SMALL LIVING, BIG COHESION

Stacked compact units for single-person households

P5 Project report

AR3AD100 ADVANCED HOUSING DESIGN
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This paper is part of a master's degree in Architecture at Delft University of Technology. It is addressing single-person households as they are found to be the most affected group from the current state of the Dutch housing market. This forms the relevance of this study and formulates the research objective.

The theoretical part describes the background of the problem from a market and a historical perspective. It further examines the needs, preferences and lifestyle patterns of this household composition and investigates 'compact' and 'live-work' as architectural notions. The design case analyses precedential building's circulation schemes, shared facilities and public/private threshold. The suitable living environment is defined as a live-work building with compact dwellings and shared facilities. The aim of the paper is to provide a design hypothesis for Building 7 for this target group located in the M4H area in Rotterdam. A conceptual design is proposed, but this section is still to be elaborated into a detailed design.

Key Words

Single-person households · Single person' behaviour · Single person' needs · Shared facilities · Self-contained housing · Compact housing · Live-work · Housing market · the Netherlands

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INTRODUCTION

The average household size in the Netherlands has shrunk by almost 50 per cent in the past 69 years. (Kamer, 2020) This doesn't imply that families have become on average two times smaller. In fact, the number of single-person households has been continuously increasing with women forming traditionally just a bit larger segment of this household type. (Kamer, 2020) Given that the prevalence of single-person households on a global scale is unprecedented historically, the reasons for the switch in household preference seem to be compound. Some of the most apparent ones are the globalisation, the high estate prices, the sharing economy, the emancipation, etc. but the extent of these reasons vary from country to country.

In the Netherlands, this household composition is nowadays very common and perceived as normal as it constitutes 38.5 per cent of the total private households. (CBS, 2020) This steady rise of single-person households over the years indicates an apparent change in the modern lifestyle. Extrapolating this trend, forecasts that single-person households would become even more popular in the future, forming an even larger portion of the household types distribution. This is also confirmed and predicted by the medium variant of the Dutch household forecast made back in 2000. (Faessen, 2002, p. 338)

Having said that, it is surprising that the housing needs of this household composition are currently often not met, and the suitable units are very scarce. The mismatch between the housing stock and the needs of the occupants has become a systemic problem in the Netherlands, especially pressing for the single-person household sector.

The single-person household or one-person household is a household that contains one person who lives alone; a person who makes provision for their own food and other essentials of living without combining with any other person to form a multi-person household. (OECD, 2013, p. 275) In this paper, the two terms will be used interchangeably.

PROBLEM STATEMENT

The supply of sufficient housing is often regarded as the biggest problem on the Dutch housing market. And since the answer seems so apparent - to just build more houses; the persistence of it indicates that it's a container problem and more complex to solve.

Consequent from the limited availability in the rented and the owner-occupied sectors along with the low mortgage interests, the prices increase. A joint mortgage or a joint tenancy of people with average income satisfies both the bank and market requirements. This, however, is not the case for single people and they often live in shared housing. In relation to this, a new term has arisen. The "economically homeless" (Rele, 2019) is someone who works or studies, but still cannot find a home. Those are most often young single people or people who have recently separated. Because the rent prices often exceed one person's strength, they fall homeless, live with relatives, rely on couch-surfing, or any type of provisional, yet unsatisfactory solution. So the policy making effect on the housing market and the economics of it leaves one group less supported than the others.

Again because the demand is high, for example, the large old apartments in the bigger cities are being transformed into smaller ones with compromises. It isn't unnatural to find studios with independent kitchens, yet a shared bathroom. This is the practical aspect of the shrinking of the household size we know from statistics. The dwelling stock is still largely orientated towards terraced and semi-detached houses (CBS-cijfers, 2016), which are typically for multi-person households. However, almost 40 per cent of all households are single-person ones presently and therefore, the large dwellings are becoming obsolete. So, the architectural dimension of the problem is that the lifestyle is changing faster than the housing stock can accommodate leaving the most up-to-date household type often living in dwellings that are not tailored for its needs.

Therefore, the most affected group and the target group of this research is the people who don't have ownership of property, live alone, are at the beginning of their career and/or have a middle income profession and/or need relatively short-term housing.

RESEARCH QUESTION

The housing crisis in the Netherlands is such that demand significantly outweighs supply to the point that there is no availability even of high-end properties for people who can afford them. Because of the nature of the problem the most affected group from the current state of the housing market are the people that rent a dwelling alone and have a middle income either because of their profession or because they are at the beginning of their career. The core research question is then based on this finding.

What housing environment is suitable to address the needs of single-person households with regards to shared facilities and dwelling typology?

The sub questions define the path towards the outcome of this research in the form of conclusions and design hypothesis for the design of a building targeted for single person households.

- What group needs urgent attention considering the current state of the housing market in the Netherlands?
- Is this group of people significant? And how did it emerge?
- What are their housing needs and preferences?
- How compact is compact?
- What is live-work?
- How to organise a building with shared spaces?

RELEVANCE AND POSITION

The foundation of this research is the problems that arise from the current state of the housing market for a target group that is discovered to be the most affected. Single-person households have been thoroughly investigated from a demographic and economical point of view. Yet, little is known in the Netherlands about their lifestyle patterns and housing preferences. This research performed a study on this although limited in its window of time and sample size. Nevertheless, it directs the attention to a very relevant topic for the present day - the architectural problems of current unsuitability of the dwellings for this evergrowing target group.

ETHICAL CONSIDERATIONS

The interviewees were voluntary respondents to an open invitation towards people living alone in the form of a post to participate in a short interview without monetization concerning their housing preferences. Their name, background, gender were not assessed. The survey was shared in the form of a link on several social media groups.

SOURCE ANALYSIS

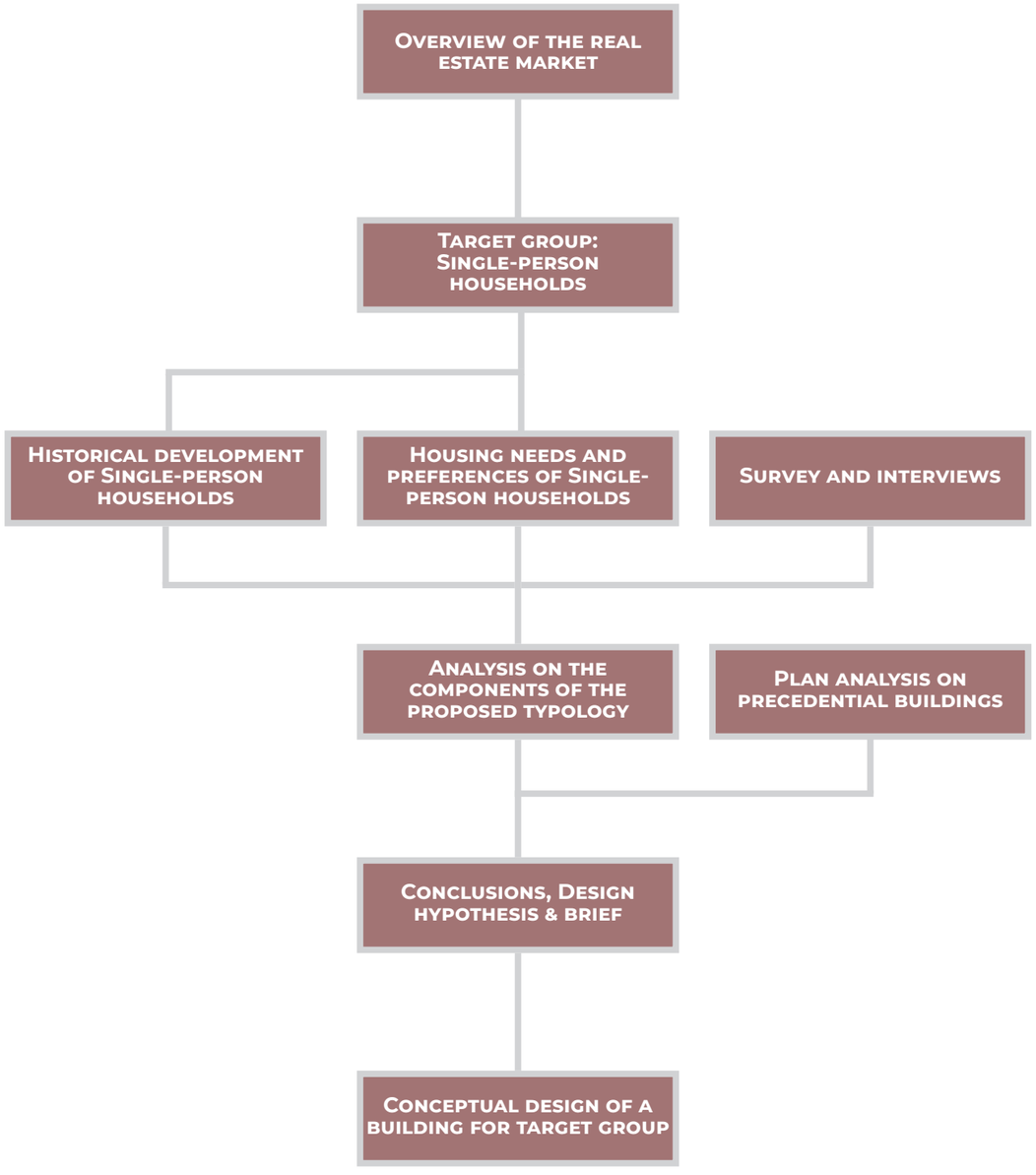
From a market, economical and demographic perspective single-person households are excellently researched. The available information is abundant from quality sources like banks, the Dutch government, statistical offices, and universities. Their needs for type of dwelling, price range, urban or suburban area, neighbourhood are extensively defined. A lot is known about how and where they currently live, what are their income, housing quote, borrowing capacity, type of dwelling, urgency to move, etc.

However, the architectural dimension of the problem isn't researched. Literature that investigates the spatial translation of their lifestyle wasn't found. This led to the necessity to perform a survey and interviews with young single-person households. The aim was to determine what their expectations are from the building they would like to live in. The literature study concluded that the young single-person households are on a tight spot financially and experience less social cohesion, hinting at co-housing and co-living housing solutions. Therefore, apart from the characteristics of the private dwelling, the focus of the survey and interviews was on the eagerness to share different types of facilities.

The architectural notions of 'compact' and 'live-work' have also been substantially researched. In fact, since the topics are architectural, but also somewhat philosophical, the information found was excessive because it was approaching the meaning of the notions from different points of view. This paper needed a general indication of what those notions represent in present times to give a direction to the design decisions that need to be made. In that sense, the literature in question wasn't reflected on too much in depth, instead a summary on the topics was sought. It is expected that when the design passes its initial phase additional research would be done especially with regards to the 'compact' notion.

No analyses were found on the precedential buildings. The available information for the case study varied from project to project, so several drawings had to be created from scratch, but all the floorplans of the buiging were found.

What housing environment is suitable to address the needs of single-person households with regards to shared facilities and dwelling typology?



METHODOLOGY

The methodological approach consists of three parts. The real estate market, the notion of single-person households, and the related architectural typologies were researched by secondary qualitative and quantitative data. The characteristics of their lifestyle and needs were defined by primary quantitative and qualitative data. Along with case study analysis, design parameters were set, which guided the development of a concept from an architectural perspective.

Related newspaper articles were taken as a starting point as a means to reflect on the Dutch contemporary society. Literature review was undertaken to examine the status of the market, its problems, previous studies, to categorize the most affected group and how it developed. Then, statistical data was used to verify its significance and its current living situation. Their housing needs and lifestyles were determined with respect to dwelling layout and building features based on a literature review and the performed survey and interviews with members of this target group. Additional literature review explored the characteristics of the architectural typologies suitable for this group. And case study research was conducted to obtain insight on possible building organisation schemes targeting single-person households with respect to circulation and shared facilities.

A literature review for investigation of the problem was undertaken. For a thorough economical review on the Dutch market, the annual reports of Dutch banks were purposely addressed. They were chosen because they give an overview of the situation, the reasons for it and recommendations for change. To understand the housing situation of the households the Dutch housing research (WoON) was used as it gives an overview on the housing market from a user perspective. Several databases were searched with terms ‘single-person’ OR ‘one-person’ AND ‘households’ AND ‘needs’ and limited to English only. This was in an attempt to define the needs of single-person households more architecturally. Although this gave a good understanding, still information was missing on the needs and preferences for the dwelling features and the types of shared facilities.

This led to the need of performing a survey and interviews among members of this target group as it was discovered that this topic is underresearched in the Netherlands. The survey was executed to investigate the needs and preferences of single-person households in relation to different types of shared facilities, the valued dwelling features, and desired improvements. It consisted of 5 single choice questions, 4 text questions, and 4 multiple choice questions distributed in the internet groups of residential buildings with small dwellings. The questions are composed based on the Traditional Housing Demand Research explained by Jansen et al. (2011). It was completed by 40 individuals, living in the Netherlands over the period of 15th of November to 6th of December 2020.

Additional interviews were performed with the aim to provide a more personal overview on the situation of the single-person household, look for information that the survey might have not addressed, and search for argumented deviations from the mean values found in the survey. Four interviews were performed in the form of conversation on the topic of housing situation satisfaction. The interviewees were respondents to an open invitation via a post in social media.

There are four case studies chosen based on presence of shared functions, and building volume and dwelling size similar to the ones to be designed. The aim was to analyse the buildings with regards to context, building circulation, dwelling typologies, and shared facilities. Followingly, to perform a typology transfer and conclude what design decision of the precedential buildings are applicable for the site of building 7 in M4H.

The preferences and lifestyle similarities of the single-person households result in a design hypothesis, which provides a basis for developing a building with self-contained units with a focus on shared facilities, which are used as an extension of the private space only when needed. The result is a set of compact work-live dwelling typologies which address the needs and living habits of single person households.

01 CHAPTER

Status of the real estate market

Currently in the Netherlands, there is a huge housing crisis due to a combination of regulations, population growth, and economics. An indication of that is the fact that since 2016 the number of homeless people between the ages of 18 and 30 has tripled to over 12,000. The crisis is so severe that according to the Minister for Home Affairs Kajsa Ollongren 845,000 homes need to be built by 2030. This number isn't homes that are currently lacking but takes into account the future housing needs since the Netherlands is expected to have 18.8 million inhabitants by 2030. The solution to build more might seem straightforward, but the persistence of the problem indicates that it's more complicated to solve. (Lalor, 2020) This chapter provides a brief overview of the origins of the problem with housing shortage and investigates the impact it has on the different households.

To begin with, the Netherlands is very densely populated with a density of 416 people per sq. km with more than half its area dedicated to agricultural land. (The world bank, 2018 and CBS, 2020) So, the availability of land is a constraint even though the residential area constitutes less than 9 percent of the total land area. (CLO, 2020) In order to develop a new residential project a tradeoff with another function needs to be made. This makes the process of acquisition of land more difficult and time consuming. Along with this, the number of construction workers is insufficient, which leads to slower developments of the projects and sometimes even complete refusal. And the new nitrogen regulations result in the issuing of less construction permits. (Lalor, 2020) (Fig. 1.1)

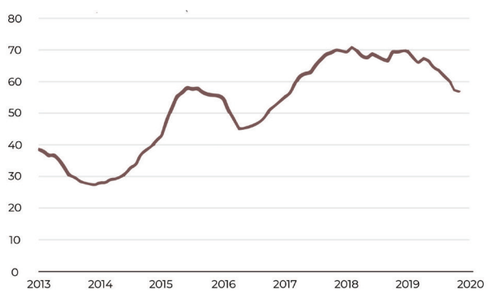


Fig. 1.1 Building permits issued x1000, in euro (CBS, 2020)

But apart from these factors which delay the development of the projects, the Dutch housing market itself has also contributed to the problem. It is characterised by a mismatch between the supply and demand not only in terms of amounts, but also in terms of types of housing, major price fluctuations, high mortgage debt, significant levels of wealth accumulation through home ownership and a very small commercial rental segment. This is the aftermath of years of consistent policy towards home ownership through mortgage interest relief, lenient underwriting standards and other measures. (DNB, 2020, p. 5)

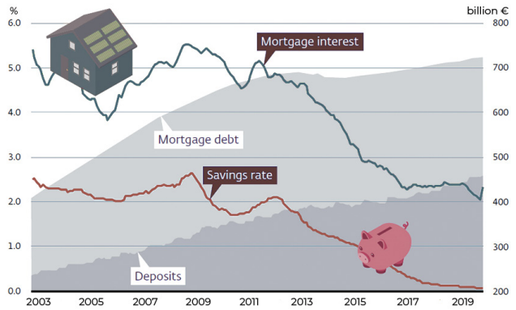


Fig. 1.2 Financial variables of Dutch households (DNB, 2020)

Continuous migration to the cities is pushing demand for urban housing and supply is failing to deliver, resulting in a shortage of affordable housing, particularly in the non-rent regulated rental sector. This is putting middle-income earners in a difficult situation. (DNB, 2020, p.7) An increase of the share of the rental market would be beneficial and more importantly a shift towards a market better fitted to the nation's needs. Above all, a greater supply of estates is necessary in the mid-price rental segment to stimulate a shift away from social housing and give potential first-time buyers a better opportunity to gain savings. This is precisely where the emphasis should be in the upcoming years, especially with regards to the new residential construction. (DNB, 2020, p. 5)

In 2020, the interest rates fell to record low levels (Fig. 1.2) and this phenomenon affects everyone. If it is very cheap to borrow money, then people and businesses are more inclined to borrow larger amounts and risk of going too deep into debt. This in turn drives up the

prices of real estate (Fig. 1.3) and other assets, with a greater risk of a sudden price slide. (DNB, 2020, p. 11) In many countries in the Eurozone, lower interest rates have aided the sharp rise in real estate prices. But in the Netherlands spiralling house prices in the cities are mainly attributable to scarcity pricing. (Hekwolter et al., 2017, p. 7) This results in a rise of more than 40% of the average house prices in the Netherlands since 2013. (DNB, 2020, p. 17)

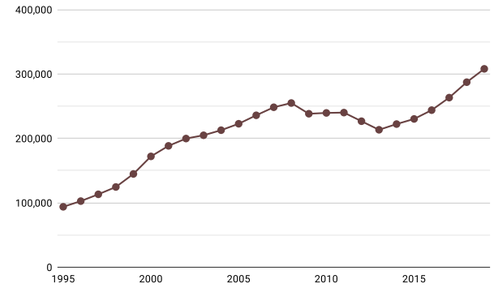


Fig. 1.3 Average residential selling price NL, € (Statista, 2020)

Rising house prices bolster confidence in the housing market, but also the current generation of first-time buyers have to pay substantially more for the purchase. Hence, they need a bigger mortgage, making it more difficult for them given the current lending standards. (DNB, 2020, p. 18) A joint rent or mortgage satisfies both the market and bank requirements, but the income of a single person is often not sufficient. In fact, the share of young adults below the age of 35 in home sales fell again in the last quarter of 2019, especially in the apartment sector. In all of the twelve Dutch provinces, the average selling price is significantly above the average maximum borrowing capacity of this group. (Fig. 1.4) For instance, prospective buyers aged below 35 can borrow just under 225 000€ on average in the province of Utrecht, but the average selling price is around 260 000€. The most favorable ratio is in Zuid-Holland. On average, young adults can borrow approximately 74 percent of the average selling price. This is due to the relatively high incomes in the area and the modest average selling price given the rest of the Randstad. (Groot & Vrieselaar, 2019)

The middle income groups who are looking for a suitable dwelling fall between two stools. They earn just too much to enter the social housing sector, they are not eligible for a mortgage, and a private rental house is often too expensive or even unavailable. Their remaining options are unsatisfactory like to ask for financial help from their parents, to share a home, to seek alternative dwelling like a caravan or to live longer at their parents home. As a result, attractive neighbourhoods in the major cities are becoming less accessible to the middle income groups, and this leads to a segregation of low incomes in the 'poor neighbourhoods'. (Boelhouwer, 2020, p. 451)

This, in turn, can result in a dichotomy - established homeowners benefit from the rising prices and the younger households find it increasingly difficult to buy a house, remaining reliant on a tight rental market. (DNB, 2020, p. 18) In housing systems, owning and renting have become a key factor of segregation, not only socially, culturally, in the quality and range of available accommodation, but also in the opportunity to accumulate and manage wealth. (Boelhouwer, 2020, p. 448) The Dutch policy of Code of Conduct for Mortgage Loans from 2011 impacted especially those whose income was too high for social housing but too low for a rental property in the private rental sector and couldn't fulfil the strict criteria of the owner occupied sector. Many failed to buy an affordable home and the pressure on the rental sector increased substantially. (Boelhouwer, 2020, p. 449)

The persistent unequal attitude towards the different housing tenures plays a key role but perhaps so does the unequal position of those who have already established a firm position on the real estate market and those who are looking forward to their first purchase. The latter group mainly consists of young households who are at the beginning of their housing career and have a middle income (Boelhouwer, 2020, p. 452) and are single, because, in principle, single-person households have a higher housing quote (net cost as a percentage to disposable income) than couples in the same age and families with children. (Kleinegris, 2017, p. 18) This problem is expected to persist since recent housing policies ensure that it's not structurally addressed and that the inequality between the different age cohorts increases rather than decreases. (Boelhouwer, 2020, p. 452)

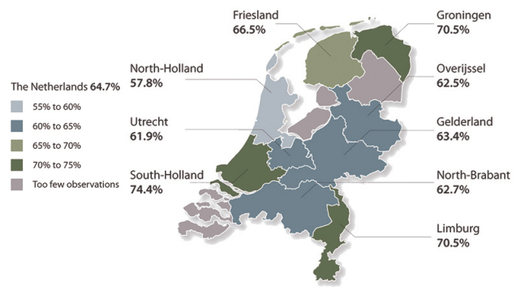


Fig. 1.4 Ratio of borrowing capacity of prospective buyers aged below 35 and the mean selling price (WoON 2018, processed by RaboResearch)

02 CHAPTER

Introduction to the single-person household

The Dutch population has been increasing notably for the last decades, caused by an aging society and migration but alongside the household composition has been changing. Nowadays, the course of life is more individual and, hence, the households are less standardized. (Kleinegris, 2017, p. 18) The youngsters live alone in opposition to the tradition where they leave their parents home only to form a family. In addition, the divorse rates are very high (Kamer, 2020) and thus there are more broken families. It's also more dynamic because two broken families often merge to form the so-called patchwork family. This chapter traces the development of the single-person households, what type of people constitute this group and what is their current housing situation.

Historical development

The total number of private households in the Netherlands has been growing rapidly in the last hundred years. (Fig 2.1) Alongside, the mean household size has shrunk by almost 50 percent in the past 69 years. The average number of residents per household decreased from 3.93 in 1950 to 2.15 in 2019. (Kamer, 2020) This doesn't imply that the standard families have become on average two times smaller. In fact, there is a tendency in the increase of the number of single-person households with women forming traditionally just a bit larger segment of this household type, (Kamer, 2020) but women's life expectancy is statistically higher. (CBS, 2020) In particular, after 1980, the number of single-person households has proliferated, while the number of multi-person ones has remained more steady. Since 1920 the number of single-person households rose from 154 000 to 3 079 778 in 2020. (CBS, 2020) The steady rise of single-person households over the years indicates an apparent change in the modern lifestyle. (Kleinegris, 2017, p. 18)

Extrapolating this trend, forecasts that single-person households would become even more popular in the future, forming an even larger portion of the household types distribution. This is confirmed by the medium variant prediction of the Dutch household forecast made back in 2000. (Faessen, 2002, p. 338) The increasingly large share of single-person households on a global scale is unprecedented historically and can be observed in every age group, resulting from the ongoing individualization. (Kleinegris, 2017, p. 19)

However, since 2002, the number of single-person households aged under 35 and the single-parent households has increased slightly, the number of couples under 64 has decreased and the number of families has remained constant. (Fig. 2.2) The greatest increase is the number of single-person households aged above 35 and the couples above 65. From 2012, the increase of all households above 65 years accounts for more than 90% of the growth of total number of private households. (WoON, 2019, p.4) The life expectancy has been continuously increasing for the same period. (CBS, 2020) If we compare the single-person households of all ages, the couples of all ages with the families and single-parents combined, the single-person households are the largest and most common household type. (WoOn, 2019, p. 14) In 2020, it accounts for 38.5% of all private households. (CBS, 2020)

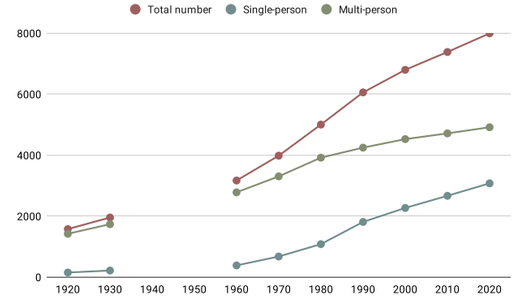


Fig 2.1 Total number of households, single-person, multi-person x1000 (CBS, 2020)

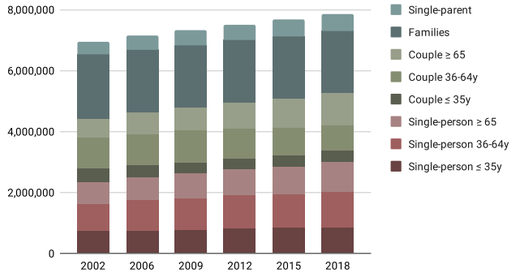


Fig 2.1 Household development by age and composition (WoOn, 2019, p. 14)

Snapshot of current situation

The number of single-person households by age is similar, but their reasons vary. For the young adults it's often a temporary situation between their parental home and moving in together with someone. For the ones aged between 36 and 64 years, it's usually the result of separation and for the elderly - the death of the partner. (Kleinegris, 2017, p. 19) The spatial distribution also varies by age. In the four biggest cities of the Netherlands referred to as G4 - Amsterdam, Rotterdam, Den Haag and Utrecht, there is a concentration of young people, where they usually live for a few years on their own. (Kleinegris, 2017, p. 13) They have a predominant role in cities, because of their attraction to education, the better first job opportunities, sociability, facilities and the lively urban environment. In general, this is a highly educated group with either already completed education or still studying at higher institutions like HBO or university. (Kleinegris, 2017, p. 31) So, in the student cities like Groningen, Wageningen, Amsterdam, Delft, Nijmegen, Utrecht, Leiden and Maastricht, half of the households are single-person ones. (Kleinegris, 2017, p. 19)

The single-person households form a majority (56%) of the occupants of the rental stock. (Fig. 2.3) In the regulated housing association sector, the share of singles has increased further in recent years, from 56% in 2015 to 58% in 2018. However, younger single-person households are less likely to live in regulated housing association homes while the proportion of older households is increasing. In 2015, 67% of private rental homes with regulated rent were occupied by single households, compared to 68% in 2018. Significantly fewer single-person households, more families and especially couples live in the free rental sector. (WoON, 2019, p. 22)

Of all tenants living alone in 2018, 59% live in an apartment and 41% in a single-family house. Two of every three rental apartments were occupied by a single-person household. On the other hand, the share of them living in a rented single-family home increased from 38% in 2012 to 42% in 2018. In the same period, the share of all private households in single-family rental homes remained virtually stable. (WoON, 2019, p. 23)

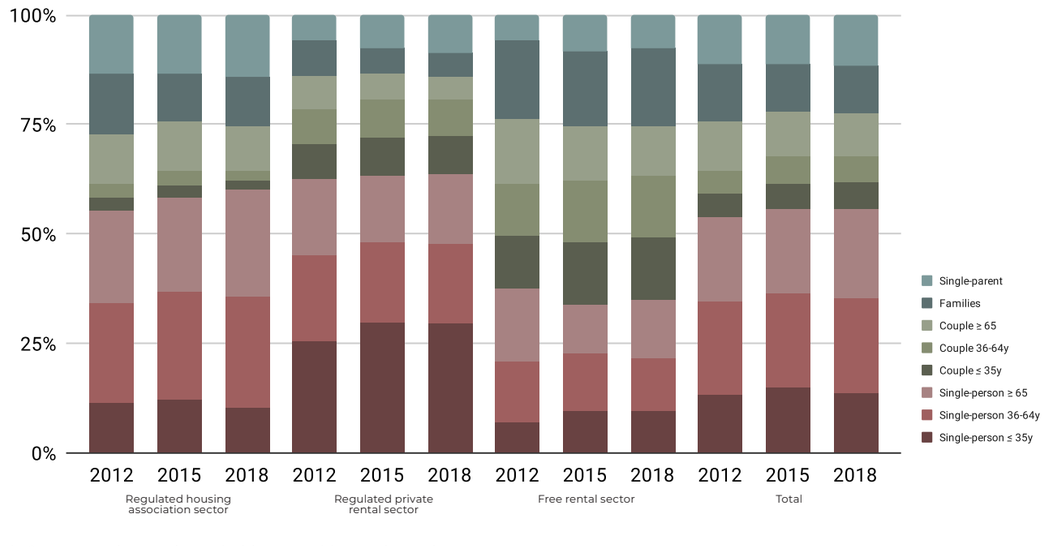


Fig 2.3 Tenants by age, household composition and rental sector as a percentage of the rental stock (WoOn, 2019, p. 22)

03 CHAPTER

Housing needs of single-person households

This chapter explores the housing needs and preferences of single-person households with the understanding that certain needs are absolute necessity and others could be compromised on. Additionally, people's preferences tend to go to extremes if not measured against reality. In the Dutch culture the ultimate preferred dwelling is something like a spacious detached house with a big green garden with various urban facilities nearby, located in a peaceful and child friendly area in the center of a favorite city. (Jansen et al., 2011, p. 9) Given that this dwelling either doesn't exist or isn't accessible to the average person, the focus would lie on more attainable housing preferences; the so-called specific housing preferences. To measure this attainability and determine which needs to be taken into account, some considerations need to be defined beforehand.

Considerations to this chapter

To begin with, there is a hierarchical structure of one's needs explained by the theory of Maslow (1954). It's visualised in the form of a pyramid (Fig. 3.1) as it argues that the needs in the lower levels of the pyramid need to be more or less satisfied before one is concerned with the ones above. (McLeod, 2020) This paper considers the psychological and safety needs to be satisfied by default from the fact the Netherlands is a developed country. It also disregards the housing shortage in this specific chapter since having provisional housing is understandably preferred to having no housing at all. Those considerations allow the housing to not be observed as mere shelter, but as a component in one's personal satisfaction. Therefore, in this paper housing needs are understood as elements of housing nature, which have a positive effect on the quality of life, but are not related to survival.

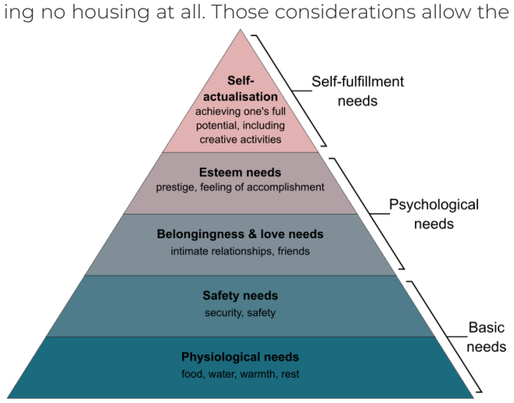


Fig. 3.1 Maslow's Hierarchy of Needs (McLeod, 2020)

Additionally, an important difference is made between choice and preference. The latter is considered a relatively unconstrained evaluation of attractiveness. In the case of a house, choice will always be influenced by a combination of preference, supply factors, government regulations, availability, budget, lifestyle, time constraints, and social class. (Jansen et al., 2011, p. 2) Meaning that the actual behavior of a housing choice represents only the revealed preferences, which often differ substantially from the complete list of stated preferences.

Last but not least, housing needs and preferences concern the characteristics of the dwelling and the environment surrounding it. The dwelling characteristics are for example, size, layout, price, materials, orientation, etc. And the environmental ones are the location, atmosphere, transportation, infrastructure, services, etc. This study focuses predominantly on the dwelling characteristic because the site of the building to be designed is already determined.

Type

Because the housing stock is very capital intensive, immobile and has long development time, it's essential to predict its needs so that upon completion the buildings are still up to date. For this reason, an extensive national housing research (Woononderzoek Nederland) is performed every 3 years. The last one was conducted in 2018 and discovered that the needs to move can be summarized by opportunities to improve the housing situation, the quality of the previous home and a life event like a child, new job, end of a relationship, health, etc.

Single-person of all ages and elderly households look forward to a rental apartment. (WoON, 2019, p. 51) The biggest incentive for single-person households aged up to 35 years to move is to obtain an independent home. A third (31%) of them who have recently moved

stated the reason was to live independently. (WoON, 2019, p. 57) Single parent families and singles aged 35-64 often move because of a breakup. This group has the highest rate of urgency to move as 40% want to move within six months and another 20% within a year. (WoON, 2019, p. 61) Of the starters who want to take their first step in the housing market, 29% would prefer to move within six months and almost the same (27%) want to move within a year. The case is similar to older single households but they often move because of health reasons. (WoON, 2019, p. 95)

When moving, the great majority of households opt for a home in the same living environment. Some, however, would like a change towards a more urban or, conversely, a less urban living environment. Older households more often opt for a move towards the city, couples and families move towards the less urban living environments, and single-parent households are opting for more urban living. (WoON, 2019, p. 66) Young single-person households slightly shifted their housing wishes towards less urban living, but still the great majority would like to stay in the same one, which currently is urban. The social life of single-person households mainly takes place in the city and they have an urban orientated lifestyle due to their studies and work.

Environment

The living environment is also an important aspect in the attractiveness of a dwelling. This is undoubtedly a complex term embodying many aspects that are out of the scope of this design assignment. However, a worth noticing factor is the social cohesion because there is a high degree of correlation between satisfaction with the living environment and the appreciation of social cohesion. Meaning that the less satisfied the people are with their immediate living environment, the lower the score on social cohesion is. And respectively, neighborhoods with a high degree of social cohesion are perceived as attractive and people state they are very satisfied with the living environment. (WoON, 2019, p. 80)

A closer statistical analysis of the data reveals that the relationships between social cohesion and living environment is age dependent. People experience more social cohesion the older they get. Also, there is a connection between the perception of social cohesion and living alone or living in a household with several people. Single-person households experience less social cohesion in their living environment than larger households. (WoON, 2019, p. 80) This could be explained by the fact that young people are more 'footloose' and therefore less limited and attached to their neighborhood. (WoON, 2019, p. 77) In general, people in urban and very urban areas are less often attached to their own neighborhood than people in low to non-urban areas. These are often areas where a relatively large number of young people live.

Additionally, the rapid growth of the sharing economy has influence on the modern lifestyle. In the same manner that this alternative economic system is changing the regular economy, it's changing the built environment. The universal idea behind it - that people don't need to own things, as long as they have access to them, is being applied in the build environment as well. In principle, there are plenty of housing elements that can be shared but the eagerness is not always high enough. For example, only 10% to a maximum of 20% of the young people in Amsterdam are willing to share their own dwelling (Glind, 2017, as cited in Kleinegris, 2017, p. 22). Even so, they indicate that bicycle storage is the most popular facility to share, followed by shared parcel lockers and workspaces. However, young people under 35, the highly educated ones, and the people with high income have a positive attitude about the peer-to-peer economy and use it more often. This is a change in the traditional understanding that ownership is a measure of success. Nowadays experiences bring more happiness to them than possession. (Kleinegris, 2017, p. 22)

The threshold between private, semi-private and public is evolving in every aspect. However, for the built environment, the realization that people are open to the sharing economy can create opportunities for better developments. Firstly, the ownership of a home has historically been inaccessible to the middle and lower class. By means of the sharing economy and smarter use of facilities, the private dwelling will be smaller. Hence, this will reduce the construction, purchase and maintenance cost, making estates more accessible. Secondly, by sharing facilities a higher number of them could be achieved. Some facilities aren't justified on an individual scale, but when shared the economics of it becomes reasonable and this leads to better services. Examples are movie theatres, game rooms, gyms, maker spaces etc. (Kleinegris, 2017, p. 23)

Again, not all facilities are welcomed to be shared, and those differ from one household type to another. Generally, young people, especially students, are

more receptive to the sharing economy. For people born between 1980 and 2000, there is a distinction between facilities that can always be shared, some that possibly can be shared and others that cannot be shared like the bedroom, bathroom, toilet and personal storage. (Fig. 3.2) (Mullem, 2017 as cited by Kleinegris, 2017, p. 23) But some single-person households think that they are sacrificing their privacy, freedom and independence by sharing a living room and a kitchen. And they regard sharing as a step back in life reminding them of their student years. Nonetheless, a dwelling for them that fits within the budget of one person is a small dwelling with a couple of shared facilities. (Kleinegris, 2017, p. 24)

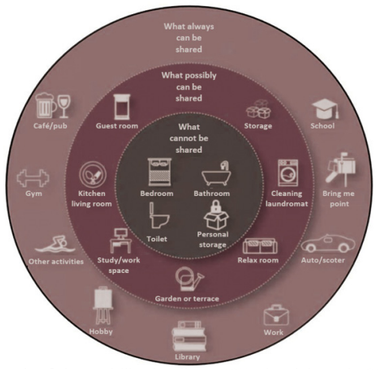


Fig. 3.2 Levels of shareability (Mullem, 2017 via Kleinegris, 2017, p.23)

Dwelling

The needs and preferences of single person households towards the building and the dwelling were examined based on the survey and interviews performed. This was necessary because literature or larger scale survey research that is focused on the architectural translation of the lifestyle of single person households was not found. The majority of the respondents of the survey live alone and in a studio with a private bathroom and kitchen (75%) in a building with more than 200 rooms (70%). Almost everyone (93%) have a personal unit of less than 40 sq.m. The interviewees live alone in a studio.

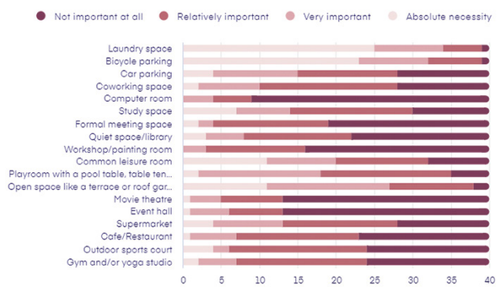


Fig. 3.3 Q8. How important do you find the availability of those functions in a building with small dwellings?

The majority of the respondents rated the laundry and the bicycle parking as an absolute necessity and the open space like a terrace or roof garden as very important. (Fig. 3.3) More than half marked the computer room, formal meeting space, workshop/painting room, movie theatre and the event hall as not important at all. The rest of the building features like car parking, coworking space, study space, quiet space/library, common leisure room, playroom with a pool table, table tennis, etc., supermarket, cafe/restaurant, outdoor sports court, gym and/or yoga studio were rated as relatively important. It should be noted that the rate of importance more or less matches the presence of those facilities in the buildings the respondents currently live in.

However, all interviewees stated that they use some sort of a working space at home. The majority prefer it to be outside their room with a monitor the can connect to, but one does more hands-on work and needs space in the private room. The setting in the common room is preferred because it's more social, but it needs to be quiet for better concentration, so the social aspect isn't solely about interaction, but about the presence of others around you. They also explained that the game room and cinema is their main point of interaction with other residents. Two interviewees said they often meet new tenants through the group chat for playing in the game room and another one said there used to be large game night tournaments that he really enjoyed.

This mismatch between output of the survey and the personal interviews indicates that respondents have a very practical definition of the word 'important'. Such features aren't particularly found important as the formulation of the survey question. Yet when people talk openly about it, it becomes clear that these features greatly contribute to the enjoyability of the life in the building, even though people could survive without them. Nevertheless, 67 percent of the respondents in the survey think that the presence of shared spaces at the building would help you feel less isolated when living alone.

The survey confirmed the attitude investigated by the literature research. Two thirds (63%) of the respondents are ready to sacrifice the living area for a private bathroom, but significantly less (52%) would do the same for a private kitchen. (Fig. 3.4) Interestingly, the largest percent (68%) would do the same tradeoff for a separate work/study space. An equal amount (35%) of people agree and disagree with the

statement "I would choose to live in a shared house if the rent is cheaper". And 75 percent disagree with "I would choose to live in a shared house even if the rent was the same as a studio". Hence, living in a shared house is only preferred because of the economical benefits and the other positive aspects like the sociability is not valued so much. There seems to be no accountability for the environmental benefits of living in a smaller dwelling as only 18 percent agree with "I would choose a smaller unit because it's more sustainable". Half of the respondents (53%) would choose a furnished dwelling.

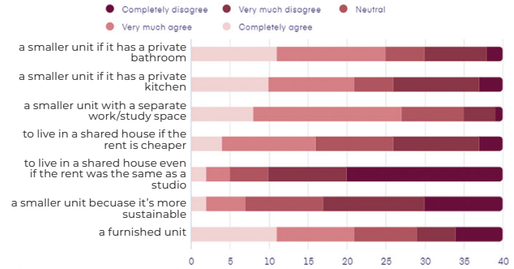


Fig. 3.4 Q10. How much do you agree with these statements? I would choose ...

The survey noted that there is an overall positive attitude towards small dwellings. Only 7% of the respondents agreed with the statement "Living in a small dwelling is always a problem". (Fig. 3.5) The interviewees confirmed that by saying they don't find their room of 22 sq.m. too small. Three quarters (73%, 73% and 78% respectively) of the respondents think that it's not a problem as long as they meet other people often, there is a space where they can host guests, and the shared facilities are inviting and pleasant to use. Exactly half but with 38% being neural about this think it's not a problem as long as they naturally and casually see the other residents. The features with the greatest importance for a small dwelling are the big window with a view, enough daylight, enough storage space as more than 83% of the respondents agree. This is in line with the interviews. Interviewees pointed to the view from the window and the amount of daylight as a key problem in their rooms.

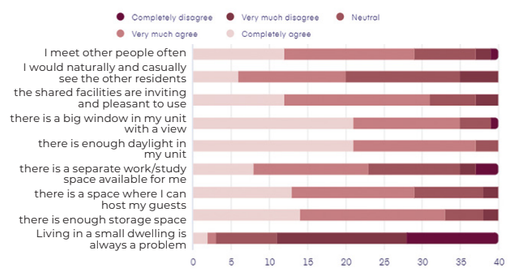


Fig. 3.5 Q11. Living in a small dwelling is not a problem as long as...

The answers to the open question of the survey indicated that more shared facilities and more social building are a recurring desire for an improvement in the living situation. Energy efficiency and soundproofing of walls and floors were features pointed out, which were not addressed previously in the survey. The interviews put emphasis on the management of a building. The shared facilities in the building in question were nicely designed but the manager doesn't allow tenants to use them freely. That is however beyond the competences of this research.

Needs

All in all, young single-person households look for a rental apartment. They value living independently and this mainly their incentive to undertake a change in their housing situation. The majority would like to keep the current living environment because of their urban oriented lifestyle. Satisfaction with the immediate living environment is linked to the perception of social cohesion, which, in turn, is dependent on age and household size. So, young single-person households are the most vulnerable group to lack of social cohesion. They are more footloose and, hence, they interact less with their neighbourhood. Consequently, this leads to the need to facilitate interactions by providing premises for the natural occurrence of meetings. The people could be stimulated to interact on a neighbourhood and building level. On a building scale, this could be done by the concept of co-housing. Small dwellings would serve only the daily needs of the residents and for everything else they need to turn to the shared spaces in the building. A solution like this will be very well accepted by this target group because they are very positive about the sharing economy and small dwellings, but they wouldn't like to share a bathroom and kitchen. The strictly positive attitude towards the small dwellings was with the condition that they function well. This points in the direction of the notion of "compact" since "small" just reflects on the size, but 'compact' refers to having all necessary features fitting neatly into a small space. Along with this, single-person households value storage, daylight, and view from their room above the shared facilities in the building. Although not perceived as crucial, the shared facilities greatly improve the housing environment. The working space is the clearest example of this. At first glance it wasn't needed, but a more in-depth look revealed that young single-person households often work from home and therefore would benefit from a functional live-work setting.

04 CHAPTER

The compact dwelling typology

It was previously defined that compact dwellings are needed currently and that single-person households have a positive attitude to them. The downscaling of the living area is a topic we discuss actively in present days, but the discussion has started long ago. After WWI, defining new architectural qualities for the living space was crucial. It wasn't merely the quantitative shortage, but a deeper theoretical problem on the structural rationale of dwelling production, distribution, and use. (Korbi & Migotto, 2019, p. 300) This chapter proves that the topic of reduction of living space has been central in a high-level architectural discussion already with the theme of 'Die Wohnung für das Existenzminimum' and reflects on its modern interpretation.

Die Wohnung für das Existenzminimum (dwelling for the minimum level of existence) was chosen as the topic for the 1929 II CIAM (Congrès Internationaux d'Architecture Moderne). This was the first worldwide comparative study on minimum dwelling and determined that this was the "correct solution" to solve the housing problems of industrial societies. The solution was the result of many studies (Fig. 4.2), mainly led by the architects Alexander Klein, Ernst May, Le Corbusier, Margarete Schütte-Lihotzky and Walter Gropius. (Brysch, 2019, p. 329)

The event focused international attention on Frankfurt's ambitious housing program and promoted a modern attitude in architecture. By defining the minimum habitable dwelling, it was positioned at the center of the socioeconomic discussion regarding the housing for the lower classes. The result was a theoretical manifesto to guide modern architects' reflection on the production of affordable living-units,

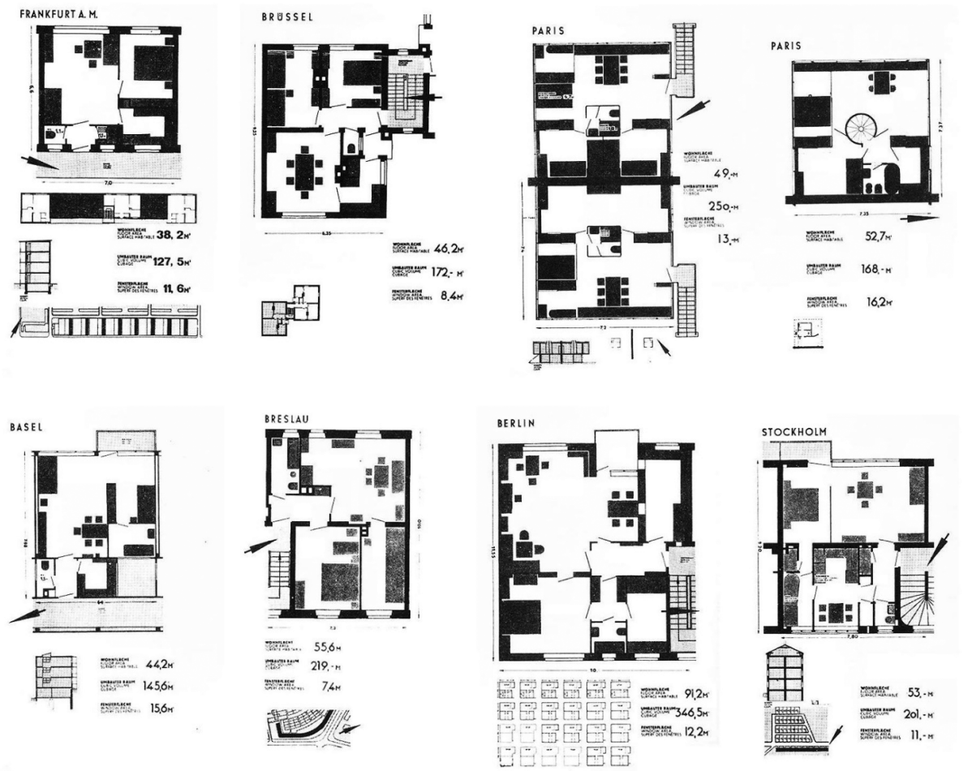


Fig. 4.2 Existenzminimum dwelling. From II CIAM (Frankfurt, 1929) (Korbi & Migotto, 2019, p. 303)

Fig. 4.1 Poster of Die Wohnung für das Existenzminimum

because the recurrent socio-political concern at the time was the reduction of the dwellings' surface and the degenerative living conditions for the working classes. (Korbi & Migotto, 2019, p. 301) The modern paradigm was built upon granting workers a space to fulfill their biological needs. Therefore, the underlying intention was not a mere reduction of the traditional housing, but rather the creation of an upgraded typology. (Brysch, 2019, p. 330)

Determining standards for the Existenzminimum units was fundamental to the success of their mass production and affordable construction without compromising the quality of the industrialised materials. The rational organisation facilitated the industrial production of the elements and accelerated the construction process, at the same time increasing the flexibility of the spatial configuration. Almost all the construction elements, ranging from entire structural walls to door handles, were meant to be prefabricated and then assembled in situ. This represented an unconventional approach to housing construction, taking advantage of technological and industrial progress. The socialist postulate of equality of all peoples' needs, influenced the idea of developing a universal housing solution, which became the standard dwelling to be used by the emergent post-war society. (Brysch, 2019, p. 330)

Nowadays, access to affordable housing has become challenging not only to low-income families, but also to the middle-classes, as public and social housing are exclusively targeted to the very poor. Consequently, urgent strategies are needed to make housing accessible to larger segments of the population. Again, architectural design plays a crucial role in this endeavour, not only to develop innovative spatial layouts, but also to guarantee that spatial standards are not corrupted to comply with the market profit oriented goals. (Brysch, 2019, p. 333) Therefore, nowadays the Existenzminimum is still a valid concept worth exploring.

Currently, the Existenzminimum demands more versatile and flexible quality standards. The new concept of minimum is not only connected to the spatial dimension, but also to services, resources, construction finishes and lower purchase of goods. Manzini (1994) argues that material possession should shift towards a 'non-individual' consumption and that the role of design in providing quality is "'reduction of needs' can be expressed as an 'increase in social quality"' (Manzini, 1994, as cited by Brysch, 2019, p. 335). Therefore, the new concept of quality of life picks up on the contribution of the Existenzminimum movement in the culture of reduction. Yet, it's less connected to the modern idea of consumption, since the original Existenzminimum propaganda was based on consumer-oriented advertising of industrial products that would reduce domestic work. (Brysch, 2019, p. 335)

From a technical perspective, current Existenzminimum approaches emphasise environmental sustainability as one of the principles that guide the construction of affordable housing. Priority is given to the correct use of resources, maximum energy savings, but this "ecological re-orientation" requires a full reassessment of the design process. (Brysch, 2019, p. 334) Prefabrication and modular construction are still a key factor in affordable housing, but now repetitive and impersonal building complexes are avoided. The mass-production of standardised housing units with standardized elements has evolved in a more flexible and customizable way. Prefabrication continues to reduce construction costs, but it is used in a more custom-like manner. The spatial characteristics today are focused on the reinterpretation of minimum and the definition of alternative layouts with flexibility, temporary solutions and shared living. Compact housing complemented with communal facilities enrich the social dimension. (Brysch, 2019, p. 343)

05 CHAPTER

The live-work typology

The live-work dwelling is a very relevant concept for the modern world because of the shift towards people working from home, which started with the advent of technology such as the fax machine and later on the computer. (CABRERA et al., 2009, p. 9) Nevertheless, this concept dates way back before the digitalization and this chapter briefly reflects on this. Further, it analyses the use of the space and defines its meaning for the present day.

The typology

To begin with, the buildings that combine dwelling and workplace are currently nameless as a type. That is because in the twentieth century the term 'house' began to mean a building for unpaid domestic, rather than paid productive, work and which provided a base for people to 'go out to work' and earn their living. The terms that exist, such as 'studio-house' or 'live-work unit' refer only to subsets. (Hollis, 2015, p. 1) Therefore, in this chapter we would refer to 'live-work typology' as a way to address the lifestyle it embodies, rather than the actual dwelling characteristics.

The live-work typology has existed for thousands of years all over the world in different forms according to culture and climate. Examples are the Japanese machiya, the Malaysian shop-house, the Iranian courtyard house, the Vietnamese tube house, the Lyons silk-weaver's atelier, the Dutch merchant's house. (Hollis, 2015, p. 6) These types of buildings have remained unnoticed for long as they have become so familiar. It's often forgotten that in the past cities have been organized around home-based work. (Hollis, 2015, p. 136) Historic precedents are abundant because it used to be the norm before the Industrial Revolution. The modernist architecture together with modern zoning rules imposed on the building and the street a strict separation between living and working, economic productive sector and domestic life. Generations of zoned planning policies have created residential deserts. On the contrary, the juxtaposition of residential and commercial functions with home-based work in a mixed neighbourhoods provides busier, livelier and safer environments with twenty-four hour inhibition. (Hollis, 2015, p. 140)

In the late 20th century, market pressure led to the removal of the condition in SoHo district that occupants of the new live-work spaces should be working artists. (Hollis, 2015, p. 54) A valuable commodity was created from unused factories and warehouses located in an area with minimal infrastructure and amenities by an active marketing of a new model of urban lifestyle. The term 'live-work' embodied the unconventional spatial qualities of the original artists' lofts and the promise of a bohemian, creative lifestyle. While the idea clearly appealed to the thousands of young professionals who bought these properties, in reality many of them never worked in their live-work units. (Hollis, 2015, p. 58) Since no mechanism ensured that people did, indeed, work in these spaces, it soon became apparent that many of the apartments were only seemingly live-work.

This building type is important today because of the changing patterns of work in the western world. (Hollis, 2015, p. 1) The number of home-based workers globally is currently estimated at 100 million and growing rapidly. In the USA, the numbers more than tripled between 1980 and 1997. In the UK, around a quarter of the working population is currently estimated either to live at their workplace, or work from home for at least eight hours a week. Consequently, a social and spatial reordering is taking place and it's a new industrial revolution. (Hollis, 2015, p. 2) So the way we think of this building type nowadays is new. It's not a single building or unit type but a loosely connected series of strategies combining live and work needs. (CABRERA et al., 2009, p. 7) Therefore, the definitions imposed by the real estate market and the common words and phrases appearing in the market description give an indication which features are currently more attractive than others. (Fig. 5.1) (CABRERA et al., 2009, p. 12) Customisation, layout flexibility, shorter commutes, business and personal needs are features that should be considered when making design decisions and spatial layouts within live-work units. Overall, there are four scales of categorization within live-work typologies. (CABRERA et al., 2009, p. 18)

Studio Loft

The studio loft is a very popular type with one room containing all of the programs: sleeping, eating, cooking, working, and relaxing. There is a slightly more complex variation with a lofted space containing the sleeping area. The most common user for this dwelling type are the artists. (CABRERA et al., 2009, p. 23) One apparent characteristic is the lack of structural separation of the live-work areas. It's very flexible and the user defines the spaces and how to separate them according to their needs. (Fig. 5.2) These multipurpose spaces could be used for various activities, which, in turn, set an imaginary boundary between the living and working spaces. In the morning, when the kitchen area is in use, the boundary between the living and work space becomes the table. Later, when the open space is used for working, the kitchen and bathroom become amenities in support of the work zone. The boundary is then the stairs leading to the upper level. In the evening, the space becomes a living area and the work space is shrunk to the remaining equipment, which sets the boundary. At night, the only space in use is the upper level so the floor becomes the boundary. This results in a constant evolution of the space tailored for the current needs of the user.

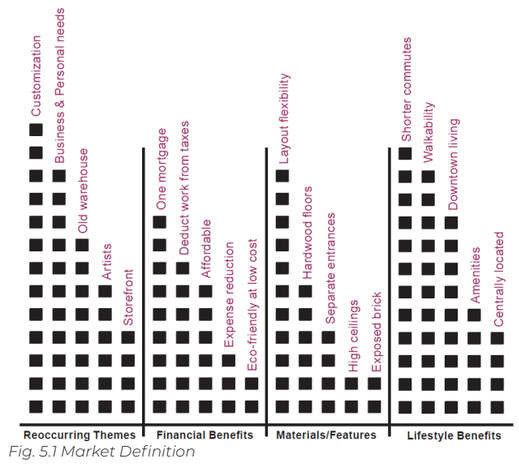


Fig. 5.1 Market Definition

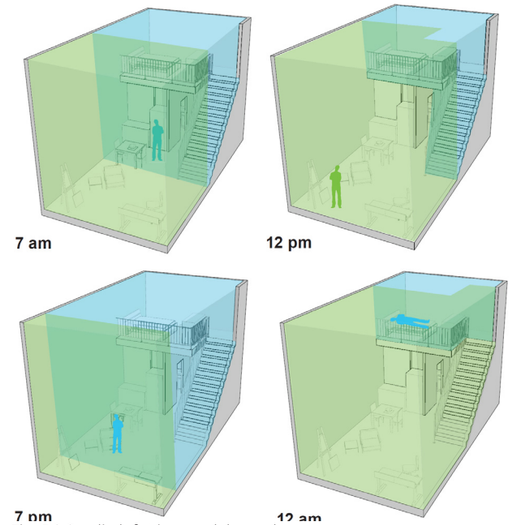


Fig. 5.2 Studio loft Live-work boundary

Home office

The home office is the classic live-work space. It features an extra room in the dwelling for working although it could sometimes be small. The space could be utilized to fit a specific function, but it's unlikely to be used in any other way. Since there is no separate entrance, the working space is making use of the living amenities like the kitchen and bathrooms. The only division of space comes from partition walls and the small floor area above (Fig. 5.3), if it's a maisonette, because the office spaces are mostly found on the lower floor. The hallway from the office to the other space is considered a part of the boundary as it creates a buffer zone between the strictly living spaces and the strictly working ones. In the case of some new homes, which are designed for live-work, there is a separate entrance into the office from the exterior in addition to the main entry, but this is unusual. (CABRERA et al., 2009, p. 38) For many years, people have been using the extra bedroom for an office, but it gets transformed into a nursery once a kid has been born. Nowadays, certain areas of the dwelling is designed with the specific use as an office type. This has caused the evolution of the threshold between

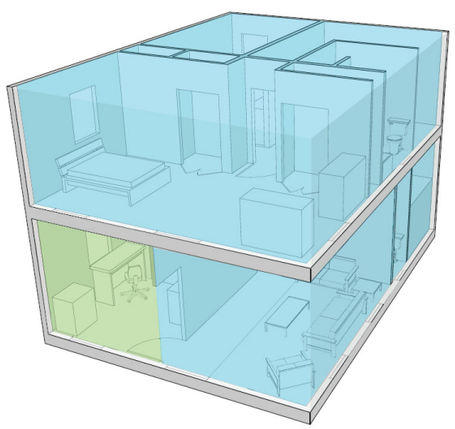


Fig. 5.3 Home office Live-work boundary

live and work like, for example, a glass wall. In certain projects, that separation is very flexible and the home office is progressing from simply a room with a desk and computer in a new and creative direction.

Ground floor workspace

The Ground Floor Workspace is very suitable for the ones that own their own company or retail business. The urban sprawl facilitated the emergence of the concept of “Zero-Commute Housing” and has been by far the biggest growing trend in the USA. In an attempt to find more affordable housing, people have started moving to the suburbs, leaving behind the busy downtown cities and have decided to commute farther to work. So the most efficient way to bring work closer to the home. And The Ground Floor Workspace typology allows for the owner of the house to live directly above his workspace. This concept first appeared in the SOHO district of New York back in the 1970’s, specifically targeting the artists. (CABRERA et al., 2009, p. 47) Nowadays, it has expanded to all types of people. The design usually features a first floor being dedicated to either office or retail, and two or three floors of living space. In the Ground Floor Workspace typology the boundary of the space is very sharp and the floor forms a clear distinction of what is live and what is work. (Fig. 5.4) The stairs are also part of the boundary because it connects the living and the working spaces.

Community

Community Live-work spaces are a very suitable solution for people who dislike the seclusion of typical studio lofts. In a Community Live-Work building residents can benefit from a self-contained private living space but still have the possibility for a community feeling when they are in the shared working space with other residents. This is a favourable option for people who want to decrease their everyday commute to work, want a separation between their living and working space, and enjoy interacting with others. The communal work space is usually located centrally on a lower floor with a large number of living spaces located on the floors above. In the past these types of spaces have been occupied primarily by artists. (CABRERA et al., 2009, p. 59) They have used their work spaces to display their work by inviting the public to exhibitions. These communal working spaces offer a good environment for residents to collaborate with each other because their layout is often very open with loose boundaries between the individual work spaces. The boundary between the living and the working spaces is created by elements like hallways, staircases, building cores, and the floor slab since the two aren’t necessarily adjacent. (Fig. 5.5) In rare cases the living units are located in a separate building within close proximity. Then, the streets, alleyways, and building exteriors create additional boundaries between the living and the working spaces. In general, in a situation where work spaces are all together and live spaces well separated, extra characteristics are implemented into the design. (CABRERA et al., 2009, p. 62)

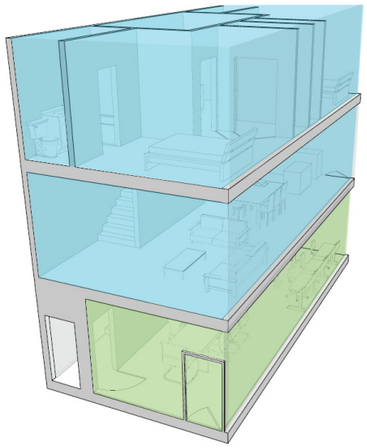


Fig. 5.4 Ground floor workspace Live-work boundary

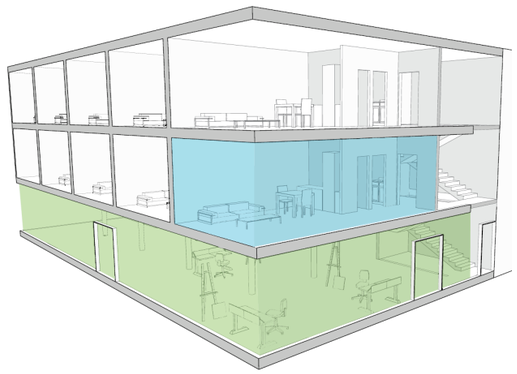
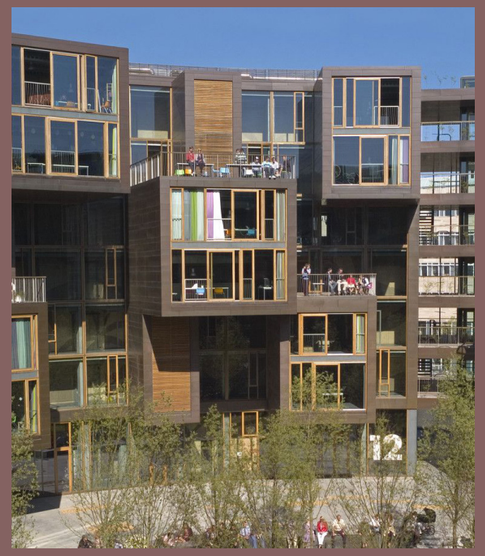


Fig. 5.4 Community Live-work boundary

PLAN ANALYSIS



TIETGEN DORMITORY
LUNDGAARD & TRANBERG ARCHITECTS

Location: Copenhagen, Denmark

Climate zone: Temperate oceanic

Annual sunshine hours: 1200–1600 h

Year: 2005

Type: Student Housing

Users: Students

Dwellings: 360

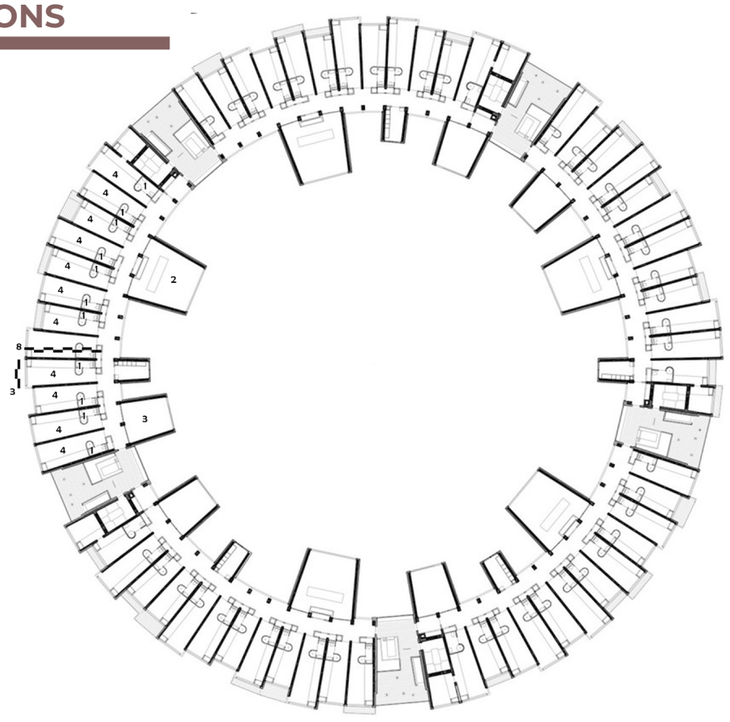
Area: 26515 m²

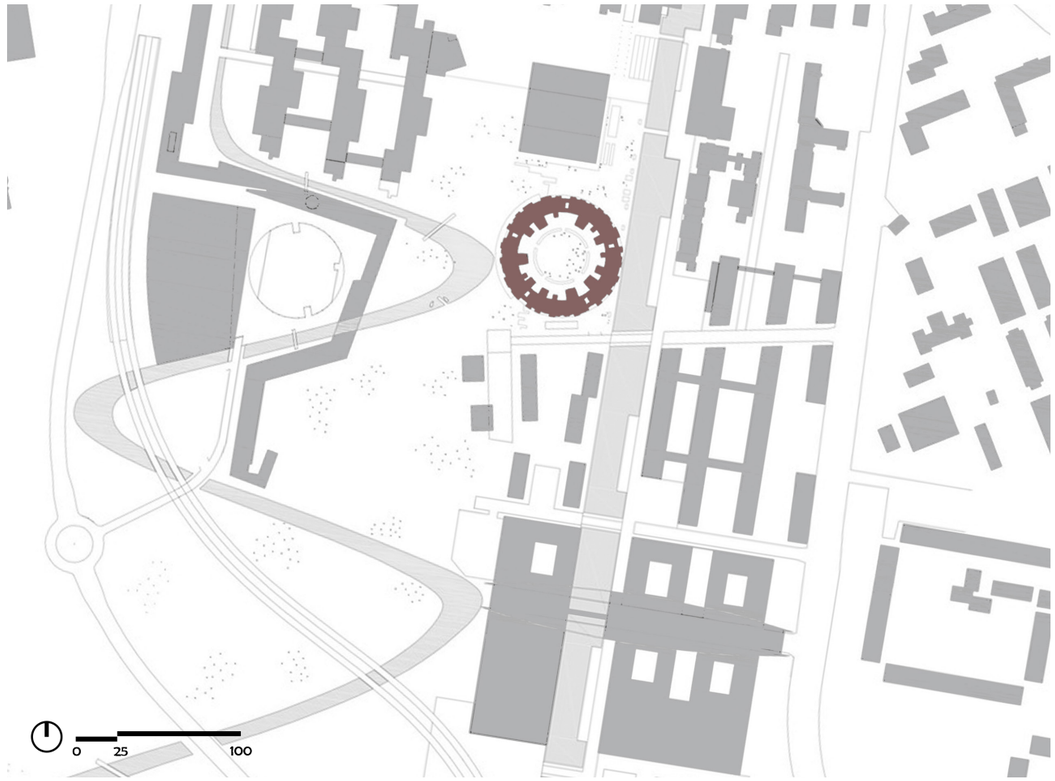
Shared functions:
workshop, bicycle parking, meeting room, kitchen, music room, study room, computer café, mail room, laundry, common room

Source: ArchDaily

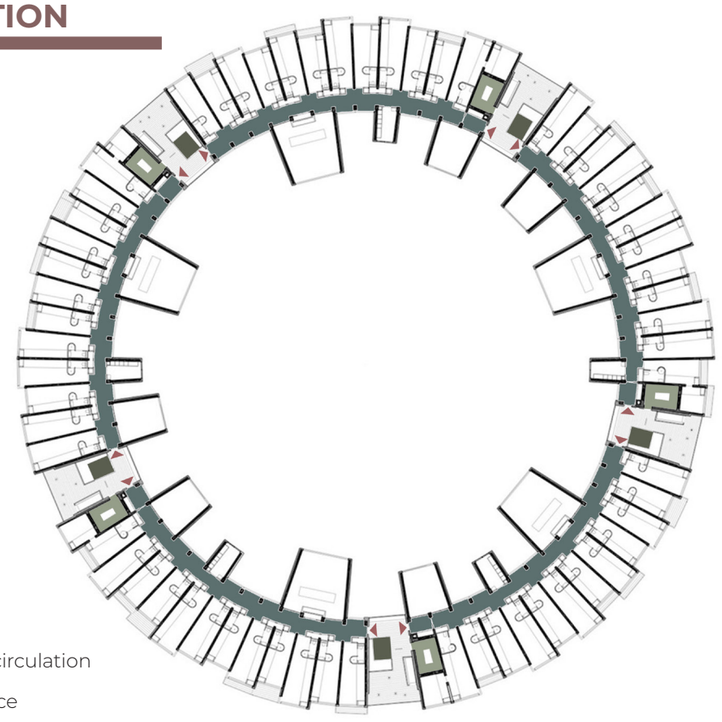
The Tietgen dormitory is regarded as 'the dormitory of the future' because of its clear and visionary architectural idea. The simple circular form is an urban response to the context, providing a bold architectural statement in the newly planned area. The project's dynamic, sculptural expression is created by the contrast of the building's overall form with the honest expression of the individual programmatic elements. The principle inspiration for the project is this meeting of the collective and the individual.

DIMENSIONS





CIRCULATION



MICROCITY HET PLATFORM VENHOEVENCS

Location: Utrecht, The Netherlands

Climate zone: Temperate oceanic

Annual sunshine hours: 1200–1600 h

Year: 2020

Type: Mixed use, Office and residential

Users: Urban professionals

Dwellings: 200

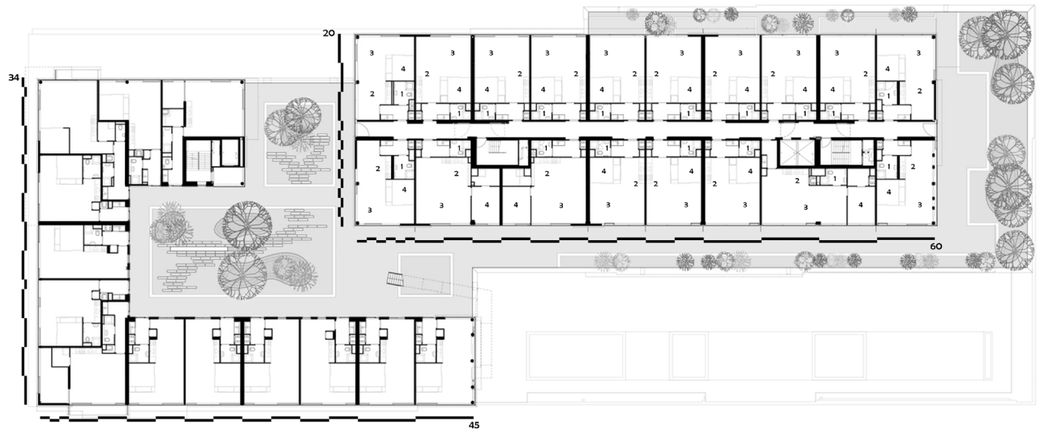
Area: 18000 m²

Shared functions:
restaurant, commercial spaces, a bicycle parking, and many “sticky spaces” for social encounters, urban living room

Source: ArchDaily

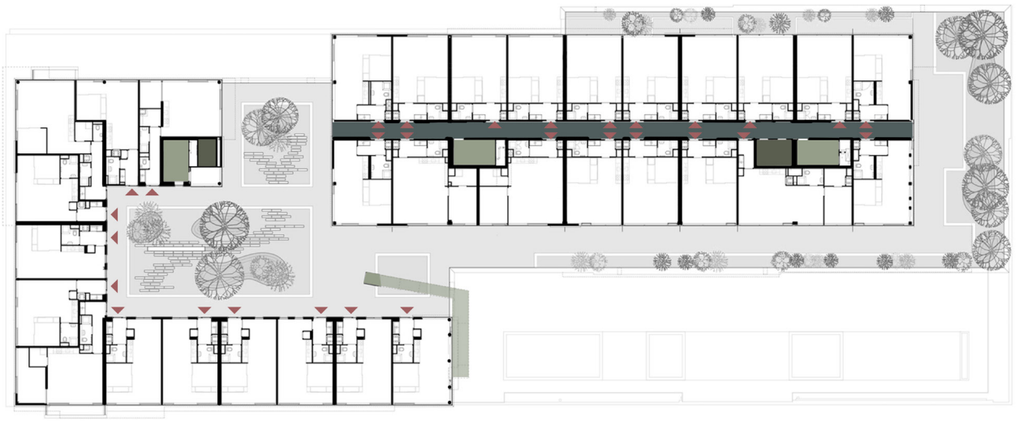
Het Platform is a mixed-use community building for green living, working, and playing. It has been designed as a MicroCity with the aid of complementary functions and a central location. By reducing commuting needs, the MicroCity concept helps cities to become truly sustainable. Het Platform is constructed on top of the Uithoflijn tram and bus terminal, directly adjacent to the station’s square. The components of the Het Platform are stacked in a way that generates attractive public outdoor spaces.

DIMENSIONS



1 Bathroom
2 Kitchen / Dining room
3 Living room
4 Bedroom

CIRCULATION



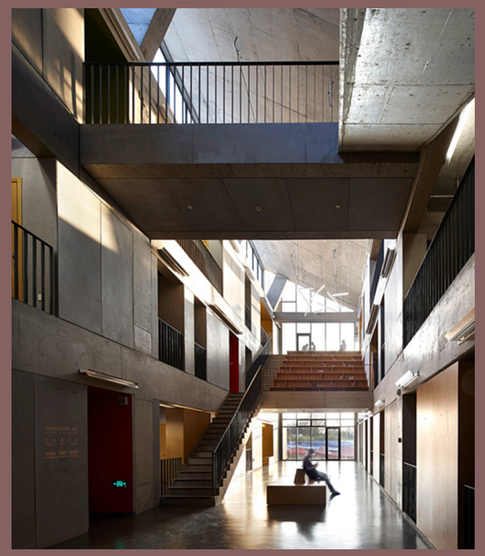
Entrance

Stairs

Elevator

Horizontal circulation

Ouside space



YOUTH COMMUNITY CENTER META-PROJECT

Location: Jilin, China

Climate zone: Humid continental

Annual sunshine hours: 2400–3000 h

Year: 2016

Type: Mixed use, Office and residential

Users: self-employed townspeople, students

Dwellings: 200

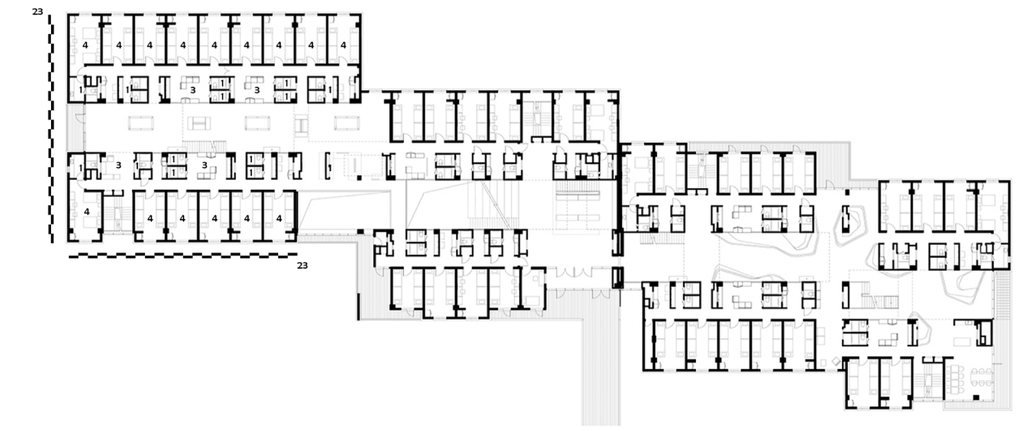
Area: 10000 m²

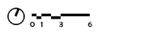
Shared functions:
restaurant, commercial spaces, a bicycle parking, and many “sticky spaces” for social encounters, urban living room

Source: ArchDaily

Youth Community Center is a mixed youth community building where the ordinary residential pattern is mutated into a quartet. Bridges, stairs and tiered seating around full-height atriums make a circulation. Thus, the framework encourages inter-level encounters among the private, shared and collective zones. The project proposes a new paradigm: mutual cooperation and positive environmental interaction through inter-spatial sharing based on a prototype community for contemporary ‘new youths’.

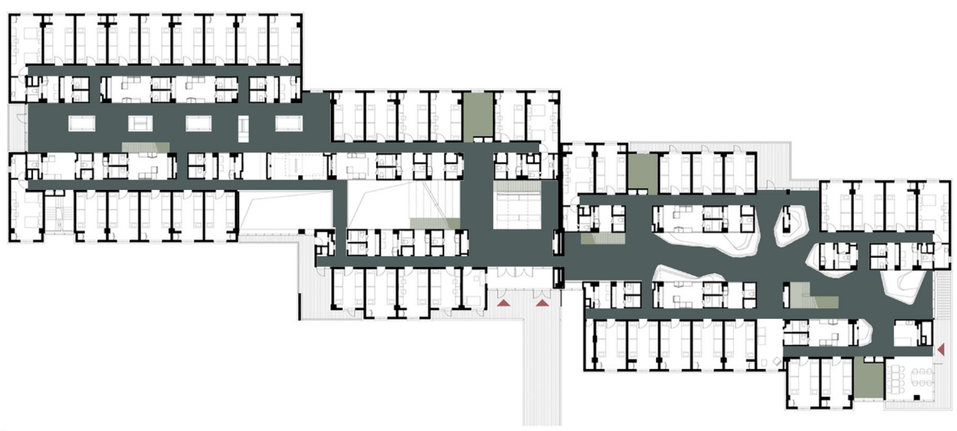
DIMENSIONS





1 Bathroom
2 Kitchen / Dining room
3 Living room
4 Bedroom

CIRCULATION



Entrance

Stairs

Elevator

Horizontal circulation

Ouside space

NIU COLIVING
CRAFT ARQUITECTOS

Location: Mexico City, Mexico

Climate zone: Temperate oceanic

Annual sunshine hours: 2400–3000 h

Year: 2020

Type: Apartments, Coliving

Users: a community of diverse people

Dwellings: 54

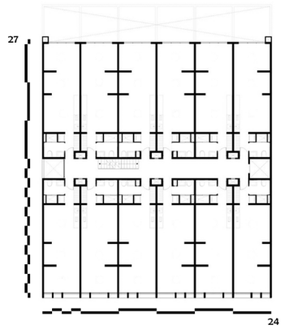
Area: 3500 m²

Shared functions:
lobby, cafe, coworking, gym, bicycle parking, storage, meeting rooms, management, play-room, podcasts room, two roof gardens

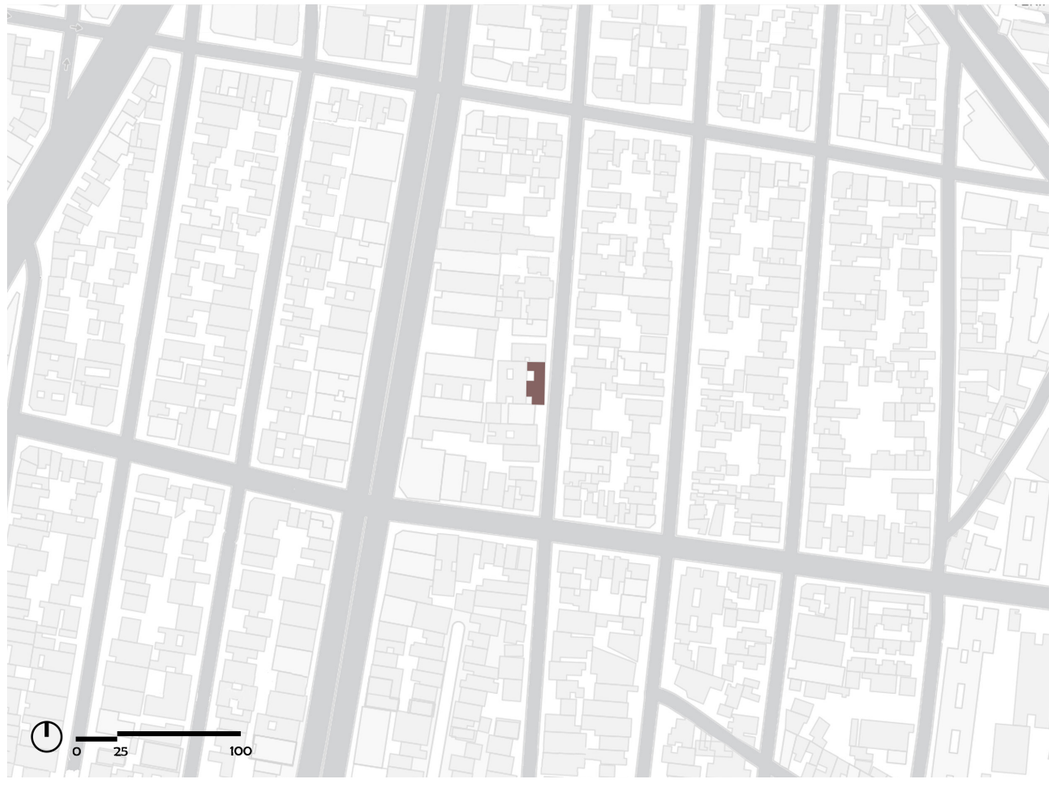
Source: ArchDaily

NIU, meaning nest in Catalan, evokes the creation of community within the space where one lives. This is not a traditional residential project, it applies a model designed to share and cohabit in spaces created in search of developing human activity for a new generation of citizens who are looking for a place that gives them a sense of “belonging”. The conceptual axis of the project is to generate complete habitable cells. that allows its inhabitants to have privacy in a building that favors a community of diverse people.

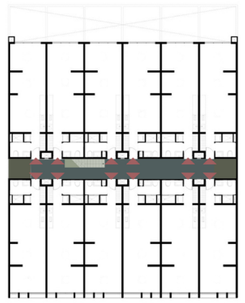
DIMENSIONS



1 Bathroom
2 Kitchen / Dining room
3 Living room
4 Bedroom



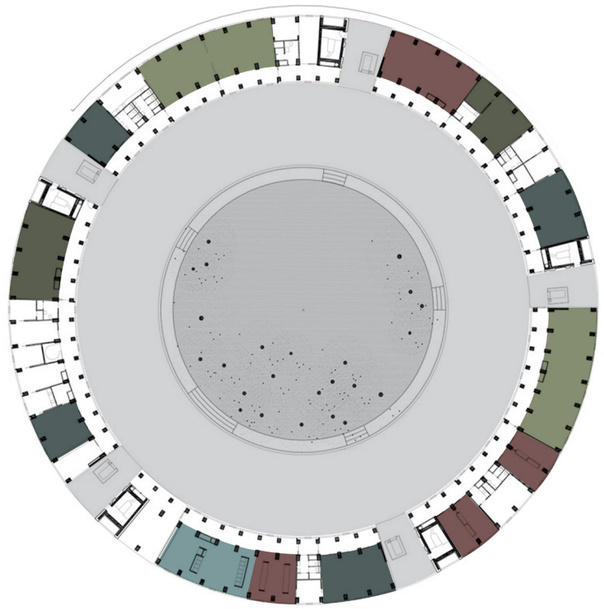
CIRCULATION



Entrance
Stairs
Elevator
Horizontal circulation
Ouside space

SHARED FACILITIES

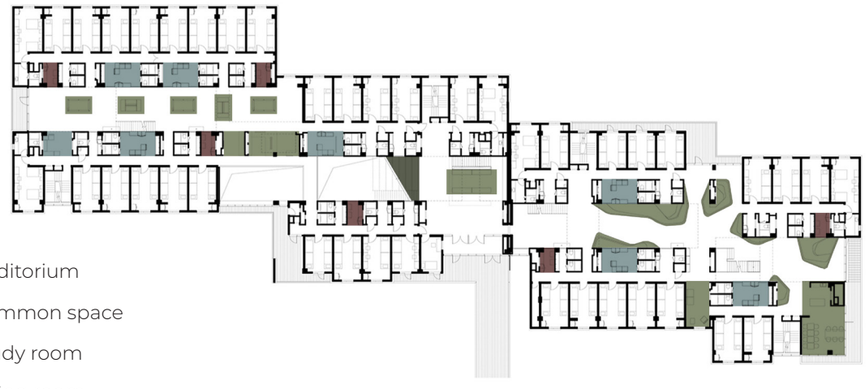
TIETGEN DORMITORY



- Common area
- Computer labs
- Bicycle parking
- Conference room
- Laundry room
- Ouside space

Ground floor

YOUTH COMMUNITY CENTER



- Auditorium
- Common space
- Study room
- Living room
- Ouside space

First floor

The choice of projects with shared spaces was intentional. It's meant to give an overview of the possible approaches towards the matter. All projects have dedicated shared spaces within the initial design, apart from the MicroCity, which has large spaces that are rented out. This might also be the reason why it's the only project that doesn't have an interior common room of some type. NIU has the largest variety of facilities compared to its size. They are also positioned on the ground and top floor, making them accessible for all the residents. The Youth center also has a large share of spaces, which are positioned in the central atrium, but very few study spaces. Tietgen has a repetition of the same type of space, but not a wide variety.

MICROCITY HET PLATFORM

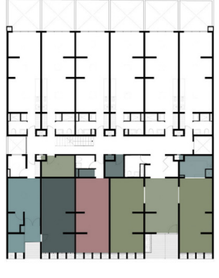
- Restaurant
- Gym
- Coworking
- Commercial spaces
- Ouside space

Second floor

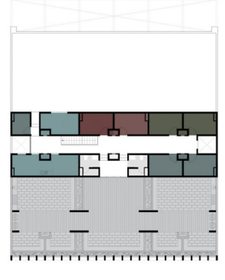
First floor

NIU COLIVING

- Meeting room
- Podcast room
- TV room
- Lobby/ Reception
- Coworking
- Cafeteria
- Gym
- Bicycle parking
- Storage
- Utility / Laundry room
- Ouside space



First floor



Sixth floor

DWELLING LAYOUT

TIETGEN DORMITORY

Tietgen is a dormitory and it has private student rooms with a bathroom and shared kitchen, living room and storage. Some rooms have a private balcony. The position of the shower further provides privacy for the bedroom. Also, there is a sliding storage unit which allows the room to be personalised.

YOUTH COMMUNITY CENTER

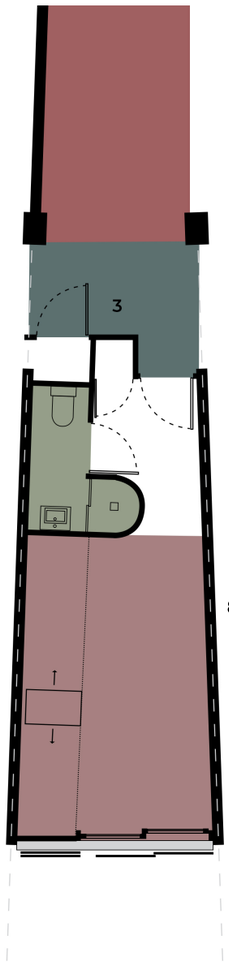
Youth community center houses camping students and self-employed townspeople. The rooms are shared with 4 people, the bathroom, toilet, living room and wardrobe are shared with the other rooms. The kitchen is shared on a building level along with all the other functions.

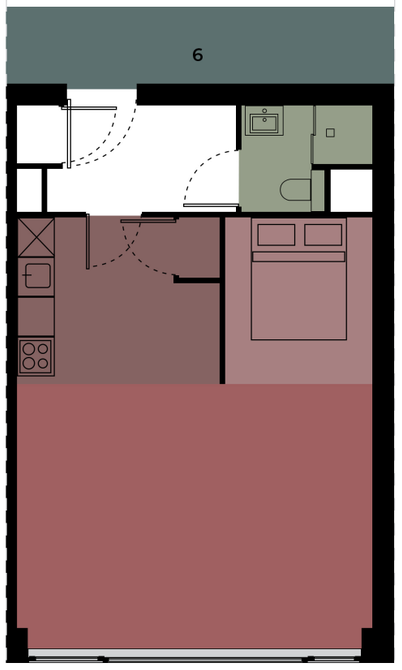
MICROCITY HET PLATFORM

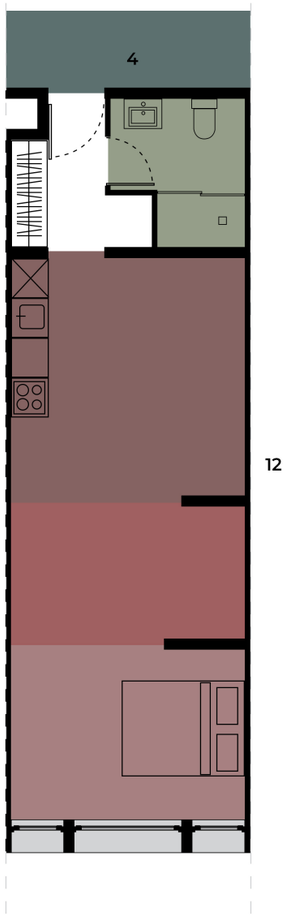
The MicroCity features self-contained dwellings. They have everything necessary in a small dwelling - a kitchen, bathroom, bedroom, and living room. The room is one, but a wall has been positioned strategically to visually separate the bedroom area from the living room.

NIU COLIVING

The NIU is very similar to MicroCity. It features small self-contained dwellings with the same functions. Again, the room is only one, but several walls have been positioned strategically to visually separate different functions. The shape of the dwelling is very different though. Here it's a long continuous space.







- Hallway
- Bathroom
- Kitchen/ Dining room
- Living room
- Bedroom

PUBLIC/PRIVATE THRESHOLD

TIETGEN DORMITORY

In Tietgen there is a clear distinction where the boundaries of the private are, yet the collective spaces are within reach. Also there are several types and levels of collective. There are the kitchen, living room, storage available for a cluster of rooms and then are the other facilities available for the whole building.

YOUTH COMMUNITY CENTER

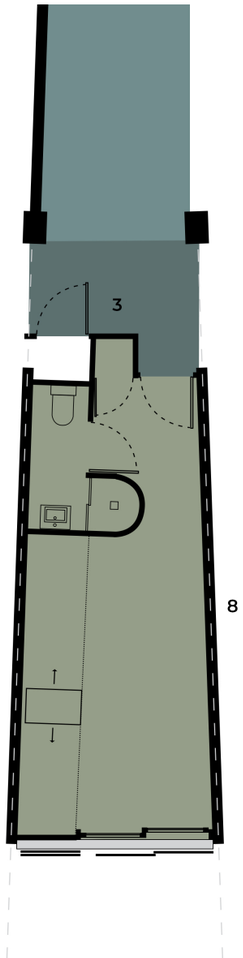
In the Youth community center there isn't a space that can be regarded as private. All the facilities are shared including the bedroom. It's also difficult to distinguish between collective and public since all the spaces are openly accessible, yet some like the living room aren't expected to be used publicly.

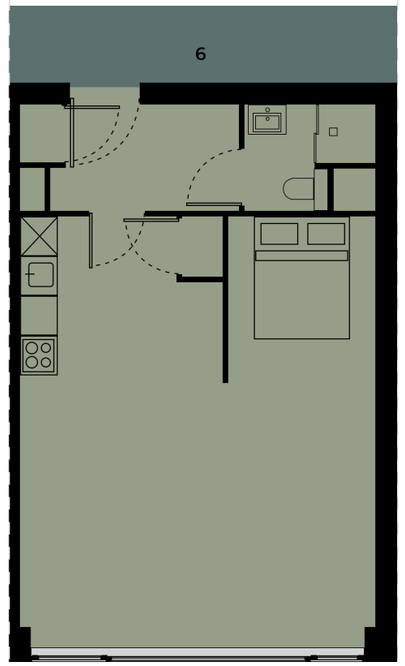
MICROCITY HET PLATFORM

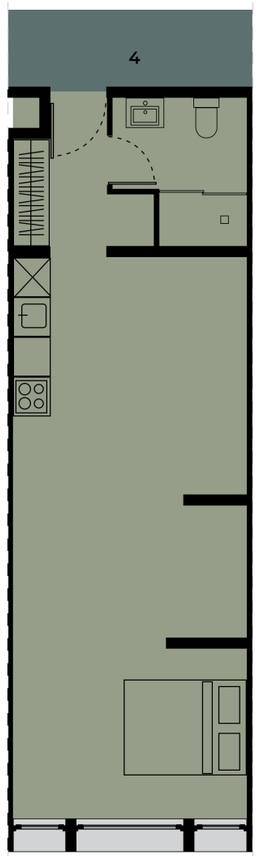
The threshold of MicroCity is very clear and sudden. There is a fully private dwelling with all the features that are needed and there are also no common spaces nearby. So if someone wants to, they can meet no other people because no unintentional meeting of residents can occur.

NIU COLIVING

Concerning the public/private threshold the NUI is again very similar to the MicroCity. The dwelling is completely self-sufficient and there are no instances to meet. However the scale of the building is much smaller and the shared facilities are closer and more in variety, so one might be tempted.







Public

Collective

Private

CONCLUSION

The status of the market revealed that there is a need for more affordable housing in the mid-price rental segment and a shift towards a market that is better fitted to the user's needs. Due to the consistent policy of stimulation of homeownership, the Dutch housing market now has a very small commercial rental segment. The rising house prices affect the first-time buyers the most because their borrowing capacity isn't sufficient to afford the average real estate prices in the majority of the cases. Those are most often young people at the start of their housing career. But if given more affordable housing, they could save more easily for their first purchase. Couples succeed more effortlessly to afford the housing costs, because of their joined income. However, singles spend a larger percentage of their disposable income for housing costs. Therefore, the middle income young single-person households are the most affected group from the current status of the market and this is why they are the target group of this research.

The single-person household of all ages is a relatively new concept. It started to develop in the 1980, but became noticeable with the turn of the century. Therefore, this ever-growing household type is the definition of a modern household as it has currently the biggest share from the total private households compared to couples and families combined with single-parent households. This share has uninterruptedly been increasing and is expected to continue. Hence, this household type deserves greater than the current attention and dwellings tailored for them. Presently, they live predominantly in rental apartments in urban areas. The young single-person households are highly educated, concentrated in the bigger cities, because of their lifestyle, and are often only temporarily in this composition, bridging their paternal home and the moment when they are ready to form a multi-person household.

On average single-person households of all ages need mid-price rental apartments. The young ones need an independent one and the great majority would sacrifice the floor area to have a private bathroom and a kitchen. They would do the same tradeoff to have a separate working space. They need an urban setting because of their lifestyle, but in those areas the perceived social cohesion is low and this is a key to satisfaction with the living environment. Young single people are less susceptible to experience social cohesion and, therefore, they need stimuli to interact with others. This observation was made concerning neighbourhoods, but if we regard the building as a smaller scale entity with the same underlying principles with regard to interaction, we can expect that the social cohesion would follow the same pattern on a building scale as well. Therefore, the building needs to facilitate contact between the residents. Because young single-person households are open to the shared economy it's very suited to achieve a better social cohesion by shared facilities and co-housing. Compact dwellings would serve the daily needs of the residents and for the other needs they would rely on the shared spaces. Compact refers to the preferences of young single-person households to have a small but well organised dwelling with storage, daylight and view. Some shared facilities are considered a must, but others are more important than people could understand, because their effect is not direct. Examples are game rooms, cinemas, working spaces, etc. This occurs because people's definition of importance concerns their first necessity items. The facilities in question have no effect on those, but rather on the overall satisfaction with the building and the life in it. Therefore, although people don't immediately recognise them as important, the design of the building should include recreational facilities. A separate work space is needed and, therefore, a live-work typology should be integrated. It needs to be common and outside one's room so residents can have the possibility to interact with each other.

The topic of downscaling the dwelling size has been central in a high-level architecture discussion already. 'Die Wohnung für das Existenzminimum' defined minimum standards for the habitable dwellings and construction procedures that would have a positive effect on construction time and affordability. This

theme appears to be relevant today as again design has a crucial role to make uncorrupted housing accessible to larger segments of the population. The prefabrication continues to be the essential means to affordability, however, emphasis is laid on flexibility, customization and avoiding standardized impersonal solutions. Also, the new dwelling for the minimum level of existence underlines environmental sustainability by correct use of resources and energy efficiency. It promotes new spatial layouts of compact housing with communal facilities, flexibility, temporary solutions, shared living and social enrichment.

It's often forgotten that the live-work typology was the norm before the Industrial revolution. The modernist zoning plans imposed a strict division between living and working. The generations of separated economic productivity and domestic life have created residential deserts. By combining residential and commercial functions, a livelier environment with twenty-four hour inhibition can be created. The lifestyle nowadays continues to change and more and more people work from home. This changes also the way we think of the live-work typology. Customisation, layout flexibility, business and personal needs are valued, but there are different variants for the form of the live-work dwelling and they all have a different boundary between the living and the working.

Many examples can be found on buildings with shared facilities, because this concept has been proven working. However, some like the MicroCity have a very sharp public/private threshold and that isn't favourable. Its shared facilities are large in their area, but very few in type. NUI Coliving has the same sharp threshold, but the variety of the facilities is much larger given the size of the building, so they are within reach. On the contrary, the Youth Community Center doesn't have any private spaces at all. Yet the shared facilities, being positioned in this atrium, are very inviting and uniting for the whole building. The threshold of Tietgen dormitory is somewhere in the middle and the hierarchy of the common spaces is valuable, because it eases contact between residents of the same cluster. The dwelling layout of only MicroCity is suitable, because the rest either have a shared bathroom and kitchen or the dwelling is too deep and the daylight wouldn't be sufficient. The scale of the precedents varies too greatly from the size of Building 7, but favourable segments could be taken. Those are the corridor typology, the dimension of the dwellings, and the shared facilities organisation.

DESIGN HYPHOTHESIS

The lifestyle of young single-person households requires living in lively urban areas in the bigger cities. Hence, Building 7 is located in a suitable area for them. Since they are often only temporarily single, they require a dwelling that could potentially accommodate another person until they are ready to move in together or expand their family. However, they still need a small dwelling because of their financial status. Therefore, the rooms ought to be compact and well organised to make efficient use of the space, have a private bathroom and kitchen, storage, ample daylight and a view from the window. The building should feature a large variety of shared facilities ranging from the essential ones to those which are just for pleasure. Those would be a laundry room, bicycle parking, outdoor space, co-working space, quiet study room or library, game room, common leisure room, gym and movie theatre. Nevertheless, because young single-person households experience much less social cohesion, the design of the shared facilities and their position in the building need to facilitate interaction between the residents. Therefore, a beneficial approach to the design of Building 7 is a public/private threshold that is similar to NIU coliving and Tietgen Dormitory. The shared facilities should be distributed in the building such that they are within easy reach to all residents, instead of exclusively on the bottom floors. The ground floor needs to house the very public facilities, a rooftop garden would make use of the height of the building, and a central central atrium would make it more lively and unite it by making the facilities visible to everyone. Along with this, the dwellings should be clustered with a belonging smaller common space. For larger groups or events the big spaces would be available. A hierarchy of common spaces would stimulate the interaction on different levels and would ease the interaction between direct neighbours.

CONCLUSION KEY WORDS

Social cohesion

Address needs of target group

Rental dwellings

Affordable dwellings

Shared recreational facilities

Compact dwellings

Large window and Daylight

Primary facilities a must

Instances of interaction

Prefabrica-tion

Environ-mental sus-tainability

Alterna-tive use of building

Communal facilities enrich social dimension

24 hour inhibition neighbour-hood

Culture of reduction

More versatile and flexible

Dwellings for 2 ad interim

Well planned living space and storage

Avoiding impersonal standardized housing

Spatial standards over profit

Self-contained dwelling

Work-live typology

High urgency to move = short-stay

Urban environment

Urban orientated lifestyle

Satisfaction with the immediate living environment

Levels of shareability

Need of facilitating interactions

Room for individuality

Satisfaction with the immediate living environment

Positive about the sharing economy

Positive attitude to small dwellings

Modern minimum habitable dwelling

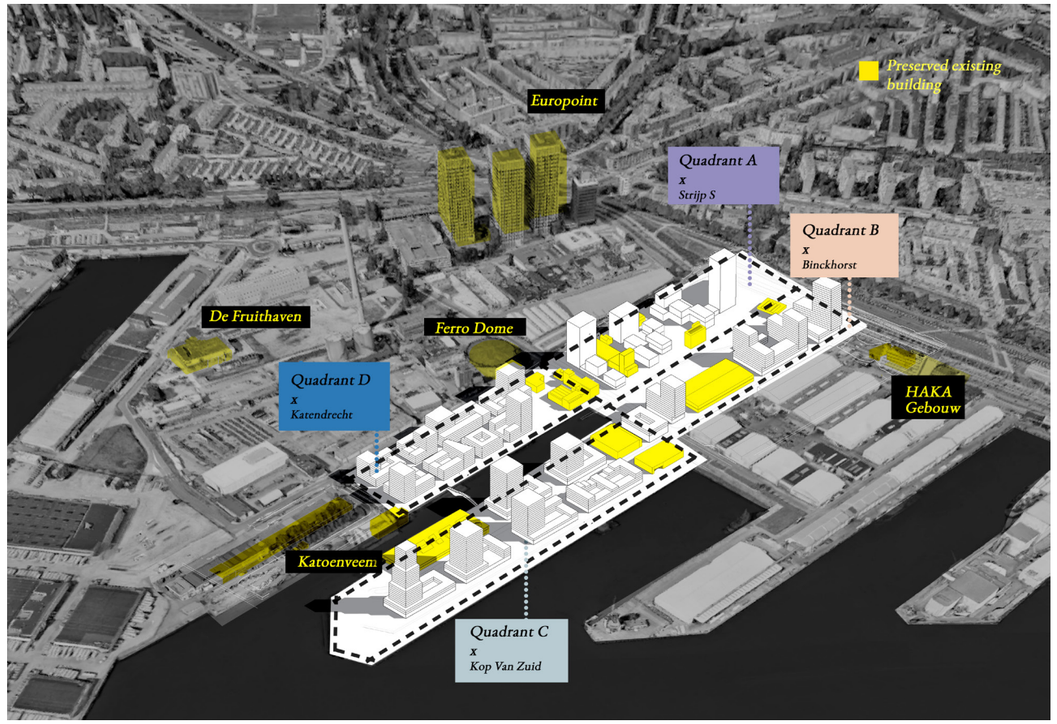
Maximum energy savings

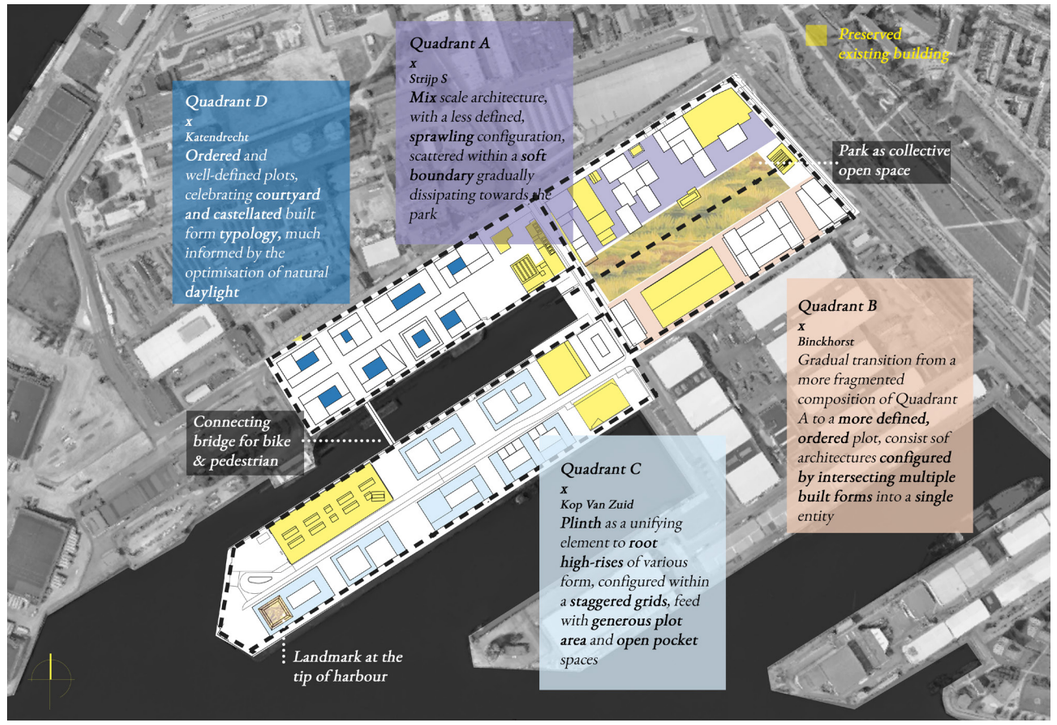
Correct use of resources

View from window

MASTERPLAN

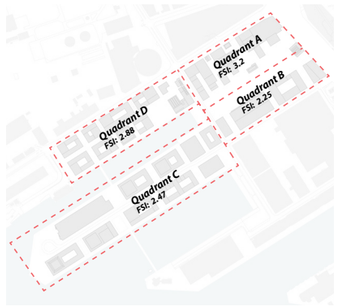
MASTERPLAN KEILEKWARTIER





The masterplan for Keilekwartier was developed in 4 quarters simultaneously, each of them with its own approach. However, a common strategy was made for the whole of Keilekwartier in terms of circulation, commercial building plinth, preserving of iconic buildings that are characteristic for the area.

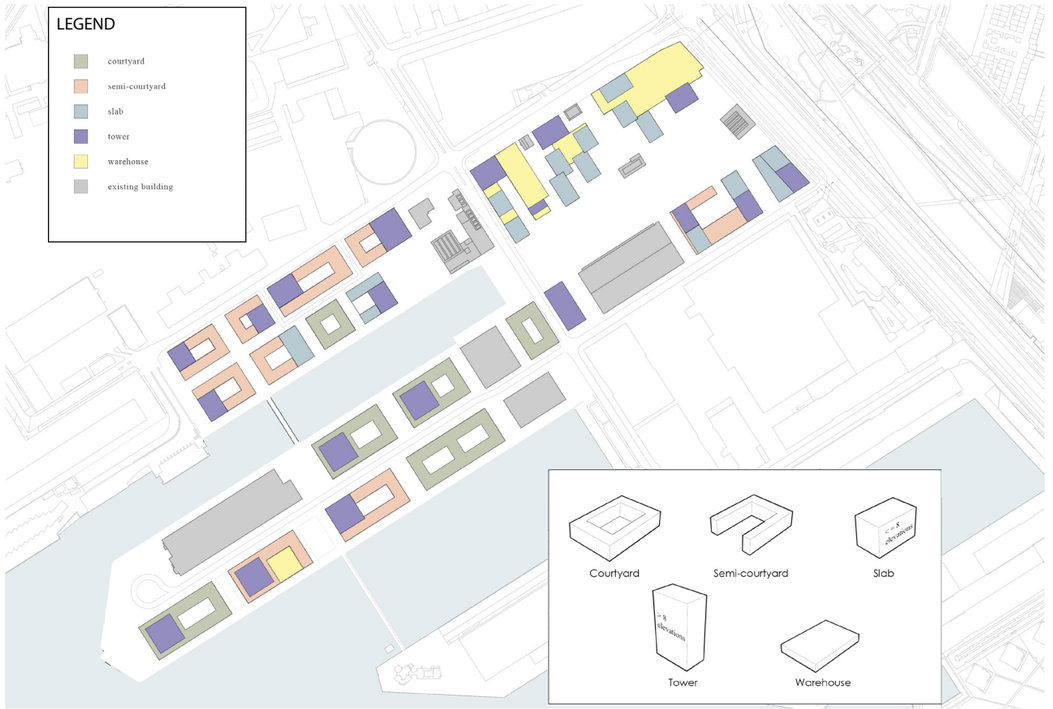
Overall, a common zoning plan was created with repeating typology to unite the appearance of the otherwise separated quarters. Yet, this was still the urban phase of the project and the volumes are preliminary.



CIRCULATION

ZONING REGULATION

TYPOLOGIES

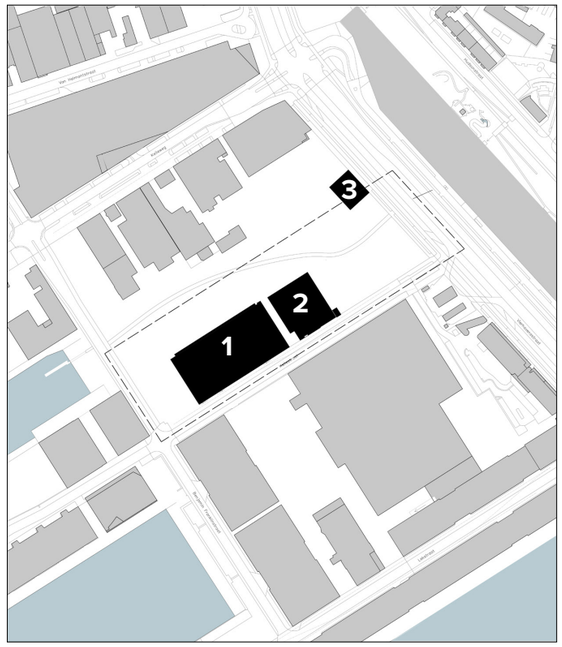


MASTERPLAN QUARTER B

CURRENT USERS OF QUARTER B

Building 1

- GROUP A architects — Studio for architecture, interior design and urban design
- SANT Interiors — Interior fitting contractor
- Happel Cornelisse Verhoeven Archi-
- Brandsing Meubelmakers — Furniture maker and design
- International Architecture Biennale Rotterdam
- De Urbanisten — Studio for urban research, design and landscape
- HP Architecten — Studio for architecture
- CiderCider — Wine store
- Woodwave BV — Furniture maker
- Bolder Neoliet — Rock climbing gym



Building 2

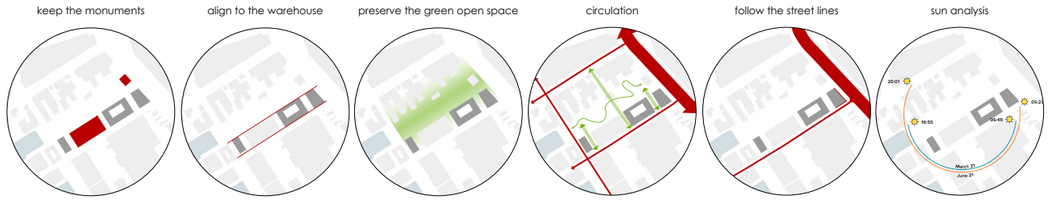
- De Ronde Engineering — Research and product development
- TTOTT — Interior products from residual material
- Keilewerf 2 — Place for makers

Building 3

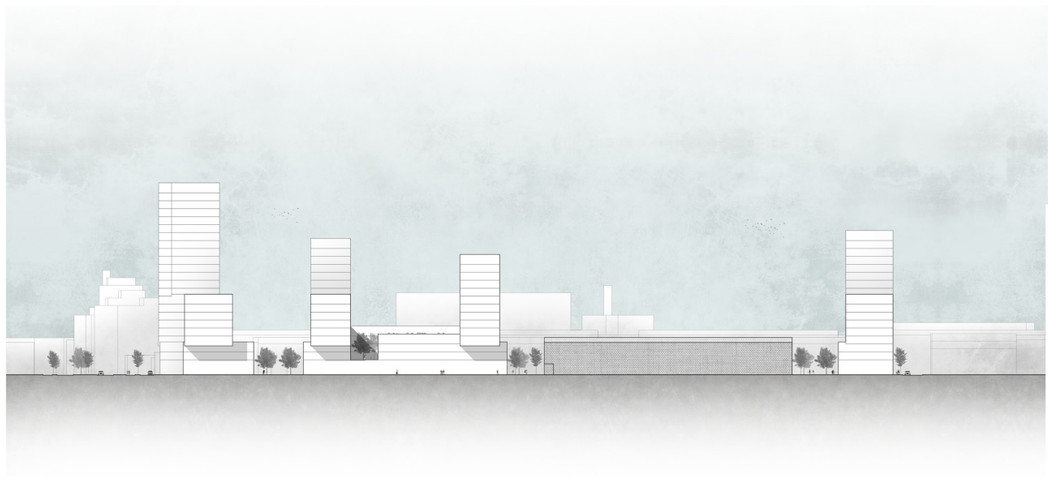
- Studio Roosegaarde — Social design lab
- Studio 4H52 — Filmography

1 Future municipality monument
3 Iconic monument

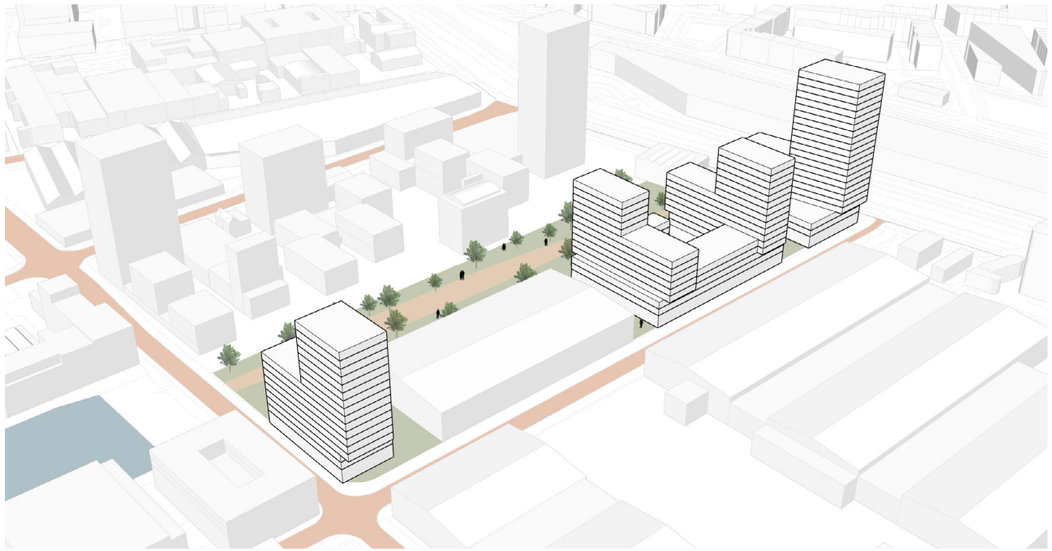
URBAN STRATEGY FOR QUARTER B



URBAN SECTION PARK SIDE

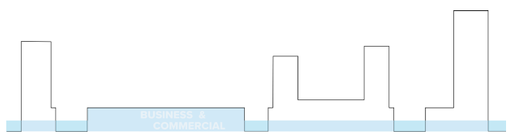


URBAN MASS PROPOSAL

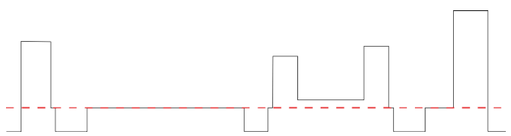


In Quarter B, there are three existing buildings. Based on their current users and their appearance, the decision was made to keep two of them. In fact, Keilepand is listed as a future municipality monument, which was recently renovated. This building was taken as a base for the urban design and the proposed volumes align with it. The park on the northern side of QB is central for the whole of M4H. That's why between the proposed buildings passages to connect to the park. The height of the building is determined by the sun analysis to provide enough daylight to every dwelling.

URBAN STRATEGY FOR QUARTER B

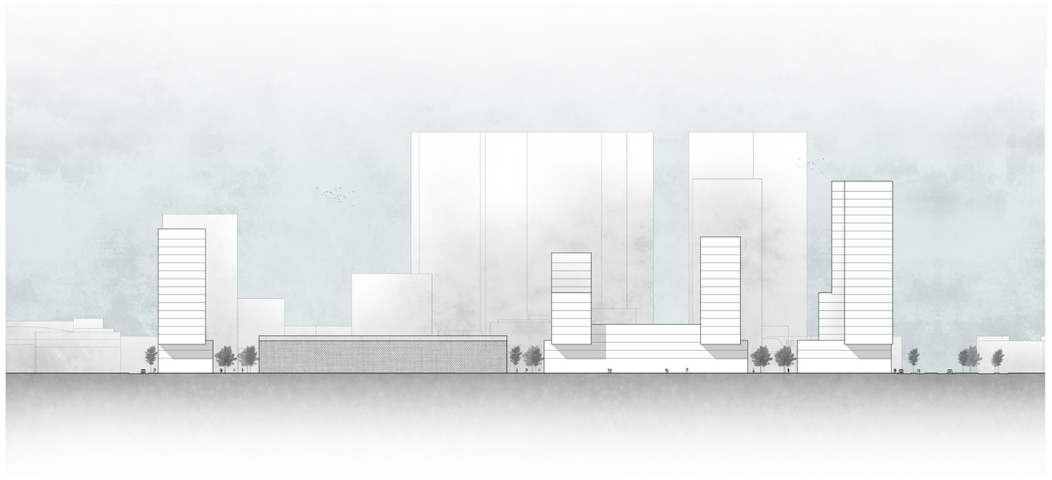


keep the setback to align to the warehouse height

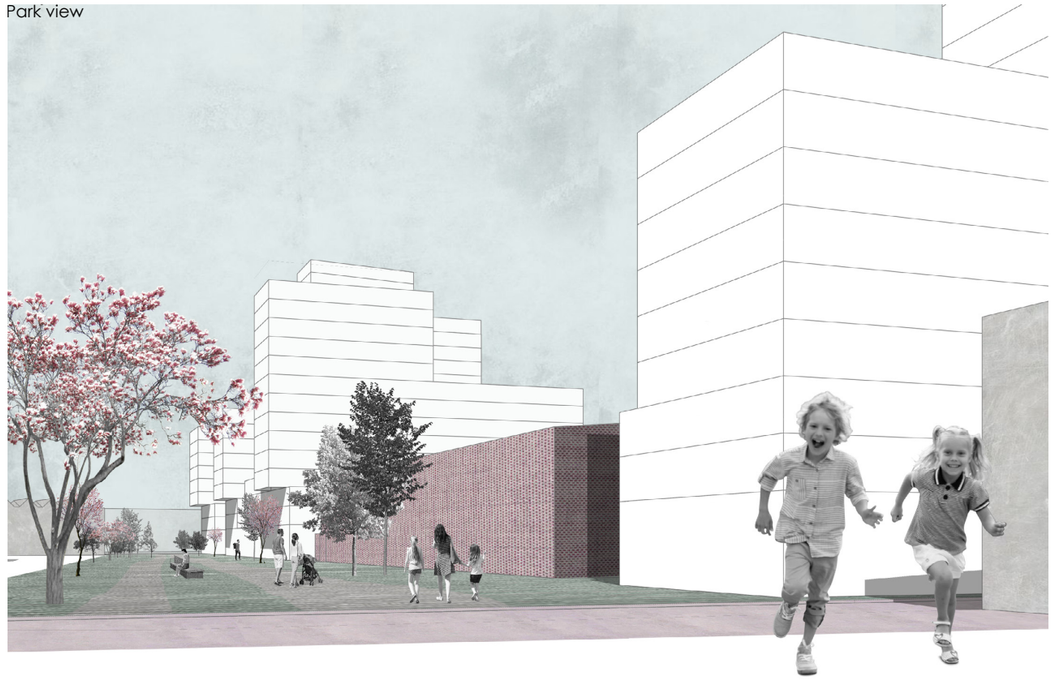


option 2a: keep the setback to align with the warehouse height

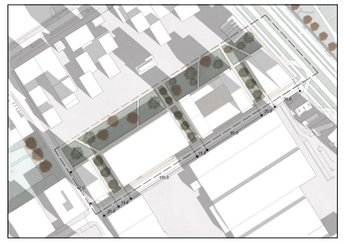
URBAN SECTION STREET SIDE



Park view



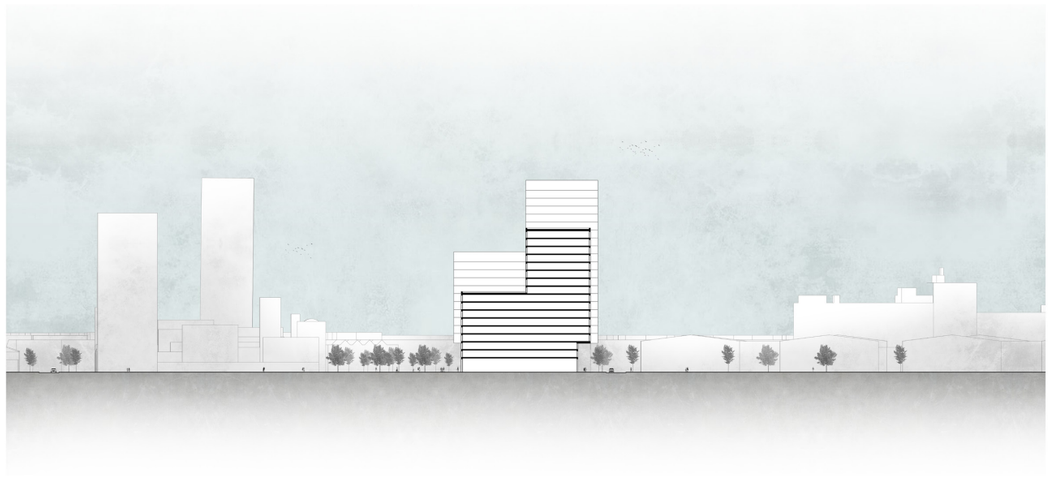
March 21, 9:00



March 21, 12:00

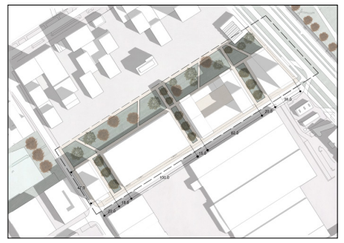
March 21, 15:00

URBAN SECTION THROUGH BUILDING 7

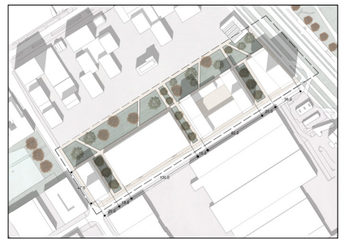


Street view

June 21, 9:00

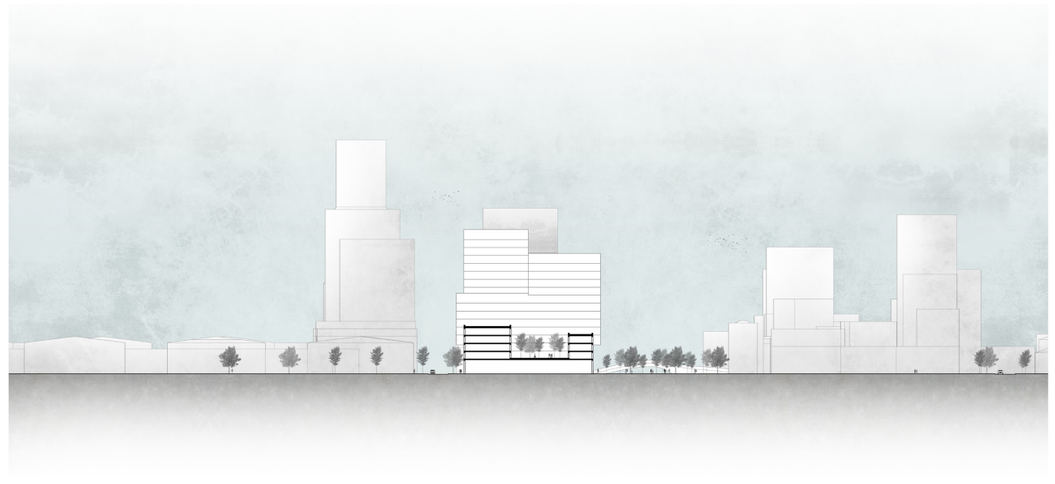


June 21, 12:00



June 21, 15:00

URBAN SECTION THROUGH BUILDING 6



MASTERPLAN PROPOSAL

CONCEPTUAL DESIGN

CONCEPTUAL DESIGN

The paper investigated the housing situation of young single-person households, concluded what their housing needs and preferences are and formulated a design hypothesis, which allows those conclusions to be implemented in the design of Building 7 in M4H, Rotterdam. The masterplan was developed prior to this research and the shape, size and outlines of the building were determined by it. A broader overview of the masterplan can be found in the Appendices.

The design of Building 7 is in its very initial phrase and will be elaborated further. The vertical circulation was taken as a starting point. Because of the changing size of the levels of the building and the various functions within it, several limitations arise in the position of the vertical shafts for the circulation. Therefore, a scheme was developed at first to indicate the approximate location of the different elements, sensible distance between the structural walls and reasonable depth of rooms.

Later on, when the floorplans were developed more, another elevator was added because the building has found to have too many residents for just one. Also the second emergency staircase of floors 9-16 was moved outside the building and connected to the second staircase of floors 0-8 via the roof area. This way room for another studio was created and the number of staircases was optimized. Admittedly, between grid lines 12 and 13 there's a possibility for another room. However this was left open for a small common room and a terrace on each floor. One of the conclusions of the research was that a hierarchy of common rooms are needed.

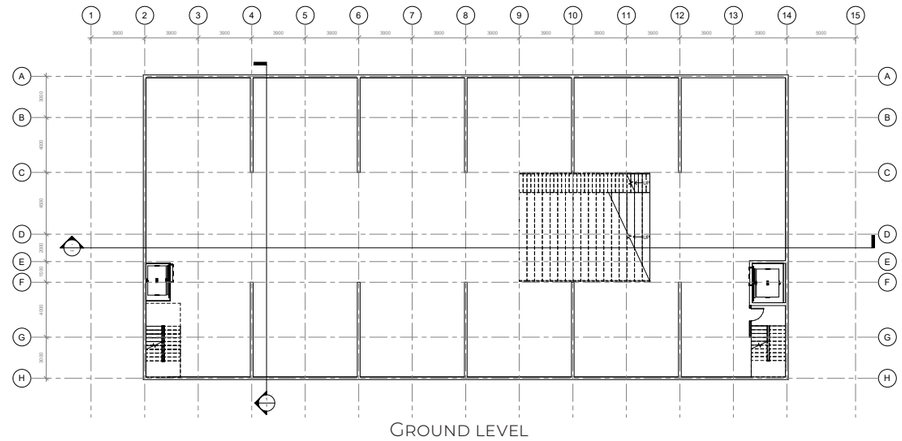
VERTICAL ORGANISATION

SCHEME

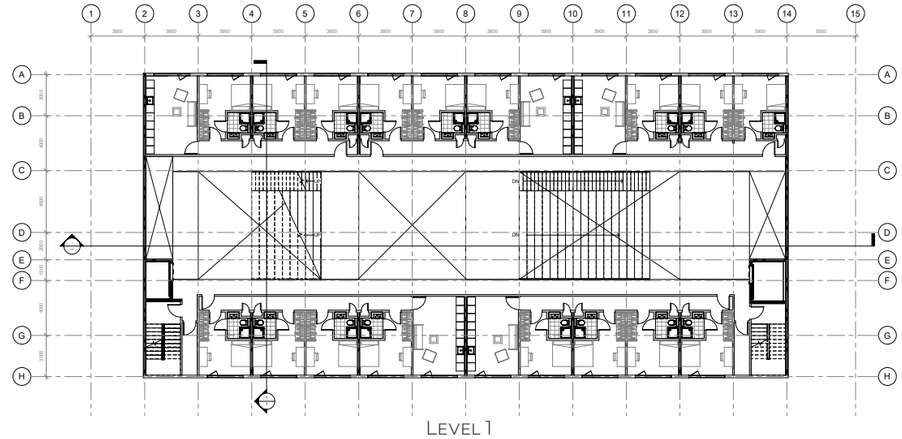
FLOORPLANS

After the general arrangement the dwellings were designed. The dwellings on Floors 1 and 2 have a shared kitchen and are grouped in apartments for privacy reasons given that in the adjacent atrium almost all collective functions are located. However because there are only 5 apartments, the wall that separates the atrium and apartments is very closed and uninviting. Hence, more openings are needed or maybe even a glass wall.

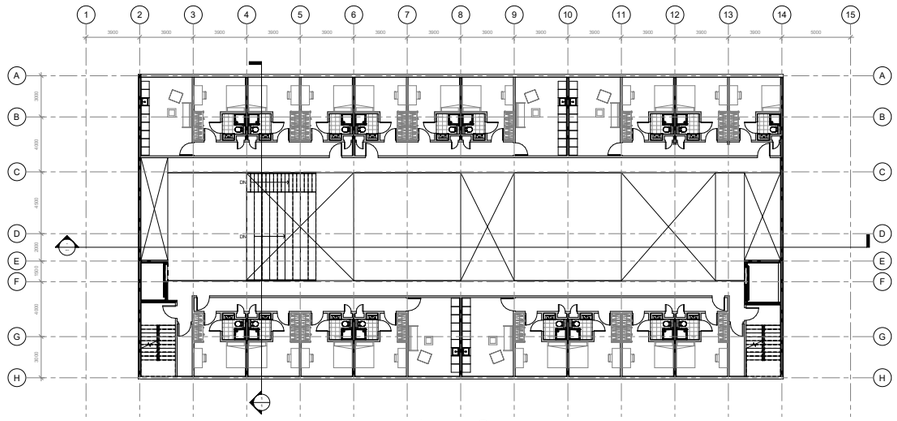
The atrium has 2 auditoriums and several bridges that connect the 2 sides of the building. The ground floor is to a large extent unfinished because the exact arrangement of the functions is still being investigated. Emphasis is laid on noise production of each function and grouping the functions accordingly. Once the functions are determined, toilets and supporting utility rooms would be positioned and the bridges and auditoriums might move. Nevertheless, the ground floor ceiling height of 6 meters and the 3.2 meter one of the first floor create a large and a small auditorium, which is favorable. Therefore, even if their position changes, the level would remain the same.



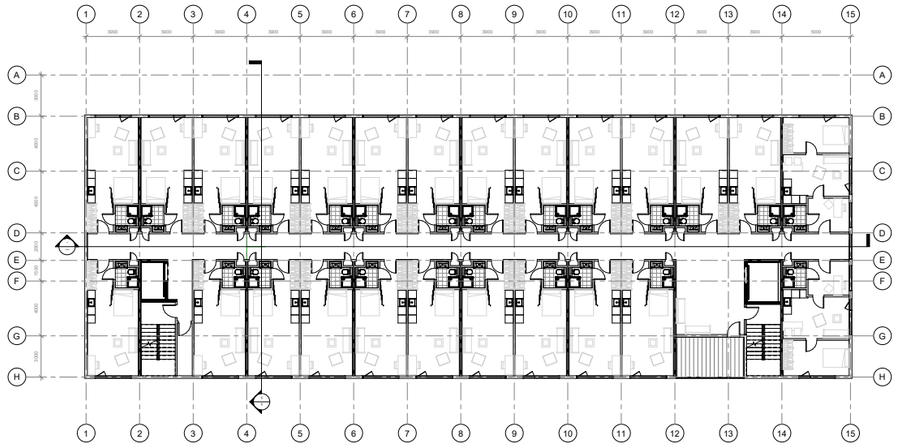
Ground level



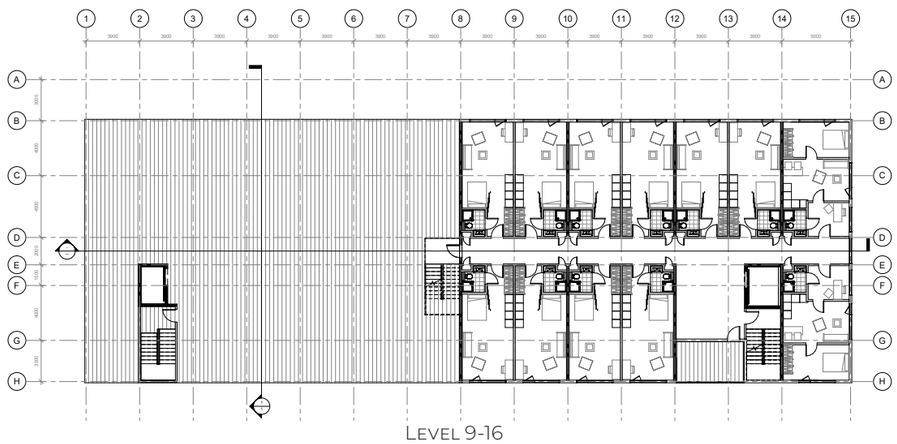
Level 1



Level 2



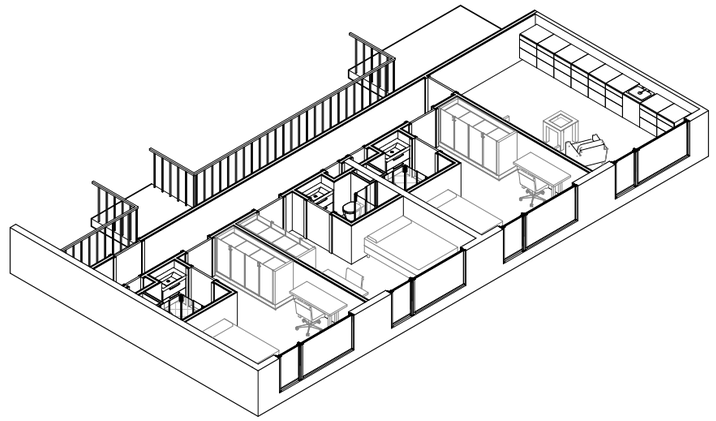
Level 3-8

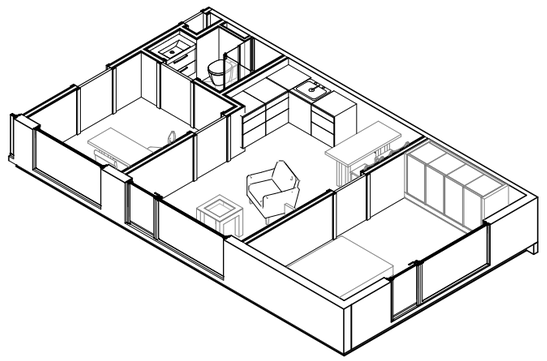


Level 9-16

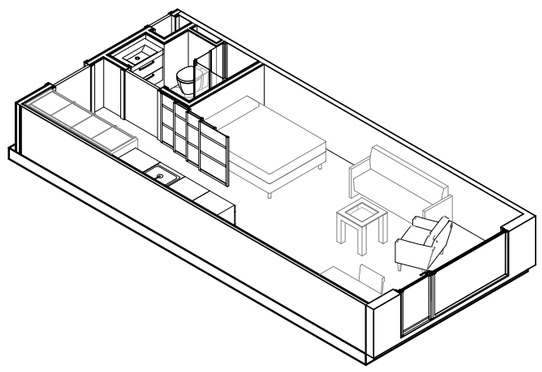
ROOMS

Shared rooms





Self-contained rooms

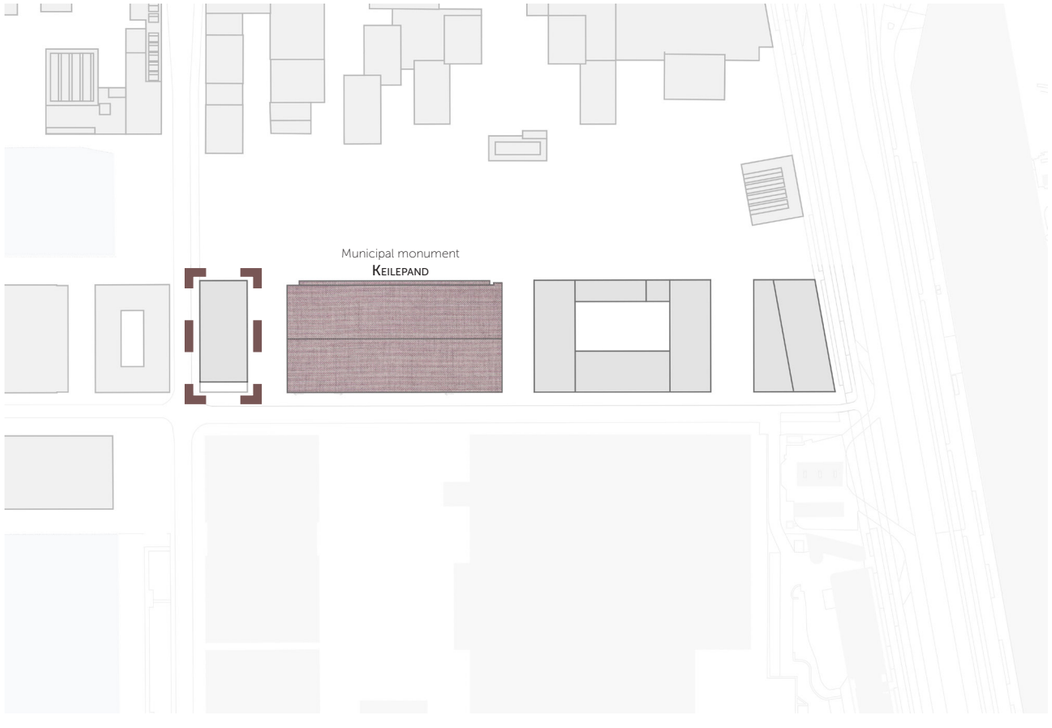


BUILDING DESIGN

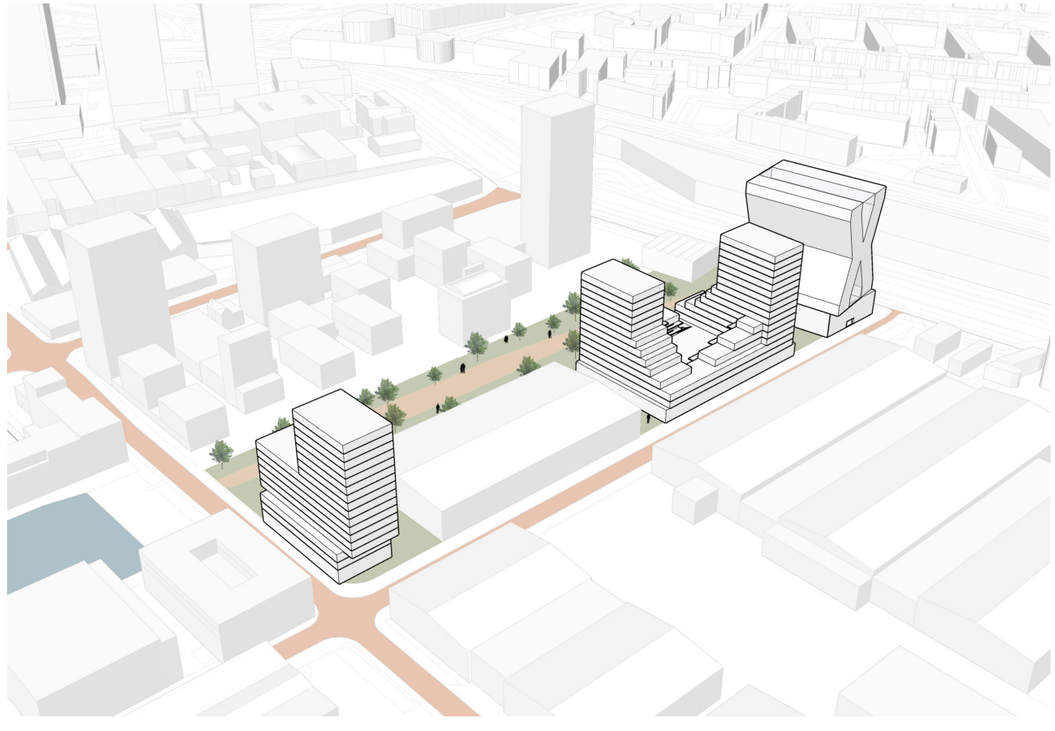
BUILDING 7

ENTRANCE TO THE BUILDING EXTERIOR

BUILDING 7 LOCATION



URBAN MASS AFTER ARCHITECTURAL ELABORATION



URBAN SECTION AFTER ARCHITECTURAL ELABORATION

The building that was developed further is given the provisional name Building 7 because all the buildings in the Masterplan were numbered clockwise. Building 7 is located on the southeast side of Keilepand. All the building are aligned to Keilepand except for this one. This was done to reveal Keilepand when approached from the sidewalk and to create a sheltered area for the main entrance.

After the architectural elaboration, the other 2 buildings in QB changed significantly. Building 7 was only mirrored so that the vertical circulation can be positioned on the north side. But the shape was otherwise not changed because it matches in height with the new context and also with Keilepand.

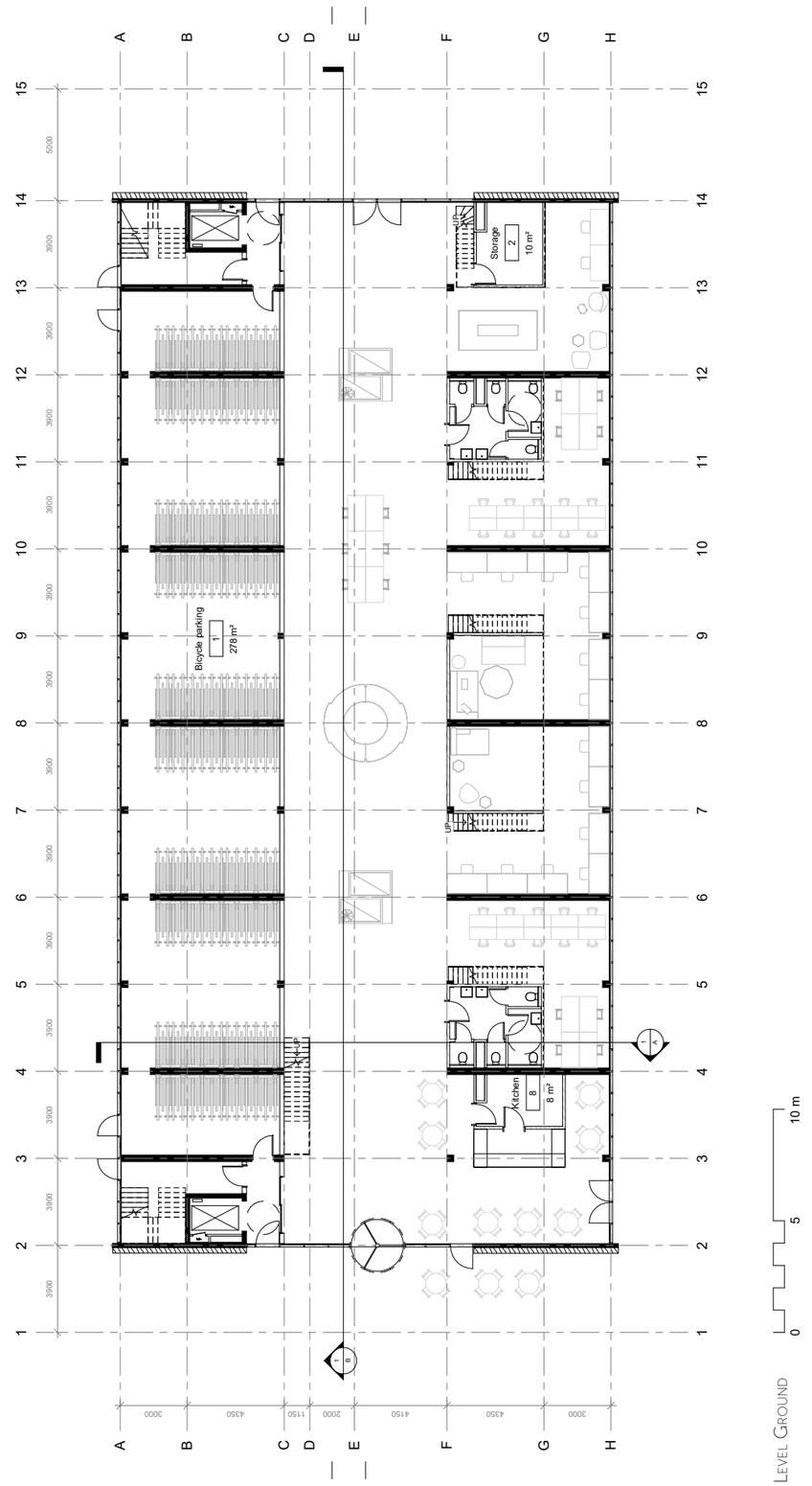
ENTRANCE TO THE BUILDING INTERIOR

URBAN SECTION THROUGH BUILDING 7

SUSTAINABLE PRINCIPLES

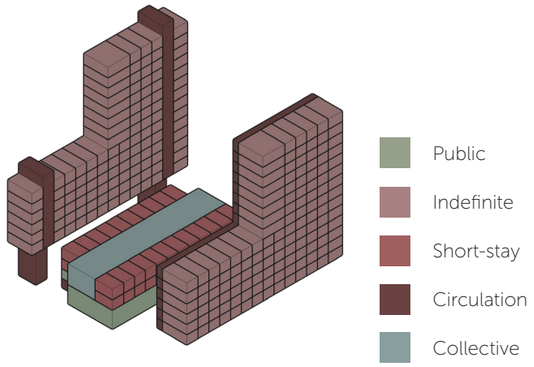
Although Keilepand is a municipal monumental building and has recently been renovated, some of its facades are not so welcoming. Especially the dead one on the side of Building 7. The parking spots are along the dead facade to distance the people from it. I share the vision of the municipality that parking should be solved on a neighbourhood scale by several parking buildings. Therefore, I only positioned a few car parking spots - 3 for disabled and 11 for car sharing.

The taller part casts a shadow over the lower roof at about midday. Thus, the lower roof is unsuitable for solar panels so they are only on the higher roof. But I intentionally didn't change the shape of the building because the lower roof provides a connection to the water and park. And the taller part is currently marking the main entrance. The rainwater of all is collected, stored and reused. The half of my plot, which is left for a passage to the park, is the perfect opportunity to implement a ground heat exchanger.

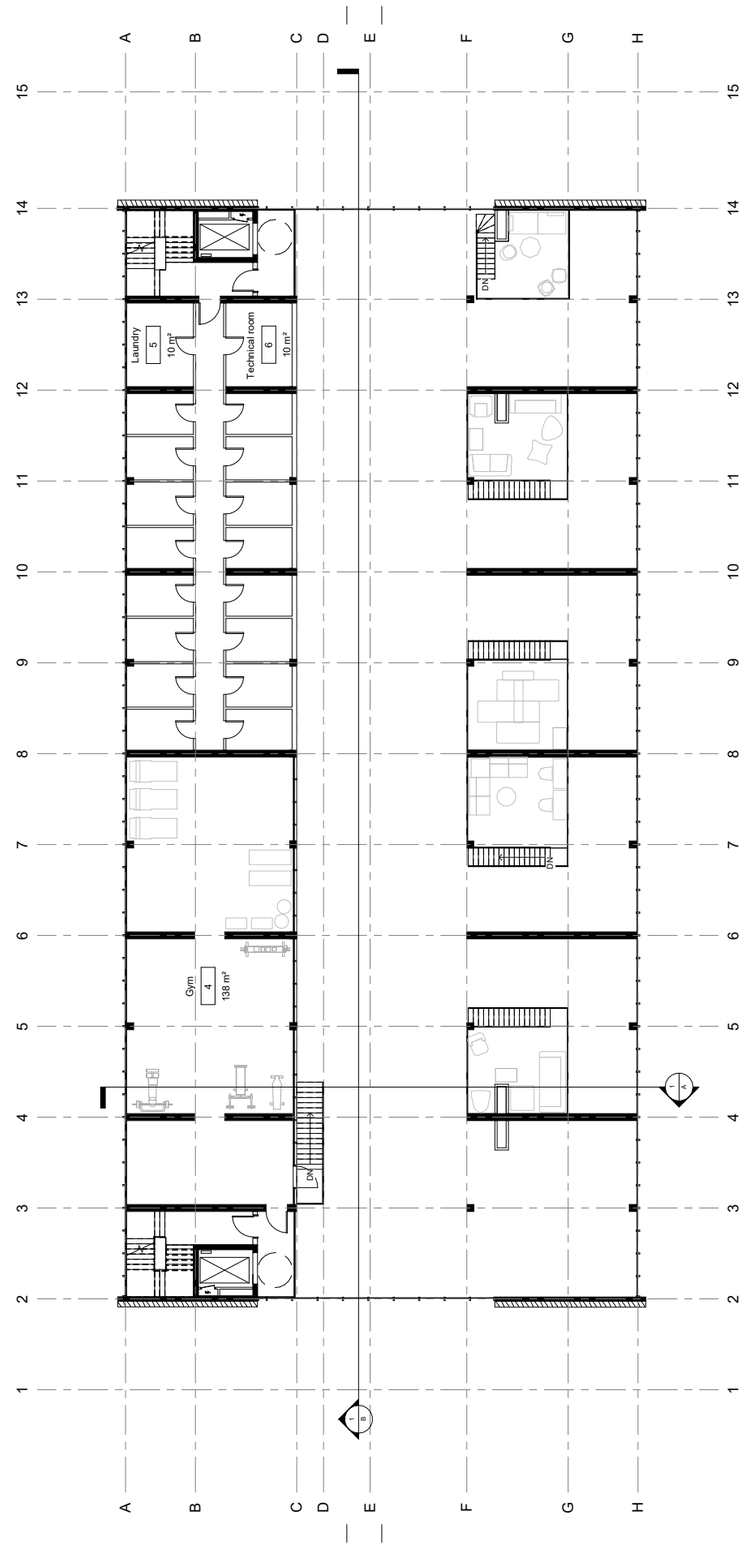


PUBLIC/PRIVATE THRESHOLD

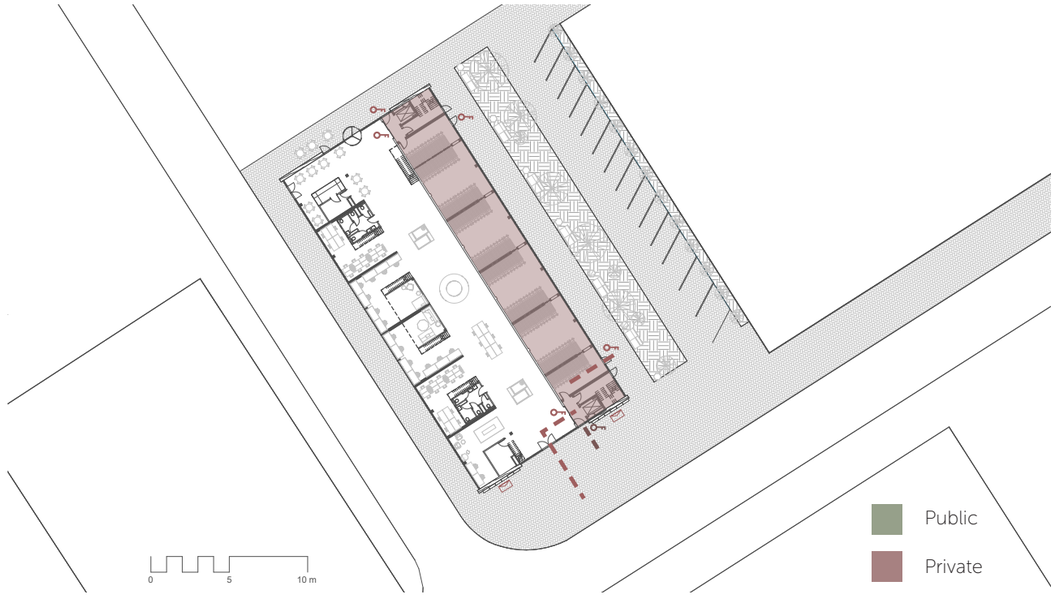
The building has public, private and collective spaces. Within the private, there are short-stay dwellings and indefinite contract ones, but all dwellings are rental. The research determined that single-person households need rental dwellings and that they have a very high urgency to move. Therefore I implemented the short-stay dwellings that are positioned around the central collective space. So people who are there only for several months can benefit intensively from the interactions in the building.



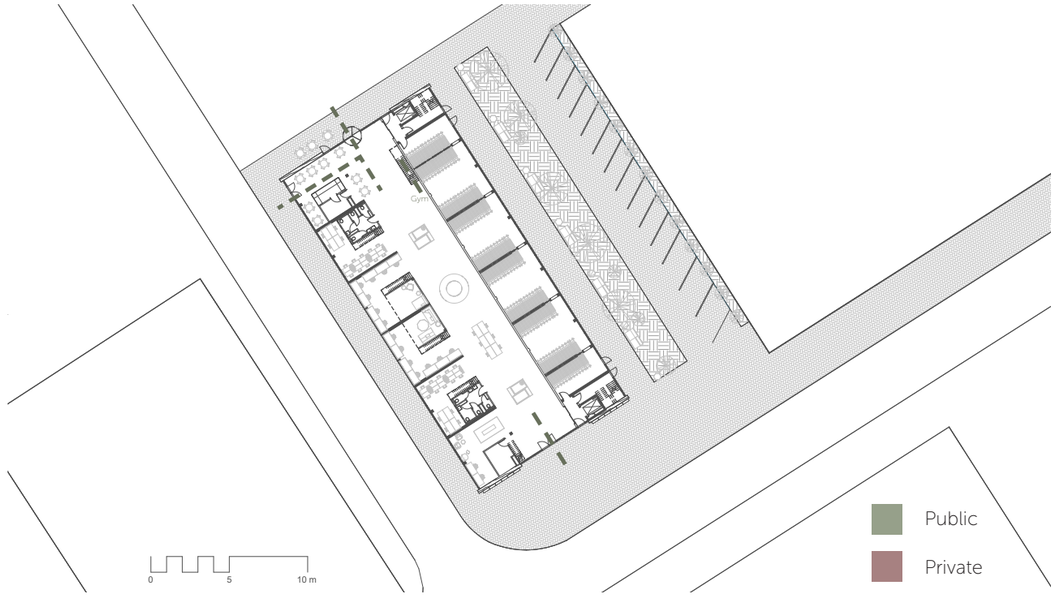
PERSPECTIVE SECTION A



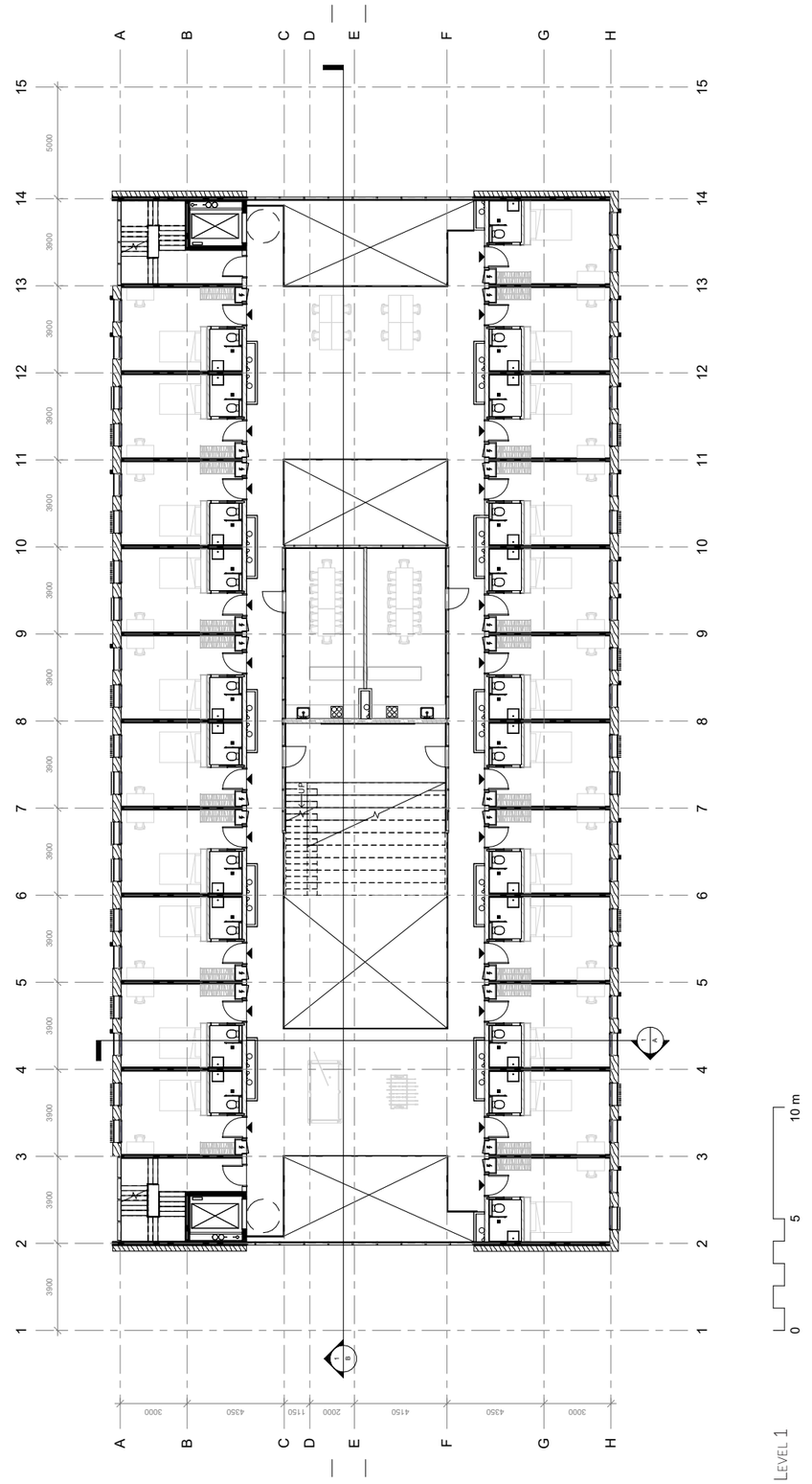
ACCESS PRIVATE FUNCTIONS



ACCESS PUBLIC FUNCTIONS



Since the building has public functions the routing is divided. If you are a resident you will either enter through the co-working space or if you are by bike through the bikeshed. But the doors will require a key and therefore will only be accessible to the residents. A secondary door is available for residents, who don't want to go through the public spaces. For example, at night when they are dark and empty. The public functions are accessible from the main entrance, through the cafe or the park.

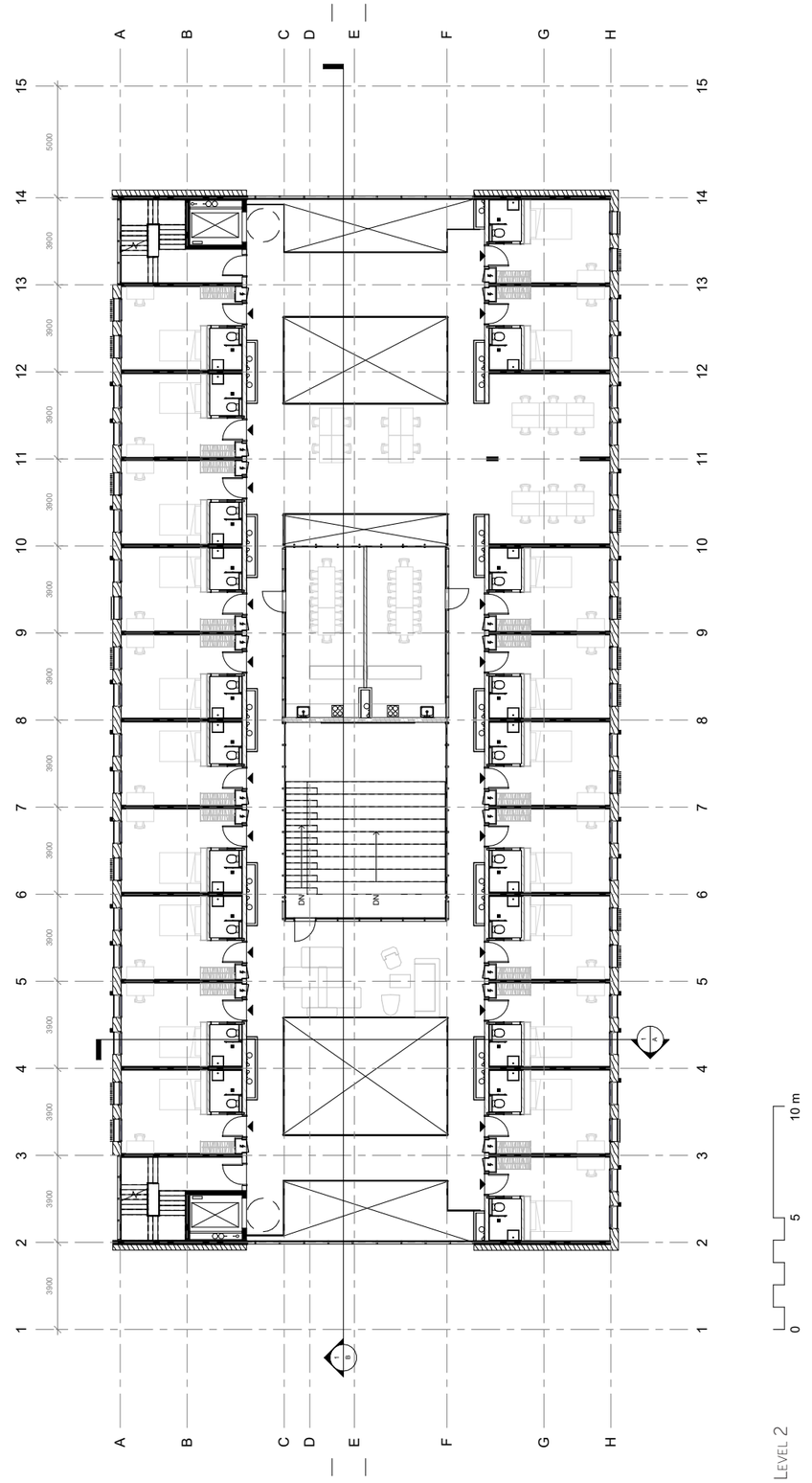


Level 1

CONNECTION TO KEILEPAND

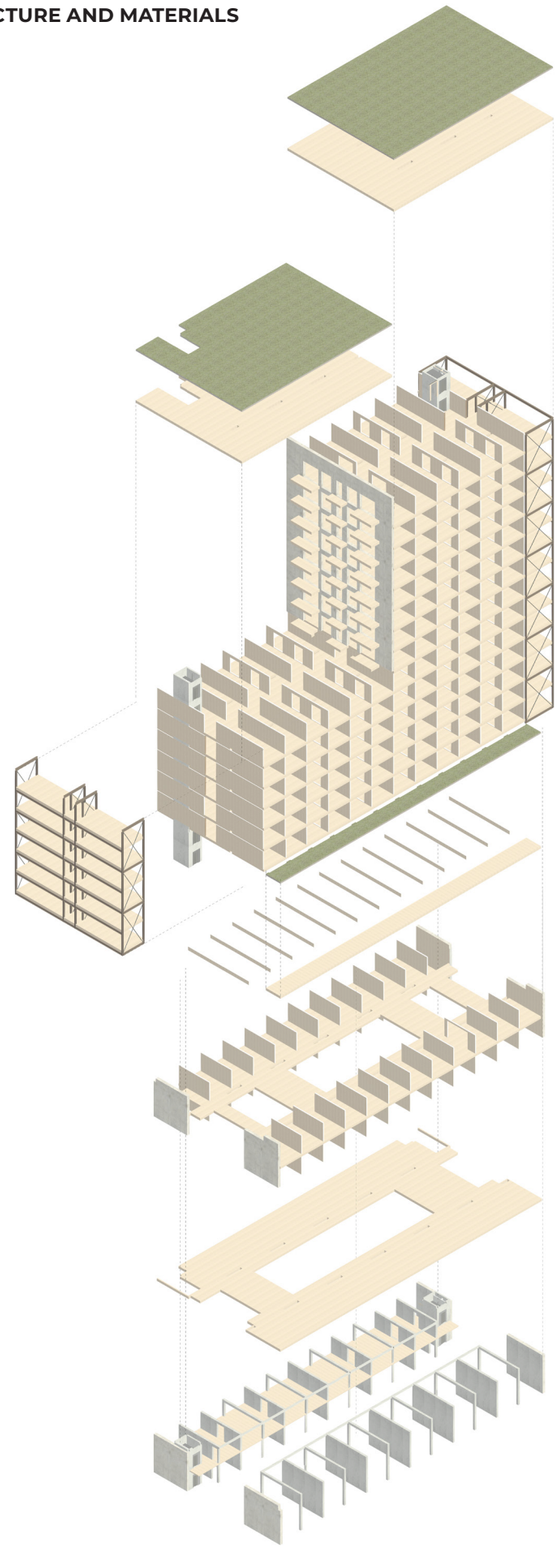
FACADE ELEMENTS

The difference between the different layers of the building is expressed in the windows. The ground floor has a glass facade, the short-stay rooms - 2 small windows and the rest 1 large window. Also on the facade, those horizontal elements are introduced. They provide a visual connection to Keilepand but also hold the shading louvres. This gives the facade a lot of dynamics.



Level 2

STRUCTURE AND MATERIALS



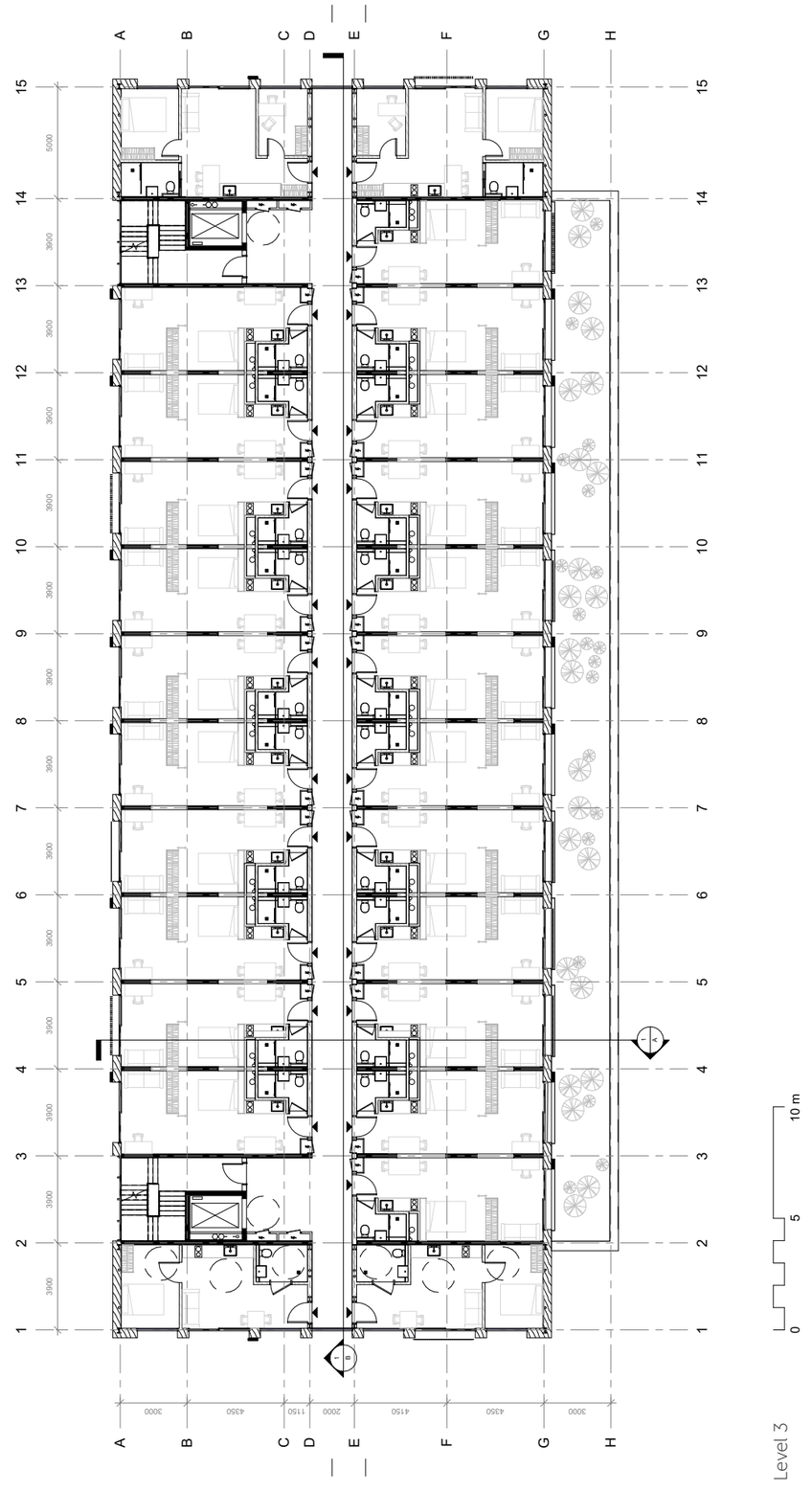
Concrete walls, columns, beams

Load-bearing concrete facade; ceramic cladding

CLT floor

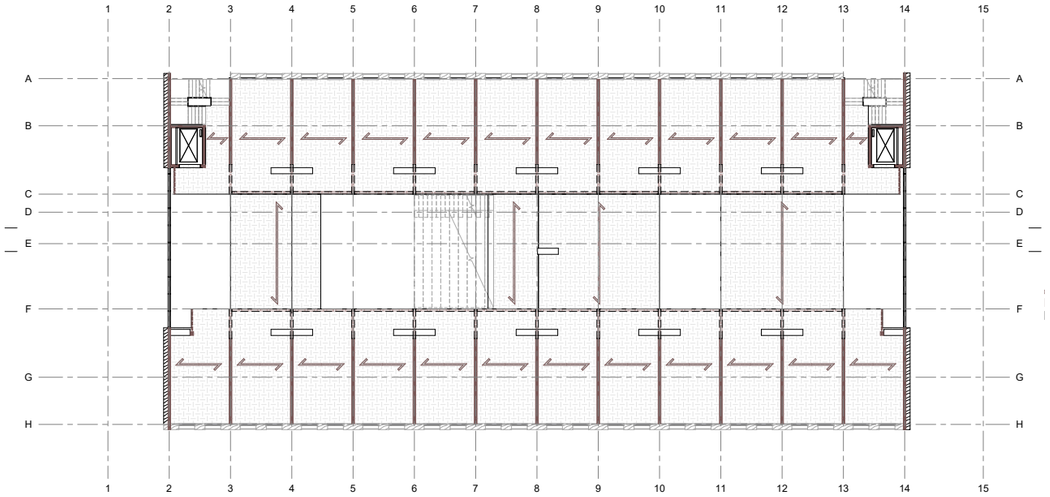
Load-bearing CLT facade; ceramic cladding

Steel frame cantilever

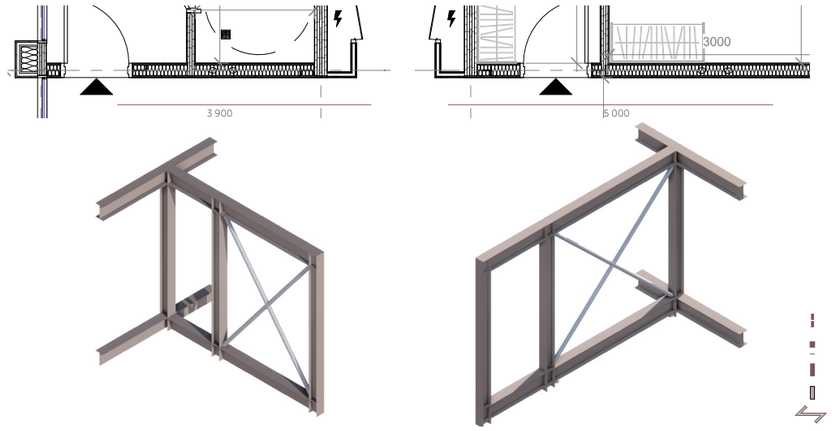


Level 3

STRUCTURE SPAN DIRECTION

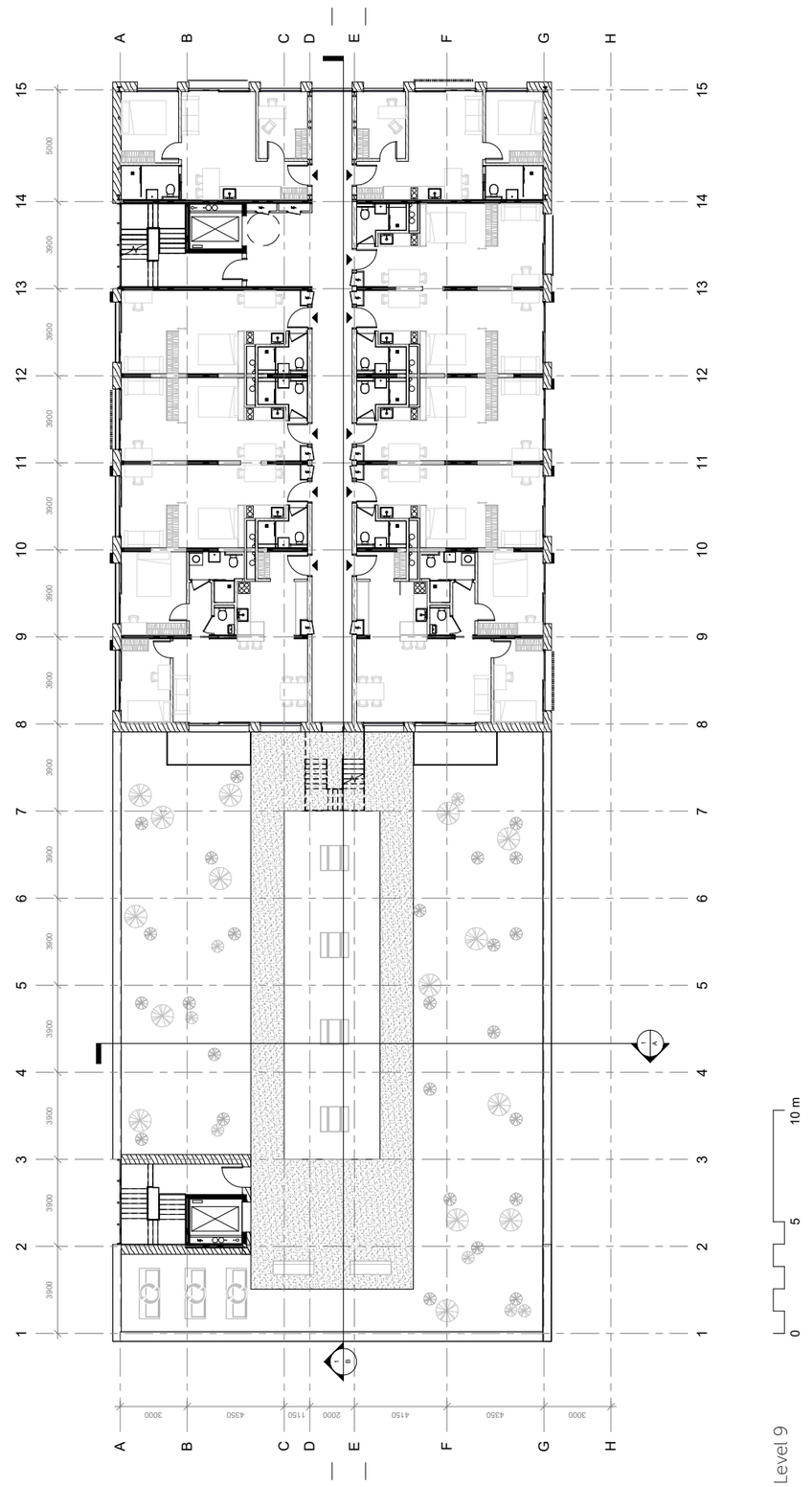


STEEL CANTILEVER



Structural railing
Steel frame
Structural wall
Structure on floor below
Floor span direction

The structure of the building consists of load-bearing walls, columns and beams between which the floors are spanning, and 2 elevator cores for stability. The ground floor of the building is made from concrete to provide a good and flood-proof base. The facades, which are in the same direction are structural too. Every other structural wall is replaced with columns and beams to provide a more open floorplan. Additionally, there are beams in the perpendicular direction that support the bridges of the atrium, which span over them. On the level of short-stay dwellings, the structure continues in CLT. The short facade continues to be load-bearing, but it's now made from CLT. To facilitate the change in the width of the building and also keep the atrium free from structural elements, large beams were needed to span over the atrium. The rest of the levels are also made from CLT floors and walls. The concrete cores, however, continue to the top to provide stability. Openings in every structural wall were provided in the case that in the future adjacent dwellings need to be combined. The overhangs, however, required structural steel frames. On the outsides, one element provides the overhang for 2 levels. On the insides, 2 different elements are used dependent on the length of the overhang. The right one is 5 meters and it on the side of the main entrance. The left one is on the park side and is 3.9 m. Both frames are divided into 2 parts, only one of which is cross-braced. The other one is left for the door and the position of the door determines where the stiff frame is.



ATRIUM SECOND LEVEL

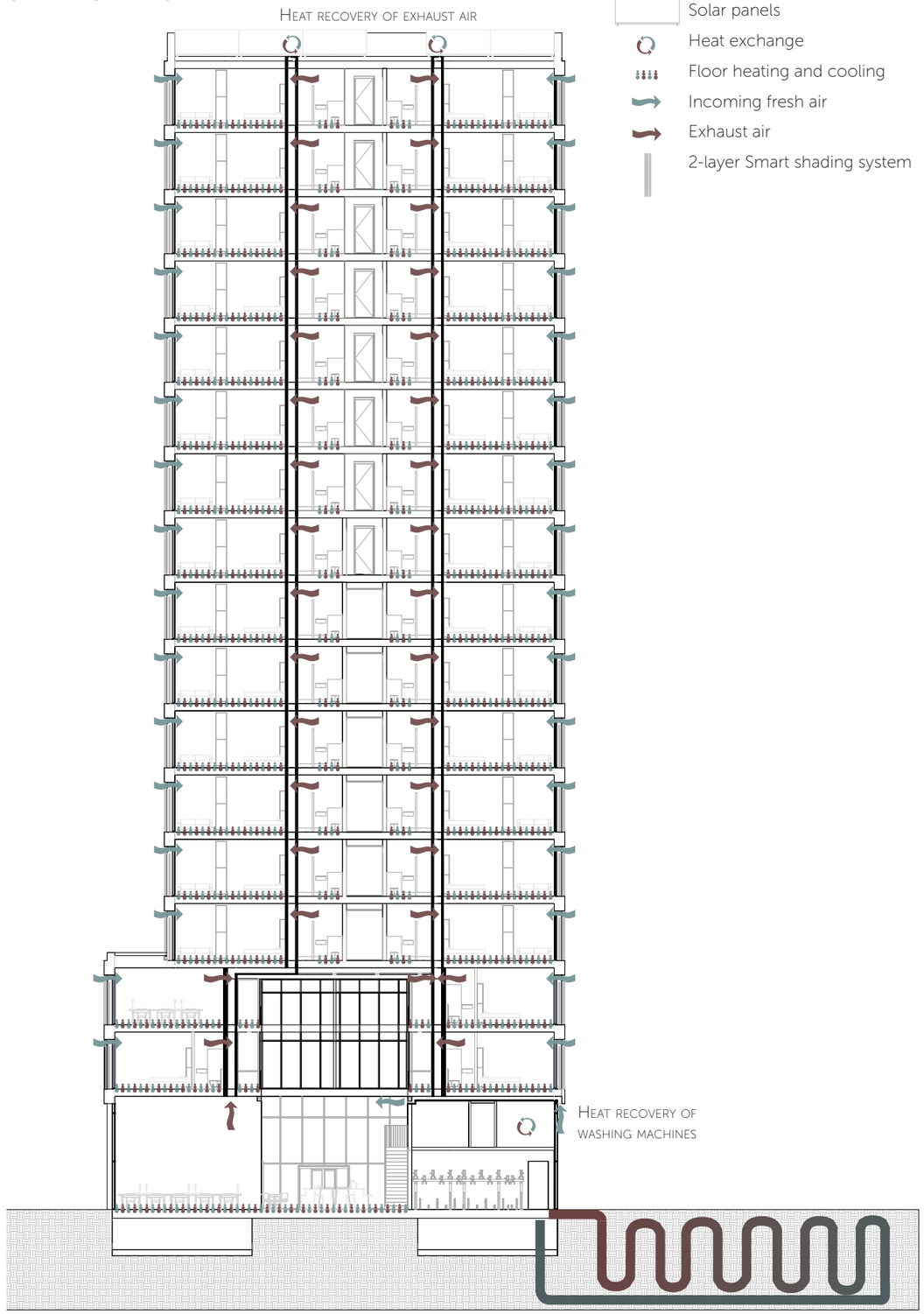
PERSPECTIVE SECTION

CORRIDOR TO DWELLINGS

SECTION THROUGH SHAFTS

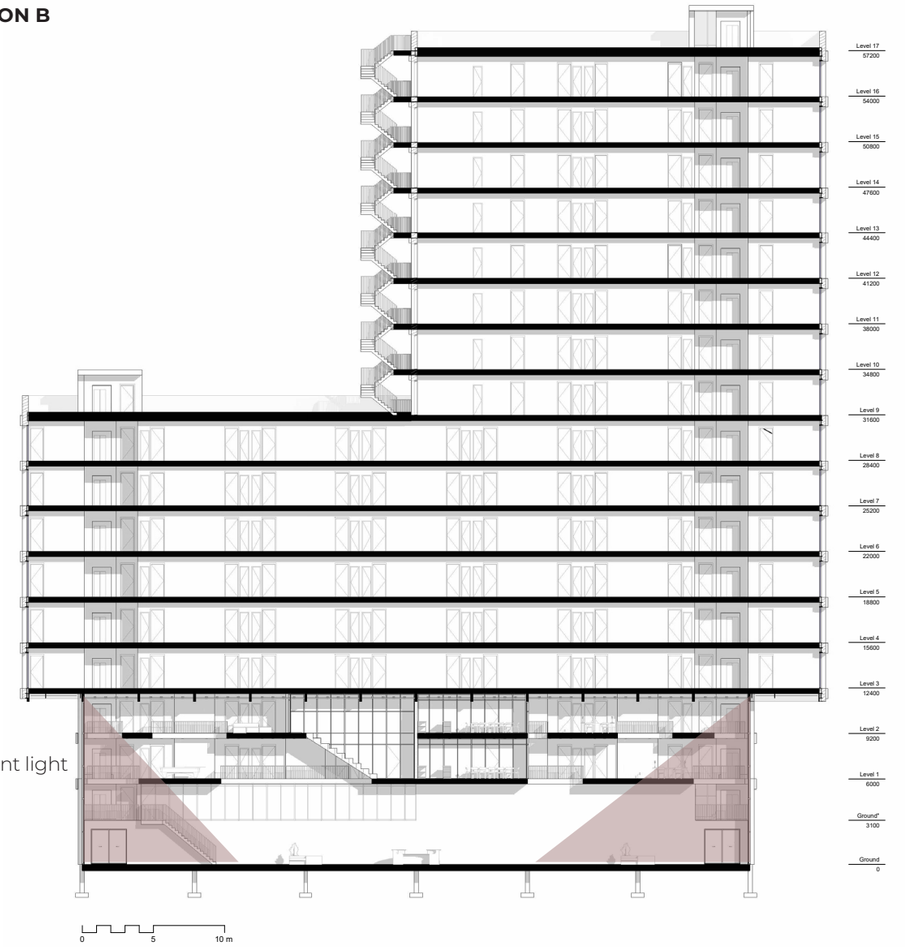
The shafts were a very persistent topic in the design. Because the width of the building changes and also to have the atrium free from such elements, the shafts became a big challenge. The final solution was to have the bathrooms on different sides of the shafts so that the shaft can be vertical. However, on the left side, the shafts needed to be offset.

CLIMATE STRATEGY

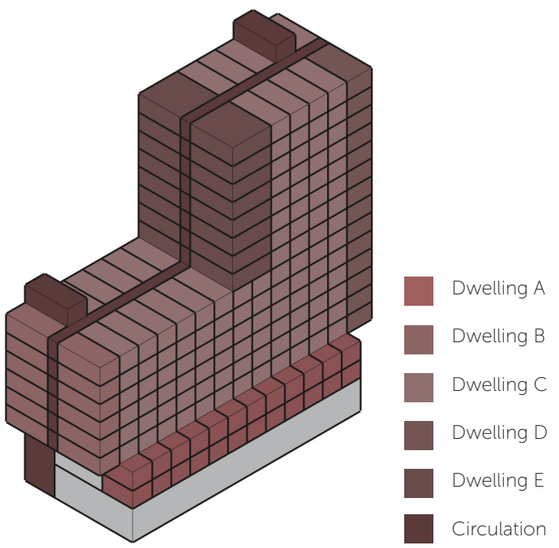


- Solar panels
- Heat exchange
- Floor heating and cooling
- Incoming fresh air
- Exhaust air
- 2-layer Smart shading system

SECTION B



DWELLING TYPES ORGANISATION



- Dwelling A
- Dwelling B
- Dwelling C
- Dwelling D
- Dwelling E
- Circulation

Fresh air is supplied through the facade for every dwelling and all exhaust air is removed from the space by the shafts. Over the storage units, the ceiling is lowered to provide fresh air from the facade to the atrium. The vents for this are hidden behind the horizontal elements of the facade. The air is conditioned using the heat from the washing machines. Every floor is equipped with underfloor heating which is powered by the horizontal ground heat exchanger. There is floor heating and cooling on every floor. The exhaust air is transported to the heat exchange units through horizontal pipes hidden in the thickness of the soil of the green roof.

DWELLING TYPES

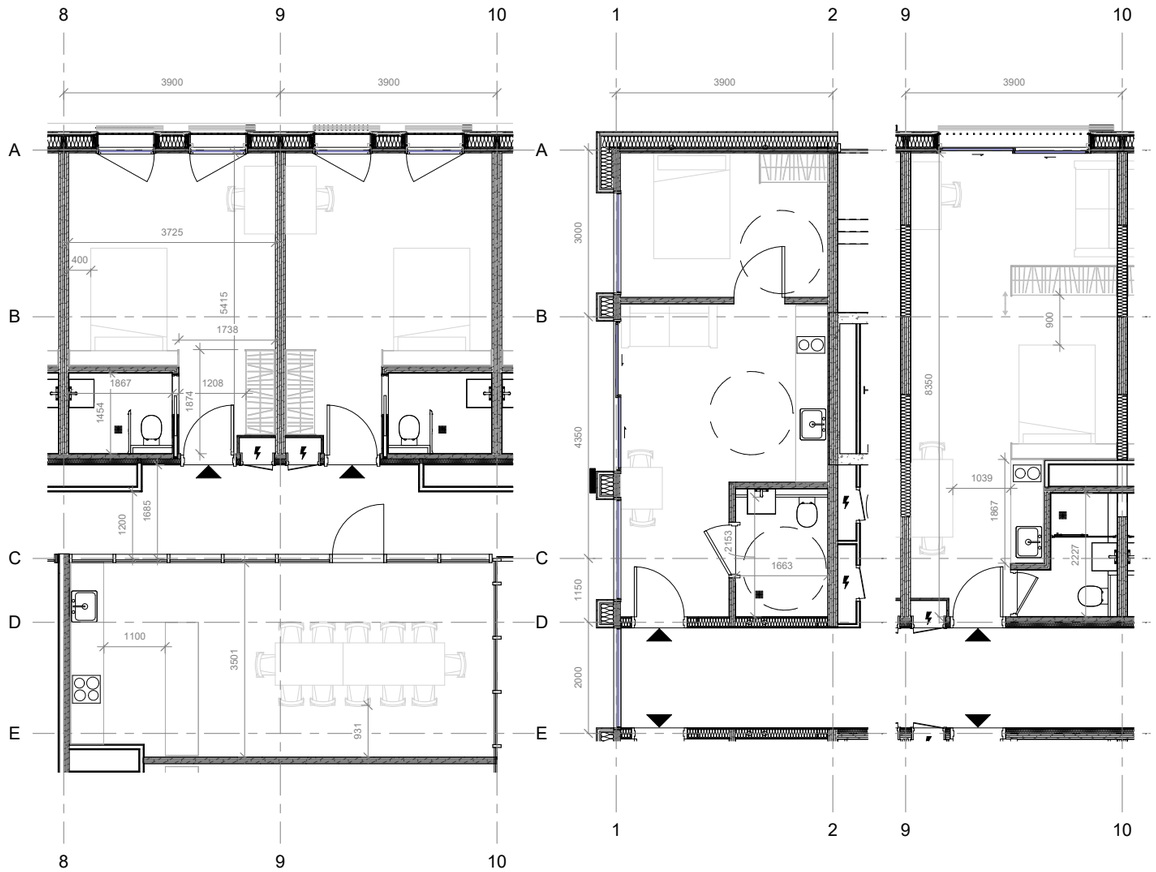
Dwelling type A x42

Dwelling type B x12

Dwelling type C x188

Dwelling type D x28

Dwelling type E x16



0 5 10 m

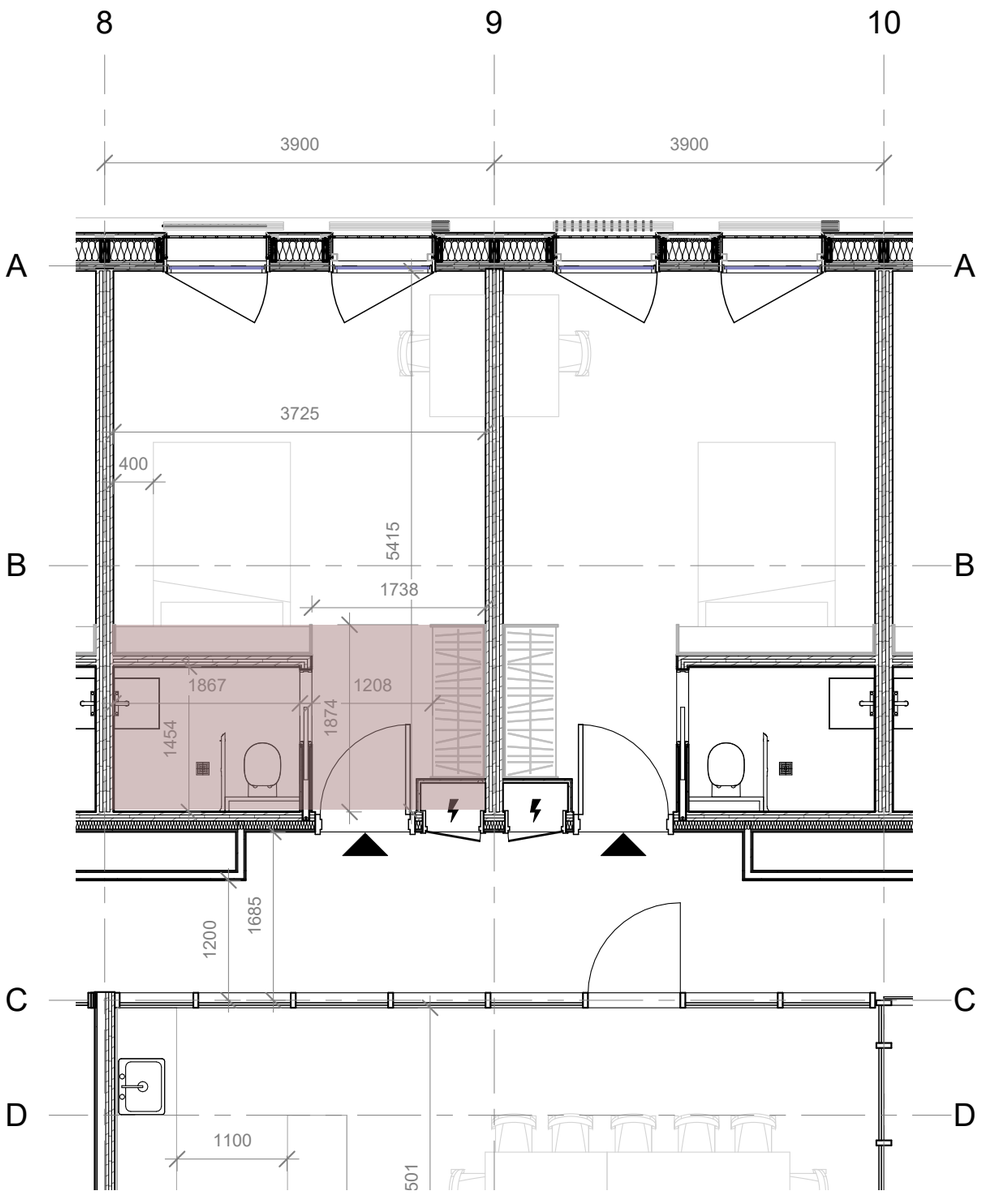
286 small dwellings of

5 different types

targeted for single-person households

DWELLING TYPE A x42 20м²

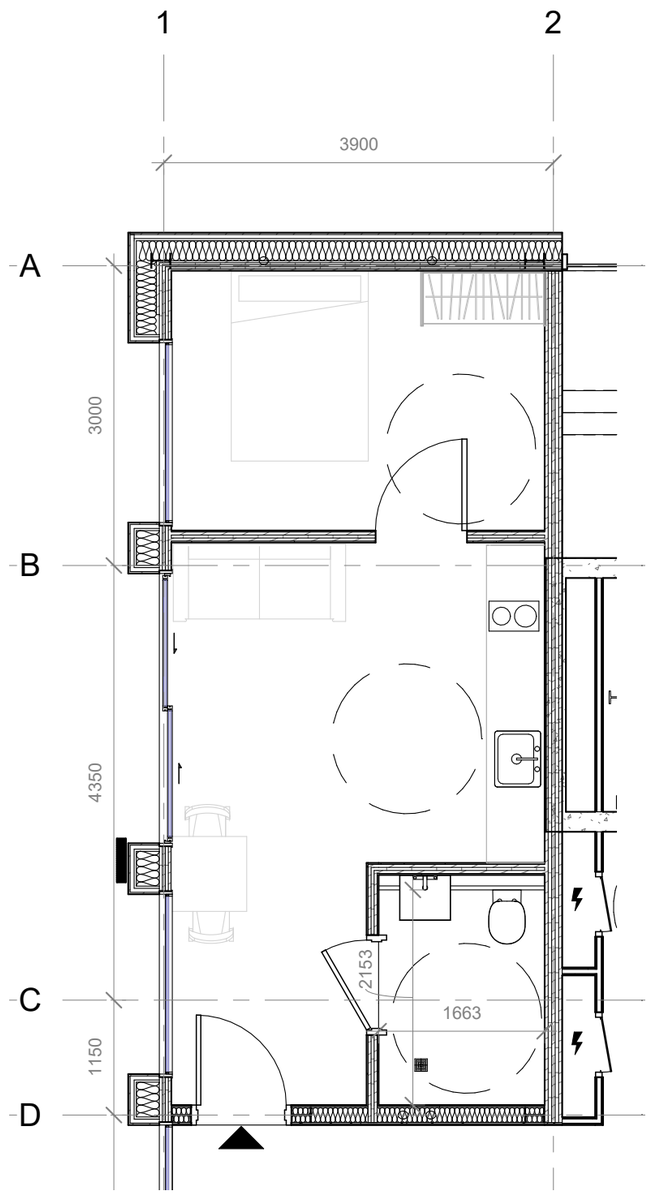
Fixed space



There are 42 short-stay dwellings type A with a shared kitchen. The rooms have a murphy bed and therefore only the area of the bathroom and entrance are fixed.

There are also 12 one-bedroom apartments type B that are handicap accessible. They are very small only 31 sq.m but because they are on the corners of the building they have a lot of windows which allows for room separation. In the research, a lot of respondents

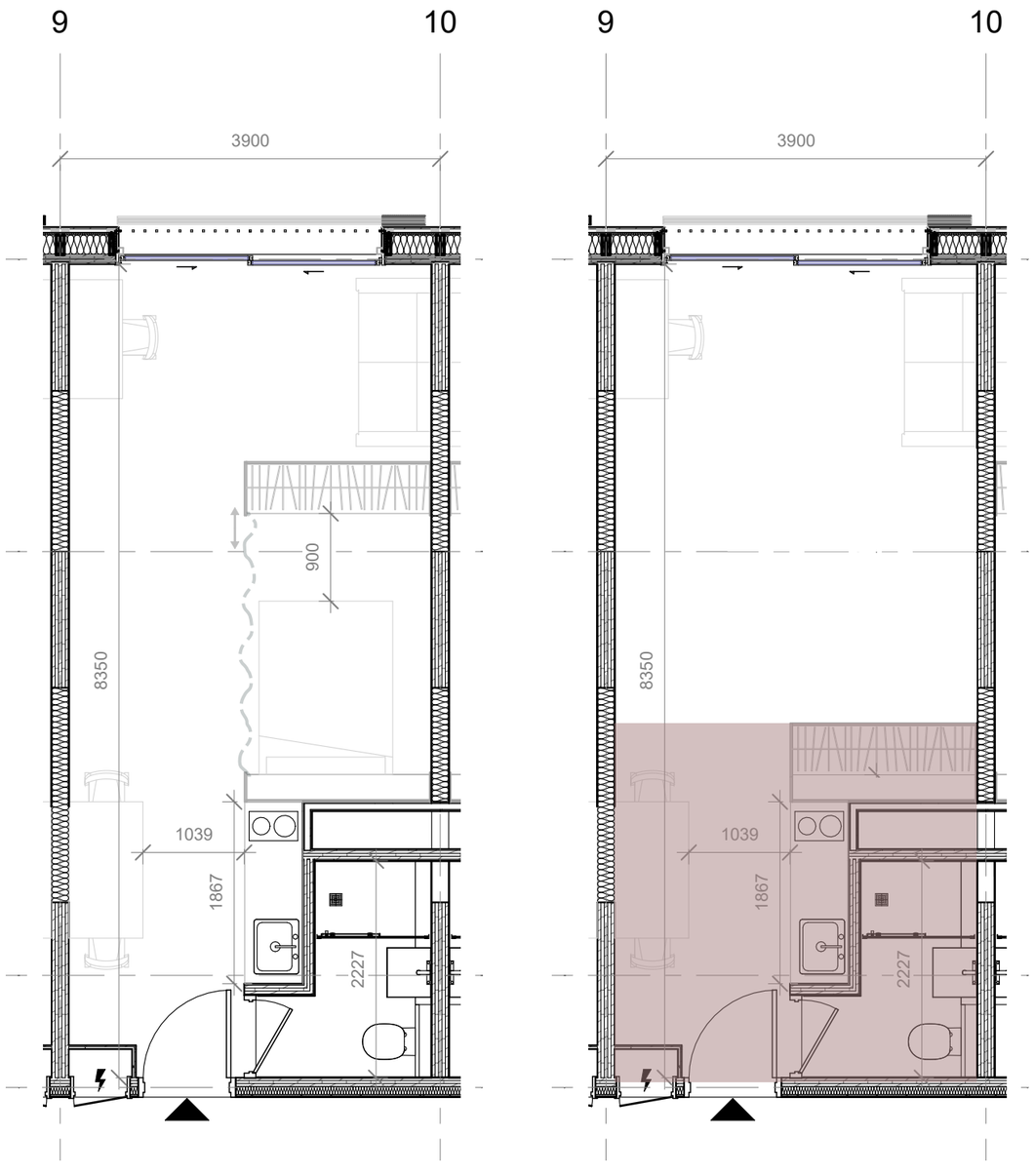
DWELLING TYPE B x12 31м²



stated that a separate bedroom is favourable and this is the reason I implemented such a typology. However, the flexibility of this typology is limited because of the room separation.

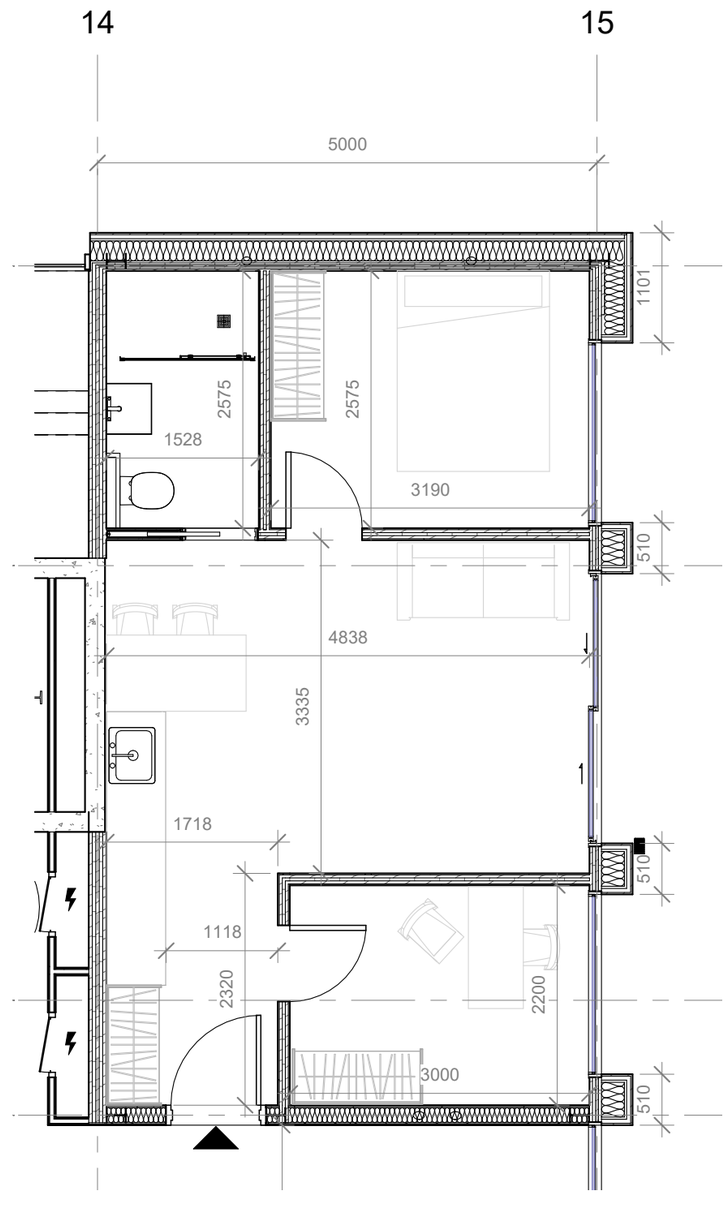
Dweeling C is the most common dwelling typology and it's a studio. It's again 31 sq.m., which isn't even that small for a tiny apartment. But the research showed that single-person households need a dwelling that could temporarily accommodate two

DWELLING TYPE C x188 31м²



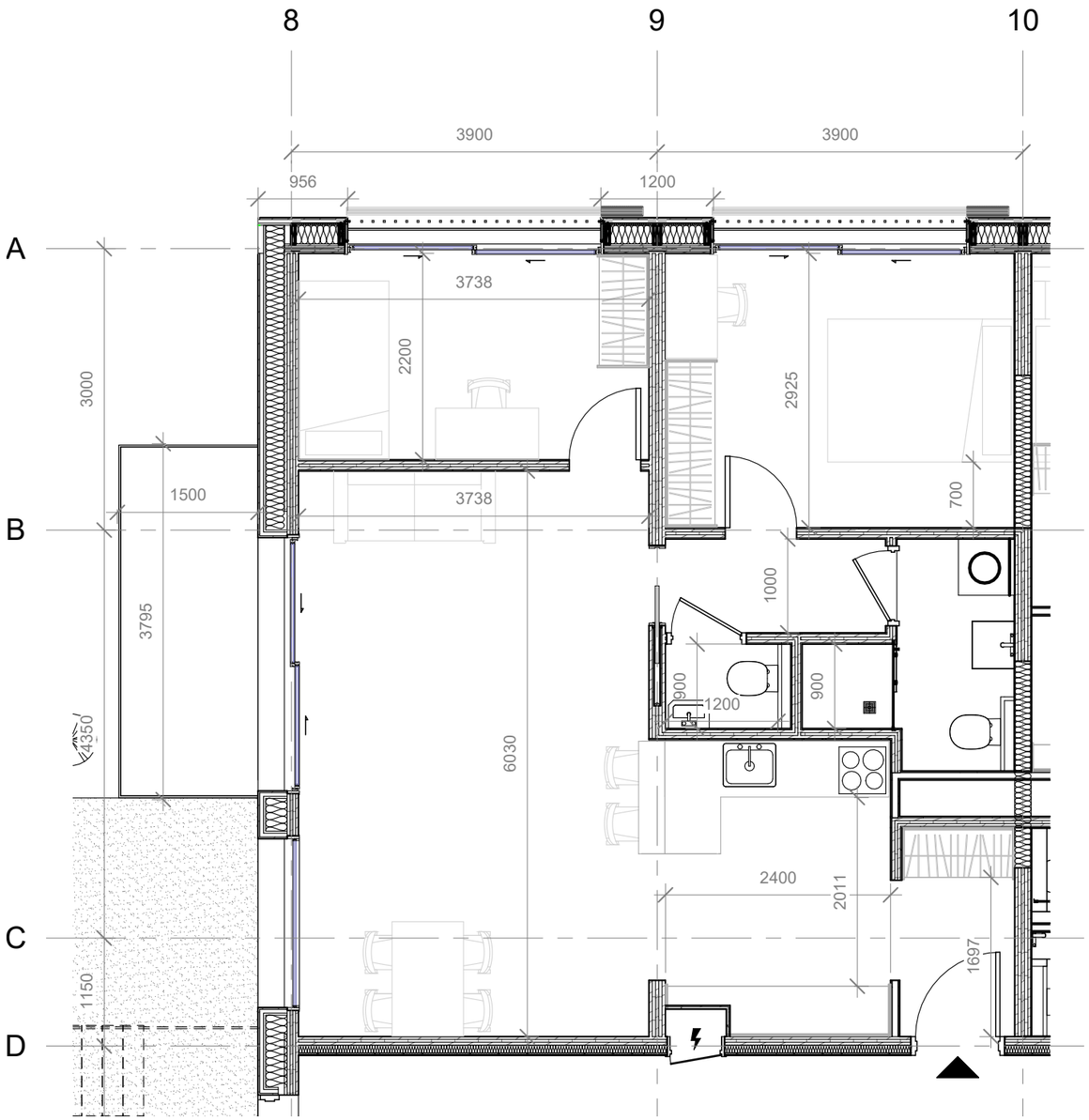
people until they are ready to move in together. This according to the Dutch laws means a dwelling of 25 sq.m. or more. It features a very small kitchen of only 1.86m but the dining table is intended as an extension of the countertop to be used where more space is needed. Since it's a studio and a separate bedroom is desired I implemented a separation with a curtain. The murphy bed folds up and the wardrobe slides in so that only half of the studio is fixed and the rest is free. A system like this is implemented in a micro-living apartment in Milan by ATOMAA architects.

DWELLING TYPE D x28 40м²



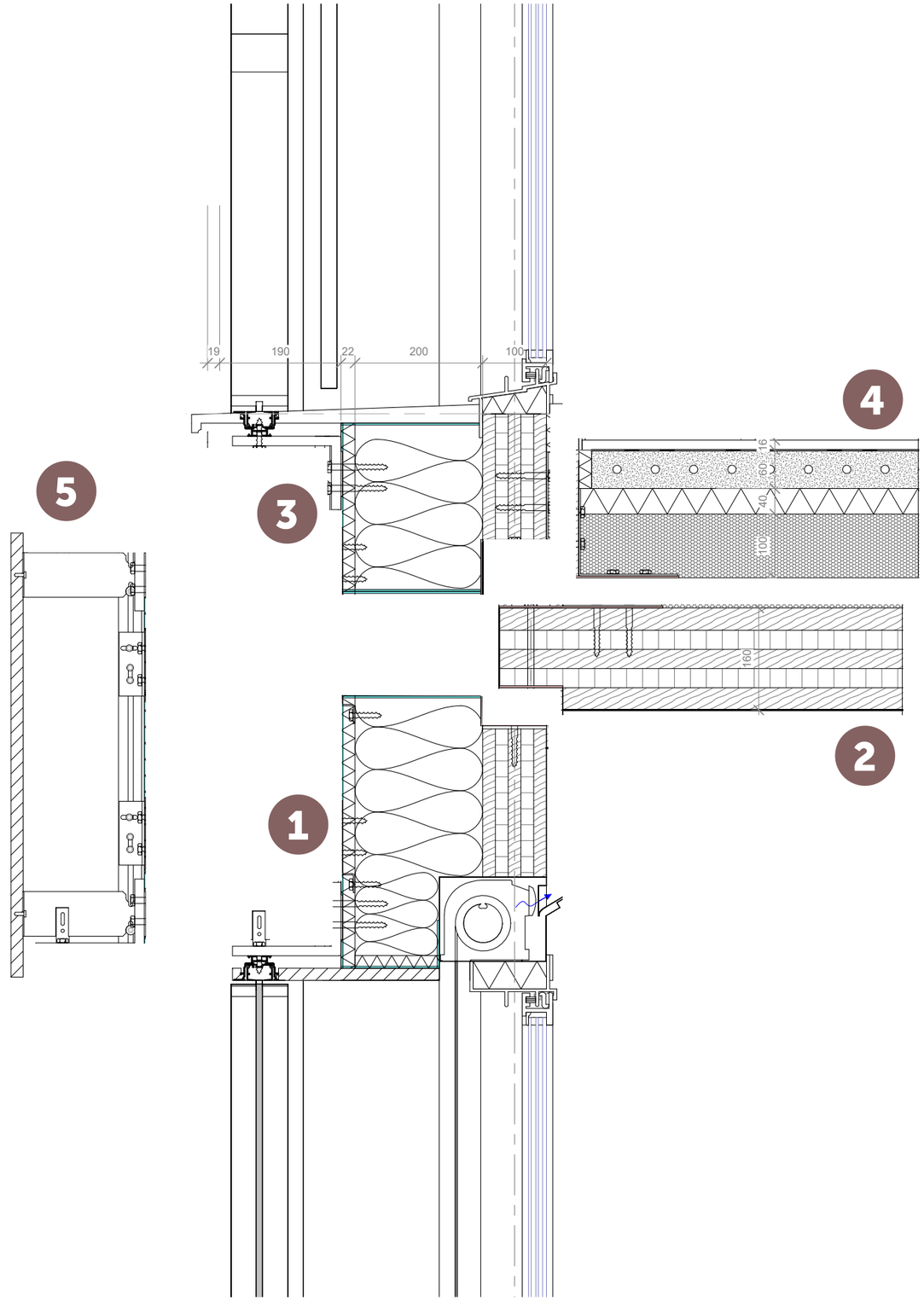
Dwelling D is a 2-bedroom apartment, but the intention is that the small room is used as an office. During the research, some of the respondents stated that they are freelancers and need adequate space for meeting clients or that they are occupied in professions like arts, which require a more specific working space. This dwelling is designed for them, but the smaller room could become a nursery too.

DWELLING TYPE E x16 64m²

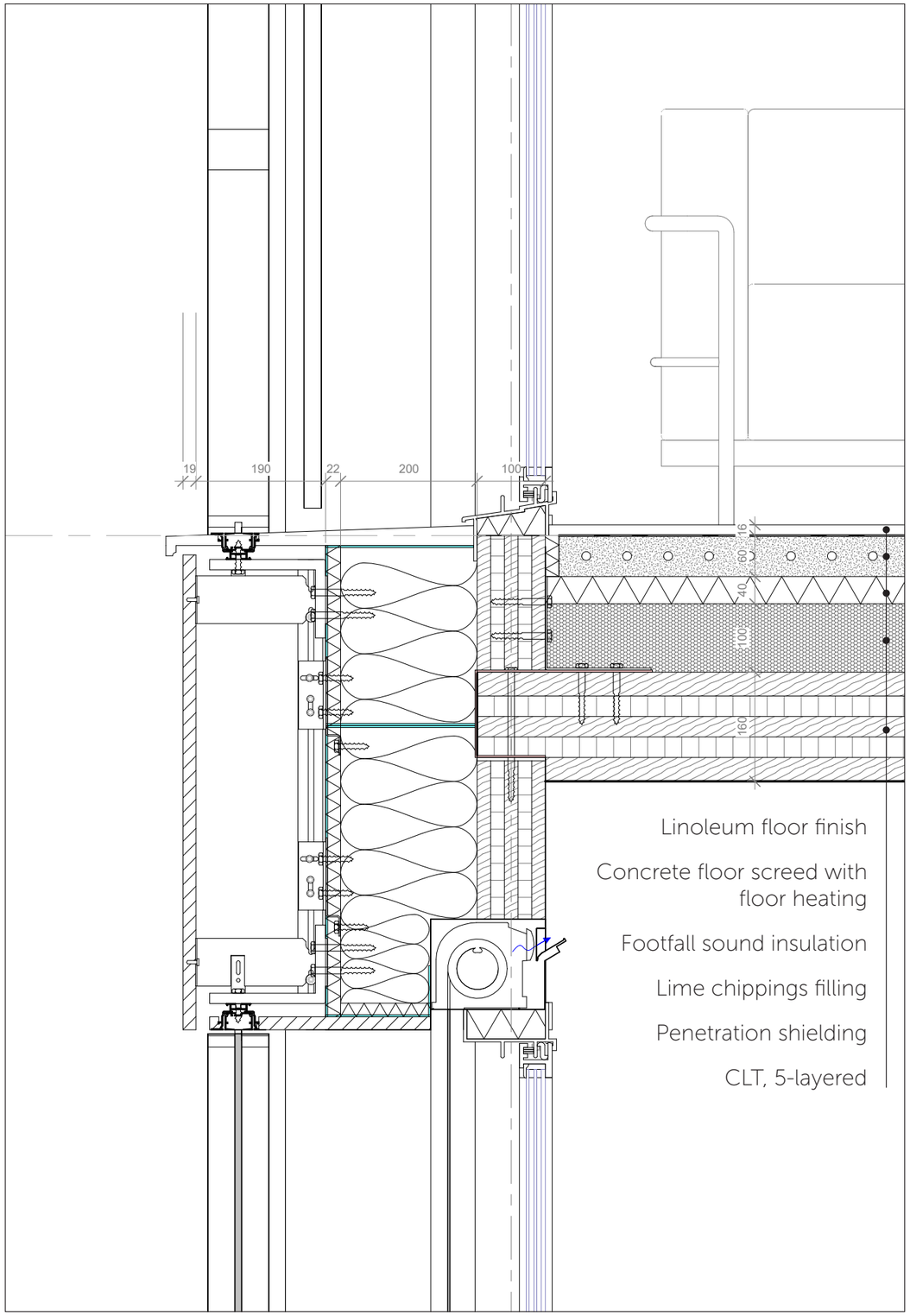


Some single-person households, especially the ones between 35 and 64 years, are divorced. They need a dwelling that could accommodate the visit of their children. Also, single-person households aged above 65 prefer to live in larger apartments. This is why I introduced a bigger dwelling type E.

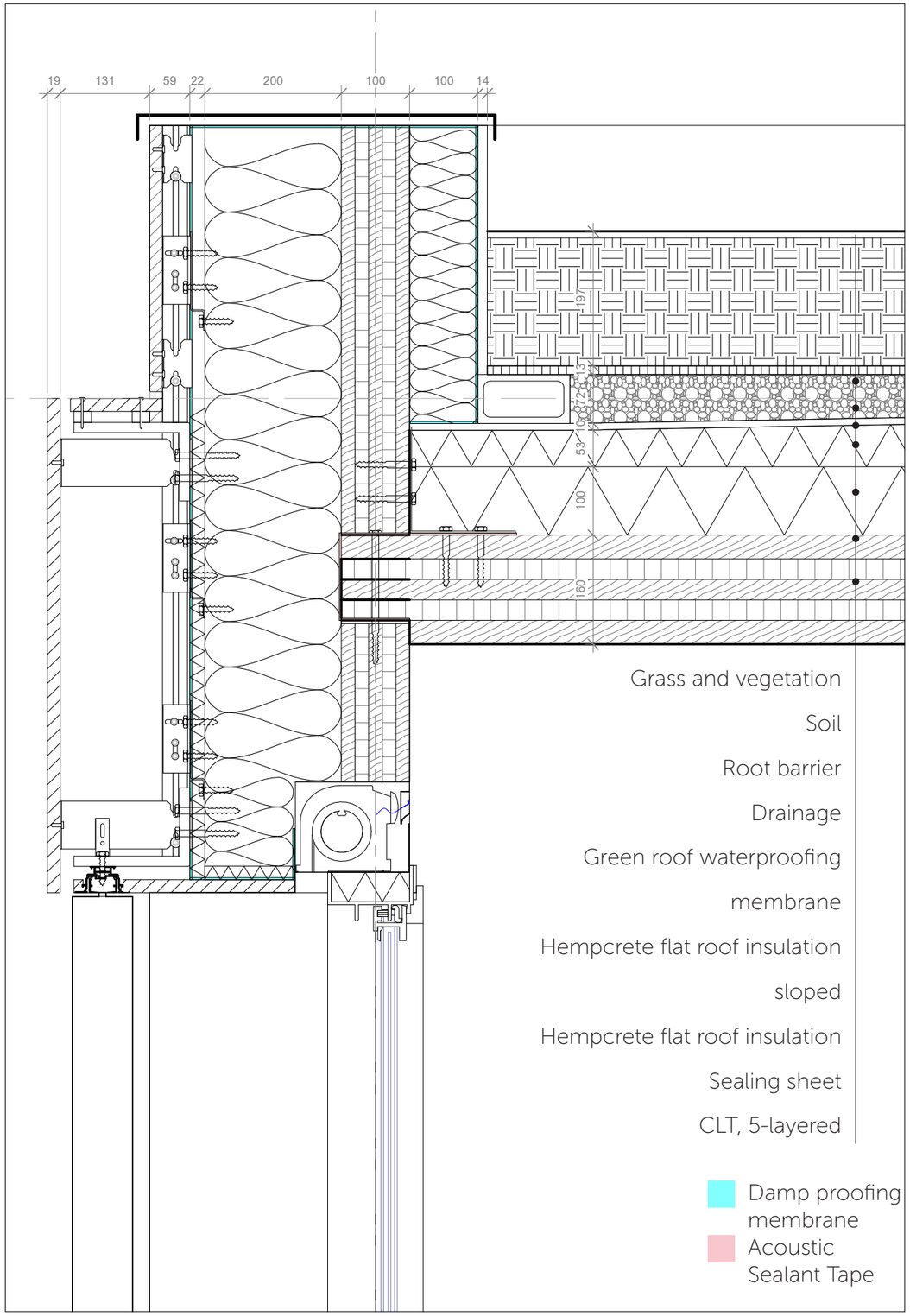
FACADE SEQUENCE OF ASSEMBLY



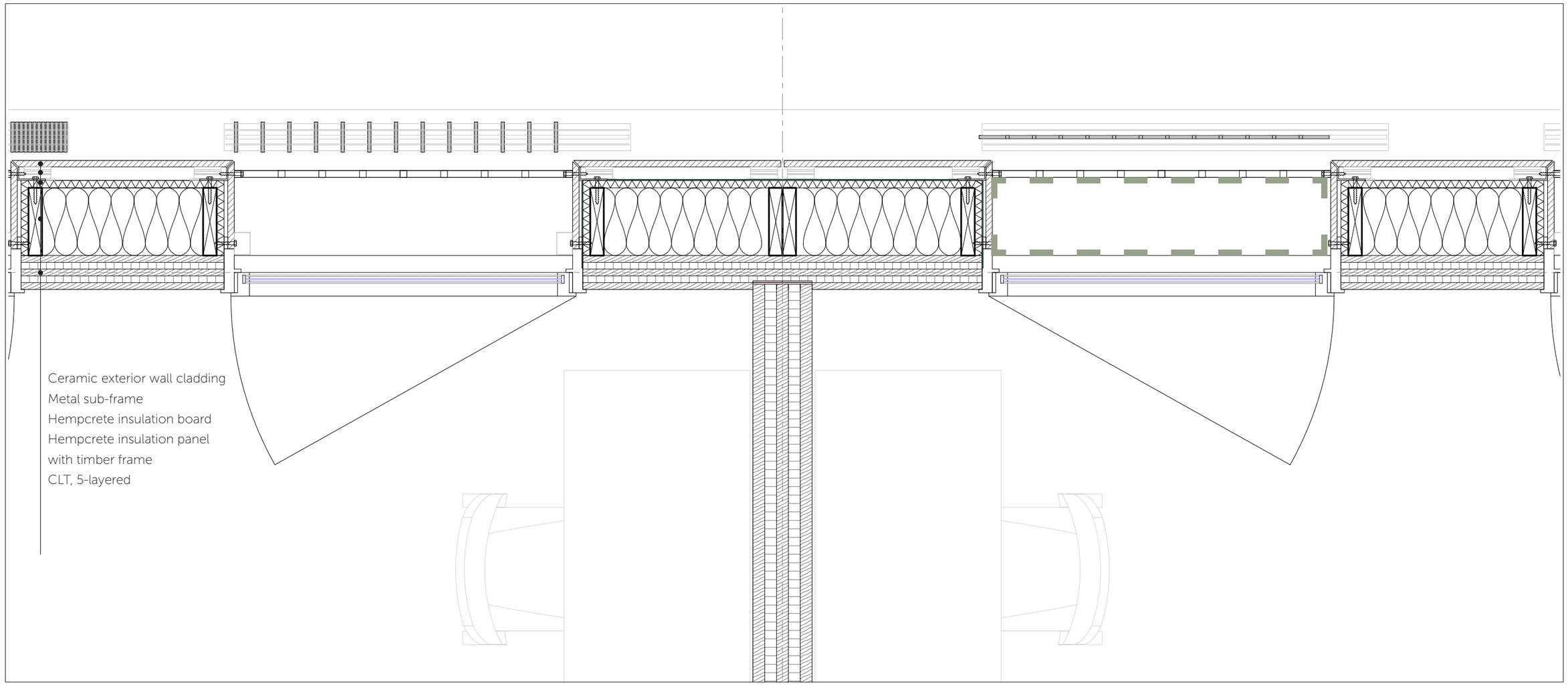
DETAIL VERTICAL FACADE TO FLOOR



DETAIL VERTICAL GREEN ROOF



DETAIL HORIZONTAL FACADE TO WALL



Natural materials, environmental sustainability and correct use of resources were aspects addressed by the research. This determined the choice of CLT, insulation materials, floor finishes, facade, etc. From the beginning, a goal of the design was that residents would feel a connection to the natural building materials chosen. Therefore I decided that the ceiling finish will always be exposed CLT and whenever possible the walls too. The vertical sun shading is fixed to horizontal facade elements. This means that it can slide to the side and not block the window in any way.

The finish of the ceiling, the facade interior side and the partition wall between the dwellings are all CLT so the rooms have a nice natural interior.I specifically chose recessed window frames and positioned the railing as far as possible so that this space is created here for the resident to appropriate and express their individuality on the facade. It's enough for one person to step on it and I imagine that some would put flowers, pots, decoration.

FACADE SOUTH

FACADE NORTH

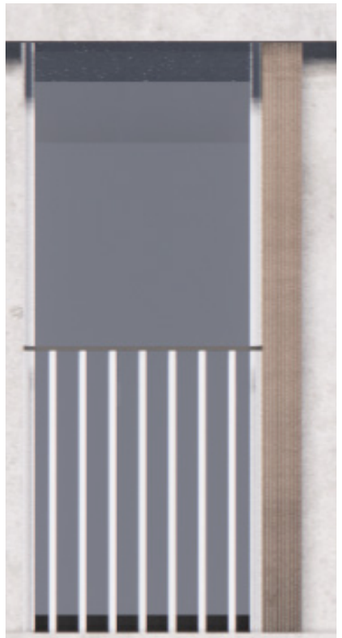
FACADE EAST

FACADE WEST

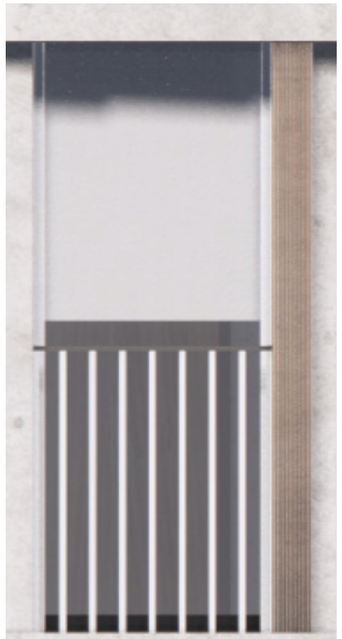
ATRIUM GROUND LEVEL WEST

ATRIUM GROUND LEVEL EAST

RETRACTABLE LOUVERS AND ROLLING BLINDS COMBINATIONS

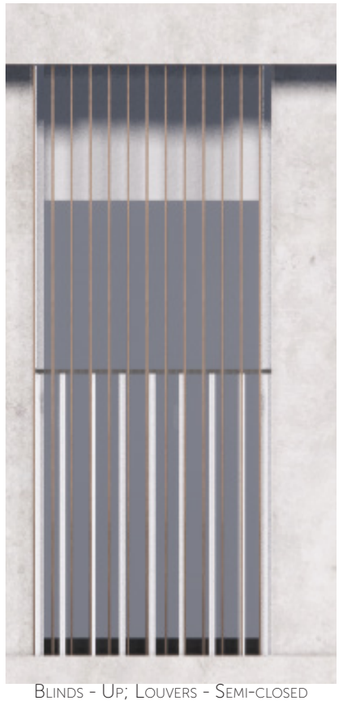


Blinds - Up; Louvers - Open

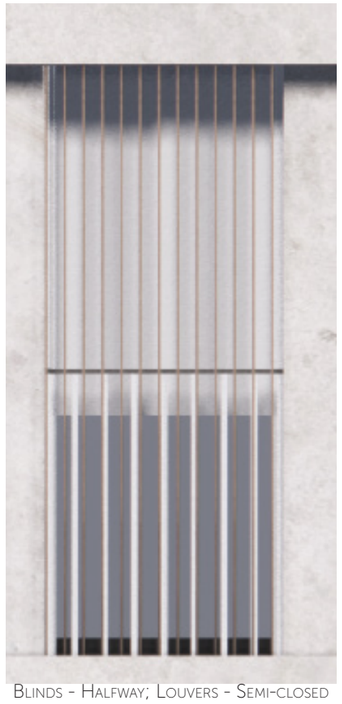


Blinds - Halfway; Louvers - Open

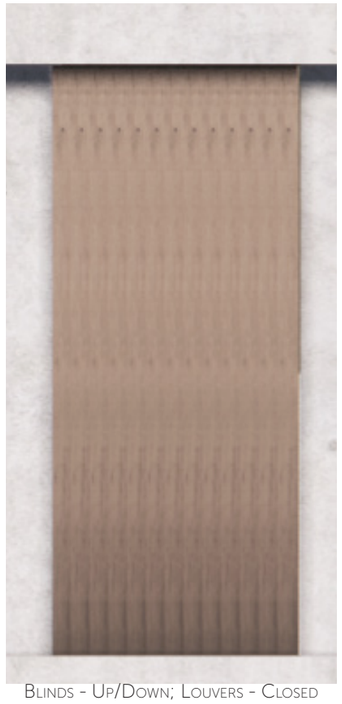
Blinds - Down; Louvers - Open



Blinds - Up; Louvers - Semi-closed

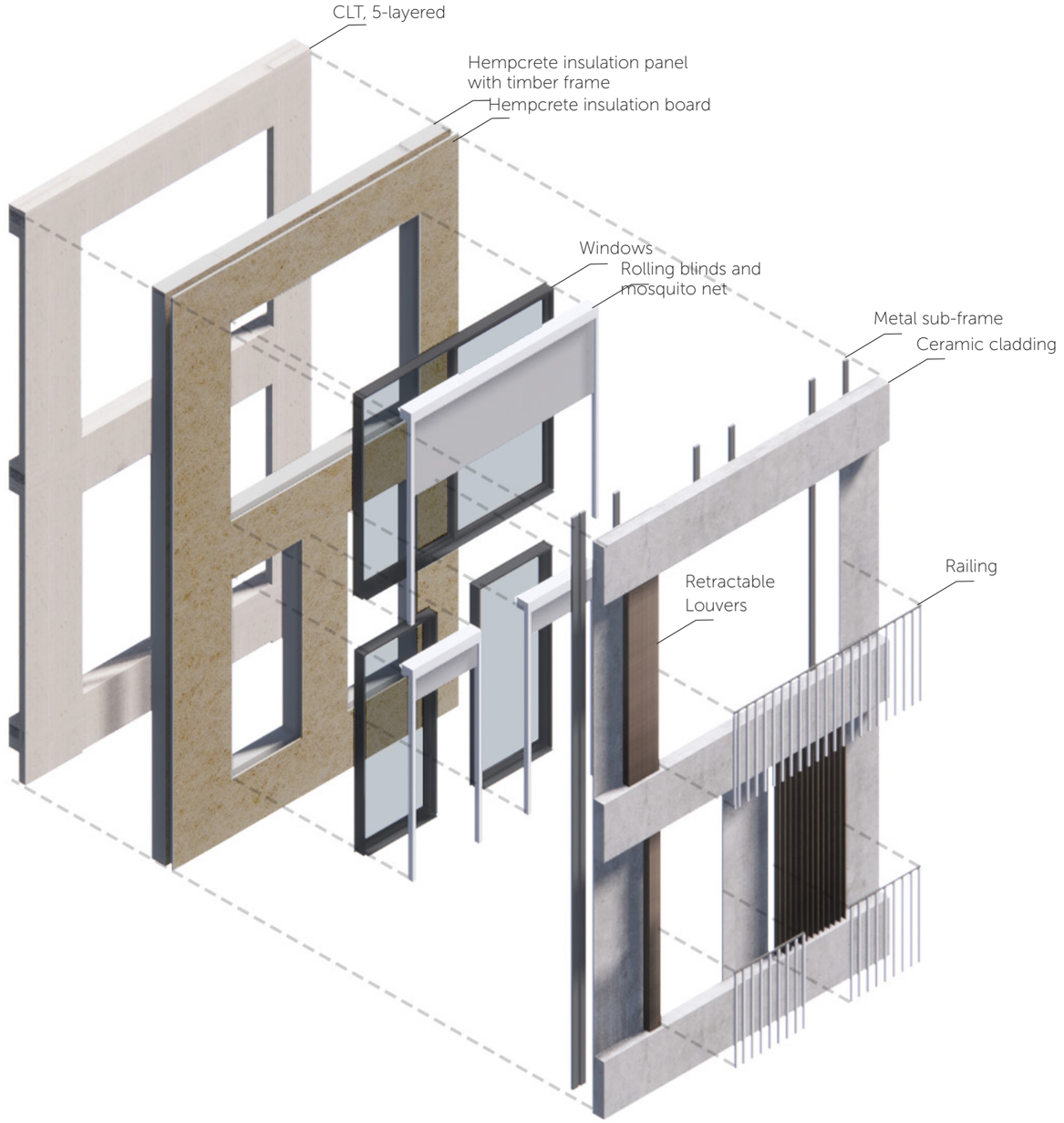


Blinds - Halfway; Louvers - Semi-closed



Blinds - Up/Down; Louvers - Closed

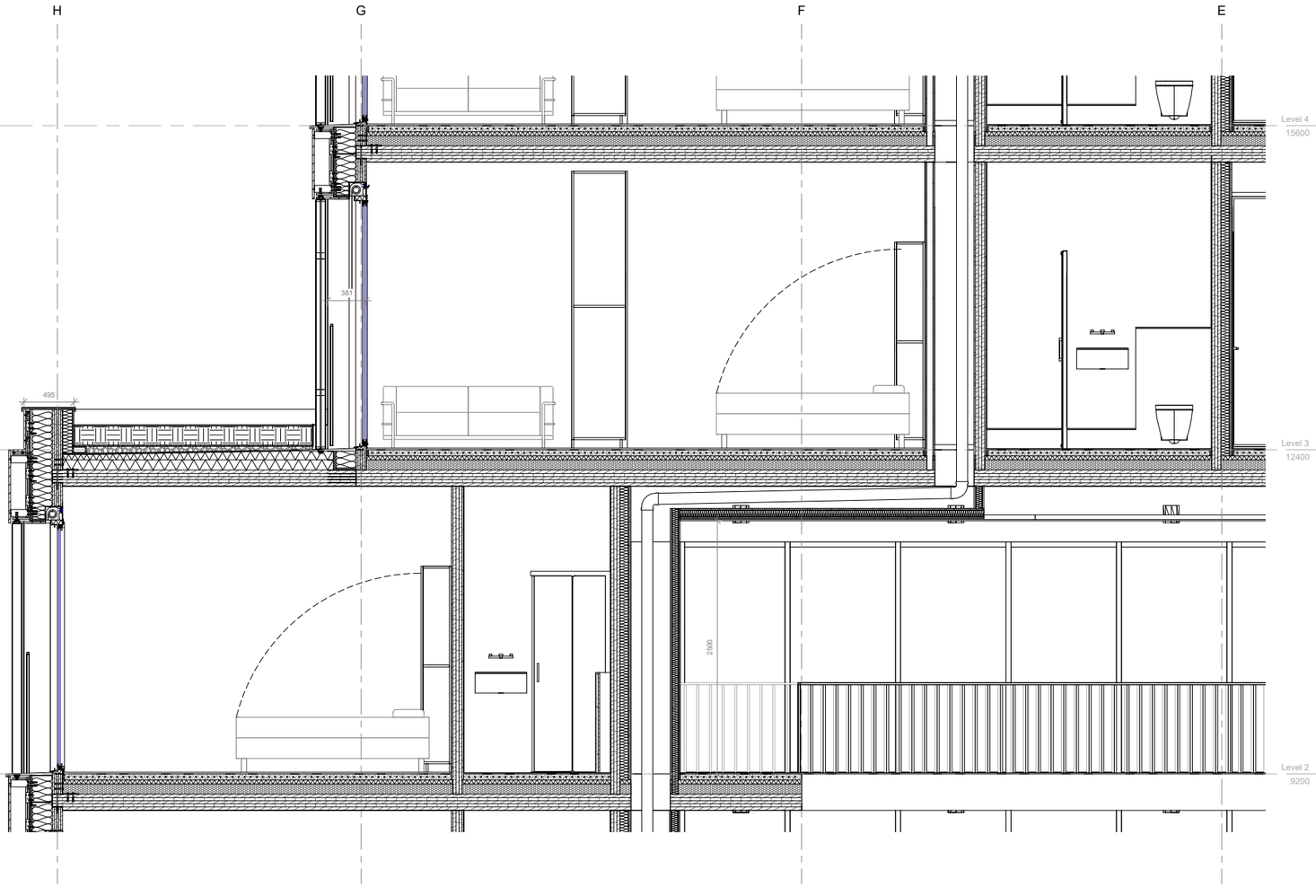
FACADE LAYERS



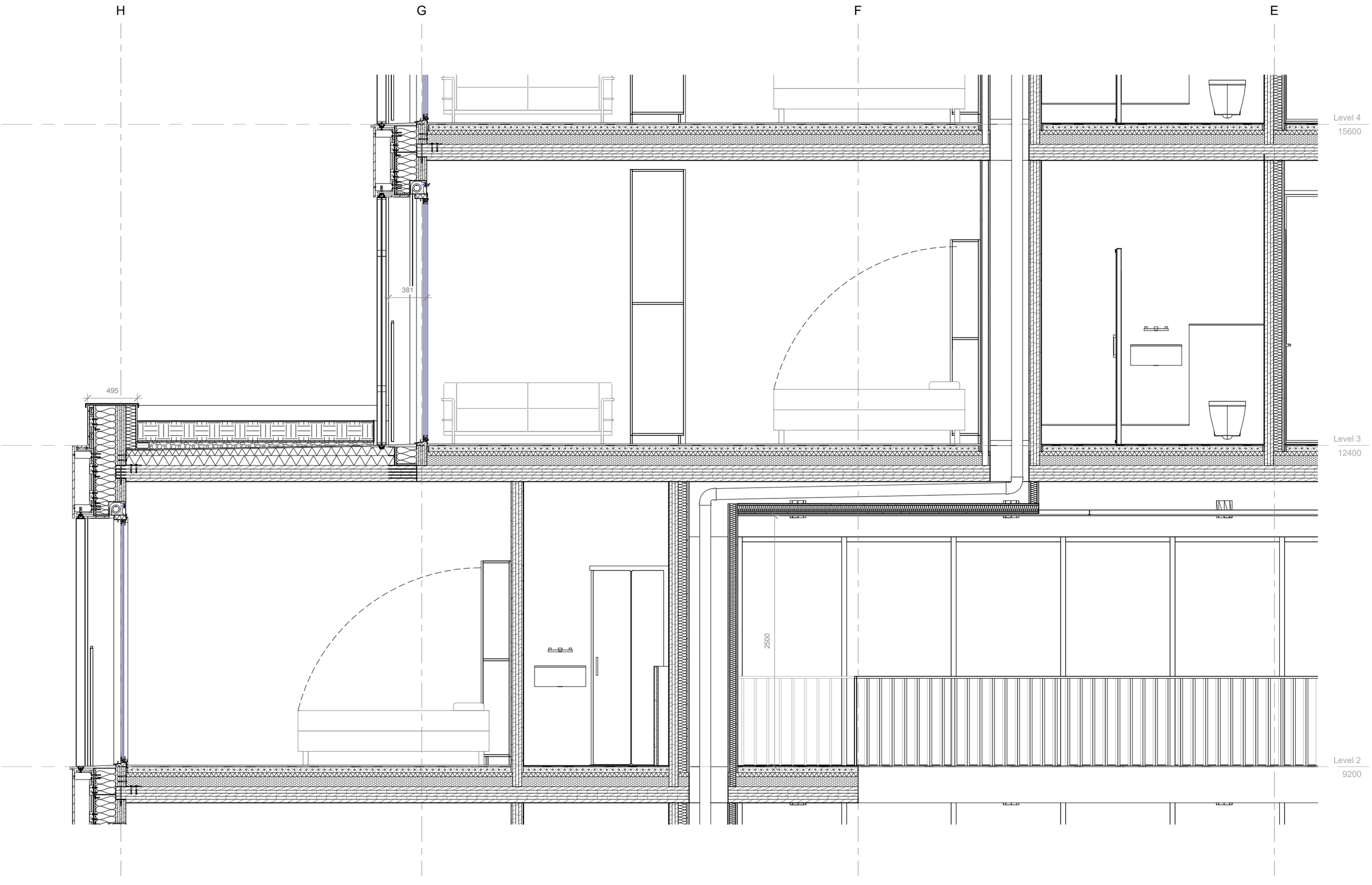
The shading system works in 2 layers. First are the rolling blinds with a screen density of 30%. They are white on the outside and black on the inside. This way they reflect the light coming from outside, but absorb the one in the room. Those rolling blinds are multifunctional. They provide the inlet of fresh air, shade and their frame is sealed on all sides so they are a mosquito net too.

Additionally, the vertical fin shading system is integrated based on Bioclimatique Retractable Louver Roof by Retractable Awnings. It can be completely open, closed with perpendicular fins, completely closed or anything in between. The second layer of shading is necessary because the cavity behind the rolling blinds is not ventilated. Meaning that the air behind the blind is heated too much anh then it radiates heat back to the dwelling. This way the shading system is much more versatile.

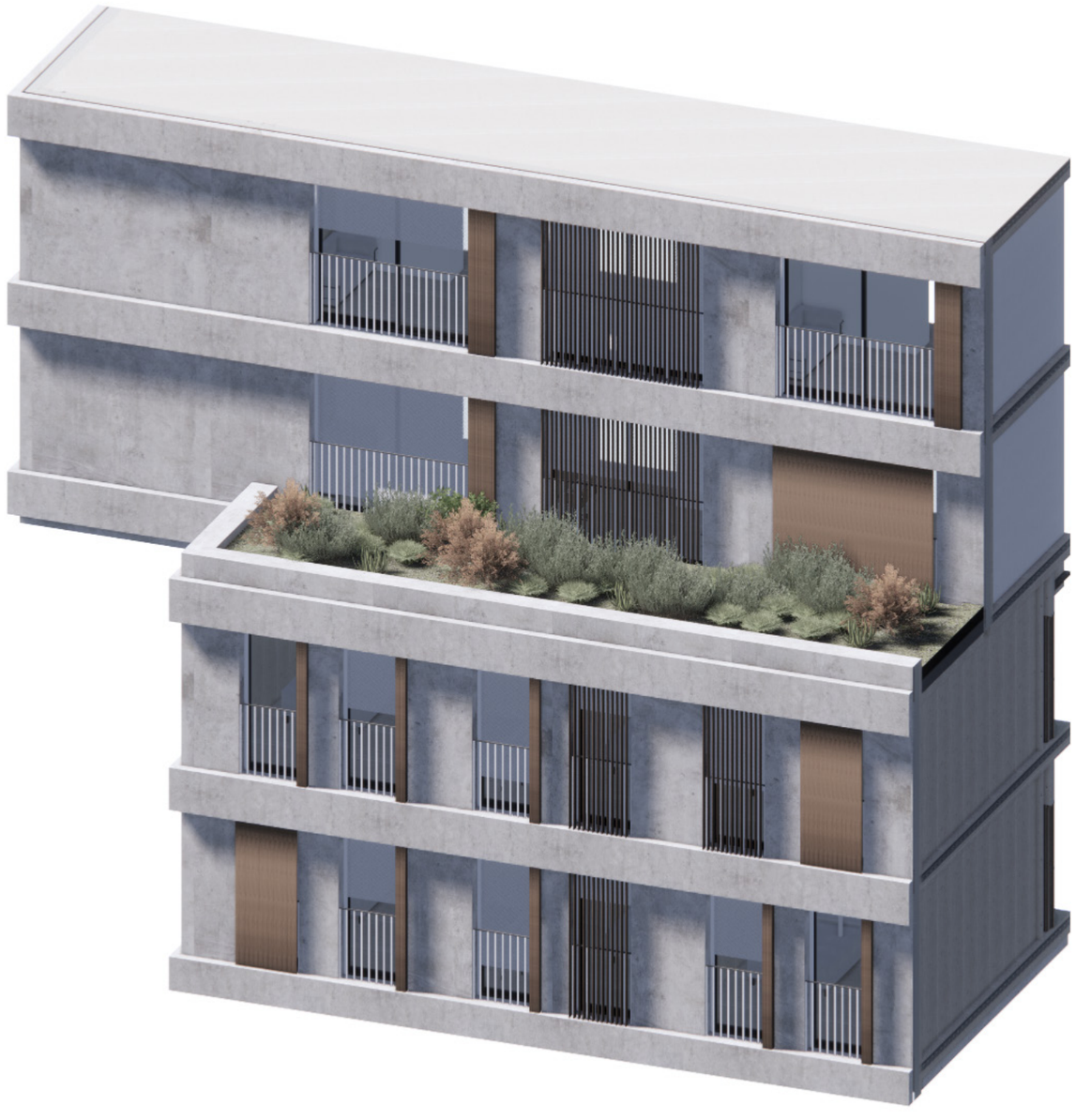
FACADE FRAGMENT 3in1 - ELEVATION, VERTICAL AND HORIZONTAL SECTION



FACADE FRAGMENT VERTICAL SECTION

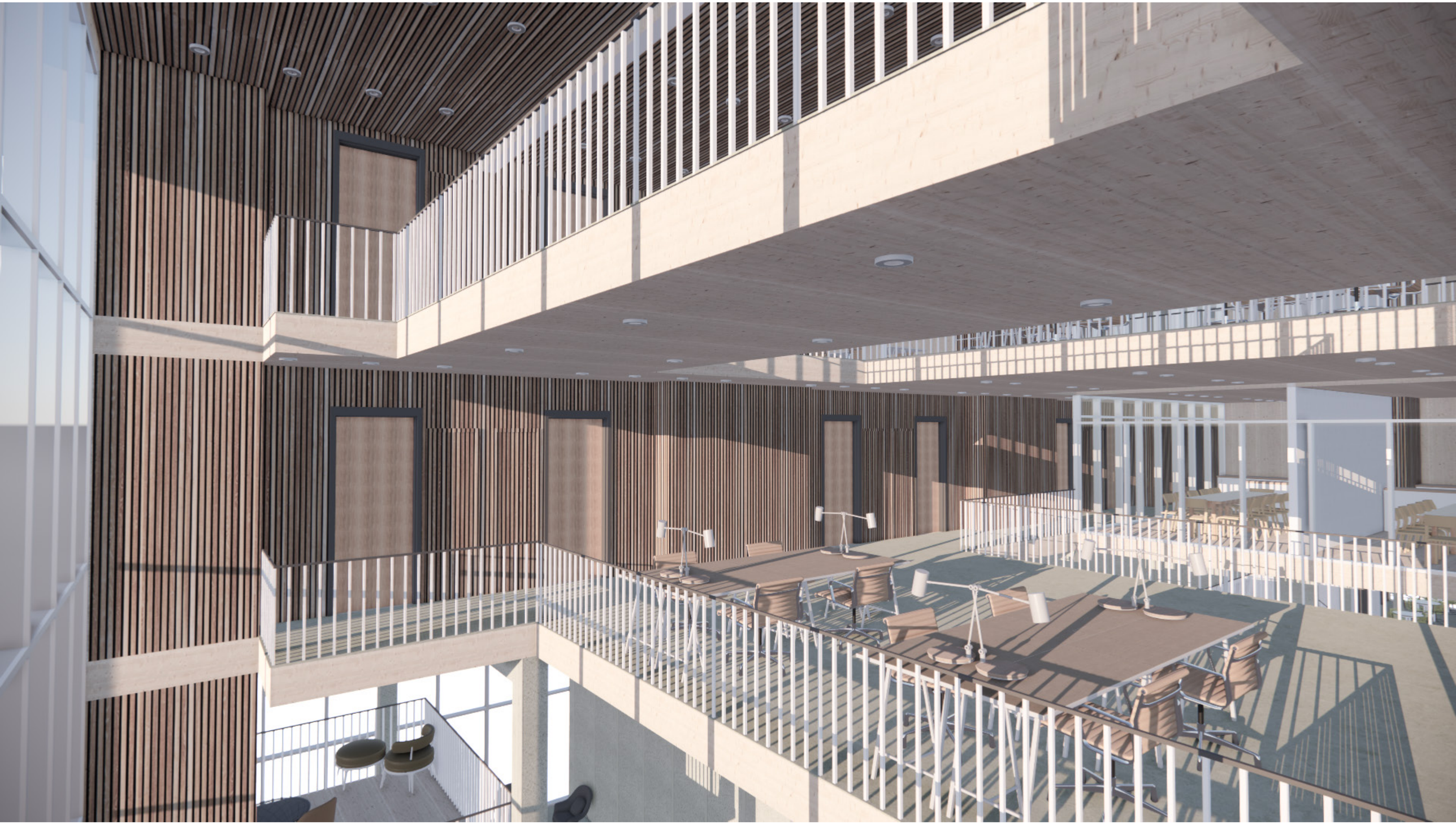


FACADE FRAGMENT 3D



SHADING SYSTEM VARIANTS

ATRIUM ALONG GLASS FACADE



ATRIUM GALLERY AND AUDITORIUM

ATRIUM LOUNGE AREA

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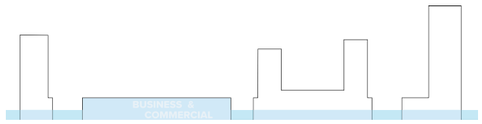
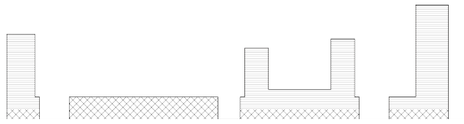
APPENDICES

Conceptual drawings

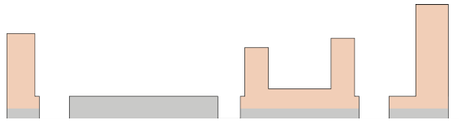
Plinth: option 1 - highlight commercial ground floor



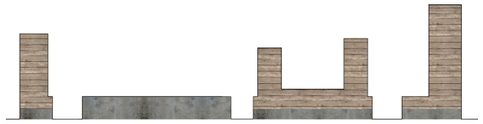
keep the setback to align to the warehouse height



option 1a: keep the setback and a unique pattern for the commercial functions

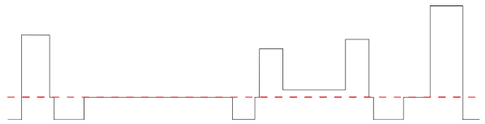


option 1a: keep the setback and a unique color of the commercial functions



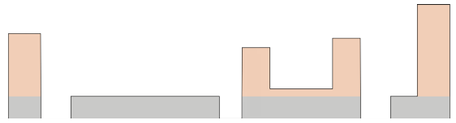
option 1a: keep the setback and a unique material of the commercial functions

Plinth: option 2 - highlight the warehouse height only



option 2a: keep the setback to align with the warehouse height

option 2b: no setback - unique pattern defines the plinth

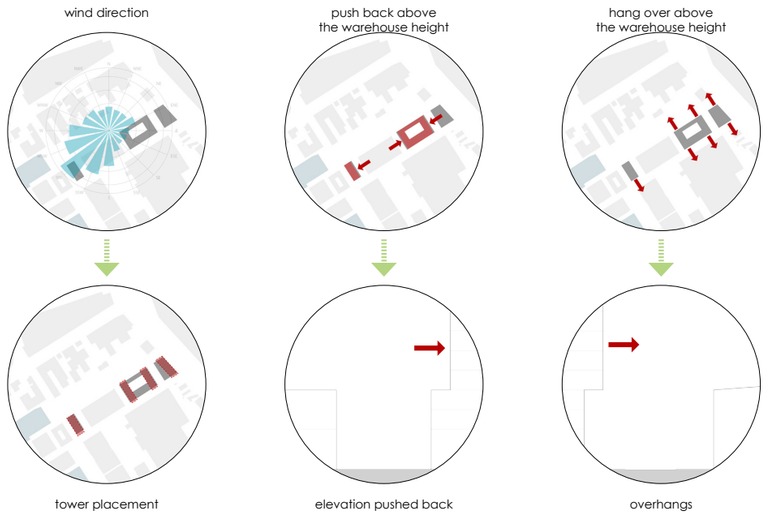


option 2c: no setback - unique color defines the plinth

option 2c: no setback - unique material defines the plinth

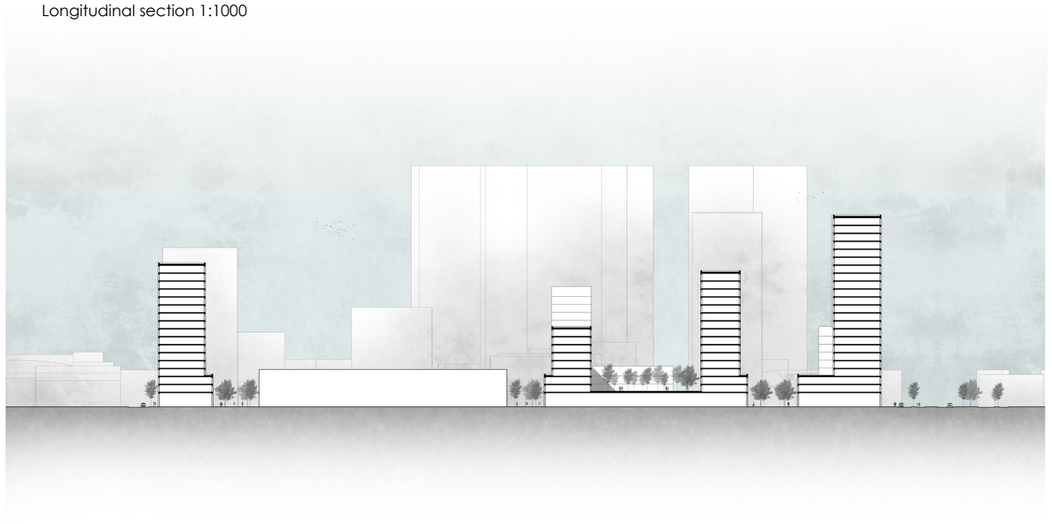
Conceptual drawings

Suggestions



Sections

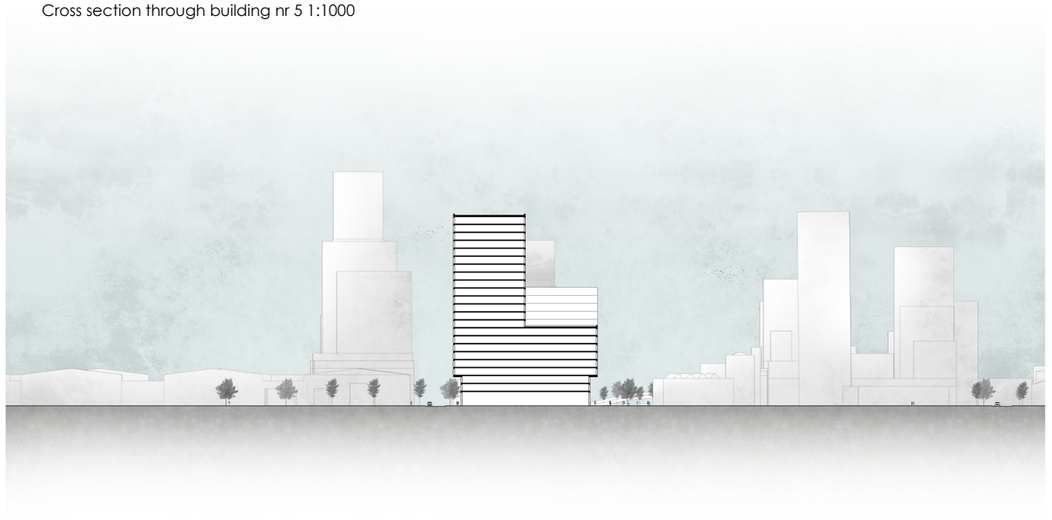
Longitudinal section 1:1000



0 10 20 30 40 50

Sections

Cross section through building nr 5 1:1000



0 10 20 30 40 50

Survey questions:

1. Do you currently live alone?*

Select one answer

- Yes
- No

2. How many floors is your building?*

If your building is mixed-use, include only the residential floors. If it is a residential complex, provide the total number of residential floors.

Type a number...

3. What is the size of your building?*

Select one answer

- less than 10 rooms
- less than 100 rooms
- 100 - 200 rooms
- 200 - 300 rooms
- more than 300 rooms
- I don't know

4. How big is your personal housing unit?*

In square meters; If uncertain, provide estimation

Type a number...

5. What type is your housing unit?*

Select one answer

- Studio
- Loft apartment
- Duplex apartment/maisonnette
- One-bedroom apartment
- Multi-bedroom apartment
- House

6. Do you share your kitchen or bathroom with other units?*

Select one answer

- Yes
- No

7. What shared facilities are there in your building?*

Select one or more answers

- Laundry space
- Bicycle parking
- Car parking
- Coworking space
- Computer room
- Study space

Formal meeting space

Quiet space/library

Workshop/painting room

Common leisure room

Playroom with a pool table, table tennis, etc.

Open space like a terrace or roof garden

Movie theatre

Event hall

Supermarket

Cafe/Restaurant

Outdoor sports courts

Gym and/or yoga studio

Other...

8. How important do you find the availability of those functions in a building with small dwellings?*

Select one answer in each row

	Not important at all	Relatively important	Very important	Absolute necessity
Laundry space				
Bicycle parking				
Car parking				

Coworking space				
Computer room				
Study space				
Formal meeting space				
Quiet space/library				
Workshop/painting room				
Common leisure room				
Playroom with a pool table, table tennis, etc.				
Open space like a terrace or roof garden				
Movie theatre				
Event hall				
Supermarket				
Cafe/Restaurant				
Outdoor sports court				
Gym and/or yoga studio				

9. Are there any other facilities you would like that weren't mentioned?

Type one or a few words...

10. How much do you agree with these statements? I would choose*

Select one answer in each row

	Completely disagree	Very much disagree	Neutral	Very much agree	Completely agree
a smaller unit if it has a private bathroom					
a smaller unit if it has a private kitchen					
a smaller unit with a separate work/study space					
to live in a shared house if the rent is cheaper					
to live in a shared house even if the rent was the same as a studio					
a smaller unit becuase it's more sustainable					
a furnished unit					

11. Living in a small dwelling is not a problem as long as*

Select one answer in each row

	Completely disagree	Very much disagree	Neutral	Very much agree	Completely agree
I meet other people often					
I would naturally and casually see the other residents					

the shared facilities are inviting and pleasant to use					
there is a big window in my unit with a view					
there is enough daylight in my unit					
there is a separate work/study space available for me					

12. Would you say that the presence of shared spaces at the building would help you feel less isolated when living alone?*

Select one answer

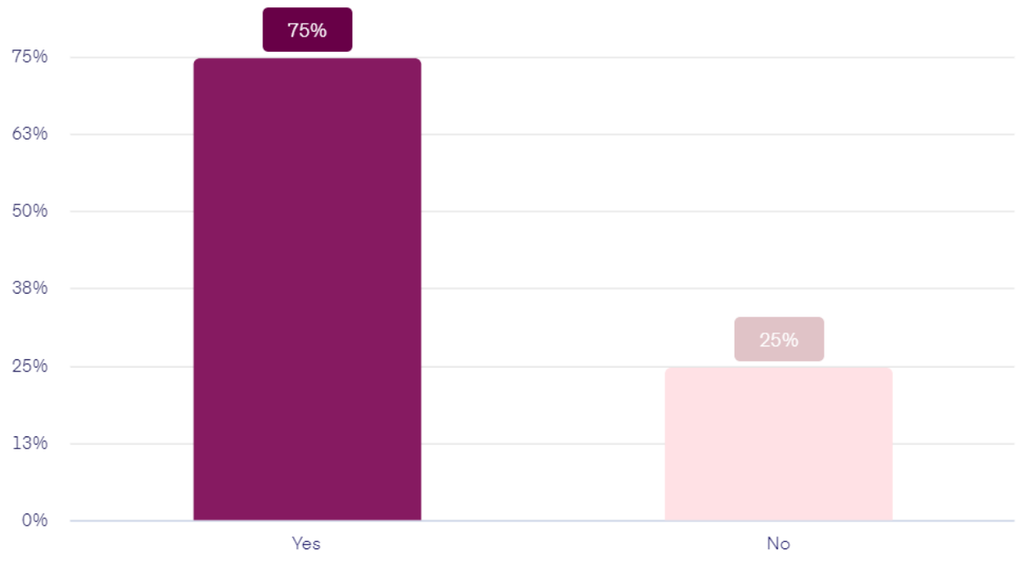
- Yes
- No
- I don't know

13. Is there anything you would like to see improved about your living situation?

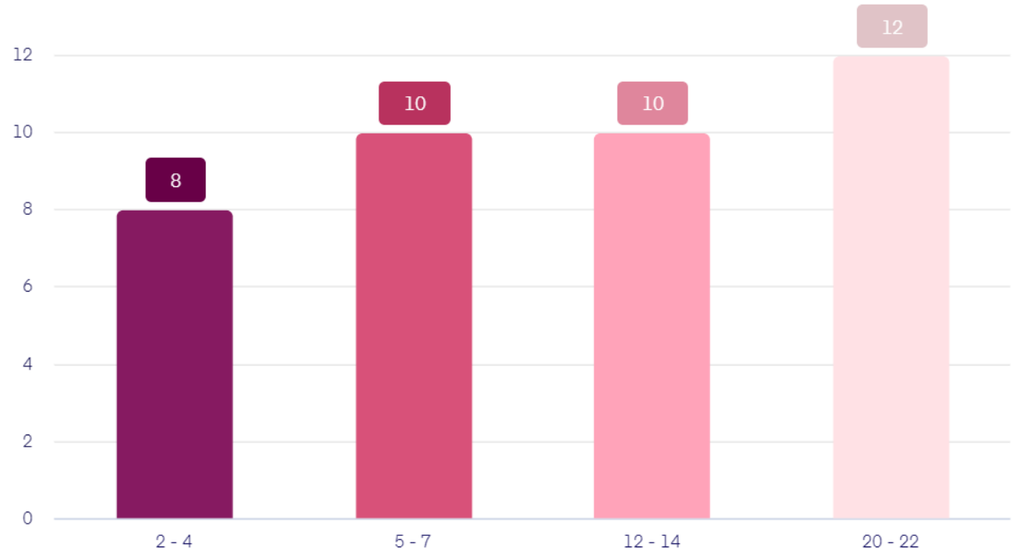
Type one or a few words...

Survey results:

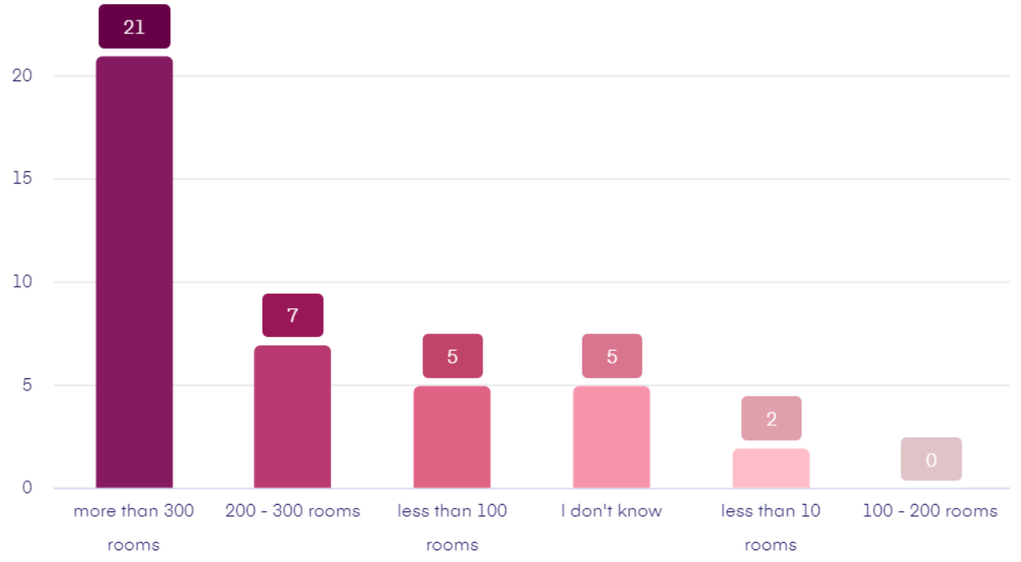
1. Do you currently live alone?



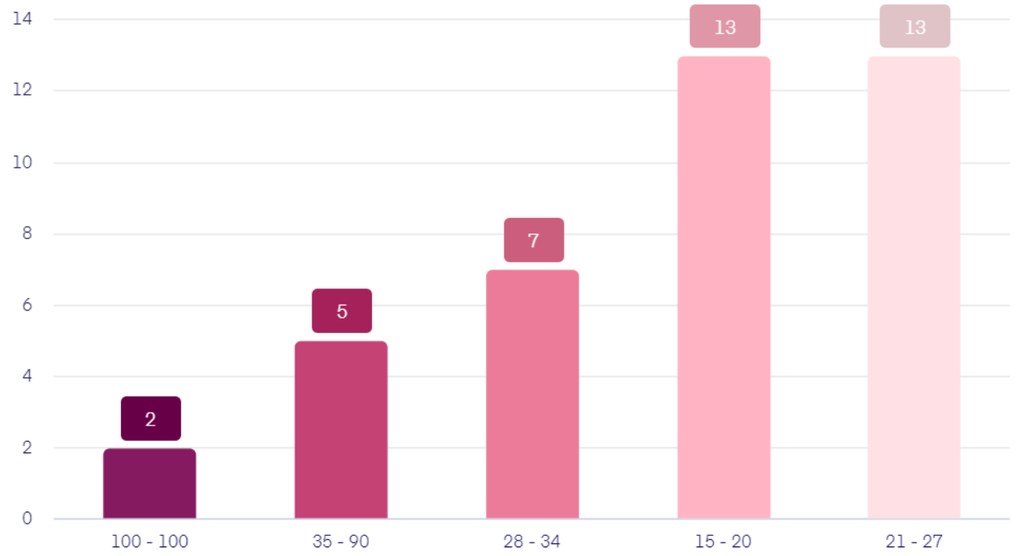
2. How many floors is your building?



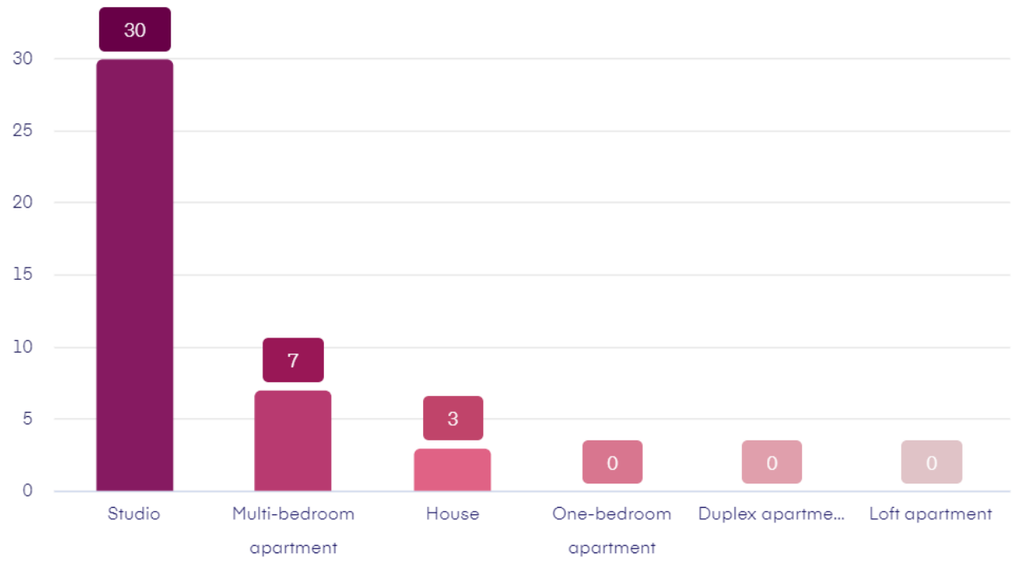
3. What is the size of your building?



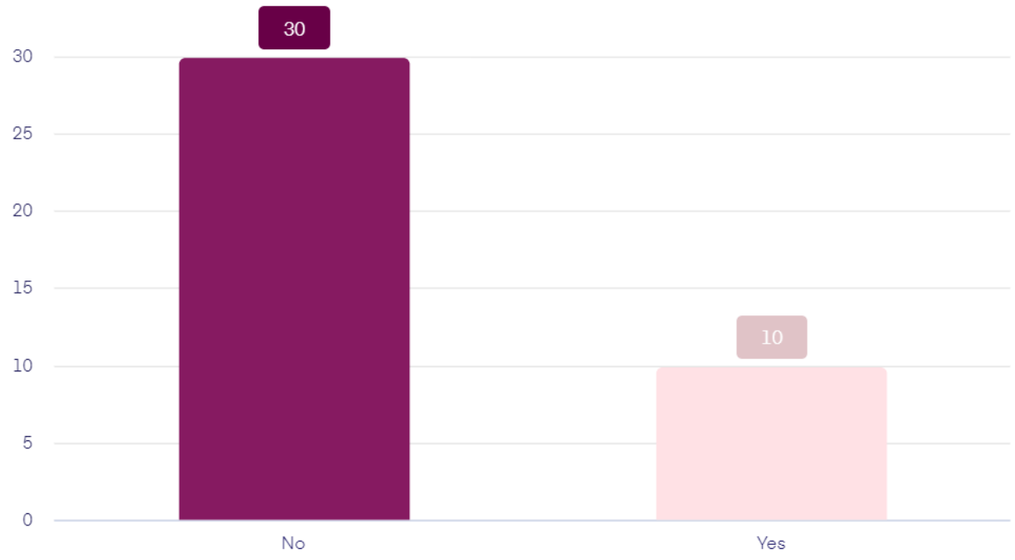
4. How big is your personal housing unit?



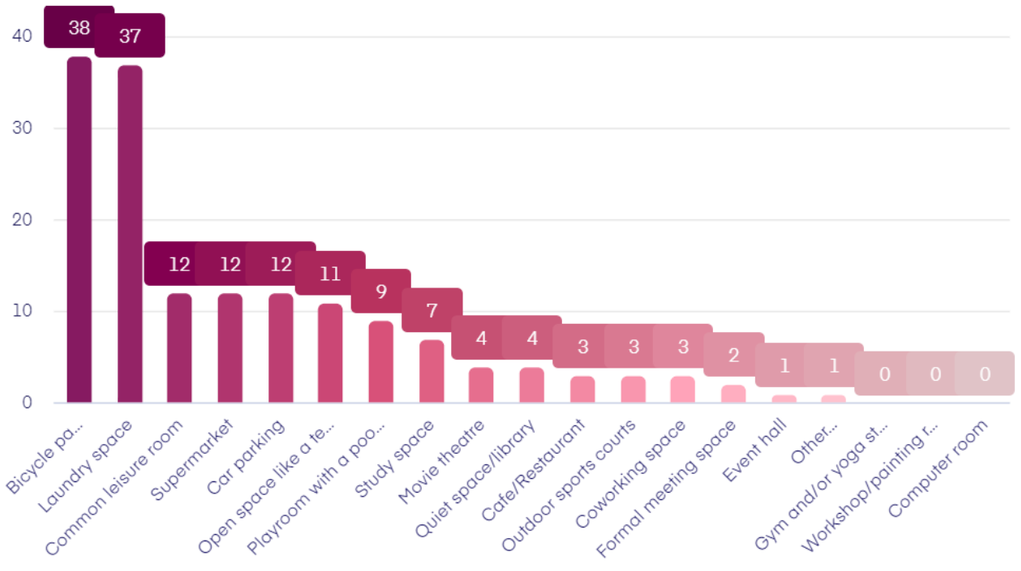
5. What type is your housing unit?



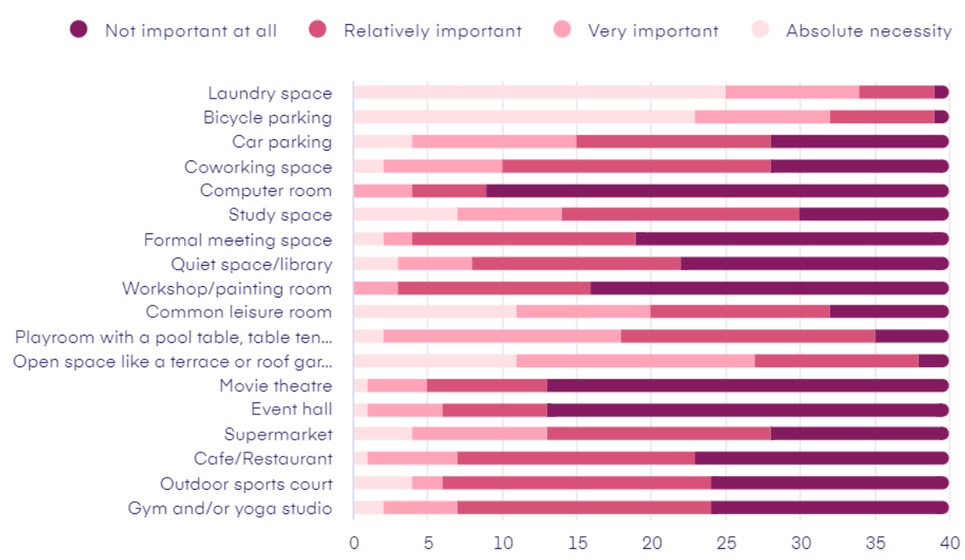
6. Do you share your kitchen or bathroom with other units?



7. What shared facilities are there in your building?



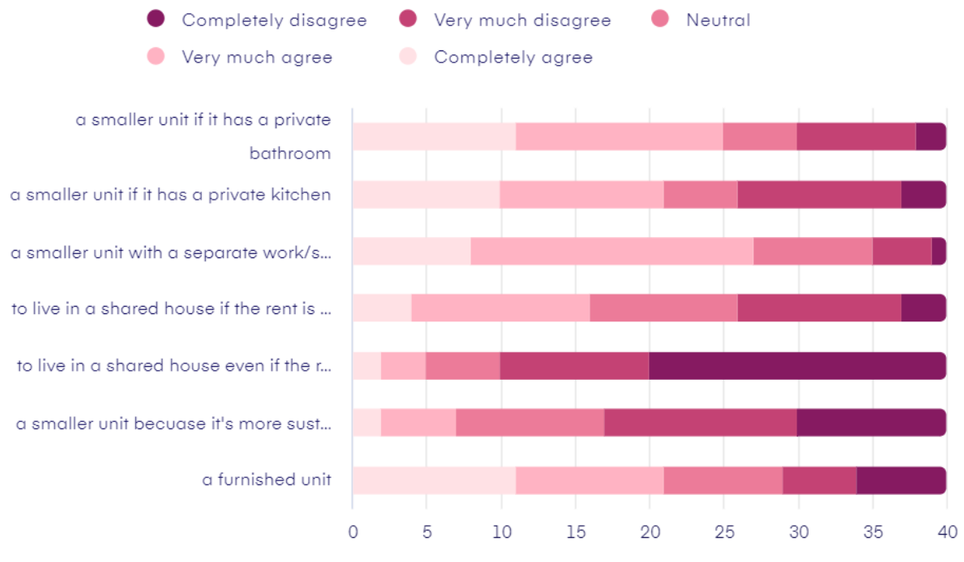
8. How important do you find the availability of those functions in a building with small dwellings?



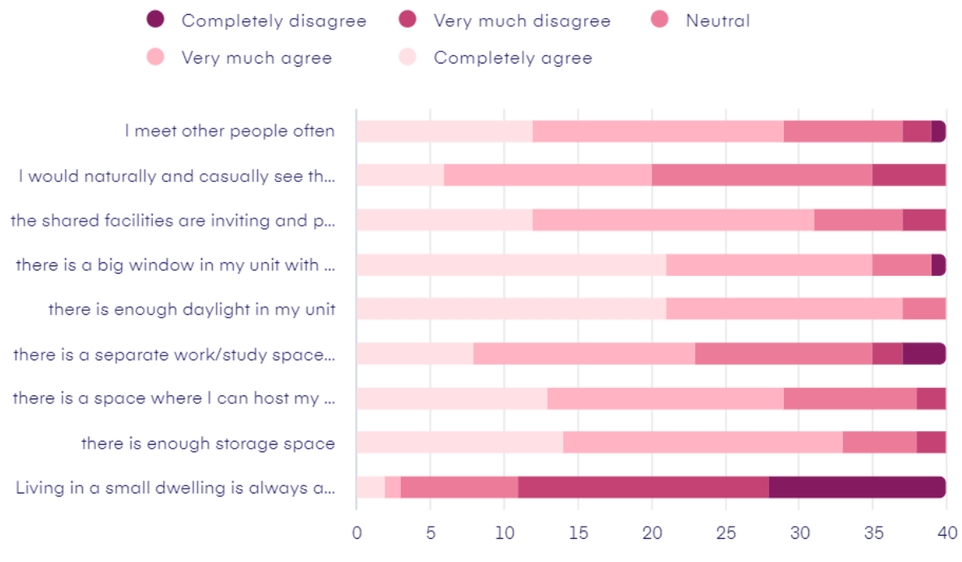
9. Are there any other facilities you would like that weren't mentioned?

ANSWER	RESPONSES	RATIO
	28	70%
No	4	10%
community garden	1	2.5%
Garbage disposal/recycling	1	2.5%
Separated garbage bins	1	2.5%
swimming pool	1	2.5%
Atm or bank	1	2.5%
Not really	1	2.5%
Garbage room	1	2.5%
barbeque space	1	2.5%

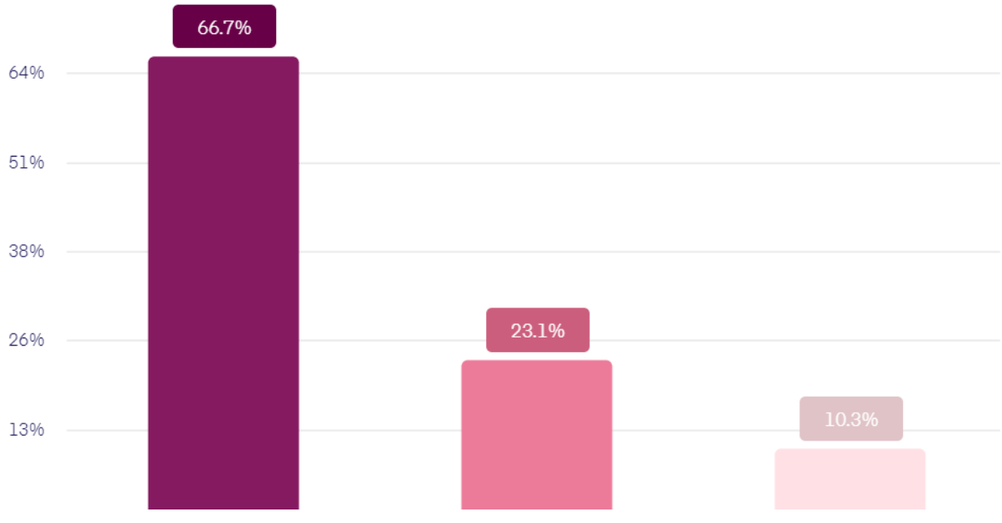
10. How much do you agree with these statements? I would choose



11. Living in a small dwelling is not a problem as long as



12. Would you say that the presence of shared spaces at the building would help you feel less isolated when living alone?



13. Is there anything you would like to see improved about your living situation?

ANSWER	RESPONSES	RATIO
	22	56.4%
More sheared spaces	1	2.6%
A shared common area would have been nice	1	2.6%
No	1	2.6%
more shared facilities	1	2.6%
Better soundproofing of walls and floors	1	2.6%
there is absolutely no storage space meaning all clutter and stuff you'd normally put in a storage closet is taking up space in the already small unit	1	2.6%
A common room in the building	1	2.6%
An Amber hub next to the building	1	2.6%
get to know my neigbours	1	2.6%
I would like to find more comfortable place for living with the same price as my current apartment	1	2.6%
Rent could be a bit lower, additional toilet would be perfect and the energy efficiency could be enhanced	1	2.6%
I would love shared living room for my hallway, in addition to my own	1	2.6%
cheaper shit	1	2.6%
cheaper utilities and less retarded neighbors	1	2.6%
Less scamming from renters	1	2.6%
More light and more social building would be nice. Currently, the common room is in the back, which provides privacy but also it is less inviting to go there.	1	2.6%
More pits to cook on, bigger freezer	1	2.6%

Interviews

There were no prescripted questions. The interviewees were simply invited to openly reflect of their living experience in the building.

Interview 1

Age: 22

Occupation: Student; Young entrepreneur; Owner of a 3D printing startup

At the time I approached the interviewee he was in a fight with the caretaker, because the caretaker insisted that the study date of the interviewee should leave immediately. It's not allowed to have not tenants in the common rooms

- Personal room is big enough 30 sq.m, but should have been divided into 2 rooms - bedroom and living room
- The window is way too small, but the supplied furniture is good enough; it's sturdy and not like IKEA; the colours are nice; flooring is good - vinyl with a timber texture
- The kitchen is too small for the size of the room, especially the cooking pits - there are only 2 of them
- The ceiling is raw concrete now; it would have been nice if it was plastered, because now dusk comes down from it
- The 2 persons bed is important; it's 140 now but it could have been bigger
- Bathroom is way too small; when you sit on the toilet your face is in the sink; and you can only bend to take stuff under the sink with the bathroom door open.
- The window is the biggest problem of the room
- The building: nice idea, bad execution
- The big number of shared facilities is nice, but the shared kitchen is not managed properly so it's not being used and that makes him wish for a gym instead of a kitchen. He said that you need a permission from the landlord to use the common kitchen and it's only allowed to d so when you have more than 8 guests
- It's nice to have the cinema and the common kitchen but it's not really a need
- Works from home and what needs is an ample space to work and closed off so that people are not just passing by; work cubicles; meeting rooms; board room; availability of screens to connect to; good chairs; good internet connection and electricity; shared screens; good coffee and tea and food machine; a space to make phone calls without disturbing the others; so a lot of different categories of rooms
- Doesn't need to meet clients
- Right now feels isolated, because people in the building are not social and don't use the common rooms; it's not a design fault, just the people change - move out, new people come and the corona now prevents from using the common spaces, but used to be different in the beginning (refers to when he moved in 3 years ago)
- Thinks that a community garden, sauna, gym and a swimming pool would be nice, and a functional shared kitchen which requires functional management that works with the tenants and not against them
- The many toilets in the shared spaces are a waste of space; everyone goes to their own room
- A roof terrace would be nice with a barbeque; in the beginning tenants gathered and built their own barbeque, but then a new caretaker came in the building and forbid it
- He really likes the shared rooms, but people don't use them and it's not fun to live in the building any-

more, in the beginning there were very often parties organised by the tenants and the landlord

- The fun Dutch and internationals moved out; 30 people used to come to game night - contest of 7-8 games in the cinema and ping pong, pool, twister, jenga. Whichever team would win would get a 30 euro voucher for bol.com per each member; this was financed by the landlord
- Landlord used to make parties, but now they aren't allowed at all; the new caretaker forbid it

Interview 2

Age: 35

Occupation: Web developer

- The building has different shared spaces on every floor but are connected by an atrium
- There are too few desks in the common areas, there is no one using the ground floor because cold gets through the sliding entrance door.
- Thinks that on the ground floor the pool table and ping pong should be, because they are noisy.
- On the 4th floor nobody sits - it's a lounge area but the couches are not comfortable and the tenants are not allowed to connect to the TV's there, which are only repeating different advertisements like Philips trimmer. Previously tenants were allowed to connect to the screens and one tenant was giving free classes in Dutch language
- Coronavirus makes it worse, nobody uses the common spaces now
- He is happy that the people are not allowed to gather anymore in the building because before that people would make birthday parties and reserve some of the common areas for their guests
- "Suppose someone has many friends, they will be here all the time" so the rule of the caretaker to not allow non-tenants in the shared spaces is fair
- There is a group chat in the building for ping pong & pool; he has all his friends there
- Would be nice to have the schedule of the cinema on a screen instead of the whiteboard now
- To work from home he would like a good internet connection, a 4K screen, bigger desks, now they are too narrow, good climate of the room
- In his opinion the best place to work is outside the room because you have more people around you; not necessarily to interact, but just to have them around
- His current room is not too small - 21 sq. m and it has everything he needs - kitchen, bathroom, bedroom; he doesn't miss anything significantly
- But the light is too little; the only thing he would improve
- He likes the cinema and the common kitchen; but the kitchen can't be used and the 4th floor is a waste of space
- He meets the clients outside the building and wouldn't want them to be in the building
- Thinks that it would be nice to have management from a group of tenants instead of an assigned caretaker, because then people could make the building their own

Interview 3

Age: 23

Occupation: Student; Project engineer at a start-up

- Moved in 3 months ago so he doesn't know that many people, but is meeting a lot through the ping pong table and the pool table

- His room is very nice, but the rounded part of the building casts a shadow and is blocking the view; he doesn't have enough sunlight in the room; it's very dark and thinks that the dark green colour of the facade also contributes to the problem; if it was white it would reflect more
- He likes the room because the kitchen is big, everything is there, It's very compact but everything works
- He would have liked if there was a couch in the room, not there's just one armchair and it's awkward when friends come over
- The very high ceiling is nice and the quality of the furniture is good
- The whole building is pleasant, a lot of shared facilities that very few buildings have them
- The temperature of the shared spaces is sometimes a problem and the laundry fee is high
- The works in the common spaces, and prefers it that way, but needs a quiet space with lots of tables and chairs and a monitor he can connect to
- Very much likes the spaces for relaxation like the movie theatre and the ping pong table

Interview 4

Age: 23

Occupation: Student; Freelance graphic designer

- Likes her rooms very much and especially waited to get a place in that building because it's a studio and the rooms come completely furnished with very nice furniture and it's close to university
- She says she wouldn't live with other people in a student house again because there were too many problems. "The concept of living with others is great - you socialise, have people to turn to, but it only works if you all have the same understanding about hygiene. In this age of independence I don't see who would sacrifice their comfort for occasional small talk ". She hates the fact that she had to put toilet paper on the toilet seat every time. Certain that money is the only reason people live in shared houses.
- She values a big kitchen very much, because it's something you use every single day even if you don't cook; make coffee, snacks, preheat your ordered food, etc. People tend to put massive couches in case they have guests but how often do you have guests? Small space needs to focus on exactly what you use
- Loves the shared facilities and hates the manager. He doesn't allow anything in the building and always has a problem with how you sit and what you do.
- Always works and studies either in the shared facilities or in the university library, because she can't focus at home. Also if she works from home sometimes days will pass without talking to anybody. Doesn't feel sad about it and it comes very natural to her, but she should work towards interacting with others. Says that she needs to set a goal to make friends, otherwise she won't ever bother to do it.
- But this is why she likes working in the common room - already knows people from the building and they sometimes hang out in the game room to play pool or table tennis. However, when she has to build models she needs her room, because it's not something you can clear up at the end of the day and set it up the next morning
- The cinema is something she wouldn't personally use, but happens that she uses it once a month with friends because "it's there and it's a great beamer. So why not?"
- The greatest problem of the room is the lack of sunlight; it's depressing and how it's managed, but doesn't miss anything from the facilities
- She really wishes tenants were allowed to rearrange and make the space more their own, because she feels like a hotel guest right now

REFLECTION

INTRODUCTION

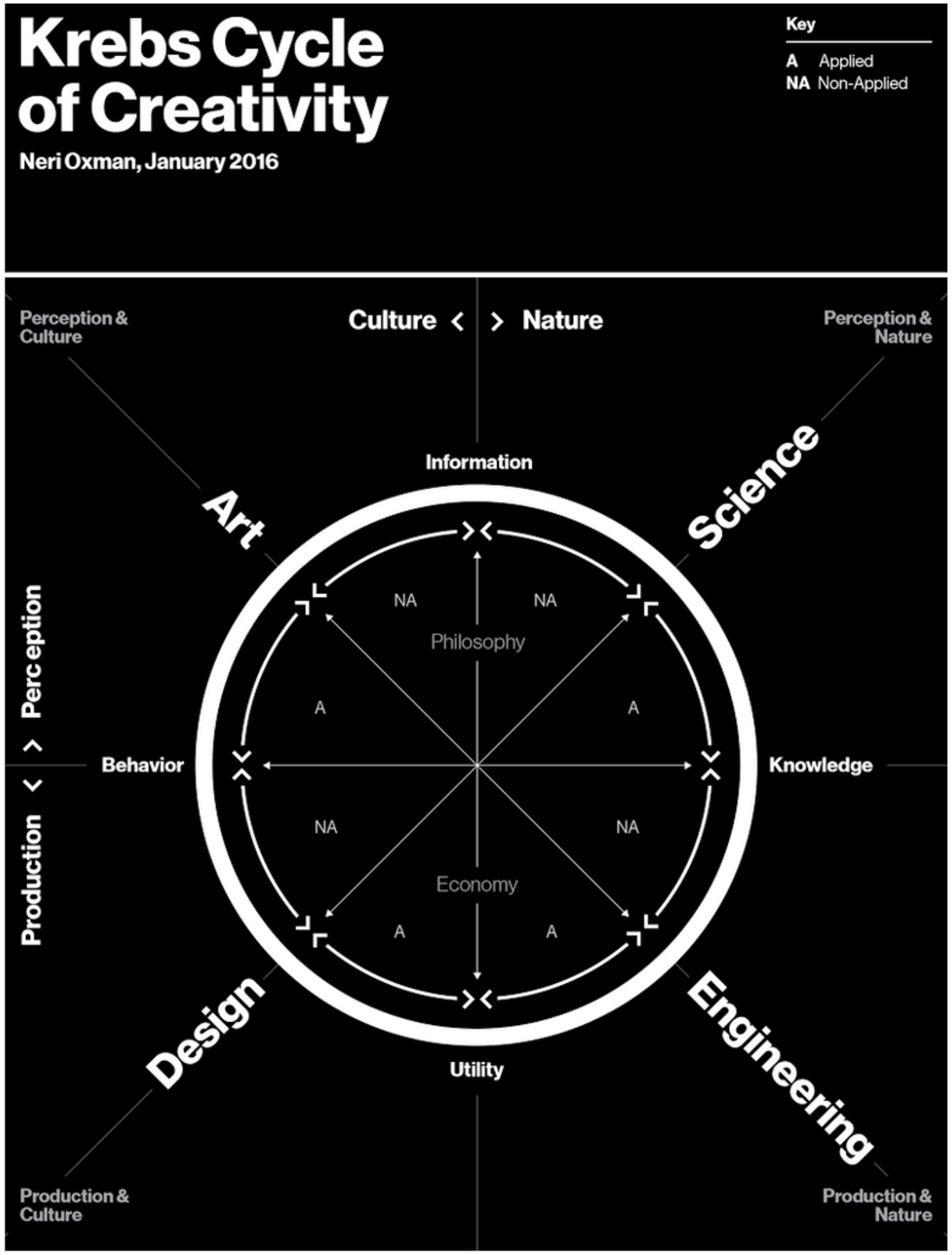
My understanding of architecture differs substantially from the established 20th century perception of the highly intellectual architect who creates buildings by inspiration, creativity and his perfect artistic mind; where design and aesthetics are superior. I see a holistic relationship between science, engineering, design and art, where no priority is given to one of the four. In fact, I see architecture as the responsibility to solve new problems and improve people's life by finding a way to integrate in practical terms the scientific and engineering developments. Meaning that architecture is not purely for aesthetics, design and the amazing conceptual sketch. A great piece of architecture could be visually unappealing but implement breakthrough technology, for example, or be organised in an innovative way that eases the users' life significantly. I greatly associate myself with The Krebs Cycle of Creativity explained by Neri Oxman.

> *"The role of Science is to explain and predict the world around us; it 'converts' information into knowledge. The role of Engineering is to apply scientific knowledge to the development of solutions for empirical problems; it 'converts' knowledge into utility. The role of Design is to produce embodiments of solutions that maximize function and augment human experience; it 'converts' utility into behavior. The role of Art is to question human behavior and create awareness of the world around us; it 'converts' behavior into new perceptions of information, re-presenting the data that initiated the KCC in Science. At this 'Cinderella moment'—when the hands of the KCC strike midnight—new perception inspires new scientific exploration."*
>
> *Neri Oxman*

Since, in my view, there aren't universal rules for 'great architecture', it's important to note that architecture should set the aims of the project beforehand. So what is that this task is trying to achieve? What are the problems to solve? For who is it? This is where research comes into play to ensure that architectural decisions have substantial grounds. I believe that The Krebs Cycle of Creativity has shortcuts that allow you to link science to design directly or art to engineering, etc. This is indeed what happened in my research. I used scientific information about the market, the society, the demographics, etc. to derive conclusions for specific architectural features which should be implemented.

In scientific research a very important aspect is whether your research would yield the same results if performed again by other scientists. In very general terms, I think of architecture the same. Your momentous decision should only be made after exploring the possible, weighing against different factors, consequences, etc. so that you could speak with authority about your design. However, in architecture there are numerous ways to achieve something, so it could be that if someone were to follow your steps they would disagree with the exact spatial, material or any other choices you made, but they should understand where this decision is coming from.

This is in fact the meaning I see in academia. The academic diploma we obtain should be a guarantor of our ability to rise above our personal beliefs, wishes, visions, inspirations, aesthetic criteria and see and understand notions that are bigger than ourselves and concern things like the well-being of others, the society, the planet, etc. So basing everything on our inspiration is very often regarded as enough, but it risks that we stay forever in the limits of our beliefs. A great designer manages to see when their subjectivity constrains them and they should in fact expand their horizons and when their subjectivity should be emphasised to break the cycle of standardised design practices. The reason I chose to study Architecture in the Netherlands and obtain a Master of Science instead of Master of Arts degree is that I believe that our responsibility as architects is to think on a scale much larger than ourselves, overcome our subjectivity, develop habits to always want to know more and seek new information, and very importantly, know when to give special importance to our personal input, fascinations, virtues as they would push the design forward.



01 ASPECT

The relationship between research and design

My research started with analysing the current state of the real estate market. The idea behind this was to determine a target group for my project that is indeed in need of attention. By doing so the paper becomes much more relevant because it focuses on a real target group with a real problem. I first investigated the housing market and market policies and saw whether there is a group that is less supported or in an unjustified position. The research pointed out that single-person households are a suitable target group for this aim. Once I dived into this target group, it became evident that there are many different people in it and they have different needs and preferences. Therefore, I narrowed it down to young single-person households, because their income puts them in an even worse position than the rest of the single-person households. However, in the design phase I kept on switching scales. So, although I was designing for young single-person households I was integrating features meant for the other types of single-person households like the larger apartments, for example.

The research was densely saturated with information. But in the end it summarised concrete architectural features which were integrated in the design of the building. There were many decisions that were based entirely on the outcome of the research so that's why I'd go over them one by one.

The literature study concluded that the young single-person households are on a tight spot financially and experience less social cohesion, hinting at co-housing and co-living housing solutions. Therefore, apart from the characteristics of the private dwelling, the focus of the survey and interviews was on the eagerness to share different types of facilities. **This set the overall aim of the design to achieve better social cohesion and determined which features to be implemented in the building.**

The status of the market revealed that there is a need for more affordable housing in the mid-price rental segment and a shift towards a market that is better fitted to the user's needs. **This was the first indication that I need to discover what exactly my target group needs.** Due to the consistent policy of stimulation of homeownership, the Dutch housing market now has a very small commercial rental segment. **This determined that the building would be rental.**

The rising house prices affect the first-time buyers the most because their borrowing capacity isn't sufficient to afford the average real estate prices in the majority of the cases. Those are most often young people at the start of their housing career. But if given more affordable housing, they could save more easily for their first purchase. **This made clear that the dwellings definitely need to be affordable.**

Presently, single-person households live predominantly in rental apartments in urban areas, which means that the location of my building is suitable for them. These households are highly educated, concentrated in the bigger cities, because of their lifestyle, and are often only temporarily in this composition, bridging their paternal home and the moment when they are ready to form a multi-person household. **Because of this, all the dwellings are designed such that they can accommodate 2 people temporarily until the couple is ready to move in together officially.**

On average single-person households of all ages need mid-price rental apartments. The young ones need an independent one and the great majority would sacrifice the floor area to have a private bathroom and a kitchen. They would do the same tradeoff to have a separate working space. **Because of how much the people emphasized on the importance of an independent space, I made the choice that I would design studios. But for the working space, I decided to combine it with the aim for better social cohesion and do a co-working space so people could be less isolated if they want to. If someone really requires, they can have a work setup in their studio.**

Single parent families and singles aged 35-64 have the highest rate of urgency to move as 40% want to move within six months and another 20% within a year. Of the young ones who want to take their first step in the housing market, 29% would prefer to move

within six months and almost the same (27%) want to move within a year. **Because of the high urgency to move I implemented the short-stay dwellings.**

Single-person households need an urban setting because of their lifestyle, but in those areas the perceived social cohesion is low and this is a key to satisfaction with the living environment. Young single people are less susceptible to experience social cohesion and, therefore, they need stimuli to interact with others. Therefore, the building needs to facilitate contact between the residents. Young single-person households are open to the shared economy; it's very suited to achieve a better social cohesion by shared facilities and co-housing. **The aim to achieve better social cohesion became central to my design. I looked for different ways to achieve it and their implication would mean. So, of course, one of the first things I tried out was a co-living option. But the respondents were clear that this would feel like a downgrade to their university years, so I went for a co-housing solution. For the shared space, I also looked in different approaches on how to design it and what it should include. And I found the solution in one of the precedence projects - the Youth Community Centre**.

Compact dwellings would serve the daily needs of the residents and for the other needs they would rely on the shared spaces. Compact refers to the preferences of young single-person households to have a small but well organised dwelling with storage, daylight and view. Some shared facilities are considered a must, but others are more important than people could understand, because their effect is not direct. Examples are game rooms, cinemas, working spaces, etc. This occurs because people's definition of importance concerns their first necessity items. The facilities in question have no effect on those, but rather on the overall satisfaction with the building and the life in it. **Therefore, although people don't immediately recognise them as important, the design of the building should include recreational facilities.** A separate work space is needed and, therefore, a live-work typology should be integrated. **But this space needs to be common and outside one's room so residents can have the possibility to interact with each other.**

Once the decision for affordable dwellings was made, I had to determine how to achieve that. I looked at post-war housing, because then more than ever it was important that affordable, fast and reliable housing was provided. The topic of downscaling the dwelling size has been central in a high-level architecture discussion already. 'Die Wohnung für das Existenzminimum' defined minimum standards for the habitable dwellings and construction procedures that would have a positive effect on construction time and affordability. This theme appears to be relevant today as again design has a crucial role to make uncorrupted housing accessible to larger segments of the population. The prefabrication continues to be the essential means to affordability, however, emphasis is laid on flexibility, customization and avoiding standardized impersonal solutions. Also, the new dwelling for the minimum level of existence underlines environmental sustainability by correct use of resources and energy efficiency. It promotes new spatial layouts of compact housing with communal facilities, flexibility, temporary solutions, shared living and social enrichment. **This determined that prefabriration should be the main building technique for the facade also. That I also need to foresee an alternative use of the building. I made the openings in every other load bearing wall so that in the future 2 studios can be combined in a larger dwelling. That sustainability should be a concept reflected in all aspects of the building like the materials, the facade, the systems, etc. Also, the remark about avoiding impersonal housing was very important to me. I have experience with Plattenbau buildings, which completely diminish the sense of individuality. So, in all my dwellings I tried to only design the fixed elements like shafts, kitchen and bathroom, and leave the rest to the user.**

It's often forgotten that the live-work typology was the norm before the Industrial revolution. The modernist zoning plans imposed a division between living and working. The generations of separated economic productivity and domestic life have created residential deserts. By combining residential and commercial functions, a livelier environment with 24h inhibition can be created. **This is why I implemented the co-working space. It will be available not only for residents, but people from M4H can use it and save time by not commuting to work.**

The main aim of the plan analysis in the report was to see the threshold between private and public, the dwelling layout and how the program was organised. **Based on this, the corridor typology, the dimension of the dwellings, and the atrium with the shared facilities were derived.** I decided to study architecture because I've always enjoyed working with space. From when I was in highschool I was interested in building layouts and organisations. But my Bachelor's degree from TU Eindhoven was Architecture, Urbanism and Building Sciences. And it indeed included a lot of courses that weren't architectural. I discovered that apart from the architecture courses, I really enjoyed the ones on Building Physics and that I'm also good at the Structural Design courses. Then I started debating whether it's not better for me to do a Master's in Building technology since I have such a fascination with sustainability. After a very long time of going over this possibility, I realized that I'm interested in sustainable practises, but in fact, I'm much more interested in their implementation and making sure that shifting towards more a sustainable building doesn't feel like a downgrade to its users. Therefore, I enrolled myself for the Architecture track, but I was only choosing courses that have sustainability as a topic.

02 ASPECT

The relationship between your graduation topic, the studio topic, your master track, and your master programme

I chose the Advanced housing studio because previously I've done only public buildings. This is my first residential project and I found it important to have experience with residential architecture before I graduate. Additionally, this studio allows me to work on sustainable architecture. And I was really curious how sustainability could be implemented successfully in residential architecture, given that residential buildings demand great functionality.

The studio of Advanced Housing Design predetermined the topic of Modern households. We were, however, required to find a more specific target group that falls under this category and design a building for it.

In order to determine what a modern household is I investigated the market to find its present day problems. This way I was able to understand the housing situation which the modern people live in. This identified the main actors in the modern housing market and together with my determination to find the group that is presently overlooked, I was able to define single-person households as my target group. After I checked the composition of this group, I was convinced that this is the right target group for me. Single-person households were a minor household type before 1960. And since then it has been proliferating to the point that now it's the largest household type forming 38.5% of all private households in 2020. So it is fair to say that single-person households completely fit the definition of a modern household since they transformed in the past 80 years to become the most common household type. Therefore, my target group, which sets the whole topic of my graduation, fits entirely with the task to focus on a modern household.

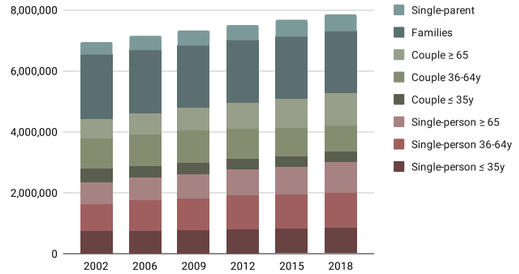


Fig 2.1 Household development by age and composition (WoOn, 2019, p. 14)

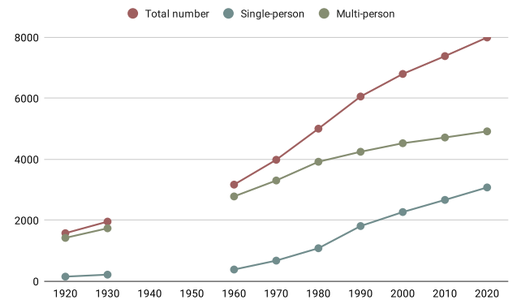


Fig 2.1 Total number of households, single-person, multi-person x1000 (CBS, 2020)

03 ASPECT

Elaboration on research method and approach chosen about the graduation studio methodical line of inquiry, reflecting thereby upon the scientific relevance of the work

To begin with, the methodological approach of this paper consists of three parts. The real estate market, the notion of single-person households, and the related architectural typologies were researched by secondary qualitative and quantitative data. The characteristics of their lifestyle and their needs were defined by primary quantitative and qualitative data. Along with case study analysis, design parameters were set, which guided the development of building on architectural level.

I am quite satisfied with the methods used for this research. Overall the aim was to find reliable sources for all the information I needed, to synthesize it and draw conclusions. That was because official papers use large data I have no access to and are, therefore, more accurate. This is why for as much as I could, I adhered to secondary data from sources I believe reliable like banks, the Dutch government, statistical offices, and universities. I think this set very good grounds for my paper and made it realistic and sensible. It was especially useful for understanding the status of the market and the development of single-person households, because I was able to compare the numbers.

So, after I defined the target group and understood how it emerged and how it lives now, I was, of course, curious what these people needed if i'm going to be designing a building for them. And then I was looking for sources, which investigate the needs and preferences of single-person households for their housing. The only ones I found were for South Korean single-person households. They were very detailed, but I understood that I can't directly transfer such information across continents with very different cultures. This led to the need to investigate this with primary information. I immediately chose for a survey because it's a good way to systematize the input and draw conclusions. However, I added interviews so that I can get to know my target group better and seek information I have missed to address in the survey questions. The sample size was very small and that is a weak point for the research. Regardless, I am glad that I didn't find information from another source on this matter. I think composing the questions of the survey and interacting with my target group helped me understand it better and improved my design.

The last method was the case study analysis. I think this method is part of any architectural design. By looking at precedences, you can decide on so many architectural qualities. I am happy with the analysis I made in the beginning and the buildings I chose. But after them I continued to analyse other buildings for other aspects. I looked at buildings for climate systems, for facades, for CLT spans and dimensions of the walls, for organisation of dwellings, etc. There isn't really only one building that could inform a design. In fact, for every aspect you are doubting you find several examples and compare them. So overall, in my research paper, I only included 4 buildings for single-person households, which served me to solve the organisation of the building. But after that, I looked into a lot of other buildings which weren't necessarily for single-person households.

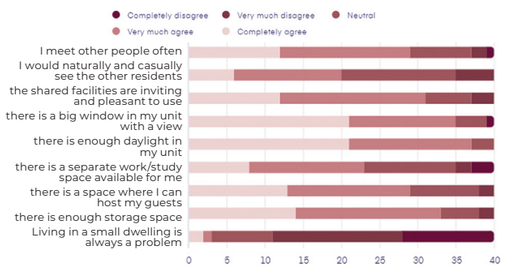


Fig. 3.5 Q11. Living in a small dwelling is not a problem as long as...

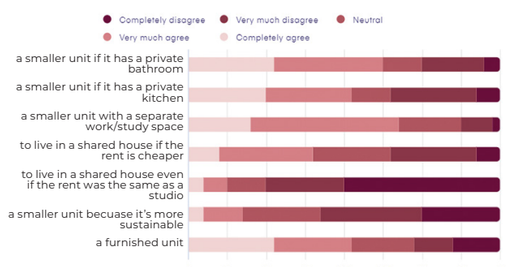


Fig. 3.4 Q10. How much do you agree with these statements? I would choose ...

04 ASPECT

Elaboration on the relationship between the graduation project and the wider social, professional and scientific framework, the transferability of the project results

I think the most valuable statement in my research is that it proves that there is a specific group for which the system in the Netherlands doesn't work. The gap between the income needed for social housing and the one needed for the free market, puts the people earning that much into a very difficult situation. The social housing system is designed for ones in the greatest need, but the threshold of when a person isn't in need anymore seems either arbitrary or not well thought through. The result is that in the current situation, the people who earn just enough not to qualify for the social market are either young university graduates, people with middle-income professions or people who have been relying on the social system until now but have worked hard enough to outgrow it. In most cases, those are people who have decided to invest in themselves instead of simply going with the flow. Their mortgage allowance, however, in the common scenario is not enough to afford the average market prices. So, those people are forced to rent for very long times or join their income with someone else and buy a house together.

The paper doesn't analyse and compare possible changes in market policies and their impact. Nor does it access which changes are better than others, but makes it clear that such a change is necessary. The paper, however, defines what are the quick wins for single-person households in terms of their needs and preferences. For example, rental apartments, the type of space they need, the location they prefer, the amenities they seek, etc. So the paper doesn't determine an overall solution to the problems of this target group. Instead it discovers what people constitute this group and defines what their needs are. This way a more informed design can be achieved.

The paper investigates the Dutch system and how it's organisation overlooks a certain group in it's aim to structure, organise and protect the housing market. So there is a big connection between the study and the Dutch society, because the regulations imposed by the government are projections of the society. They are meant to support the most people possible. But because the systems are in principle inert, the society, lifestyle, and household compositions have all changed much faster than the system accommodates. This has resulted in the current mismatch.

In general, the outcome of the research is reliable, credible and confirmable. The only threat to the accuracy of the results are the very limited time that the research was conducted for and the small sample size, which resulted from it. However, concerning transferability one has to take into account that the research was conducted for the Netherlands. If one wishes to use this research and draw conclusions for other nations and their housing market, one needs to be the judge whether this transfer is sensible.

05 ASPECT

Discuss the ethical issues and dilemmas you may have encountered in doing the research, elaborating the design and potential applications of the results in practice

I have not encountered any ethical issues concerning Honesty and Integrity, Carefulness, Openness, Respect for Intellectual Property, Confidentiality. I have documented the research step by step and the methods I chose were stated in the methodology. The paper and the data were checked several times by me and two times by external parties to avoid any careless mistakes. The data was discussed openly and the results were based on the discoveries. In the paper, I have taken great care to cite all the information thoroughly and accordingly. The name, background, gender of the interviewees were not assessed and no information used in the research was confidential.

There is, however, a minor dilemma about Objectivity. The interviewees were voluntary respondents to an open invitation towards people living alone in the form of a post to participate in a short interview without monetization concerning their housing preferences. The survey was shared in the form of a link on several social media groups. This filters out people who are not using social media. And, hence, this predisposes the research to bias. However, the possibility of this bias was known to me when I decided to only reach out to people through social media. I made the choice anyhow because I don't have access to databases with people's phone numbers and also time was limited so I needed something with large coverage.