

An architectural rendering of a modern building interior. The space features a large, light-colored wooden staircase on the right side, where several people are sitting and talking. To the left of the stairs is a planter area with various green plants. In the background, there are large glass windows and doors, and a person is walking through a doorway. The overall atmosphere is bright and airy, with a focus on natural materials and greenery.

Working Together

An investigation into synchronic typologies and
collaborative living

P5 presentation 21.06.2023

Stein Johansen

AR3AD100 advanced housing design 2023



International House, University of NSW, Sydney, Australia. Own drawing.

*“What may be lacking in terms of individual comfort will be provided—just as in a high-end hotel
—through shared luxury.”*

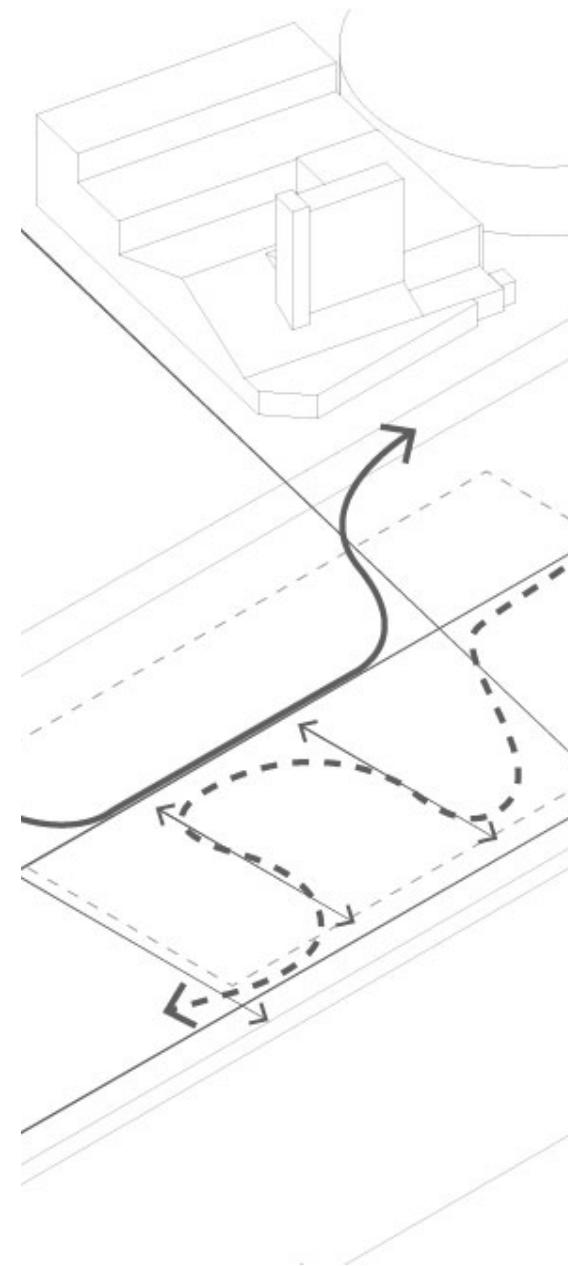
- Founders, Kraftwerk 1, (Zurich Housing Cooperative)

motivation.

presentation overview.



1
Research



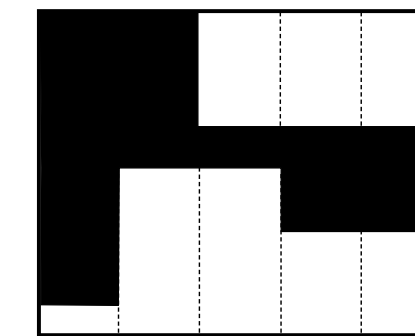
2
Site & Masterplan



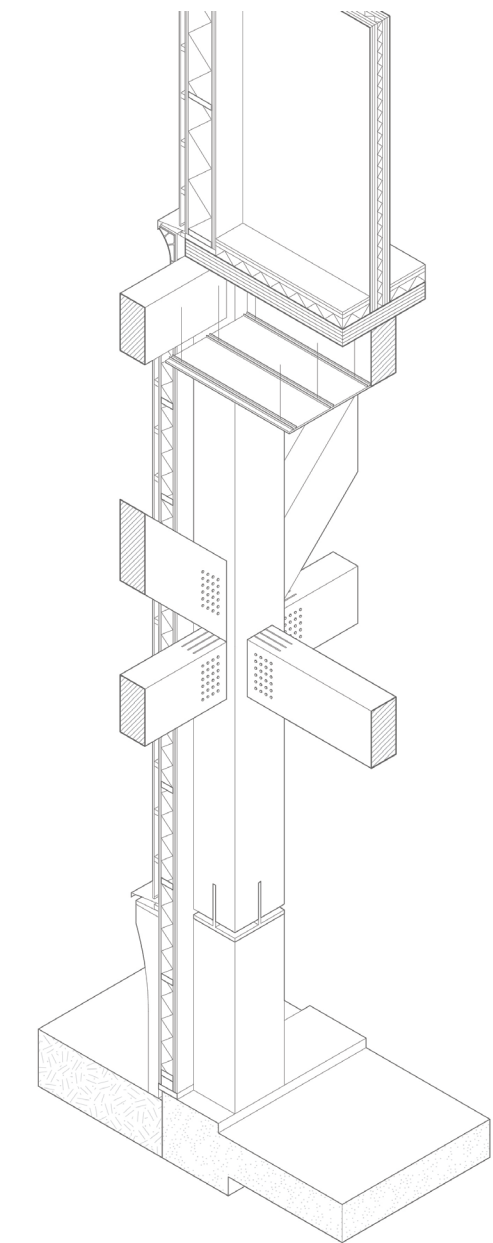
3
Urban Response



4
Architecture



5
Typologies



6
Building Technology

Context:
Research Problems

“In an individualized society, with atomized family structures and an increasing number of singles, many people find themselves alone at some point [...] while living alone and feeling loneliness is not the same, many people do experience a serious decline in physical and mental health due to loneliness.”

Hauderowicz, Dominique, Kristian Ly Serena: “Who are the elderly? An introduction to ageing,”
in: *Age-Inclusive Public Space*, Hauderowicz, Ly Serena (ed.). Berlin: Hatje Cantz, 2020. 8.

Demographic shifts (demand)

Changing household compositions; fragmentation of the household unit, leading to social isolation and new spatial needs

Ageing population

Increase in solo dwellers

Diminishing of the nuclear family structure

“Trends show growing residualization of social housing, through reducing its accessibility to a small part of the population. This is triggered by a decline in public expenditures for housing subsidies and by a general state withdrawal from public housing. [...] Housing was affected by the wholesale dismantling of basic institutional welfare, and the mobilization of a range of policies intended to extend market discipline, competition and commodification.”

Balmer, Ivo, Jean-David Gerber: “Why are housing cooperatives successful? Insights from Swiss affordable housing policy,” *Housing Studies* vol. 33, no. 3 (2018) 361–85.

Housing (in)affordability (supply):

Lack of access to appropriate, affordable housing

Dismantling of social housing sector

Housing prices outnumber inflation

Buyers and renters priced out of market

“The artificial distinction between work and reproductive labour has collapsed. The home is not anymore the hallowed place of the reproduction of the family. [The] work we undertake outside the home has now increasingly absorbed some of the characters of reproductive labour: its essentially social nature, its focus on service and interaction, its ‘immaterial’ quality. Reproductive labour is nowhere and everywhere in the city at once. The house becomes a city, the city a house.”

Giudici, Maria S.: “Counter-planning from the kitchen: For a feminist critique of type,” *The Journal of Architecture* vol. 23, no. 7–8 (2018): 1214.

The modern work/life dichotomy:

“We work in our homes and live in our office”

Integration of productive and reproductive realms

Post pandemic reality: working from home

“The functional zoning typical of modern urbanism is no longer self-evident. People’s domestic and professional lives increasingly take place in one and the same domain. They need a different type of city, one that accommodates a wide variety of programmes [that] allow combinations of living, working and care.”

Van Gameren, Dick, Paul Krautenbrouwer and Eireen Scheurs, ed.,
DASH 15. Huis Werk Stad: wonen en werken in het stedelijk bouwblok. Delft: TU Delft, 2019

The new mixed-use city

Integration of living and working environments

Urban design

“The building sector represents 40 per cent of Europe’s energy demand, 80 per cent of it from fossil fuels. This makes the sector an area for immediate action, investment, and policies to promote short and long-term energy security”

UN Climate Goals: <https://www.unep.org/news-and-stories/press-release/co2-emissions-buildings-and-construction-hit-new-high-leaving-sector>

Climate crisis

Reduce impact

Construction & operational impact

Climate adaptable designs

Research Questions

Three scales:

Urban Response

How can port cities facilitate inclusive urbanism that enables the coexistence of living and working?

Building Level

How can collaborative housing and shared space expand the concept of domesticity?

10

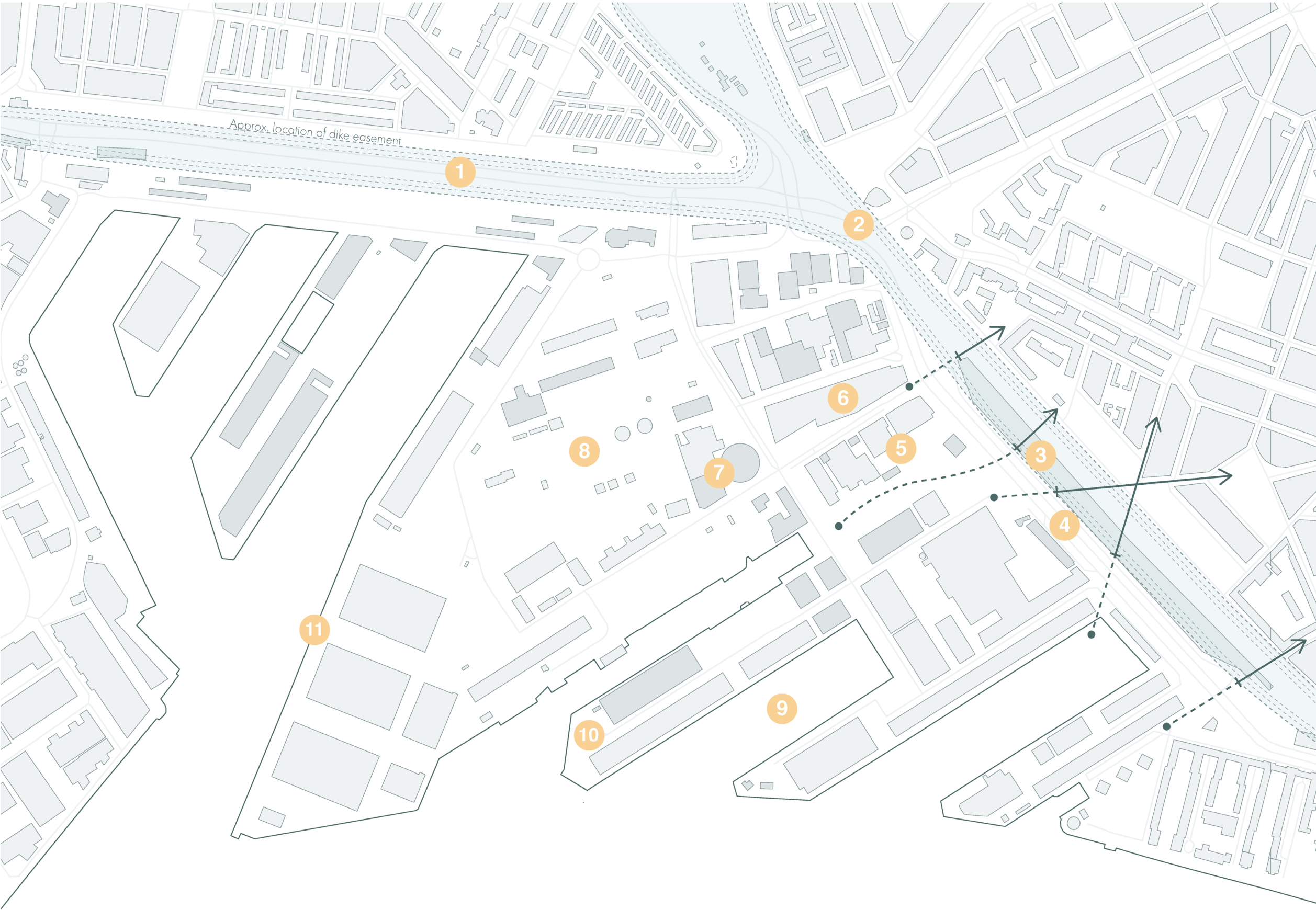
Dwelling Design

How can dwelling types respond to new household types and changing work patterns?

=

New Urban Mix

Observations - Morphological Constraints & Opportunities



- 1 Dike, road and rail infrastructure presents permanent physical barrier to existing residential area.
- 2 Multiple layers of transport infrastructure, primarily roadways, create physical barrier between M4H and Marconiplein.
- 3 Shopping centre and Dakpark along Vierhavensstraat creates strong, impermeable street wall, blocking access between existing residential areas and M4H. Possible future connections between the urban tissues are implied by existing landscape design.
- 4 Multi-lane road with very few crossings presents barrier between shopping centre and M4H. Opportunity to create a strong street wall along Vierhavensstraat to establish identity for M4H precinct.
- 5 Diverse mix of existing buildings provide inspiration for future mixes of buildings in bulk and character.
- 6 Existing warehouses prevents through-block permeability.
- 7 Heritage overlays presents limitations to developments and an opportunity for integration of significant structures to retain the physical character of the place. Monumental buildings are an opportunity for placemaking and wayfinding.
- 8 Significant vacant space exists between existing structures.
- 9 Bodies of water acts as a key constraint in the future development. It provides a natural framework for the new urban tissue, and opportunities to incorporate water into new open spaces and built developments. Accessibility between blocks are constrained as direct physical links do not exist between wharfs.
- 10 Ends of finger wharfs contain residual vacant spaces currently used for vehicle turnaround or distribution purposes. Opportunities to create public open spaces.
- 11 Opportunity for retention and restoration of existing quays to provide accessible open space and incorporate historical structures in new development.



Methodology

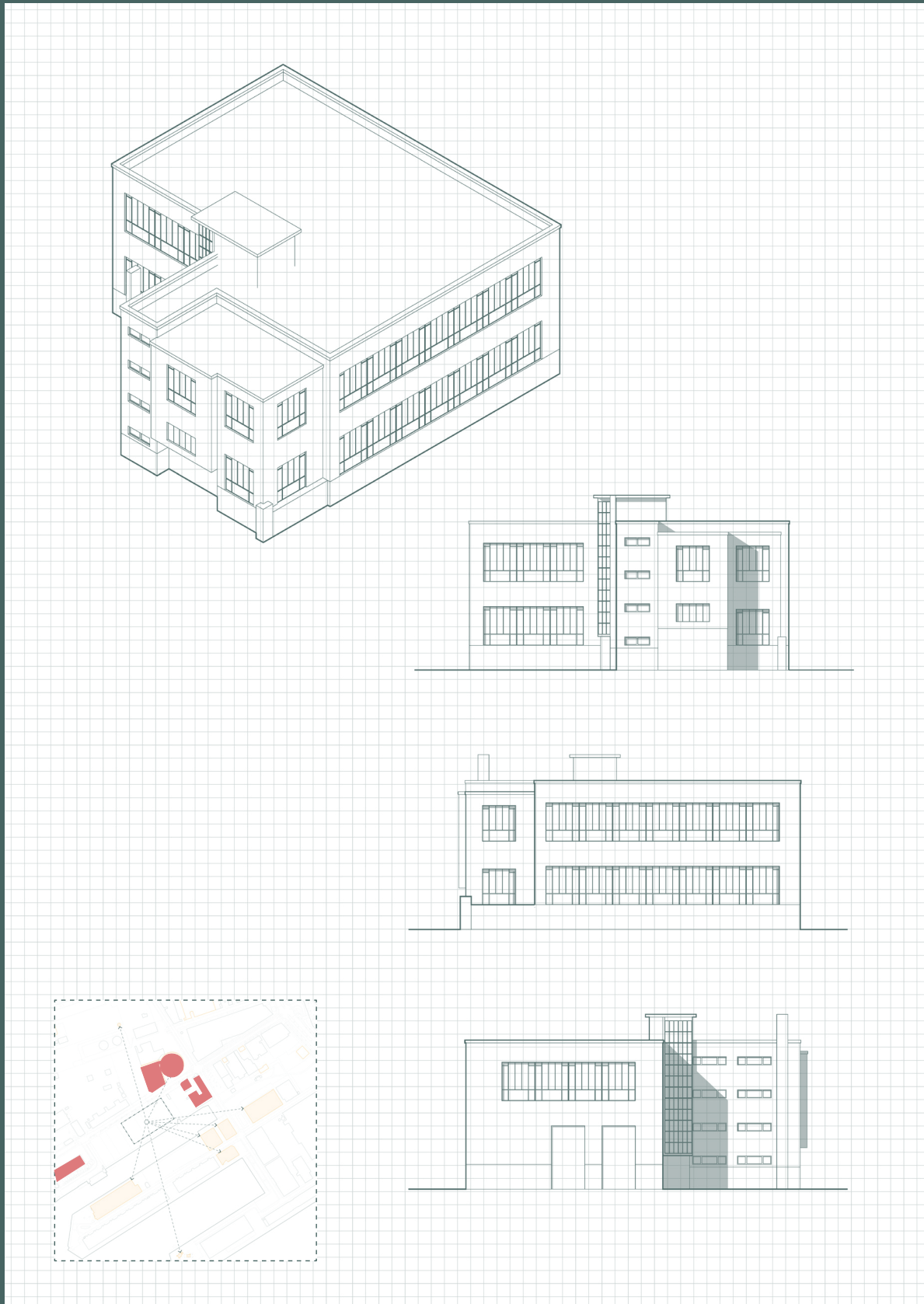
Site analysis

Site visit + SWOT study + photography, interviews

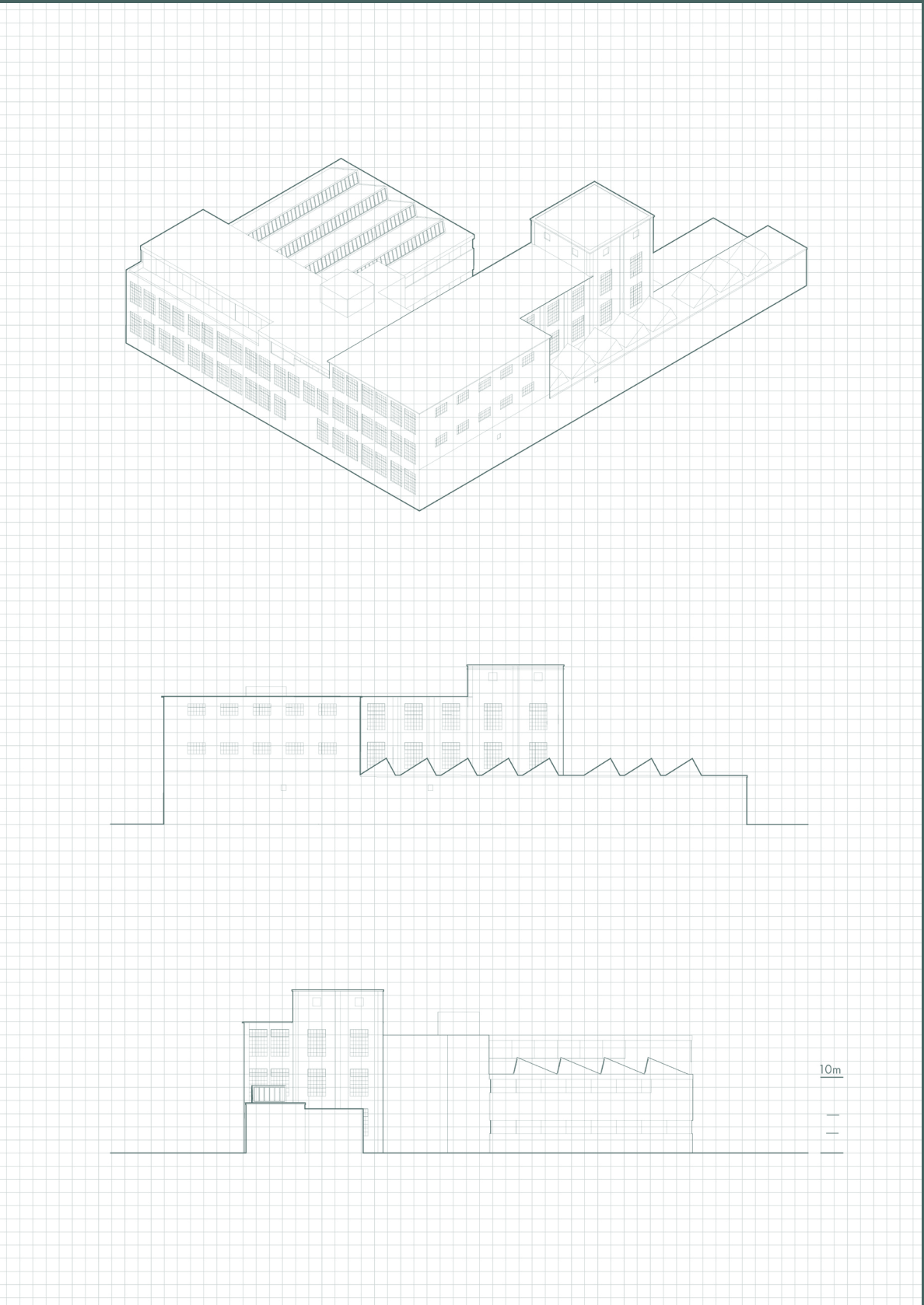
SWOT analysis

Site context

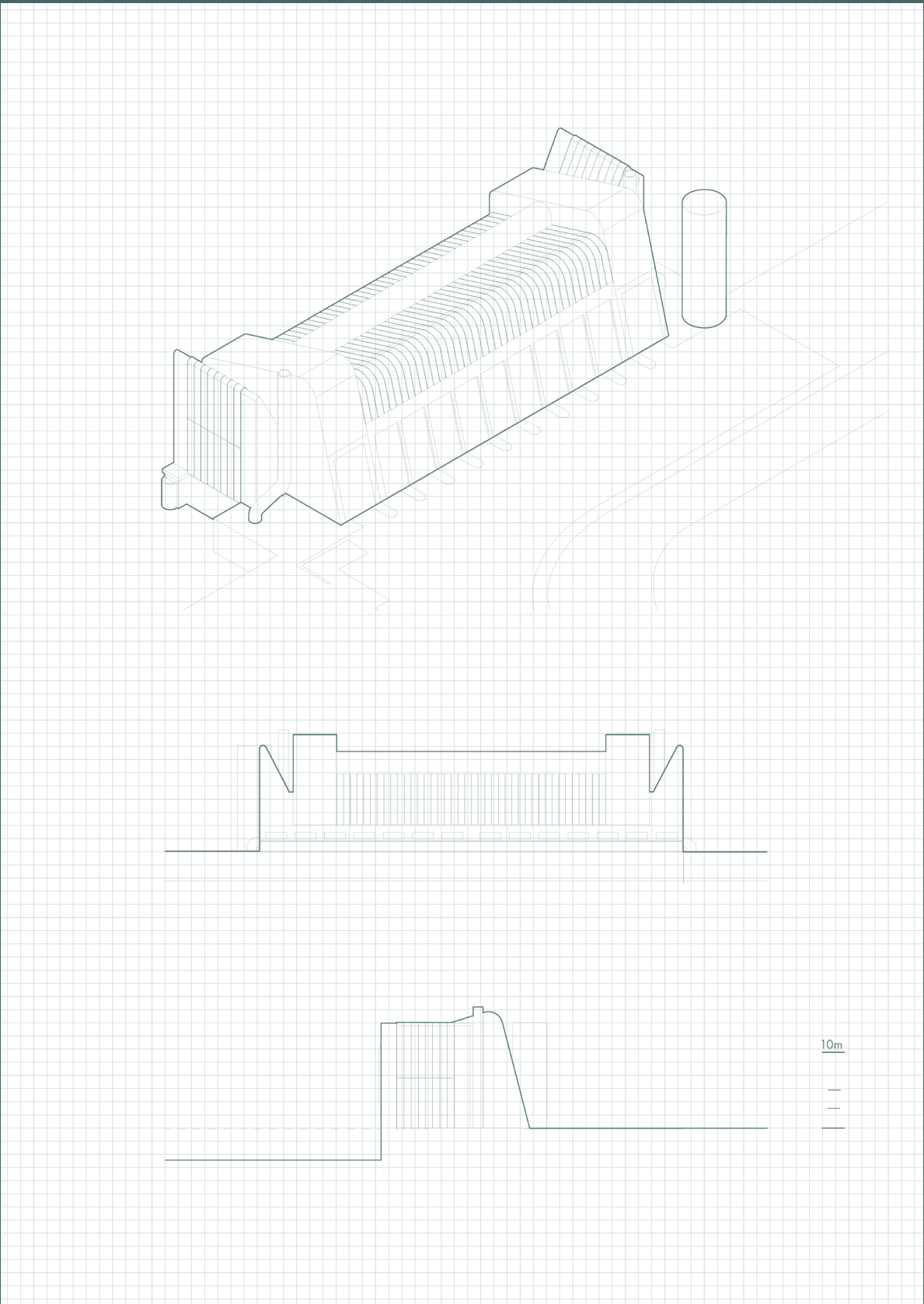
Research



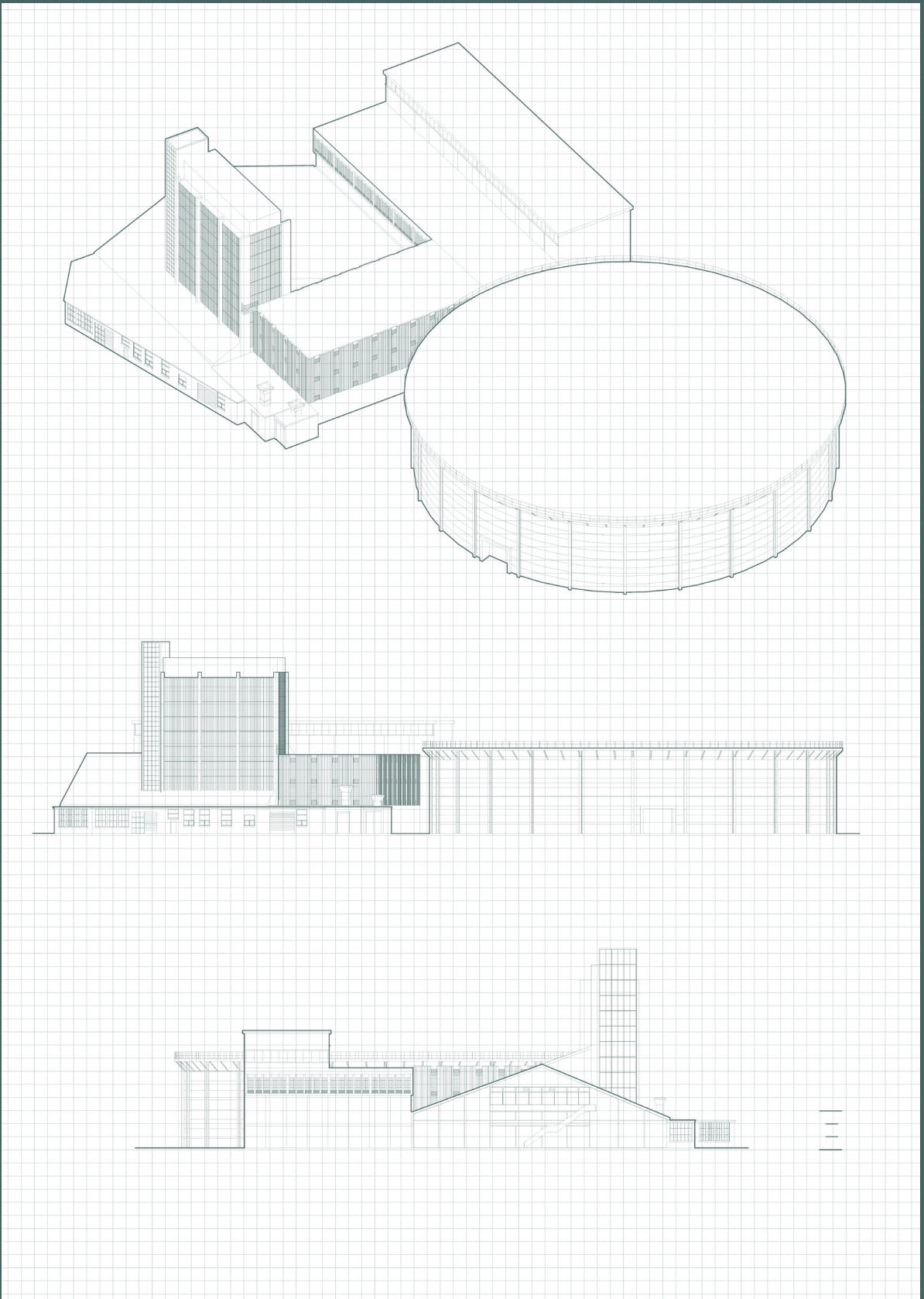
Kunst & Complex



Kunst & Complex



Milieupark Delfshaven

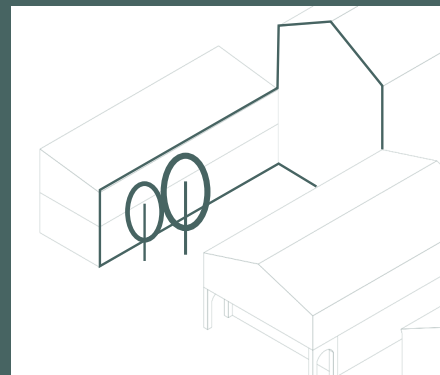
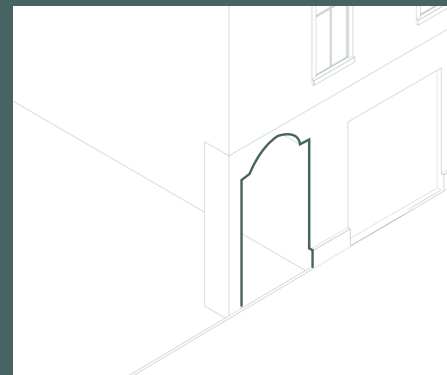
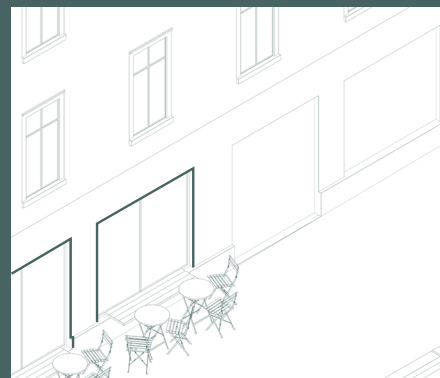
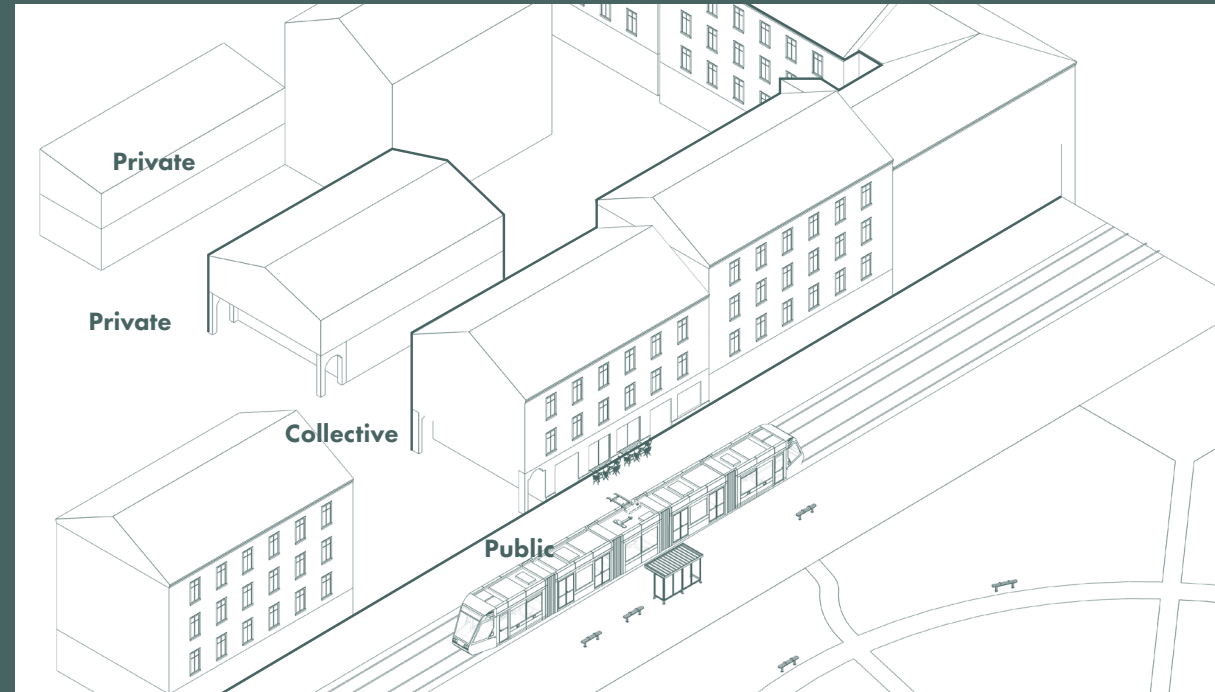


Former Ferro Factory

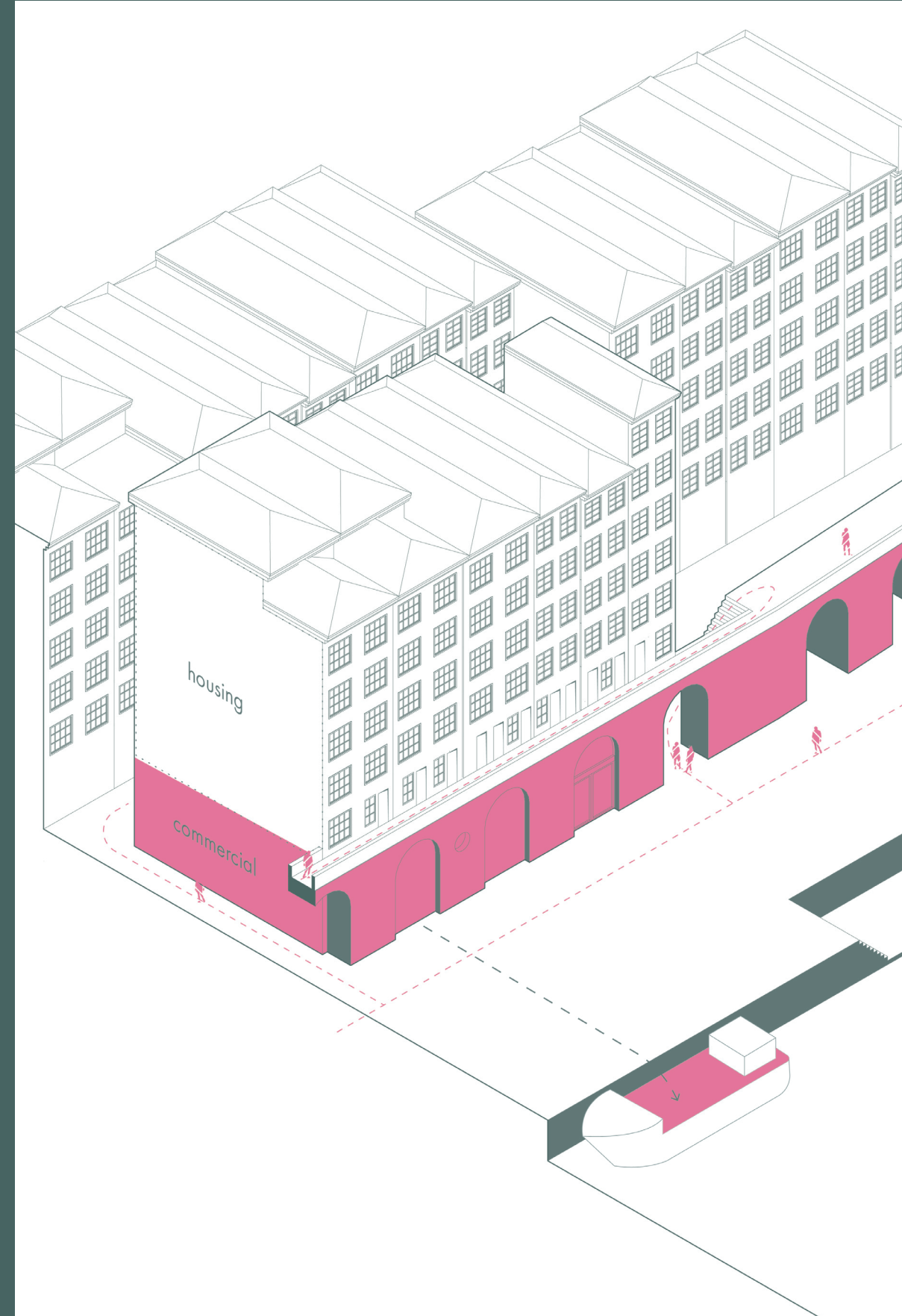
Methodology

Site documentation

Morphological study



Spatial sequences in the traditional urban block



Traditional Merchants housing, Porto, Portugal

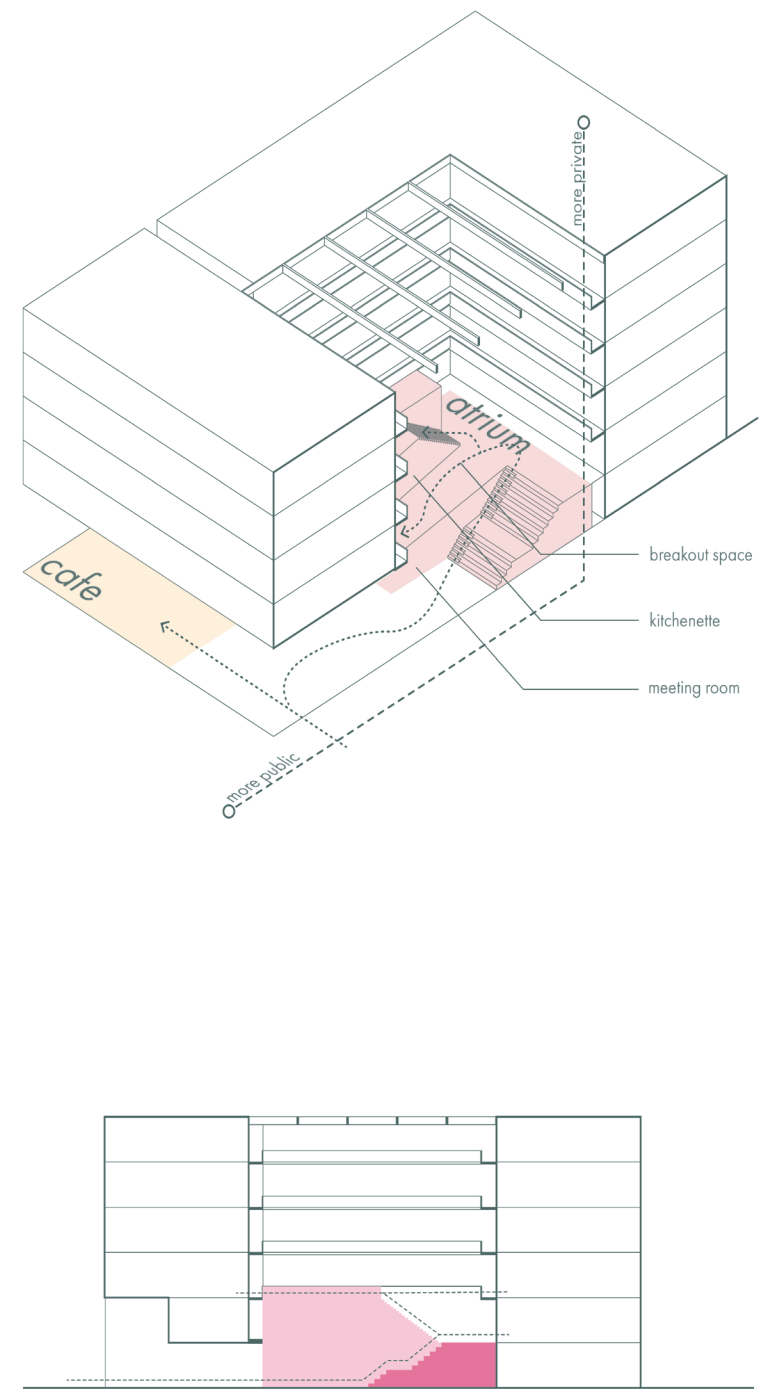


The Boompjes, Rotterdam (Above)
Traditional Dutch weavers houses (Below)

Methodology

Mixed-use city

History/theory study & observational studies



NEXT Delft



Faculty IDE, TU Delft



Faculty Civil Engineering, TU Delft

Methodology

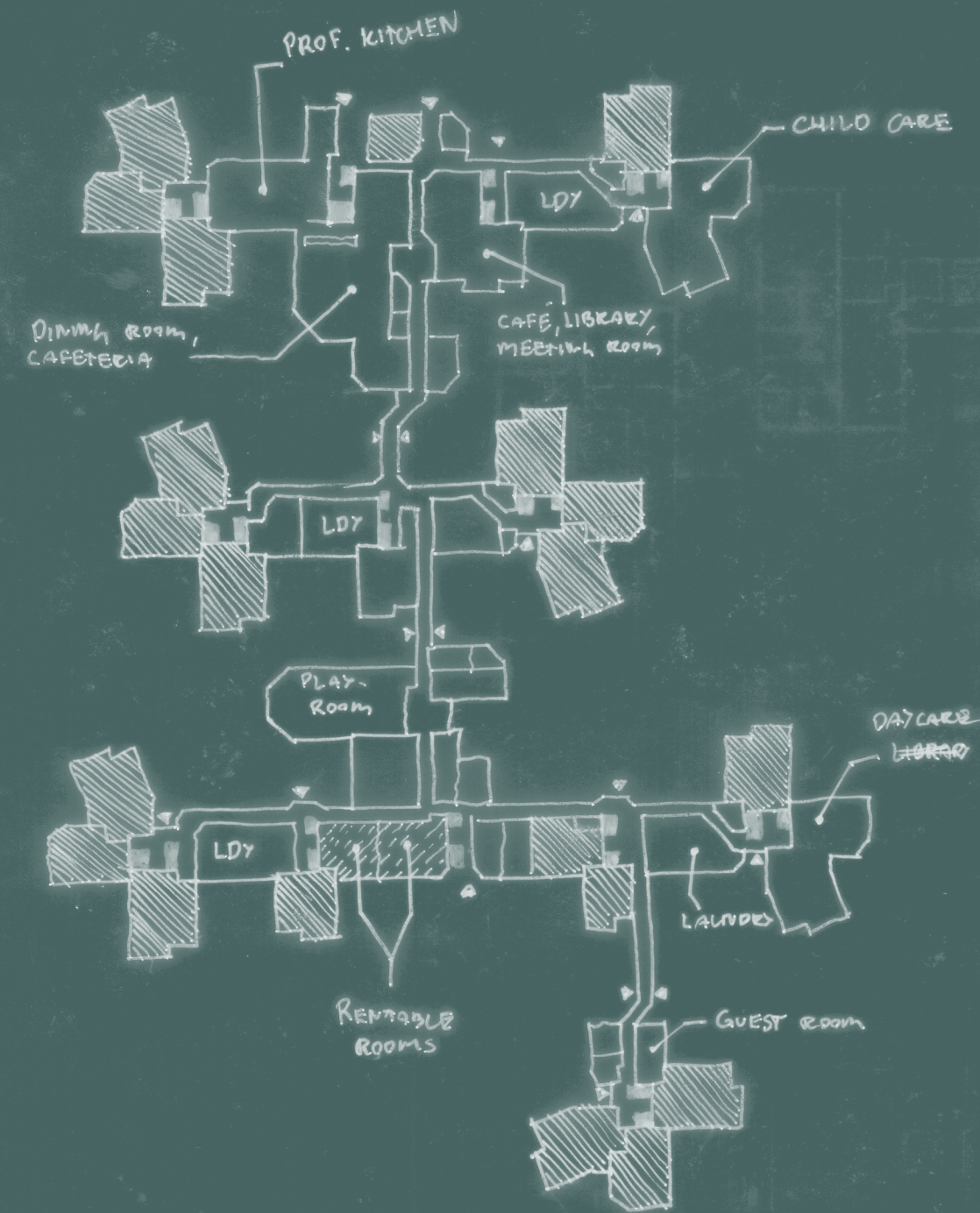
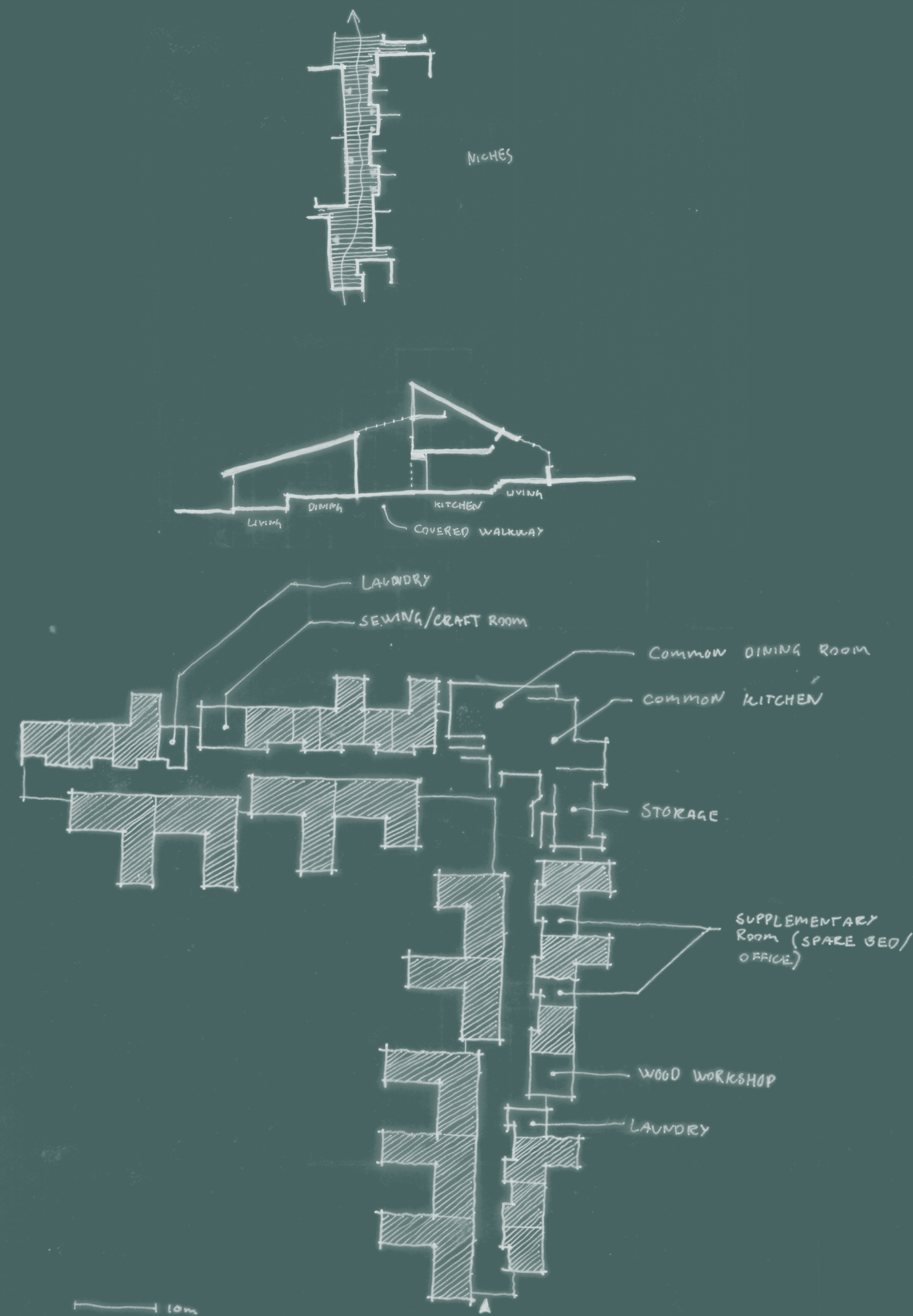
Maker spaces

Site visit + architectural case study

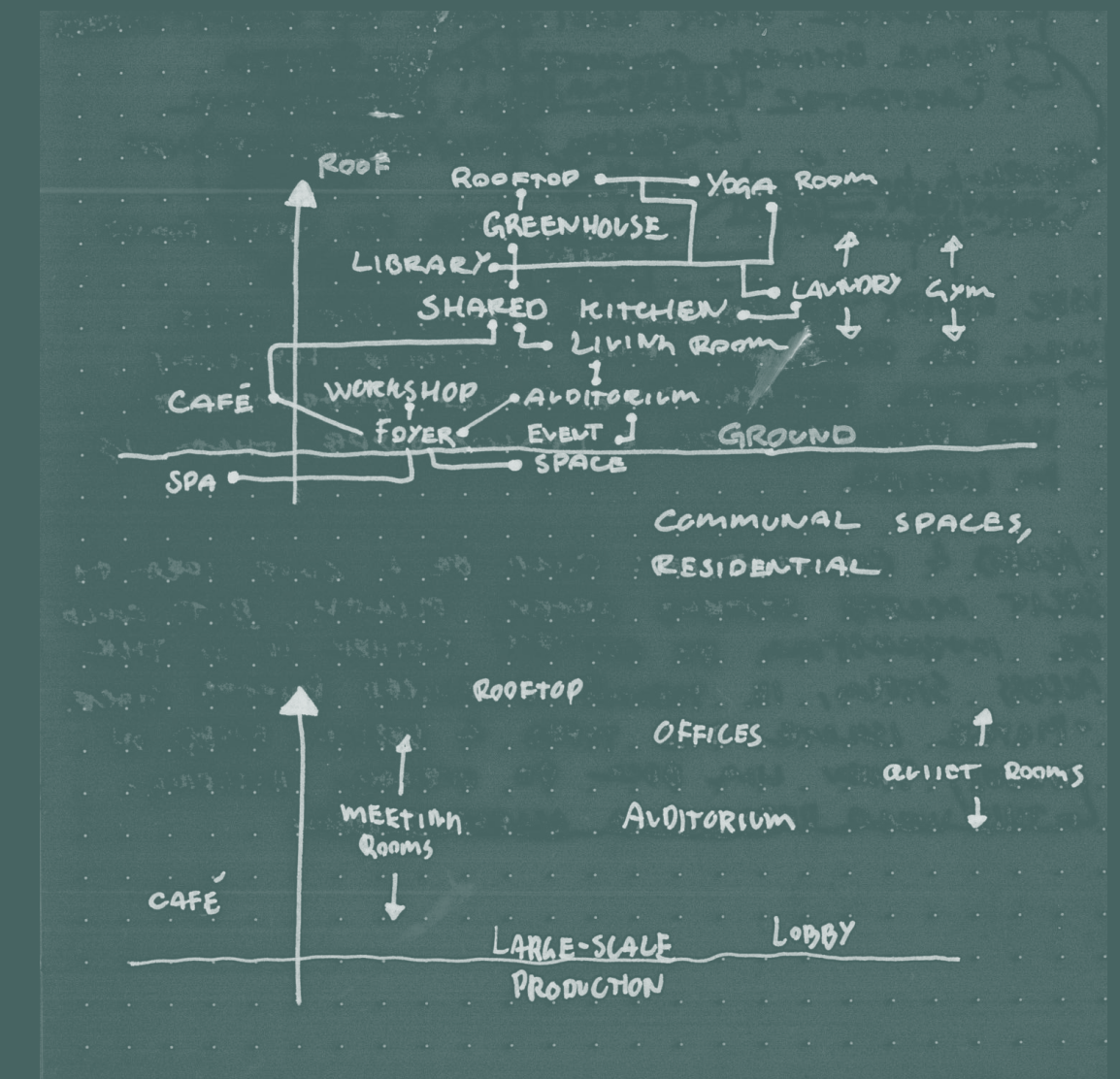
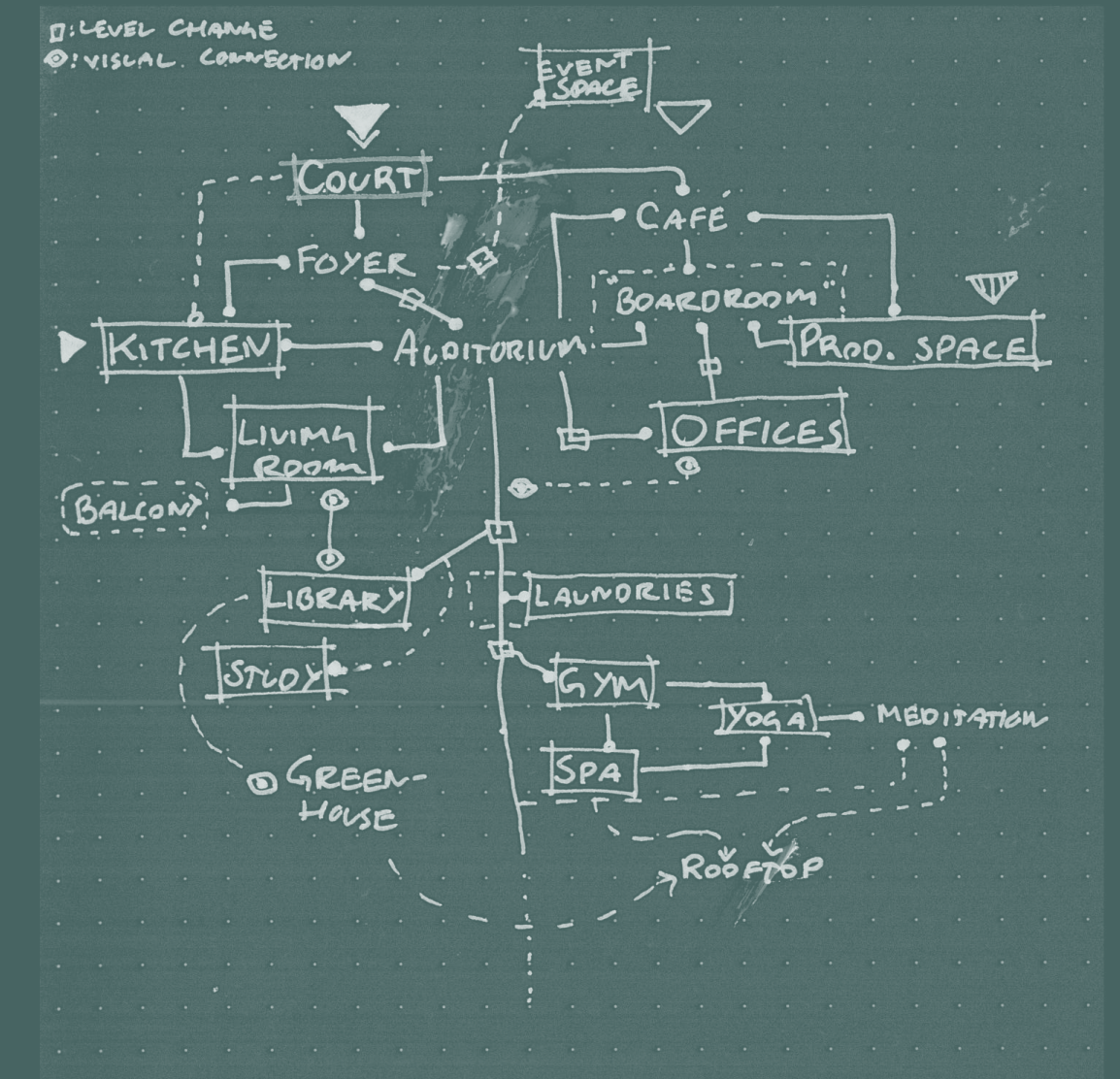
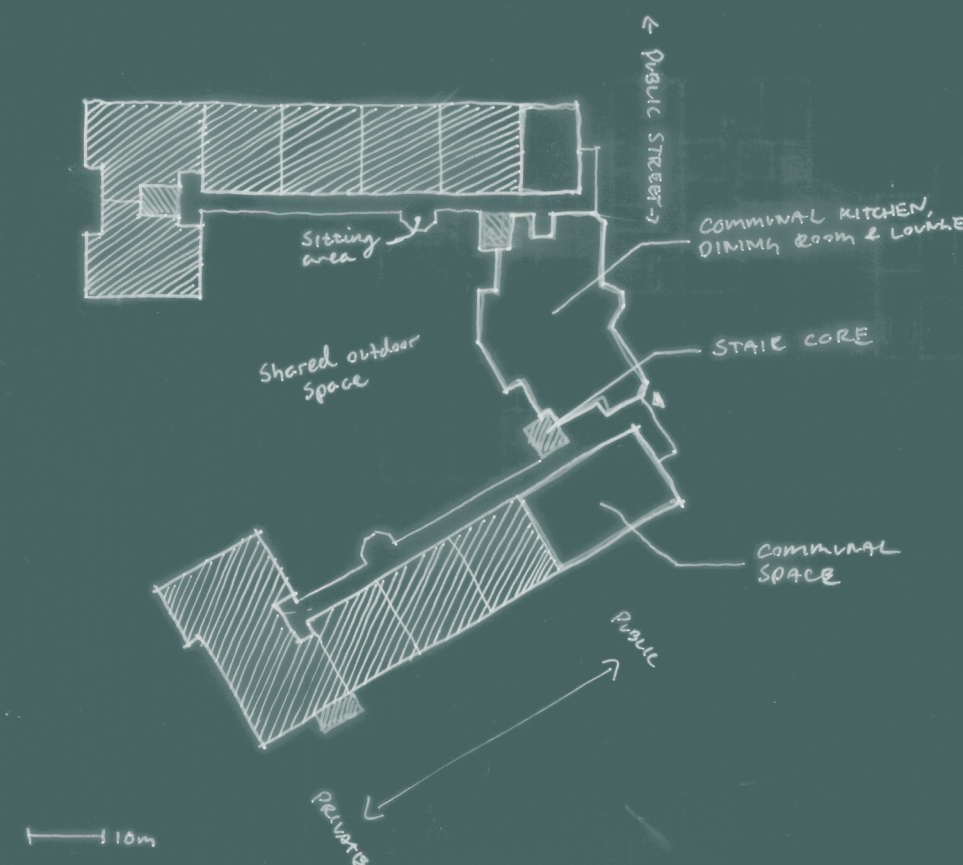
Methodology

Co-Housing & Cooperatives

Typological studies, scandinavian co-housing



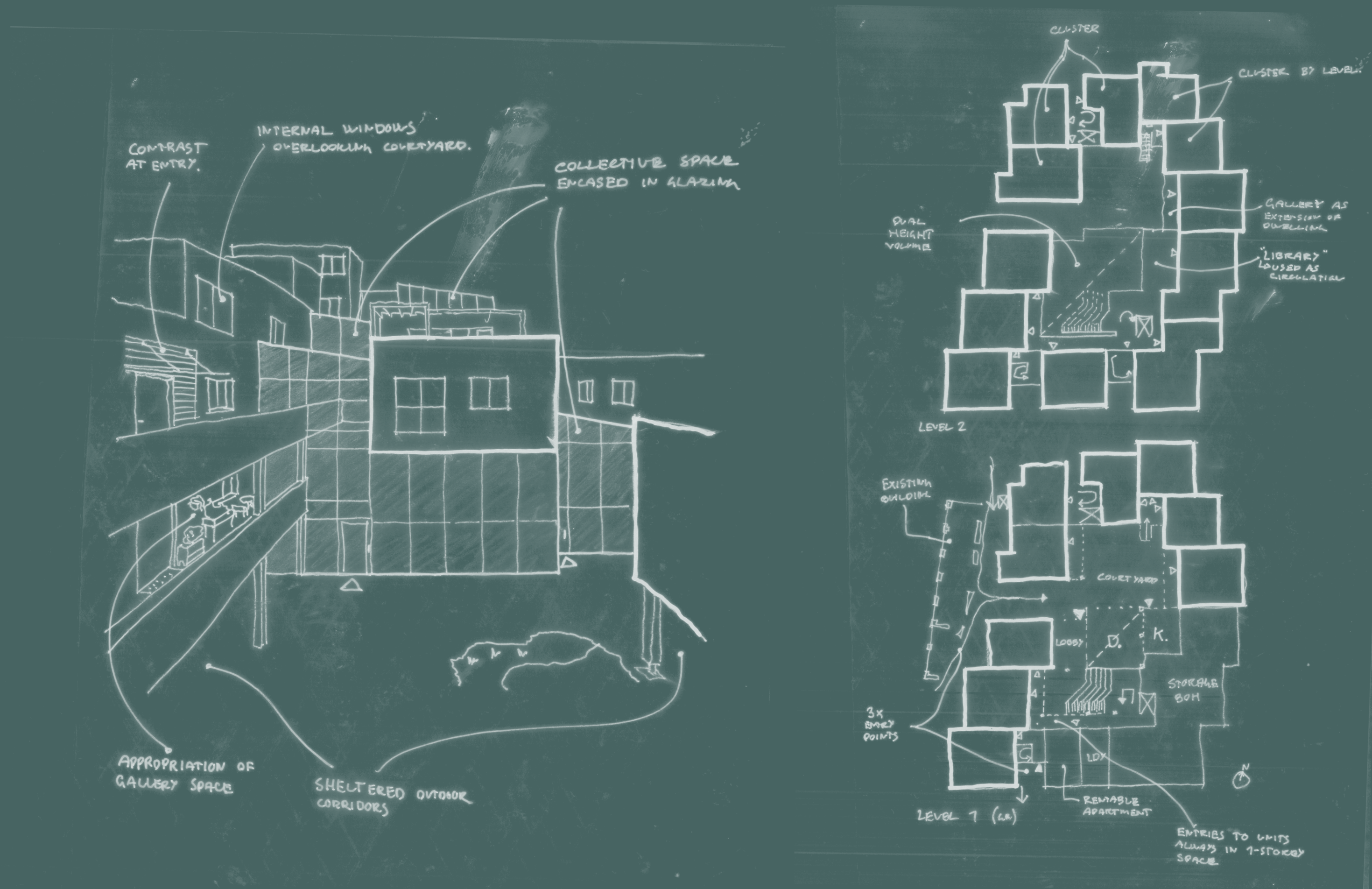
"RAINBOW", SWEDEN, 1984
COLLECTIVE HOUSE



Research

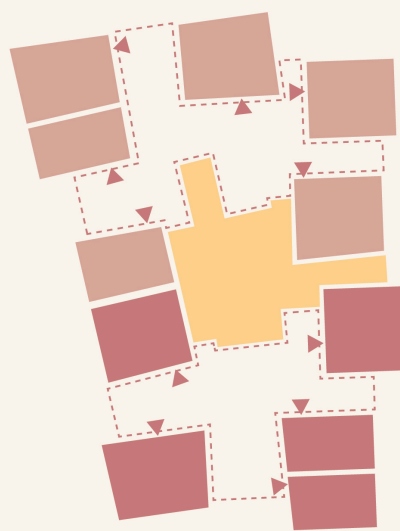
Co-Housing & Cooperatives

Typological case studies, scandinavian co-housing





Ground level: Collective spaces



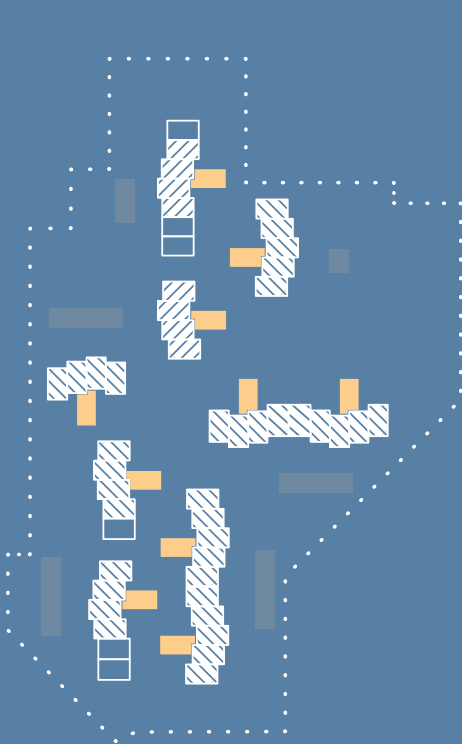
Typical Level: Division of space



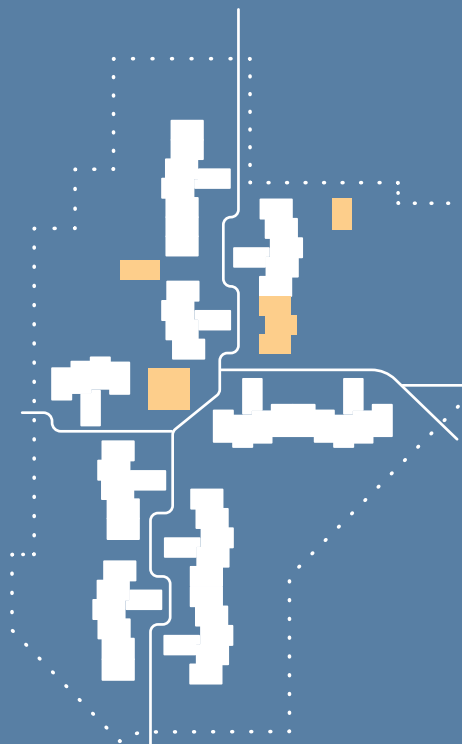
Typical Level



Cluster dwellings: Mehr als Wohnen, Haus A (Duplex Architekten)

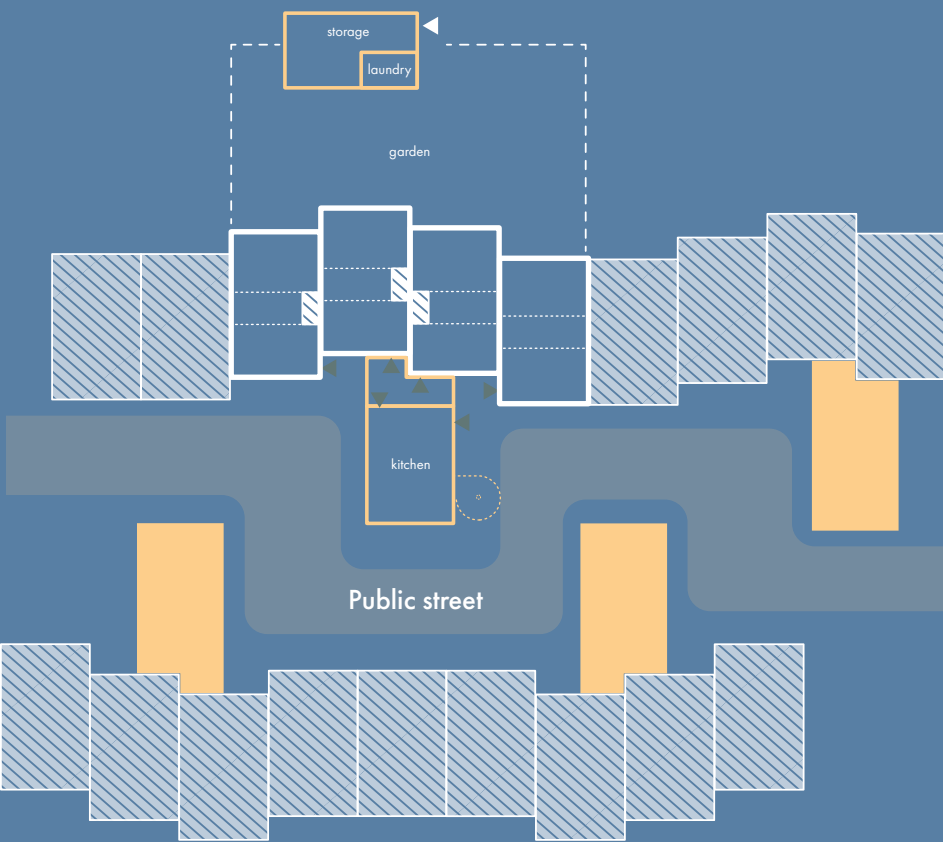


distribution of cluster amenities



distribution of collective spaces

20m



Typical cluster layout

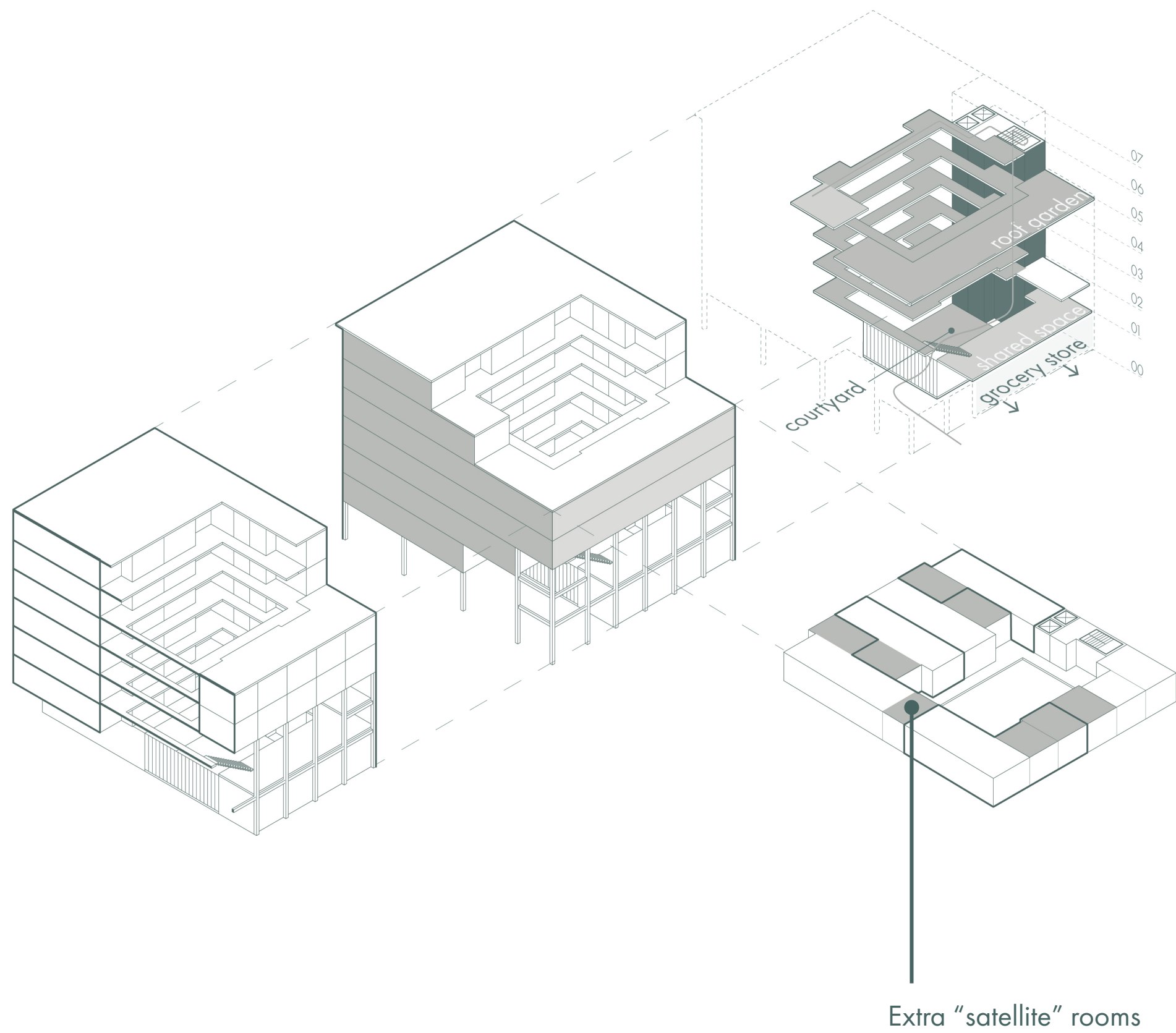
5m

Suburban cluster houses: Hilversumse Meent

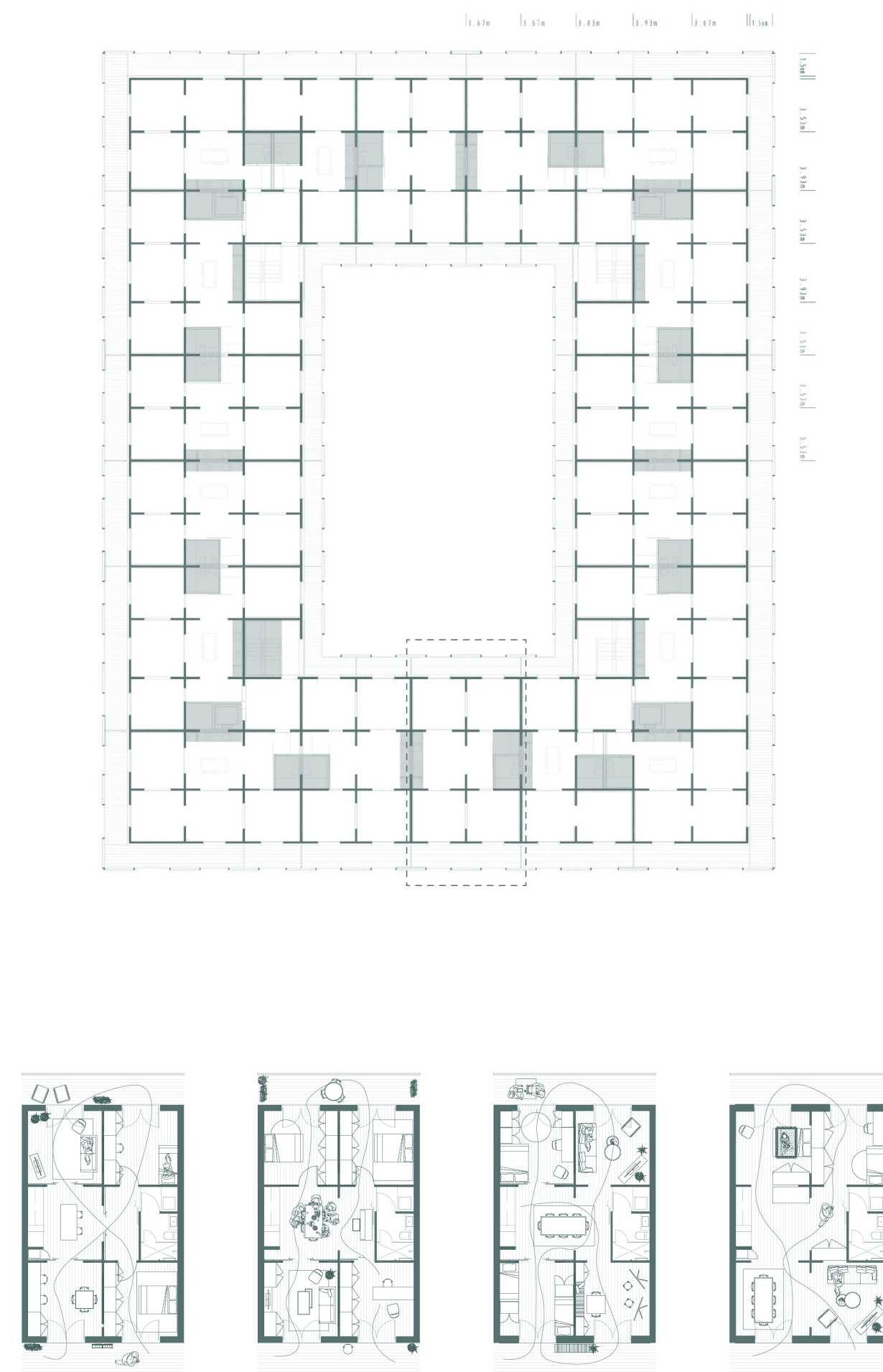
Methodology

Cluster dwellings

Architectural case studies



La Borda - Lacol Architects (Barcelona, Spain, 2019)

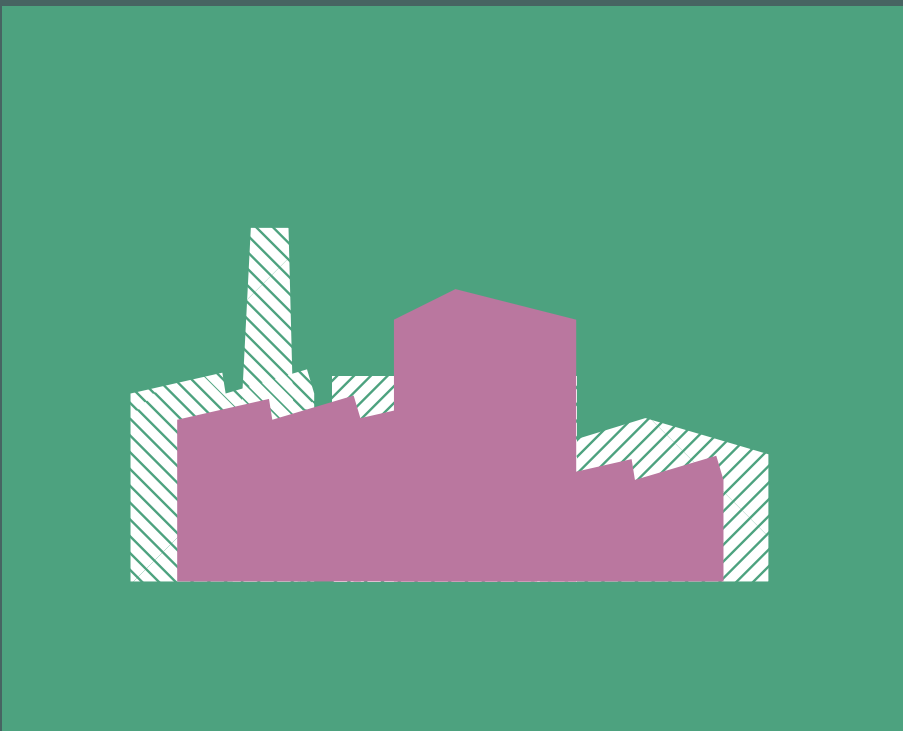
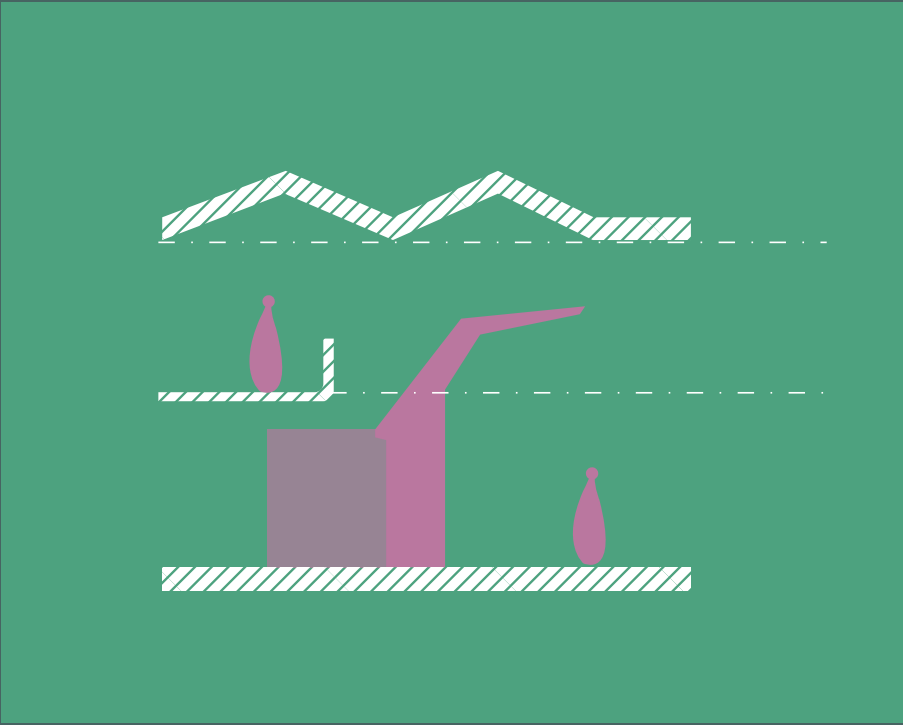
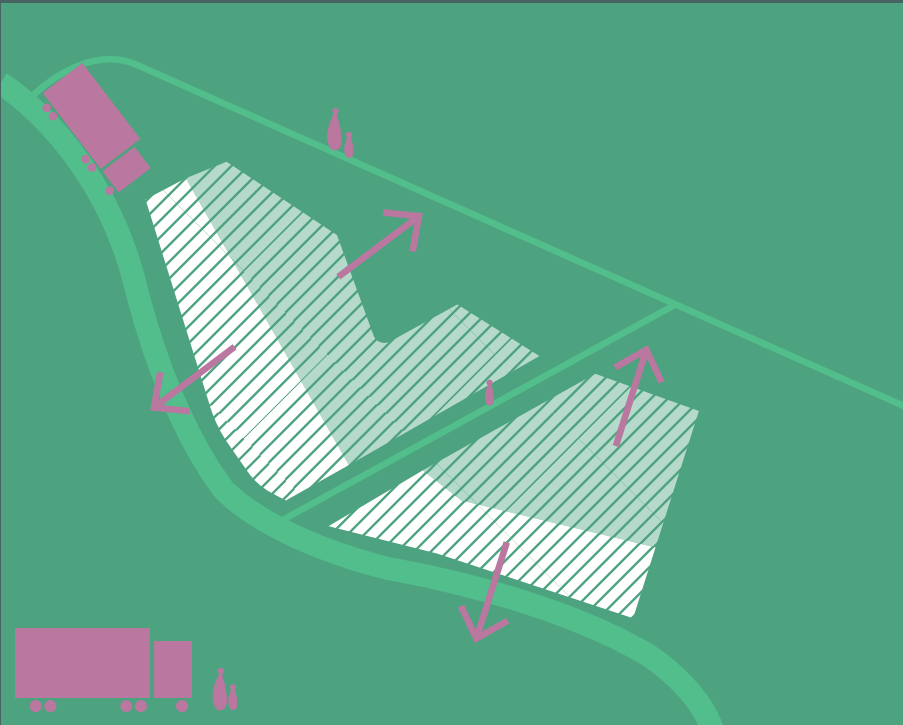
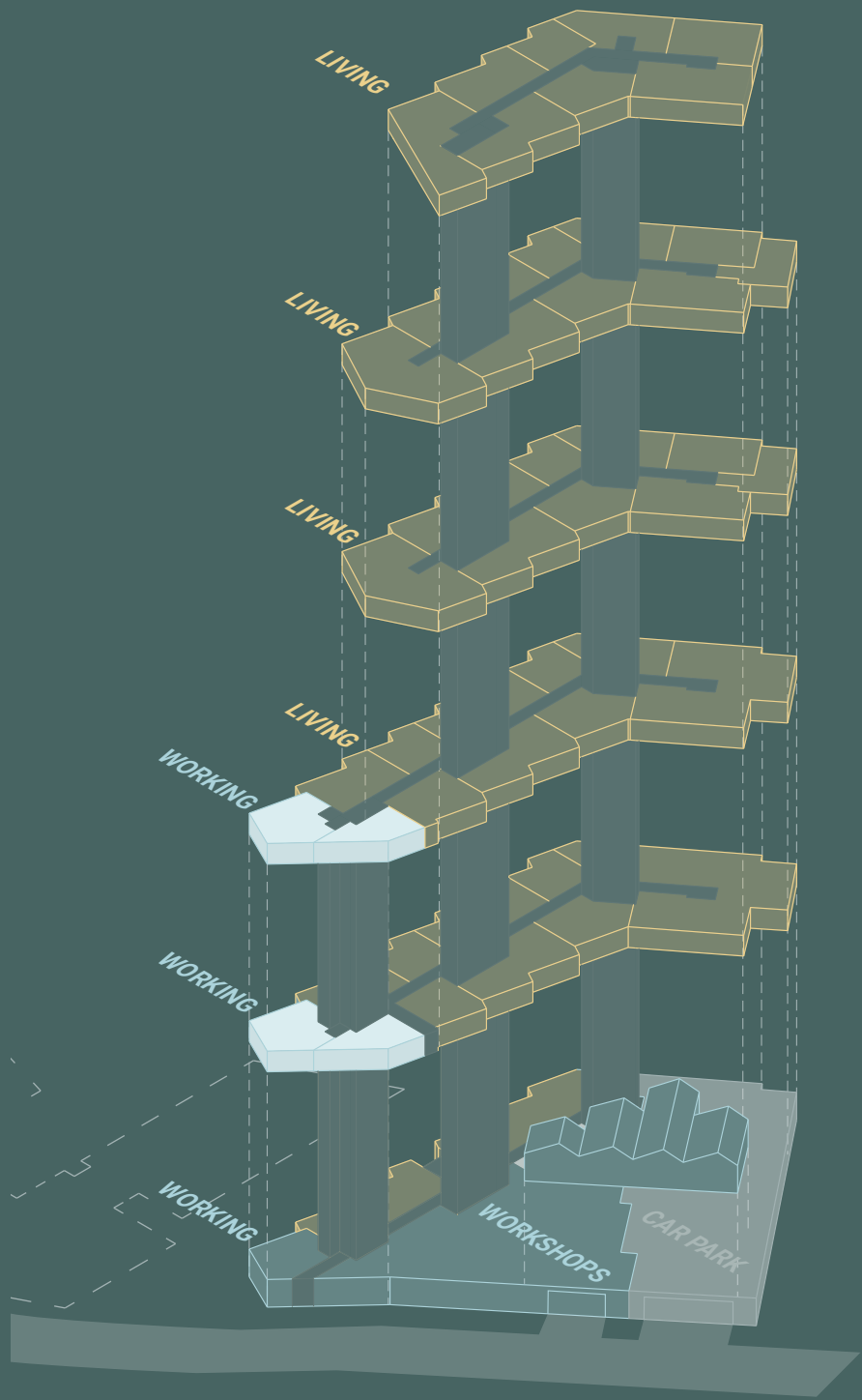
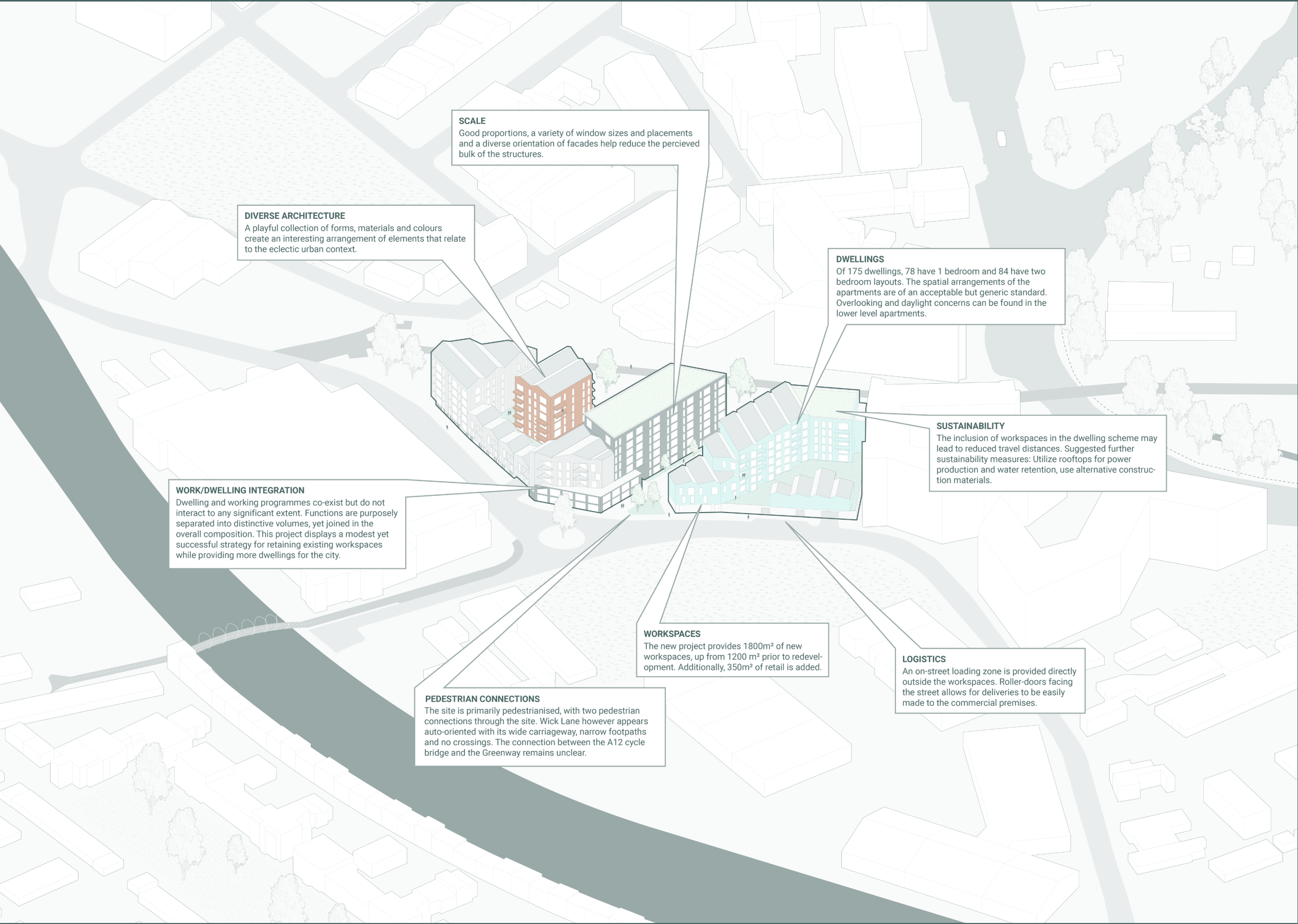


Cornella Social Housing Project - Peris + Toral Architects (Barcelona, Spain, 2021)

Methodology

Spatial flexibility & indeterminate plans

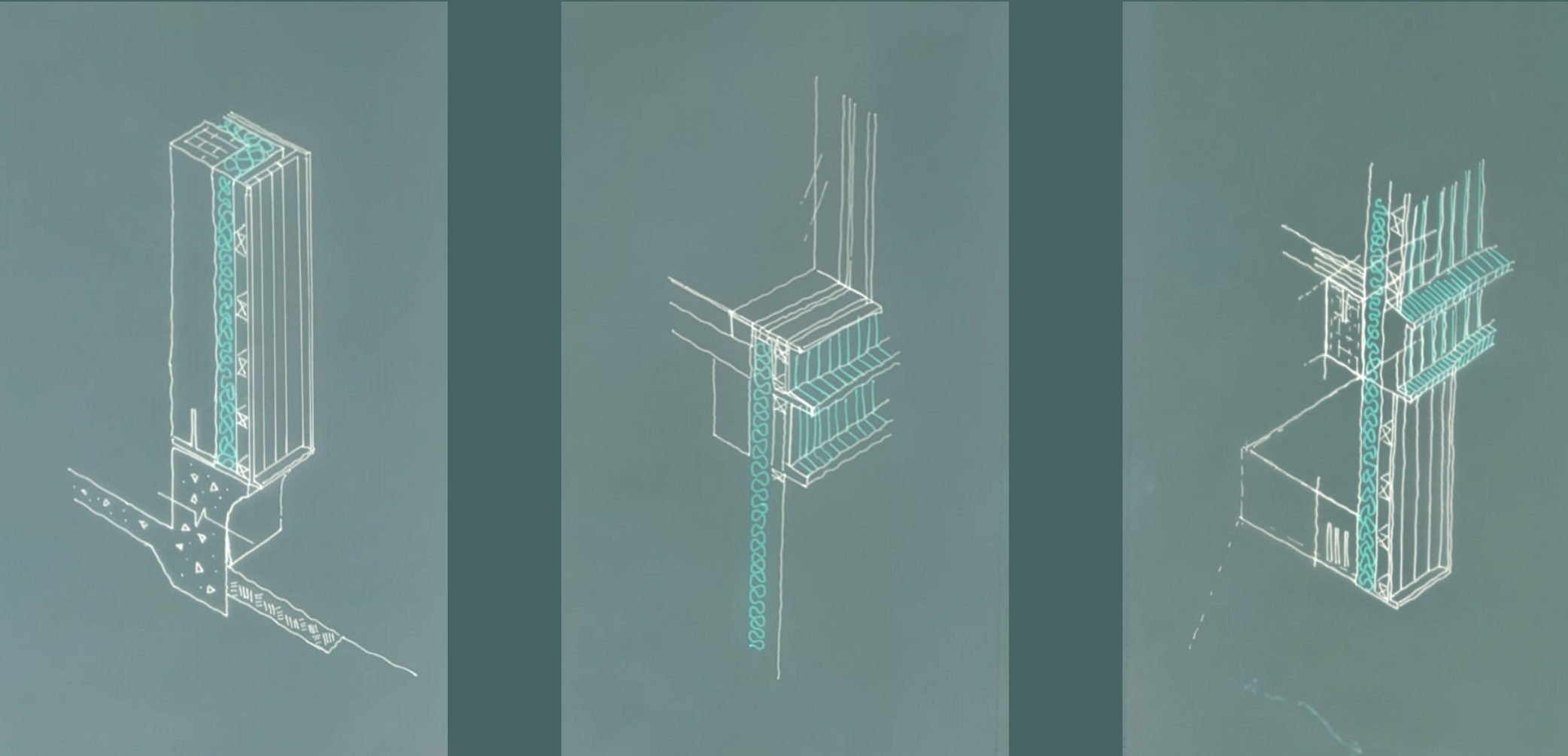
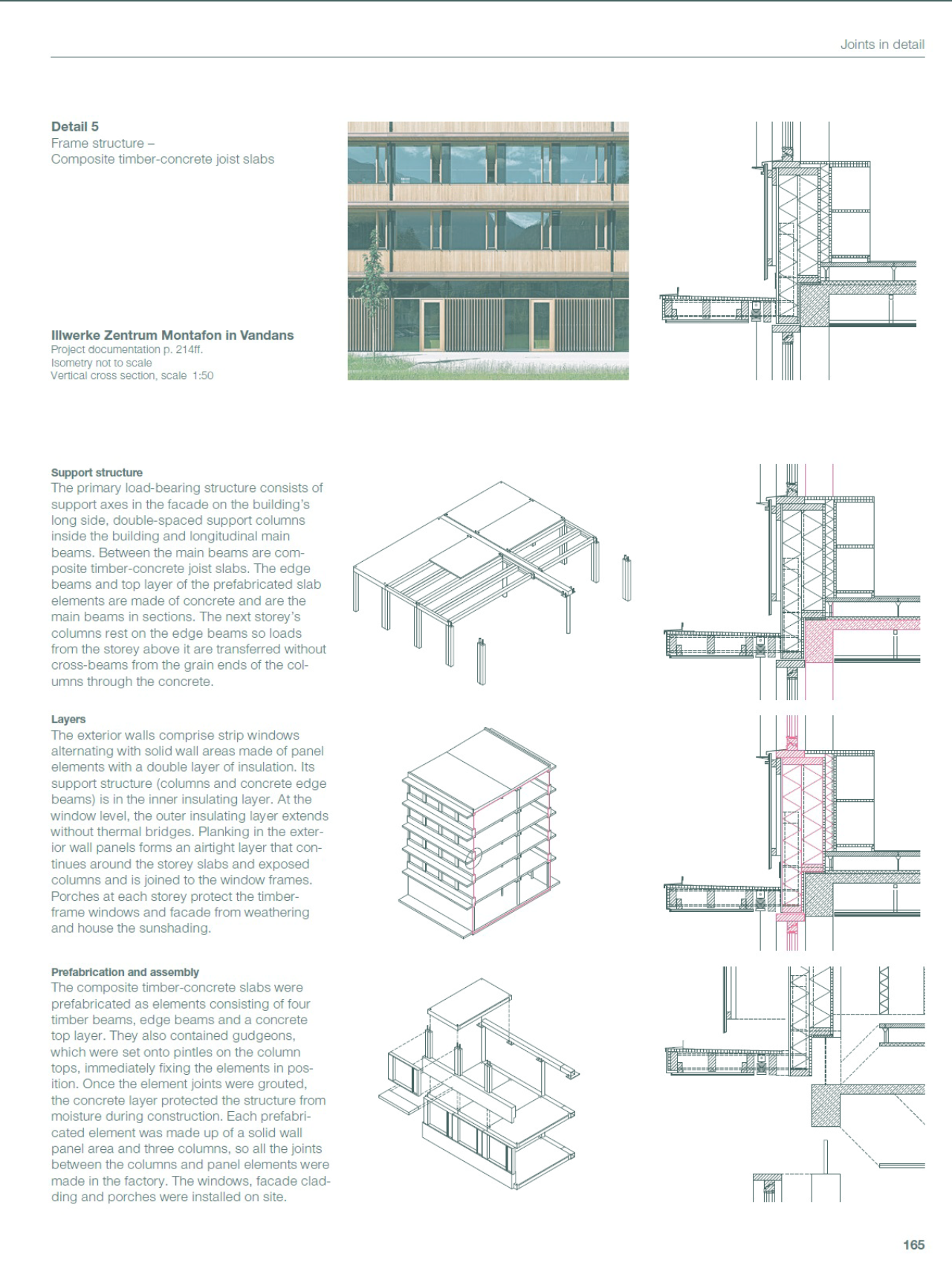
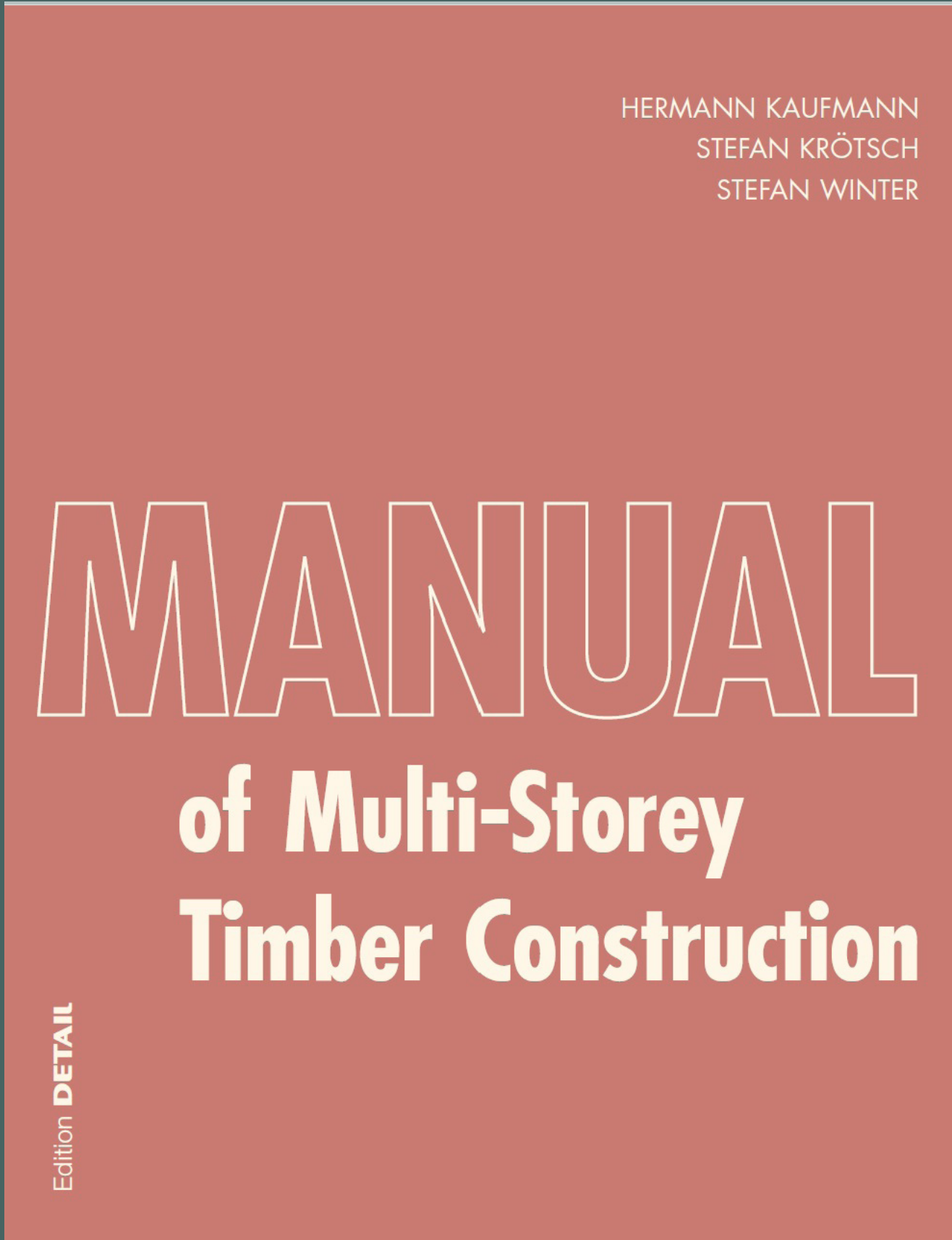
Typological case studies



Methodology

Hybrid buildings & mixed use

Architectural case study



Construction development sketches

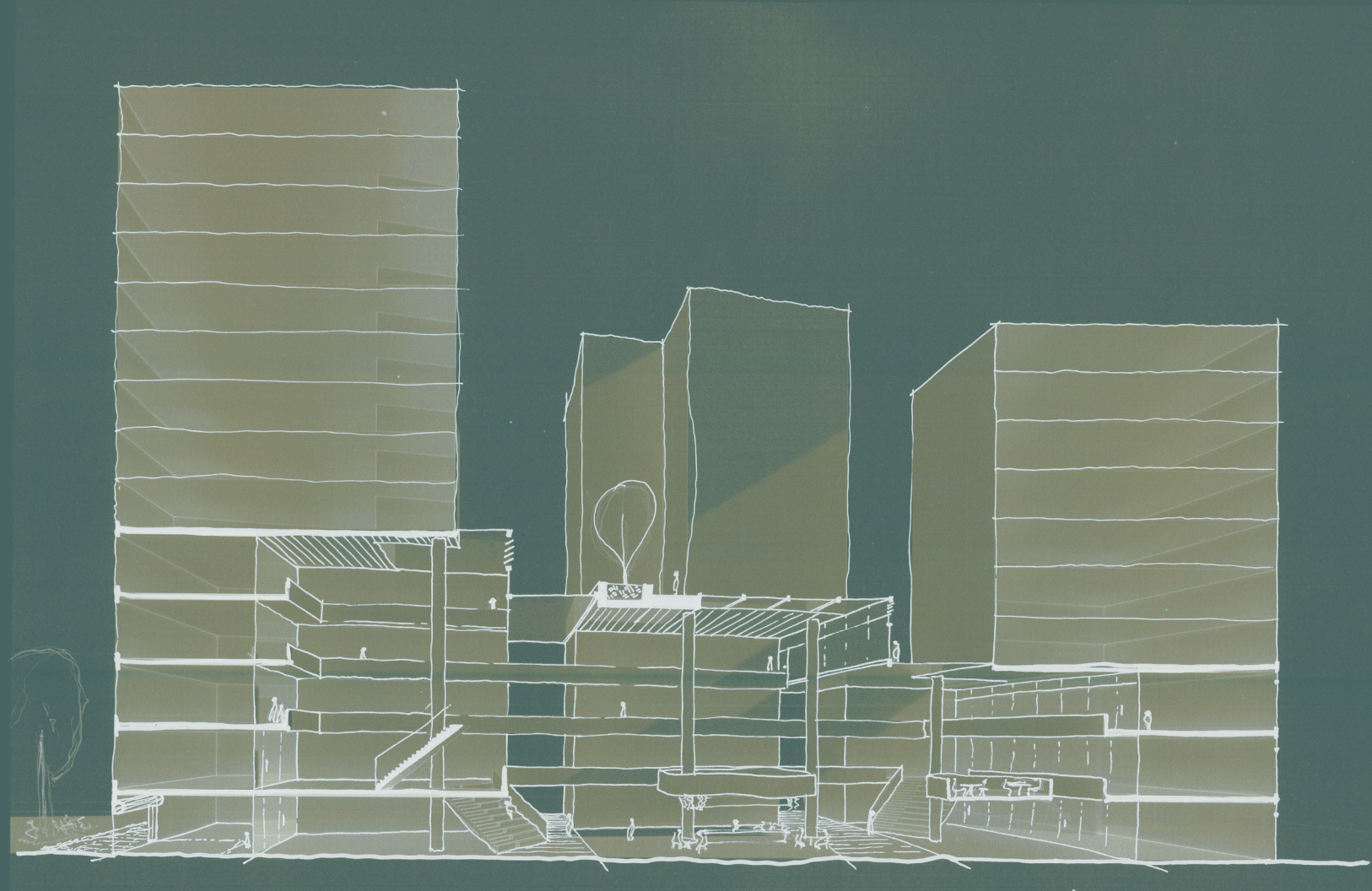
Manual of Multi-Storey Timber Construction - Kaufmann et al. (2018)

Methodology

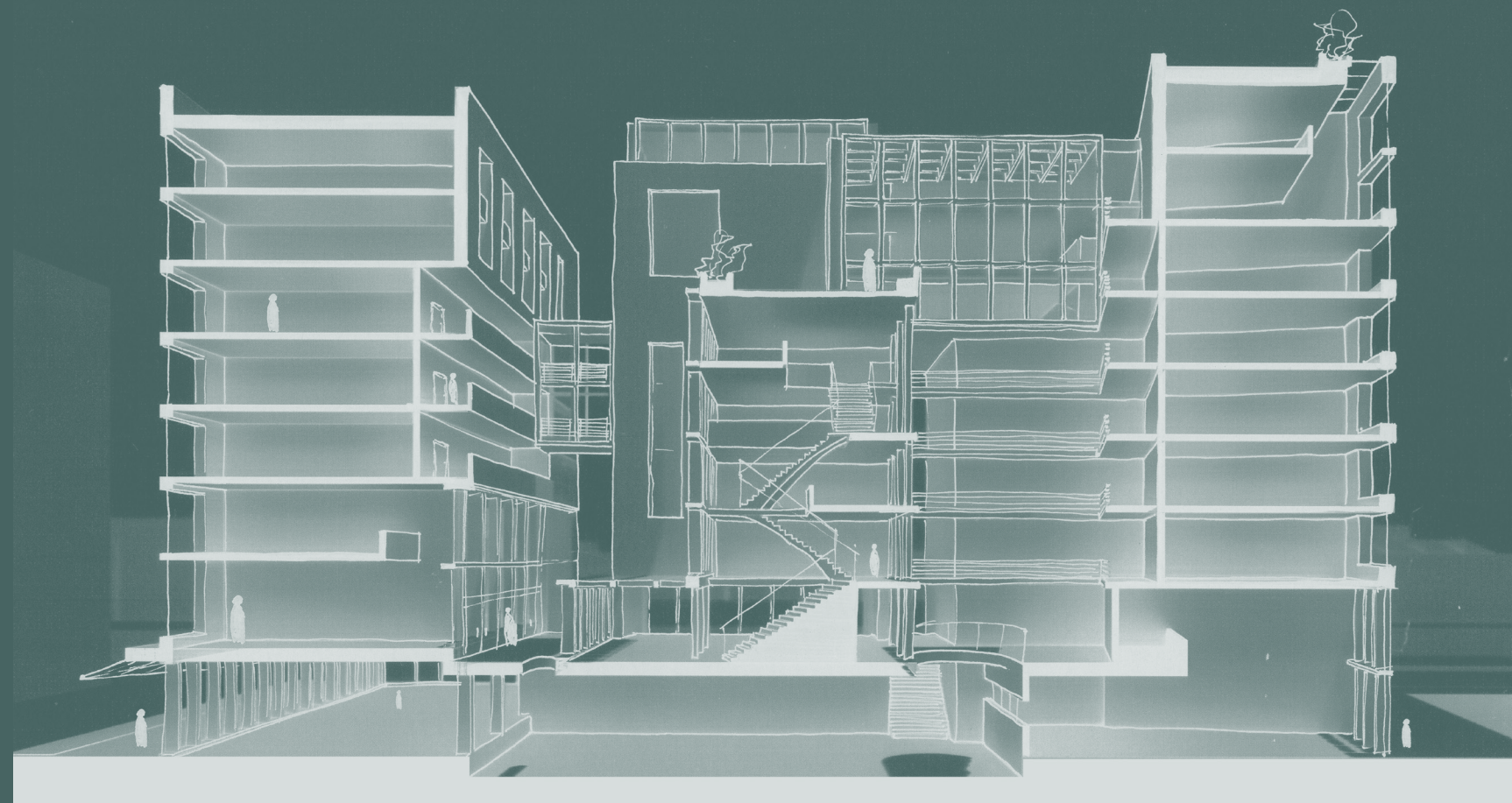
Building Technology

Multi-storey timber construction

Research



P1

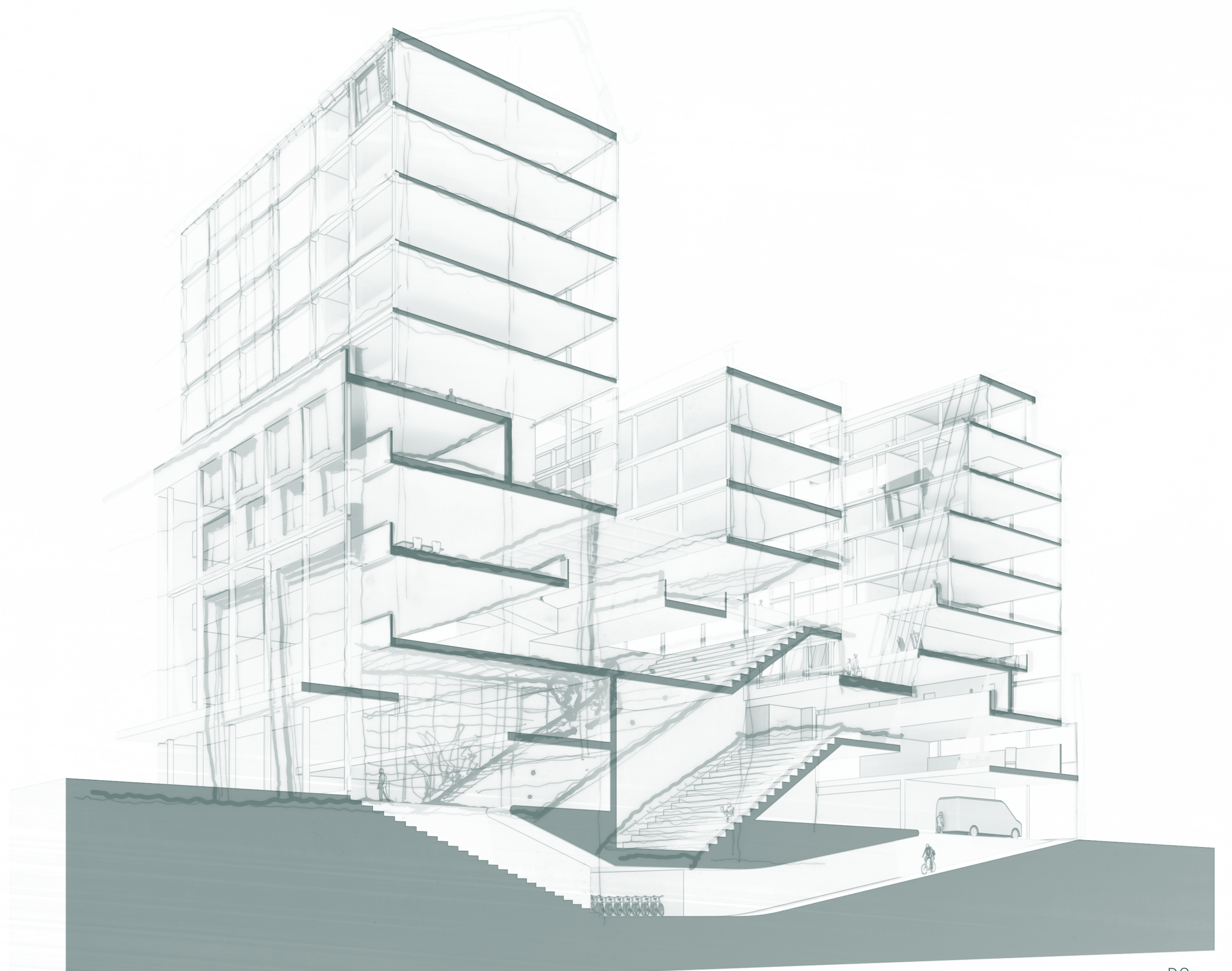


P2

Methodology

Research-by-design

Iterative design



P3

Aim

Strategy

Reduce loneliness & isolation

Encourage social interactions through spaces of encounter

Promote inclusion

Design for modern households

Affordable homes

Cooperative ownership structure

Future-proof

Built-in flexibility: Design for multiple scenarios

Low impact building

Use of natural materials, low embodied carbon and passive design

Project aims and ambitions



Working Together

A hybrid proposal exploring the combination of education spaces and collaborative housing in the port of Rotterdam

Merwe Vierhavens
Rotterdam, Netherlands

01. Site & Masterplan

25



The Hague 20km

Amsterdam 70km

Schiedam Centrum

Rotterdam Centraal

SCHIEDAM

ROTTERDAM

Marconiplein

Subject Site

M4H

Nieuwe Maas

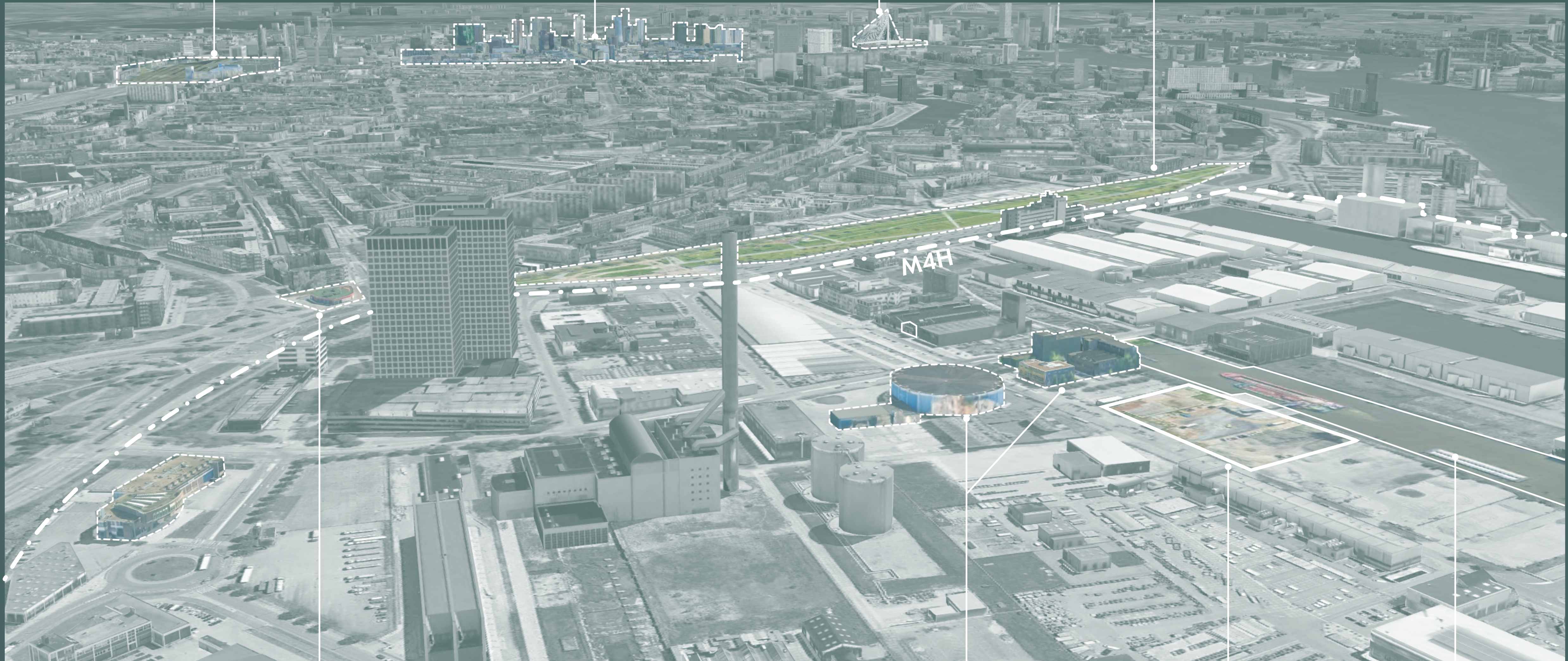
Urban Context

Rotterdam Central station

Rotterdam city centre

Erasmusbrug

Dakpark

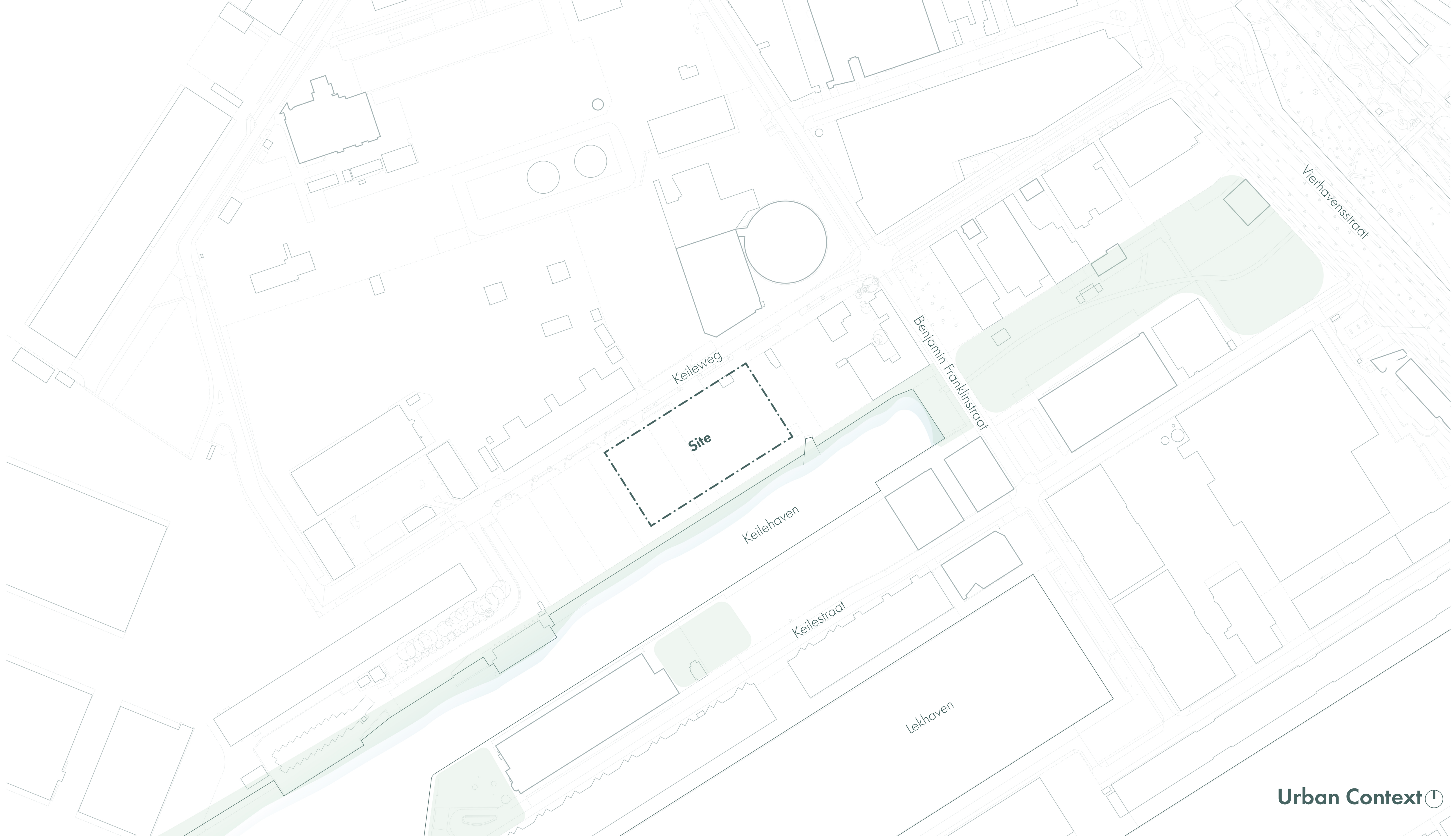


Marconiplein Metro station

Heritage buildings

Subject site

Keilehaven



Keileweg

Site

Keilehaven

Benjamin Franklinstraat

Keilestraat

Lekhaven

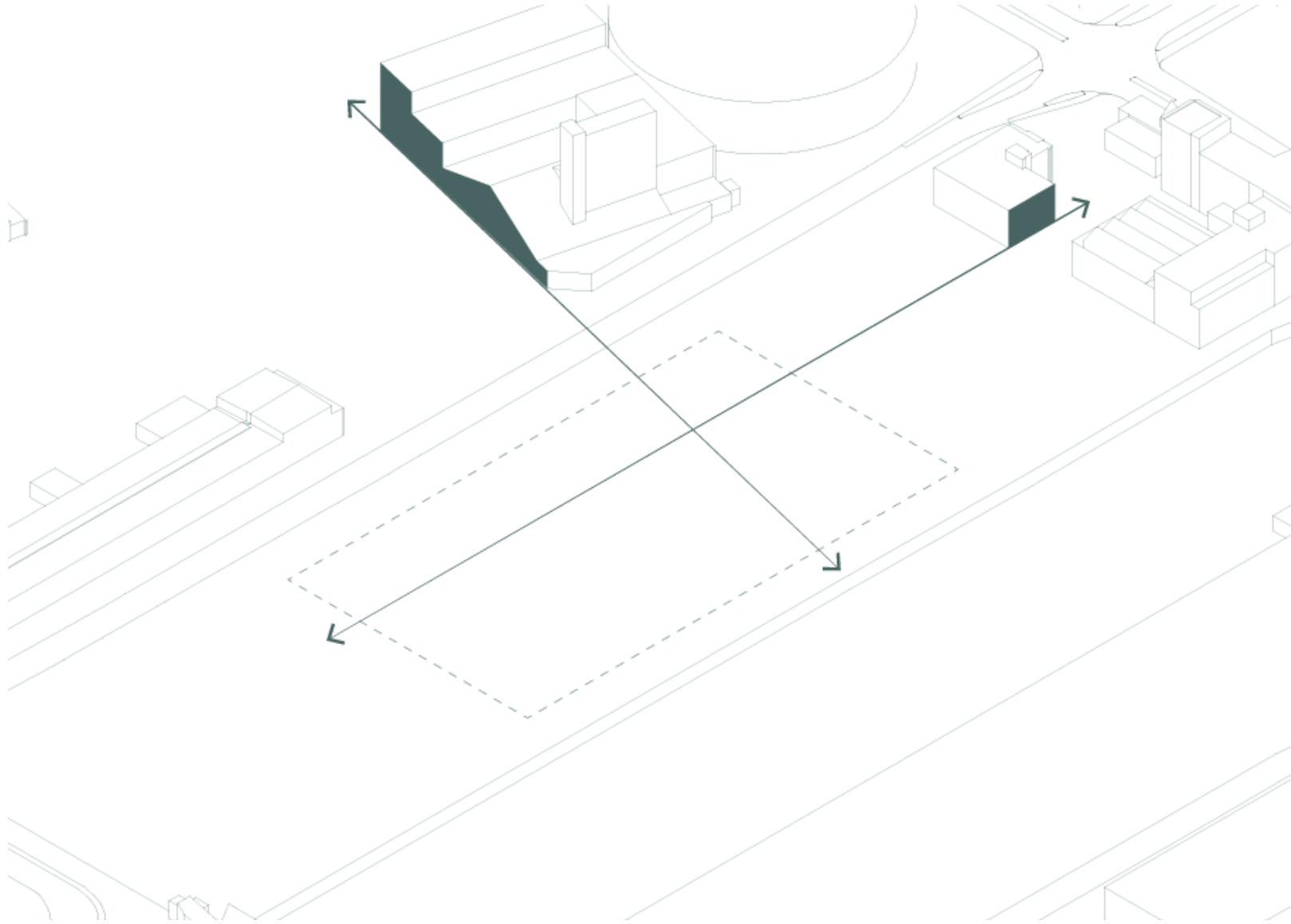
Vierhavenstraat



Keileweg

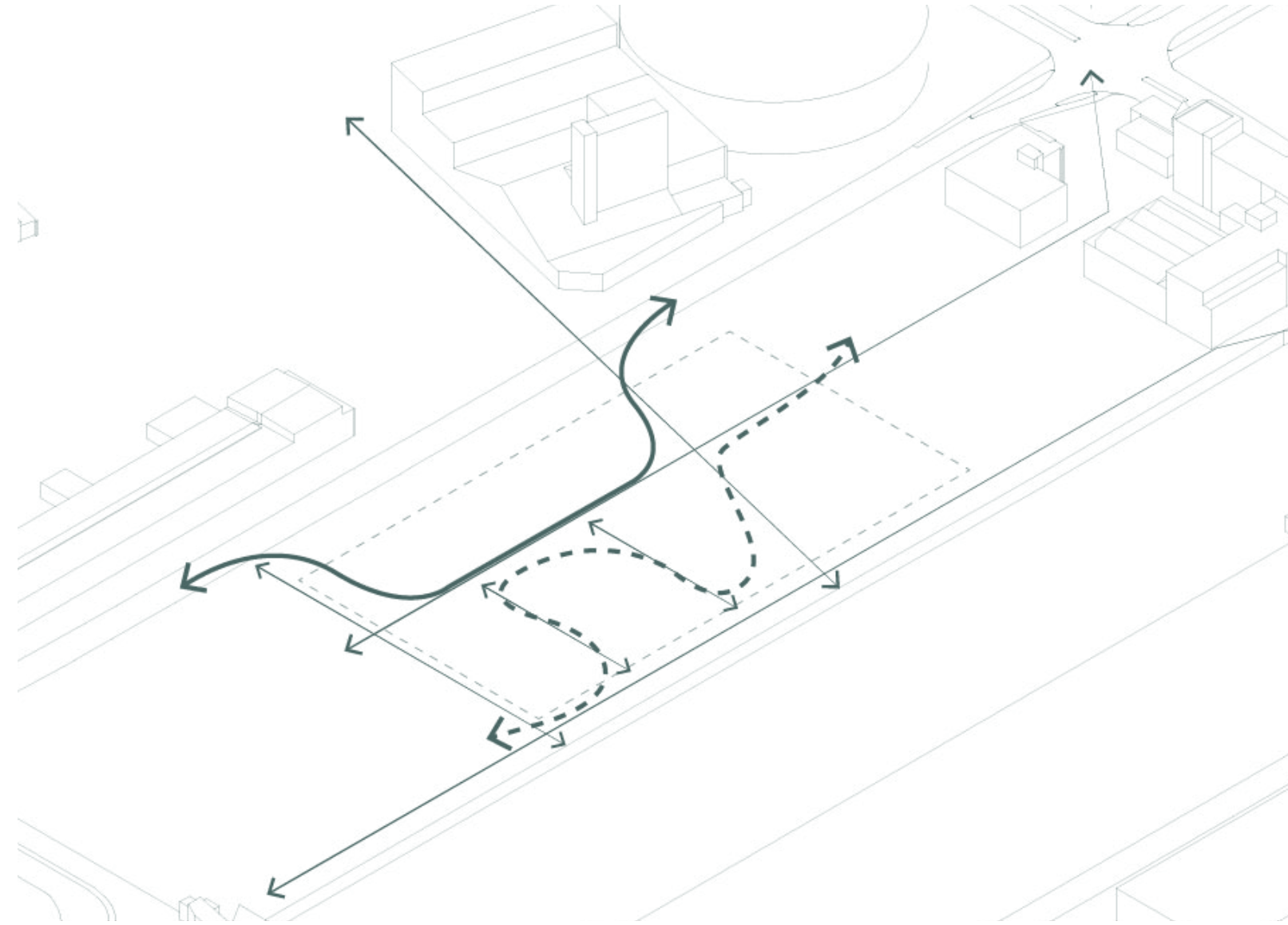


Keilehaven



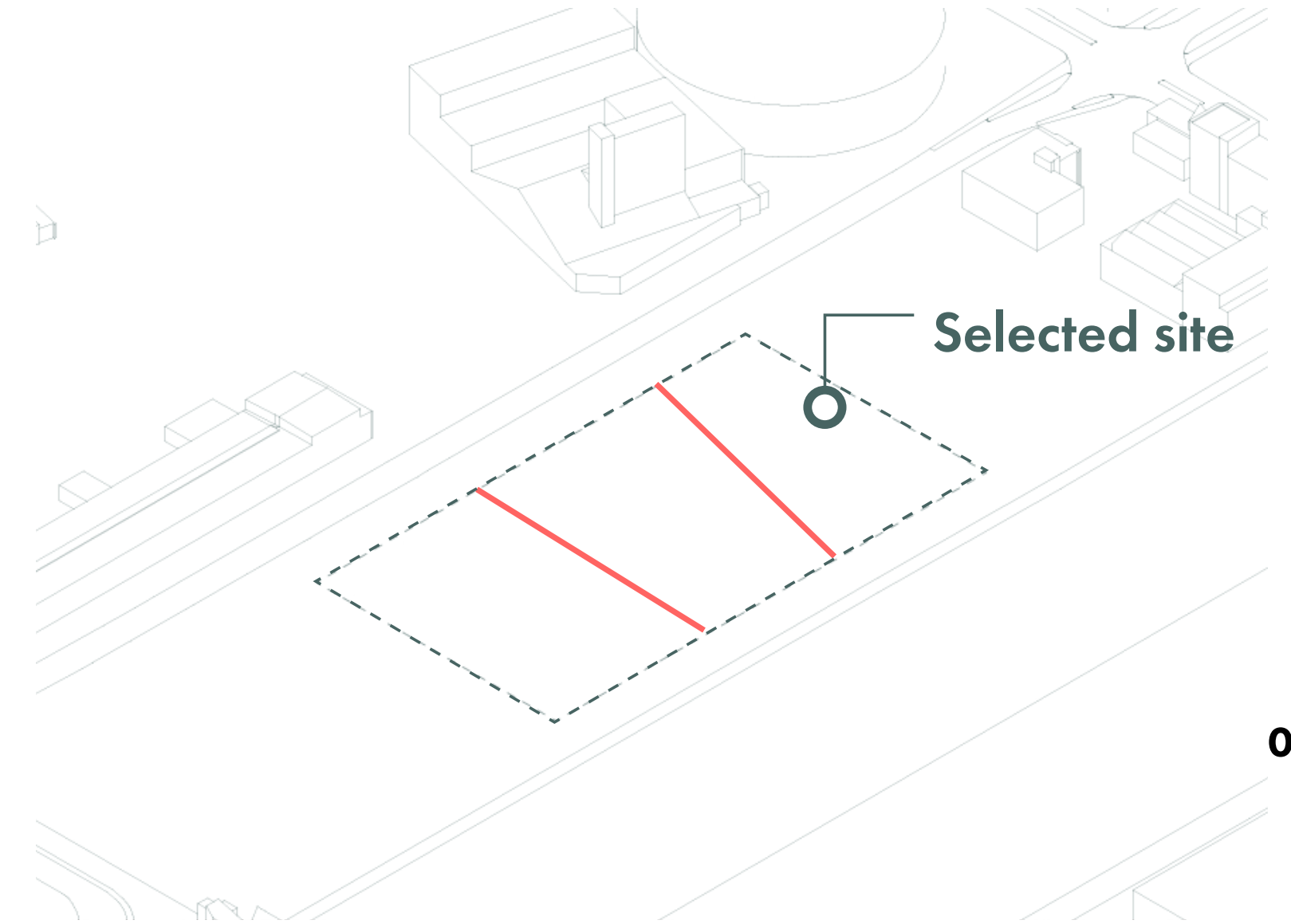
Masterplan strategies:

Relate to heritage structures

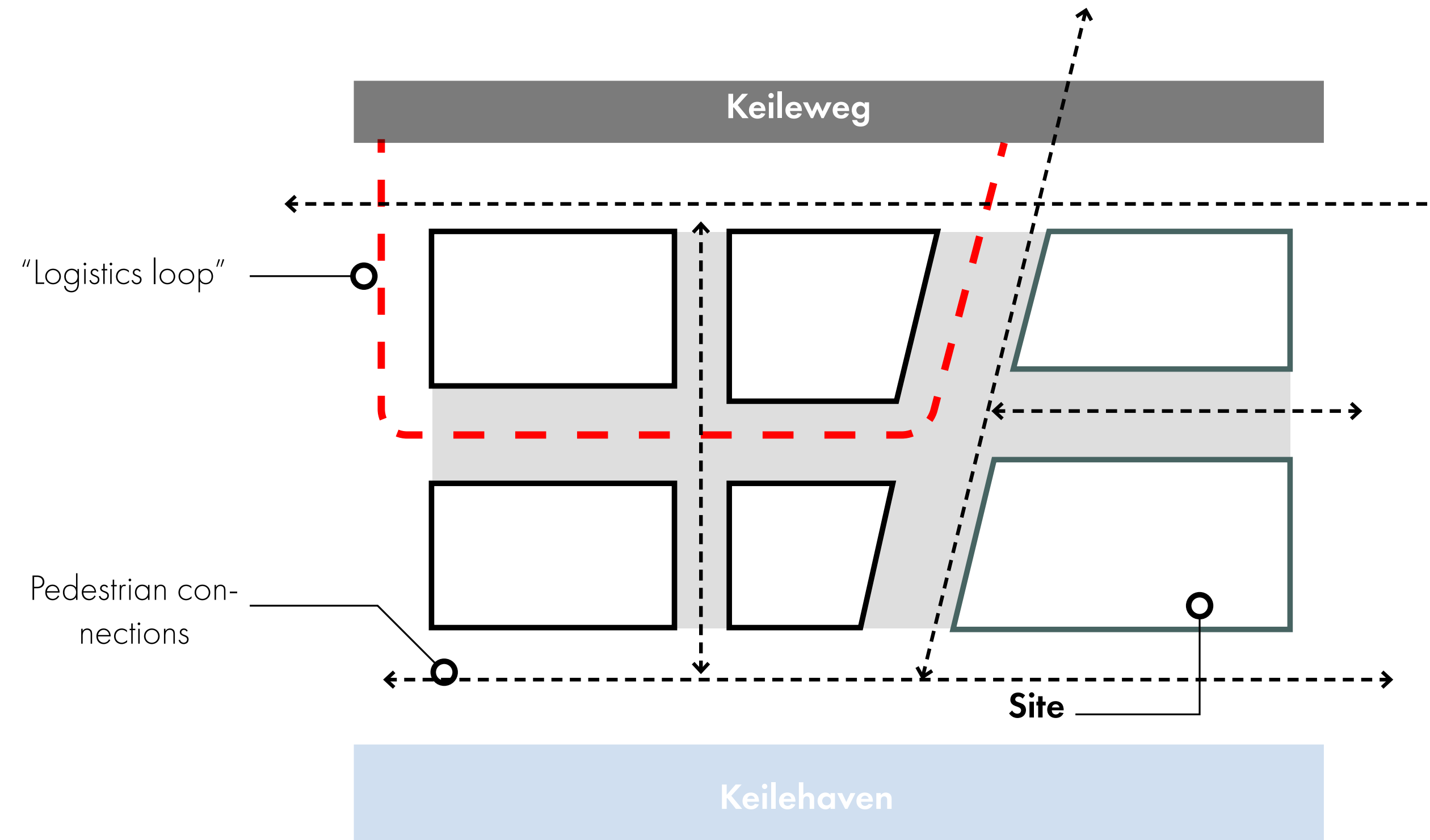


Masterplan strategies:

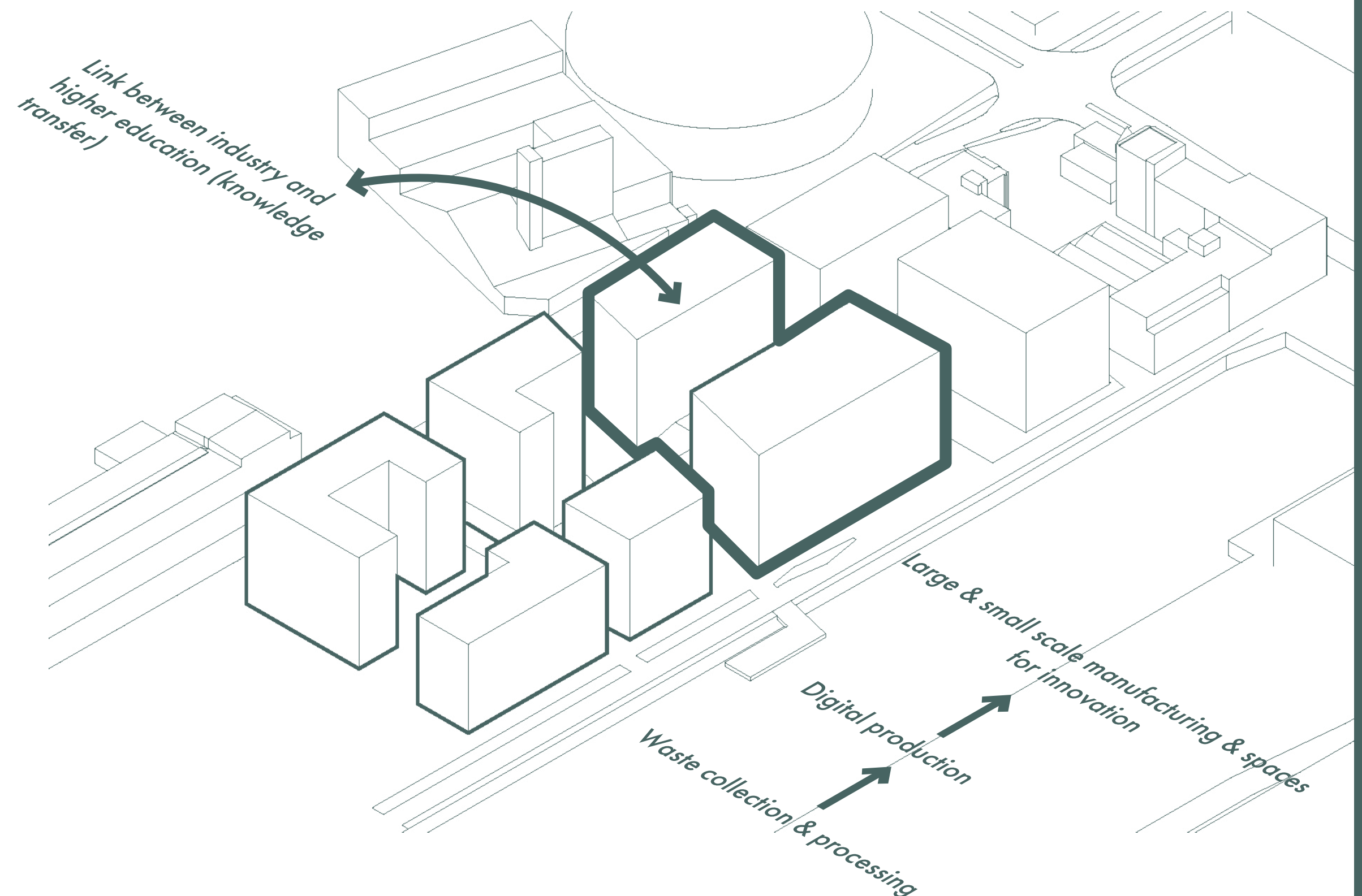
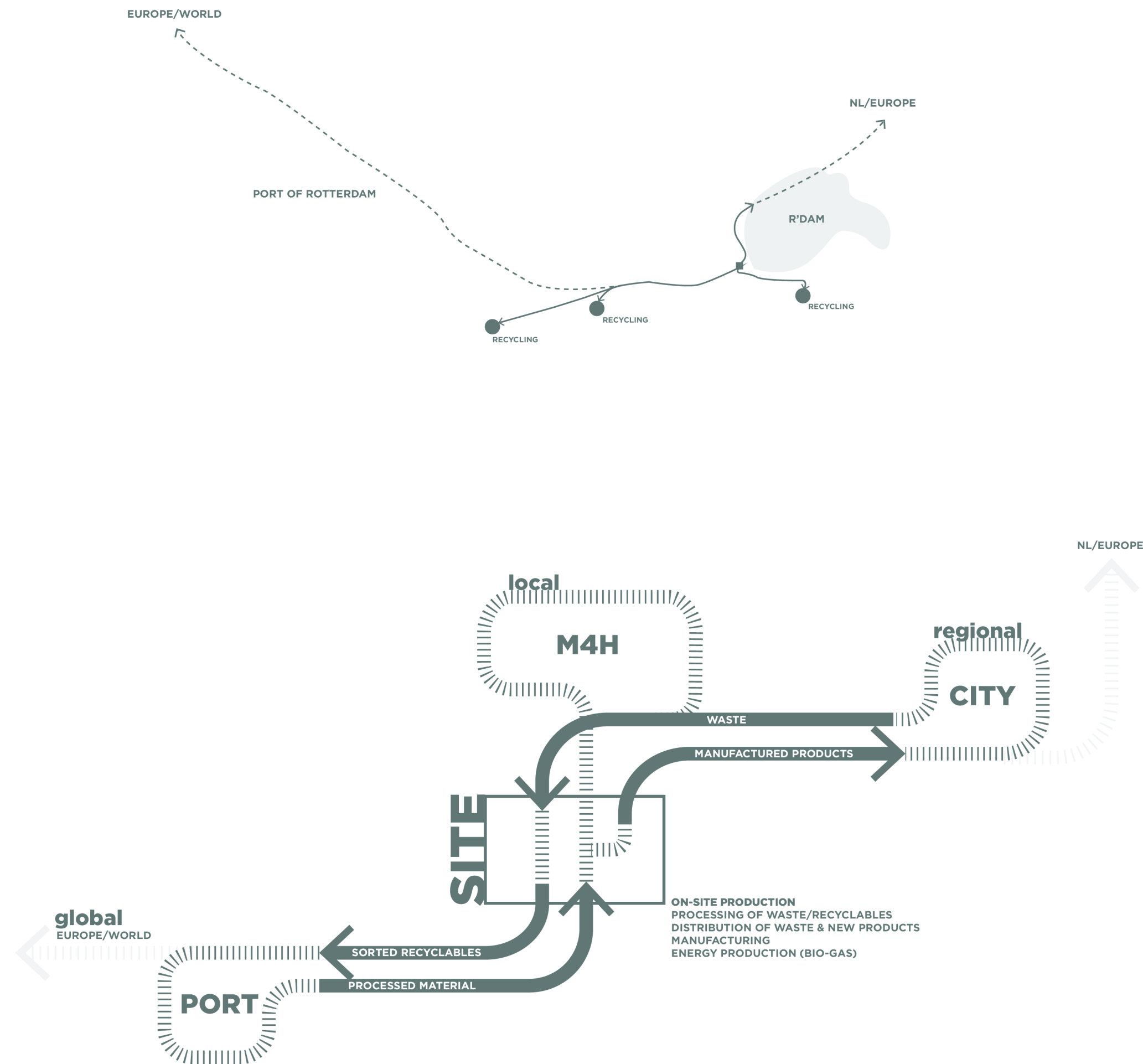
Separate logistics & pedestrian movements



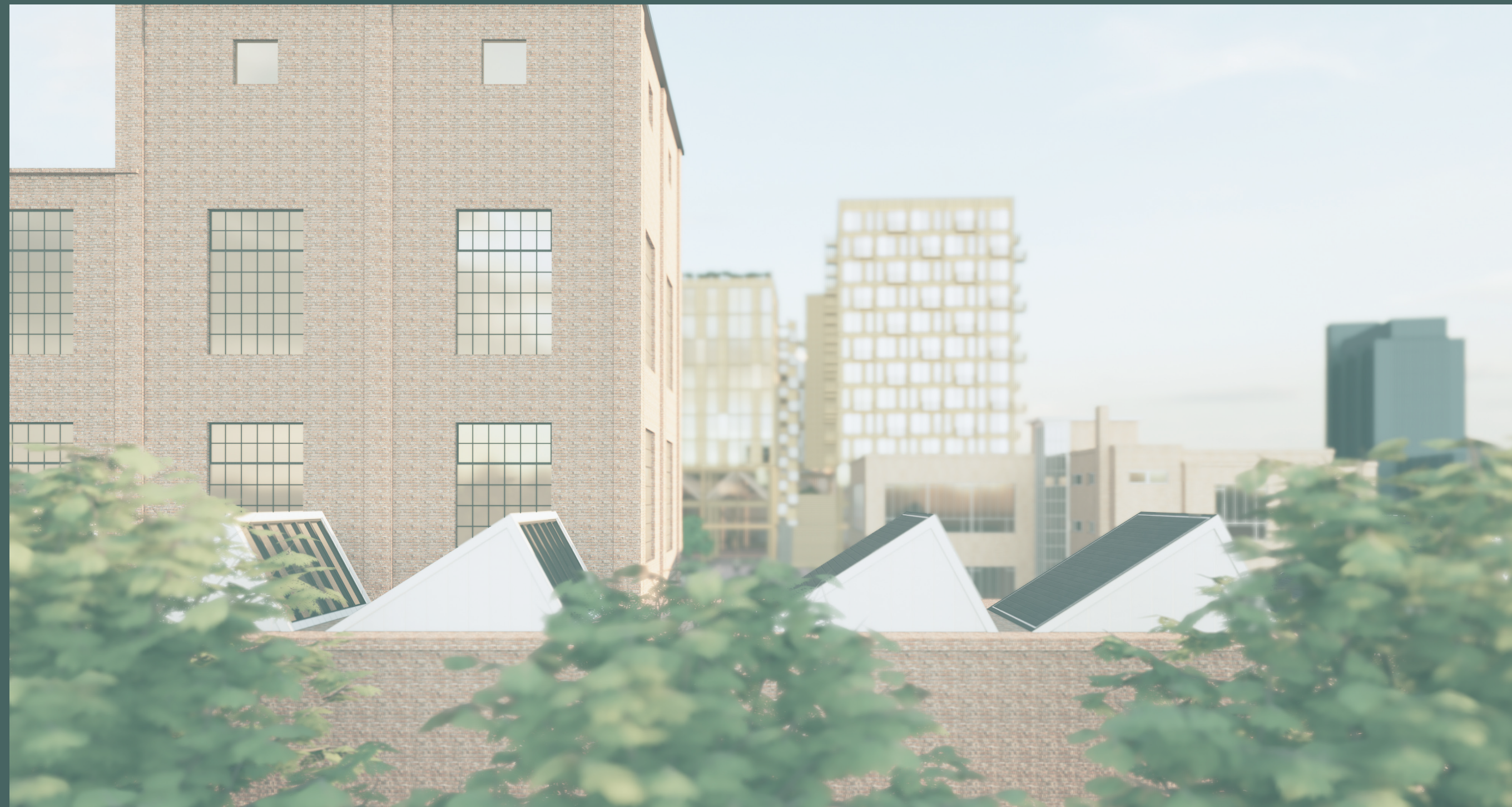
Parcellation for individual work



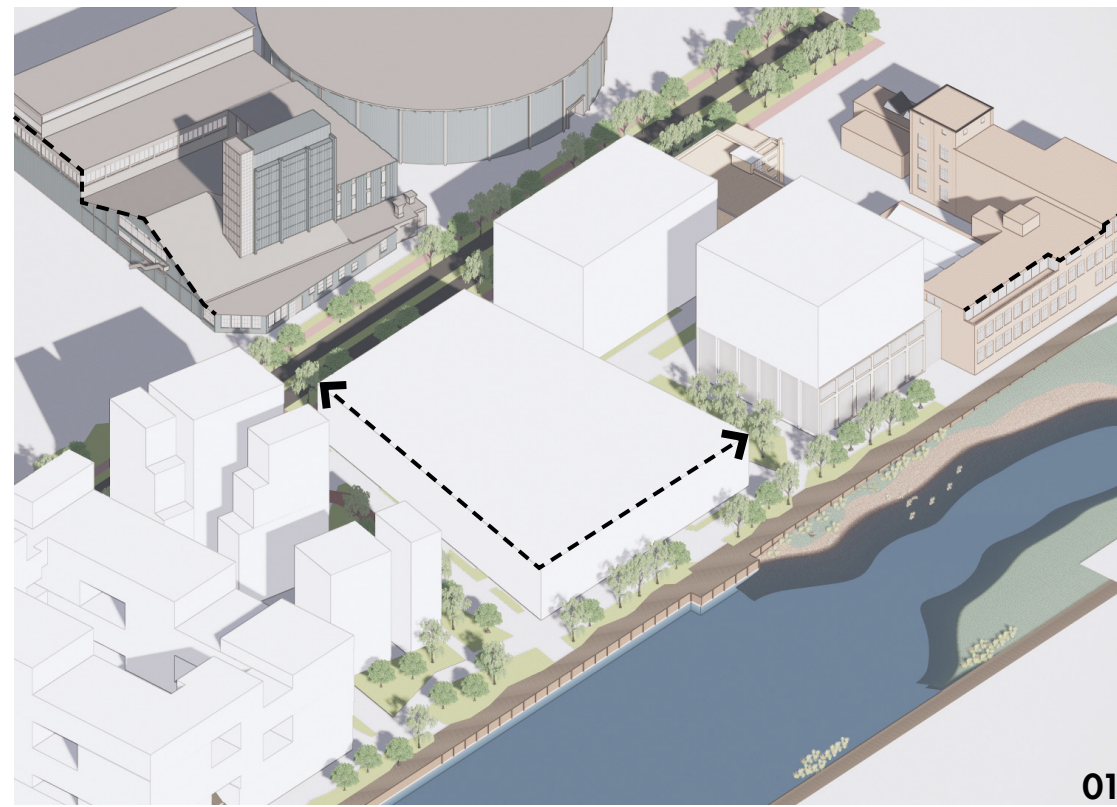
Masterplan strategies:
Circulation strategy



Masterplan strategies:
Integration of production processes



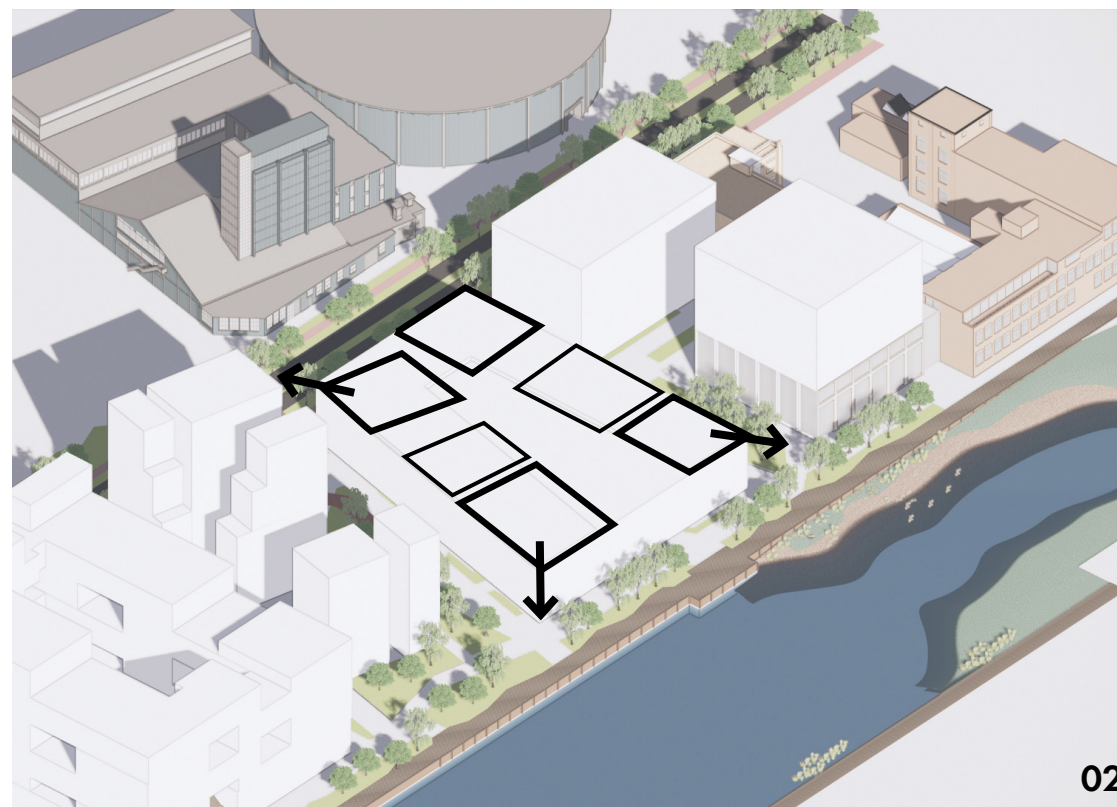
02. Urban Response



Podium: Establish street wall

The podium follows the lines of adjacent heritage structures, creating a continuity of form in the urban fabric.

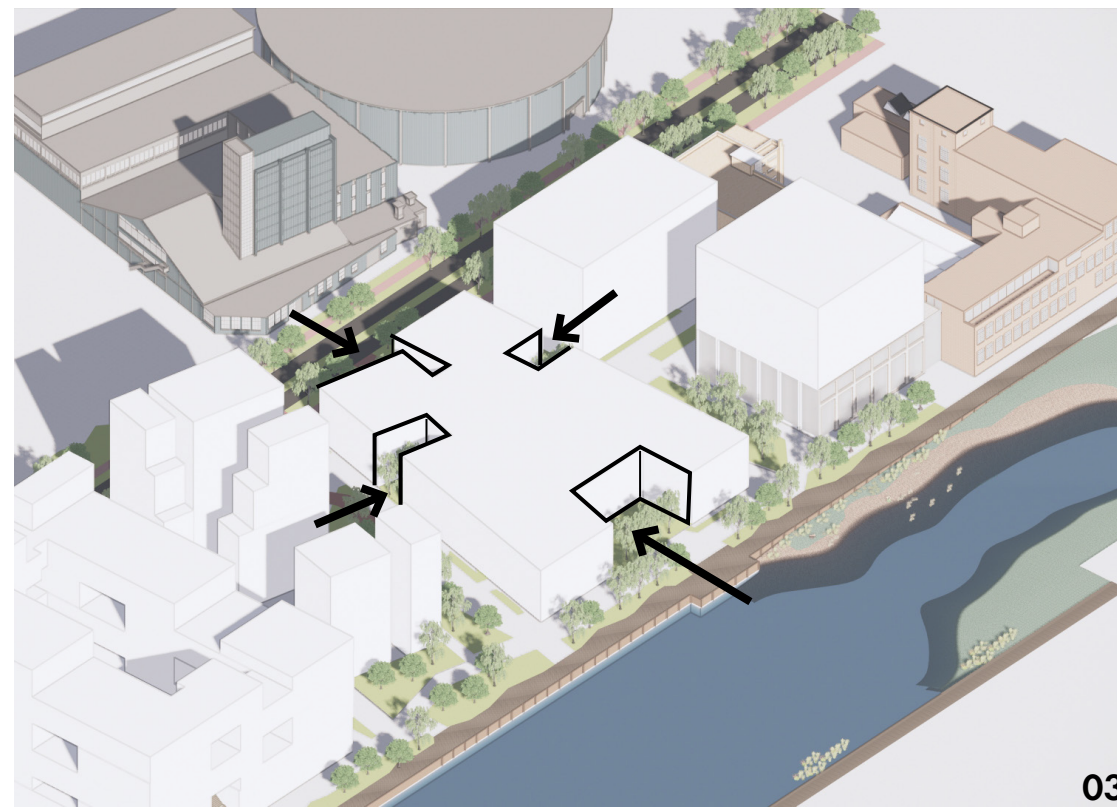
01



Active corners

Mixed programming at ground level ensures variety of user groups throughout the day, adding vibrancy and encouraging passive surveillance of urban realm.

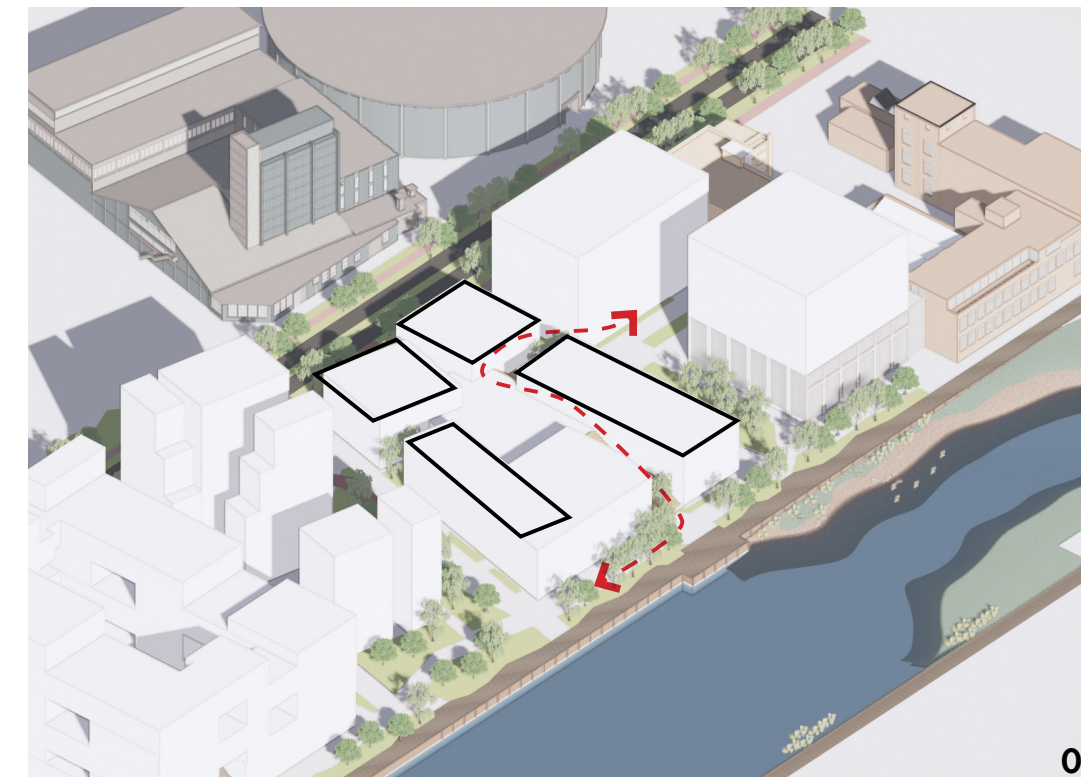
02



Biophilia

Landscaping (including deep soil) is brought into the site, encouraging both well-being through closeness to nature while reducing the urban heat island effect and providing on-site water management.

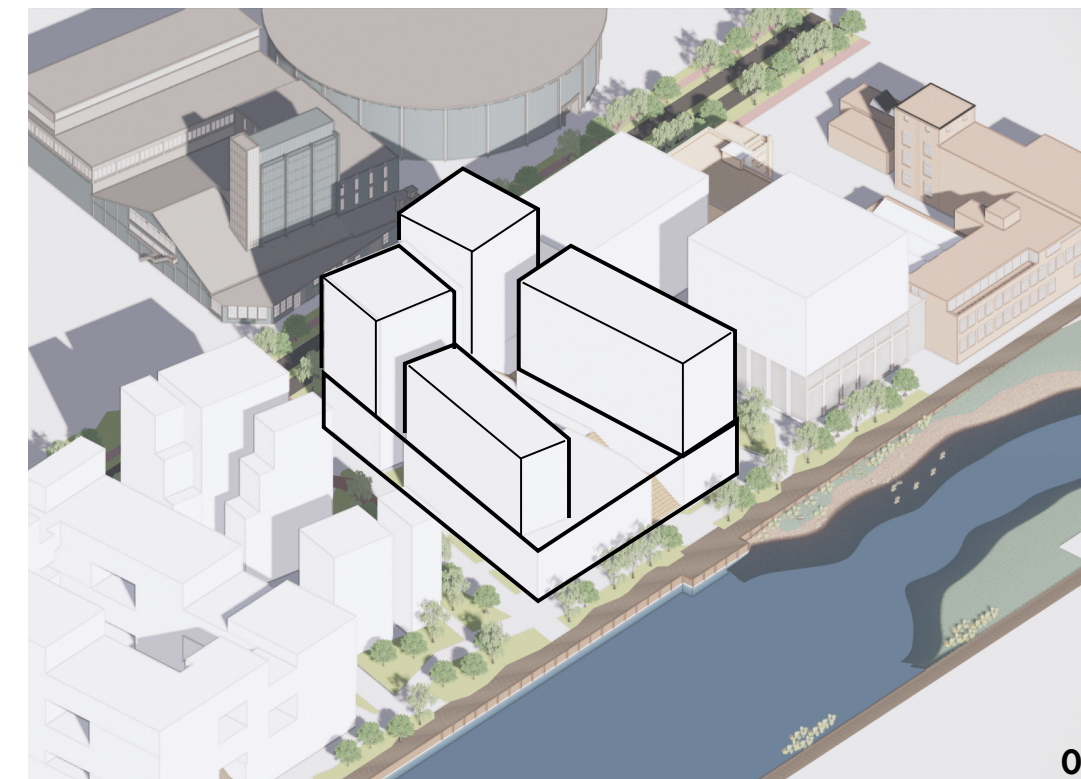
03



Through-site link

The urban realm is continued through the site, a gesture that both creates a pedestrian link through the site while at the same time providing an external link between internal functions.

04



Tower forms

Breaking the residential programme into towers allows for most dwellings to feature dual aspects, while slits between buildings creates sightlines and glimpses through the block. The tower forms additionally reflects the three main residential typologies of the project.

05



Materiality

A timber structure with an expressed timber facade reinterprets the rigid architectural fenestration of adjacent heritage buildings in a new materiality. Key to the material choice lies in its low embodied carbon.

06

Site plan

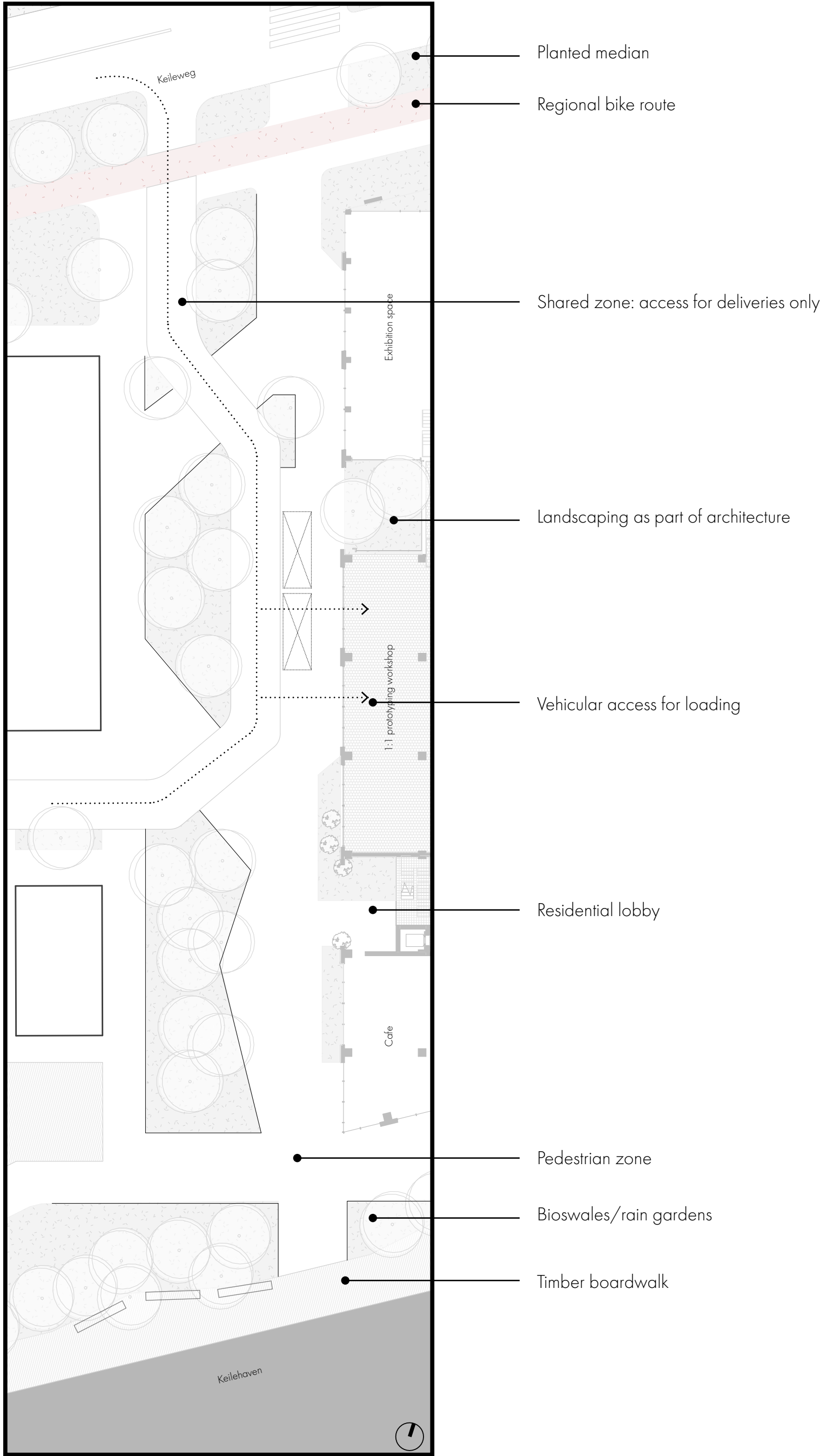
- 1 Heritage building “Ferro Dome”
- 2 loading dock
- 3 lobby, residential
- 4 lobby, maker centre
- 5 Bicycle parking
- 6 Access to rooftop courtyard
- 7 Limited access road
- 8 Public plaza
- 9 Foreshore walk
- 10 Sunken platform
- 11 Tidal park



Keilehaven

10m





View of Keileweg



View of Keilehaven

View along Keilehaven



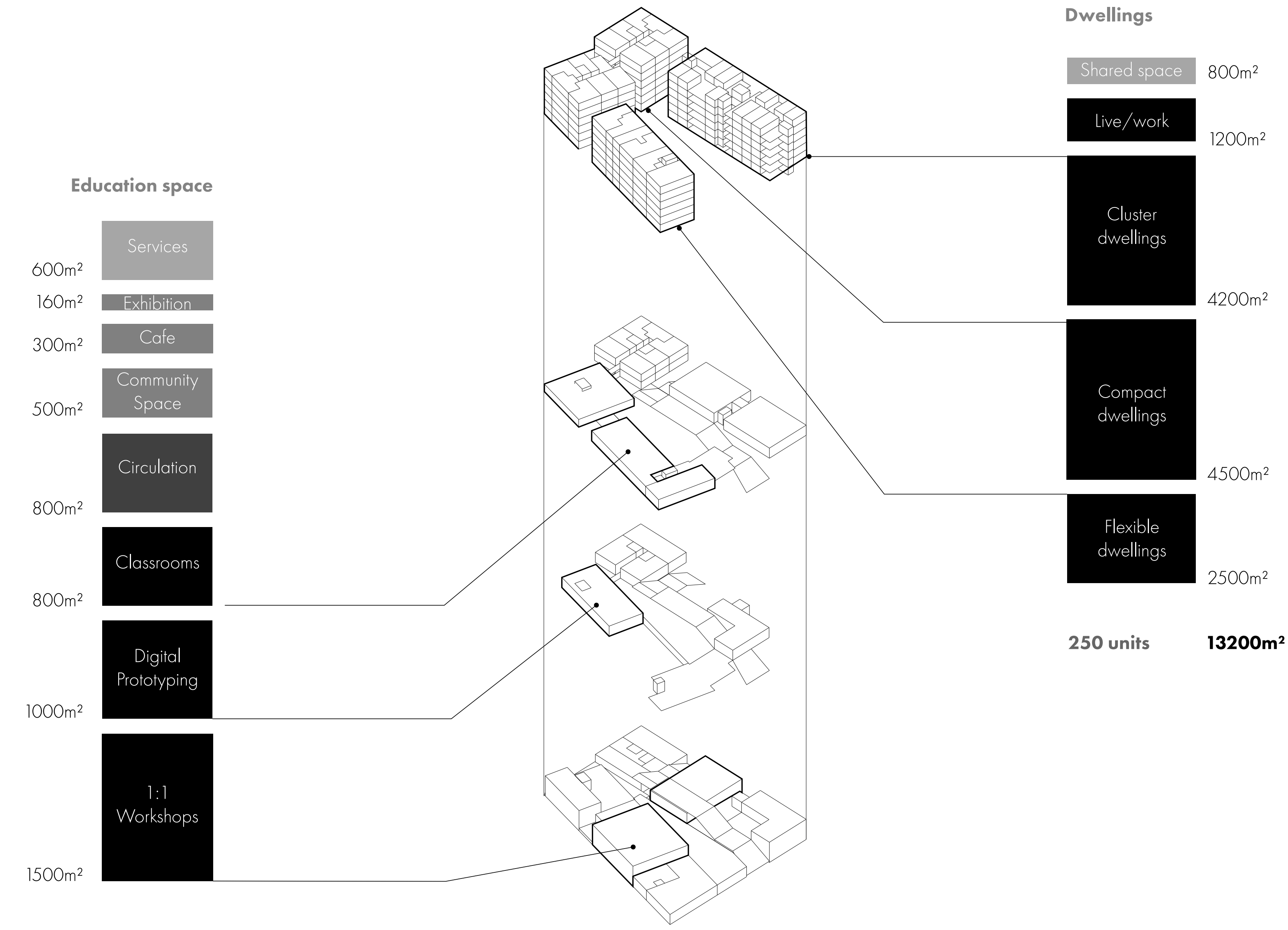


View across from Keilehaven



Urban Section

Urban Design



The cooperative scenario: “Mathenesse Makers”

The city of Rotterdam has decided to strongly incentivise housing- and maker collectives.

Through a long-term land lease (from the port authorities), the maker collective of Mathenesse Makers has acquired a land parcel in Keileweg for a relatively low cost.

A condition of this lease is an agreement that the cost-rent principle will apply, meaning that the cooperative is not allowed to take out profit from tenants in the long term.

A local bank has seen potential in the concept and has agreed to assist in financing the development, with a view of a long-term return on investment.

42

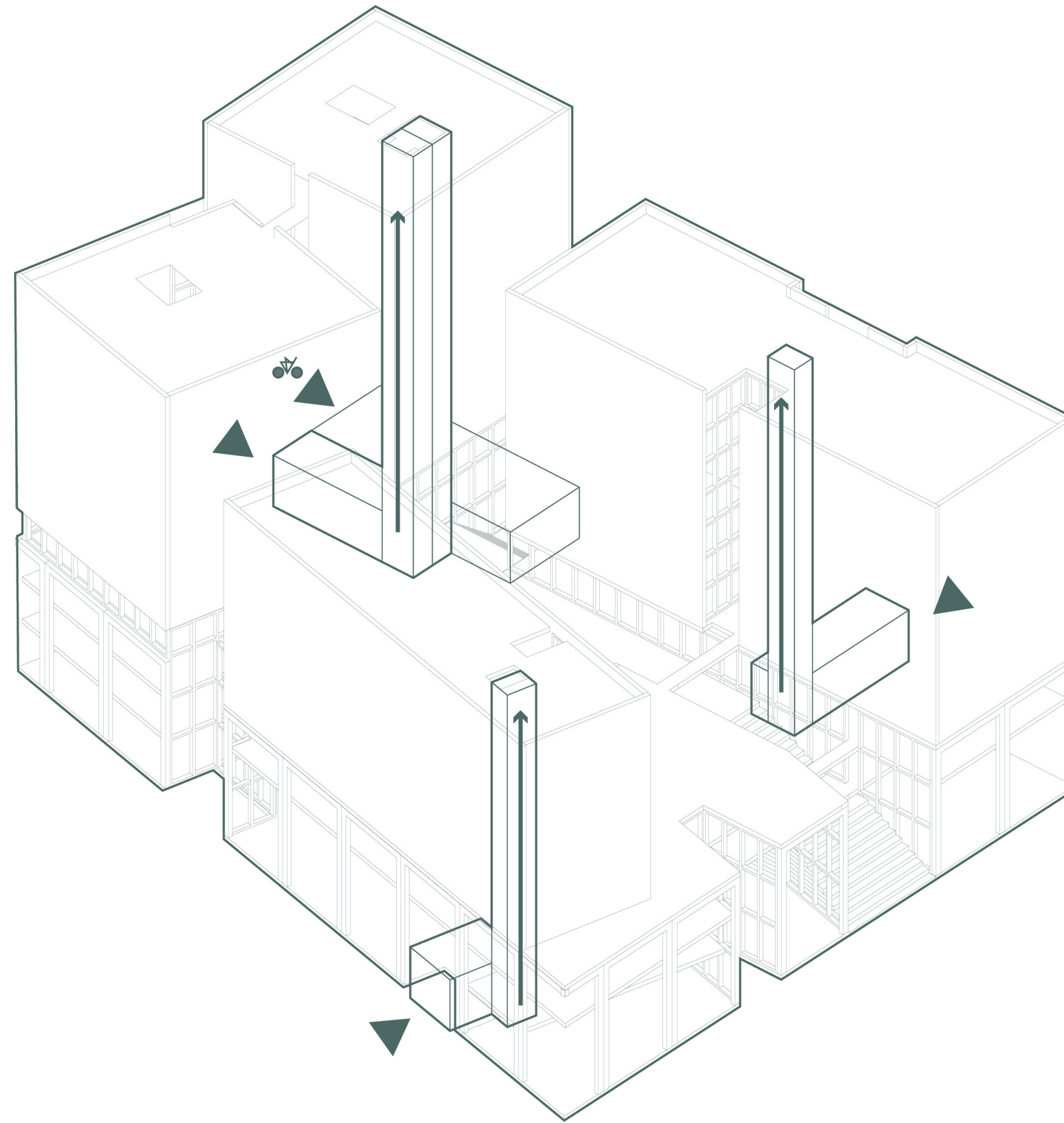
Financing is further sourced from interested future tenants, with a not-insignificant fee being collected in order to be placed on the waiting list for future developments.

In order to kick-start the project, additional funding is provided through investment from an existing Dutch woningcorporatie.

Key to this has been successful cooperation between the involved stakeholders: The cooperative, the local municipality, and financing institutions as well as lobbying from local makers, educational institutions, potential future residents and affordable housing providers.

An overarching, cooperative organisation owns the entire building, with its shared mission being long-term prosperity for its users.

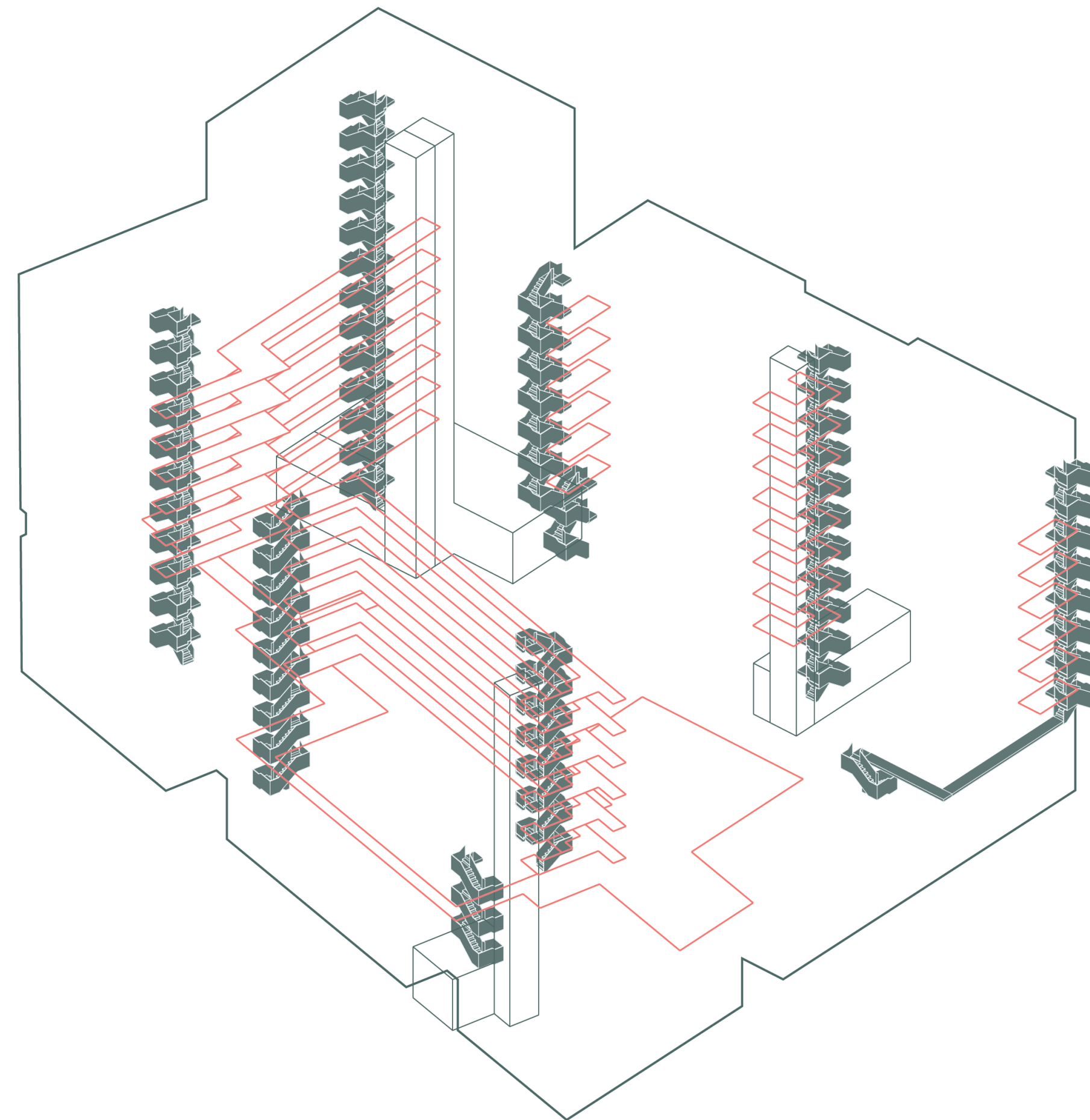
Two sub-organisations exist: A maker facility and a housing cooperative. The rationale for this arrangement is to create a balanced income stream for the larger organisation and less financial risk through diversification.



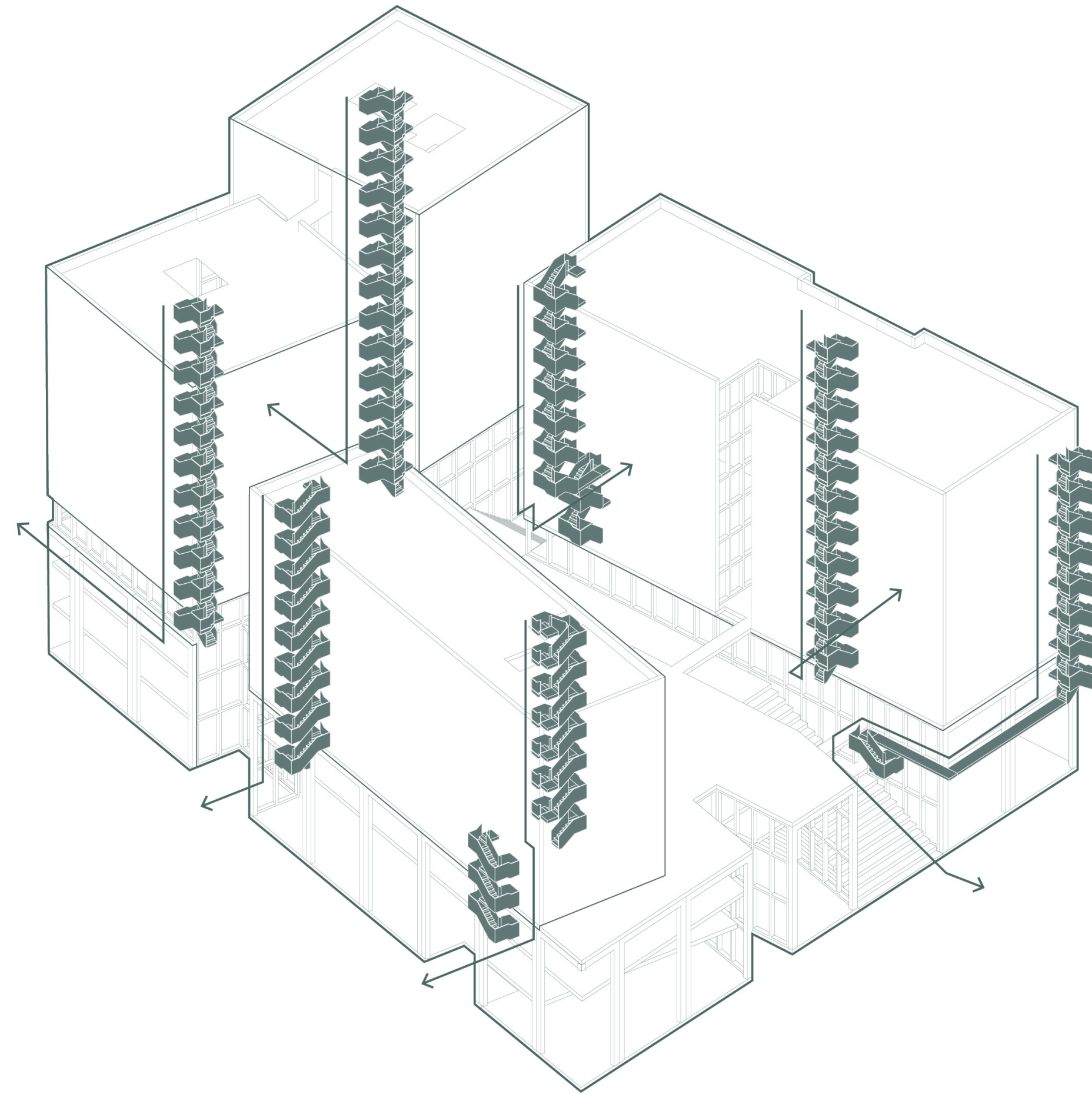
Entries & Vertical transportation

Access System





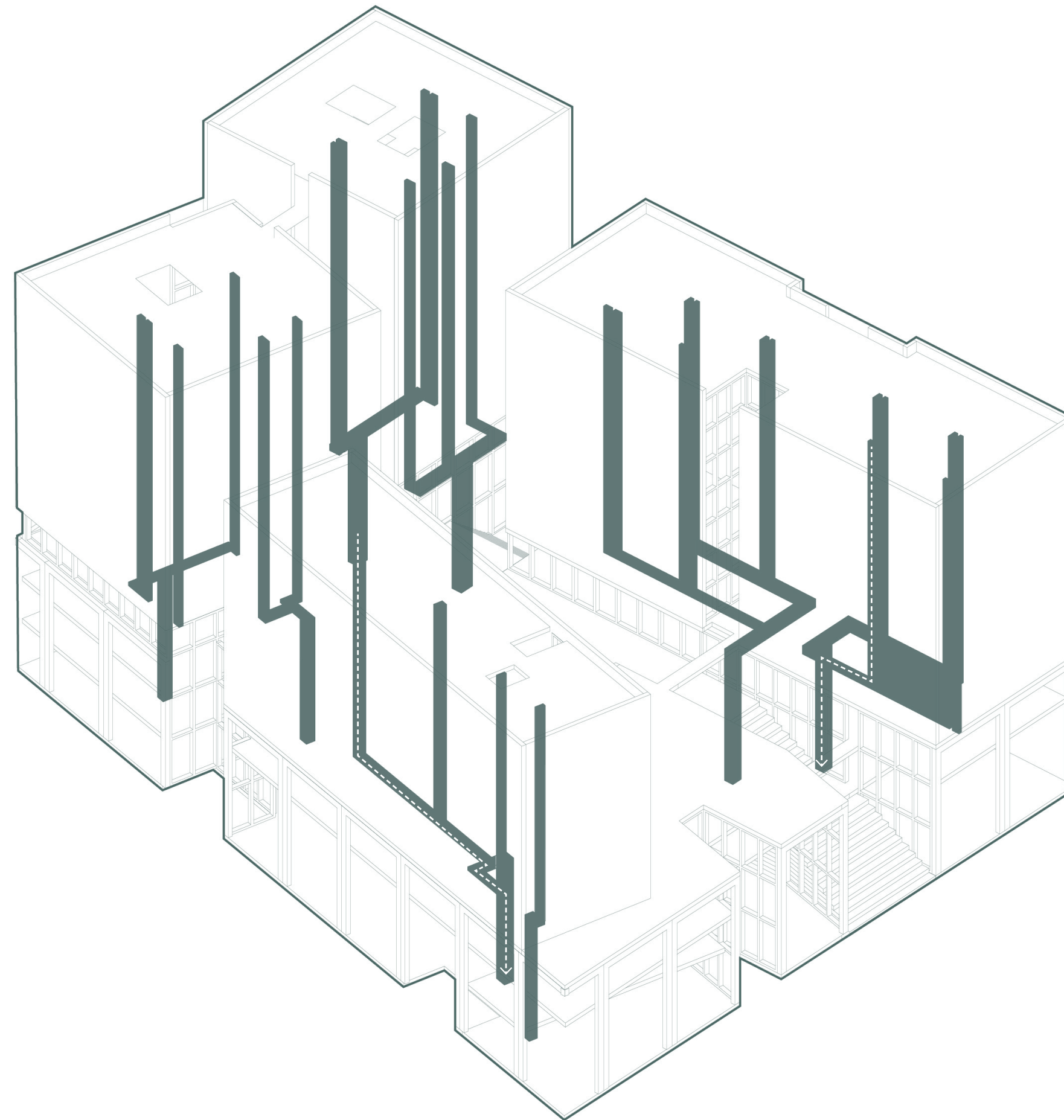
Access system



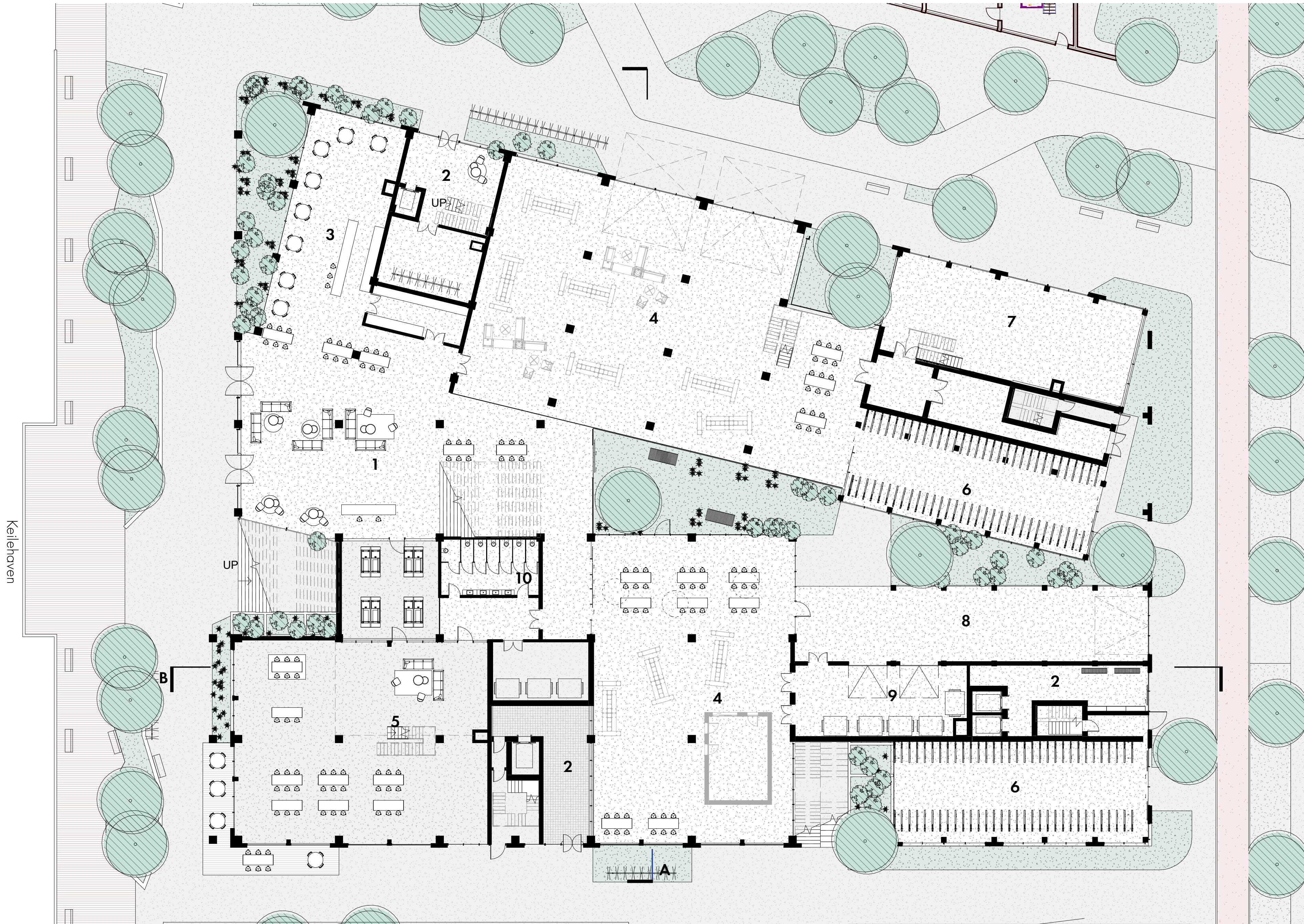
Fire egress

Building System





Vertical shafts



Ground Floor

- 1 Foyer, education centre
- 2 Residential lobby & mail room
- 3 Cafe
- 4 Workshop (1-1 prototyping)
- 5 Community maker space
- 6 Bicycle storage
- 7 Exhibition space
- 8 Loading dock
- 9 Waste room
- 10 WC

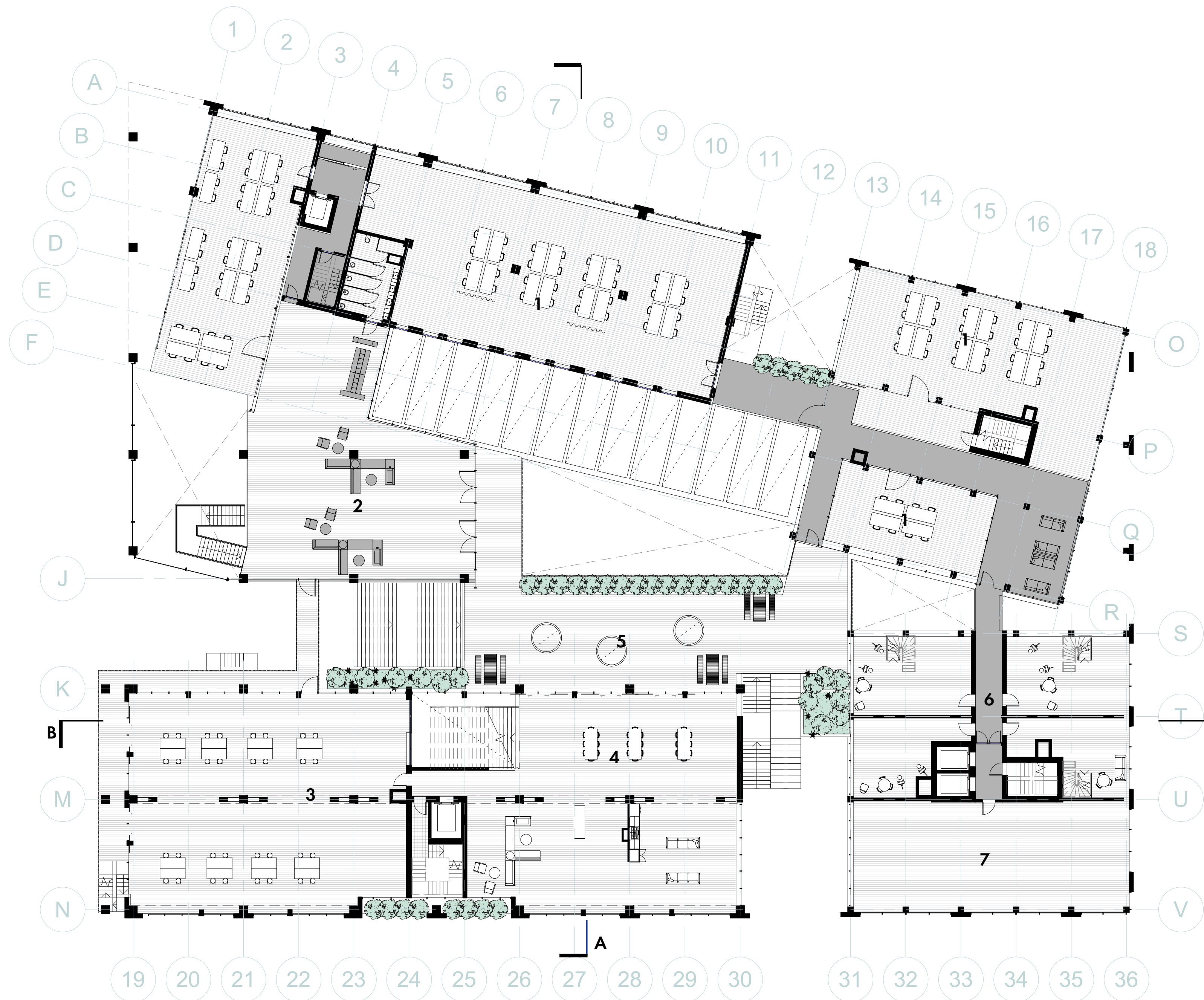




Level 1

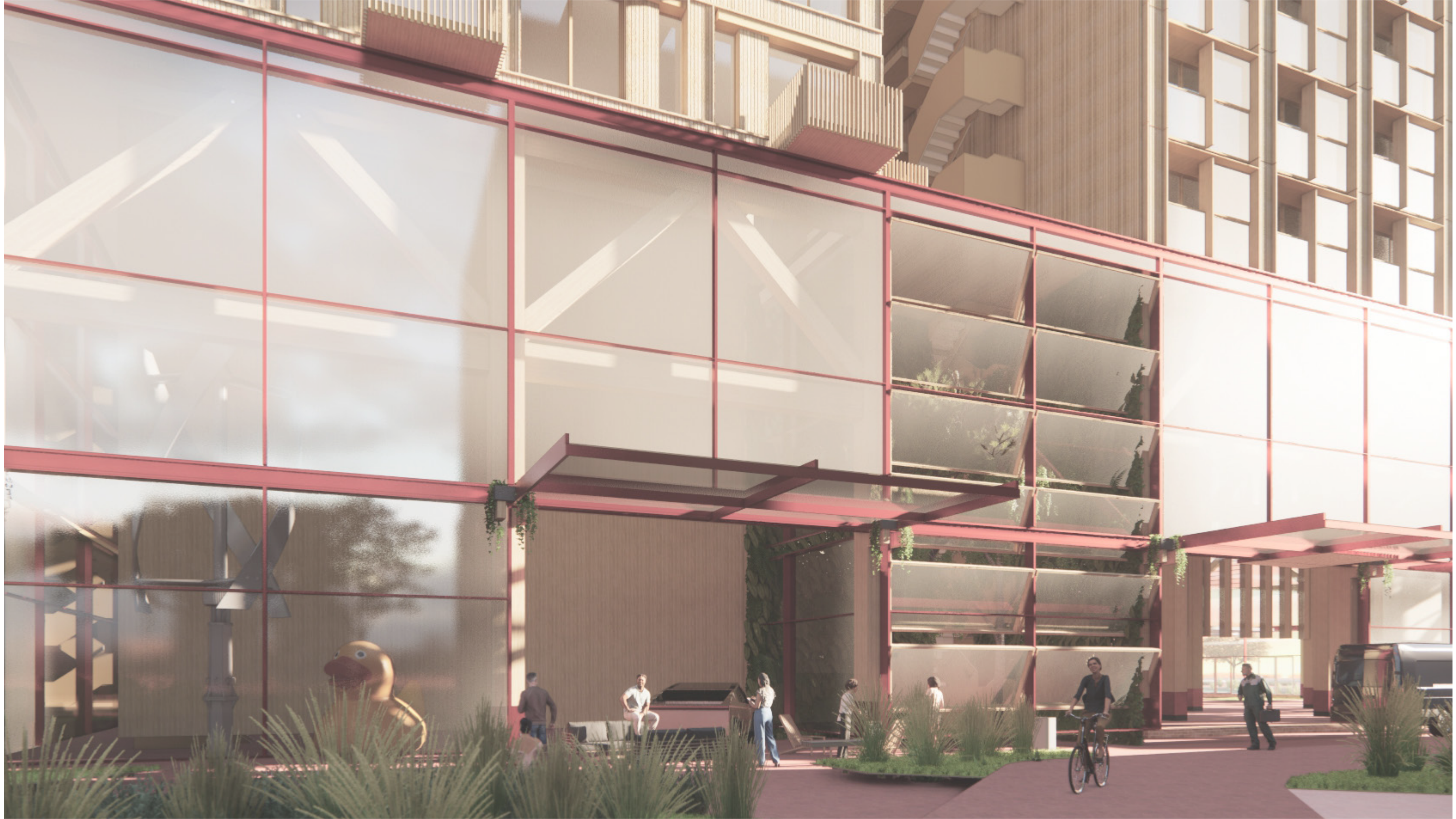
- 1 Breakout space/coworking
- 2 Workshop below
- 3 Auditorium seating
- 4 Digital prototyping labs
- 5 3D print room
- 6 Bathrooms
- 7 Storage space (residential)
- 8 Commercial space



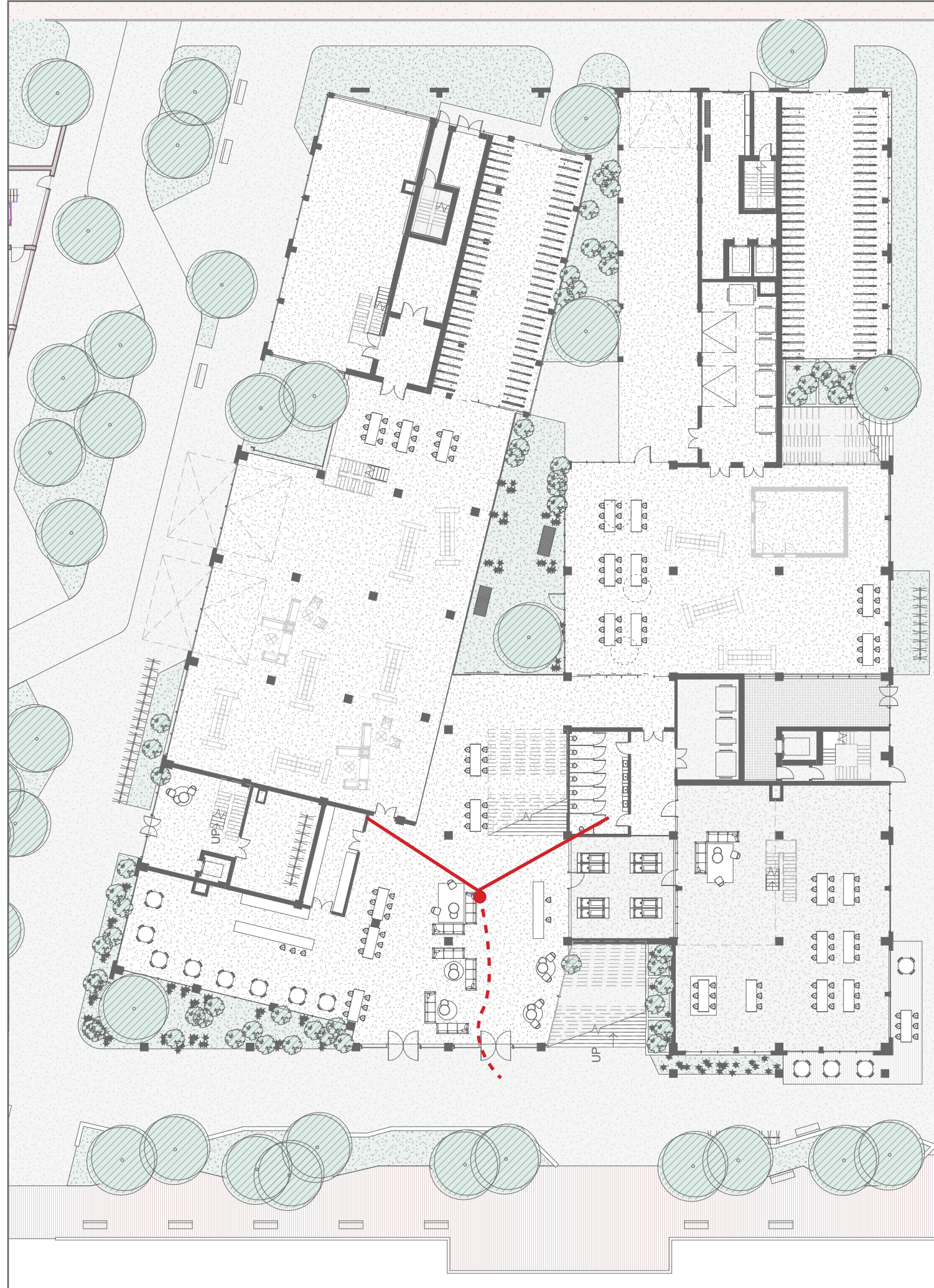


Level 2

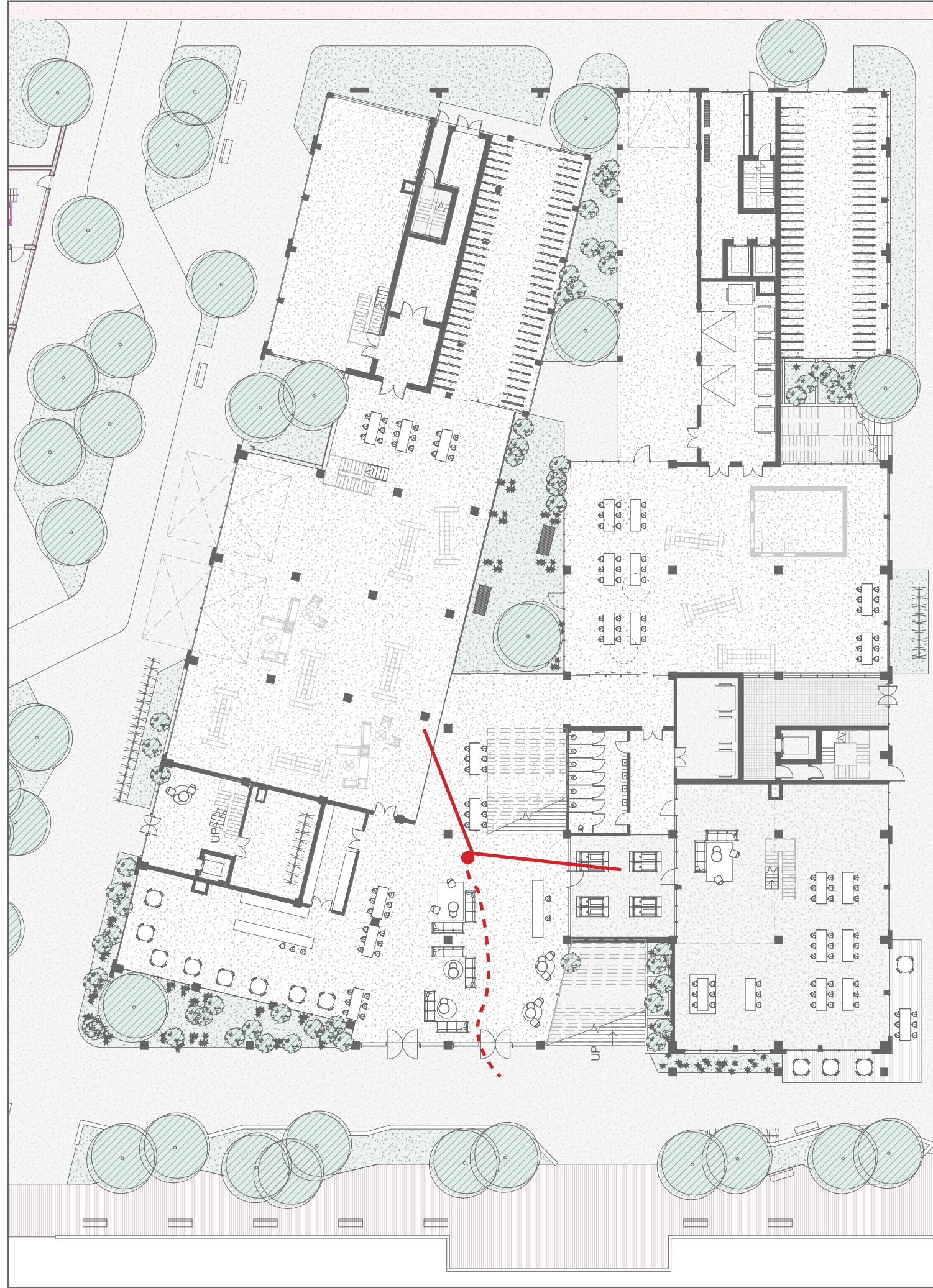
- 1 Classrooms/computer labs
- 2 Breakout space/coworking
- 3 Workshop
- 4 Collective lounge, residential
- 5 Courtyard
- 6 Live/work units
- 7 Commercial space



View of pedestrian zone



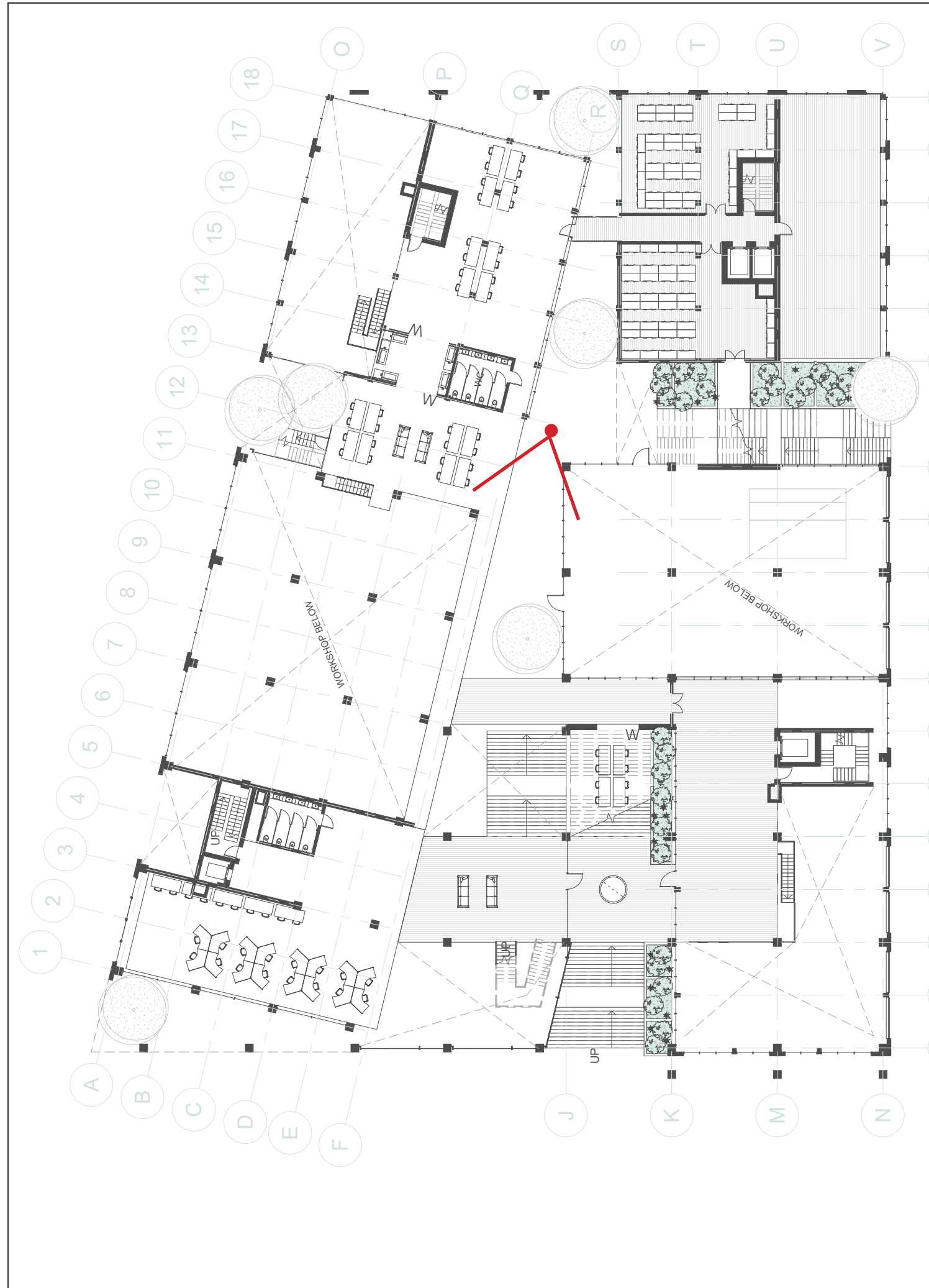
View of main lobby & breakout spaces



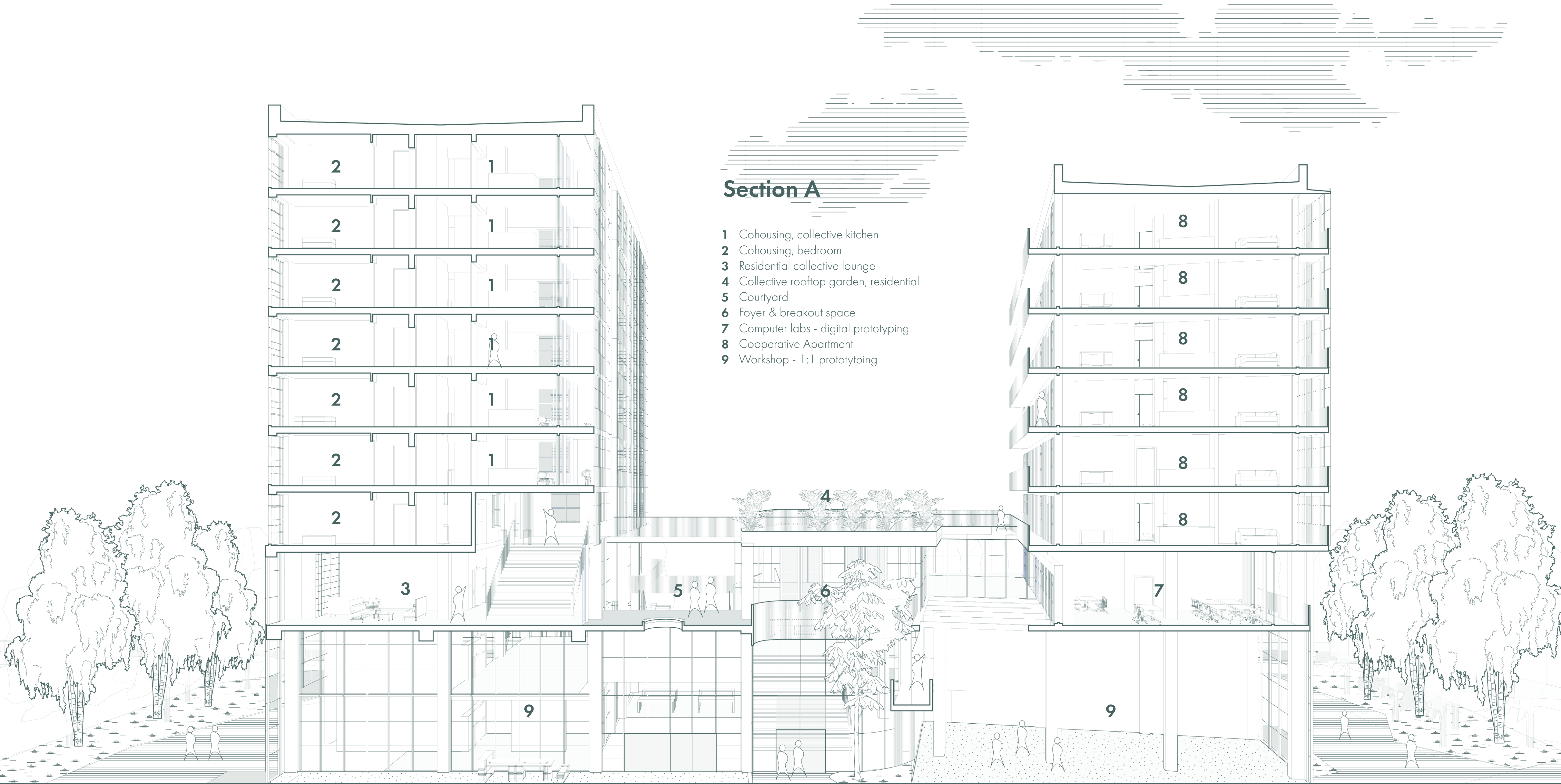
View of main lobby & breakout spaces



View of digital prototyping space and workshop below

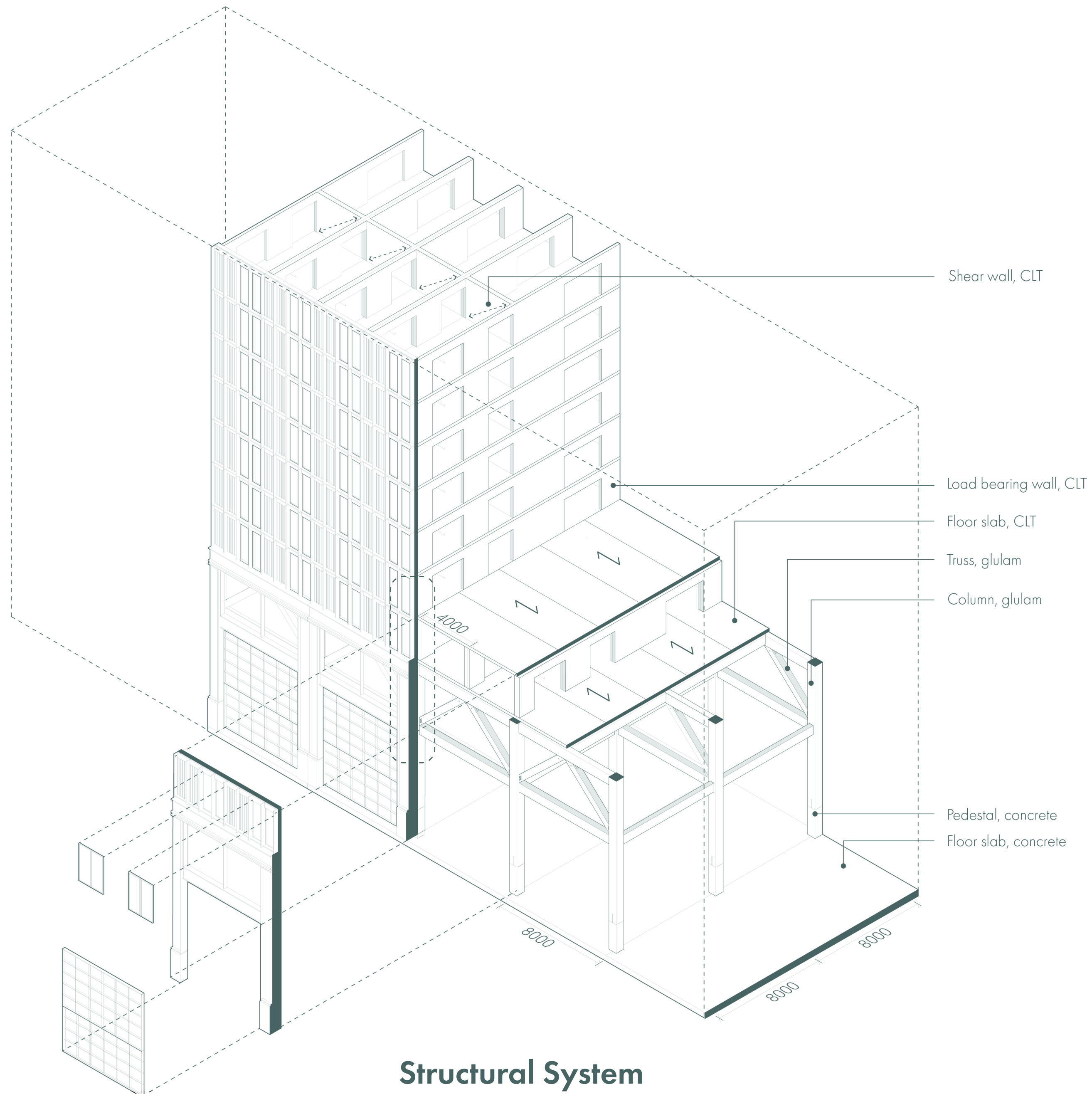


View of internal courtyard



Section A

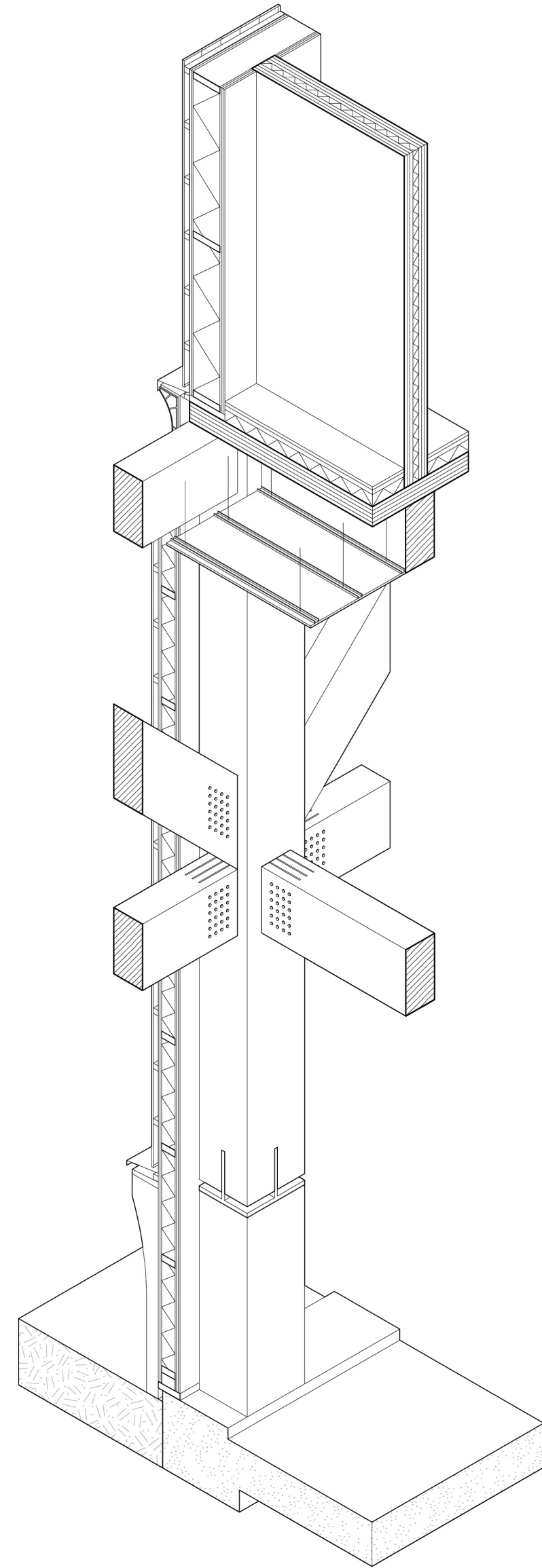
- 1 Cohousing, collective kitchen
- 2 Cohousing, bedroom
- 3 Residential collective lounge
- 4 Collective rooftop garden, residential
- 5 Courtyard
- 6 Foyer & breakout space
- 7 Computer labs - digital prototyping
- 8 Cooperative Apartment
- 9 Workshop - 1:1 prototyping



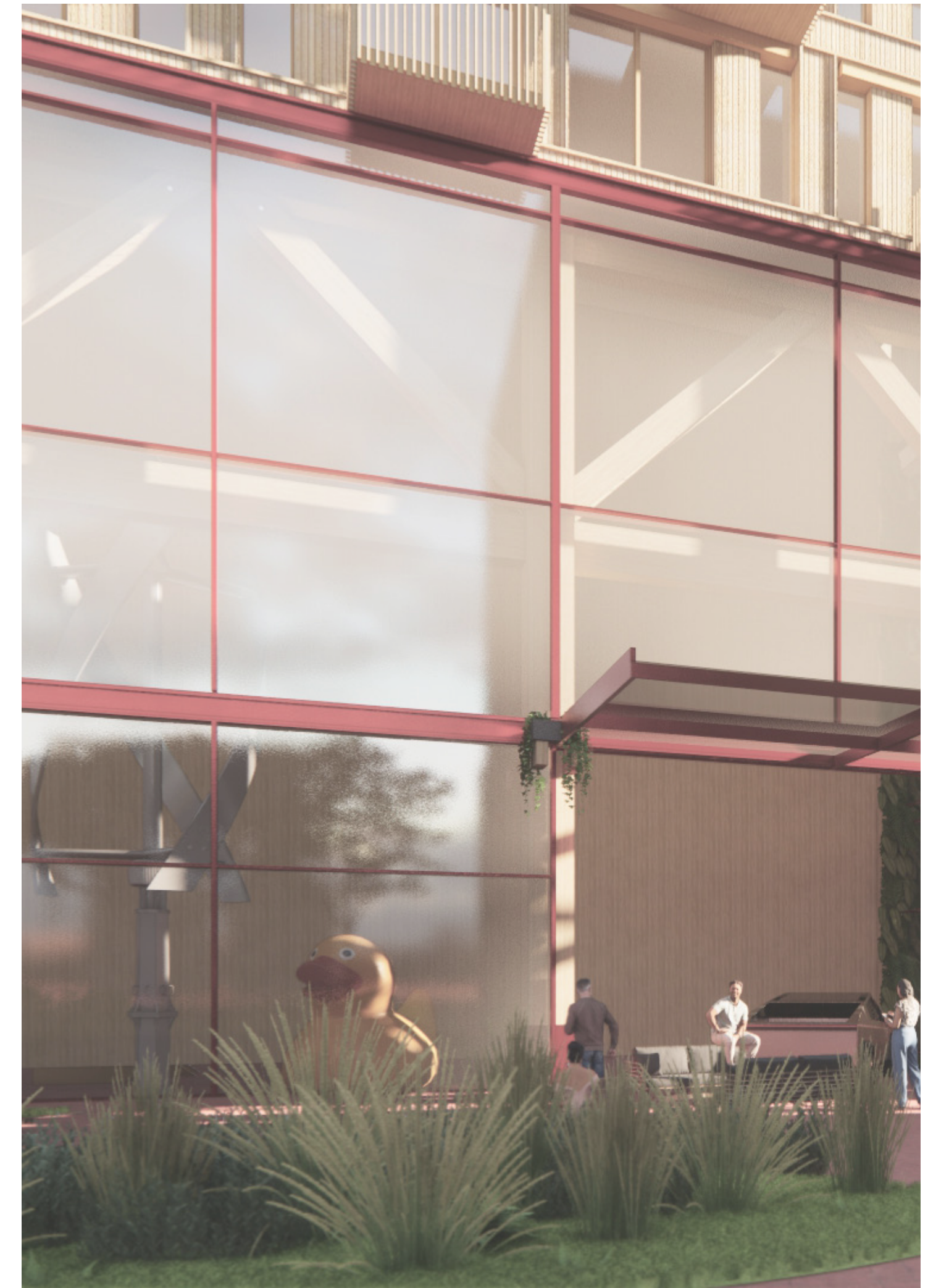
Structural System

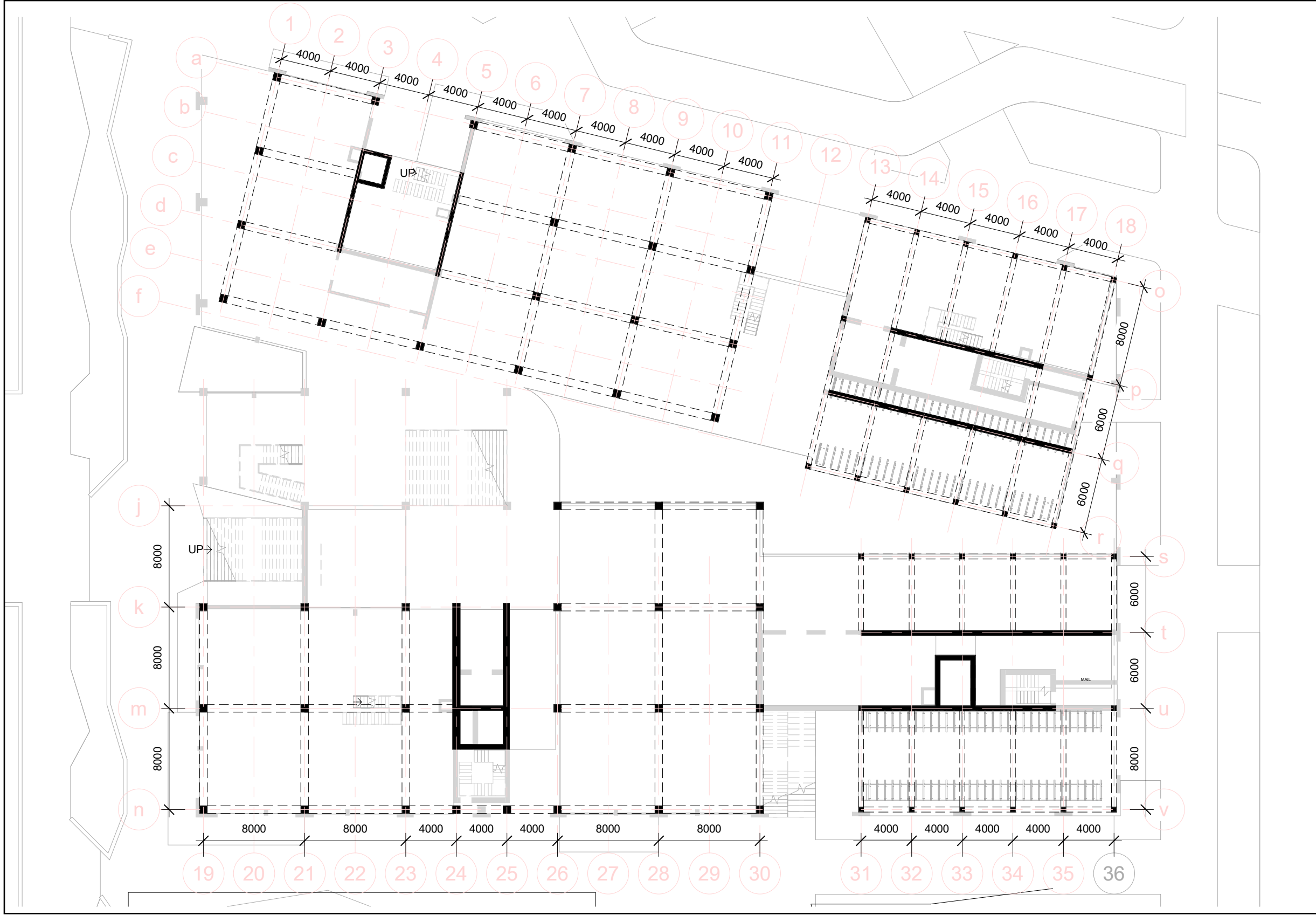
Overall load bearing structure concept



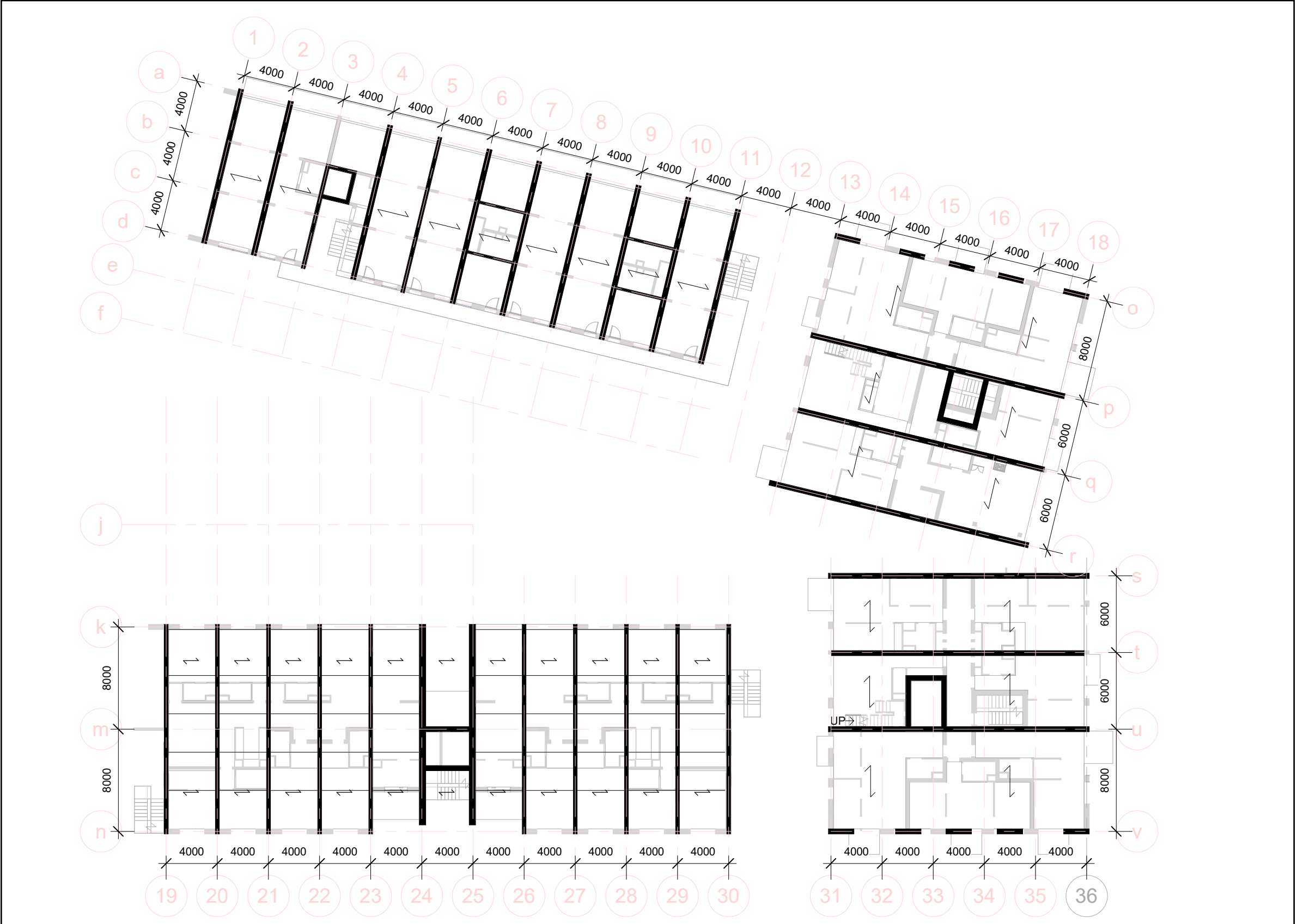


Transfer condition: production space and dwellings





General structural arrangement, Ground level



General structural arrangement, Typical apartment level

Structural System

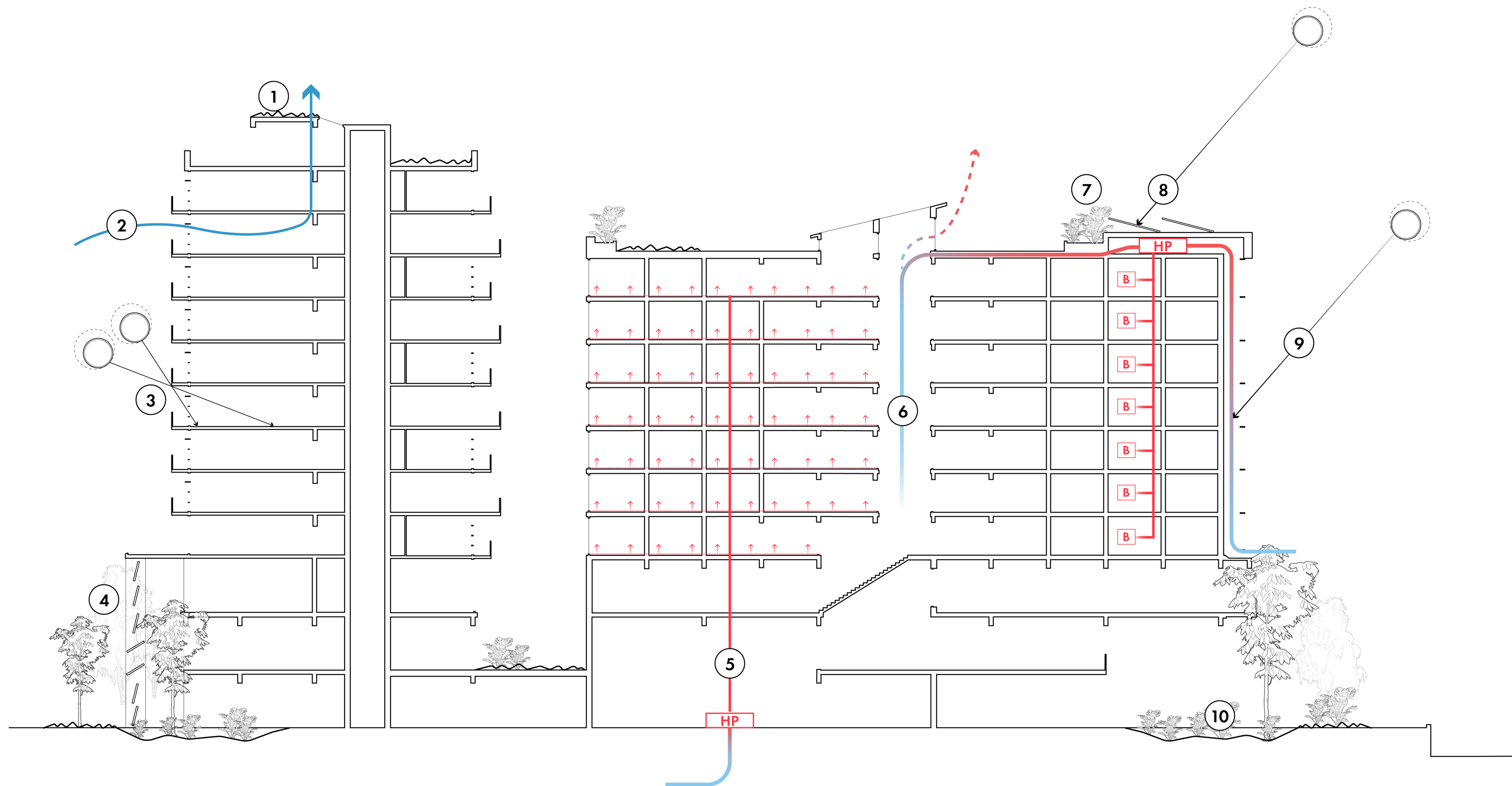
Overall load bearing structure



Section B

- 1 Collective rooftop garden, residential
- 2 Dwellings: compact type
- 3 Dwellings: 2-storey type
- 4 Dwellings: live/work
- 5 Storage
- 6 Residential lobby
- 7 Waste & loading dock
- 8 Workshop - 1:1 prototyping
- 9 Community maker space
- 10 Residential collective lounge
- 11 Residential workshop
- 12 Cohousing, collective kitchen
- 13 Cohousing, bedroom
- 14 Solar chimney



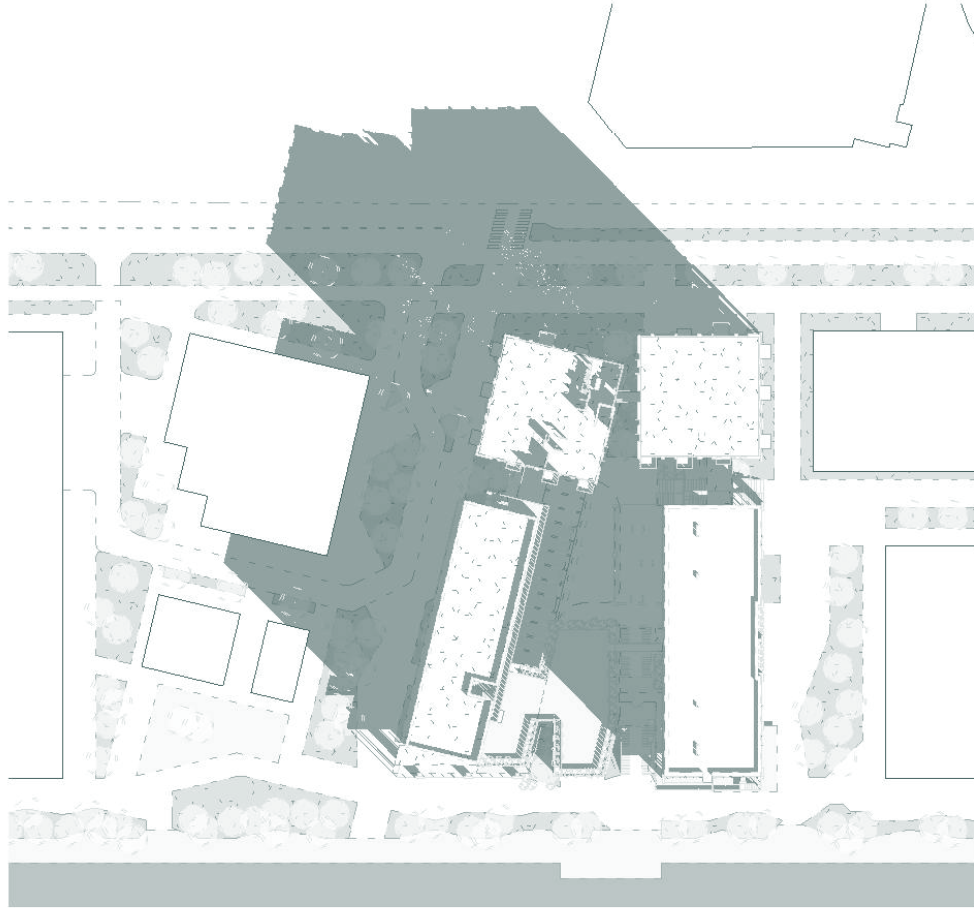


Climate section

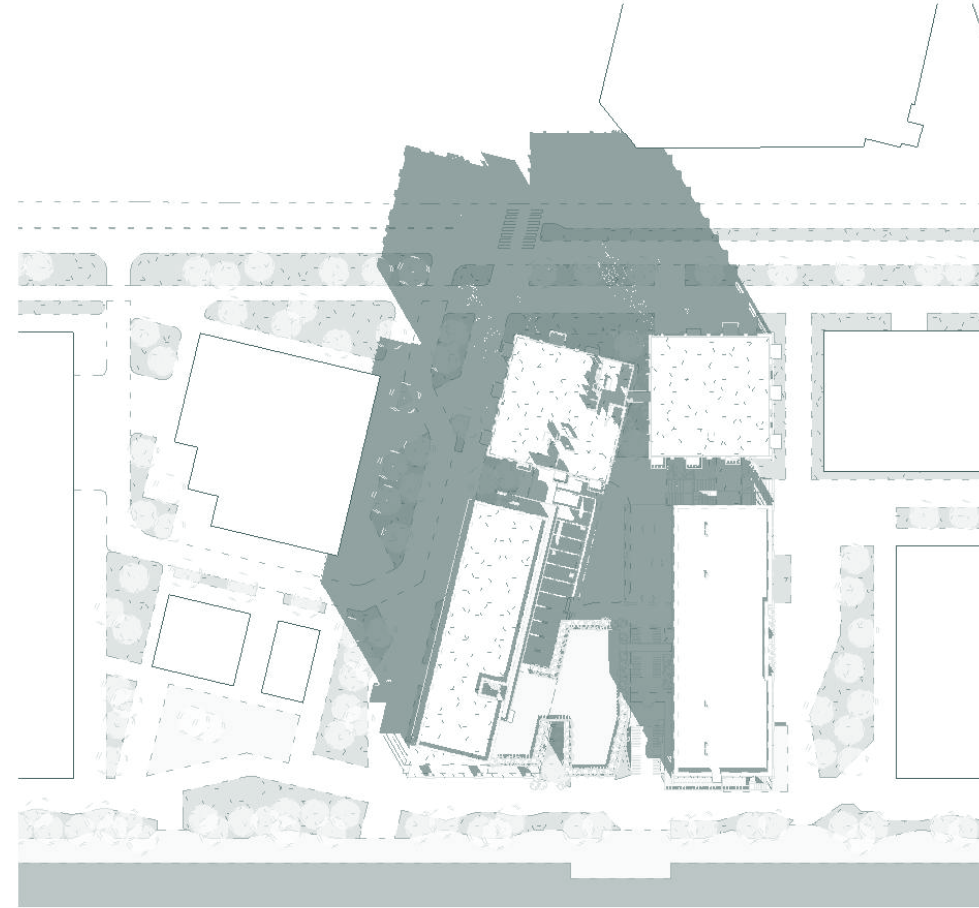
- 1 **Sedum roof** alleviates heat island effect and encourages biodiversity by attracting insects and birds
- 2 **Ventilation system C:** Natural in, mechanical out. Several units feature winter gardens for passive heat recovery.
- 3 **Passive shading:** Projecting facade elements and overhanging balconies provide shade during summer months.
- 4 **Gardens:** Glazed gardens at ground level provide an all-year planted outdoor space.
- 5 **Floor heating** is provided by geothermal heat via a heat pump.

- 6 **Stack effect:** Excess heat in atrium flushed out through skylight or recovered in heat pump depending on heating needs.
- 7 **Rooftop planters** for bio diversity, heat island reduction & air filtration.
- 8 **Energy generation** through PV panels on rooftop
- 9 **Solar chimneys:** Boilers heated by heat pump on roof. Low tech heat recovery through solar chimneys.
- 10 **Rain gardens:** Deep soil providing local water treatment & reduction in heat island effect

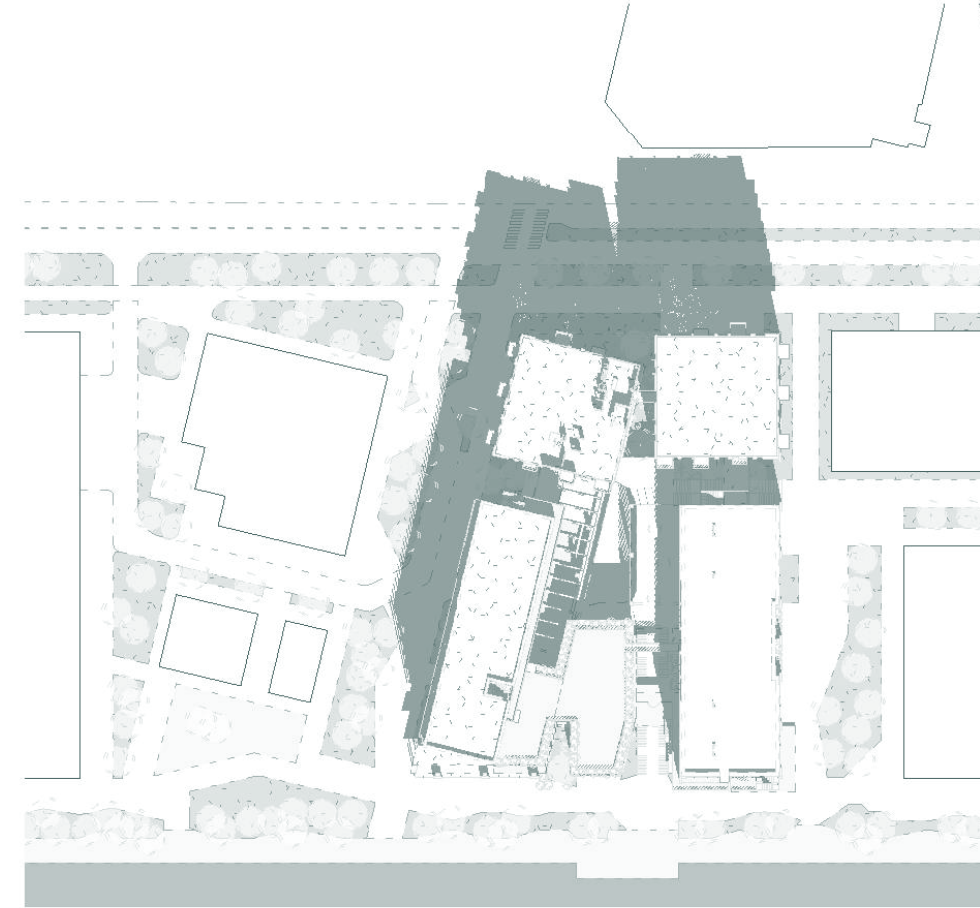
0900



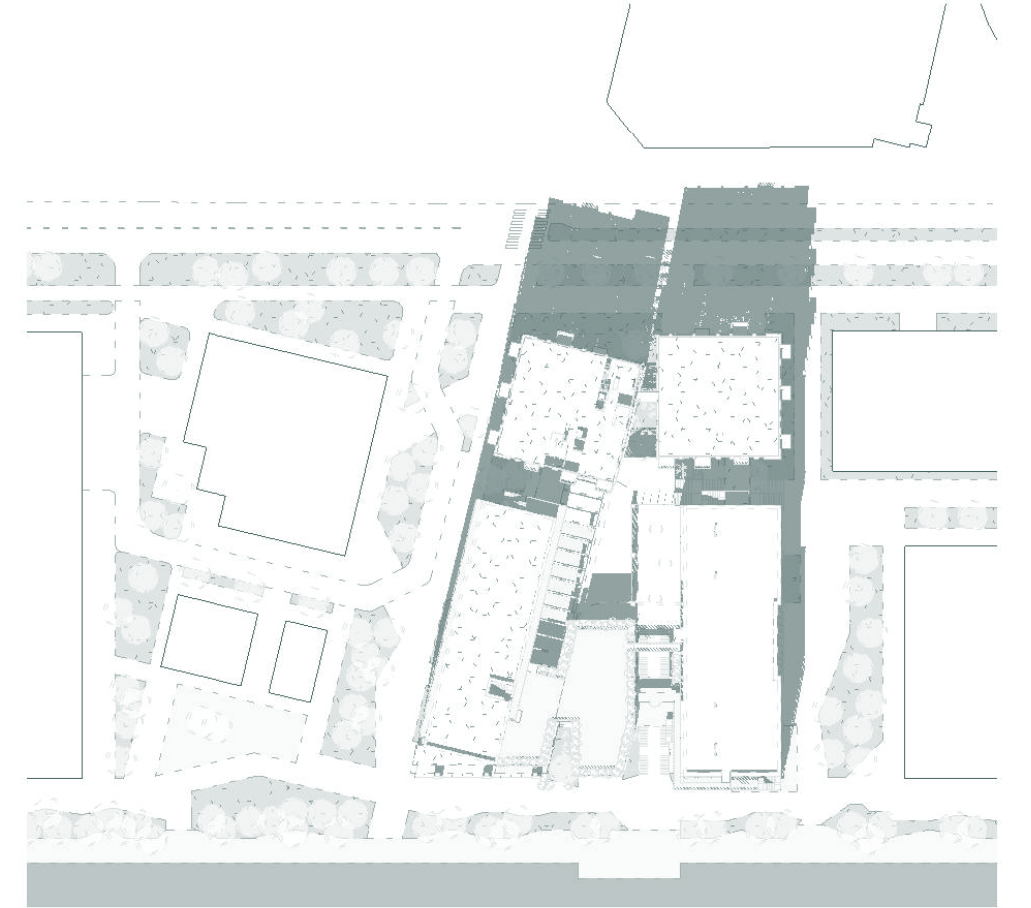
1000



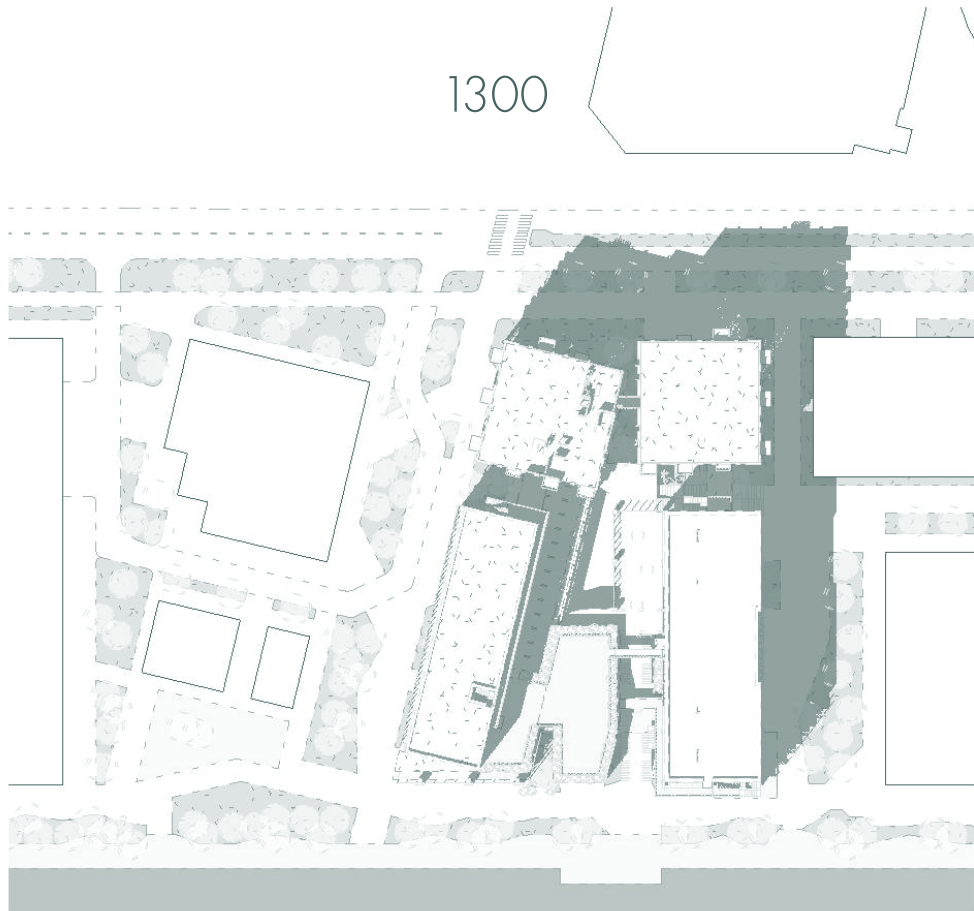
1100



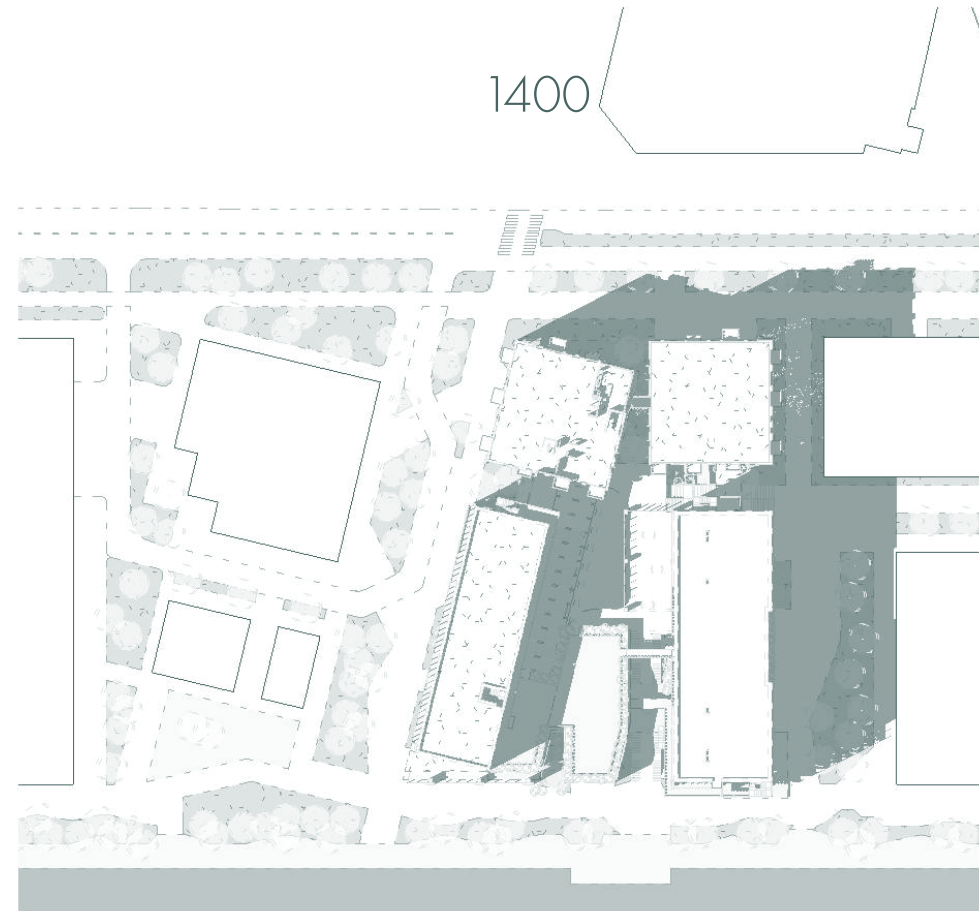
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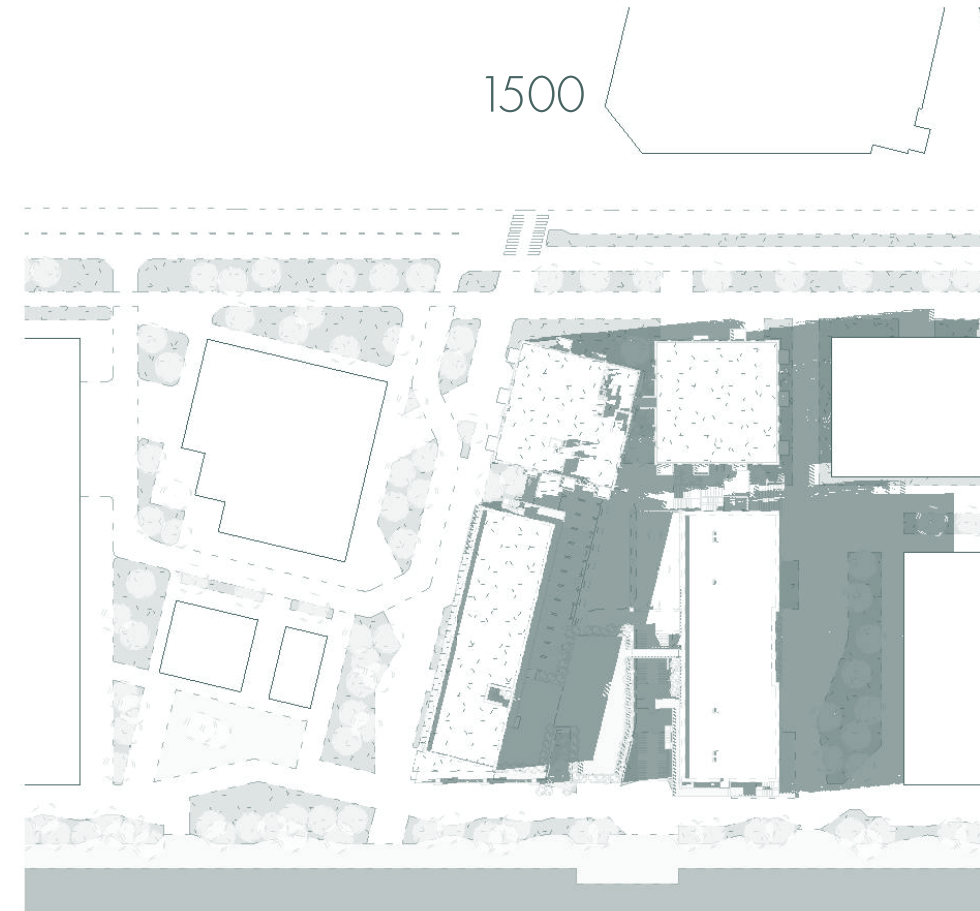
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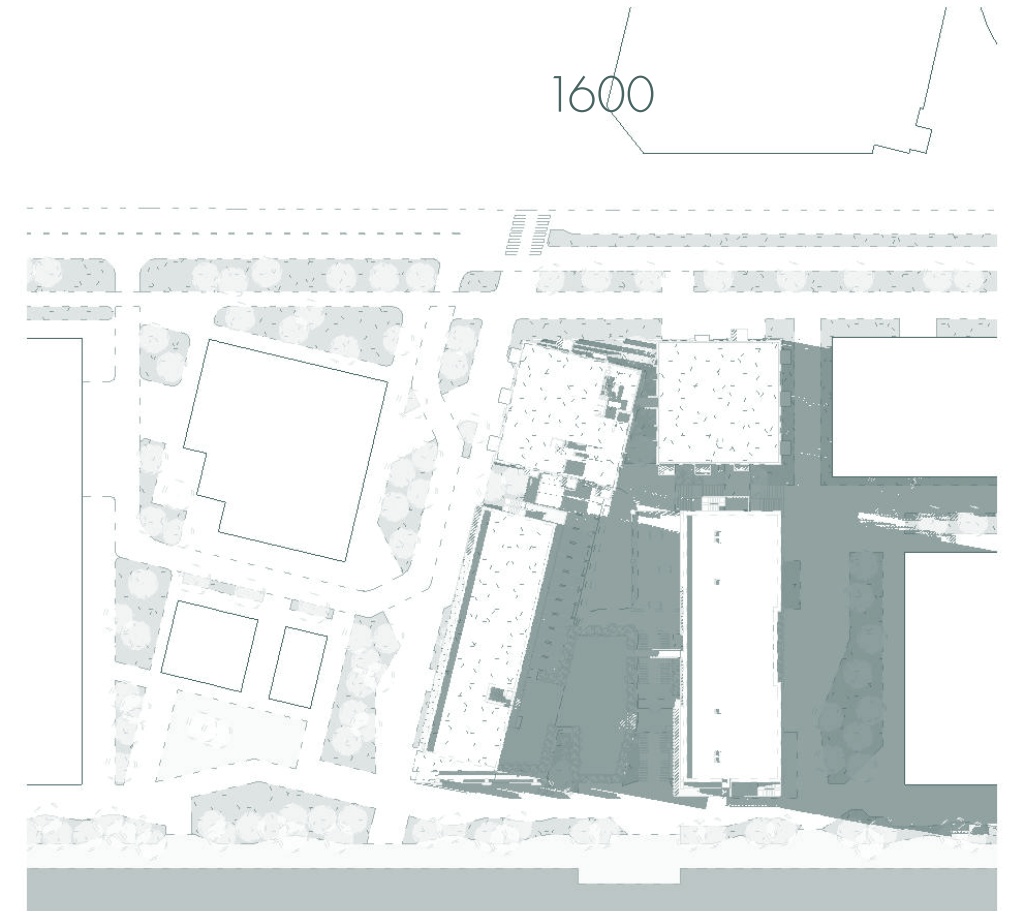
1400



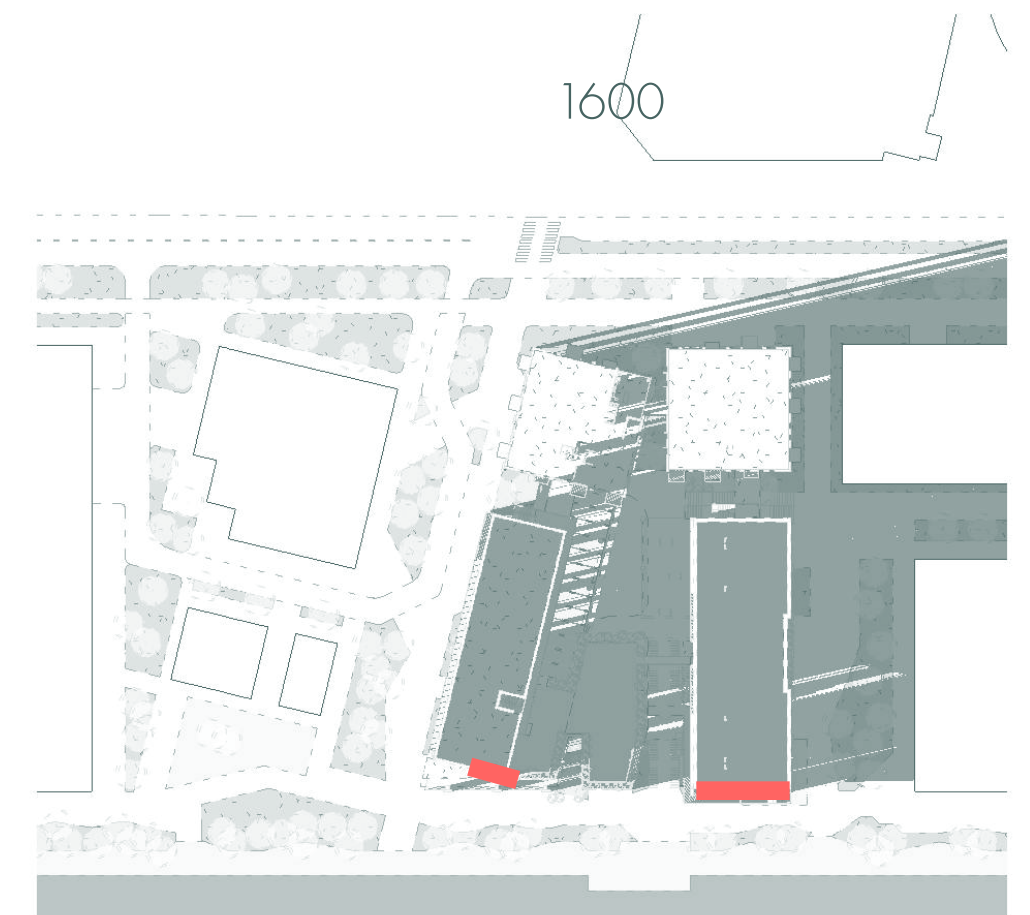
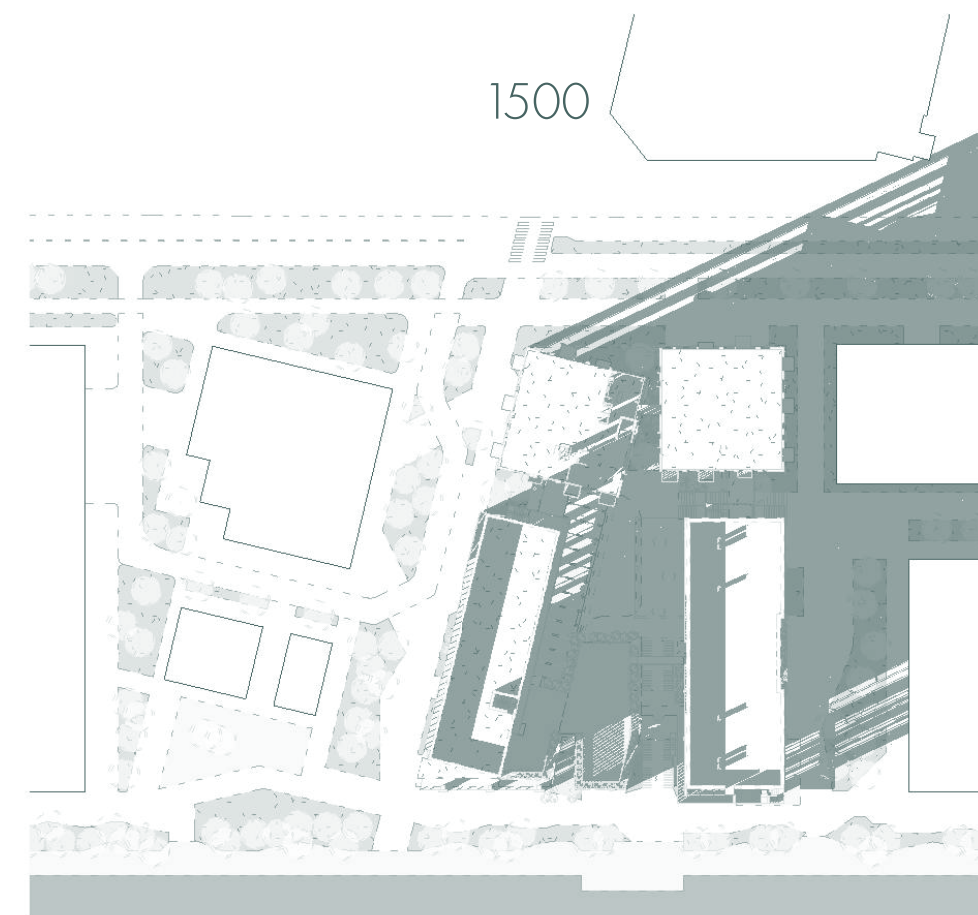
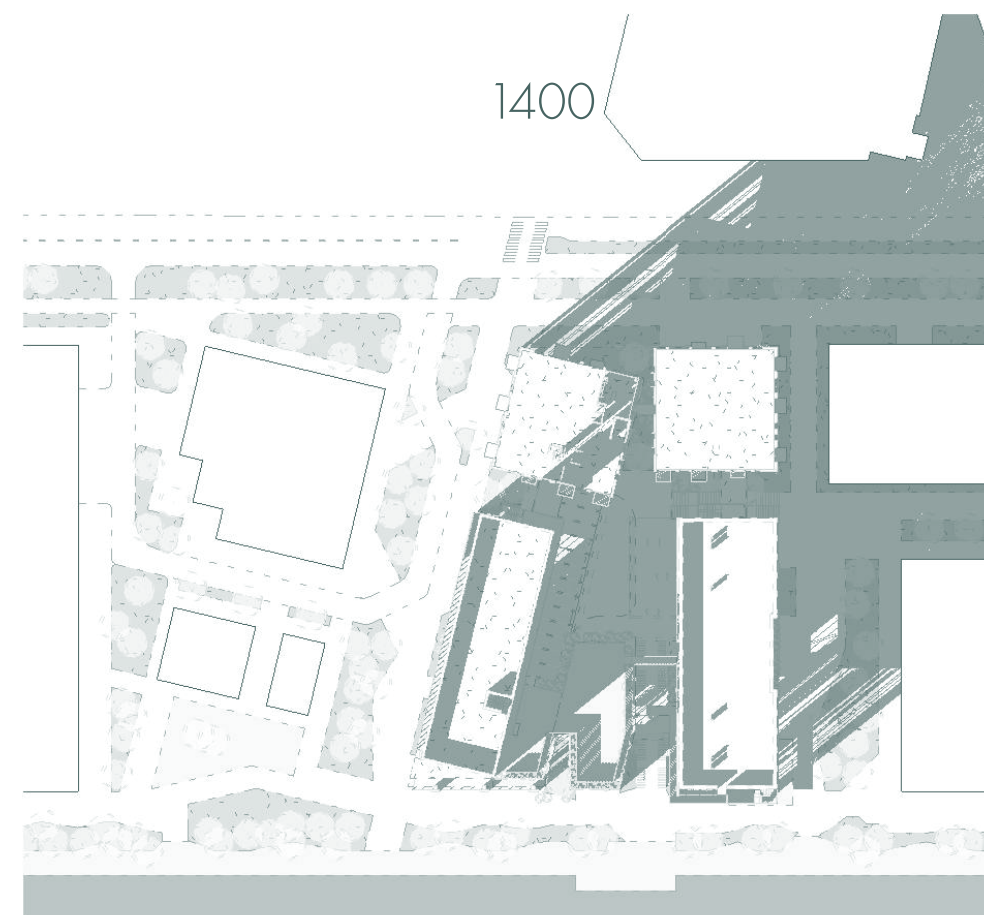
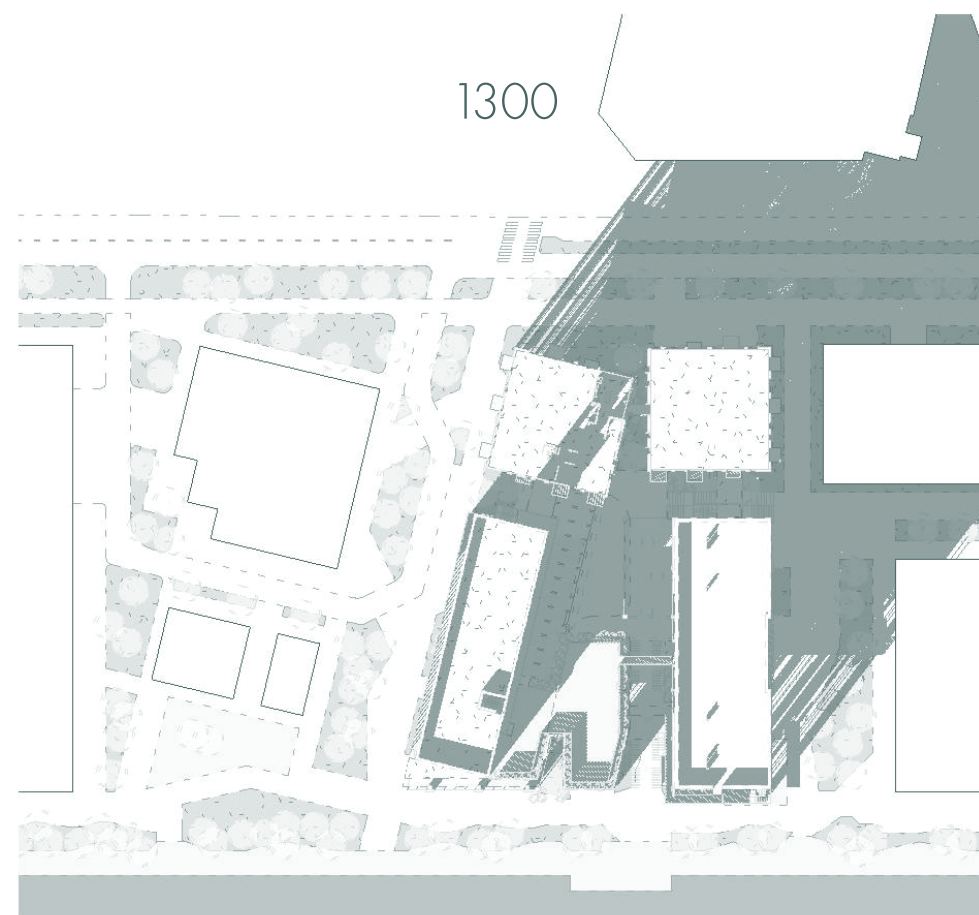
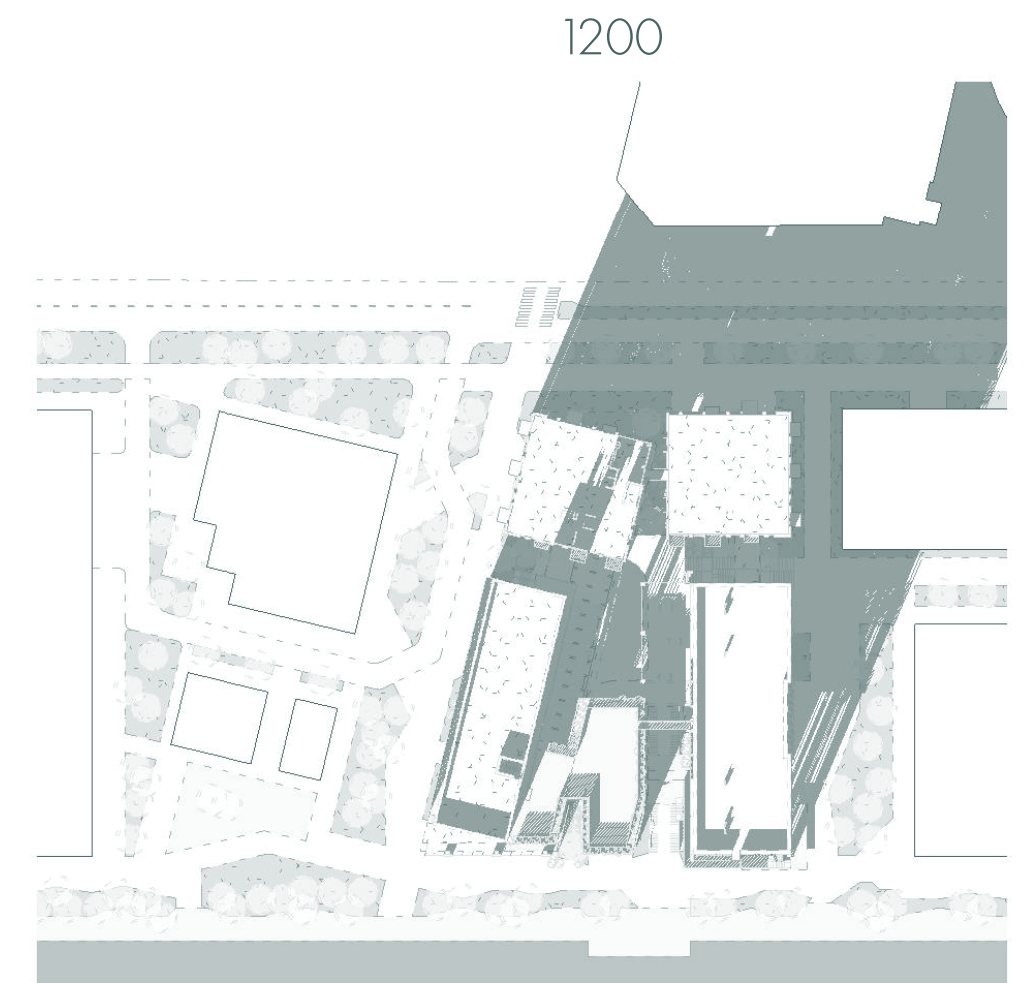
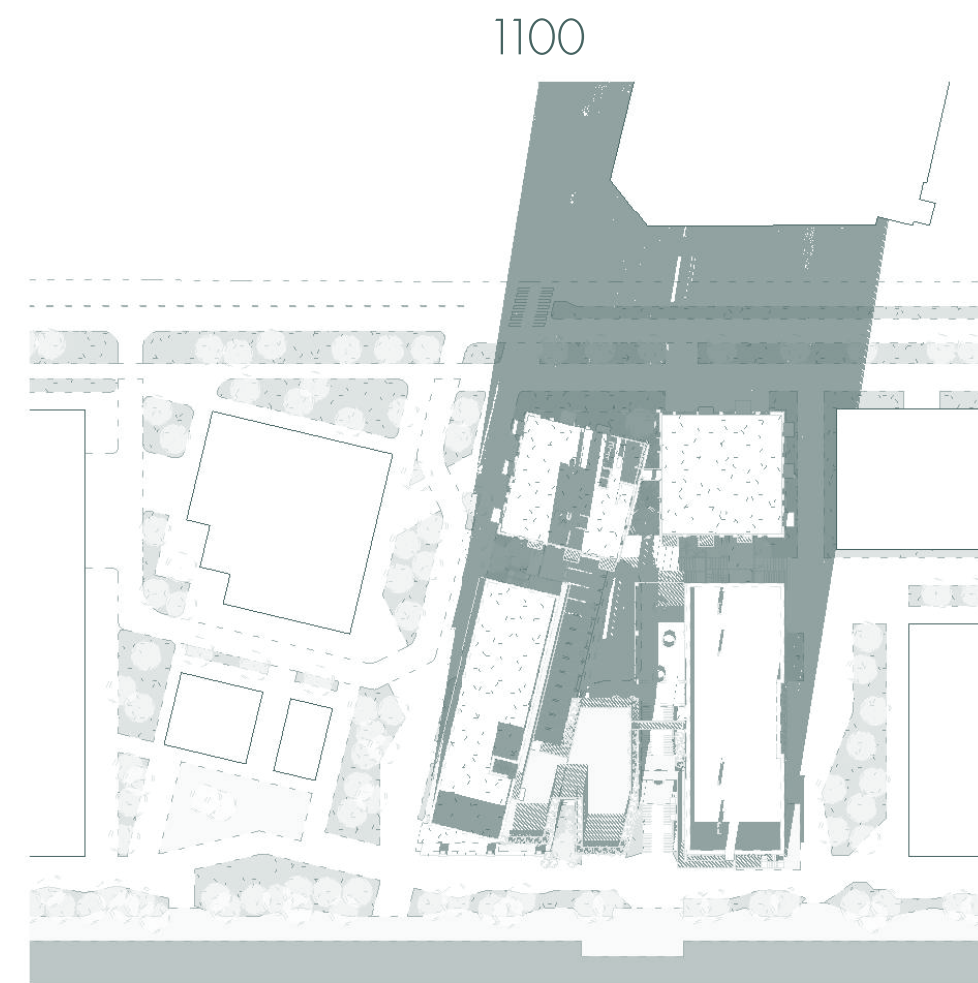
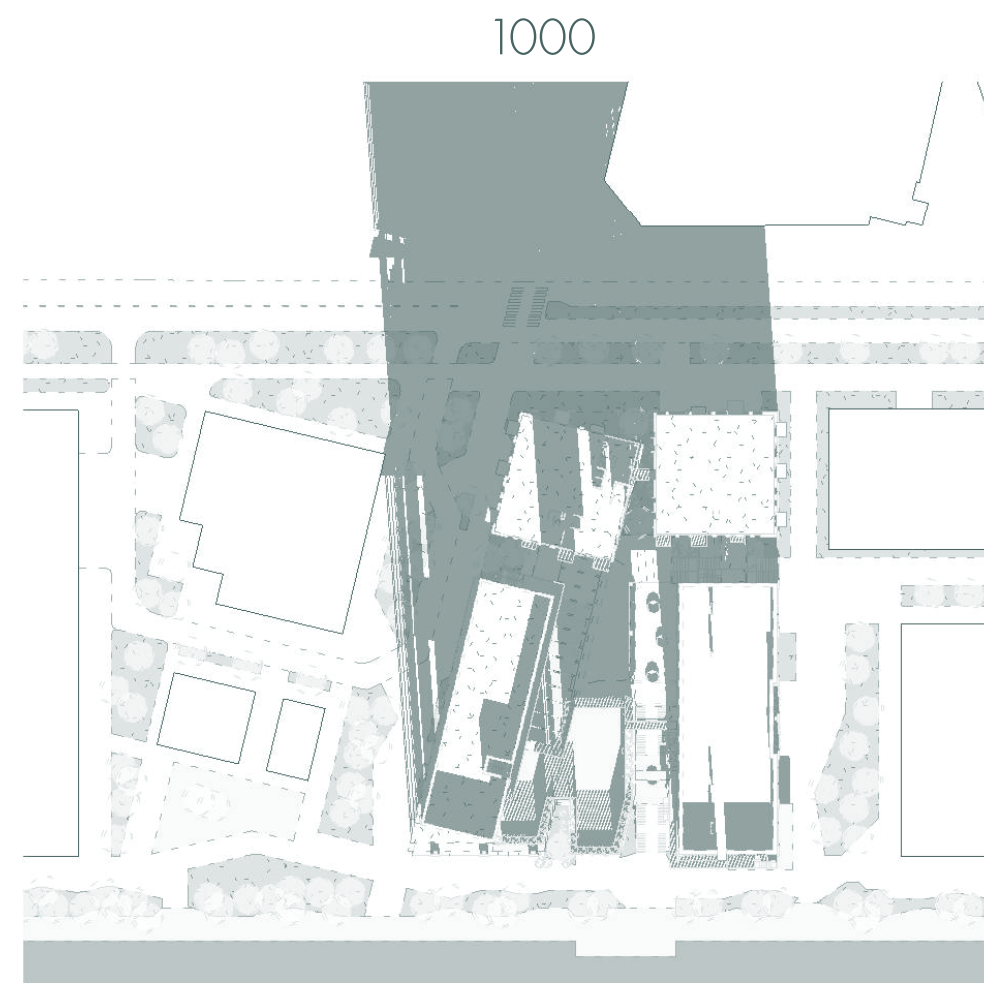
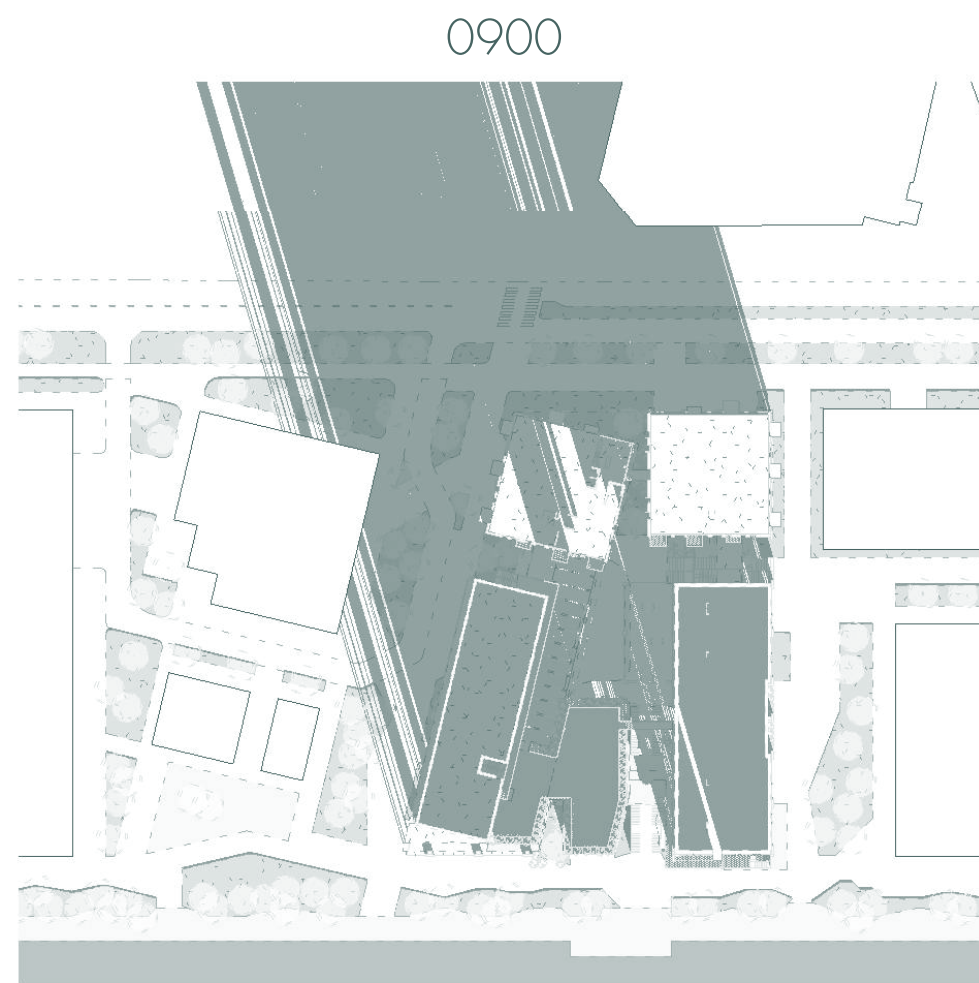
1500



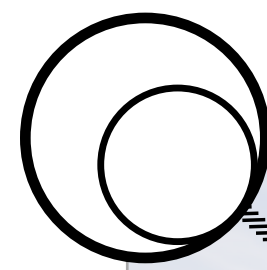
1600



Shadow study: Summer



Shadow study: Winter



Heat pump

Water boiler

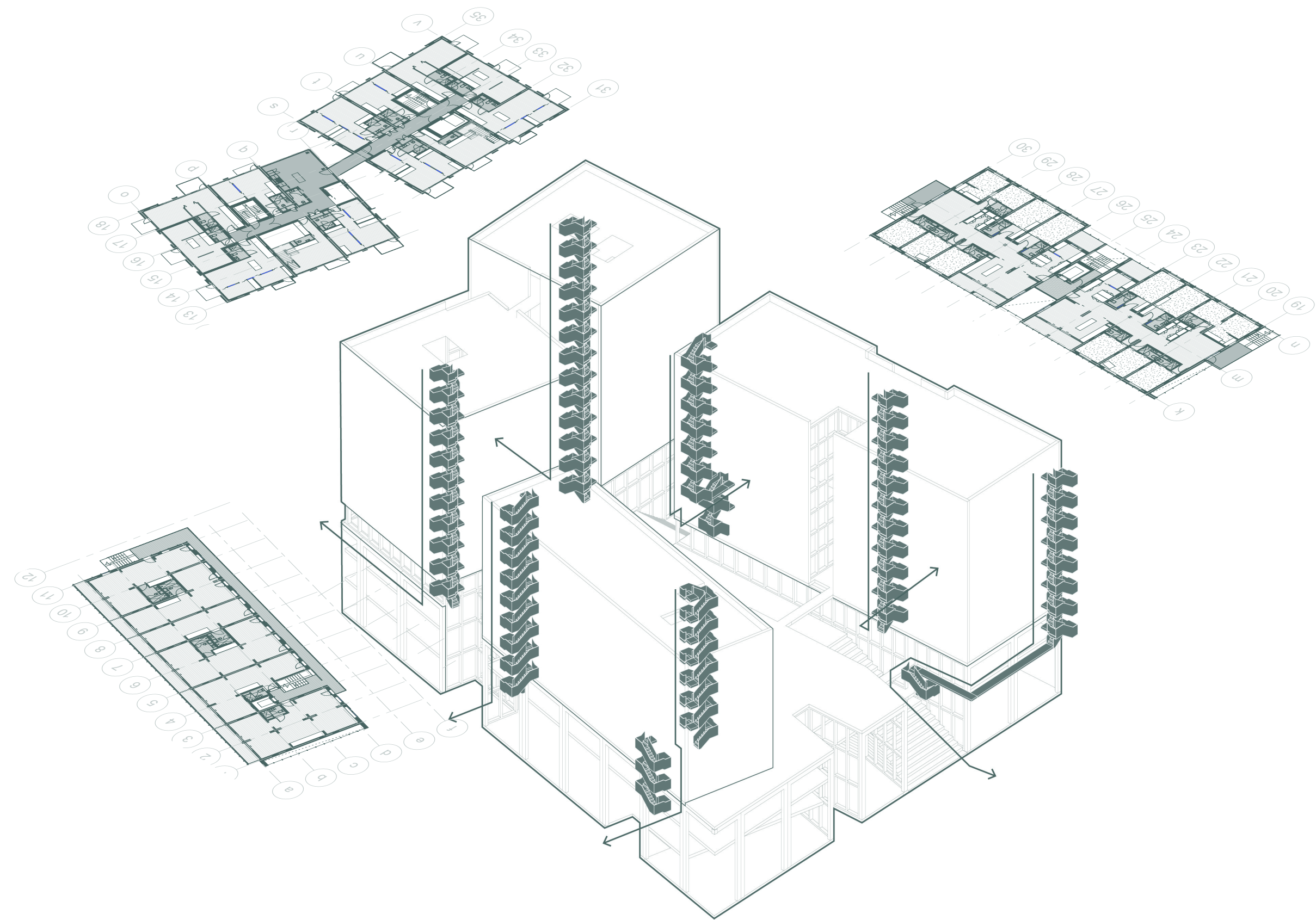
Glazing

Thermal mass: Rammed earth panel

Air inlet

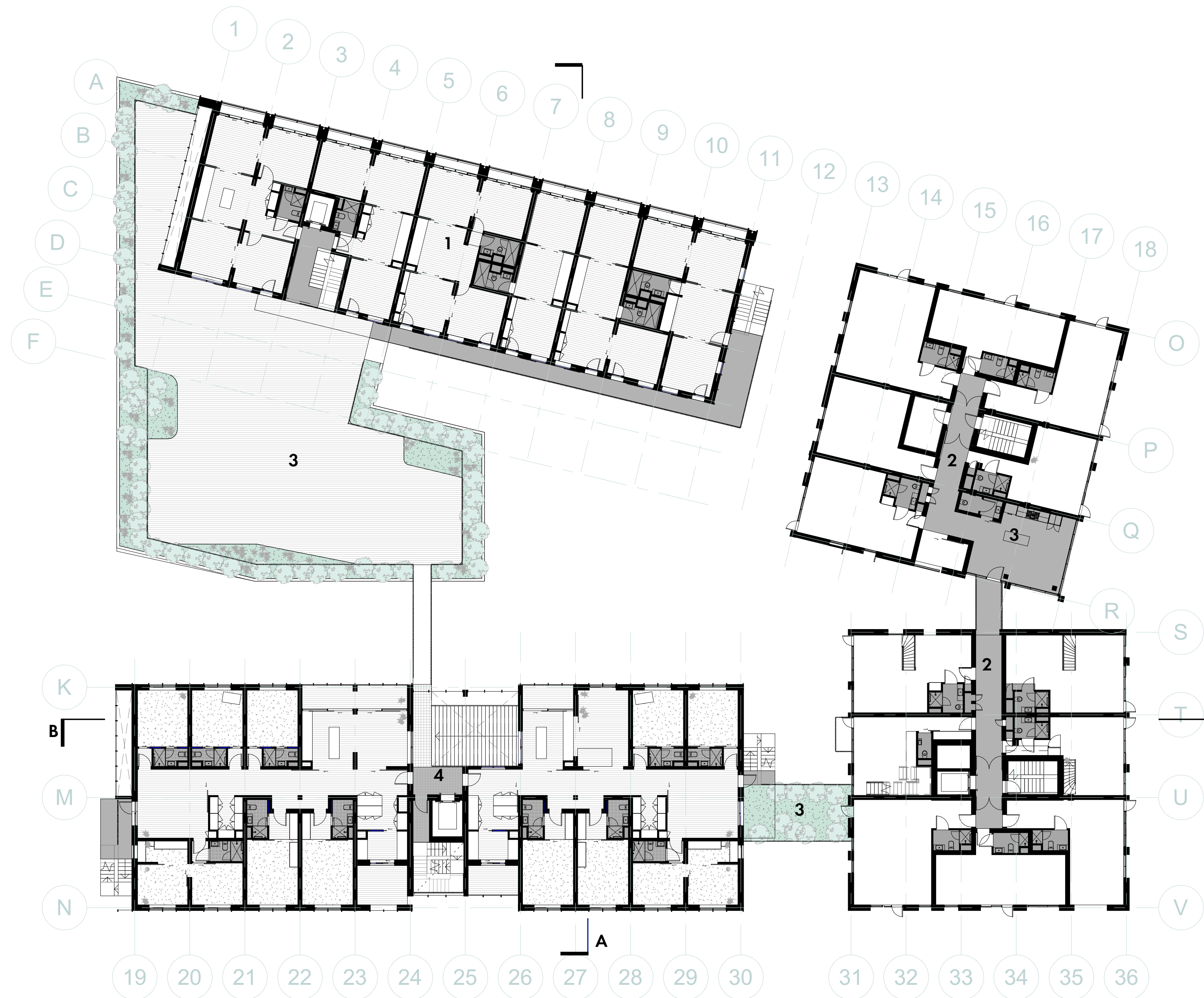
Passive heating: Solar chimney

Solar gain as heat recovery



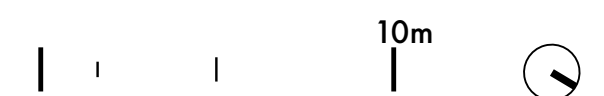
Dwelling typologies

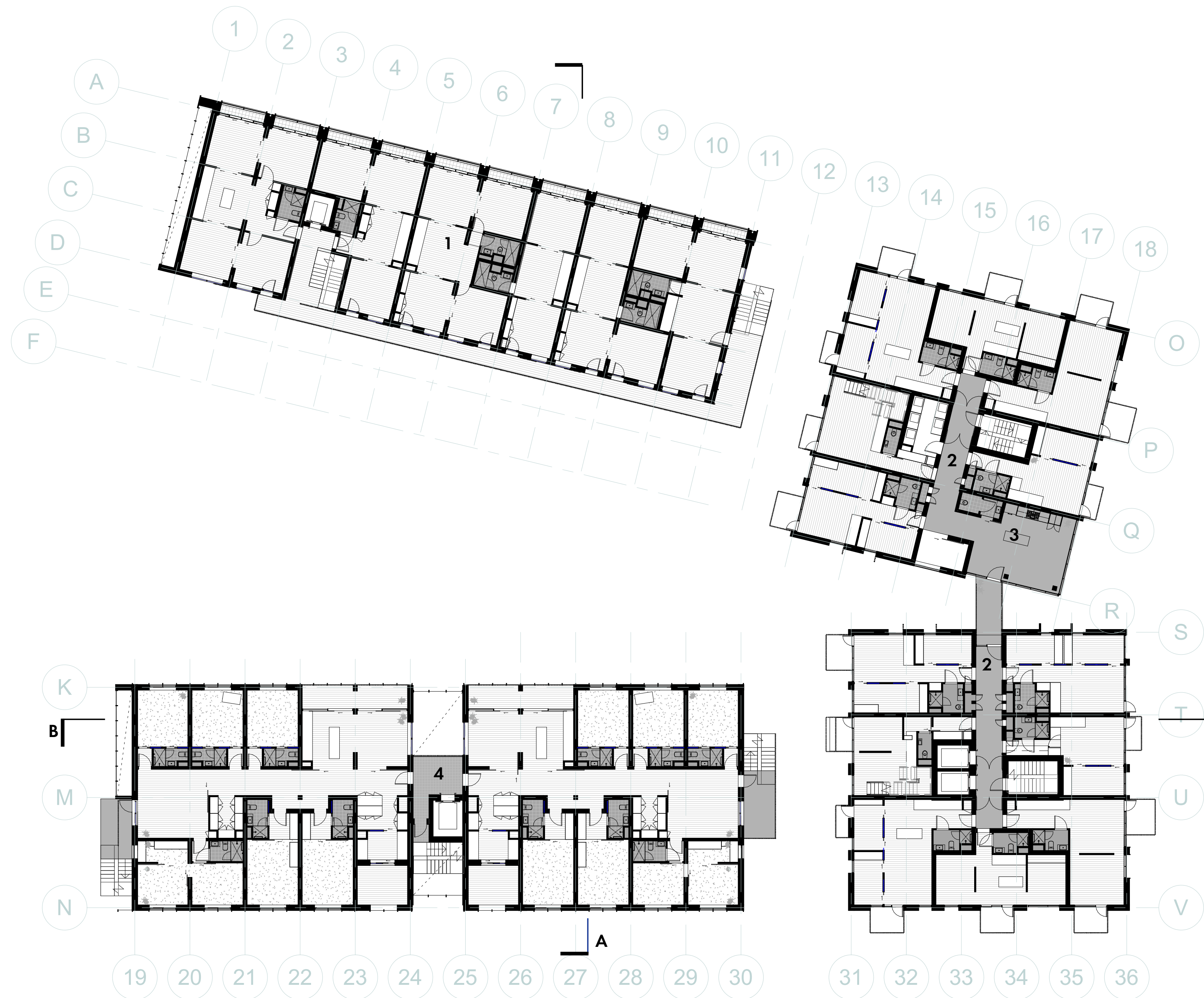
“architectural diagrams such as the bourgeois flat have become increasingly inadequate in terms of living and working conditions that cannot nowadays be explained using traditional categories. ”



Level 3

- 1 Apartments, Flexible type
- 2 Apartments, Live/work
- 3 Collective garden
- 4 Apartments, Cohousing

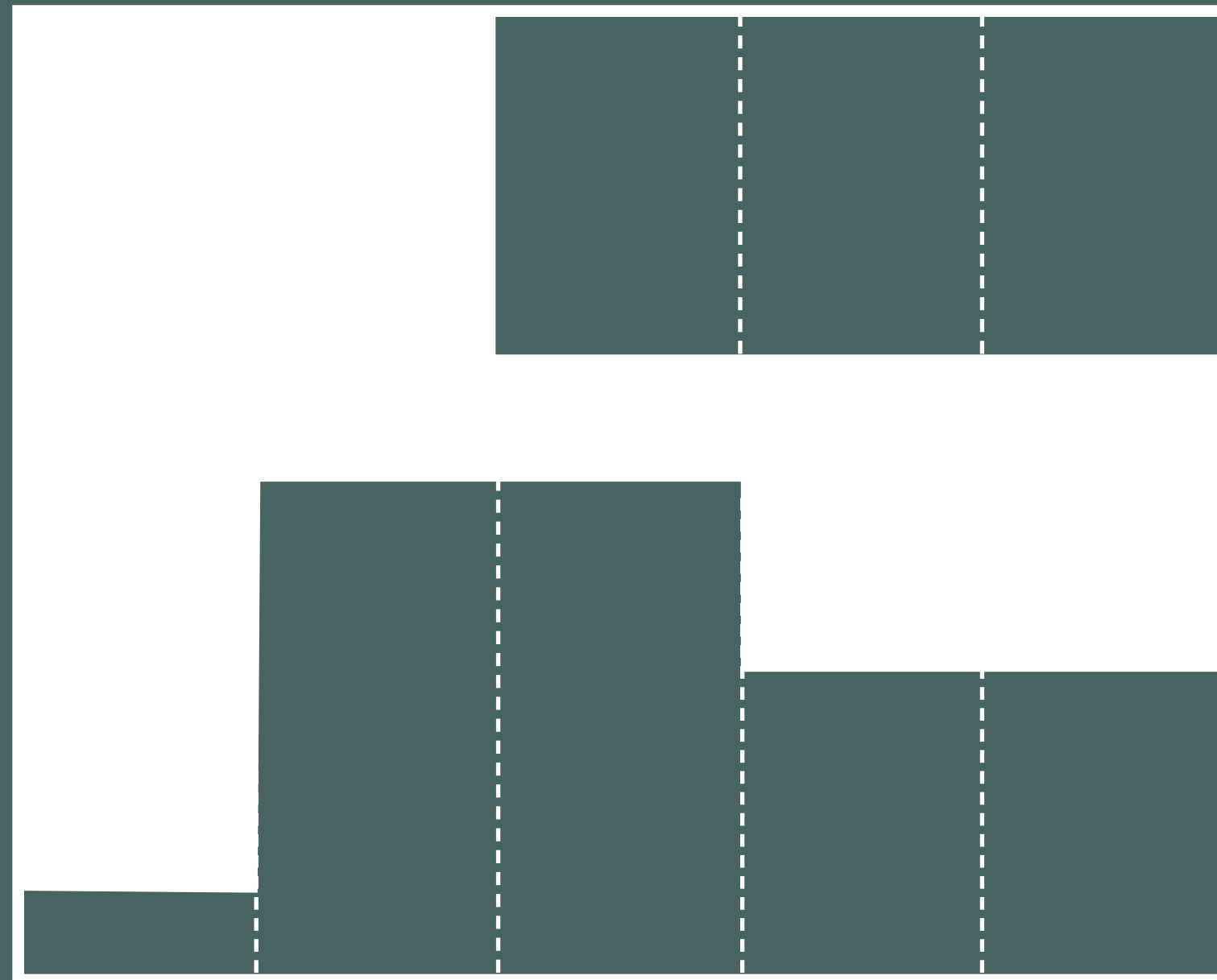




Level 4 (typical)

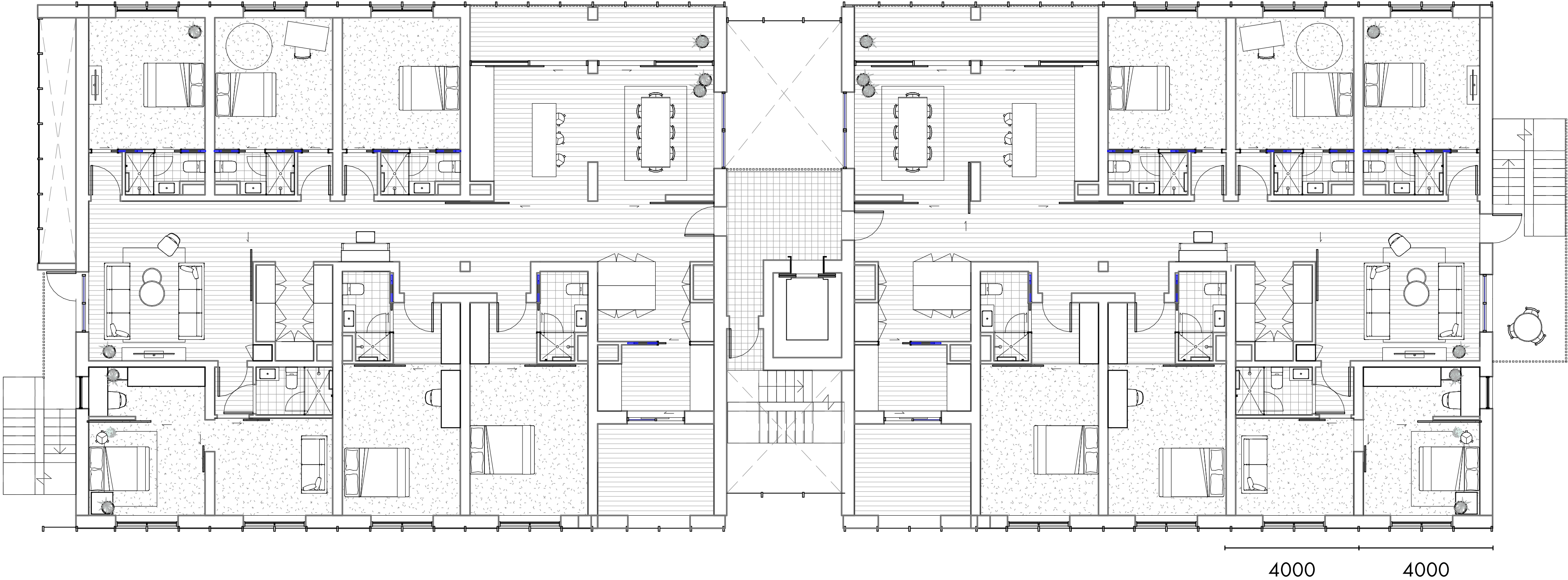
- 1 Apartments, Flexible type
- 2 Apartments, Compact type
- 3 Collective space
- 4 Apartments, Cohousing





Type 01:
The cluster dwelling

Block Concept



Dwelling Concept 1

Cluster apartments



Dwelling Concept 1

Cluster apartments



- WG** Winter garden
- D** Dining
- K** Kitchen
- ST** Storage
- LDY** Laundry
- DRY** Drying area
- ST** Storage
- L** Living
- B** Balcony





Spaces of social encounter:
Lobby





Spaces of social encounter:
Stairwell





Spaces of social encounter:
Collective lounge





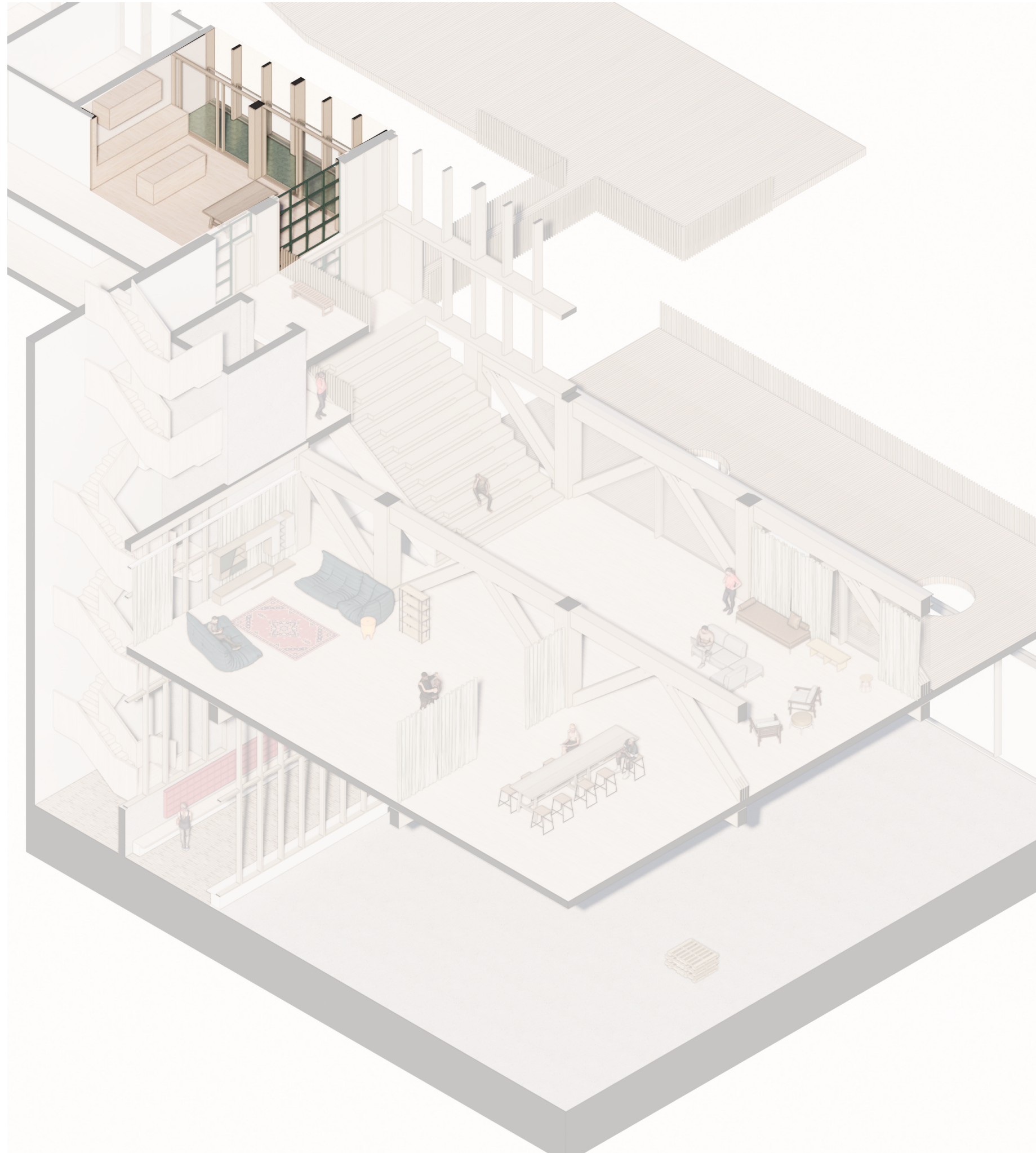
Spaces of social encounter:
Shared circulation space





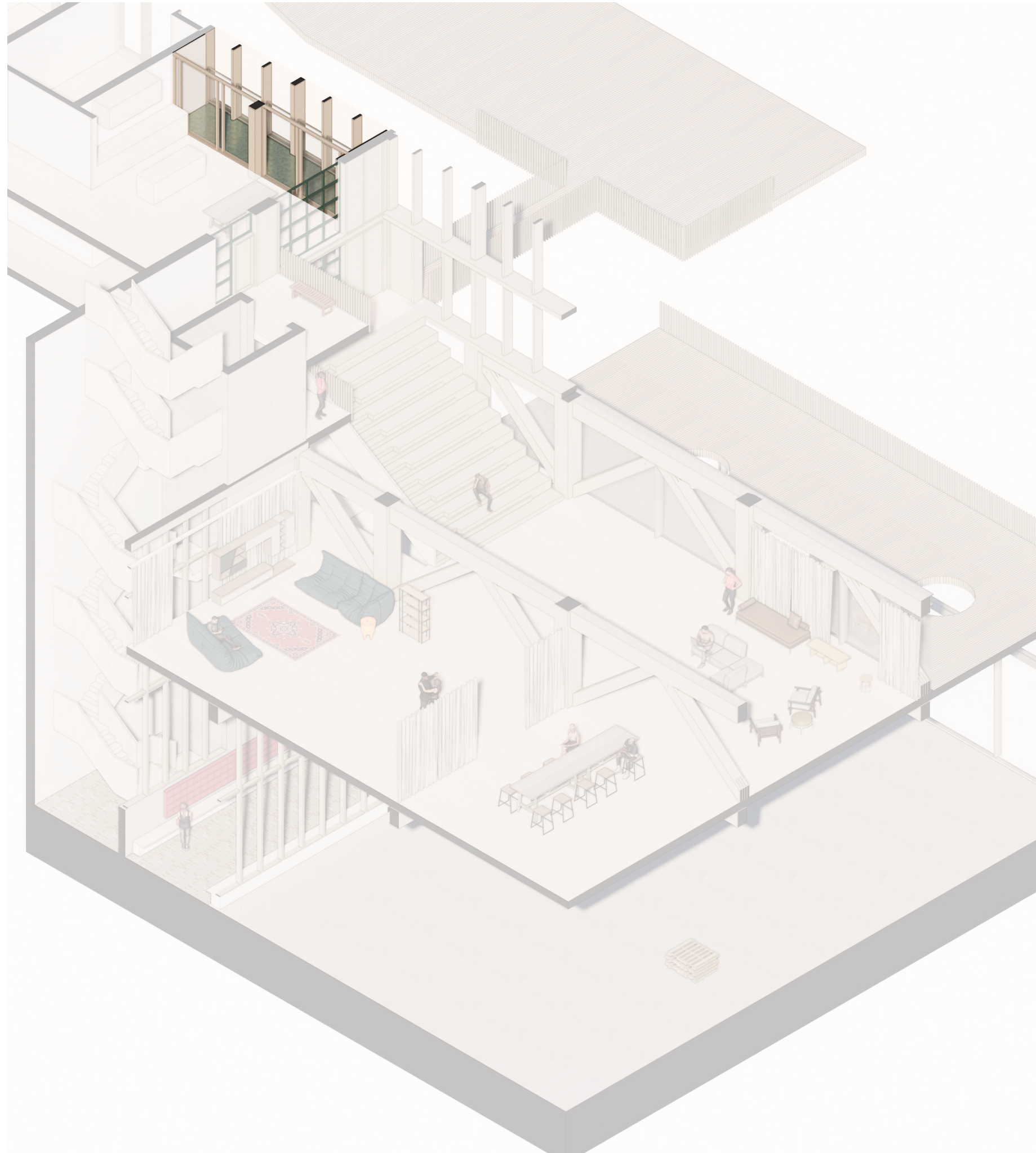
Spaces of social encounter:
Landing



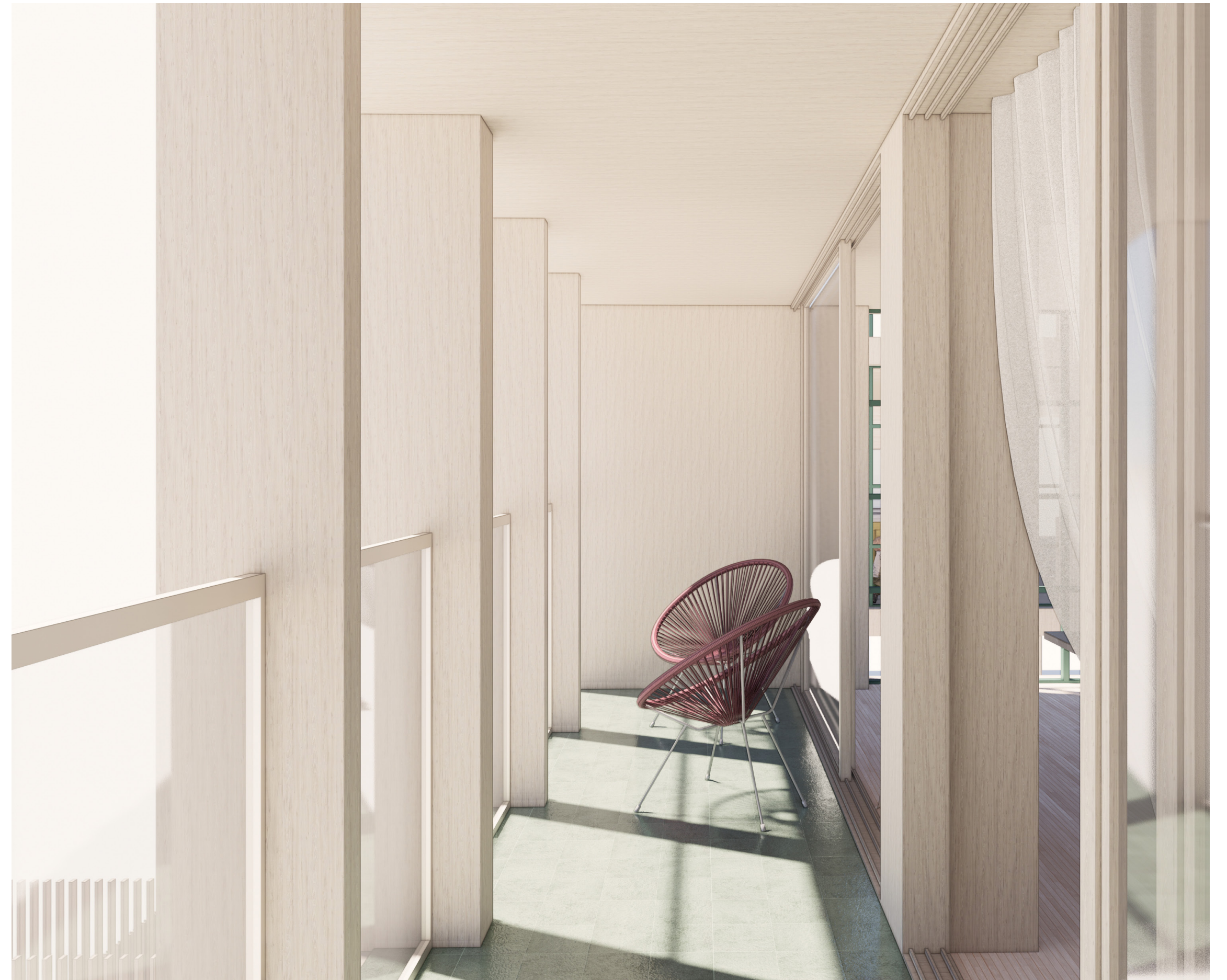


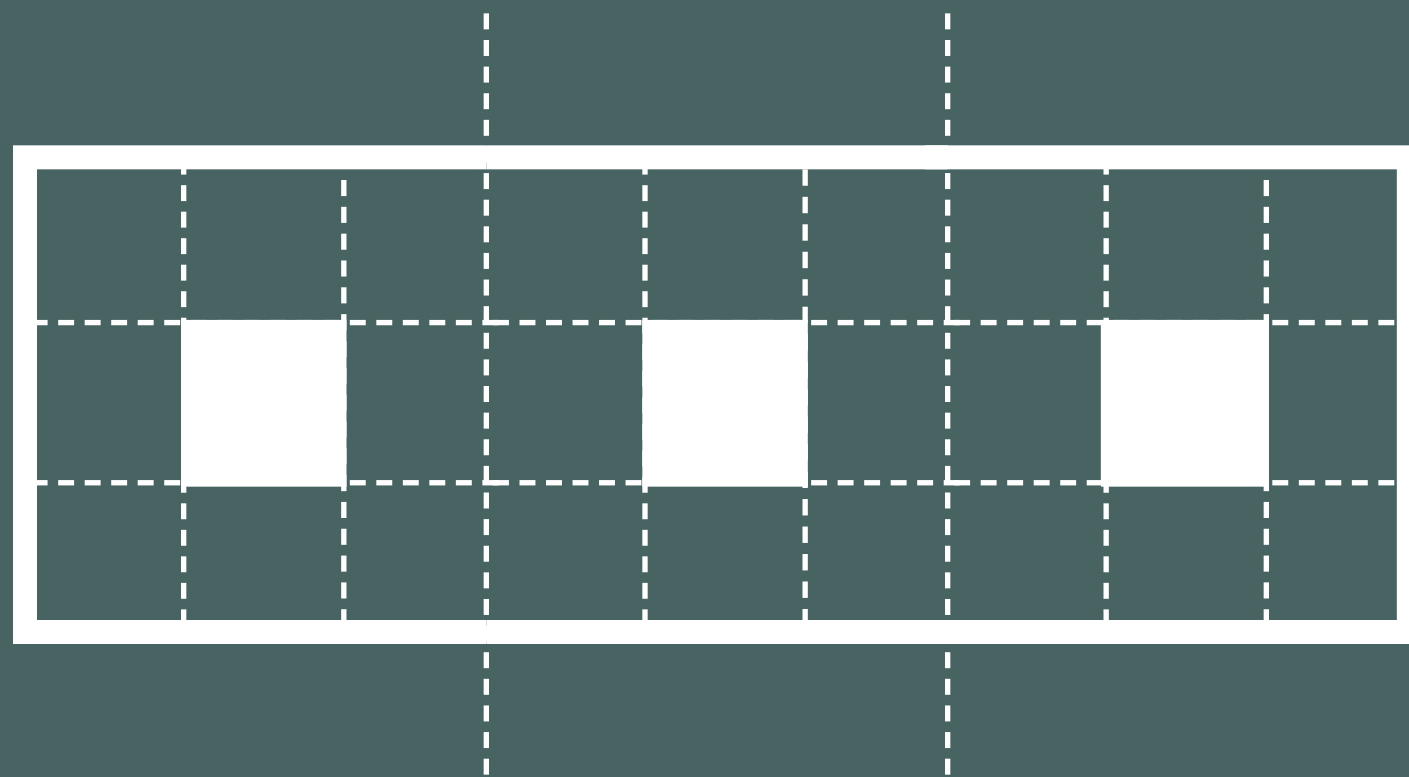
Spaces of social encounter:
Cluster kitchen





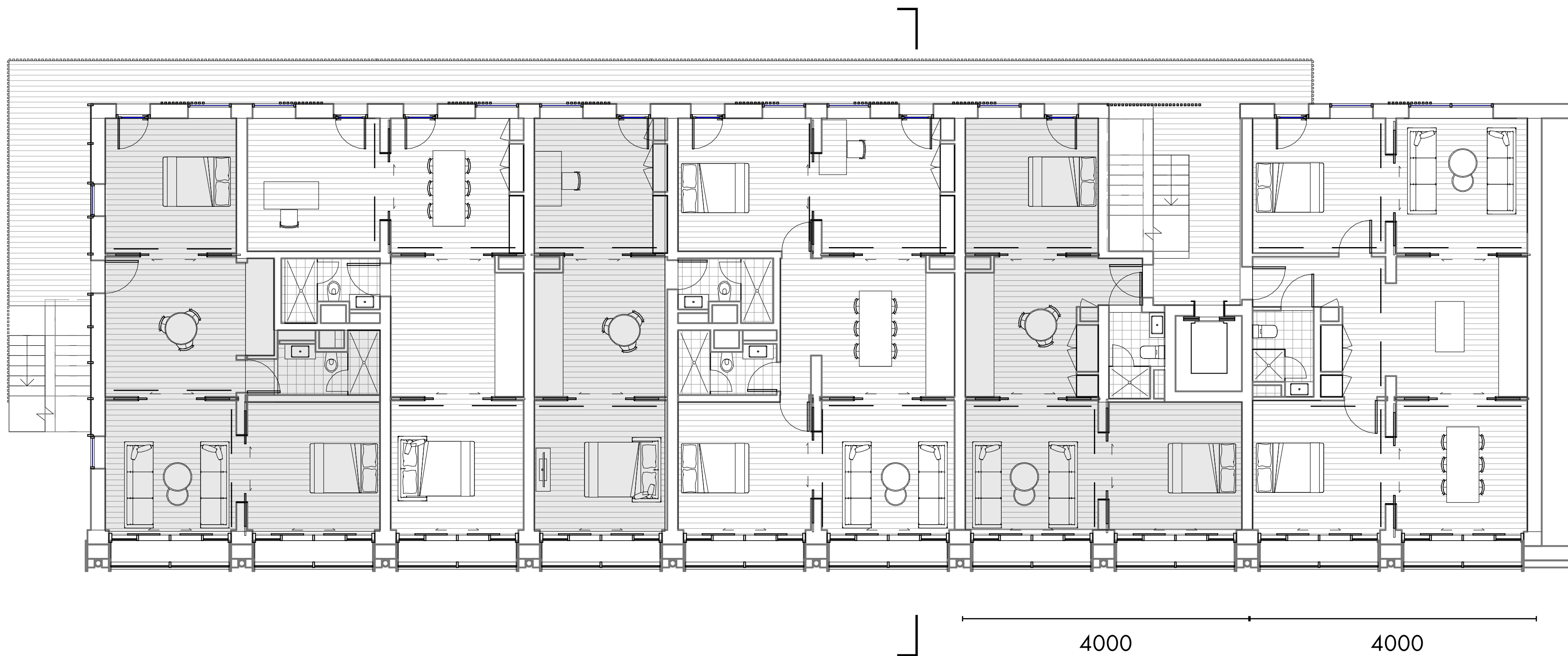
Spaces of social encounter:
Cluster balcony





Type 02:

The indeterminate plan



Dwelling sizes: **40-80m²**

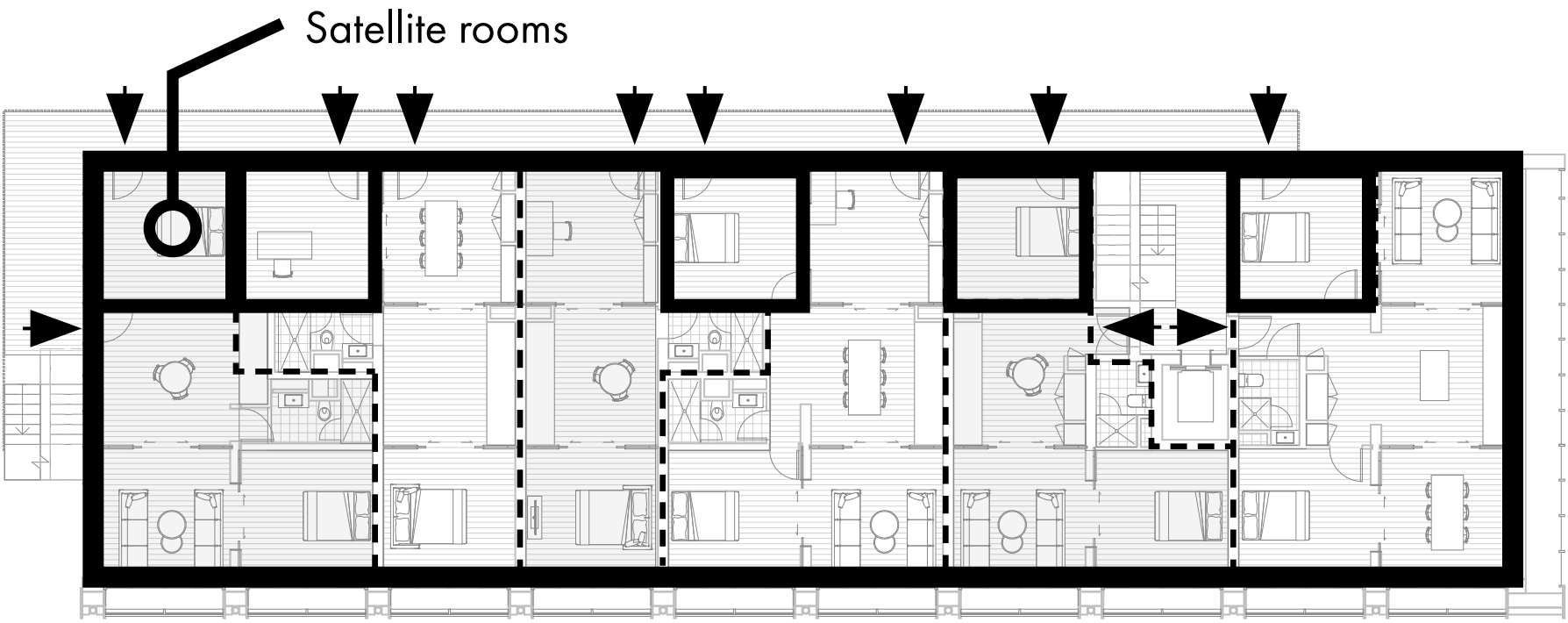
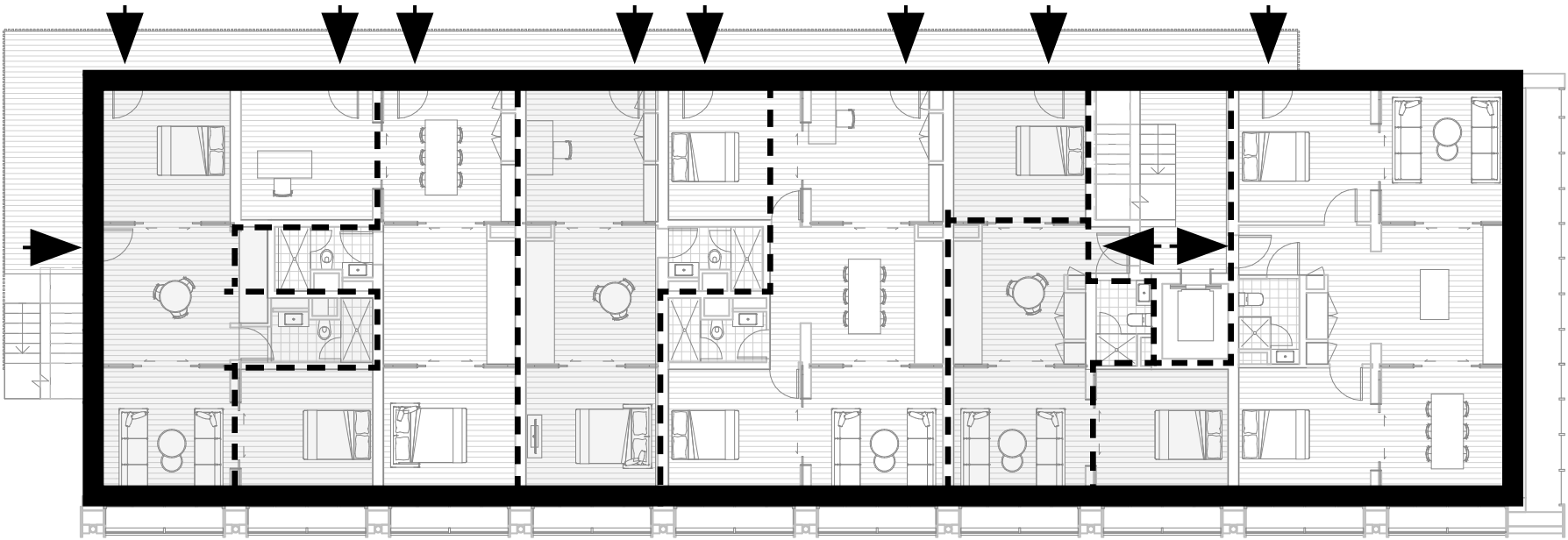
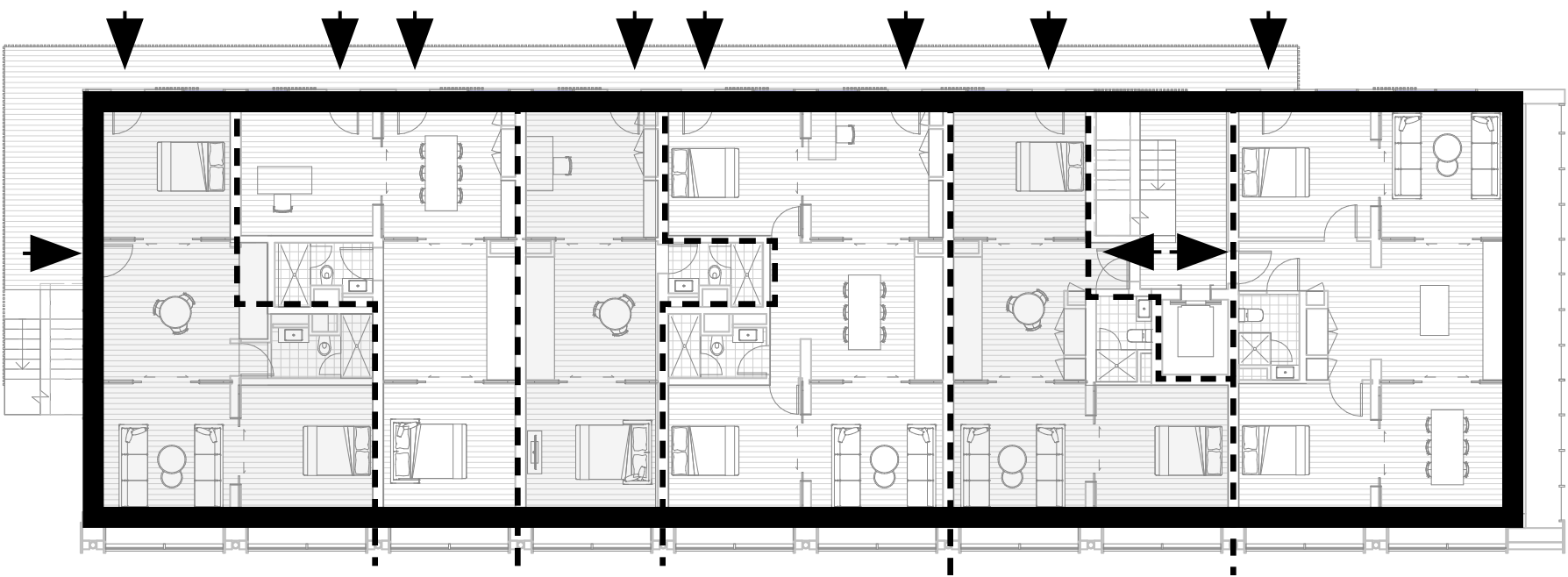
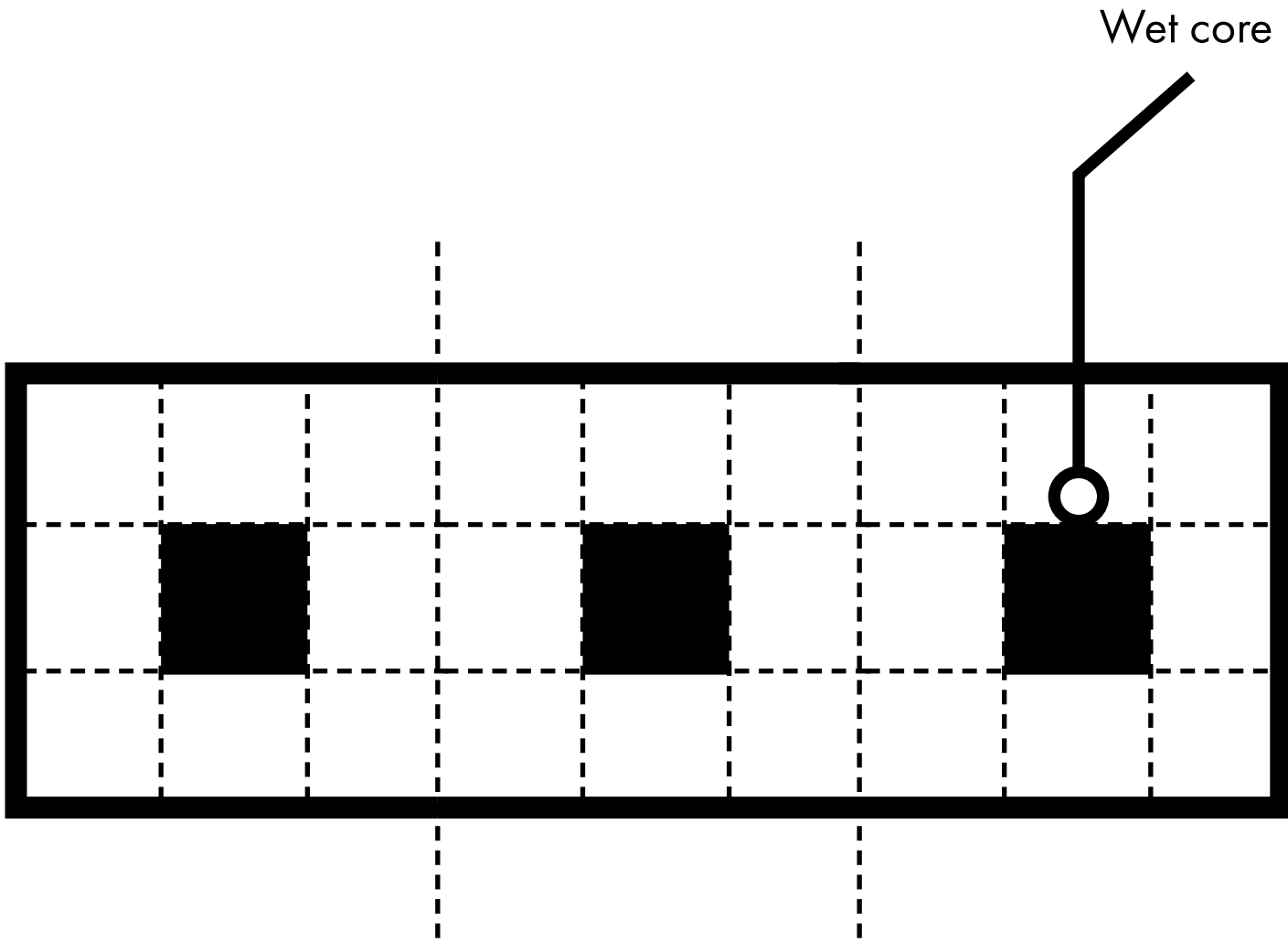
Dwelling Concept 2

The indeterminate plan



Flexibility Principles: Construction

Year 0: Flexibility in unit layouts during design & initial construction
Year 0-10: Dual entries & dual aspects allow for multiple furnishing options
Year 20+: Unit partitions able to change over time.



Dwelling Concept 2

The indeterminate plan

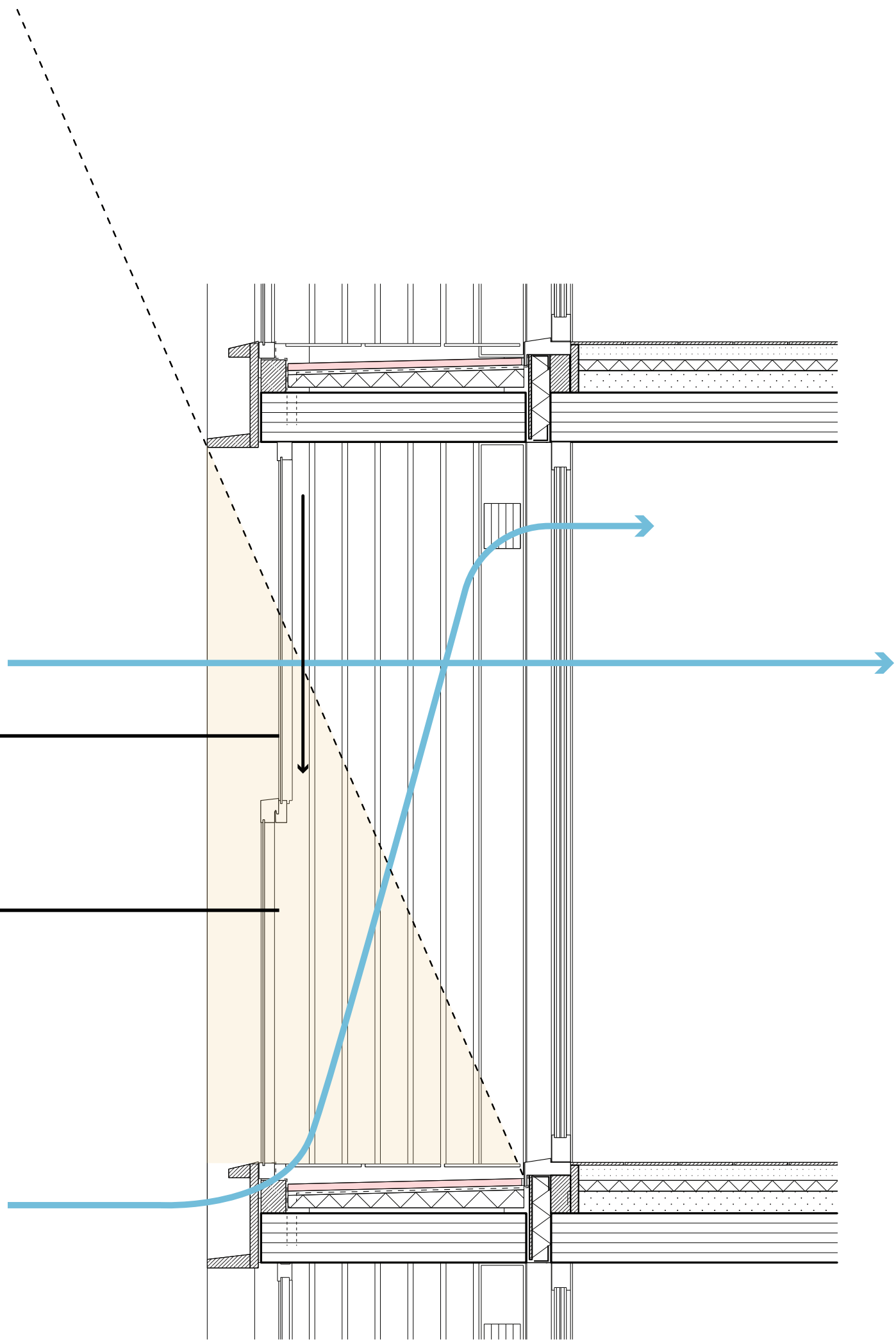








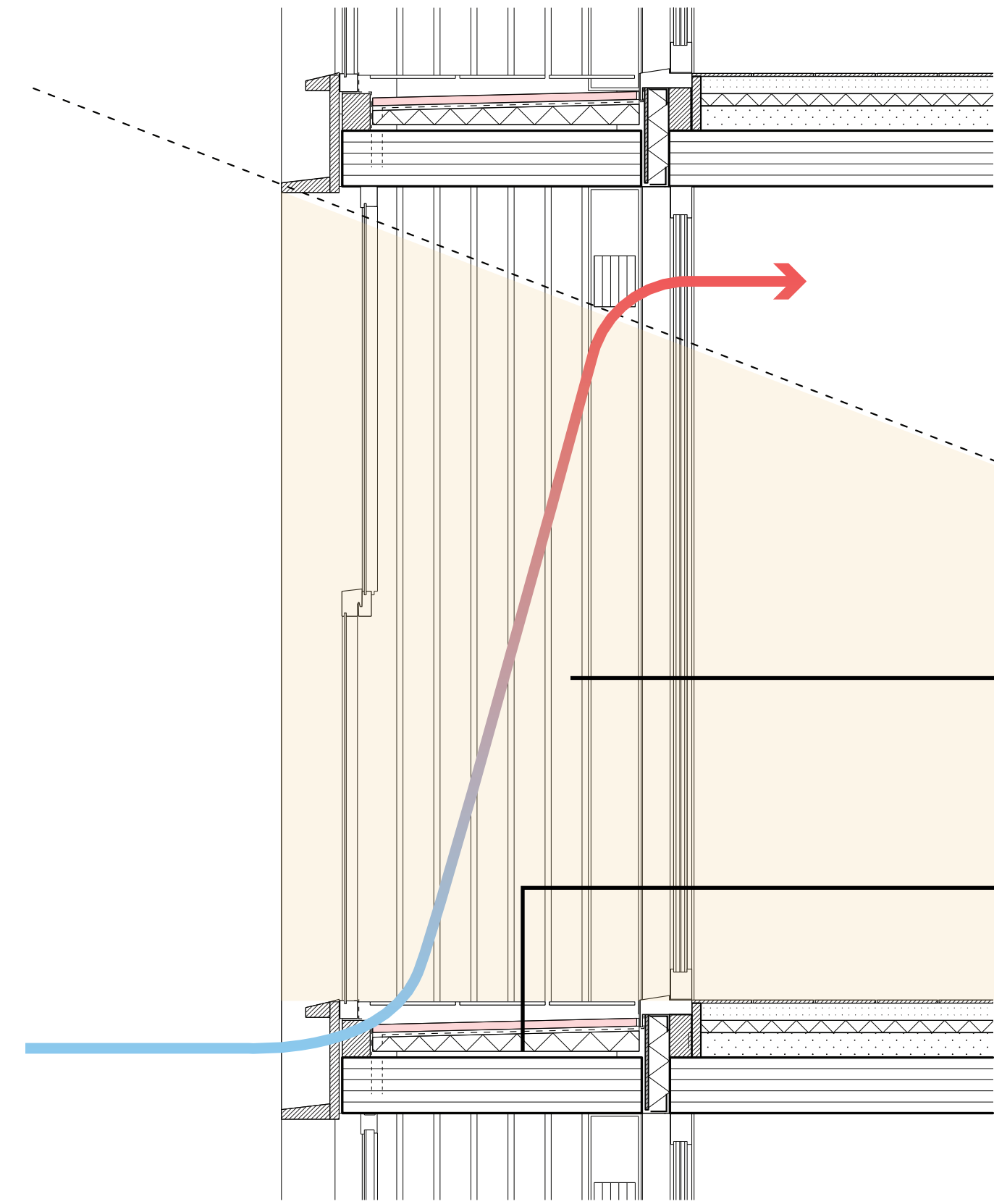




External window layer kept open
for natural cross breezes

High sun angle: balcony above
acts as shading

Summer condition



Low solar angle allowing light to
enter deep into plan

Air is preheated within the com-
partment of the winter garden
before entering dwelling

Layer of phase changing material
(PCM) below balcony tiles for
low-carbon thermal mass

Winter condition

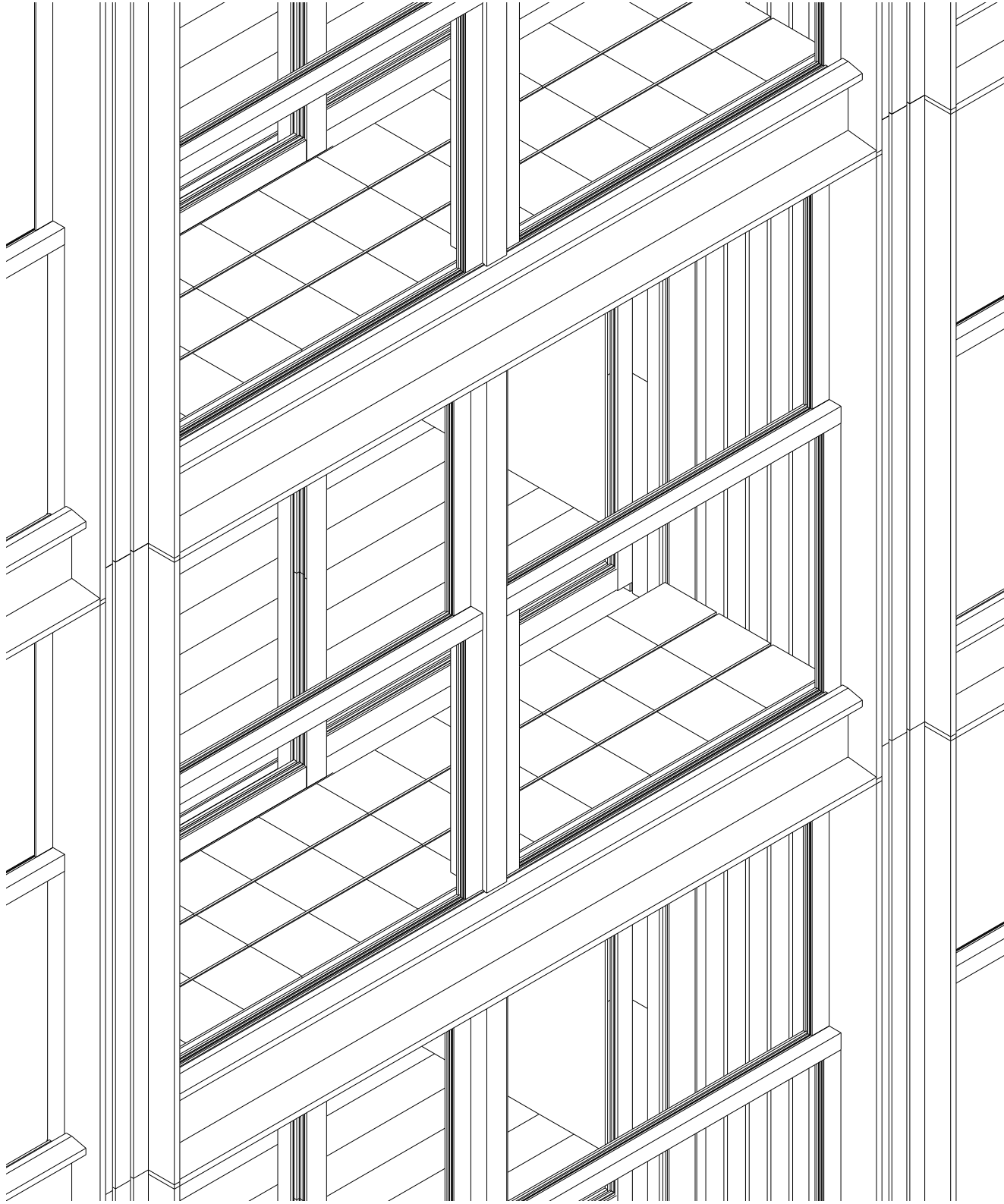
Facade fragment

Winter garden: Passive design



Ventilation strategy

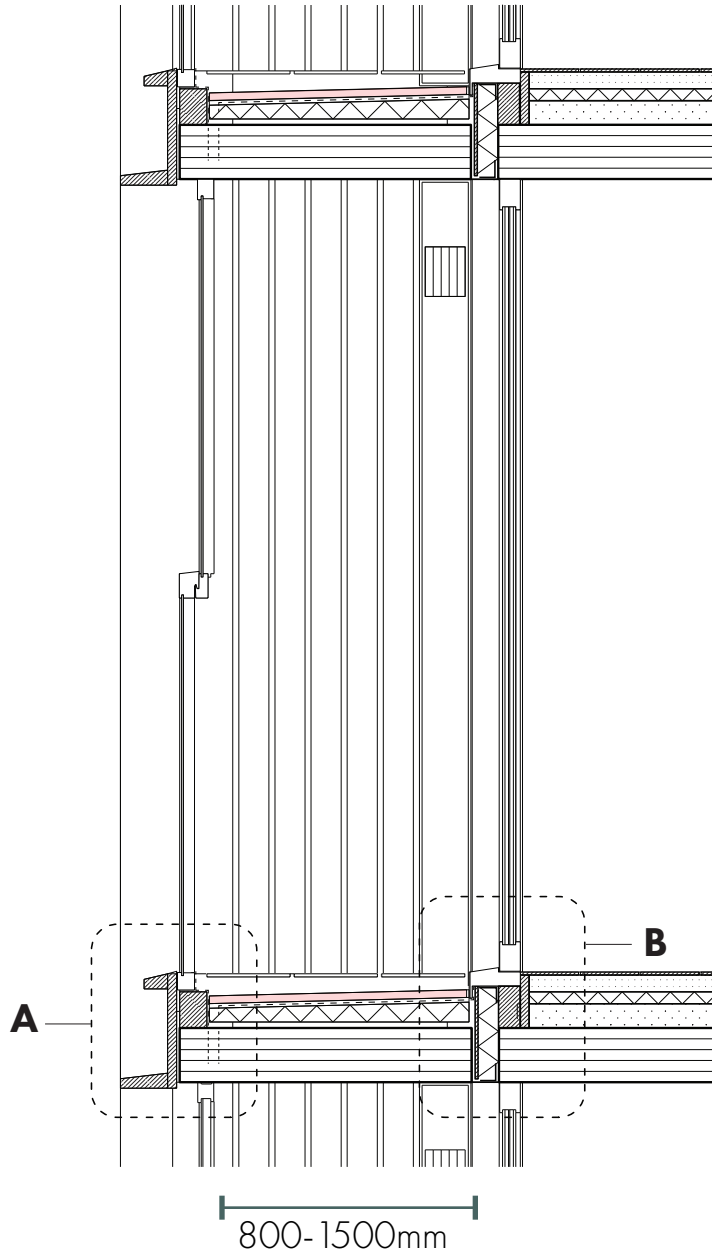
Type C: Natural ventilation in, mechanical ventilation out



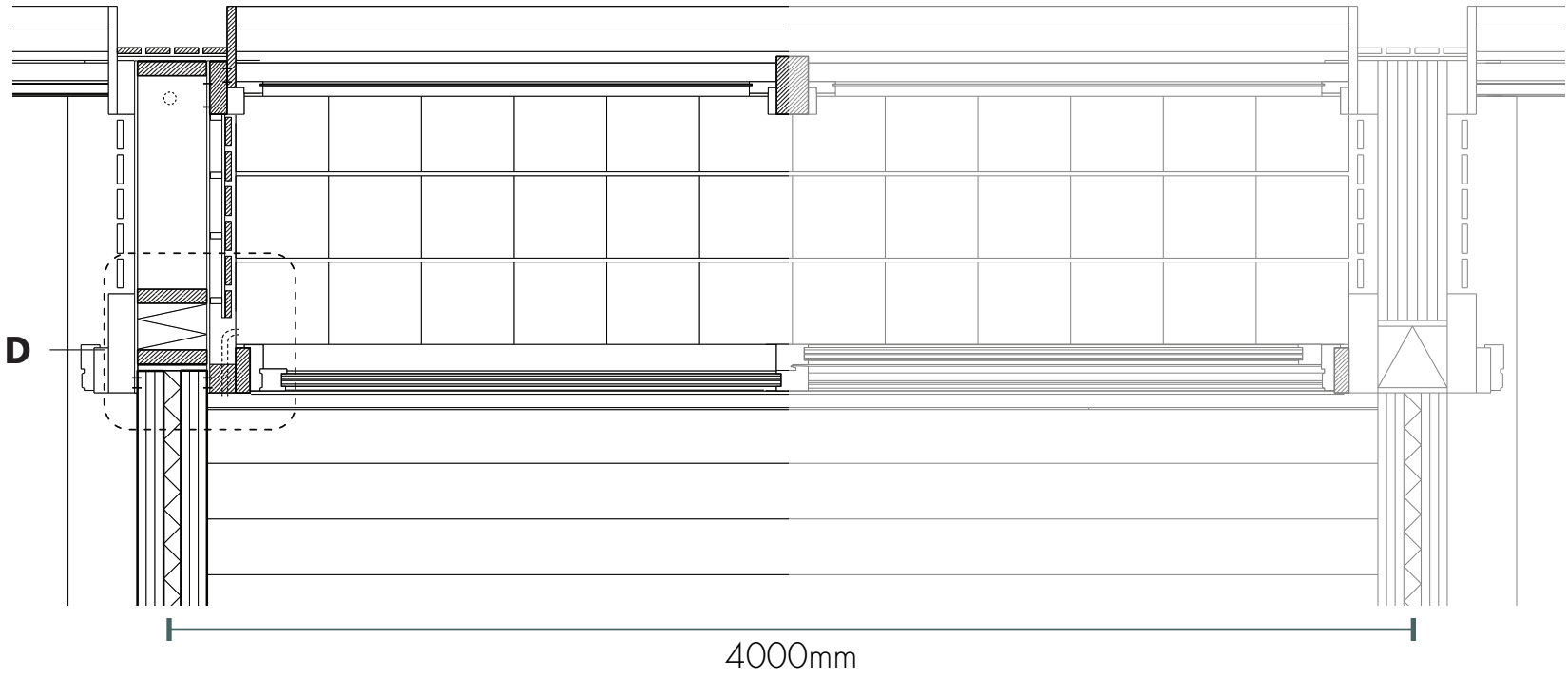
Axonometric

Facade fragment

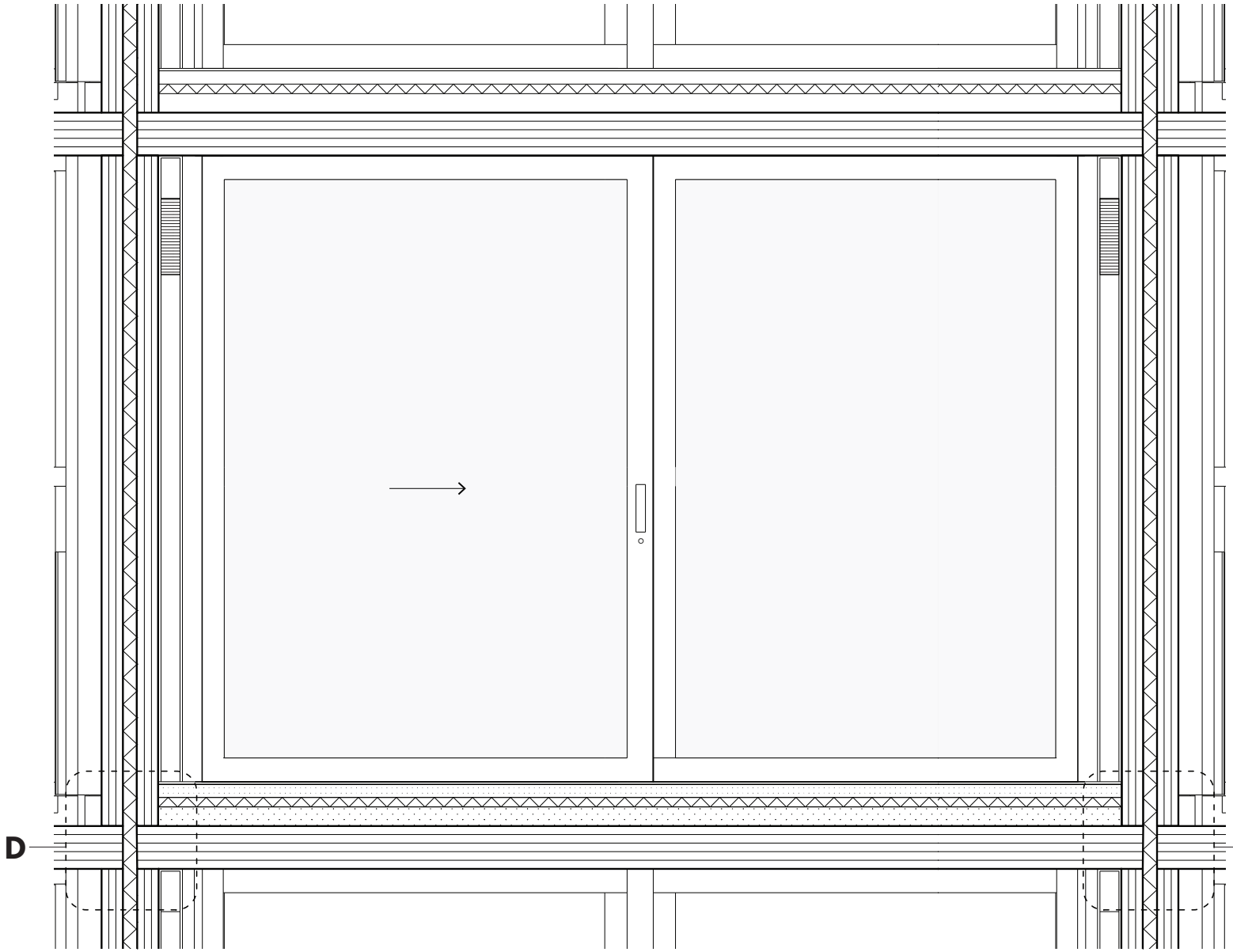
Winter garden



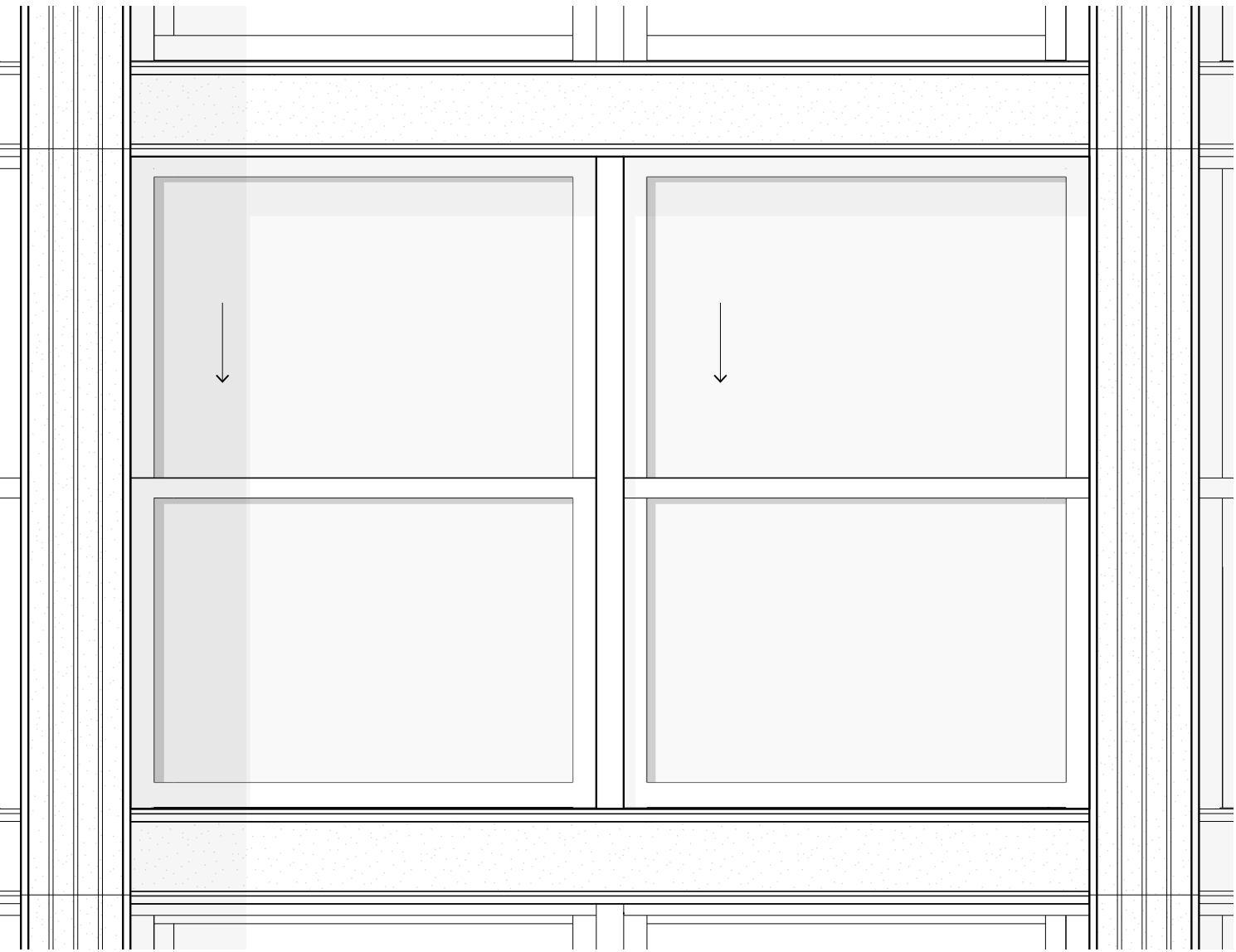
Section



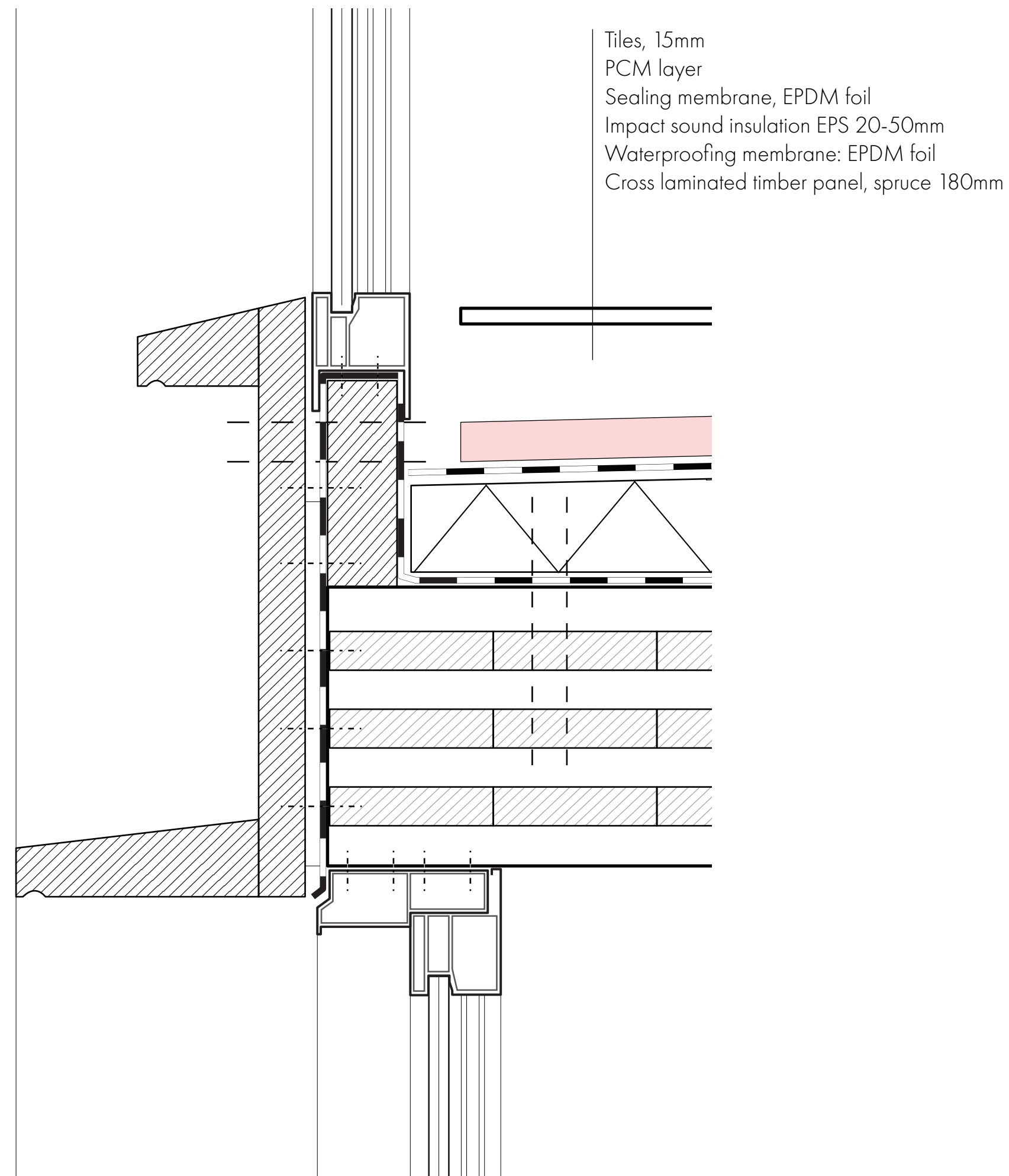
Plan



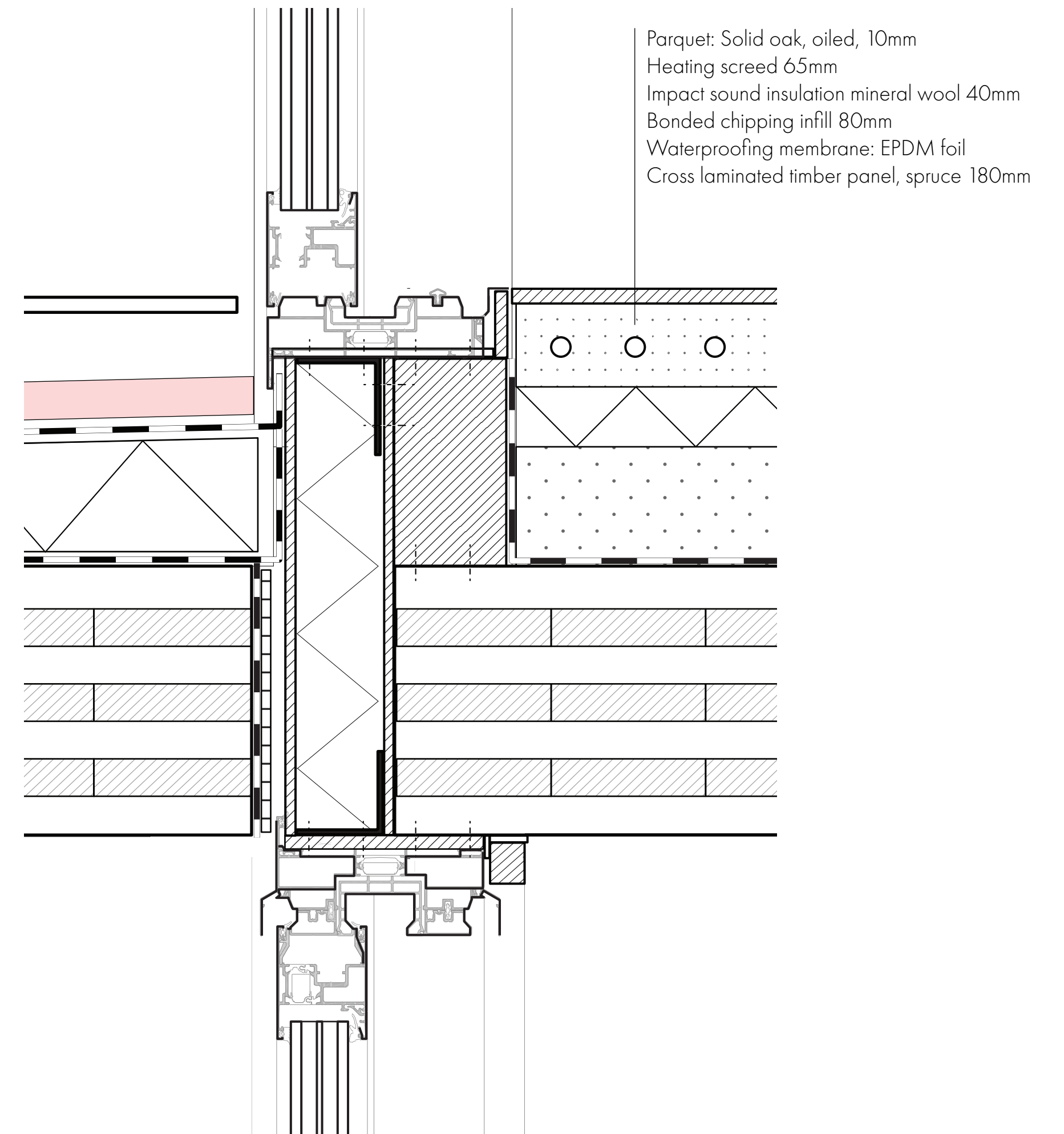
Longitudinal Section



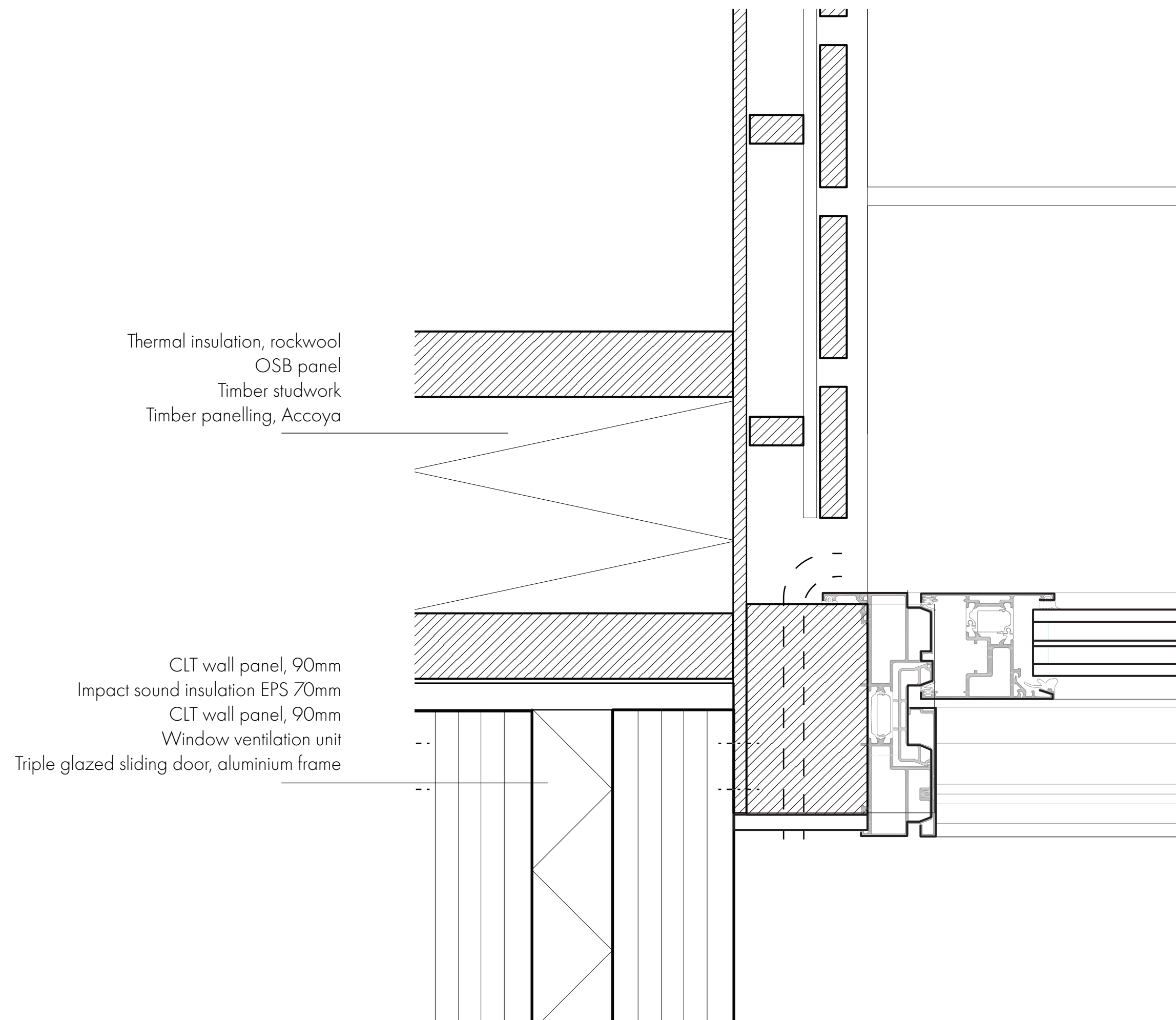
Elevation



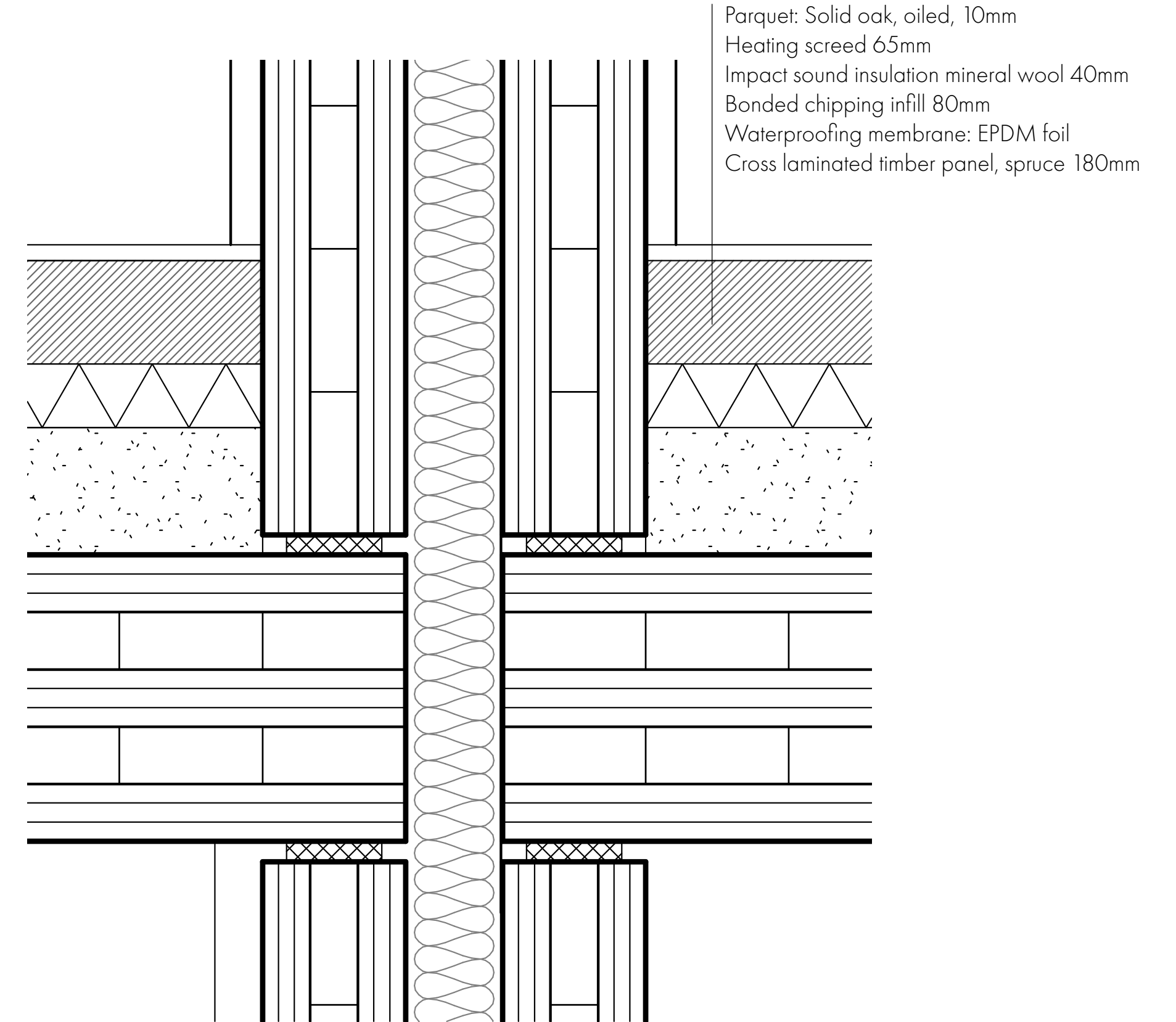
A Typical winter garden detail



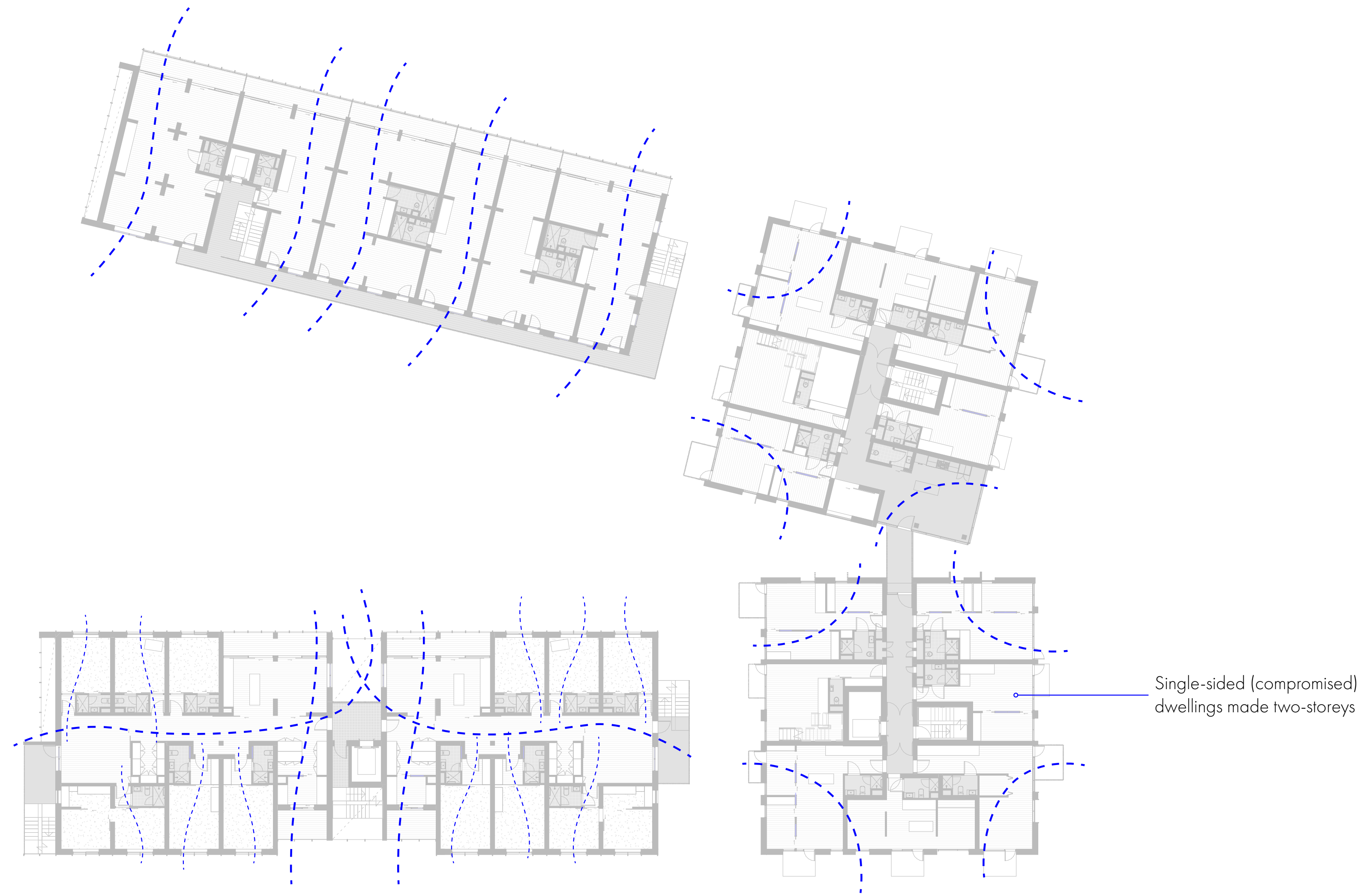
B Typical winter garden detail: sliding door



C Threshold detail



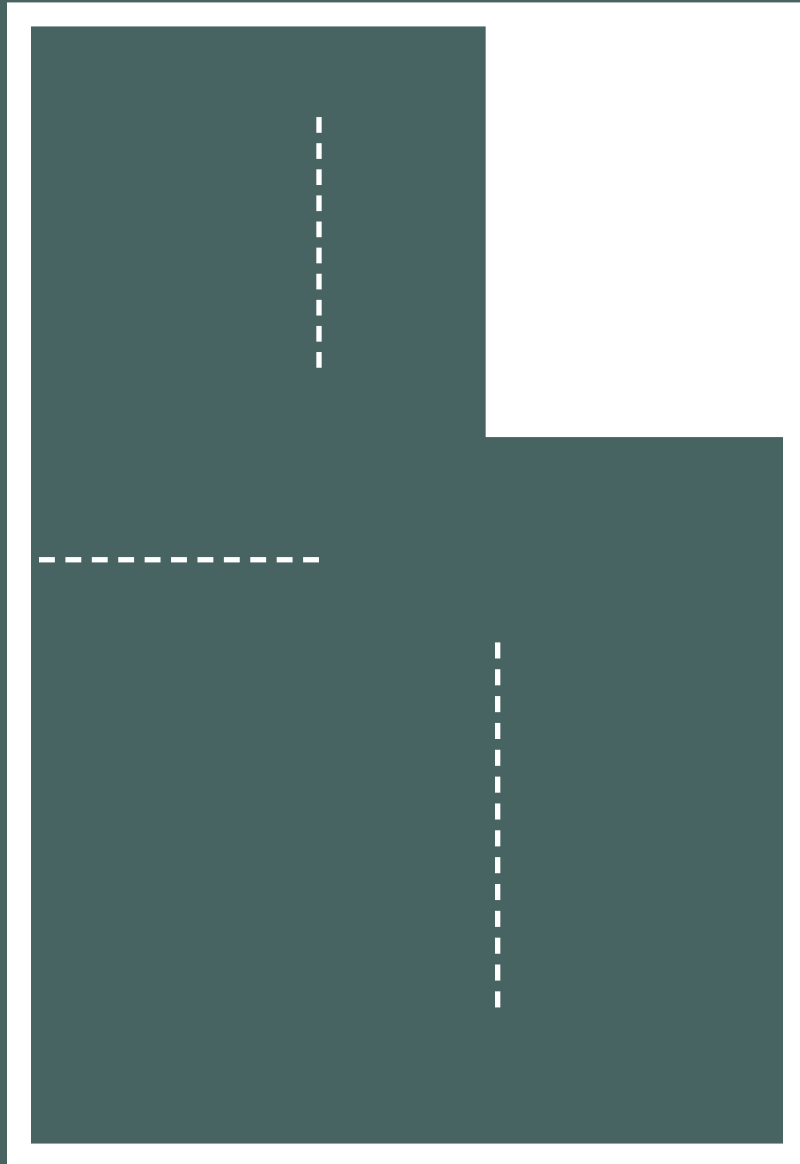
D Typical inter-tenancy wall



Ventilation: Natural cross ventilation

Dwellings oriented to maximize dual aspects





Type 03:
The compact plan



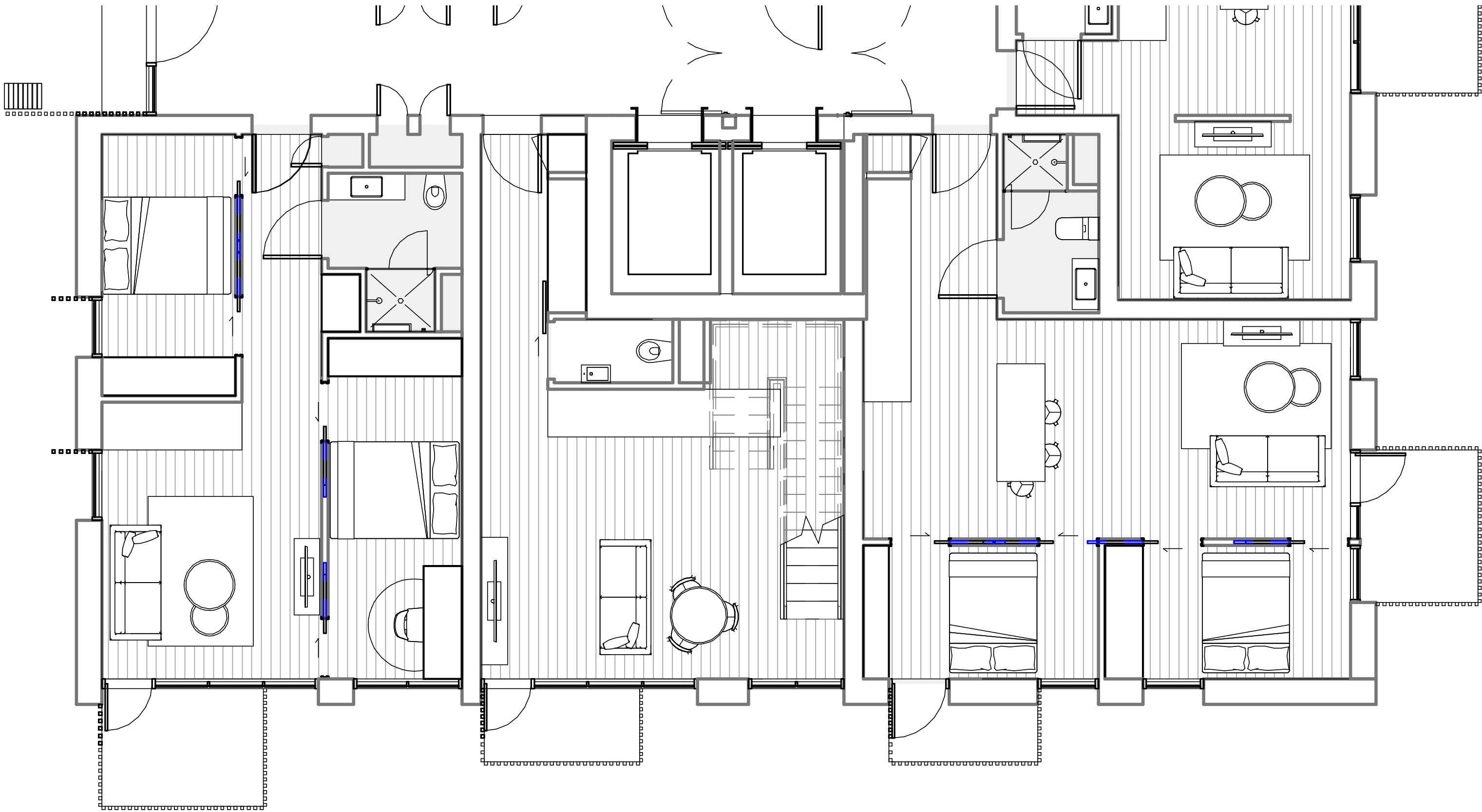
Dwelling sizes: **35-50m²**

Dwelling Concept 3

Compact units

Dwelling Concept 3

Compact units





Balcony

Living room



Flexible room



Corridor

Spare room



Collective kitchen

Private dwelling

Collective space

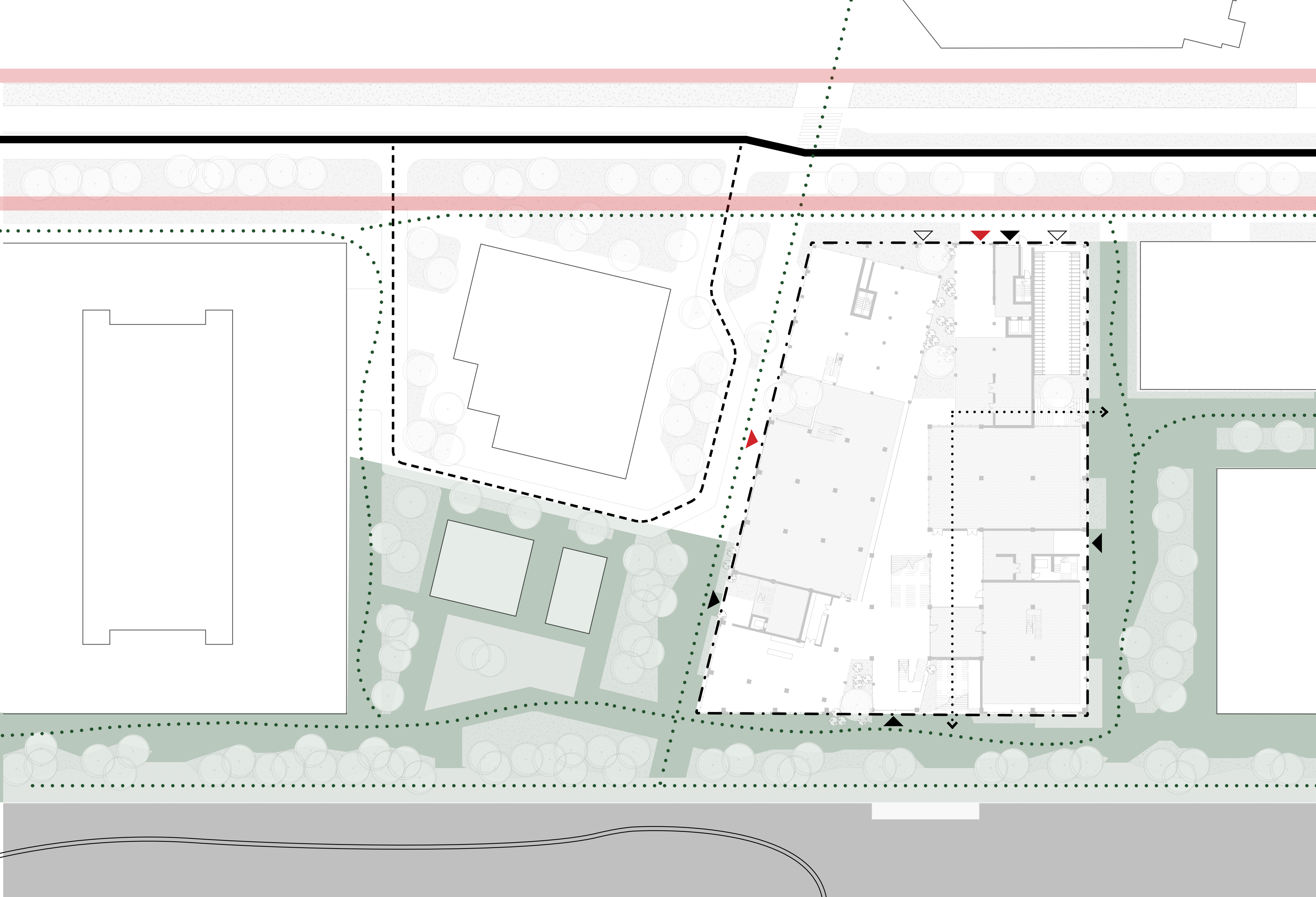


thank you

Supplemental drawings

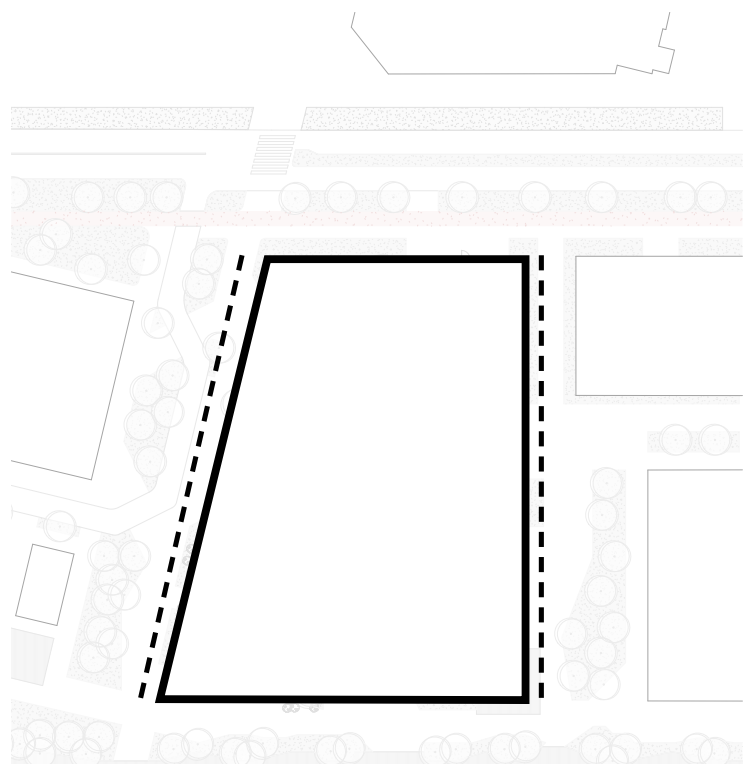


Circulation

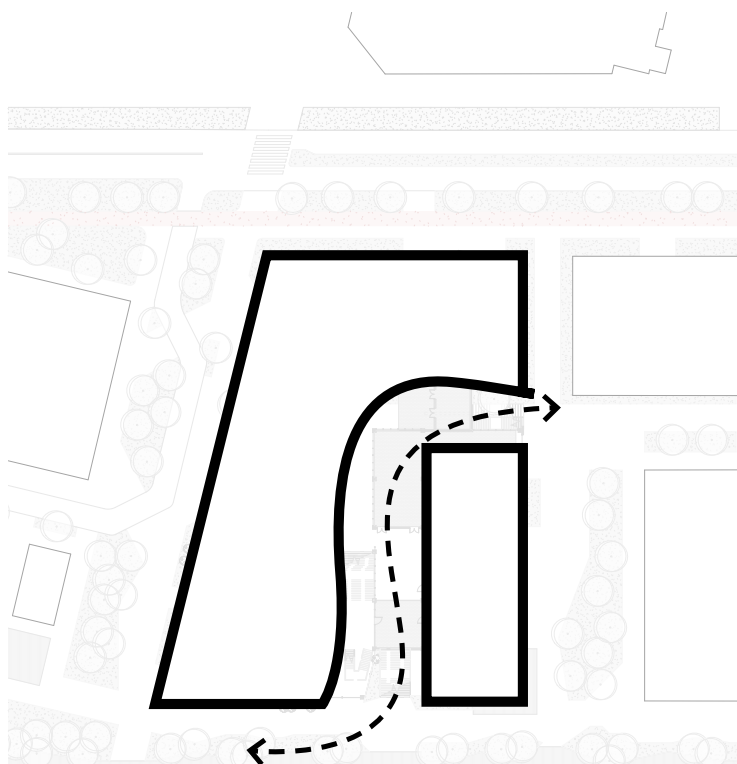


- Pedestrianized zone
- Main vehicular road
- Regional bicycle route
- - - Mixed zone - deliveries only
- ... Pedestrian links
- ... Pedestrian link through site
- || Boat access
- ▲ Main building entries
- ▲ Delivery points
- △ Bicycle parking

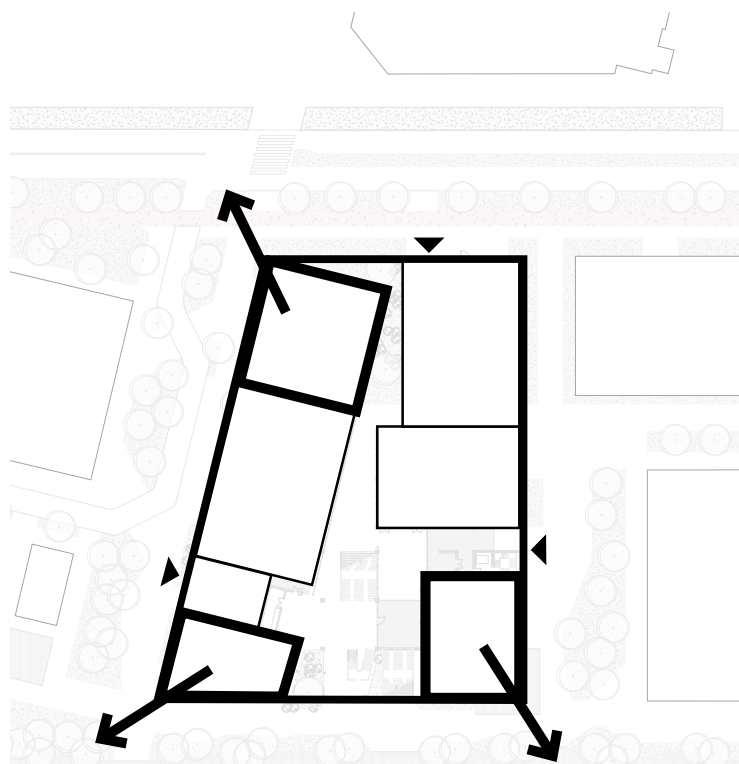




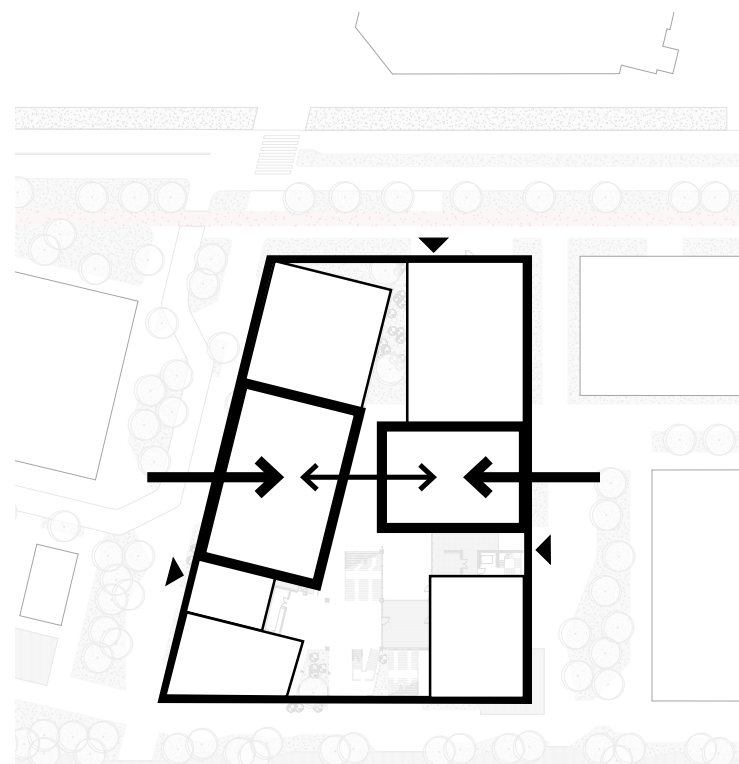
Create streetwalls to neighbours



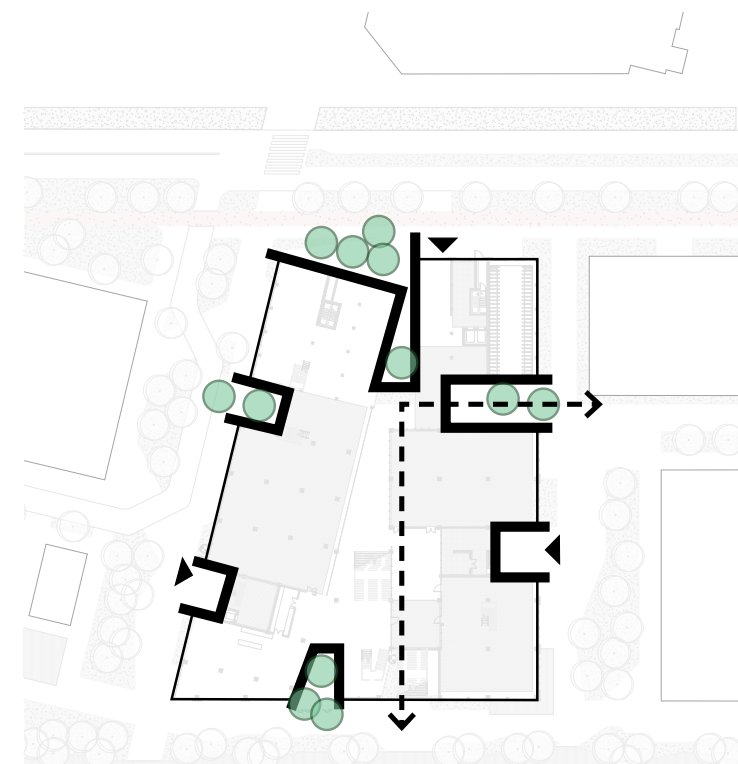
Connection through site



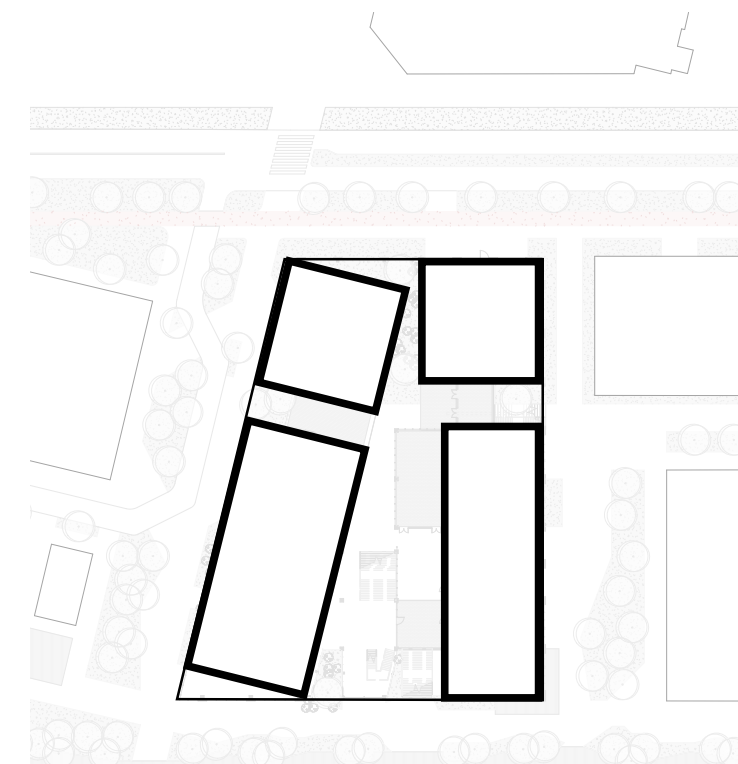
Activate corners



Workshops in centre



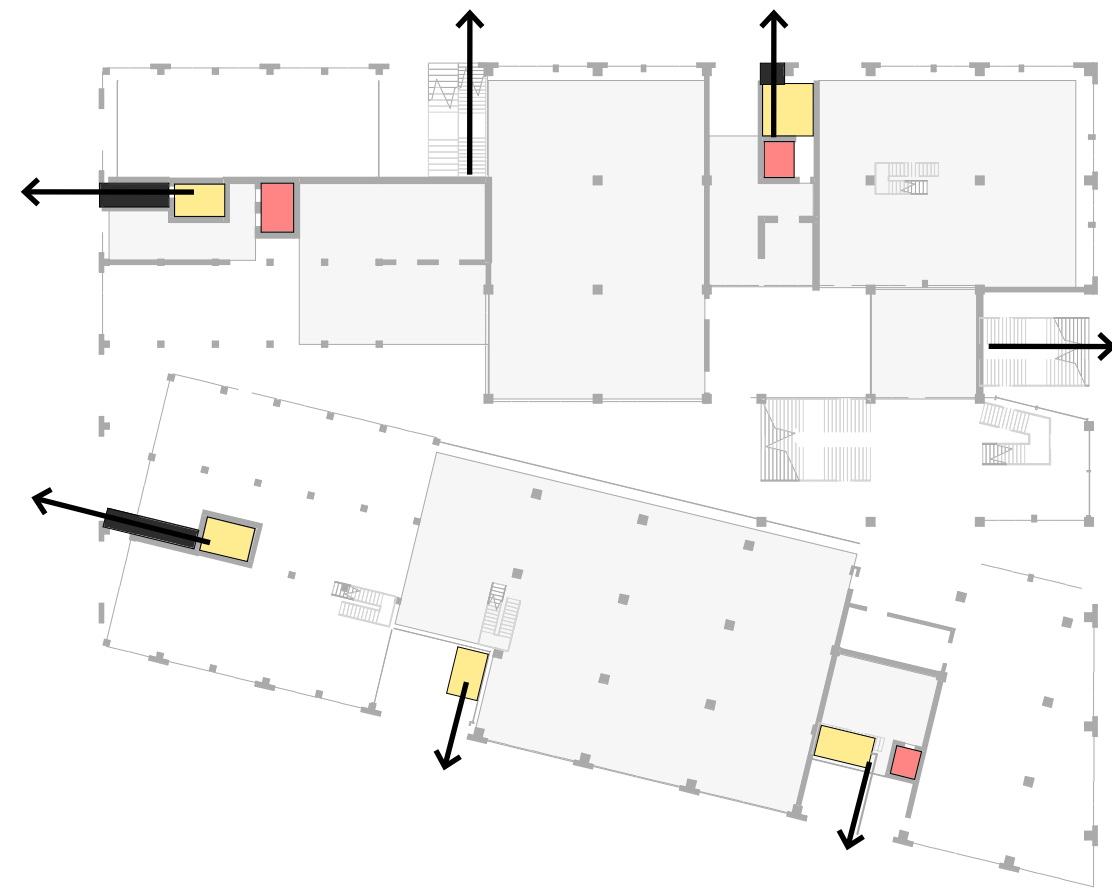
Bring landscape into plan



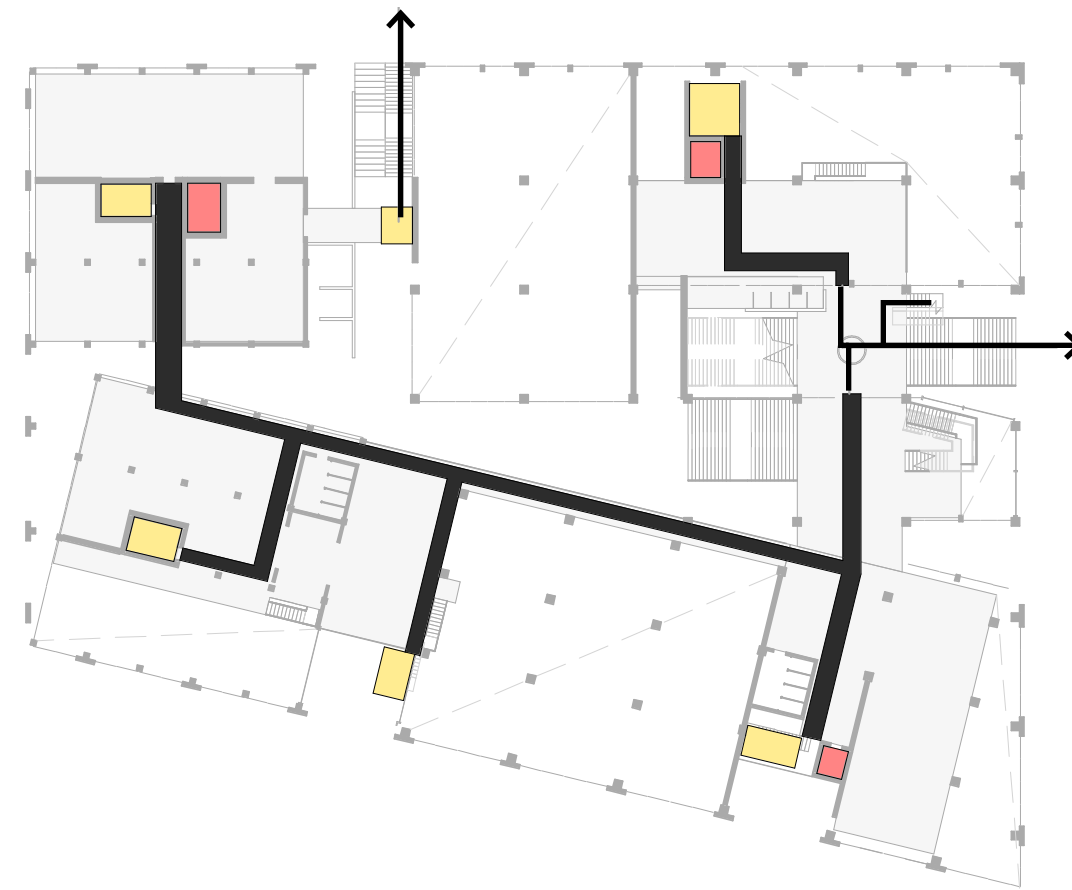
Residential levels

100

Massing



00



01



02



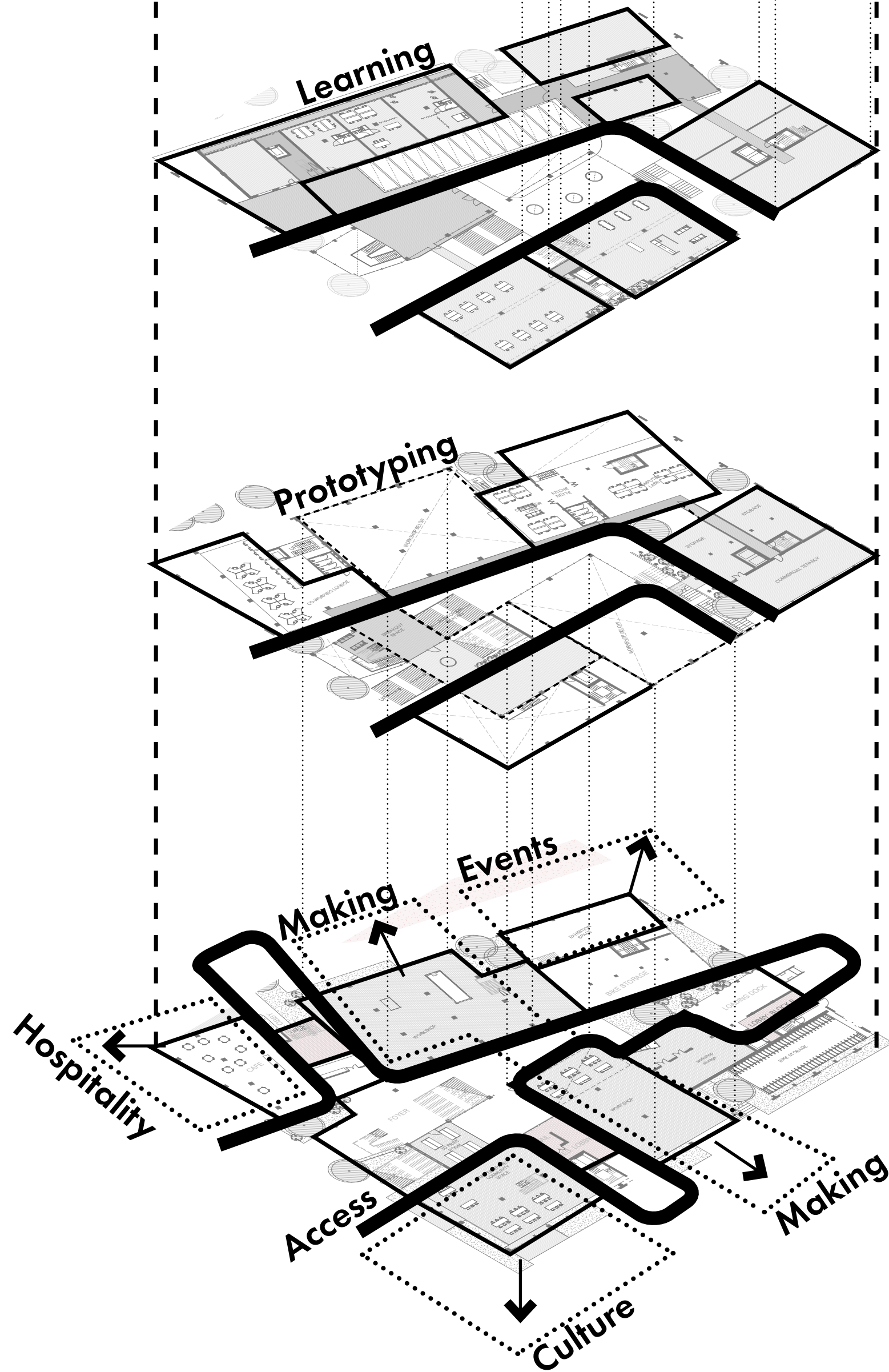
03



04 (typical)

Fire egress

Building System



- 02**
Classrooms
Breakout space
Collective lounge, residential
Workshop, collective
Communal courtyard
Live/work dwellings

- 01**
Study lounge
Breakout space
Digital prototyping labs
Storage, residential
Communal courtyard

- G**
Foyer, education
Residential lobbies
Bike storage
1:1 workshops
Cafe
Community maker space
Exhibition space