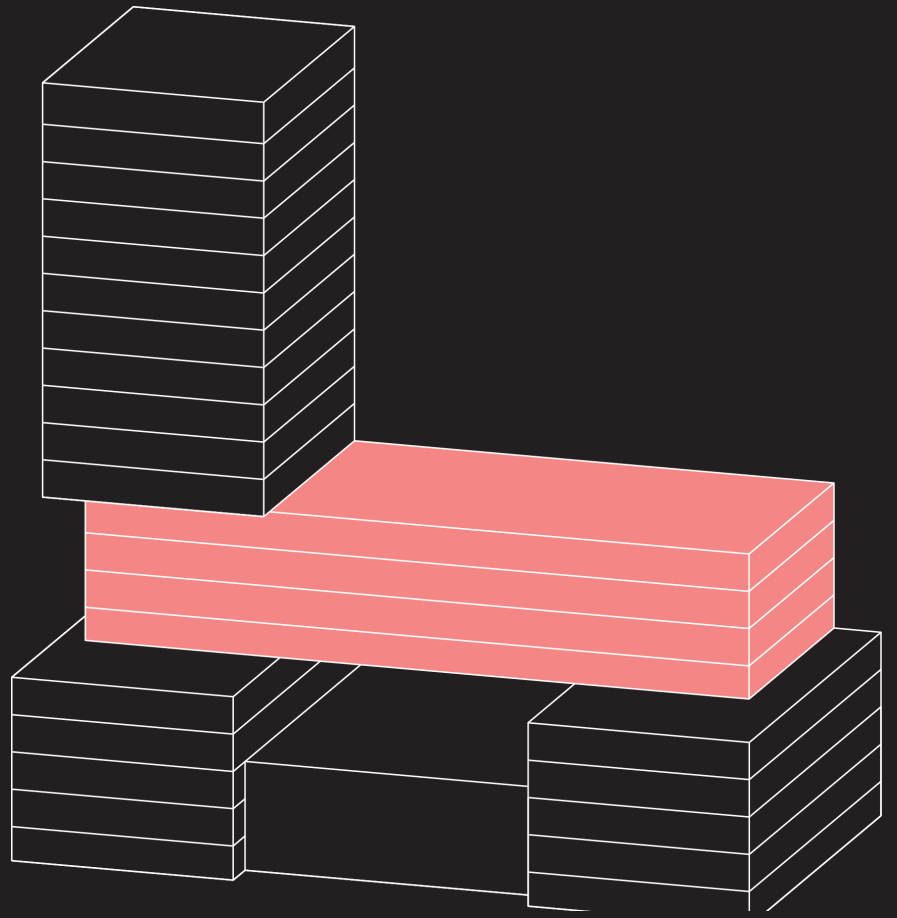
Family home

Typologies



2 person duplex house
2-3 work-home
Workshops
Offices
Commercial space
Factory
Shared facilities

Bridge



Bridge

Community

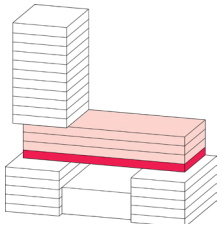
Courtyard

Different dwelling typologies to stimulate flow-through

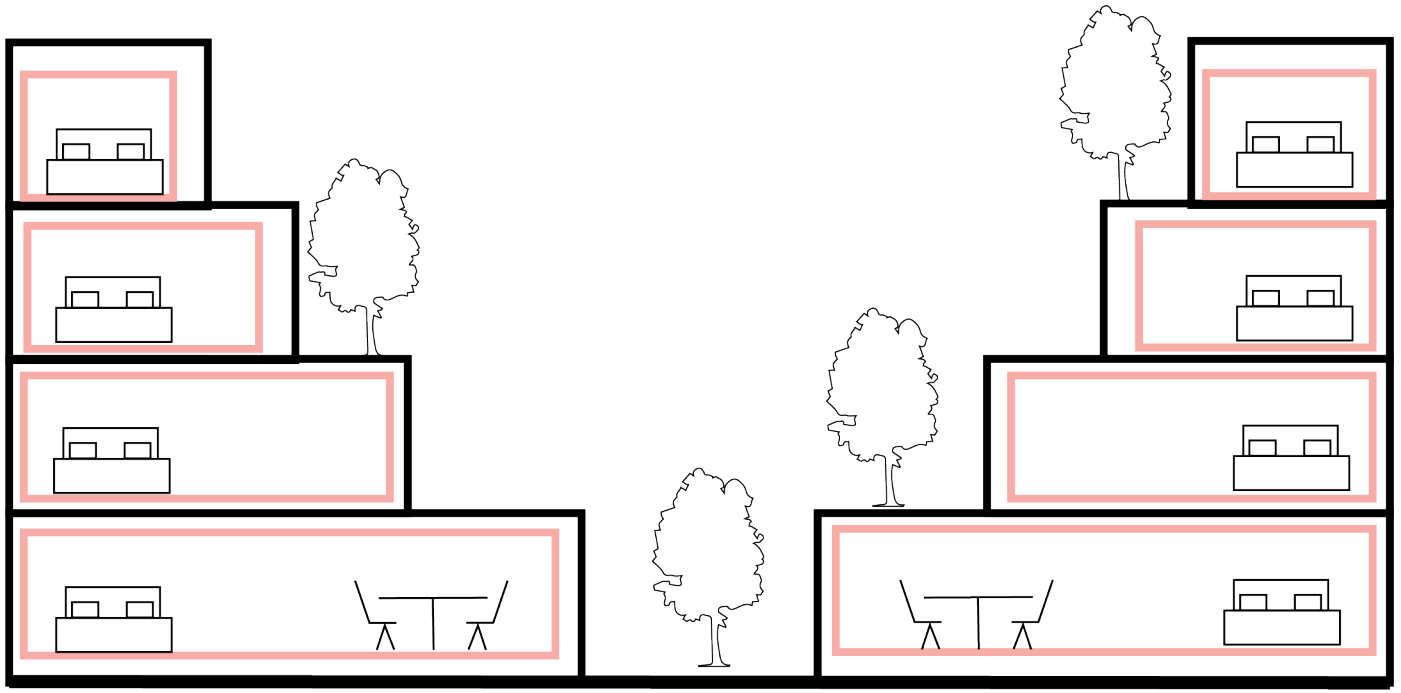
Shared rooms to rent

Cooperative

Starters, small and large families, and elderly



Zoning | Bridge



5th floor (+21m)

Legend:

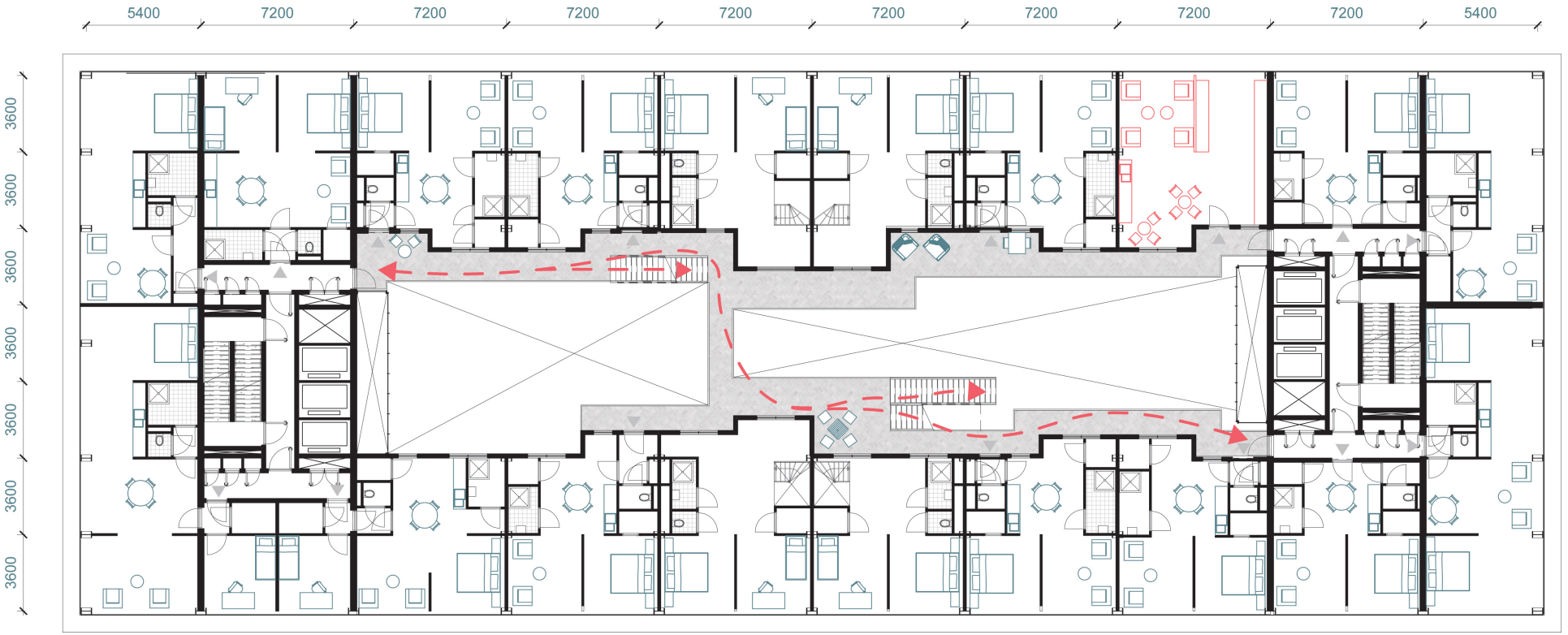
Private use

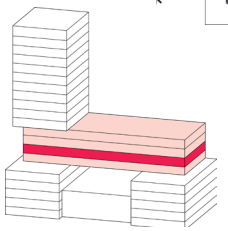
Shared use

6th floor (+24m)

Legend:

- Private use
- Shared use





Impression | Courtyard bridge

Terraces

Structure | Bridge

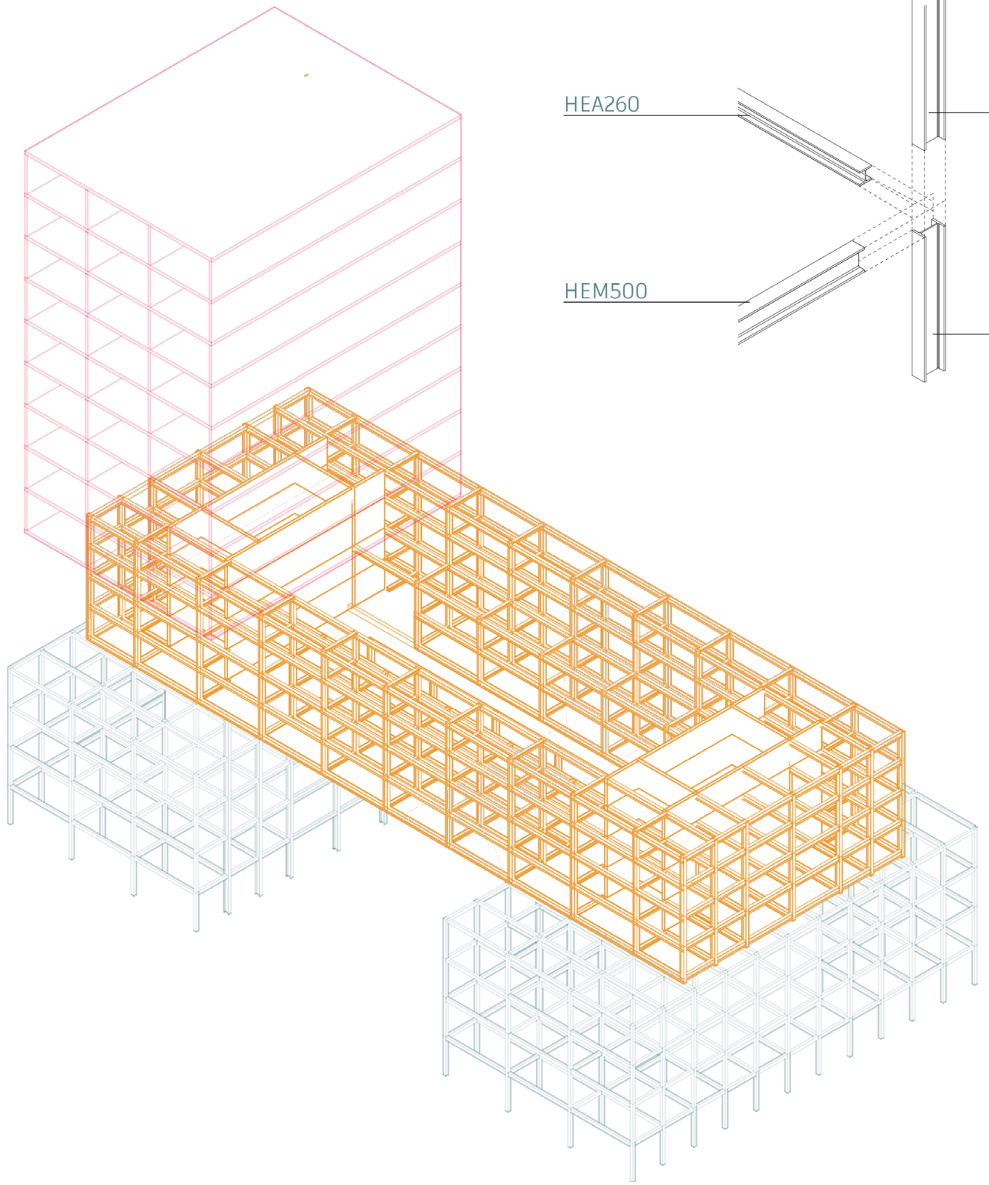
Steel open structure

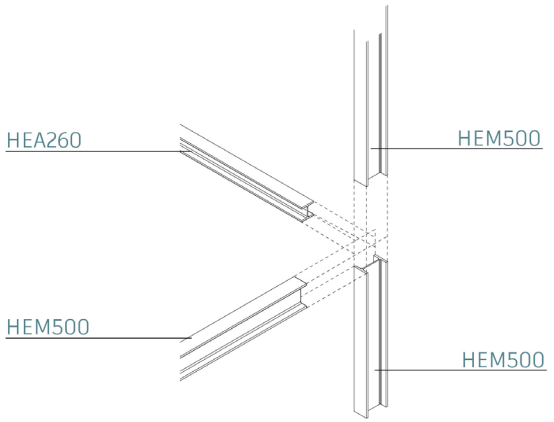
Vierrendeelbeams

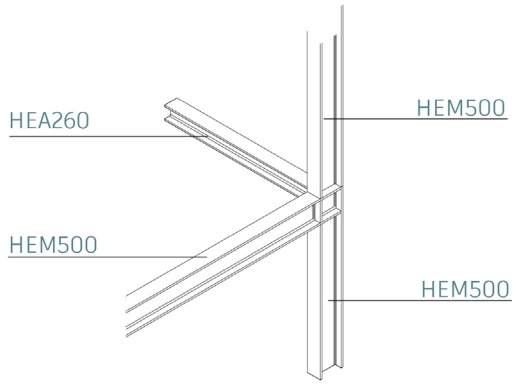
Span of 28 meters

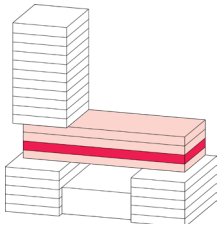
Open facades

Terraced structure

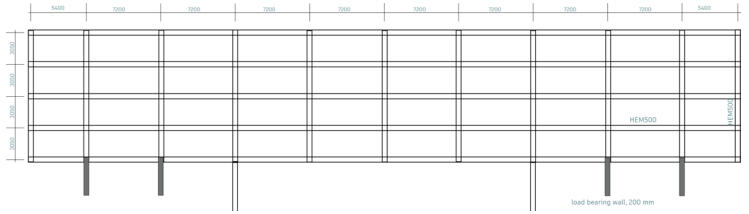




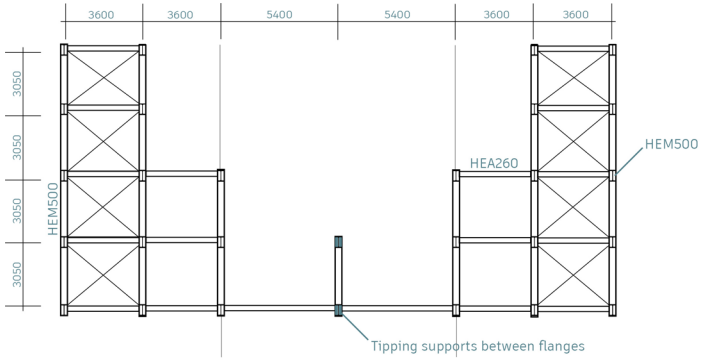




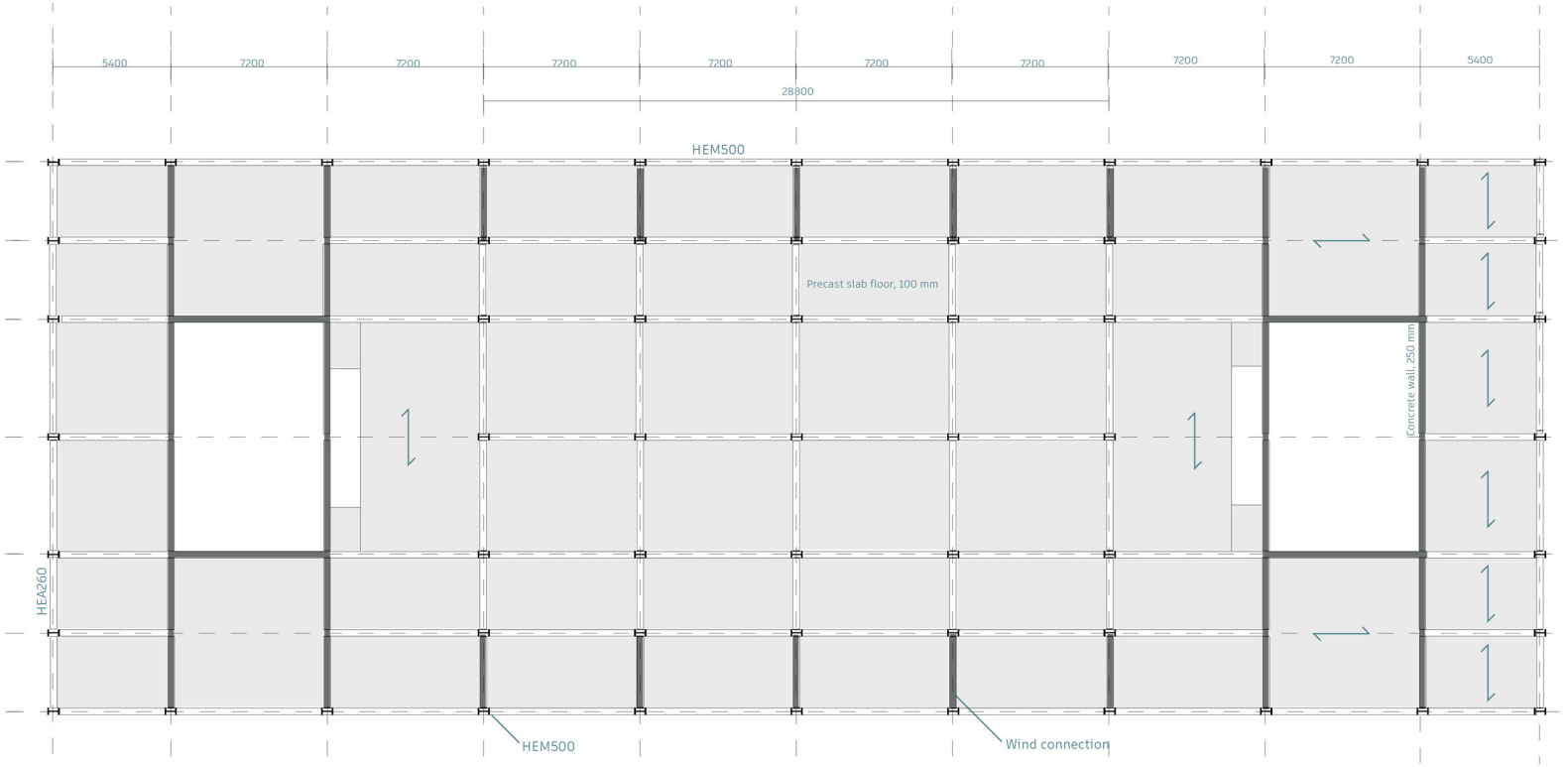
Structure | Level 5

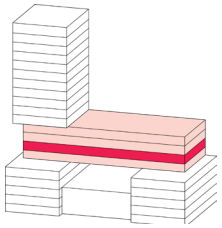


View



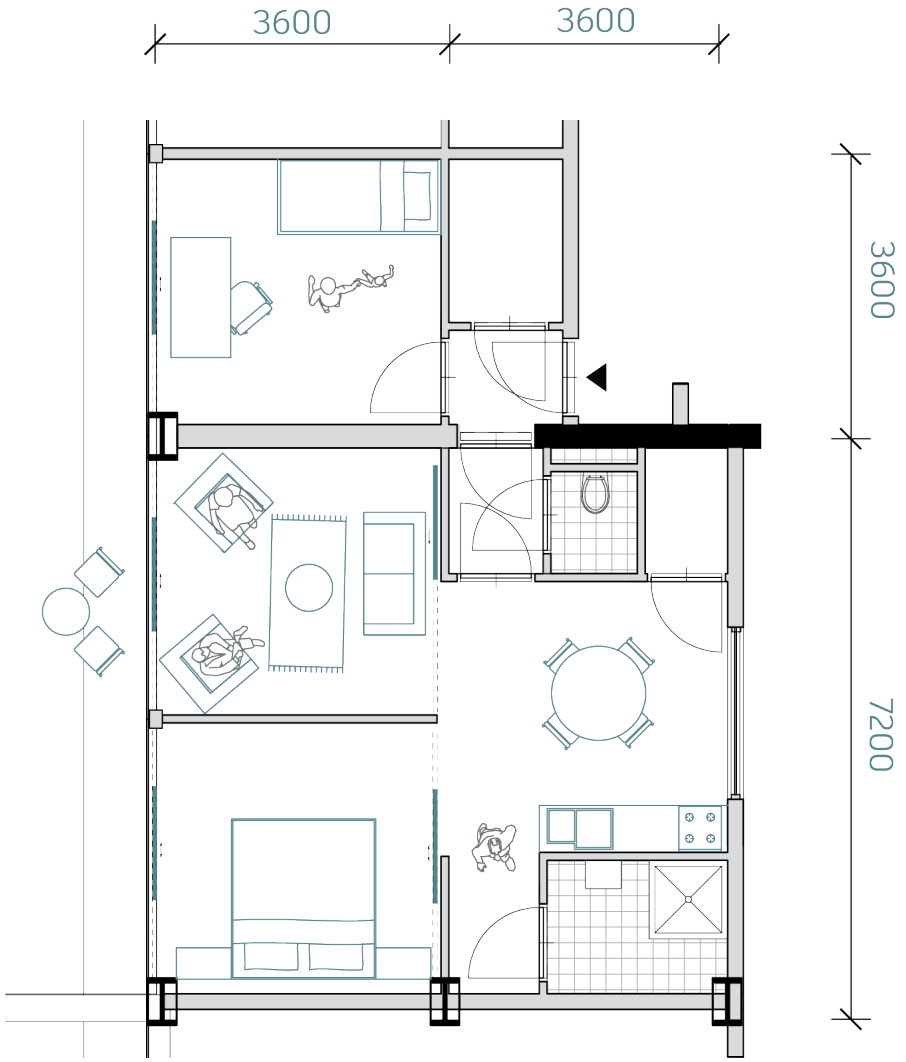
Section





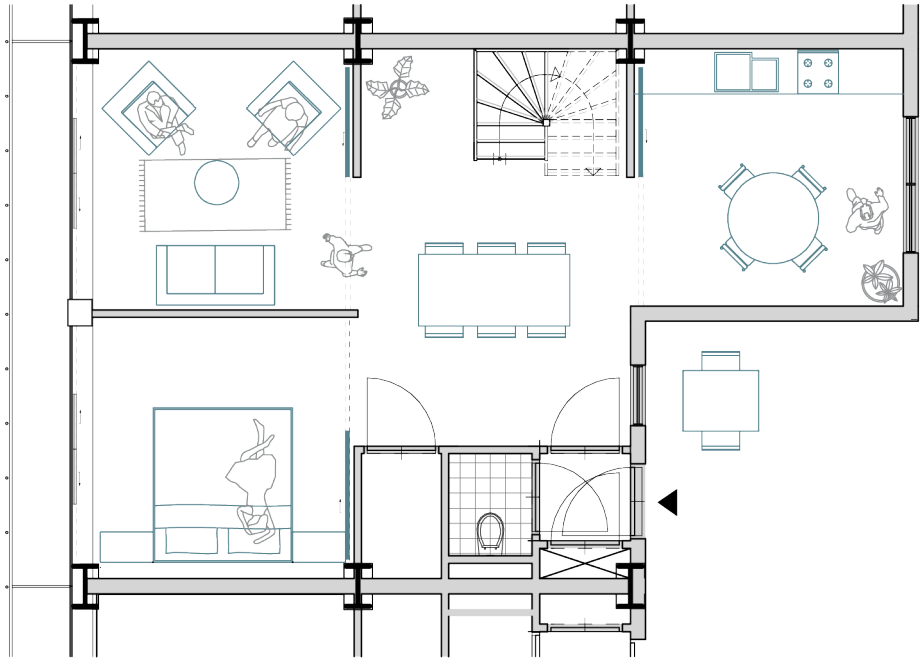
5th floor (+24m) | Dwelling

Pass-through homes - Young professional

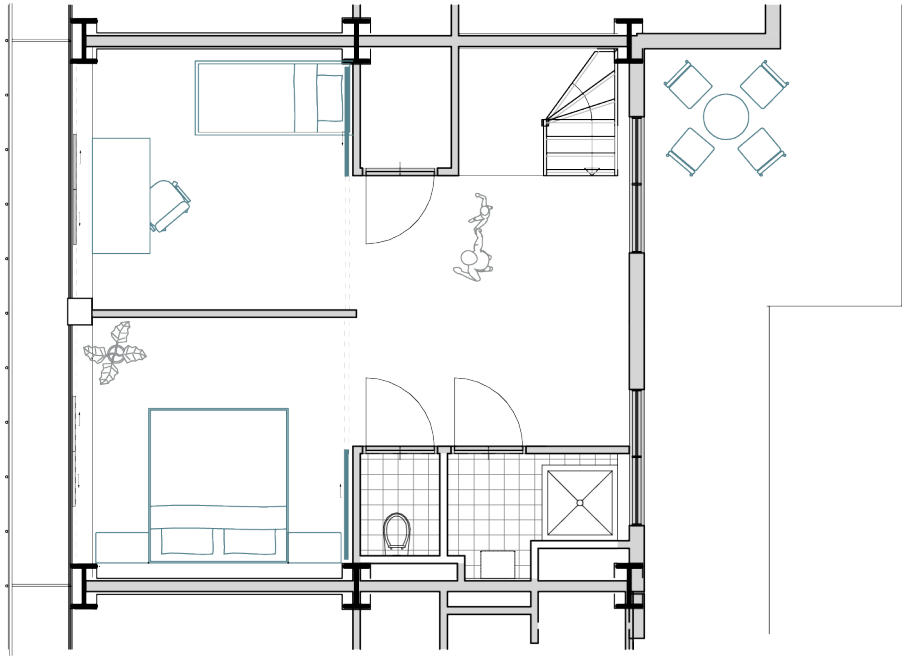


5th floor (+24m) | Dwelling

Pass-through homes - Family



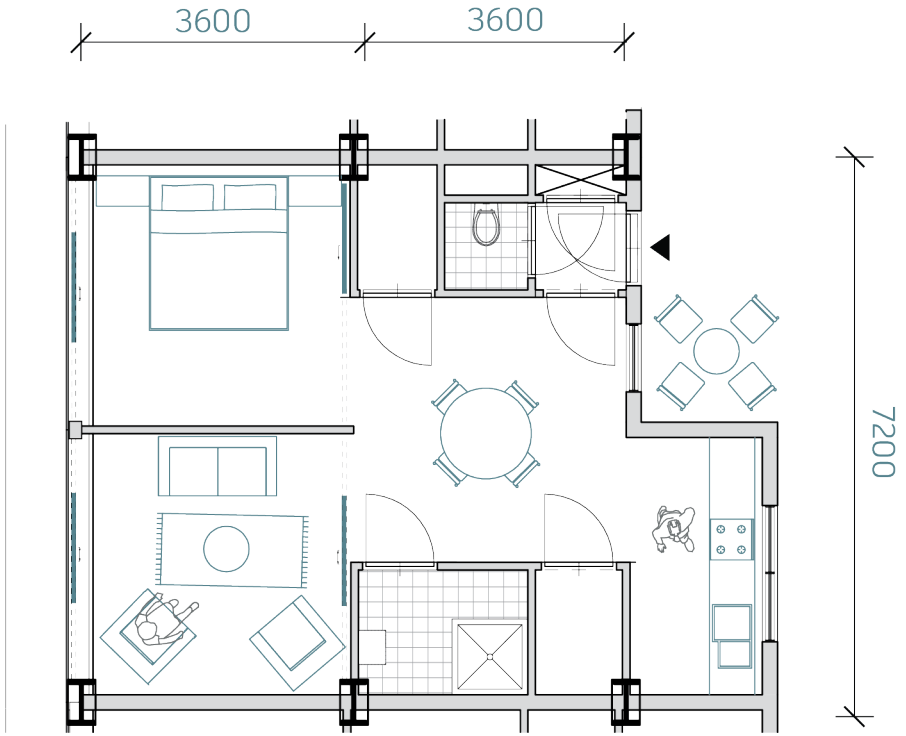
1st floor



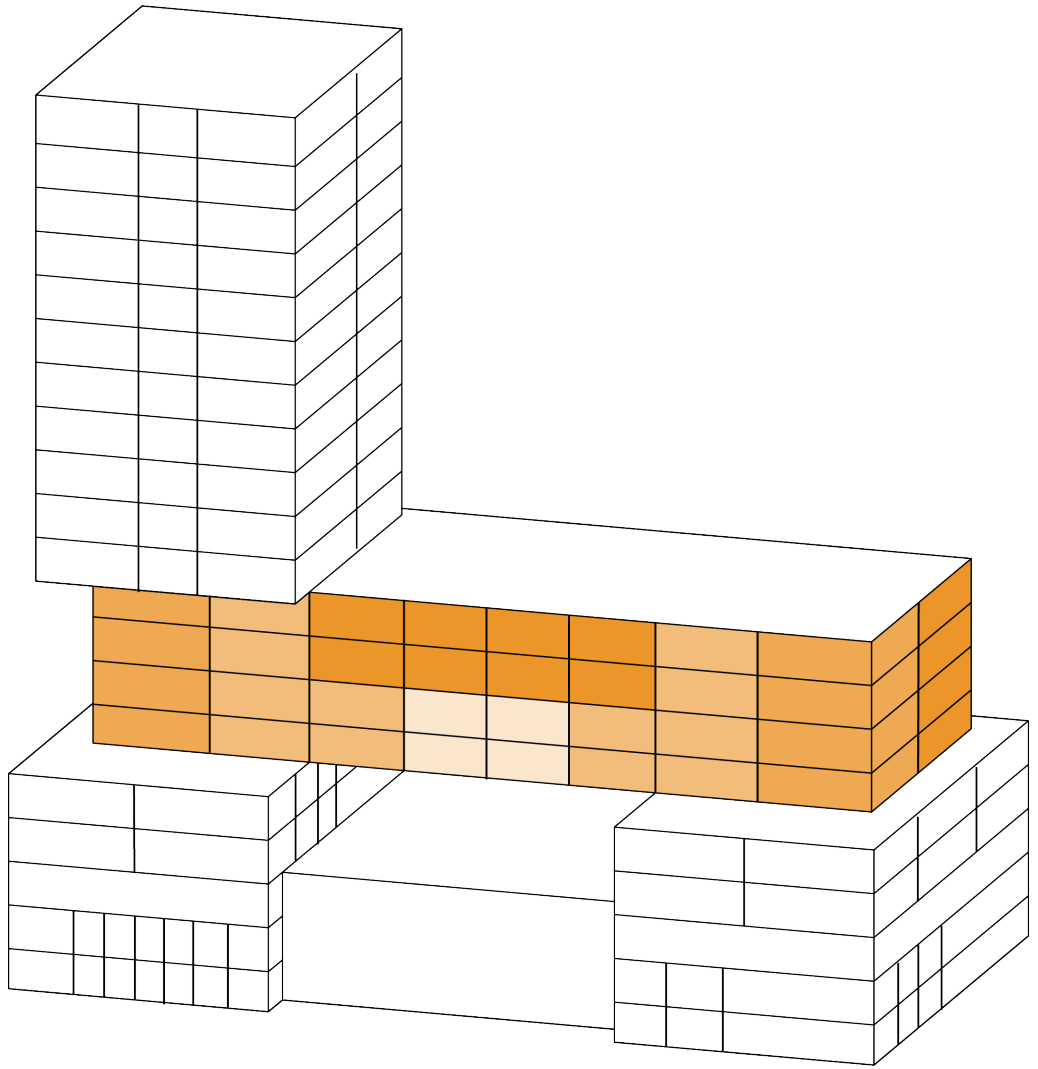
2nd floor

5th floor (+24m) | Dwelling

Pass-through homes - Elderly

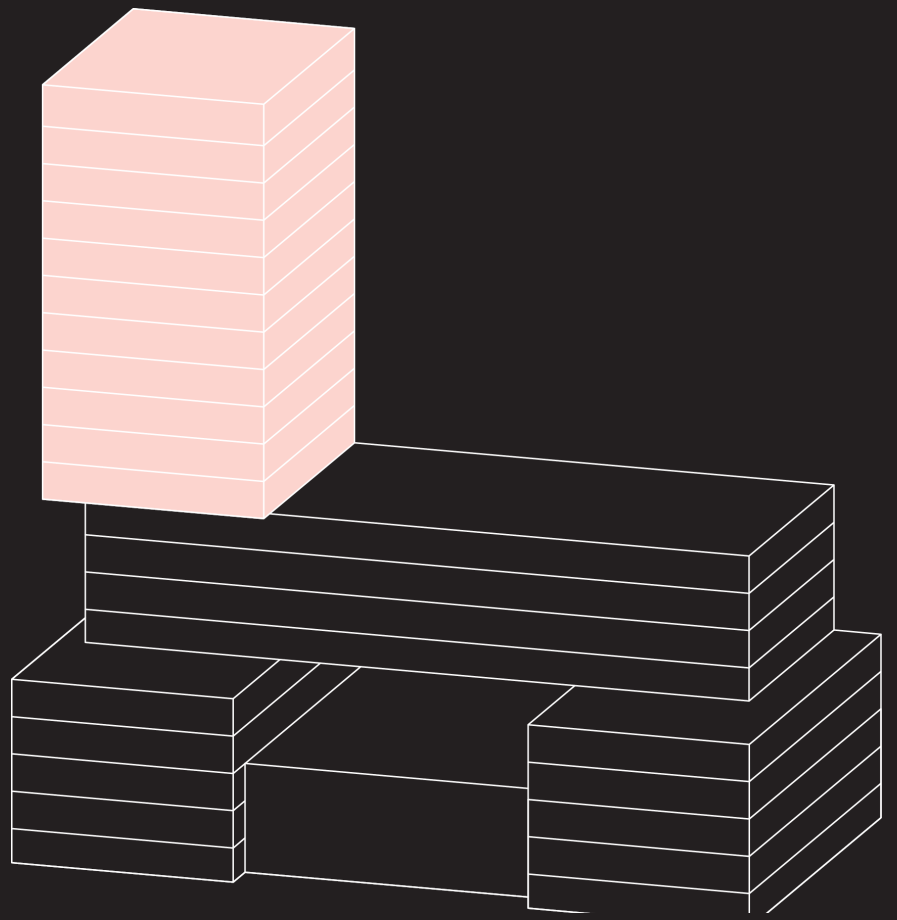


Typologies

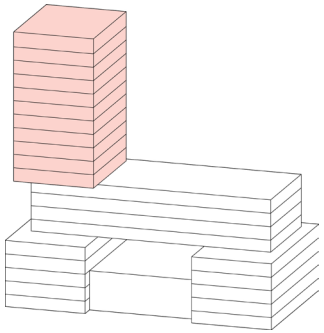


Studio
2-3 person house
3-4 person duplex house
3-4 person house
Shared facilities

Tower



Tower

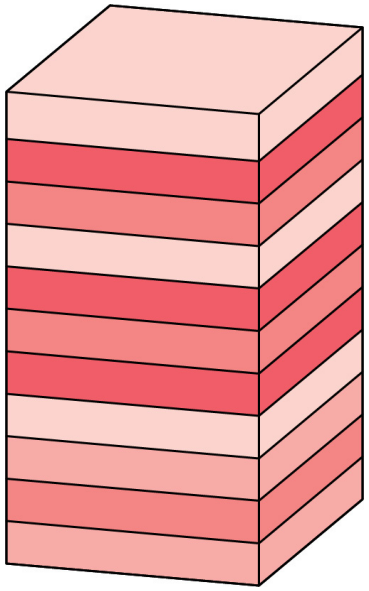


Large dwellings

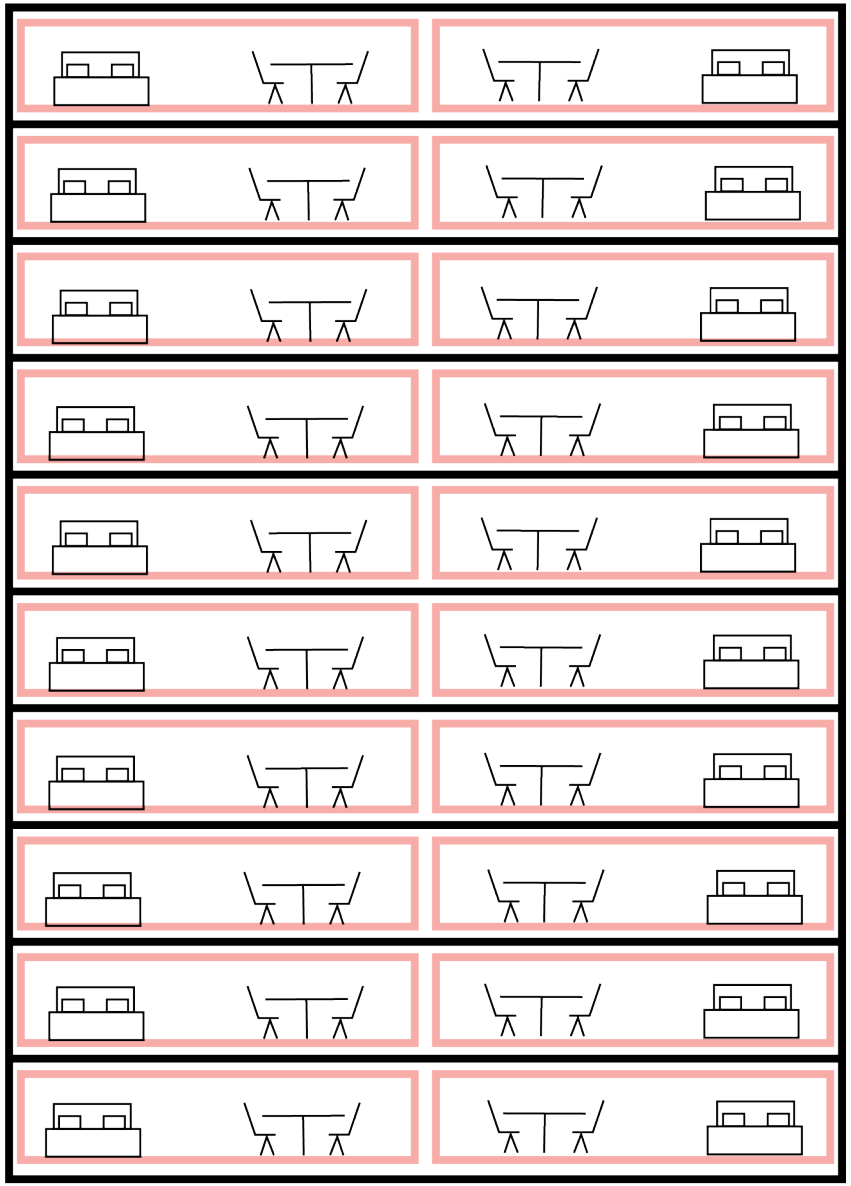
Privat individual dwellings

Developer

Different dwelling sizes small and large families



Zoning | Tower



9th floor (+33m)

Legend:

- Private use
- Shared use

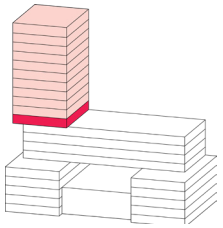
Structure | Tower

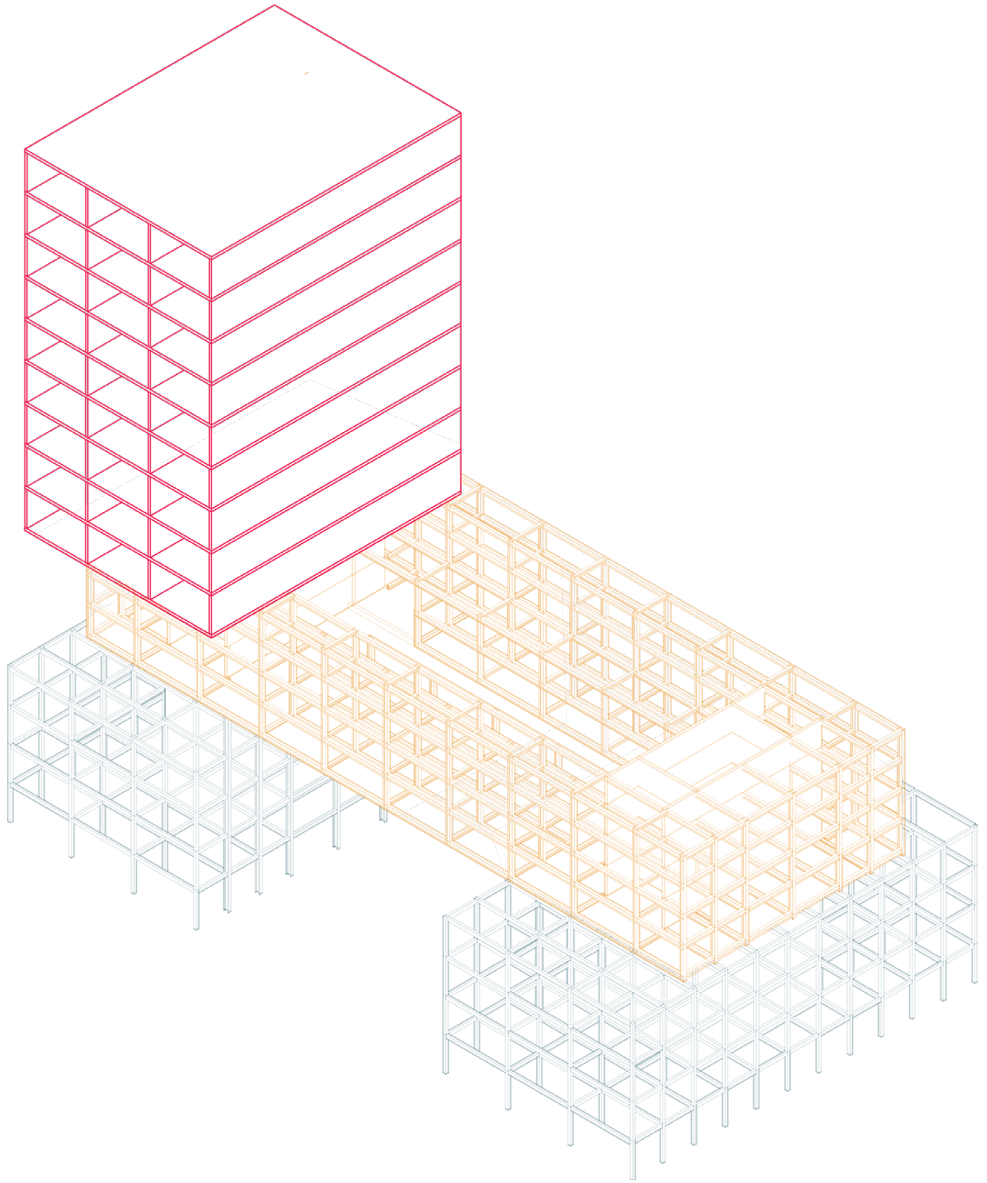
Wooden structure

Reduce weight

Storing CO2

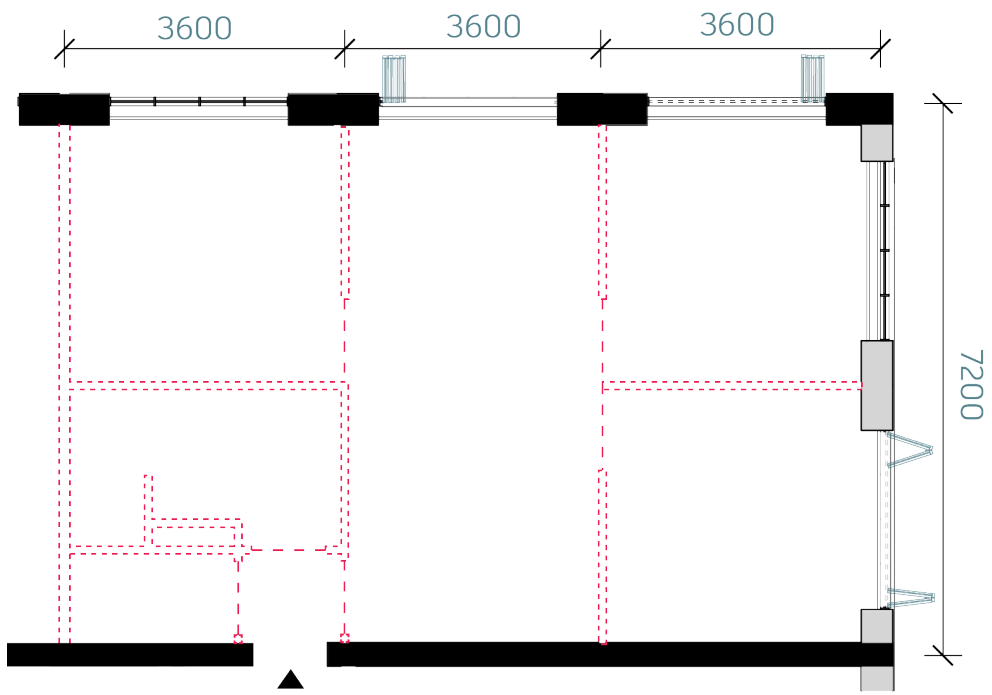
Modular design

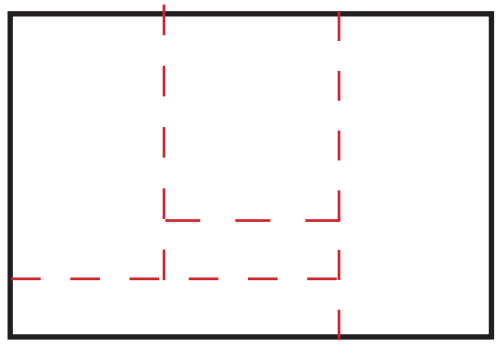


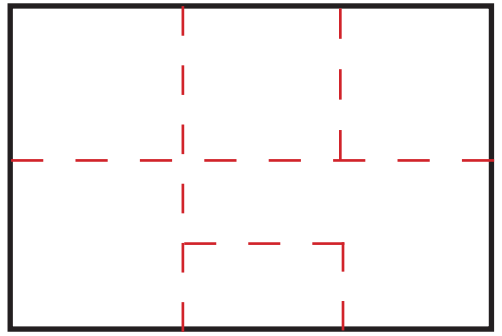


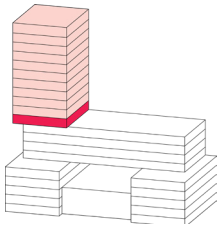
9th floor (+33m) | Dwelling

Adaptability



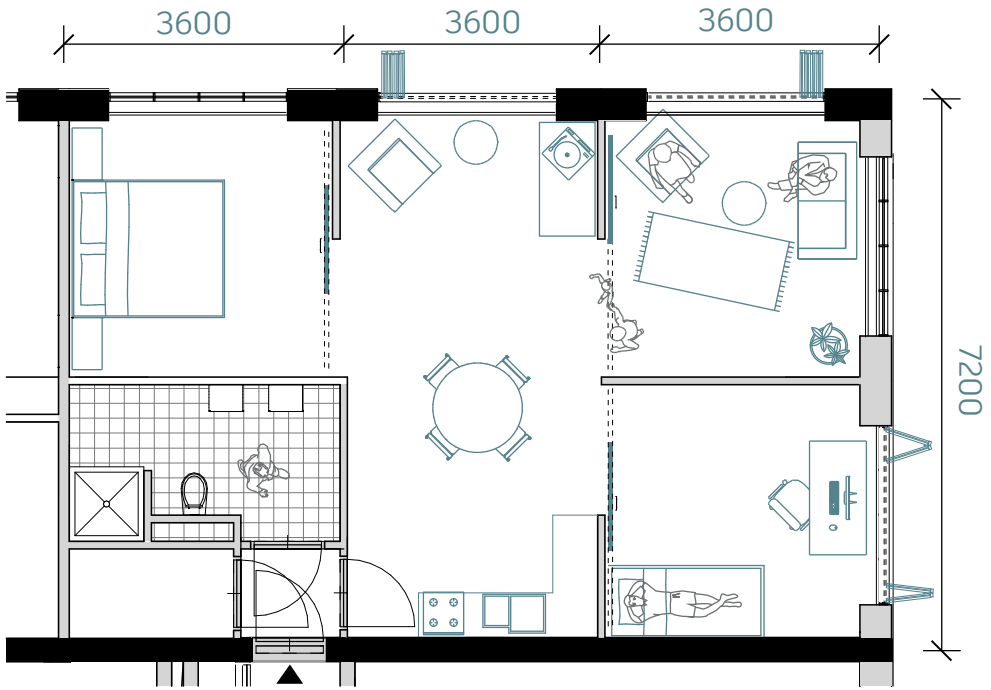


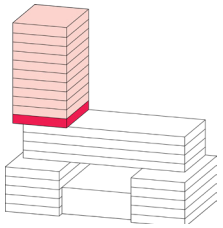




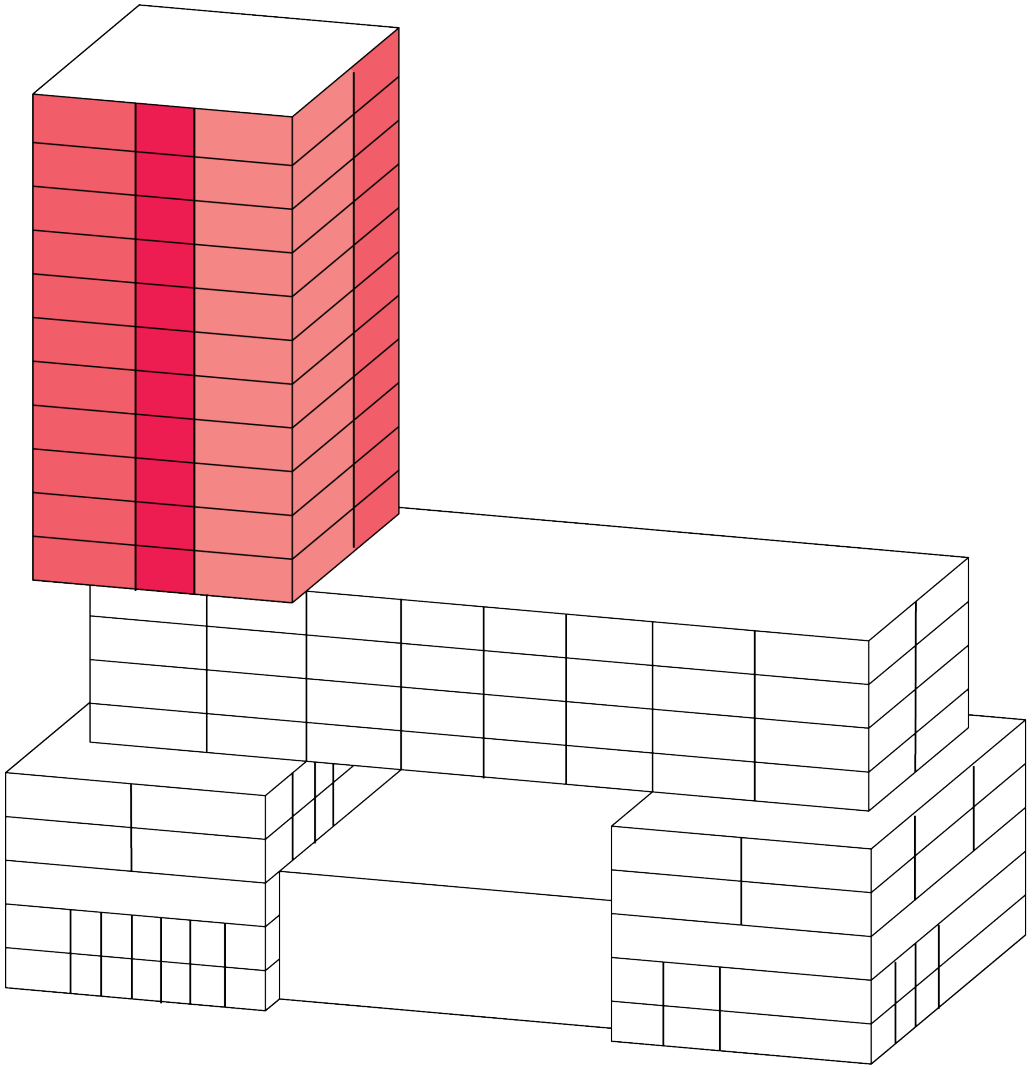
9th floor (+33m) | Dwelling

Use by residents



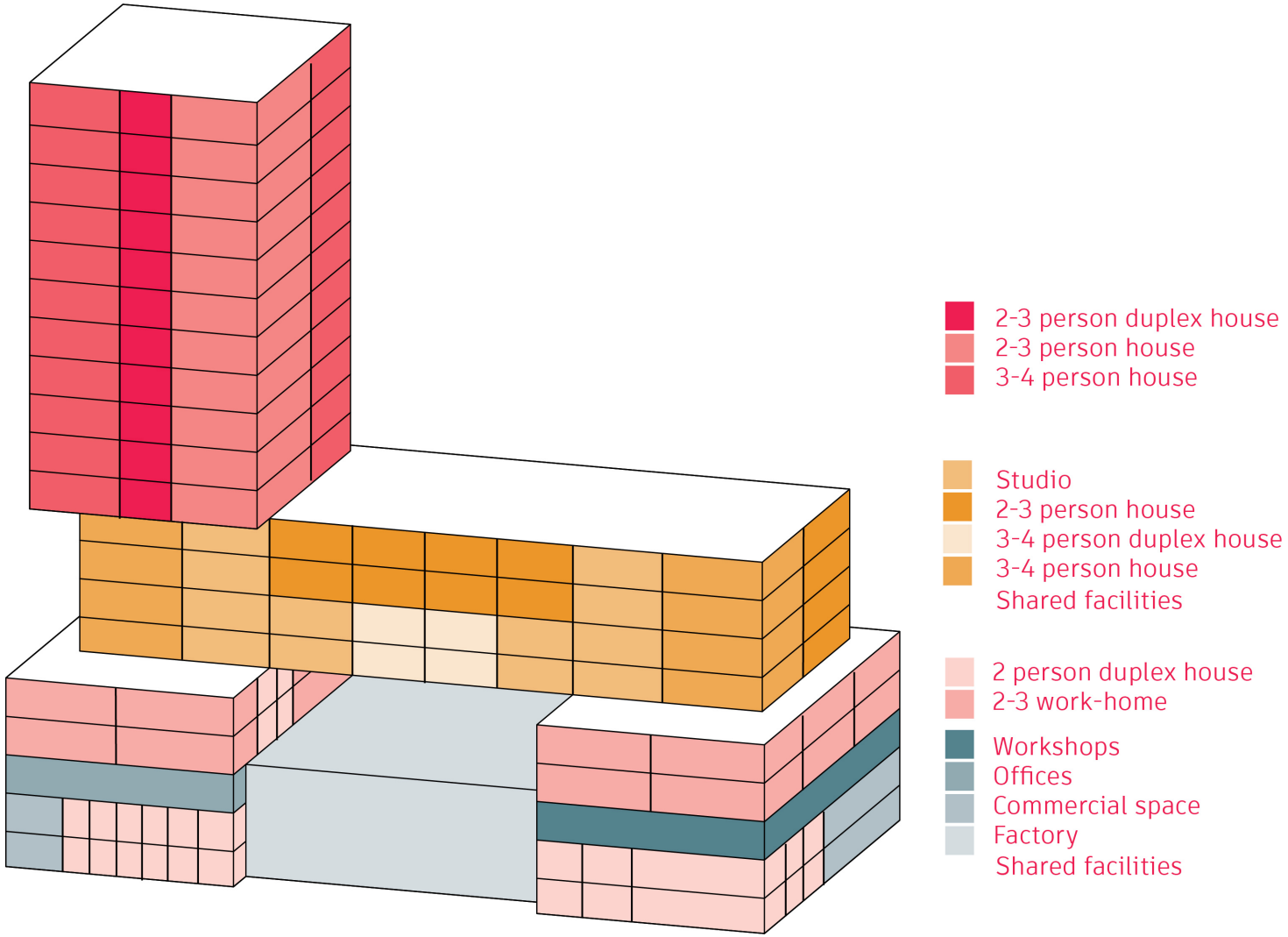


Typologies

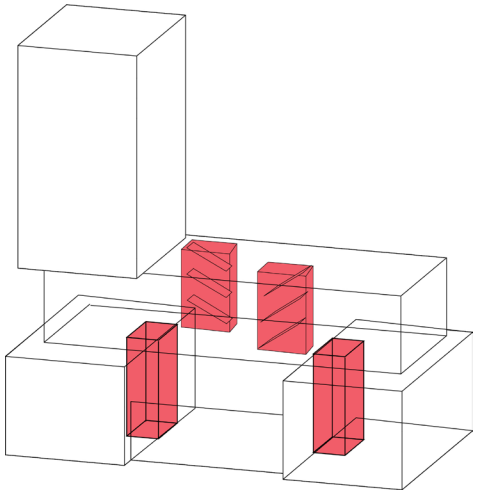


2-3 person duplex house
2-3 person house
3-4 person house

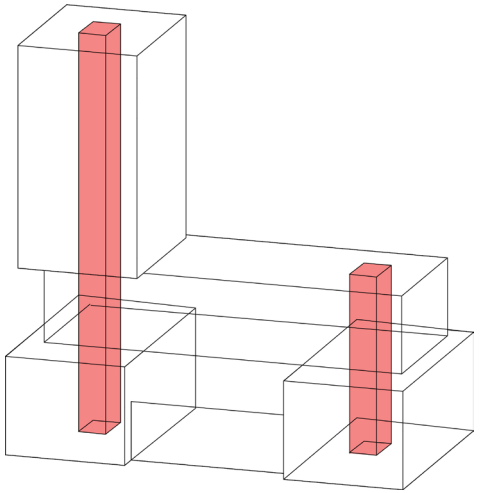
Typologies


2-3 person duplex house
2-3 person house
3-4 person house
Studio
2-3 person house
3-4 person duplex house
3-4 person house
Shared facilities
2 person duplex house
2-3 work-home
Workshops
Offices
Commercial space
Factory
Shared facilities

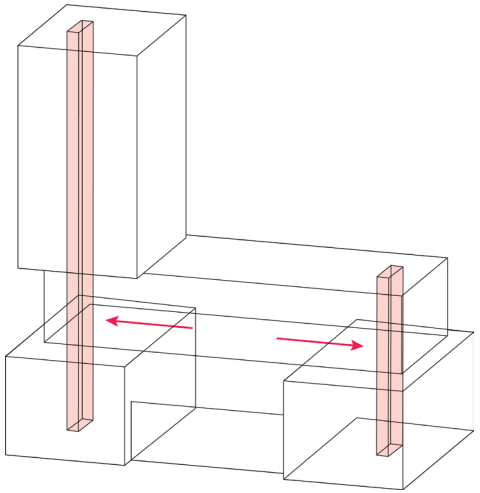
Technology



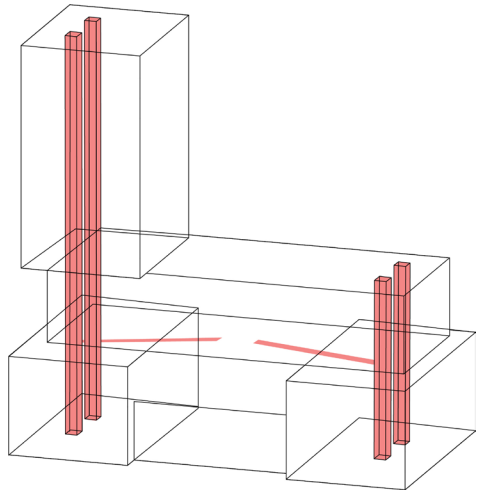
Stairs



Elevators

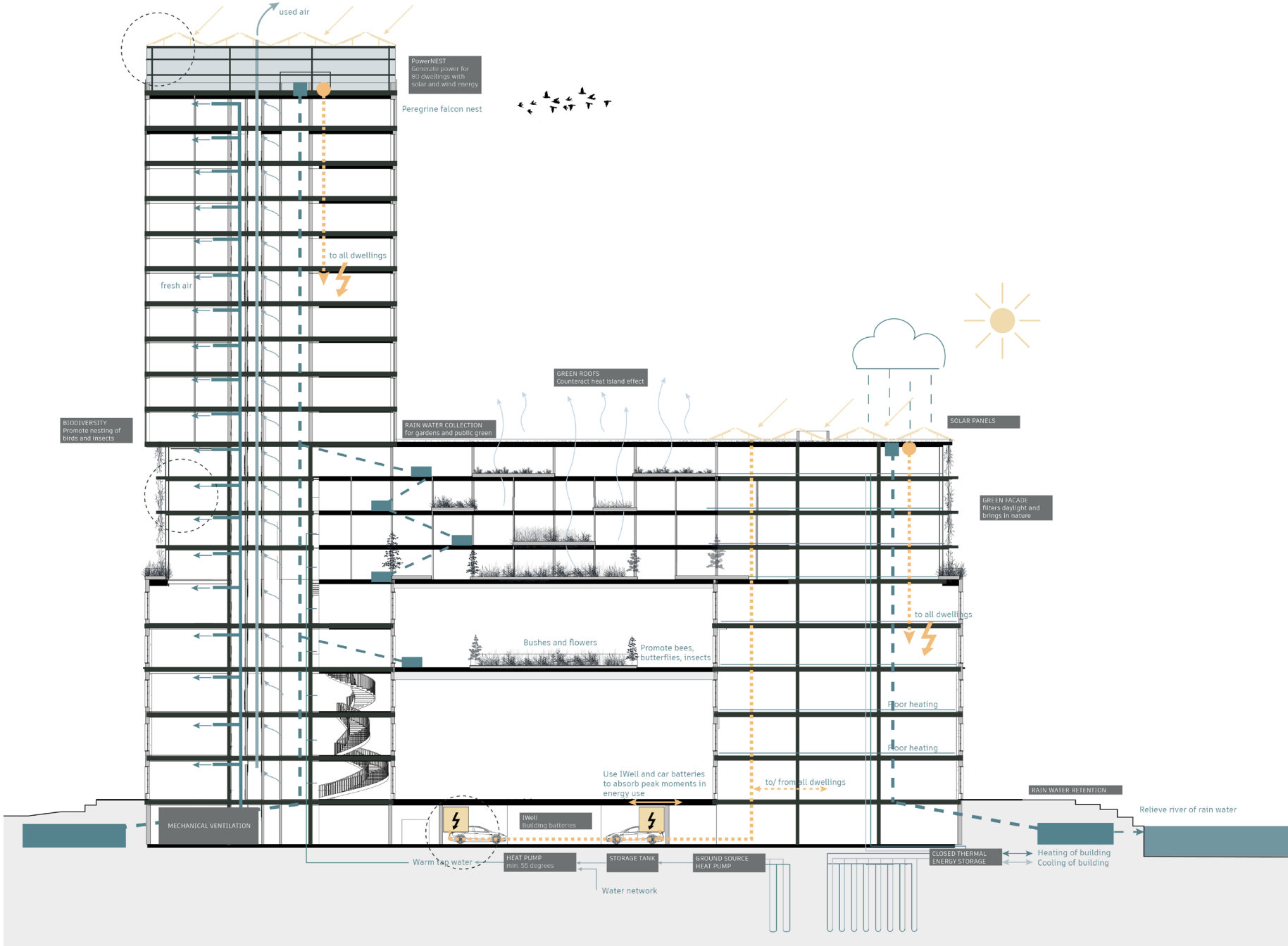


Emergency stairs

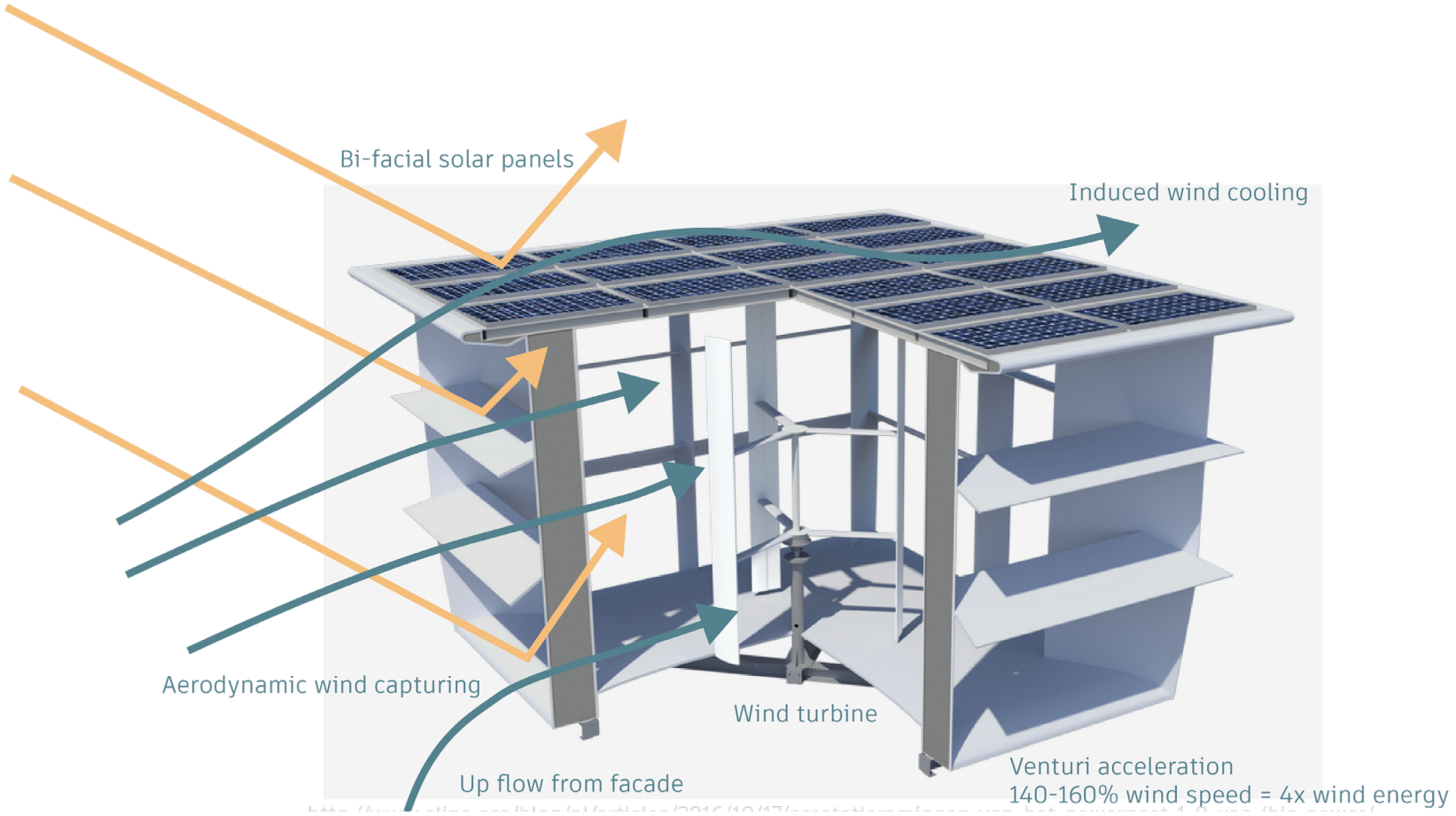


Technical shafts

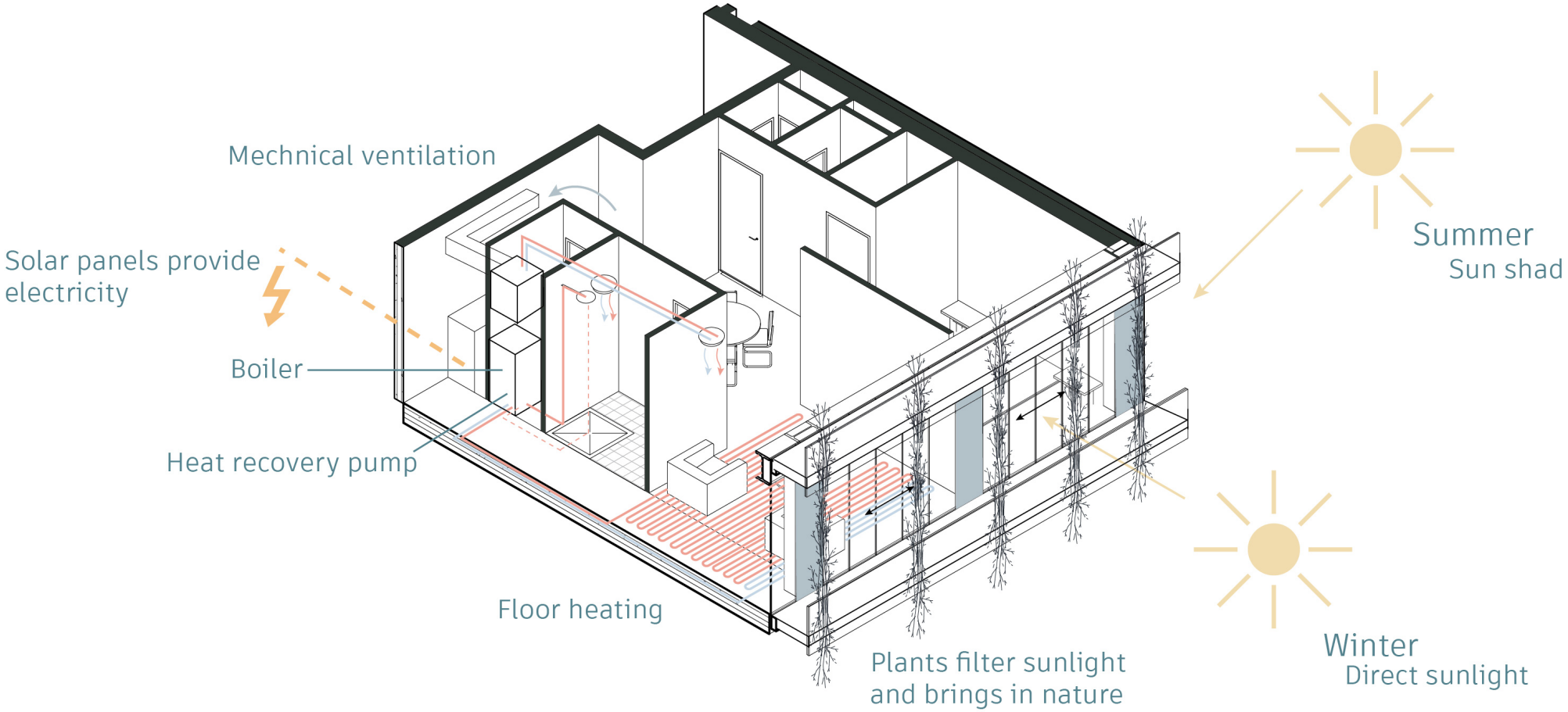
Climate diagram



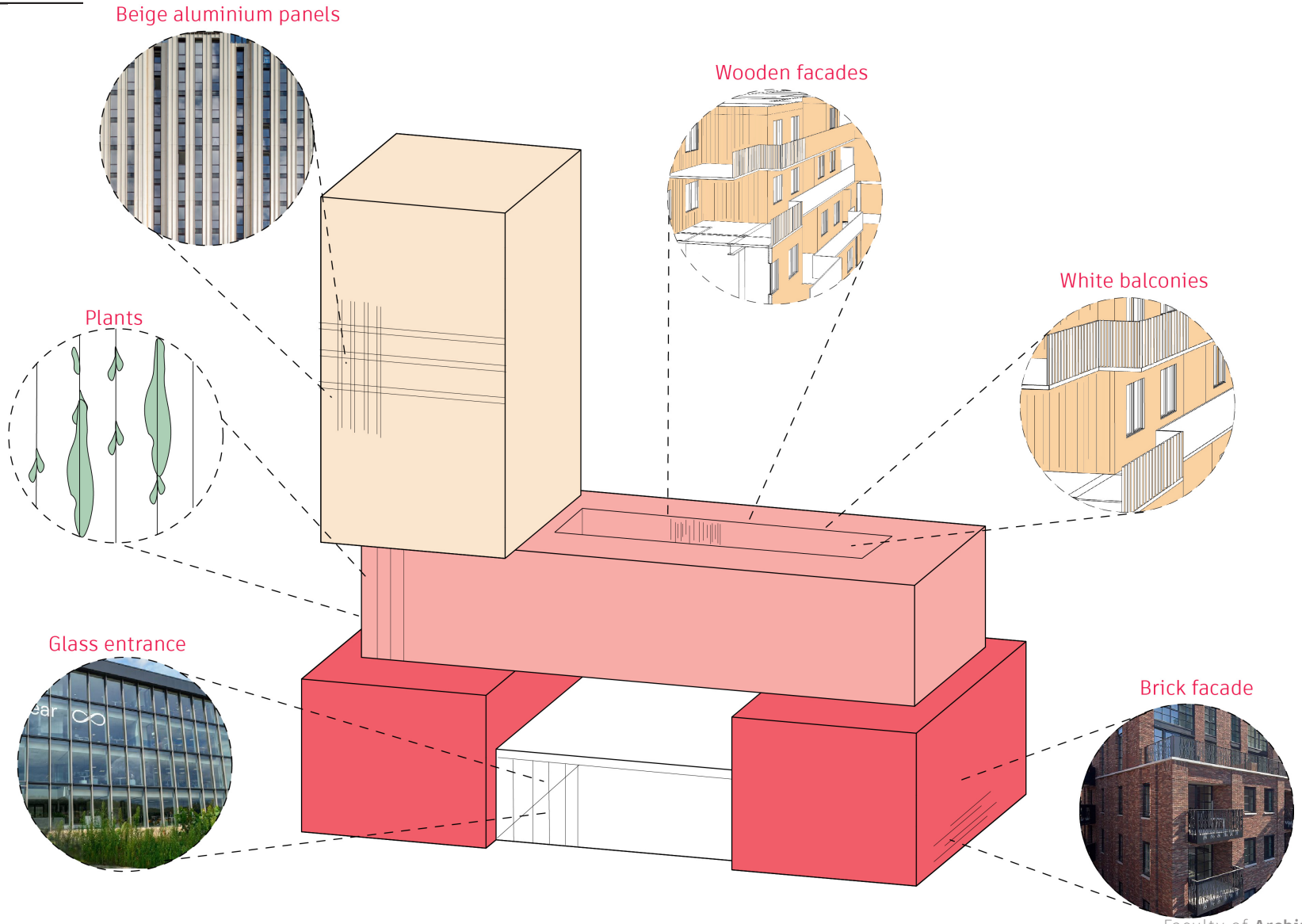
PowerNEST


Bi-facial solar panels
Induced wind cooling
Aerodynamic wind capturing
Wind turbine
Up flow from facade
Venturi acceleration
140-160% wind speed = 4x wind energy

Climate diagram | Dwelling 5th floor



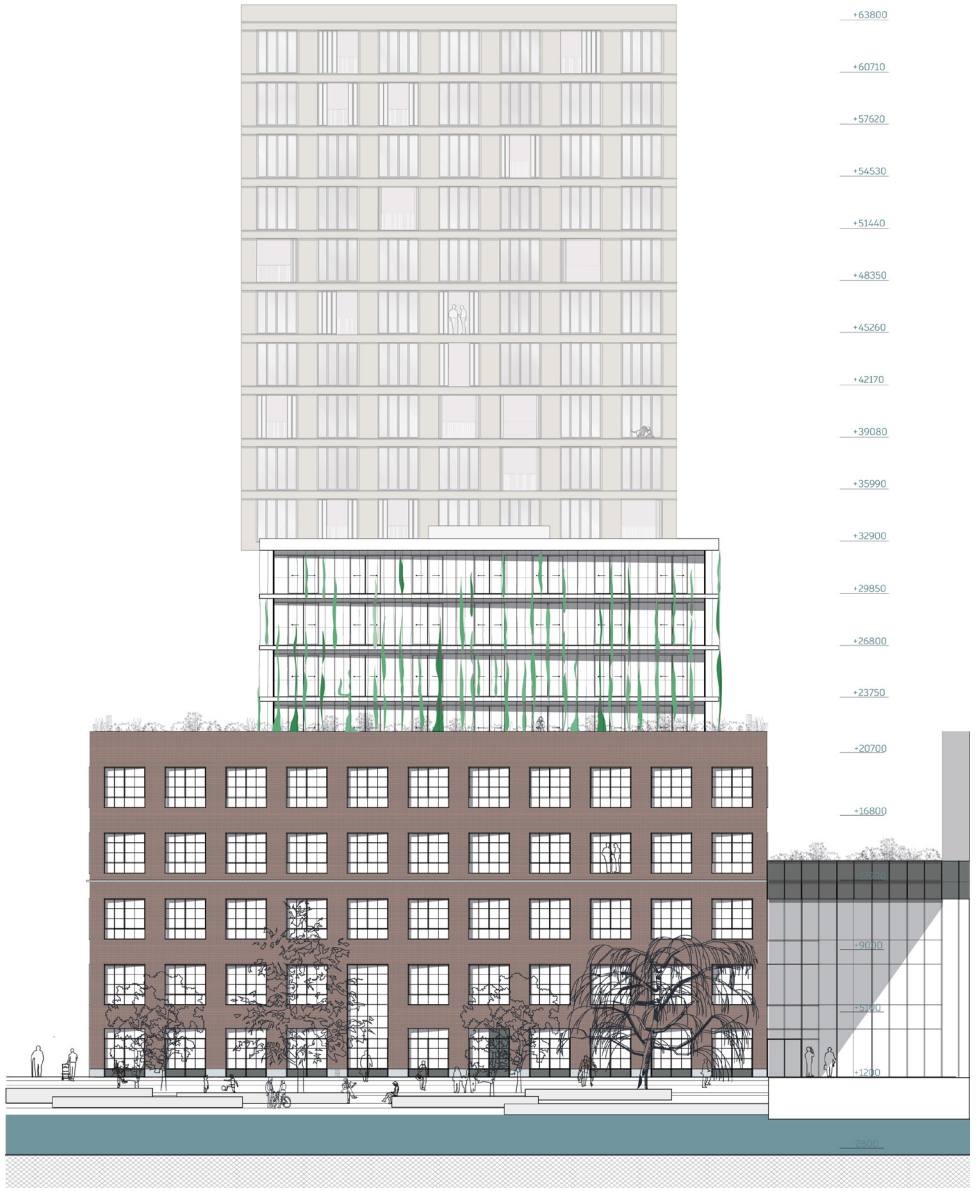
Materialisation



Facade elevation north

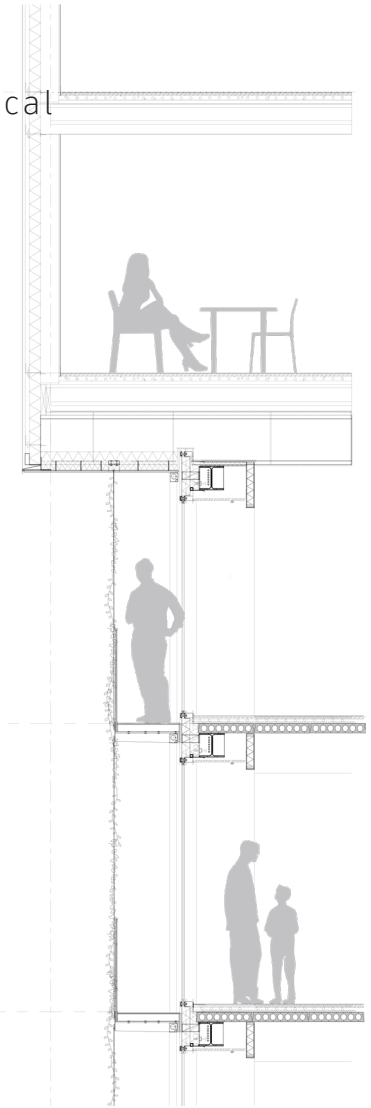
Facade elevation west

Facade elevation south

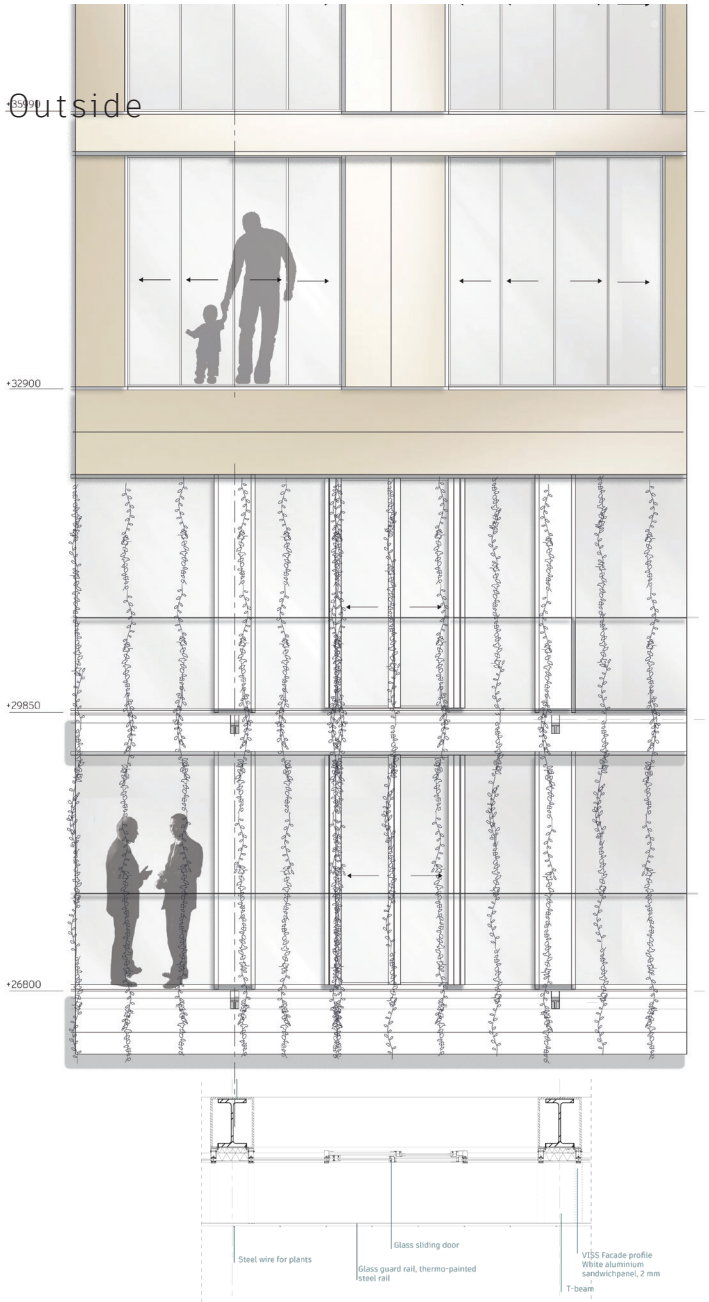


Facade fragment

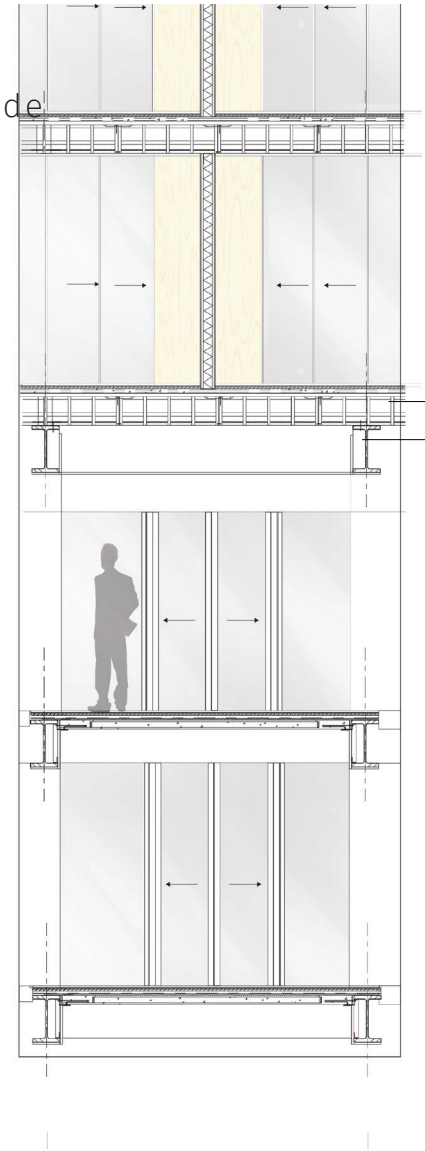
Vertical



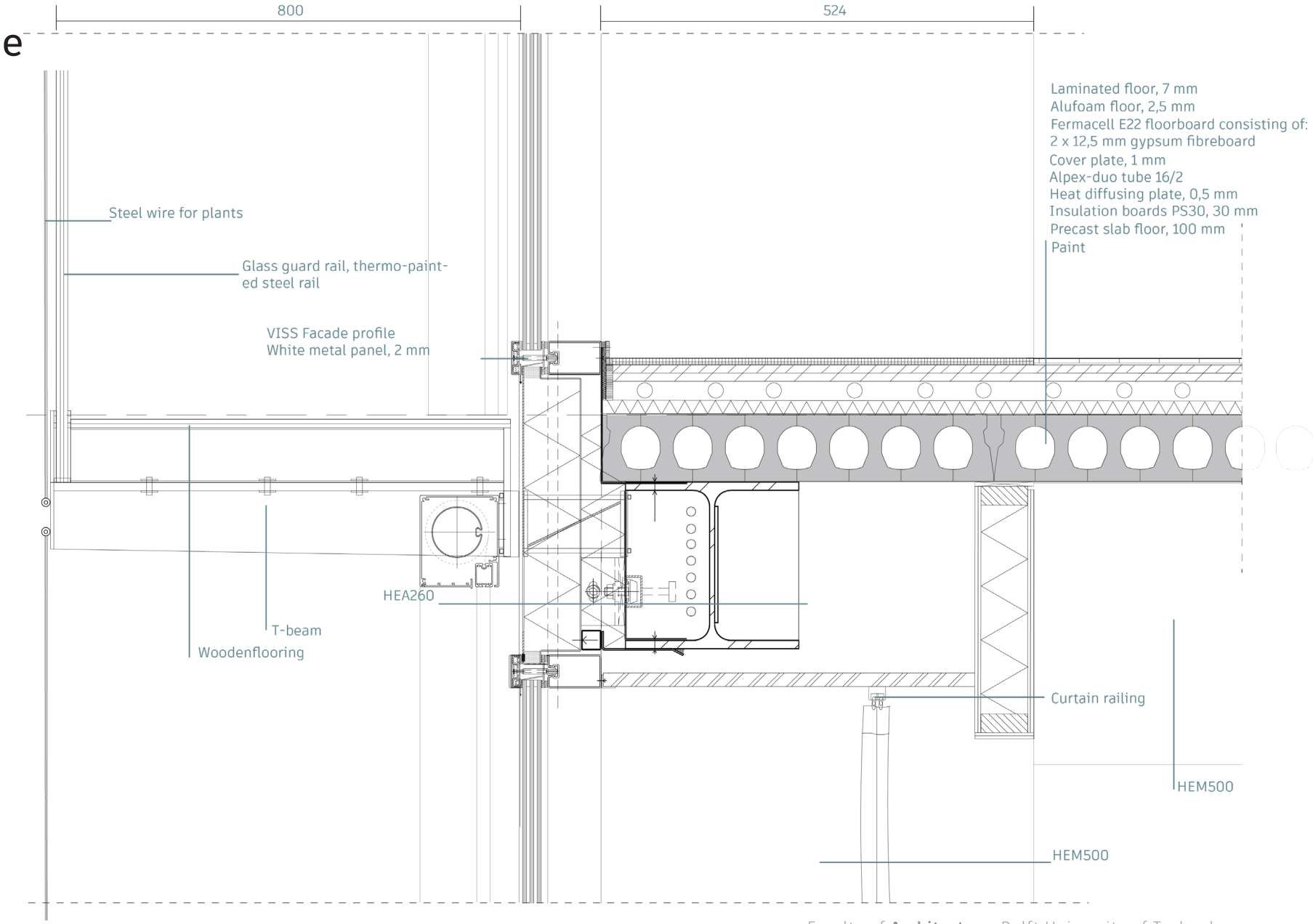
Outside



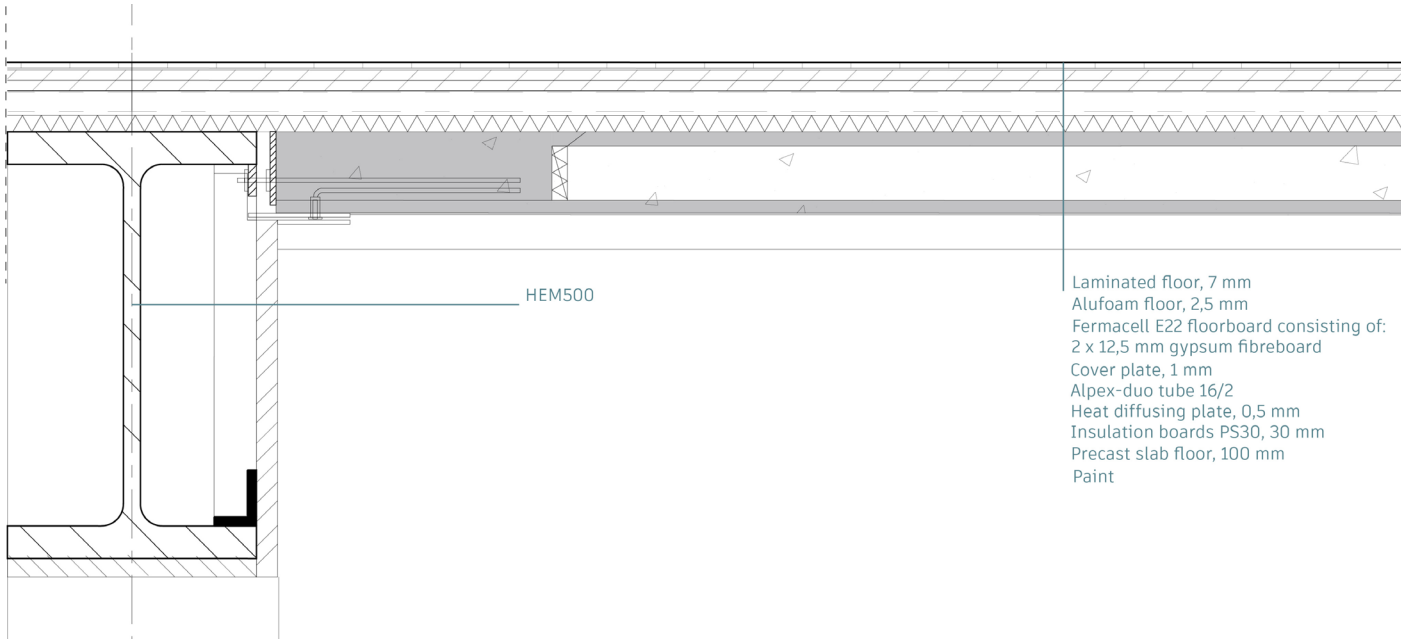
Inside



Detail floor and facade

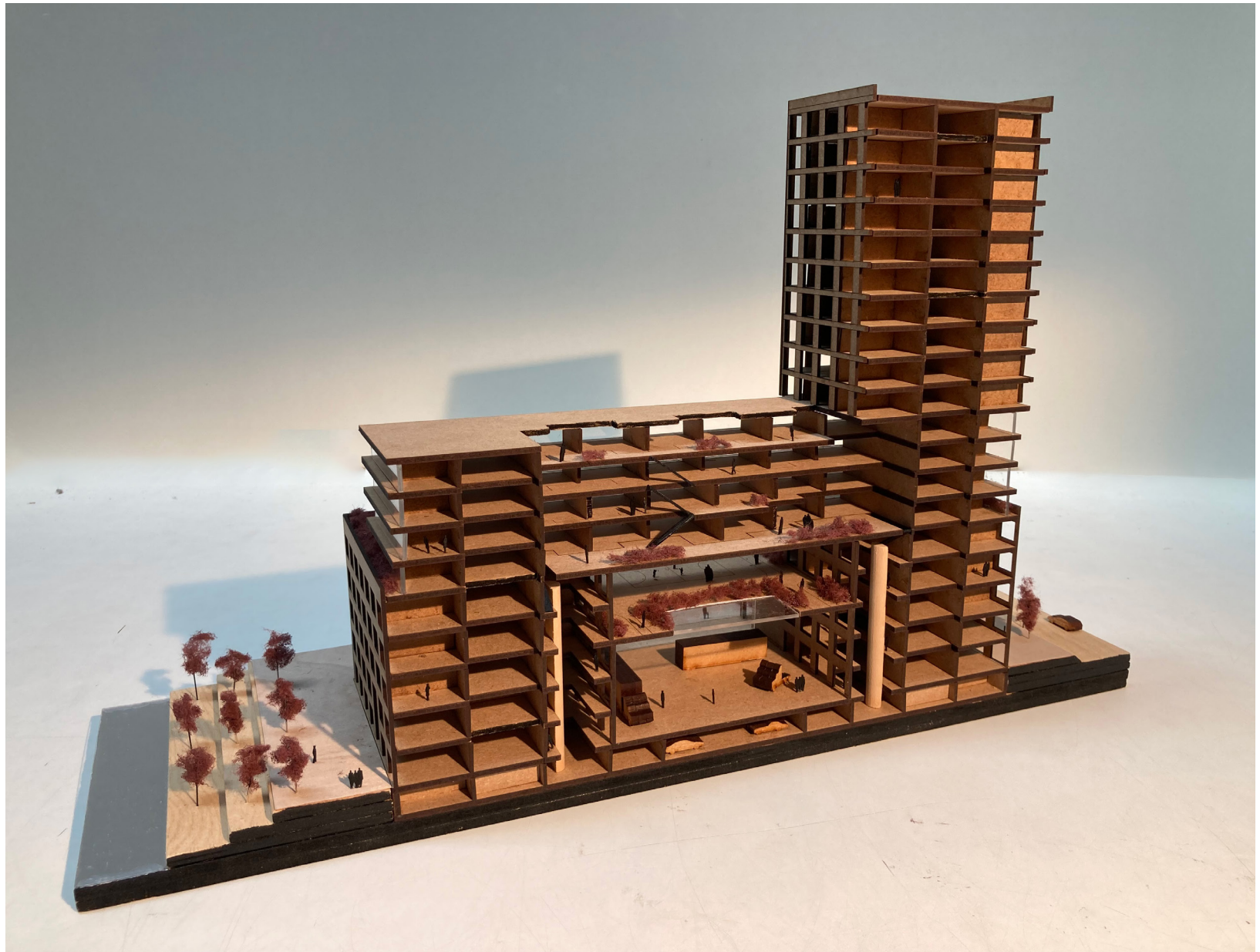


Detail floor bridge

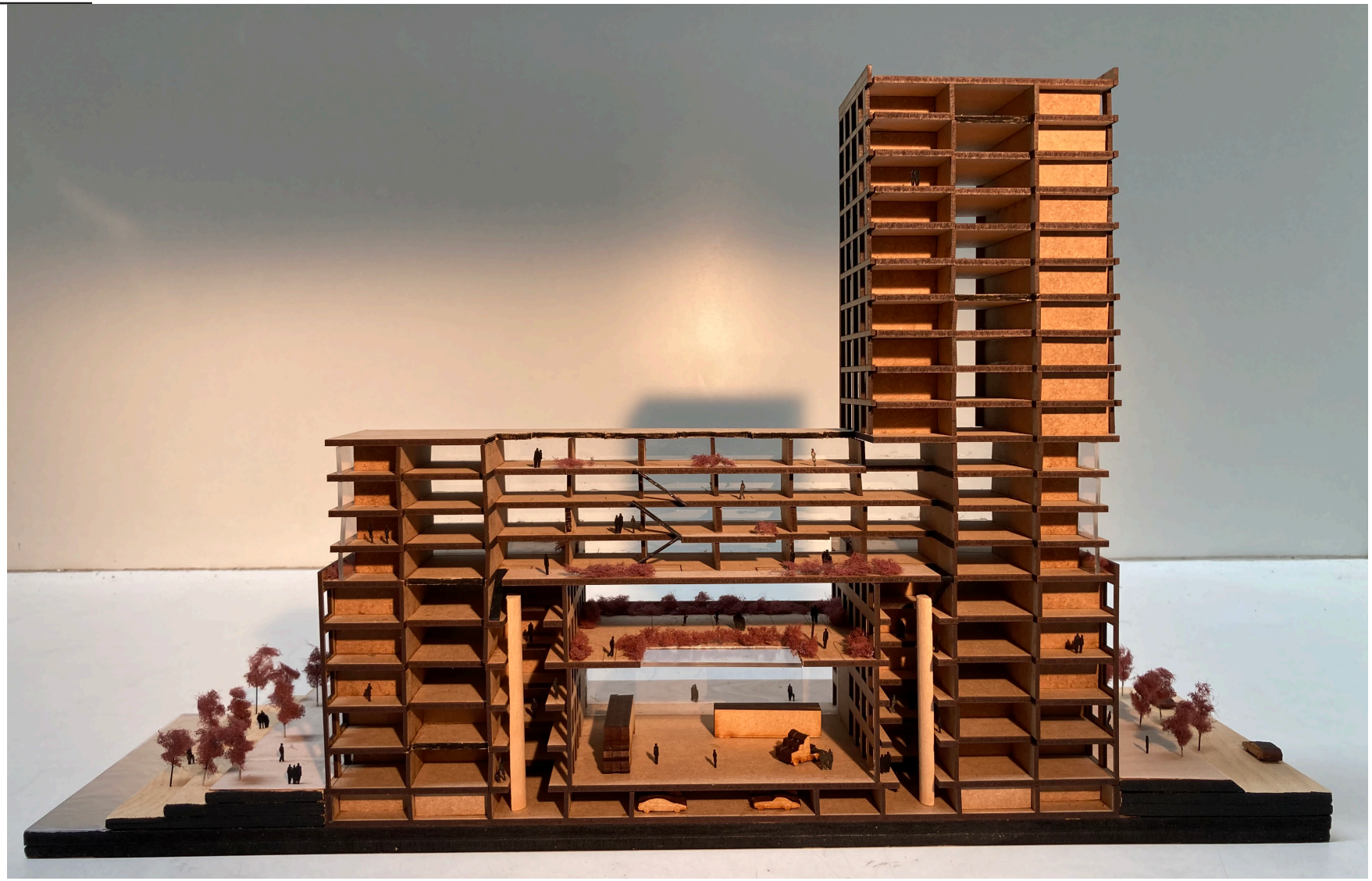


Waterfront

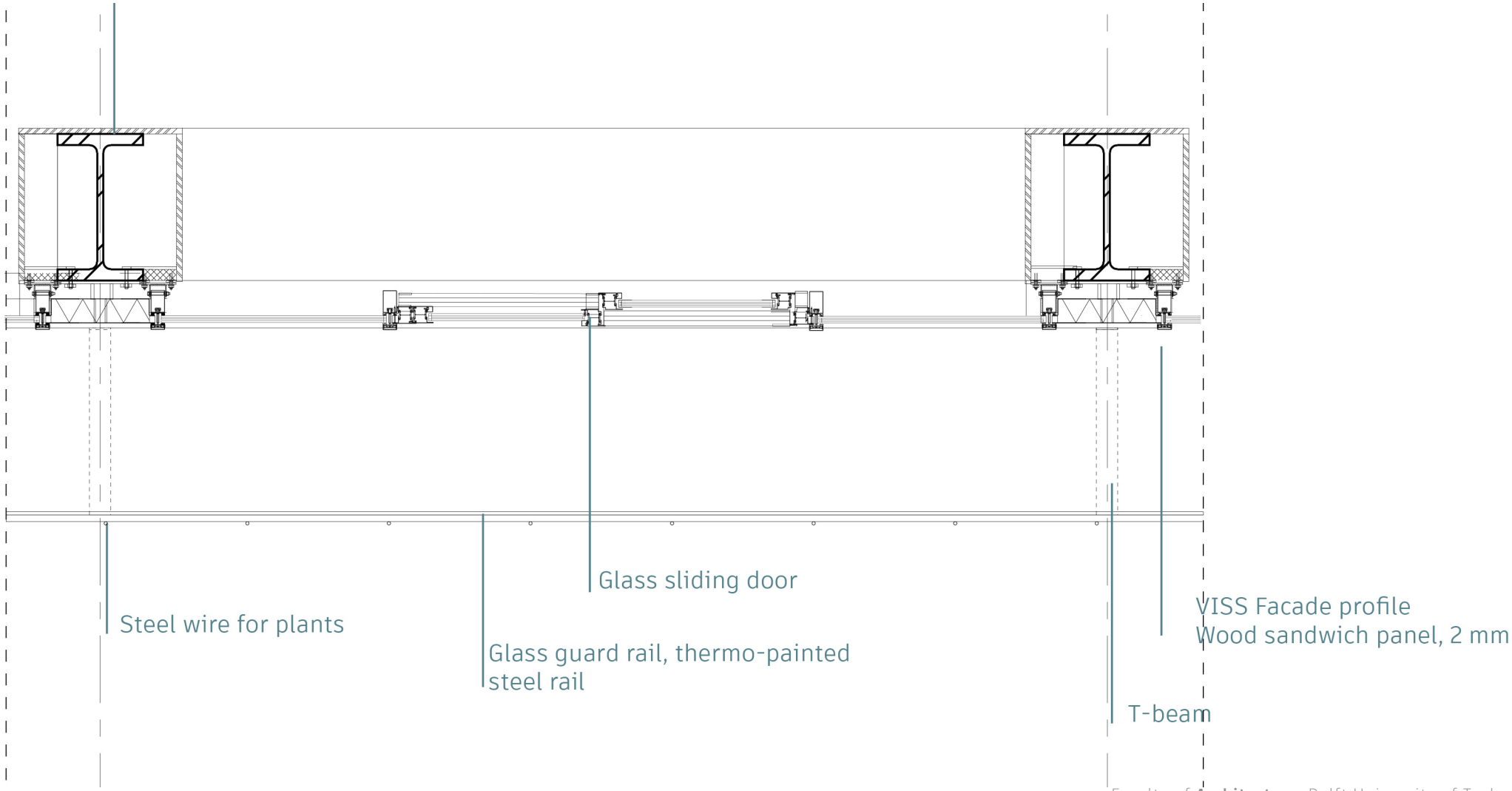
Segments



Shared spaces



Horizontal detail



Detail floor tower