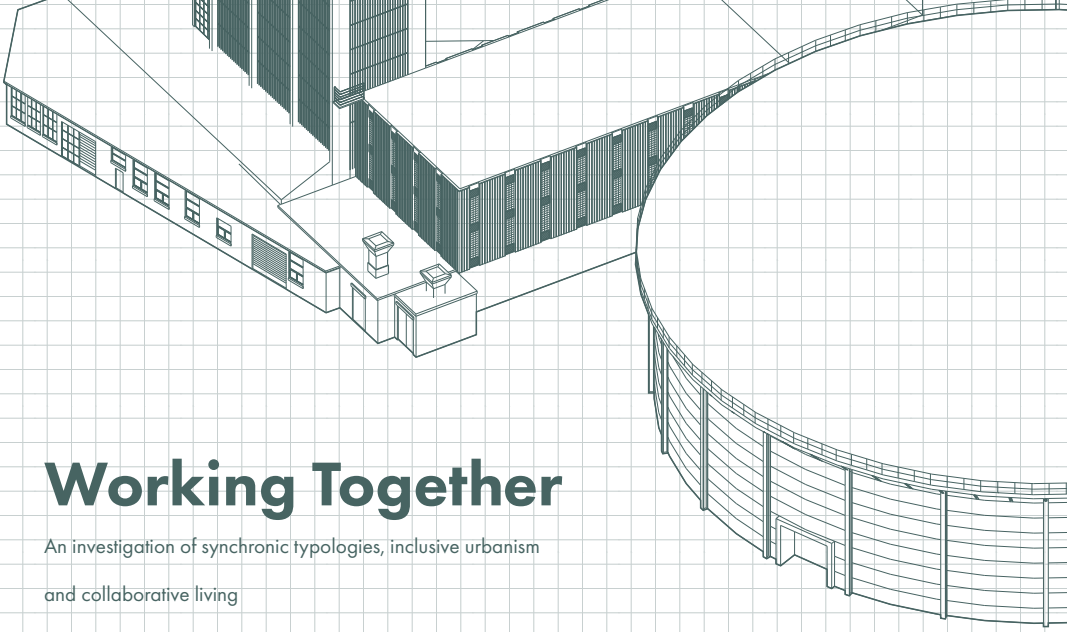
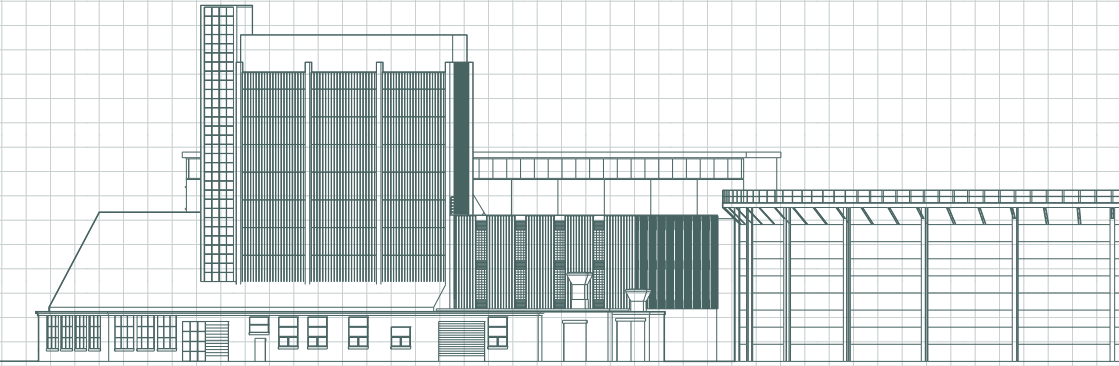


Working Together

An investigation of synchronic typologies, inclusive urbanism

and collaborative living

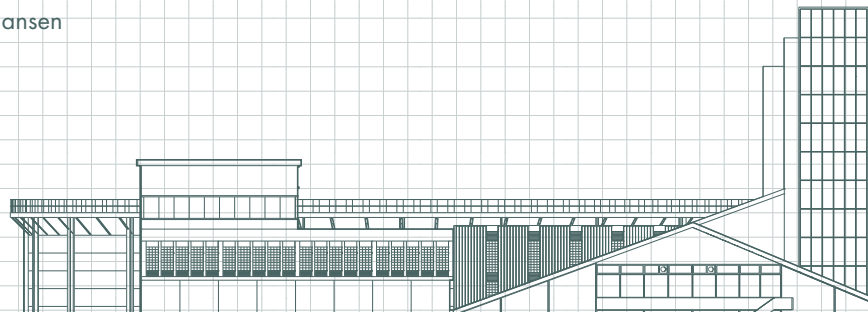


Graduation Project

MSc Architecture, Urbanism and Building Sciences

TU Delft 2023

Stein H. Johansen



Working Together: An investigation into synchronic typologies and collaborative living
Graduation Project
Advanced Housing: Ecologies of Inclusion
MSc Architecture, Urbanism and Building Sciences
TU Delft 2022-23

Stein Heier Johansen

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Research tutor: Anne Kockelkorn
Design tutor: Olv Klijn

1 M4H, existing condition. Photography by author

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Glossary

Synchronic typology
Buildings that support different operations but exist and operate in the same space while optimally sharing resources.

Co-operative housing
A cooperative is a corporation co-owned by its members. Members become co-owners of a housing complex when they become residents and buy a share.

Co-housing
Individual dwellings units with shared facilities. Individuals, families, or shared housing groups can live within the dwelling unit. The cost of rent/mortgage and utilities is not shared, however a percentage of monetary value funds the shared facilities.

Cluster housing
Groups of micro-units assembled into a larger whole.

Decommodified Housing:
Housing that does not generate a profit through monetary terms**.**

Social Infrastructure
Physical places and organizations that shape the way people interact. Robust social infrastructure fosters contact, mutual support, and collaboration among friends and neighbors.

Cost-Rent Principle
In the case of a housing cooperative: The cooperative is not allowed to take out profit from rent. Instead, profits are reinvested into the cooperative through mainenance or new projects.

2 Grunerløkka, Oslo (Own photography)

Prologue

‘Shared Luxury’

“What may be lacking in terms of individual comfort will be provided—just as in a high-end hotel—through shared luxury[1].”

Founders, Kraftwerk1, Zurich

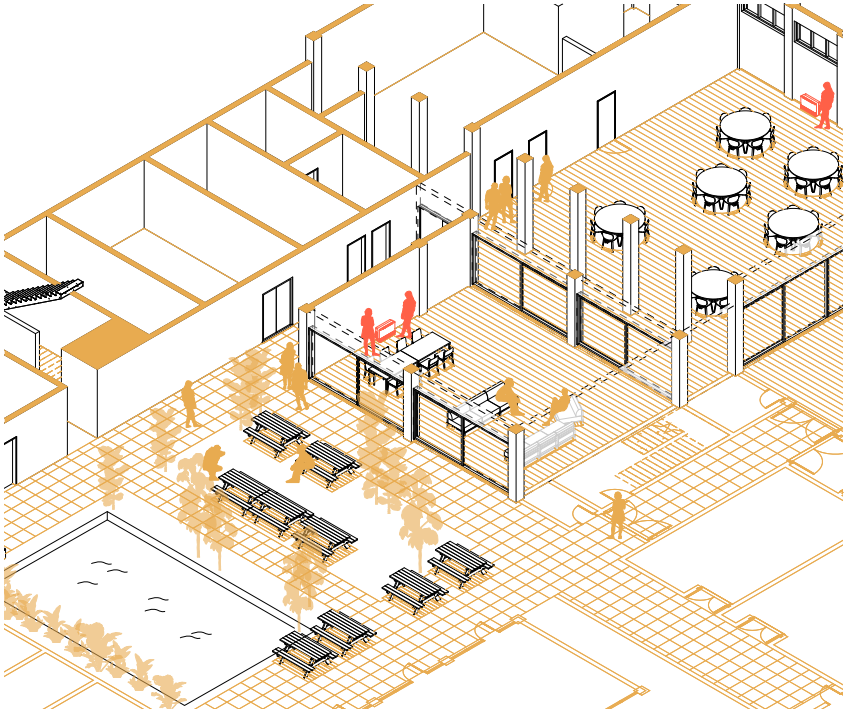
My introduction to shared living came in 2016, as I was studying for my bachelor’s degree in Australia. For a little over two years, I lived with 160 other students in a residential college (fig. 2), sharing next to everything; bathrooms, common spaces and mealtimes. I was given my own little room, one with just enough space for a bed, a wardrobe and a desk. There was a certain charm to the shabbiness of the original 1960s furniture; austere constructions of black metal and stained wood panels. The walls, a mishmash of exposed brick, roughly cut and in shades of burnt beige and faded browns complemented the exposed concrete ceiling, revealing its haphazard formwork.

The architecture of the place was not impressive, nor particularly inviting. Yet this space contained certain qualities that transcended that of aesthetic or architectural beauty. What was impressive to me at the time, was the sheer amount of space I was allowed to access, at such a low cost. A compromise of individual private space in favour of the collective whole, the configuration translated into a certain luxury of space that dramatically extended my personal domestic space through collective indoor and outdoor spaces. Each of us individually would not have been able to afford such rich spatial diversity, this was only possible as a result of the collective. Being a part of this student community was a remarkably rewarding experience and one that I would not be without.

The experience made me appreciate the benefits and joys of shared living, yet sensitive to its limitations. While I look back upon this time with great fondness, it did have its downsides; persistent socialisation and a chronic lack of personal space. Such radical levels of sharing are likely only successful in highly specific situations or phases of life, such as student housing, or for individuals particularly inclined to collective living.

During this time I also developed a curiousness for the ways we reimagine our cities. Observing first-hand the redevelopment of ports areas in both Sydney, Australia and Oslo, Norway, I came to realise the dichotomy that

1. “An Idea of Sharing.” Cooperative Conditions, https://www.cooperativeconditions.net/home/1-an-idea-of-sharing.



3 International House, University of NSW, Sydney, Australia (Drawing by author)

such projects often propose: On the one hand reclaiming land for the public good and on the other fueling exclusive class-specific enclaves within the city.

A substantial reason why I have chosen the Ecologies of Inclusion graduation studio is a desire to investigate to what degree collectivity can be created within dwelling schemes for the general public (ie. not student-specific housing), and how our urban spaces and dwellings can be more social and ultimately more inclusive.

Problem Statement

Key words: Mixed use, Housing affordability, experimental housing types, ageing society, social isolation, live/work, cooperative housing, co-housing, demographic change

Affordability

The Netherlands is facing a housing crisis. It is widely assumed that we need to build a million more homes in the coming decades to meet the increased demands put on the market. A lack of supply and increased financialisation have led to price increases that are excluding a growing proportion of the population from accessing appropriate housing[2].

Live/Work

Another imbalance in the supply of housing lies in the fact that we use our dwellings differently from before, and different to what they were originally designed for. The rapid acceleration of working from home fueled by the COVID-19 pandemic is changing the way we inhabit our spaces; the lines between personal and work life are blurring[3].

Social Isolation

Demographic restructuring, a consequence of improved living conditions and decreased birthrates, is leading to more of us dwelling alone and increasing levels of loneliness and social isolation, particularly in old age[4]. Loneliness is not a condition specific to the elderly, however, with increased measures of social isolation being a trend among the general population in Western societies[5].

Housing cooperatives have emerged as a potential remedy to many of the ills of the housing market. Generally compatible with financialised capitalism, cooperatives provide a third alternative in the market, outside of private-market commodified housing and state-sponsored social housing[6]. Contemporary examples of housing cooperatives present a critique of the dominant market-driven dwelling type, and through its relative detachment from market logic, allow for increased flexibility in the assemblage of housing types and a potential foundation for a rethink of the levels of integration of productive and reproductive work that can coexist within a dwelling scheme.

Mixed Use

Functional zoning, a product of modern urbanism, is no longer sufficient in accommodating the varied needs of contemporary life: Our domestic

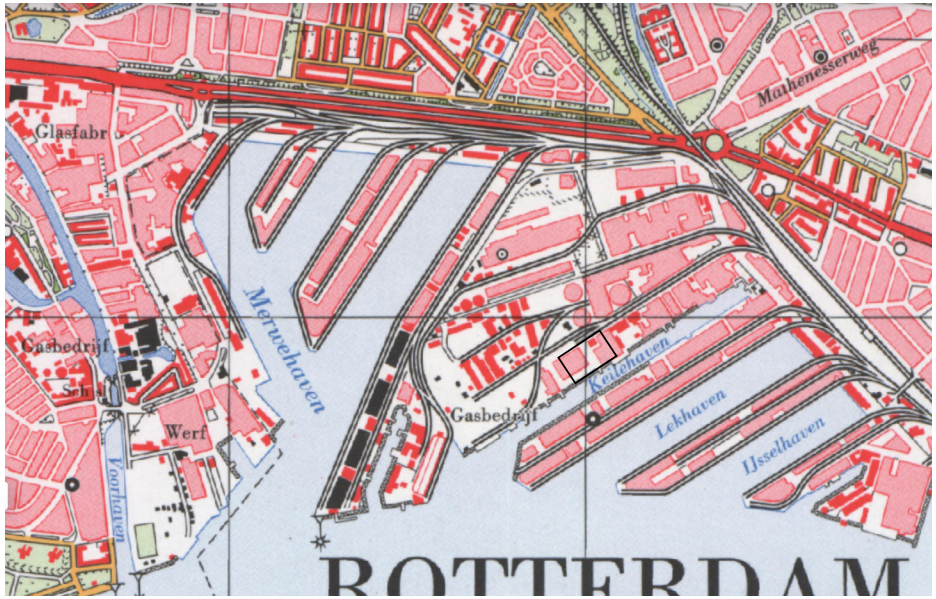
2. Lengkeek, Arie, and Peter Kuenzli. *Operatie wooncoöperatie: uit de wooncrisis door gemeenschappelijk bezit.* trancity*valiz, 2022.

3. Giudici, Maria S.: "Counter-planning from the kitchen: For a feminist critique of type," *The Journal of Architecture* vol. 23, no. 7–8 (2018): 1217.

4. Klinenberg, Eric. *Palaces for the People: How Social Infrastructure Can Help Fight Inequality, polarization, and the Decline of Civic Life.* New York: Crown, 2018.

5. 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, 16–21.

6. Balmer, Ivo, Jean-David Gerber: "Why are housing cooperatives successful? Insights from Swiss affordable housing policy," *Housing Studies* vol. 33, no. 3 (2018): 381



4 Merwe Vierhavens in 1970. Source: https://www.topotijdreis.nl/kaart/

5 Planned transformation of M4H by 2050. Source: m4hrotterdam.nl/ruimtelijk-raamwerk-m4h/.

and professional lives are increasingly performed in the same domain and dual pressures of providing both more housing and accommodating local manufacturing, will require a rethinking of mixed-use neighbourhoods.

In this research report, I am looking into how the mixed-use city of tomorrow can incorporate living, working and care within one architectural scheme, responding to the needs of contemporary households. As the domain of dwelling design extends beyond the individual unit, the report is divided into three complimentary chapters investigating, in this order; the urban layer, the building and then the dwelling unit. The final chapter combines the findings into a hypothetical design programme which informs the accompanying design project.

Research Questions:

Urban Design

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

Architecture

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

Typology

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

=

New Urban Mix

6 The existing site is characterized by an eclectic building stock. Photography by author

Theoretical Framework & Methods

Theorietical Framework

In order to substantiate the problematiques that I have presented and respond to the research questions, I have relied on a variety of sources which present the framework within which my own research will be positioned.

Mixed use

In the realm of mixed-use developments, I have relied on *New Industrial Urbanism* by Tali Hatuka and Eran Ben-Joseph[7] as an introduction to the need for hybridity and synchronic architectural typologies. The *Cities of Making report*[8] has provided numbers and insights relating to the specifics of the Rotterdam region, while Han Meyer's *City & Port*[9] has been a central source for understanding the history of living and working in the port of Rotterdam.

Cooperatives & cohousing

The writings of Anne Kockelkorn and Susanne Schindler for the *Cooperative Conditions*[10] project provide an overview of the conditions that have made cooperative housing particularly successful in the Swiss context. Adding to this, the writings of Balmer & Gerber[11] present a discussion on how a decommodified housing model can thrive within a capitalist society. As the design project is located in Rotterdam, the work of Lengkeek and Kuenzli[12] provides a useful link to the particular context of the Dutch housing market. Transposing learnings from cooperative housing projects in Zurich, Vienna and Munich into the Dutch context, this book helped relating the findings from other countries tothe specifics of the Dutch housing market, including the roles that cooperatives can play. Creating inclusive living environments requires thoughtful consideration of shared spaces and how they link and interrelate. The writings of Dorit Fromm[13] and Karin Palm Linden[14] on Dutch and Scandinavian cohousing of the 1980s have provided a foundation for the types of shared spaces that such schemes include, their placement within a building and the importance of the room system as a whole. I have relied particularly on Palm Linden's analysis of Swedish collective houses in developing my own understanding of the connectivity of shared space.

Commoning & social infrastructure

Amanda Huron's *Carving out the Commons*[16] provided an introduction to commoning and the reasons people form cooperative communities. One of the potential positive side effects of cooperative housing is the creation of social infrastructure, a concept derived from Klinenberg: *Palaces for the People*[17].

7. Hatuka, Tali and Eran Ben-Joseph. *New Industrial Urbanism: Designing Places for Production*. New York: Taylor & Francis, 2022.

8. Vickery Hill, Adrian and Josie Warden, ed., *Cities of Making: Cities Report*. Brussels: Cities of Making, 2018.

9. Meyer, Han. *City and Port: Urban Planning as a Cultural Venture in London, Barcelona, New York, and Rotterdam: changing relations between public urban space and large-scale infrastructure.* Rotterdam: Han Meyer, 1999.

10. Cooperative Conditions, https://www.cooperativeconditions.net/home/1-an-idea-of-sharing.

11. 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.

12. Lengkeek, Arie, and Peter Kuenzli. *Operatie wooncoöperatie: uit de wooncrisis door gemeenschappelijk bezit.* trancity*valiz, 2022.

13. Fromm, Dorit. *Collaborative Communities: Cohousing, Central Living, and Other New Forms of Housing Shared Facilities.* New York: van Nostrand Reinhold, 1991.

14. Palm Linden, Karin. *Kollektivhuset och Mellanzonen: Om rumslig struktur och sosialt liv.* Lund: Byggnadsfunktionslara, Lund Universitet, 1992.

16. Huron, Amanda. *Carving Out the Commons: Tenant Organizing and Housing Cooperatives in Washington D.C.* Minneapolis: University of Minnesota Press, 2018.

17. Klinenberg, Eric. *Palaces for the People: How Social Infrastructure Can Help Fight Inequality, polarization, and the Decline of Civic Life.* New York: Crown, 2018.

18. Giudici, Maria S.: "Counter-planning from the kitchen: For a feminist critique of type," *The Journal of Architecture* vol. 23, no. 7–8 (2018): 1223.

19. Per, Aurora Fernandez and Javier Mozas, ed., *Generosity: Housing Design Strategies : the Indeterminacy of the Floor Plan.* Barcelona: A+T Architecture Publishers, 2022

20. 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, 16–21.

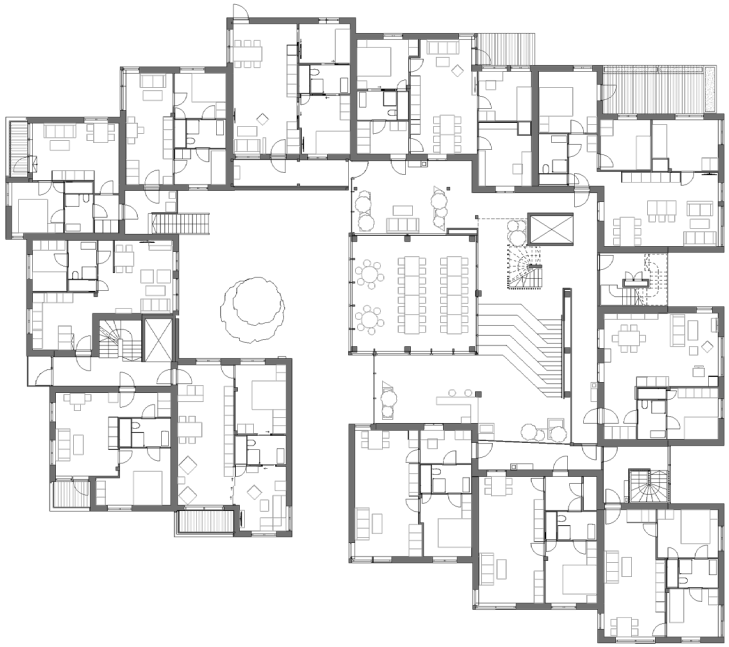
21. Van Gameren, Dick, Paul Krautenbrouwer and Eireen Scheurs, ed., *DASH 15. Huis Werk Stad: wonen en werken in het stedelijk bouwblok.* Delft: TU Delft, 2019

Dwellings beyond the nuclear

Changing household compositions and how cooperative housing can accommodate these diverse living patterns is a key theme of my investigation. Maria S. Giudici's *Counter Planning From the Kitchen*[18] was the starting point for my investigation into housing typologies beyond the nuclear unit. Per and Mozas[19] provided theoretical background on indeterminate housing typologies, while designing for longevity and age-inclusivity was explored in the work of Hauderowicz and Ly Serena (ed.): *Age-Inclusive Public Space*[20]. The workhome and ideas around how dwellings and cities can accommodate duality is largely based on *DASH #15: Home Work City*[21].

Methods

The aforementioned theoretical material feeds into the methodology of the research, a strategy composed of three main components: Literature study, case study (typology/morphology) and the interpretation of lived experience (praxeology). This research paper is intended to add to the discourse around the future of our cities; the diffusion of work and domestic life and the promotion of inclusive and sociable urban spaces and dwellings. Architectural and urban case studies are sourced from a variety of locations, allowing the research to hold some universal qualities applicable to multiple locations, while the findings are translated into a site-specific architectural proposal.



7 Vindmøllebakken, Helen & Hard (Stavanger, 2019)
Source: helenhard.no/work/vindmollebakken/

Literature review: Formation of a position and an argument

The collection of readings and other study material (books, journals, videos etc.) of the research framework presents several perspectives and academic positions in the fields of their respective expertise, which has informed the writing of this paper.

Lived experience as raw material (Praxeology)

As I have personal experiences with many of the topics discussed in this research paper, I will be relying on some of my own observations to supplement the research. These experiences have been translated into one-page vignettes that exemplify a certain theme of their respective chapter.
In order to better understand the maker-space typology, I have performed site visits at three buildings at the TU Delft campus as well as the Keile-kollektif in Merwe Vierhavens. The former were observational studies while the latter also included informal interviews with some of the people working in the building.

Case Studies & Site Analysis (Typological & morphological research)

Through a combination of written descriptions, plan analysis and photography, I have analysed a selection of conventional and collaborative housing projects, live-work projects, educational buildings and maker centres. The intention behind using such a broad range of case studies is to provide a typological basis that covers the different scales found in a new live-work hybrid project. Scales thus range from urbanism to dwelling design as well as various typologies on the continuum of the live-work spectrum:

Little Coolhaven (INBO) became an important case study in the creation of a more intimate form of mixed-use urbanism, while at the level of dwelling design, I have looked into a selection of housing projects from six different countries from the 1970s up until today. This intentional choice has provided varied insights that are intended to reflect the pluralism of the globalised present. Hilversumse Meent represents Dutch centraalwonen of the 1970's, and displays an early approach of clustering dwellings around shared kitchens. Jystrup Sawmill (Denmark) and Regnbogen (Sweden) present contemporaneous Scandinavian variations on this suburban typology. Vindmollebakken (Norway) presents a contemporary evolution of Scandinavian co-housing and a sophisticated integration of shared space, while the Swiss cluster typology is illustrated by Haus A by Duplex Architekten. Two Spanish examples are investigated: the Cornellà social housing project by Peris + Toral, as well as the La Borda cooperative (Lacol architects), both exploring concepts of spatial flexibility and adaptability. While not a formal case study, I have additionally included brief observations of the recently completed Domus Houthaven project (Shift architects, Amsterdam) and insights from one resident in this shared dwelling project. 415 Wick Lane (drmm architects, London) has provided a model for how to combine dwellings and productive facilities into a coherent urban scheme, while Piazza Ceramique (Jo Janssen Architekten) is used as an example of the live-work type.

In conjunction with the architectural precedent studies, the immediate location surrounding the project site has been analysed, both through a conventional SWOT analysis and more in-depth drawings of a selection of heritage-listed structures.

Research by design

As the research has been running parallel to a design process, findings from both have continually influenced the direction of the other. Testing of concepts derived from the diverse selection of case studies and insights from the literature has been performed through an iterative design process, The presentation of a diagrammatic design scheme based on the research

Fig 8 Waterfront, Schiedam at Nieuwe Maas. Own photography.

Chapter 1: Urban Design in the Post-industrial Port City

Merwe Vierhavens: Urbanism for the "maker class"

Merwe Vierhavens (M4H) is an older harbour area at the threshold between the Port of Rotterdam, Schiedam and the city of Rotterdam. Project manager, Isabelle Vries, described the area as being slated to become an "innovative district for the 'maker movement', to cater for upcoming industries" while at the same time providing dwellings to meet the city's housing targets. The benefits of such a mixed-use development, according to Vries, are shorter travel distances between workplaces and home as well as supporting additional functions such as shops and cafes, but most importantly, the retention of industrial workplaces within close proximity to the city, reversing trends of peripheralization of industries that have occurred in previous decades[22]. This development is in line with the up-and-coming "productive city" movement, currently seen in cities across the world, an effort to encourage urban producers to regain a position in the cities[23]. So how does the M4H approach differ from port redevelopments of the past?

22. Van Gameren, Dick, Paul Krautenbrouwer and Eireen Scheurs, ed.: "The Future of the Dutch Workhome Project," *DASH*, no. 15 (2019): 17.

23. Novy, Johannes: "Getting back into the 'business of making things'. On the promise and perils of the 'productive city'," *European Journal of Spatial Development* vol. 19, no. 2 (2022): 1–12.

24. Meyer, Han. *City and Port: Urban Planning as a Cultural Venture in London, Barcelona, New York, and Rotterdam: changing relations between public urban space and large-scale infrastructure*. Rotterdam: Han Meyer, 1999: 44

Fig 9 M4H: Industrial collage. Own photography.

A post-modern redevelopment project: 'Destination Urbanism'

Redevelopments of former port areas is not a new phenomenon. During the 1970s and 1980s, following a wave of industrial outsourcing moved production facilities from developed countries to more affordable locations in the global south. Former port areas were redeveloped en-masse and transformed into residential, recreational, cultural and commercial areas. Traditional manufacturing and transhipment were relocated, either to the periphery of the city or to other countries altogether. Largely replaced by jobs catering to the service and knowledge economies, many such waterfront areas were repurposed as extensions of the city core, and opened up for real estate development and provision of public amenities.

According to Han Meyer, in this period the role of the city shifted from primarily being a place for traditional commerce towards "centers of a 'culturalized' urbanism" with focus on "cultural, touristic, and recreational activities: museums, galleries, theaters, festivals, and commercial environments conducive to 'fun shopping.'" The target group for these redevelopments was the emerging "new middle class, the backbone of a new 'postmodern lifestyle' and a new metropolitan elite for whom life in the city is to be an ongoing, fascinating experience."[24] Housing provision was a key factor in urban renewal: In 1980s Rotterdam, large swaths of smaller mixed-use workspaces suitable for local manufacturing were lost in an effort to meet the housing crisis:

10 Darling Harbour, Sydney, 1970
Source:
archives.cityofsydney.nsw.gov.au/
nodes/view/1827286

11 Darling Harbour, Sydney, 1988
Source:
skyscrapercity.com/threads/darling-har-
bour-silver-jubilee-1988-2013.1602686/

"Firstly houses were prevented from being transformed into office space. Secondly retail structure was pushed onto high streets to avoiding scattered shops in residential areas. Finally industrial spaces causing nuisance were moved out of the neighbourhoods. The consequence was a sharp reduction of local jobs and working environments: - 11 percent reduction of local jobs compared to -0.7 percent in overall Rotterdam. Urban renewal resulted in a surprising paradox in Rotterdam's business landscape: while the supply of business space was twice as the demand, there was a shortage of smaller business premises; large companies had left, smaller ones remained, and new, smaller companies could not afford the new rents." [24]

24.
Vickery Hill, Adrian and Josie Warden, ed., *Cities of Making: Cities Report.* Brussels: Cities of Making, 2018: 140

12 Prime real estate: Sørenga, Oslo. Own photography

Looking to cities around the world, such development trends can clearly be identified, such as at Sydney's Darling Harbour (figures 10,11), where the industrial capability of the harbour was all but erased in favour of a string of shopping centres, convention halls, public plazas and a new monorail system. Oslo's waterfront (figure 12), previously blocked off by arterial roads and container yards, is now a continuous, publicly accessible foreshore, lined with cafes, offices, high-end residential developments and

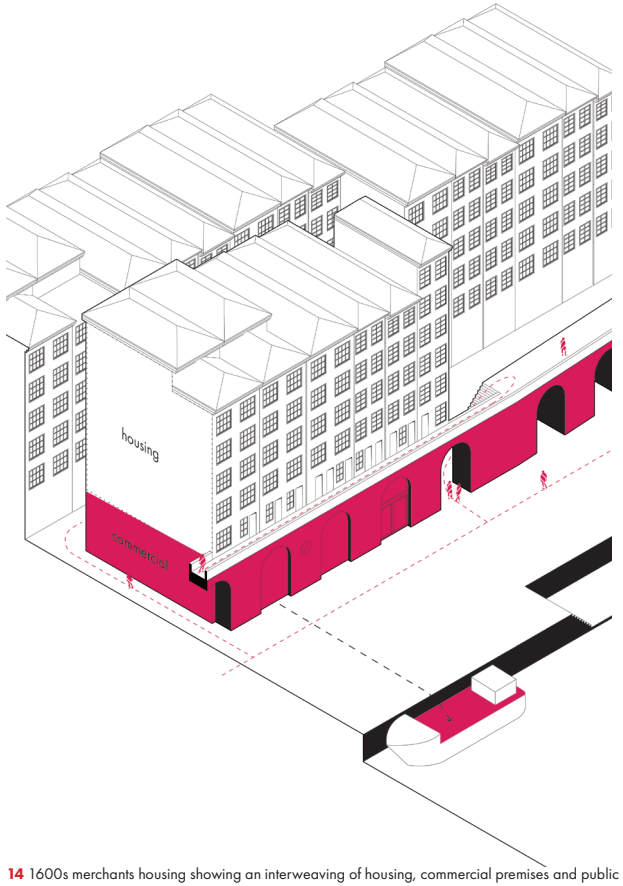
13 Boompjes, Rotterdam (1880's), showing merchant's houses directly adjacent to public leisure space and productive functions. (City & Port, 1999)

a tour-de-force of iconic public architecture. The assumed value of such developments comes from it being attractive for a highly skilled workforce that can then contribute to the city economically and culturally.

There is a genuine value in such developments, in that they repurpose previously underutilized and inaccessible land for public use. In the two aforementioned examples, such developments have drastically changed the cities' relationship to the water - the cultural heart of Sydney is now along its waterfront, while Oslo's foreshore has become the most popular spot to frequent, including spots to swim in the previously contaminated harbour. While the public-space dimension of this form of urbanism has undoubtedly seen success, a core critique of the legacy of neo-liberal city design lies in its provision of housing and workspaces. With typically higher-than-average rents, redeveloped port areas often become class-specific enclaves for the few and an occasional destination for the rest. The positive urbanistic qualities that have been created become exclusive to those with high incomes working in high-income jobs.

From industrial zone to mixed use

Merwe Vierhavens (M4H) similarly aims for cultural, recreational and commercial premises as part of the urban mix, however, there is a strong emphasis on retaining space for manufacturing, in spirit with Rotterdam as a creative hub. As the site has a history of strict separation between these functions, in particular the residential and industrial uses, the question becomes: How can we create an urban fabric that can incorporate these disparate uses? How can we accommodate both the larger-scale



14 1600s merchants housing showing an interweaving of housing, commercial premises and public space. Porto, Portugal

logistical considerations required for production and transportation while at the same time creating liveable urban spaces? Such an intermingeling of functions is not a new concept, as illustrated by Han Meyer's description of Dutch ports of the 1800s:

> "The most important harbour quays were also a city's most important public areas, which accommodated a concentration of vital urban functions and the homes of prominent merchant families. Quays were the domain of trade, of loading and unloading, of markets, but they were also an attractive spot for relaxation and enjoyment."[25]

25.
Meyer, Han. *City and Port: Urban Planning as a Cultural Venture in London, Barcelona, New York, and Rotterdam: changing relations between public urban space and large-scale infrastructure.* Rotterdam: Han Meyer, 1999: 51

15 Weavers houses, Leiden. Painting by Willem van der Nat, 1915. Public space used as an extension of the production process.

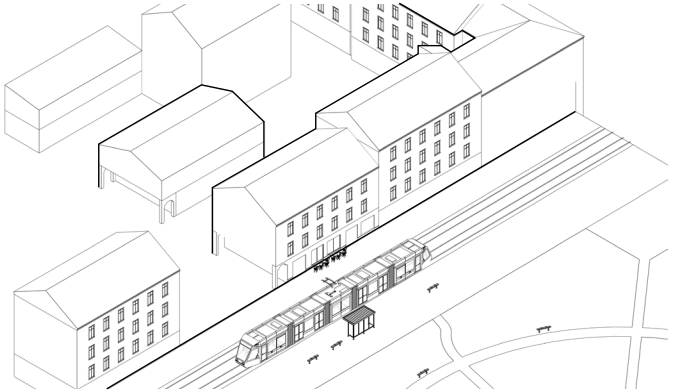
While such dual-function ports were commonplace in other locations around the world, the quality with which the Dutch ports executed this mixing was "unrivalled". The industrial/living ambitions of M4H, and the broader "productive city movement" is thus perhaps not 'revolutionary' in a historical sense, but rather, a new interpretation of an urban form that was previously omnipresent; one where living and working were not seen as separate spheres but rather incidental functions within an adaptable urban system.

Thresholds in the traditional urban block

The traditional mixed-use city structure is recognized as a pattern that can create favourable conditions for both lively streets and economically viable commercial districts. It also presents a structure that is reconfigurable, and the relationships between what is public and private can change over time:

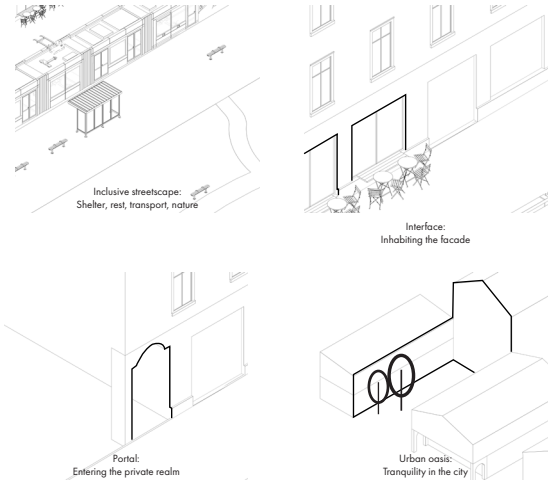
> "The spatial organization of the block draws its interior and exterior spaces closely together such that programmatic activity can evolve fluidly from the street into the courtyards. This supports a flexible gradation from public to private space, while also promoting a distinct neighbourhood identity."[26]

26. Borsi, Katharina: "Drawing and dispute: The strategies of the Berlin block," in: Intimate Metropolis Urban Subjects in the Modern City, Di Palma, Periton, Lathouri (ed.). London: Routledge, 2009, 132



Sequencing of shared space in the urban courtyard

The 1800's courtyard typology establishes a clear separation between the public street and the collective courtyard. A public-facing street wall is composed of repetitive fenestration and animated by shopfronts that allow for smaller businesses to engage with the public space.



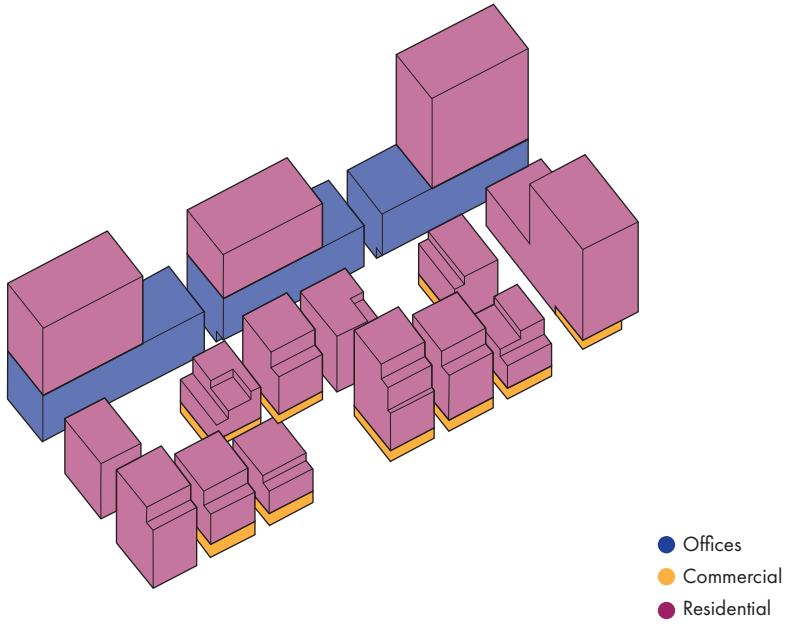
16 Traditional urban block, Oslo. Own Diagrams.

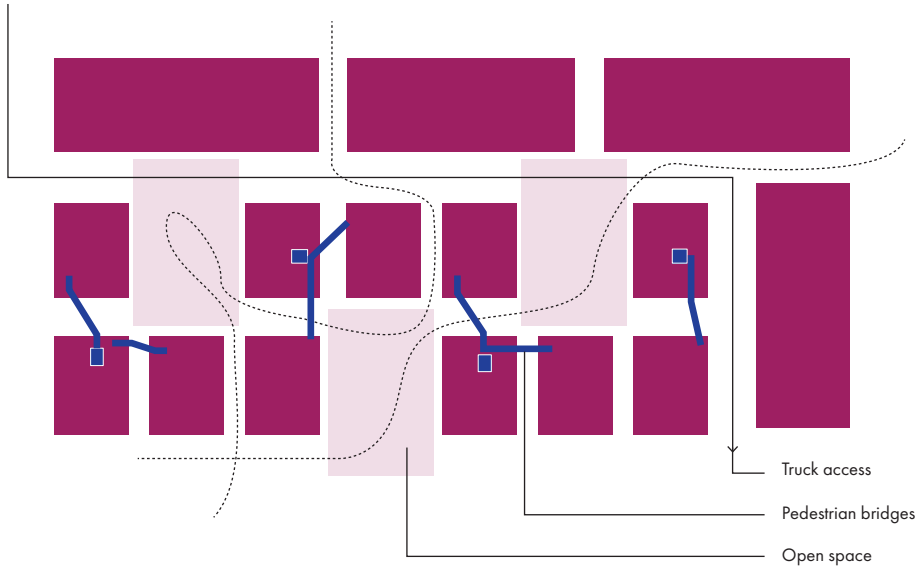
A high level of mixing, particularly between domestic, productive and public spaces, necessitates some form of distinction between these realms. In the traditional city block, a gradient of zones typically exists, from the public street to the building edge to the intermediate zone of a courtyard or stairwell and finally the private dwelling. Illustrated by a typical 1800s urban block in Oslo, Norway (figure 16), the zones become clear and the roles of each space display the richness and diversity of activities that can occur in such spaces. Crucially, these relationships are not fixed, and while zoning does exist, the "flexible graduation from public to private" allows for many alternative functions to exist over time.

17, Little Coolhaven. Photography by author.

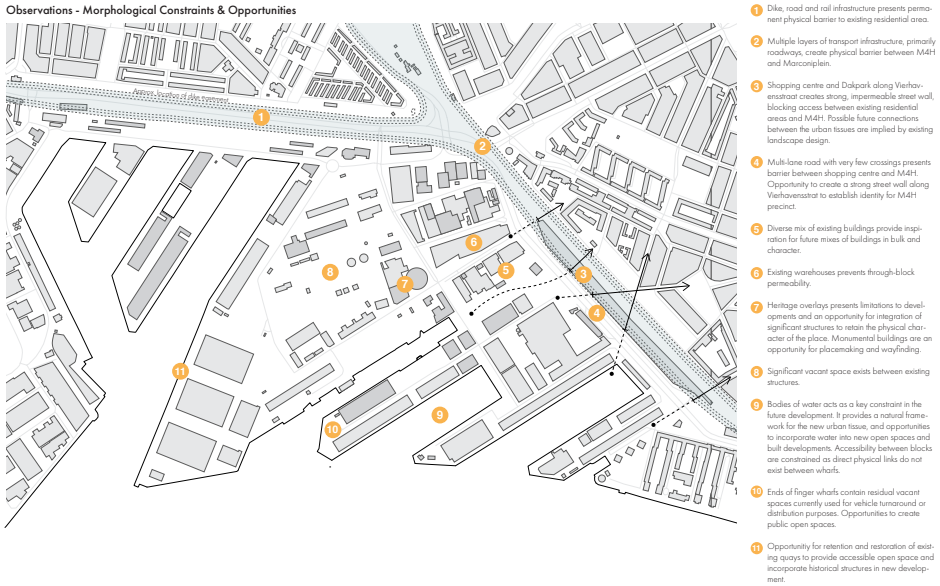
Little C - Engineered urbanism

A contemporary interpretation of the mixed-use city can be found in the recently completed Little Coolhaven project in Rotterdam. Similarly to M4H, it is located in an area experiencing a programmatic transformation from industrial to mixed-use. Here, a seamless mixing of functions has been engineered as office buildings and residential towers sit side-by-side, connected by a continuous streetscape of narrow streets, squares and pocket parks. Diversity of use is expressed at the ground level, where dwellings, cafes and office spaces face directly to the street, ensuring that there is active use at the ground level at various times of the day, a key factor in creating safe pedestrian environments. Instead of a perimeter block design, the buildings appear as individual towers in-space framing the public open spaces. A shared architectural language, continuous streetscape design and a systematic linking of vertical access systems between buildings create a unified character to the development.

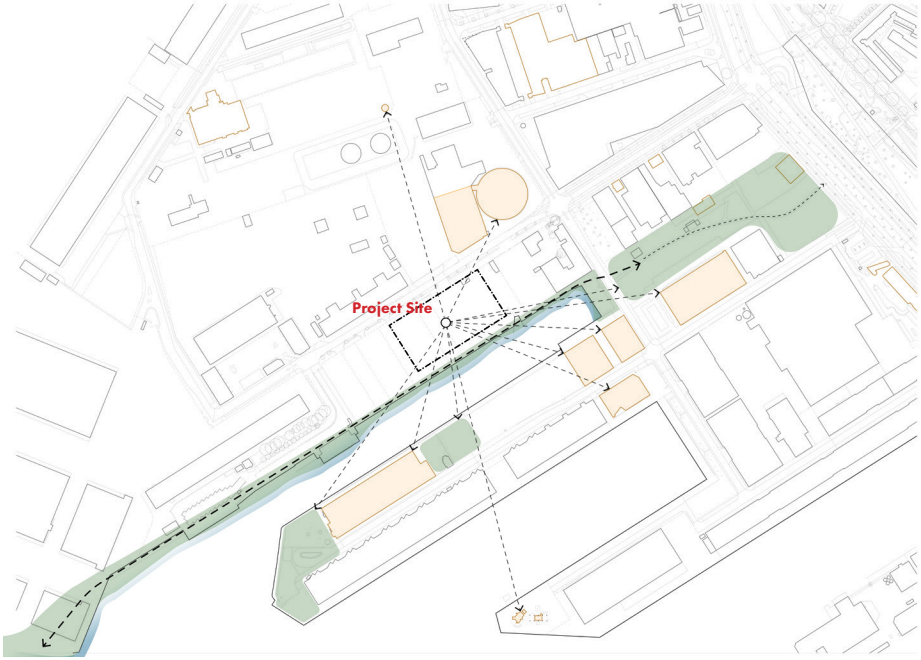




18 Diagrams showing distribution of programme, open spaces and vertical circulation. Diagrams by author.



20 SWOT analysis following site visit



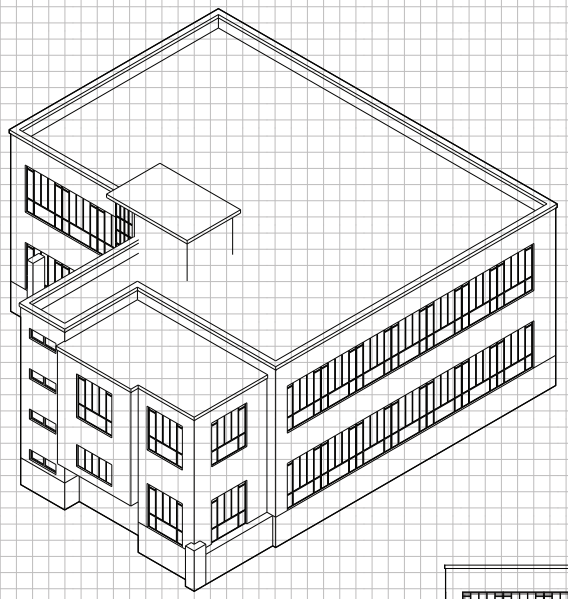
21 Significant opportunities exist to engage both with the foreshore and with existing heritage items

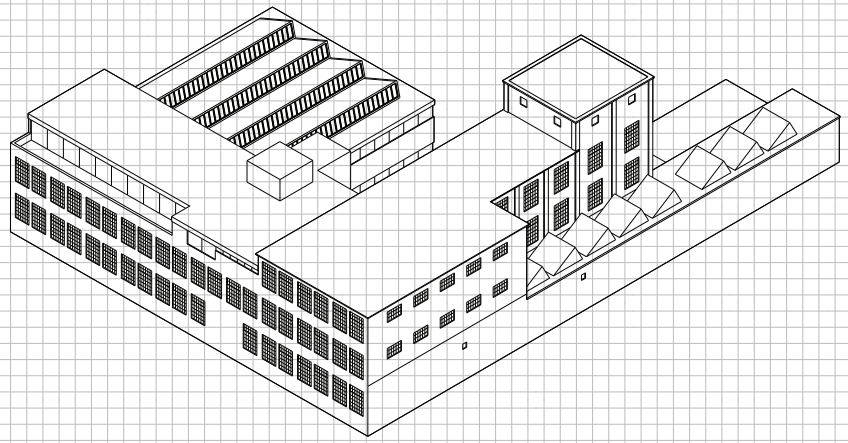
Site Observations

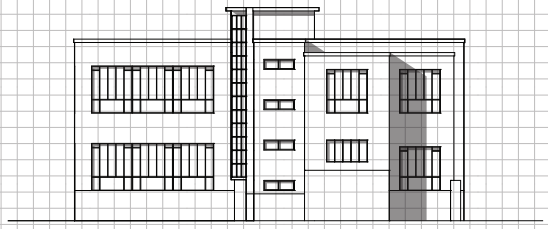
M4H is characterized by a detachment from the neighbouring urban tissue, with major roads and existing dikes separating the industrial zone from adjacent residential neighbourhoods. This separation, a product of its historical function as an industrial port, as well as being on the outside of the protective dikes, is seen in the urban tissue; a built environment that has developed based on the logistical considerations of transhipment, storage and production. Large parcels of land dotted with buildings of various proportions, from wide and bulky to tall and skinny, full-block to fine-grain, reflects the evolution of the site through changing economic paradigms. The economic, industrial and logistical considerations that shaped the landform of the site present a direct connection back to its heritage. Surrounding neighbourhoods on the other hand, which historically have been a source of labour for the harbour, presents a very different type of urban space. These areas are designed with human habitation in mind and consist largely of smaller parcels of land, subdivided into plots suitable for residential construction. This parcellation of land and existing residential structures leaves little space for other uses, such as production. With the introduction of a more human-centric urban fabric containing housing, education and services in addition to production facilities, improved integration with adjacent urban areas is desirable as it increases mobility and mutual access to transport and services, existing and new. The "island" condition of M4H is likely to prevail, however, with the dike and recent constructions such as the Dakpark being permanent obstructions to a continuous urban tissue. This relative disconnection between M4H and the city does however present an opportunity for the creation of a precinct identity distinct from the existing housing areas.

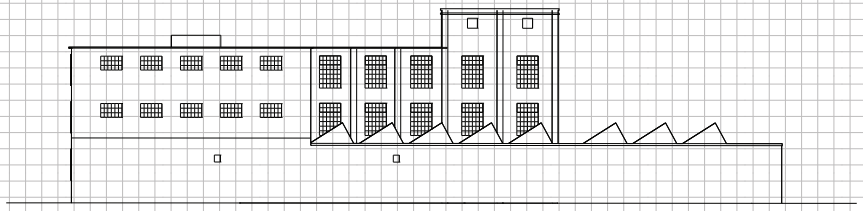
The Architecture of M4H

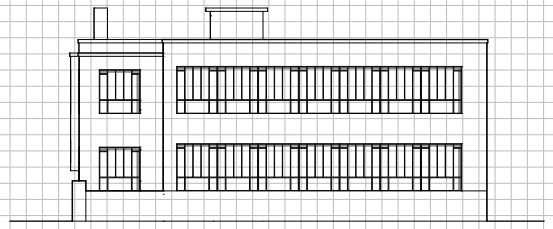
Adjacent heritage-listed buildings creates a framework for new architectural interventions. Such structures can both serve as formal inspiration as well as opportunities for place making and adaptive re-use. The following pages include a selection of heritage-listed structures within immediate proximity to the project site (figure 21). Understanding their composition, materiality and architectural language creates a baseline for a new architectural incision.

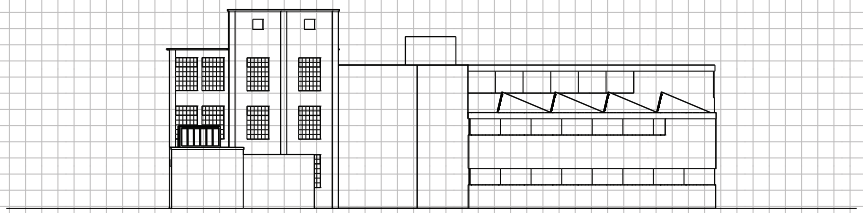


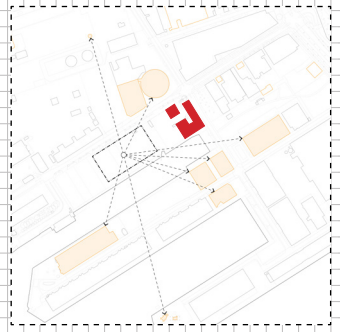




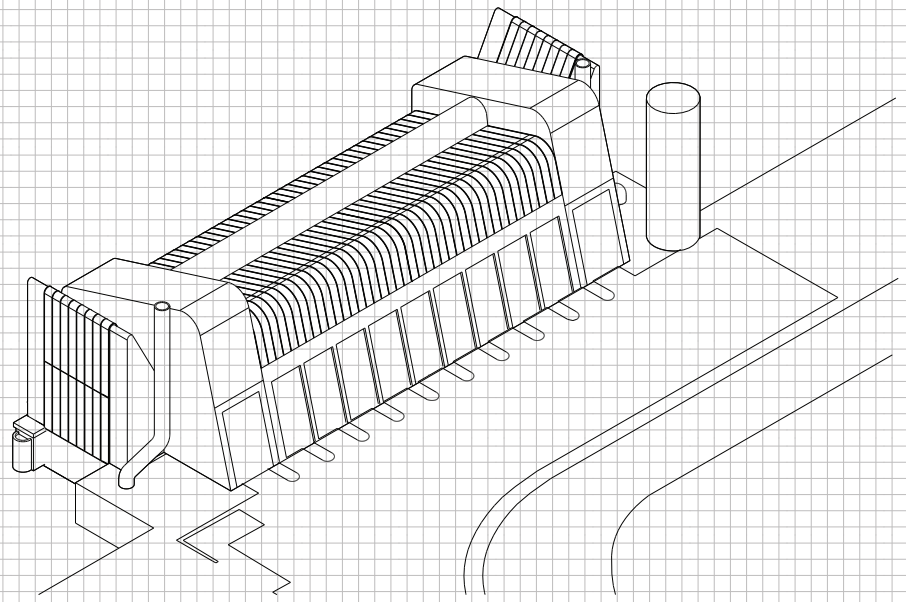


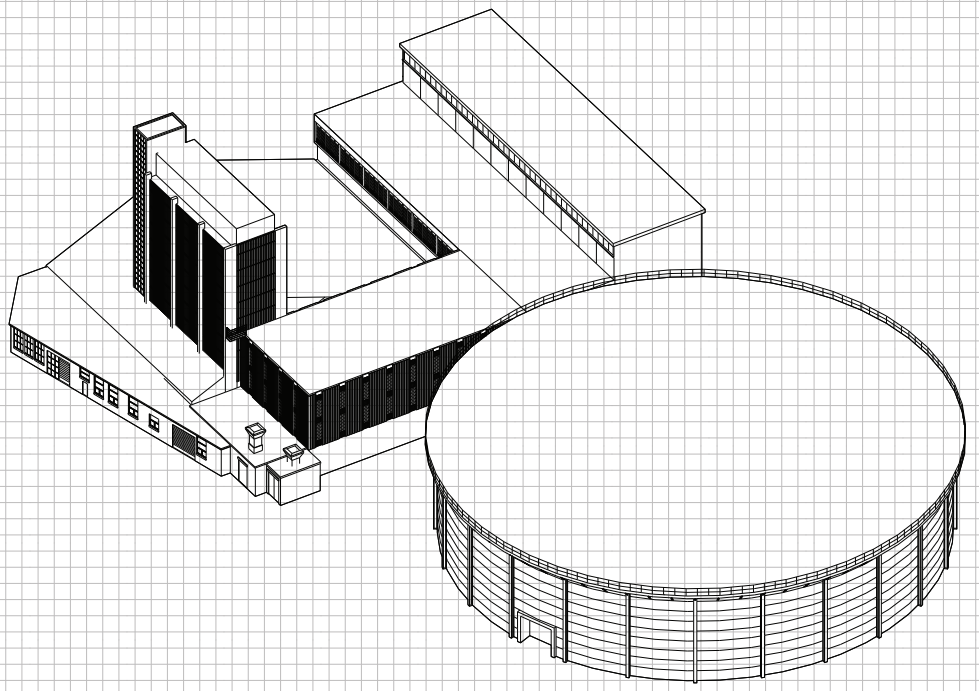


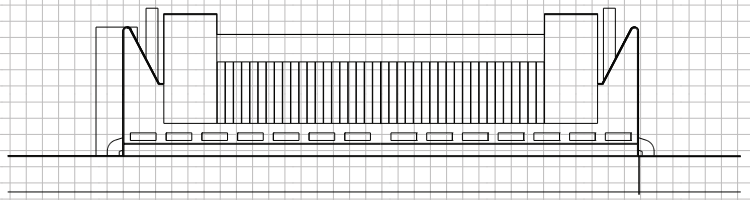


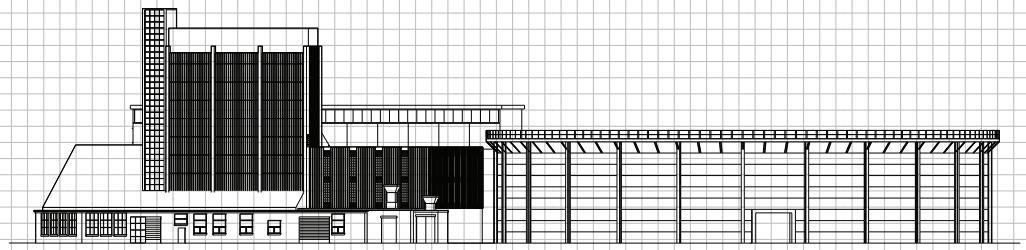


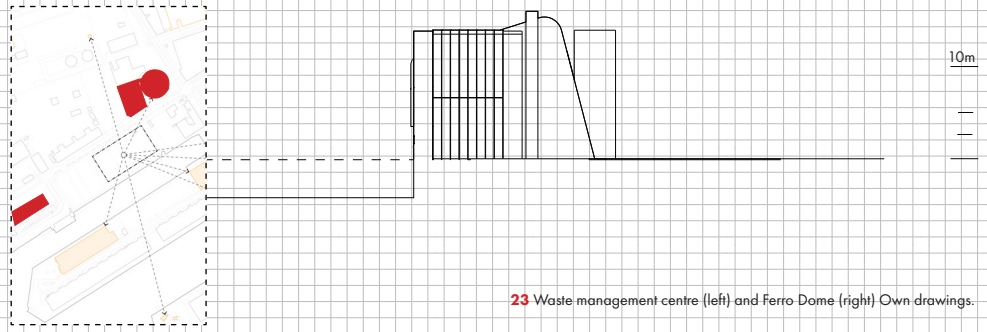
22 Kunst & Komplex buildings. Own drawings.

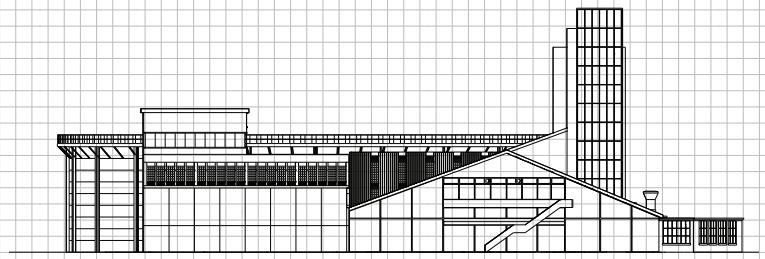












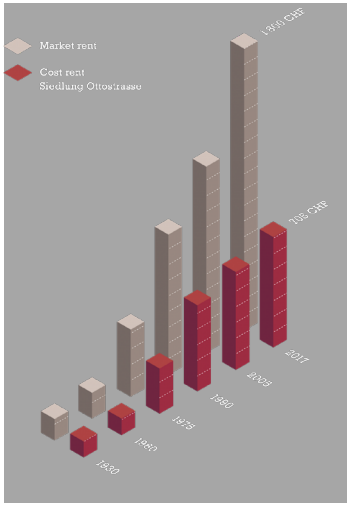
23 Waste management centre (left) and Ferro Dome (right) Own drawings.

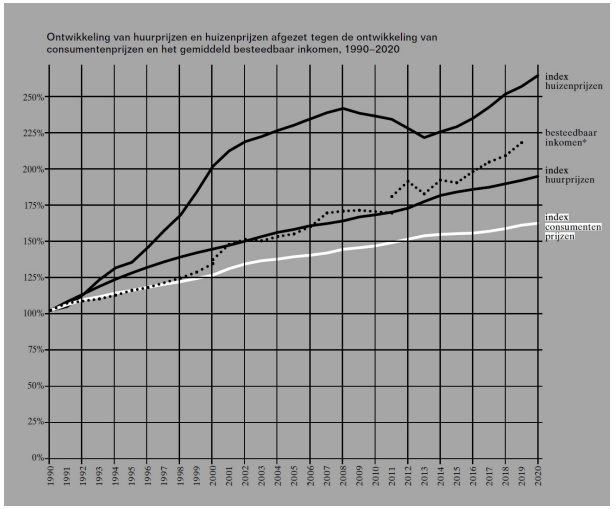
24 Ferro Dome. Own photography.

M4H aims to deliver mixed-use programming of living and industrial production. Building on the successes of past waterfront developments, M4H could become an inclusive addition to the city. Its unique position within the urban fabric of Rotterdam and its architectural and cultural history lays the foundations for a rich new urban ensemble. However, if the area is to be inclusive to a wider variety of functions and inhabitants now and in the future, it will be important to encourage affordable rents to both housing and production spaces in order to attract the innovative entrepreneurs that the municipality is seeking.

25 Industrial areas showcase a utilitarian architecture. Own photography.

26 Vindmøllebakken, Helen & Hard (Stavanger, 2019)
Source: helenhard.no/work/vindmollebakken/





27 Left: Housing cooperatives emplying the cost-rent principle caps profit from land speculation, reducing rent pricesin the long term. Source: https://www.cooperativeconditions.net/home/3-nonspeculation

28 Right: Housing prices have risen sharply in comparison with inflation. Source: Operatie Wooncooperatie

Chapter 2: Shared Housing & Social Infrastructure

"The idea of sharing can be understood as collective action by a group of individuals for joint benefit, whether for survival, saving or pleasure[35]."

Co-ops: A financially and socially sustainable model

According to one Rotterdam senior urban designer, the M4H proposal does not intend to require more affordable housing beyond the minimums mandated by national Dutch housing policies[27]. Given the gradual decline of social housing and soaring housing prices in the private sector, I would argue that new developments in the port of Rotterdam offer an ideal opportunity to not only experiment with innovative mixed-use concepts, but also to pursue more radical initiatives to provide affordable housing and business premises.

Housing cooperatives have been identified as an instrument to provide affordable housing for the long-term, without relying on conventional political approaches like social housing, direct rent subsidies, or construction subsidies. By existing outside of both the private, profit-driven housing market and the public social housing system, cooperatives provide a non-profit alternative that promotes fairer access to housing. In Switzerland, housing cooperatives have proved particularly effective as they can provide housing at below-market rates, without requiring significant financial support from the government. This has made them a popular solution that is supported by both ends of the political spectrum[28].

Cooperative housing is first and foremost a financial model; a co-op is a corporation co-owned by its members. Typically made possible through favorable, long-term land leases and a focus on not deriving profit from tenants (using the cost-rent principle)[29], cooperatives can play a role in offering affordable housing stock to an overheated market. Another benefit is social: Housing cooperatives and co-housing are not mutually exclusive - but many cooperatives do have an emphasis on collaborative living. Such projects typically feature shared spaces and dwelling typologies that promote social interaction and community building, freeing residents from the isolation of the single-household or single-person unit.

27. Based on informal interview with Annette Matthiessen, Rotterdam Senior Urban Designer on 09/09/2022.

28. 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.

29. Cooperative Conditions, https://www.cooperativeconditions.net/home/1-an-idea-of-sharing.

Social infrastructure

Some level of sharing in our day-to-day lives can provide a tremendous health benefit, in particular for those vulnerable to isolation. The term "social infrastructure" coined by Eric Klingenberg refers to "the physical conditions that determine whether social capital [relationships and interpersonal networks] develops". Klinenberg argues that robust social infrastructure, in the form of local, in-person interactions creates the conditions for "sustained, recurring interaction which allows relationships to grow." A Chicago neighbourhood with high-quality social infrastructure is described as follows:

> "They knew their neighbours - not because they made special efforts to meet them, but because they lived in a place where casual interaction was a feature of everyday life."[30]

What might social infrastructure look like? I will use the case of an elderly member of my own family as a concrete example. As seen in figure 29, their dwelling (in yellow) is located in a cluster of 8 apartments, distributed across two houses. The placement of their dwelling within the complex ensures a modest yet impactful background level of neighbourly interaction that is subtly encouraged by the orientation and placement of private outdoor spaces, dwelling entries and shared amenities. This sets the foundation for neighbourly interactions and a level of care between the elderly owner-occupiers of the cluster.

Shared housing

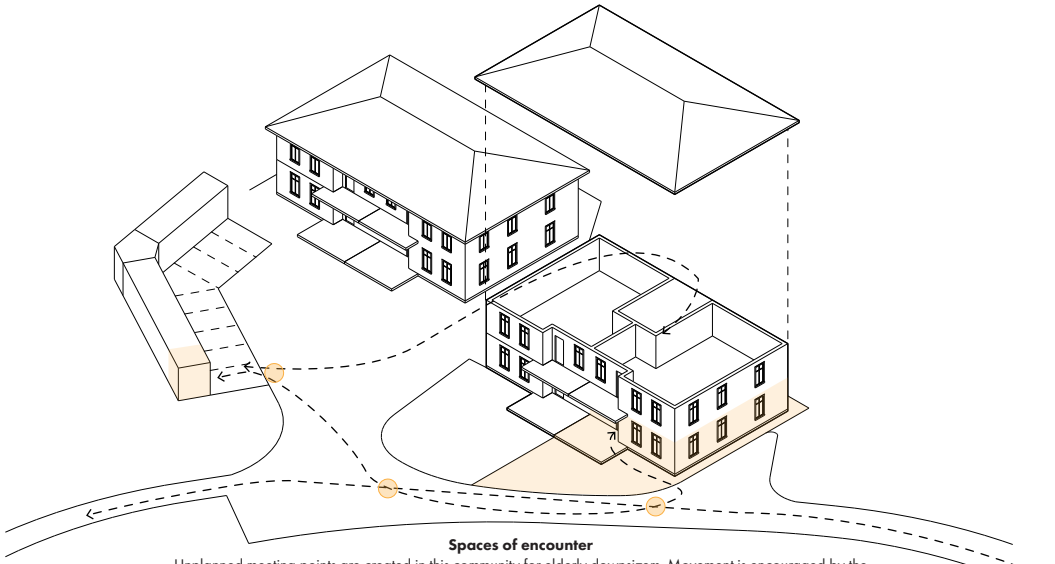
What defines collaborative housing? And why share? While the specific concepts of sharing differ between countries and change over time, what unifies each effort is an understanding that sharing of resources can provide benefits beyond what is typically possible in individualised housing. Dorit Fromm describes collaborative housing as a community where "Each household has its own house or apartment and one share in the common facilities, which typically include a fully equipped kitchen, play areas and meeting rooms. Residents share cooking, cleaning and gardening on a rotating basis" [31]. Karin Palm Linden, in her dissertation on Swedish *kollektivhus* (collective houses) uses similar phrasing, but with shared household chores being less emphasised [32]. Dutch *centraal wonen* of the 1970s and 80s were characterised by a desire to create a more social way of living, with sharing of chores being seen more as a side-effect of this arrangement. Common to these is a questioning of the isolation of the single family home, or in the specific case of the Hilversumse Meent, questioning the concept of the nuclear family structure altogether, with the ultimate aim being a more social way of living[33]. Similar motivations can be seen among

30.
Klinenberg, Eric: "Social Infrastructure," in: Age-Inclusive Public Space, Hauderowicz, Ly Serena (ed.). Berlin: Hatje Cantz, 2020, 126-129.

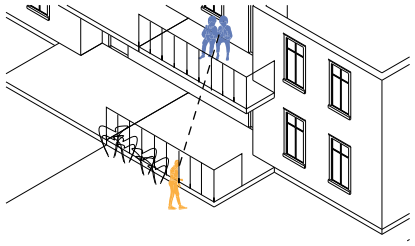
31.
Fromm, Dorit. *Collaborative Communities: Cohousing, Central Living, and Other New Forms of Housing Shared Facilities.* New York: van Nostrand Reinhold, 1991, 31

32.
Palm Linden, Karin. *Kollektivhuset och Mellanzonen: Om rumslig struktur och sosialt liv.* Lund: Byggnadsfunktionslara, Lund Universitet, 1992.

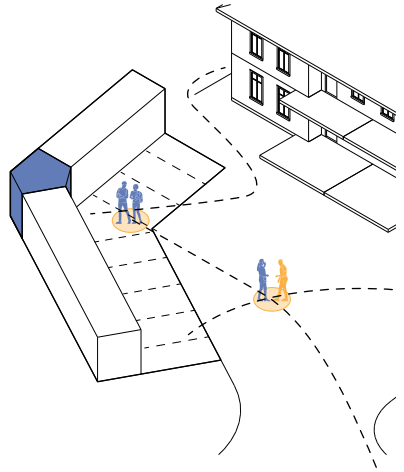
33.
Fromm, Dorit. *Collaborative Communities: Cohousing, Central Living, and Other New Forms of Housing Shared Facilities.* New York: van Nostrand Reinhold, 1991.



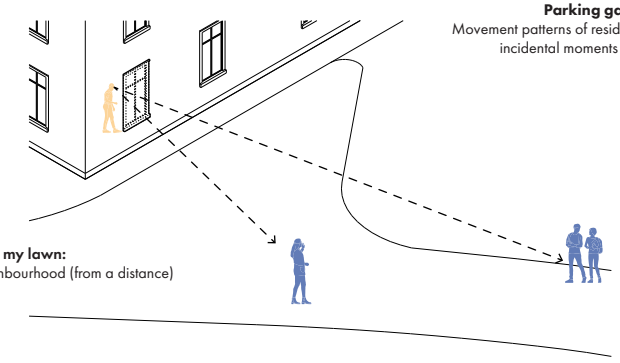
Spaces of encounter
Unplanned meeting points are created in this community for elderly downsizers. Movement is encouraged by the central placement of shared facilities - car parking, garbage room, storage spaces - creating a platform for occasional social contact between neighbours.



A place in the sun:
Stacked outdoor spaces



Parking garage:
Movement patterns of residents overlap, creating incidental moments of interaction.



Get off my lawn:
Keeping up with the neighbourhood (from a distance)

30 Resident meeting, La Borda cooperative (Spain)

residents of Vindmøllebakken, Stavanger (2019), where loneliness - both for couples and singles - was a key factor in joining the community[34]. The Swiss cluster flat, as seen in the Hunziker Areal project Haus A, caters to a diversity of living situations, creating a transitional understanding of the traditional household. Affordability is an additional factor in many collaborative housing projects, ranging from "more value for money" to the more spartan Barcelona Cooperative La Borda, where residents joined together to provide a resident-led alternative to state-funded social housing.

While there are several motivations for choosing to live together, from cost reduction to increased efficiency, the key factor remains a social one, as identified by Anne Kockelkorn and Susanne Schindler: a motivation "to satisfy a basic desire for a sense of community and the enjoyment of the self-determined exchange among like-minded others.[35]"

Conditions for Care

Hallways, stairwells, lobbies, courtyards, gardens. These spaces create the potential for resident interaction, however, they do not automatically guarantee the forging of social bonds. I would argue that the successful creation of shared space has two main components: governance and spatial design. Referring again my own elderly family member as an example, engagement in the 8-unit housing association has created regular "rituals" that forge bonds between residents. A bi-yearly meeting to discuss finances - over coffee and cakes - creates a formal gathering, while more mundane day-to-day rotating chores - such as changing the recycling bag in the garbage room - create incidental interactions and a sense of shared

34.
Lundberg, Henrik: "Arkitektur som oppfinnelse," *Arkitektur N*, no. 2 (2020): 38-47.

35.
Anne Kockelkorn, Susanne Schindler, Rebekka Hirschberg: „An Idea of Sharing", in *Cooperative Conditions. A Primer on Architecture, Finance and Regulation,* Zürich: gta verlag, forthcoming in 2024.

36.
Lorraine Farrelly, ed., *Designing for the Third Age: Architecture redergined for a generation of active givers.* AD, 2014: 57

37.
Lundberg, Henrik: "Arkitektur som oppfinnelse," *Arkitektur N*, no. 2 (2020): 38-47.

38.
Refer to glossary for definitions

ownership. The relative homogeneity of the residents (all being either retired or close to retirement) has created the conditions for informal, mutual care between residents, from borrowing a cup of sugar to providing a lift to the emergency room. As most older people desire to remain in their homes through old age [36], such informal care networks provide both built-in security and positive health effects which can reduce or eliminate the need for institutionalisation. This not only reduces the burden on state-run care facilities but it provides a tremendous boost to the quality of life of the elderly.

Organised activities, typically with resident involvement, help boosting resident interaction; In Vindmøllebakken, Norway, there are 26 "activity groups" created among the 54 residents, ranging from a "workshop group" to a "pet group"[37]. In the recently completed Domus Houthaven project in Amsterdam, one resident noted that the only reason that he had any friendships in the building was because of organised parties and lunches. The architectural features of the building, such as a communal garden, a collective lounge, an interconnected circulation system and centrally located bicycle parking, help sustain friendships, but, as this resident argues, would not be enough by themselves.

These examples show the importance that some form of organising body has on the success of shared space. A resident organisation, building owner, architect and others then makes decisions on how the spatial planning should occur.

Spatial Characteristics of Shared Domesticity

The shared ownership and/or governance of collaborative communities allows more flexibility for residents to design buildings that meet their own needs and desires, rather than being limited by developer-driven marketing considerations. What follows is a look into a selection of housing cooperatives, co-housing and collaborative housing developments[38] that expand the notion of domesticity, beyond the individual dwelling unit. Domesticity refers here to home and family life, with the traditional norm being the single-household dwelling. Collaborative housing, by introducing higher levels of sharing, blurs the lines between private, shared, and public spaces, affecting the layout of dwellings, access systems, and shared fa-

31 Hilversumse Meent, public pedestrian street. Source: https://www.bvintersell.nl/activiteiten/wandelmeent-hilversum

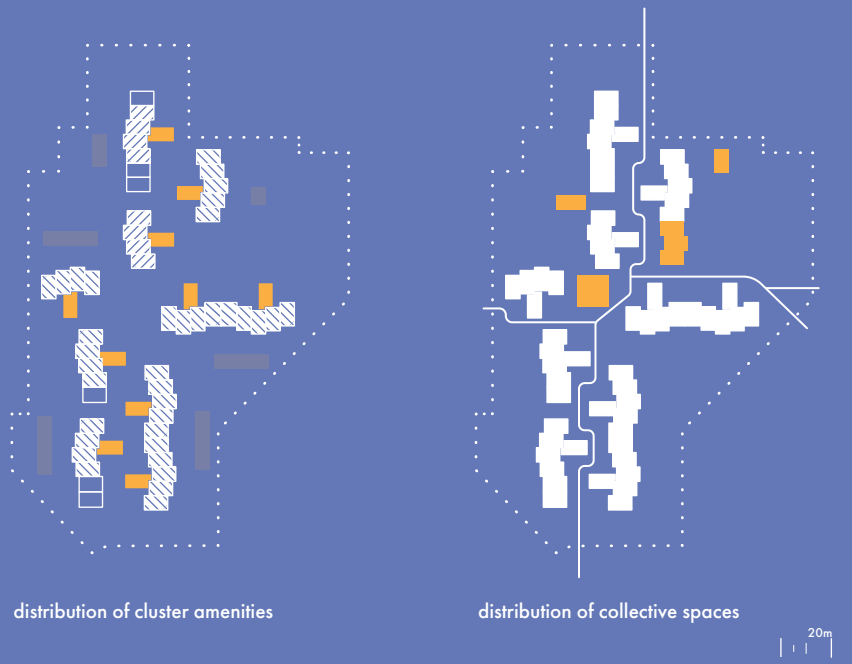
cilities. This chapter focuses on the spatial characteristics of various collaborative housing projects from different countries and times. The analysis is primarily qualitative and spatial, with different aspects being examined for each project.

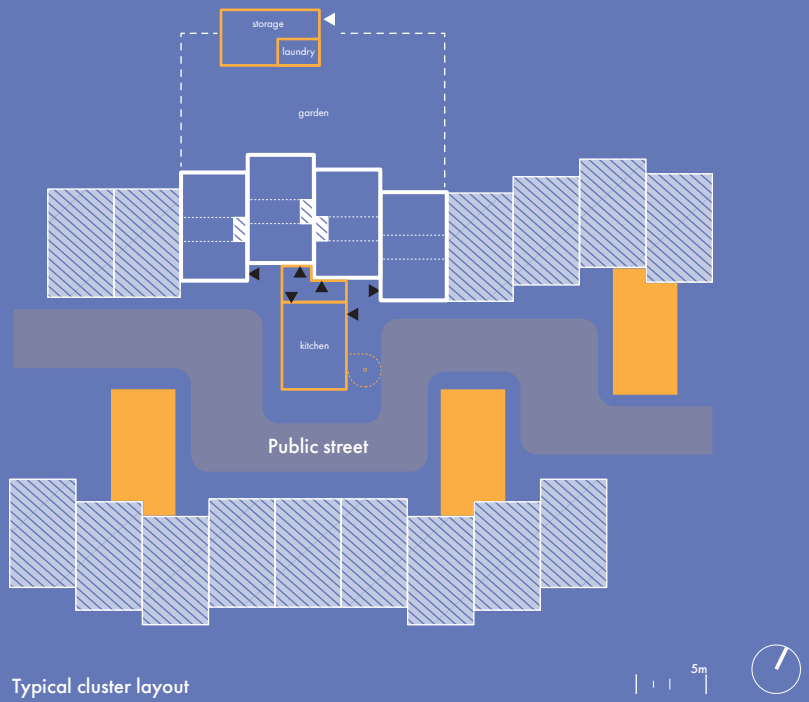
Clustering

A version of clustering is found in most residential projects, in the form of necessary groupings into lift cores, stairwells, etc. However this tool can also be used to intentionally create smaller, more intimate social groupings within a larger residential scheme.

In the case of the Hilversumse Meent, The Netherlands (completed 1977), future residents of the envisioned a community where they could live in less isolation and develop new friendships for themselves and their children. They did not have any major expectations for relief from chores or efficiency in completing tasks. Being a part of the development process, residents chose to divide into ten subgroups (clusters). With the majority of the residents being single or single parents, completing chores within the clusters had the effect of creating something akin to a community family. Kitchens and laundry rooms are provided per cluster, while shared facilities for the entire community include a library, meeting room, bar-cafe, sauna, workshop, studio, and a common garden[39].

39. Fromm, Dorit. *Collaborative Communities: Cohousing, Central Living, and Other New Forms of Housing Shared Facilities*. New York: van Nostrand Reinhold, 1991.





32

50 units are arranged in clusters, each with five individual dwellings. Four main dwelling types exist, ranging from 41 to 107 m2. Stairs and bathrooms are located in the centre of the unit, freeing up rooms along the facades to become the living room, kitchen or bedrooms. The development is arranged along a publicly accessible pedestrian street which links two adjacent streets. A meandering effect is created by the protruding cluster kitchens, resulting in a series of more semi-private outdoor spaces between each cluster. Each housing unit is expressed in one, two or three storey barrel-vaulted volumes with the kitchens being differentiated by their flat roofs, allowing for a shared terrace on top.

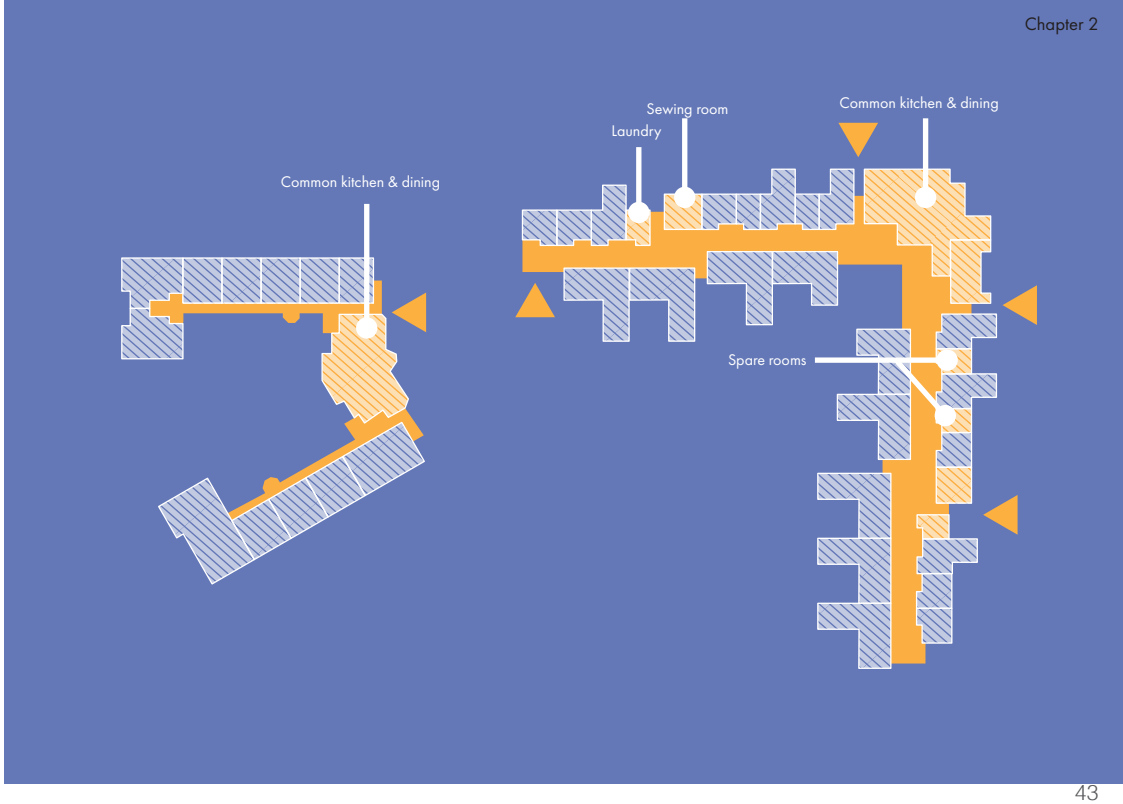
The arrangement proved successful in the first couple of decades of the development, with, in the year 1989, social activities being reported in all ten clusters, with varying levels of engagement. As the majority of the founding members have now left, some of the the idealism of the 1970's has faded, however the community is still reported to remain a very social neighbourhood, with everyone knowing their neighbours by name[40]. These observations indicate that a robust organising body with a long-term vision is important to sustain ideas of sharing over time. Hilversumse Meent also demonstrates the long-term positive effects that urban design - and effective clusters - can have in the creation of socially inclined neighbourhoods, aspects that may outlive the organisation that it was created for.

The in-between zone

While Hilversumse Meent uses clusters as the main method of organisation, Scandinavian co-housing projects presents an alternative pattern: one that is typically more focused on the individual dwelling in connection with a larger whole. Dwellings are grouped more loosely around collective areas, a zone that Karin Palm Linden dubs the "middle zone" or "in-between space". Palm Linden argues that the circulation system should be treated as a "room system" (Swedish: *rumssystem*) and that the layout of this zone is crucial to the success of a collaborative dwelling project. Important common rooms should be clustered and placed close to the main entries, as can be seen in Regnbogen (Sweden) where two residential wings each with 4-6 dwellings connect to a central collective space. Dwellings should ideally should face onto the collective space, with sightlines between shared areas, dwellings and circulation systems to ensure surveillance and a sense of ownership over the shared spaces. Another common feature is the distribution of common spaces throughout the plan/cirulation system, as seen in Jystrup Sawmill (Jystrup, DK) where with one main collective space (kitchen, dining hall) is flanked by smaller shared rooms (sewing room, workshop, spare bedroom, laundries) in the two wings[41].

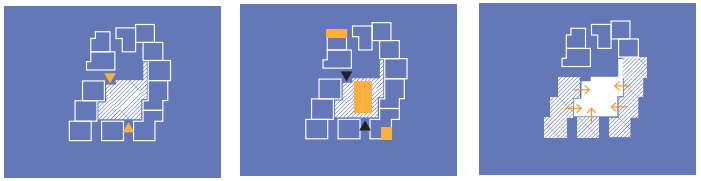
40.
Co-housing: The wandelmeent. Maarten P Kappert. Retrieved April 25, 2023, from https://maarten-pkappert.nl/co-housing-the-wandelmeent/

41.
Palm Linden, Karin. *Kollektivhuset och Mellanzonen: Om rumslig struktur och sosialt liv.* Lund: Byggnadsfunktionslara, Lund Universitet, 1992.



33 arrangement of collective facilities, Regnbogen (left) and Jystrup Sawmill (right)

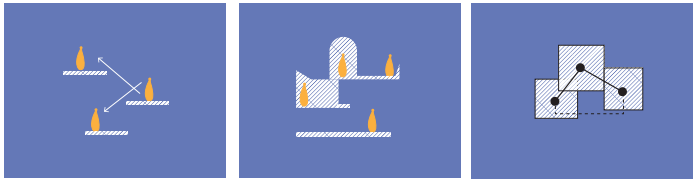
Vindmøllebakken (Helen & Hard, Stavanger, Norway 2019) represents an evolution of many of the principles pioneered by earlier scandinavian co-housing projects.
54 residents across 40 dwellings share access to an extensive offering of collective spaces. Targeted at down-sizers and empty nesters, the project has attracted a wide variety of residents, from small families to elderly.
Henrik Lundberg (Arkitektur N, nr.2 2020) describes the type of dwelling configuration that Vindmøllebakken reperesents as a type of shared living that offers "relatively conventional apartments" with a "modestly reduced footprint", which, when combined with a shared ownership structure, offers collective facilities that give residents access to "collective facilities with a spatiality and functionality that one would not experience in a conventional dwelling".



Central shared spaces clustered centrally in plan & close to entries

Minor shared spaces distributed throughout plan to create "destinations"

Dwellings located directly onto shared spaces

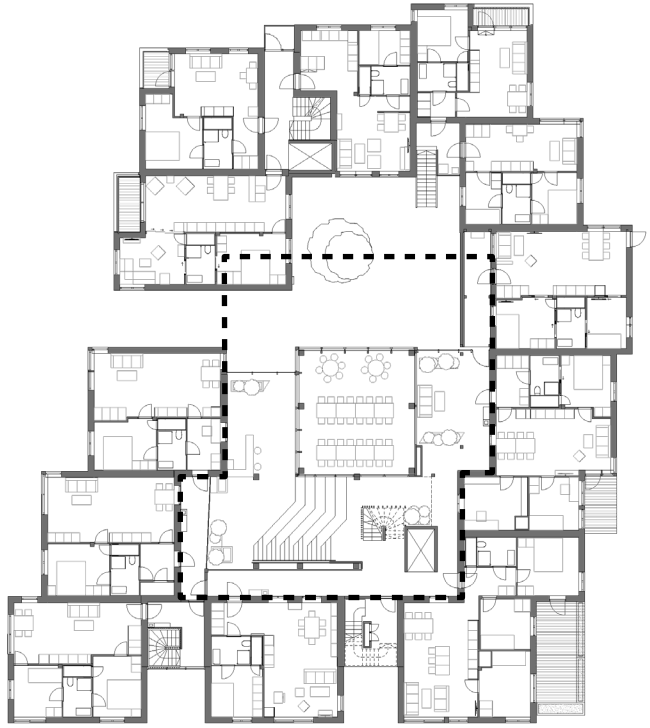


Shared spaces linked visually

Shared spaces feature unique spatial qualities not found in the private dwellings

Sequential space rather than corridors. Create choice by including circulation loops

34 Vindmollebakken. (own drawings)



35 Vindmollebakken, level 1. (https://helenhard.no/work/vindmollebakken/)

The collective facilities emerge from a centrally located external courtyard space, forming the entry to the building. A two-storey reception space with an adjacent auditorium seating welcomes visitors and works as a foyer space. Abutting this is the main collective space; a two-storey dining/living room which is again connected to the shared kitchen. Several additional shared spaces are dispersed throughout the house, including a soundproof event space in the basement, a workshop, laundry, a library/sewing room, a greenhouse and a yoga room with an adjacent roof terrace.

An important value in the project was a balance between resident privacy and collectivity:

> "Everyday life can unfold within each own's apartment should that be desired. Multiple entries to the house ensure that one can choose how updated one wants to be on shared social activities when coming and going,"

The relatively small (for Norwegian standards) individual units of 45-75m^2 are noted as a difficulty for some residents, many of whom are downsizers from larger properties:

> "Several of the living rooms appear "over-furnished" (cluttered), which evidences that the downscaling from a previous dwelling has been challenging."

The project has been developed under the Helen & Hard-developed "Gaining by Sharing" model, which aims to increase the social value of housing projects through increased sharing and collaboration. In this project, value is added in particular to residents who are nearing or in retirement; daily interactions with neighbours and shared activities, meals and projects ensure that residents avoid the isolation that is common in old age[42].

Future proof

Collaborative living is not a long-term solution for everyone, thus resident turnover can be high, particularly in the case of rentals[43]. These developments can form a role as a transitionary dwelling, where one might decide to relocate once the living situation changes (such as the example of a resident remarrying or having children). Alternatively, changes can be accommodated within the building. Changing life situations require apartment layouts to permit a certain level of flexibility.

The La Borda cooperative in Barcelona, Spain, has sustainability as a key guiding principle, based on three pillars: Community, sustainability, accessibility. The project is built using low-impact materials, and passive energy methods are used to reduce consumption and provide climatic comfort for residents. Facilities are provided for residents so that they can live with less, one example being the guest rooms. One resident notes that she used to live in a three bedroom home so that she could host her children when they would come to visit. "Now, when visitors come, I book the guest room and they stay there". Additionally, the building is designed with adaptability in mind, with "extra" spaces of 18m^2 being located along the galleries[44]. These spaces are attached to the adjoining apartments, but over time they can be repurposed based on user needs:

> "With this mechanism, you can grow sideways, and you can also end up with a split unit" So if you work from home and there is a spare room, you could have a study on another floor, that's a genuine possibility.[45]"

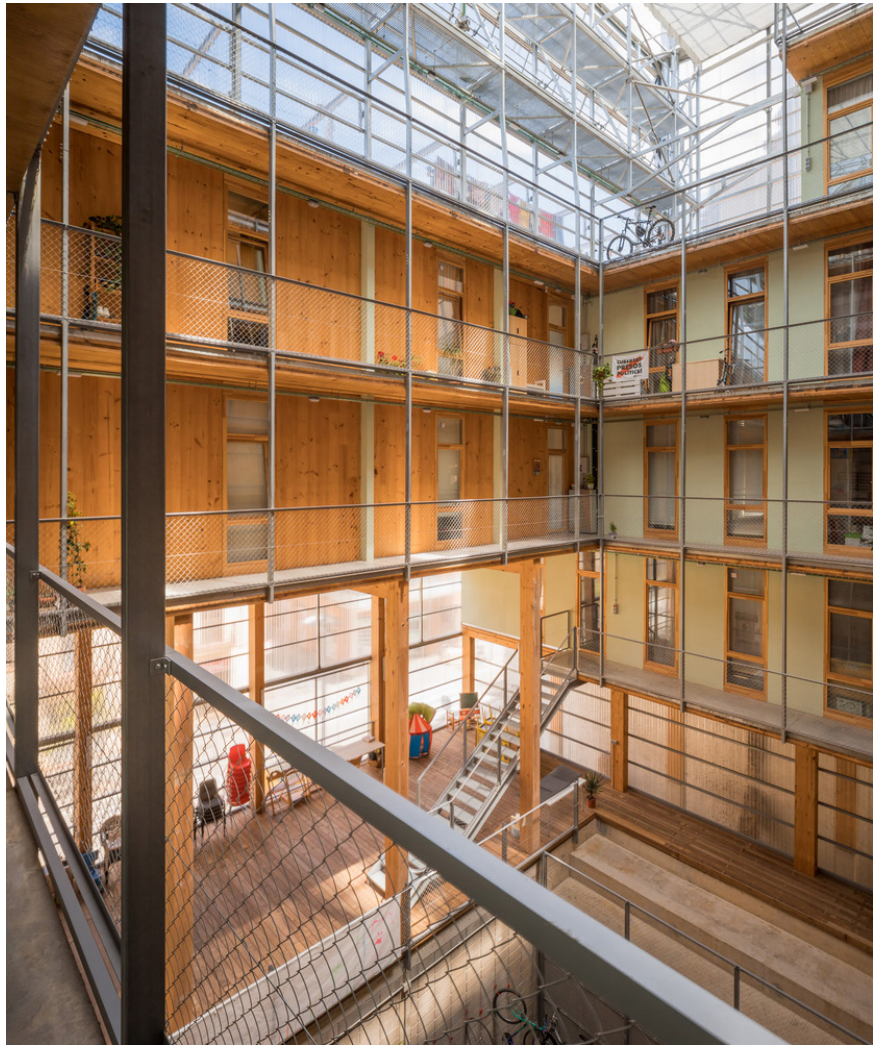
The building features shared spaces at the ground level, podium level and

42.
Lundberg, Henrik: "Arkitektur som oppfinnelse," *Arkitektur N*, no. 2 (2020): 38-47.

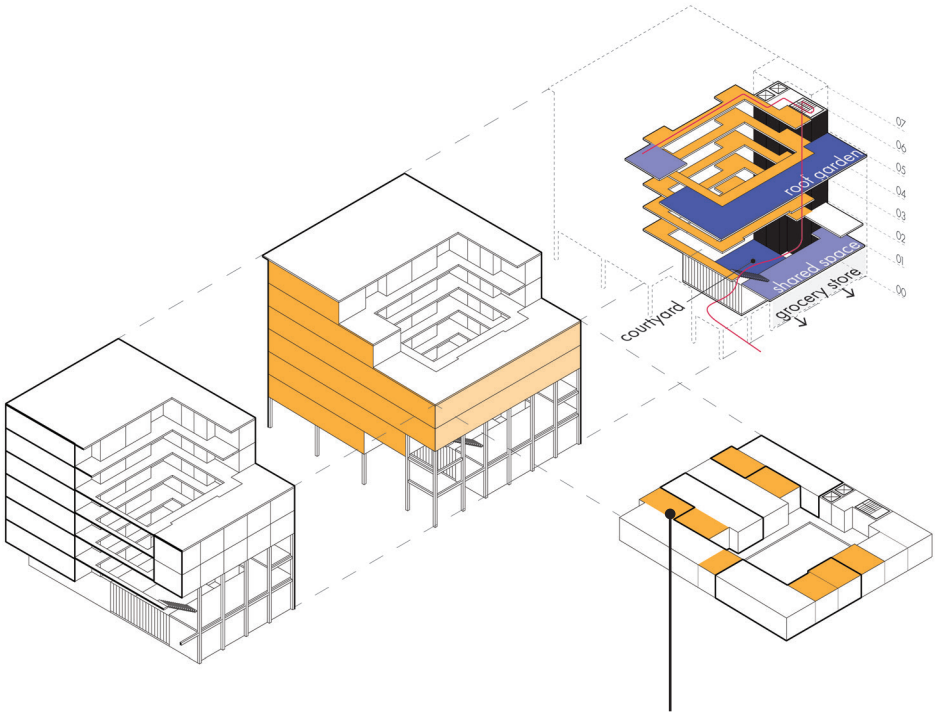
43.
Fromm, Dorit. *Collaborative Communities: Cohousing, Central Living, and Other New Forms of Housing Shared Facilities*. New York: van Nostrand Reinhold, 1991.

44.
La Borda cooperative housing by Lacol (2023) YouTube. YouTube. Available at: https://www.youtube.com/watch?v=uqcK9BOGYtg (Accessed: April 15, 2023).

45.
Quote from La Borda architect and resident.
La Borda: visita arquitectònica (2020) YouTube. YouTube. Available at: https://www.youtube.com/watch?v=YQYTrgeT7jY (Accessed: April 21, 2023).



36 Galleries overlooking the naturally climatised collective space, La Borda Cooperative. Source: archdaily.com/922184/la-borda-lacol



37 La Borda Cooperative. Diagrams by author

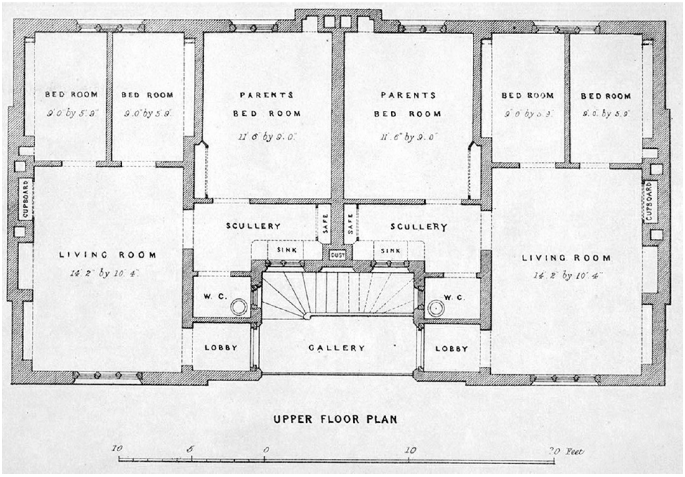
38 La Borda Cooperative., typical plan. Source: http://www.laborda.coop/en/

two rooftop levels, distributing programme based both on climatic conditions (giving the most favorable aspects to the dwellings) and address to the city. A shared kitchen hosts meetings and shared meals while a non-climatized 'living room' in the courtyard functions as a multi-purpose space and laundry. Gardening can occur at the rooftop. These spaces result in a community where residents can live with less, yet get more in return, akin to the "gaining by sharing" concept of Vindmøllebakken. This also has positive social impacts, as was felt by the residents during the COVID-19 lockdowns. During that time, the cooperative formed a community in an otherwise isolated and socially distanced world:

> "We went into the courtyard, with social distancing (...) everyone on their walkway, distanced (...) and suddenly... we were together.[46]"

Collaborative communities such as La Borda thus present a not only a more sustainable way of living through the sharing of resources and subsequent reduction of carbon emissions, they present a robust and socially sustainable mechanism to create robust social infrastructure with mutual care being a built-in feature.

46.
Quote from La Borda resident. *La Borda cooperative housing by Lacol* (2023) YouTube. YouTube. Available at: https://www.youtube.com/watch?v=uqcK9BOGYtg (Accessed: April 15, 2023).



39 Henry Roberts, Model Houses for Families, 1851 source: Henry Roberts, The Dwellings of the Labouring Classes: Their arrangement and Construction; with the Essentials of a Healthy Dwelling [London, Society for the Improvement of the Labouring Classes, 1867]

Chapter 3: Beyond the Nuclear

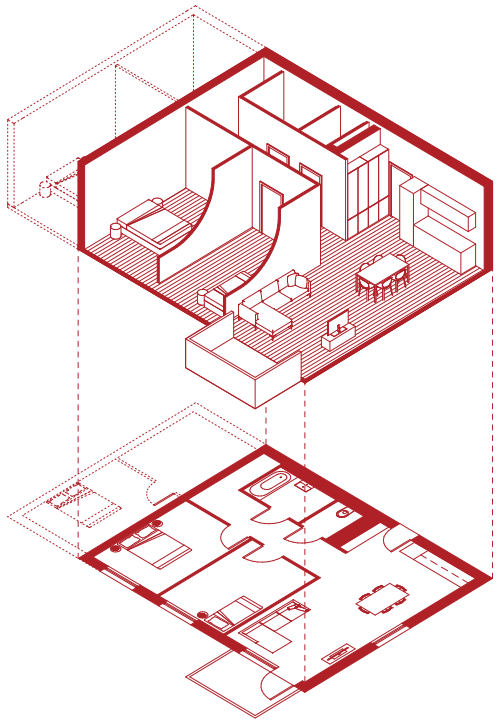
Research Question: How can dwelling types respond to new household types and changing work patterns?

A benefit of cooperative housing is the potential for dwelling typologies that would otherwise not be feasible within either the profit-driven, financialised housing market or in the social housing sector. Co-ops can thus be a mechanism to provide more choice in the housing market and better respond to future residents[47], both in the initial development phase (through direct engagement) and future residents (through flexible spatial systems).

Beyond the Nuclear

Typical contemporary apartment types generally consist of a few common characteristics: They are divided into a "daytime" and a "nighttime" zone, with the former containing a living room and kitchen, and the latter the bedrooms. Functions are generally determined by the purpose of the room - the bedrooms are for sleeping and the living room for daily activities. But why are our spaces prescribed in this way? In her article *Counter-planning from the kitchen: for a feminist critique of type,* Maria S. Giudici argues that the spatial pattern of contemporary dwellings can be derived from typical patterns developed in continental Europe in the 1700s and formalised in the 1851 Model Houses for Families by Henry Roberts (figure 39). The critique held against the nuclear family flat is that the patterns they are based upon reflect an ideal of what a family or household should look like - a prototype of the stay-at-home housewife and wage-earning husband - yet

47.
Claudia Thiesen, founding member, Mehr Als Wohnen. *Cooperative Conditions symposium:* Rotterdam: October 6, 2022



40, The diagram of the family flat has survived until the present day. Wood Housing, Seestadt Aspern, Austria (2019). Berger + Parkkinen Architekten & Querkraft. Drawing by author.

this standardised spatial pattern is not compatible with the wide variety of family constellations that now exist[48]. Between 1962 and 2022, Dutch households shrank from 3.53 to 2.13. By 2070, there will exist 1.7 million additional households, one million of which will be single-person households. Approaches to family planning are changing, with marital rates going down and childlessness becoming more common. Divorce rates are increasing, leading to family dynamics that carry over multiple dwellings[49].

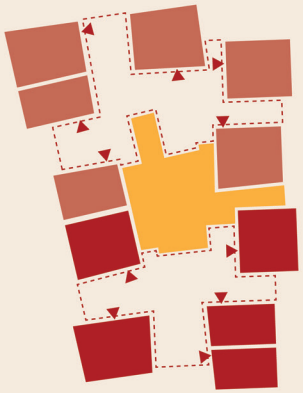
Giudici argues that "type has been used in the last centuries as a tool to produce specific subjects," wherein choice in how to inhabit our spaces has been constrained by floor plans. The nuclear family flat is "inadequate to host forms of living that are increasingly diverse; work and reproduction cannot be so clearly separated, and the nuclear family has changed, perhaps waned.[50]" Giudici here alludes also to the changing nature of work, where our dwellings increasingly become a space for waged labour through the proliferation of the home office. The following projects show alternative configurations intended to accommodate modern household constellations and the changing relationship between dwellings and work.

48.
Giudici, Maria S.: "Counter-planning from the kitchen: For a feminist critique of type," *The Journal of Architecture* vol. 23, no. 7–8 (2018): 1223.

49.
Centraal Bureau voor de Statistiek (2023) Centraal Bureau voor De Statistiek, Centraal Bureau voor de Statistiek. Available at: https://www.cbs.nl/ (Accessed: April 23, 2023).

50.
Giudici, Maria S.: "Counter-planning from the kitchen: For a feminist critique of type," *The Journal of Architecture* vol. 23, no. 7–8 (2018): 1223.

Ground level: Collective spaces



Typical Level: Division of space

Typical Level

41, Haus A, Duplex Architekten: Interior view of cluster kitchen. Source: https://duplex-architekten.ch/en/#

42 Left: Mehr Als Wohnen: Haus A. Plan underlay courtesy of Duplex Architekten. Diagrams by author.

An alternative "family": urban cluster dwellings

Haus A, developed by cooperative Mehr Als Wohnen ("More Than Living") in Zurich, with its 11 "cluster" apartments, present a transitional understanding of the household. Each cluster apartment features 5-6 individual units, arranged around an irregularly shaped shared zone.

This layout creates moments of enclosure and openness; dwellings frame a landscape of somewhat ambiguous sequential shared space. The only fixed element in this space is the kitchen, allowing for the remaining spaces to be changed at will. Inhabitable spaces are arranged around a dark core containing a cloak room, storage and a shared bathroom. The individual dwellings appear as micro-apartments in themselves and come in different layouts of one or two rooms. Common to all is an intermediary zone between the shared space and the sleeping space, in the form of a small living room or a corridor space with a kitchenette. This space works as a buffer zone, increasing the perceived privacy within each private unit.

This arrangement allows for a range of family types to coexist; one could perhaps imagine a scenario where a couple with two children, a single parent with a child, an elderly couple, a young couple and a middle-aged divorcee sharing this dwelling, all gaining benefits from such an arrangement in the form of informal care (such as child care) and reduced loneliness. The compactness of the private domicile becomes generous in combination with the shared space of the unit and the common facilities found at the ground level.

43, Cornella social housing project. Source: peristoral.com/proyectos/85-viviendas-sociales-en-cornella

Spatial adaptability and duality of plan

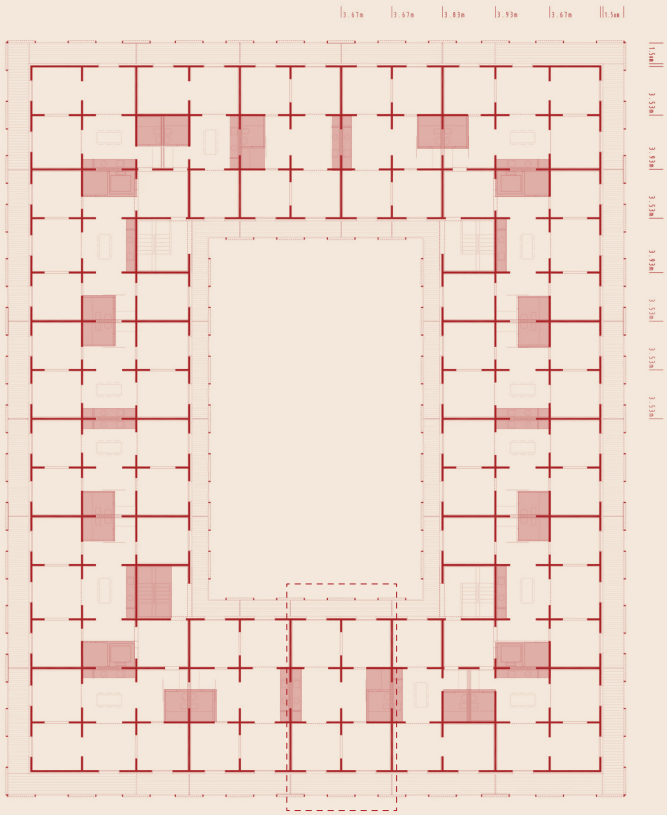
The conventional zoning of dwellings into function-specific spaces has consequences not only for inhabitants but for the wider urban fabric. Katharina Borsi comments on the changing nature of the Berlin block in the late 1800s:

> "The internal spatial organization [of the block] is now determined by the specific function of housing. Spaces are differentiated into self-contained units, and subdivided into a defined number of rooms, each with its allocated function. The measurements written on the drawing fix the size and hierarchical sequence of these rooms according to their use. Thus, the building's internal organization distributes defined groups of individuals across its plan: it configures the space of the family.[51]"

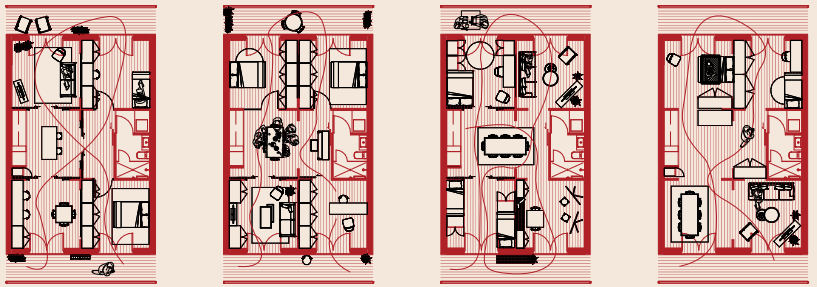
From a city made up of a series of undifferentiated spaces that are easily changed over time, it has morphed into a repetitious pattern of dwelling-specific units, with the dwelling as the organising unit of the overall urbanism [52], constricting choice and reducing the ability of cities to accommodate change over time. This indicates the importance of the spatial

51. Borsi, Katharina: "Drawing and dispute: The strategies of the Berlin block," in: Intimate Metropolis Urban Subjects in the Modern City, Di Palma, Periton, Lathouri (ed.). London: Routledge, 2009, 147

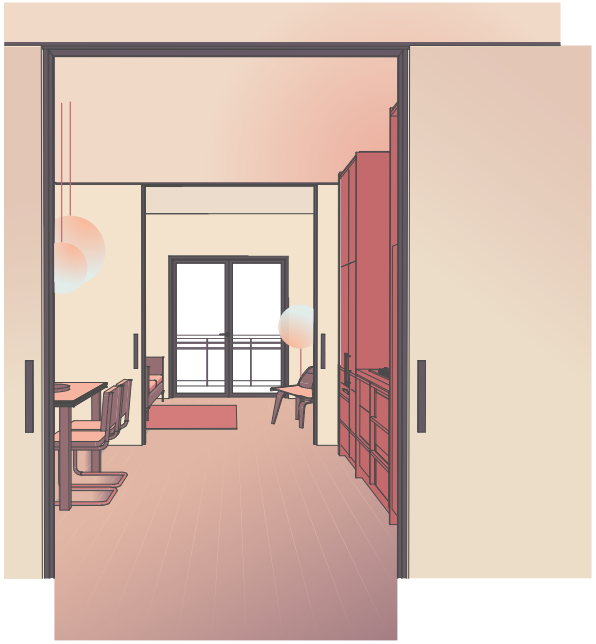
52. Giudici, Maria S.: "Counter-planning from the kitchen: For a feminist critique of type," *The Journal of Architecture* vol. 23, no. 7–8 (2018): 1225.



Typical Level



44 Cornella social housing project. Plan underlay (typical level) courtesy of Peris + Toral. Diagrams by author.



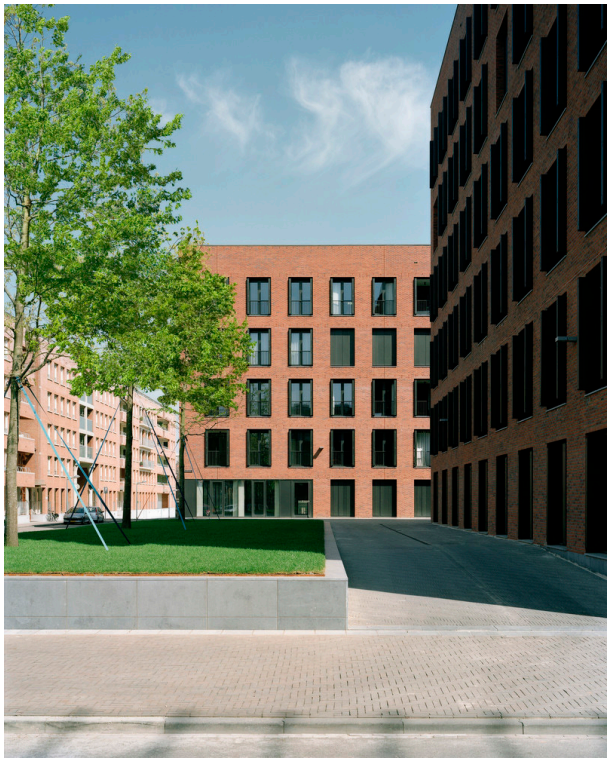
45 Cornella social housing project. Sequential space. Drawing by author.

design of the dwelling - its level of specificity or flexibility - as it is a determinator of the future adaptability of the urban block as a whole.

Utilizing the concept of "indeterminacy", Peris and Toral architects, in their Cornellà social housing project, have imagined dwellings that are not guided by conventional zoning of spaces (living/sleeping, bright/dark, public/private) but rather have created a more undefined - indeterminate - framework for living. The building, located in Barcelona, Spain, features a plan made up entirely of 3,6 metre modules arranged in enfilades. The kitchen and bathroom modules are the only fixed features of the plan. With no space being the "living room" or the "bedroom", every space is open for interpretation[53].

Such a spatial system accommodates a diversity of use and inhabitation. Being 3 "rooms" deep, the dwellings feature a gradient of public to private from the courtyard gallery to the external balcony facade. The fact that no corridor is included through the apartment allows for many apartments to be two rooms wide, in essence providing a solution to a problem inherent to slim, naturally ventilated apartment types: Long, narrow corridors that take up valuable floor space simply to move from one space to the

53. Per, Aurora Fernandez and Javier Mozas, ed., *Generosity: Housing Design Strategies : the Indeterminacy of the Floor Plan*. Barcelona: A+T Architecture Publishers, 2022

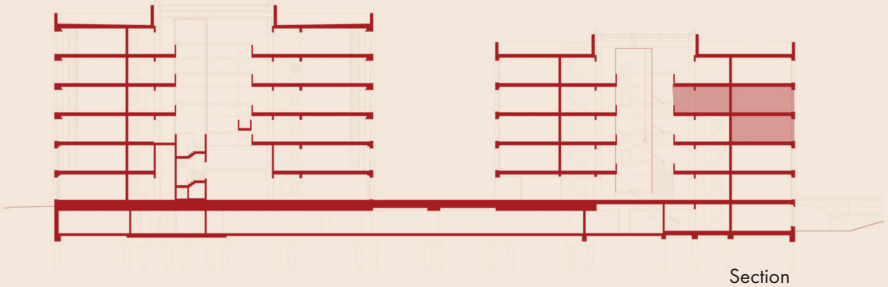


46 Piazza Ceramique.
Source: www.archdaily.com/508089/piazza-ceramique

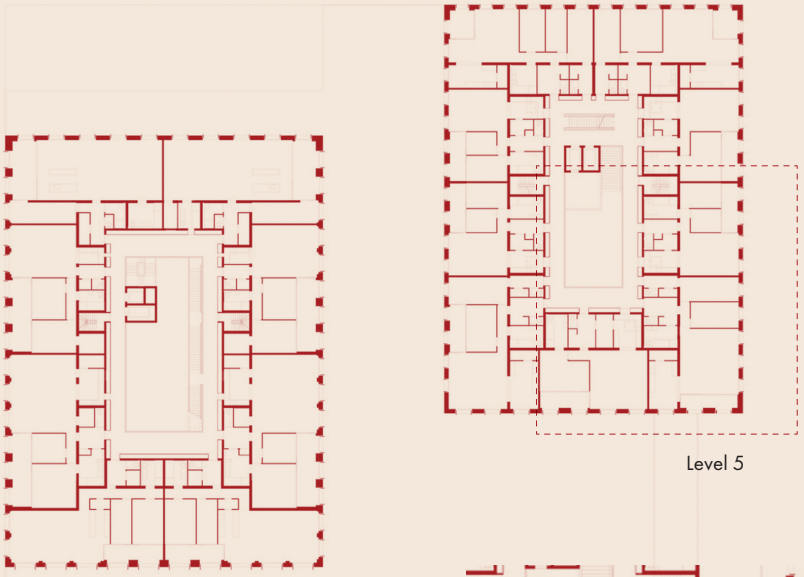
next. The two-room-wide arrangement of dual-entry apartments extends the possibilities for the dwellings to include home businesses, with one or more of the gallery-facing bays being able to be used as a more publicly oriented space. Internally, the enfilade arrangement allows for more possible circulation routes, enabling more complex plan arrangements and increasing the perceived sense of space.

Dual entries are a key feature of Piazza Céramique by Jo Janssen Architecten in Maastrict. Attempting to "revive the 19th century type of mansion-annex practice usually inhabited by lawyers, doctors [and] architects", the project features dwellings that allow for a combination of home and work life, with a key feature being apartments with dual entries. This, according to the architects allows for a "psychological split between the more private space of the family and for living, and the more public space for working and receiving clients"[54]. A novel feature is the introduction of split-level units where the separation between the functions can be in-

54. Sánchez, D. (2014) *Piazza Céramique / Jo Janssen Architecten*, ArchDaily. ArchDaily. Available at: https://www.archdaily.com/508089/piazza-ceramique-jo-janssen-architecten (Accessed: March 03, 2023).



Section



Level 5

47 Piazza Ceramique. Plan underlay courtesy of architects. Diagrams by author.

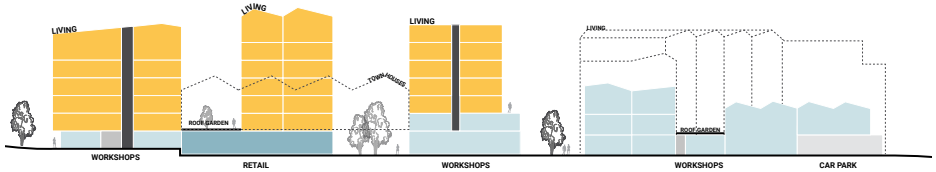
48 Lobby, Piazza Ceramique. Source: www.archdaily.com/508089/piazza-ceramique

creased. This type of project allows for a live-work integration typically only found in older, traditional mixed use urban areas. When asked of the added value of including workspaces in the building, architect Jo Janssen (who lives in the building) responds:

> "The most important advantage is that there more sense of a community, more than if it's just housing. This is because the building has another daily rhythm, which is more varied. This makes people more tolerant. They are fine with the fact that people are waiting for the dentist in the lobby. (...) The apartments are flexible, people change them from living to working (...) Elderly residents like the fact that you can use the second entrance as a mini apartment for the nurse[55]."

These projects demonstrate the value of thinking beyond the traditional nuclear family flat when designing future-proof dwellings. Our homes hold a different function than they once did, and alternative configurations are needed. One key takeaway is the importance of some form of spatial ambiguity; such as the "negative space" shared zone of Haus A, the roomless-ness of Cornella or the dual entries of Piazza Ceramique. By not designating a specific function or purpose to each space, the unpredictabilities of life can be accommodated.

55. Van Gameren, Dick, Paul Krautenbrouwer and Eireen Scheurs, ed.: "The Future of the Dutch Workhome Project," *DASH*, no. 15 (2019): 20.



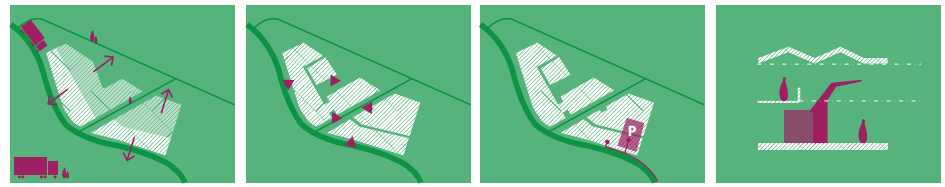
49 Wick Lane: Progamme section. Diagram by author

Chapter 4: New Urban Mix

Rotterdam is aiming to build 50,000 new homes by 2040. As expansion of the city is not desirable, centrally located port areas (such as M4H) are ideal targets for densification. At the same time, desires to retain manufacturing in the city lays claim on the same areas[56]. This conflict is the starting point for a new urban mix, aiming to meet the housing shortage while stimulating new business, education and manufacturing.

Firstly, what could such a mix look like? Similarly to Rotterdam, London, UK, is experiencing a housing shortage and a wish to retain manufacturing within the city limits. In the area of Fish Island, the council is experimenting with new forms of mixing, with 415 Wick Lane (drMM, 2022) being one of such completed projects. The development features a mix of 175 dwellings, commercial spaces and spaces for light industry. A key planning condition for the new development included the retention of existing industrial uses on-site. Previously the site housed artist studios, an MDF workshop, a car workshop and a rental car business with an accompanying car park. The site lies on the threshold between two planning overlays: The Fish Island Conservation Area and the Fish Island Strategic Industrial Land (SIL) to the south. It is also adjacent to the 'Greenway', an active transportation link to neighbouring boroughs. In order to respond to the site conditions, the programme is split up into commercial and industrial uses being situated along the Wick Lane street front (relating to the industrial character of the area) while the bulk of the residential programme is placed towards the back of the site, addressing the greenway. Workspaces vary in size, with one building being completely detached from the residential programme, allowing for larger structural spans. Deriving hints and architectural motifs from the adjacent industrial structures, the new build presents a collage of form, texture, colour and character.

56.
Vickery Hill, Adrian and Josie Warden, ed., *Cities of Making: Cities Report*. Brussels: Cities of Making, 2018, 164

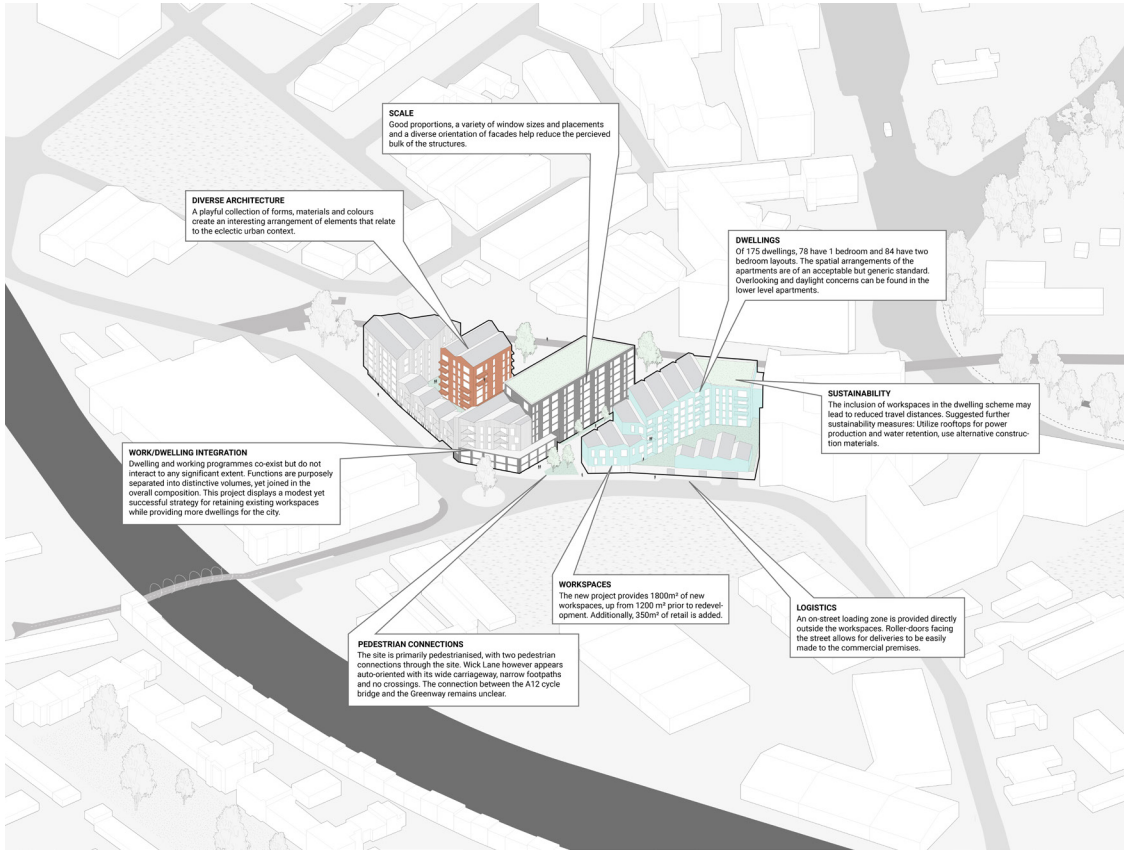


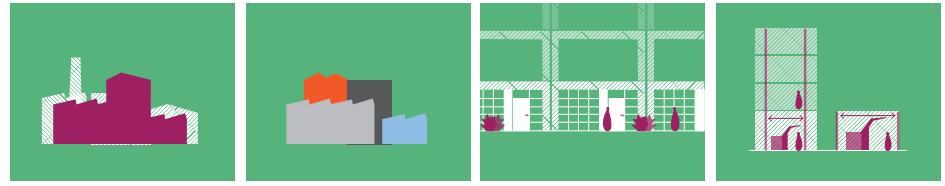
Programmatic split: light industry facing industrial area, housing facing green space

Multiple entries

Parking and loading docks consolidated to single point

Two-storey production spaces for flexibility of use





Architectural cues taken from context

Form broken into legible parts by material, form and colour

Apartments brought to ground level to create streetscape

Dwelling programme limits structural spans

50 Wick Lane: Summary of findings. Diagram by author

51 415 Wick Lane, street elevation. Source: Google StreetView

The success of the development is primarily in its architectural and volumetric composition, responding to existing architectural forms and mediating between the adjacent historical precinct and an industrial zone. Within this fusion of the disparate functions and forms that dwellings and industry project, a 'new' type of urbanism is attempted. However, rather than shaping an environment of true integration of industry and living, the Wick Lane project demonstrates a strategy of co-existence; a playful integration of functions within the urban fabric while separating uses programmatically.

Deciding on a mix: Maker Centre

What form of production is likely to occur in the M4H precinct? The port of Rotterdam is seen as a source of innovation, attracting highly skilled labour and investors. The knowledge economy of the region (Including Rotterdam, Delft, The Hague and Leiden) is strong and larger educational institutions such as TU Delft, Erasmus University and three schools of applied sciences are within relatively close proximity[57]. Herein lies an opportunity to create a connection between the productive capacities and practical knowledge of industries and the innovation brought forward by educational institutions. For this reason, I have chosen to include a "maker centre" as the main productive component of the urban mix. 10% of the Dutch workforce is currently in manufacturing, and the "maakindustrie" (maker industry) extends beyond production, also employing people in design, development and sales[58].

In order to get a better understanding of these spaces, I have performed

57. Vickery Hill, Adrian and Josie Warden, ed., *Cities of Making: Cities Report*. Brussels: Cities of Making, 2018, 141

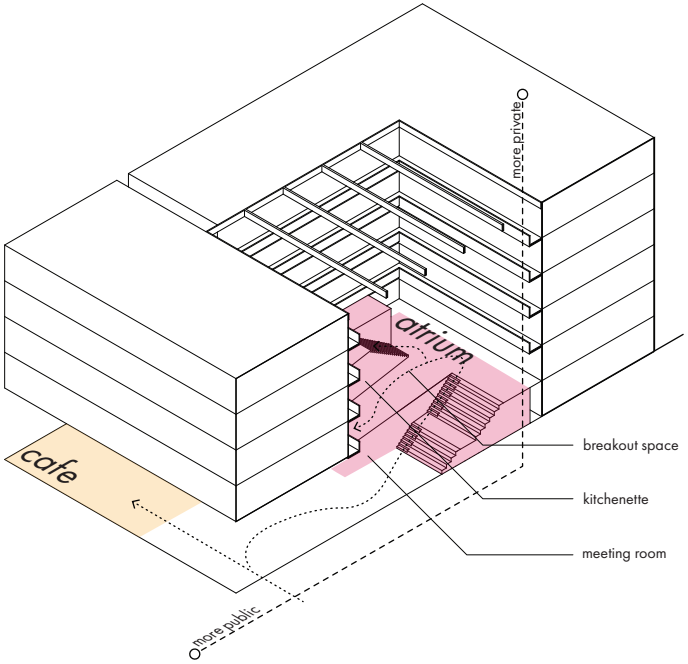
58. ibid, 146

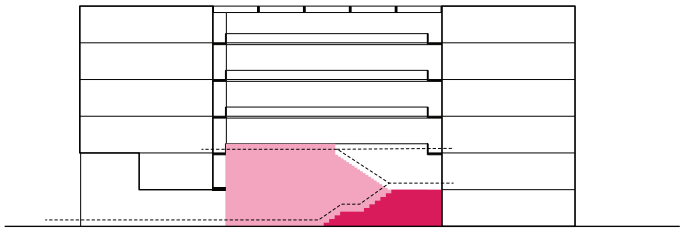
52 NEXT, Delft Own photography

site visits to the TU Delft campus, as well as to current makers at M4H, including informal interviews with individuals on-site.

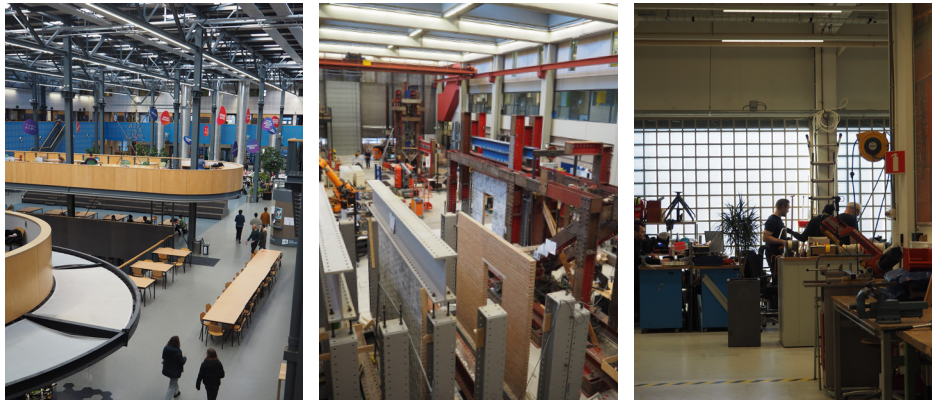
An example of a recent maker-focused facility is found in NEXT, at the TU Delft, an initiative that allows small startups to rent spaces, enabling a sharing of knowledge between individuals, with the building functioning as a pipeline between the university and industry. The individual tenancies are arranged around a central atrium which contains shared spaces for informal gatherings, as well as shared meeting rooms and a cafe. Clearly, the emphasis here is on design and development, reflecting the importance of digital production.

More "hands-on" workshops for medium and larger scale experimentation and production are found in other facilities close by. The makers at M4H (in the fields of waste management, furniture making, food distribution, brewing and architectural design), meanwhile, noted the value of space for expansion, such as in the case of the brewery wanting vertical expansion of its production process, while the furniture maker was able to expand horizontally through renting adjacent bays in the same location. Direct access to loading docks is another benefit, as well as allowing for storage of smaller delivery vehicles. It is thus beneficial to locate such activities at ground level. Common to all facilities is the inclusion of a shared





53 NEXT, Delft Diagram by author



54 Variety of maker spaces at TU Delft. Photography by author

space that connections functions and allows for casual gatherings and potentials for collaboration between users.

Bringing it together: Creating a scenario

How can then the function of a maker centre and dwellings be combined into one architectural scheme? Based on the findings from previous chapters, I have imagined a hypothetical scenario including a client and architectural programme. This forms the basis for the design project which accompanies this research report. In this hypothetical scenario, the fictitious maker collective Mathenesse Makers is designing a combined facility of affordable maker spaces, educational spaces and collaborative dwellings:

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 co-operative 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.

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, in

an effort to reintroduce the social aspect that these organisations largely played before the liberalisation of the Dutch housing market in the 1990s. 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 collective and a housing cooperative. The maker collective consists of a two-part facility; part educational space, and part rental maker spaces. Shared workshops, exhibition spaces, common areas and an entrepreneurship centre create a link between the two. The housing cooperative consists of three buildings: two distinct housing cooperatives and one building with free-market rental units, the latter taking advantage of the over-inflated housing market to finance the rest of the development. The distinction between the cooperatives is organisational and social, the financing being shared between them. As Rotterdam zoning codes allow for 30% of a dwelling to be used for work-related activities[59], units are to be designed to allow for an integration of these uses.

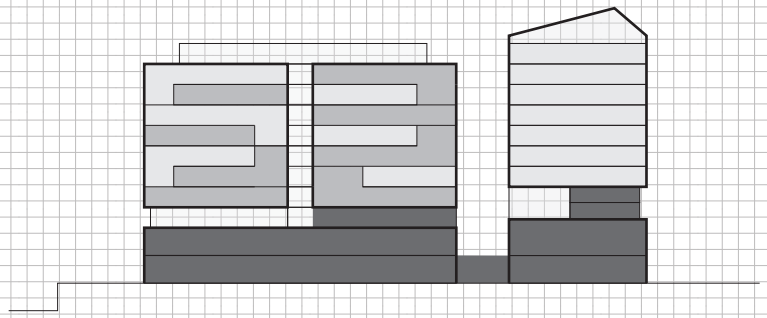
The rationale for this arrangement is to create a balanced income stream for the larger organisation and less financial risk through diversification. As the housing cooperative and the maker collective gain rental income from residents and makers, this can be redistributed to subsidize ateliers for struggling artists or lower housing rent for low-income individuals. The educational institution runs somewhat independently, running its operation on tuition fees and government funding.

An initial proposal

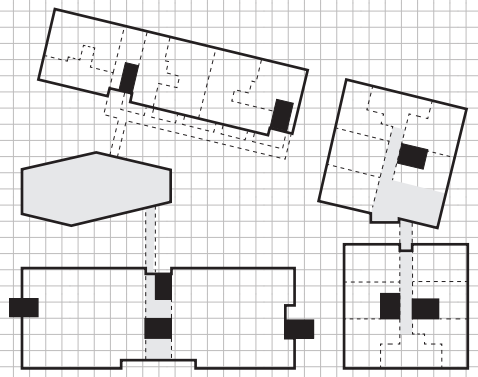
The question then becomes architectural. Findings have been condensed into a preliminary scheme which explores a synchronic typology that intersects living and working - at the scale of the precinct, building and dwelling. An educational centre addresses the public realm. This space features lettable collaborative studios and workshops, allowing for makers to test business ideas while collaborating with academia. The dwelling programme is situated on top of the podium, with live-work dwellings and studio spaces creating a transitional, hybrid-zone in between. The dwellings explore various configurations of co-living - from cluster apartments to adaptable dwellings - and work/live combinations.

59.
Vickery Hill, Adrian and Josie Warden, ed., *Cities of Making: Cities Report*. Brussels: Cities of Making, 2018, 164

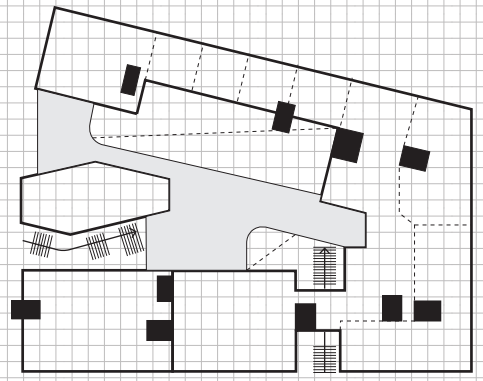
55 Concept sketch exploring stacking of manufacturing, logistics, educational spaces, public space and dwellings.



Concept section



Typical plan, residential



Level 2: Maker Spaces & Education

56 Preliminary proposal, diagrammatic drawings.

Discussion

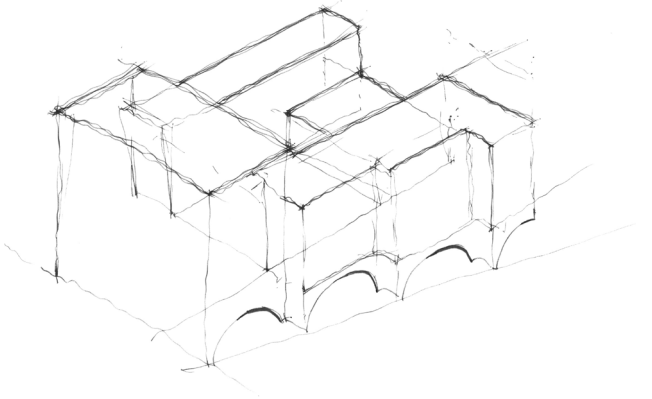
A key takeaway from this research has been the importance of the dwelling unit as an organising unit of the overall urban fabric. Earlier urban forms (pre-1800s) embrace a certain indeterminate structure, allowing for buildings to more organically adapt to changing requirements. When designing the mixed-use buildings of the future, we as architects and spatial planners should keep this legacy in mind, as the mixing of complex components can indeed lead to highly complex and function-specific buildings, reducing their ability to meet future change. Mixing of incompatible functions also brings with it issues in the form of structural acrobatics and - in the case of industrial production - noise, smell and logistics interfering with residential amenities. It should thus be assessed whether stacking of functions is worth the added effort: Mixing of programmes should not be seen as an aim in itself, but rather a mechanism to provide increased value for all users.

As conflicting functions are combined within one building or urban block, the scale of the building changes - from being an individual piece of architectural design to becoming a piece of urbanism; an extension of the city. Duality should be embraced, both in programming and in spatial design; multiple scenarios should be explored for the inhabitation of future spaces. An increasingly complex ecology of functions requires designers to traverse the disciplines of architecture, urban design and landscape architecture in order to create inclusive environments for a wide cross-section of society.

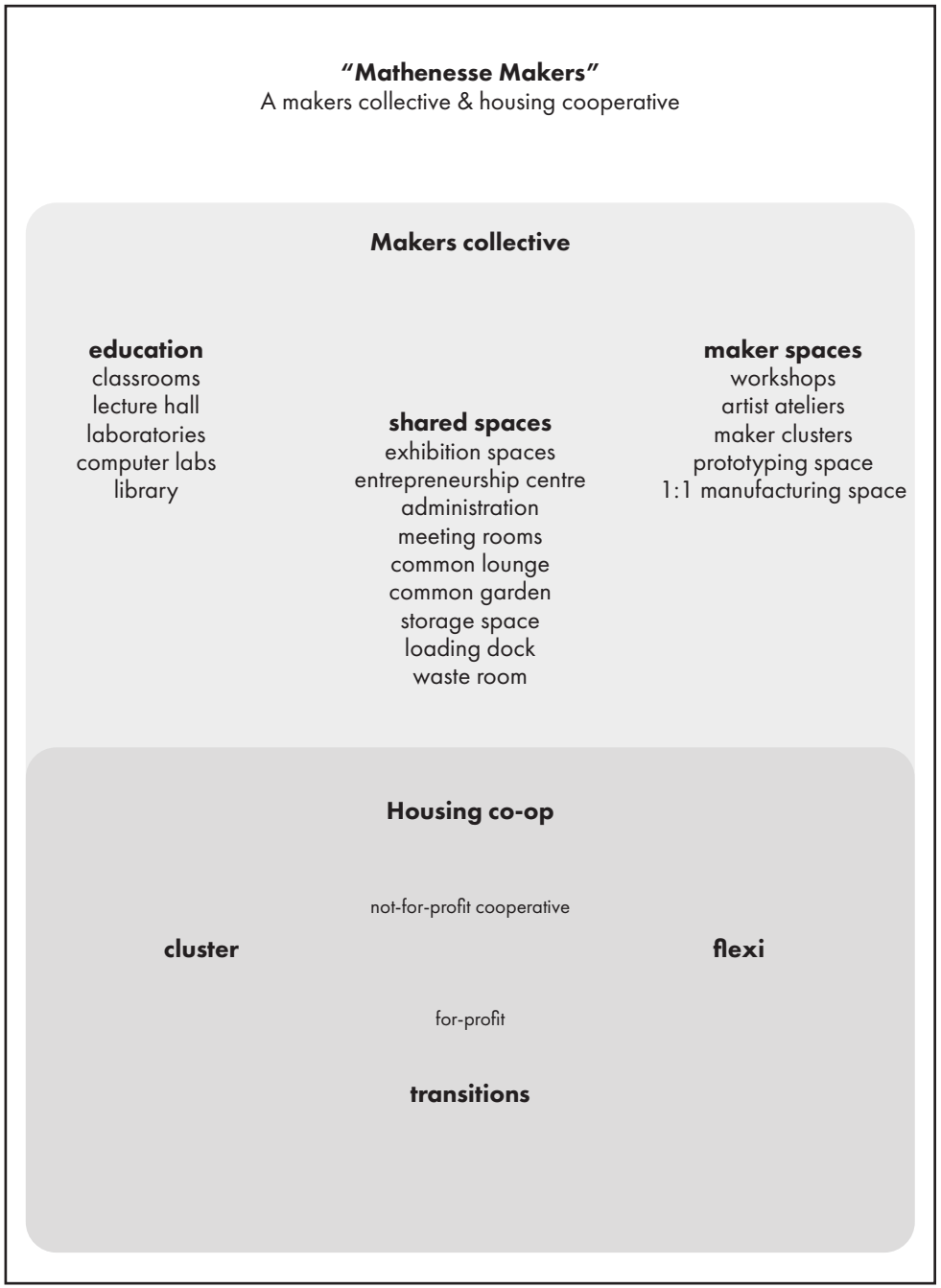
Conclusion

With the dual pressures of a housing shortage and a wish for local economic growth in the manufacturing and tech sector, mixed-use proposals have the potential to ensure a balanced response to both issues. Such hybrid developments also present additional benefits as they support tertiary businesses (such as cafes and other services) allowing employment opportunities for more user groups. Housing affordability and social isolation are issues that impact a wide cross-section of society, as is the issue of increased social isolation. Combined with the ongoing climate crisis, we cannot follow the status quo of housing developments. Architectural design cannot alone solve these issues, political action is required. We can however learn from existing collaborative housing projects, using them as blueprints which can, when used in combination lead to a housing future that is more equitable, less harmful to the environment and ultimately future-proof; accommodating the yet unknown ways our dwelling habits will change in the coming century.

Appendix.



Preliminary Design Diagramme.



List of Case Studies.

This list includes all projects investigated as part of the process, with certain projects not mentioned in the text but still contributing to the project.

Vindmøllebakken, Helen & Hard (Stavanger, Norway, 2019)

Haus A, Duplex Architekten (Zurich, Switzerland, 2015)

Haus M, Duplex Architekten (Zurich, Switzerland, 2015)

Zwicky Süd, Schneider Studer Primas (Zurich, Switzerland, 2015)

Kalkbreite, Müller Sigrist Architekten (Zurich, Switzerland, 2018)

International House, UNSW, unknown architects (Sydney, Australia, 1968/77)

415 Wick Lane, drmm Architects (London, UK, 2022)

NEXT Delft, Ector Hoogstad Architects, Delft, Netherlands, 2022)

Ivry-Sur-Seine social housing project, Jean Renaudie (Ivry-Sur-Seine, France, 1975)

Little C, Juurlink [+] Geluk (Rotterdam, Netherlands, 2021)

Hilversumse Meent, Leo de Jonge & Pieter Weeda (Hilversum, Netherlands, 1970-1977)

La Borda Cooperative, Lacol (Barcelona, Spain, 2019)

Cornella Social Housing, Peris Toral (Barcelona, Spain, 2021)

Regnbogen, Unknown architects (Lund, Sweden, 1989)

Jystrup Sawmill, Vandkunsten (Jystrup, Denmark, 1984)

Piazza Ceramique, Jo Janssen (Maastricht, Netherlands, 2014)

List of Site Visits.

M4H (3 occasions)
Informal site observations, informal discussions/interviews with the makers at M4H. Autumn 2022

Cooperative conditions symposium
October 6, 2022

Little C: Site visit
Novermber 2022

Visit to elderly family member, including informal interview (Alesund, Norway)
December 2022

Visit to Oslo, Norway: General observations of urban form
August, 2022

Site visit, NEXT Delft (Delft, Netherlands),
October 2022

Informal conversation/interview with resident of Domus Houthaven (Amsterdam, Netherlands),
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block," in: *Intimate Metropolis Urban Subjects in the Modern City,* Di Palma, Periton, Lathouri (ed.). London: Routledge, 2009.

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199–209.

Cooperative Housing & Co-housing

Lengkeek, Arie, and Peter Kuenzli. *Operatie wooncoöperatie: uit de wooncrisis door gemeenschappelijk bezit.* trancity*valiz, 2022.

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Kockelkorn, Schindler, “Introduction” in *Cooperative Conditions,* 2021

Dominique Boudet, ed., *New Housing in Zurich: Typologies for a Changing Society* Zurich: Park Books, 2017

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Reflection

1. Relation between graduation project topic, the studio master track (Ar) and the master programme (MSc AUBS)

My graduation topic is focused on changing work habits, new family constellations andideas of sharing and how these can be combined into a mixed-use typology. The research and design project works with the premise of the studio "Ecologies of Inclusion", a studio aimed at exploring economically, ecologically and socially sustainable dwelling designs that incorporate levels of sharing and the intersection between home life and work life. The studio is positioned within the TU Delft Architecture track, exploring new paradigms in dwelling designs.

2. Relationship between research and design

In my graduation project I have been looking into how the mixed-use city of tomorrow can incorporate living, working and care within one architectural scheme, responding to the needs of contemporary households. In order to manage the different scales of the project, research was done on three levels; the urban layer, the architectural layer and at the level of the dwelling unit. At the urban scale, I used site observations (SWOT analysis, photography, mass modelling, sketching) and historical research to form an approach to the site, develop initial strategies and placement of building forms, as well as considerations of orientation, views, and relation to existing built forms. I additionally documented some of the key heritage-listed structures adjacent to the site, in order to inform the volumetric composition and facade language for my own project, a key intention being to harmonize with the eclectic yet utilitarian character that the site currently holds. Urban design strategies such as through-site pedestrian links and mixed functions at street level were derived from theory (such as Borsi's discourse on the traditional urban block) as well as my own observations of urban locations in Oslo and Rotterdam. The design programme was informed by several site visits to the Keilepand in Rotterdam, resulting in a decision to include a maker collective in the project. Conversations and informal interviews with the Keilekollektif founders and some of the workers provided first-hand insight into the spatial requirements of such a facility. Further spatial background was derived from site visits at TU Delft's facilities (NEXT, IDE, Civil Engineering, Bouwkunde) which informed much of the spatial planning of the production/education facility in my own project.

Research into shared housing was highly based on the writings of Karin Palm Linden and Dorit Fromm on Scandinavian and Dutch co-housing, with examples and design strategies playing a major role in the planning of my own project. Key design strategies, such as the centralised collective space flanked by housing units and smaller collective spaces, were derived from these sources. Based on literature review, a target group of single people, elderly and single parents were chosen as these groups are growing and tend to experience isolation. Seminars and publications by Anne Kockelkorn, the Cooperative Conditions symposium (Rotterdam, October 2022) the book Operatie Wooncooperative (Lengkeek & Kuentzi) among other resources informed the cooperative tenure model for the project, which had implications for the spatial planning.

415 Wick Lane (drmm, London) informed a strategy of mixing production and dwellings, with features from this project being seen in my own project, such as the consolidation of logistics into a single point, as well as a strategy of breaking up the residential programme into smaller masses in an effort to (a) reduce perceived bulk and (b) create an "identity" for each of the towers.

Three main dwelling concepts are explored in the project. Based on architectural case studies, each concept is explored in a distinct building form, each acommodating requirements of working from home, solo living and an ageing population. Building A features a "flexible type" which takes patterns from Cornella by Peris + Toral and La Borda by Lacol, utilizing concepts such as the enfilade and indeterminate space (allowing for flexibility in interior layouts), dual entries (enabling a work/live component) and the "satellite room", consisting of additional rooms per level whose use/ownership can change over time.

3. Assessment of approach, methods and methodology

My approach to this project was multifaceted, with the intention being to create a foundation for an architectural response at the level of the city, neighbourhood and individual dwelling. I found this approach to be quite conducive to generating insights for my own design project, with the shifting of focus and scale providing a multiscalar response. Specific methods included architectural case studies, literature review, informal interviews, site observations as well as observations of human inhabitation. The architectural case studies were important in getting a good foundation for the design of the project. I explored a variety of projects from different contexts, which provided me with spatial solutions that I would not have

arrived at had if I relied purely on a single location. Valuable insights also came from interviews with residents, found in journal articles, video interviews and other publications. The combination of architectural plan and lived experience proved to be a very productive way to understand the successes of certain projects and to extract more nuanced information. While I certainly found each case study to be useful, I was perhaps overly ambitious with the number of projects I chose to study. This awarded me breadth of knowledge, but perhaps not the depth I would have gotten from a deeper dive into a smaller number of projects.

After examining my research paper and the accompanying design project, I have determined that the approaches and materials I utilized were ultimately very effective in shaping the final design outcome. Nearly all of the research findings were incorporated to some extent in the project design, indicating a high degree of success.

4. How do you assess the academic and societal value, scope and implication of your graduation project, including ethical aspects?

The project promotes the inclusion of a range of household types by both providing a variety of dwelling types as well as dwelling plans with built-in flexibility, suited to changes in living patterns over time, including changing live/work relationships and demographic shifts. Shared dwelling types and activated collective spaces encourage social interaction between residents which has the effect of reducing loneliness, and ensuring social sustainability is built into the project. Economic sustainability is ensured by the cooperative tenure form, encouraging long-term investment in the building, its upkeep and the development of new cooperatives. A cap on profits from rent (a product of the cost-rent principle) additionally ensures a long-term relative reduction in dwelling prices, creating affordable housing for the future. The project additionally aims to have a low environmental impact; by reducing the footprint per person, less heating is required. Passive climate strategies, such as double facade skins, winter gardens, thermal mass in floors and ample cross-ventilation further reduce reliance on heating and cooling, meeting the needs of the already changing climate. A timber construction system not only reduces the embodied carbon in the project but the exposed elements throughout the building also have positive health benefits for residents.

5. How do you assess the value of the transferability of your project results?

The premise of the design project and the research focus of the studio were built on a dichotomy between on the one hand a critique of status-quo private-market driven housing provision while at the same time designing

in a production facility to satisfy capitalist growth. As such, the notion that this project is "sustainable" could be argued against on the basis of a production facility which has the potential to perpetuate consumer culture and the development of new technologies that further environmental destruction. If the architectural ideas from this research and design project are to be implemented at a larger scale, it will be instrumental to ensure that the economic tenure (the cooperative) and values (social, environmental, and economic sustainability) are retained. Without this in place, the dwellings and production spaces can quickly end up becoming spaces for consumption, fueling the private housing market and environmentally destructive manufacturing processes.

The tendencies that underly this project (unaffordable housing, social isolation, global warming and changing demographics) are found in most large European cities, and efforts are generally made to encourage mixed-use developments. As such, many of the elements found in my graduation project can be relevant to other contexts. The specific typology of production spaces mixed with dwellings is relevant to other contexts with similar ambitions to M4H, such as port areas of New York and the special districts in London, while a more generic version could exist that includes a more "soft" version of workspaces, essentially expanding the idea of working from "home". I additionally believe that this model could be very suitable if employed in adaptive reuse projects, with the benefit of reusing local landmarks and a reduction in environmental impacts through less material use.

Combining housing and production, and particularly the stacking of incompatible functions introduces conflicts that would otherwise not exist. This means that a significant portion of the design process can be spent on resolving constructed issues of noise, non-continous structural systems, arrangement of vertical services, et cetera. This leaves less time to resolve smaller-scale elements (such as housing layouts). As demographics change, it will be increasingly important to design dwellings that can accommodate these changes. The dwelling types investigated in this research can thus be transposed into housing projects both in mixed-use and more conventional forms. The timber construction system should also be adopted on a mass-scale, as we cannot continue to rely on carbon-intensive construction materials for our buildings. It does remain however that co-housing and cooperatives present an "alternative" form of housing provision, and as such will not easily be replicated on a large scale. Unless specifically encouraged by authorities, it is unlikely to have a major impact on the way we design housing in the future. While housing cooperatives can provide a long-term solution to housing unaffordability, they do little to reduce housing prices right now. It can thus be critiqued for not helping those in urgent need of housing. The range of housing types and room for flexibility

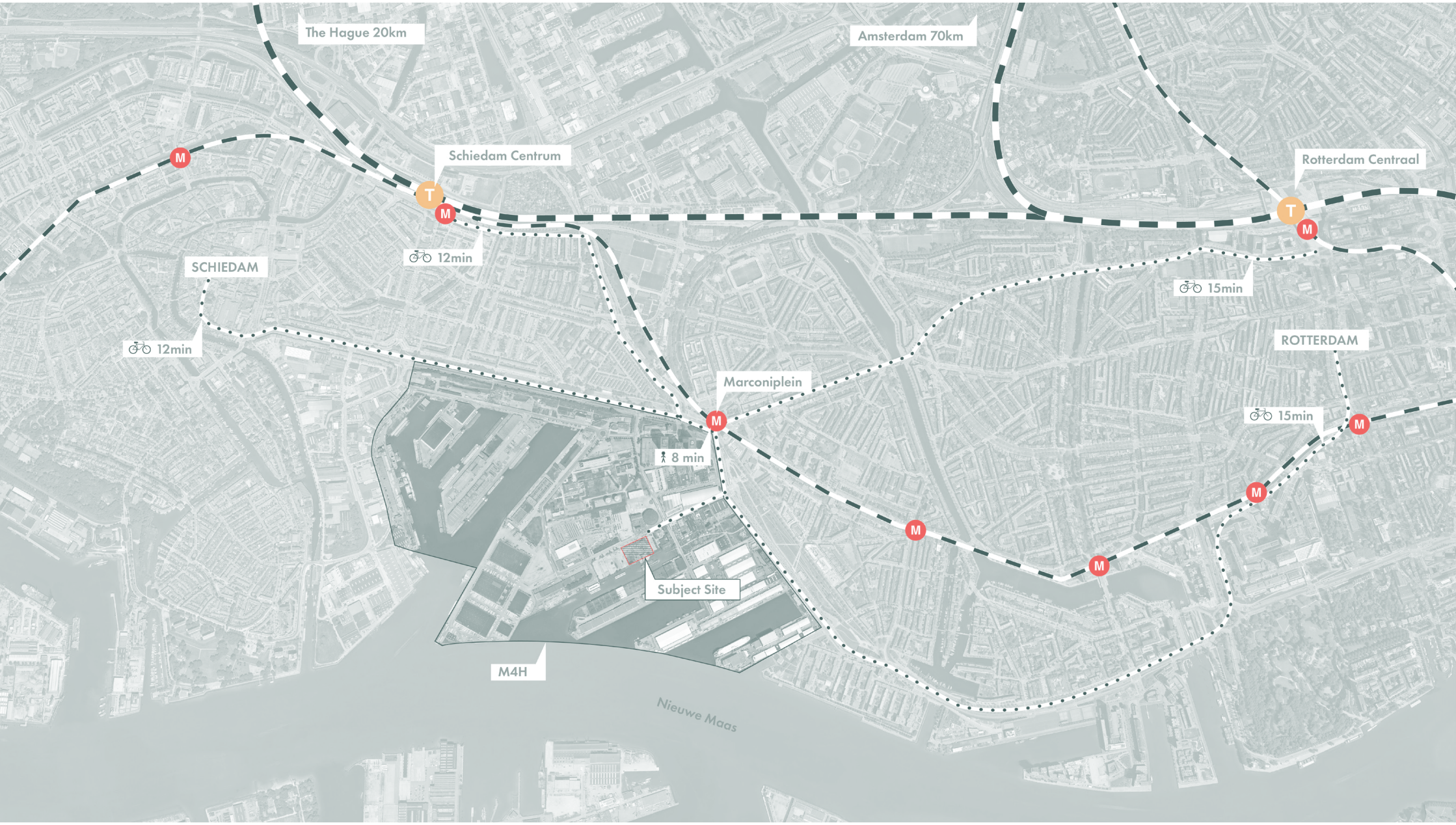
over time allows for a cross-section of society to inhabit the spaces, however, the resident-led nature of cooperatives can lead to the exclusion of certain “undesirable” groups. Instruments to avoid exclusion must thus be in place, especially in the case of mass adoption of the cooperative model, to avoid creating introverted, socio-economic enclaves in the city.

Design project.

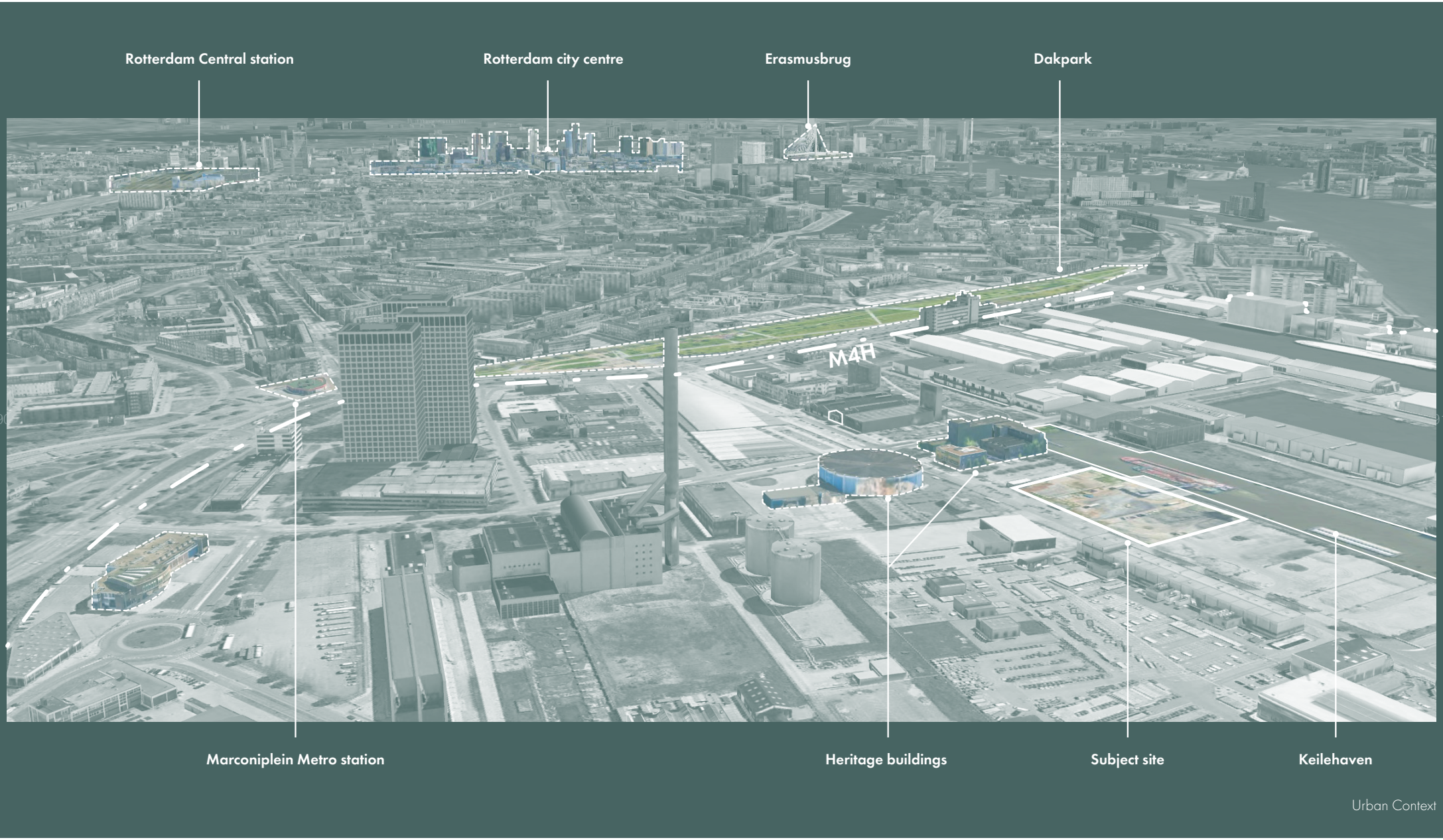
Working Together

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

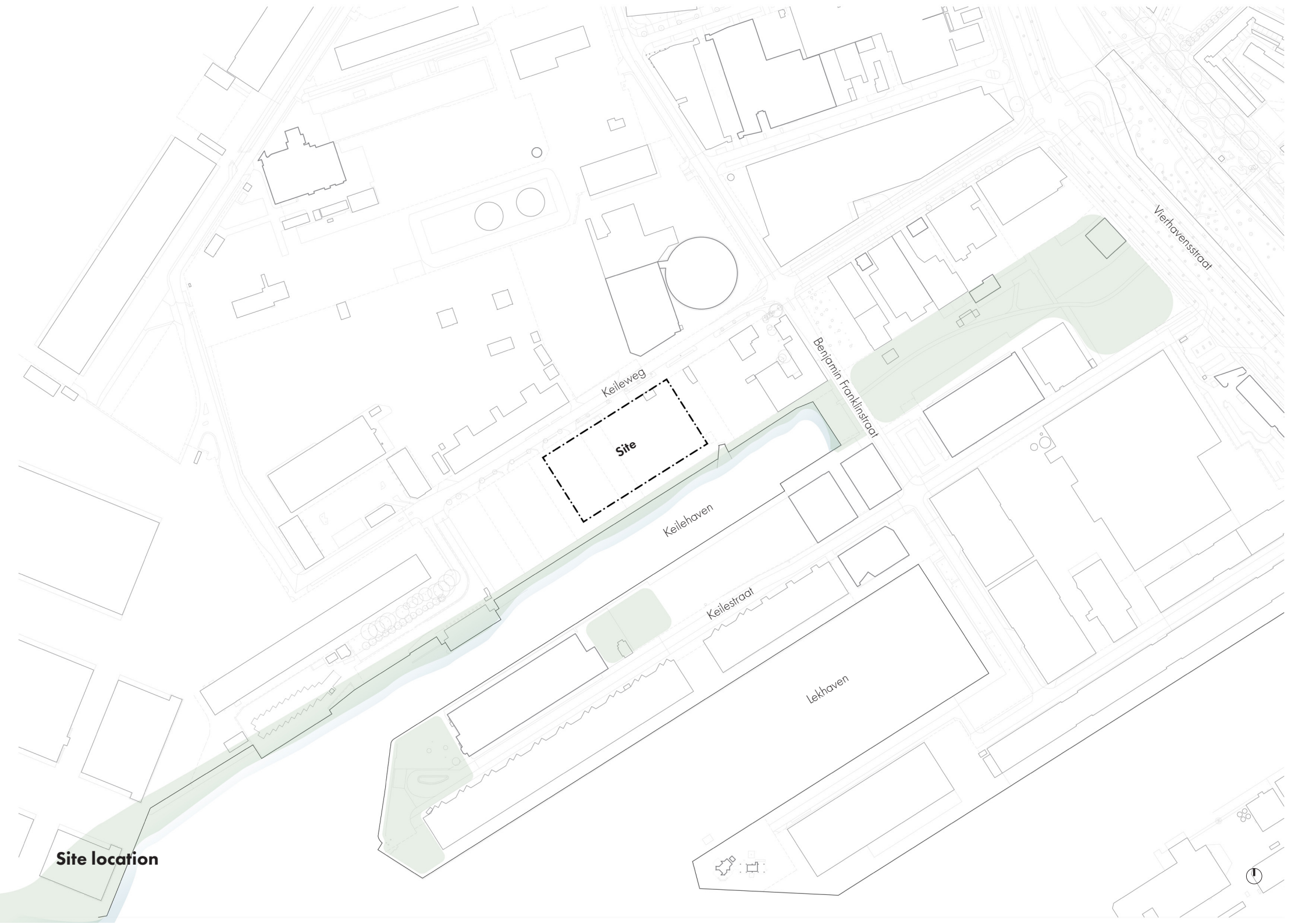
Merwe Vierhavens
Rotterdam, Netherlands



Urban context



Urban context

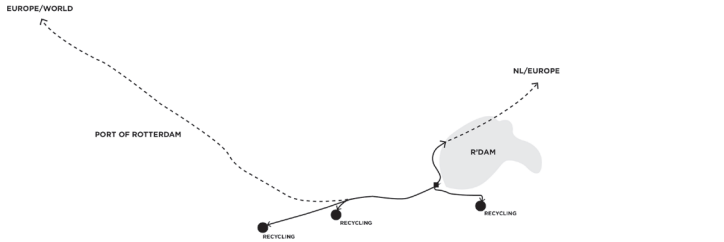


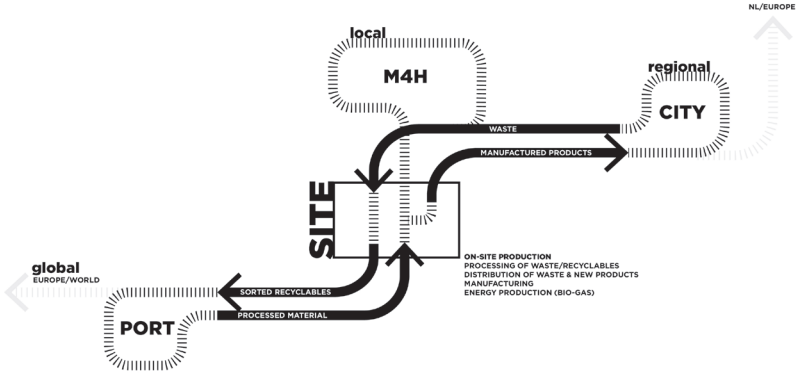
Site location

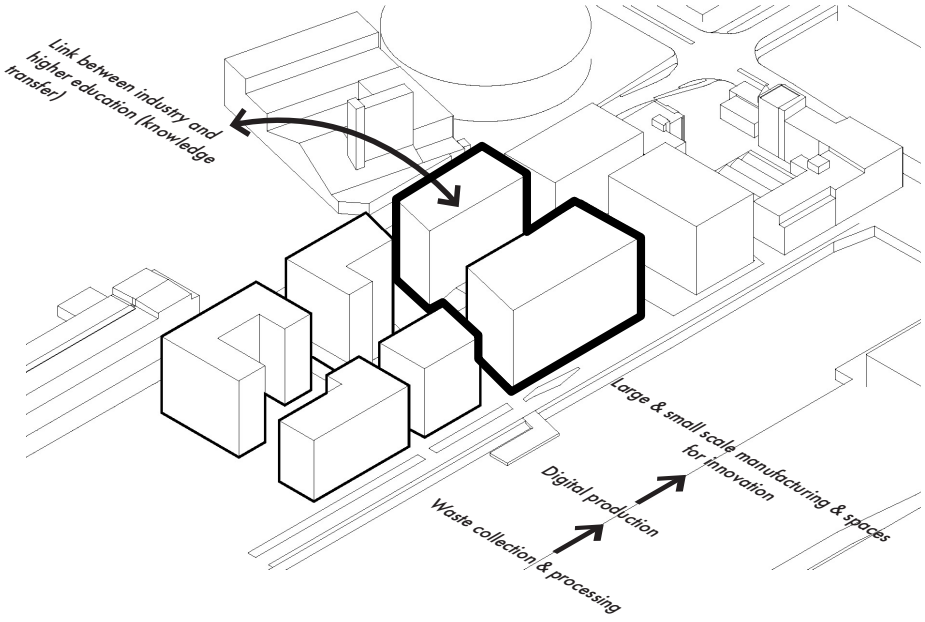
Keileweg

Keilehaven

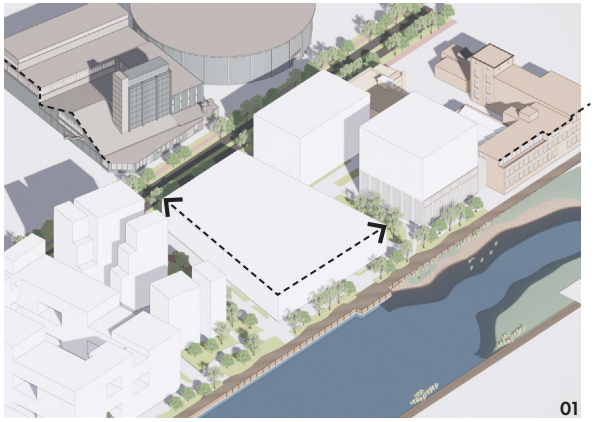
Site location





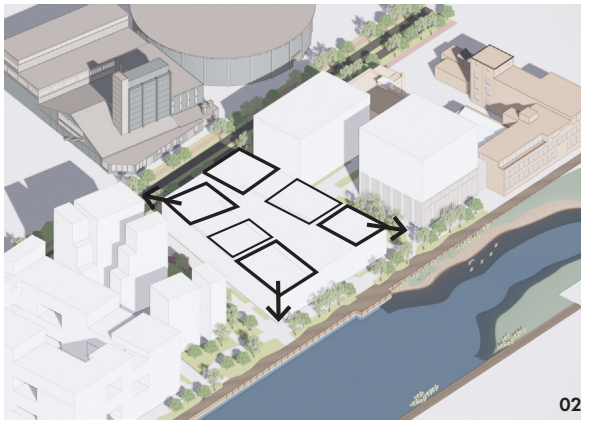


Group concept: integration of production processes



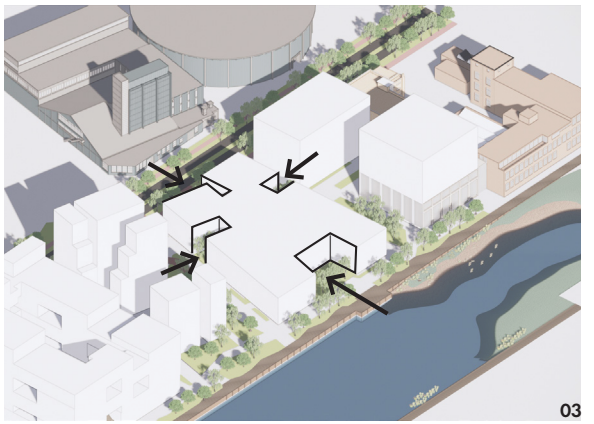
Podium: Establish street wall

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



Active corners

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

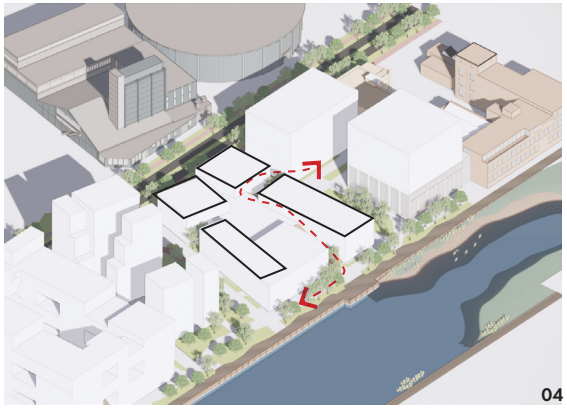


Biophilia

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.

Through-site link

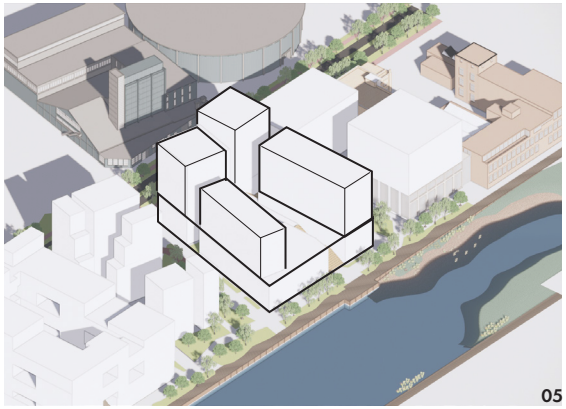
The urban realm is continued through the site, a gesture that both creates a pedestrian link through the site while at the same time providing an external link between internal functions.



Through-site connection

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.



Tower forms

Materiality

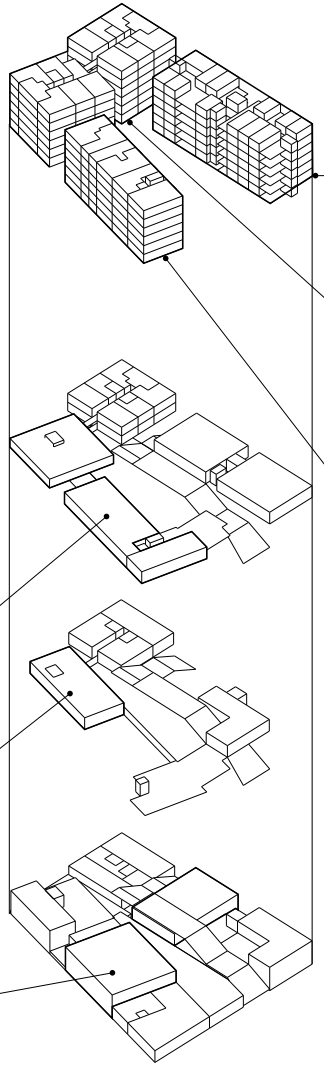
A timber structure with an expressed timber facade reinterprets the rigid architectural fenestration of adjacent heritage buildings in a new materiality. Key to the material choice lies in its low embodied carbon.

Urban Section

Education space

Services	600m²
Exhibition	160m²
Cafe	300m²
Community Space	500m²
Circulation	800m²
Classrooms	800m²
Digital Prototyping	1000m²
1:1 Workshops	1500m²

5660m²



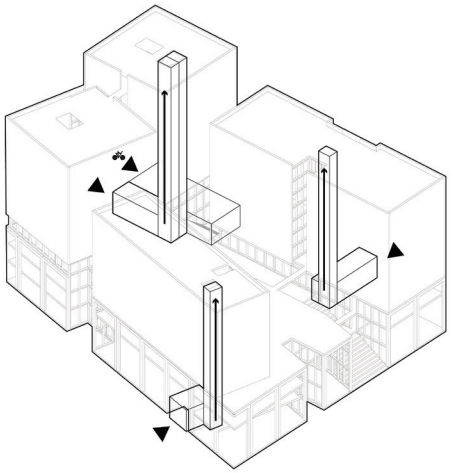
Dwellings

Shared space	800m²
Live/work	1200m²
Cluster dwellings	4200m²
Compact dwellings	4500m²
Flexible dwellings	2500m²

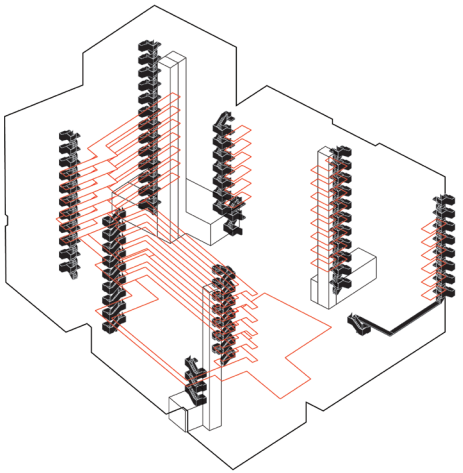
250 units **13200m²**

Site area: 3700m²
Site area: 18860m²
FSR: 5.1

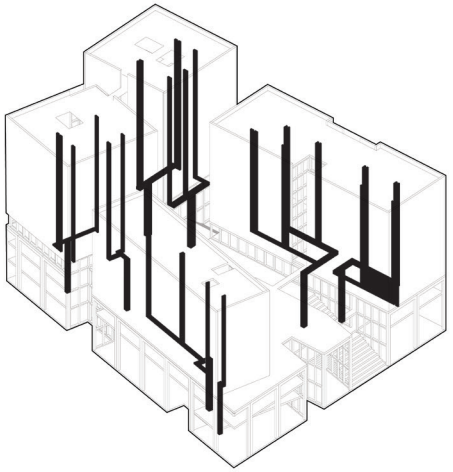
Programme



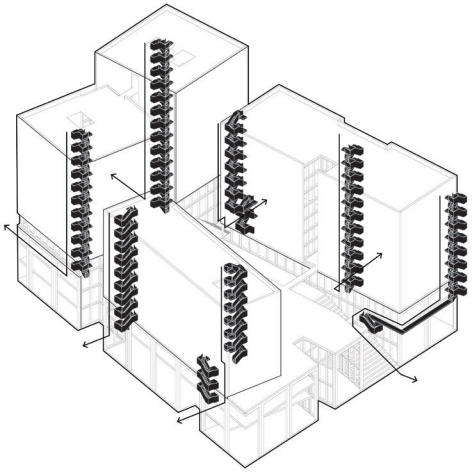
Lobbies & vertical transportation



Access system



Location of risers



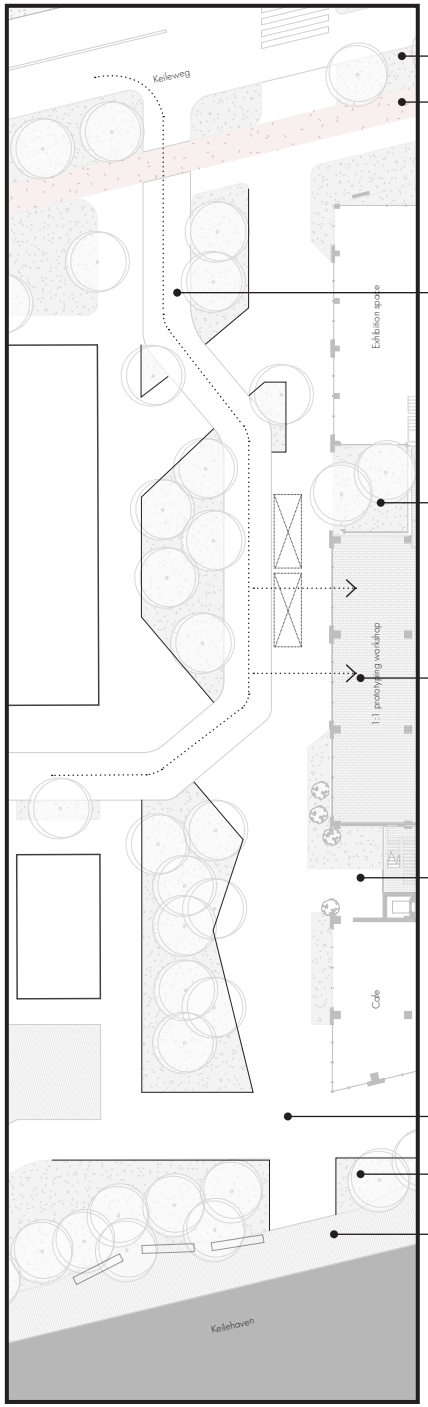
Fire egress

Building diagrams

Site Plan

Keilehaven

10m



Planted median

Regional bike route

Shared zone: access for deliveries only

Landscaping as part of architecture

Vehicular access for loading

Residential lobby

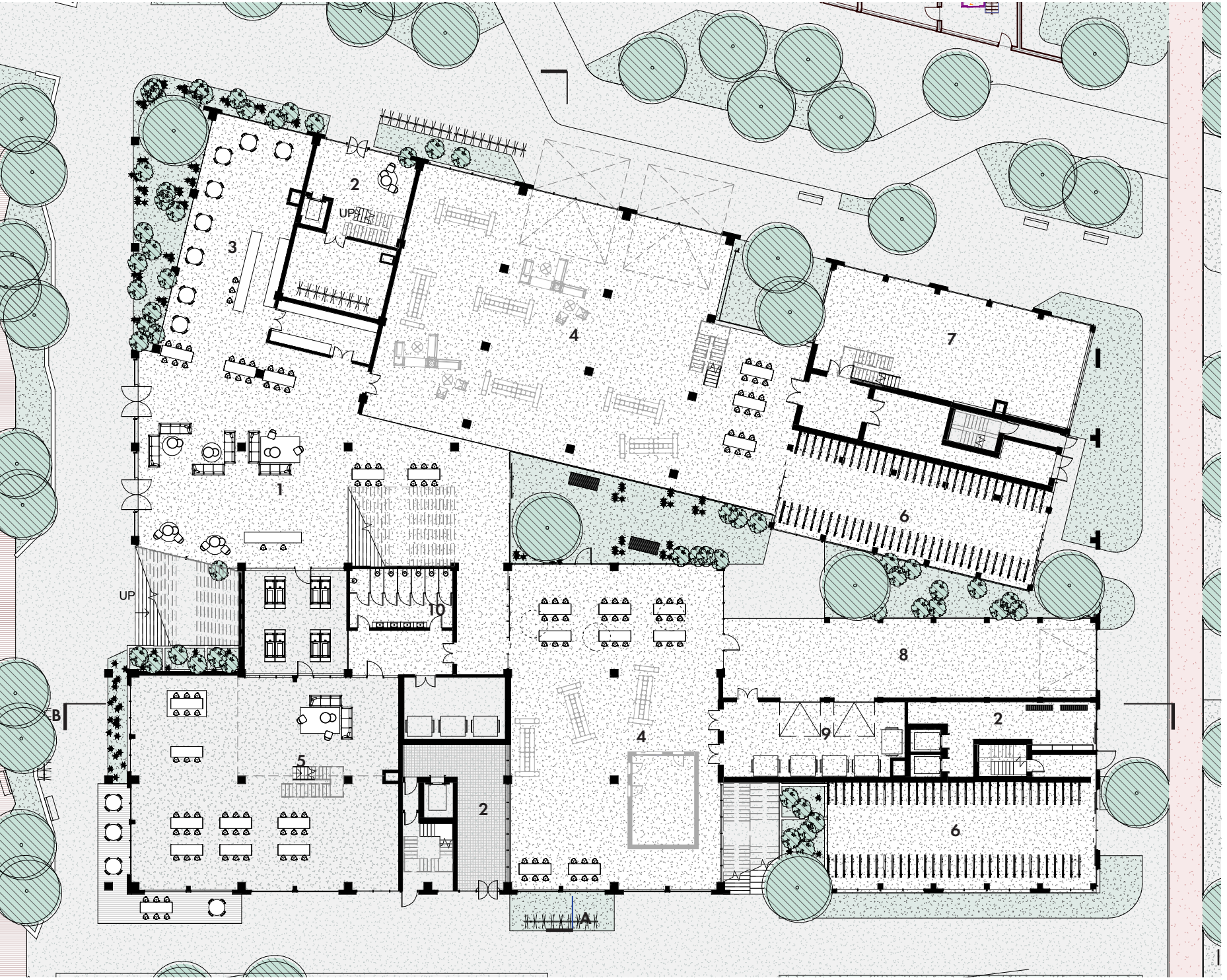
Pedestrian zone

Bioswales/rain gardens

Timber boardwalk

Streetscape

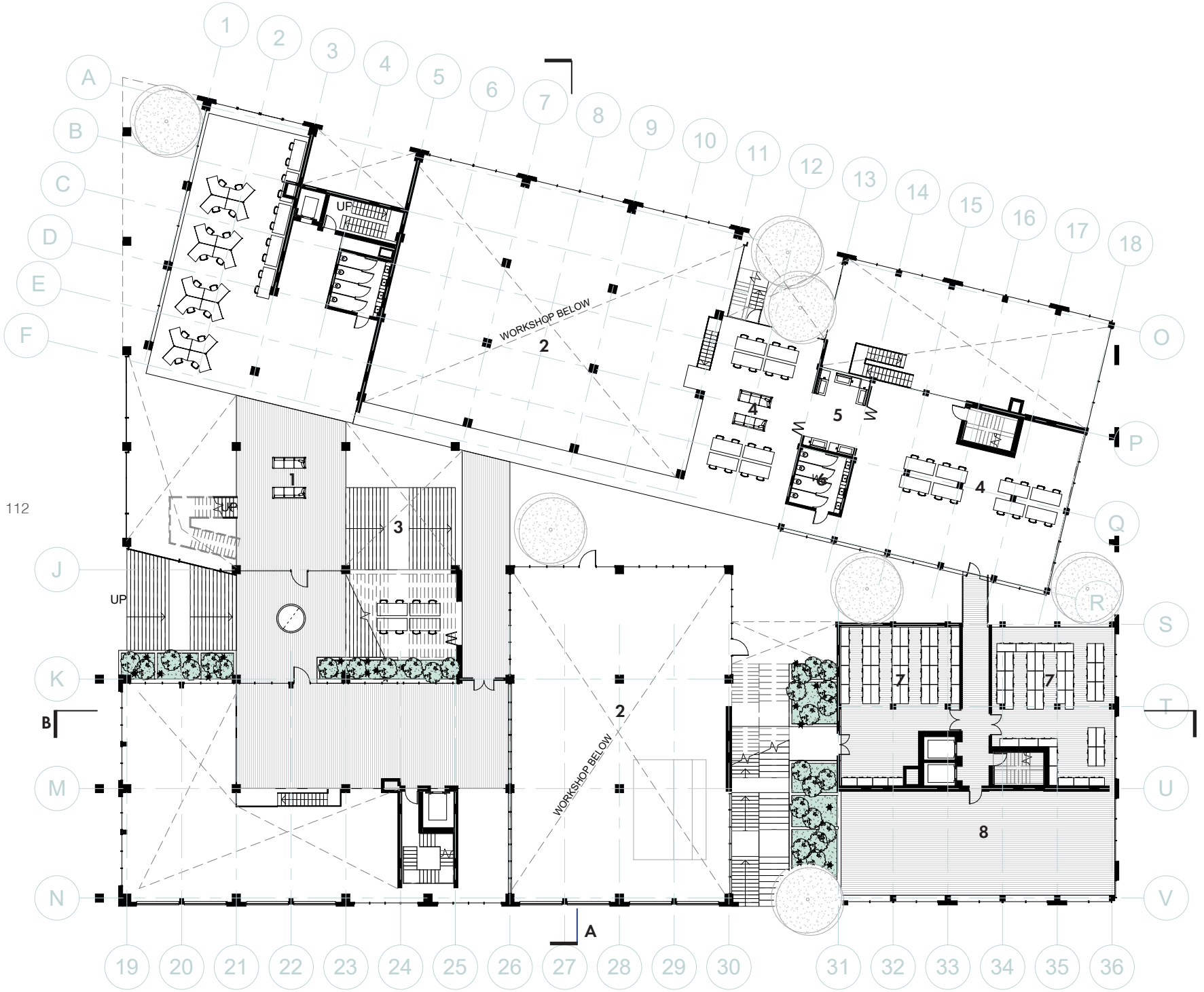
A new street links Keilehaven and Keileweg. This street is designated as a pedestrian zone with vehicular access for deliveries only. A significant area is given to deep soil and planting, adding a natural element to the dense urban environment while reducing hard surfaces, reducing urban heat and providing localised water management.



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

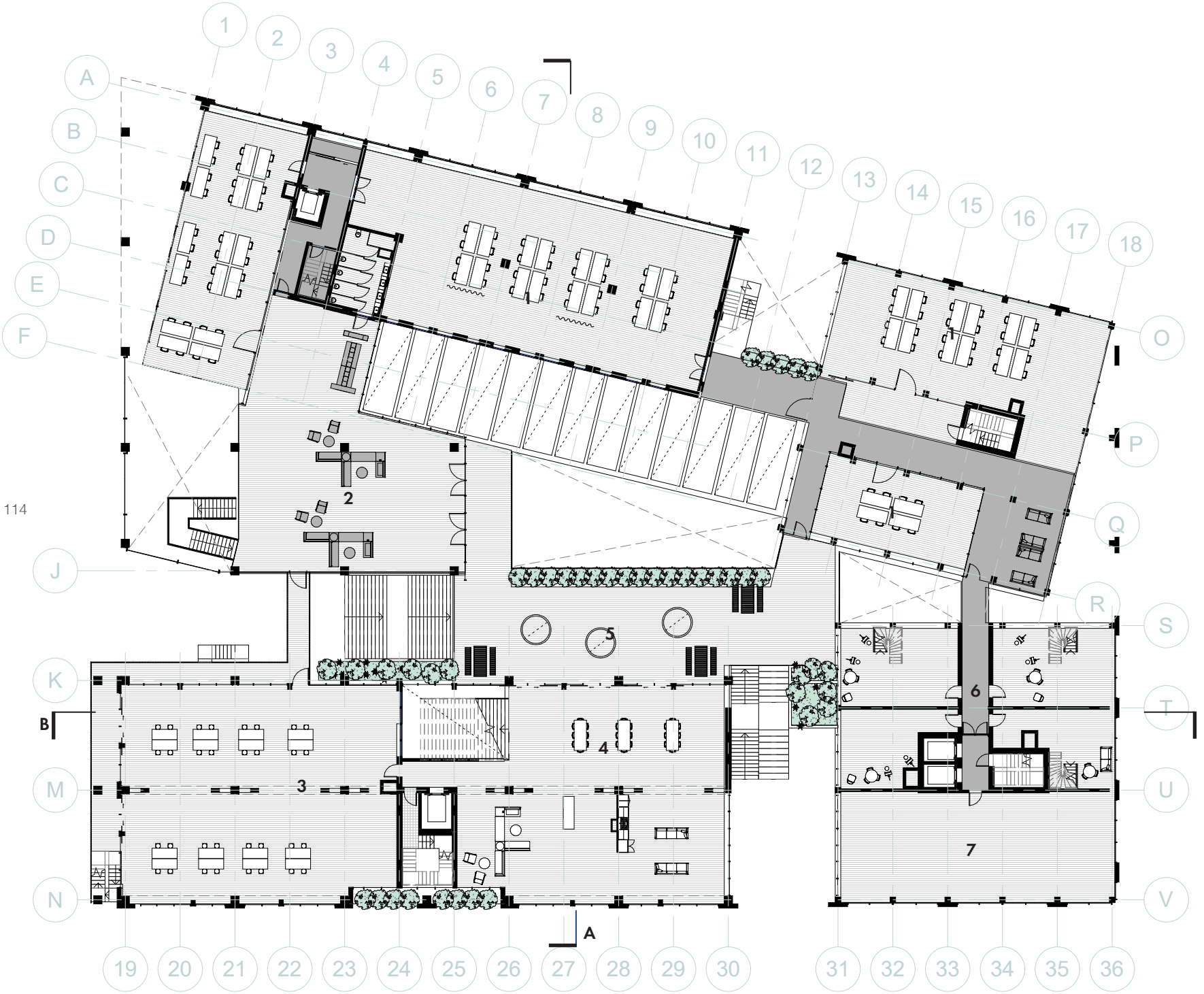
10m



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

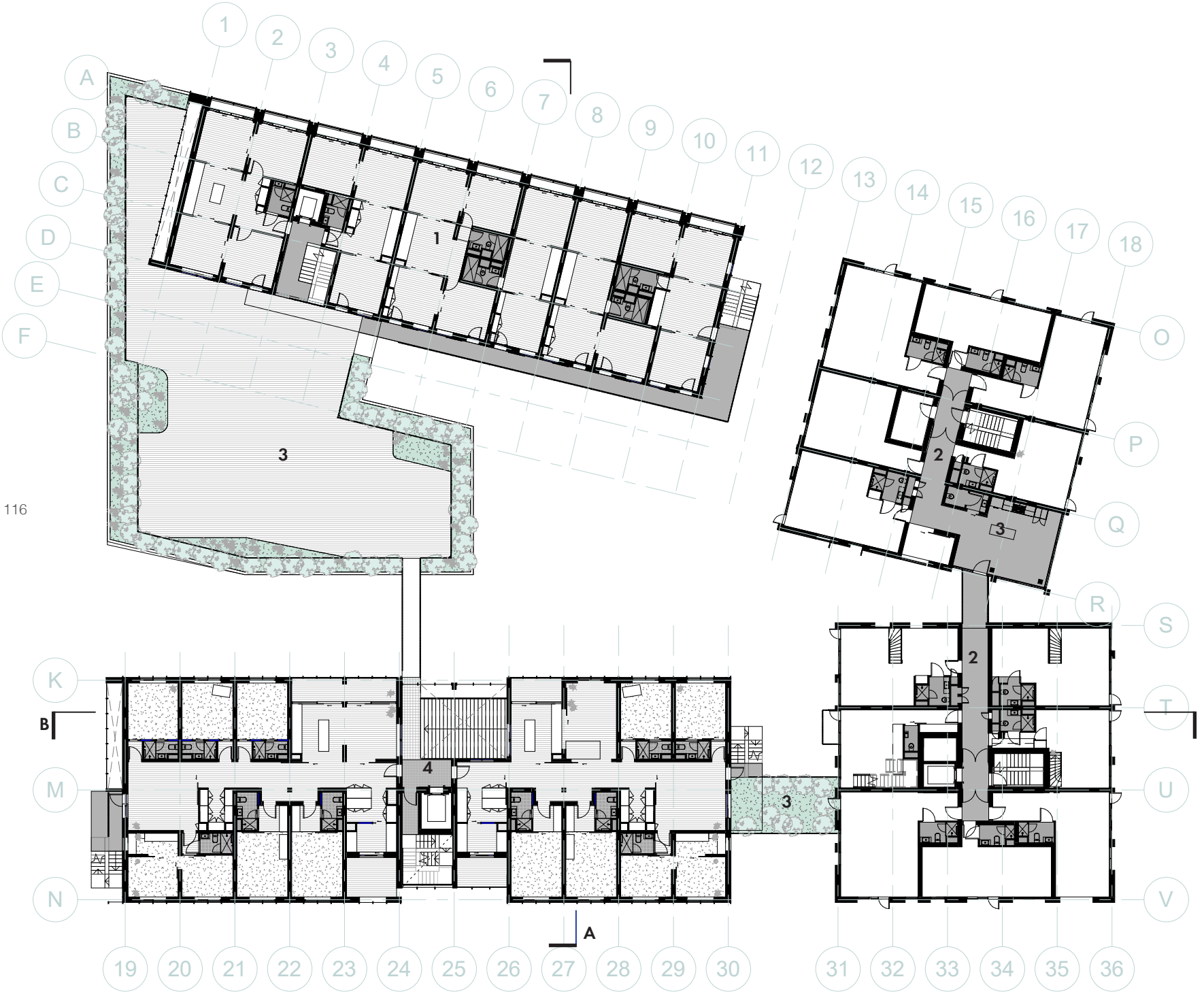
10m



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

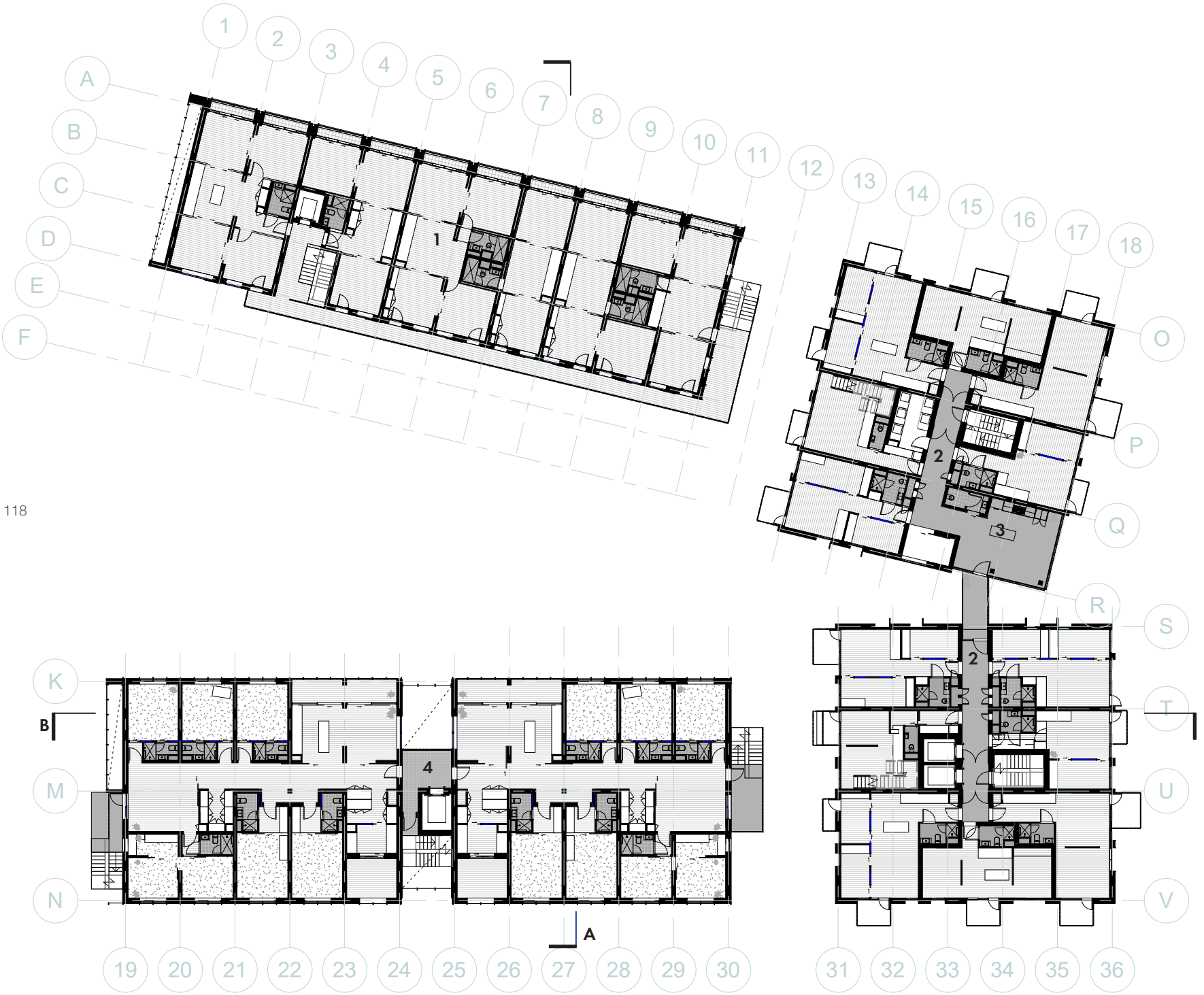
10m



Level 3

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

10m



Levels 4-8

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

View of main lobby

View of main lobby

View of digital prototyping space and workshop below

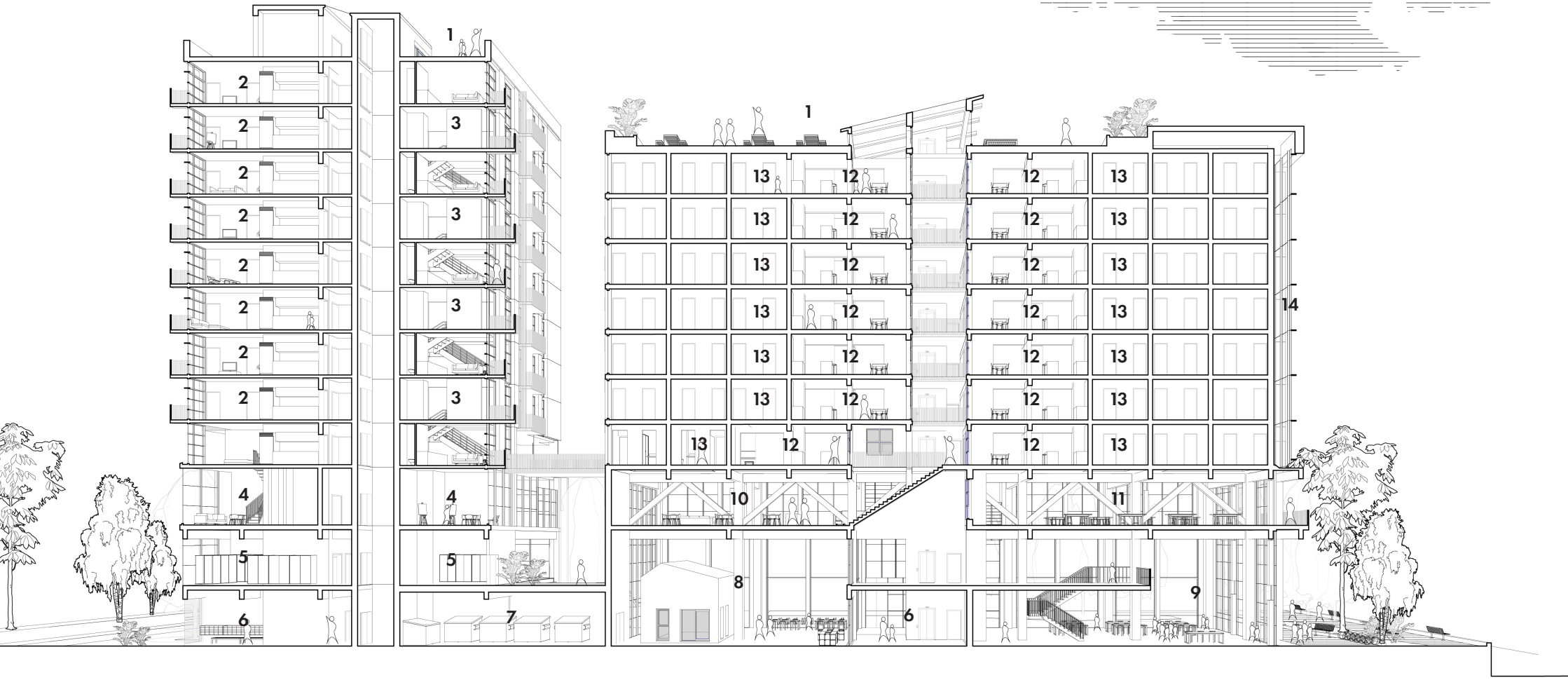
Courtyard

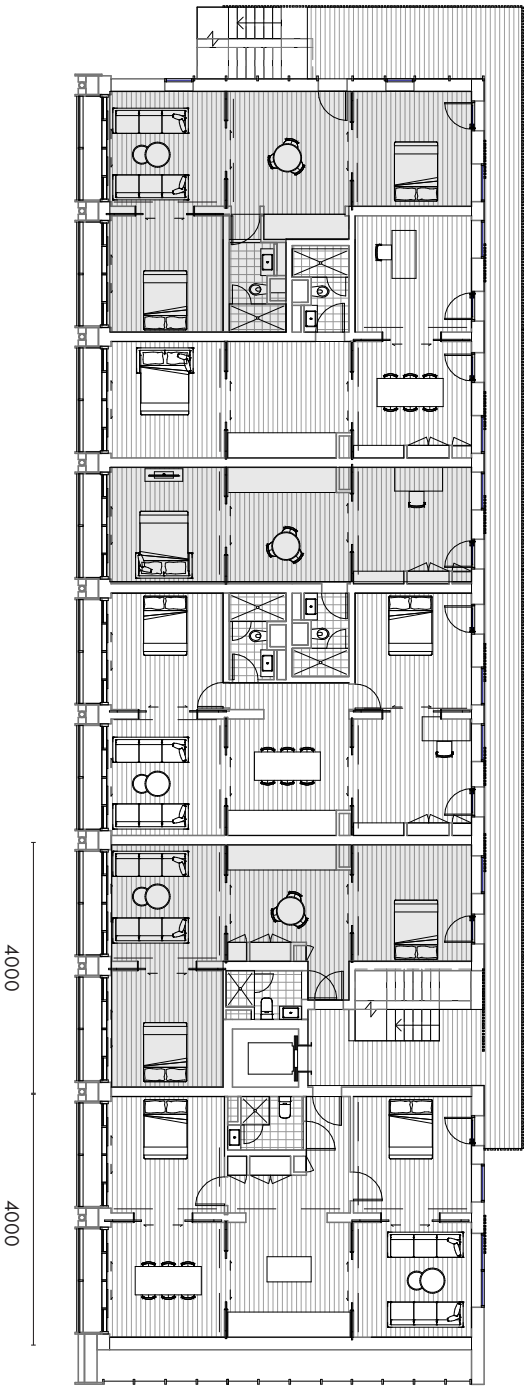
Section A

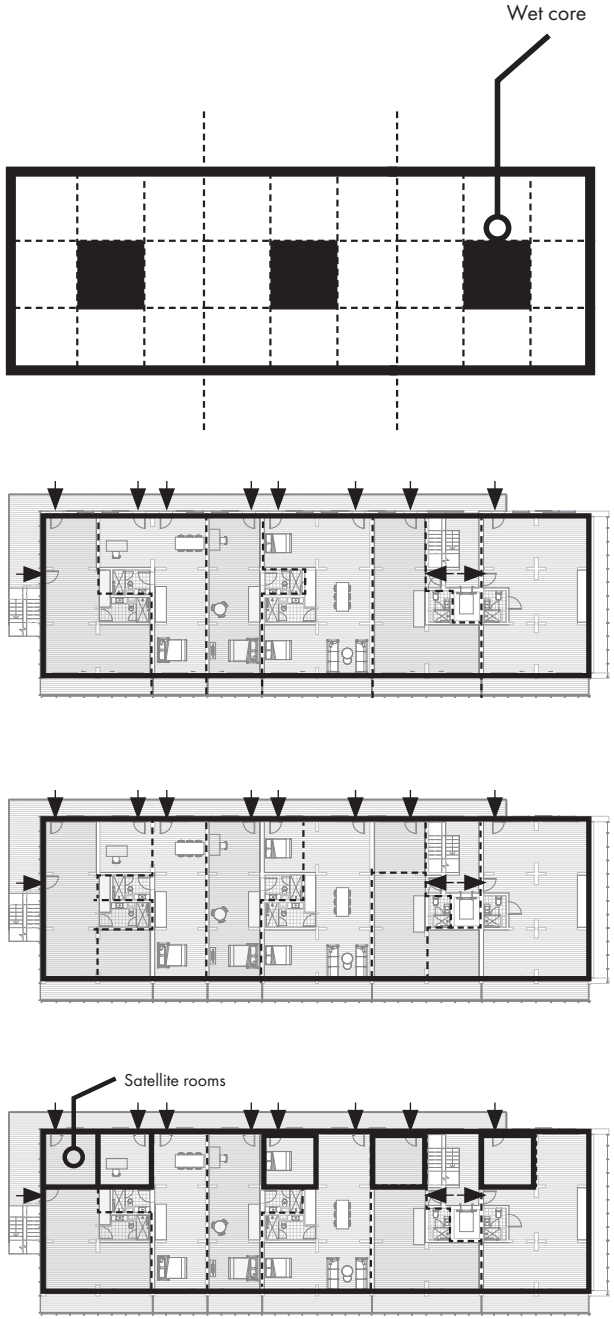
1 Cohousing, collective kitchen
2 Cohousing, bedroom
3 Residential collective lounge
4 Collective rooftop garden, residential
5 Courtyard
6 Foyer & breakout space
7 Computer labs - digital prototyping
8 Cooperative Apartment
9 Workshop - 1:1 prototytping

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







Apartment type A

The indeterminate type

Unit layout allows for a variety of inhabitants

Apartment type A

The indeterminate type

Apartment type B

Compact apartments

Balcony

Living room

Flexible room

Spare room

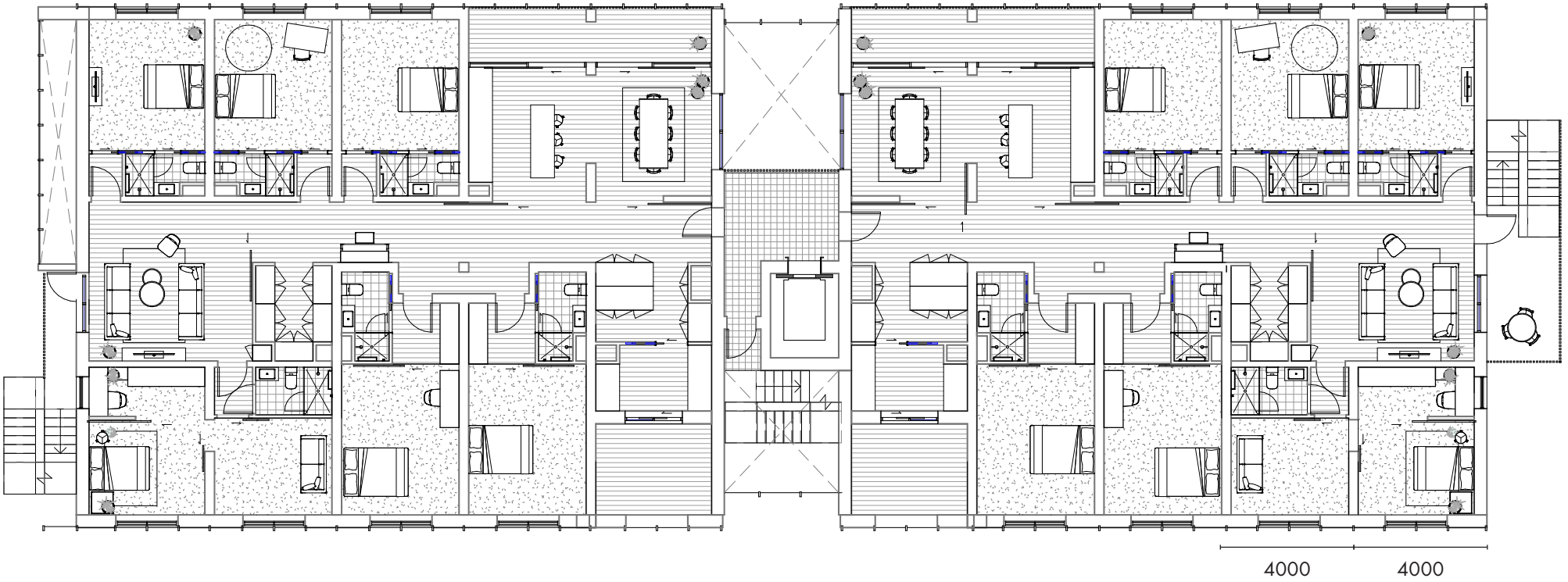
Collective kitchen

Private dwelling

Collective space

Section

Centrally located kitchen and laundry encourages social interaction



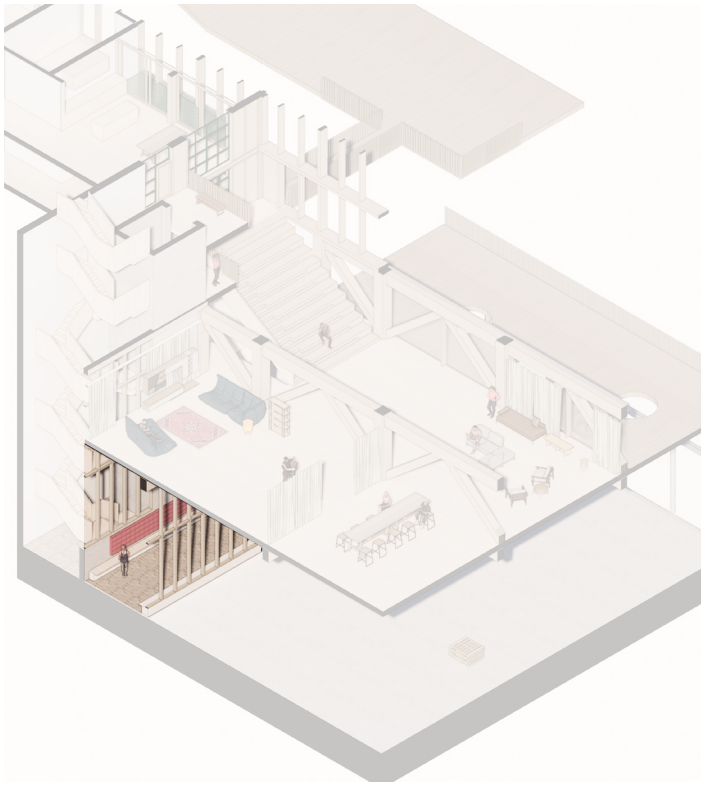
Apartment type C

Cluster dwellings

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

Apartment type C

Cluster dwellings



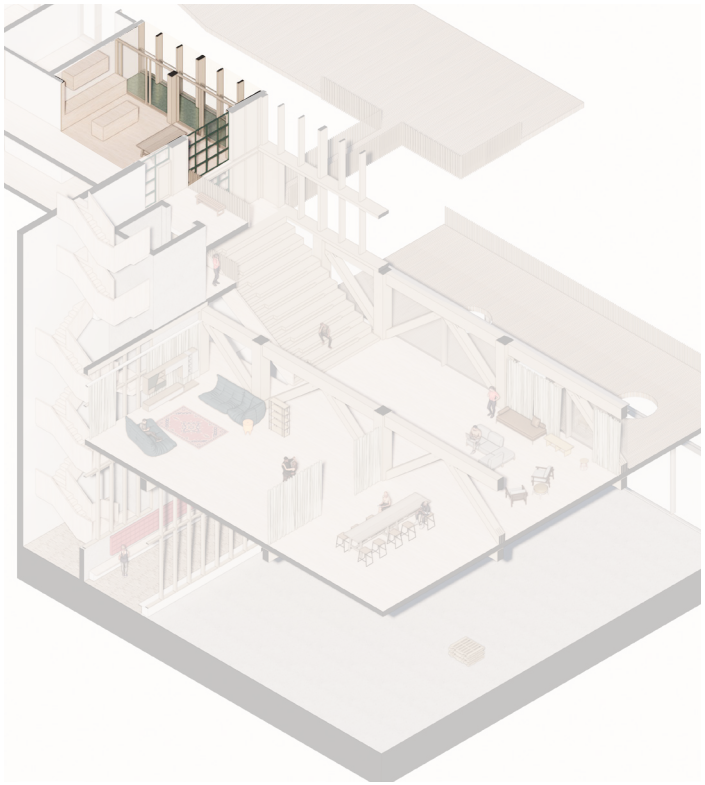
Apartment type C
Cluster dwellings

Lobby & mail room

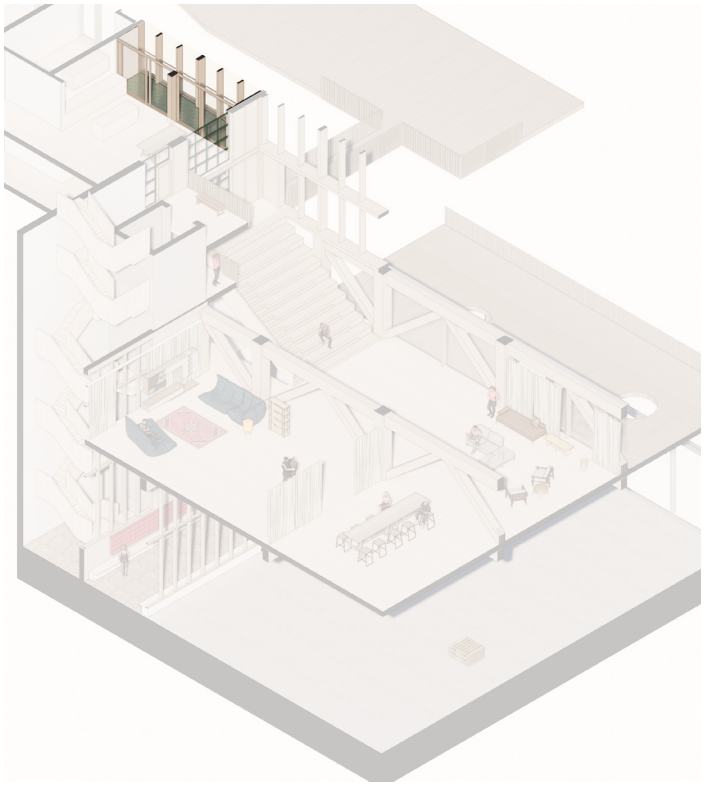
Stairwell

Collective lounge

Collective lounge - auditorium stairs



Cluster kitchen

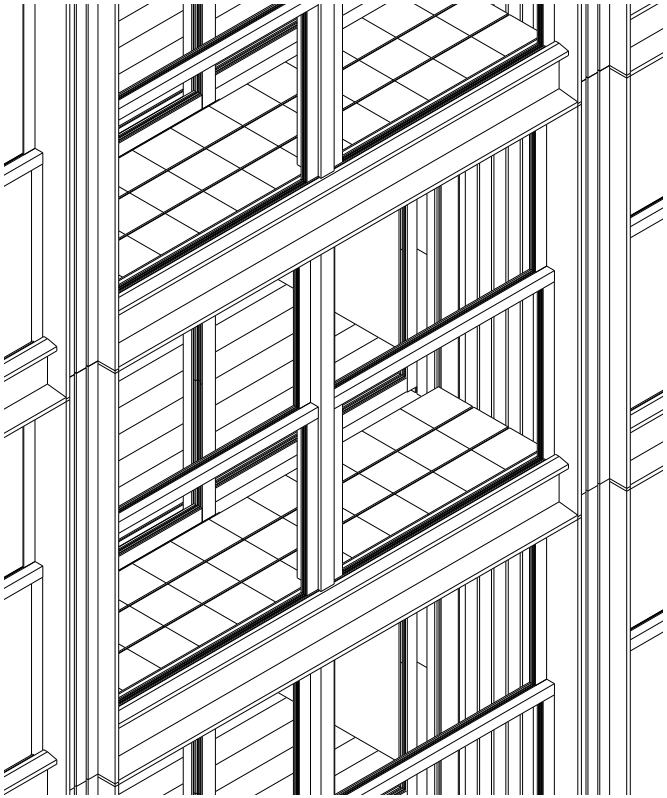


Cluster winter garden

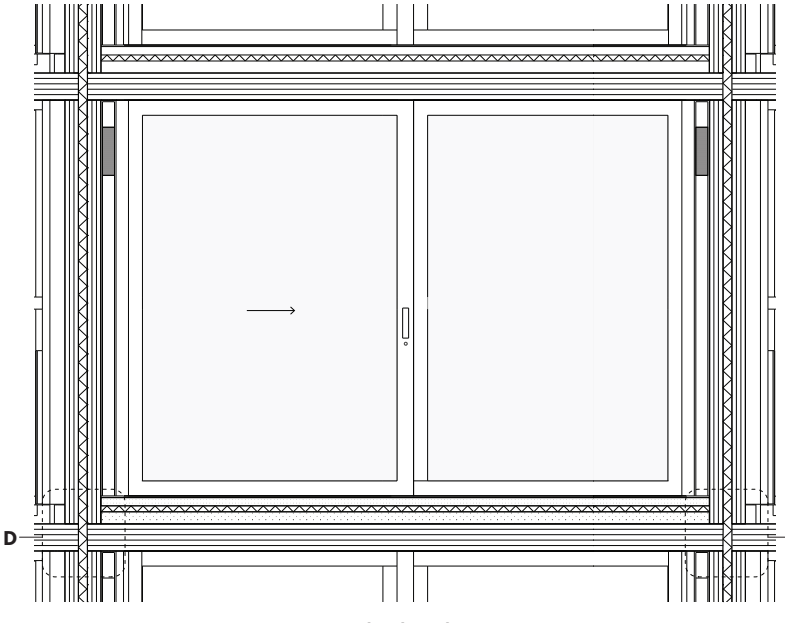
View of Keilehaven boardwalk

View from Keilehaven

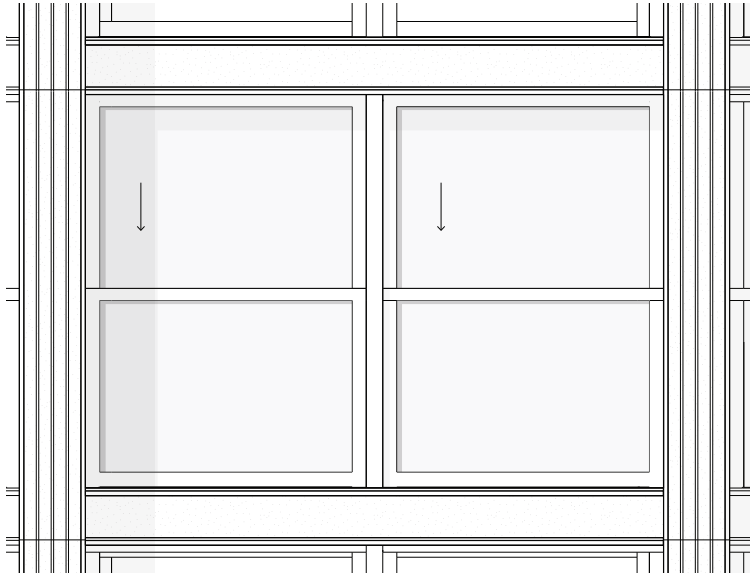
View from Keileweg



Axonometric, facade

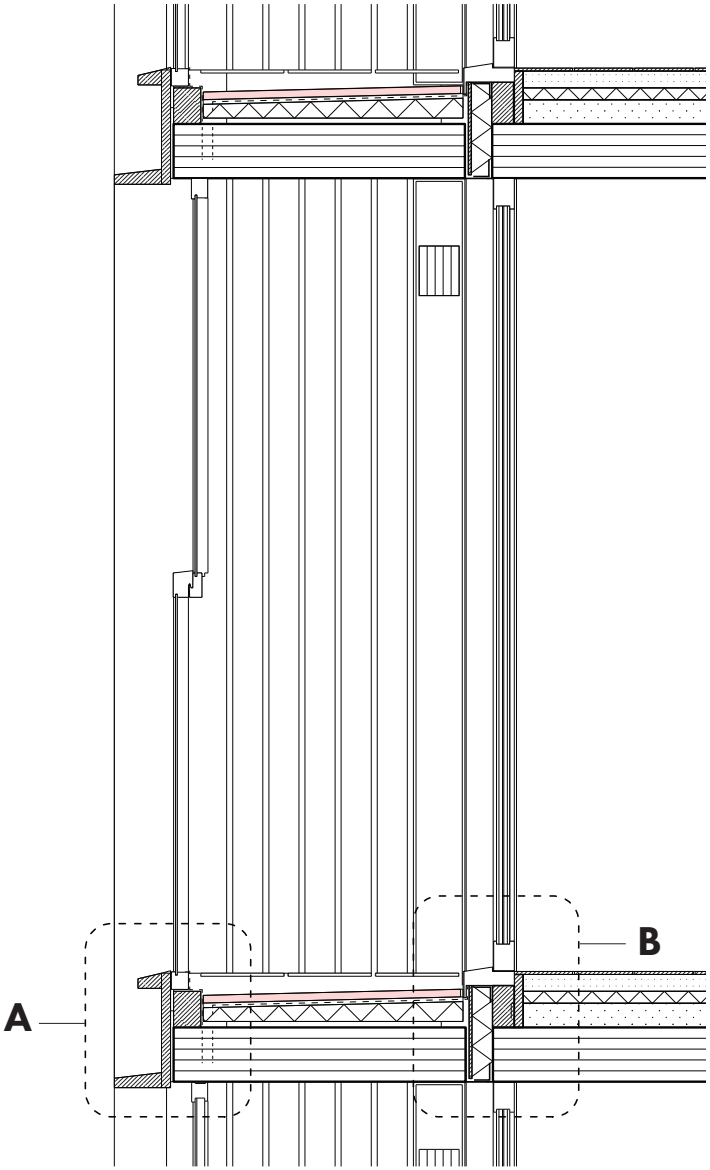


Internal elevation

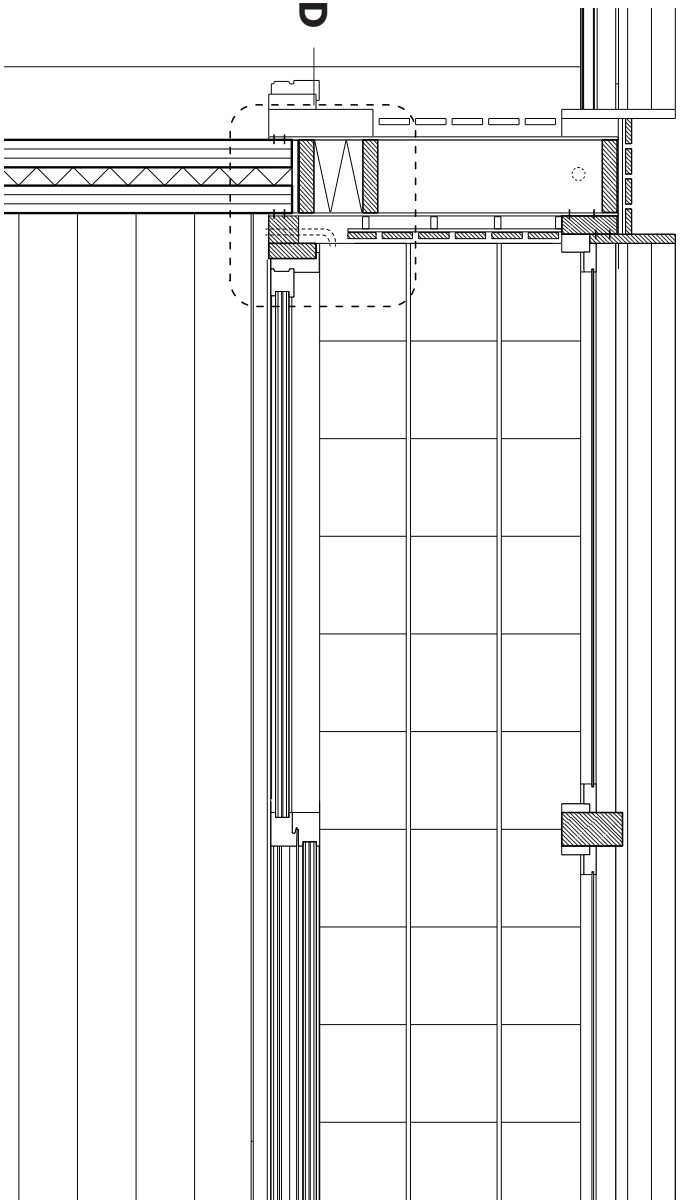


Elevation

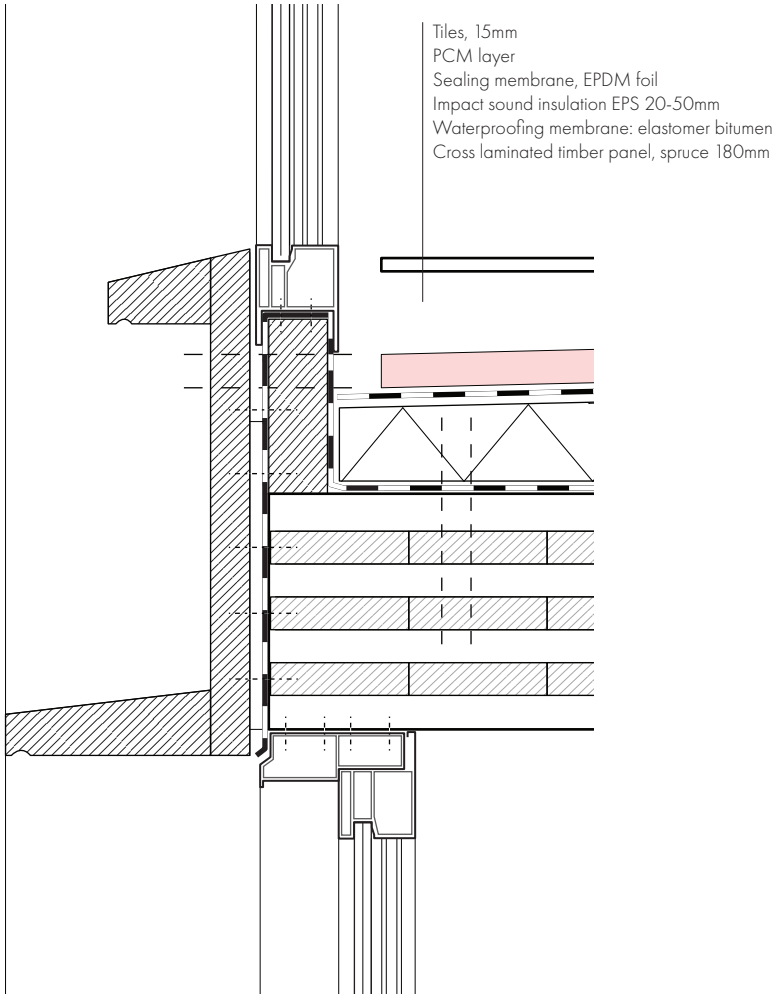
Facade fragment: winter garden



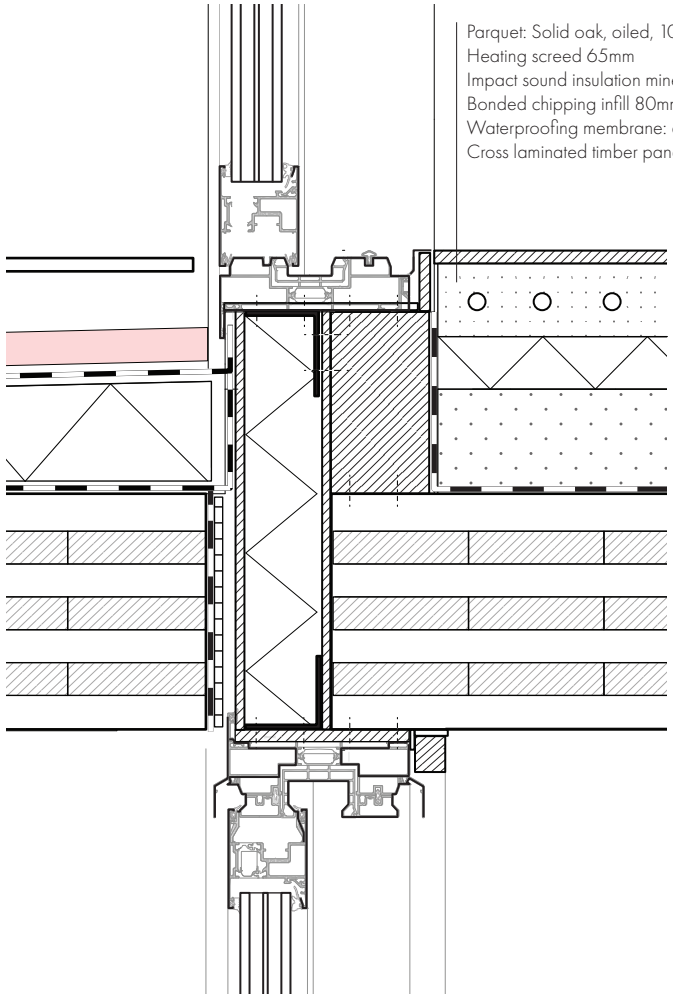
Section



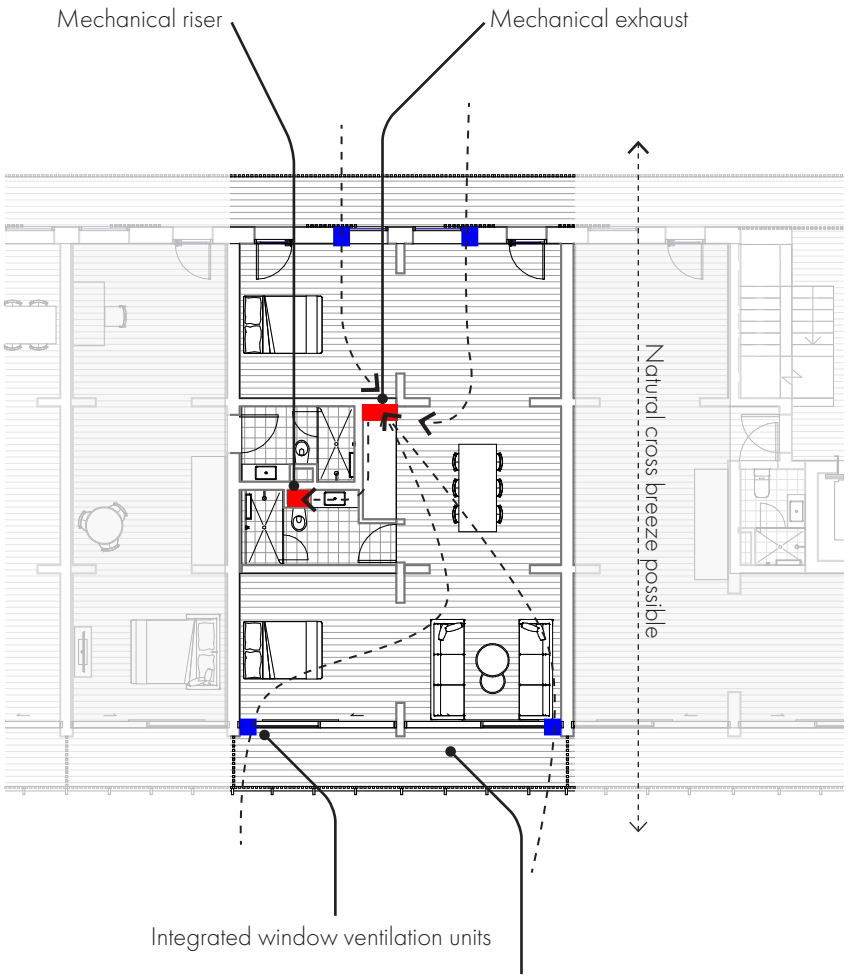
Plan



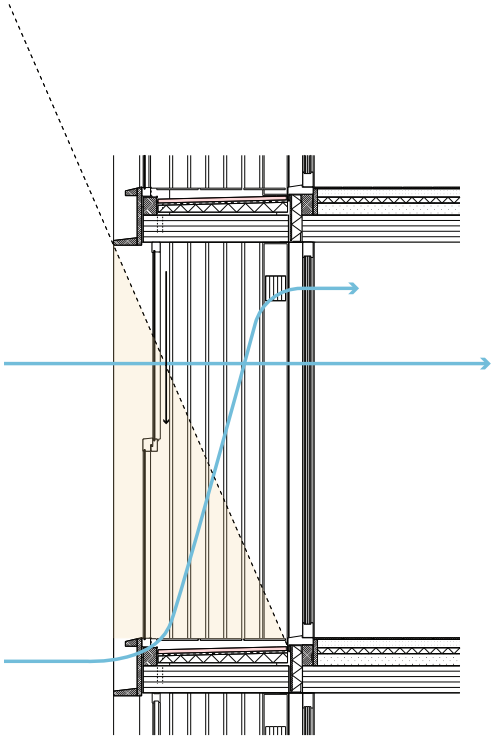
Detail: Balcony end



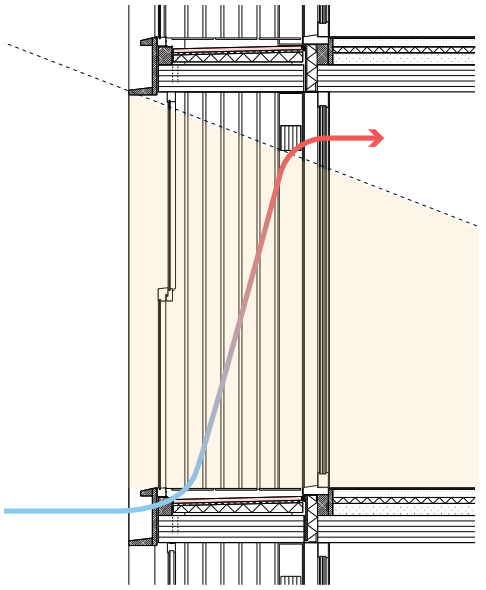
Detail: Balcony threshold



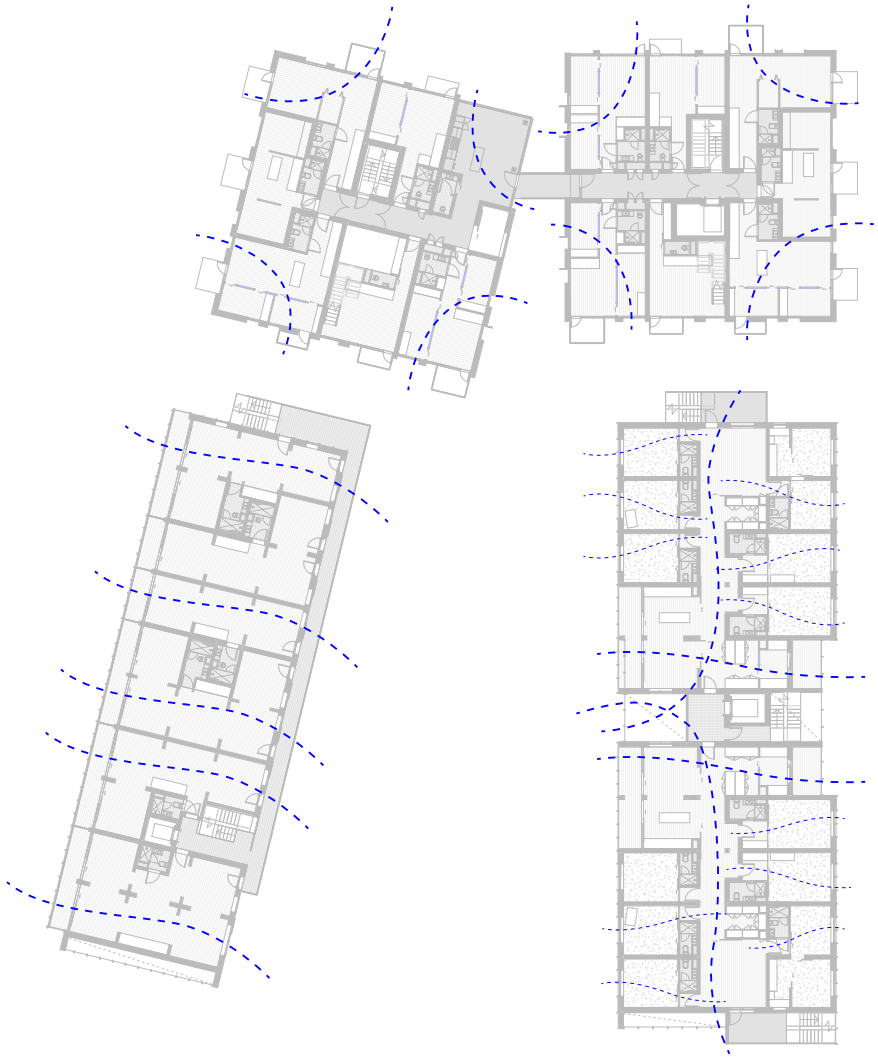
Ventilation principle: Type C ventilation



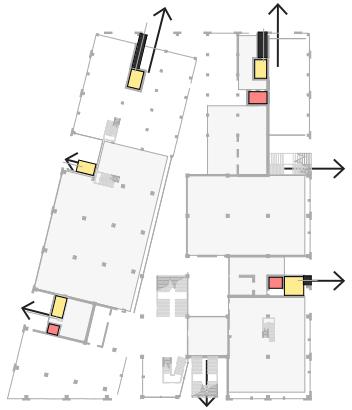
Summer condition
Projecting balcony provides shade. Winter garden kept open for cross-breezes.



Winter condition
Winter garden kept closed. The glazed compartment captures heat which is retained through a PCM layer below the floor tiles.



Natural ventilation



00

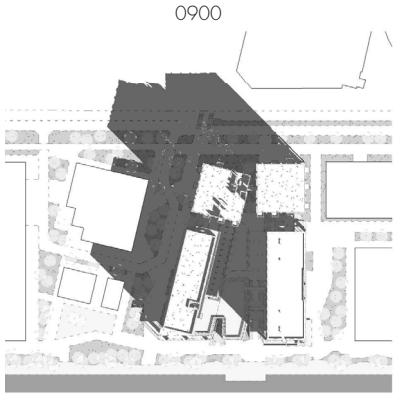
01

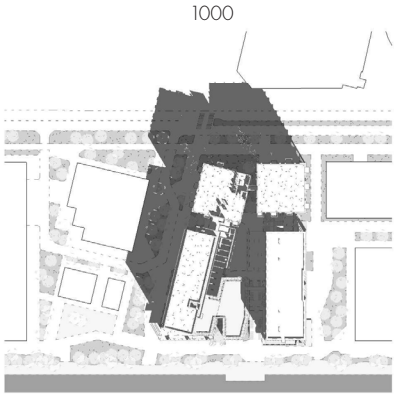
02

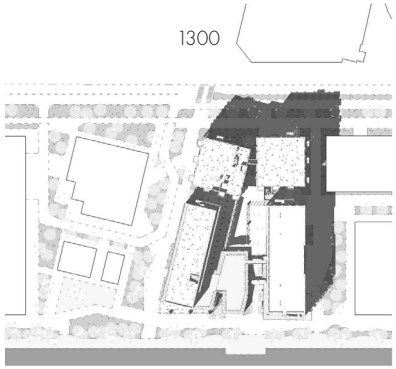
Fire egress

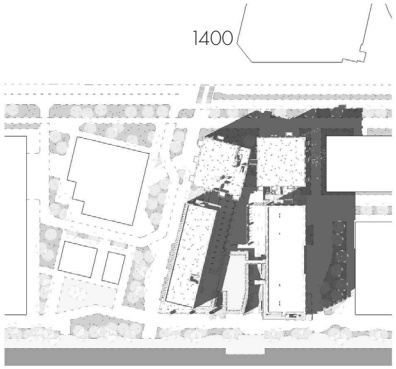
03

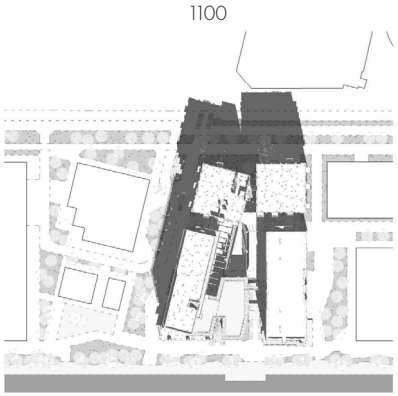
04 (typical)

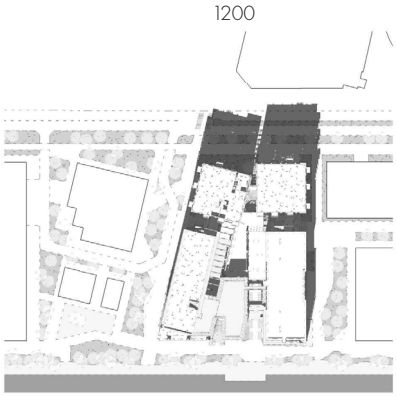


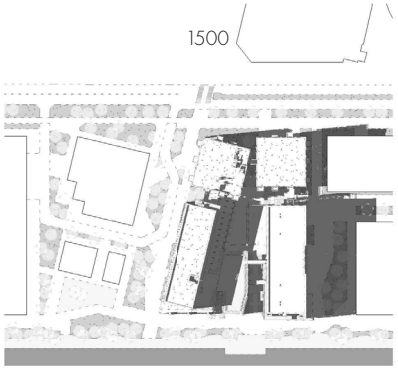


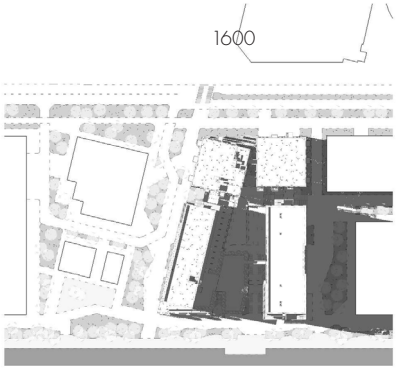




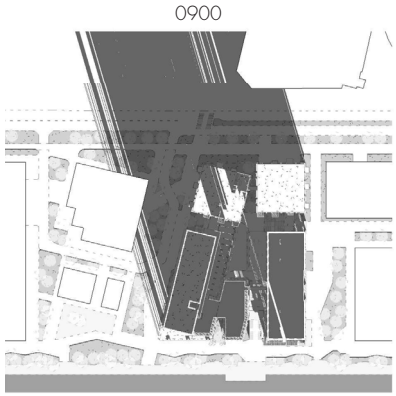


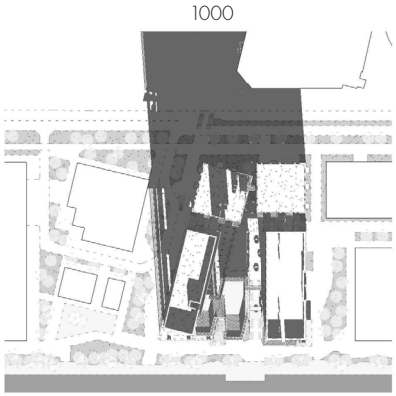


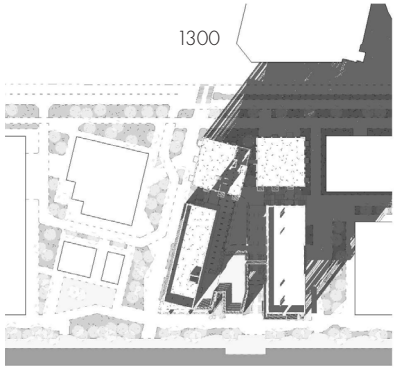


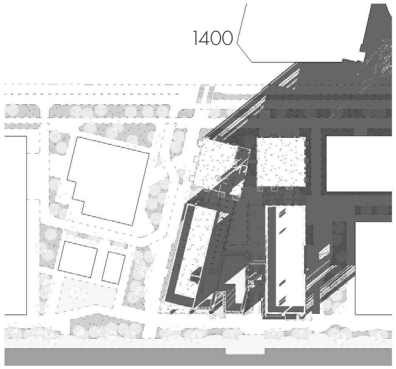


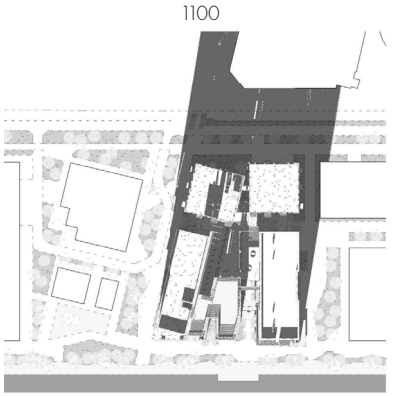
Shadow study: Summer

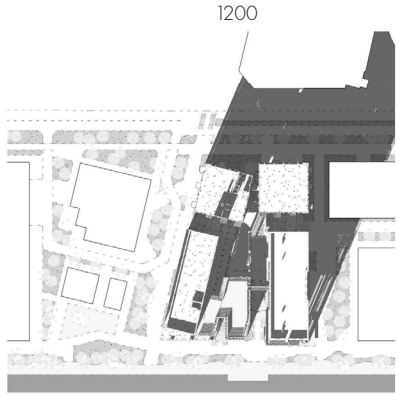


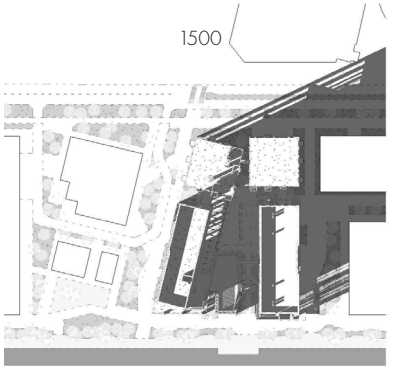


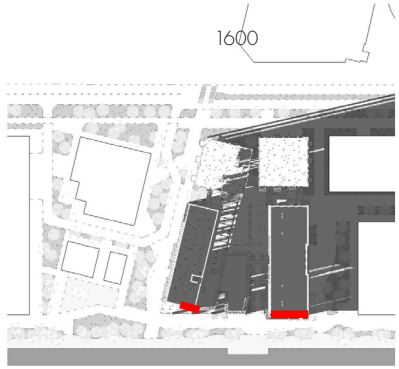




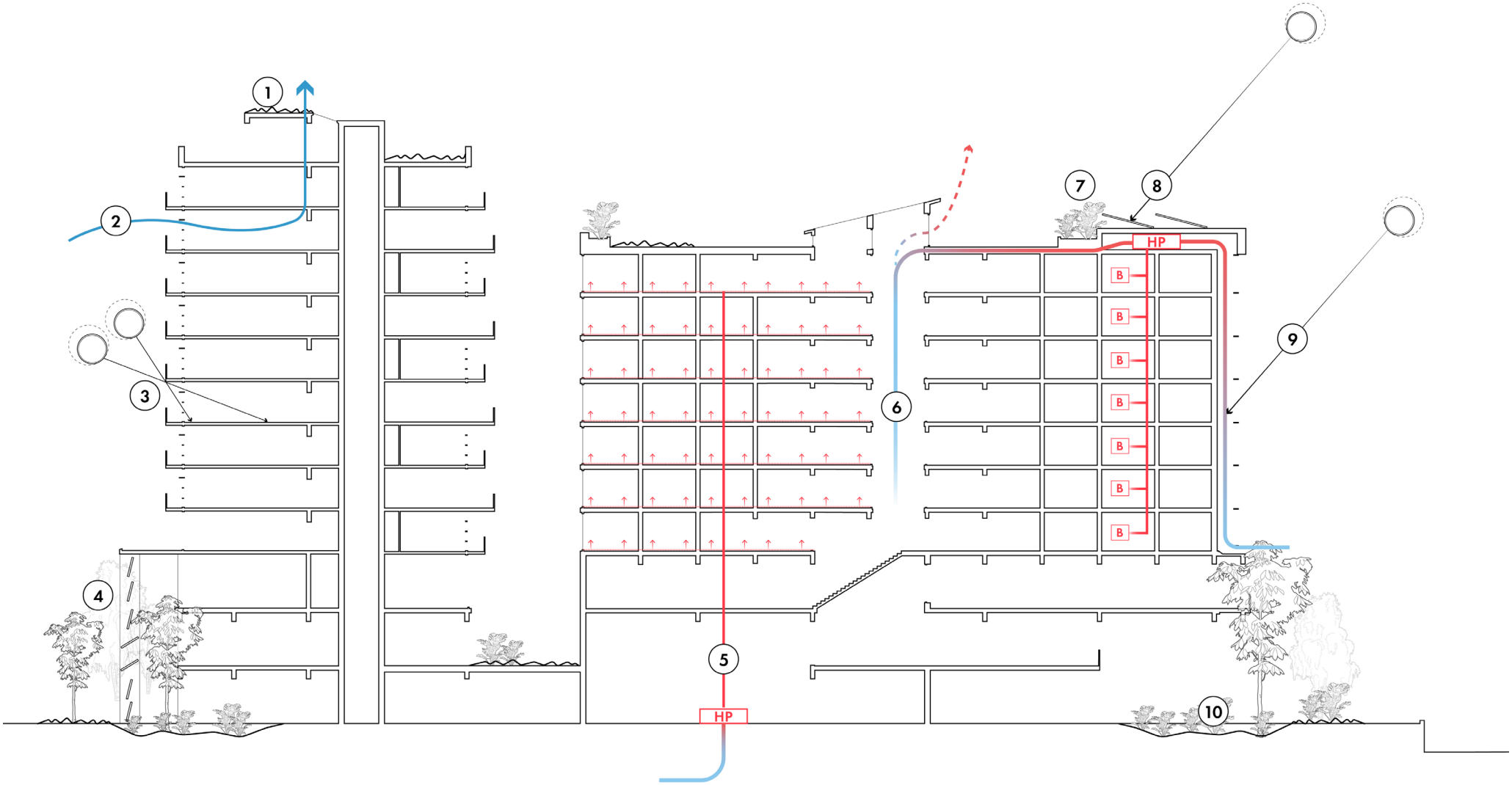








Shadow study: Winter



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.

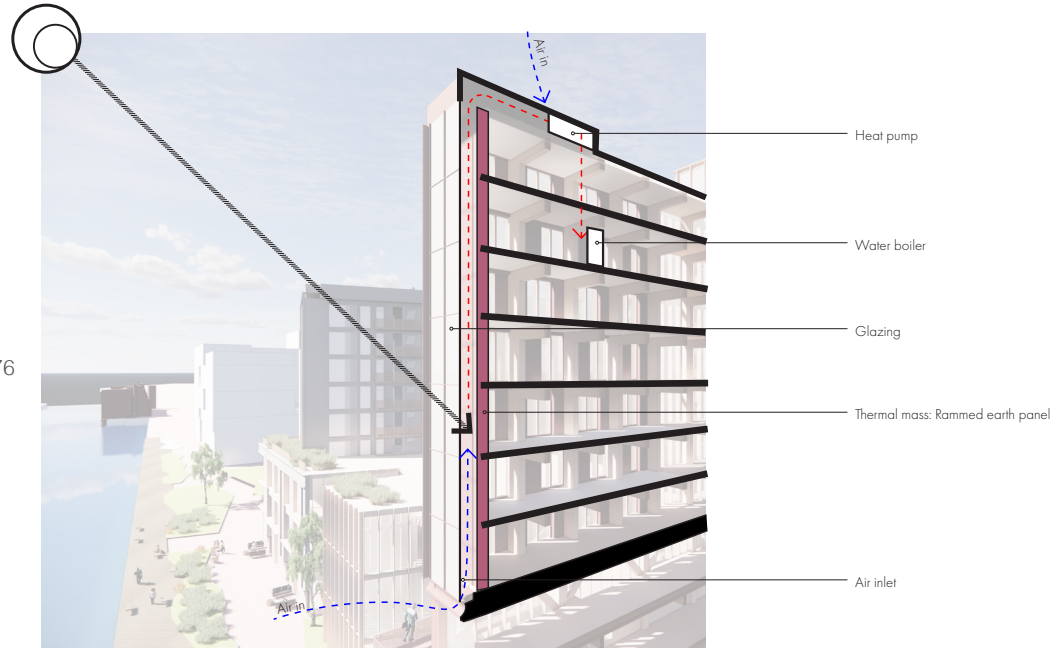
6 **Stack effect:** Excess heat in atrium flushed out through skylight or recovered in heat pump depending on heating needs.

7 **Rooftop planters** for bio diversity, heat island reduction & air filtration.

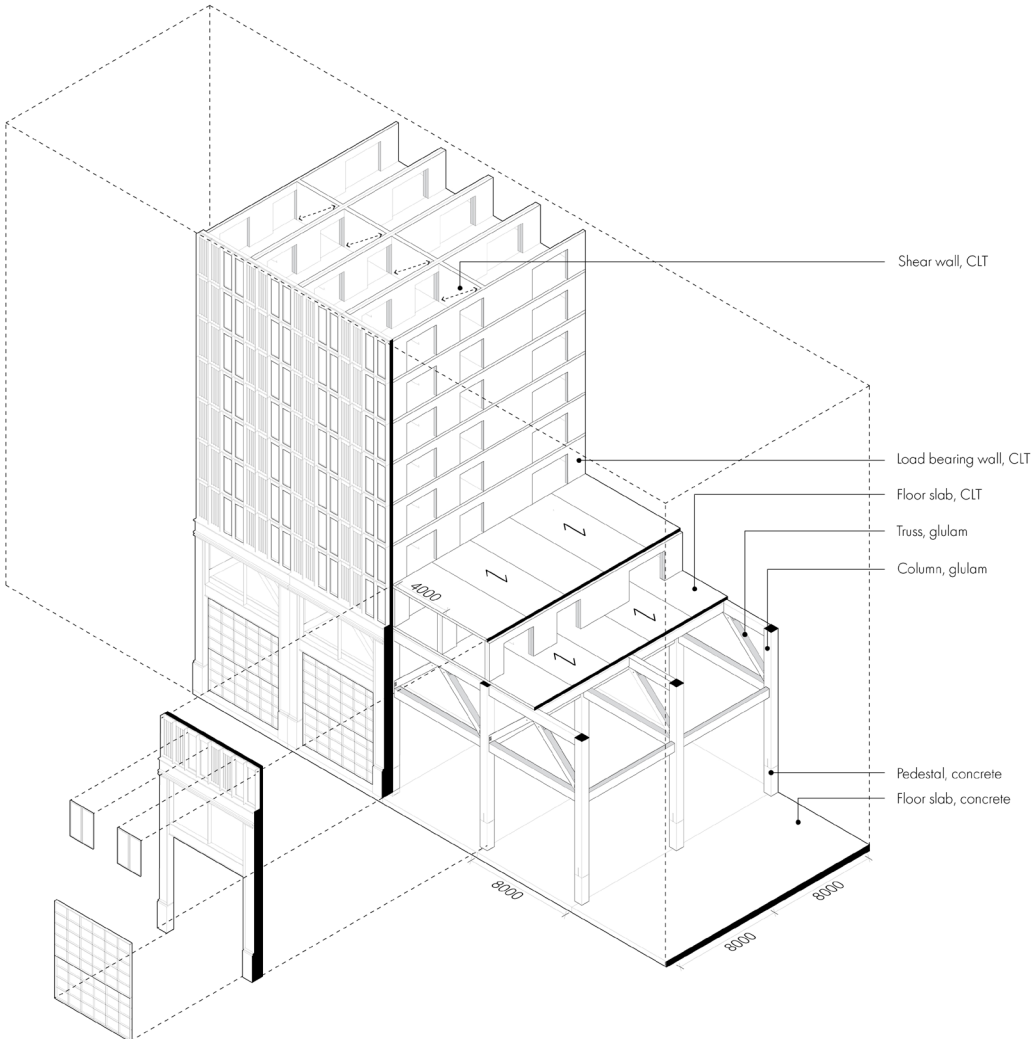
8 **Energy generation** through PV panels on rooftop

9 **Solar chimneys:** Boilers heated by heat pump on roof. Low tech heat recovery through solar chimneys.

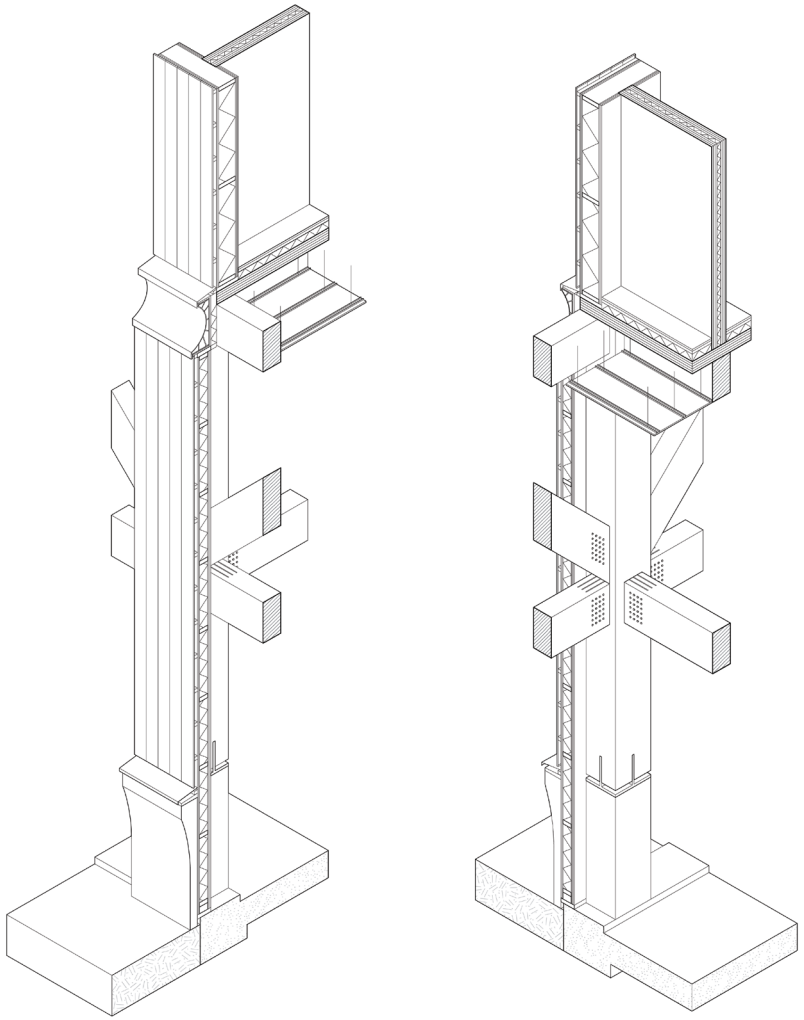
10 **Rain gardens:** Deep soil providing local water treatment & reduction in heat island effect



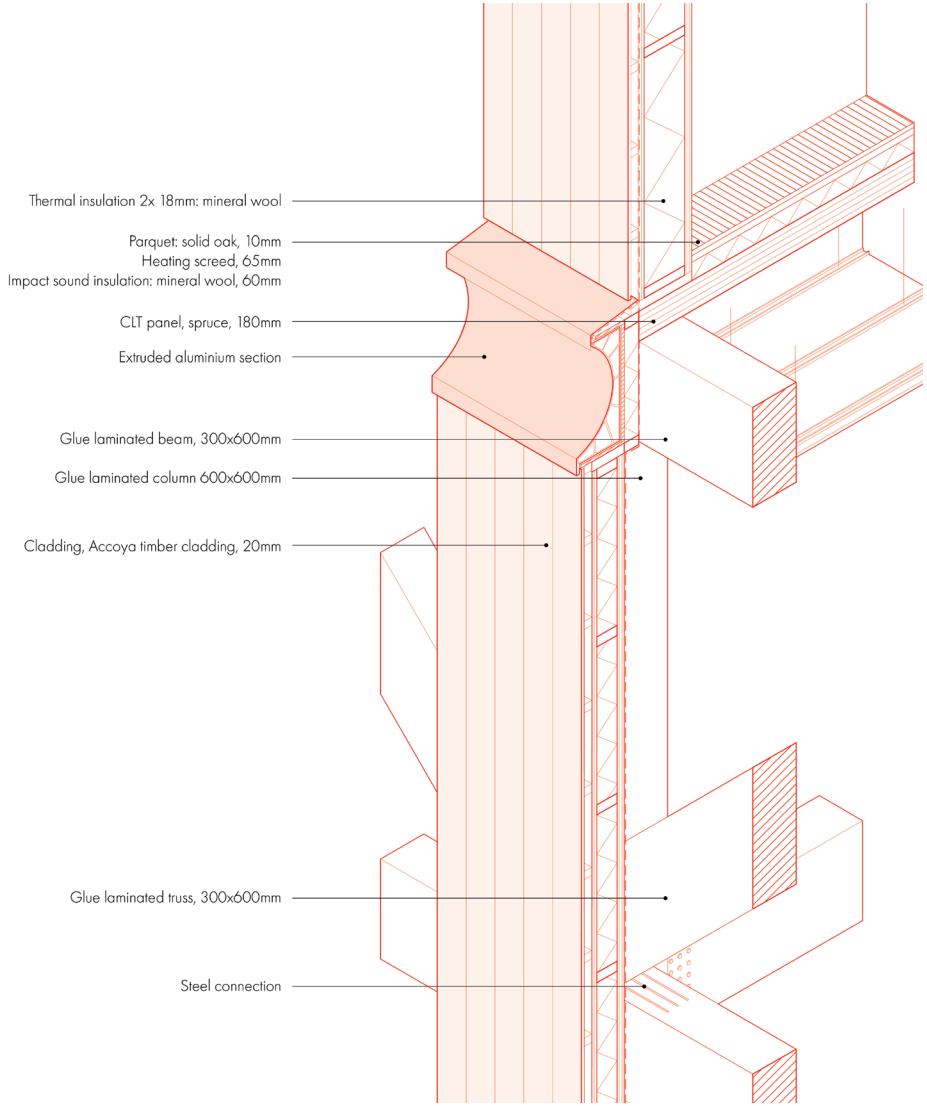
Passive heating: Solar chimney

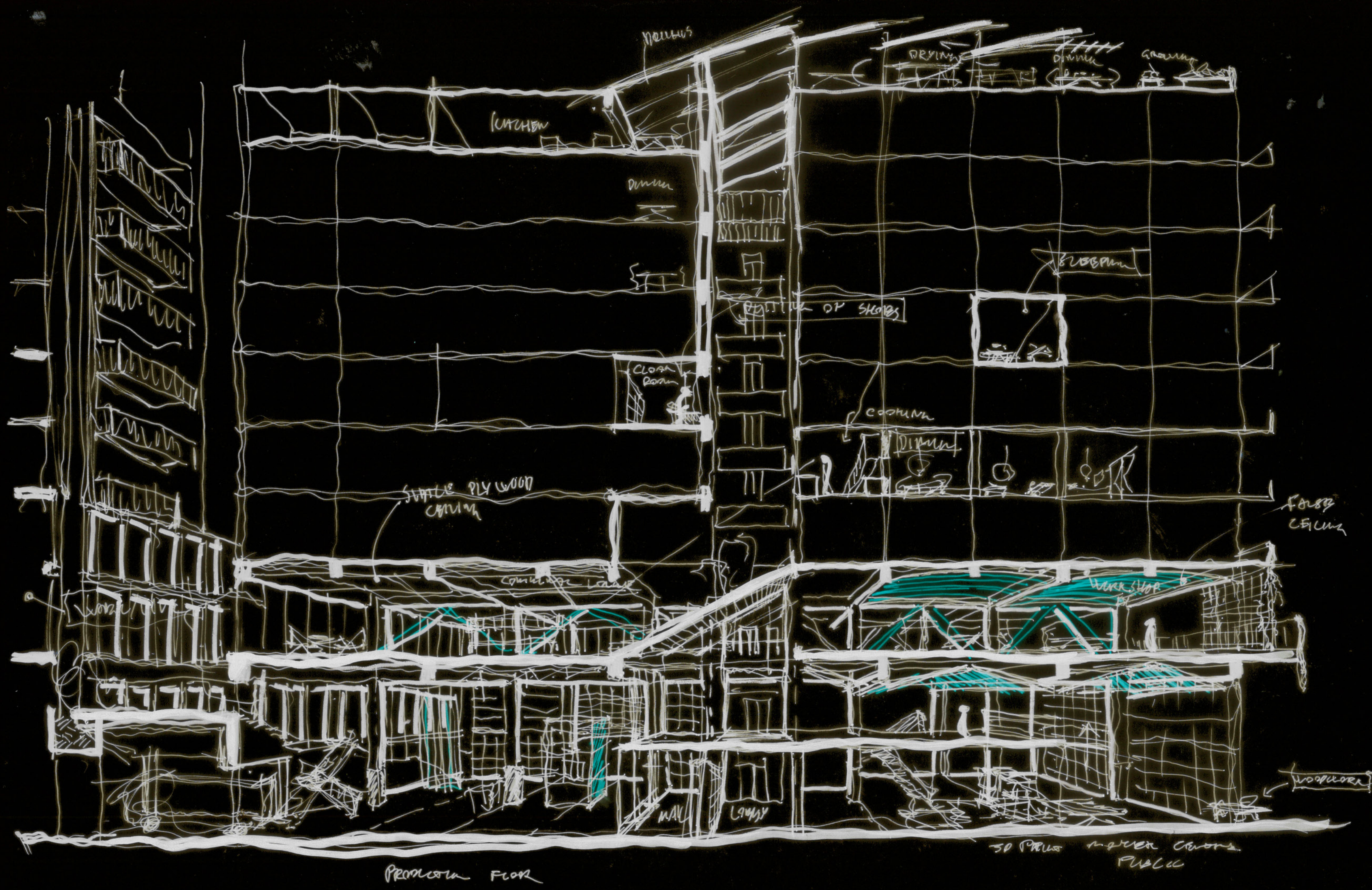


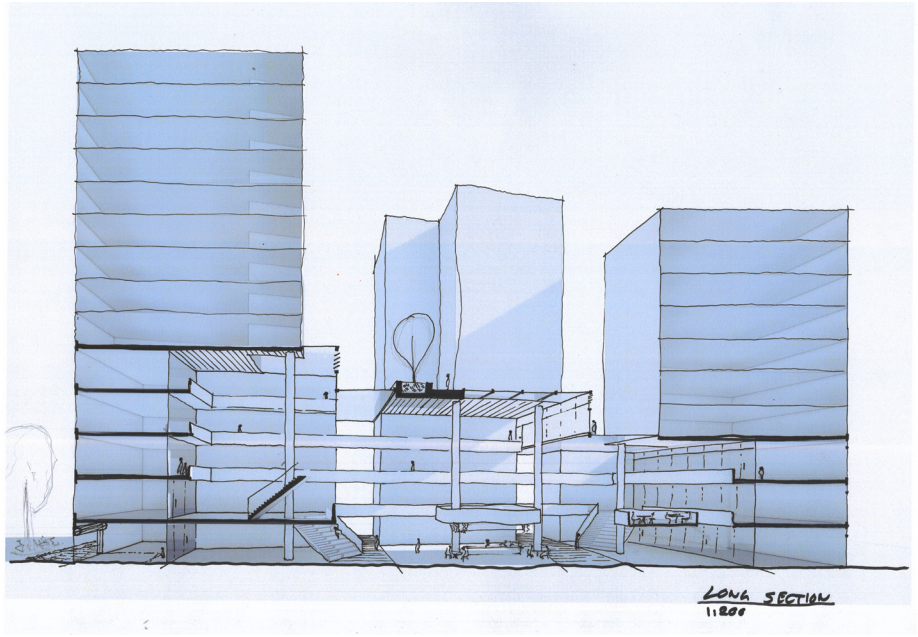
General structural principle



Structural transfer




KITCHEN
DRYING
DINING
CLOAK ROOM
COOKING
FALSE CEILING
PRODUCTION FLOOR


LONG SECTION
1:200