Together alone.

Advanced Housing Design Graduation Studio
M4H for modern households // Rotterdam

Chahrazad el Otmani

Studentnumber: 4567005

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Studio tutors:
Theo Kupers
Ferry Adema
Anne Kockelkorn

The NUM bar

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Location.

Schiedam24 (2020). Staatssecretaris: geen grote risico's door schip met ammoniumnitraat. Schiedam24. Image retrieved on December 27, 2021 from https://www.schiedam24.nl/nl/nieuws/nieuws/staatssecretaris-geen-grote-risi-co039s-door-schip-met-ammoniumnitraat/15341

Merwevierhavens, Rotterdam

The studio of Advanced Housing Design tasked us to prepare a masterplan for the Merwehaven in Rotterdam. Currently, the district has to be transformed since its not suitable for living. The plan of the municipality of Rotterdam is to tranform the area into a neighborhood with a lively live-work environment. This chapter starts of with a describtion of the design stragegy and follows with maps that explain the masterplan.
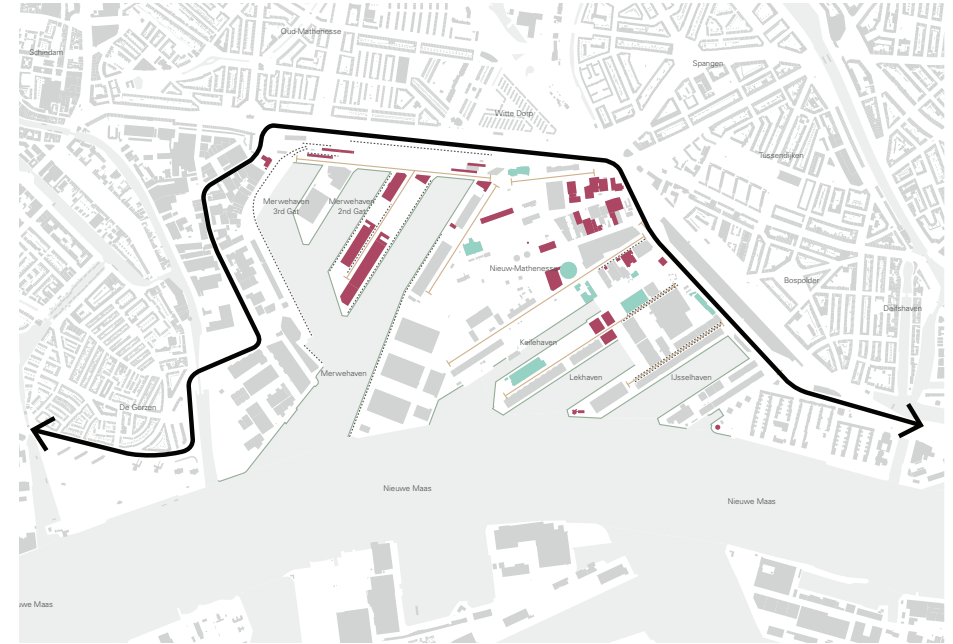
The concept of the urban masterplan

1. Preservation of the harbour identity

Respect the industrial character and preserve the characteristical elements.
• Preserve the rich variety of buildings, quays, tracks, and constructions in Merwehaven. These image-defining objects form the basis of the identity of the area and contribute to value development.
• A green heritage route is proposed that follows three key points in the masterplan where the monuments are preserved.

2. Implementing a strong spatial structure

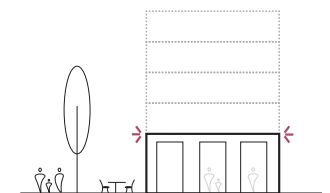Restore the spatial connection with the surrounding area.
• Creating good and safe connections over water and land, at all levels and for all modes of transport.
• In order to connect the harbour with the city, strong physical and functional connections will be made to the adjacent neighbourhoods.
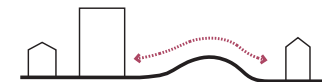
3. Create a strong programmatic structure with surrounding area

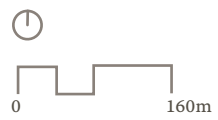Restore the programmatic connection with the surrounding area.
• Creating high plinths that define the image of the street with a mix of commercial, cultural, and social facilities.
• Realizing an open innovation environment with a varied mix of companies in different growth phases.
• In addition to the green heritage route, building block setbacks along the quay provide space for greenery and leisure activities.
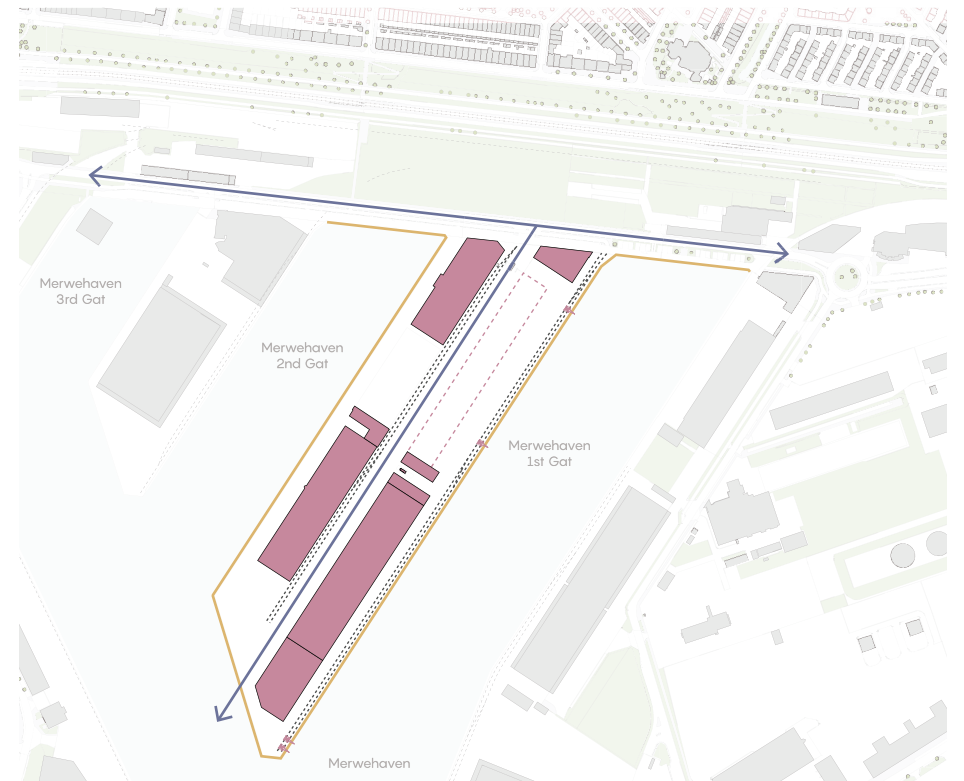
8 9

Location of the urban masterplan

Characteristical elements on the location

Dyke

Merwehaven
3rd Gat

Merwehaven
2nd Gat

Pier

Merwehaven
1st Gat

Merwehaven

Merwehaven
3rd Gat

Merwehaven
2nd Gat

Merwehaven
1st Gat

Merwehaven

0   160m

0   160m

Legend

Characteristic warehouses

Characterstic quay

Crane and traintracks

Characteristic structure

Characteristic cranes

Circulation - The car is a guest

Merwehaven
3rd Gat

Merwehaven
2nd Gat

Parking Hub

Merwehaven
1st Gat

Merwehaven
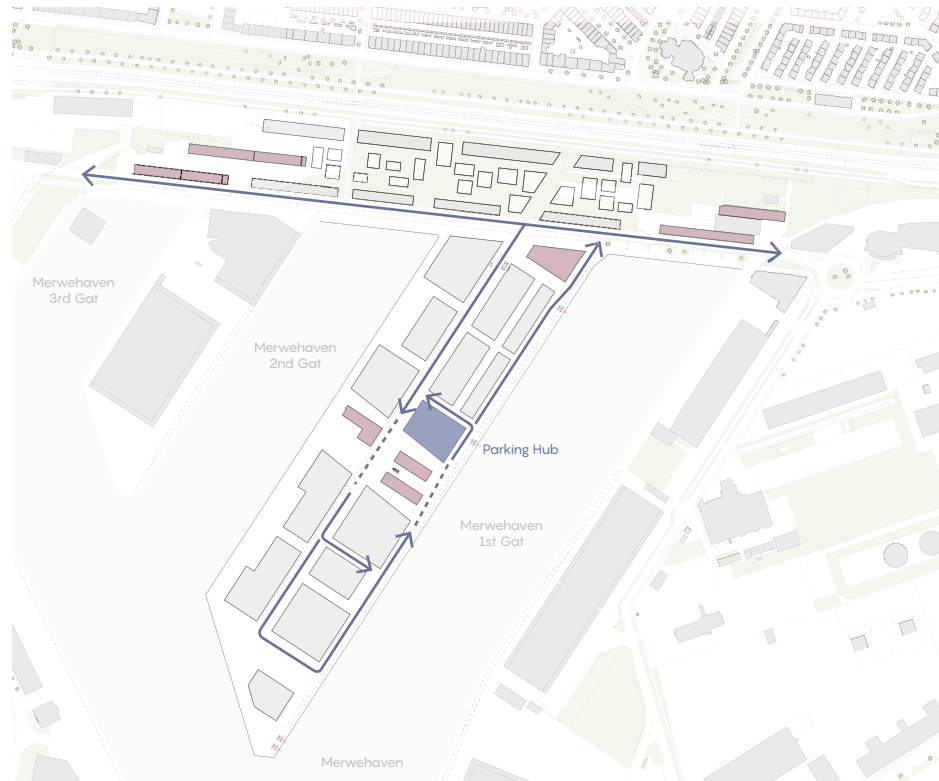
Legend

Parking hub

0   160m

Circulation - Public transport

Merwehaven
3rd Gat

Bus Stop

Merwehaven
2nd Gat

Merwehaven
1st Gat

Bus Stop

Merwehaven

Legend

Bus stop

0   160m
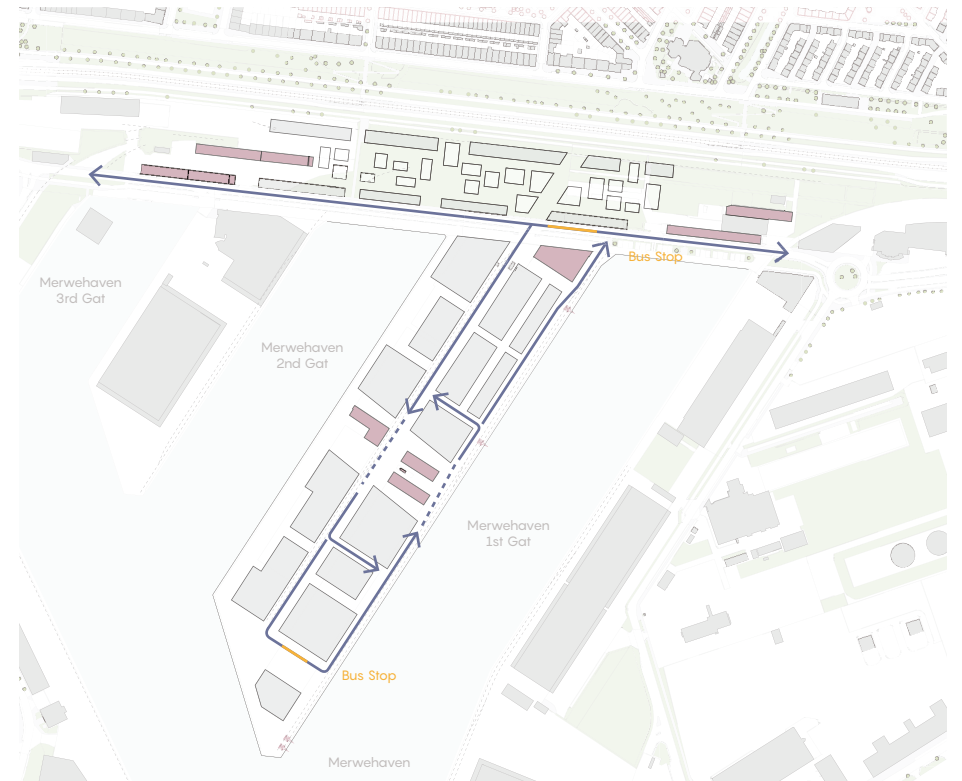
Circulation - Pedestrians and bicycles

Connecting to heritage and surrounding areas
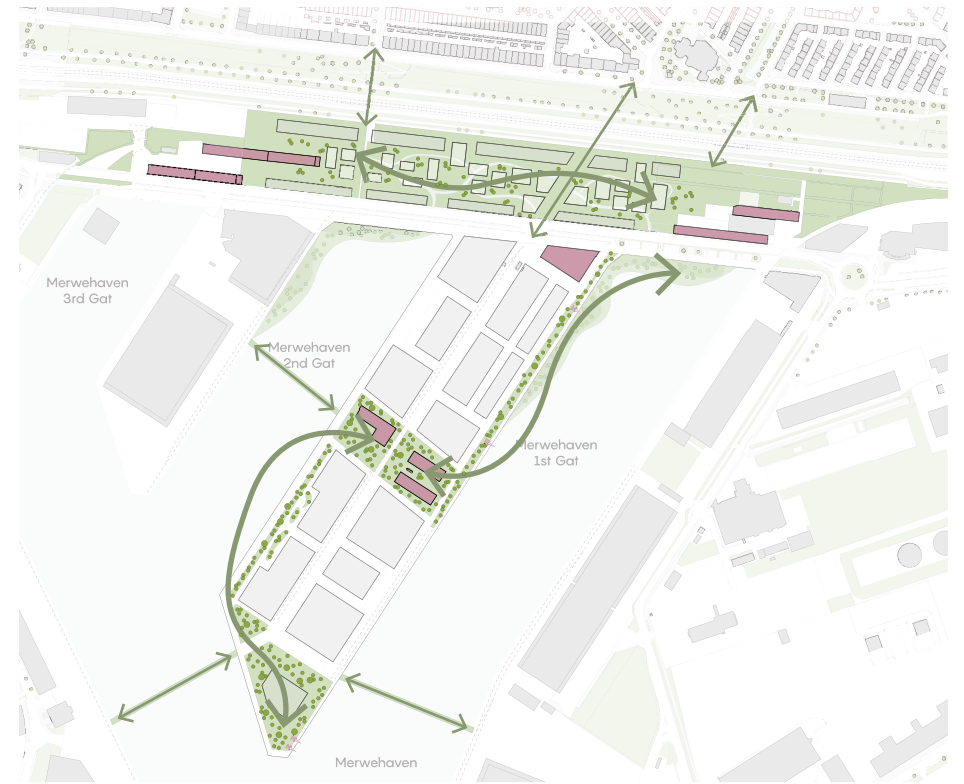
Merwehaven
3rd Gat

Water Taxi

Water Taxi

Water Taxi

Merwehaven
2nd Gat

Merwehaven
1st Gat

Merwehaven

Merwehaven
3rd Gat

Merwehaven
2nd Gat

Merwehaven
1st Gat

Merwehaven

Legend

— Bicycles
— Pedestrians
▮ Parking hub

0   160m

0   160m

Functions along the route

Final masterplan

Merwehaven
3rd Gat

Merwehaven
2nd Gat

Merwehaven
1st Gat

Merwehaven

Merwehaven
3rd Gat

Merwehaven
2nd Gat

Merwehaven
1st Gat

Merwehaven
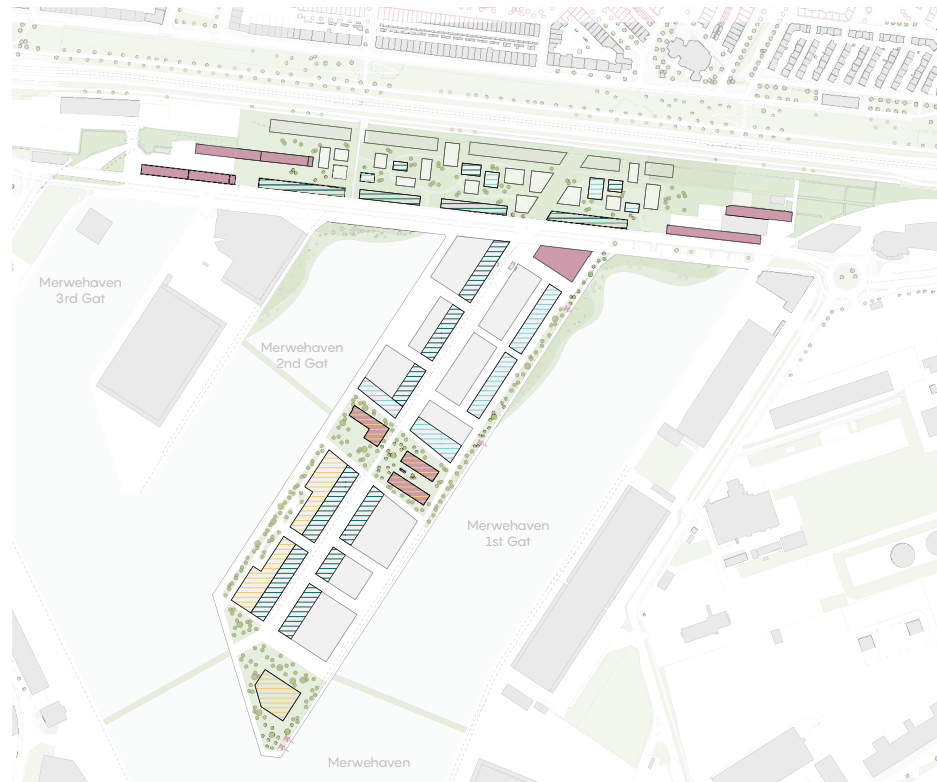
Legend

Horeca: cafes & restaurants
Work & living mix
Horeca: cafes & lunchrooms

0   160m

0   160m
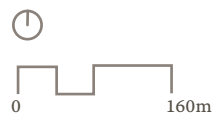
Heritage route impressions

1

2

3

4

7

5

6
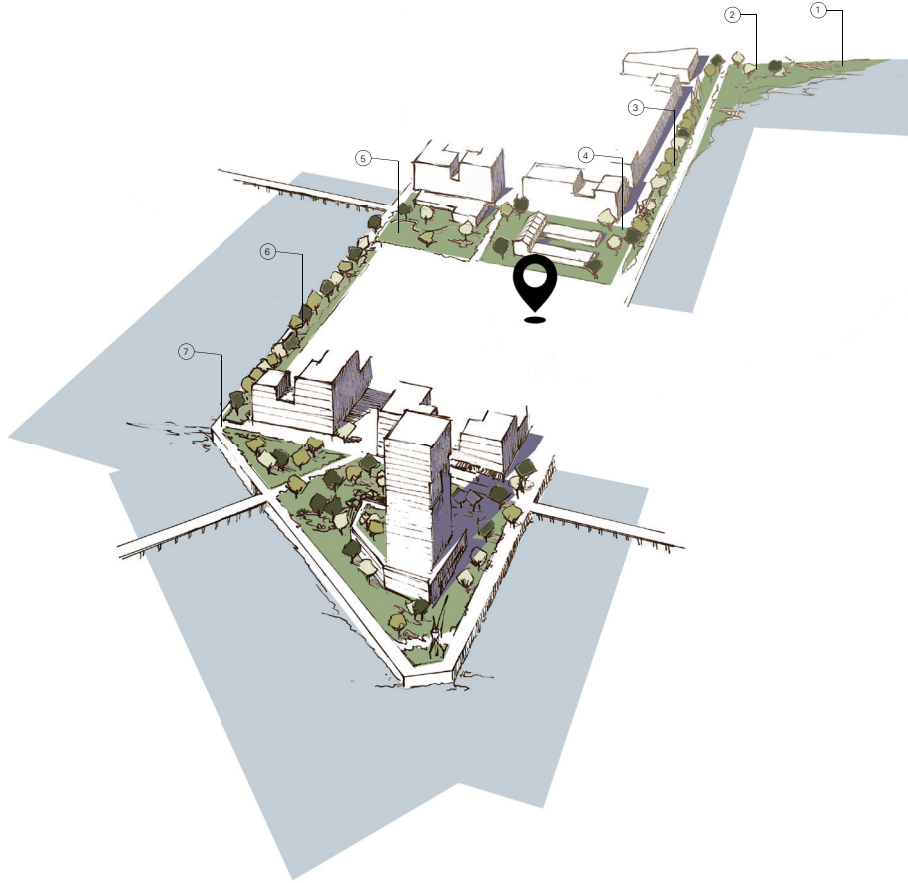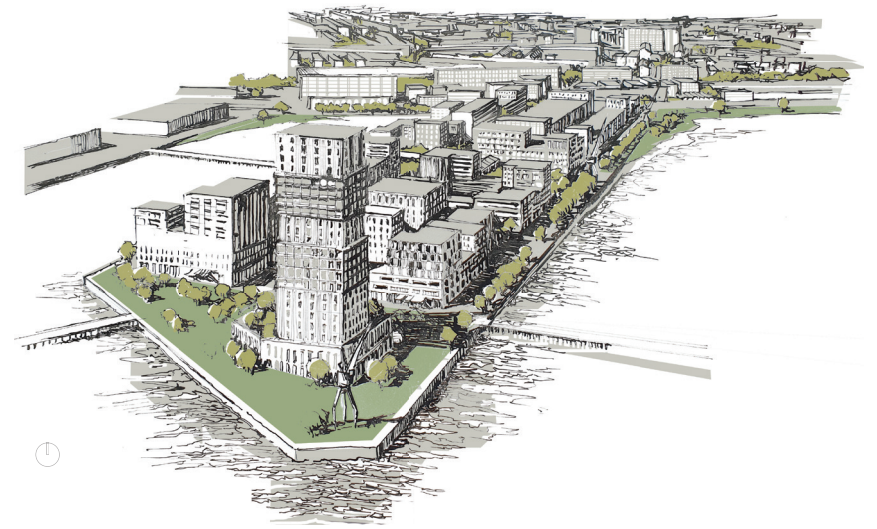
Topic research.

Abstract

The number of solo-dwellers is a rising trend in the Netherlands. While living alone is not a new phenomenon, the proportions of solo-dwellers have made this a significant demographic group. According to ABF Research, the total number of households in the Netherlands in 2020 is 8,02 million with 3,11 million solo-dwellers. In 2050 the total number of households is expected to grow to 9,2 million with 4,09 million solo-dwellers. Thus, the solo-dweller household is the household type with the most expected growth compared to the other household types (ABF Research, 2020). More people choose to live on their own as a lifestyle choice or as a consequence of social and economic circumstances. Also, the number of people who express feeling lonely is increasing in the Netherlands. Within the solo-dweller household type, 48% of the people express to feel either somewhat or very lonely. Of the solo-dwellers who express feeling lonely, 14,8% are emotionally lonely and 16,3% are socially lonely (CBS, 2019). There are different reasons for being lonely, therefore, finding the solution to combat loneliness can be difficult. In the context of this research, this paper aims to focus on the loneliness that is caused by social isolation. Social isolation can be very harmful to physical and mental health, according to Holt-Lunstad (2015). This is why human societies have organized themselves around the notion of living with others and not alone (Klinenberg, 2012).

Be that as it may, modern society is changing according to Sennett (2018) as strangers keep more to themselves and do not interact with other strangers as much compared to the years before. If in today's age, as a solo-dweller, you do not interact in public and also not in your home, it is not surprising to see that the number of people who express to feel lonely at times increases. This is because not interacting with people in public and in private is a form of social isolation which can cause loneliness. As people are more hesitant to interact with other strangers it becomes evident how important architecture is that incite moments of social encounters. The obvious question that follows this statement is whether solo-dwellers even want moments of social encounters. According to the research of Klinenberg (2012), for solo-dwellers, these spaces for social interactions are very important. This is because to compensate for the social isolation at home, the solo-dweller looks for nearby facilities where they can socialize. As the life of a solo-dweller continues, their living arrangements can change. A solo-dweller will have moments where they are not a solo-dweller. To prevent an excessive concentration of single-use within a building or space, it is important to cater to the diverse and ever-changing needs and practices of a young solo-dweller.

Furthermore, Novotney (2019) mentions that co-living is a popular trend for young and old to improve social connections and combat loneliness. These co-living communities can be established in a neighbourhood with multiple single-family homes or with solo-dwellers in one large apartment block. I will investigate different strategies in precedent co-living housing schemes to reduce loneliness among solo-dwellers in the city.

Keywords: Solo-dweller, loneliness, co-living, social interactions.

Introduction

In the nineteenth century, Europe experienced rapid urbanization and American sociologist Richard Sennett (2018) mentioned in his book Ethics for the City that from that moment a shift occurred in public life. Urban dwellers started to relate to each other more visually rather than verbally and they wanted to be shielded from the intrusion of strangers. An example of this shift, is that the big common tables in café spaces were replaced in 1900 with smaller tables. "One aspect of modern urban life was the veil of silence cast over public spaces, protecting individuals from strangers. The small café tables were the furniture of this protection; only people you knew would sit at your table" (Sennett, 2018, p. 33). This mentality was not always here, before this time that Sennett mentions, in the mid-eighteenth-century, strangers felt no hesitation in coming up to you in the streets.

Individualization, not to be equated with individualism which is a belief, conviction, or value, is a crucial process that can change a society, as a shift occurs from central authority towards individual freedom and personal autonomy (Halman, 1995). The changing patterns of family life are seen as a direct consequence of this process of individualization. This process has made people more reliant on themselves and less dependent on traditional institutions. On the other hand, these changes are a direct result of the creation of a welfare state in most European countries. Creating a welfare state focussed on social achievements, a community of interest, social as well as economic interdependence, redistribution of wealth, and resources to provide a social safety net (Bozeman, 2007). These changes in society created an environment where people did not only have the freedom to choose how they want to live but also had the means to do so. And even though modern society is individualized, people do not always opt for individualistic choices (Halman, 1995).

The human interest in the collective is also evident by looking at the history of the formation of families in all cultures. Before, living with others offered a competitive advantage by providing security, access to food, and a means of reproduction. Thus, human societies, at all times and places, have organized themselves around the notion of living with others and not alone. This has changed during the past half-century when other forms of living in society appeared such as solo-dwellers (Klinenberg, 2012). In these modern times, we do not have to rely on our family members to keep us safe. Instead, you can call the police at any time and place if you are in danger.

Sennett discusses the concept of "stream of consciousness" to explain how people dwell. A stream flows and is therefore never fixed, meaning that to dwell is never static. People cycle in and out of different living arrangements. Today, when people divorce, they stay single for much longer, whereas before people would get remarried quickly. When people age, they try to do as much as possible to avoid moving in with family members (Klinenberg, 2012).

Postmodernism affects views and lifestyles, which determines how a person fulfils his roles, meets his needs, and grows in society. The concept of postmodernism emerged in the 1960s as a reaction to or a departure from modernism. The origin of high modernist urban plans can be traced to the crisis after World War II. The reason why modernism became so dominant in that time was because post-war politics had to address questions of employment, decent housing, social provision, welfare, and better opportunities in the future (Harvey, 1990). Postmodernism as a cultural phenomenon is grounded in a change in the social and technical conditions of life. Thus, during this time major changes occurred in the qualities of urban life.

As reported by Stefanov, Terziev, and Banabakova (2018), the characteristics of postmodern society are globalization, loss of legitimacy of the state, technological revolutions, the crash of big ideologies, the end of the individual role models, the end or the transformation of communities, and the new generations. Some of these characteristics are especially interesting for this research. Firstly, the end of the individual role models refers to a person's role in society. A person's role used to be defined by the place and environment he was born in. Whatever job your father was practicing was most likely your future job. This predetermination was considered the norm. In postmodern society, however, a person has the freedom to choose his or her role in society depending on his or her capabilities and potential. This is because no one feels bound to a specific place anymore and people can change it at any given moment. Secondly, the end or the transformation of communities refers to the disintegration of communities. The postmodern society is not deprived of communities, instead, the development of technologies and the internet allowed people to create virtual societies (Stefanov et al., 2018). For virtual societies your geographical location also does not matter. Therefore, to put it extremely, even your community does not bound you to a specific place anymore as long as you have internet connection. These characteristics of postmodern society have a link with the rise of the solo-dwellers.

These different ideologies influencing today's society (e.g. individualization, individualism, postmodernism), are combined the driving force behind the changing patterns of family life. In the Netherlands,

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more people choose to live on their own. Today, 39 percent of the household types in the Netherlands are solo-dwellers, making this a significant demographic group. According to Klinenberg, despite its popularity, solo-dwelling is one of the least discussed and understood issues of this time (2012). It is often reasoned that the rise of solo-dwellers is an inevitable result of a social problem. This social problem refers to an increasingly narcissistic and fragmented society with a diminished public life. This narrative creates a misleading view of why so many people live on their own. In today's age, we have grown far from the traditional and we realise that nothing is binding or permanent. People move through different cycles of being single, solo, married, separated, partnered, and back. The only constant in this is the self. However, both individualism and collectivism can exist within the same society, as a person can have individualistic and collectivistic tendencies. A person who can believe in independence can also value the group (McCarty & Shrum, 2001).

As the number of solo-dwellers continues to grow, the risks of loneliness and social isolation have to be discussed. According to Novotney (2019), loneliness is defined by a person's perceived level of social isolation and is not synonymous with chosen solitude. Holt-Lunstad (2015) mentions that loneliness and social isolation are twice as harmful to physical and mental health as obesity. There is also evidence that loneliness and social isolation can increase the risk of premature mortality. Finding the solution to combat loneliness can be difficult because there are different reasons for being lonely. Loneliness can be divided into emotionally lonely and socially lonely. When someone is very emotionally lonely it means that they lack emotional close connections. Whereas when someone is very socially lonely it means that they are in need of more social connections (CBS, 2019). By living alone the risks of social isolation and thereby loneliness increases.

According to the social experiment of Klinenberg (2012), living alone does not mean that you are condemned to feel lonely. Most solo-dwellers purposely use their dwelling as a place where they can regenerate and not isolate themselves. To compensate for the social isolation at home, solo-dwellers become more socially active outside than those who live with others. This is, however, if the location of their dwelling accommodates these social activities. For this reason, proximity of these communal facilities are important for solo-dwellers. Cities are suitable for solo-dwellers because they create conditions that make living alone desirable. There are many areas with bars, restaurants, entertainment zones, and commercial streets that encourage solo-dwellers to socialize.

Novotney (2019) mentions that co-living seems to be a popular trend for young and old to improve social connections and combat loneliness. What sets co-living communities apart from regular dwellings and neighbourhoods is that these communities are built to encourage social interactions. Social interactions between the residents help to establish social networks, knowledge about each other, and thereby trust. The design in these co-living developments is focused on inciting moments of interaction. For this reason, precedent co-living developments will be analysed to determine the possibilities to use the scheme to meet the changing needs of the young solo-dweller.

Problem statement

There is a misconception that the rise of solo-dwellers is a sign of a social problem. This is, however, not the case as it is more a sign of a social change. According to Klinenberg (2012), there is a multitude of reasons explaining the rise of solo-dwellers. The first being, wealth generated by economic development and social security because of the creation of a welfare state. The second reason is a cultural change where the focus is on the individual rather than the group. While making the shift from traditional rural communities to modern industrial cities, the individual became the focal point. This resulted in changes in family formations in recent decades such as later marriage, increased cohabitation, increased divorce and cohabitation breakdown, and later parenthood (Smith, Wasoff, & Jamieson, 2005). Sociological phenomena such as postmodernism and individualism are the driving force behind social and technical changes in life. A result of these changes is the rising number of solo-dwellers. As this number continues to grow, the risks of social isolation and thereby loneliness is an important issue we have to be aware of. The social problem we are facing is the rising number of people who express to feel lonely, specifically among the solo-dwellers. Although living alone does not necessarily mean that a solo-dweller by definition lonely, they are more at risk of social isolation which can cause loneliness. Loneliness and social isolation can be extremely harmful to physical and mental health (Holt-Lunstad, 2015). As these solo-dwellers are more at risk of social isolation, they need access to networks of social support. A network that does not only rely on having relatives, friends, or co-workers. According to Novotney (2019), the co-living trend seems to be a popular trend for people to improve social connections. This research explores the role that co-living housing schemes could play in improving social connections between the residents and thereby reducing loneliness among solo-dwellers.

Main research question

How can co-living design strategies meet the changing needs of the solo-dwellers, both within the collective and private domain of a building?

Sub-research questions

i. How did the solo-dwellers and co-living trend develop in Europe?

ii. Who are the solo-dwellers and what are the transitions in their household formation?

iii. How do their changing living arrangements affect their daily activities and thereby their needs?

iv. What design strategies that stimulate social interactions in co-living developments have been implemented in precedent housing schemes?

Main design question

What architectural design strategies for co-living meet the changing needs of solo-dwellers, protect their privacy and incite moments of social interaction?

Criteria:

Context
     i. Where is the building located and how does it relate to its context?
Circulation
     i. How are the collective facilities and private dwellings accessed?
Programme (including layout and proximity)
     i. How are the essential activities allocated among the different types of spaces throughout the building?
     ii. How does the private dwelling relate to the collective domain?
     iii. What is the functionality of the communal spaces?
     iii. How does the dwelling accommodate the changing living arrangements of a solo-dweller?
Sequence of space (including social networks and interactions)
     i. What are the spaces that a resident experiences while moving around in the building?

Relevance

Today, there are many misunderstandings concerning the rise of the solo-dwellers. Many people assume that the reason for the rising number of solo-dwellers is a social problem. However, due to economic development and social security more people can live on their own. Also, society is more focused on the individual. Solo-dwellers are rising and not because of a social problem, but because of a social and financial change. There is, however, the issue of social isolation and loneliness among many types of households including the solo-dweller. In the field of architecture, this means that it is important to question the current traditional solo-dwellings and its facilities. Co-living design strategies can provide a different perspective on how to design to improve social connections. This perspective will be beneficial for looking at ways the solo-dwelling and its environment can improve. Also, the key design factors of co-living can be applied to other forms of residential development. This research paper will illustrate how architecture can accommodate a fitting environment for the solo-dweller, while preventing social disconnect.

Methodology and source analysis

This research is primarily based on qualitative methods. Quantitative research and data are used from governmental institutions to understand the demographical changes in the Netherlands. Also, this data is used to explain and illustrate the issue of loneliness among the different types of households in the Netherlands. Reliable quantitative data on the topic of co-living in the Netherlands is yet unavailable.

In the introduction, major changes in our societies have been defined to understand the reason why the number of solo-dwellers is rising. Also, it gives an insight into the social structures in today's society. It explains how people behave in public and how that can impact a person's mental health. For this part, literature research was used such as the book Ethics for the City by Sennett (2018) and The condition of postmodernity by Harvey (1990).

After the introduction, this research paper will start by giving a historical context regarding the topics of solo-dwellers and co-living. This historical context will be focused on the last 50 years. This is because around 1970 the co-living trend appeared in Europe and during this time it also became more common to live on your own. This part of the research paper will be based on literature research. Vestbro has written many documentations about the co-living trend and cohousing such as Living together: cohousing ideas and realities around the world: proceedings from the International Collaborative Housing Conference in Stockholm 5-9 May 2010 by Vestbro (2010) and De-

sign for Gender Equality: The History of Co-Housing Ideas and Realities by Vestbro and Horelli (2012). In his research, he explains how the idea of collective living started and developed in Europe. On the history of the solo-dwellers, the book of Eric Klinenberg Going Solo: The Extraordinary Rise and Surprising Appeal of Living Alone (2012) will be used.

Next, the solo-dwellers and the transitions in their household formation will be analysed. This research will be based on literature research. For this part, the same book of Eric Klinenberg (2012) will be used. In his book, he shows original data and from more than 300 interviews he describes experiences of solo-dwellers in America. The perspective of Klinenberg is very refreshing because he argues the widespread assumption that living alone is a negative trend. In his book, he illustrates that solo-dwellers are actually more engaged in social activities than those who do not live alone. The findings of Klinenberg are used in this paper to understand who the solo-dweller is and how they live.

Furthermore, to understand how their changing living arrangement will affect their daily activities the study of Klinenberg will be useful. This is because the interviews with solo-dwellers will provide an insight into how solo-dwellers live and experience their dwelling. Moreover, other researches on resident behaviour will be used such as Saving space, sharing time: integrated infrastructures of daily life in cohousing by Jarvis (2011). The product of this part of the research will be a clear definition of four common types of solo-dwellers. Their lifestyle and needs will also be clearly defined. These different types of solo-dweller will be included in the case studies.

Lastly, the topic of co-living will be studied with literature research and a case study analysis. Many papers have been written on designing for communities and social interactions such as Designing Neighbourhoods for Social Interaction: The Case of Cohousing by Williams (2005). Publications that discuss the topic of co-living often link their research to specific target groups such as the elderly households, which makes it difficult to link their findings to the solo-dwellers. One example of this is the article The role of co-living spaces in digital nomads' well-being by von Zumbusch & Lalicic (2020) which discusses the influence of co-living spaces on specifically digital nomads. There is however a growing realisation that co-living spaces can also be used for younger people. Co-living: A solution to the Housing crisis by Corfe (2019) is a study that explores the role that co-living could play in increasing homeownership among younger age groups in the United Kingdom. The same publications of Vestbro will be useful for this part of
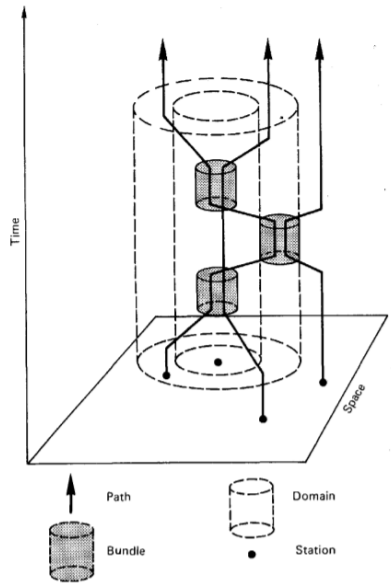
the research.

The second method for this part of the research is a case study analysis. The four co-living buildings that will be analysed are Tietgen Dormitory, Songpa Micro housing, Kalkbreite, and Treehouse. These four case studies have been selected because they all are co-living buildings with communal spaces. This is done to make sure that the buildings can be compared to each other. The four case studies all have different qualities that set them apart from one another. This is done in order to have a diverse set of co-living buildings to study which can give different insights. The Tietgen dormitory provides high-quality student housing and illustrates the possibilities of how shared space in housing can be organized. Songpa Micro Housing and Treehouse have micro-apartments. As the dwellings are kept to a minimal size the communal spaces are even more important in these buildings.

A book Small is Necessary: Shared Living on a Shared Planet by Nelson (2018)) discusses how and why small and shared housing is a stepping stone towards environmentally sustainable livelihoods. Finally, Kalkbreite is a residential and commercial complex that combines a socially mixed community in a building block. The building has a mix of functions and scales. This building caters to diverse household types and clusters together like-minded people into smaller groups.

All these case studies will be studied on the following criteria: urban context, circulation, programme (including layout and proximity), division of public and private spaces, and the quality, type, and functionality of communal spaces, and lastly sequence of space (including social networks and interactions).

There are many different types and forms of interactions. Harvey (1990) discusses the scheme of Hägerstrand which illustrates how the daily life of individuals unfolds in space and time. In this case, the interaction is physical. Each person is an agent that takes up time through movement in space with their daily routines. These paths can be portrayed diagrammatically and when two or more paths intersect a social interaction takes place. In this diagram, there are stations (places where certain activities take place) and domains where social interactions prevail. These physical interactions are important in developing a social structure. In co-living developments, these social networks are important as you gain knowledge about each other and are able to build trust and relationships. The literature study together with the case studies will help to define and illustrate how co-living buildings design to stimulate social interactions.

Diagrammatic representation of daily time-space paths according to Hägerstrand (Harvey, 1990).

Table of contents of the research topic

Chapter One
History

The history of Co-living

The idea of living together as a modern concept can be traced back to the new housing forms that appeared in the 1970s in several European countries, such as Denmark, Sweden, the Netherlands, and Germany. Before this, the idea of a community where practices are organized collectively already existed. While there was little architecture to speak of, the notion of communal living can be found in the hunter-gatherer culture. According to the findings of anthropologists, the hunter-gatherer culture can be dated back as far as two million years ago. This culture was a lifestyle that relied on hunting and fishing animals. They lived in mobile camps together and would help each other with food, protection, and child care (Groeneveld, 2016).
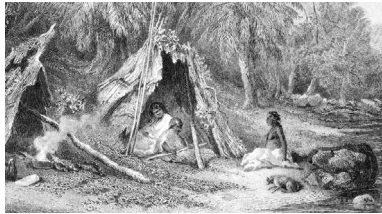
Hunter-gatherer as the first example of communal living (Prout, 1876).

Around 12,000 years ago, the agricultural revolution made it possible for humans to built long-term settlements. It removed the need to rely on others to survive but humans kept living together in large communes. When we continue on this timeline during the Middle Ages, communal living was still the typical household structure across most of Europe. The typical home consisted of a mix of friends and extended family (Coliving, 2020). This was the case until the 12th century when a household started to be organized around a monogamous couple and their children. However, during this time many people such as poor couples, orphans, widows, and elderly couples remained in communal housing (Bee Breeders, 2019).

Furthermore, the industrial revolution majorly impacted the way people lived and where. People began traveling away from rural homes to work in the city. This was when communal living mostly began to disappear. The industrial revolution in Europe inspired people to apply technical innovations to other sectors, such as the housing sector (Coliving, 2020).

In the 19th century, Charles Fourier, a French utopian socialist, wrote several books about his ideal society which he called "Falanstere". This vision revolved around the fact that the workers would own the means of production and organise everything collectively. These societies were imagined as cohousing communities or "social palaces" with dwellings organized around a large communal space. In 1858, Jean-Baptiste André Godin, a French iron stove manufacturer, brought the concept of Fourier to life. Godin built the Familistère in Guise, France. The Familistère was a factory with large multi-family dwellings, organized around a covered courtyard. The workers owned the factory and looked after the communal space. The woman was not considered capable of the factory work and this lead them to be out of work. Because of this, the families built individual kitchens which caused the building to gradually lose its collective character (Vestbro, 2008).
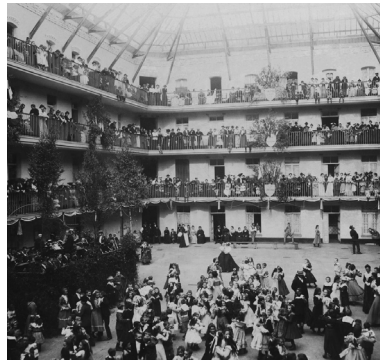
Le Familistère in Guise, France by Jean Jean-Baptiste André Godin (Hidden Architecture, 2021).

In the 19th century, the growing middle-class families had problems finding domestic servants at an affordable price. This is when the idea came to group multiple families with a central kitchen. The aim of this concept was to collectivize the maid. During this time domestic servants kept demanding higher wages, so by utilizing this concept the families could save costs by employing fewer servants. The first building of this kind was the "Fick's Collective", which was built in 1903 in Copenhagen. The second project was Hemgården Centralkok which was built in 1905-1907 in Stockholm. In this building, the individual dwellings did not have a kitchen but instead a central kitchen, and a bakery was placed in the basement. You could order three meals a day which were sent to the dwellings by food lifts. After they were finished the dirty plates were

sent back to the basement. The building was run as a Limited Company but went bankrupt in 1918. After that, individual kitchens were built in the dwellings and the basement was used as space for collaborative activities (Vestbro, 2008).

The idea of the central kitchen (Vestbro & Horelli, 2012)

The courtyard of Hemgården in Stockholm. (Vestbro & Horelli, 2012)

In the 19th century, the migration of people to the city massively impacted the landscape of the cities. The influx of people from all types of ethnic communities and backgrounds caused a sudden high demand for housing in the city. The people came for different reasons as some were fleeing war and others came as guest workers. It was difficult for immigrants to find housing in the city because the rent was typically high. This is when boarding houses gained its popularity as it was an affordable and temporary option for people. A boarding house is a privately owned house that provides accommodations and meals for paying guests (Vogel, 2005). In many cases, this type of co-living concept lacked the comfort factor because it was

seen as a temporary solution. This is also why they often tried to fit in as many people as possible in a single house.

Boarding house for guest workers in 1966 in Amsterdam, the Netherlands (Vogel, 2005).

The discussion about new housing forms continued and in the 1960s the desire to revolt against the nuclear homes grew in America and Europe. These people chose to live together in peace in communes. These hippie communes were built as a result of a social discontent. Each hippie commune developed its own culture, rules, and character. By the 1980s, however, this trend died out and the hippie communes largely disappeared (Coliving, 2020).

Hippie commune (Davidson, 2010).

Between the 1930s and 1950s, there were collective houses built in Sweden called "Kollektivhuse". These projects were initiated to rationalise everyday life and to make the mother available in the labour market (Larsen, 2019). The idea of communal living was met with great opposition. The idea was especially opposed by men because they wanted their wives to stay home and manage their house. After the second world war, there was a movement that tried to encourage mothers to stay home. Furthermore, the Swedish government investigated whether the cohousing project should get government support. This investigation was influenced by a British investigation of kindergarten children and concluded that children who were not brought up by a mother who stayed at home were more likely to have a social problem. This caused the Swedish government to give government support to cohousing projects. During the 1960s, however, this changed and it beca-

me more generally accepted that wives and mothers would work outside their homes (Vestbro, 2008).

In the mid-1950s, the Hässelby hotel, with 328 apartments, was built by Olle Engkvist. This family hotel was a way to support families with working mothers. The building did not rely on the residents to work together. Rather, the building was run by employees who also ran the dining hall like a restaurant. The restaurant closed in 1976 after new residents started to complain about the building's rules and the increasing prices of rent and meals. After the restaurant closed, the residents started to cook in the restaurant kitchen by themselves. Half of the residents worked together and cooked in teams and sold meal tickets themselves. This, unfortunately, did not last long as the housing company wanted to free the space for more profitable purposes (Vestbro, 2010).

The large communal dining room in the Hässelby hotel (Olsen, 1956).

In the 1970s, Denmark was a catalyst for the modern cohousing movement with a growing number of 'bofællesskab' (Danish cohousing communities). The Danish cohousing communities took inspiration from the Soviet Union and particularly Sweden (Kollektivhuse). The most important element that differentiates the Danish modern cohousing communities from previous projects, is that the cohousing communities were not only formed out of a necessity but also a desire of the residents. The residents of the communities wanted to live, work, and interact together. The Danish cohousing trend was a revolt against the nuclear family. This inspired Charles Durrett and Kathryn McCamant to introduce cohousing to America through their books and publications on the topic. They saw the Danish cohousing communities as the "golden standard for cohousing". These cohousing projects were popular among the rich urban families and hippie communities. In the Netherlands, this trend was introduced by Eric Frijters and his firm, who worked on cohousing projects for small senior households to give them access to social and health services (Vestbro, 2010).

In 1968 there was a movement from young people that challenged the bourgeois nuclear family. This movement developed the idea of cohousing even more. In the 1970s, the group BIG ("Live in Community" in Swedish) was formed. This group aimed to create a new blueprint for cohousing. Their booklet came out at a time when more women began to work outside their homes and demand some form of cohousing to be built. Most cohousing projects before this time depended on paid staff for services. Instead, this new idea was a self-work model where the residents would work together to get the services done that they needed. Thus, cohousing in the 1970s was different from the model that was used in the 1930s. A working community replaced the need for paid services (Vestbro, 2010).

The first building that applied the self-work model was the Stacken in Gothenburg in 1979. The sixth floor of this eight-story building was reserved for collective spaces. The young people from the 1968 movement moved into this building. It turned out that they all had different ideas on the house rules and the way the children should be brought up. These conflicts caused many people to move out (Vetsbro, 2010).

Stacken in Gothenburg, Sweden (Vestbro, 2014).

After this, about 50 more cohousing units were built in Sweden until the early 1990s. Majority of these units used BIG's self-work model. In the early 1990s, the cohousing trend was in a general decline. This is when another model appeared called the "second half of life". This model was created for people above the age of 40 without children at home. This concept was created by a group of seniors who were concerned about their living conditions as they grew older. The idea was that the middle-aged and elderly would help each other out. The first building that applied this model was the Färdknäppen in Stockholm which was built in 1993. The residents were included in the design process so they could tailor their apartments to their wishes. The residents of the building rely on the cohousing association to manage the common spaces (Vestbro, 2014).

Dining room of Färdknäppen, Sweden (Vestbro, 2008).

In the past ten years, co-living models mainly are in the form of businesses offering a community that is led by paid staff. Examples of these co-living firms are The Collective, Pure House, Common, and WeLive. The residents can socialize and network together in the communal spaces and retrieve in their private units. There are different co-living spaces as some offer a community for people who share values and interests and others simply offer a place to live together and just share the physical space. Most of these co-living spaces today are used as temporary living spaces. This model is financially appealing for young people because of the high rents in the big cities. Some co-living spaces target their space to specific groups such as start-ups, artists, freelancers, remote workers, entrepreneurs, young professionals, or students (Coliving, 2020). This idea fits well for digital nomads and global citizens because these co-living spaces are built in big cities around the world, so they can easily move around. An online survey conducted by Space10 (2018), IKEA's research lab that explores the future of living, concluded that the respondents prefer to live in small communities of four to ten people. Be that as it may, many of the co-living firms built these spaces for hundreds of people. Currently, the largest co-living space is the Old Oak in London which is built by PLP Architecture. This co-living building was completed in 2016 and has 11 levels with 550 micro-apartments (PLP Architecture, 2016).

A communal workspace in Old Oak in London, England (PLP Architecture, 2016).

The history of Solo-dwellers

Through times humans have lived in groups, whether they were related or not. This is because living with others offered a competitive advantage for people from the first human societies. Communal living offered access to food, security, and provided a way to reproduce. Through natural selection, our species developed a genetic disposition to establish close social ties (Klinenberg, 2012a). In 1949, the survey of Murdock concluded that the nuclear family was the universal social grouping from which other more complex forms could be created. As a reaction to this, many scholars argued that domestic arrangements that did not fit in this nuclear model existed such as the co-living models. These models typically include more people than the nuclear family. This means that they all at least agreed on the fact that the household sizes were typically made up of multiple people (Klinenberg, 2012a).
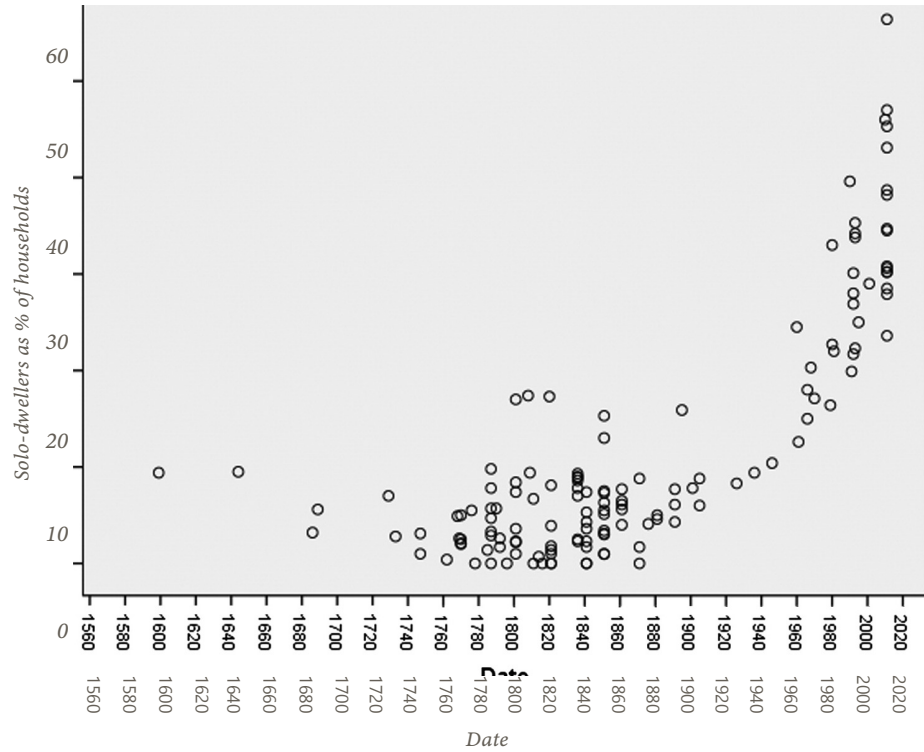
Figure 1. The development of the Solo-dwellers in Europe, North America, Japan, and Britain since 1560 (Snell, 2017).

This changed since the early 20th century as the number of solo-dwellers globally started to rise (Snell, 2017). The chart in figure 1 from Snell (2017) illustrates this trend and shows the percentage of solo-dwellers since the 1560s in different areas across Europe, North America, Japan, and Britain. This chart is only indicative because all the points shown in the graph are very different from one another regarding size and geography. Be that as it may, the chart illustrates a trend in the growth of solo-dwellers that is evident in many places across Europe, North America, Japan, and Britain (Snell, 2017). Market research was done by Euromonitor International, a London-based market research database, and also found that the number of solo-dwellers globally is rising. From about 153 million in 1996 to 277 million in 2011 which is an increase of around 80% in 15 years (Klinenberg, 2012b). Throughout history, no human societies have supported such large numbers of solo-dwellers for so long. Therefore, there are no historical examples to study and learn from (Klinenberg, 2012a).

The proportion of solo-dwellers remained under ten percent until the 1910s. All the points that exceed the ten percent before the 1910s are located in Japan that

is culturally very different from Europe. In the more detailed charts of figures 2 and 3, the trend is seen in the Netherlands where the number of households and solo-dwellers grew around the 1960s. So what caused the number of solo-dwellers to rise since the 1960s?

There are many interlinked causes for the rise of solo-dwellers. Among these causes is the rising real incomes that enabled more people to live alone by choice. In addition, the feminist movements greatly impacted the rise since the mid-1970s. The movement went against the cultural constraints against women living alone. The movement increased the female participation rates and legal reforms which affected their working rights. Furthermore, the countries with the highest proportions of solo-dwellers are Sweden, Finland, Estonia, Norway, Denmark, Germany, Switzerland, Netherlands, Austria, Estonia, Belgium, Japan, Iceland, France, Slovakia, and the UK. The countries with the lowest proportions of solo-dwellers are India, Chile, Mexico, Argentina, and China. The countries with the highest proportions, which includes the Netherlands, are mostly north-western European countries. As a result of the process of individualisation, these countries are typically described as having
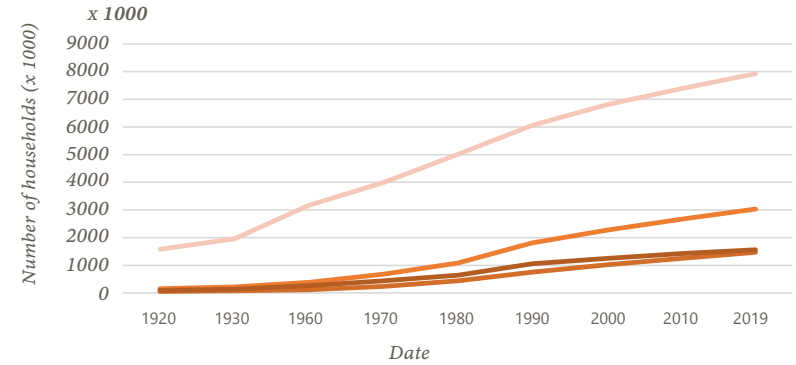
Figure 2. The development of the Solo-dwellers in the Netherlands. Illustration by author based on information from CBS (2021).
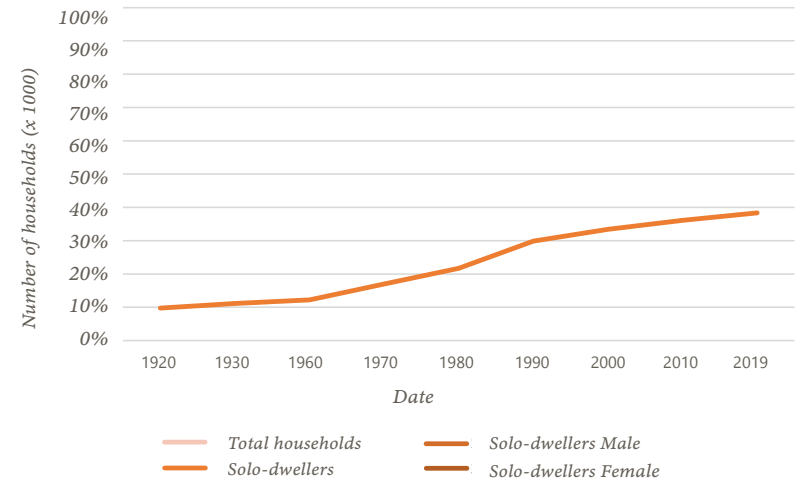
Figure 3. The percentage of solo-dwellers from the total number of households. Illustration by author based on information from CBS (2021).

relatively late marriage, neolocal residence, a significant number of people who never get married, the rarity of joint household systems, and public welfare systems (Snell, 2017). In the Netherlands, the rise of the solo-dwellers can be explained by the shift in demographic structures such as lengthening life expectancies, changing marriage patterns and lessening remarriage, the decline in birth rate, shifts in childlessness, changing mean age, increasing divorce, along with rising prosperity, women's rights, the communications revolution, urbanization, higher education growth, and individualistic ideologies (Snell, 2017). Today, the solo-dwellers cluster together in metropolitan areas. This is because even though people want

to live alone more often, they do not want to be alone. They prefer to live alone in an area where there are more solo-dwellers. The metropolitan areas are more suited for the solo-dwellers as it enables them to have more social experiences compared to rural areas (Klinenberg, 2012a).

Chapter Two
The solo-dweller
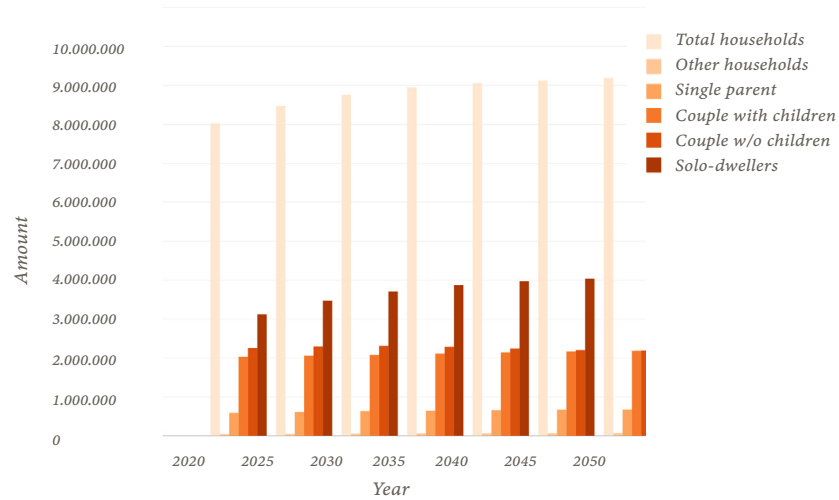
Figure 4. Household developments in the Netherlands (CBS, 2020).
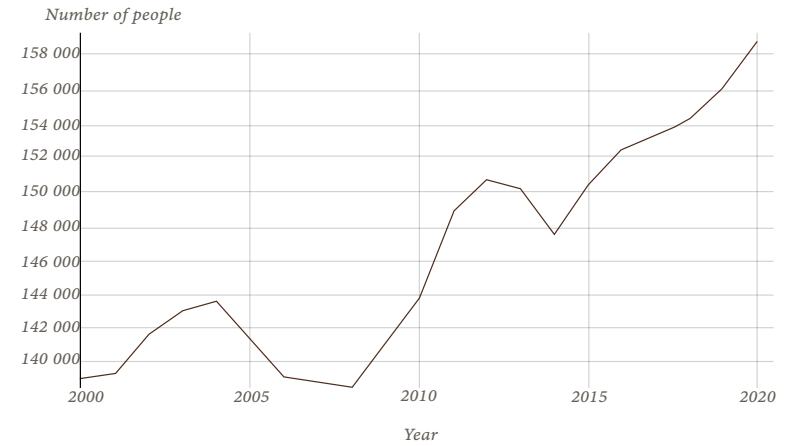
Figure 5. Total rising number of Solo-dwellers since 2000 in Rotterdam. Illustration by author based on information from CBS (2020).

Demographical changes and the one-million homes challenge in the Netherlands

The long-term vision for the future development of the living environment in the Netherlands is presented in the National Strategy on Spatial Planning and the Environment (in Dutch, this stands for Nationale Omgevingsvisie: NOVI) (van der Gugten et al., 2021). In this strategy, there is a list of 21 goals, one of which urges that the housing stock needs to match the housing demand. Currently, there is a housing shortage due to the population growth and the growth in the number of households. The goal for the housing stock is to add approximately 1.1 million homes by 2035.

In terms of built quality, the aim is to make low-CO_2 built environments that are climate resilient and nature-inclusive by 2050. The goal of the additional 1.1 million homes is based on the expected population growth by 2050. The population of the Netherlands is expected to grow to 19,3 million people (ABF Research, 2020).

Currently, there is already a shortage in the housing stock of approximately 240.000 homes. Due to the expected growth in the number of households, this shortage will only increase if we do not add more homes. In addition to the population growth, a reason for the shortage is the lack of fitting homes for the households.

On figure 4, we can see that the solo-dwellers experienced the largest growth compared to the other household types in the Netherlands. According to ABF Research, the total number of households in the Netherlands in 2020 is 8,02 million with 3,11 million solo-dwellers. In 2050 the total number of households is expected to grow to 9,2 million with 4,09 million solo-dwellers. The solo-dweller household is the household type with the most expected growth compared to the other household types (ABF Research, 2020). This has tangible implications for the overall housing

demand because it increases the consumption of housing and other resources. It will lead to proportional growth in the number of households rather than the total population (Palmer, 2006).

A similar trend is seen on the regional scale of Rotterdam. In 2020 the number of solo-dwellers is 159.000 (see figure 5) and this will grow until 2035 to be 173.000, meaning that in 2035 49% of the households will be solo-dwellers in Rotterdam (CBS, 2020).

More people choose to live on their own for a multitude of reasons. Also, the number of people who express feeling lonely is increasing in the Netherlands. Within the solo-dweller household type, 48% of the people express to feel either somewhat or very lonely (see figure 6). On the other hand, within the couples with children household type 28% of the people express to feel either somewhat or very lonely (CBS, 2019). From the solo-dwellers, 14,8% are emotionally lonely and 16,3% are socially lonely (see figure 7). As a reference, for the couples with children, 5,1% are emotionally lonely and 11% are socially lonely (CBS, 2019). There are different reasons for being lonely and finding the solution to combat loneliness can, therefore, be difficult. This paper will focus on the loneliness that is caused by social isolation which can be very harmful to mental health (Holt-Lunstad, 2015).
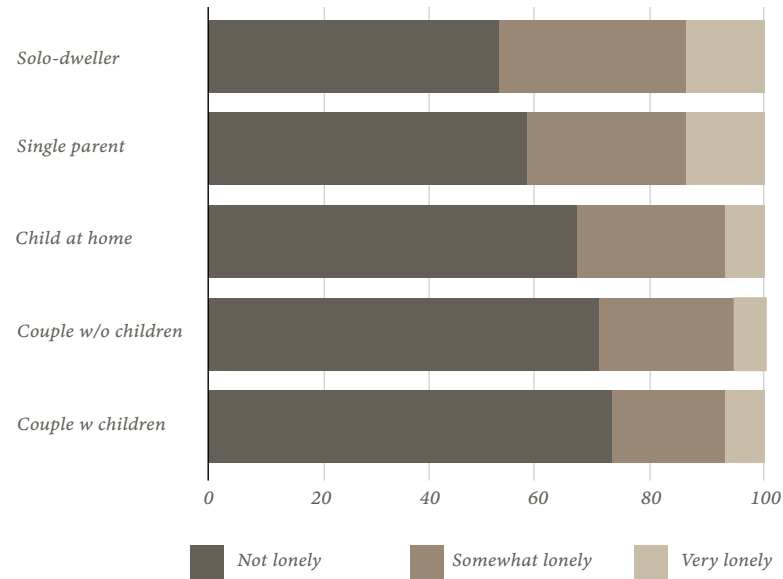
Figure 6. Loneliness among different household types in the Netherlands. Illustration by author based on information from CBS (2019).
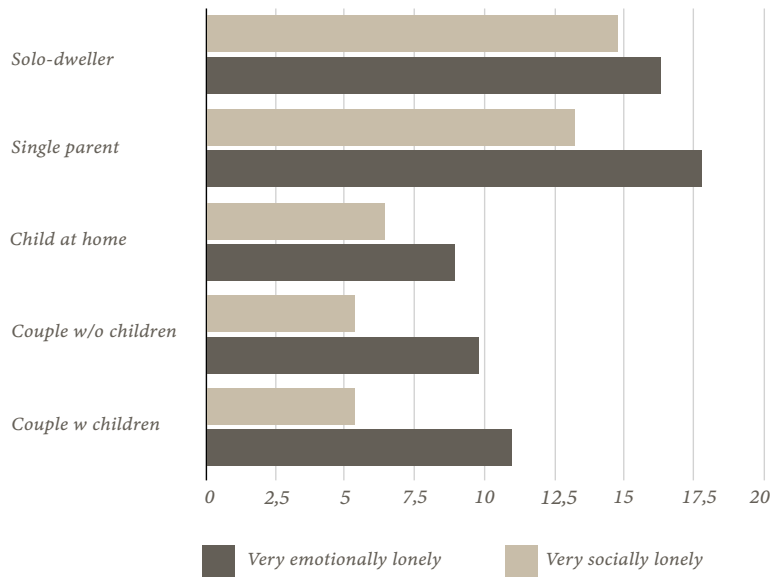
Figure 7. Social and emotional loneliness among different household types in the Netherlands. Illustration by author based on information from CBS (2019).

Societal changes

The demographical changes are a direct result of societal changes. By understanding the changes in society, and thereby the way people thought, we can find out why the number of solo-dwellers is rising.

According to Klinenberg (2012), the first reason for the rise of solo-dwellers is the wealth generated by economic development and social security. In most European countries the welfare state was created. This welfare state focussed on social achievements, a community of interest, social as well as economic interdependence, redistribution of wealth, and resources to provide a social safety net (Bozeman, 2007). These changes in society created an environment where people did not only have the freedom to choose how they want to live but also had the means to do so. The second reason is a cultural change where the focus is on the individual rather than the group. While making the shift of traditional rural communities to modern industrial cities, the individual became the focal point. The changing patterns of family life are seen as a direct consequence of this process of individualization. This process has made people more reliant on themselves and less dependent on traditional institutions (Halman, 1995). However, both individualism and collectivism can exist within the same society, as a person can have individualistic and collectivistic tendencies. A person who can believe in independence can also value the group (McCarty & Shrum, 2001). Klinenberg (2012), discusses the 1942 book of Joseph Schumpeter Capitalism, Socialism, and Democracy. In this book, he predicts the decomposition of the collective in society. Free-thinking people will not take for granted the traditional living arrangements. Instead, they will weigh the individual advantages and disadvantages of any prospective course of action. Schumpeter predicted that people would then opt for the lives of comfort and freedom from care. As this individualistic society develops, it becomes apparent why people choose to live on their own.

The solo-dweller

According to Klinenberg (2012), the solo-dweller is someone who lives alone and does not share their dwelling with anyone else. Living alone is not synonymous with being single because you can be single and live with others e.g. adults living with their parents, a single parent living with their dependent children, non-cohabiting adults sharing a house, for instance, the Friends house. You can also be in a relationship and live alone for instance when you are in a LAT relationship. There is a multitude of reasons for someone to live alone. Some reasons are because of a major adverse event in a person's life such as bereavement and separation. Social and marital arrangements can influence someone's living arrangements. Thus, solo-dwellers are not always solo-dwellers. They cycle in and out of different living arrangements. People

move through different cycles of being single, solo, married, separated, partnered, and back. The only constant in this is the self (Klinenberg, 2012).
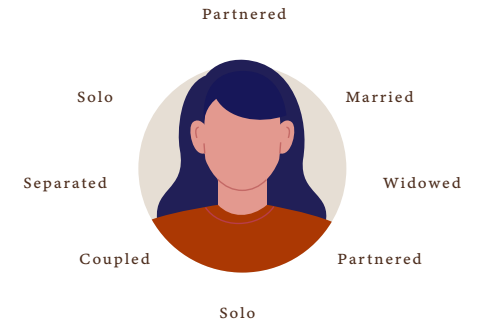
The solo-dweller and their changing social, marital, and living arrangements. Illustration by author.

From his interviews with solo-dwellers Klinenberg (2012), concluded that solo-dwellers see living alone as a sign of success and not social failure. They use it as a way to invest time in their personal and professional growth. These changes are necessary because contemporary families are fragile and in the end, one must be able to depend on themselves. However, most solo-dwellers see living alone as a temporary living arrangement. Furthermore, according to Klinenberg (2012), people often associate living alone with social isolation, for most adults the reverse is true. In many cases, those who live alone are socially overextended and more active on social media which keeps them busier. He continues by stating that many solo-dwellers do occasionally struggle with loneliness or the feeling that they need to change their living arrangement to feel more complete. And that finding a partner or companion is not enough to solve this loneliness as it is a fundamental part of the human experience. There is also a difference between women and men. This is because women who live alone in their thirties and forties face far more social pressure than men. This is because women have biological pressure to partner up and reproduce as delaying marriage for a woman means reducing the odds of having a biological child. For both genders, they find that their community weakens as close friends get married and have children (Klinenberg, 2012).

The solo-dweller in a relationship

During most of the 20th century, marriage was the most dominant type of relationship type. Since the 1970s, cohabitation started to become a common type of relationship. More recently, solo-dwellers have established non-residential partnerships, also known as "Living Apart Together" (LAT) relationships. LAT unions are relationships between partners who live in separate households but identify as a couple (Strohm et al., 2009). A study on LAT relationships found that less than ten percent of adults are currently in a LAT relationship in Western European countries (Liefbroer et al., 2015). In 2013 in the Netherlands, eight percent of the couples were in a LAT relationship. These numbers seem to be unimpressive. Be that as it may, I predict that in the future the LAT relationship will be more common in Western Europe. This trend is already evident in the Netherlands. According to van de Nieuwegiessen (2020), one in five solo-dwellers in the Netherlands was in a LAT relationship in 2020.

Since the 1970s, there have been many changes in the way families and relationships are formed in Europe, and more specifically in the Netherlands. Back then, it was common to live with your parents until you get married, and only then did people move in together. Nowadays, most of the couples in the Netherlands choose to first move in together, and only after they have tested whether they are still compatible will they possibly get married. Furthermore, relationships are less likely to succeed because today 40 percent of marriages end in divorce. This is very high compared to the 1970s when only 15 percent of marriages ended in divorce (te Riele, 2019). The fact that divorce and separation rates are increasing means that people will form new partnerships after they divorce. When people form these new partnerships, a common reason to choose for a LAT union is that they do not want to repeat the same mistake twice (Levin, 2004).

The reasons to form this type of relationship can vary. For some younger couples, this may be a temporary living arrangement. As they intend to move in together in the future, but for now, this union involves less of a long-term commitment. In contrary to older couples who choose to permanently live apart from their partners to maintain privacy and freedom (Strohm et al., 2009).
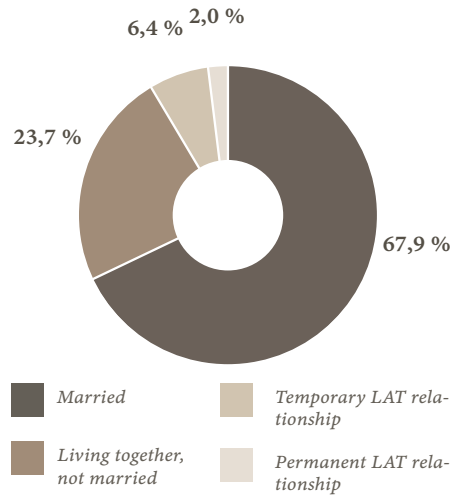
Figure 8. Types of relationships of partnered people aged 18-63 years old (CBS, 2013).

Two important questions can distinguish the types of LAT unions. Firstly, does the couple prefer to live apart, or do they live apart because of situational constraints such as work or not being able to find affordable housing? According to the research of Liefbroer et al. (2015), there is a very specific group of people that see the LAT union as an alternative to marriage and cohabitation. The people that belong in this group are mostly divorced, widowed, and people who have children from a previous relationship. The second question is whether the couple sees the LAT union as a temporary stage that will eventually lead to cohabitation or as a permanent arrangement? The study of Liefbroer et al. (2015) has shown that very rarely do couples see the LAT union as an alternative to marriage and cohabitation. Instead, the couples see this type of union as a logical and necessary stage in the relationship process. Of all the people in a LAT relationship, 55 to 79 percent of the couples intended to live together within three years.

Figure 9. Outcome living satisfaction solo-dwellers. Illustration by author based on information from BPD (2015).

The living needs of the solo-dweller

There are some living needs that generally all solo-dwellers have in common. For instance, solo-dwellers can live in smaller places and might be interested in sharing facilities like a launderette or common room (Klinenberg, 2012). Furthermore, for solo-dwellers, the possibility for social interactions is important. Solo-dwellers are more likely than those who live with others, to go outdoors to socialize. For this reason, it is important that their environment accommodates social interactions. However, many needs of the solo-dwellers depend on their lifestyle and other personal factors such as having a romantic partner. In order to properly define the living needs of the solo-dwellers, we first have to specify the most common types of solo-dwellers.

The BPD (Bouwfonds Property Development) (2015), a Dutch semi-governmental real estate developer, discusses their research on the needs of solo-dwellers in the Netherlands in their research report "Woonwensen van eenpersoonshuishoudens". In the research of the BPD, they interviewed 25 solo-dwellers. This is enough to paint a pretty clear picture of their needs, however, it is important to note that 25 solo-dwellers cannot speak for all of the 8 million solo-dwellers in the Netherlands.

The BPD (2015) asked the respondents to rank the types of rooms and spaces according to where they spend the most time and how satisfied they are (see figure 9). Also, they asked them to rank the qualities of their building. An interesting outcome of this research is that many wishes of solo-dwellers correspond with those of multiple-family homes. The rooms where they spend the most time are the living rooms and the bedrooms. The bedrooms have to be clean and relaxing, therefore, the solo-dwellers need enough storage spaces to avoid clutter. Solo-dwellers prefer to sleep in a two-person bed. The solo-dwellers were least satisfied with their kitchen and bathroom. This is because they complain that these rooms tend to be older and lack modern equipment such as a washing machine. When solo-dwellers are alone they tend to eat on the couch while watching TV. They only use the dinner table when they have visitors. Moreover, the presence of outdoor space is considered crucial for solo-dwellers. They use the outdoor space to relax, eat and drink, hang their laundry, and do chores. Furthermore, solo-dwellers express that they find an extra room necessary. This room can be used for hobbies, storage, guestroom, or office space. Surprisingly, solo-dwellers find a guestroom important even though, on average, a guestroom is used just ten times a year (BPD, 2015).

The solo-dwellers that were interviewed were quite reserved on the idea of sharing facilities. This is because they feel like they have to give away their privacy, freedom, and independence. Sharing facilities is negatively associated with their student years. They wish to move forward in life and succeed and by sharing facilities they have the idea that they are moving backward. Also, the solo-dwellers were not necessarily interested in micro-apartments. They prefer to have a dwelling of at least 60 square meters. Furthermore, they prefer to have separate rooms instead of a loft typology. The classic three-room apartment is most favoured by solo-dwellers (BPD, 2015).

Thus, the outcome of this research shows that so-

lo-dwellers negatively associate sharing facilities and micro-housing with their student years. When designing such buildings for solo-dwellers that include sharing facilities and micro-housing, it is important to take this into account and to maintain their sense of privacy and independence.

Meet the solo-dwellers

The BPD (2015) distinguished two types of solo-dwellers: functional adventures and solid homebodies. The functional adventurer is a solo-dweller that spends most of their time outside. For this reason, they prefer to live in an urban environment that is close to the active center. This solo-dweller does not need a lot of space and is not picky about the layout of their dwelling. The solid homebody has opposite characteristics to the functional adventurer. The solid homebody prefers the suburban areas, spends most of their time inside, and has more guests over. Therefore they prefer to have a larger dwelling than the functional adventurer.

This research only distinguished two categories for the solo-dweller. In reality, there are many more types and living arrangements that can differentiate the solo-dwellers. The third type of solo-dweller is the person who is in a LAT relationship. This solo-dweller is different from the solid homebody or the functional adventurer because they have an intimate relationship with a person who can spend a lot of time at their place. Therefore they need more space when the partner is sleeping over. They can also be absent for multiple days a week when sleeping over at the partner's house. The fourth type of solo-dweller is the Friend. This is someone who decides to share their dwelling with a friend. In this type, both friends have their room in a dwelling but share communal spaces such as the living room and bathroom. A reason to choose for the Friends house is because of financial reasons as rent can be too high or because the solo-dweller could not find a fitting dwelling for themselves. Another reason can be to have the ability to share tasks such as cooking, cleaning, and grocery shopping. Furthermore, the solo-dweller could opt for this type to combat loneliness.

In this paper, Sophia, Noah, Alex, Zoë, and Rosie represent these four types of solo-dwellers. Every person has a description of their character and preferences. This is done to illustrate the differences between the types of solo-dwellers and their needs.

Sophia is a functional adventurer. She is 24 years old and recently started to work as a graphic designer in a studio in the city center of Rotterdam. Sophia's only means of transportation are her bike and public transportation. She prefers to take her bike to work every morning so she can stop at her favourite café for a quick breakfast sandwich to-go. Only when there is heavy rainfall does she prefer to take the bus. After work, Sophia loves to go out for dinner and a drink with her colleagues. She is trying to save some money so she tries to eat dinner at home most nights. After dinner she often joins her colleagues again for drinks. When she goes out she normally comes home at around eight o'clock. She immediately takes a shower and puts on her pyjamas. Before she goes to bed she normally puts on a movie or TV show. On the weekends Sophia loves to invite a friend over to join her for some homemade dinner. Sophia enjoys spending her free time going for walks, visiting museums, and art exhibitions. She does not need a lot of space in her dwelling because she spends most of her time outdoors. She is also not to picky about her dwelling as the most important thing for her is that it is close to her work. She does prefer some privacy and wants her own bathroom and a small kitchen in her apartment.

Noah is a solid homebody. He is 24 years old and prefers the suburban areas. He is quite introverted and loves to stay home. Noah works in IT and partially works from home. At the firm where he works he can choose to rotate between working from home and at the office. For this reason, he prefers to have an extra room in his dwelling that is completely dedicated to his job. Also, he loves to have his own outdoor space where he can sit and have his lunch. Because he works most days from home, Noah likes to cook dinner for

himself. This is why he also prefers to have his own kitchen. In his free time he love to play videogames and watch movies. Because Noah spends so much time alone, he often invites his best friend over to play videogames with him. On Friday and Saturday nights he goes out with his friends.

Alex is in a LAT relationship with his girlfriend Nora. Alex is 27 years old and works as a producer at a large film production company. He lives in the city center of Rotterdam and prefers to take the public transportation to avoid traffic. Alex has a bad habit of always running late. When he is running late he does not have enough time to wait for the bus. Instead, he uses an app that allows him to drive a shared e-scooter. Before he leaves in the morning, Alex opens the app and reserves the nearest e-scooter he can find. By taking the scooter Alex is way quicker and gets to work on time.

Before he met his current girlfriend, Nora, Alex was in a relationship that ended pretty badly. He was living with his ex-girlfriend and that did not go very well. After the breakup with his ex, he wanted to do thing differently with Nora. Alex preferred to have his own place and not move in together too quickly. Instead he loves it when Nora comes over for the weekends. During the week Nora lives in a different city where she works, but in the weekend she sleeps over at Alex's place. Nora lives together with multiple roommates which is why they prefer to spend most of their time together at Alex's place to have more privacy.

Zoë and Rosie are friends and roommates. They met during their time in university. They have since finished their education but decided to keep living together. They love to share the responsibilities of cooking, grocery shopping, and cleaning. Rosie is a morning person and loves to make her friend breakfast every morning. After snoozing her alarm for 30 minutes every morning, Zoë finally wakes up to the smell of eggs and tea. She makes her way to their balcony, where they eat their breakfast on sunny days. In exchange for her breakfast, Zoë always makes sure to clean the dishes. Every morning when the girls have to leave for work they walk to their bikes together and bike together for a little bit until they have to go their separate ways. Rosie works at an architecture firm and always has to work overtime. Because of this, Zoë is in charge of cooking dinner most days. When Rosie gets home there is still some food left for her. On the weekends the girls mostly spend time apart. Zoë is mostly at her boyfriend's place and Rosie enjoys their place by herself. She often invites her friends over or just enjoys some time alone.

An overview of the types of solo-dwellers

"Functional adventurer"

- Spends most of her time outside
- Prefers the urban environment
- Close to the active center
- Budget-conscious individual with a limited capital
- Prefers to pay for specific experiences
- Smaller dwelling
- No demands on dwelling layout

"Solid homebody"

- Spends most of his time inside
- Prefers the suburban area
- Space for their stuff and guests
- Extra office space
- Larger dwelling
- Needs a private outdoor space

"LAT relationship"

- Couples living apart together (LAT) have an intimate relationship but live at separate addresses
- Indivual wants to keep their freedom and privacy
- May have a guest or be absent for a few days a week
- Needs extra space for a guest

"Friends"

- Two-income household
- Two separate bedrooms
- Shares tasks and responsibilities
- Needs a shared outdoor space
- Dwelling should allow communal activities as well as assure individual privacy.

Chapter Three
Co-living

The rising number of solo-dwellers causes issues regarding consumption. Personal consumption such as food or water is proportioned to the total population. Other consumption such as homes, cars, energy use is proportioned to the number of households. Thus, when the number of households grows this has an impact on household consumptions. This sparks an environmental debate regarding sustainability. Co-housing and co-living communities are often described as sustainable alternatives to traditional housing. However, according to Marckmann, Gram-hanssen, and Christensen (2012), it is not as simple as that. Firstly, the sustainable aspect of co-housing comes from the initiatives of the residents and the technology that is used. Co-housing communities are motivated to and capable of installing technologies such as solar power and composting toilets. Furthermore, co-housing communities are generally smaller and denser compared to detached housing in suburban areas. Thus, it is more energy-efficient. The degree of efficiency, however, depends on how close the dwellings are to one another. It is more energy-efficient if the dwellings share walls with their neighbours.

Co-living buildings are useful case studies for this analysis as it combines social contact design with formal social structures to incite social interactions in neighbourhoods and buildings. The key design factors in these developments are density (proximity), layout, division of public and private spaces, and the quality, type, and functionality of communal spaces (Williams, 2005).

In a community, social contacts are enhanced when residents have the possibility to have social contact with each other. This happens when they live in close proximity to others and have appropriate space for interaction. According to Williams (2005), by increasing proximity (and thereby density), there is an increase in repeated passive contacts between residents. More passive contacts between residents helps to form social relations. Proximity has an impact on the pattern

Proximity between residents help to form social relations. Illustration by author.

of socializing in a building. Immediate neighbours communicate much more with each other than with residents that live further away. In a building, the residents that live next to the staircase and elevator socialize more with residents from different floors. The residents that live in the middle of the floor socialize more with their immediate neighbours on the same

floor. This might led you to believe that high densities automatically lead to more socialization. This is not the case, since at extreme high densities, residents can be overwhelmed and feel as if they have less control over their social environments and can, therefore, withdraw from the community. If this factor is not taking into account while designing it can lead to the residents socially isolating themselves in their dwellings.The residential buildings in urban cities are mostly from a high density. According to Altman's optimization process, there is a threshold where the dwelling density allows proximity but not overcrowding. The use of buffer zones, or intermediate spaces, between the public and private spaces of a building can increase this threshold. This is zone is describes as an in-between space by Hertzberger (1991). An in-between space is an intermediate space between two opposite elements such as public and private, inside and outside, open and closed, and central and decentral. Providing such intermediate spaces in a high-density building is important as it creates a protective barrier for the residents. In this intermediate space, they have a degree of privacy and territorial control with options for active contact in the adjacent public spaces (Williams, 2005).

Using buffer space between the private and public domain.Illustration by author.

Furthermore, shared spaces are considered as the soft edges of residential areas, including porches, verandas, semi-private or front courtyards (De Jorge-Huertas, 2020). Communal spaces provide opportunities for social interaction. This is the case if they are of good quality, suitable for use, and flexible. Flexibility is important because it will increase the potential for social interactions. Moreover, the positioning of these communal spaces in the building is important to increase the opportunity for social interactions. The communal spaces should be placed on shared pathways and visibility is important for surveillance which increases use and thereby the opportunity for social interactions (Williams, 2005). Furthermore, the communal space should have equal accessibility.

The communal spaces are used more often when they are shared with a smaller community. The smaller the community, the more residents participate in the communal spaces. Williams (2005), discusses the use of hierarchy (e.g. clustering) in communal spaces as means of maximizing their effect. The four case studies are all multi-storey buildings. Multi-storey buildings can reduce social interaction because the residents that live on the upper floors are less inclined to come down and join centralized communal spaces. Therefore, to maximize social interactions it is important to build low to medium-rise buildings for the

communities.

Clustering the dwellings to create smaller communities to maximize the use of communal spaces. Illustration by author.

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The size of the dwelling has an impact on the participation in communal spaces. The smaller the individual unit is, the more inclined the residents are to use the communal spaces.

Whilst trying to design for social interactions it is important to understand other factors that can influence social interactions for instance personal factors. These include someone's personality traits and background.

The four co-living buildings that will be analysed in this research are Tietgen Dormitory, Songpa Micro-Housing, Kalkbreite, and Treehouse. The projects are selected on the following characteristics:

- It is a co-living multi-storey building
- It has communal spaces
- It has dwelling units for solo-dwellers
- It flexible to change according to the needs of the residents (Songpa Micro-housing and Kalkbreite).

The buildings will be studied on the following criteria: urban context, circulation, programme (including layout and proximity), division of public and private spaces, and the quality, type, and functionality of communal spaces, and lastly sequence of space. Furthermore, every case study will be related to one of the four types of solo-dwellers (functional adventu-

rer, solid homebody, LAT relationship, and friends).

The floorplans of the case studies will be analysed from a purely abstract point of view. The seven essential activities, ordered from most private to public, are washing & relieving oneself, sleeping, cooking, eating, working, exercise, and gathering. In the case studies, this diagram will show the essential activities are hierarchized and organized in a building. It will show the prioritization of relationships between the individual and the collective (Zapel, 2017).

The literature study together with the case studies will help to define and illustrate how co-living buildings are designed to stimulate social interactions.

Tietgen Dormitory
Co-living

Architect: Lungaard & Tranberg Architects
Landscape architect: Marianne Levinsen A/S
Henrik Jørgensen A/S
Location: Copenhagen, Denmark
Rued Langgaards Vej 10, 2100
Client: Fonden Tietgenkollegiet, Nordea Danmark Fonden.
Construction period: 2003-2006
Total area: 26515m²
Plot size: 6082m²
Number of units: 360 rental units (24-33m²)
Rent: 3000 - 3500 DKK (400 - 470 euro)
Number building layers: 7
Communal functions: On every floor there are 5 clusters of 12 residents. Each cluster shares one communal kitchen/ living room and a communal roof terrace.
Service: computer café, auditorium, study and workshop space, laundry, music room and bicycle shed
Keywords: Co-living, student housing, collective.

In this building lives Sophia, a functional adventurer.
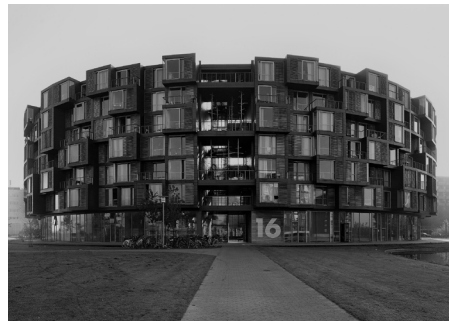
Source: Lundgaard & Tranberg Arkitekter (2007). Accessed on April 12, 2021 from https://www.ltarkitekter.dk/tietgen-da-0
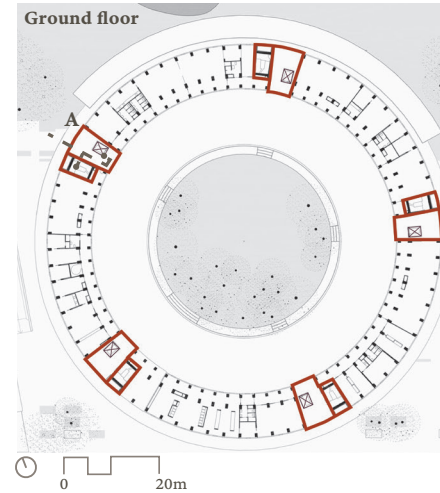
1 min walk to the university

14 min bike to central station

20 min public transport to central station

■ Building footprint
■ Parking garage

0   100m

Source: Illustration by author basis retrieved from: Lundgaard & Tranberg Arkitekter (2007). Accessed on April 12, 2021 from https://www.ltarkitekter.dk/tietgen-da-0

50

Ground floor

First floor

0   20m
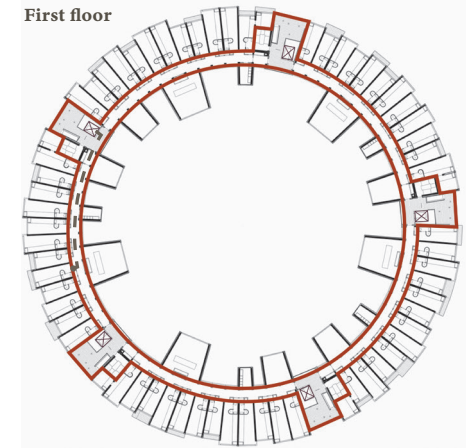
□ Circulation space
⊠ Elevator
— Route to Sophia's dwelling

Source: Illustration by author basis retrieved from: Lundgaard & Tranberg Arkitekter (2007). Accessed on April 12, 2021 from https://www.ltarkitekter.dk/tietgen-da-0

Circulation

The Tietgen dormitory (Tietgenkollegiet) is located in Ørestad North, where the open landscape of a nearby city called Amager meets the strict grid of the city plan of Copenhagen. This building is an iconic example of the New Danish Wave of high-quality student housing. Tietgenkollegiet is named after the Danish financier C. F. Tietgen who in the 1800s was one of the main forces behind the Danish industrial revolution (Tietgenkollegiet, 2021). The building illustrates the possibilities of how shared space in housing can be organized.
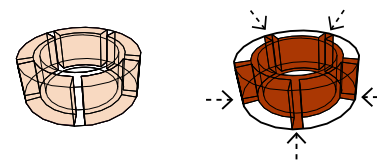
Left: Schematic drawing of the positioning of the private dwellings. Right: Schematic drawing of the building's circulation. Illustration by author.

The building's circular form symbolises equality and community. The individual forms that stick out of the volume represent the individual residents. The important theme throughout the building is the meeting between the individual and the collective.

The circular shape of the building creates a logical organization of the programme. All the dwellings are placed along the periphery. Therefore, all sides of the facade have an equal relation to the outside space because of the shape of the building and the entrances on the ground floor. The circular shape of

the building is divided into five clusters. The clusters are defined by the five entrances. Therefore there is equal accessibility for all the residents because all the clusters have an entrance on each side. The residents tend to use the most efficient entrance to their dwelling. This means that half of the residents of both clusters use the middle entrance (see image below). This means that the paths of different clusters meet each other creating passive encounters between the residents.
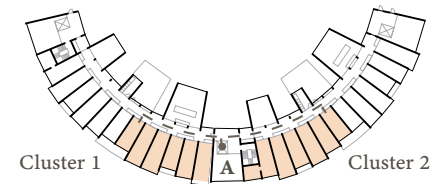
Cluster 1   Cluster 2

The paths of the residents of both clusters cross in entrance A. Illustration by author.

To enter her dwelling Sophia uses entrance number A (see ground floor plan). When she is in the entrance she has a direct view of the communal courtyard. She can see a lot of people sitting there enjoying a drink and socializing with the neighbours. She is not really in the mood to do that so she walks up to the elevator door. As the door opens she sees another resident from a different floor. Sophia greets him and steps into the elevator. The elevator stops on the first floor and Sophia steps out. She is immediately greeted with a bird view of the same courtyard. She is still not in the mood to socialize with that many people so she makes

51
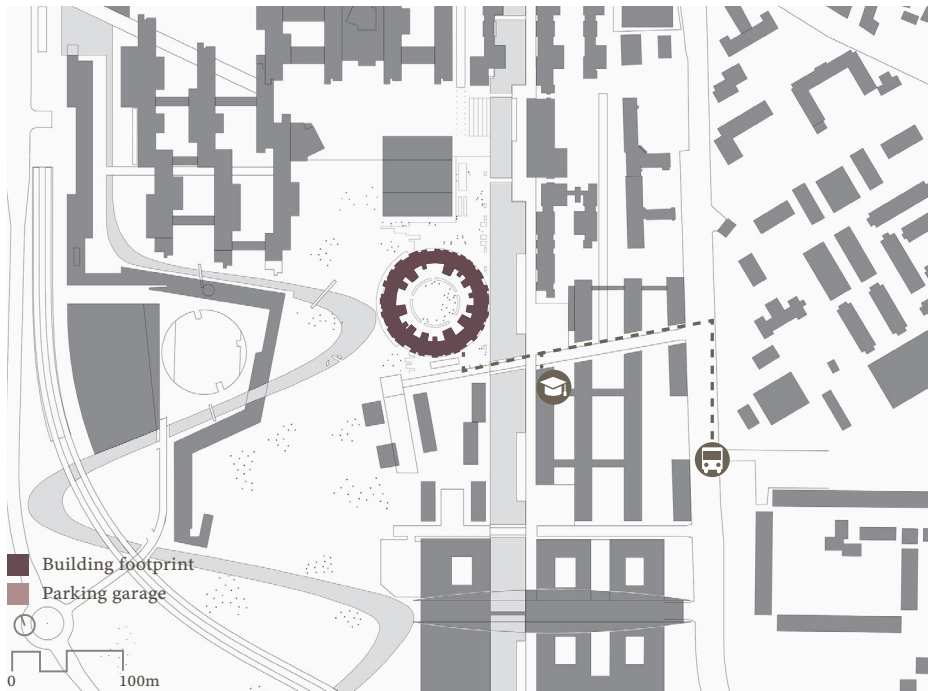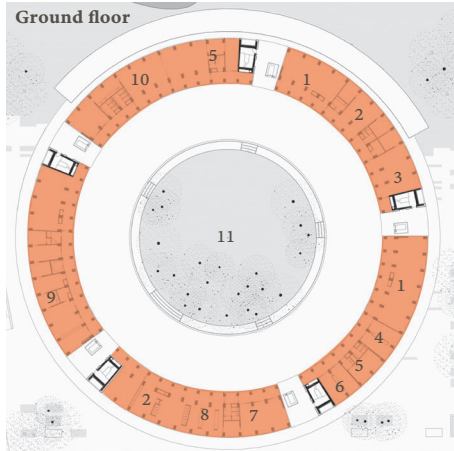
Source: Illustration by author basis retrieved from: Lungaard & Tranberg Architects. Accessed on April 12, 2021 from https://www.ltarkitekter.dk/tietgen-da-0

Legend

Communal space for entire building

1 Bike storage
2 Gym
3 Reading room
4 Room for groupwork
5 Music room
6 Workshop
7 Computer room
8 Letterbox
9 Offices
10 Assembly hall
11 Communal space: Courtyard

Communal space for cluster

12 Communal kitchen/ living room
13 Communal utility room
14 Communal study space/ entertainment

Private dwelling

15 Private dwellings

Programme

All the progamme in this building can be categorized into three types of spaces: the private space, the communal space for each cluster, and the communal space for the entire building. The ground floor has no private spaces and only communal spaces for all the residents of the building. On the floors above there are private dwellings and communal spaces that are shared by the residents within one cluster. The five entry halls serve as an additional gradient between the clusters and the communal space with all the residents. The communal spaces for the entire building are all located on the ground floor, making them equally accessible for everyone.

her way to her dwelling. Her dwelling is the eighth door on the right. While she walks to her door she has to walk past the entertainment room on her left. The door of this room is made of glass so she can see her next-door neighbour Emma sitting on the couch. They make eye contact and Sophia decides to have a chat with her. She enters the room and sits next to Emma to discuss their day.

Private space
Communal hallway
Communal spaces for clusters
Collective courtyard

While the dwellings are located along the periphery, the horizontal circulation space is located along the inner ring. This ring provides a view of the communal courtyard as well as a visual connection with the other residents of the different clusters. In addition, the gallery serves as a transitional zone between the private dwellings and the communal spaces. When you walk towards your dwelling, you will inevitably walk past the communal spaces. This creates a visual connection and the opportunity to interact with your neighbours. Thus, the placement of the gallery, in between the private dwellings and the communal spaces, creates the opportunity for passive encounters (Lundgaard & Tranberg Arkitekter, 2007).

Division between the public and private domain

This illustration below shows how the seven essential activities are allocated among the different types of spaces. The activities are ranked according to the degree of privacy starting from the most private activity to the least. In this building three types of spaces with different degrees of privacy. The most private space is the individual dwelling, then the communal spaces that are shared within the clusters, and lastly, the communal spaces that are shared by all the residents of the building. There is no kitchen placed in the private dwellings which forces the residents to use the communal kitchen.
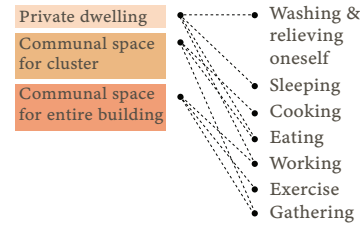
Seven essential activities in the Tietgen Dormitory. Illustration by author.

Programme in section. Illustration by author.
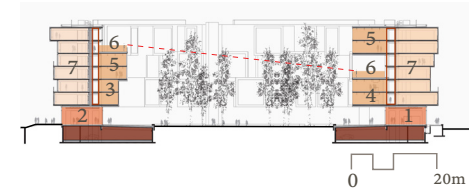
1 Bike storage
2 Workshop
3 Communal utility room
4 Communal kitchen/ living room
5 Communal study space
6 Roof terrace
7 Dwelling

Communal space

Each cluster is made up of 12 dwellings and a communal kitchen, a study space/entertainment room, utility space, and a roof terrace. There are two types of communal spaces: those shared within the clusters and the spaces that are shared by all the residents of the building. In terms of proximity, the communal spaces for the clusters are opposite the individual dwellings making them much closer and, therefore, easier to reach. As you are forced to cook in the kitchen, you cannot avoid these communal cluster spaces.

Image of the communal kitchen (Tietgenkollegiet, 2021).

The kitchen is spacious enough for several residents to cook at the same time. The kitchen has pots and pans for everyone to use. The kitchen faces the window with a view of the courtyard and the other communal spaces. In front of the kitchen, there is enough room for a table with chairs for people to eat or work. In the same room, there is also a couch for people to sit at. All in all, this room combines four essential activities: cooking, eating, working, and gathering. By combining these activities people can interact with each other even though they are doing different things.
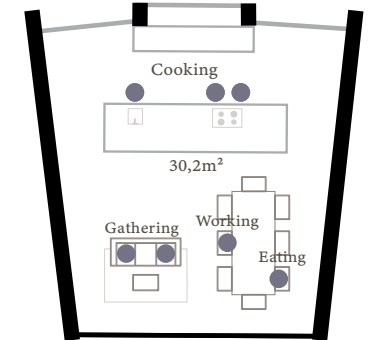
Communal kitchen. Image by author.

In the study space/entertainment room, this is different. As seen in the image, this room is meant for one activity which is gathering. Therefore, in this room, people only meet if they intend to do so. However, it is important to note that the interior is not the same for each cluster. The rooms can be designed according to the needs of the residents in the cluster. This image illustrates the room layout for one cluster.

Image of the entertainment room (Tietgenkollegiet, 2021).

Gathering

16,7m²
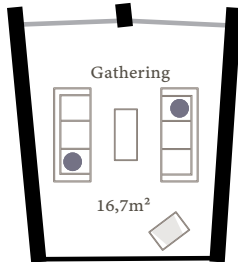
Entertainment room. Image by author.

Similar to the entertainment room the utility space is meant for one activity. In this case, it is meant for storage and hanging your laundry. Hanging your laundry in a communal space requires trust, as you leave your personal belongings unattended for a while. To hide the clutter the windows of the utility rooms have shutters (Tietgenkollegiet, 2021).

Image of the laundry room (Tietgenkollegiet, 2021).

The roof terrace has a table and some chairs. This furniture is only there during the summer. The roof terrace can be used for gathering, eating, and working (Tietgenkollegiet, 2021).

28m²　　5,6m²

Gathering

Eating　　Working

Communal kitchen. Image by author.

0　　2m
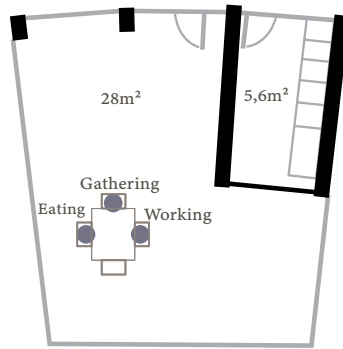
Image of roof terrace (Tietgenkollegiet, 2021).

The dwelling

The dwellings, or dorms, are clustered in groups of 12 dwellings and there are five clusters on every floor. The three main communal spaces are shared among the 12 dwellings. The individual dwellings are small and compact. This is done because the residents share a living room, a kitchen a study room. The individual dwellings have a bathroom and storage space. There is enough space to put in a bed, some drawers, a desk, and some chairs. There is no kitchen space in the dwellings because the only place where you can cook is in the communal kitchen. All the dwellings are mostly uniform in size. Some are slightly longer than others. However, the average size of a dwelling is 26 m². The private dwellings are all oriented towards the surrounding context.

The layout of the dwellings in the Tietegen dormitory is all the same. The rooms are made up of one open space with a bathroom and some storage. All the rooms have in common a single wall that is made from light plywood panels. They do not only have a decorative purpose but also a functional one. There are several storage spaces integrated in this wall. In the middle, there is a moveable wardrobe that doubles as a room divider. At the end, there is a closed bookcase.

Next to the entrance of the dwelling, there is a bathroom. So you can wash and relieve yourself in your private dwelling. There are no kitchens in the private dwellings. According to the Tietgenkollegiet, they did this on purpose because they want to encourage the residents to be part of the community. Thus, the cooking activity only takes place in the communal kitchens (Tietgenkollegiet, 2021).

Wall

Integrated storage

Moveable wardrobe　　　Storage lockers
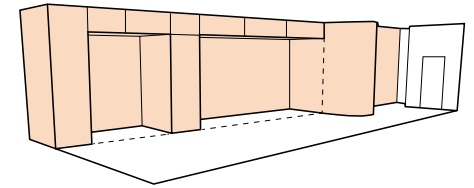
Closed bookcase
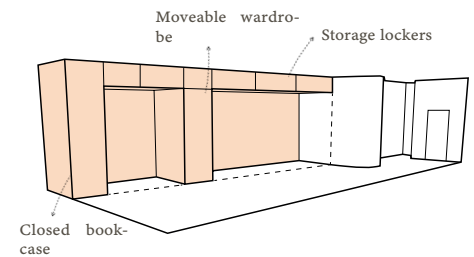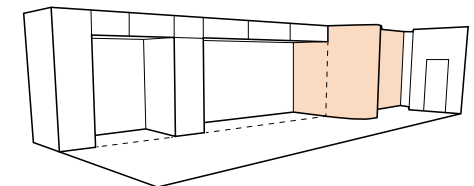
Bathroom

The interior of the dwelling. Illustrations by author.

3400 mm

26m²

5770 mm

7600 mm

1000

0　　10m　　0　　2m
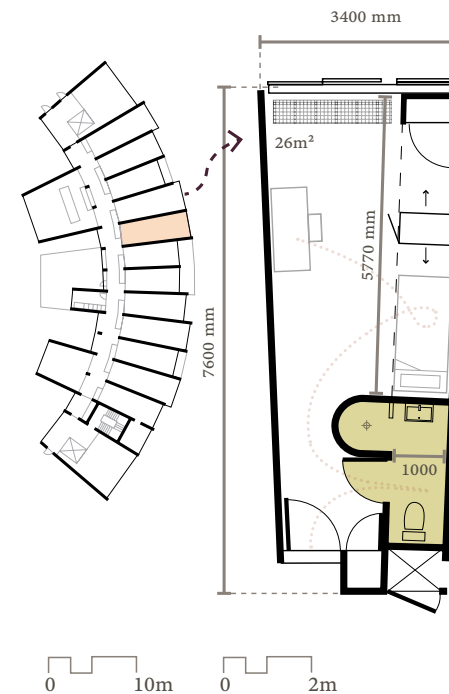
Floorplans illustration by author.

Legend

☐ Circulation
■ Communal space for the building
■ Communal space for the clusters
■ Private dwelling
■ Bathroom
■ Parking garage

Tietgen Dormitory
Sequence of spaces

Along the way to your dwelling you pass by your communal kitchen/ living room, utility room, study space, and roofterrace.
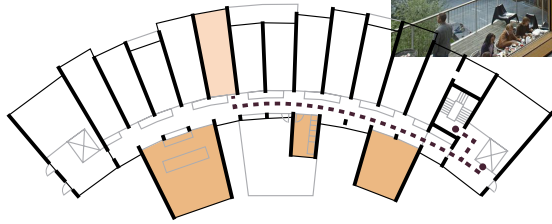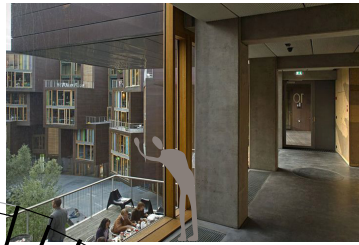
*Lets follow **Sophia** around!*
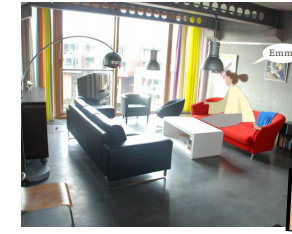
The building's circular form symbolises equality and community throughout the building. The individual forms that stick out of the volume represent the individual residents. The theme that is most evident throughout the building, is the meeting between the individual and the collective. While walking through the building you experience a sequence of different spaces. Spaces where you can interact with residents of the entire building, spaces where you can dine with your next-door neighbour, and spaces where you can be by yourself. This illustration visualises the sequence of spaces that Sophia experiences in the Tietgen Dormitory.

Letterbox

Dwelling
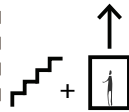
Entrance
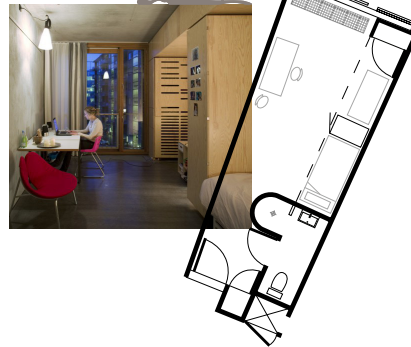
Bike storage

Reading room

Courtyard
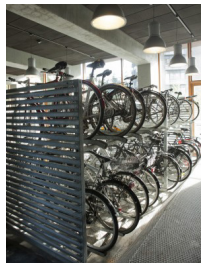
Laundry room

Music room
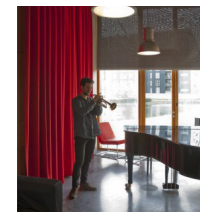
Assembly hall

Legend

Dwelling

Communal space for clusters

Source: Illustration by author. Pictures retrieved from: Tietgenkollegiet. Accessed on April 12, 2021 from http://tietgenkollegiet. dk/bygningen/

Songpa Micro-Housing

Co-living

Architect: SsD, Jinhee Park, John Hong
Architect of record: Dyne Architects
Location: Songpa-Gu Seoul, South Korea
Songpa-daero 48-gil
Client: Chanill Lee
Construction period: 2014
Plot size: 514m²
Number of units: 14 units (10-22m²)
Number building layers: 7
Communal functions: On the basement level there is a café and micro-auditorium. The ground floor is open to the public and visitors. On this open space on the ground floor there are parking spots for cars and bicycles. The first floor is an open space that can easily be converted to work or gallery spaces. There is a roof terrace and some dwellings share a balcony.
Keywords: Co-living, micro-apartments, flexibility, collective.

In this building lives Noah*, a solid homebody.*

Source: Archdaily (2019). Songpa Micro Housing / SsD. Accessed April 12, 2021 from https://www.archdaily.com/576302/song-pa-micro-housing-ssd

7 min walk to the Seok-chon metro station

12 min walk to lotte world mall

45 min public transport to Seoul central station
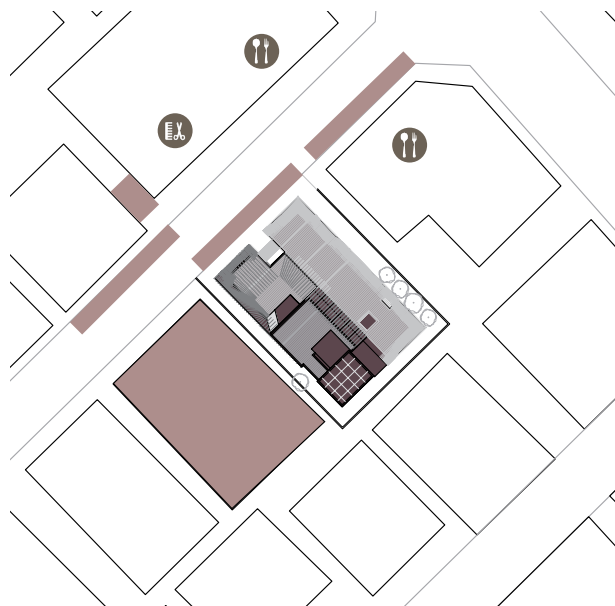
■ Building footprint
■ Parking garage

0   10m

Source: Archdaily (2019). Songpa Micro Housing / SsD. Accessed April 12, 2021 from https://www.archdaily.com/576302/song-pa-micro-housing-ssd

Circulation

This building was designed as a reaction to the negative stereotype that micro-apartments are only temporary and lack social potential. This building revolves around extending the limits of the individual dwellings. Thus, the living space is supposed to flow throughout the building. The building includes semi-public circulation space, balconies, and visual extensions. The idea is to create social fabrics between neighbours with the intersection between public/private and interior/exterior. The building has fourteen units that can be used for differing programs for instance a workspace or art gallery.

The theme of flexibility is very strong throughout this building. The residents can adjust the units to their needs. The residents can claim a single unit or in the case where a couple or friends require more space, they can combine the blocks for a larger dwelling. If they need less individual space, the units can be used as workspaces and galleries. This flexibility in the building makes it that the residents can live longer in this building, even if their living arrangement changes (Zapel, 2017).
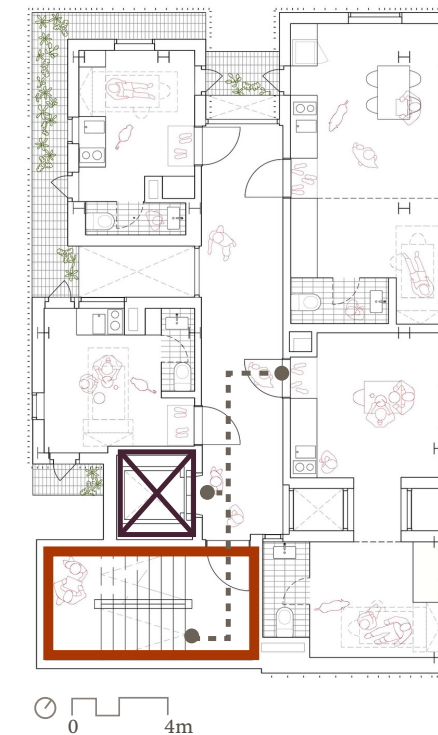
Furthermore, the zoning regulations require the building to be lifted for parking. This results in an open ground plane that can be constantly reprogrammed for differing events such as performances, art openings, or gatherings. Also, the pedestrians are guided from the street down through the micro-auditorium steps, connecting the city, building, and residents to the exhibition spaces below.

0   8m

Third floor

0   4m
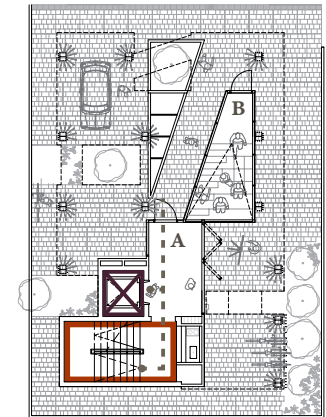
To enter his dwelling Noah goes through entrance A. This is the main entrance for all the residents. In this entry, he passively encounters his neighbours from different floors, but never any strangers. The path of the visitors does not cross with the path of the residents. The visitors of the exhibition space in the basement can enter through entrance B. Noah takes the stairs to the third floor. His apartment is the first door on his right. On his floor, there are no communal spaces except for the hallway. The hallway is where most of his neighbours sit and have a chat. He has a double unit dwelling. Noah is a solid homebody and prefers to have additional space for his work.
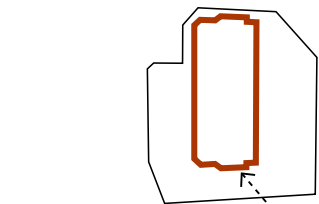
□ Circulation space
⊠ Elevator
━ Route to Noah's dwelling

Programme

Songpa Micro-Housing provides a new typology as a reaction to the global problem of urban density and housing costs. This building revolves around extending the limits of the individual dwellings. Thus, the living space is supposed to flow throughout the building. The building includes semi-public circulation space, balconies, and visual extensions. The idea is to create social fabrics between neighbours with the intersection between public/private and interior/exterior.

The floorplans are made to be flexible in order to provide for the changing needs of the residents. If their living arrangements change, they can combine units or open up the units and use them for collective functions. This flexibility is illustrated in two options of the second floorplans. The second floor can be converted from five individual dwelling units to work or gallery spaces. The third-floor plan illustrates how two units can be combined into one dwelling for a couple (Zapel, 2017). The two units can also be combined for people like Noah.

Second floor OPTION 1
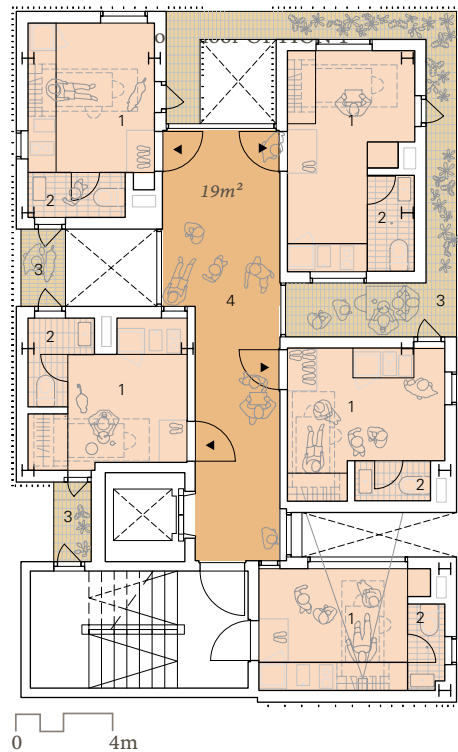
Division between the public and private domain

This building provides different levels of shared spaces that provide gradients between the public and private spaces. There are public spaces, communal spaces for the residents of the building, spaces shared between the residents of a certain floor, and spaces shared with your next-door neighbour. An example of this is the balcony that is shared between two or three neighbours.
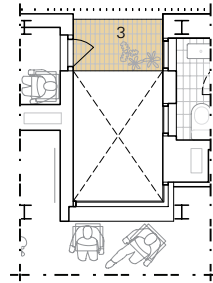
A big difference from the Tietgen Dormitory is that Songpa Micro-housing includes all the essential facilities in the private dwelling including the kitchen. This building also has an additional gradient between the communal space and the private dwelling, which is the shared balcony. This space is different from a communal space specifically in terms of territorial claims. The balcony is directly accessible from your private dwelling. Also, you can personalize the balcony by adding your own decorations and furniture. This illustrations shows how the seven essential activities are allocated among the different types of spaces.
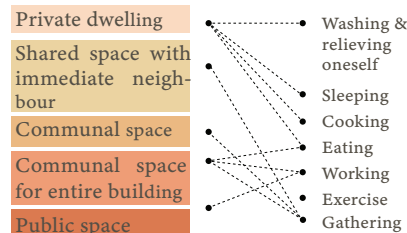
Legend

Private dwelling
1   Private dwelling
2   Bathroom

Shared space with immediate neighbour
3   Balcony

Communal space
4   Circulation space

Public space
5   Communal gallery space
6   Micro-auditorium / café

Programme

The building is made up of 14 unit blocks within a twisted stainless steel structure. These 14 individual units can be seen as boxes that are pulling away and pushing up against this steel external envelope. The co-living building has semi-outdoor bridges, balconies, and corridors that are created by the shifting of these boxes.

This circulation space is seen as the extension of the private units which gives them an additional function. The circulation space has benches for the residents to sit on. The width of this circulation space enables the residents to sit in the hallway and be close enough to their neighbour to socialize. It also allows people to still have enough space left to walk through the hallway.
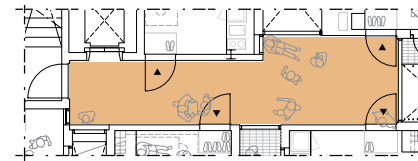
The hallway in Songpa Micro-Housing. Illustration by author.

The proximity between the residents is very important according to Williams (2005). Functional and physical proximity helps encourage social interaction. By extending the private space into the communal space it creates a gradient between the public and private realm of a building. The architects use the metaphor "tapioca", to explain how the various walking bridges and courtyards create a gradient between the public and private property. The different degrees of communal spaces are linked to the proximity of the spaces. The spaces that are furthest away from the individual dwellings are public in nature. The closer the spaces get to the individual dwelling units, the fewer people you share the spaces with.

Schematic floorplan
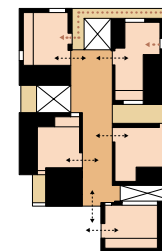
According to Williams (2005), this is because immediate neighbours tend to communicate more with each other than residents who live further away. Residents tend to withdraw from the community due to the high-density environment they live in. Altman's optimization process seems to be applied in this design scheme. Altman's process discusses the importance of the use of buffer zones as a transition bet-

ween the public and private space, as they protect the privacy of the residents and protect them from overexposure to the community (Williams, 2005). These buffer zones in the Songpa Micro-housing are the shared balconies and the circulation space that doubles as a living space. These spaces should also provide residents with an area in which they can express themselves and their lifestyles. Due to the small living area and the prefabricated furniture, this element is missing in the Songpa Micro-housing.

Longitudinal section
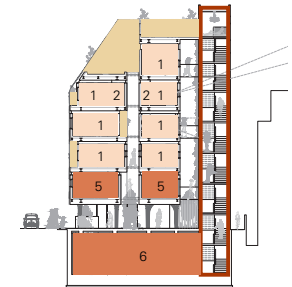
Basement
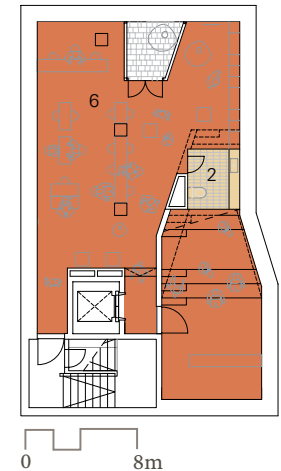
Legend

Private dwelling
1   Private dwelling
2   Bathroom

Shared space with immediate neighbour
3   Balcony

Communal space
4   Circulation space

Public space
5   Communal gallery space
6   Micro-auditorium / café

The dwelling

In the Songpa Micro-Housing, there are 14 adaptable unit blocks. These blocks can be used and adapted according to their changing life and work situations. The residents have the choice to claim a single unit or, like Noah, multiple units. If a solo-dweller decided to move in together with a partner or friends they can combine multiple units for a larger configuration. Currently, there are nine tenants, as several residents decided to combine units. Even though the units are small, the living space is roomy due to the communal spaces in the building and the prefabricated furniture that folds in the walls. The units are supposed to extend in the semi-public circulation space, balconies, and visual connectors. The spaces in between the different units create soft intersections between public and private spaces.

The individual units are made into the minimum state-required floor area which is 11 square meters. These basic micro-units are compact but contain what the residents need. There are efficient, operable walls. The interior walls are made of gypsum board walls. This material makes it flexible to change the configuration when needed. Furthermore, the building has multiple communal walking bridges.

Single unit
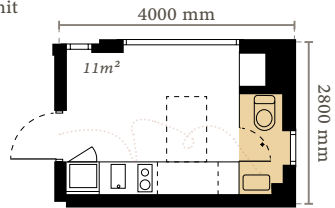
Double unit
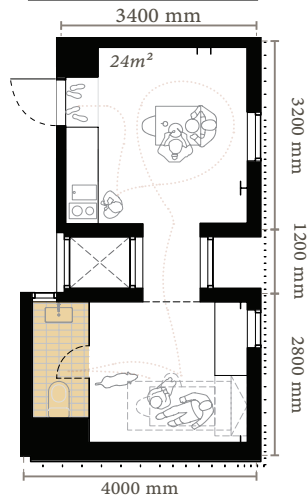
These bridges connect neighbouring micro-units. This allows the possibility to create a double unit using these bridges as a connector (SsD Architecture, 2014).

The dwelling units in the building are micro-apartments which is why it is necessary to include built-in furniture in the units. This is because the limited space needs efficiently placed furniture.

The windows allow a view of the outside world and deep skylights allow lots of natural light to enter your unit. The micro-units have a kitchen with a fold-down table/counter, a full-height pull-out pantry, a full-height fridge, range, and space for a microwave. All this furniture is placed along one side of the unit. Moreover, the kitchenette has a refrigerator, a stove, a sink, and small tables that slide out from a cupboard.

A bed can fold down from the wall. When the bed
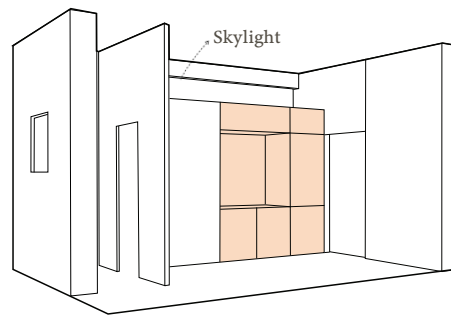
The ktichenette in the micro-apartment. Illustration by author.

is folded down, it also reveals the wardrobe that is behind the folded bed. Furthermore, every micro-unit has a bathroom with a private toilet, shower, and sink.
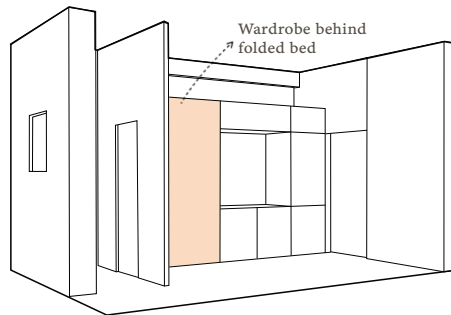
The bed and wardrobe in the micro-apartment. Illustration by author.

It is interesting how efficiently 11 squared meters are used up in this micro-apartment. The dwelling has all the necessities built in the dwelling. By using elements, such as the bed and tables, that can be stored away if not needed, there is enough space left for the residents to walk around.
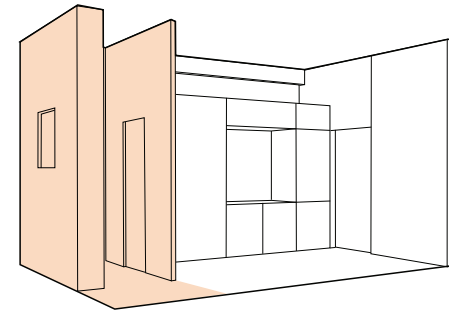
The bathroom in the micro-apartment. Illustration by author.

Songpa Micro-Housing
Sequence of spaces

The idea of Songpa Micro-housing is that you do not need a lot of space to create spaciousness. The units are created by taking a small area and making it into a comfortable living environment with prefabricated foldable furniture. These units are then complemented by various communal areas such as the semi-public balconies, the circulation space, the exhibition space, and the café (Simons, 2015).

Entrance base-ment

Courtyard

Entrance

Let's follow **Noah**
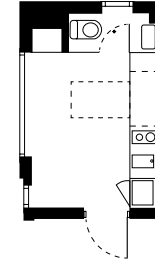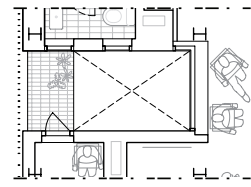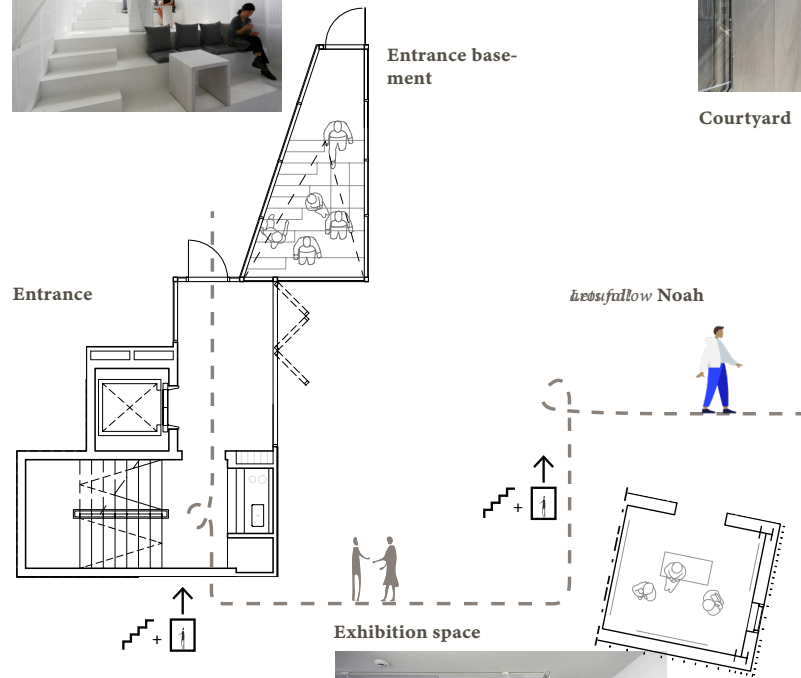
Exhibition space

Courtyard

Circulation space

Kalkbreite
Co-living

In this building lives Zoë and Rosie, two friends.

Architect: Müller Sigrist Architekten
Landscape architect: Freiraumarchitektur GmbH
Location: Zürich, Switzerland
Badenerstrasse 173, 8004
Client: Housing cooperative Kalkbreite (live-work-complex), City of Zürich (tram depot)
Construction period: 2014
Total area: 22900m²
Number of units: 97 units in 55 dwellings
Dwelling size: 29-412 m²
Number building layers: 8
Service: Commercial spaces in the plinth, tram depot, catering, retail, cultural spaces, conference rooms, communal offices, guest house, sauna, garden kitchen, roof terraces, laundry rooms, workshop, bicycle store.
Keywords: Co-living, multi-family homes, collective spaces.

Source: Archdaily (2018). Kalkbreite / Müller Sigrist Architekten. Accessed 16 Apr 2021. https://www.archdaily.com/903384/kalkbreite-muller-sigrist-architekten

0 min walk to the restaurants

1 min walk to the Kalkbreite tram / bus station

9 min public transport to central station
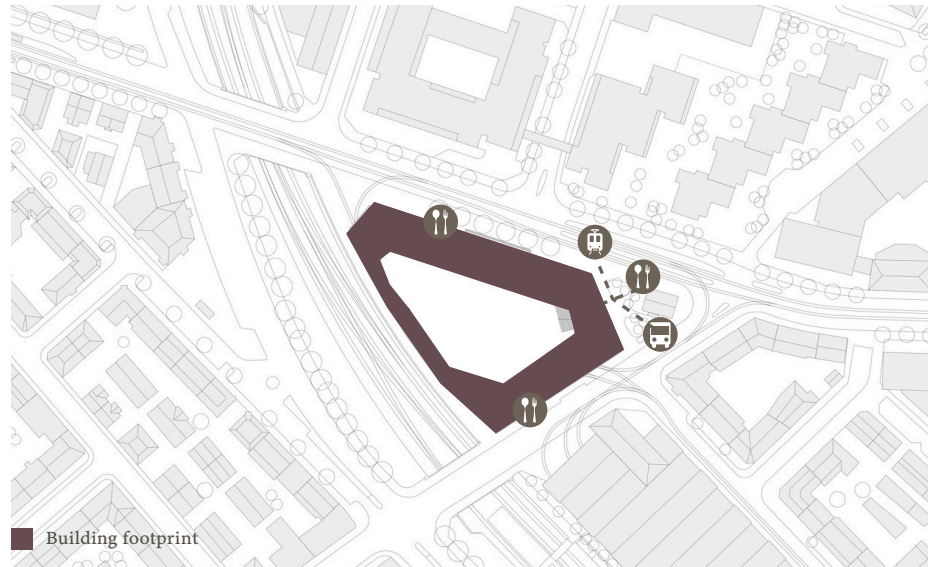
■ Building footprint

0   40m

Source: Archdaily (2018). Kalkbreite / Müller Sigrist Architekten. Accessed 16 Apr 2021. https://www.archdaily.com/903384/kalkbreite-muller-sigrist-architekten

Circulation

Kalkbreite is a residential and commercial complex that combines a socially mixed community in a building block. The building is located in between two city districts and on a tram depot. This building offers new flexible forms for living and working for the roughly 500 people who live and work here.

The plinth of the building incorporates shops, bars, and a cinema. The courtyard is publicly accessible for the residents, employees, or visitors. The mix of functions and scale of this building makes the perimeter block feel like a city itself. The building has 60 percent housing and 40 percent commercial uses. Moreover, it is free of cars and the average area per resident is less than 35 square meters. Kalkbreite is completely car-free, apart from two disability parking spots. The building has great accessibility due to the bus and tram stop which is located right across the building. The building has bicycle parking near the ground floor. The residents can, therefore, use public transport or their bike to move around the city. Kalkbreite uses a car-free environment and limited space per resident to enable a sustainable urban lifestyle while ensuring affordable rent (o500, 2015).
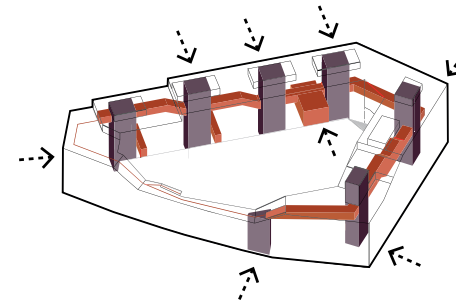
Circulation and entrances. Illustration by author.

There are seven vertical circulation areas in the building which have a staircase and an elevator. These stairs and elevators are used by the residents to enter their dwellings. These dwellings are organized around a corridor. The corridors of the different levels are connected by the internal street or "rue intérieure" which is illustrated in red in the scheme. This internal street creates a continuity of circulation flow within the building on the different levels. The internal street starts in the hall, leads past the cafeteria, the mailboxes, the laundromat, and the library, to the offices. Then it goes through the residential floors and eventually leads to the roof gardens, the sauna, and the garden kitchen. This street also doubles as an emergency escape route (Kalkbreite, 2014). Outdoors, the circulation is arranged through roof terraces and stairs that lead to the public courtyard (o500, 2015). This courtyard is part of a green urban structure that is open to the public. The courtyard is accessible to the public from 8 am to 8 pm.

Ground floor

Fourth floor

0   60m

□ Circulation space

⊠ Elevator

— Route to Zoë & Rosie's dwelling

Source: Illustration by author with basis retrieved from: Detail (2015). Accessed on May 20, 2021 from https://inspiration.detail.de/prozess-wohn--und-gewerbebau-kalkbreite-in-zuerich-113104.html

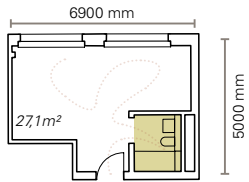Zoë and Rosie typically use entrance A to get to their dwelling on the fourth floor. Zoë is home early and makes her way to their dwelling. She uses the elevator to take her to their floor. In the elevator, she sees her downstairs neighbour Thomas. They have a nice chat before Thomas gets out of the elevator first. Zoë gets out on the fourth

floor and walks through the corridors. Their home is the last door on the left, right before the staircase. While standing in front of her door Zoë takes a look at her right and sees her other neighbour Dan in his home. She smiles and quickly greets him before entering her home. Zoë decided to prepare their dinner before Rosie gets home.
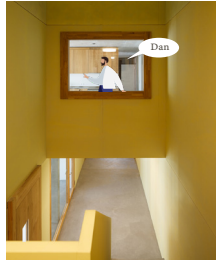
The stairs at the end of Zoë & Rosie's corridor (Nieder-berger, 2015).

Programme

Kalkbreite distributes its communal spaces heterogeneously in the whole building. The courtyard includes diverse activities: a walking park, a playground for the children, a kitchen garden, and other recreational activities.

Similar to Tietgen Dormitory and Songpa Micro-housing, Kalkbreite also has gradients between the public and private spaces. There are public spaces, communal spaces that are shared among all the residents of the building, and communal spaces within the cluster. The communal spaces for all residents are the courtyard on top of the tram hall, a cafeteria, laundry rooms, a library, and multiple Ground floor

Second floor

Fourth floor
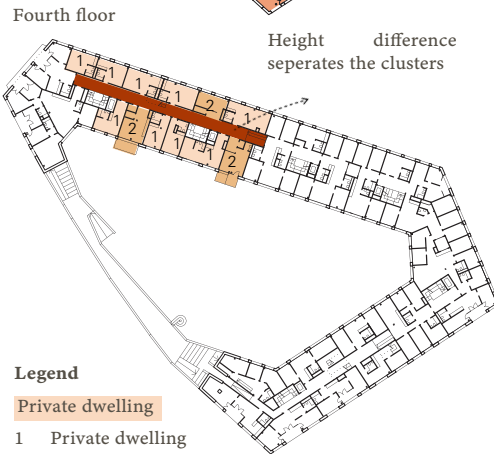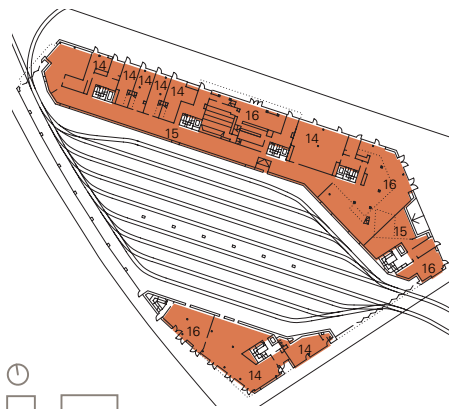
Height difference seperates the clusters

Legend

Private dwelling

1 Private dwelling

Communal space for cluster

2 Communal space

Communal space for entire building

3 Day nusery
4 Childbirth clinic
5 Communal office
6 Conference room
7 Cafeteria
8 Entrance hall
9 Laundry room
10 Guest house
11 External staircase
12 Living/dining room
13 Courtyard

Public

14 Commercial
15 Bicycle store
16 Bar, café, restaurants
17 Cinema

shared workspaces. Some spaces can be rented such as the kitchen garden and the sauna. The ground floor and the second floor have public functions.

In the circulation scheme, the "rue intérieure" is illustrated, this route connects the different clusters from different levels together. Therefore, as seen on the fourth floor, the clusters on the same floor are not always connected. This creates an additional level of privacy for the clusters.

Kalkbreite provides many different kinds of dwellings for different households such as solo-dwellers, couples, friends, and families. There is space for different housing forms such as flat-sharing communities (Kalkbreite, 2014). The clusters have multiple rooms available for communal facilities. This is because the rooms that are not always needed, for instance guest rooms and offices, are not included in the private dwellings. Instead, these spaces are part of the communal rooms.

Division between the public and private domain

This illustration shows how the seven essential activities are allocated among the different types of spaces. This illustration is based on the cluster dwelling because other types of dwellings in Kalkbreite will have different results. The cluster is chosen because it is most beneficial to study for the solo-dwellers.

Private dwelling
Communal space for cluster
Communal space for entire building
Public space

Washing & relieving oneself
Sleeping
Cooking
Eating
Working
Exercise
Gathering

Kalkbreite offers housing for diverse people. By doing so, they created a community of different household types and people. To properly deal with this diversity, Kalkbreite proposes a new housing scheme: the cluster. This cluster is made up of a couple of studio apartments for solo-dwellers. Cluster number 3 (illustrated on the right), is an example of such a housing scheme. This cluster is made up of nine dwellings and three communal spaces. There is a communal kitchen and two communal living spaces. There is 9,2m² of communal space per dwelling.

This housing scheme is also beneficial to avoid losing the residents in the scale of the building. Cluster 3 is too small for families, instead, they can live in "Grosshaushalt". This is a cluster of twenty dwellings with communal living and dining spaces. They also have a kitchen with professional chefs, where other

residents of the building can also get their meal.

Cluster 3

Box 2
22,8 m²

Communal kitchen
39,4 m²

Box 3
20,5m²

Section

0   30m
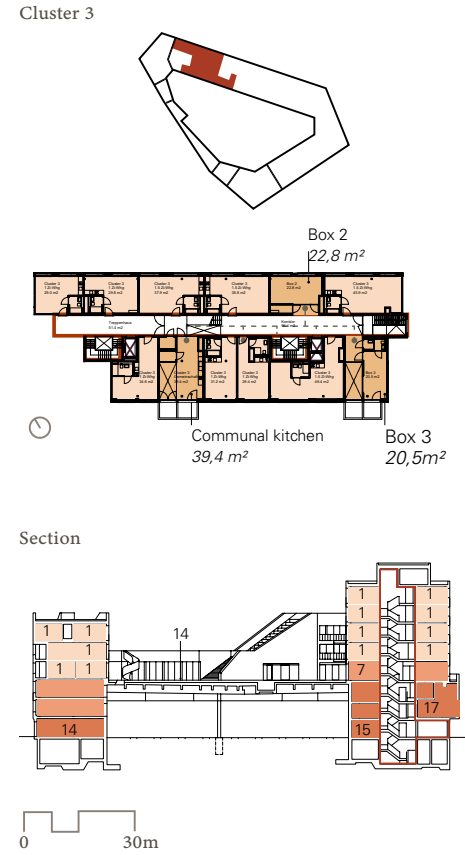
Source: Illustration by author basis retrieved from: Wolf (2015). Wohn- und Gewerbebau Kalkbreite in Zürich. Accessed on May 20, 2021 from https://inspiration.detail.de/prozess-wohn--und-gewerbebau-kalkbreite-in-zuerich-113104.html

Images of the communal spaces in cluster 3. Left: Communal kitchen. Middle: Box 2. Right: Box 3 (Wolf, 2015).

Type A

6900 mm

5000 mm

27,1m²

Type B

4200 mm

8000 mm

33,6m²

Type C

10400 mm

5000 mm

52m²

Type D

10200 mm

5000 mm

51m²

Type E

5800 mm

8200 mm

42m²

0   4m
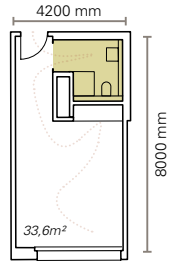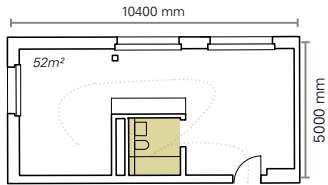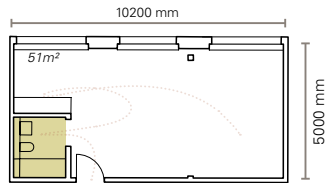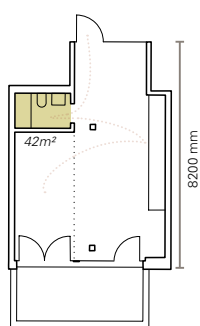
Legend

A. Joker dwelling
B. Studio cluster 3
C. 1,5-room dwelling cluster 3
D. 1,5-room dwelling cluster 1
C. 1,5-room dwelling cluster 3

Dwelling

High flexibility and modularity are important themes in the Kalkbreite building. To allow flexibility, the building is executed with a simple constructive principle of precast concrete columns and in-situ concrete floor slabs. Most of the internal walls are made from metal studs and gypsum plasterboard. The walls are only poured in concrete where necessary. The flexibility is useful for the dwellings as well as the commercial functions on the ground floor (Boucsein & Seidel, 2015).

Almost half the 97 dwellings are of standard sizes with 2½ to 4½ rooms. The cluster housing schemes have in total thirty 1- and 1,5-room apartments that are grouped together with communal spaces. There are also larger-scale dwellings for family households, which is less significant for the research on solo-dwellers. By minimizing the individual dwellings, it was possible to create unusually large spaces for communal use, amounting to 916 m² in total (Wolf, 2015).

Throughout the building, there are also multiple flexible spaces available for the residents. These are called the "joker units" (see dwelling type A). The joker dwellings are 27 to 29 square meters. These joker rooms have a bathroom and can be rented out from 6 months up to 4 years and can also be rented out as a hotel room. These joker rooms can also be absorbed by the adjacent dwellings to create a larger configuration, similar to the Songpa Micro-Housing scheme. The joker rooms are open to the community and can, in coordination with the rest of the community, be adapted to certain functions. It can also be used as communal spaces such as a meditation room. Furthermore, these joker rooms promote flexibility, adjustability, and growth in domestic spaces according to the changing needs of the residents (De Jorge-Huertas, 2020).

The bathroom in the joker dwelling. Illustration by author.

In Kalkbreite there are in total nine residential joker rooms. The rooms have a built-in bathroom with a shower and a toilet. There is no kitchen in the joker room.

To continue, cluster living is important in the Kalkbreite housing scheme. It offers the residents the opportunity to live with others and still have their private rooms. The studios have a bathroom with a bath and a kitchen. The cluster apartments share an electricity meter and a fiber-optic connection. Residents have to agree on the same provider and cost distribution. This is because connection fees are minimized by sharing and the overall costs are significantly lower than if everyone had individual connections (Kalkbreite, 2014).

Furthermore, once a month the tenants' council meets to plan certain actions and keep the residents
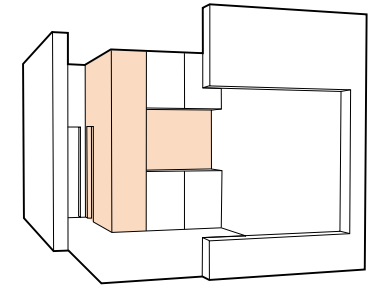
The bathroom in the studio. Illustration by author.
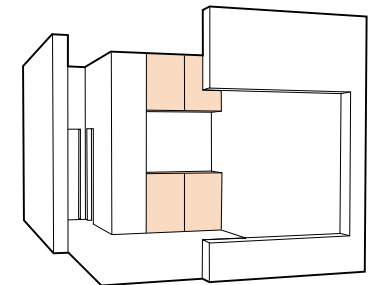
The kitchen in the studio. Illustration by author.

informed. The residents are included in the decision-making process such as who can rent the commercial spaces. Once a year there is an event where people can discuss the communal spaces in the building. The residents pay a monthly fee for this (Be sustainable, 2020). The management of a building of this scale has its difficulties. This is because there are many different opinions to take into account. For instance, some residents do not agree with some of the initiatives to promote sustainable living.

Kalkbreite
Sequence of spaces

Kalkbreite illustrates the importance of intermediate space between the public and private realm of a building. Furthermore, the building protects the residents of its scale by dividing the dwellings into clusters. By adopting the "rue intérieure" the clusters are not too isolated from the rest of the residents. Moreover, it allows for passive encounters between the residents.
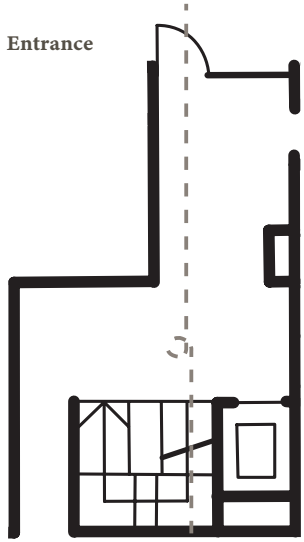
Private dwelling

Internal street

Entrance

Main entrance hall

Office

Communal cluster living room

Cafeteria

Communal cluster kitchen

Bicycle storage

Source: Illustration by author. Pictures retrieved from: Kalkbreite (2015). Accessed on May 20, 2021 from https://www.kalkbreite.net/en/kalkbreite/

Treehouse
Co-living

In this building lives ALEX, who is in a LAT relationship.

Architect: Bo-DAA
Architect in charge: Melody Song, Xinyi Wang, Dionysus Cho.
Location: Dogok-dong, Gangnam-gu, Seoul, South Korea
Client: Kolon Global Common Life
Construction period: 2018
Total area: 4810m2
Number of units: 72 units (16,5/ 23/ 33 m2)
Number building layers: 7
Communal functions: The building is centered by an interior garden in the atrium with collaborative work areas, relaxing lounge spots, communal kitchen, laundry, and pet baths.
Keywords: Co-living, micro-apartments, single professionals.

Illustration by author. Image source: Archdaily (2020). Treehouse Coliving Apartments / Bo-DAA. Accessed april 11, 2021 from https://www.archdaily.com/932735/treehouse-apartment-building-bo-daa

0 min walk to the restaurants

1 min walk to the bus stop

45 min public transport to central station

■ Building footprint

0   50m

Illustration by author.

Ground floor

Fourth floor

Emergency staircase

0   8m
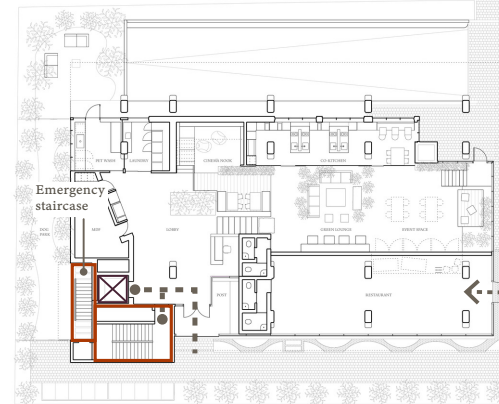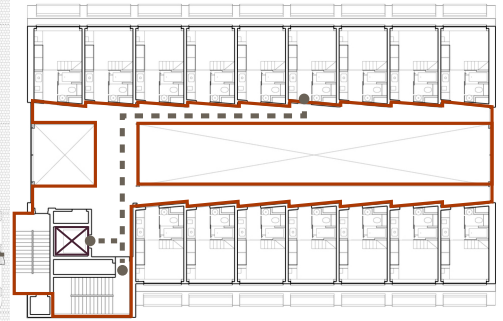
□ Circulation space: Horizontal
⊠ Circulation space: Vertical (elevator)
— Route to Alex's dwelling

Circulation

Architecture studio Bo-Daa has designed Treehouse, a co-living complex in the center of Kangnam in Seoul. The complex is a stack of micro-apartments surrounding an interior garden in a triangular concrete block.

From a survey of 395 millennials that aimed to understand the type of lifestyle that was important for them, Bo.Daa designed The Tree House. A building where the community is not forced but coaxed: each unit is designed for a single person with a private bath and kitchenette, and residents only share amenities where larger scale and community make for a better experience (Rosete, 2020).
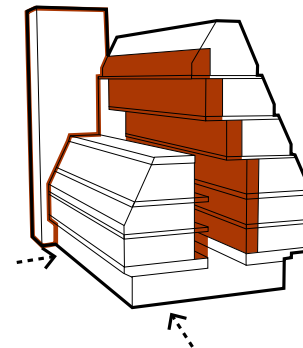
Treehouse has one public function, a restaurant, that is only accessible by a separate entrance. This means that the path of the visitors and the residents do not cross at any time in the building. Alex enters through the main entrance that leads him directly to the lobby in the atrium. From the atrium, he can choose to take the stairs or elevator to the upper floors or stay in the atrium and socialise with his neighbours. He normally takes the elevator to the fourth floor. When he arrives on his floor, Alex has to cross a bridge overlooking the green lounge. He looks down and sees most of his neighbours there. Some of them are eating dinner in the green lounge and others are working in the event space. The guys eating dinner call for Alex to join them. He quickly goes to his dwelling to put his stuff down and makes his way down again to join the rest in the green lounge.

The dwellings are accessed by a gallery that allows for openings in the floor for the atrium. This creates a visual connection between the residents walking to or from their dwelling and the residents in the communal spaces below. The atrium is the first thing they see when they enter the building and the last when they enter their dwelling.

Programme

All the dwellings and communal spaces are organized around the atrium. The communal spaces are all located on the ground floor and the first floor. In addition, there is a communal terrace on the rooftop. The communal spaces are shared by the entire building. The third, sixth, and seventh levels have additional communal spaces. It is easier to access for the residents on those specific floors but it is available to use for all the residents of the building. Similar to the Micro-Housing building, Treehouse does not use clusters or smaller communities. This is because the building's scale does not affect the participation of the residents in the communal spaces like it would for

0   8m

Dormitory and Kalkbreite.

The atrium is the center of the building with an interior garden and collaborative work areas, lounge areas, communal kitchen, laundry room, cinema room, private warehouse, and pet baths (van Es, 2019).

There is no intermediate space from the communal spaces on the ground floor and first floor to the individual dwelling. The gallery leads you directly to the individual dwelling. Only on the third, sixth, and seventh floors, there are additional communal spaces placed. These spaces are a gradient between the private dwelling and the communal lounge. Above these additional communal spaces, there are voids placed to create a visual connection with the levels above. Moreover, all the floors have a void that gives them a view of the green lobby and event space.

Additional communal space on the third floor (Archdaily, 2020).

Division between the public and private domain

This illustrations shows how the seven essential activities are allocated among the different types of spaces. From this illustration it is apparent that most essential activities, apart from sleeping and washing and relieving oneself, can be done in the private dwelling as well as the communal

Private dwelling
Communal space for entire building
Public space

- Washing & relieving oneself
- Sleeping
- Cooking
- Eating
- Working
- Exercise
- Gathering
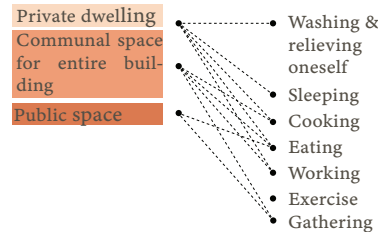
Legend

Private dwelling
1   Private dwelling

Communal space for entire building
2   Circulation space / lobby
3   Mailbox
4   MDF
5   Print / Rental
6   Pet wash
7   Laundry room
8   Cinema nook
9   Communal kitchen
10   Green lounge
11   Event space
12   Library
13   Communal workspace
14   MTG RM

Public
15   Restaurant

space. This relates to the goal of the co-living building, to not force the community. Therefore, people can choose where they want to cook, work, eat, and gather.

Fourth floor

0   8m
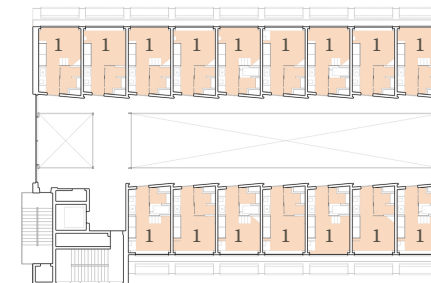
The dwelling

There are 72 units in this co-living complex. All the units are micro-studios and micro-lofts, specifically for solo-dwellers and their animal companions. There are six floors for the dwellings and on every floor the units are different.

To create the volume of the Treehouse, the triangular prism was split in two and opened up with a glazed atrium. The atrium is meant to be the heart and soul of the building. The windows on the south facade help to create a stack effect to ventilate the central atrium. The atrium is supposed to give the feeling of being outdoors. For this reason, the space is decorated with many trees, plants, stone paving, and benches. As the heart and soul of the building, the courtyard accommodates many communal activities. Yoga and other activities were held by the residents in the atrium. The number of communal spaces and shared activities in Treehouse is moderate compared to Tietgen Dormitory, Kalkbreite, and Songpa Micro-Housing.
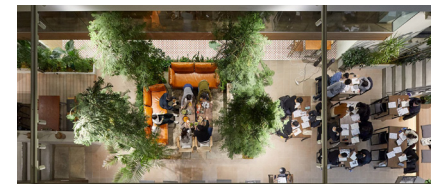
The green lounge and event space in the atrium (Archdaily, 2020).
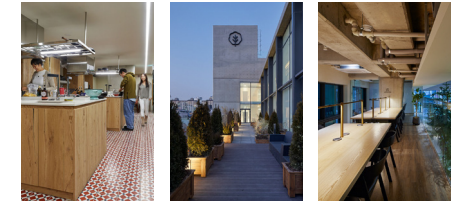
Communal spaces in Treehouse. Left: Communal kitchen. Middle: Communal roof terrace. Right: Communal work-space (Archdaily, 2020).

As these buildings have additional shared spaces for smaller communities within the building.

This six-storey co-living building is located in one of Seoul's most expensive neighborhoods. The smallest dwelling in Treehouse is 16,5 square meters and can be rented for 865 euros a month. From the survey, conducted by the app Mylo, half of the participants said that they are willing to pay the rent if the whole space is good, even though the room is small. In addition, around 50 percent of them said they do not own a car. The number of parking spaces per household at Treehouse is 0.6. Moreover, Treehouse offers a car-sharing service for the residents run by a Section

0   8m
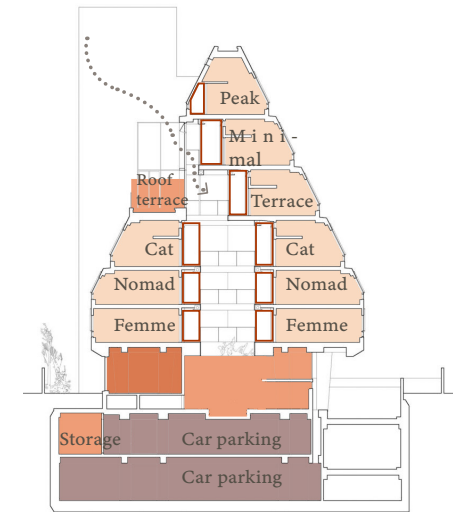
start-up called Linkable (Han Eun-Hwa, 2019).

There is a lack of individualization and customization throughout the building and more specifically directly outside the individual dwellings and the communal spaces. This is even seen on the door numbers as they are discreetly

hidden. This is done intentionally to underline the sense of community.

Furthermore, in the dwelling, there are sliding doors that double as shelving. Also, built-in modular storage and magnetic wall-paint have been designed to make personalization of the spaces quick and easy (Astbury, 2019). The loft units have additional ventilation windows into the atrium for cross ventilation.

All the units are fully equipped with kitchens, bathrooms, and built-in storage spaces. All the units are meant for solo-dwellers. However, the top floor has peak units of 33 square meters which can be used for solo-dwellers as well as couples.

Alex also lives in a Cat unit. He is a solo-dweller which is why he choose this unit. It has enough space for
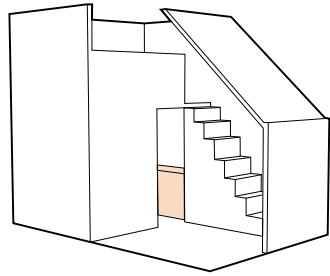
The kitchen in the Cat unit. Illustration by author.
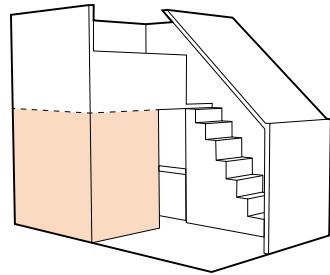
The bathroom in the Cat unit. Illustration by author.
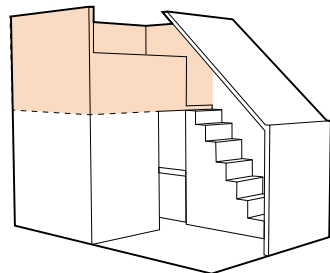
The bedroom in the Cat unit. Illustration by author.

Cat unit floor 1

Cat unit floor 2

0   2m
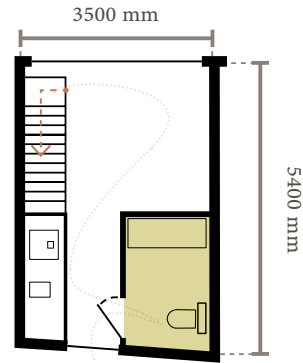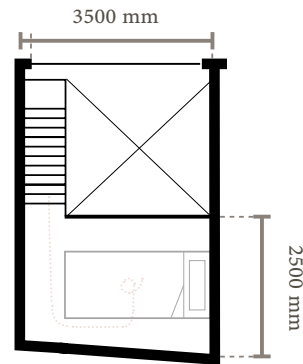
one person and he prefers the bedroom to be separate from the living room. This allows him to have guests over and his girlfriend during the weekends.

Because of the Treehouse shape of the building, the dwellings have a slanted facade. This is part of a key architectural detail for the building. The full-width slanted windows provide a view to the sky. The windows also have blinds that can rise from the bottom to the top for privacy.

Femme unit

6800 mm

3500 mm

23,8m²

Nomad unit

6800 mm

3500 mm

23,8m²

Cat unit

5200 mm

3500 mm

31m²

Terrace unit

5200 mm

3500 mm

23m²

Minimal unit

5200 mm

3500 mm

23m²

Peak unit

4600 mm

5100 mm

33m2

0   2m
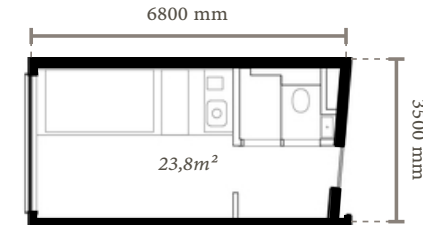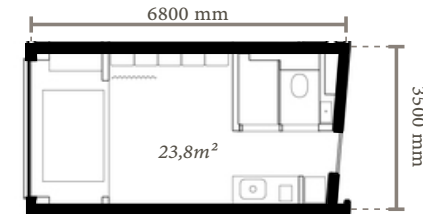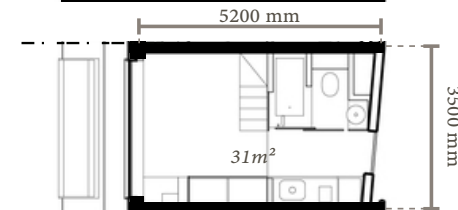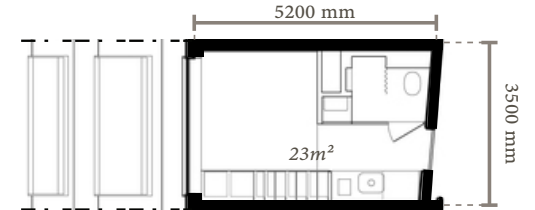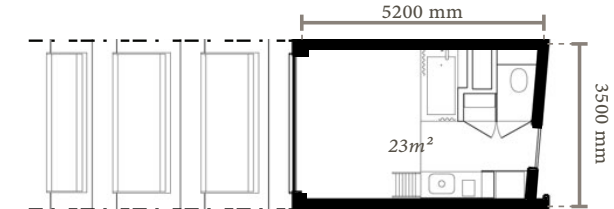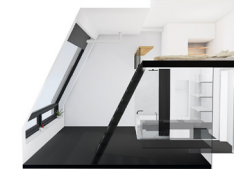
Treehouse
Sequence of spaces

Communal kitchen

Main entrance

Green lounge

Gallery

Communal workspace

Dog park

The spatial composition of Treehouse reflects the communal lifestyle. The atrium symbolizes the community and is the center and the heart of the building. But it is the stacking of the individual units that creates the space for the atrium (van Es, 2019).
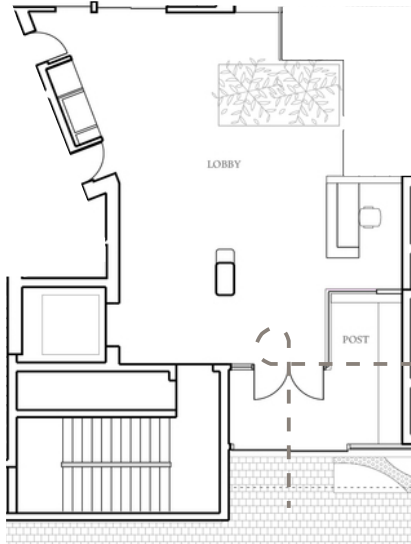
Lounge area with lockers
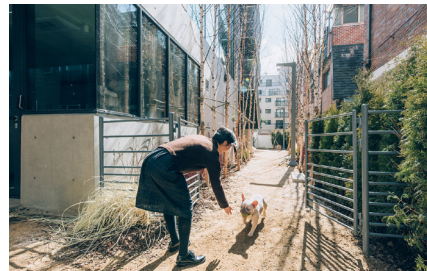
Source: Illustration by author. Pictures retrieved from: Bo-DAA (2018). Accessed on May 21, 2021 from https://www.bo-daa. com/ko/residential

Conclusion

Tietgen Dormitory
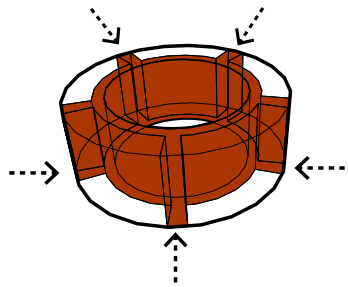
Kalkbreite
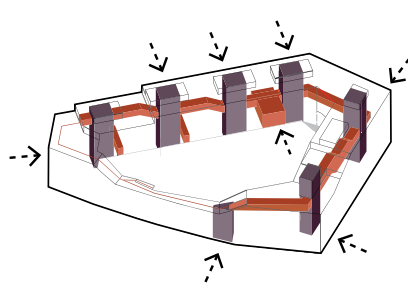
Songpa Micro-housing
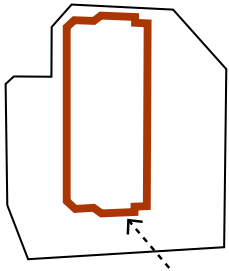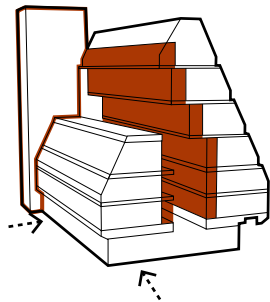
Treehouse

Circulation

All the buildings make sure to separate the residential entrance from the public entrance. Furthermore, most buildings implement a corridor typology. This is not the case for the Treehouse that uses a gallery scheme. When designing for solo-dwellers it is important to understand where possible encounters might occur. The circulation space is the place where most of the passive encounters occur for the residents. Therefore, it is important to use this aspect to allow different residents to interact. The Tietgen Dormitory does this by placing two vertical circulation spaces on either side of the clusters. This will allow the paths to cross of the residents of different clusters. Moreover, Kalkbreite uses the "rue intérieure" to connect the different clusters. This internal street goes through the building on different floors. Instead of having one very long corridor or only very short corridors, Kalkbreite decided to connect the short corridors from different floors together with stairs. This makes sure that the residents of the clusters are not too isolated while ensuring their sense of privacy.

The opportunity for surveillance in the communities allows for an increase in participation in the communal spaces. The ability for the residents to see the nearby communal spaces increases their sense of community. In Tietgen Dormitory, this is done by organizing the building in a circular shape to increase the visual connection. Also, the communal spaces are strategically placed along the path of the residents towards their dwelling. By doing so, they are continuously confronted with the communal spaces, which will increase participation. In Songpa Micro-housing, there are multiple walking bridges and voids placed to create visual connections. Finally, the galleries in Treehouse are all organized around the atrium where are the communal spaces are.

To conclude, it is important to design the routing in such a way that it will either pass or cross a communal space. This can be done by physically passing through the communal space or creating a visual connection with the communal space.

Tietgen Dormitory
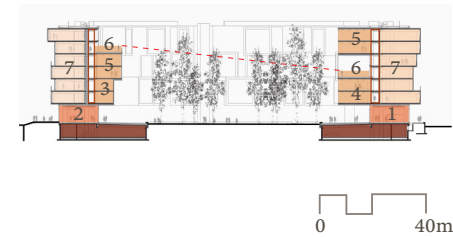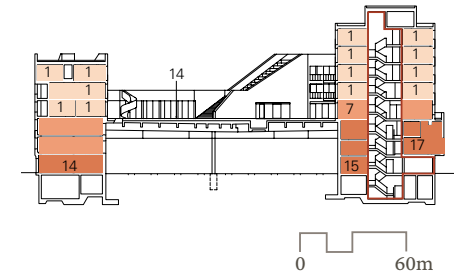
Kalkbreite

Songpa Micro-housing
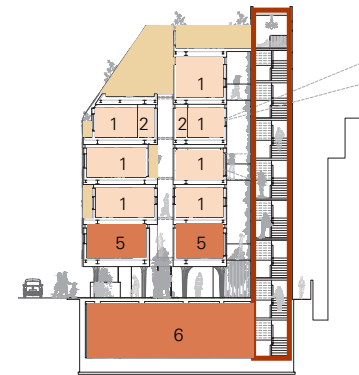
Treehouse
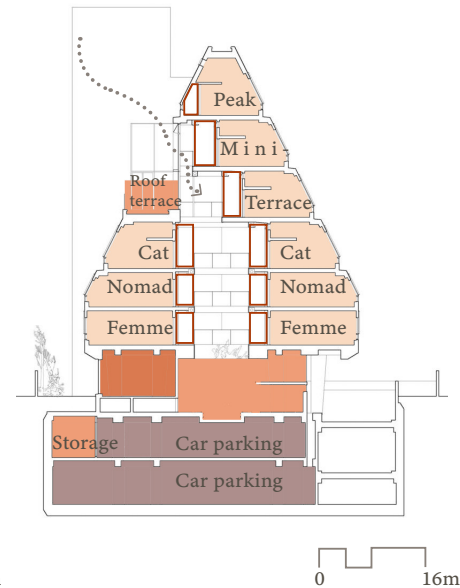
- ☐ Private dwelling
- ☐ Communal space for entire building
- ☐ Public space

Programme

To conclude, all buildings make sure to keep the plinth for only public or communal functions. In Kalkbreite, the floors have a clear gradient from the ground floor upwards. The floors with the dwellings have communal spaces scattered around. The Tietgen dormitory, on the other hand, has a clear distinction between the communal spaces and the private dwellings. In this case, it is the corridor that divides both functions. In Songpa Micro-housing and Treehouse, the circulation spaces double as communal spaces. In the Songpa Micro-housing, this is done by adding furniture and allowing the residents to customize and personalize their territory. They can claim the space

much more in comparison to Treehouse. Treehouse also has furniture in the communal spaces, but it does not allow the residents to claim their space by personalizing it. Instead, they opt to prioritize the sense of community.

Furthermore, Tietgen Dormitory and Kalkbreite are large building blocks. At high densities the residents feel like they have less controll over their environment. To prevent this from happening, the dwellings are clustered together to create multiple smaller communities within the large building block. Also, it will increase the residents' participation in the communal spaces and thereby increase the social connections and sense of community.

Tietgen Dormitory
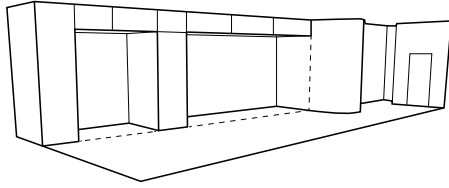
Single unit
Separate bathroom (4m²)
Living space (20,5m²)
+ Built-in storage

Kalkbreite
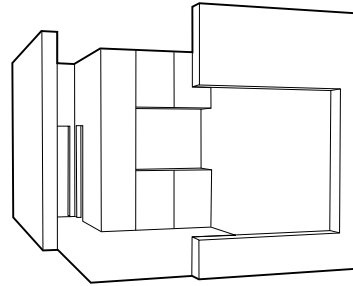
Single unit
Separate bathroom (6,5m²)
Living space (26m²)
+ Kitchenette

Songpa Micro-housing
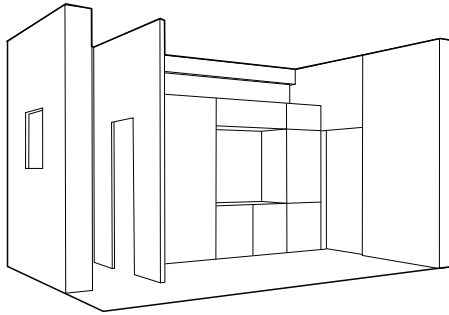
Single-micro unit
Separate bathroom (2m²)
Living space (9m²)
+ Built-in storage
+ Kitchenette
+ Built-in bed

Treehouse
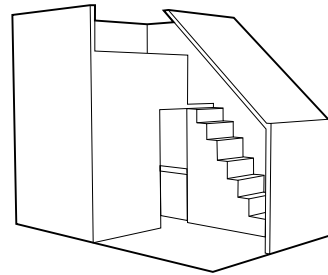
Single-loft unit
Separate bathroom (3,5m²)
Living space (19m²)
+ Built-in storage
+ Kitchenette
Separate bedroom (9m²)

The dwelling

All the units, except for Kalkbreite, have built-in storage space. This is useful to minimize the space needed for the residents. These built-in storage spaces mostly take up one wall of the dwelling. In this storage space, Songpa Micro-housing and Treehouse included a small kitchenette. The unit of Tietgen Dormitory does not have a kitchenette which forces the residents to do this essential activity in the communal space. The communal space is seen as an extension of their private dwelling.

Tietgen Dormitory and Treehouse have opposite strategies in the way they tried to set up these co-living buildings. Treehouse made sure to minimize the space in the dwellings whilst still providing all the necessary elements such as a bedroom, living room, bathroom, kitchen, and storage. By providing this, the residents can choose to not participate in the communal spaces.

The split-unit scheme used in Treehouse, is useful to increase the living space of the dwelling while keeping the unit compact.

Concept design

The design principles

The following design principles are formed in the research report. These design principles are used as a guideline to design for solo-dwellers and to incite social encounters within a building. These principles are incorporated in the design of the building.
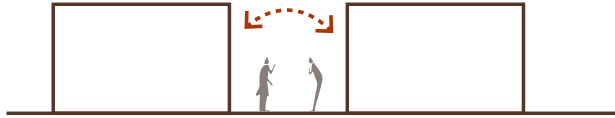
Proximity between residents help to form social relations

Clustering the dwellings to create smaller communities to maximize the use of communal spaces

Using buffer space between the private and public domain
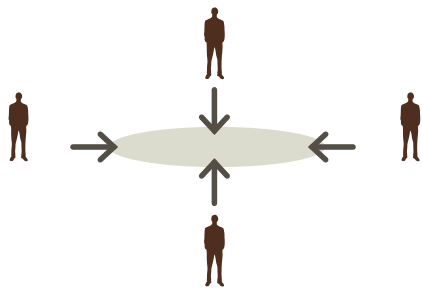
The communal space should have equal accessibility (distance and visibility).
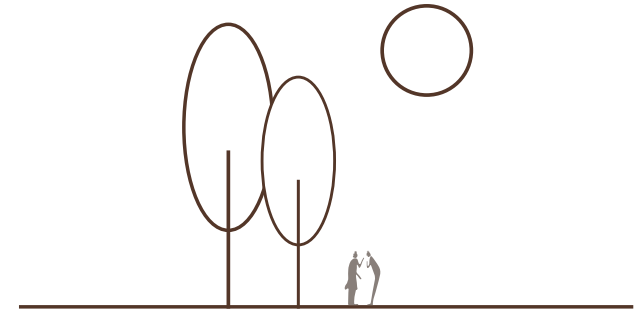
Create common outdoor areas for the entire building as well as the clusters
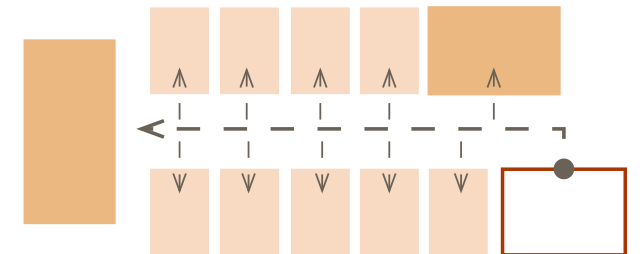
☐ Private dwelling

☐ Communal space for clusters

☐ Circulation space

The routing towards the dwellings have to pass or cross a communal space.

The volume of the building
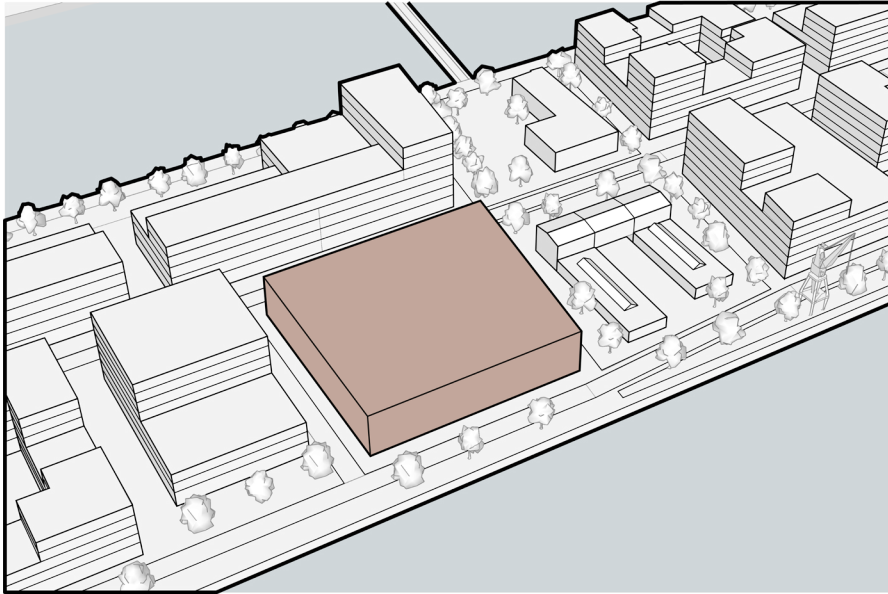
Plot
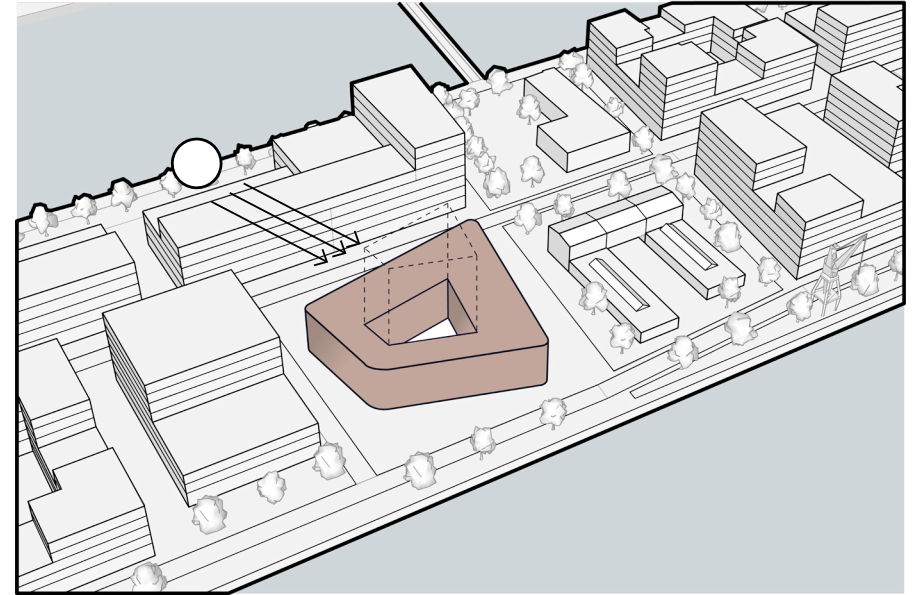
A courtyard is created to allow daylight to enter the dwellings.
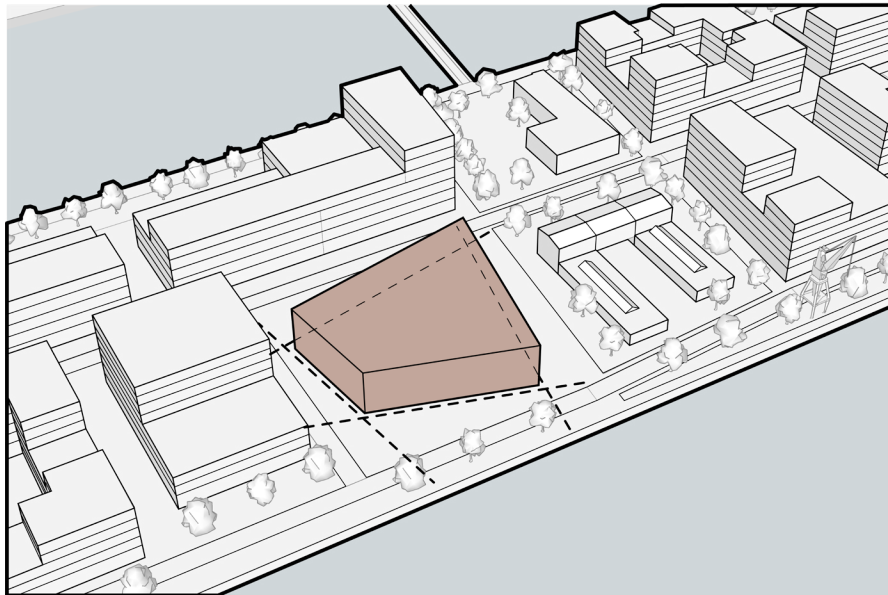
The sightlines are broadend to create a stronger visual connection between the main road and the quay.
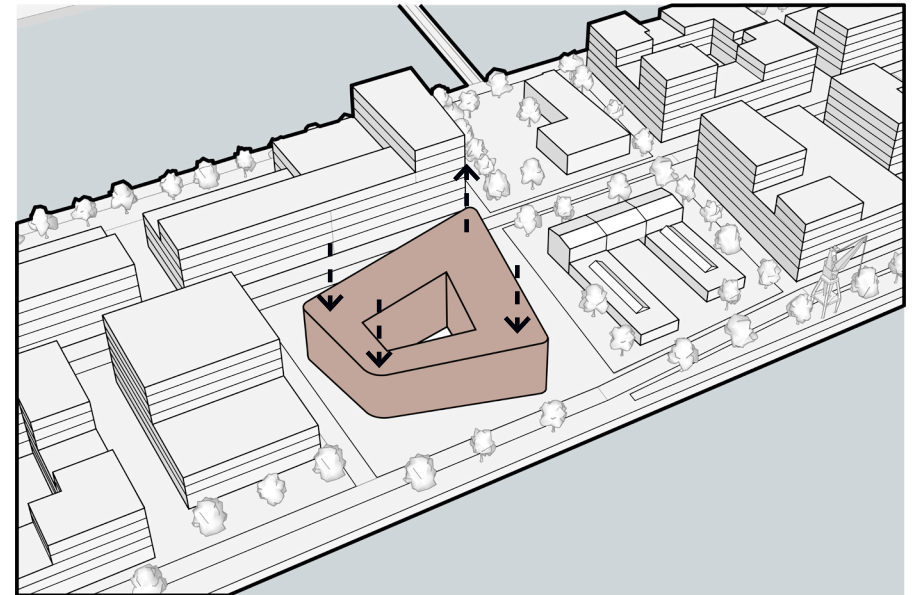
The roof is slanted to allow more daylight to enter.
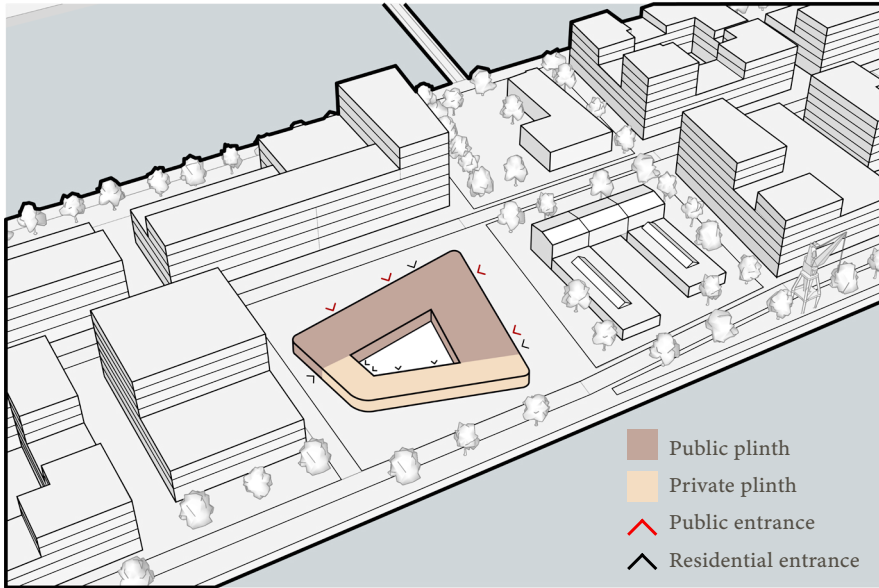
The ground floor has a public and private plinth.

Public plinth
Private plinth
Public entrance
Residential entrance
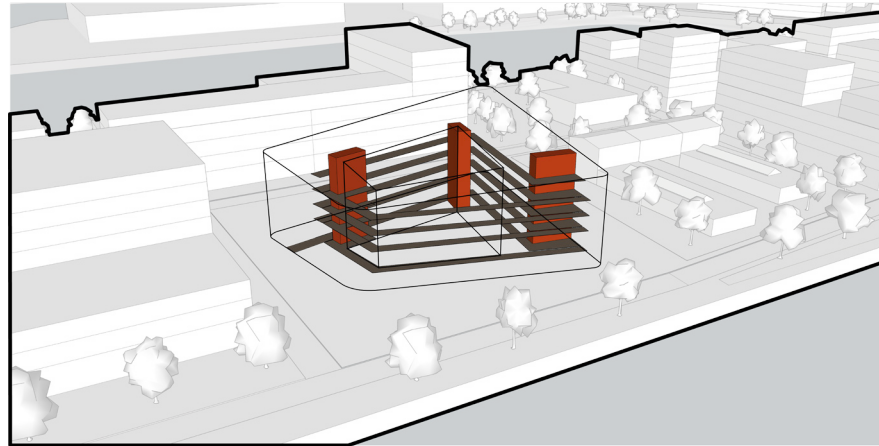
Circulation
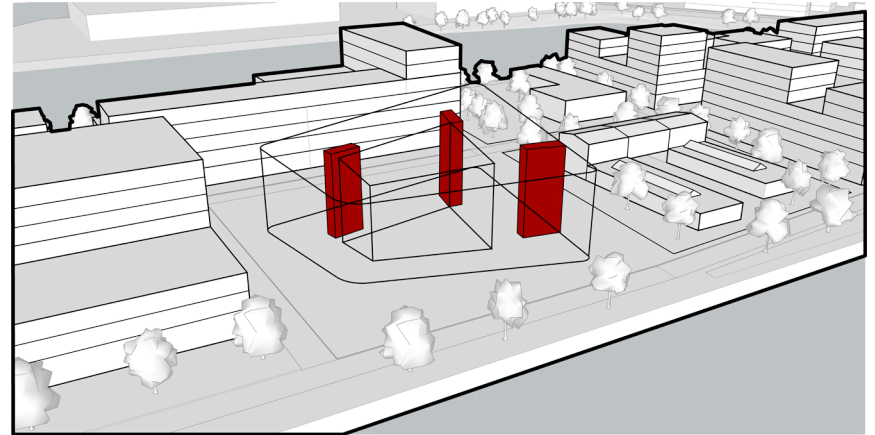
Staircase and elevators
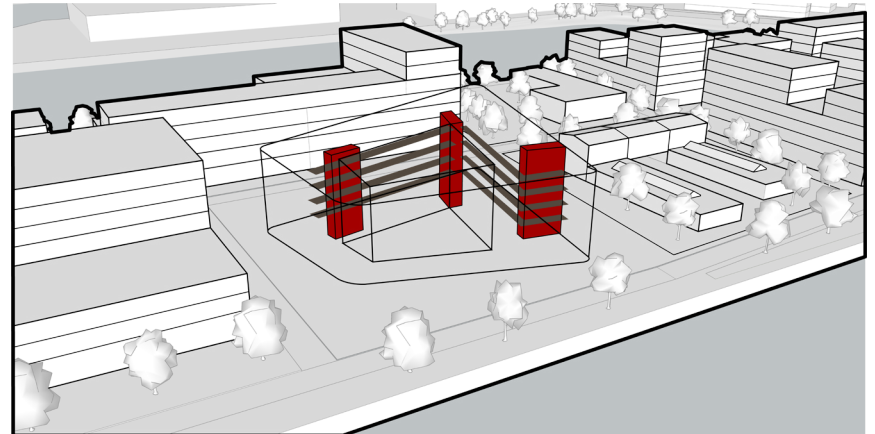
Corridor
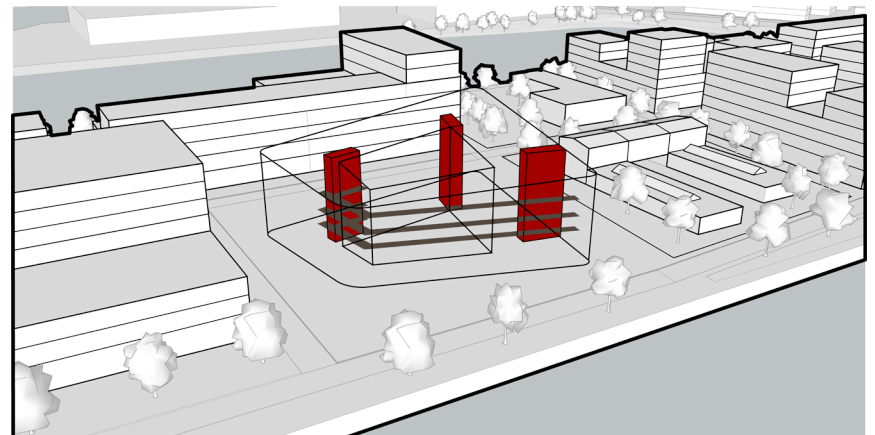
Indoor gallery
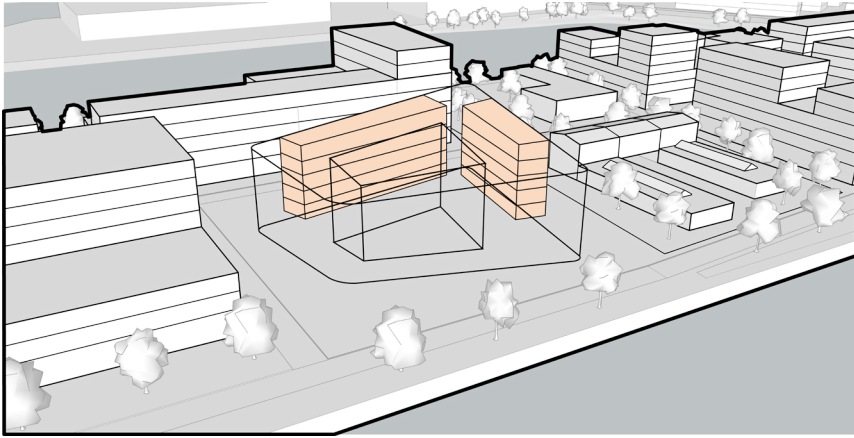
Functional adventurer
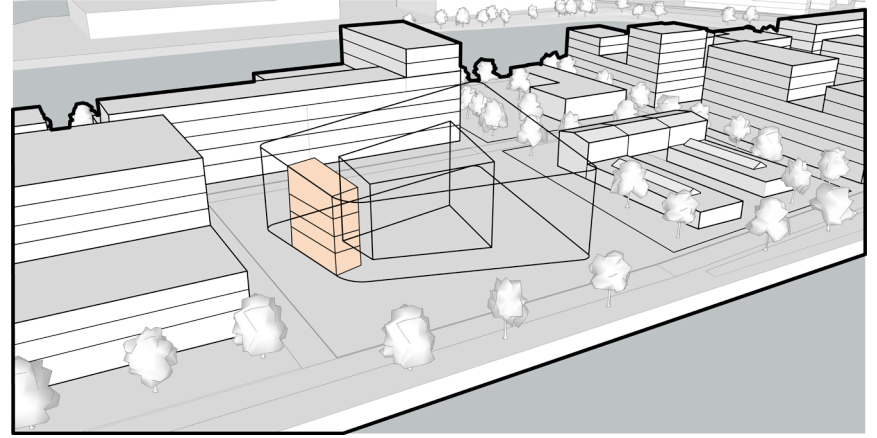
Solid homebody
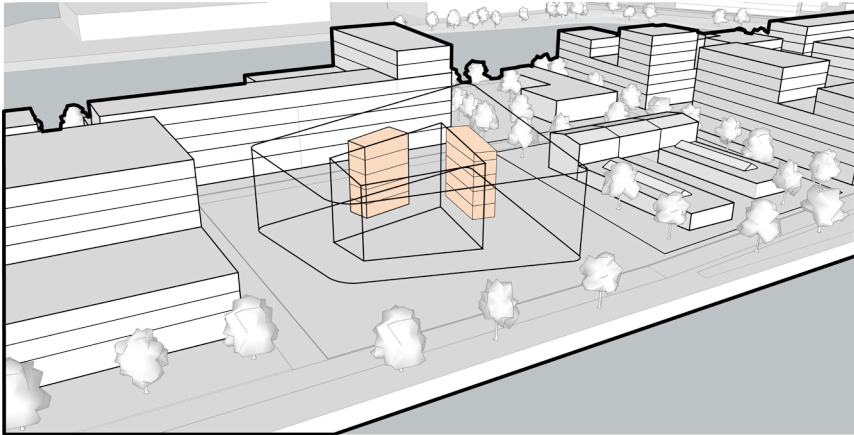
Latters
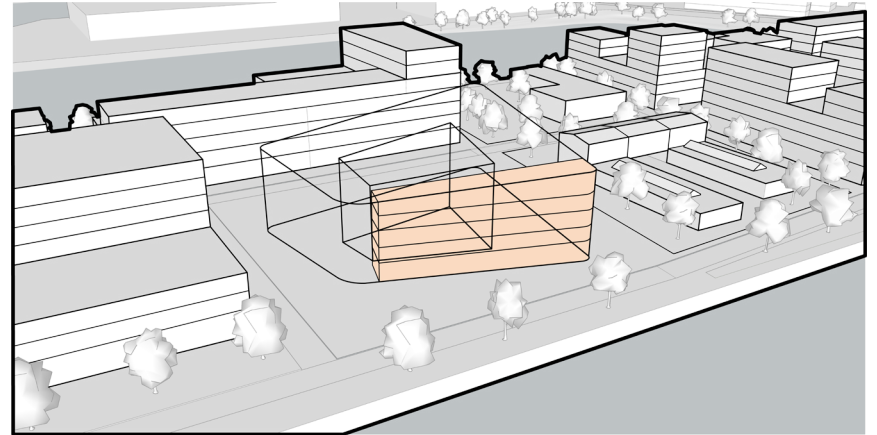
Friends

The building.

0   80m

0   20m
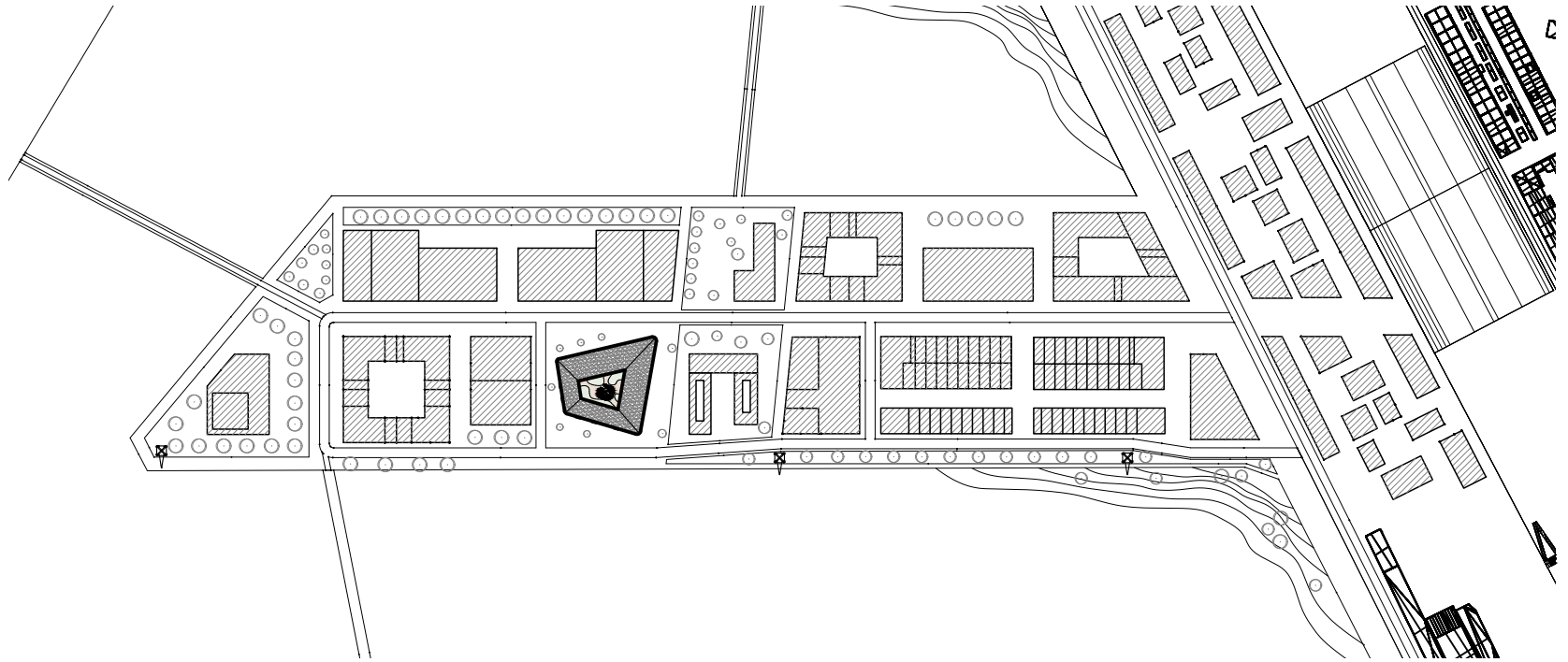
Building floorplan - Section
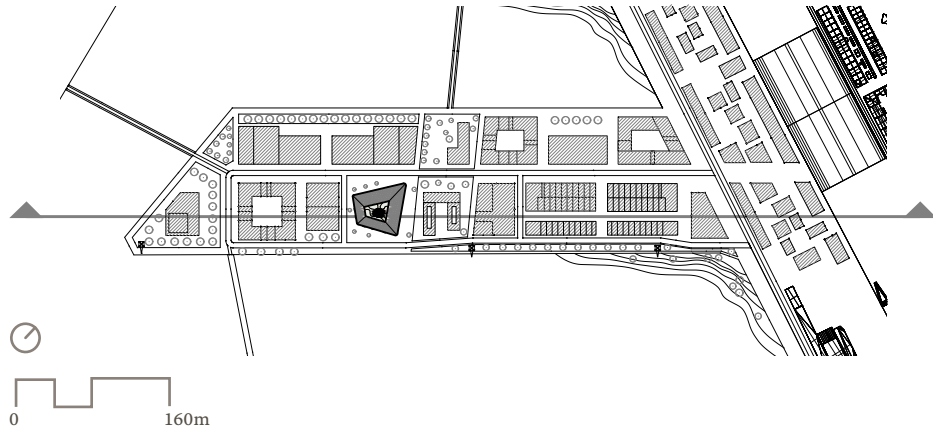
0   160m

0   60m

Building floorplan - Programme

19670

17120

14660

10440

7120

3800

P = 0.00
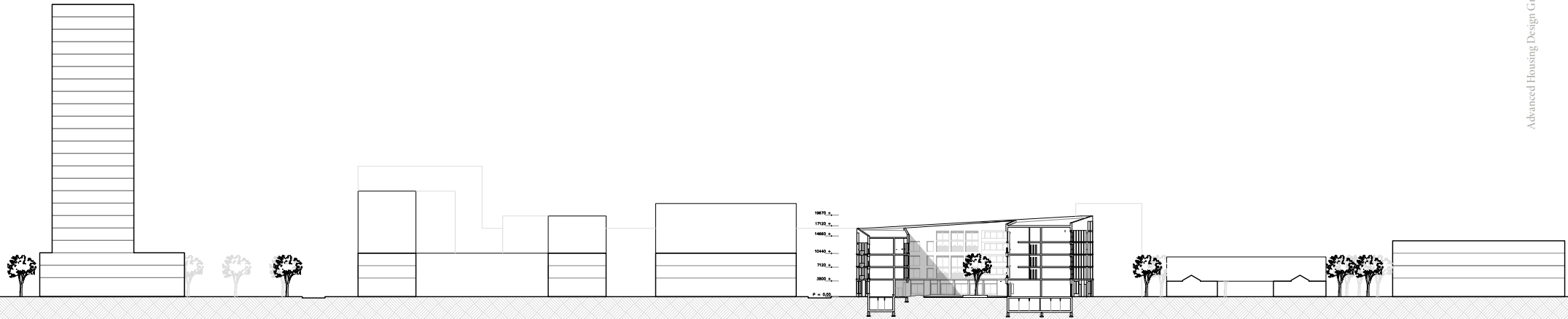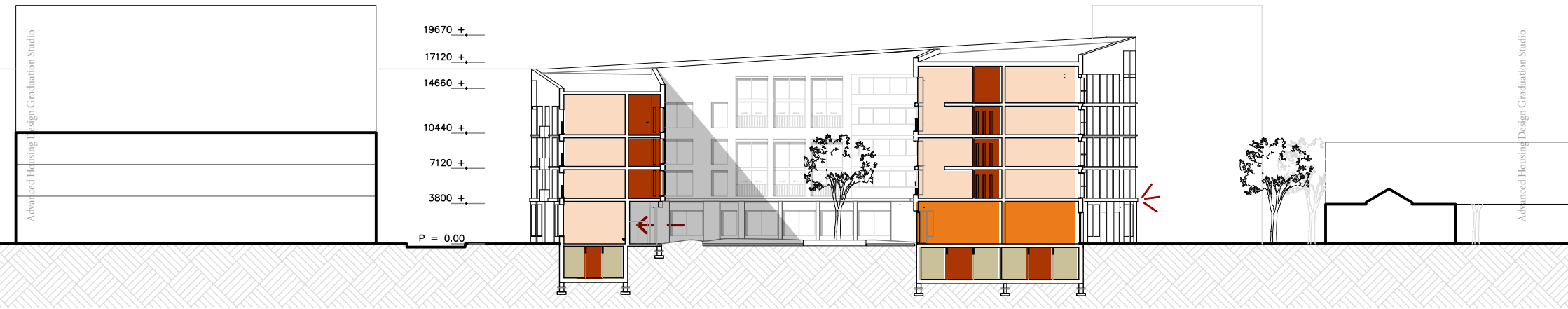
Private dwelling

Public function

Circulation space

Storage units

0   10m

Building floorplan - Ground floor
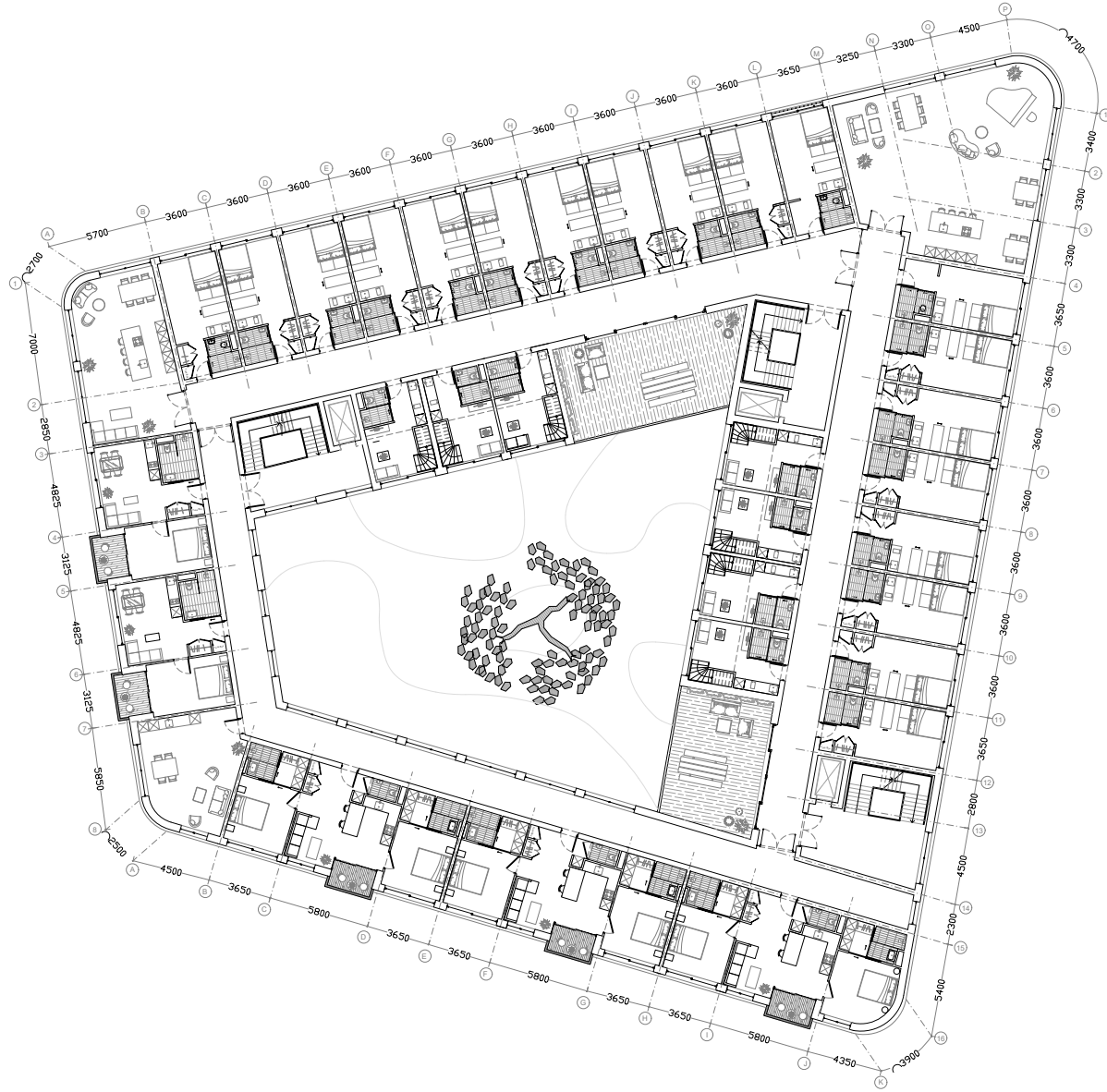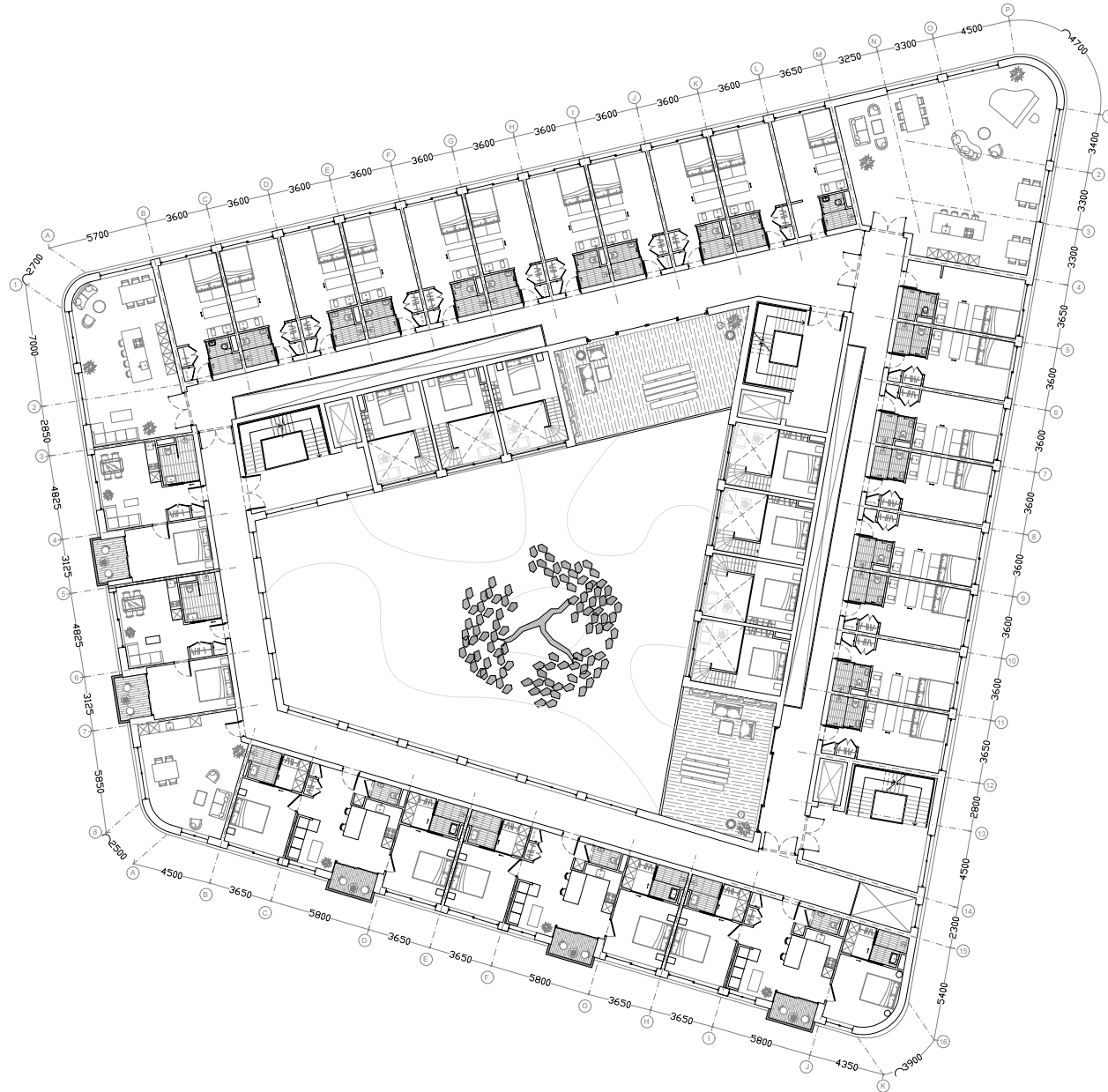
Containers

Shop

Break room

Break room

Shop

Restaurant

Study space

Residential entrance

Mailboxes

Residential entrance

Storages

Mailboxes

Laundromat

Restaurant & event space

Residential entrance

Mailboxes

0   8m

0   8m

0   8m

0   8m

Courtyard at night.

The study

The NUM bar

Building - Section

19670 + Roof

17120 + Ceiling

14660 + Ceiling

10440 + Ceiling

7120 + Ceiling

3800 + Ceiling

P = 0.00 +

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0   4m

0   160m
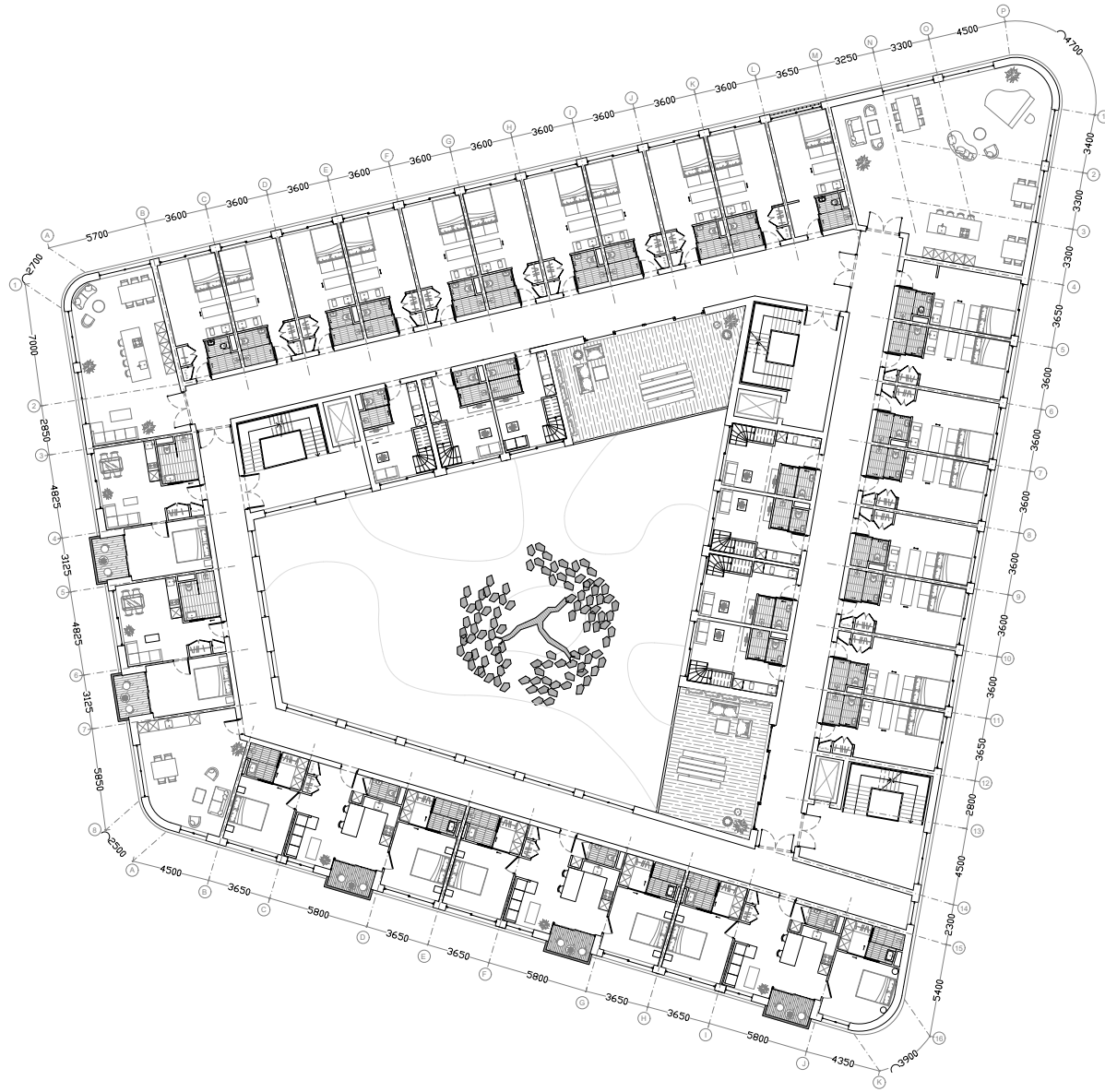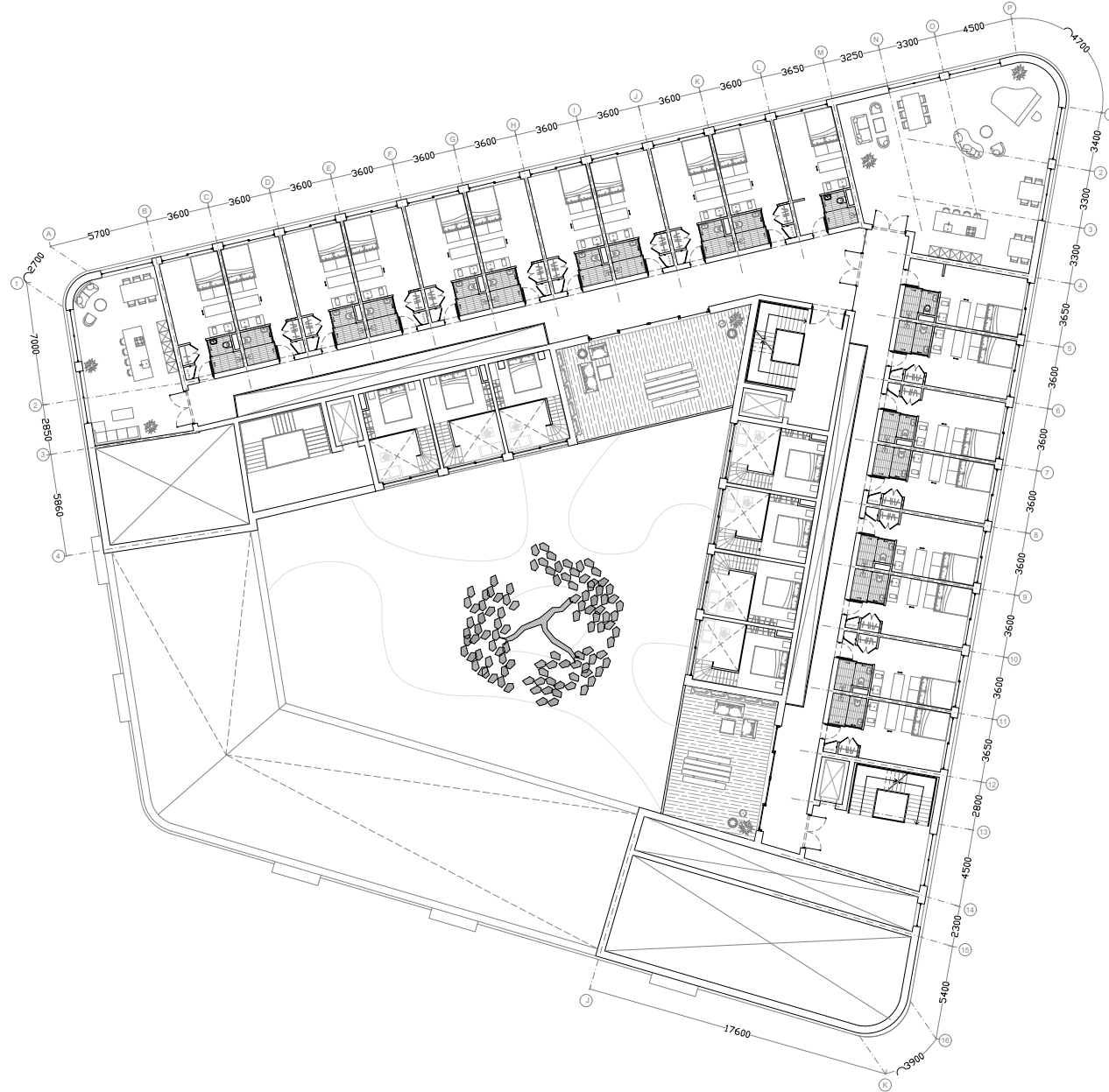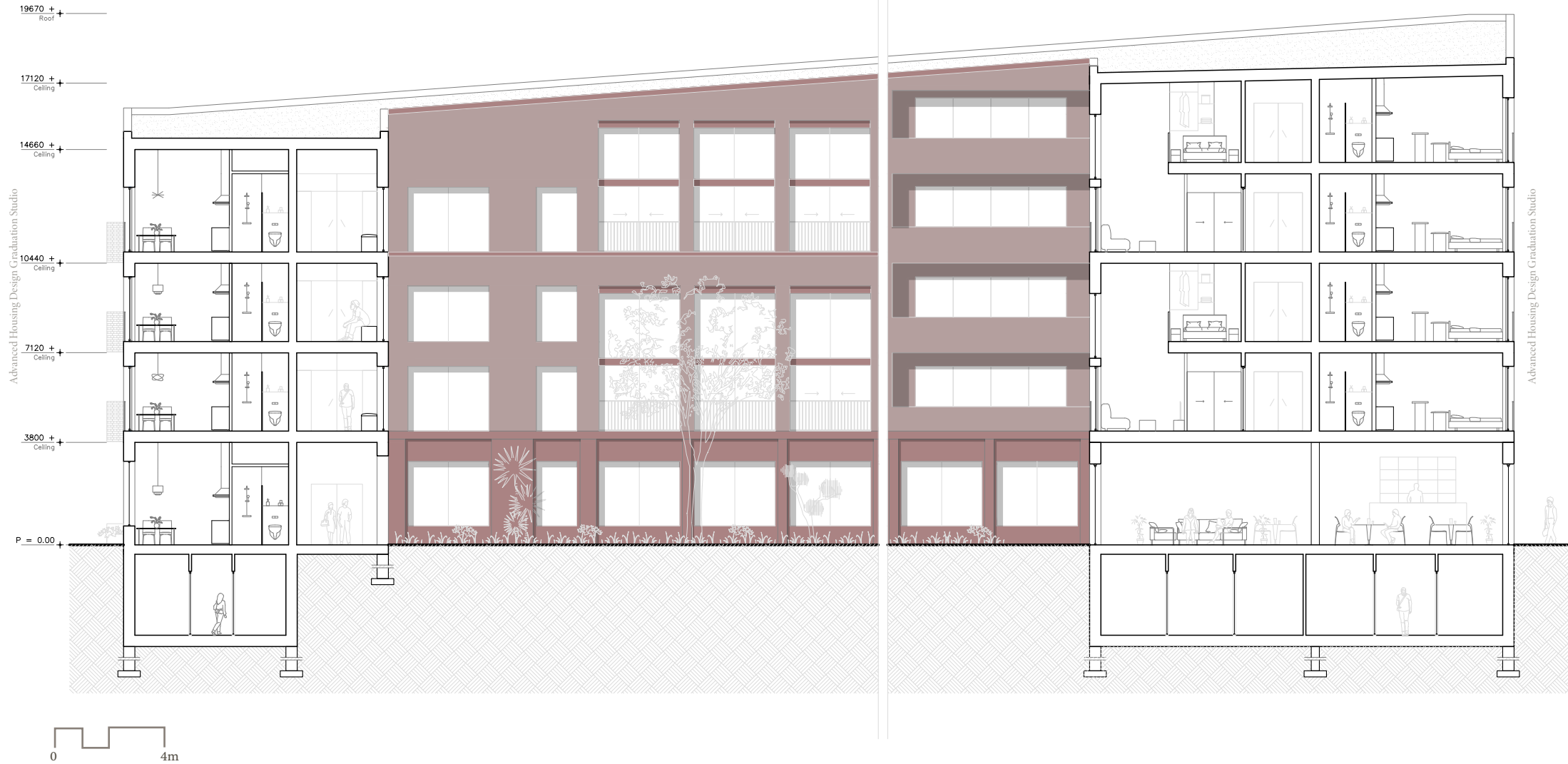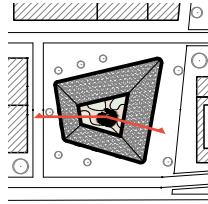
Merwevierhavens, Rotterdam

The iconic and characteristic buildings that remain in the masterplan are used as a references for the brick pattern.
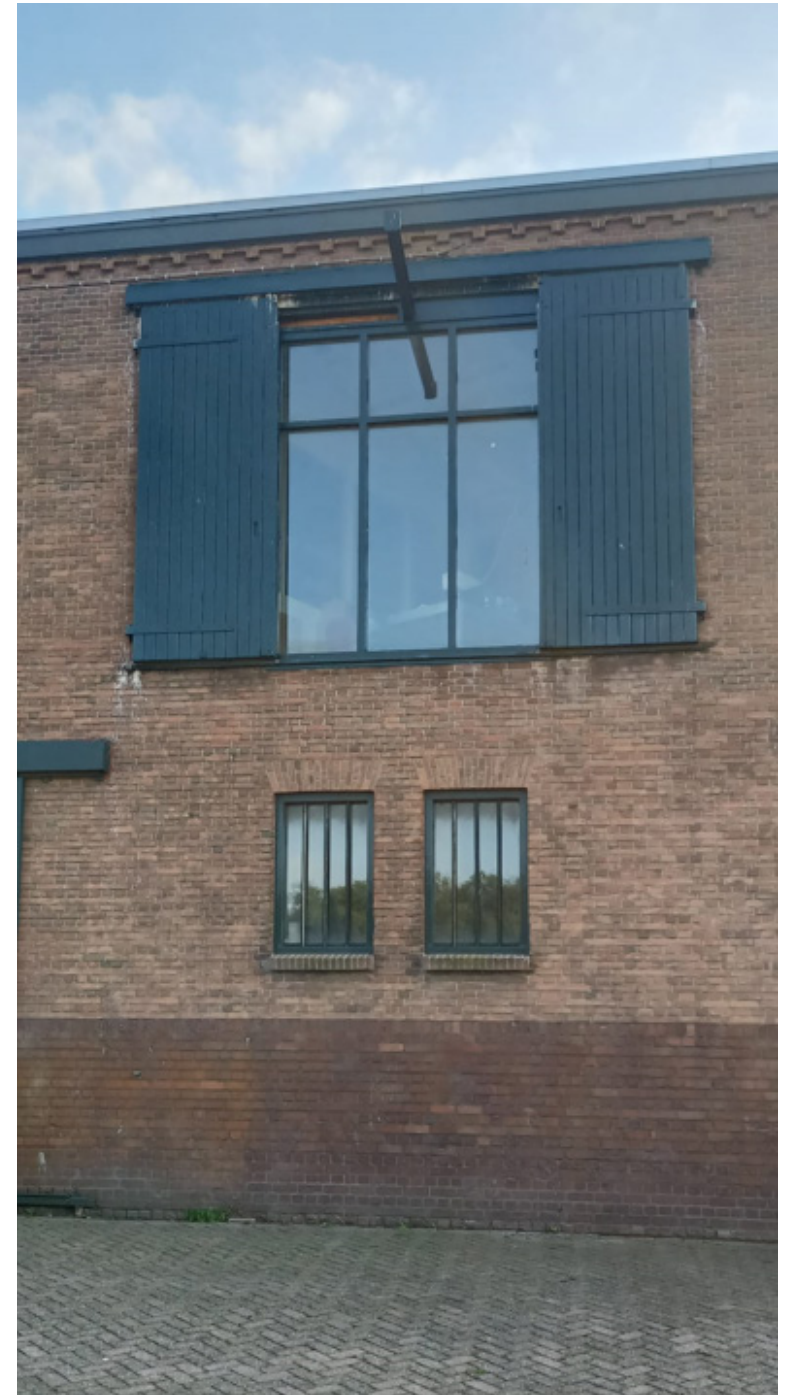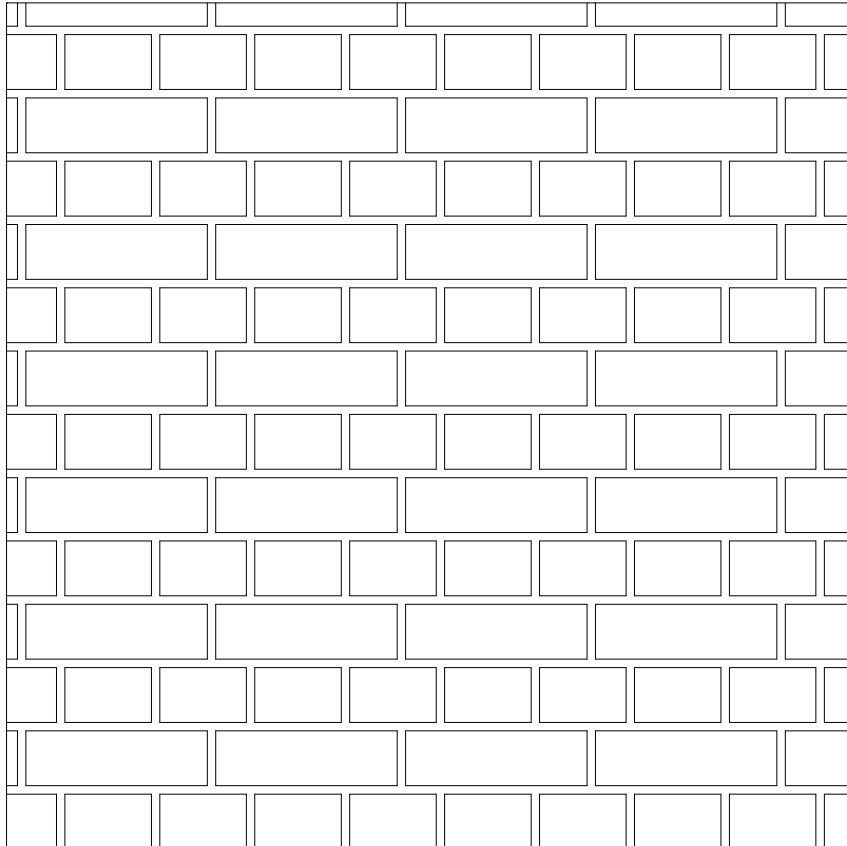
Existing brick pattern

The existing building uses a Dutch bond (or English cross bond) in their brick pattern. This same brick pattern is used in the building to create a connection to the existing buildings.
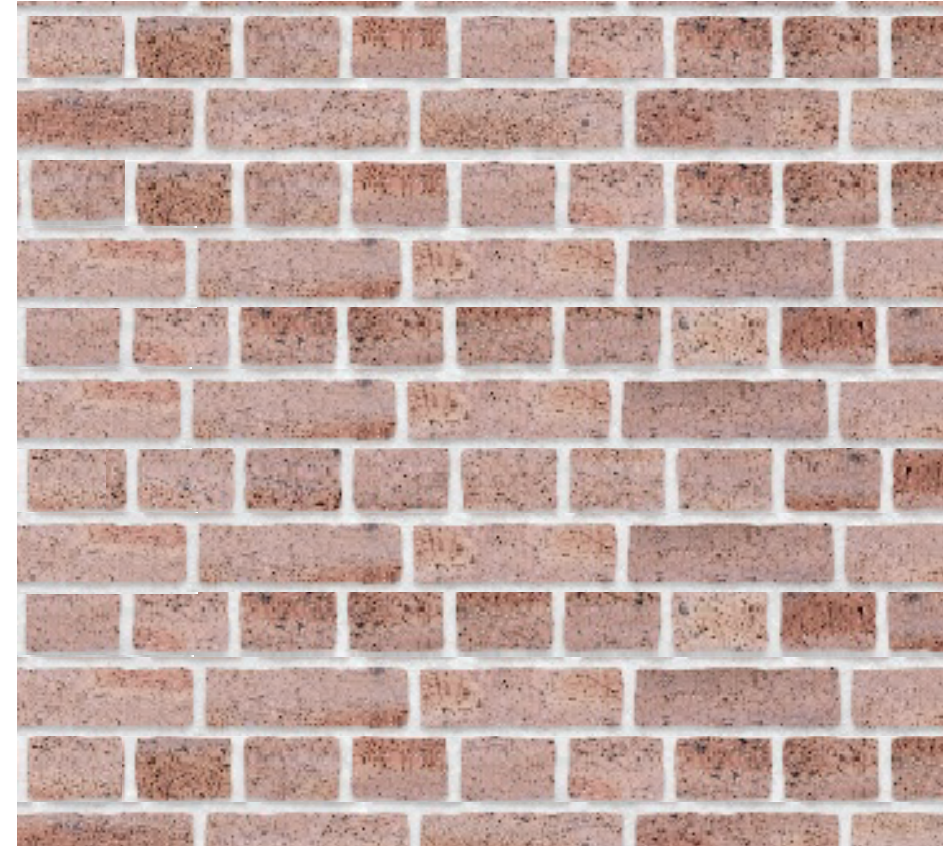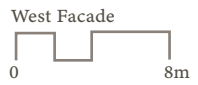
Used brick pattern

This image shows the Dutch bond (or English cross bond) that is used in the building. The bricks have different shades to create a connection with the existing buildings. This is because the bricks on the existing buildings are old which is visible in the facade. By using bricks with different shades a similar effect can be created in the new building.

Building - Elevations

20500 + Roof
17120 + Ceiling
14660 + Ceiling
10440 + Ceiling
7120 + Ceiling
3800 + Ceiling
P = 0.00

North Facade

20500 + Roof
17120 + Ceiling
14660 + Ceiling
10440 + Ceiling
7120 + Ceiling
3800 + Ceiling
P = 0.00

West Facade

0   8m

17120 +
Ceiling

14660 +
Ceiling

10440 +
Ceiling

7120 +
Ceiling

3800 +
Ceiling

P = 0.00

South Facade

0   4m

17120 +
Ceiling

14660 +
Ceiling

10440 +
Ceiling

7120 +
Ceiling

3800 +
Ceiling

P = 0.00

East Facade

0   4m
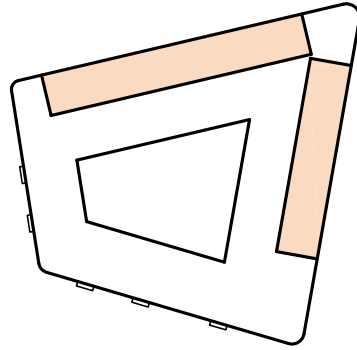
Sophia

- Spends most of her time outside
- Prefers the urban environment
- Close to the active center
- Budget-conscious individual with a limited capital
- Prefers to pay for specific experiences
- Smaller dwelling
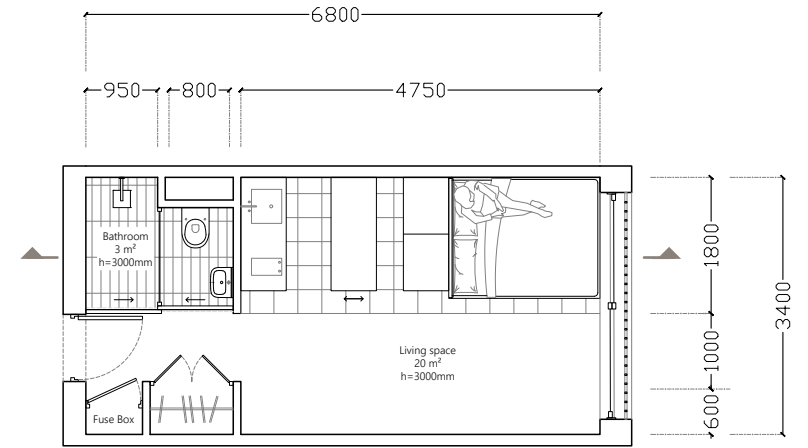- No demands on dwelling layout

Functional adventurer

- 23m²
- In total there are 76 dwellings of this type
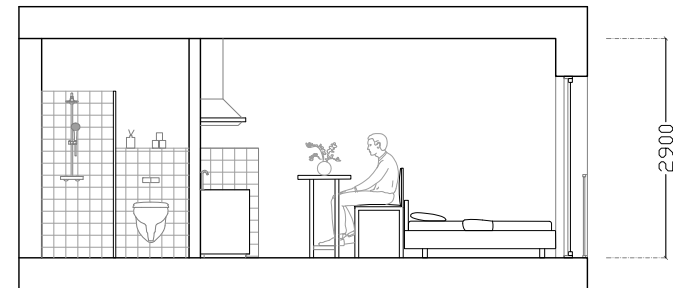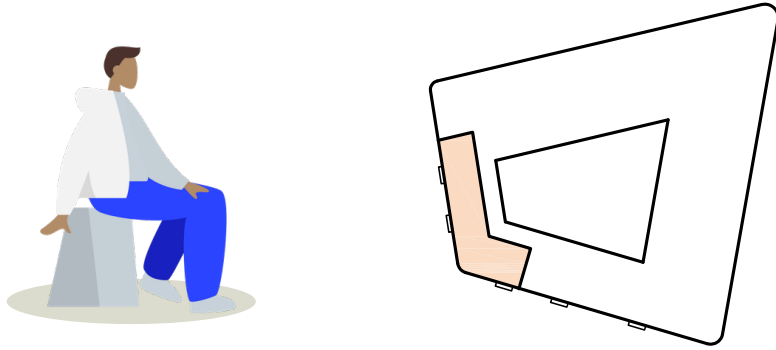- This type makes up 70% of the total dwellings in the building.
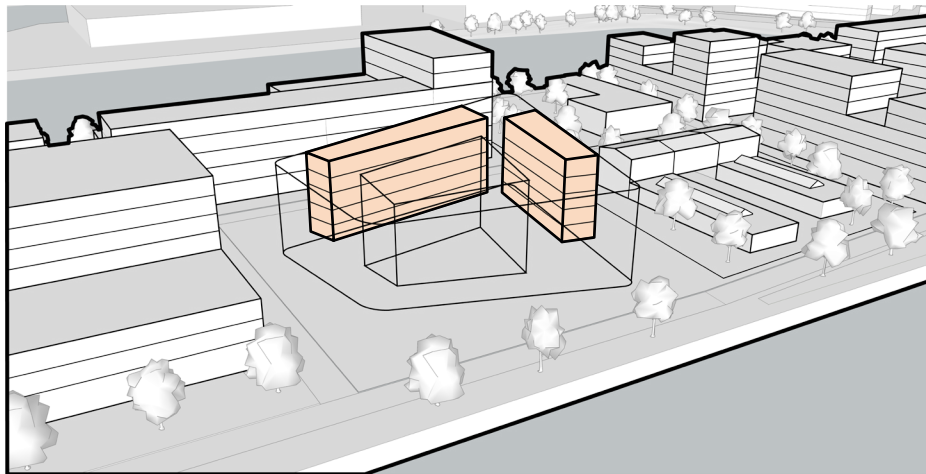
Dwelling section
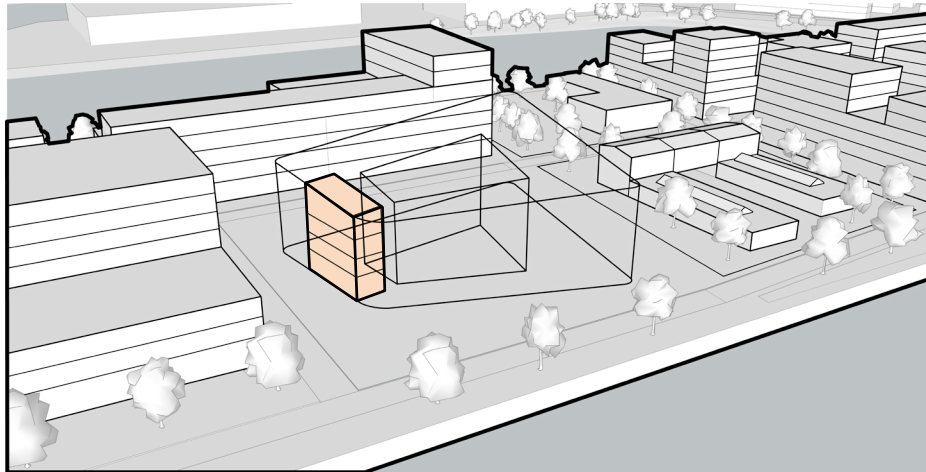

Functional adventurer

Noah

- Spends most of his time inside
- Prefers the suburban area
- Space for their stuff and guests
- Extra office space
- Larger dwelling
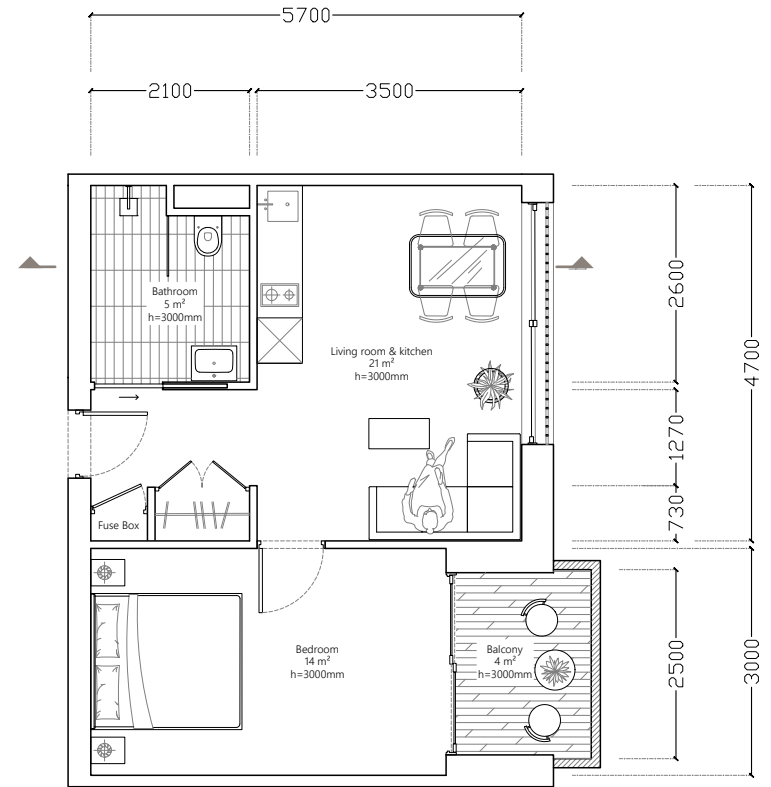- Needs a private outdoor space

Functional adventurer

- 44m²
- In total there are 7 dwellings of this type
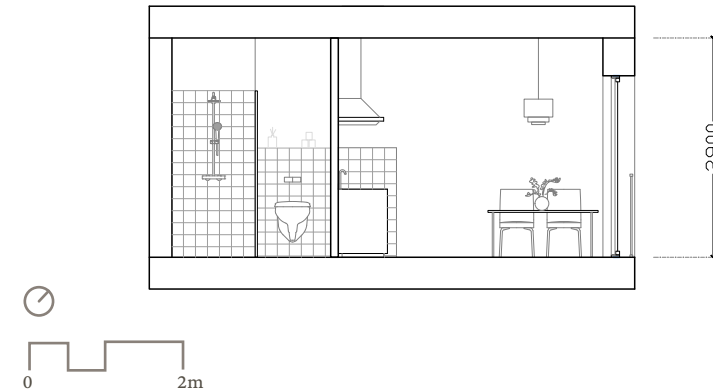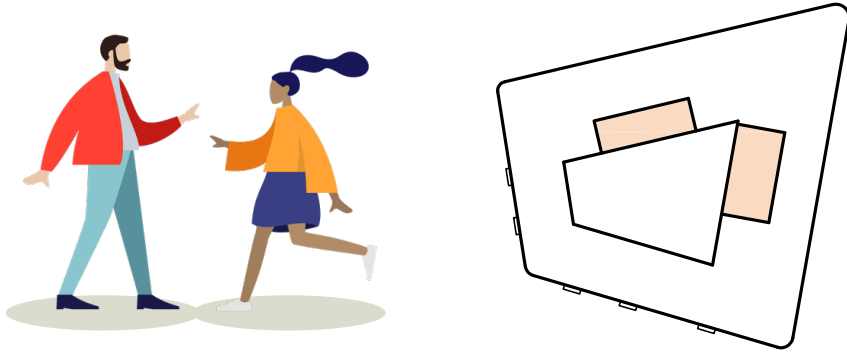- This type makes up 6% of the total dwellings in the building.

Bathroom
5 m²
h=3000mm

Living room & kitchen
21 m²
h=3000mm

Fuse Box

Bedroom
14 m²
h=3000mm

Balcony
4 m²
h=3000mm

5700
2100
3500
2600
4700
1270
730
2500
3000

Solid homebody

2900

0   2m

Alex

- Couples living apart together (LAT) have an intimate relationship but live at separate addresses
- Indivual wants to keep their freedom and privacy
- May have a guest or be absent for a few days a week
- Needs extra space for a guest

LAT relationship

- 26m²
- In total there are 14 dwellings of this type
- This type makes up 13% of the total dwellings in the building.

LAT relationship

Advanced Housing Design Graduation Studio
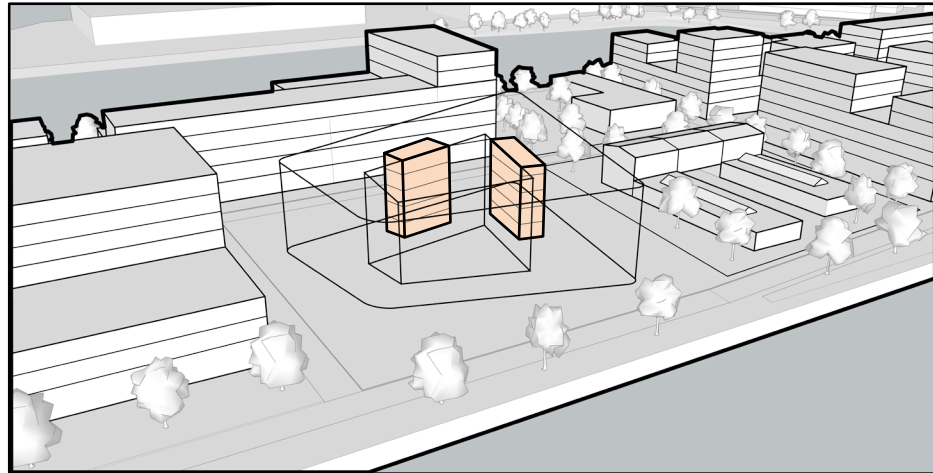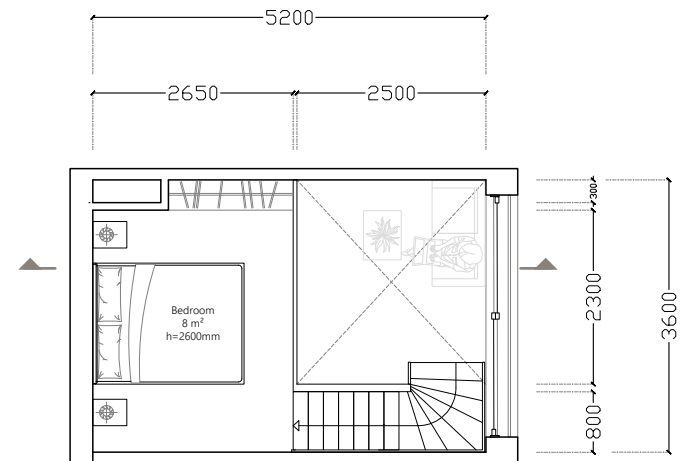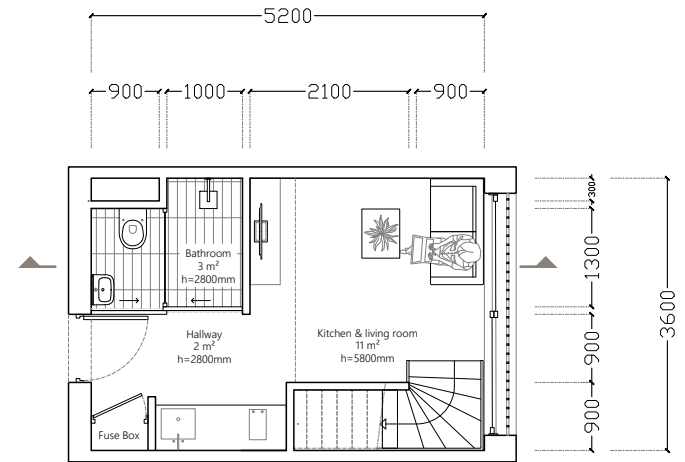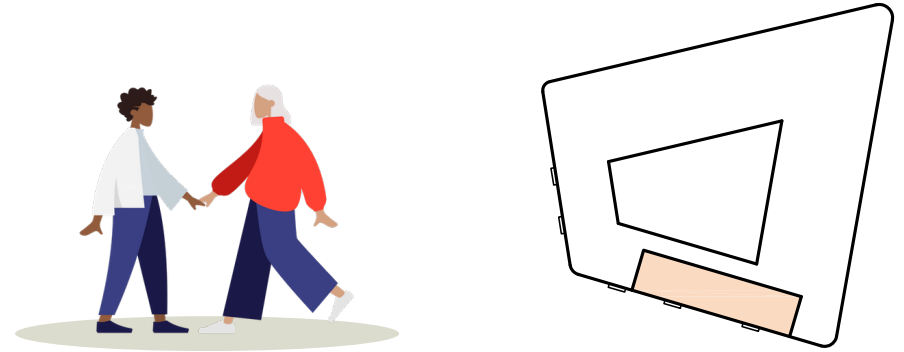
Zoë & Rosie

- Two-income household
- Two separate bedrooms
- Shares tasks and responsibilities
- Needs a shared outdoor space
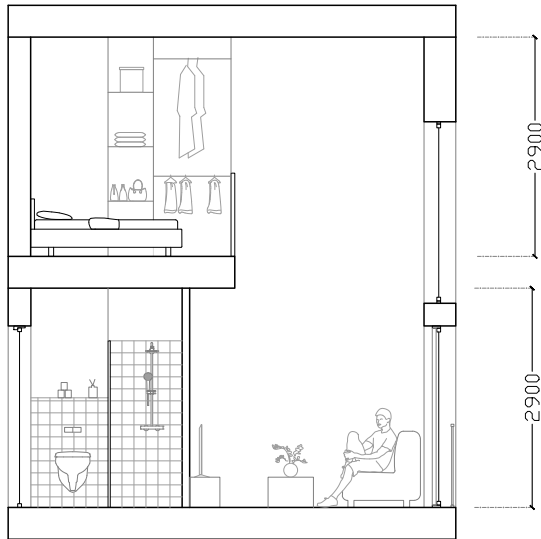- Dwelling should allow communal activities as well as assure individual privacy.

Friends

- 70m²
- In total there are 12 dwellings of this type
- This type makes up 11% of the total dwellings in the building.

Friends

2900

2900

0   2m

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Dwelling floorplan

Bathroom
3m²
h=3000mm

Wardrobe
3m²
h=3000mm

Bedroom
13m²
h=3000mm

Toilet
2m²
h=3000mm

Kitchen
11m²
h=3000mm

Balcony
4m²
h=3000mm

Living room
18m²
h=3000mm

Fuse Box

Wardrobe
3m²
h=3000mm

Bedroom
13m²
h=3000mm

Bathroom
3m²
h=3000mm

5700
900
850
3750

1800
1550
2300
600
2145
600
1600
1800

3500
2500
2745
3500

13000

2900

0   2m

0   2m

Building floorplan - Load-bearing structure

0   8m

Load-bearing structure

The load-bearing structure is created to allow flexibilty. The separation walls between the dwellings are made up of metal stud walls. This will ensure flexibility in the long-term and it allows the building to change the dwellings according to the demand.

Building technology - Load-bearing structure

— CLT roof

— CLT walls and floors

— Concrete ground floor

— Concrete base-ment level

Dwelling floorplan

3400

1800 — 1000 — 600

6800

4750

950 — 800

Fuse Box

0   1m

Building technology- Climate scheme

Summer

Winter

19670 +
Roof

17120 +
Ceiling

14660 +
Ceiling

10440 +
Ceiling

7120 +
Ceiling

3800 +
Ceiling

P = 0.00 +

CLT floor

CLT load-bearing wall with
brick cladding

Collecting rainwater

Sewerage
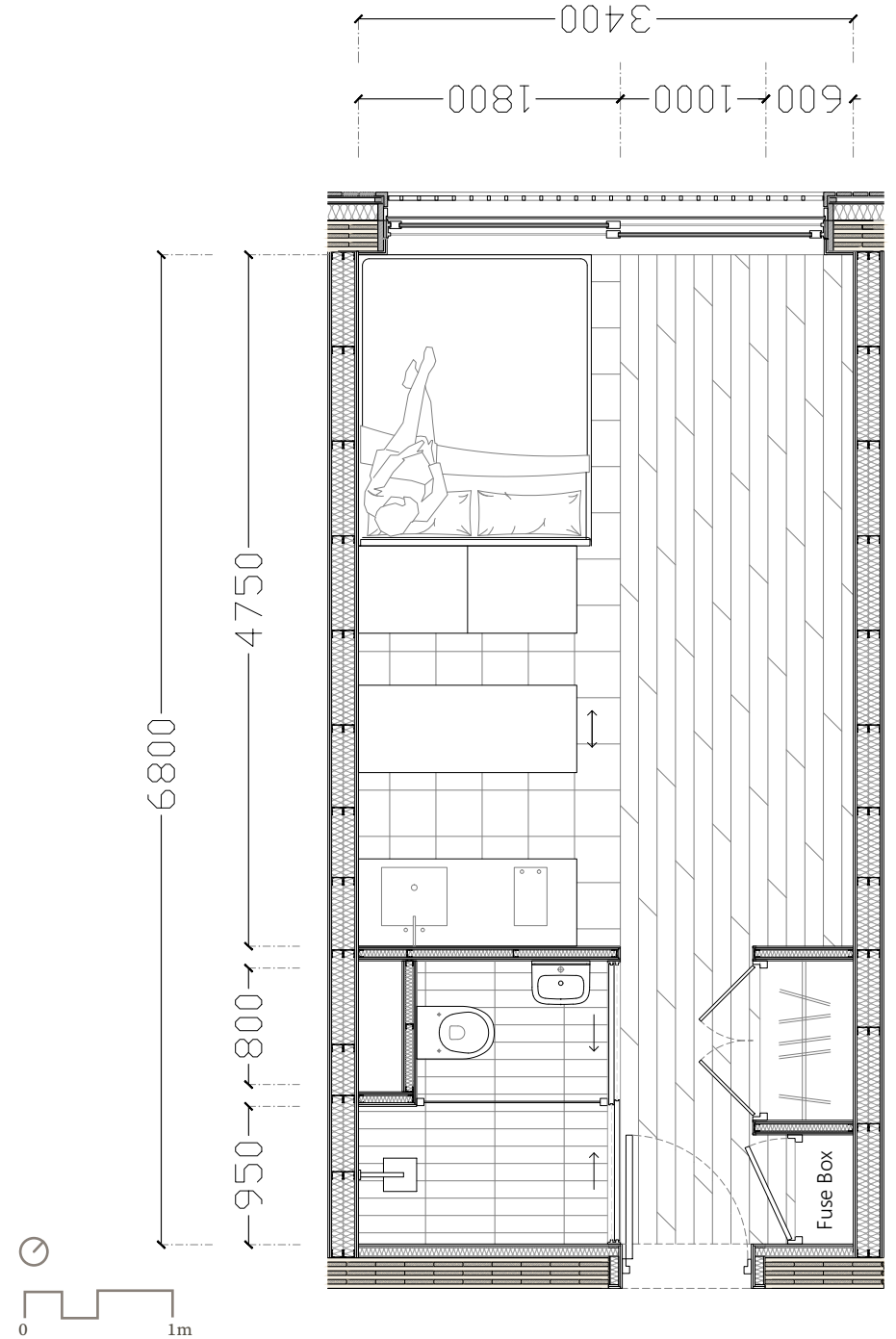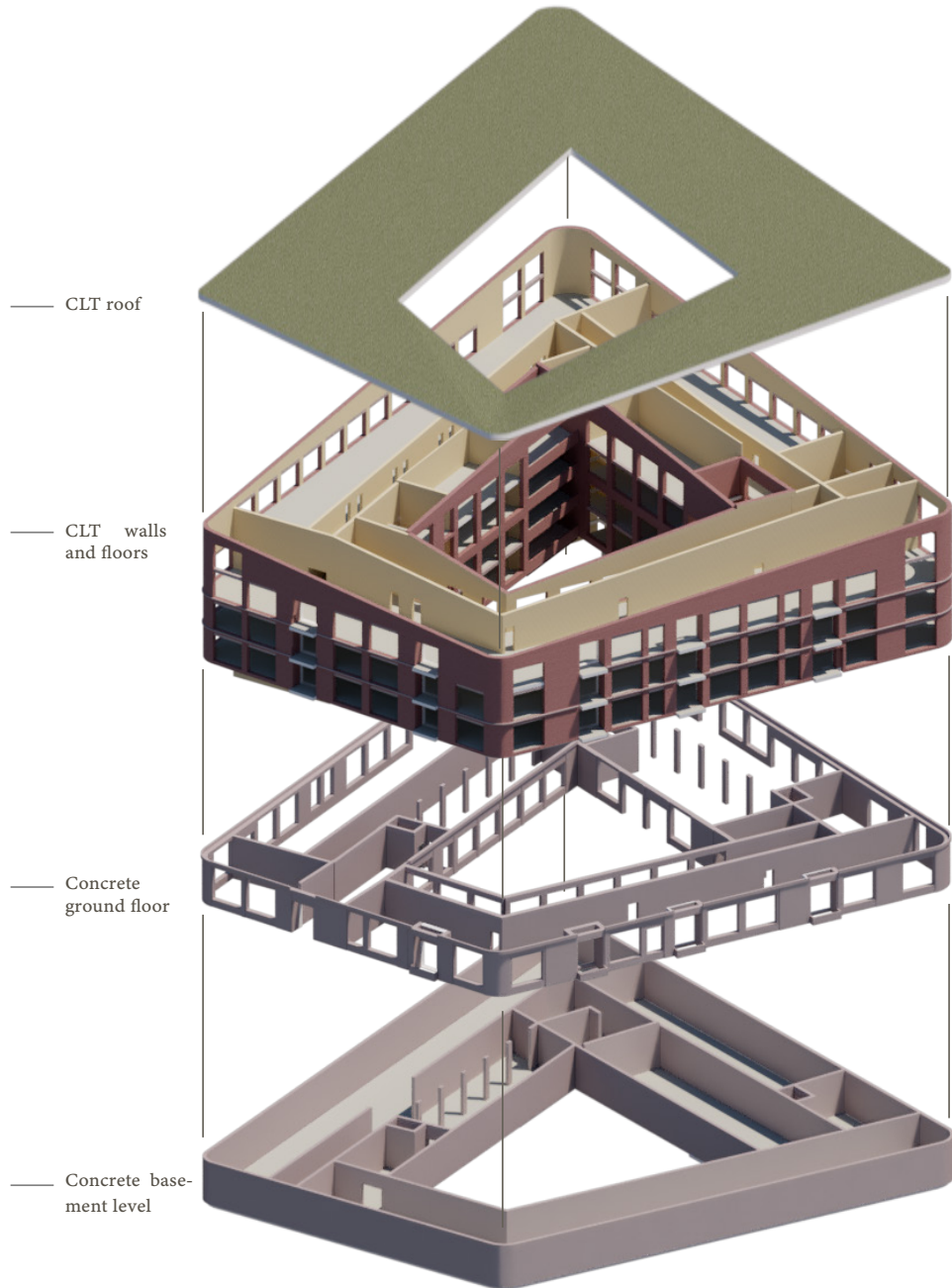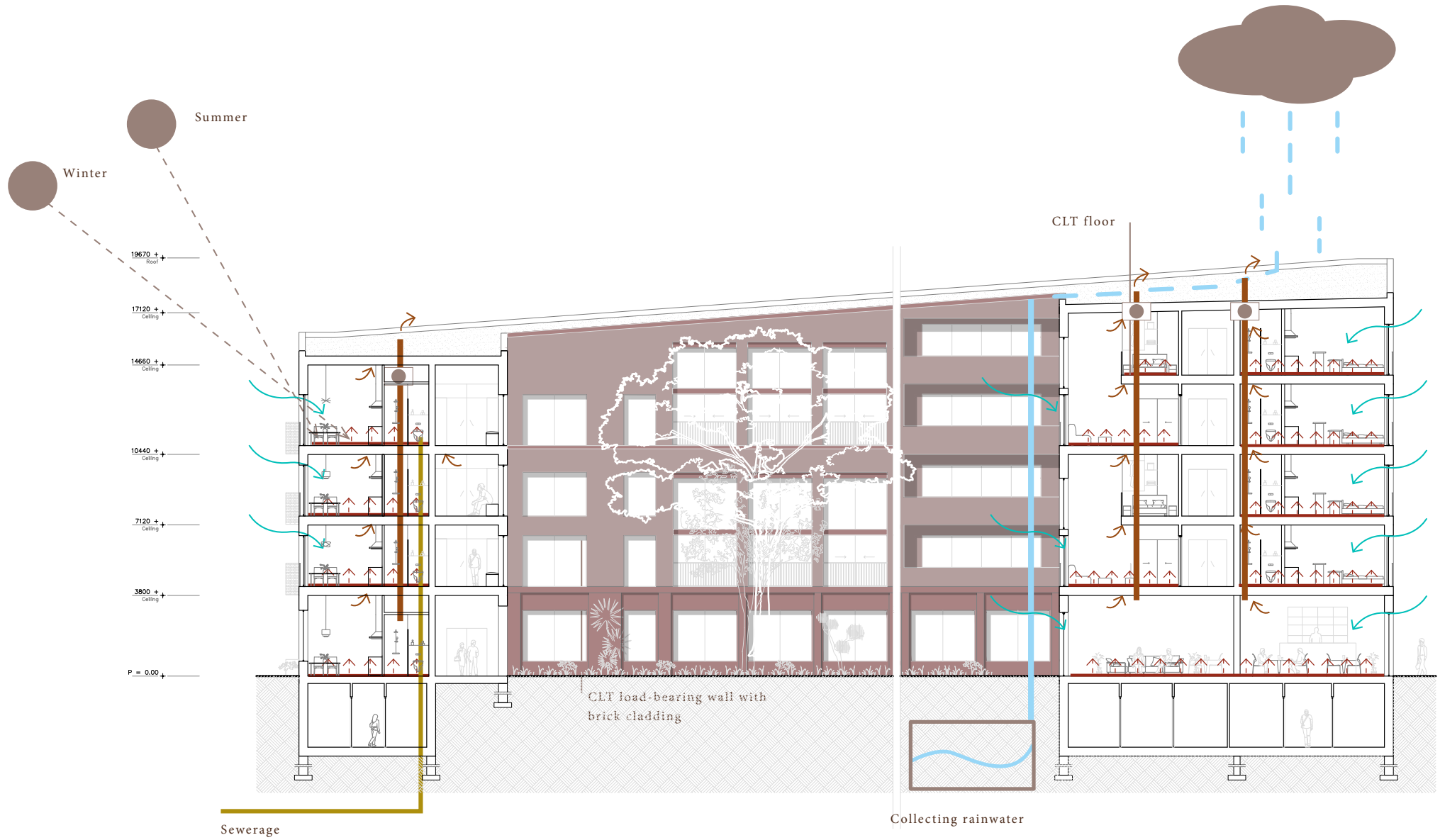
March 21st
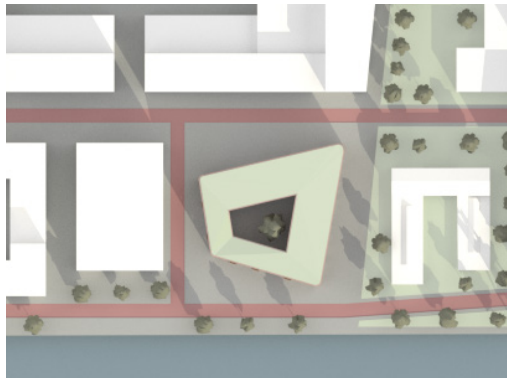
9:00
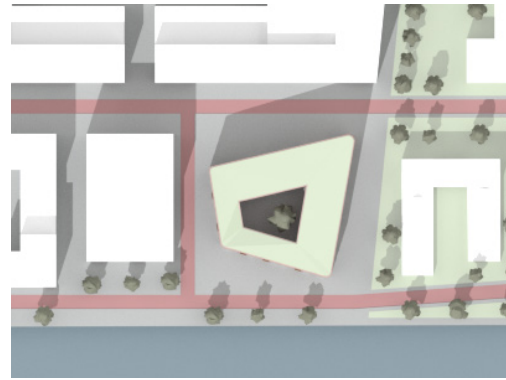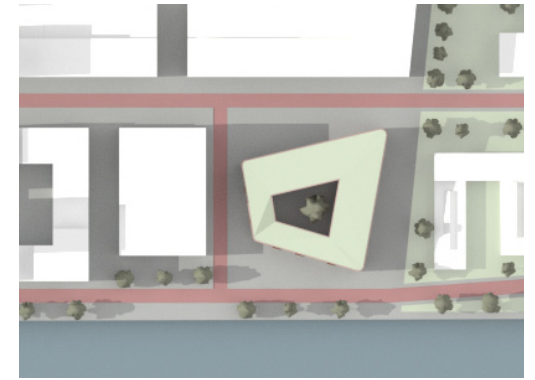
12:00

16:00

June 21st
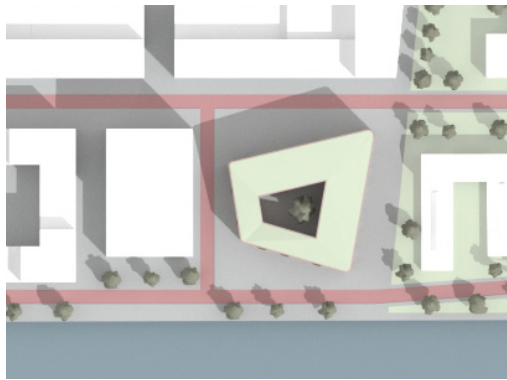
9:00
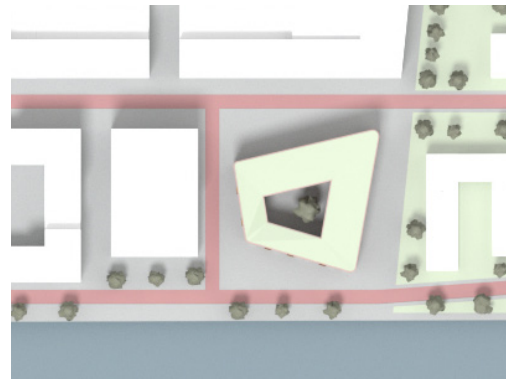
12:00
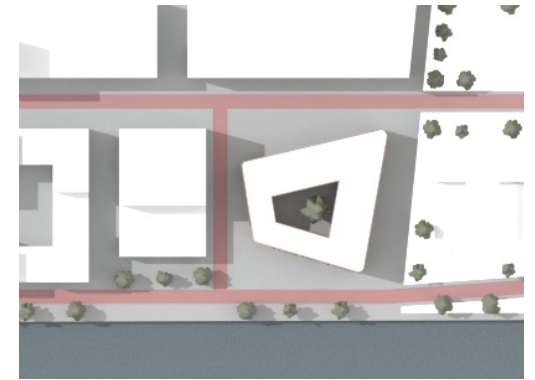
16:00

December 21st
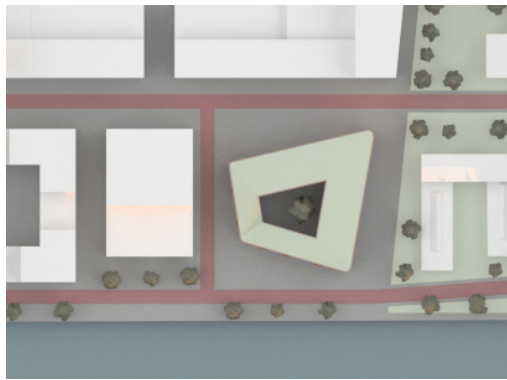
9:00
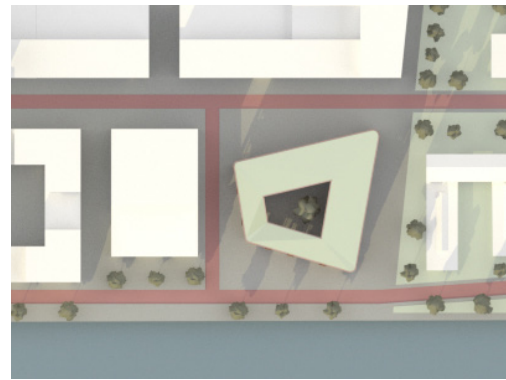
12:00
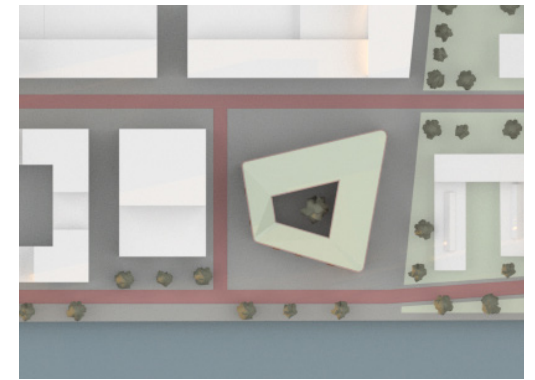
16:00

Building technology - Assembly facade

1. Window
2. Screen
3. Holonite sill
4. Insulation
5. Wind and weather proof structural panel, siniat Duripanel
6. Vertical timber panels with air cavity
7. Siniat bluclad
8. Brick slips

9. Balustrade

510

4600

420

2900

420

0   1m

0   1m

Roof

Vegetation
SDS extensive substrate
FL 150 filter layer
SedumDrain water reservoir & drainage layer
PL 300 protection layer
Root-resistant waterproofing
120mm insulation
Vapour control layer
CLT 230-5s, 230mm

Floor

10mm Floor finish
50mm Concrete screed with floor heating
Damp proof membrane
30mm Impact sound isolation
100mm Lime chippings filling, bonded with Köhnke K101
CLT 230-5s, 230mm

Holonite sill

Holonite finish 20x340mm

Facade

25mm Brick slips
Glue system
10mm Siniat Bluclad
30mm Air cavity
Waterproofing sheet
10mm Wind and weather proof structural panel, Siniat Duripanel
110mm insulation
CLT 210-5s, 210mm
2x 12.5mm Plasterboard

0   400mm

0   400mm

Building technology - Facade detail

Joint finish
Metal stud MSH
Insulation tape

Partition wall

2x 12.5mm Gyproc Plasterboard
2x 75mm Rockwool insulation
2x 12.5mm Gyproc Plasterboard

Dwelling
Hallway

PF Felt

Load-bearing wall

2x 12.5mm Gyproc Plasterboard
60mm Rockwool insulation
10mm PF Felt
CLT 210-5s, 210mm
Envirograph TCW Fire Protection Top Coat

0
400mm

Reflection.

Table of contents of the reflection

Introduction

Modern society is changing as people tend to keep more to themselves rather than interact with strangers. While the number of solo-dwellers is rising in the Netherlands, the number of people who express to feel lonely also rises. My research and design process aimed to find a design strategy to incite moments of social encounters. Different research methods were used to explore this topic: historical research, literature research, case study research, and research during my designing process.

The purpose of this reflection paper is to demonstrate the relationship between my research process and my design. I will explain how each method influenced my research.

Aspect One

The relationship between research and design.

Historical research

The first part of the historical research was about the co-living trend. This part helped me to get an understanding of why people opted for the co-living housing scheme. The history of co-living was important to understand for many reasons.

Firstly, by understanding the reasoning behind the co-living trend I can anticipate if this trend will continue in the future. This is because if the co-living trend was mainly done out of necessity due to high rent and low wages then I could reason that this housing scheme is not favorable. It was merely preferred because it was an affordable option.

The second reason was to examine how the co-living trend developed. I found out that there were many different co-living schemes such as the "Falanstere", the central kitchen, the boarding house, the hippie commune, the 'bofælleskab' (Danish cohousing communities), the self-work model, the "second half of life", and the contemporary co-living model. The boarding house and the central kitchen were mainly done because it was a more affordable option. Also, this scheme relied on paid staff. In contrary to the self-work, this scheme was formed because the residents wanted to build a community that shared responsibilities. They did not rely on paid staff but worked themselves. By relying on the people themselves to work you are not taking into account that diff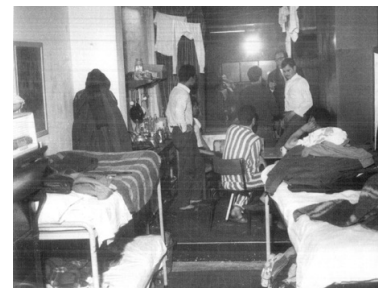erent people could move in. The only way this self-work scheme can succeed is when the residents are involved in deciding who can move into the building.

The last reason is that I could study how the collective character of the precedents developed. In many cases, I found out that eventually buildings were changed and lost their collective character.

Boarding house for guest workers in 1966 in Amsterdam, the Netherlands (Vogel, 2005).

This was because restaurants closed, or private kitchens were later built in the dwellings, or new tenants with different views and lifestyles moved in. It

Stacken in Gothenburg, Sweden (Vestbro, 2014).

is very important for my design to understand what the possible downfalls could be for my building. The only way to find out is by studying precedents.

The second part of the historical research was about the history of the solo-dweller. It is important to find out how the solo-dwellers developed. I found out why people decided to live on their own. By understanding why people choose to live on their own I can understand the mentality of the solo-dwellers. This is helpful to define the characteristics of a solo-dweller and thereby their needs. Moreover, it helped to predict future developments for the solo-dwellers.

How did this influence my design?

From this part of the research, I found out that the degree of shared facilities determines the collectivity within a building. Furthermore, the way the building can withhold through time is by making it suitable for different types of people with other lifestyles. Therefore, in my design, I did not limit myself to one type of solo-dweller. Instead, I created four profiles of different solo-dwellers with different lifestyles. The history of the solo-dweller helped formulate the characters and their needs as they are people who want to invest in themselves and remain
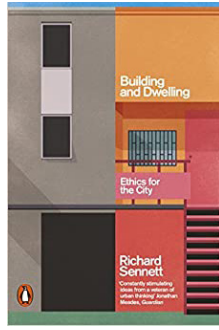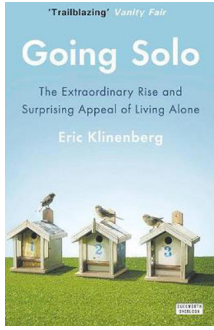
Some research materials used in this paper.

independent. Therefore, it is important to ensure their sense of independence while sharing facilities.

Another important design requirement for my building is to ensure residents' participation in the communal spaces. From the precedents, I found out that this can be done by not relying on a single communal activity such as cooking. By providing multiple different communal spaces, such as cooking, working, and leisure activities, there are more chances for the residents to meet.

Literature research

Literature research helped me to answer most of my sub-research questions but it also inspired my research topic. The book of Richard Sennet *Building and Dwelling - Ethics for the city* (2018) inspired me as it gave an insight into the changes in social structures in society. It described how people behave in public and how they want to be shielded from strangers. Sennet mentioned how people are less inclined to socialize with strangers in today's society. While reading his book those words stuck by me because I am quite introverted myself and in public, I behave in a very similar way. However, I don't lack social interactions because I live in a house with my family of eight people. So when I go outside I seek a break from my busy household and want to spend some time alone. This change in behaviour is, therefore, beneficial for me because I do not want to socialize with strangers in public. This made me think of people who live alone and who actually go outside to seek social interactions. I started to think about how this can impact those people's mental health. Thus, this inspired me to study the topic of solo-dwellers and loneliness among this household type. Furthermore, the book of Eric Klinenberg *Going Solo: The Extraordinary Rise and Surprising Appeal of Living Alone* (2012) shows original data from more than 300 interviews with solo-dwellers. This book was especially very helpful for my research to understand the solo-dwellers and their needs. Reports such as *Woonwensen van eenpersoonshuishoudens* by BPD (2015) were useful for defining

the different types of solo-dwellers and their needs specifically in the Netherlands.

I rely heavily on literature research in most of my studies. This has positive and negative effects on my research. This is because everything I write down has to be backed up with reliable resources. This makes my research factually very strong. However, because I was so used to only mentioning the things I could back up with other reliable sources I limited myself to knowledge and information that already existed. I became afraid to include my input in my research paper. This became especially apparent from the feedback I got from my tutors. I made a lot of adjustments to my research to include my own findings. I decided to have more fun with my research by including more types of solo-dwellers and different storylines for each type. It is still difficult to move away from this habit that I created to simply stay factual in my research paper but this is definitely a step in the right direction. This habit is not translated into my design. I enjoy designing and I am never afraid to create my work.

The research method influenced my dwelling designs. This is because defining the different types of solo-dwellers and their needs determined how many different dwelling types I had to create and what facilities they had to have.
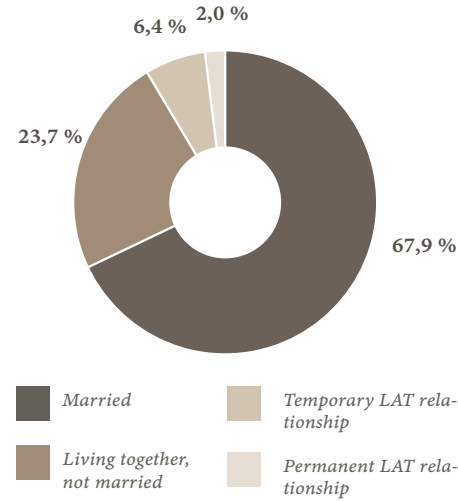
Figure 8. Types of relationships of partnered people aged 18-63 years old (CBS, 2013).

6,4 %   2,0 %

23,7 %

67,9 %

- Married
- Living together, not married
- Temporary LAT relationship
- Permanent LAT relationship

Sophia   *Alex*
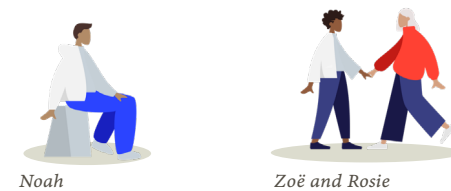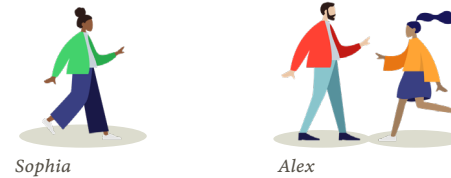
Noah   *Zoë and Rosie*

1. Sophia is a Functional adventurer
2. Noah is a Solid homebody
3. Alex is in a LAT relationship
4. Zoë and Rosie are Friends

Functional adventurer

The dwelling for Sophia is 23m² and is thereby the smallest dwelling compared to the other solo-dwellers. This is because she prefers a small dwelling because of her limited capital. She spends most of her time outdoors anyway. She just needs minimal facilities.
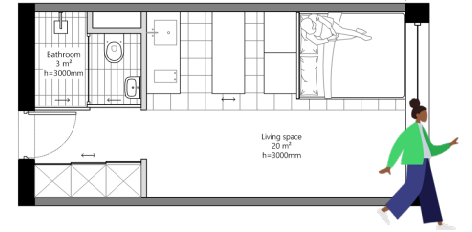
Solid homebody

The dwelling for Noah is 44m² which is almost double the size of Sophia's dwelling. This obviously comes with a higher price but that is not an issue for Noah. He spends much more of his time in his home which is why the higher price is worth it for Noah. He prefers to keep his bedroom separate from his living room because he invites his friends over often. Furthermore, Noah does not go outside very often. This is why he loves to have a private outdoor space where he can hang out and get some fresh air.
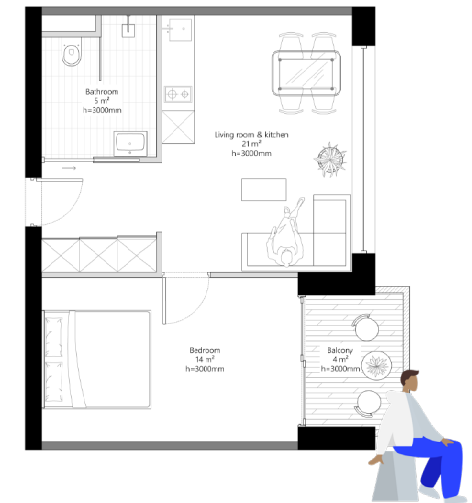
LAT relationship

The dwelling for Alex is 26m² which falls in between the previous two solo-dwellers. Alex is in a relationship and spends a lot of his time at his girlfriends' house and she spends a lot of her time at his house. Even though Alex is in a relationship he wants to keep his individual freedom by living on his own. He does not need a lot of space as he spends a lot of time away. On the other hand, he needs more space than Sophia because he has his girlfriend sleeping over at his place. Therefore, the best solution for him was the loft-style dwelling. This separates the bedroom from the living space.

Friends

The dwelling for Zoë and Rosie is 70m² which is the largest dwelling type. The girls wanted to live on their own but share common spaces with each other. This allows them to live in a larger dwelling and share costs. To ensure their privacy they, both have their own bathroom and large closets that can double as storage space. The girls share outdoor space, storage, a toilet, kitchen, and living room.

To combat loneliness among solo-dwellers, I wanted to look into co-living design strategies. Co-living buildings are centered around sharing facilities and can only work if the residents participate. The co-living buildings have design strategies that will ensure that residents participate in the communal spaces and thereby have social encounters. The article of Joanna *Williams Designing Neighbourhoods for Social Interaction: The Case of Cohousing* (2005) was very insightful. In this article, she defines elements that influence social interactions in cohousing design. This was useful for my case study research as well as my design. Before I could start with my case study research, I had to understand what exactly I was going to focus on. The literature research helped define the key elements I could focus on. These key elements were density (proximity), layout, division of public and private spaces, and the quality, type, and functionality of communal spaces (Williams, 2005). Furthermore, it helped define the criteria for my design.

Proximity between residents help to form social relations. Illustration by author.

Using buffer space between the private and public domain. Illustration by author.

Clustering the dwellings to create smaller communities to maximize the use of communal spaces. Illustration by author.

Case study research

The case study research helped me to figure out the design strategy that is used in other co-living buildings to enable social encounters. It also inspired certain concepts in my design. For instance, the Tietgen dormitory clustered 12 dwellings together in one community. The clusters all have four communal spaces on one side and all the dwellings on the other side. You are immediately confronted with the communal spaces as you walk towards your dwelling. The communal spaces have glass doors to create a visual connection with the residents in the hallway. Furthermore, by looking at four case studies I could compare the design strategies and see either similarities or differences. The use of buffer zones between the private and public domains was present in all four
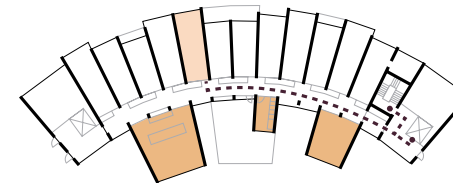
case studies. This influenced my design as I implemented gradients in my building as well. In the case studies, this is mostly done by reducing the accessibility of the communal spaces as you move further into the building. An example of this is seen in the Tietgen Dormitory. On the ground floor, there are communal spaces for all the residents in the building. As you move further in the building the communal spaces become accessible to smaller communities. The elevator and staircase can be used by the two adjacent clusters from all the different floors. And then on each floor, the communal spaces are only accessed by the residents in the clusters.
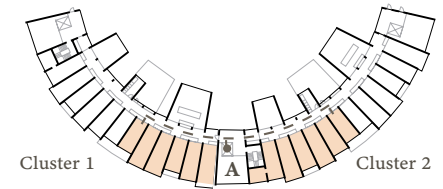
Cluster 1   Cluster 2

The paths of the residents of both clusters cross in entrance A. Illustration by author.
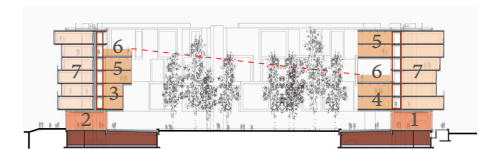
Tietgen Dormitory section

Legend

Private dwelling
1   Private dwelling

Communal space for cluster
2   Communal space

Communal space for entire building
3   Day nusery
4   Childbirth clinic
5   Communal office
6   Conference room
7   Cafeteria
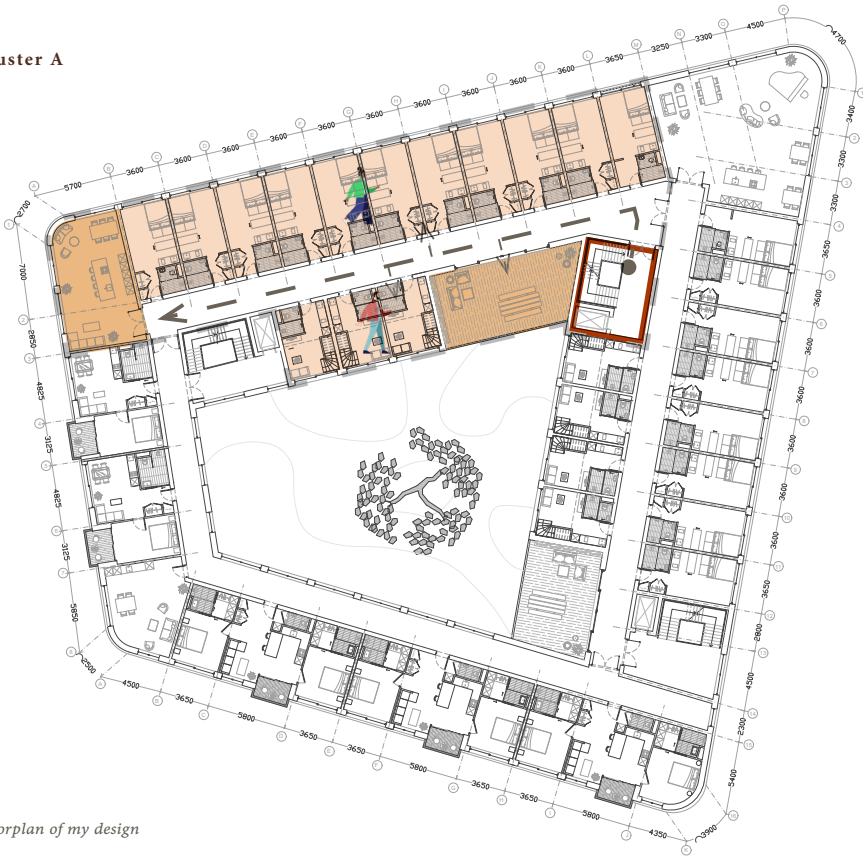
Floorplan of my design

How did this influence my design?

My design was especially influenced by literature research and case study research. The literature research provided an overview of important design elements that I needed to take a closer look at. It also provided the theoretical framework regarding design elements such as density (proximity), layout, division of public and private spaces, and the quality, type, and functionality of communal spaces (Williams, 2005). The case study analysis works hand in hand with the literature research. The four case studies allowed me to see how these design elements were incorporated in previous co-living buildings.

Firstly, to ensure that the scale of the building does not affect the participation of the residents in the communal spaces, it is important to cluster the multiple dwellings together. In my design, the floor plan can be divided into three clusters. All the clusters have two types of solo-dwellers. Cluster A and B combine Functional adventurers and LAT-relationship. These are combined because they have common needs such as more shared communal

spaces. The solo-dwellers that seek more independence from the community are in cluster C. This is the Friends typology and the Solid homebody. They prefer more individual space than communal spaces.

In my design, I decided to have two communal spaces for clusters A and B. There is a communal kitchen and living room, and communal outdoor space. When you enter the hallway of your cluster you are confronted with the communal spaces. Firstly, the communal kitchen and living room in located at the end of the hallway. The communal spaces all have glass doors as well. By doing so, it creates a direct visual connection with the residents in the hal
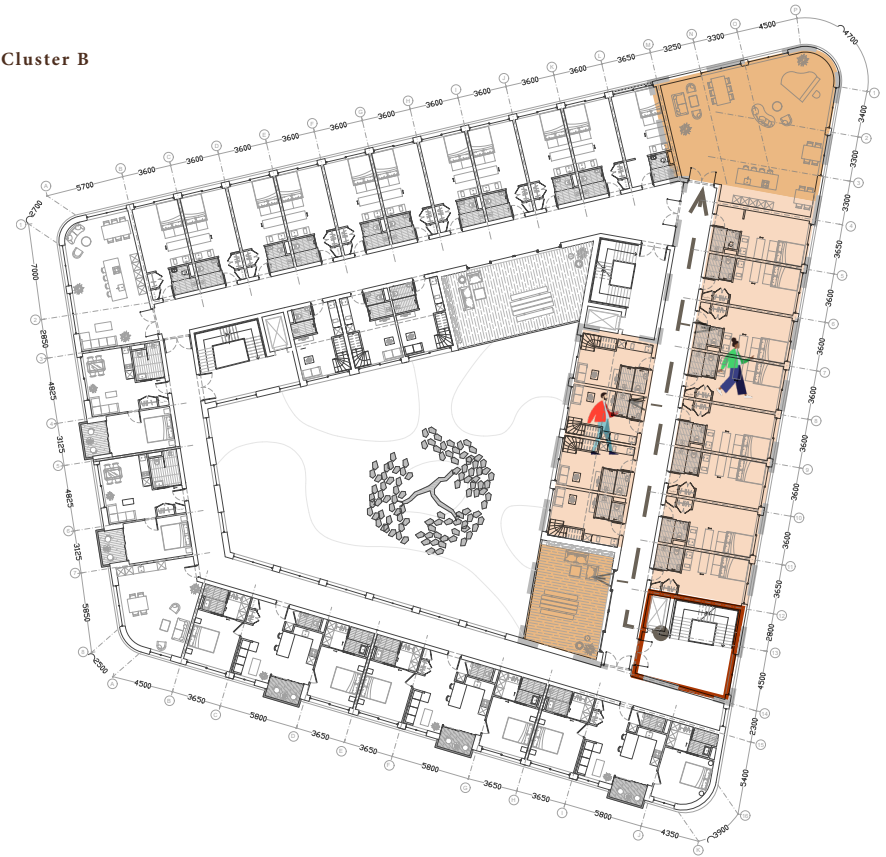
lway. Furthermore, the communal outdoor spaces are located either right across from the stairs and elevator or right next to it. This all increases the accessibility of the communal spaces which will increase the participation of the residents in these spaces.

The communal outdoor spaces of clusters A and B and the private outdoor spaces of cluster C are all oriented towards the South-east to ensure enough daylight. Furthermore, because the functional adventurer spends most of their time outdoors these dwellings are oriented towards the North.

Cluster C
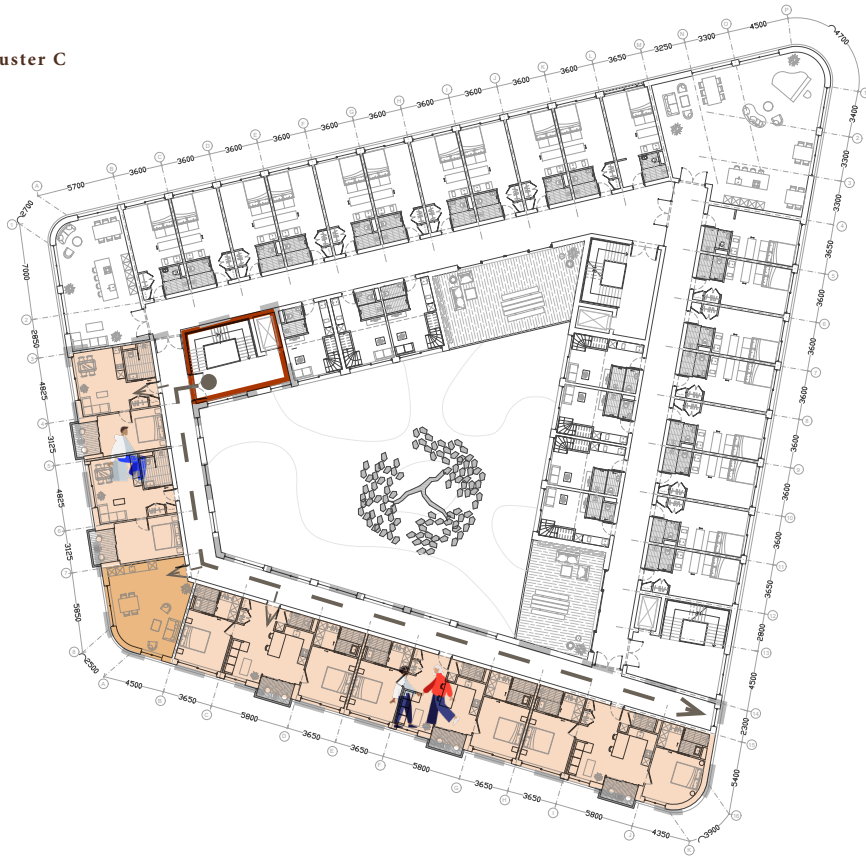
The hallway in cluster A

Communal outdoor space   *Communal kitchen and living room*

Section

Femme unit

$23,8m^2$

Functional adventurer

Bathroom
3 m²
h=3000mm

Living space
20 m²
h=3000mm

Terrace unit

$23m^2$

LAT-relationship

Bathroom
3 m²
h=2800mm

Kitchen & living room
11 m²
h=5600mm

Hallway
2 m²
h=2800mm

Bedroom
8 m²
h=2600mm

To continue, the case study research was extremely helpful for the dwelling floorplans. Two of the four case studies that I analysed were in Seoul, South Korea. There are many examples of micro-apartments in South Korea. The culture in the Netherlands, however, is completely different than in Korea. The apartment size in Songpa Micro-housing for example was about 11m2. For the Netherlands, this is very small. For this reason, I was very hesitant to use these dwelling types in my design. This case study was still very useful because of the flexibility in the programme and the use of different communal spaces.

The Treehouse case study, on the other hand, was very useful for my dwelling design. The sizes of these dwellings are still minimal but applicable in the Netherlands. The layout of the dwellings is simple but still contains all the necessary facilities. This is done
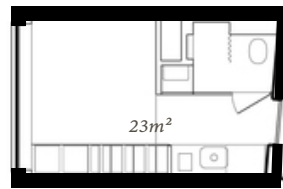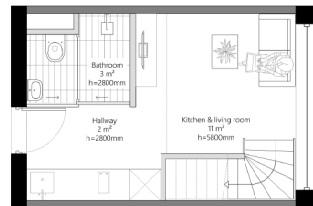
by designing furniture with built-in storage spaces. For the Functional adventurer, the Femme unit of Treehouse was used as a reference. Furthermore, for the LAT-relationship the Cat unit of Treehouse was used as a reference.

Aspect Two

Relationship between graduation topic, studio topic and master programme.

My research topic is about young solo-dwellers and the co-living trend. As the number of solo-dwellers is rising in the Netherlands, there needs to be more focus on studying their living arrangements and thereby their needs. During my research, I found out that loneliness and social isolation, especially among solo-dwellers, are important issues in today's society. As an architect, you cannot claim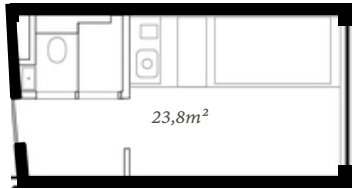 to solve mental issues and overestimate the impact design has on them. Human behaviour is influenced by personal, informal, formal, and physical factors. Physical factors (layout, communal facilities) encompass the role of architecture in behaviour. Other factors are personal factors (personality traits, social class, culture, religion, education, family), informal social factors (financial resources, time, and health), and formal social factors (policies, social structure, organized activities) (Williams, 2005).

In my research, I aimed to get a proper understanding of design elements used to stimulate social interactions between residents. By inciting social interactions, and thereby social relations, the proposed issue of social isolation can be minimized in a building. In today's society, loneliness and social isolation is a growing issue. From my research on the topic of solo-dwellers, co-living, and combating loneliness I wanted to have a better understanding of what role I can have as an architect, to create the most optimal environment for the residents to meet and interact with each other.

Aspect Three

Research method and scientific relevance.

My research is primarily based on qualitative methods. I choose to start my research by describing the societal changes. This was an important part of my research because I needed to understand why the number of solo-dwellers is rising. This is important because then I could predict whether this trend will continue to rise. Thus, I could find out if this research will be beneficial in the future. Furthermore, quantitative research and data were used from governmental institutions to understand the demographic changes in the Netherlands.

With the help of literature research, I aimed to understand the co-living trend and who the solo-dweller is, and what their needs are. Vestbro has written many publications about the co-living trend that were used in this research. The article of Williams (2005) *Designing Neighbourhoods for Social Interaction: The Case of Cohousing* was used to formulate design requirements for the solo-dweller. Moreover, the book Eric Klinenberg *Going Solo: The Extraordinary Rise and Surprising Appeal of Living Alone* (2012) was a very reliable source to understand the rise of the solo-dweller as well the solo-dweller themselves.

My research paper is based on a multitude of reliable sources which had both its positive and negative sides. This is because I am used to only stating information about things of which I can find a reliable source. I always believed that this was the only way to write a research paper. From my feedback from the tutors, however, I released that this negatively impacted my research as well. I was very hesitant to include my findings in the research paper. My graduation research paper was not like previous researches I had done. This was quite hard to hear at first as I understood that I had to make a lot of changes to my research paper. This bad habit of being afraid to include my findings in my research was quite hard to get rid of. This is something that I need to keep working on but I believe that I made quite an improvement.

My case study analysis was very helpful because I was able to recognize important design elements in co-living buildings. While designing my building I used my four case studies as a reference. I used the case studies to create different dwelling units for the solo-dwellers. Furthermore, I used them to understand how the public space should relate to the private spaces and the spaces in between. Therefore, the case study analysis on many levels inspired my current design.

Aspect Four

Transferabilitiy of the project results

I choose my research topic because it is a current issue. The solo-dwellers is the largest growing household type in the Netherlands. And there are still many misunderstandings concerning the rise of the solo-dwellers. In my research, I discussed the reason why people decide to live on their own. This is not a sign of a social problem in contemporary society. People choose to live on their own due to economic development and social security. Be that as it may, the issue of social isolation and loneliness among all household types in our society is growing. Of all the household types, the solo-dwellers are most susceptible to social isolation. In the field of architecture, this means that it is important to question the current traditional solo-dwellings and its facilities. Co-living design strategies provided a different perspective on how to design to improve social connections. This perspective was beneficial for looking at ways the solo-dwelling and its environment can improve.
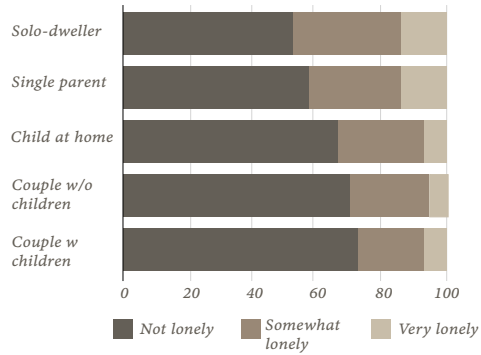
Loneliness among different household types in the Netherlands. Illustration by author based on information from CBS (2019).

Aspect Five

Ethical issues and dilemmas

My research methods were reliable and from that, I did not encounter any ethical issues. A dilemma I had during my research was that I lacked my own input in my research as I mentioned in aspect Three. Another dilemma I had was when I had to find my case studies. My case studies are Tietgen Dormitory, Songpa Micro-Housing, Kalkbreite, and Treehouse. Two of the four case studies are located in Seoul, South Korea, and the other two are located in Europe. As the culture, and thereby mindset, in South Korea is very different from the Netherlands I was hesitant to analyse those case studies. I doubted that I could use those case studies as a reference because of this difference. However, the co-living trend in South Korea is slowly becoming a strong presence in the city of Seoul. They have greatly influenced the contemporary co-living trend. And those case studies ended up being a big inspiration for my design.
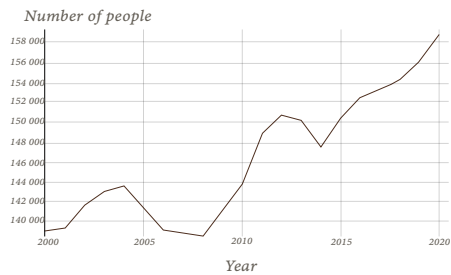
Total rising number of Solo-dwellers since 2000 in Rotterdam. Illustration by author based on information from CBS (2020).

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