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Graduation Project by Anne de Kleijpoer

Hi Buurman!

Connectedness while preserving one’s own independence

Graduation Booklet by:

Anne de Schepper
Student ID: 4085485

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Faculty of Architecture & Build Environment
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Mentors:

Architecture	Ir. Theo W. Kupers
Research	Ir. Pierijn S. van de Putt
Building Technology	Ir. Ferry Adema
Delegate Board of Examiners	Prof. Dr. Paul W. Chan

Introduction

This graduation research report is part of the Dutch Housing studio, Dwelling. The aim of the studios briefing is to design a large residential building in the Merwe-Vierhavens (M4H), a former port area, in Rotterdam that is being redeveloped by the municipality. The guidelines from the municipality are to create a dense, dynamic urban area consisting of a living-makers function with an informal collective character[1]. The studio's provided additional guidelines, namely, design for an urban area with a collective and inclusive living environment.

The structure provided by the studio for this project was divided in a group setting and an individual setting. As a group we did literature research on Sennett, Building and Dwelling; Rasmussen, Experiencing Architecture. Furthermore, as a collective we did a multi case study on collectivity in residential buildings.

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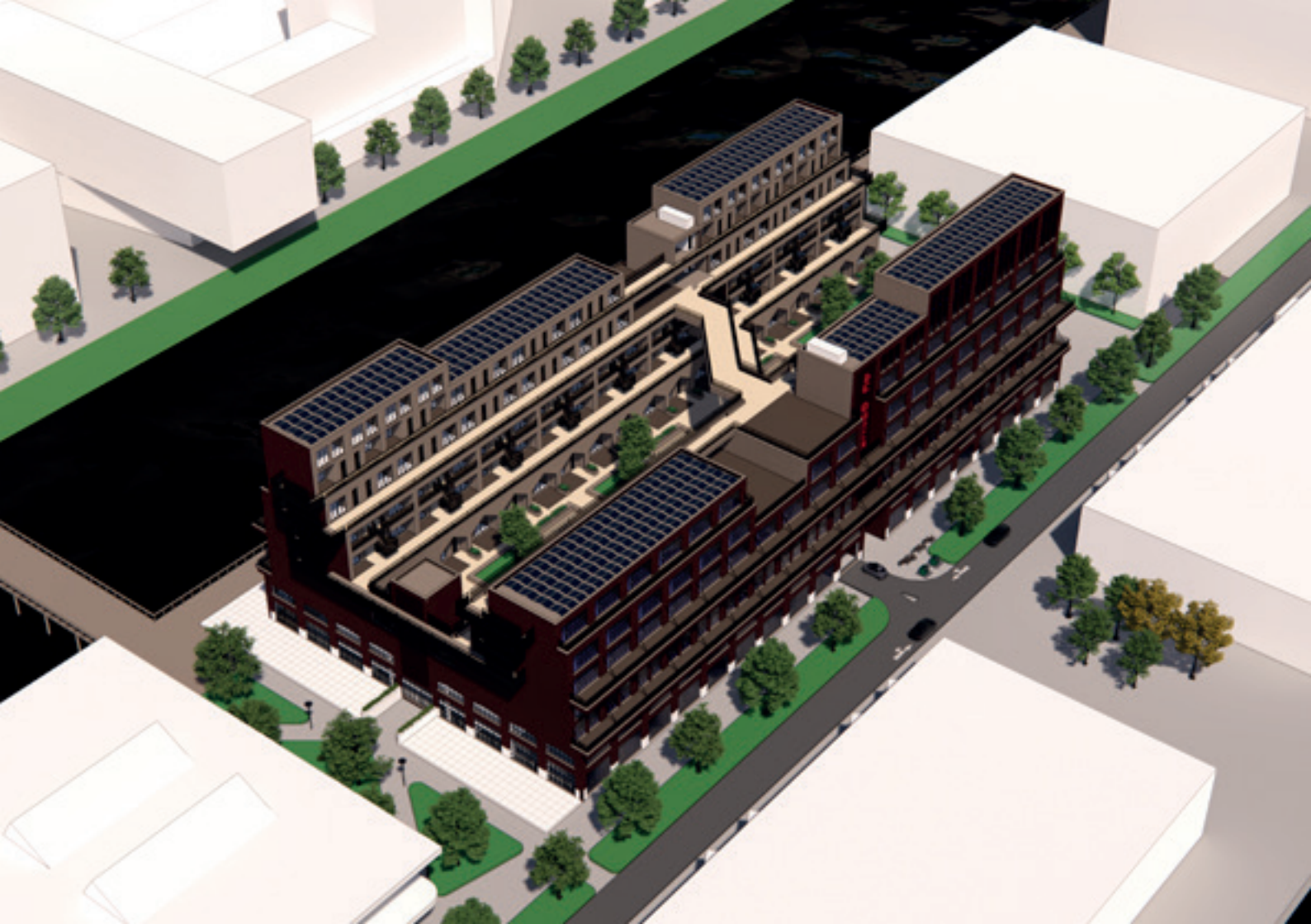
[1] Jeroen de Bok, Briefing Merwe-Vierhaven Rotterdam, February 14, 2020.

One of the first things in every design process is to get a better understanding of the location. However, the M4H is not yet developed. So, the task at hand was to collectively design an urban development plan for a part of the M4H, the Keile kwartier. The location was divided into four quadrants and each quadrant was developed in groups of four. The quadrant assigned to my group was quadrant C.

The individual part of the studio started with research into our own fascination, the research was required to have a relevance to the society we live in. My research was triggered by the recent events around the corona crisis and this led me to the individualization of society. The individual research needed to connect to a specific target group to whom this topic was applicable. The target audience for my graduation project consists of small households, such as starters and empty nesters. These target groups needs are in line with the municipalities vision for the M4H development. The municipality requirements for the location are that it should become a live-work environment, more specifically a maker's district. The research, target audience, and makers have to form a coherent entity. This entity has led to multiple design hypotheses that are translated into a concept design.



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Chapter 01

- Research

Introduction

"Have each other's backs and pay a little attention to each other".

These kinds of statements were made by the prime minister of the Netherlands during the corona crisis. He often stressed the importance of looking out for your neighbours, friends, and family, and functioning as a unity against 'the virus' (Ministerie van Algemene Zaken, 2020). But how does a society that is focused on individualization become united?

Individualization is the process of becoming independent from a group. The individualization process, as observed in western society, took off in the 20th century with the rise of industrialization and democratization (Wikipedia, 2018). Becoming independent is not necessarily a bad thing since it can lead to more exploration and innovation. However, the individualization process has caused a shift within society that resulted in some serious negative effects which are mainly observed in big cities. First of all, it caused a decrease in social cohesion. People don't really look out for their neighbours anymore because they do not feel any close ties (CBS, 2020b). Secondly, people get alienated from their neighbours. Becoming independent means that people don't feel the need to talk to people in their neighbourhood.

This eventually can lead to alienation, even though people often would like to interact more with their neighbours (Akkermans et al., 2019; CBS, 2019). Finally, individualization has caused people to experience feelings of loneliness. They either miss interaction with a significant other or would like to interact with other people on a more frequent basis (Van Tilburg & de Jong-Gierveld, 2007).

The current way of dwelling design mainly focuses on privacy and comfort. It is also more focused on the individual rather than the collective. This means that the process of individualization can strike again in, for instance, newly developed residential buildings and neighbourhoods. This resulted in the following research question:

Is it possible for an architectural design to counter the negative effects implicated with the individualization and improve the social cohesion within a residential building?

Furthermore, the current research tries to answer the following sub questions:

What is social cohesion?

What is the status of social cohesion in the Netherlands?

How are people affected by alienation?

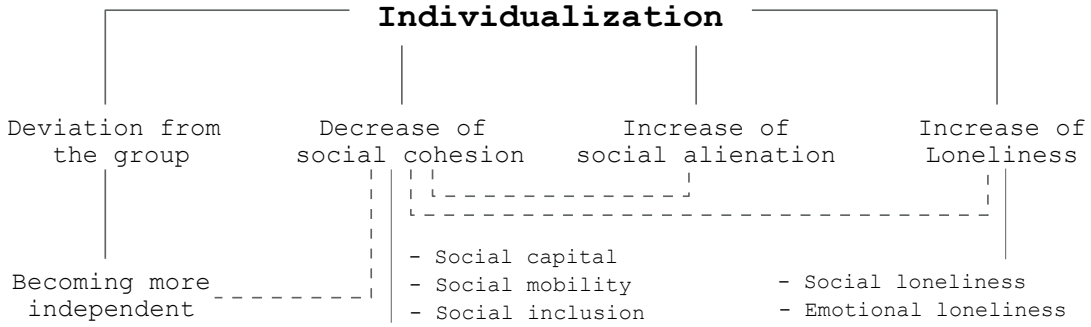
How is alienation experienced in the Netherlands?

What is loneliness?

How is loneliness experienced in the Netherlands?

How can architectural design stimulate interaction between neighbours?

The current research is not only applicable for the design location, Merwe vierhavens, not even only for the city of Rotterdam but can be used in other big cities that feel the negative effects of individualization.



Individualization

Individualization[2] is the process in which an individual becomes independent from a group within society. The current process of individualization finds it origin in the industrialization during the 20th century. This in combination with the democratization movement in the '60s caused an increase in the welfare of certain groups and resulted in a decrease of interdependency of, for instance, the working class and women's rights movement (Wikipedia, 2018). Thus, people started to see that what is considered 'normal' is not necessarily the best way to do something. This development resulted in less control of the group, more individual exploration (Wikipedia, 2018), and freedom of choice (CBS, 2017). More specifically, people started to deviate from social groups such as their family, the church, or village, and became more and more independent. However, the opinions about the process of individualization are divided. It does not solely have positive effects but also brings forth several negative effects such as: a decrease of social cohesion (Putnam, 2000), an increase of societal alienation (Akkermans et al., 2020), and an increase of feelings of loneliness (Van Tilburg & de Jong-Gierveld, 2007).

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[2] Individualization is not the same as individualism, the way in which the rights of the individual are placed above the interest of the group.

Social Cohesion

Social cohesion refers to the cohesion between members of a society (Putnam, 2000). It is about the way the society functions on a social- and task relationship level, on perceived unity, and emotions such as solidarity and feeling at home (CBS, 2020c; Putnam, 2000; Qwe, n.d.). Levels of social cohesion do not only determine the way in which people interact but also have a big influence on people's health. Robert Putnam (2000) discovered that societies with high levels of social cohesion are healthier because the social network functions as a safety net and as a result reduces psychological and physical stress and reinforces healthy norms.

Social cohesion consists of three elements, social capital, social mobility, and social inclusion:

- Social capital, the first and main component, is the total amount of 'tools' available to individuals within a community. It shapes the organization of social relationships, group memberships, social networks, shared norms, trust, reciprocity, and community commitment within a group or society. Moreover, it facilitates the coordination and cooperation for mutual benefits (Putnam, 2000; Putnam, 2001).

- Social mobility is the degree to which people go through life-changes (OECD, 2012). When social mobility is high people experience a high amount of life changes which decreases the likelihood of their connection to their neighbourhood. Thus, social immobility leads to more neighbourhood connection (Dempsey et al., 2009).

- Social inclusion is the degree to which people feel a sense of belonging to the group. These feelings of belonging are derived from anything on which people feel a similarity, from shared demographic variables to shared world views (Dempsey, 2008).

Social cohesion in the Netherlands

The rise of individualization and multiculturalism in the 20th century has put pressure on social cohesion in Europe (Putnam, 2000) and the Netherlands (Wikipedia, 2020). The pressure on social cohesion is mainly observed in a decline of social cohesion in the bigger cities, such as Amsterdam, The Hague, Utrecht and Rotterdam, since the 1980s. The Dutch Central Bureau for Statistics (CBS) has been analyzing the feelings of social cohesion amongst Dutch citizens since 2012. A recently published research showed that the feelings of social cohesion are overall medium and are lowest in the more densely populated provinces and cities. Furthermore, this study showed that people in South-Holland and Rotterdam have the lowest feelings of social cohesion, see Table 1. The item scores and total social cohesion score have not improved since the first measurement in 2012 (Akkermans et al., 2020; CBS, 2020b).

	Nederland	Zuid-holland	Rotterdam
People hardly know each other	24,8	28,2	37,4
People get along well	71,6	67,2	57,5
Cozy neighborhood with a lot of togetherness	44,8	39,6	32,3
Feel at home with people in this neighborhood	67,9	57,6	49,8
Lots of contact with other local residents	61,5	33,6	29,4
Satisfied with population composition	36,6	64,3	55,2
Total score	6,3	6	5,5

Table 1. Percentage scores on the items and total score of social cohesion among Dutch citizens (CBS, 2020b)

Social alienation within a neighbourhood

"We no longer know who our neighbours are" (Akkermans et al., 2019). This statement was made by the researchers of the CBS in 2019 after analyzing the quality and quantity of social interactions amongst Dutch citizens. People are overall happy with the amount and intensity of contact with friends and family. However, the social interaction between neighbours is lacking in the desired frequency and strength (Akkermans et al., 2019; CBS, 2019). The analysis in the social cohesion research showed similar results. Moreover, the more densely populated areas are also the areas with the least amount of social interaction amongst neighbours (Akkermans et al., 2020; CBS, 2020b). In extreme cases the lack of social contacts results in social loneliness and isolation (CBS, 2017; Van Tilburg & de Jong-Gierveld, 2007). Our current way of building design focuses on privacy, comfort and the individual rather than the collective, which means that alienation, resulting in social loneliness and isolation, is lurking.

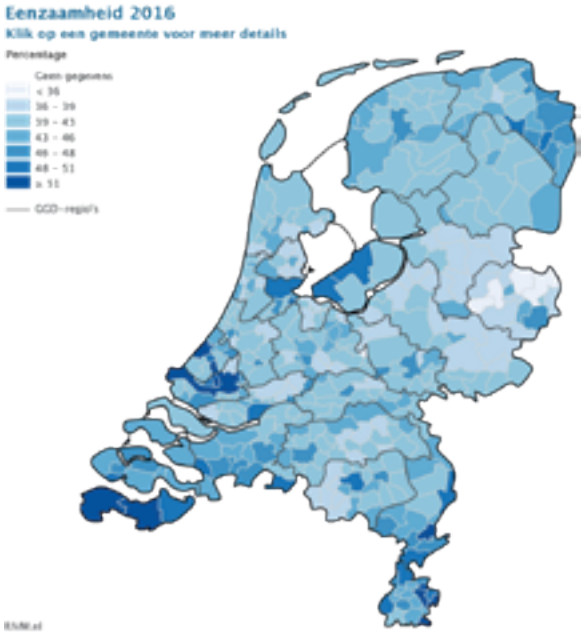
Loneliness

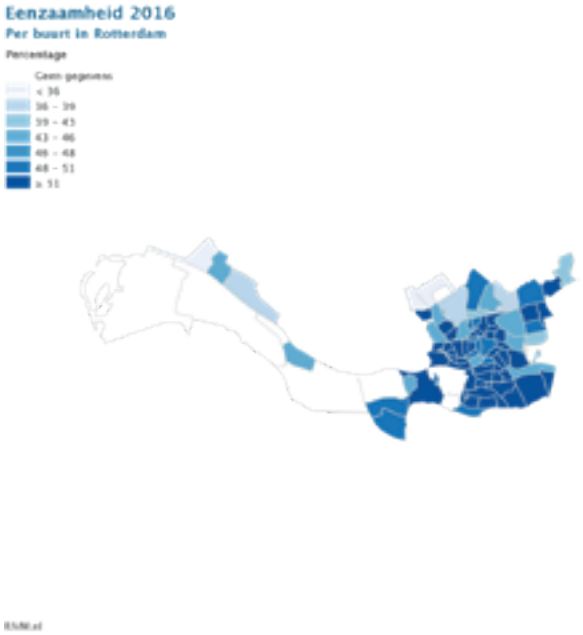
Loneliness is a subjective feeling of missing certain social relationships. It may either be that the number of contacts is less than desired or that the quality of the existing relationships is lagging in desired intensity (Van Tilburg & de Jong-Gierveld, 2007). Feelings of loneliness become problematic when they are strong and experienced over a long period of time (Ministerie van Volksgezondheid, Welzijn en Sport, 2019b). Feelings of loneliness have several negative effects on both physical and psychological health such as health risks, threats to quality of life, less participation in society which can result in societal withdraw, and high risk of premature death (Ministerie van Volksgezondheid, Welzijn en Sport, 2019b). Loneliness can be divided into two types: emotional loneliness and social loneliness. Emotional loneliness is the feeling of a lack of an intimate relationship with a partner or friend. Social loneliness is the feeling of missing a meaningful relationship with a wider group of people, such as neighbours. Unfortunately, one cannot replace the other (Van Tilburg & de Jong-Gierveld, 2007).

Creating more contact with others is not enough to reduce the feeling of loneliness. It is more about maintaining meaningful and valuable relationships. A number of people, four or five, with whom someone has good contact provides sufficient protection against the negative health effects caused by loneliness (Stevens & Westerhof, 2006; Van Tilburg & de Jong-Gierveld, 2007).

Loneliness in the Netherlands

A research by the Dutch National Institute for Health and Environment (2016) into the health of the Dutch citizens showed that about 44% experiences feelings of loneliness on a daily basis. These numbers go up when looking at the bigger cities such as Amsterdam (49%), the Hague (53%), and Rotterdam (52%). Emotional loneliness is experienced by 32% and social loneliness by 44%. Again, in the bigger cities such as Rotterdam these numbers are higher, with 39% of emotional- and 51% of social loneliness. The feelings are also stronger for small households (CBS, 2020a).





(Rijksinsituut voor Volksgezondheid en Milieu, 2016)

Stimulating interaction between neighbours through architecture

There are roughly four types of encounter: visual, acoustic, physical and digital[3]. These forms can happen either active or passive. Active encounters types are previously planned encounters. The built environment can not directly influence the encounter forms since they are previously fixed (Gehl, 2011). However, architecture can accommodate the planned encounter by facilitating in the needs of the residents in common areas such as laundry rooms, workspaces, etc. Passive encounter forms happen when we are around, hear, or see another person but do not actively engage with social interaction. It is possible for architectural designs to actively influence the passive encounters of residents (Gehl, 2011). Architect Jan Gehl (2011) researched the ways in which architectural design is influential in creating positive passive encounter experiences. He found that a 'well-designed' environment stimulates the unplanned encounter and is better in facilitating these moments as compared to an unattractive environment. Moreover, an area that consists of high quality does not only facilitate in creating interactions between passersby, but can also evolve into a space where a wider range of activities can take place because they invite people to stop, sit, eat, and play.

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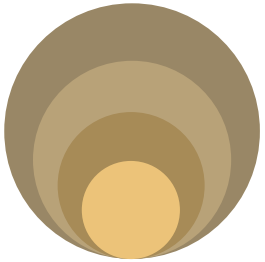
[3] It is not possible to influence digital encounter forms through architectural design.

Whether a passive encounter results into social interaction is not only influenced by the attractiveness of a space but is also influenced by one's chance to avoid a conversation (Evans et al., 1996; van Stiphout & de Vries, 2006). Especially in big cities, the feelings of crowding can cause social withdrawal resulting in less social cohesion amongst neighbours. Research into feelings of crowding showed the importance of being able to walk away from a conversation into a private space. The ability to avoid conversations gives the feeling of being in control of one's environment and regulate social interaction (Evans et al., 1996).

So, to stimulate social interactions between neighbours the public spaces should be designed in a way that is aesthetically appealing and at the same time should leave room to avoid or retract oneself from the interaction. A way to ensure that people can retract oneself from interactions with others in a residential building can be done via a continuous circulation. This can at, the same time, increase unplanned or new encounters since more dwellings make use of different access areas. However, when to many people make use of an access area feelings of identity and control disappear amongst the users. This can result in a loss of feelings of ownership which can result in pollution (Montgomery, 2015).

Dunbar's number

In order to design a residential building that connects its residents, it is important to understand the social ties that humans can maintain. Robin Dunbar (1993), an evolutionary psychologist, researched the levels of social contact and found that humans can maintain relationships with approximately 150 people at the same time. These people are divided over 4 levels with different intimacy amounts. This means that designing a building that exceeds the 150 threshold can cause people to deviate from the group because it is not possible to maintain a relationship with this many people.



150 People with whom we can maintain a meaningful relationship

50 Friends

15 Good friends

5 Intimate relations

Chapter 02

- Target Audience

Target groups on the housing market are more complex than one might think at first. That is why my teachers tried to challenge me to think differently about target groups. The term target group was, so to speak, removed from my vocabulary and I was forced to think differently about the task at hand.

Living and the appropriate dwellings are too diverse to base it on simple “target groups”. Nevertheless, the living needs of people are often uniform, that is to say that both a starter a family or an empty nester all have the same living needs such as: a bathroom, a living room, a bedroom, and a kitchen. However, the proportions in which these occur does say something about the composition of the household. Just like the accessibility and whether the house is on the ground floor, this can tell you something about the age of the resident(s). Furthermore, the size of the house can tell you something about the financial possibilities of the resident(s).

Target groups in the housing market have always been a vague concept, to me. It is not surprising that there is no agreement about the different target groups. You could make a list of terms that are commonly used: students, starters, families, empty nesters, etc. but what does this really tell you? Take for example “starters”, whom we all know, but what is the definition?

Someone who is going to buy or rent their own home for the first time. That does not yet provide insight into the composition of the household or the financial possibilities. That is why I made a new classification for myself where I categorize in order to gain a better understanding of the people I design for. For the sake of clarity, I still use terms such as starters, empty nesters and families. I define these terms as follows:

Small households such as starters and empty nesters. Households consisting of 1 or 2 persons from the age of 18 without children with a middle to low income.

Medium-sized households such as families up to and including 4 people (no distinction is made based on the composition of the family): Households consisting of 1 or 2 persons and 1 or 2 children with a middle to high income.

One of the guidelines from the studio is to design for an urban area with a collective and inclusive living environment. In my opinion, therefore, a residential building should not have monotonous floor plans. This is because the needs within a target group can vary, let alone when several target groups have to be considered. By designing for different target groups and different

needs, there will be a better reflection of society. This contributes to an inclusive and collective residential building.

Research into the housing market demand in Rotterdam mainly resulted in a target group specification of small households. The demand for housing in a city is greater among small households because the city can better facilitate them in the needs of activity and liveliness. Starters like to live close to their work and recreational opportunities. They are more focused on a good distribution of work and leisure time than before and therefore attach great importance to both job opportunities and recreational opportunities in their hometown (Gemeente Rotterdam, 2017).

Nine out of ten times empty nesters still live in single-family homes, because current regular housing does not meet their needs. As a result, they occupy homes for which the demand is high among young families (Bouwfonds property development, 2018). Empty nesters often want to move to the more urban areas, but only when they can take a surprising new step. They specifically would like to live in spacious and single-story dwellings in or near the city because this can provide them with all sorts of activity and facilities (Duobo, n.d.). When this group can settle in and around the city again,

the single-family homes will become available for small families. This can, in part, resolve the flow through on the current housing market.

The housing market research indicates that families are moving out of the city. The question is whether families do this because they do not want to live in an urban environment or for financial reasons. A major problem on the housing market is investors who are driving up housing prices enormously, causing families, among others, to leave the city because they cannot buy or rent anything. In addition, families would like private outdoor space which is often not available in the city. Yet families are very important for social cohesion in a city and street. Families are more often at home and form a connection between different generations.

The research into the negative effects of individualization within society does not show a strong effect on a specific group, but how it is experienced by society on a wider level. However, it showed that small households are more likely to experience feelings of loneliness because they lack a social network of family, friends or neighbours (CBS, 2020a). Robert Putnam also writes about this in his book Bowling alone (2000) and attributes this development to the decrease in civic engagement.

Both being married and having children would contribute to an increase in time shared with a community or social network. Small households, such as starters, often miss this connection because they are at the beginning of this development. Empty nesters also often feel a strong lack of social contact because the children have left home, also known as the empty nest syndrome (Raup & Myers, 1989). Small households are therefore more susceptible to the negative consequences of individualization because the membership to social networks such as family, church, and village has started to play a smaller role within society.

The research into social cohesion showed that children can be a connector in social cohesion, which is why I made the choice to design a multi-generation residential block focusing on small- and medium-sized households. In this way I answer the question from market and the social cohesion research and guarantee the relevance of the design.

Chapter 03

- Makers

Makers industry

The Municipality of Rotterdam and the Port of Rotterdam Authority want to develop the M4H core area into a mix of makers industry, housing, catering, and other urban functions. This mix increases support for facilities, making the area attractive to entrepreneurs, residents, and visitors alike. An energetic atmosphere is created that strengthens the innovation climate. Through this climate it is possible to benefit the more vulnerable groups in the city, for example by creating employment in support services (Gemeente Rotterdam, 2017).

M4H objectives:

Strengthening the innovation ecosystem

The Makers District focuses on the requirements and preferences of the innovative makers industry, which needs large and small production halls, shared facilities, test facilities and experimental rooms. It thus provides a direct reinforcement for the innovation ecosystem in the region.

Mixed environment with small-scale manufacturing industry

The Keilehaven, with the characteristic buildings such as the Katoenveem and the Kunst & Complex, form a good basis for a mixed environment with a small-scale manufacturing industry.

Retaining existing makers

For example, the Keilecollectief and the vegetable gardens

Attracting companies in different growth phases

The focus will be on start-ups, scale-ups. There will be less space for large-scale grown-ups as they require more customization and can oppress small businesses. A balanced environment can offer opportunities for everyone to share experiences and knowledge in order to grow.

Collaborated with educational and knowledge institutions

Collaboration with students brings liveliness, talent, energy, and ideas which forms valuable work potential. A collaboration with the RDM Rotterdam knowledge campus which is located on the other side of the river, the Maas, is desired.

Examples of makers

- Small-scale food production: city brewery, bakery, coffee bean roaster, and catering companies.

- Small-scale & Technical industry: small-scale workshops, interior builders, and (repair) workshops.

- Public Workspaces & Home Working: designers, industrial designers, and architectural firms.

Chapter 04

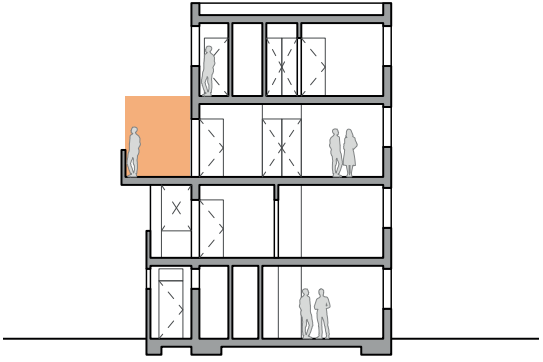
- Case Studies

(Justus van Effencomplex, n.d.)

Robin Hood Gardens (Nicholas, n.d.)

(Narkomfin, 2017)

8 House (Fleming, n.d.)

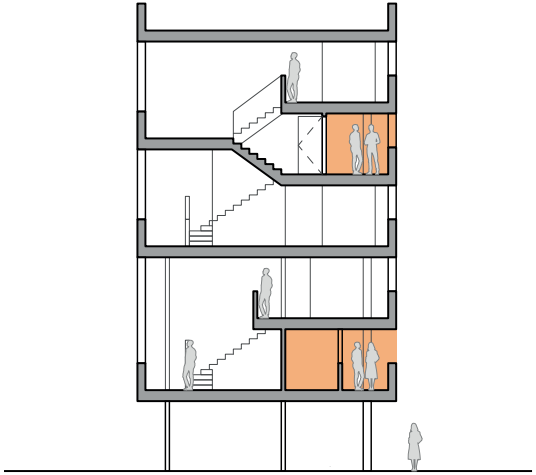


Justus van Effen Complex - 1922
Michiel Brinkman

Justus van Effen complex is a symbiosis between the individual and the collective, between the terraced-housing typology and the closed-block with communal courtyard typology.

Brinkman appreciated the sense of community but was unwilling to ignore individualism. He incorporated different degrees of transition between public and private.

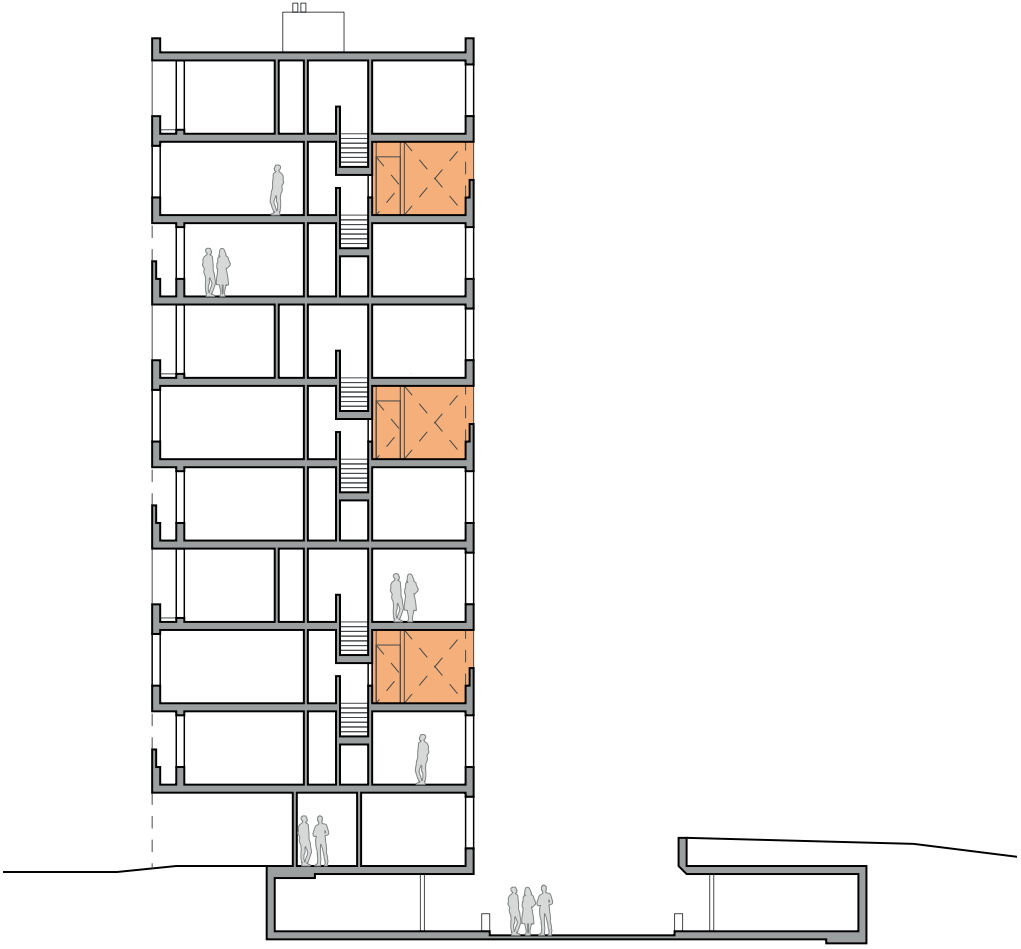
The ground floor and first floor are accessed from the courtyard, and the second floor from a deck that runs along the length of the entire complex and acts as an elevated street.



Narkomfin - 1932
Moisei Gizburg - Ignaty Milinis

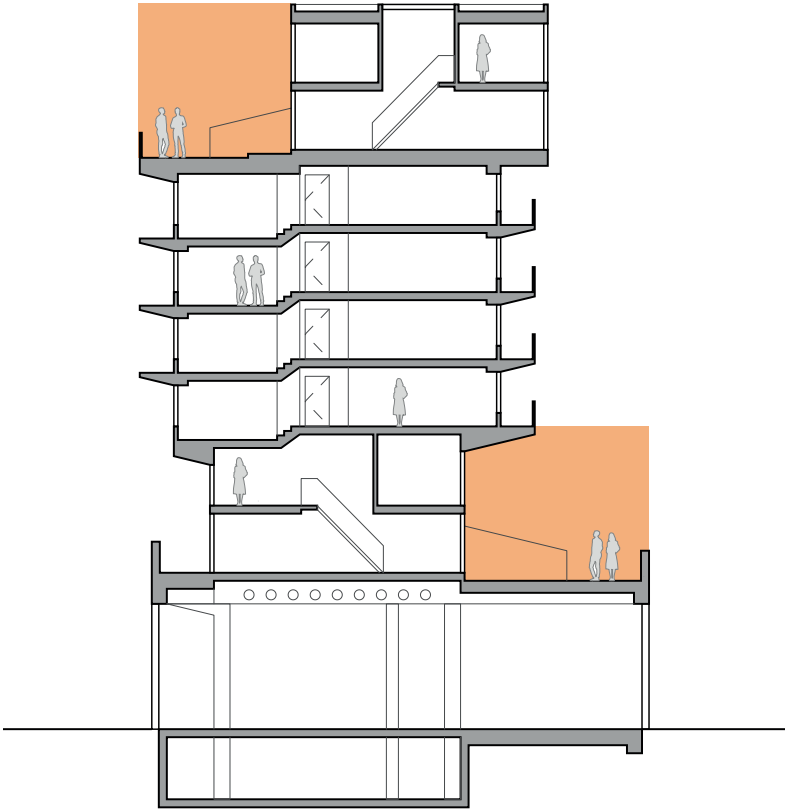
Narkomfin consists of apartments, spacious entrances, corridors, and a communal terrace on the roof. The building has five floors that are accessible from two corridors, on the second and fourth floors. This has been solved by making innovative use of a split level. In the cross-section, each apartment forms an L and fit together so that the central void is the gallery.

Ginzburg like Brinkman had a clear vision on how architecture could play an active role in embracing communal life. To achieve this goal, all housing units in Narkomfin are directed outwards to society. Most of the daily functions were also moved to communal areas in order to create a connection.



Robin Hood Gardens – 1972
Alison & Peter Smithson

Robin Hood Gardens consists of two buildings and is located in an industrial harbour area. The buildings enclose a central space with communal garden. The Smithson's primary aim was to protect the residential complex from the presence of urban infrastructure. The communal garden is only accessible on foot via passages. The interiors of the apartments are organized in a way that the living rooms face the street and the bedrooms and kitchens overlook the quiet inner garden. This was not only done to create a peaceful environment, but also so that parents could see their children playing in the communal garden. The heavy vertical concrete ribs along the facade function as sound breakers. The two meter wide galleries sit along the edge of the building, acting as elevated 'streets in the air'.



8 House - 2010
Bjarke Ingels Group

8 House takes its name from the shape of the design as it was designed as figure 8. It has two courtyards, connected with a passage of 9 meters wide, and consists of 11 floors with a sloping green roof down to the corner which opens the up building towards to the canal. It is a mixed-use building with most of the building's base for commercial program.

Instead of a traditional courtyard typology, the 8 House stacks all the ingredients of a lively city in vertical mixture of typologies. The floors are connected by a continuous gallery with small gardens and a bicycle path to the 10th floor. This creates a three-dimensional city district that encourages spontaneous encounters.

Shared Conclusion

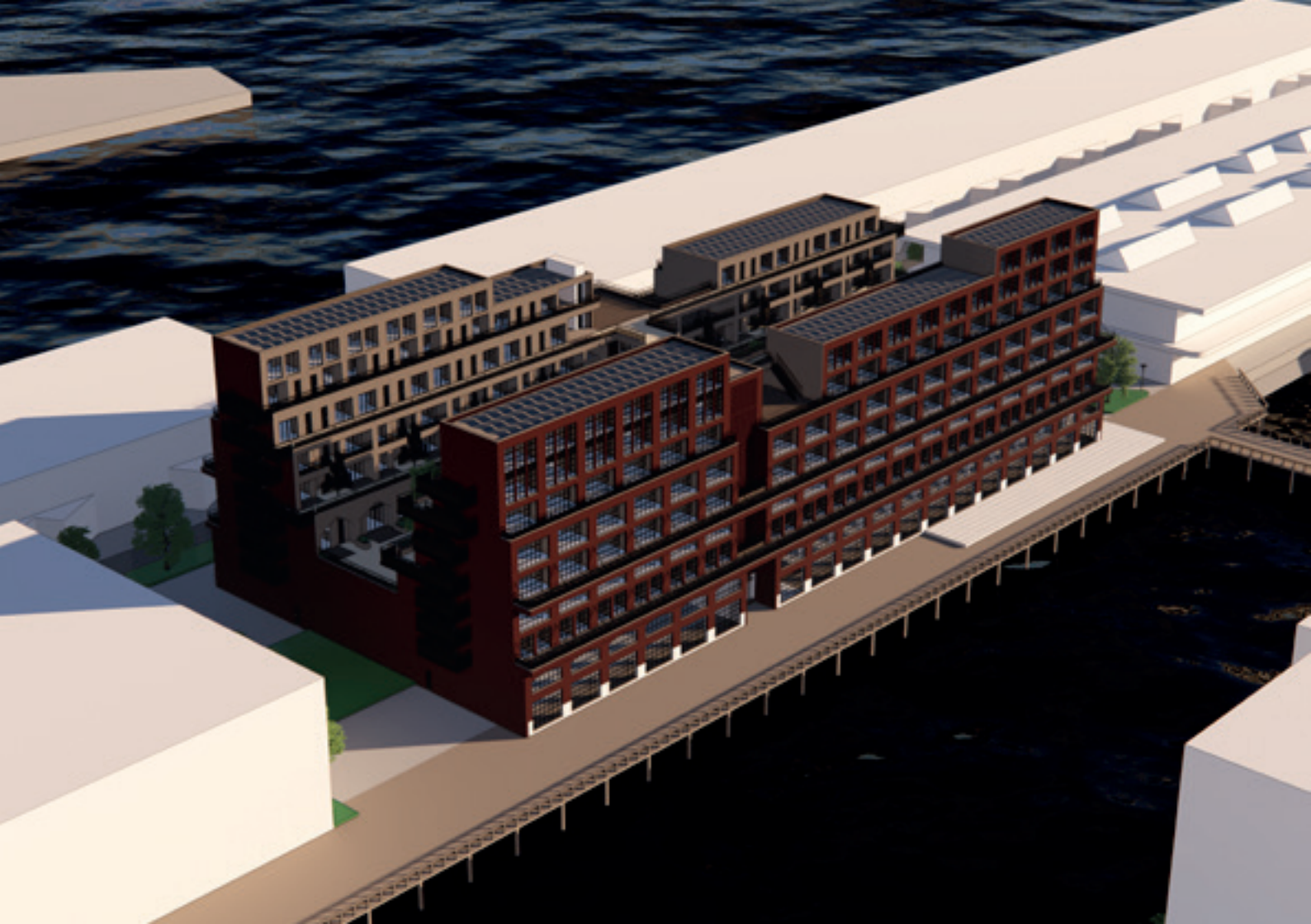
Accessibility: The elevated street in both Justus van Effen and 8 House, is an architectural element which is clearly visible in the section. The facade has been set back from the elevated street to prevent it from taking too much daylight away from the floor below. In Narkomfin and Robin Hood Gardens, the street is built into the facade and enclosed on three sides.

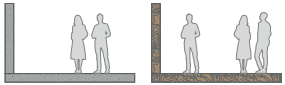
Routing: In the Justus van Effen Complex and the 8 House, the galleries follow the shape of the building, mainly on the inside of the block. In Narkomfin, the gallery is a straight line, and in Robin Hood Gardens, a line with two turning points that always run around the outer facades of the linear blocks.

All the case studies share the idea of connecting the people and dwellings via a 'street in the air', by studying these designs and combining it with my literature research I come to a understanding that by carefully using this accessibility type I can create a comfortable living environment inside the block and meanwhile increase the chance of unplanned meetings.

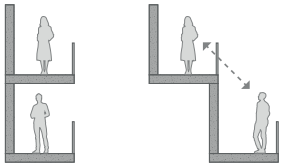
Chapter 05

- Design Hypotheses

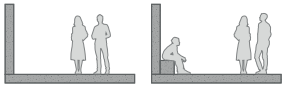




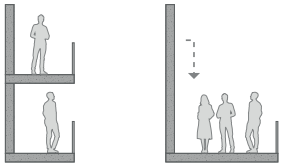
Materials & Colour



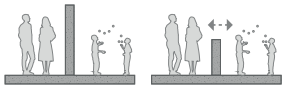
Visualy connecting the galleries



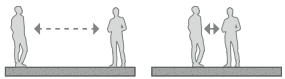
Integrated elements



Intensifying the corridor / gallery



View of liveliness / vibrancy

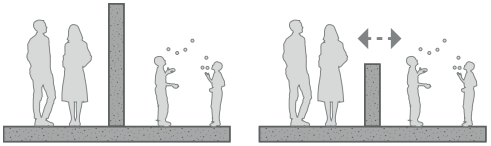


Distance from each other

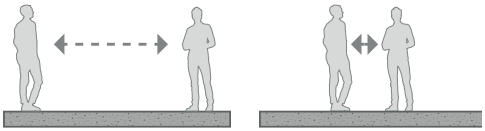
The research showed there is a need for social interaction amongst neighbours. I therefore continued my researched into ways of increasing social interaction through architecture via literature and case studies. The insights where translated into the following design hypotheses which are used in the final architectural design. The design hypotheses mainly shaped the inside of the building block. The goal is to implement the hypotheses to create a desirable inner atmosphere to improve the chance of the unplanned encounter and thus improve the social cohesion of the residents. This will hopefully create an environment where people know their neighbours and thus feel more connected, comfortable and safe.

View of liveliness: By making the galleries at the side of the common garden there will be a view of liveliness which increases the chance somebody will stay there for a longer period of time.

Distance from each other: People prefer a transition zone from public to private. This can be done within the space created by the extra wide galleries with the help of personal niches, those niches can also give a sense of identity. As a result of this the living rooms are situated at the inner side of the building.



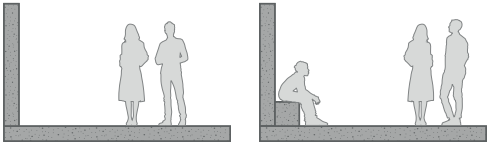
View of liveliness / vibrancy



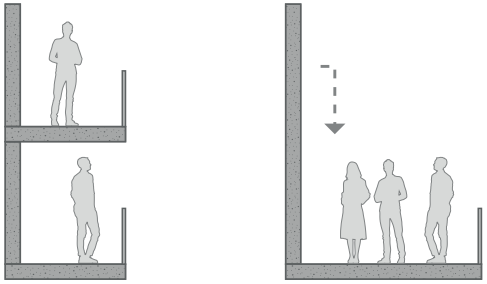
Distance from each other

Intensifying the gallery: By creating a 'street in the air', there will be a more comfortable environment and by connecting it to multiple floors and thus intensifying the use of the galleries it increases the chance of the unplanned encounter.

Materials and colour can influence the atmosphere of an environment, by using warm and soft materials in combination with integrated elements people are more likely to stay there for a longer period of time, again increasing the chance of the unplanned encounter.

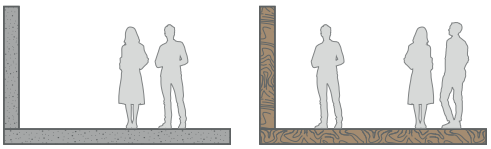


Integrated elements

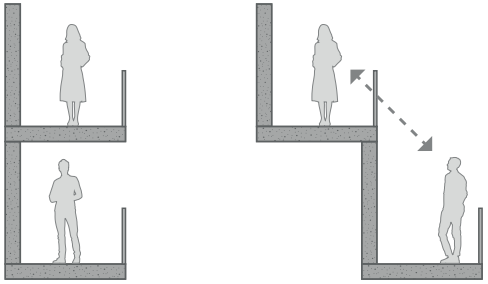


Intensifying the corridor / gallery

Visually and acoustically connecting the galleries: By shifting the galleries from stacked to cascading this effect can be amplified and people will have a better visual and acoustic connection to the floors below and above.



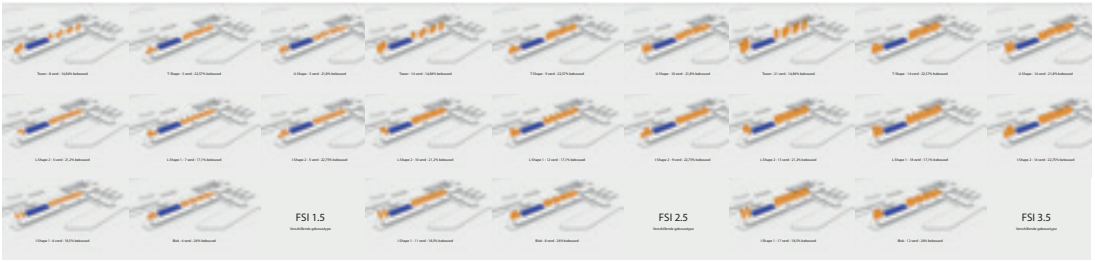
Materials & Colour



Visualy connecting the galleries

Chapter 06

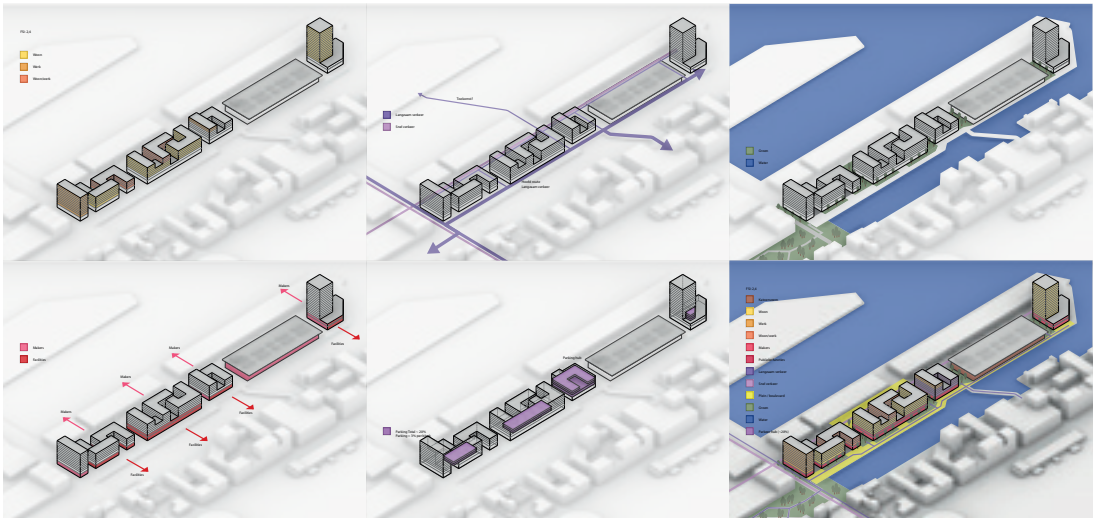
- Design location


FSI 1.5
FSI 2.5
FSI 3.5

Urban development plan

The master graduation consisted of a group part in which we had to develop an urban development plan for the design location. The municipality and the graduation studio provided us with some guidelines concerning the site M4H. For more information regarding the guidelines from the municipality see: RUIMTELIJK RAAMWERK MERWE-VIERHAVENS ROTTERDAM, TOEKOMST IN DE MAAK.

During the urban development process of quadrant C we mainly did mass studies and looked at the natural conditions. For the mass study I wrote an automated script that calculated the FSI for each situation.



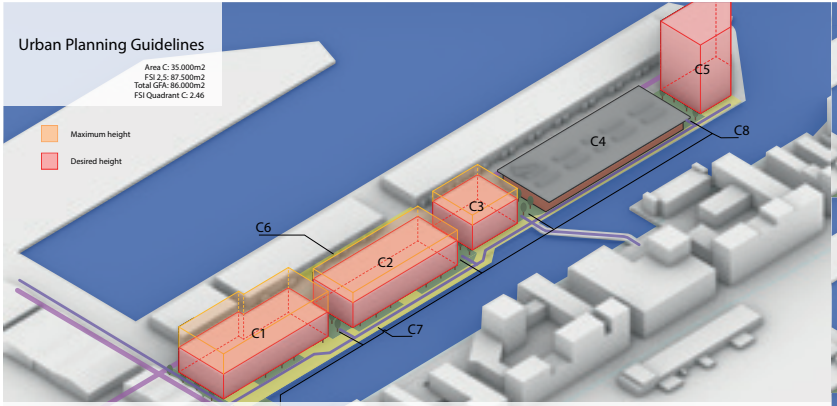
I was part of the group that was responsible for quadrant C. The current situation of quadrant C consists of 3 buildings, one of which is worth mentioning the Katoenveem, which is a national monument. The rhythm we have maintained for the new building comes from the dimensions of the Katoenveem. We aimed to use a garland of green to create an interesting walking route from the park to the head of the pier. We have added a boulevard that is only for pedestrians to connect the area to the water. To make the boulevard more appealing some of the buildings must have public functions on this sides.

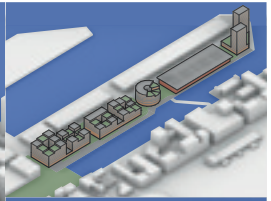
Urban Planning Guidelines

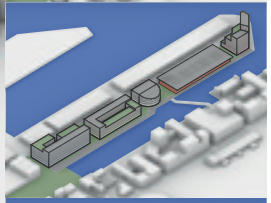
Area C: 35.000m2
FSI 2,5: 87.500m2
Total GFA: 86.000m2
FSI Quadrant C: 2.46

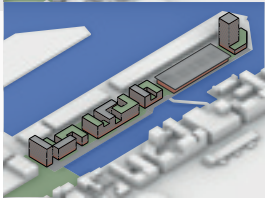
Maximum height

Desired height









C1 GFA: 24.000m2

Minimum 3% GFA for parking.
Desired height at 22 meters.
Maximum height at 40 meters.
Footprint of approx. 50m*100m.
Minimum of 6m ground floor; room for makers/facilities.

C2 GFA: 24.000m2

Minimum 3% GFA for parking.
Desired height of 22 meters.
Maximum height of 31 meters.
Footprint of about 50m*100m.
Make space for the square on the keilestraat.
Minimum of 6m ground floor; room for makers/facilities.

C3 GFA: 10.000m2

Minimum 20% of total GFA for parking, so C3=20%-C1-C2-C5.
Desired height of 22 meters.
Maximum height of 31 meters.
Footprint area of about 50m*50m.
Functions as a parking hub.
Minimum of 6m ground floor; room for makers/facilities.

C4 GFA: 13.000m2

Leave the Katoenveems monumental status intact as much as possible.

Provide space for the makers functions and exposition spaces. (foundation Droom en Daad)

C5 GFA: 15.000m2

Minimum 3% GFA for parking.
Base of 12 meters high.
Maximum height is 61 meters (will be a landmark).
Footprint area of about 50m*50m.
Minimum of 6m ground floor; room for makers/facilities.

C6

Square
Low traffic zone
Only temporal parking
Urban park atmosphere
Active facade ground floor (makers/industry).

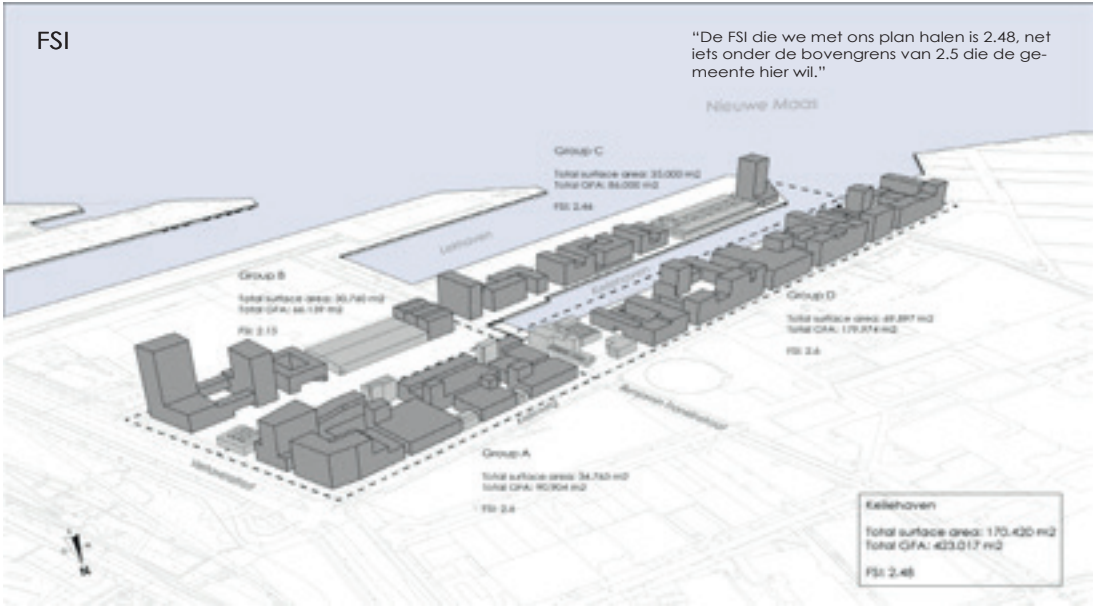
C7

Boulevard
Minimum width of 15m
Atmosphere: urban with facilities and terraces.
Active facade ground floor (facilities).
Slow moving traffic route.

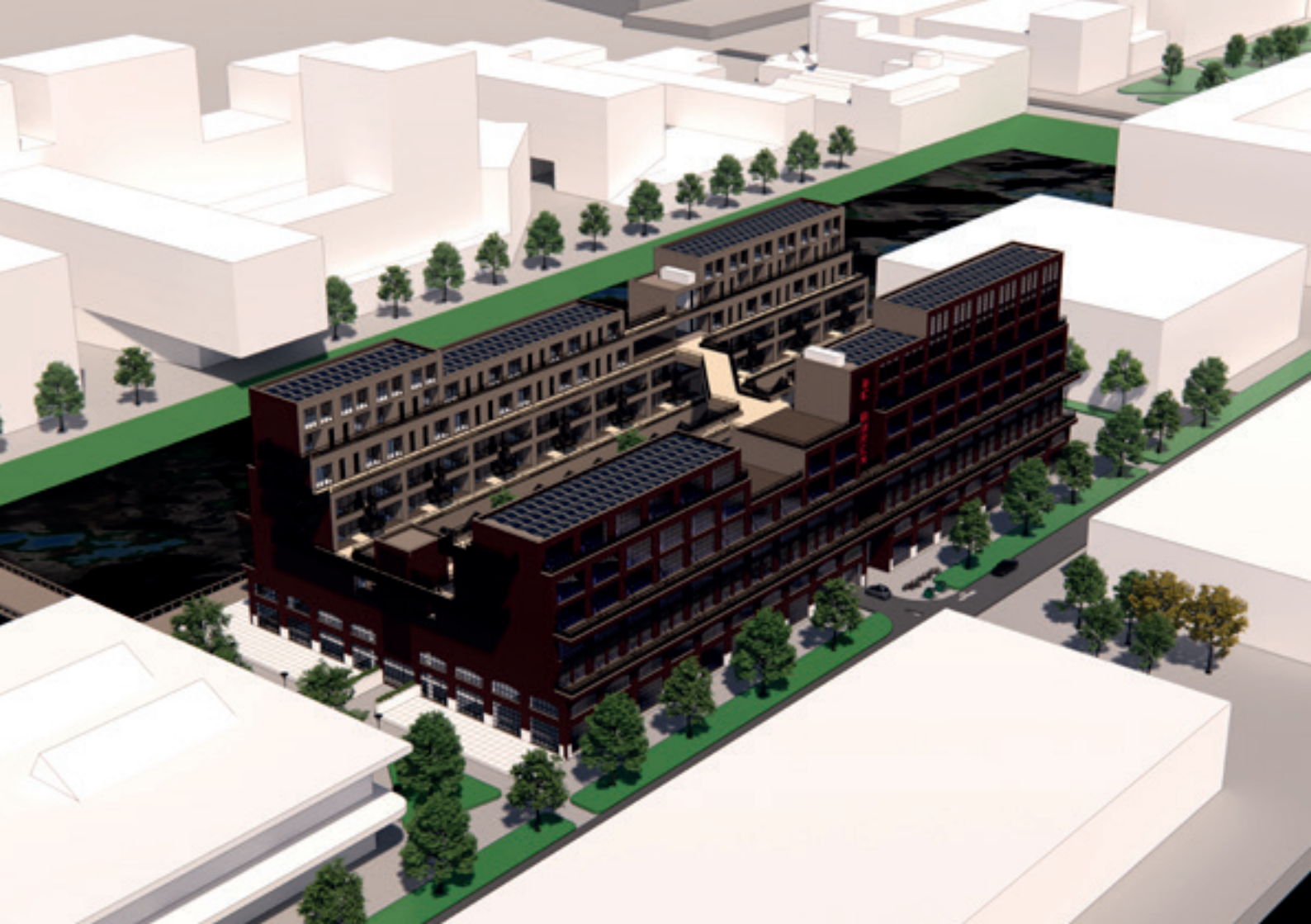
C8

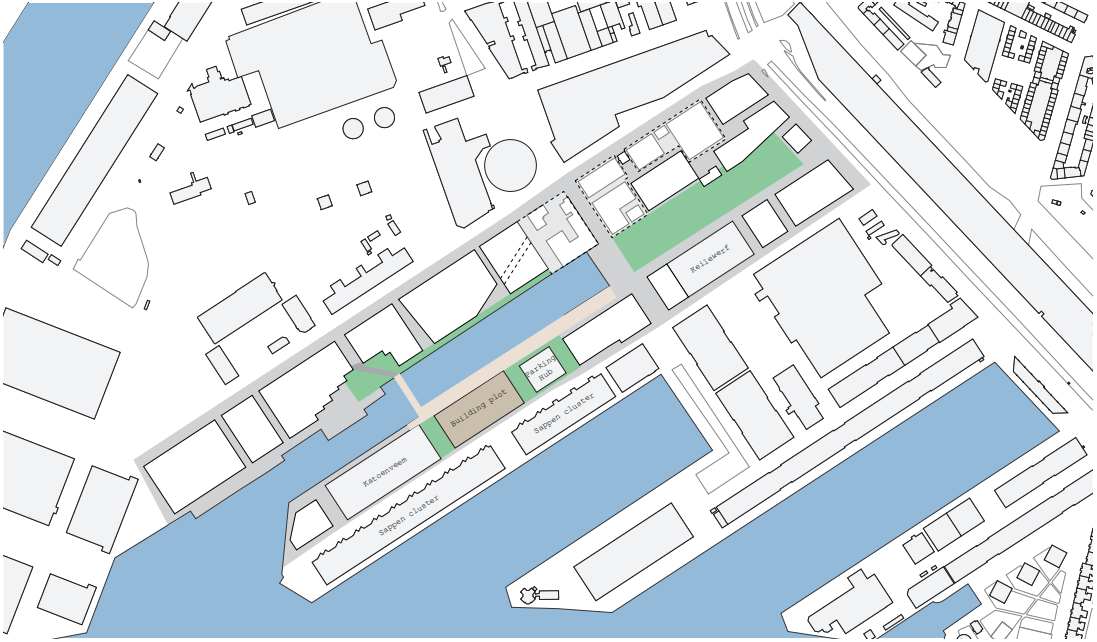
Intermediate space
Minimum width of 15m space between the buildings.
Atmosphere: Urban green with playgrounds.
Carfree

The 3 images on the right are possible elaborations of the plan to indicate that there is still sufficient architectural freedom and to spark the imagination. Our research led to the results you can see above. At the end of the pier is a high tower with a beautiful view over the Maas. The rest of the buildings have been built in height from Katoenveem to quadrant B. What has been decided later and has not yet been adapted in these illustrations is that buildings C2 and C3 have changed positions.



The sum of the quadrants can be seen above. The plan meets all the requirements that the municipality has set for this location.

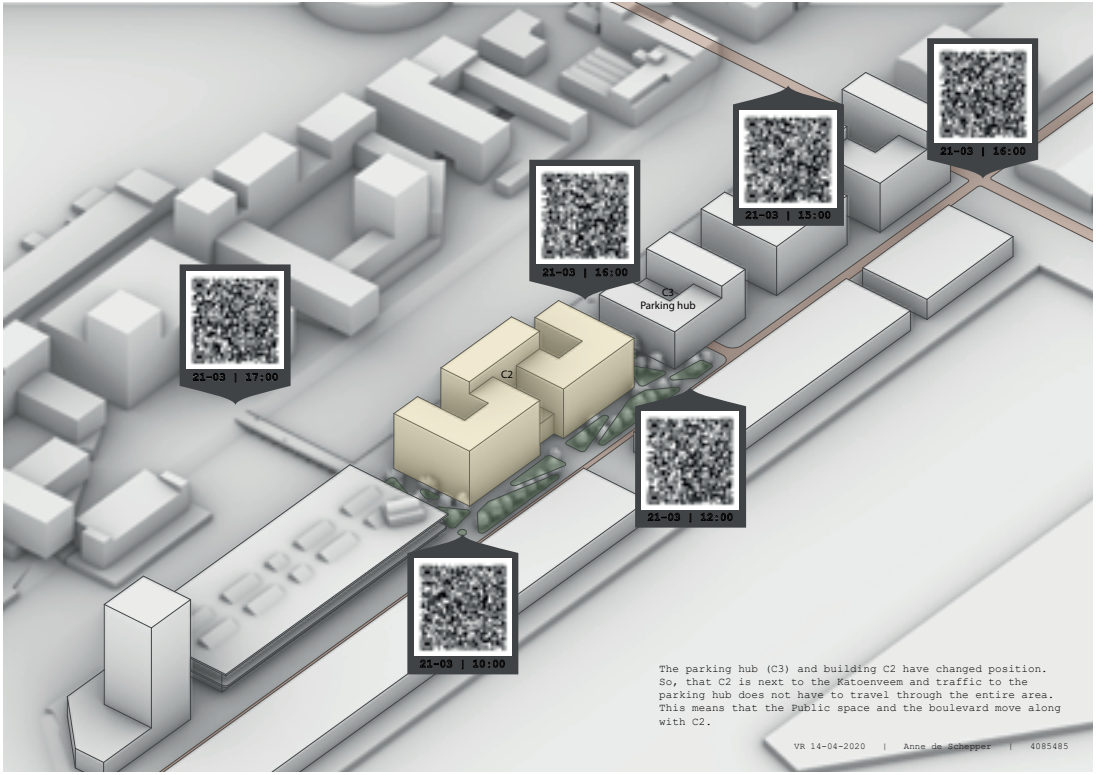




location overview

Building plot

The design location is Merwe vierhavens, in Rotterdam. The building plot for the current project is C2 and is located in center of the Keilehaven between the National monument, the Katoenveem, on the left and the parking-hub on the right. On the north-west side is the harbour mouth with a boulevard and on the other side of the building is the access from the street.



The parking hub (C3) and building C2 have changed position. So, that C2 is next to the Katoenveem and traffic to the parking hub does not have to travel through the entire area. This means that the Public space and the boulevard move along with C2.

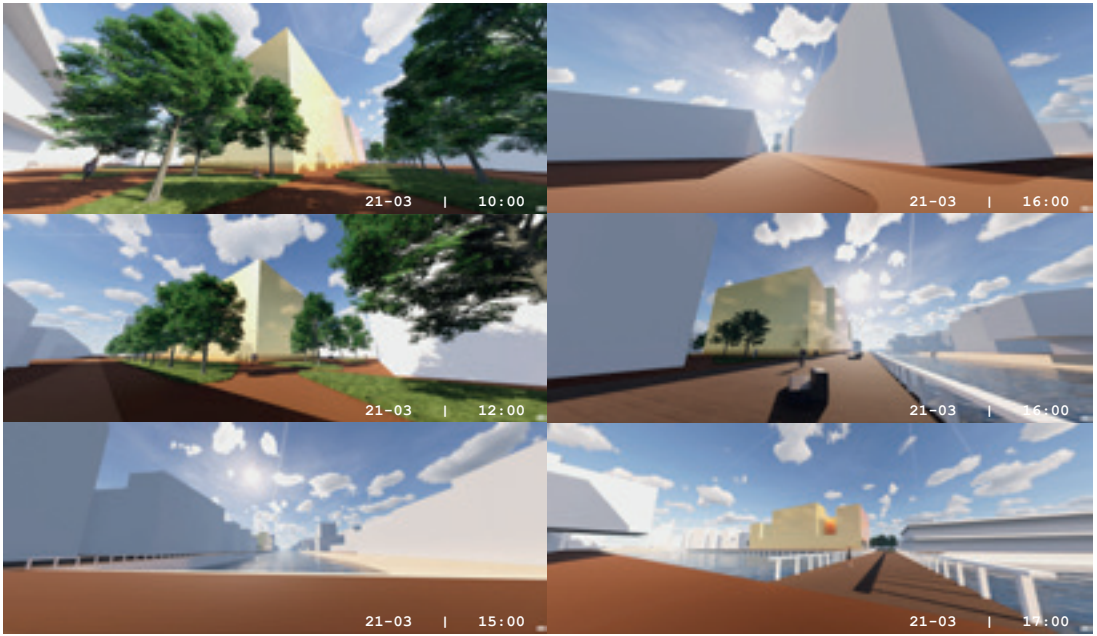
VR 14-04-2020 | Anne de Schepper | 4085485

Virtual Reality

The C2 building and parking-hub locations where initially switched in the urban development plan. By exchanging the position of the parking hub and building C2, traffic does not have to move across the entire site. As a result, the building C2 is connected via the bridge to the other location, which offers interesting possibilities. The makers industry can benefit of the future functions of the Katoenveem.

The morning sun illuminates the space between the buildings and the street side of area C. Likewise, the evening sun illuminates the space between the buildings. The sun exposure analysis showed that by opening the building block in the length, the afternoon sun also shines on the open space between the buildings.

By aligning the building on the waterfront with the Katoenveem, the building block distinguishes itself from the end of the harbour mouth. It also creates a nice open space at the other side of the building for a possible city park.

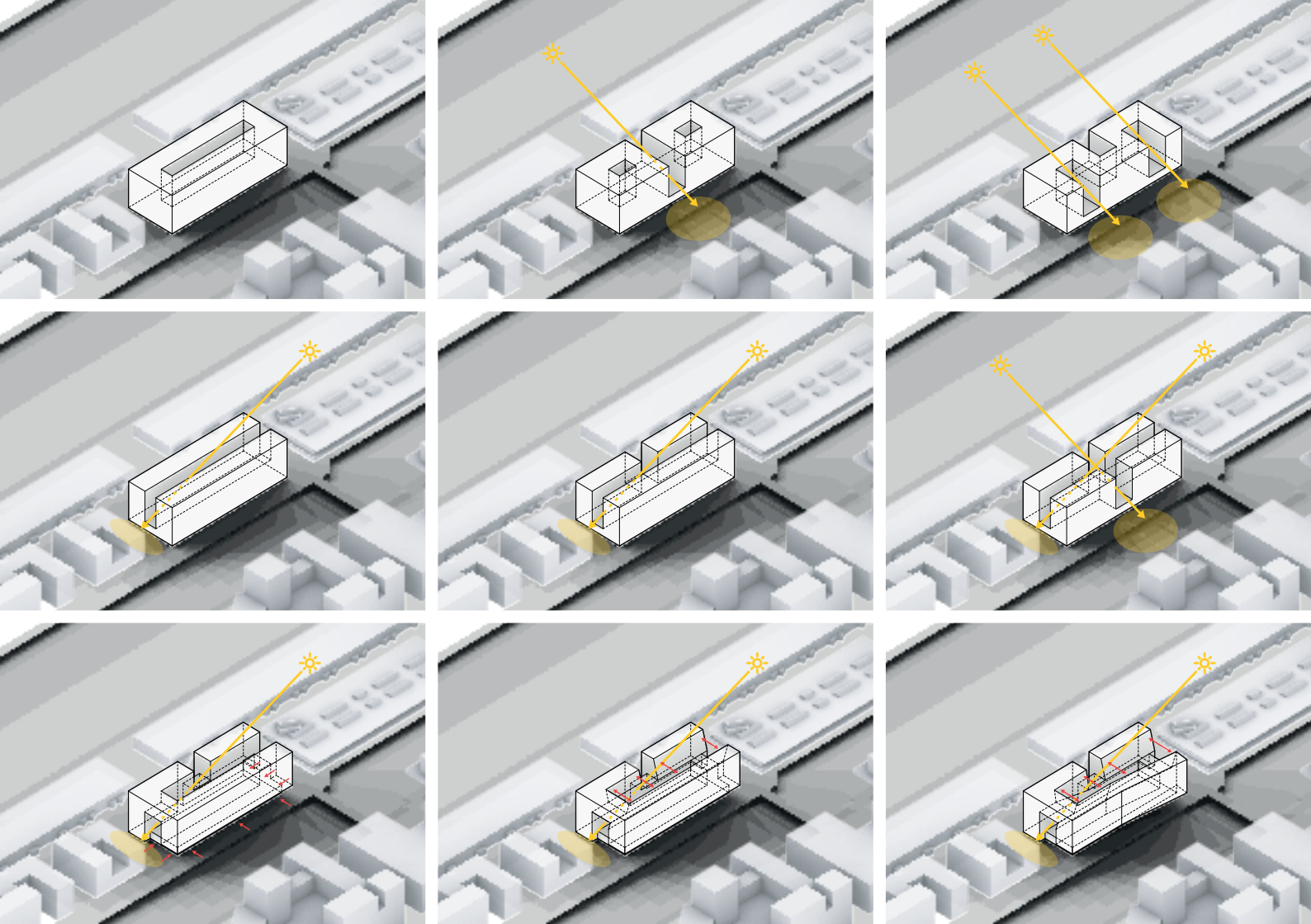

21-03 | 10:00
21-03 | 16:00
21-03 | 12:00
21-03 | 16:00
21-03 | 15:00
21-03 | 17:00

By pinching the building on the side of the Katoenveem it gives space to this national monument and is therefore more noticeable. To prevent the courtyard from becoming too narrow, the top of the building moves towards the water.

Chapter 07

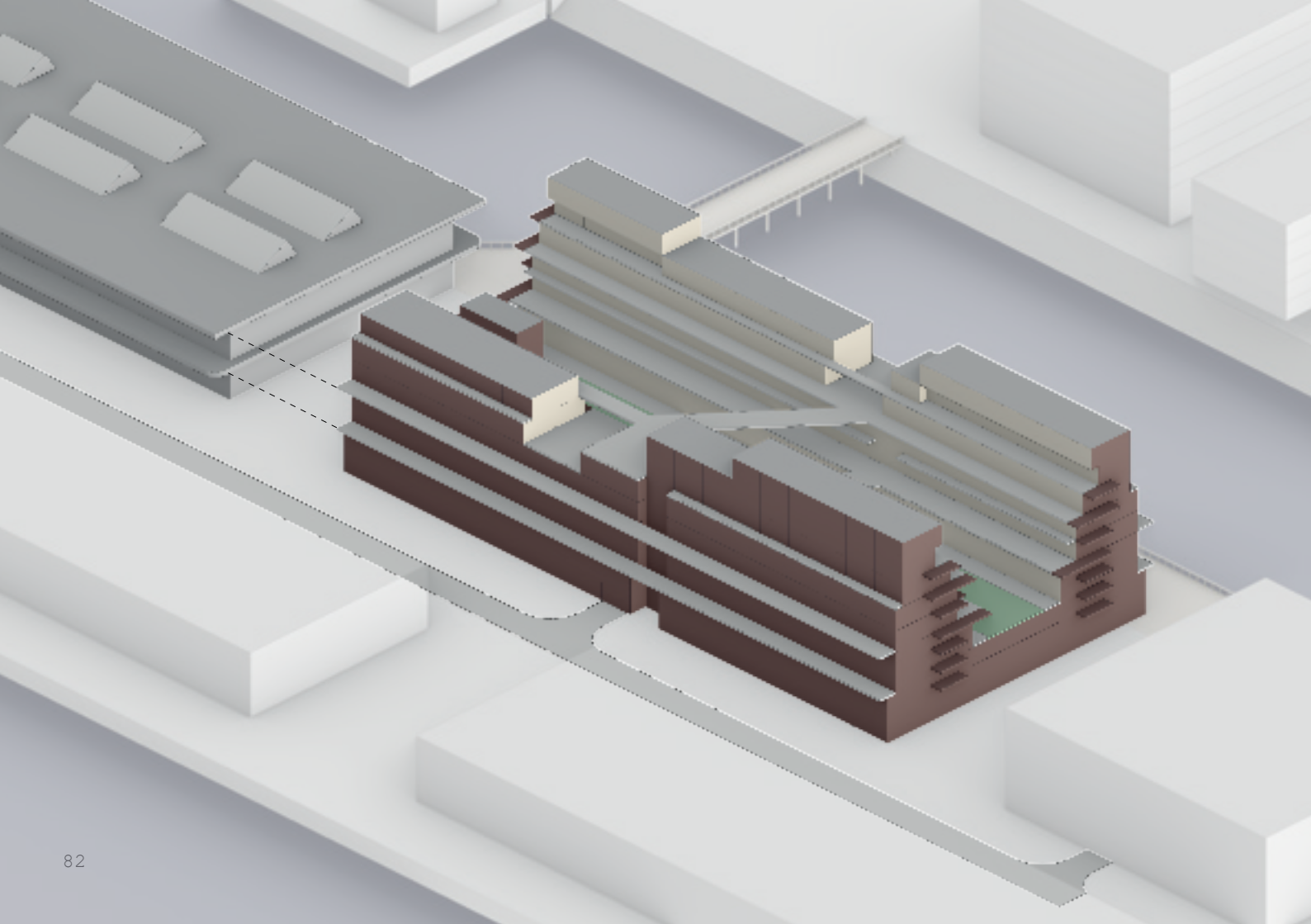
- Building design


DE BUREN



The building form is mainly derived from solar and sight line analyses.

By opening the building at both short ends, the afternoon sun shines through the block on to the open space between the buildings. Giving not only the building views over de Maas but improving the space around it.



Katoenveem alignment

The Katoenveem is a prominent building of the site and at the moment there are plans to renovate it for an art gallery. I tried to make an architectural connection between my design and the Katoenveem. The main connector are the balconies that are aligned with those of the Katoenveem.

Katoenveem (van den Berge, n.d.-a)

Katoenveem (van den Berge, n.d.-b)

West facade

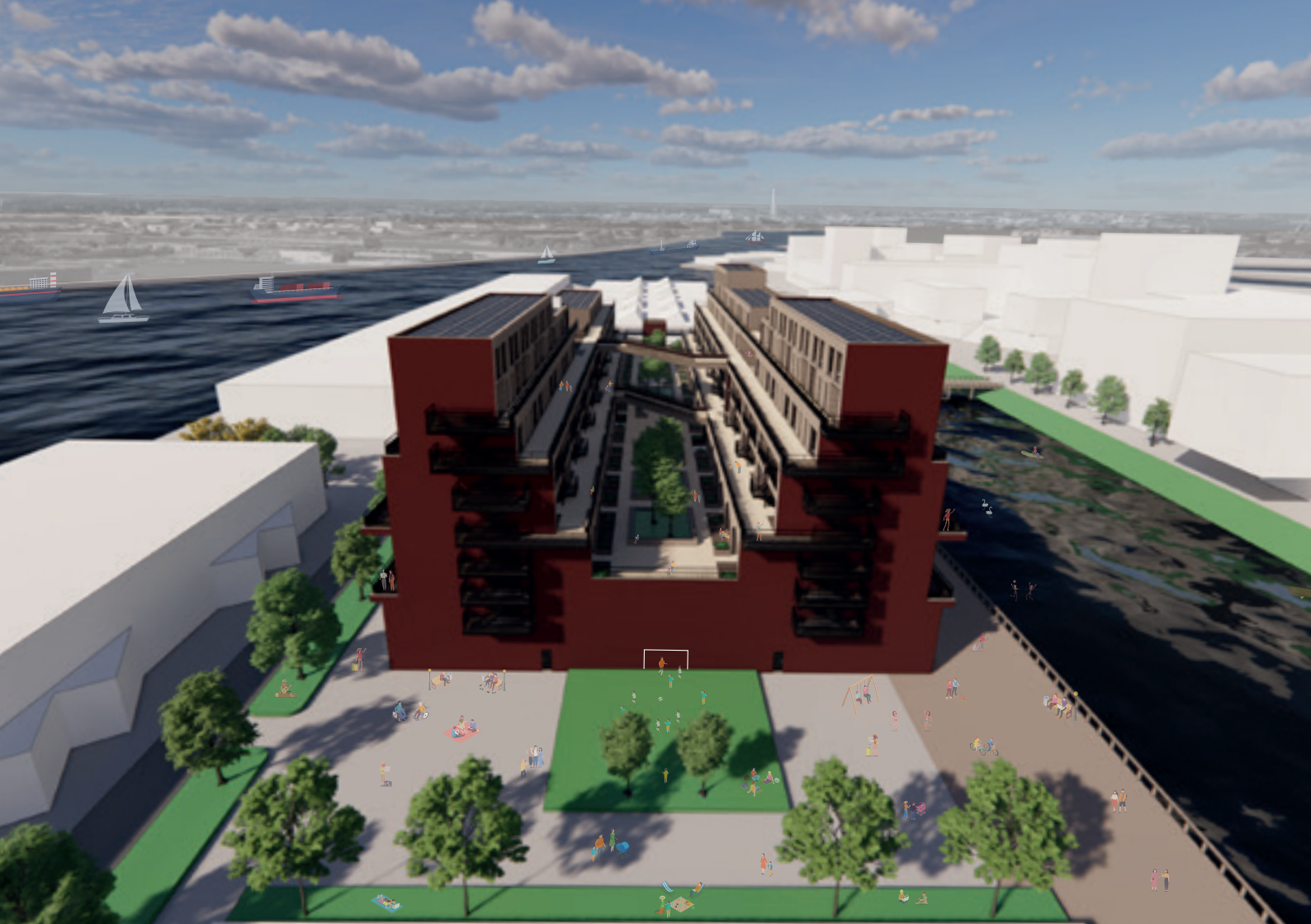
South facade

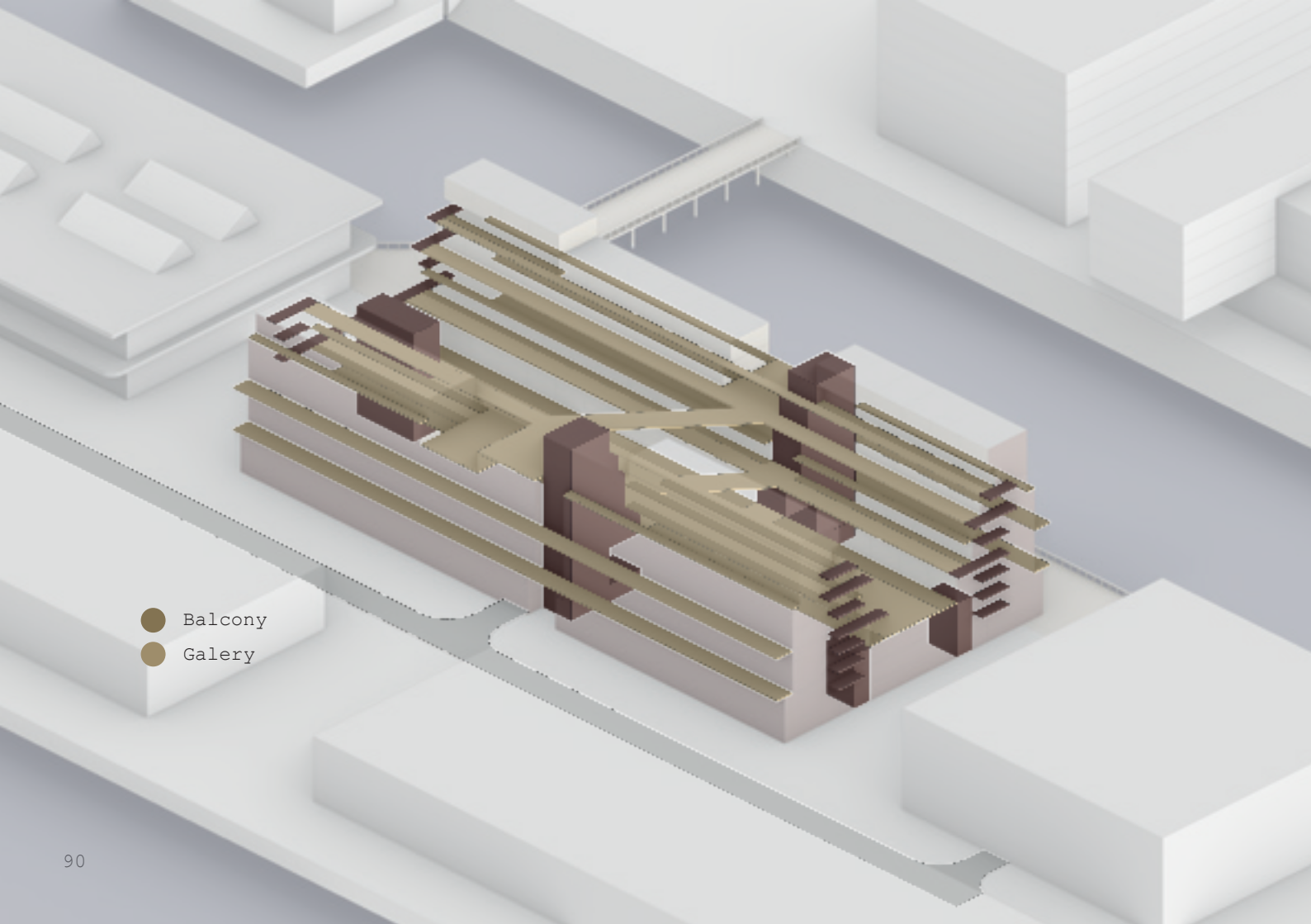
North facade

The decision was made to give the outside façade of the building an industrial/ harbour character. In this way a connection is made between the Katoenveem and former harbour environment. This means largely that the project should contain: brown/red brick, dark and small window frames, the use of steel components, and sturdy rectilinear architecture.

Since the building plot is located right next to a parking-hub the decision was made create a blind façade on the north-west side. However, people don't like monotony, but they prefer architectural details. A quick research into blind façades in the surrounding area revealed that street art and graffiti are often used to create such architectural details. I therefor decided to adapt this strategy into the current project.

On the south side of the building I open up the ground floor to facilitate the liveliness from the Katoenveem and the other side of the Keilehaven via the bridge.

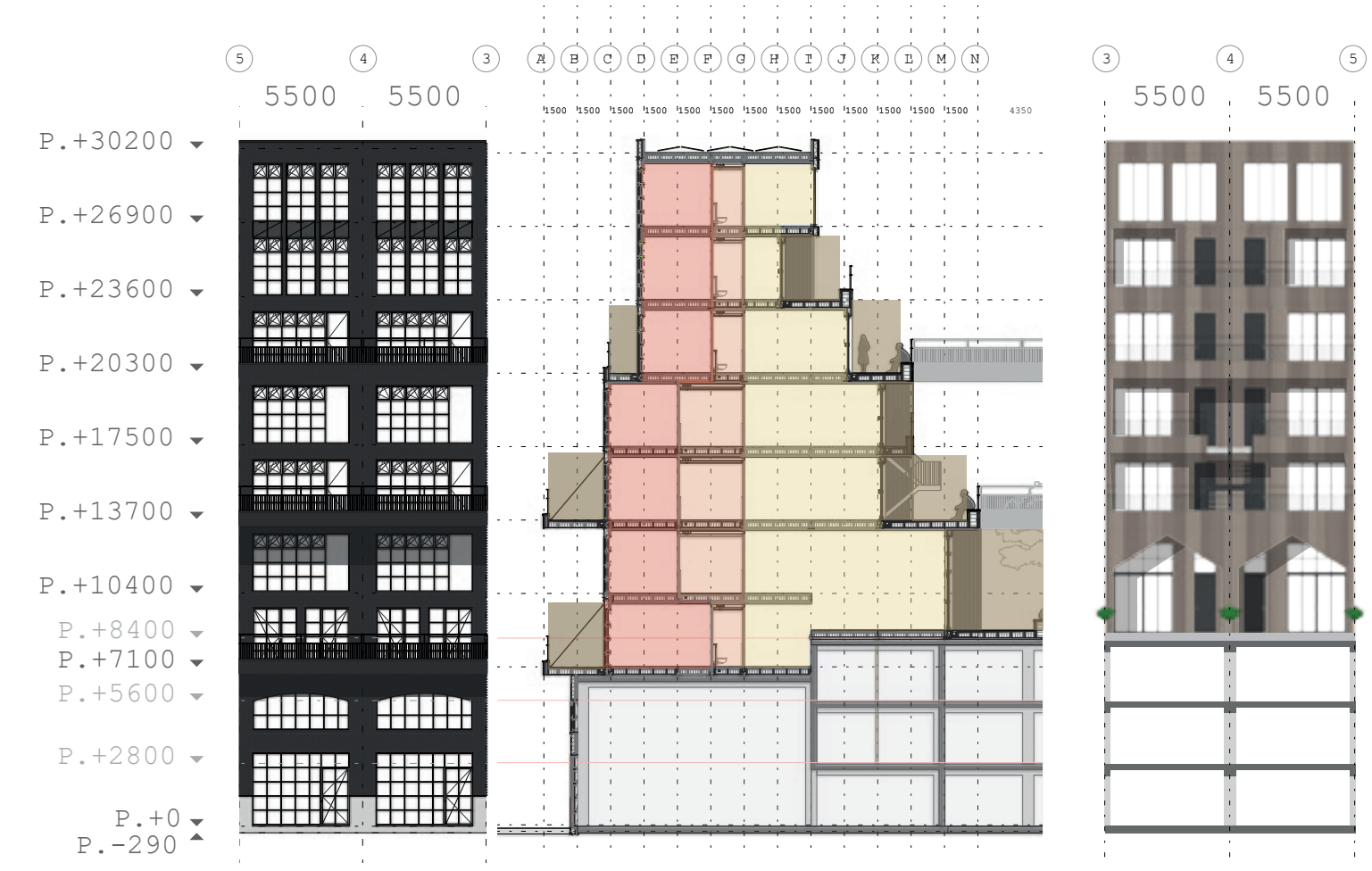



Balcony
Galery

Accessibility

The design consists of 160 dwelling divided over the 7 floors. The dwellings are stacked in a way to create a cascading construction. The use of a cascading construction creates space for the extra wide galleries without taking away sunlight on the dwellings below and allows extra sunlight into the inner garden.

There are 2 main staircases which are connected to all the floors and both contain 2 elevators. These staircases are connected to each other on 3 levels, the inner garden, the 3d and the 5th floor. There is a 3d staircase on the side of the Katoenveem (south-east) that connects to the inner garden and the fire escapes of the remaining floors.


5
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3
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4350
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P.+23600
P.+20300
P.+17500
P.+13700
P.+10400
P.+8400
P.+7100
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P.+2800
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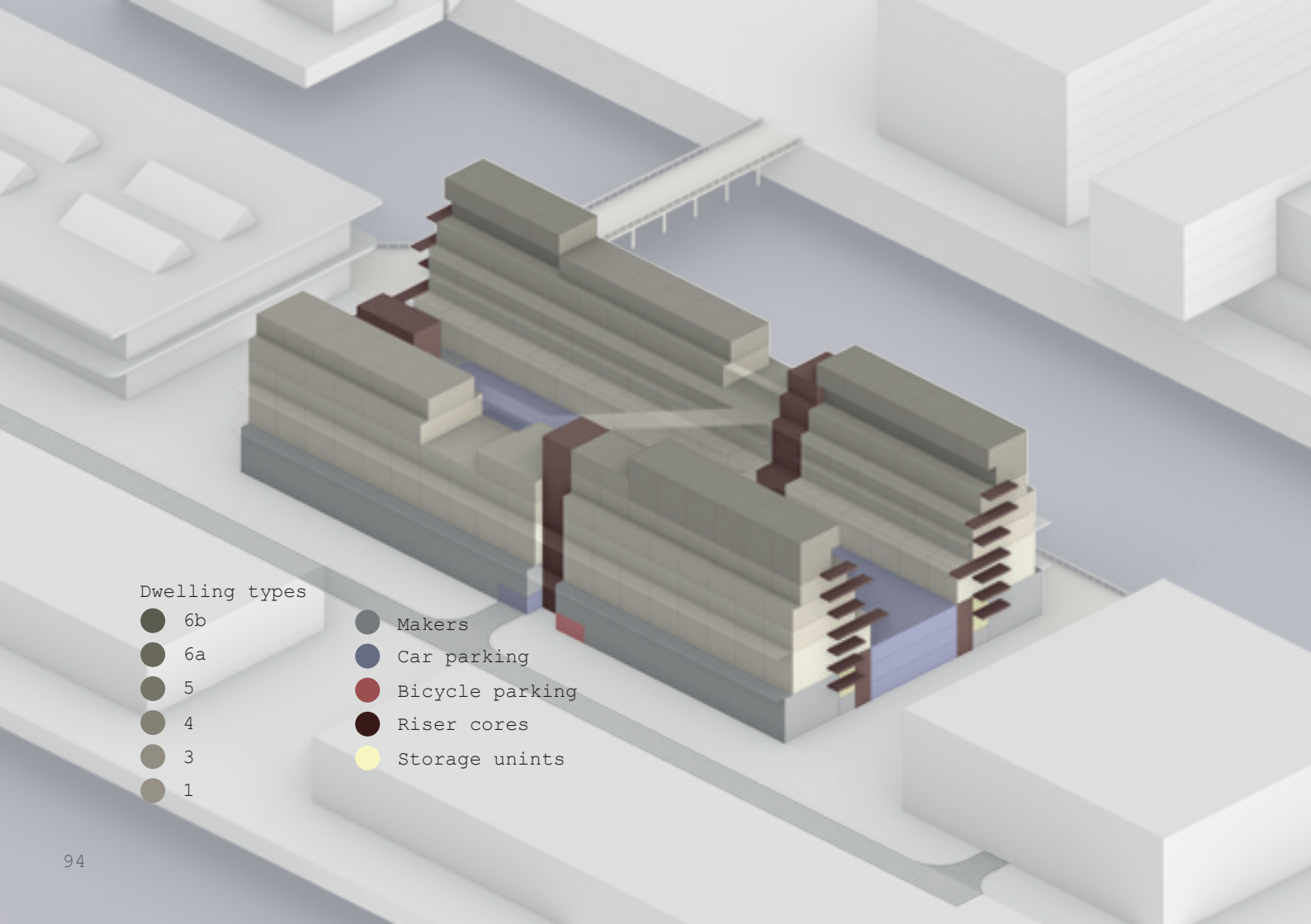
P.-290

The research into social cohesion showed a need for social interaction amongst neigbhours. Therefore, the decision was made to create a lively inner garden. In order to create such an atmosphere, the more ‘active’ living functions, such as the living room, kitchen and personal yards, should be placed around the inner garden. Moreover, research into transition zones from public to private shows that front yards can promote interactions amongst people (COMMUNICATION BK, 2020). This resulted in the same floorplan structure for all the dwellings:

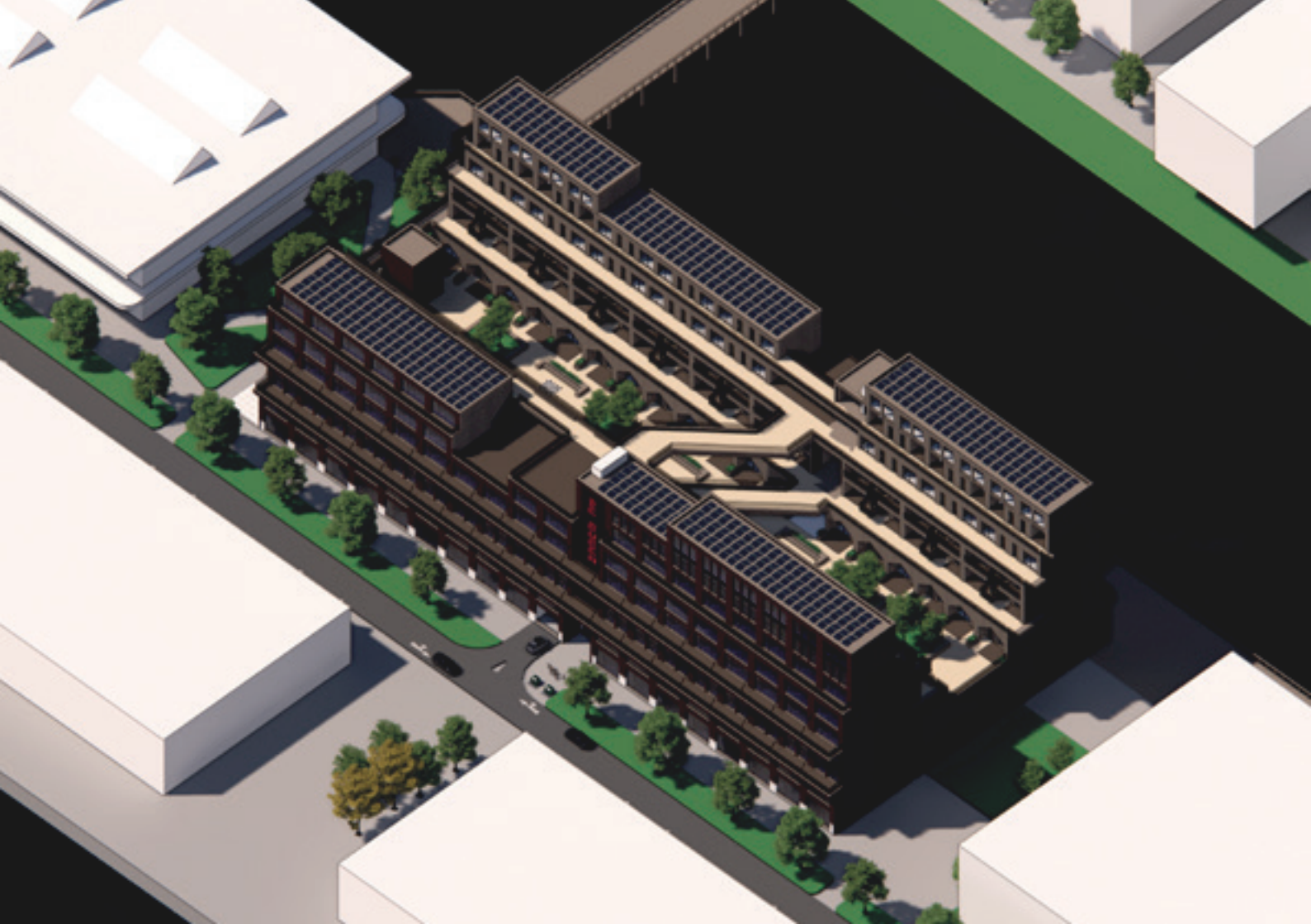
- a personal front yard that is connected to the gallery or inner garden.
- The front yard is connected to the living rooms
- The bedrooms are placed at the outside of the building creating a place to retreat after a busy day on the block.
- And the bathrooms are located in the middle of the dwelling


Dwelling types
6b
6a
5
4
3
1
Makers
Car parking
Bicycle parking
Riser cores
Storage unints

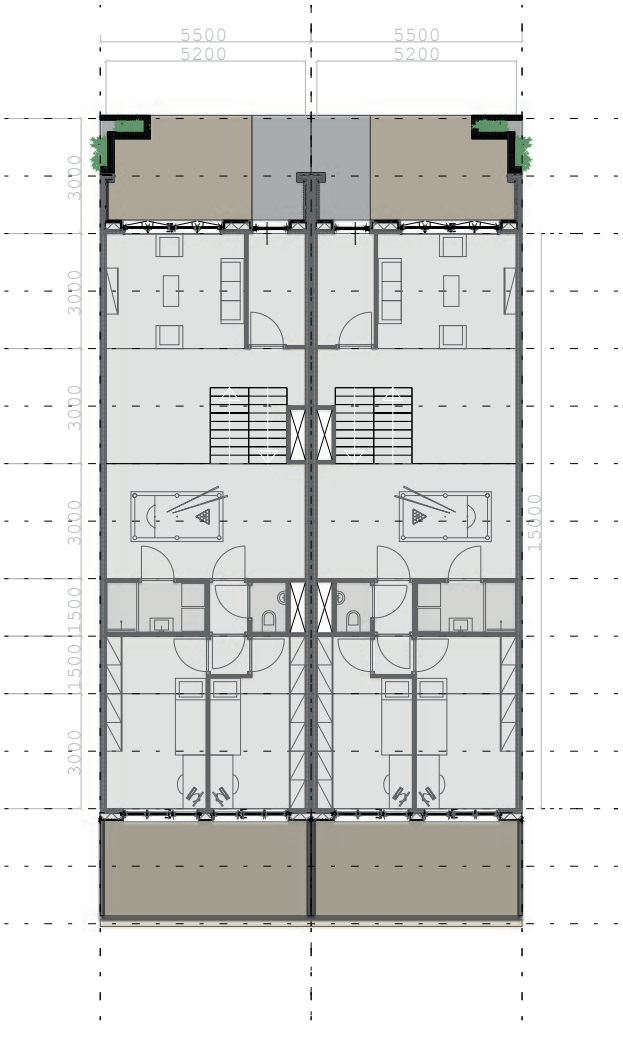
Dwelling Types

The building consists of 160 dwellings with 5 different dwelling sizes and 4 different dwelling types: Split level dwellings, ground floor apartments, upstairs apartments, and maisonettes.

Every floor except for the 6th is a different dwelling type. And the higher you are in the building the smaller the dwelling. The dwellings are composed out of different modules. For more information on modular building and the adaptation of modules in the current project see Chapter 08.




ARENA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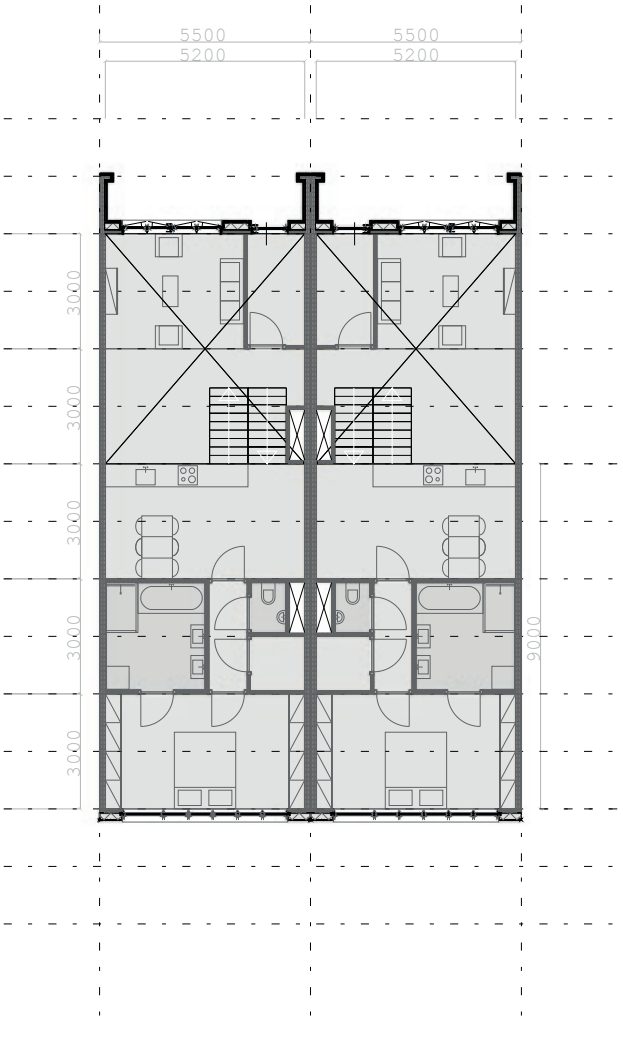
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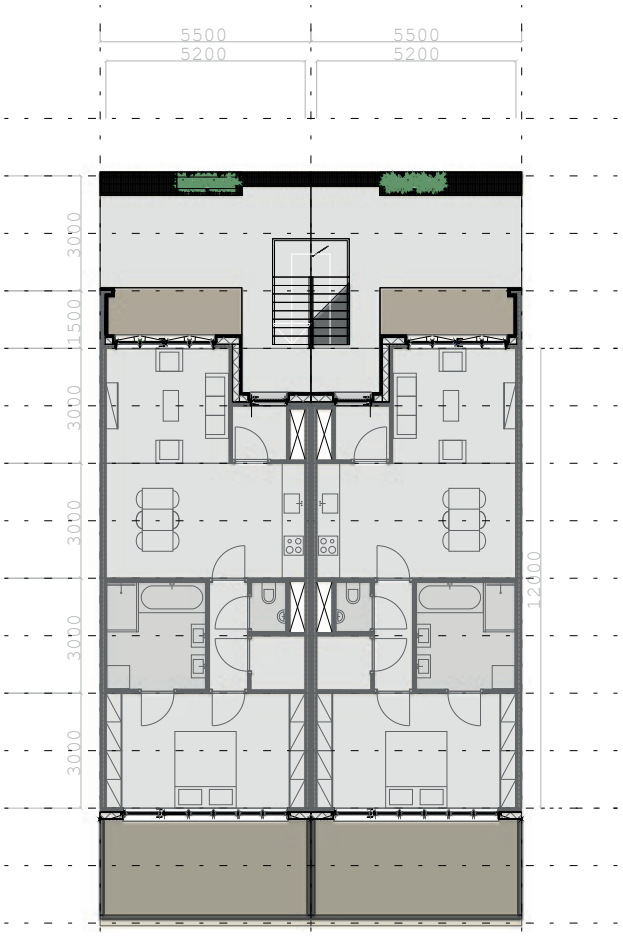
9000

Dwelling type 1
Total of 36 units
124,8 m^2 floor space

Dwelling type 1 is a split-level dwelling located on Floor 1 and 2 and consist of 36 dwellings of 125m2. the dwellings are constructed out of 9 modules.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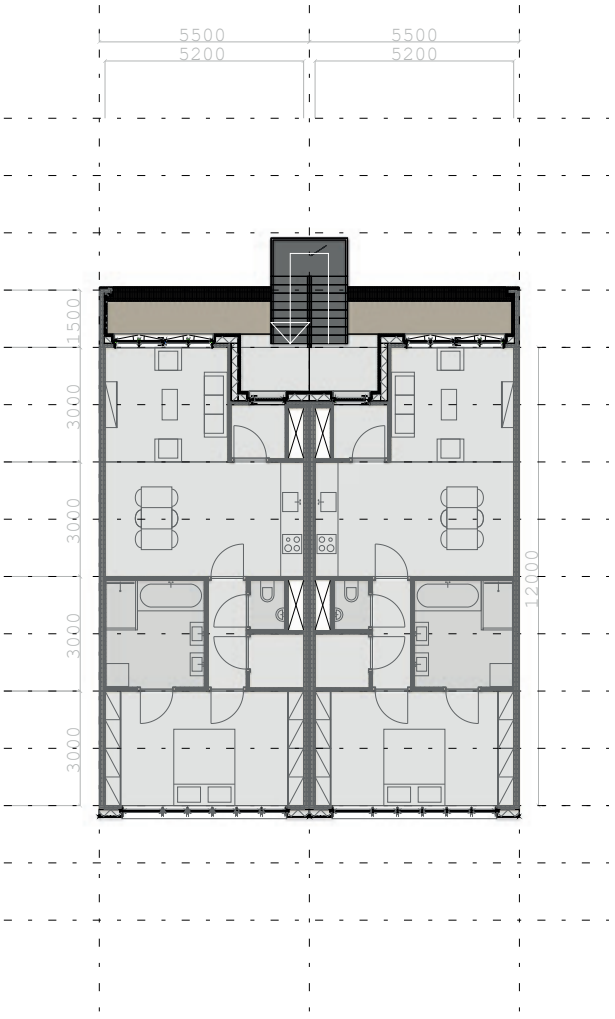
5500
5200
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1500
3000
3000
3000
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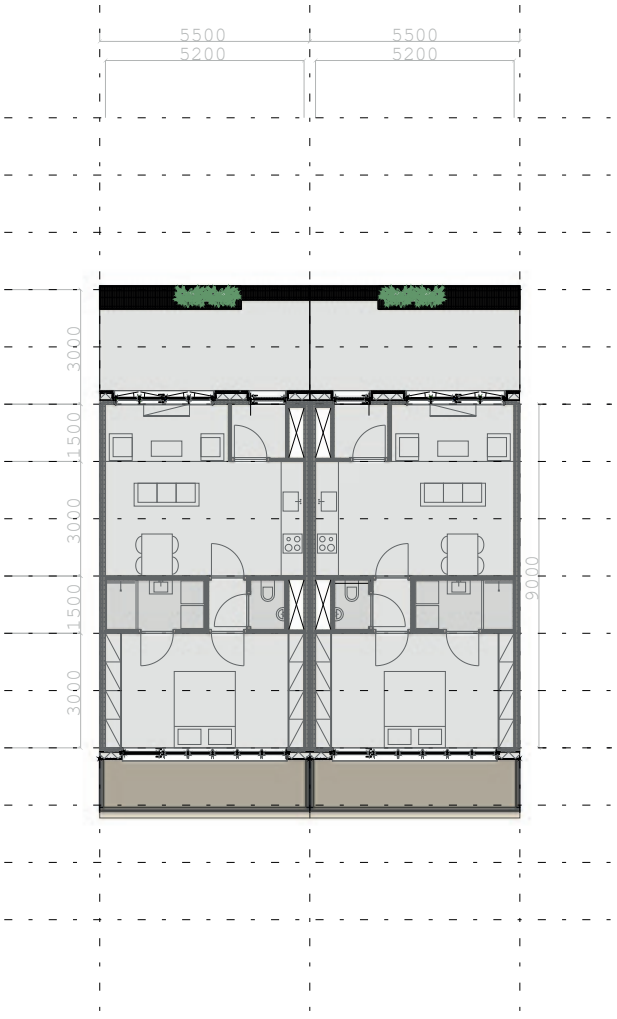
12000

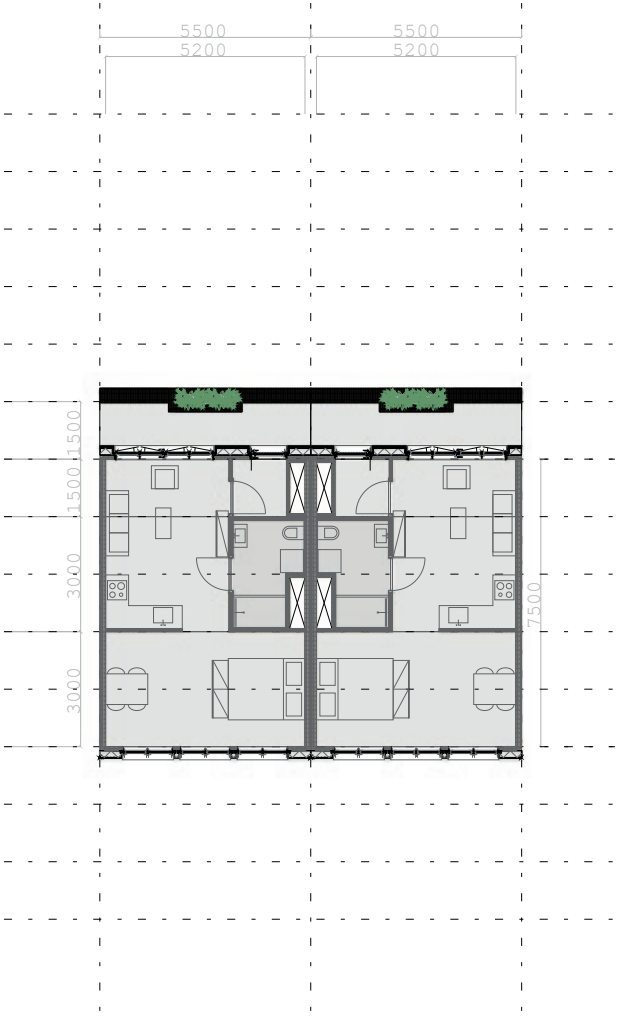
Dwelling type 3 & 4
Total of 70 units 36 type 3 & 34 type 4
62,4 m^2 floor space

Dwelling type 3 and 4 have identical floorplans and are located on Floor 3 and 4. The only difference is that type 4 is accessible via porch access whereas type 3 is accessible via the gallery. There are a total of 70 type 3 and 4 dwellings of 62m2 constructed out of 4 modules.


5500
5200
5500
5200
3000
1500
3000
1500
3000
9000

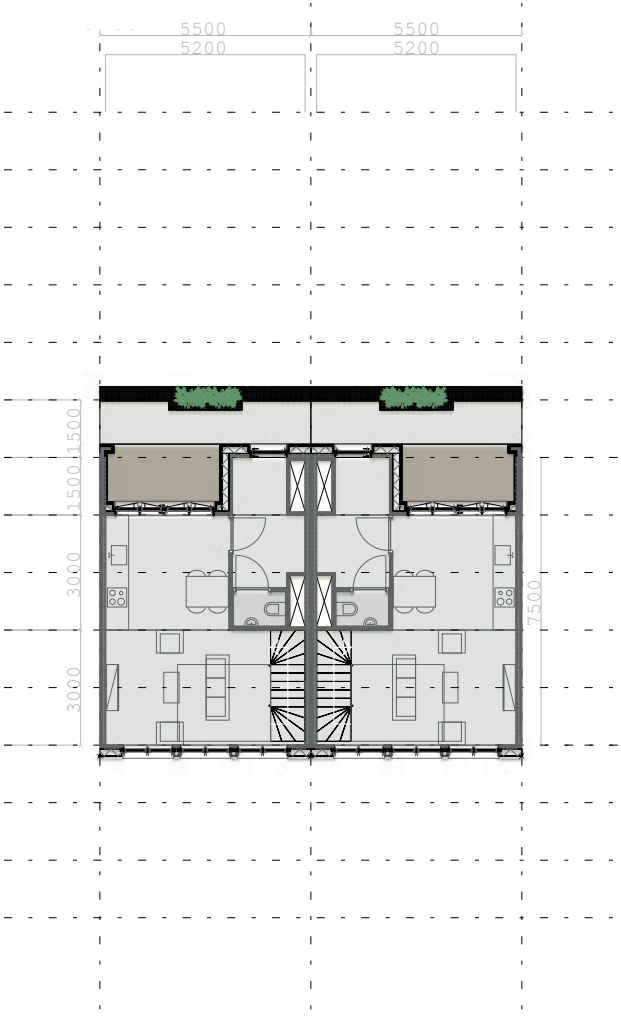
Dwelling type 5
Total of 30 units
46,8 m^2 floor space

Dwelling type 5 is located on Floor 5 and consist of 30 dwellings of 47m2 which are constructed out of 4 modules.


5500
5200
5500
5200
1500
1500
3000
3000
7500

Dwelling type 6a
Total of 8 units
39 m^2 floor space

Dwelling type 6a consist of 8 dwellings of 39m2 which are constructed out of 3 modules.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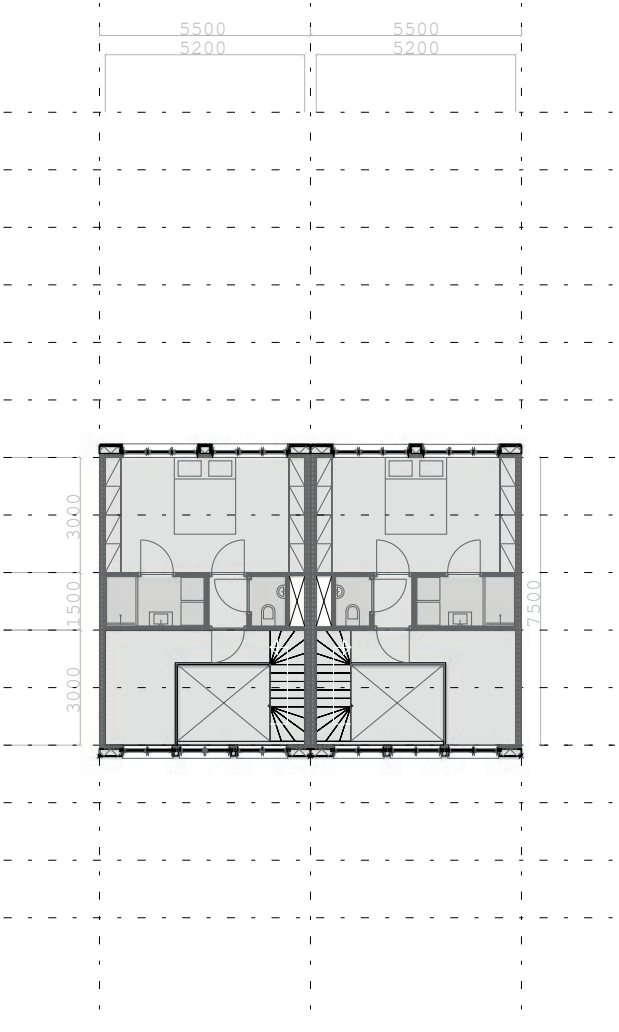
7500


5500
5200
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5200
3000
1500
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7500

Dwelling type 6b
Total of 16 units
78 m^2 floor space

Dwelling type 6b consist of 16 dwellings of 78m2 divided over 2 floors. These dwellings are constructed out of 6 modules.

Chapter 08

- Modular design

1 million homes before 2030, this is a challenge that architects in the Netherlands have to face in the upcoming 10 years. Meaning that we have to start thinking about ways to build fast and efficient. This is why I became interested in modular building systems.

The use of modules in architecture is not a new concept. It has been around for at least a century. One of the first modular house that was supposed to be mass produced is the Dymaxion house, by Buckminster füller (see image on the next page). The building of modular prefabricated houses has an uneven distribution through history, it has been popular in periods when the demand for housing was high. For example, after the world war 2 modularity and prefabrication became popular in Europe and the US. Prefabrication used to mean repetition and simplicity, to save time and money. That is why the design and quality usually suffered (MODE LAB, 2015).

(Dymaxion House, 2014)

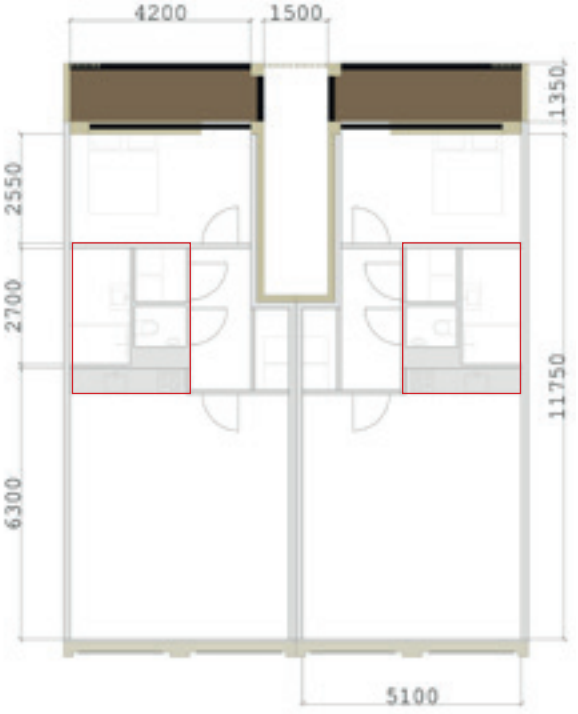
There were some fundamental misconceptions about modular prefabricated housing during the previous centuries. The most common misconceptions of prefabricated modular houses are that they are boring and simple, of less quality, less sustainable, less structural stable, and more expensive. These misconceptions were formed because, most modular buildings where used for cheap repetitive social housing with bad quality. However, these misconceptions are no longer applicable and as it turns out, prefabricated modular architecture might be a solution for the future.

Modularity no longer means that everything has to be the same, because of parametric and automated production modular design does not need to be repetitive (anymore). Some form of repetition makes it easier and cheaper, but the better we become in automation, the less repetitiveness we can achieve. Which is great because you keep the design freedom and still have the benefits of modular housing.

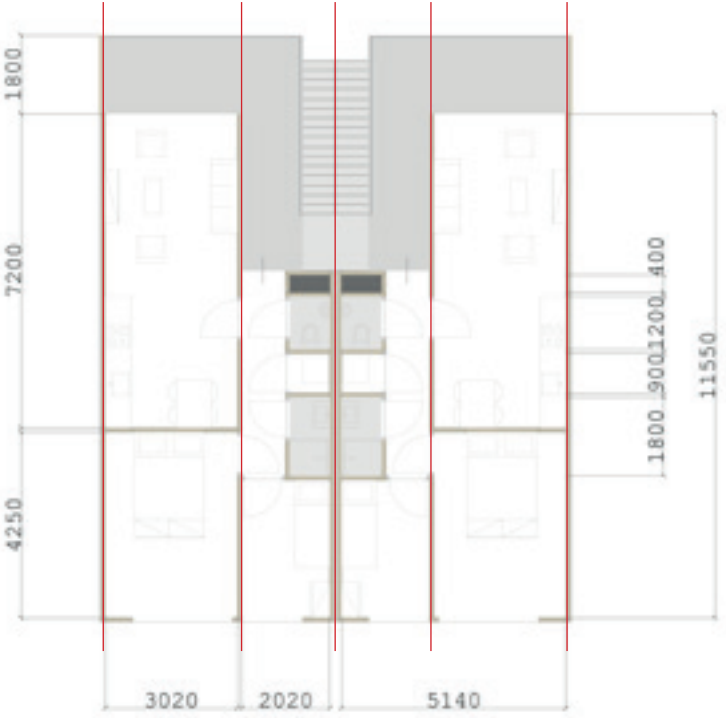
The quality of modular architecture was not at the same level as the build onsite designs and thus, most modular designs did not stand the test of time. However, as it turns out todays modular houses are indistinguishable from the onsite built ones. First of all, they are of better quality because they are built in a factory under a controlled environment where they are not influenced by outside weather conditions such as snow or rain. Moreover, they have a shorter construction time on the building site, with less need of construction personnel. Secondly, construction on the building site is often very inefficient, as architect Andrew Waught states: "1 out of 3 tasks is done twice" (VPRO Tegenlicht, 2019, 7:27). This results into a massive amount of materials that go to waist, building in a factory reduces this amount immensely. Finally, modular buildings reduce the amount of circumstantial onsite issues, such as, complicated site management, noise pollution, and possible injuries (VPRO Tegenlicht, 2019). Furthermore, a report by Bertram et al. (2019) shows that with modular housing there is an opportunity for 20% savings and the construction time onsite can be compressed up to 50%.

Prefabricated modular housing does not have its fair share in the Dutch housing market, currently it is only successful in some parts of Asia, Scandinavia, and some parts of Europe. In Singapore al government housing project must be build using modular techniques pushing the modular method to innovate and become better. In japan modular buildings have a better seismic performance than the onsite built buildings, if you can weld or connect the elements in a controlled environment, they will be more stable (Bertram et al., 2019).

Dwelling type 4
Bathroom module



Dwelling type 4
Two module system



Adaptation of modules in current project

It is important to determine early on in the design process to work with modules. My own experience has shown that the application of modules determines the main (dimensions)structures of the building.

Before I decided to use a fully modular system the floorplans consisted of only a facilities module, consisting of a bathroom, toilet, and kitchen. The first try on a fully modular system I did not want to change the main structural dimensions of the dwellings. The dwellings therefore consisted of two modules dividing the dwelling in two zones. Zone one, the living area, kitchen, and bedrooms. Zone two, entrance, toilet, bathroom, and small bedroom. These floorplans were based on the floorplans of old Dutch Herenhuizen.

Modules

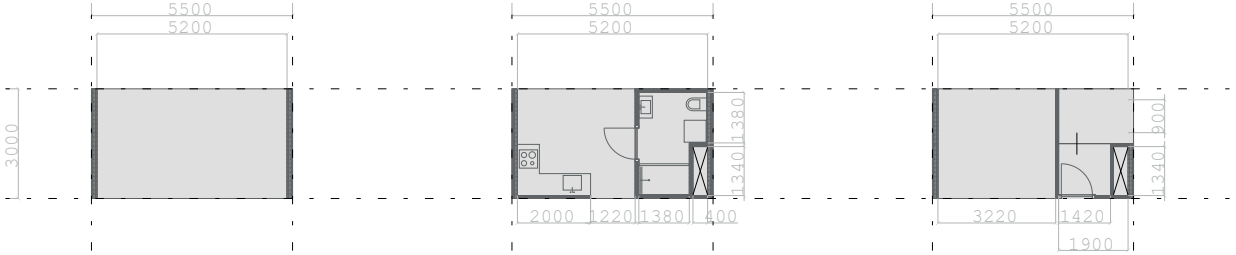
844 in total

Module: Living-Bedroom

Module: Facilities

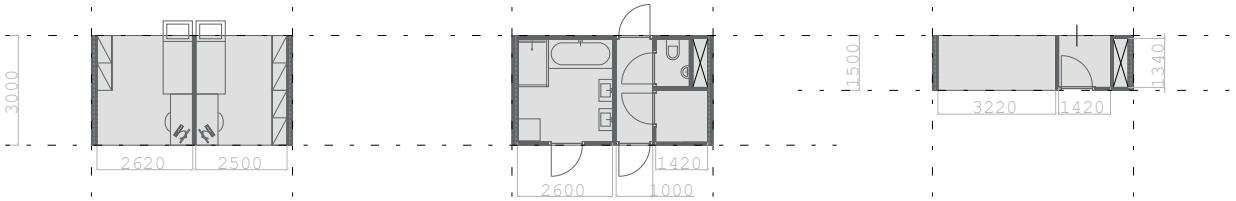
Module: Entrance

Module A:

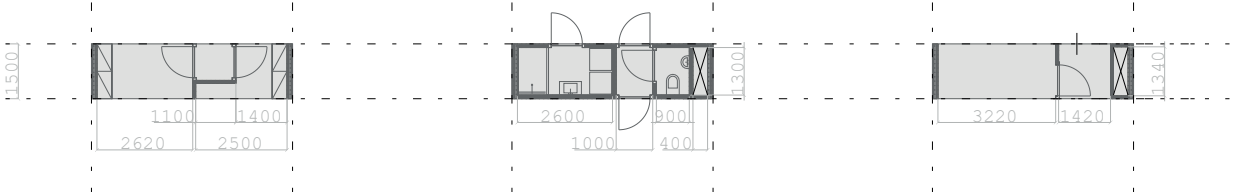


Module B:

Module C:



Module D:



The final modules I designed are split into different functions. By designing the modules to have a specific function it is possible to arrange them is such a way that the vibrant functions are on the inside of the building. This creates a connection between the residents and the inner garden and hopefully stimulates a lively and energetic atmosphere. Furthermore, by creating a system with specific module functions, you create a pluck and play system, kind of like Lego's. This allows you to compile different dwelling types with the same modules. The designs are transferable to other projects and allow you to create a large number of floorplan variations.

The modules are designed in such a way that they can be transported by road without restrictions or extra safety measures making the logistics a lot easier. In total there are 844 modules in the building.

Chapter 09

- Structure

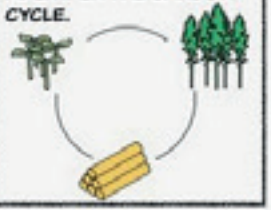
The main structure of the building consists of a concrete table structure. The reason to use concrete for the first floors is because the building is located outside of the dikes and consists of a parking garage. The use of concrete will increase the fire safety of the garage and decrease the change of water damage. The modules will be stacked on top of the main structure and consist of Cross Laminated Timber (CLT) walls and ceiling, and timber rib-floors. The modules are instead of the regular 3 meter height enlarged to 3,3 meters. This is done because the modules have a ceiling and floor structure that are combined thicker than a traditional floor packet. The reason to mainly use CLT is because, to my opinion, this is the structural material of the future.

HOW CLT CAN SAVE THE WORLD

TREES ABSORB CO2 WHILE THEY GROW

BUT THAT STOPS WHEN THEY MATURE.

IF WE CUT THEM DOWN WE CAN REPLANT AND MAINTAIN THE CARBON CYCLE.



USING THE TIMBER TO BUILD A HOUSE CREATES A LONG TERM CARBON STORE.

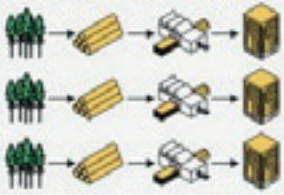
-19T CO_2

CLT IS A WAY OF ENGINEERING TIMBER ALLOWING US TO BUILD LARGE NUMBERS OF HOMES...

... SO WE CAN STORE LOTS OF CARBON

AND REDUCES THE USE OF POLLUTING AND HIGH ENERGY MATERIALS.

THE MORE WE BUILD WITH TIMBER, THE MORE DEMAND WE CREATE.



THIS COULD LEAD TO LARGE SCALE REFORESTATION OF THE PLANET...

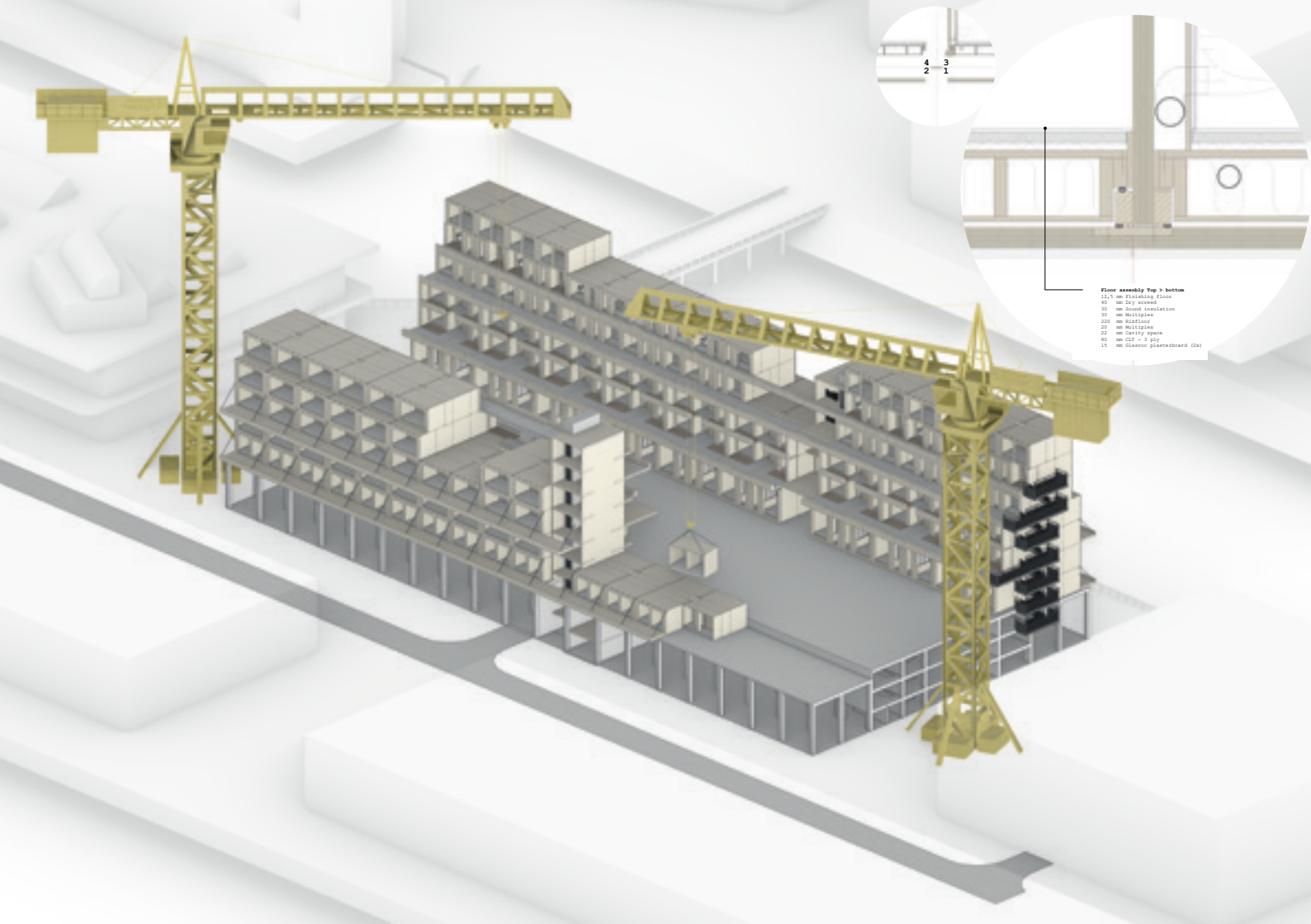
...WHICH IS THE ONLY VIABLE WAY OF HALTING GLOBAL WARMING.

How CLT can save the world

Trees absorb CO2 while they grow. This slows down as they mature. So, cutting them down and planting new ones maintains the carbon cycle. Building houses from wood creates a long-term carbon storage, about 19T CO2 per house (VPRO Tegenlicht, 2019). My building has 160 smaller dwellings so this would mean my building could store around 3.000 T of CO2.

So, the more we build, the more demand we create. This could lead to a large-scale reforestation which is good for everything, global warming, wildlife, and reduce the current problems with nitrogen. Not only that, it also reduces the use of polluting and high energy materials.

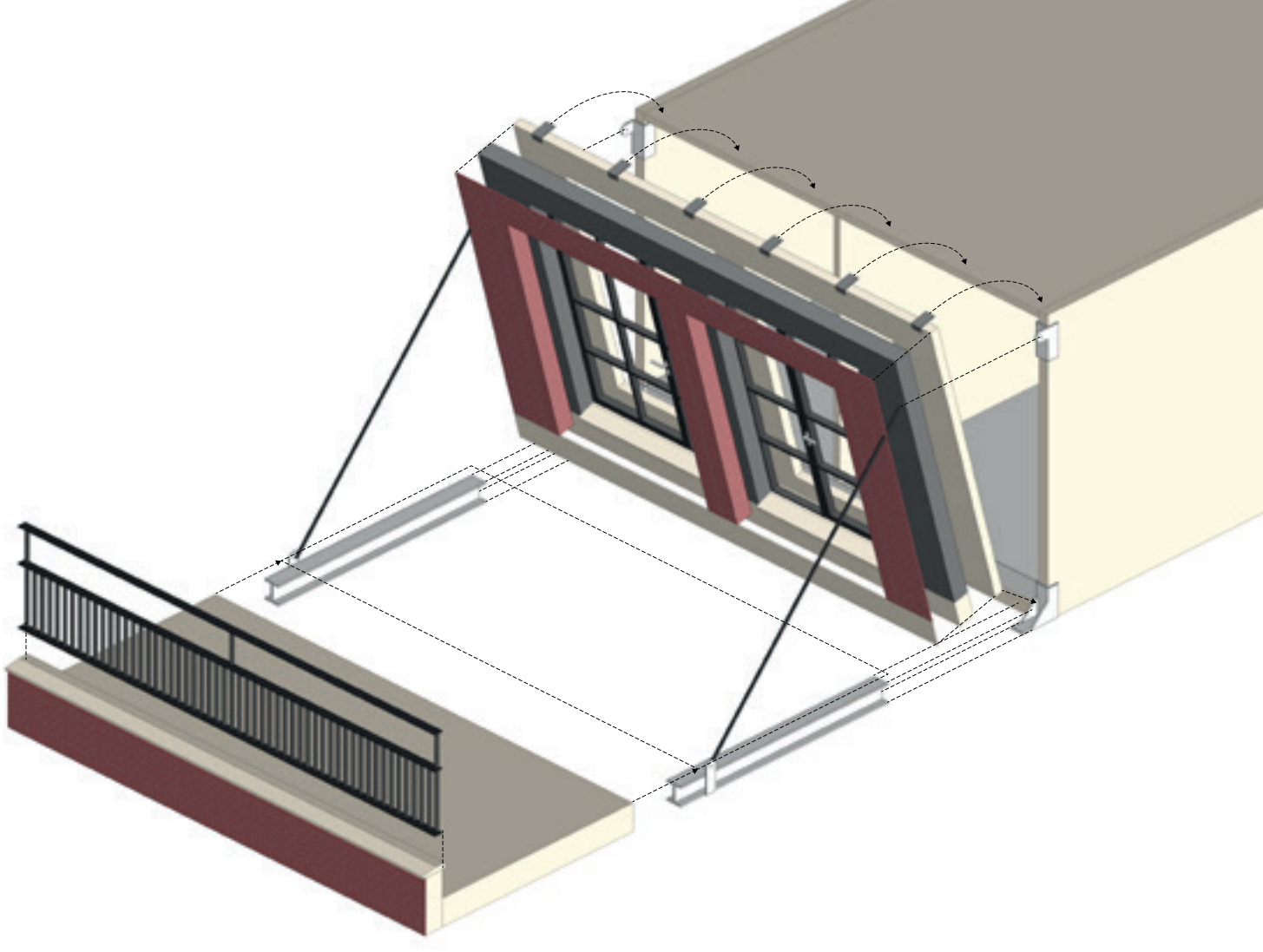
In the Netherlands there are about 140.000 hectares of production forest, planted with the intention to be cut down again and used for ships, clogs or matches. Now these forests are no longer used by these industries and this wood is now used for the incinerators. This is crazy if you think about it, but we could potentially use this wood for a local CLT production (VPRO Tegenlicht, 2019).


4 3
2 1
Floor assembly Top > bottom
12,7 mm Finishing floor
40 mm Dry screed
30 mm Sound insulation
30 mm Multiplex
220 mm Ribfloor
20 mm Multiplex
22 mm Cavity space
80 mm CLT - 3 ply
15 mm Glasroc plasterboard (2x)

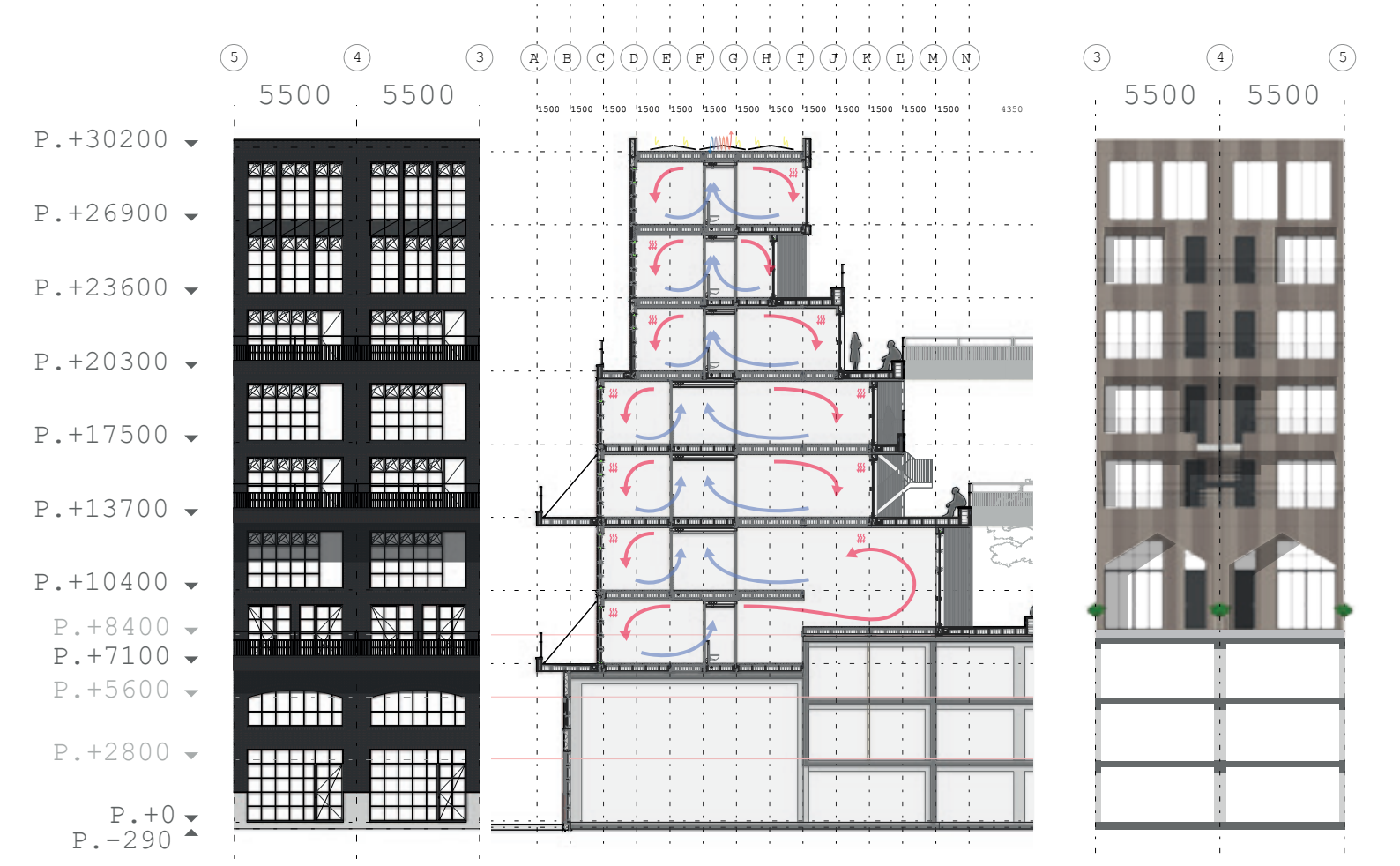
Module assembly

The building is constructed from the two riser cores. This allows modules to be placed in 4 locations at the same time. However, there fit only 2 maybe 3 cranes on the building site. Hotel Jakarta in Amsterdam was built via modules. This building consists of 176 modules. The process of placing them on site took about 18 days. For my building the modules are smaller which means they can put up more modules per day, let's say 2 times as fast as compared to Jakarta. This would mean that placing the 844 modules on site would take around 43 days.

The modules will be placed per dwelling from the inner garden to the external façade and stacked from the bottom to the top. They are vertically separated by vibration pads. The modules that form one dwelling are connect over the seams via wooden slats. The connection to adjacent modules is done via steel connectors plates. The façades and balcony will be prefabricated and can be connected to the modules before or after placing them. The facade elements connect in the same way as the modules. They are first placed on the bottom after which it folds up against the top of the module after which they are connected. As last, the balcony is placed on the bottom bracket attracted to the façade and hung on the top of the facade.



I used mineral strips, with a brick look, on the outside face to give it an industrial character. I used strips to keep the elements light weight and because regular brick is to labor intensive. To get the industrial character I was after I choose small steel window frames.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Sustainability

The use of good sun blinds prevents the need for cooling of the dwellings which limits the amount of energy use. The use of natural sun blinds on the inside of the building are formed because of the personal niches and the galleries. On the outside of the building there are the balconies and the use of sun-resistant glazing.

By using a heat recovery system, the amount of energy needed to preheat the air can be lowered even more.

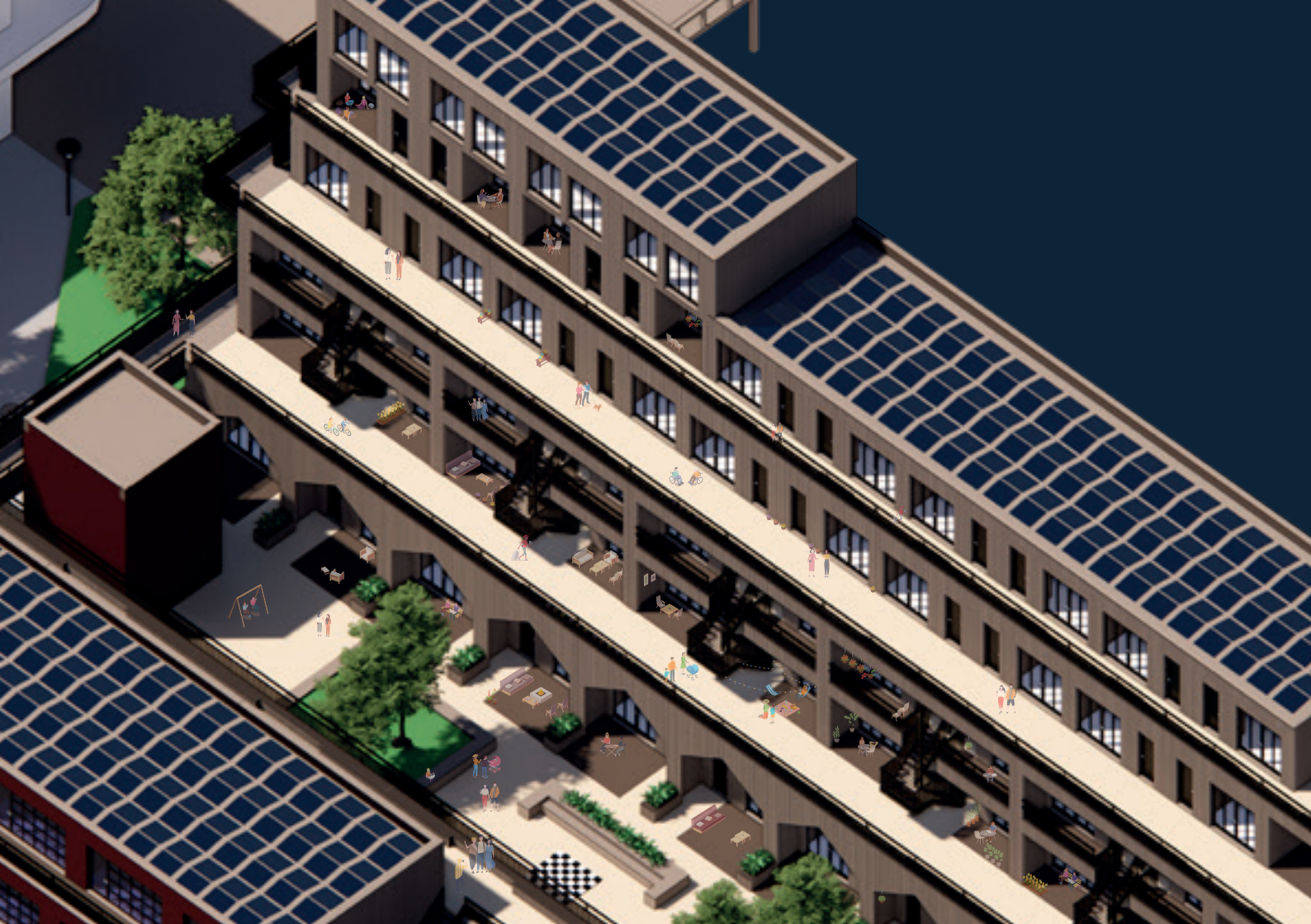
The building recycles rainwater to reuse it in the greywater system of the building. The Roof, galleries and inner garden collect enough rainwater to reduce the buildings use of drinking water by about 50%.

Conclusion

The current project started with the research question:

'Is it possible for an architectural design to counter the negative effects implicated with the individualization and improve the social cohesion within a residential building?'

In order to answer this question, the literature research focussed on the role of individualization because it plays a major role in the decline of social cohesion. This study concludes that stimulating interaction between local residents can make a positive contribution to improving social cohesion. By means of, among other things, analysing case studies with comparable problem analyses, various design hypotheses have been formulated. These design hypotheses have been leading in the spatial planning of the current design. This is mainly reflected in the structure of the building: a lively indoor climate (around the inner garden), where the dwellings are situated in such a way that they can contribute to improving the social interaction between 'de buren'.



In addition to the social task, there is a very large construction task in the Netherlands: by 2030, 1.000.000 homes must be built. The large scale and industrialization of the building assignment does not necessarily mean that this will result in monotonous architecture. As shown in current project, it is possible to design for a residential community with all kinds of different homes and residents. By using modern techniques such as CLT and modular construction, the construction assignment can be solved in an efficient and sustainable way. The research shows that the social character does not have to be excluded by the industrialisation of construction and vice versa.

The current project provides an answer to the research question and posed problems. The research and final design show that an architectural design can reduce the negative effects of individualization and promote social cohesion within a residential building. This design is not the only solution to the problems, but can, in combination with the research, contribute to conscious design for a more pleasant living environment within a residential building. The final design does not hinder the individual living enjoyment of the resident, since everyone still has the opportunity to withdraw and be themselves.
Social interaction should not be enforced because there is no other way, but rather it should be an invitation to participate in activities in an environment that tempts ‘de buren’ to meet.

Chapter 10

- Technical Drawings

Façades

West facade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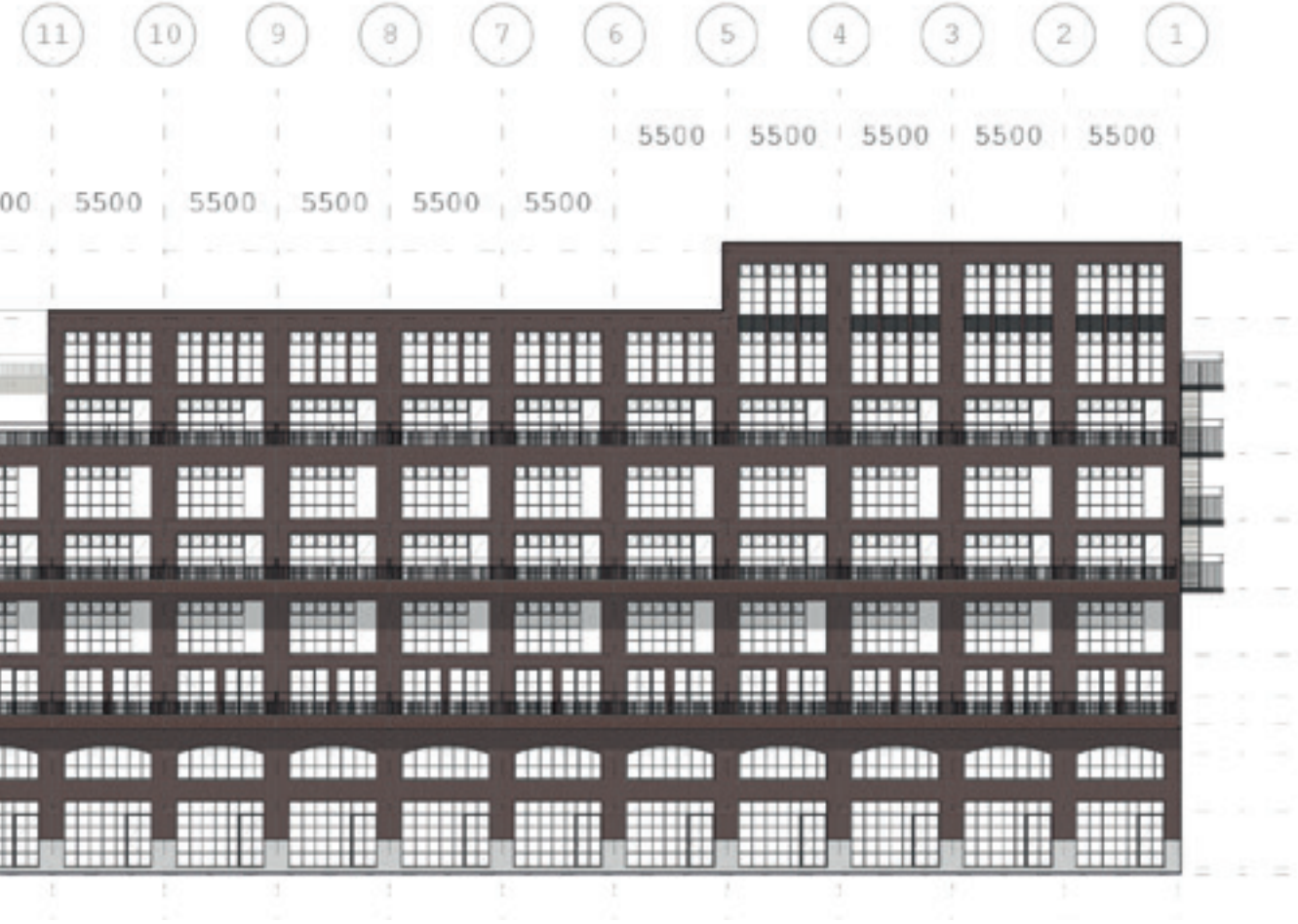
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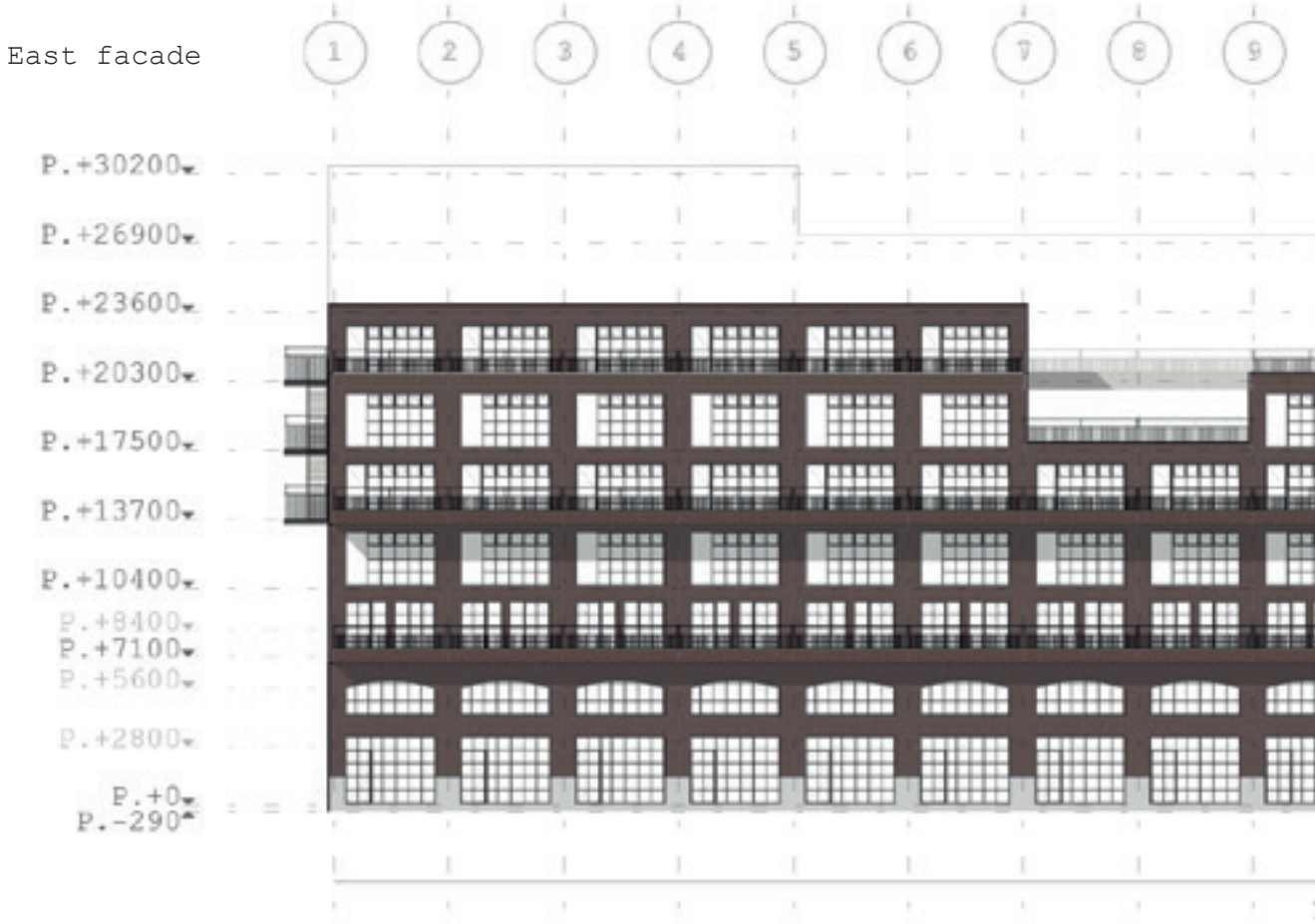
East facade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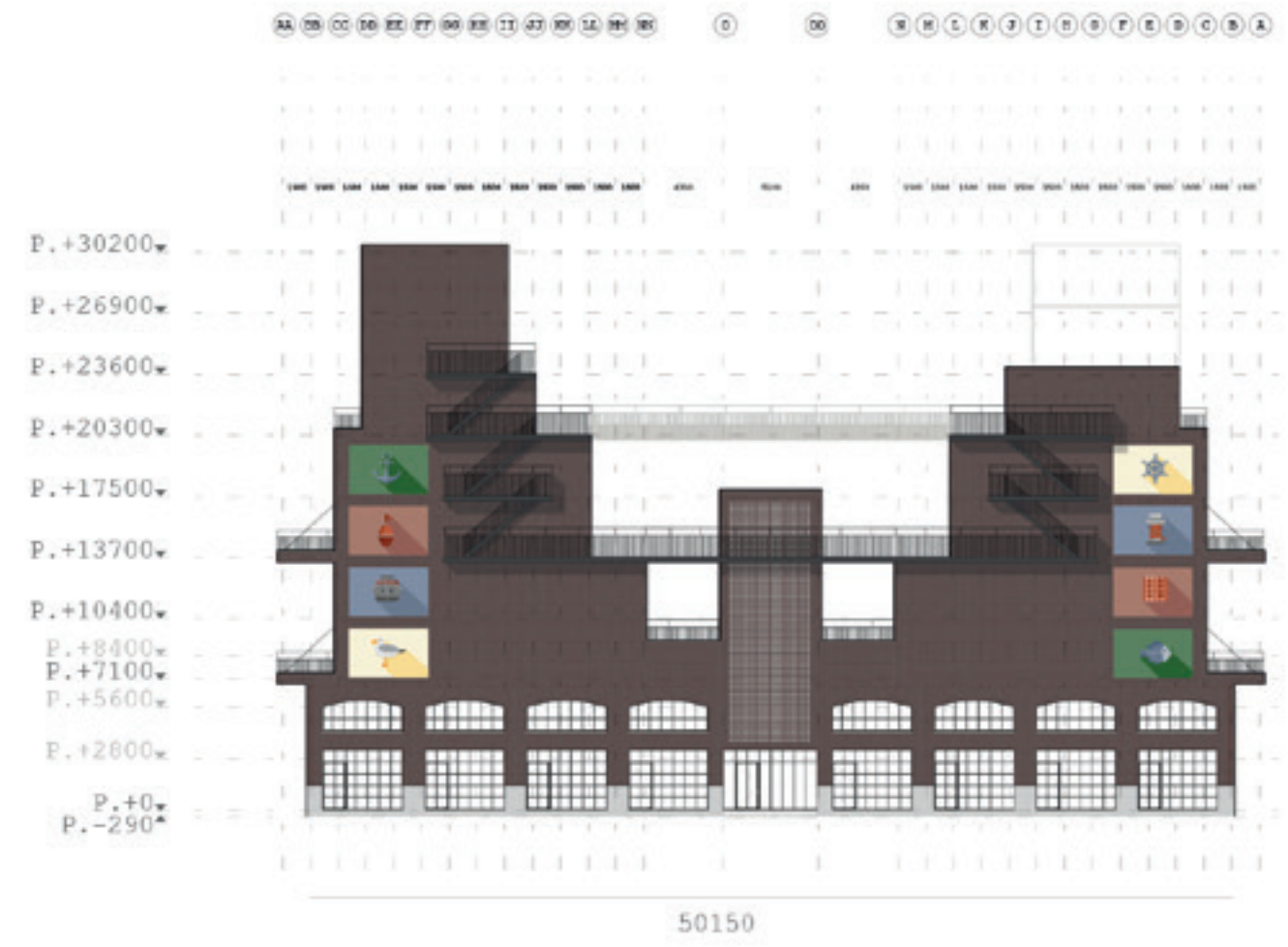
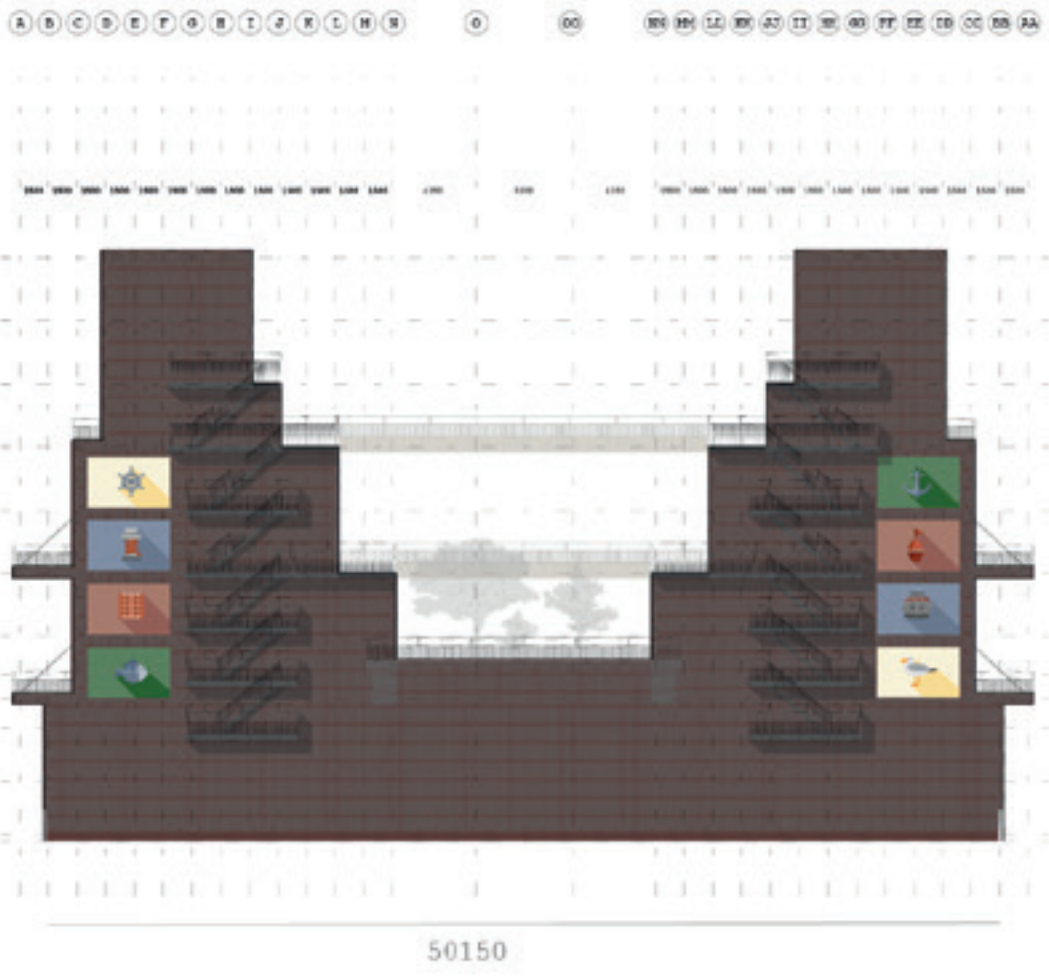
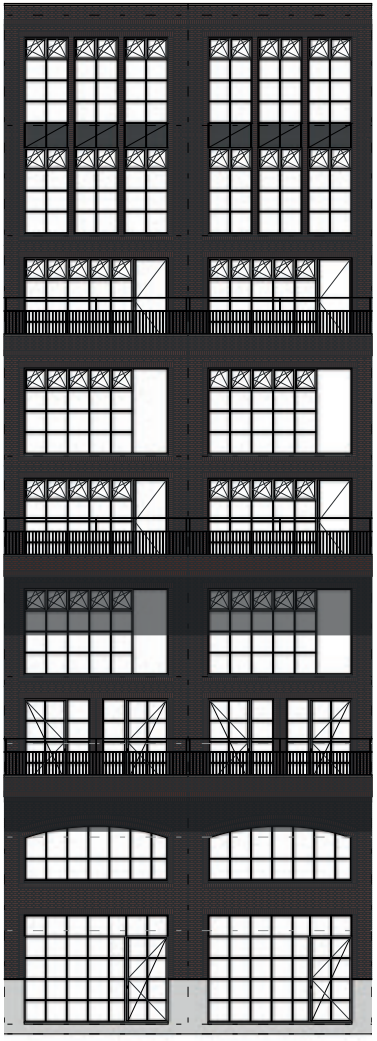


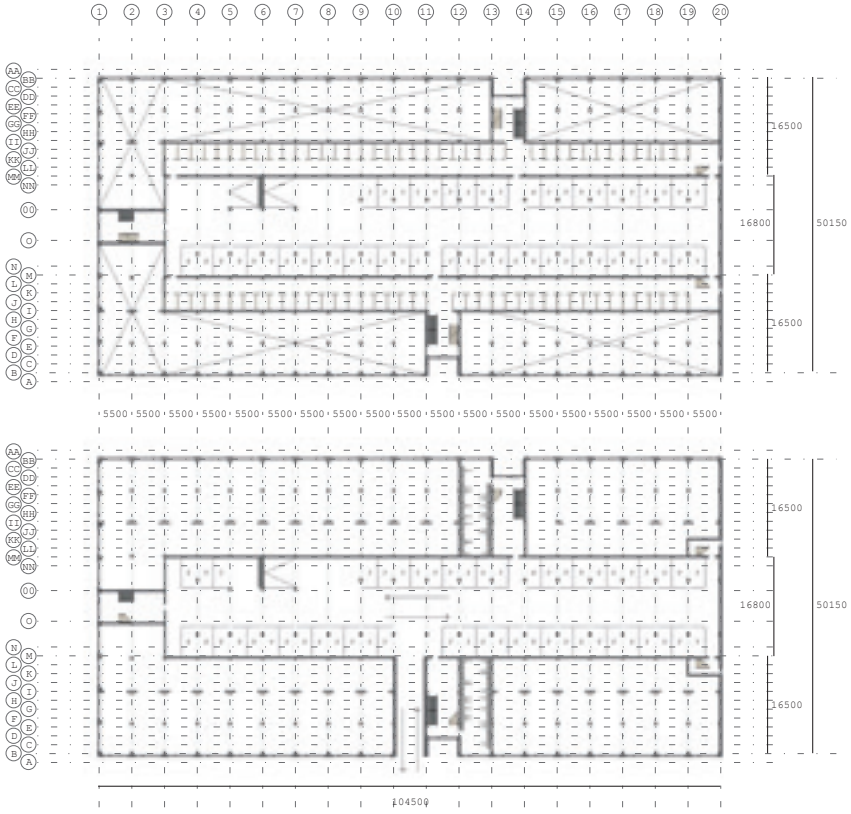
South facade



North facade

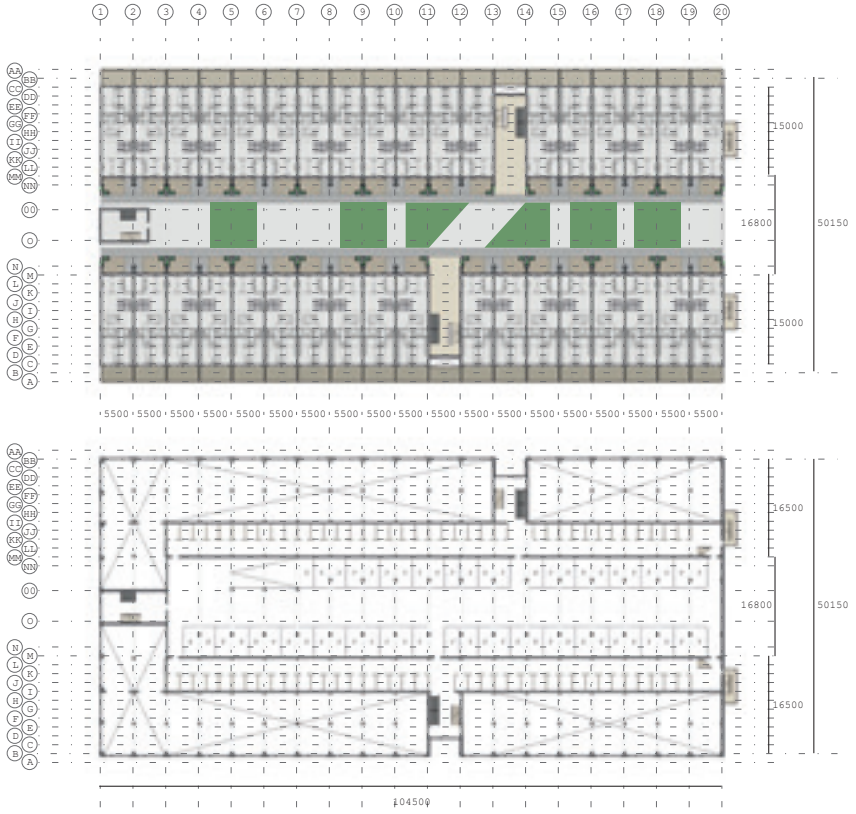


Floorplans



PARKING FLOOR 2

GROUND FLOOR

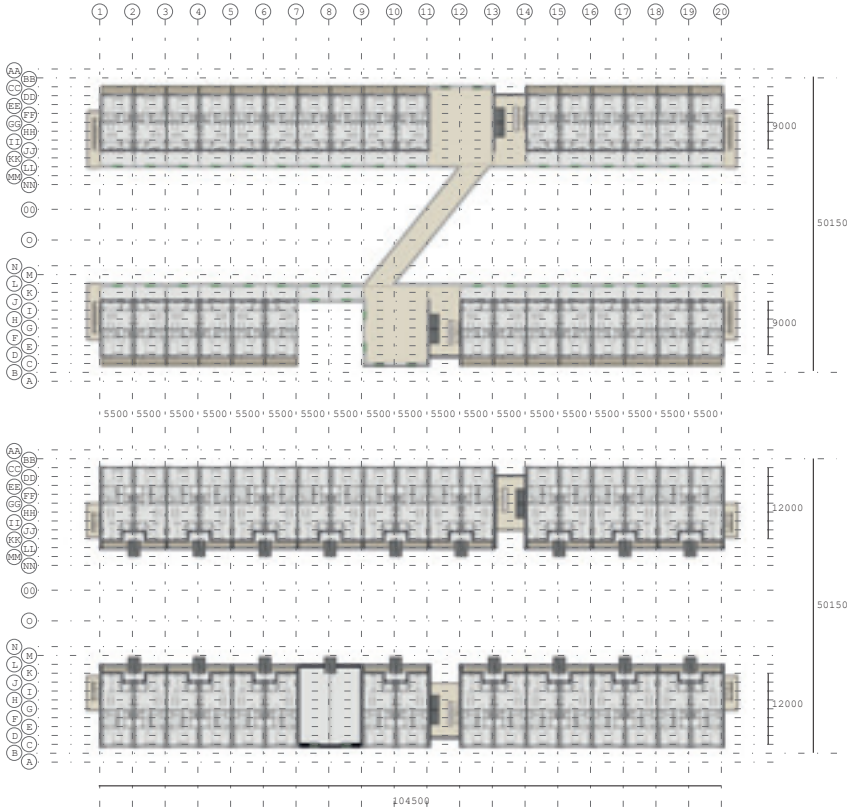


FLOOR 1

PARKING FLOOR 3

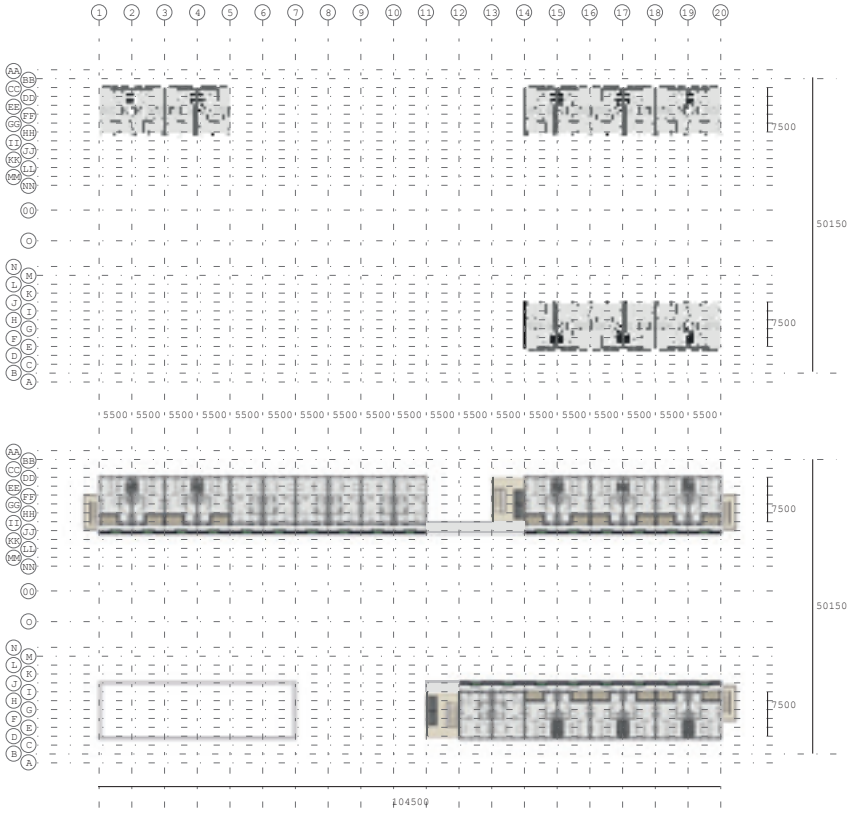
FLOOR 3

FLOOR 2



FLOOR 5

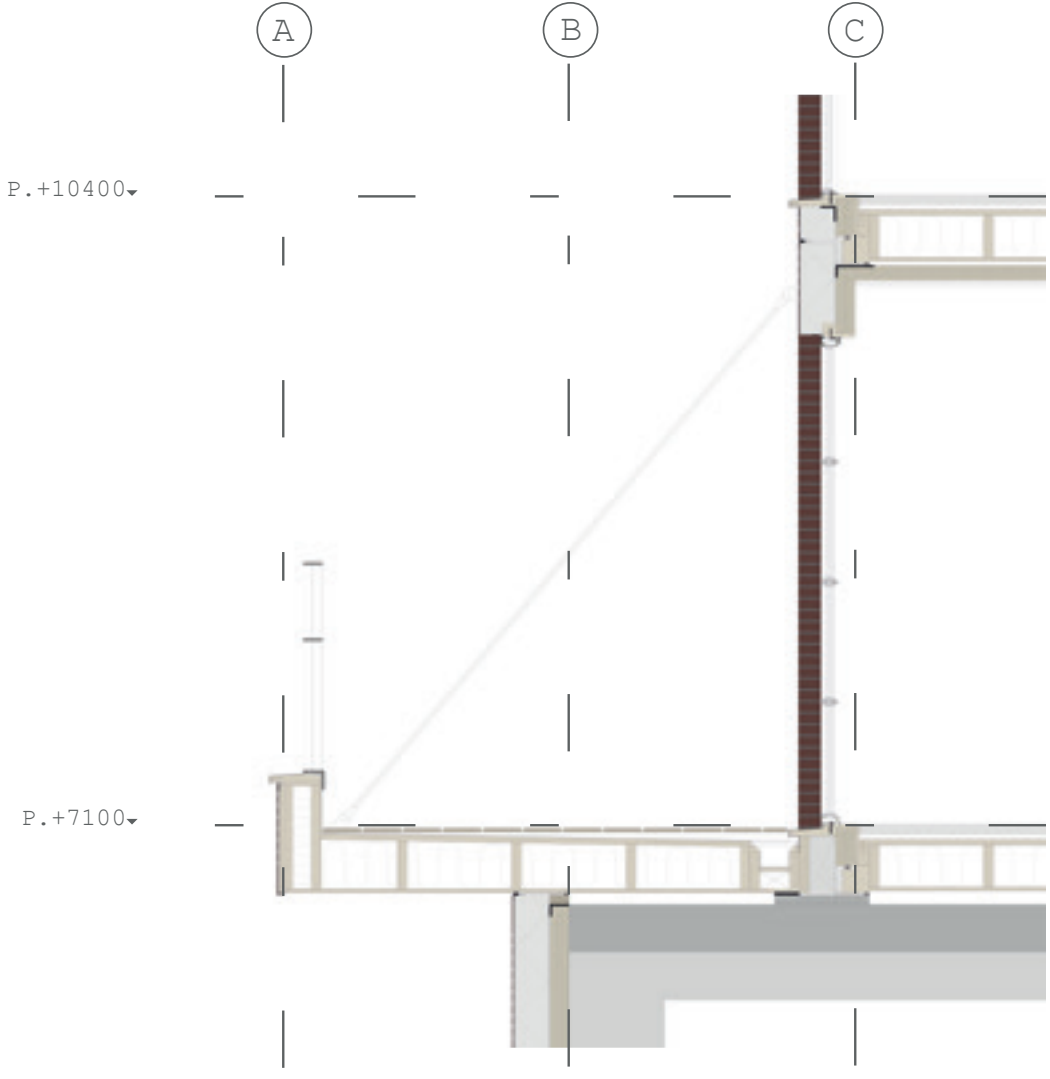
FLOOR 4



FLOOR 7

FLOOR 6

Details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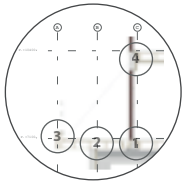


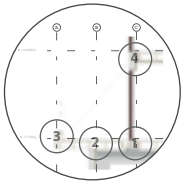
1 12 mm Vibration insulation pad
2 Rubber seal land soft

Floor assenbly Top > bottom
12,5 mm Finishing floor
40 mm Dry screed
30 mm Sound insulation
30 mm Multiplex
220 mm Ribfloor
20 mm Multiplex
72 mm Cavity space
250 mm Concrete

P.+7100

C

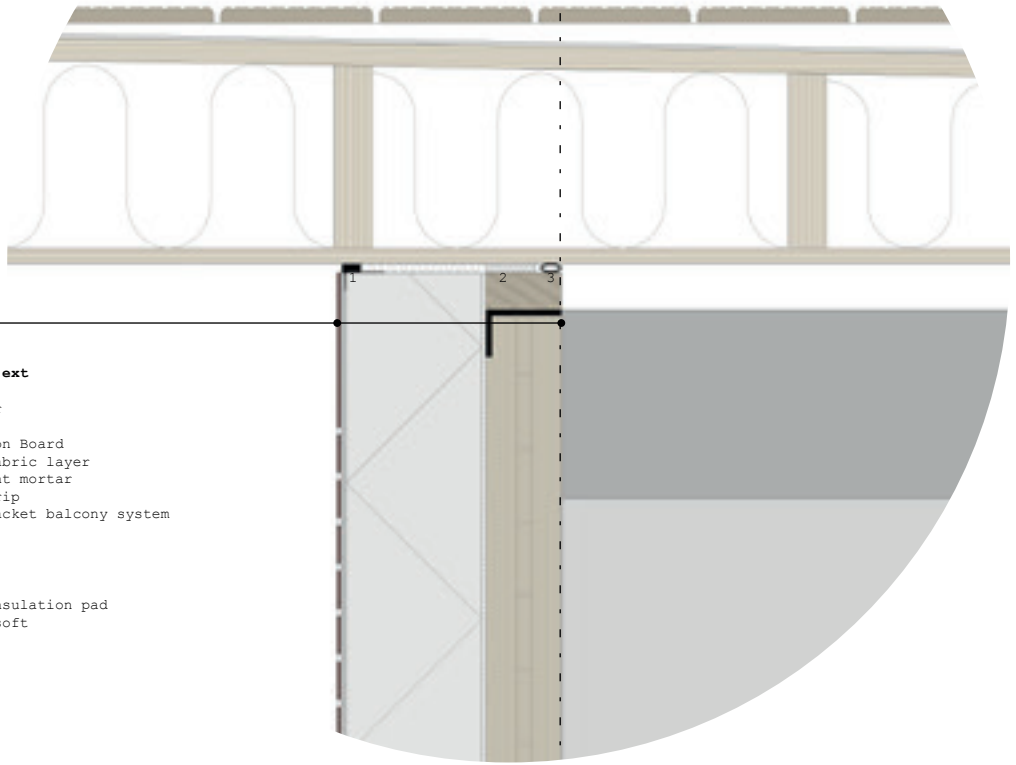
1



B

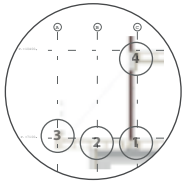
2

P.+7100



Wall assenbly int > ext
100 mm CLT - 3 ply
Facade anchor
5 mm STO bonding
180 mm STO insulation Board
4 mm STO mortar fabric layer
3 mm STO glue joint mortar
4,5 mm STO brick strip
Top steel bracket balcony system

1 Sealing rubber
2 12 mm Vibration insulation pad
3 Rubber seal land soft



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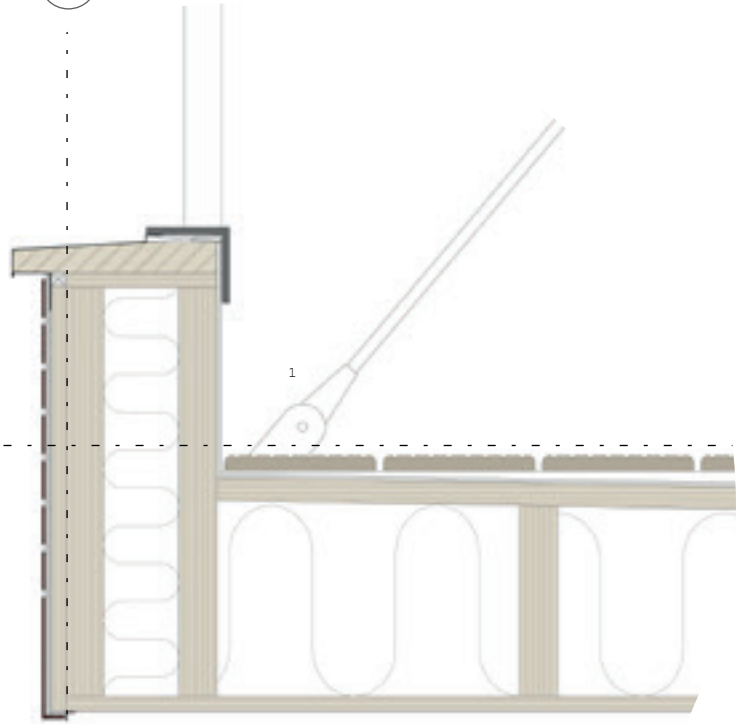
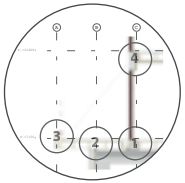


1 Bottom steel bracket balcony



4

C

P.+10400

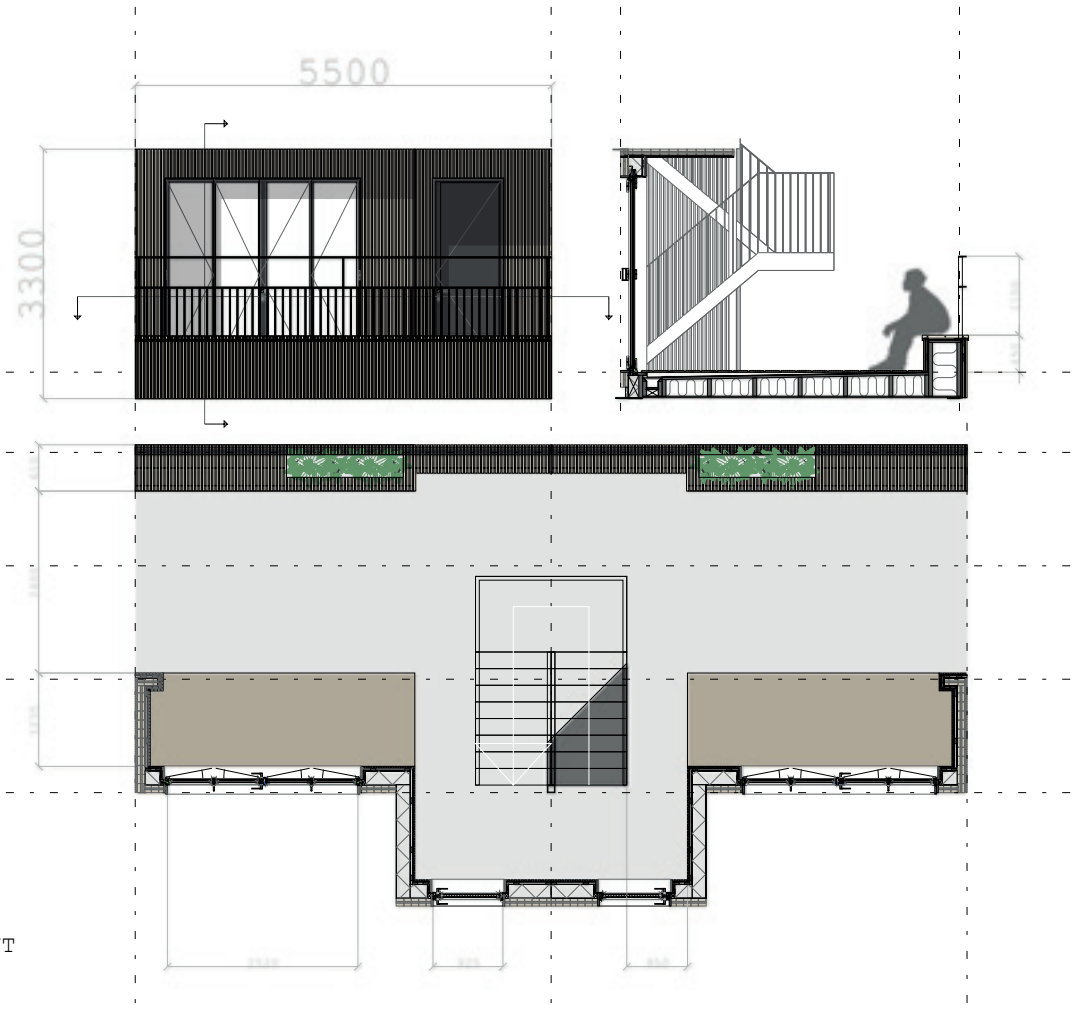
1 Facade anchoring (5x)
2 12 mm Vibration insulation pad
3 Rubber seal land soft
4 Mineral wool
5 Airtight tape + Sealing rubber

Wall assenbly int > ext
100 mm CLT - 3 ply
5 mm STO Bonding
180 mm STO insulation Board
4 mm STO Mortar fabric layer
3 mm STO glue joint mortar
4,5 mm STO brick strip
Top steel bracket balcony system

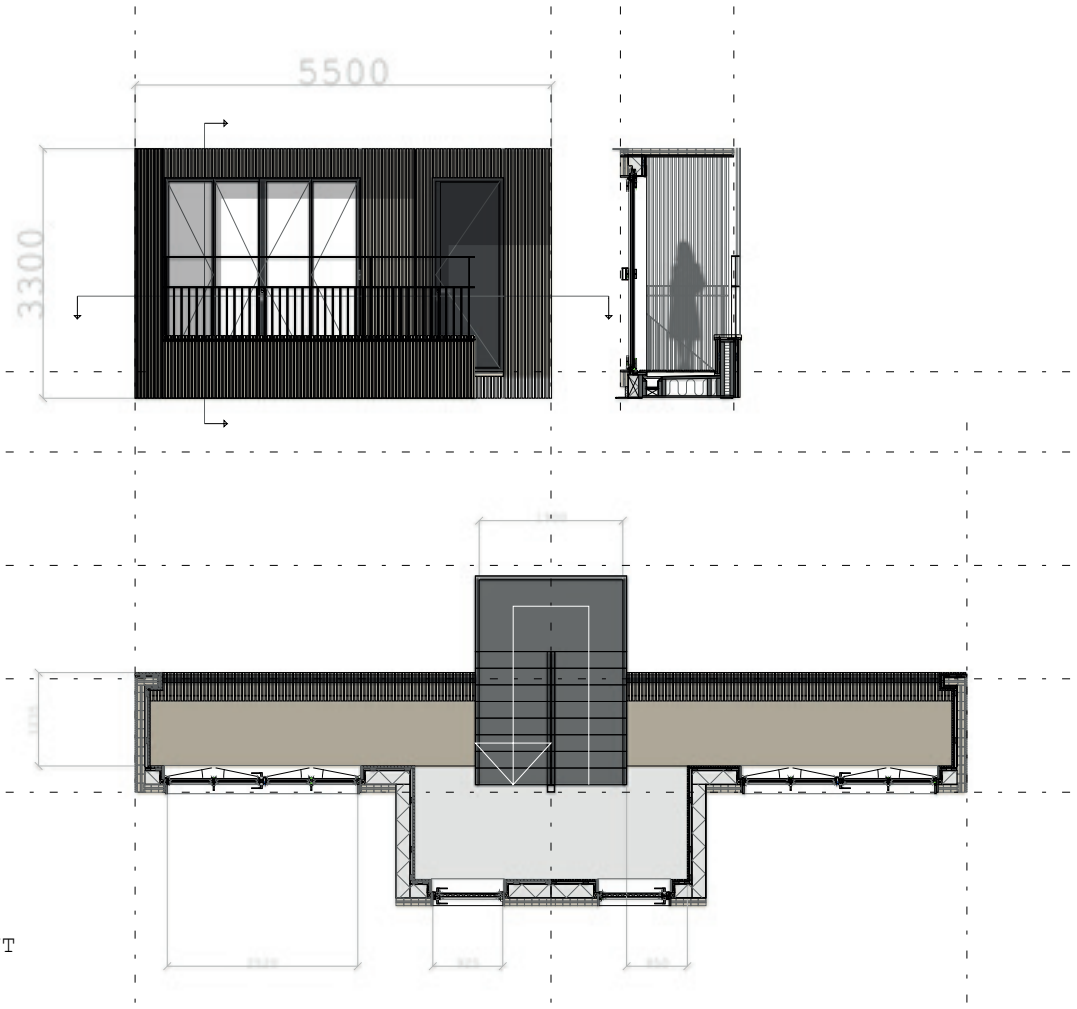
Floor assenbly Top > bottom
12,5 mm Finishing floor
40 mm Dry screed
30 mm Sound insulation
30 mm Multiplex
220 mm Ribfloor
20 mm Multiplex
22 mm Cavity space
80 mm CLT - 3 ply
15 mm Glasroc plasterboard (2x)

Facade fragments

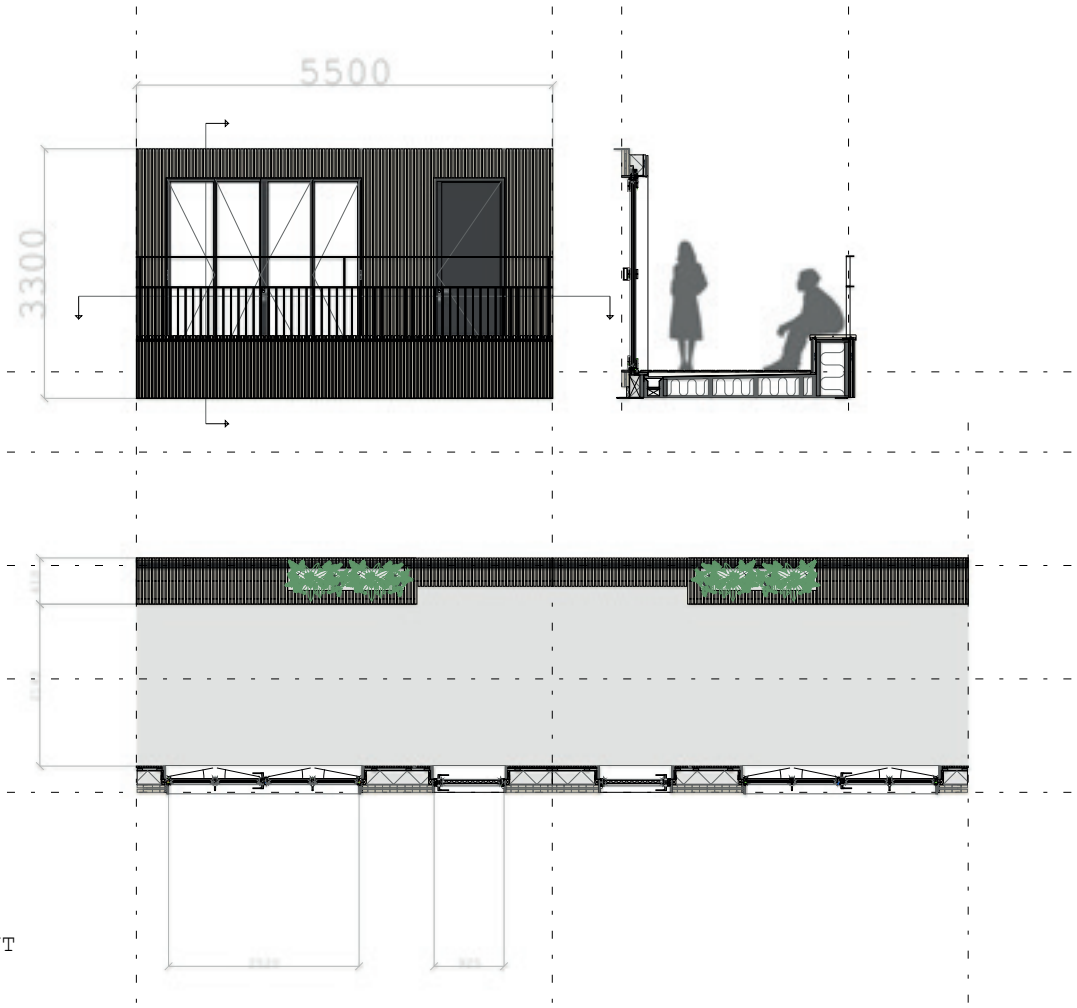
- Front view
- Section
- Plan view (connection front yard and gallery)



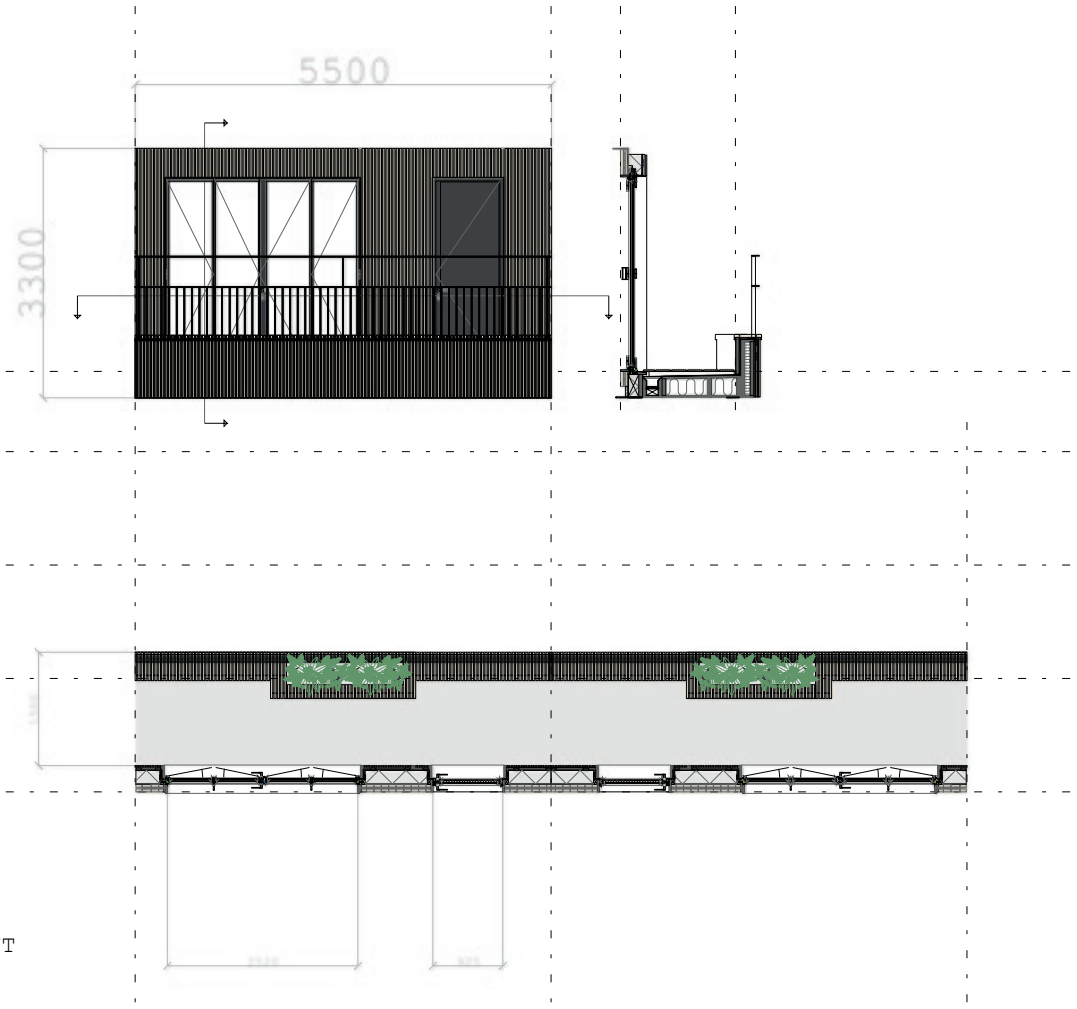
FACADE FRAGMENT
FLOOR 3
1:50



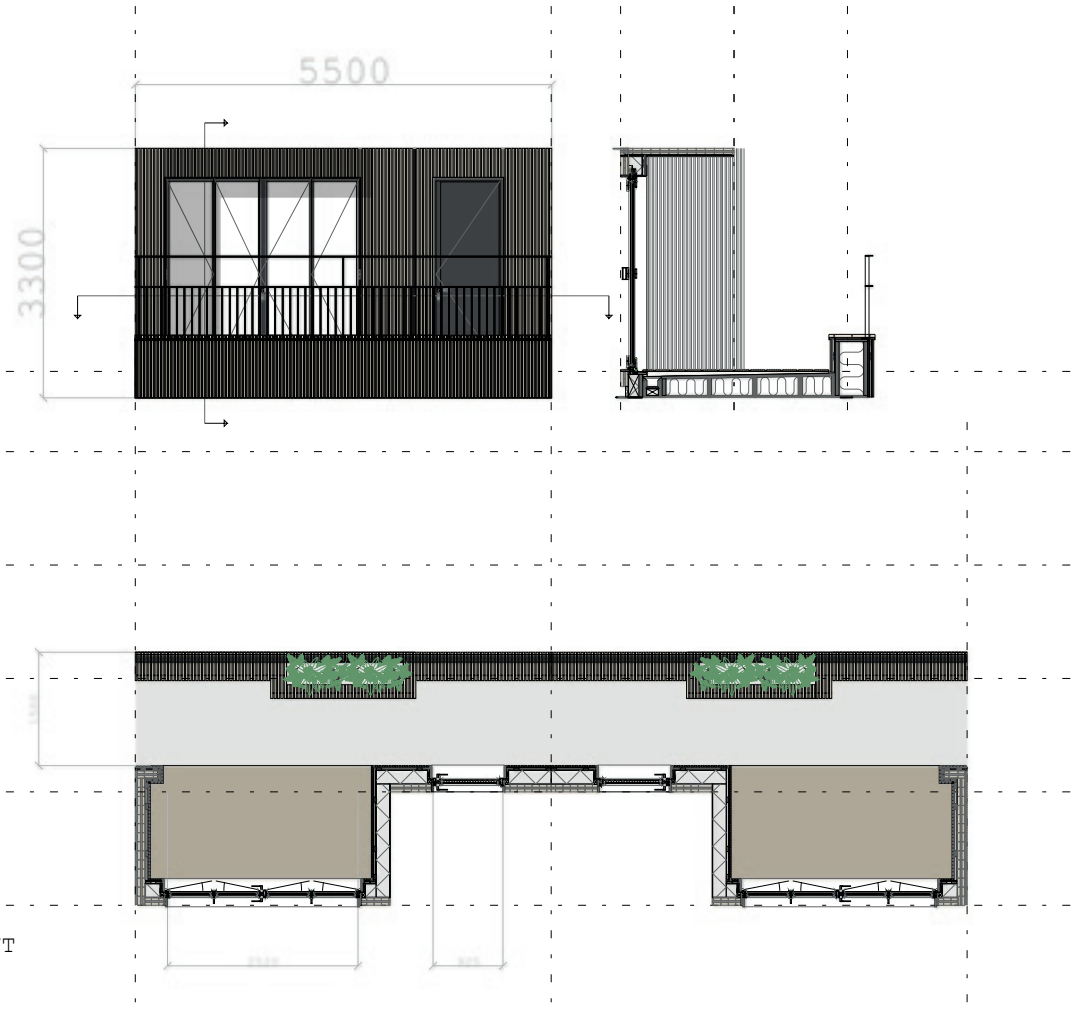
FACADE FRAGMENT
FLOOR 4
1:50



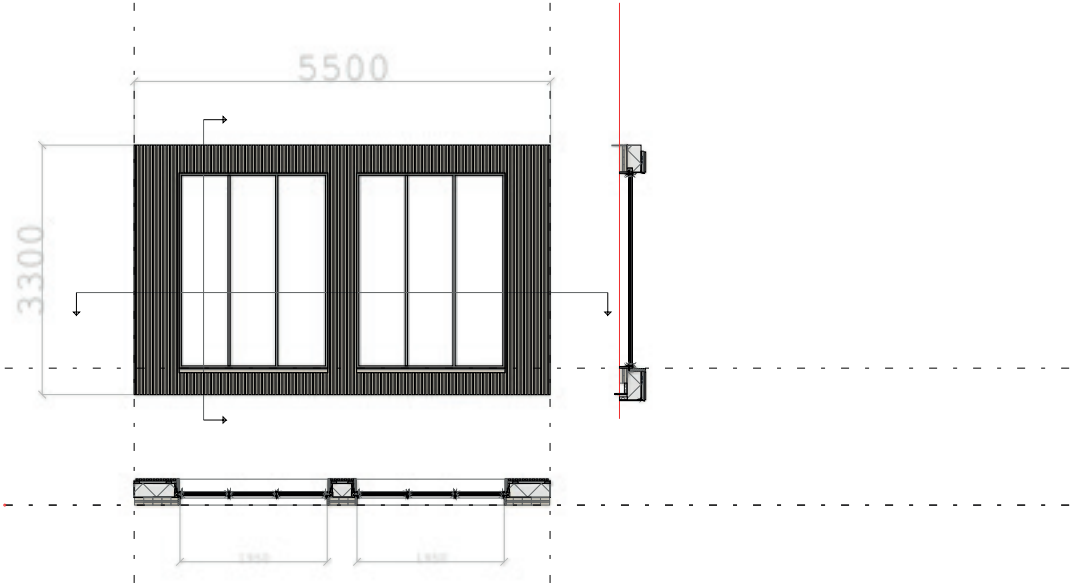
FACADE FRAGMENT
FLOOR 5
1:50



FACADE FRAGMENT
FLOOR 6A
1:50

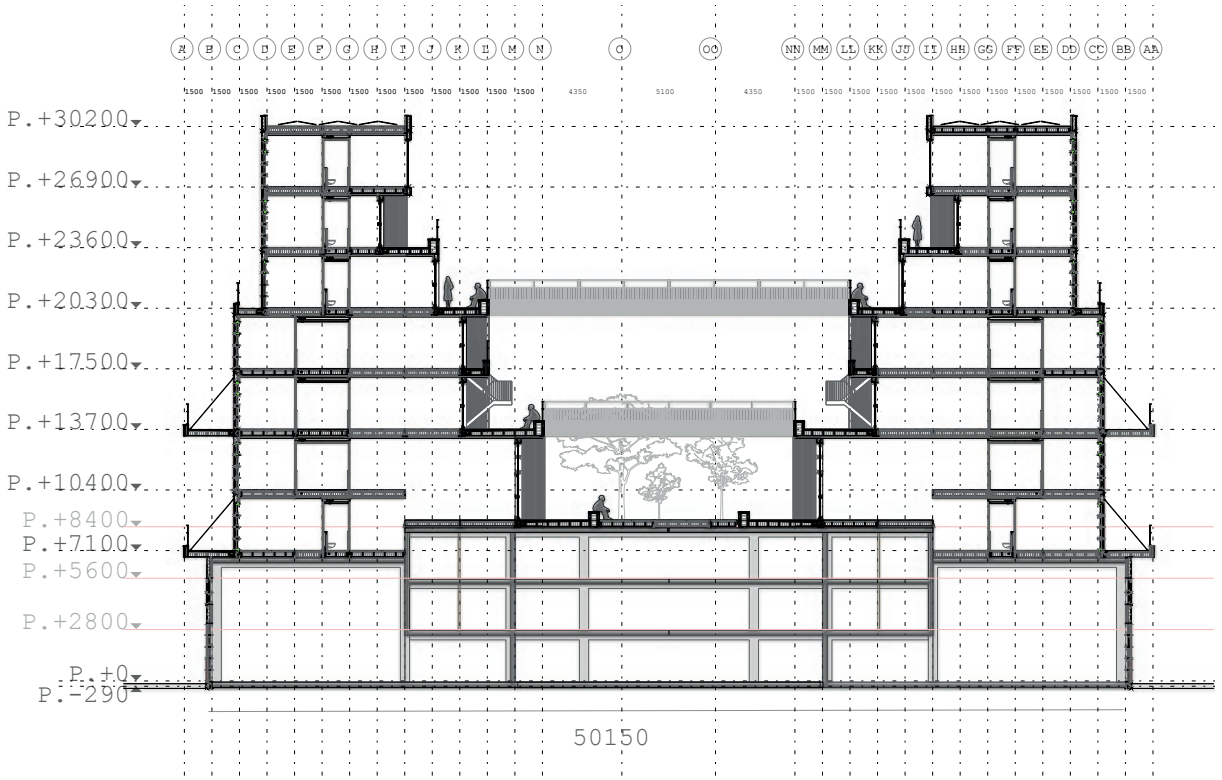


FACADE FRAGMENT
FLOOR 6B
1:50



FACADE FRAGMENT
FLOOR 7
1:50

Section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P.+7100
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P.+2800
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Modules

Modules

844 in total

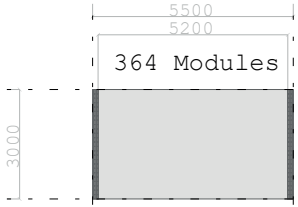
Module:
Living-
Bedroom

Module:
Facilities

Module:
Entrance

Module A:

364 Modules



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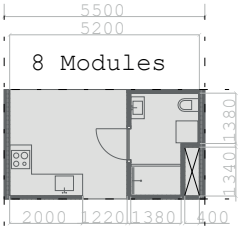

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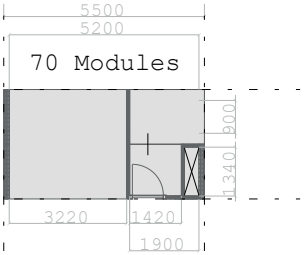

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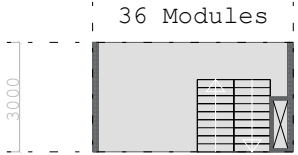

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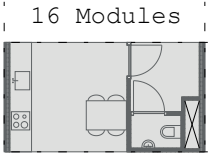

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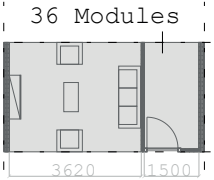

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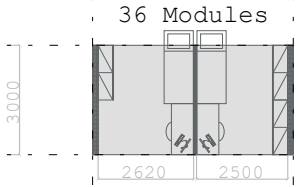

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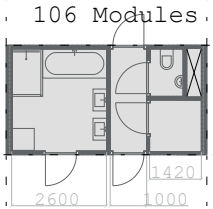

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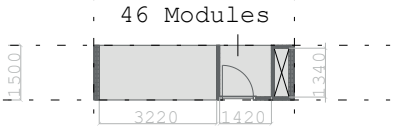

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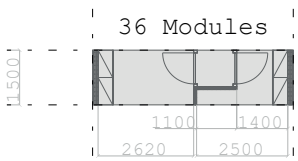

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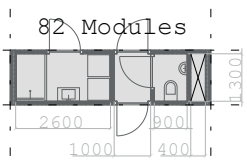

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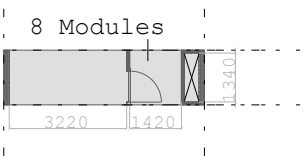

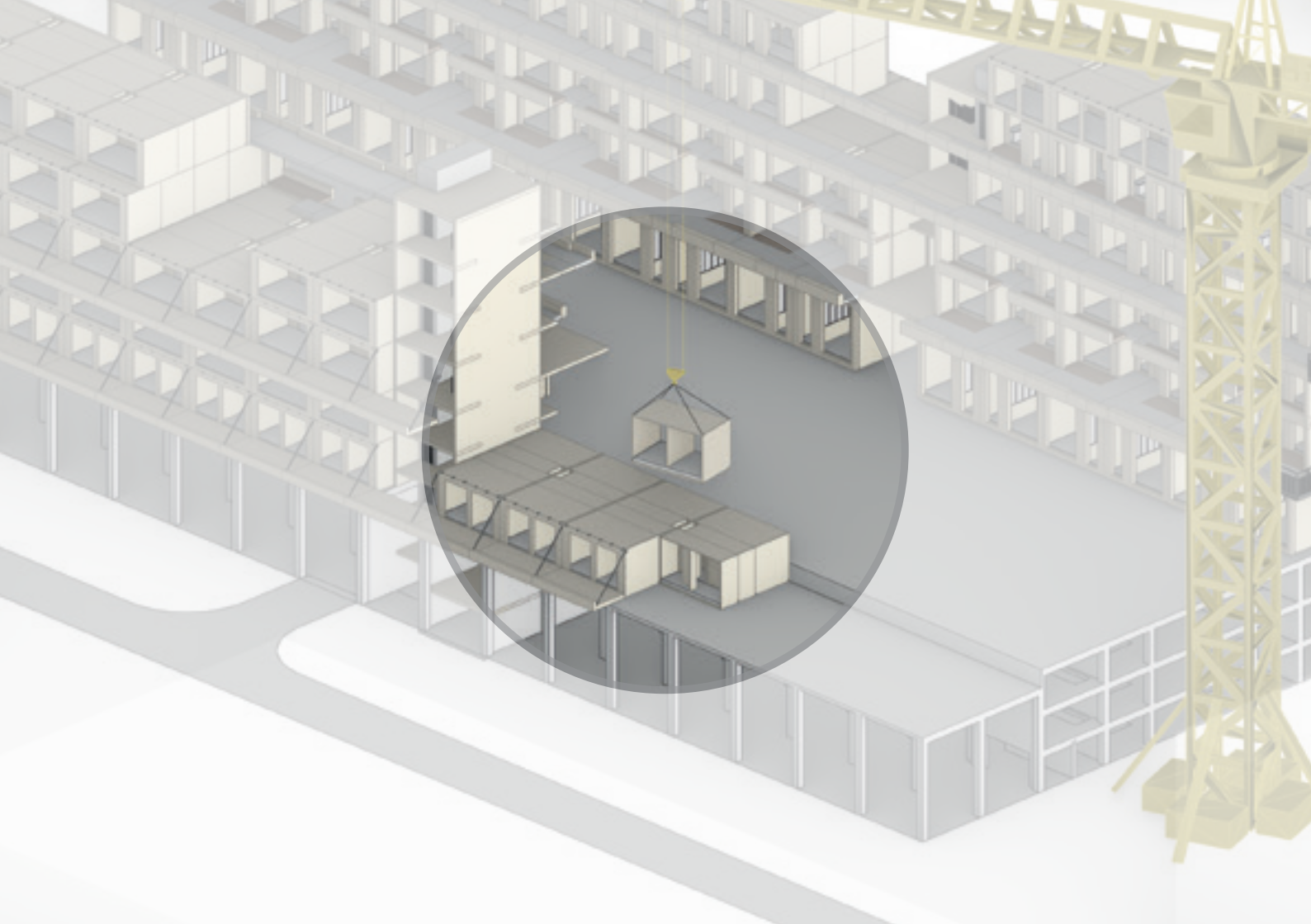

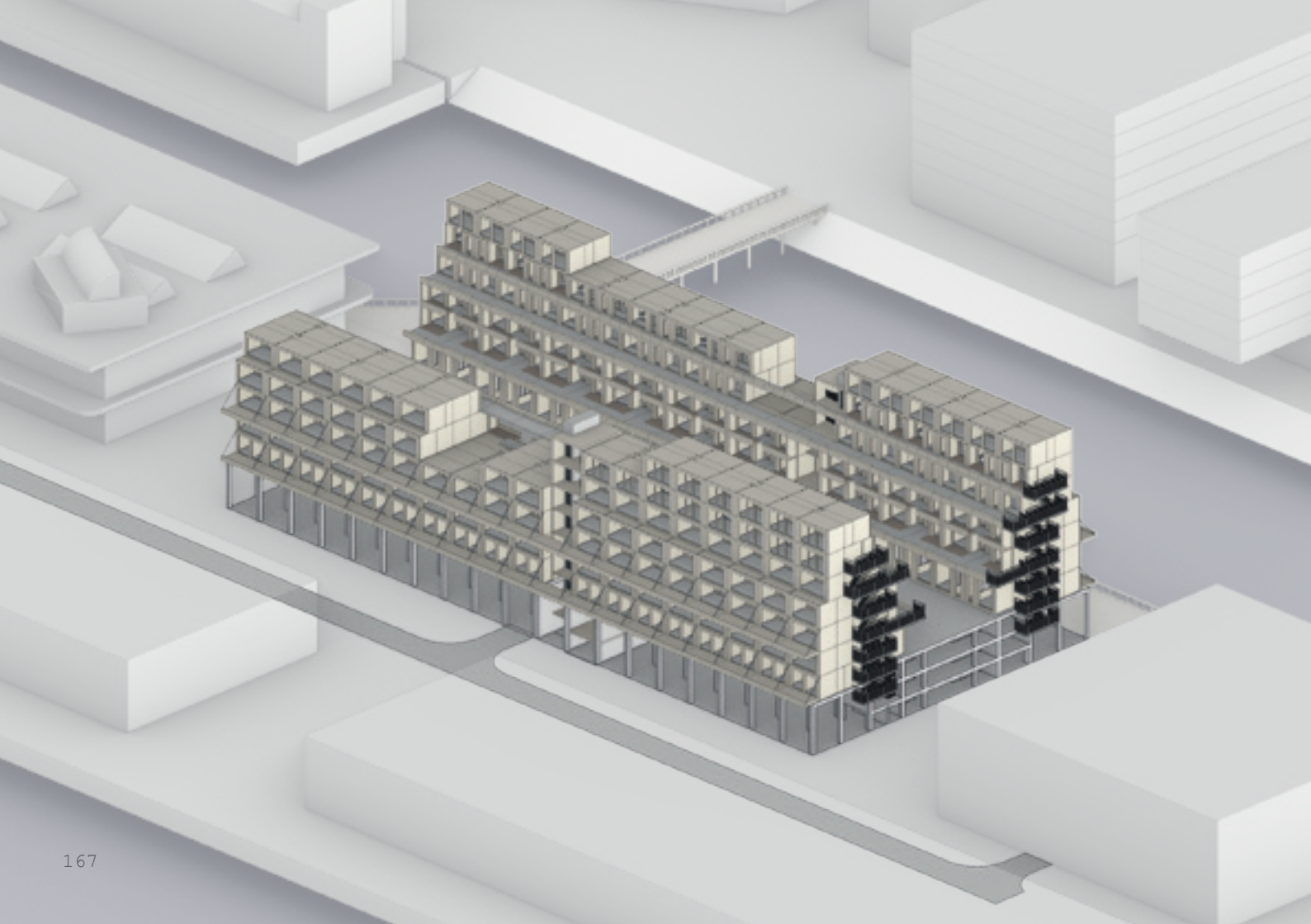

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Appendix A:

Reflection booklet master graduation

‘Hey Neighbor’

Connectedness while preserving one’s own independence

Reflection booklet master graduation

Anne de Schepper | 4085485

3-12-2020

Technische Universiteit Delft
Master Architecture, Urbanism and Building Sciences
Architecture track
Dwelling, Dutch Housing studio

Mentors:
Architecture Theo Kupers
Research Pierijn van de Putt
Building Technology Ferry Adema
Delegate Paul Chan

Preface

The goal of this reflection report is to reflect on how different research methods have contributed to my master graduation project. My project, 'Hey Neighbor', focuses on countering the negative effects of an individualized society. Moreover, it focuses on improving the social cohesion amongst neighbors of a large residential building. During this project I therefore sought to answer the following research question: Is it possible for an architectural design to counter the negative effects implicated with the individualization and improve the social cohesion within a residential building?

Throughout this booklet I will reflect on the research methods that I used and how they contributed to my graduation project. The research methods range from purely scientific to more subjective. In addition, I will reflect on what I could have done differently to give a better support of the final design and on a number of aspects as determined by the University.

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Introduction

The master graduation studio of Dwelling Dutch Housing makes use of different research methods. These methods range from fundamental to applied and developmental research. This makes architecture, and the Dwelling studio in particular, an interesting study since it uses different methods than other more scientifically oriented professions. Objectivity and relevance of architectural designs are therefore often debated because of the use of different research and how not scientific they can be. However, it is not always possible to select the most scientific research in order to come to an architectural design since we as architects need other information as well[1]. The master graduation project of Dwelling tries to embed the elements of controllability and fundamental research. By making use of different research methods students get the change to see for themselves how research, in all its different forms, can contribute to an architectural design. By using different research methods and reflecting upon how u used them and why, can make the design process more transparent, making it easier to defend your design choices.

In current reflection booklet I will first give a more elaborate reflection on the Scientificness of architectural design and research process. In the second part I will discuss and reflect upon a couple of different research methods that I used during my master graduation. In addition to the reflection on the scientificness of my master graduation and the used research methods, I will shortly discuss four reflection aspects determined by the University.

[1] Such as information about economic aspects, building sites or design solutions.

Scientificness of architectural research and design

What is the scientificness of architectural research and design? This is an important question to ask oneself upon graduating from a University because the ability to conduct scientific research is an important requirement to finishing a master's degree. This question becomes even more important when graduating from a design-, rather than a technical- or 'more scientific-', study. This because design is often seen as subjective whereas scientific is seen as the search for the truth.

In order to see how scientific architectural research and design actually are, we first need to have a definition of what actually is scientific. The OECD is an international organization that tries to create a shared view on science, technology and innovation. They support the scientific community by creating methodological guidelines in order to collect, report and use data. The OECD state that scientific research should contribute to creating knowledge for the sake of knowledge. Which can be seen as 'fundamental research'. However, they also underline the importance of being able to transfer the scientific knowledge to the field of research and development. Their view is that scientific efforts should provide a basis for new (technological) developments (OECD, 2015).

This view of science is interesting from an architectural perspective because it can help architects to shape design hypotheses based on scientific research. However, the application of said science does not need to be scientific in itself.

In order to use scientific research as a base for architectural application it is important to understand the ways in which scientific research is conducted.

Moreover, when it is possible to adapt a scientific research method in the application of an architectural design the design can contribute to the scientific knowledge. The structure of scientific research follows the following steps:

1. Creating a theoretical framework which leads to a specific research question.
2. Based on the research question and theoretical framework hypotheses with specific expectations are formed.
3. Creating operational definitions. In order to test the hypotheses, it is important to define the to be tested variables and how these will be measured in the experiment(s). This is an important step because it is the bridge between the conceptual and observable.
4. Gathering the data.
5. Analyzing the data.
6. Interpreting the data by reporting and visualizing the outcomes of your analysis.
7. Test the hypothesis. Did you find what you were looking for?
8. Draw a conclusion and discuss why the results are (or not) as expected.

With this structure hypotheses can be tested and either be supported or rejected. By structuring and reporting once research via a scientific approach it is possible to reproduce the experiment and moreover also to see if the hypotheses would hold under different circumstances. Furthermore, it also opens ways for alternative hypotheses to be tested, making it possible to get closer and closer to the truth (OECD, 2015).

This approach works for most of the architectural research. However, the application of architectural research to an architectural design does not necessarily work via a scientific method. Here it is not always possible to adapt a fully scientific approach. We can take current Dwelling studio as an example. We started by doing research into a specific topic, which can be seen as step 1 of the scientific approach. In my case this resulted in the question: '*Is it possible for an architectural design to counter the negative effects implicated with the individualization and improve the social cohesion within a residential building?*'

Based on this question and the literature research on social cohesion I developed different design hypotheses that should be tested during the design process. So, I started to design a concept in which different elements that can improve social cohesion amongst neighbors in a large residential building should be tested. This is where the scientific parts come to an end because in order to test the concept the building needs to be build. This takes both time and money which is not offered in the master's degree. This makes it impossible to see if the design concept really improves social cohesion amongst neighbors during the design studio.

Let's say it is possible. What would we do when the design is build but the research rejects the hypotheses? Would we tear down the building? Would we alter it via our newly gained scientific insight? Or would we leave the building as is?

The question arises if it will ever be possible to adapt a fully scientific approach to architectural design? To my opinion? More or less. The Dwelling design studio already uses technological tools like VR to make testing more approachable. Even though these tools and their application are still in their infancy, they

could open the way in which buildings are created. Tools like VR could help future architect by making it easier to test their hypotheses and come to a final design based on a more scientific approach.[2]

The next question that comes up: is it a problem that architecture is not (yet) fully scientific? No, because for now it is not necessary. However, in order to create a design based on scientific research a fundamental knowledge of conducting and applying scientific research is required.

The final question: do architectural designs become better when they are more scientific? In some ways they might. For instance, when looking at sustainability or even when trying to answer my own research question. Both of these challenges could benefit from more knowledge around building principles in order to make a more livable environment. However, it might be that a fully scientific approach to architectural design inhibits architectural freedom. It could be that the use of strict rules and guidelines make designs more monotonous because of the systematic approach to all design problems. So therefore, it might not be so bad that not all parts of coming to an architectural design are strictly scientific.

So then, what is the scientificness of architectural research and design? Architectural research can take a fully scientific approach, but architectural design differs in certain ways. To me personally this means that the basis of architectural research and design can be done via a scientific method, however, the

[2] For more information on this topic see Nigel Cross and his systematic design process.

application of said research can be influenced by other factors making it less scientific and more applied or developmental. So, the approach one takes to come to a design can be done via scientific research and scientific research can give direction for certain design choices. However, architectural research as used in current design studio cannot always be fully scientific since it is not always possible to follow a strictly scientific method.

Types of research

Fundamental research

Literature research

The previous chapter states the importance of following a specific structure in order to conduct scientific or fundamental research. The first step is to create a theoretical framework which leads to a specific research question. This approach is also adapted by the Dwelling master's program.

In order to give some direction to the research the master group was briefed by both the municipality and the master track mentors on the topics that were of interest for this project. The municipality, as well as the mentors, instructed us to design for a collective and inclusive living environment within a dynamic urban area. This for me raised a couple of questions; *'What cause people to feel excluded from the collectiveness and inclusiveness within a dynamic urban area?', 'Who are the people that could benefit most from living in a collective and inclusive environment?',* and finally, *'how can architecture contribute to the creation of collectiveness and inclusiveness within a residential building?'*. These questions show the importance of understanding how scientific research is conducted in other scientific fields because the answers cannot be found through merely architectural research. In order to come to a full understanding, I needed to borrow literature and research on social sciences.

By researching the questions that came up during the design briefs I found that people who live in urban areas or in a small household are more susceptive for feelings of social loneliness (Rijksinsituut voor Volksgezondheid en Milieu, 2016;

CBS, 2020). These feelings of loneliness cause people to withdrawal from society (Ministerie van Volksgezondheid, Welzijn en Sport, 2019). Fortunately, there is a solution for this, namely; increasing the social cohesion (CBS, 2017; Van Tilburg & de Jong-Gierveld, 2007). The research into social cohesion and loneliness showed that both of these constructs are influenced by the individualization of society[3] (Putnam, 2000). This research formed itself into my research question: '*Is it possible for an architectural design to counter the negative effects implicated with the individualization and improve the social cohesion within a residential building?*'

It was hard to find an all-encompassing answer on this question via literature research since it is a niche. However, there were a few interesting literature insights that I adapted into my design hypotheses and inspired the continuation of my more applied and developmental research.

[3] It should be mentioned that not all parts of individualization are bad. For instance, people started to think for themselves.

Insights of the literature research:

- People would like to have a closer relationship and more interaction with their neighbors (Akkermans et al., 2019; CBS, 2019).
- There are four ways in which people can have an interaction: visual, acoustic, physical and digital (Gehl,2011).
- There is a difference between passive and active encounters (Gehl, 2011).
- 'Well designed' environments stimulate unplanned encounters and can facilitate them better (Gehl, 2011).
- Feelings of crowding increase social withdrawal (Evans et al. 1996).
    - The ability to easily transition from a public to private area gives people feelings of control and counteracts social withdrawal in crowded spaces (architectural depth).
- Promote the transition from public to private in a intuitive way (public to, semi-public to, semi-private to, private) to stimulate interaction.
    - Front yards can promote interaction (COMMUNICATION BK, 2020).

Applied research

Field research

A less scientific but more applied research method is field research. By doing field research you get a feel and understanding of the area you are designing for. This type of research can help you to better embed your project into its context. Two types of field research that are applied in my project were (1) the design brief by the municipality and (2) walking around and taking photo's

Municipality design brief

The design brief of the municipality provided the students of the master program insight into the development vision for the Merwe-Vierhavens area (ruimtelijk raamwerk). This vision is important because in order to make a design that can potentially be build it needs to fit the vision of the area developer. However, if your design does not fit into the set vision you need to be able to explain if and how your design is a better solution. The design can be 'alien', but you need to have a good reason for making it so.

The design brief influenced my decision to build for starters and empty nesters. The municipality wants to create a lively urban area and both of these target groups have the need to live near on in such areas. Moreover, the literature research revealed that small households are more susceptible to social loneliness and withdrawal. This means that my literature research and the design brief have a

nice overlap[4]. Moreover, the decision to design for starters also shaped the floorplans because in order to attract starters housing needs to be affordable and available[5]. Living in or close to a city center can be expensive, which meant that my floorplans should not be too big in order to remain affordable for this target group.

Walking around and taking photo's
In order to get a feel for an area it is important to walk around and breath in the air. By walking around and taking photo's you can get inspired. My architectural decisions are greatly inspired by the chosen plot and photo's that I took of the surrounding area. The plot is located at in a former harbor area, which made me decide to give the building an industrial look. Furthermore, the Katoenveem is located directly next to my plot. This national monument to which I wanted to make an architectural connection. This is why I decided to design my balconies in line with the 'balconies' of the Katoenveem.

[4] which is logical since my literature research was inspired by the design brief
[5] The current housing market is overstrung and in order to solve this we as architects need to design houses that can resolve this issue.

Conclusion
The field research application to my design is based more on intuition than fundamental research. However, it is important to understand the context for which you are designing in order to create a coherent story for yourself and the developer.

Online Reference research
The corona crisis made it almost impossible to travel during my master graduation. In order to draw inspiration from previous harbor area's and industrial looks it was therefore necessary to conduct online reference research. Websites like Pinterest, Google and industrial design architects made this fairly simple. This research inspired me to use a brick facade on the outside to connect to the harbor area.

I decided to use wood for the inside façade since wood can create a warm and soft environment. My previous literature research reviled that warm and well-designed spaces are better at stimulating social interactions (Gehl, 2011). So, it made more sense to use wood instead of brick.

Multi-case studies

As an architect you can draw inspiration form your development plot and the surrounding area. You can also draw inspiration and insight from previously developed buildings. This is the essence of Multi-case studies. Conducting Multi-case studies offers you a lot of information on different design solutions to the same problem (Groat & Wang, 2013).

The master studio identified a number of case studies located in the Netherlands or Belgium. These cases were selected so that we could visit them. However, the corona crisis made it impossible to visit the sites. Therefore, we based our insights on these cases on online documentation.

I also included four personal case studies in my research: the Justus van Effe, 8 House, Narkomfin, and Robin Hood. These cases gave insight on different accessibility and routing types. They inspired me to create streets in the air. This resulted in the design hypotheses to create wide galleries that create space for transition zones and the use of one gallery for multiple floors to increase the chance of unplanned encounters. Moreover, the case studies inspired me to use simple integrated elements into the galleries like benches. In this way you create a simple semi-public space where people stay for a longer period and promotes interaction.

Development

Module research

1 million homes before 2030. This is a challenge that architects in the Netherlands have to face in the upcoming 10 years. Meaning that we have to start thinking about ways to build in a fast and efficient way. This is why I became interested in modular building. Modular buildings are created in a factory under controlled conditions, have a short construction time on the building site, the designs are transferable to other projects, and you can create a large number of floorplan variations. There is not a lot of information on modular systems for residential buildings. This meant that I needed to contact different module developing companies. I got into contact with three developers: Stora Enzo (located in England), KLH (located in Austria) and Laminated timber solutions (Belgium).

These companies gave insight into stacking methods and how far the modules can be finished in the factory and which parts need to be added on the building site. They also advised me on different options for the floor plates: Rib-floor (LVL hout), Cross Laminated Timber (CLT) and concrete. I decided to use a rib-floors because this creates the opportunity to integrate ducts into the floor, it isolates the gally floor without adding extra parquet thickness, and uses less wood making it more sustainable.

During my studies I never really saw making drawings as doing research. However, since the beginning of the master project I have seen that drawing can contribute to get a better understanding of your design. This is also what happened when I was working on the different floorplans with the combination of modular building. By

drawing different floorplan and module solutions I learned more and more on how I could fill the spaces within my design. This ultimately led to the idea of a house as a tunnel with different section. The fist section are the living room areas, which are faced towards the inner garden to create a direct connection. The second section consists of the kitchen and bathroom. The final section contains the bedroom. By shaping the floorplans via these sections I was able to create a few modules that can create a large variety of floorplans within the same system.

Discussion and conclusion

Making use of different research methods is key in architectural research. As I stated in the fundamental research section, there was not a lot of fundamental research on improving social cohesion amongst neighbors. This research phase was more about creating a clear view on the target group and their needs. The literature research did give some insight into small design choices that can have a big impact on interaction amongst people (for instance; encounter types and ways for interaction). Since the answer to my research question could not be found solely through fundamental research, I also needed to apply applied and developmental research. These research methods resulted into clear design hypotheses and the conceptual and final design.

The process of architectural research is not linear but rather intertwined. To me this means that architectural research is the bridge between scientific and the real world. This project made abundantly clear that in order to come to a 'good' design, research, in whichever form it comes, can give new insights and design inspirations. The combination of research methods used in my project resulted into a design with different design elements, stimulating social interactions amongst neighbors. By creating a 'well designed' space this project aims to ward off the loss of social cohesion and create an enjoyable and livable residential building in a lively urban area. To my opinion, it's a successful design and I think it will achieve its goal.

Secondary reflections

Aspect 2

"The relationship between the graduation topic, the studio topic, the master track and the master program"

There is not a clear relationship between my graduation/studio topic and the other studios within my master track. When I started my masters I was very interested in different parts of architecture such as research, which is why I chose to do The Why Factory studio, and non-standard interactive architecture, which is why I chose the Hyperbody studio. I initially wanted to graduate from the Hyperbody studio, but the University canceled this master graduation making this no longer possible. Parts of the Hyperbody graduation became mixed with architectural engineering however, this was not at the same level.
In order to decide which master graduation track I wanted to follow I decided to take a gap year and get some professional working experience. When I reentered into the master program, I had decide on a new graduation path and chose Dwelling. To me, the Dwelling master studio was the most interesting and challenging because of the puzzle that forms a housing assignment.
Even though my master track was not linear I gained a lot of knowledge and experience in different architectural fields. This path might not make me a standard Dwelling or Hyperbody architect but more an architect that is able to transfer his knowledge of different architectural fields into an architectural design.

Aspect 3

"Elaboration on the research methods and approach chosen by me in relation to the graduation studio methodical line of inquiry, reflecting thereby upon the scientific relevance of the work"

See the first chapter and literature research paragraph of this reflection paper for more elaboration on this aspect. These chapters show the relevance of understanding how scientific research is conducted. Moreover, architecture can be seen as a bridge between fundamental and applied science. As an architect you need to be able to understand scientific research methods and outcomes in order to apply them to a research hypotheses and develop these into a working design.

Aspect 4

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

My literature research into the individualization of society and social cohesion can be used as a basis for future design projects of myself and other architecture students or professionals. This research can also give way for future research projects since there is not a lot of information on how architectural designs can influence human behavior and human interaction.

My research and the use of modular building techniques is also something that can be interesting for me and other professionals. In order to create 1 million homes before 2030 we need to start building. Modular building with a residential purpose is relatively new but, as I have shown with my graduation project, can be verry interesting since it can be fast, efficient, and sustainable.

Aspect 5

"Discussing the ethical issues and dilemmas I may have encountered in doing the research, elaborating the design and potential applications of the results in practice"

There were two ethical issues about the target group establishment/formation that I encountered during the literature research.
First of all, research showed that ethnical diversity decreases social cohesion. This raises the question of who is going to be your target group? Is it the role of an architect to solve this issue or is it something that others should solve? Furthermore, is it okay that an architect segregates? I decided to stay away from this discussion since this is, in my opinion, an issue that should be solved by others. However, it is possible that if I decided to focus on a more specific ethnical group the final design would have been a better solution to my research question.

The second issue was about my decision to design for small households. The reason I decided to focus on this group had two reason; (1) the housing market in Rotterdam is most overstrained for starters and (2) loneliness and alienation is biggest amongst smaller households. My research however revealed that children can be a binding factor. So again, if I would have focused on a different target group the final design might have been better solution on my research question. The challenge to design for small households is therefore greater.

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