

STARTERS IN THE CITY:

A LIVELY AND VIBRANT
LIVE-WORK ENVIRONMENT IN
THE FUTURE METROPOLITAN
AREA OF ROTTERDAM.

TIJMEN LOURENS DIJK

TIJMEN LOURENS DIJK
4303458

IR. T.W. KUPERS
IR. F. ADEMA
IR. P.S. VAN DER PUTT

TU DELFT | FACULTY OF ARCHITECTURE
ARCHITECTURE AND DWELLING

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PREFACE

Over the past year I have followed the Dutch Housing graduation studio of the chair of Architecture and Dwelling at the TU Delft - Faculty of architecture.

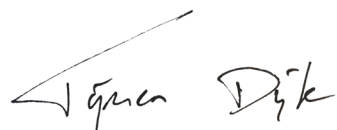
During this design project i've focussed on designing affordable housing for just graduated starters in the city. A group of recent graduates of professional schools which are in the age group between 25 and 34, and just started in their first jobs. For this group of 'Young Professionals' it is extremely hard to find a place to live in the city at the moment.

They earn too much for social housing, but not enough to buy or rent on the private market. The availability of affordable housing is very low. For me this was a very interesting subject, because in the near future I will belong to this target group myself.

This graduation year, was a special year. Not only it was the end of seven years of study at the Faculty of Architecture, it was also the year of a worldwide pandemic.

Due to the coronavirus the faculty was closed a couple of months, and the tutoring and lectures had to take place online. This was a new experience for all of us, and has created several challenges both on an organizational and mental level.

In this booklet I will look back on the past year, on the different parts of the process during this graduation project. In this way i hope to give you a clear overview on my overall progress, and on the final result.

A handwritten signature in black ink, reading "Jeroen Dijk". The signature is written in a cursive, slightly slanted style. The first name "Jeroen" is written in a more compact, rounded script, while the last name "Dijk" is written in a more open, elongated script with a prominent upward stroke on the 'i'.

INTRODUCTION

There is an urgent need for affordable housing solutions in the Netherlands before 2030. However, the focus should not only be on producing new dwellings, but rather on creating homes and neighbourhoods that meet the needs of the future population.

In Dutch cities there is a change in the residential culture and there is a large lack of affordable and suitable homes in the Dutch urban region (Randstad). At this moment most of the dutch citizens simply do not have the income to buy a new expensive house or apartment and social housing is only accessible for the citizens with lower incomes.

1 Million Homes

There is a huge housing demand for people with middle incomes and starters, but the production of new dwellings isn't going fast enough. The cities are getting out of space, and densification isn't part of the current Dutch housing culture. This results in a shortage of available homes and a rise of real estate prices in urban regions. On the Dutch housing market there are no opportunities for starters and

at this moment this is causing big problems.

More people wants to live in the cities these days, but in those cities the amount of one-/(or two) person households is also risng. Combined with a constantly growing population there now is a large shortage.

For this reason the TU Delft started a new research programme called '1Million Homes' where through research and eduction the faculty of architecture is exploring a solution for this housing problem.

In the studio Dutch Housing, part of the chair of Architecture and Dwelling at the TU Delft we have done a research on this subject in the context of our graduation assignment. In this research the focus was on collectivity in residential buildings for a specific usergroup. This research consisted of two different parts.

Collectivity Research

With the whole group of graduation students we did a case study research on collectivity in residential buildings around the world. In this study we looked at 15 case sudy projects.

In all those projects two main aspects has been investigated.

1. Dwelling Typology

At first we had a look at the typology of the dwellings within the residential buildings. How are these dwellings situated in the building, and how are they accessible?

2. Collectivity

We also defined the collective spaces, drawn walking routes through the buildings and marked all the possible collective activities in the buildings.

User Group Research

On the other hand we did a user group research in which we defined the user groups for our own design projects. This study also contains out of two parts.

1. In a literature study the user group is defined and investigated. The preferences they have for a house are set out, and form the base of the design project.

2. This literature study is substantiated with another case study research. On the basis of relevant case studies of comparable buildings in the same region the wishes, preferences and expectations of the chosen user group are defined.

This research is the base for the conceptual design of the building block. These two parts of the research (one was more architectural, the other more theoretical) were supplemented with two other courses in which we obtained more background information.

Research Courses

With the research seminar we are practiced in getting the right information out of the book *Building and Dwelling* by Richard Sennet. This was also a good base for an architectural research, and the 5 open forms helped me to define the first conceptual design proposal.

On the other hand we have done a research tutorial in which we learned to adopt techniques from anthropology to conduct research into the relationship between humans and their buildings. During this course the design is brought to another level with the help of Virtual Reality. This new techic makes it possible to walk around your conceptual design and see the problems with scale, height and daylight. This research was strengthened by the book *'Experiencing Architecture'* by Steen Eiler Rasmussen.

Unfortunately due to the corona pandemic it was not possible to follow the full virtual reality course, but it was very helpfull by shaping the form of the building.

All these research parts together have lead to a first conceptual design. In the first chapter you can read the most important outcomes of the different research parts which lead to this conceptual design of the building, and for creating the urban plan. In the second chapter you can see the final design, followed by a reflection on this whole project. With these components I hope to provide a good insight into my entire graduation project.





RESEARCH

INTRODUCTION

Currently in the Netherlands there is a big housing shortage, due to a change in the Dutch residential culture and lack of affordable and suitable homes in the urban regions. More people live alone in large houses, while the population is still growing. Dutch citizens simply do not have the income to buy a new expensive house or apartment and due to changes in legislation housing associations are only allowed to offer dwellings to lower income groups.

Most of the houses in the Netherlands are built to live with a family, but the way we live has changed fast in the last 50 years. Young couples are not living together instantly and even more married couples are splitting up. This causes a rising number of one-person-households.

The largest part of the current housing stock does not fit the requirements of this 'modern families'.

Many one-person-households are currently living in a house that's designed and built for a family. Also empty nesters

(parents of moved out children) keep to remain living in their family houses. This is causing a huge shortage on the housing market which is driving up the prizes.

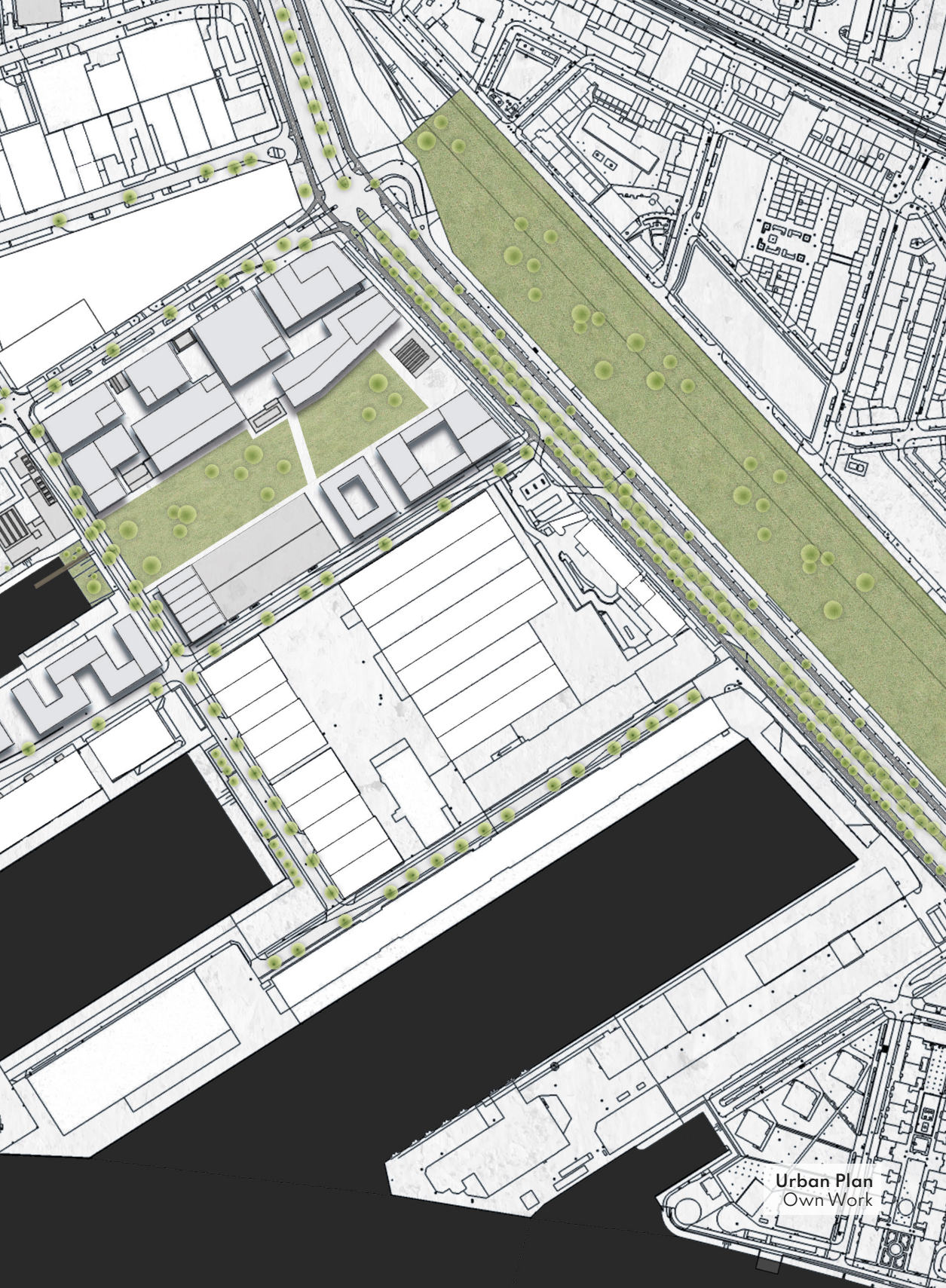
To solve this problem there is not only a need to build a lot of houses, it's even more important to look how this new houses can 'meet the needs of the future generation' (IM Homes, TU Delft). We need to have a more precise look into who we are building for.

For this research and the following design project I have selected the Knowledge workers as target group. For this group of high educated just graduated starters there is a big shortage on the housing market. They can't use social rent, and most of the other houses are too large and expansive.

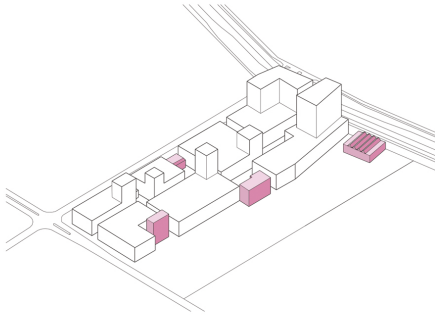
But how to create a building block which perfectly meets the requirements and wishes of the Knowledge Worker?

To answer that question I have conducted a research to define this group. In this book you will read a short summary of this research.

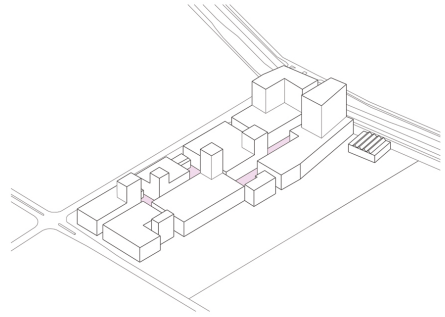




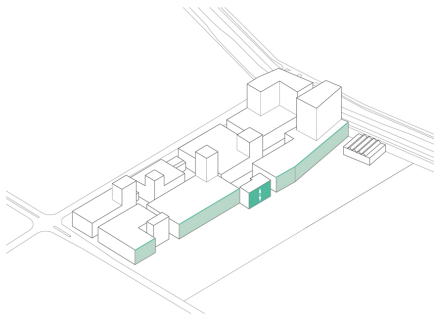
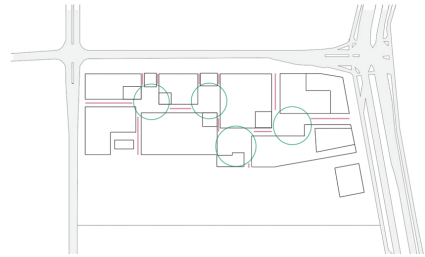
Urban Plan
Own Work



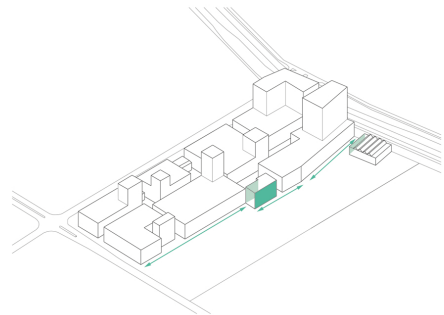
Keep the old characteristic buildings
And form the new buildings around them.



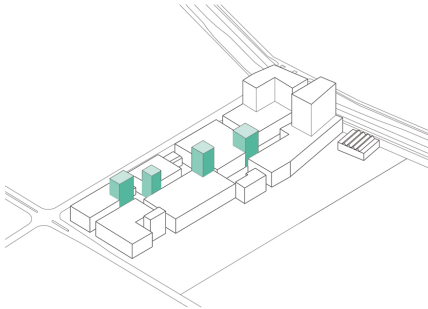
Create small squares inside the block
to keep the coziness of the current
area alive



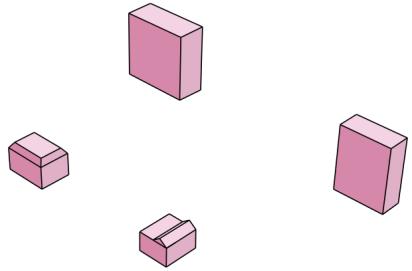
The building height at the park side
is based on the height of the soundport
building



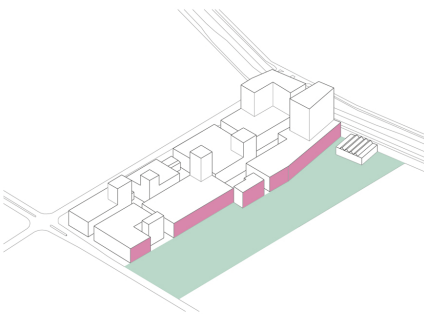
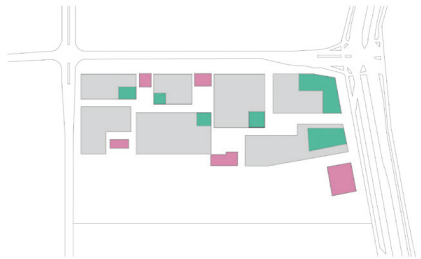
The building line at the park side
is based on the kept buildings



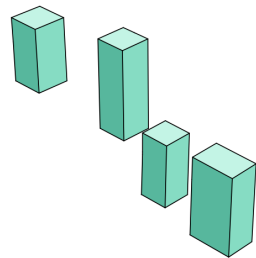
Create landmarks
at the end of every street



Kept existing
buildings



The facades at the park side
are all the same height and orientated to
the park (South-East)



Created Landmarks

URBAN PLAN

With the group of graduation students of the dutch housing studio we have created an urban plan for the 'keilekwartier' which is part of the M4H Area. This former harbour area contains a lot of characteristic old buildings which remind you of the rich history of this area.

In groups of four students we have designed the urban plan for one of the four quadrants of the 'keilekwartier'. In this part you can see how the plan for quadrant A is created.

Existing Buildings

There are 3 types of existing buildings in this area:

1. National Monuments
2. Iconic Buildings
3. Not so special buildings

In the urban design we have decided to remain the monuments and iconic buildings, and to situate the new buildings around them.

We not only want to keep the existing

buildings, but we want to make them real monuments. To achieve that, we have created small squares next to these old buildings which give them a good visibility from all different sides.

Fine Meshed area

But it's not only the old buildings which give this area identity. Also the fine-meshed structure with narrow alleys and building plots in difficult shapes and different sizes gives this area identity. That's why we have decided that we wanted to remain this structure in the new urban plan

To achieve that we've set up a couple of rules. One of the most important was that the 'streets' and alleys in this area may not follow one straight line. This ensures that you never immediately see where you are walking towards.

On the places where the streets ends we created small squares where you can stay for a while, or you can continue your route.

Landmarks

At the endpoint of every street the building blocks are extended with towers, which will act as a landmark.

This 'landmarks' not only give you direction while moving through this area, they also break the monotonous height of the rest of the building blocks, and attract people to have a look what's happening inside this area. These tall towers attract the attention, waiting to be discovered.

Park

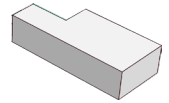
Another important part of this area is the large park at the southside of the building blocks. This park is also monumental and remains in the new urban design. The building blocks on the park side all have the same height which is based on the height of the soundport building. By recording this, an uniform facade line is created along the park, even if the individual facade design of every building is totally different.

Also the border of the buildings around the park is based on the remained existing buildings. (Mainly on the Soundport building, the sloping end is based on studio Roosegaarde). This is done to emphasize the importance of the Soundport building, and to involve this existing buildings in the new urban design.

Building Height

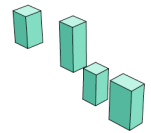
The quadrant is recognized by tall structures at the Vierhavenstraat. These tall structures quickly make place for lower structures as we move closer to the waterfront. The facades surrounding the quadrant express unity, only to be interrupted by the contrasting kept structures.

Building blocks
Plint height 6 meter
4 Layers on top
Monotony and Unity



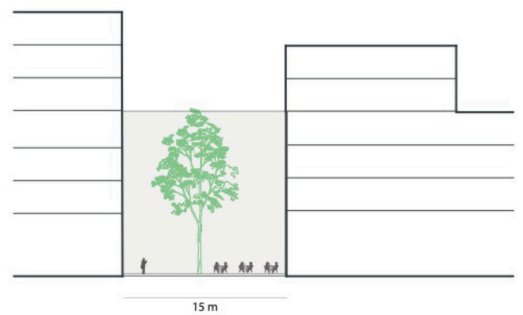
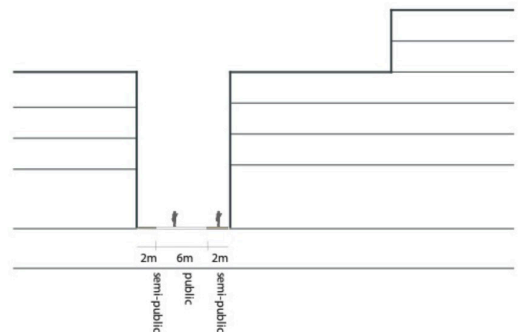
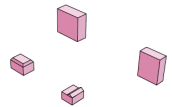
The Towers
8-12 Floors High

Need to be visible from the ground floor of the Ferrodome



Kept Structures

Original character and structure are kept. Only minor refurbishments and interventions



Vierhavenstraat

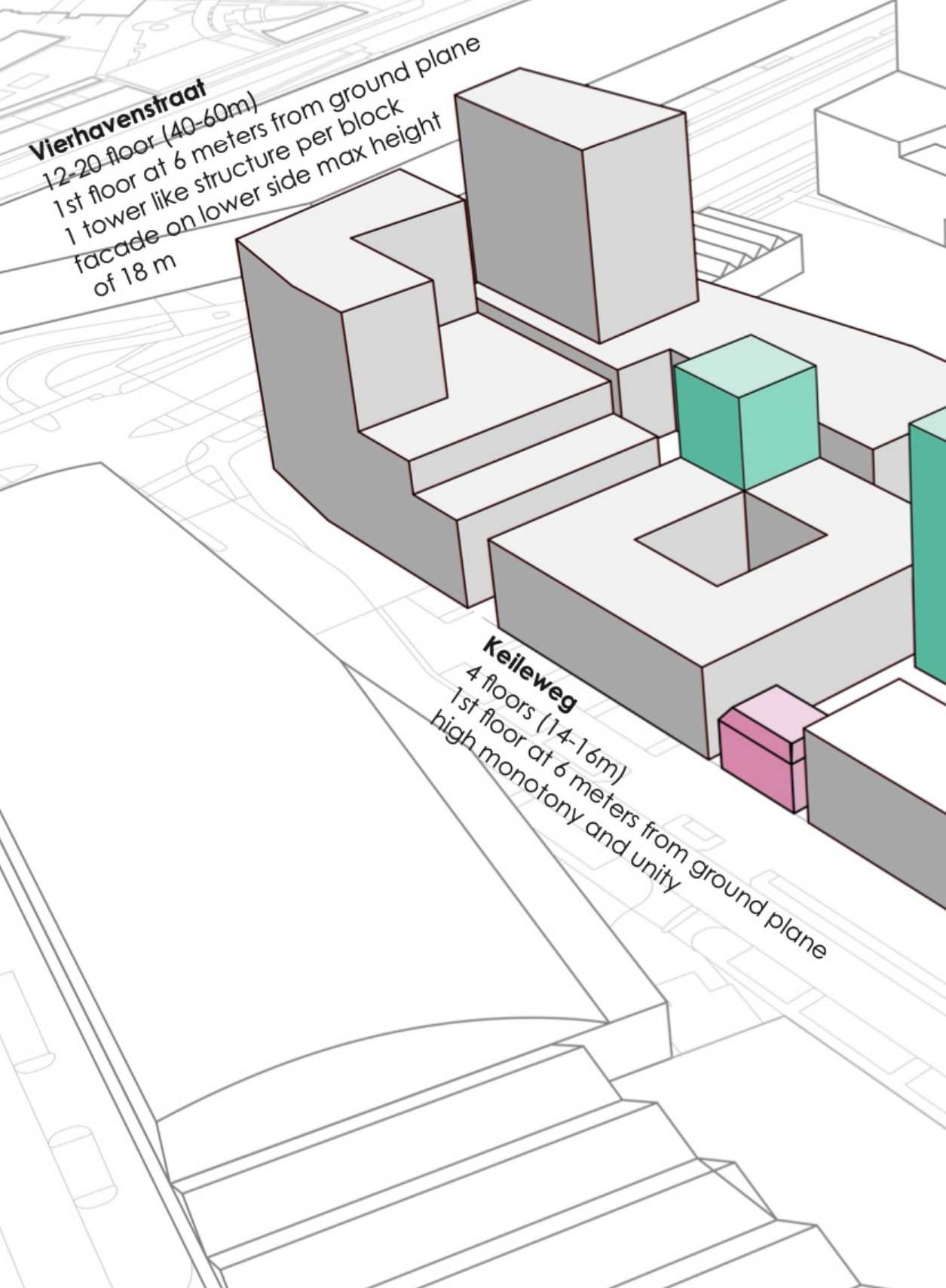
12-20 floor (40-60m)
1st floor at 6 meters from ground plane

1 tower like structure per block
facade on lower side max height
of 18 m

Keileweg

4 floors (14-16m)
1st floor at 6 meters from ground plane

high monotony and unity



Park

4 or 5 floors (16-18 m)
1st floor at 6 meters from ground plane
high monotony and unity

Street width is 7-9 m

Benjamin Franklinstraat

4 floors
1st floor at 6 meters from ground plane
high monotony and unity



Keileweg

Benjamin Franklinstraat

Keilestraat



Vehavenstraat

BUILDING BLOCK

The building block A4 is situated on the head of the keilekwartier, and consists out of two different parts. A tower at the side of the 'Vierhavensstraat, and a lower part going into the area.

As described in the urban plan the lower part consists out of 6 layers and is the same height as the soundport building. Also the front facade is aligned with this building. The height of the lower part is 18 meters

The tower contains 14 floors, and the total height is 43 meters. This is the real 'eye catcher' of the building and will contain apartments with a nice view over the new park, the 'dak-park' and the skyline of Rotterdam.

The shape of this building didn't change a lot during the research tutorial. The reason behind this is that the shape of this building was really thought out in the urban plan. All the lines of this building are based on surrounded buildings, and also the shape of the space between the buildings was carefully shaped out to keep the fine meshed structure of this area.

This shape in between can be seen as cavities (although they are surrounded by Solids). They are carefully carved out of the building blocks to create a fine meshed area, that at some point feel as a maze, but due to the placed towers always provides direction.

Also the places where the higher levels lay back (like the tower are carefully thought of) For this reason i tried to change as less as possible to the shape of the building.

When i looked to the building and 'walked around it' all these decisions worked, and made the scale of the building look and feel smaller than it is. The different heights and corners worked good, and also the size looked good. All the different parts of the building were in proportion with each other.





BUILDING SHAPE

One of the most characteristic elements of this area are the cavities created by the surrounded buildings. On this little squares is place for small terraces. These places provide shelter and giving this neighbourhood it's identity.

Cavities

The shape of the building is really important for creating and shaping those cavities. In the urban plan the outlines of the building thought out carefully. This results in a cohesive whole, and moving these outlines would change the whole area. That's why I decided to keep the outlines of the building the way they are, and also the heights of the different parts stay the same. (Higher is not allowed and lower is a waste of floorspace.)

The shape of the building is also challenging to fill with dwellings because of all the slanting walls. But this also gives the building as a whole, but also the separated dwellings identity. All the proportions of the different parts of this building are carefully matched. This makes the building as a whole a nice composition, and the different roof levels are a good possibility for collective outdoor space.

Daylight

For a residential building daylight is the most important aspect. The daylight as shown in the picture is the situation around 12:00 PM on a spring day. On the park side of the building the daylight isn't a problem. The situation here is quite ideal. On the other side of the building (Which is the North) there is a low amount of sunlight. For the lower part there isn't a big problem. Sunlight will reach the facade indirect, but in the part between the two higher towers there is not enough sunlight to place one side oriented dwellings.

But the sunlight is not the only problem on this side of the building, also the depth of the building is not suitable for dwellings, and because of the tower on top it's not an option to carve out an hole in the block.

By putting the makers in this part of the building, the rest of the plot can be filled with houses.

STARTERS IN THE CITY

In the current Dutch economy, the amount of knowledge workers living in an area is an increasingly important factor in the location choice for large companies.

Herefore attracting and keeping knowledgeworkers is the base for the future economy of the city, so for large cities like Rotterdam the living climate for knowledge workers is an important issue.

At this moment there is a big housing shortage for this group. They earn too much for social housing, but not enough to rent or buy. The current housing shortage in every dutch city has a large impact on the group of knowledgeworkers, and make them move out of the city, which is also a reason to look for a job somewhere else.

Let's start to define the term 'knowledge worker'. The dictionary says: The knowledge worker is someone who is high educated

(HBO or WO), takes in and interprets knowledge and information, develops it and then uses and distributes it. The knowledge workers can be defined in two main categories.

Dutch Knowledge Workers

This first category involves Dutch students who are just graduated and have to leave their student houses. The problem with this group is that they don't have a permanent job yet, and are single most of the time. For work (and network) they are looking for a place in one of the large cities of the Netherlands (Amsterdam, The Hague, Rotterdam or Utrecht) but in this cities, due to housing shortage, the housing prices are rising.

Social housing is not an option because their income is most of the time too high, but they don't earn enough to rent a house on the free market.

International Knowledge Workers

As an international port and trading city, Rotterdam has always attracted people from all over the world. The city now has more than 170

nationalities and more than 300 different cultures. Rotterdam is an example of a city where all these cultures live together and side by side. You can see the wealth that these different cultures bring to the city.

But we are now in a new phase of internationalization. In the 21st century, prosperity is increasing worldwide. This offers plenty of opportunities from an economic perspective. Higher educated people from other countries come to the Netherlands to study and work here. The Erasmus University enrolled a record amount of international students last year (5800) and also more graduated students find Rotterdam because they see prospects for one of the international companies in the city.

These new inhabitants are going to consume, want to travel and ensure that their children have the right education. More countries allow free travel. Partly because of this, and because Rotterdam has developed very positively in recent decades, the city is seeing an increased influx of tourists, but also of international companies opening a branch here.

The expat Center of Rotterdam already noticed a larger influx of higher educated 'internationals' who want to settle (temporary) in Rotterdam, because they see prospects for one of the international companies in the city. The number of internationals at the Rotterdam Expat Center increased by 46% in 2018 compared to the previous year. Companies in Rotterdam like to see them come, because they have a gre-

at need for the knowledge that these internationals bring.

But it brings also some problems. The housing market in Rotterdam is, since a couple of years, quite overheated. Rotterdam was once the city of cheap housing and plenty of space. Those times are now far behind. Rents in Rotterdam are rising faster than in the region of Amsterdam, and housing shortage is increasing faster. The group of knowledge workers which Rotterdam wants to attract can't find a fitting house in the city.

New Living District

But now there is a new opportunity. The old harbour area of the 'Merwe Vierhavens' is going to be transformed into a new living district with the focus on young makers. A place where entrepreneurs and knowledge institutions are putting the transition to the new economy into practice.

In the next 15 years this new district will place around 5000 new houses which will serve all different parts of the population, combined with a dynamic 'makers industry' which will place the current maker companies of this area combined with new categories of makers.

This areas new 'makers industry' brings the economy of the city and port together and contributes to the broadening and sustainability of both. It boosts the innovative power in the region and creates new jobs.

This makers industry responds to new opportunities, made possible by digitization and robotisation. She uses materials that are not harmful

to people and the environment. The proximity to creative talent, markets and knowledge centers is decisive for the success. In addition, this industry needs flexible deployable space.

The 'Merwe Vierhaven' area is ideal for this. There is plenty of room. The universities and the city center are around the corner. And there is a promising prospect for further synergy with RDM directly across the river.

Connection with the Universities

In recent years, the old harbour city Rotterdam has increasingly become a combination of a maker and a knowledge economy. With one of the best universities of the country and many international offices. The Universities of Rotterdam (EUR, HR and INHolland) argue that the city of Rotterdam has to do its best to be attractive for students and knowledge workers to study, work and live.

They advocate for a better living environment for this group. Don't isolate them on a campus, but make designs that place them in the center of the society.

The boards of the university of applied sciences and university suggest 'combining this goal with the further development of Rotterdam South, for example in buildings that contain more than just houses. This makes students part of everyone's daily life in the city.'

These boards set up 10 guidelines which they have presented to the city council. These guidelines

should help to keep the city attractive for higher educated people.

1. Make Rotterdam more attractive for students and knowledge workers.
2. Make Rotterdam more attractive as a place to work on the future.
3. Invest in connection and inclusion.
4. Invest in a Knowledge Agenda.
5. Look differently at international students, knowledge workers and refugees.
6. Joint international profiling.
7. Rotterdam must maintain its own education policy
8. Rotterdam supports higher education in its pursuit of equal opportunities.
9. Support collaboration in education and research in the arts.
10. Be proud of higher education.

All those points together are a good startingpoint for designing for this specific target group. There is a need, there are possibilities, and this area will provide good circumstances for this group of people. Also the connection with the rest of Rotterdam is quite good.

But what are the preferences for this target group the building needs to contain?

PREFERENCES

The group of Knowledge Workers ofcourse has some preferences for their future homes. Different from other target groups these preferences are more based on the price and location, than on the house itself.

To set out the preferences for this target group, at first it was important to define this group. Not all the knowledge workers are the same.

I've divided this group in 3 sub-groups. Singles, Young Couples and Expats. These three subgroups have many matching preferences, but for a good fitting house the preferences are different.

Housing Preferences

For just graduated singles who just leave their student house, a small studio is good enough, while young couples are looking for a 2/3 room apartment. The budget of this couples is also significant higher. For the international Knowledge Worker the price is less relevant, but the service is more important. They prefer furnished houses, with maintenance included because most of the time they are 'short stay' residents. Buying

furniture would be too complicated and expensive.

For most of the knowledge workers the size of the house is less important. The availability, location and price are leading by choosing for a place to live.

Connection

One of the most important consideration points is the location. A good connection with public transport is really important for this group, but also a good connection to the city center. They are looking for good urban facilities on walking/biking distance, and want to live close to the city center and the entertainment area.

For this group it's not a problem when the house is smaller, when there are good facilities in the near surroundings. The city as an extension of the living room.

Price

The most important aspect for this target group is the price. Knowledge Workers who just started working are looking for a place around 60-80 m2 to rent for a maximum

monthly amount of €700(inclusive). When they are together they can pay more (€ 1,000 + per month) and they are looking for about 100 m². (Research of the municipality of Delft for attracting knowledge workers).

For Expats the price is less important. They are mostly short stay residents, and the location is for them the most important aspect. The biggest problem for this group is that they are not familiar with the dutch housing market and its hard to find a good place, on the location they want.

The three pillars in the live of this young knowledge workers are: Living, Working and Services/Facilities. These are the three most important parts of their lives, and in all these categories they have their preferences. Not only in the city, but also in the future building itself these are the three pillars.

In this area there are a lot of chances and possibilities because in terms of location it meets most wishes of this group.

Location

The location of this new urban area is really good accessible with public transport, car and bike. It's close to the city center of Rotterdam and all the important urban facilities are nearby.

Also the area itself will develop to a new urban area, with horeca, clubs, meeting points, public parks and lots of facilities.

It is going to be a nice green area with a park, a nice waterfront, characteristic old harbour buildings combined with modern 21st century architecture. Culture and Making are also important in this area.

So in less then 10 minutes you are in the city center of Rotterdam, but for good facilities you only have to walk a couple of minutes.



SINGLES (23-28)

- Rent
- Uncertain Future
- Location is the most important
- Around City Center
- Studio/Apartment
- 1/2 Rooms
- 40-70 m²
- ± €700,- Incl.



YOUNG COUPLES (28-35)

- Rent/Buy
- Ensured Job
- Location is still important
- Size of the house is important
- Around City Center
- Apartment
- 2/3 Rooms
- 80-100 m²
- > €1000,- Excl.

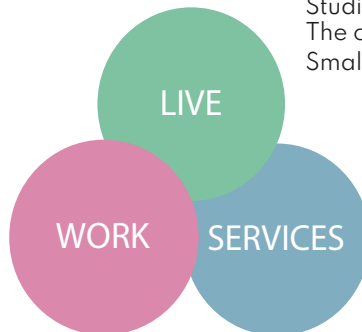


EXPATS (25-30)

- Rent
- 'Short Stay'
- Location is the most important
- Preference for Furnished Room
- Studio/Apartment
- 1/2 Rooms
- Price is less important

LIVE

Living urban environment with various types of building and population
 Green Neighbourhood
 Studio / Small Apartment
 The city as an extension of the house
 Small private outdoor space



WORK

LIVE

SERVICES

WORK

Large international offices
 Technical startups
 University Campus
 Port Of Rotterdam
 High educated region

SERVICES

Shared Facilities
 Urban Facilities on walking/biking distance
 Good Connection to Public Transport
 Close to the city center
 'Urban Living Rooms' Like a coffeebar

MAKERS

The 'Merwe Vierhavens' is called the 'Makersdistrict'. These makers are really important in the development of this area, and are the startingpoint in the design question. Room for this makers absolutely has to be integrated in every single building and they are going to be the base of this area.

To ensure that the makers are going to be part of this new society it is important to really integrate them in the buildings, instead of placing them in separate ones. A good connection between Living, Working and Facilities is important for letting this new neighbourhood work well.

But not only the integration in the buildings is important. It's also important that the future makers of

this area have a good connection with the residents of the buildings, or even better, Live in the buildings.

To achieve that i have chosen to facilitate workplaces for technical startups in robotics and automation. This makers group is mostly technical educated (TU Delft) and is also part of the target group of the knowledge workers. This ensures a good connection between the residents of the building and the makers working in the building.

For Example you can think of a company like somnox. This startup from TU Delft Students is creating a robot to improve the quality of your sleep. By giving this kind of startups a place where they can develop their products and grow a company in Rotterdam, they will have a positive influence on the Rotterdam market. Another great example is the 'Robo House' a place where companies can explore the possibilities of implementing robots into their company.

This kind of companies also perfectly fits the vision the city council of Rotterdam has for this area. A combination of the traditional and the modern makers.



COLLECTIVITY

An important part of this research is collectivity in residential buildings. How does people experience collectivity and how does it work in different residential buildings? These questions are investigated in the group research part for different buildings around the world, but what parts of this collectivity research fit the group of starters?

The research showed that there are 5 different ways to respond to collectiveness in a residential building:

1. Shared staircase or hallway

In most of the residential buildings a staircase or hallway is shared. This is the most cost efficient way to make all the houses in a building reachable and accessible. This is the most basic form of shared space.

2. Meeting elements in hallway

As an architect you can create some informal meeting spaces into the design of a hallway. This can stimulate the residents to meet each other and can create a better community in the building.

3. Visual Connections

Visual connections inside the building can improve the safety of a building, and will stimulate interaction between the residents off the building. It can also provide daylight to spaces which are further from the facade.

4. Shared Facilities

In some residential buildings the residents are sharing some facilities. With communal spaces the interaction between the residents is improved, and by sharing some spaces you can reduce the dwelling sizes and costs of the dwellings inside the building.

5. Shared living elements

The last step is sharing living elements like a livingroom or kitchen. This will definitely make the community inside a building stronger, but will also create a lack of privacy.

But sharing laundry rooms for example don't give the residents a big lack in privacy, and will reduce the costs

Those 5 steps of collectiveness were a good starting point for the design. The starting point was to create a building with enough privacy for all the residents, but with inserted elements of collectiveness from all the categories to stimulate the collectiveness in the building.

So the next step was to investigate the preferences of the chosen target group, to see which kind of collectiveness would fit their preferences.

Collectivity for Starters

Most of the residents of this building are just graduated students, who are used to share facilities with others, but they now became older, and in their first house they don't want to share living spaces with others.

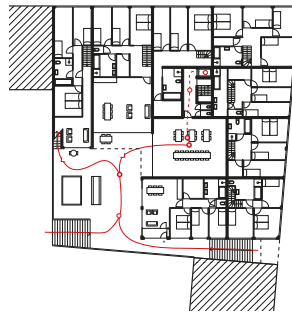
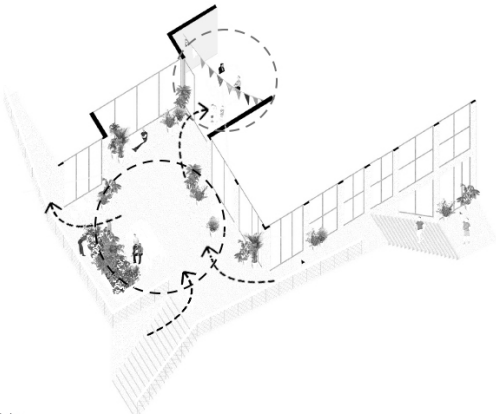
Different sources and case studies showed that this group of young starters want to have primary facilities in their own house. In their student time most of them had to share a kitchen and a bathroom with others. Now they are graduated they are ready for a next step. Having their own Bathroom, Toilet and Kitchen is one of the requirements while looking for a new home.

Looking into the case studies I've seen that there are also a lot of facilities this group of knowledge workers is willing to share with the rest of the building.

Washing machines is one of the things people in this age don't need for themselves. When you live alone you use the washing machine once or twice a week and buying one is expensive, will take a lot of space and make a lot of noise in your room.

Other great examples of shared spaces found in the case studies are collective fitness spaces, Bike storage, a collective group room (with a bar) to give you the possibility of inviting larger groups, and collective outdoor space (Like a roof terrace) In one of the buildings there were even spare rooms where your family can stay when they are over, these are great examples of collective spaces which are an addition on your living comfort, which are great to share with the rest of the residents of the building.

This group of starters like their privacy and rest. When they are at home they want to have the primary facilities for themselves, but they also like to meet people and to hangout with their neighbours (since they mostly live alone). The building has to contain a good mix of this both worlds.



- Deliberate short encounter
- Deliberate long encounter
- Negative encounter
- > Visual encounter

Plain



Private Outdoor Space

'Public' Street Space

COLLECTIVITY RESEARCH
Own Work

SCYE010

Location

Schiedam

Building Year

-

Design Type

Renovation

Architect

Mei Architects and Planners

Dwellings

236 Apartments / Studios

Bruto Floorspace

21.600 m²

Client

SOM Nederland

Target Group

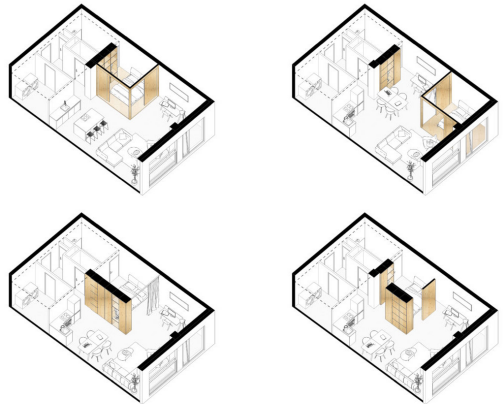
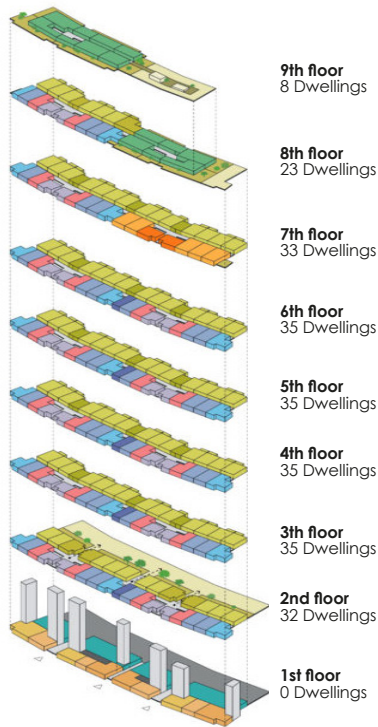
Starters / Knowledge workers

Young Professionals

Images and Drawings

Mei Architects and Planners





Flexible studio rooms

This building has the same building depth and housing type as the building i am designing. The depth of the studio's is solved here by placing the bathroom and a storage room at the back of the apartment. These rooms doesn't need windows. The living area is placed in the front with a modular sleeping room. Because this is a room in a room it doesn't need windows but his module also can be placed by the windows for more daylight in the bedroom.



VOLT

Location
Building Year
Architect
Dwellings
Bruto Floorspace
Client
Target Group

Delft
2020
Barcode Architects
130 Apartments
17.800 m²
ERA Contour
Starters / Knowledge workers

Images and Drawings

Barcode Architects





This building in the new center of Delft is completely focussed on knowledge workers. People who just have been graduated from the TU Delft and who are looking for a next step on the housing market. On the ground floor there is space for cafes and restaurants, and in the towers you find small apartments.

“VOLT is a well thought concept that makes urban living in Delft accessible for starters on the housing market. The compact apartments are approximately 50 to 70 m² in size. You see that people increasingly see the building and the city as their living room, instead of just the four walls of their home. People who like to live in the city are willing to settle for a smaller apartment if there is sufficient attention in the immediate living environment for facilities and services aimed at convenience and meeting.” (Wim Wensing, Amvest)

The apartments are spread over different towers and are accessible via the core of the towers. Every tower has its own core, with elevator and staircase. Around this core the apartments are situated.

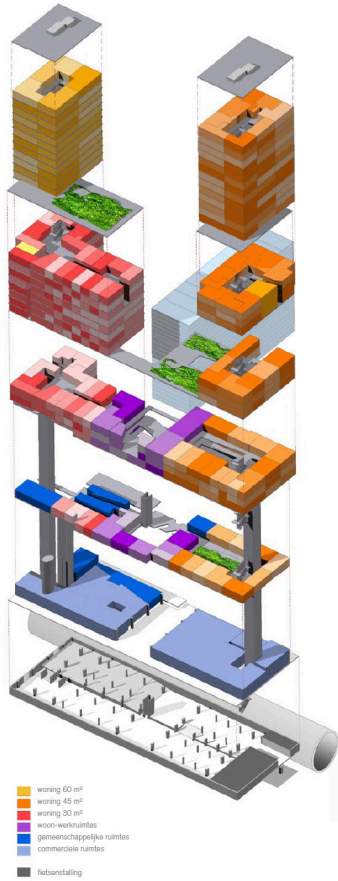
In the center, between the towers there is a large square surrounded by commercial spaces. Here is space for terraces where the residents of the building, but also other people from the neighbourhood can come together.



CITÉ

Location	Rotterdam
Building Year	2010
Architect	Tangram Architecten
Dwellings	228 Studios 266 Apartments (2/3 Rooms) 84 Short Stay Rooms
Bruto Floorspace	44.342 m2
Client	Stadswonen Rotterdam
Target Group	Students / Knowledge workers
Images and Drawings	Tangram Architecten





- woning 60 m²
- woning 45 m²
- woning 30 m²
- woon-recreatie
- gemeenschappelijke ruimtes
- commerciële ruimtes
- sfbestanding

programma totaal: 33.000m²

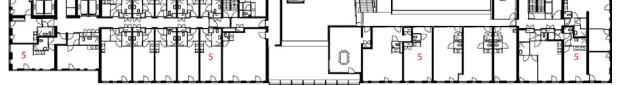
11-27



8-10



5-7



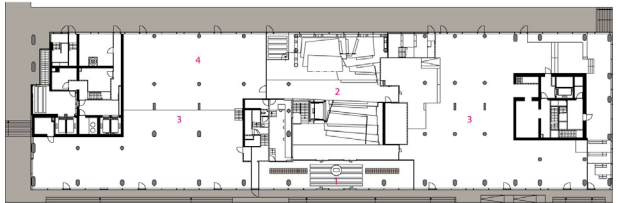
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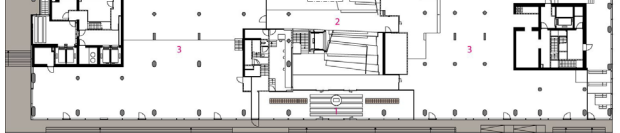
1



begane grond



metrotunnel



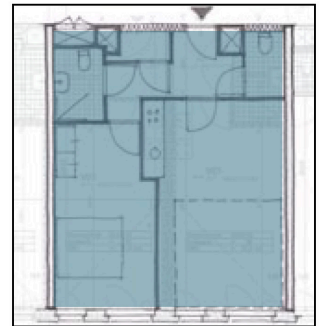
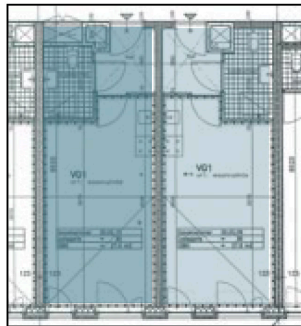
parkeerkelder



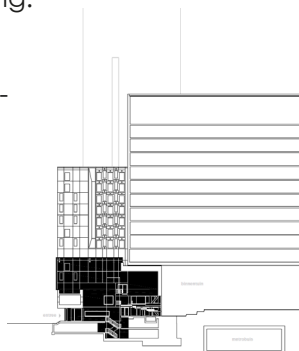
Analysis

This building contains different housing types and different users. Students and Knowledge workers. The rents are low and the houses are small. Due to the small houses it was possible to add a lot of collective spaces in the building. There are even spare rooms where your family can stay when they are over. Other collective spaces are:

- + Large Atrium
- + Washing Room
- + Fitness
- + Party Room with Bar



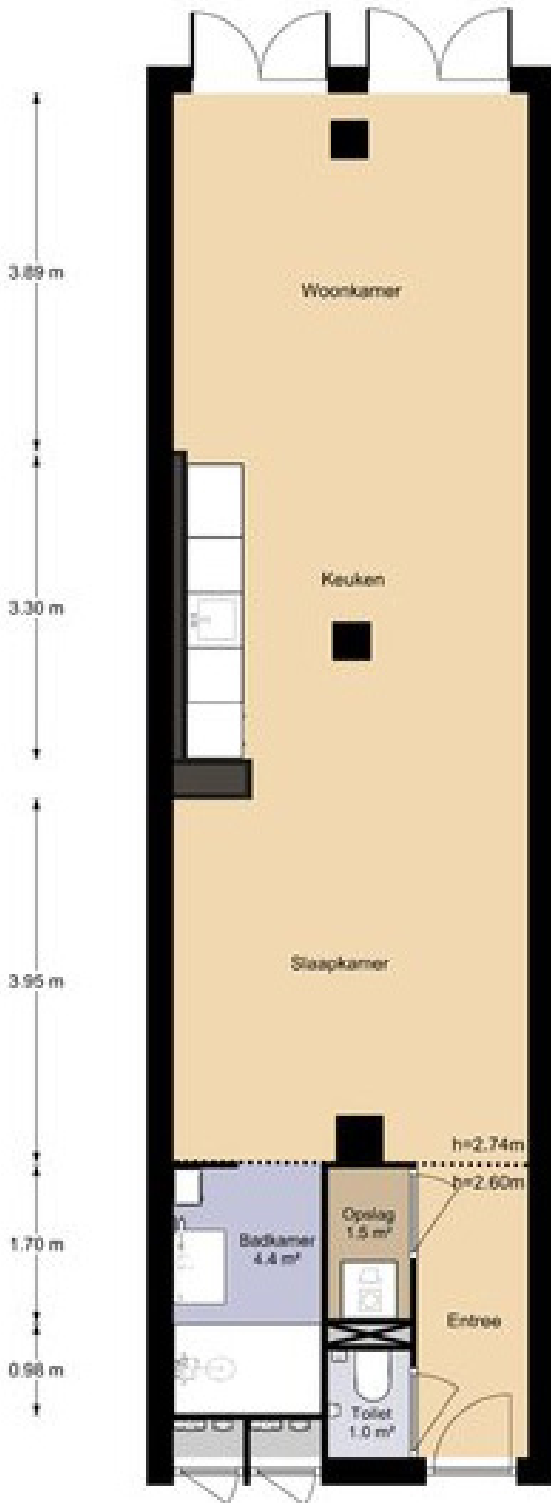
Flexible Rooms
It's possible to combine two separate rooms to one apartment



VAN VOLLENHOVENKWARTIER

Location	Rotterdam
Building Year	2018
Architect	RoosRos
Dwellings	200 Studios
Bruto Floorspace	30.000 m2
Client	Trivestor Groep ABB Bouwgroep DBOG
Target Group	Starters
Images and drawings	Funda





Analysis

This floorplan has the same 'depth problem' as the floorplans I am designing, and is also designed for the same target group.

I was inspired by the different zones in this floorplan, but the challenge was to get the same building idea into a floorplan that has less depth and square meters.







DESIGN

CONCEPTUAL DESIGN

From the outside the building is shaped, but now it's time to have a look how this building will work and function at the inside. What kind of dwellings are placed, how are they placed in the building and how are they accessible? How is the collective space defined, and how is this all connected to the makers in the same building?

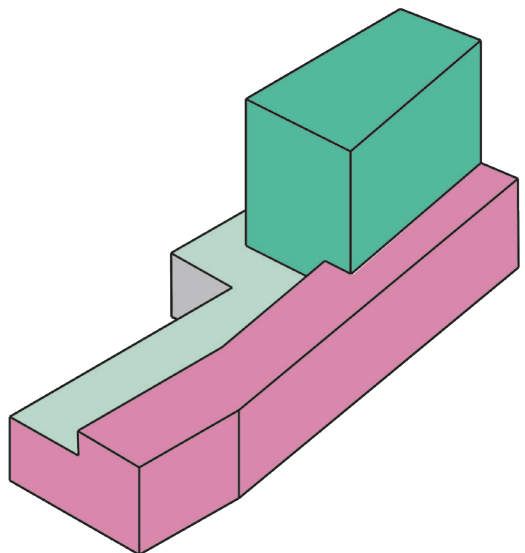
The outcome of the research is the starting point for this phase in the design. For the Knowledge workers it is desirable to design a building with studios ($\pm 50 \text{ m}^2$) and apartments between the 60 and 100m².

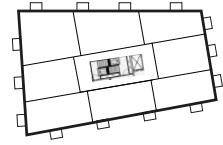
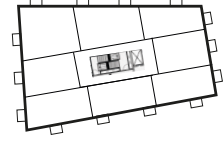
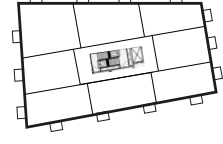
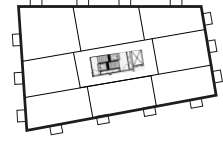
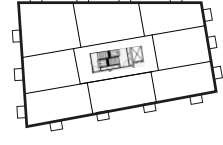
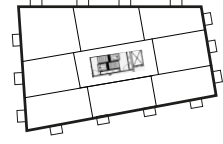
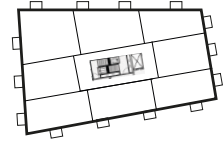
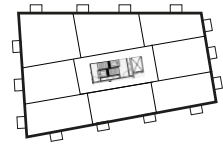
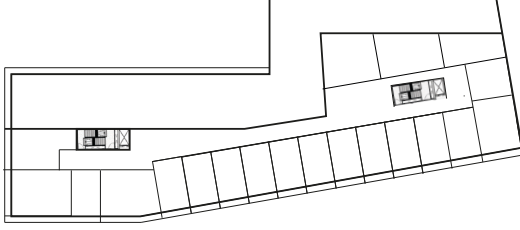
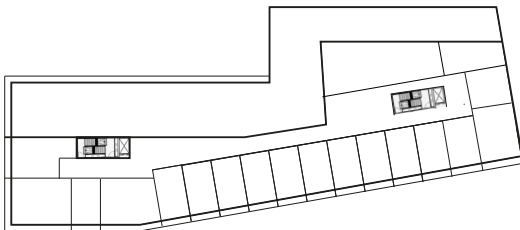
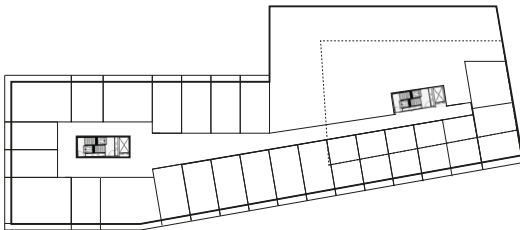
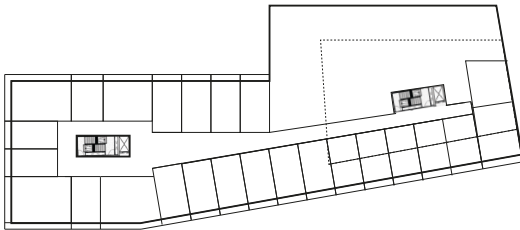
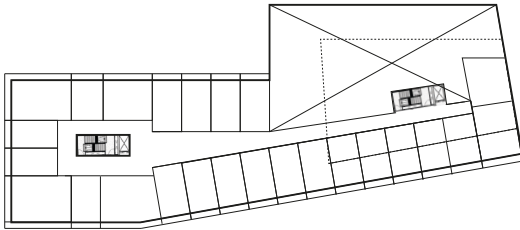
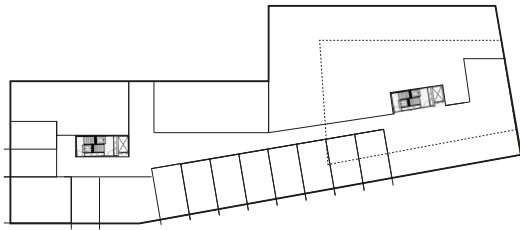
The building exists out of three parts. The lower part, the tower and the makers part. These 3 parts are folded around each other which connect the different parts of the building into one composition. By alternating the facade structure and materials you can distinguish these different parts.

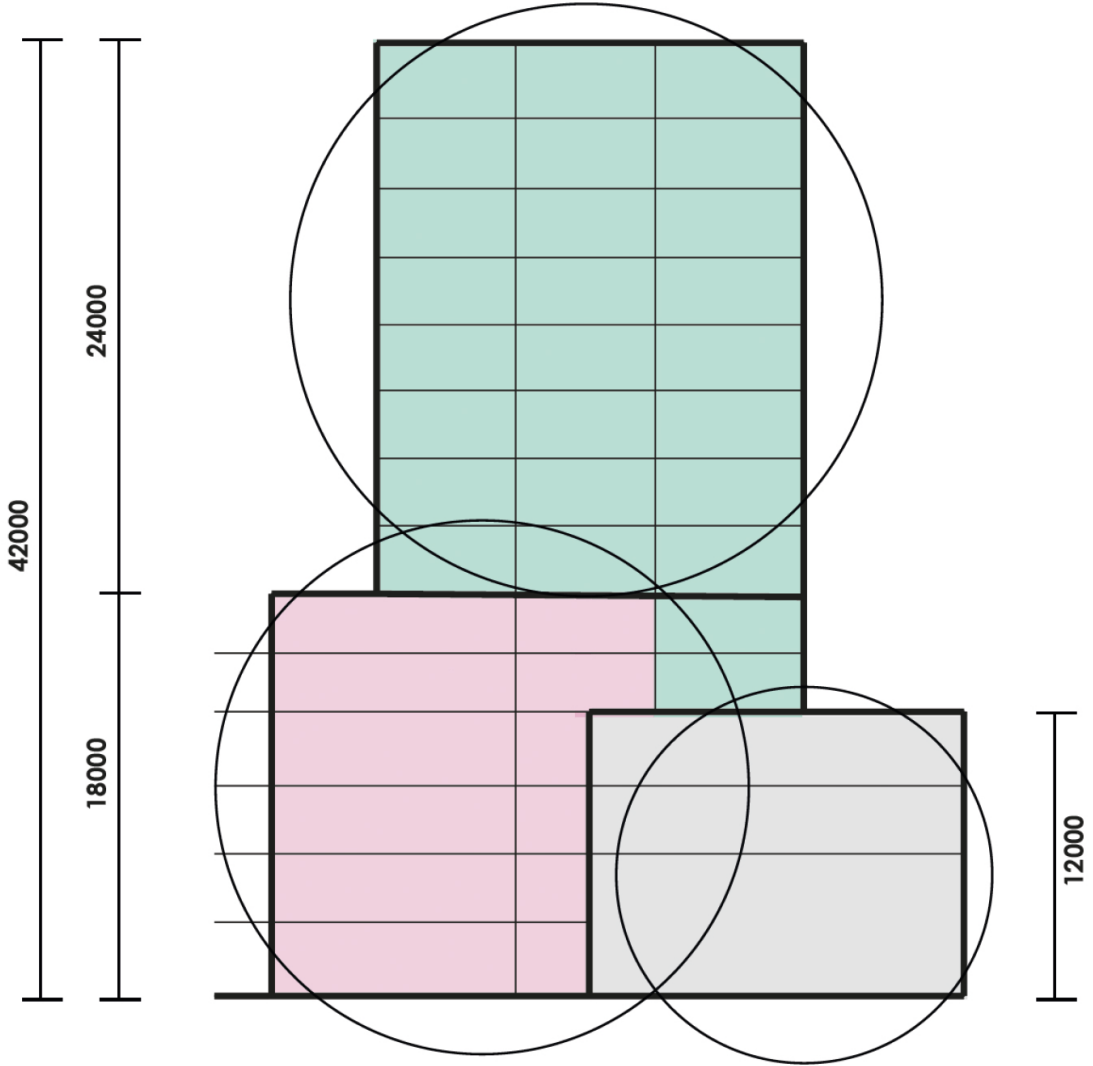
For me as a designer it is very important that those three parts are really integrated with each other. By using a shared entrance and a good connection between those three parts of the building I will try to achieve that.

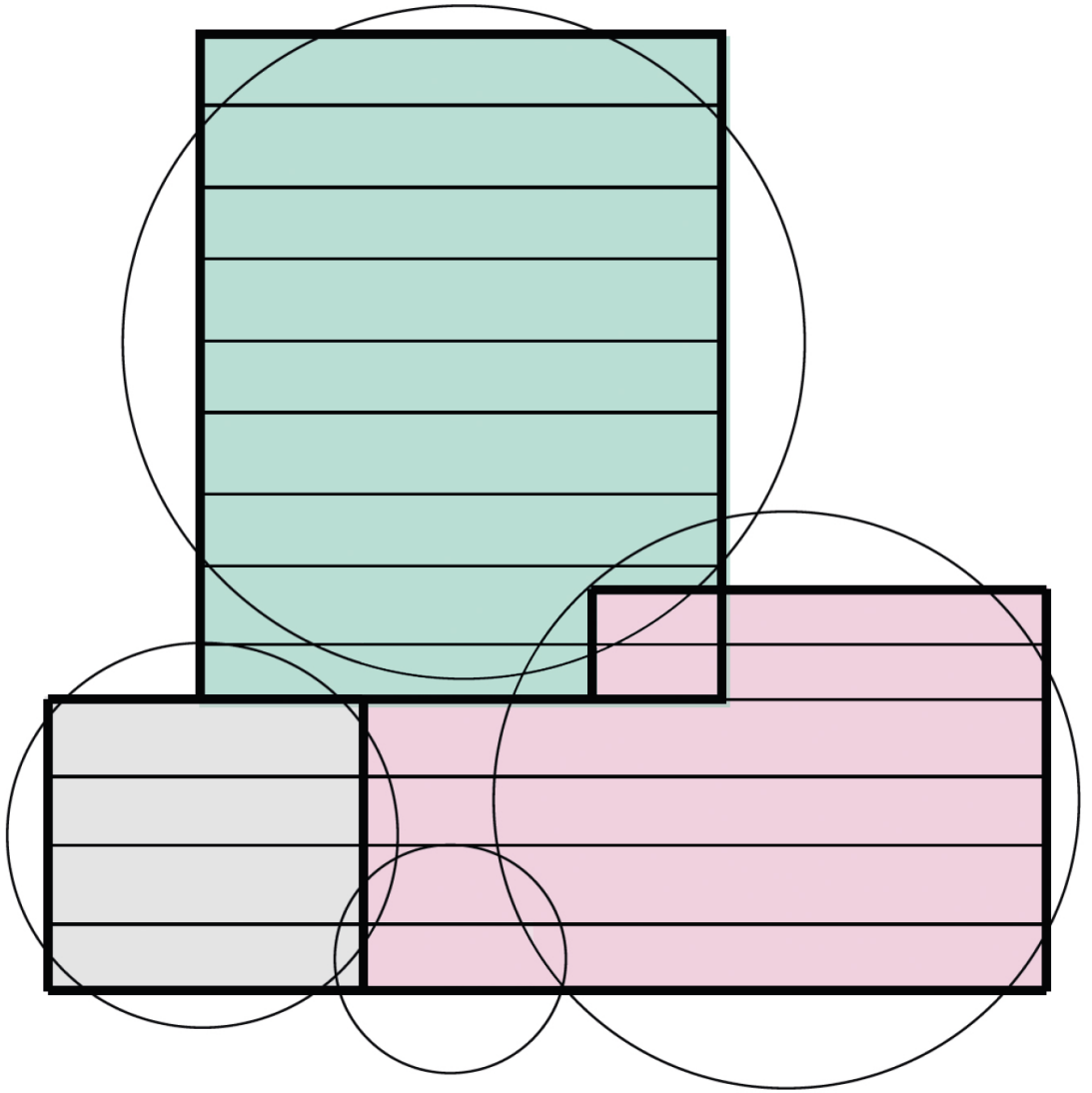
The shape and the depth of the building is a challenge. With a building depth of 25 meters it is impossible to make an inner courtyard, which result in a corridor access. But for a corridor building 25 meter is quite deep.

On the top of the lower part of the building there is room for a collective roof garden.

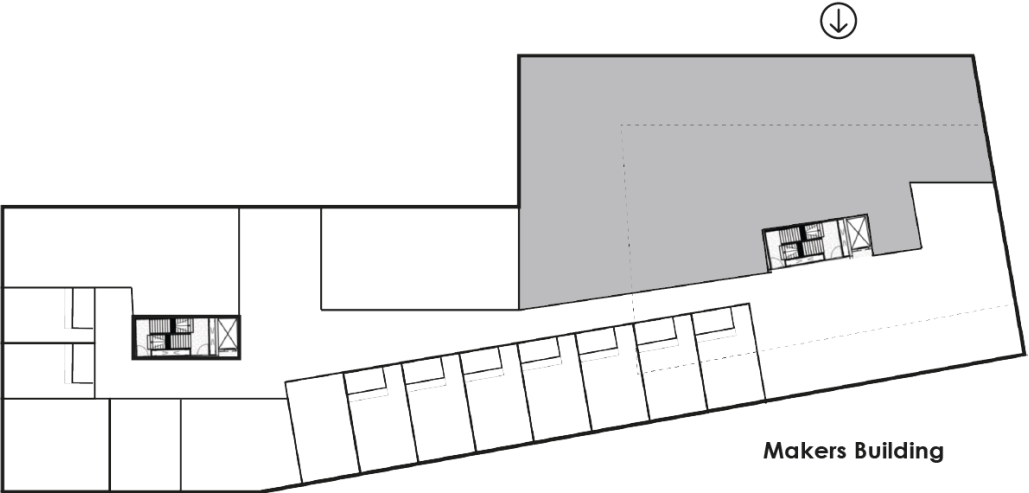
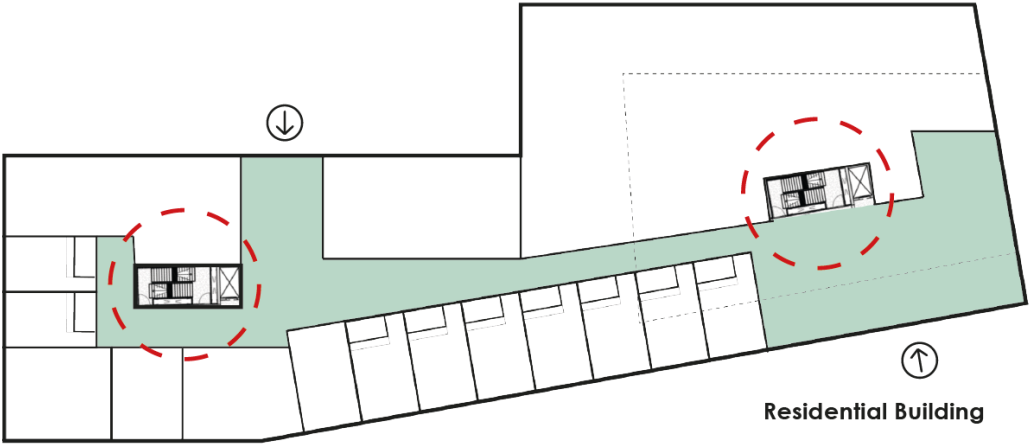




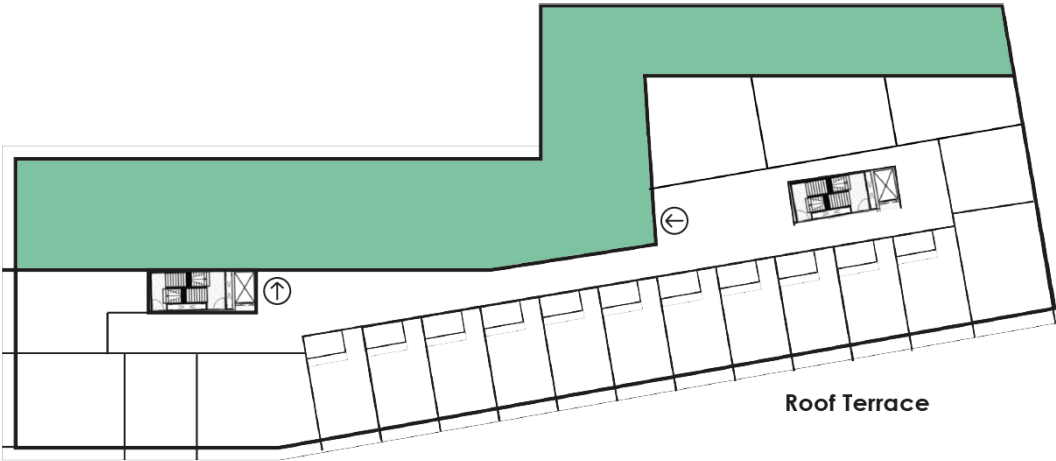
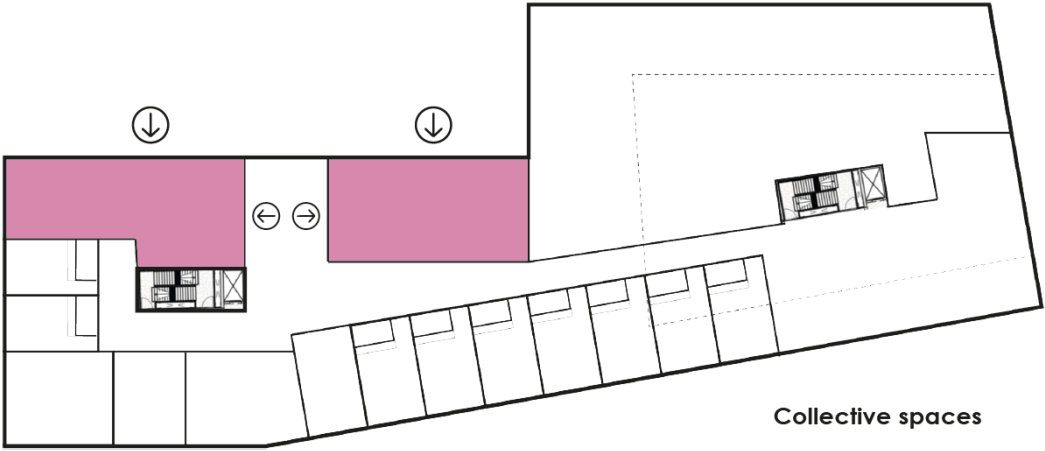


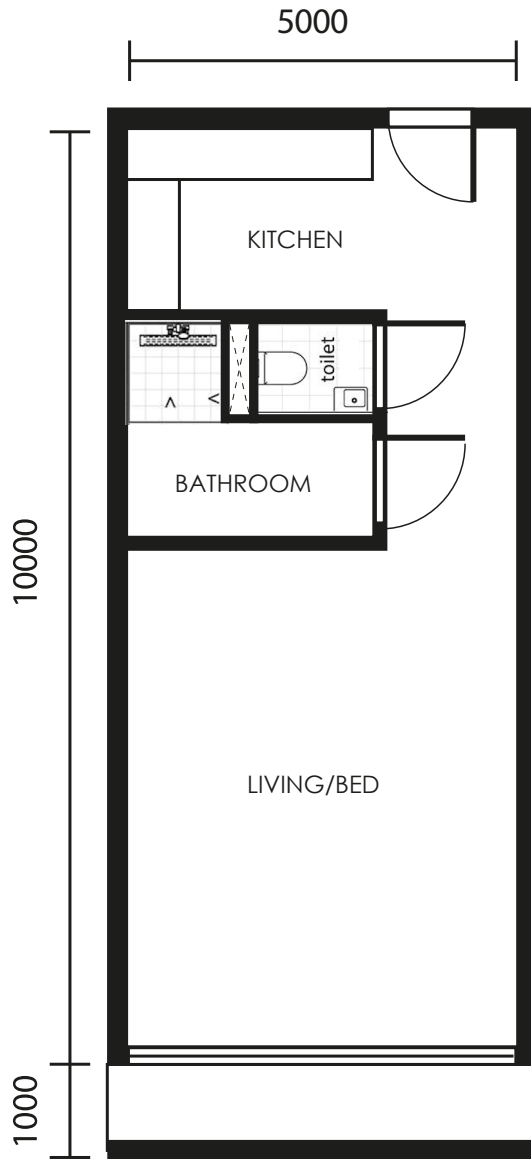


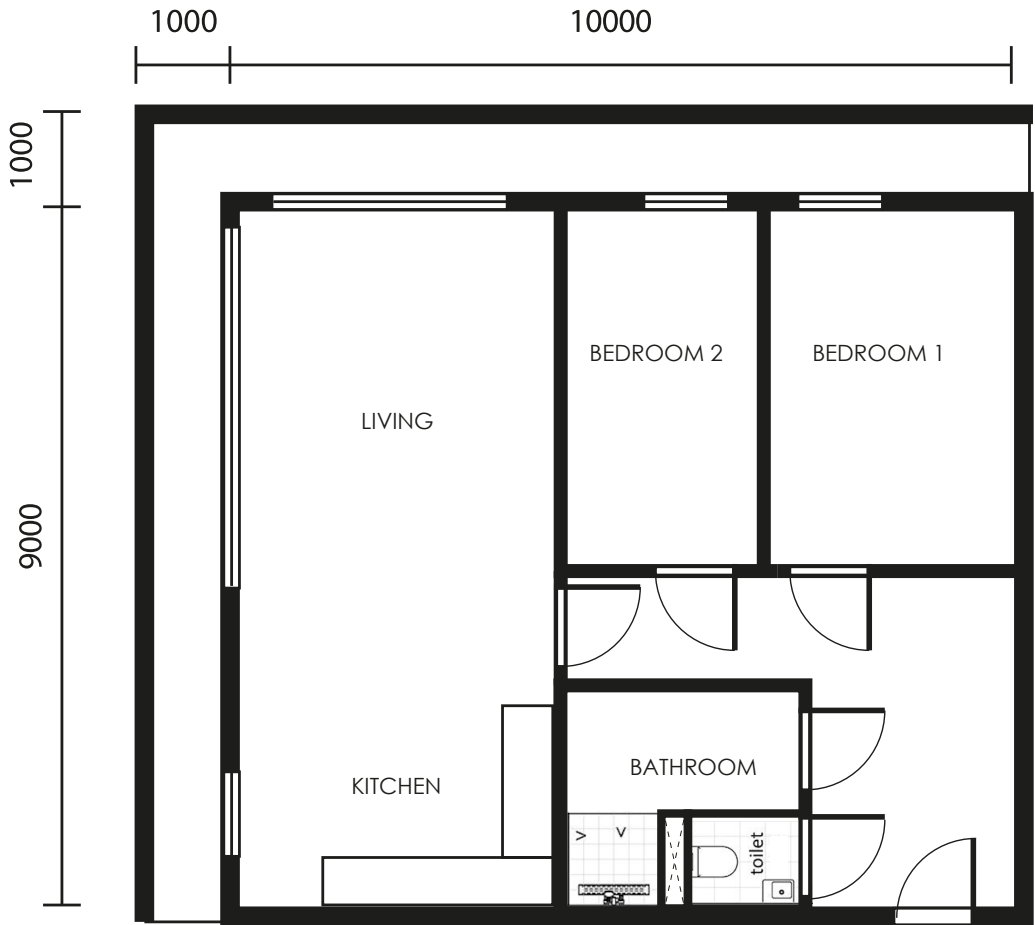
ACCESSIBILITY

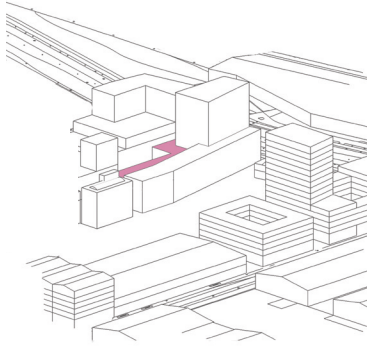


COLLECTIVITY

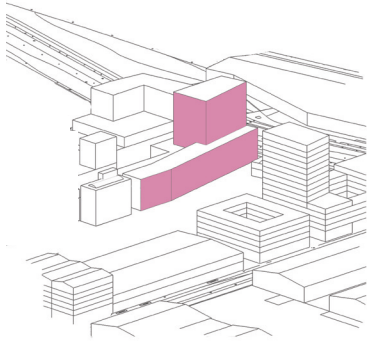




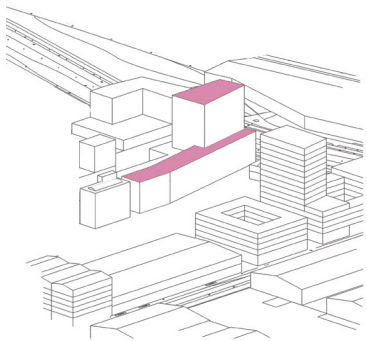




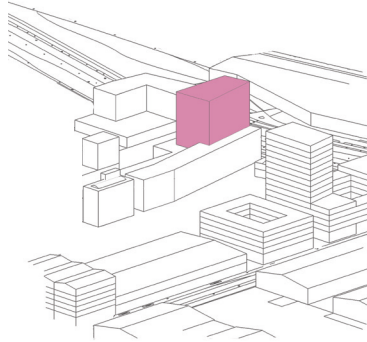
COLLECTIVE ROOF GARDEN



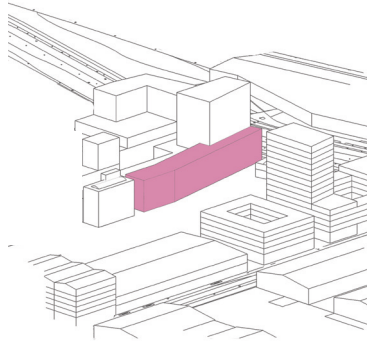
SOLAR PANELS



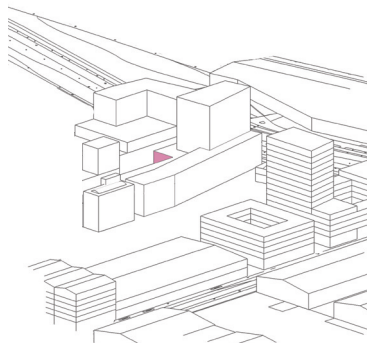
GREEN ROOF



HIGH RISE
Apartments



LOW RISE
Studios



COMPANY SPACE

CLT STRUCTURE

The structure of the building is built up out of CLT (Cross-Laminated Timber). This is a wooden structure which is built up out of wooden panels. Those panels are pre-fabricated, and in those panels wooden strokes are laminated together in a couple of layers. This relatively new building material is better for the environment than other building materials like steel and concrete, and even more important the material is renewable.

Concrete, an essential building material, has for decades offered us the possibility of shaping our cities quickly and effectively, allowing them to rapidly expand into urban peripheries and reach heights previously unimagined by mankind. Today, new timber technologies are beginning to deliver similar opportunities – and even superior ones – through these new materials like Cross-Laminated Timber.

Environmental Impact

CLT was first manufactured in Austria with the aim of reusing lower value timber. Today, the use of wood is again becoming a relevant factor in the construction industry because of

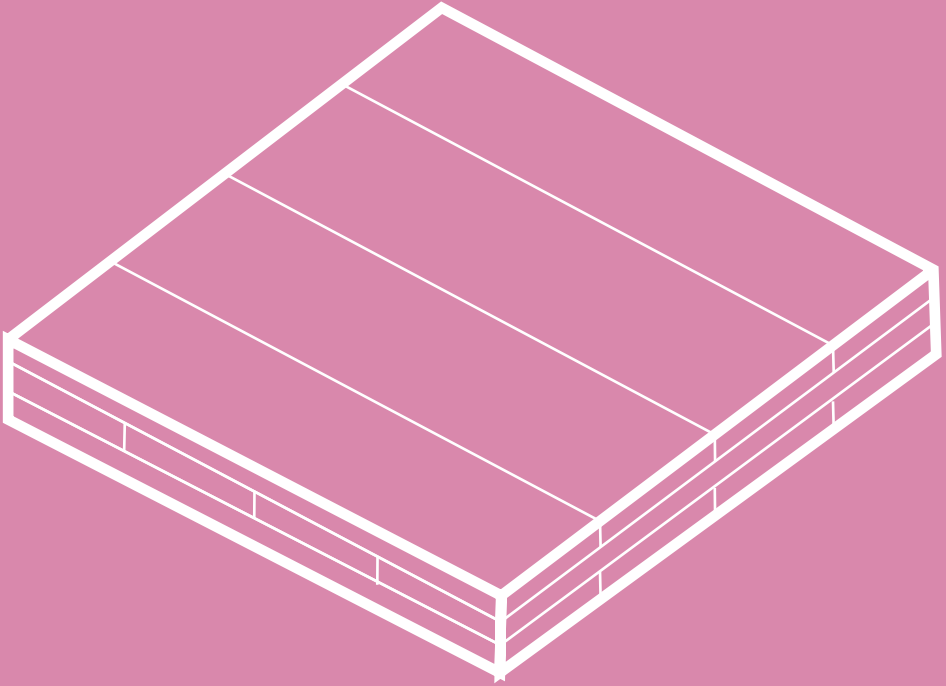
environmental factors.

For years we used to design and build with concrete, but concrete's environmental footprint is enormous compared to that of wood. One ton of CO₂ is emitted into the atmosphere for every cubic meter of concrete created. In contrast, CLT contains "sequestered carbon," or carbon naturally stored in wood during tree growth. Thus, despite all the energy used in the extraction and manufacturing processes, emissions from wood construction will never match the amount of carbon that is kept "sequestered" in the CLT.

Structural Behaviour

CLT has been called "the concrete of the future," and in a sense – it's true. It delivers at minimum the same structural strength as reinforced concrete, but it's a material with a high degree of flexibility that has to undergo great deformations to break and collapse – unlike concrete. Also the weight of the material is a fraction.

Due to the fact that the building is situated outside the dikes of Rotterdam, the foundation and ground floor are built up out of concrete.



SUSTAINABILITY

Wood is a very durable building material. Timber construction can therefore be used well in a tender where the sustainability requirements are high, or if the client requires a high BREAAAM score.

Why is wood so sustainable? There are several reasons for this.

Wood is a renewable building material, which means that wood can always grow back. Unlike concrete, where we deplete the earth. A condition for this is that no more wood is extracted from the forest than it grows annually

Reusable

Wood in a building is very suitable for reuse. It is lightweight, easy to disassemble, easy to transport and can be sawn and reassembled without loss of quality.

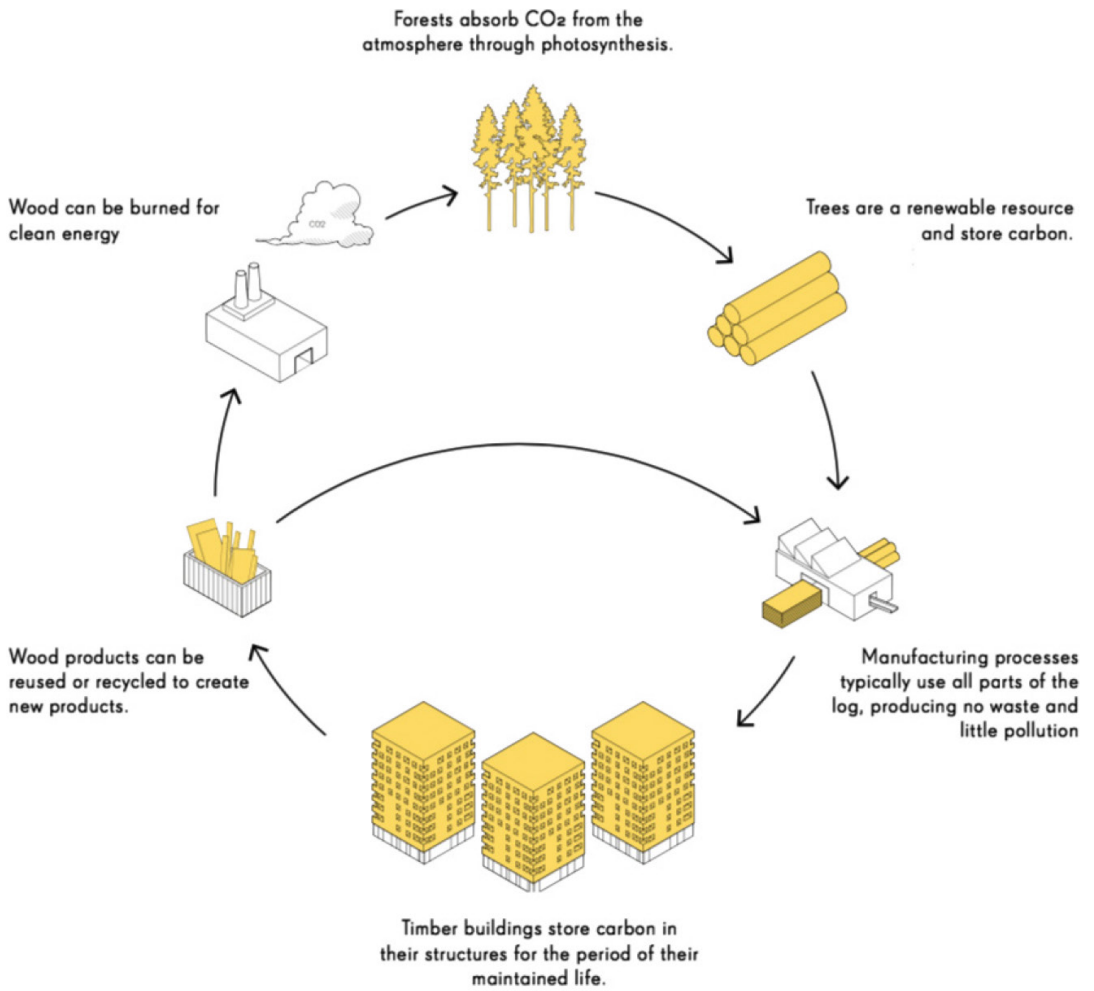
CO2 storage

Concrete is responsible for 4-8% of global CO2 emissions. Wood, on the other hand, has a positive effect on CO2 emissions. Trees convert CO2 into oxygen as long as they grow. When a tree dies or burns, it relea-

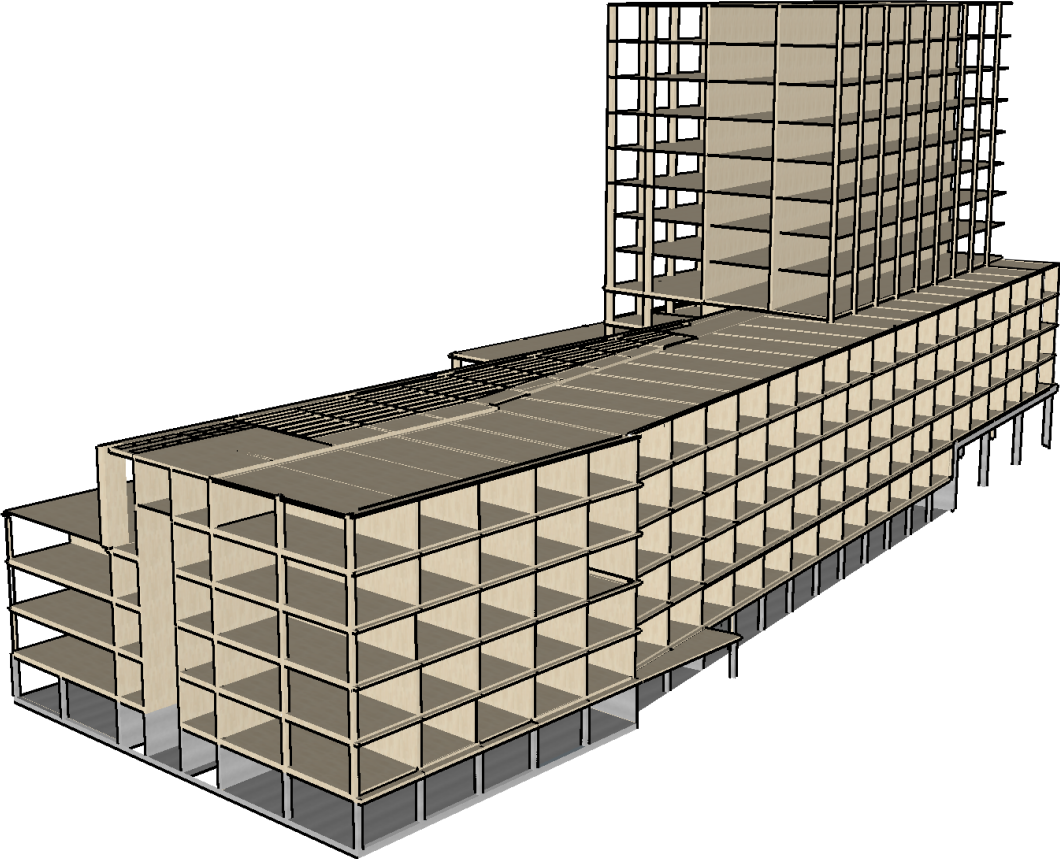
ses this CO2, but if the tree is felled in time, the CO2 remains stored in the wood. By subsequently using wood as a building material, you store this CO2 in buildings. Timber construction can reduce global warming by 14-31% (Source: Potsdam Institute for Climate Impact Research). The climate plan for Europe therefore states that timber construction can contribute to a solution to the climate problem.

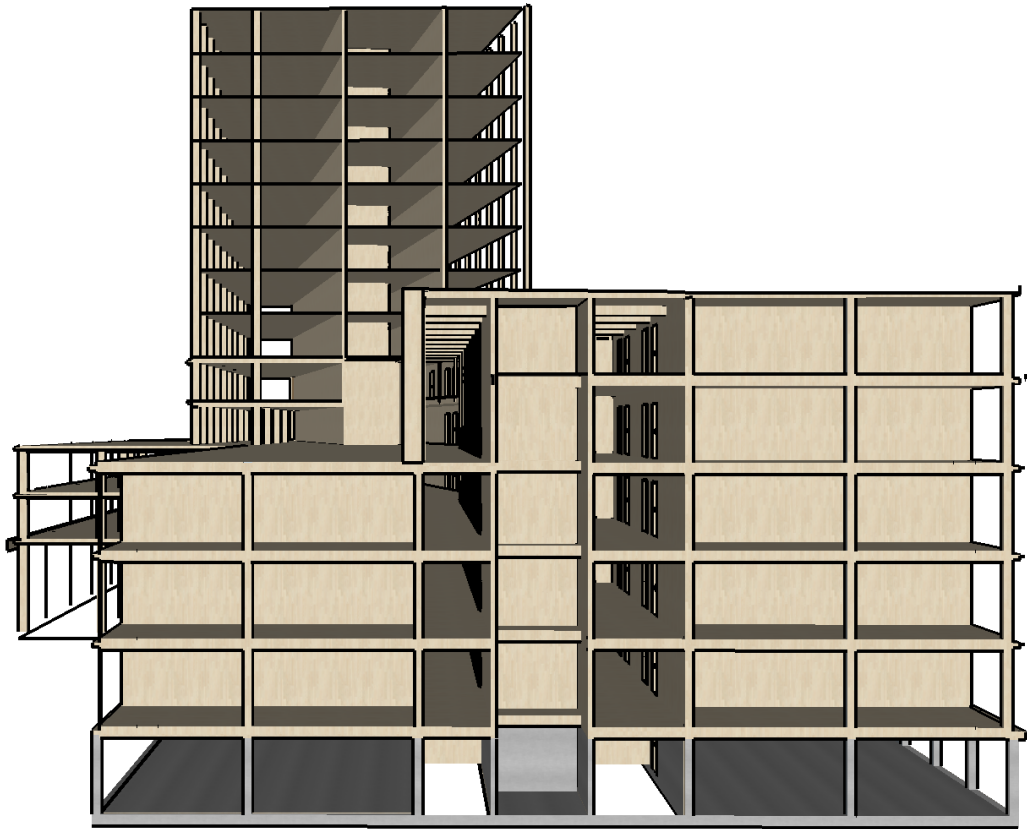
Timber construction is a light construction method for which you need relatively little heavy equipment and fuel for transport. A construction site with a heavy diesel hoist can thus be converted to a fully electric construction. Timber construction reduces nitrogen emissions and can thus contribute to a solution to the current nitrogen crisis in the construction industry.

Also the building time and waste is way less than with other building materials like concrete and steel because it's easy to pre-fabricate the building elements.



CONSTRUCTION





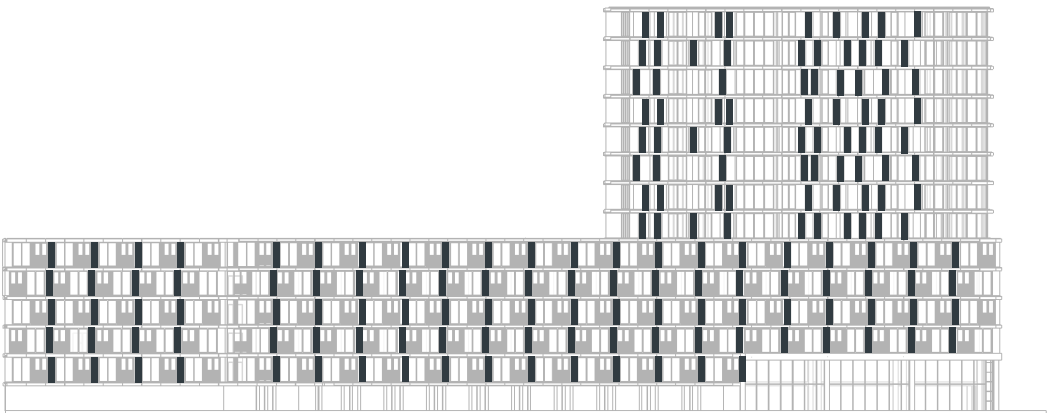
SOLAR PANELS

ENERGY BY SOLAR PANELS

- Southwest Facade
- Southeast Facade

By using solar panels most of the needed energy for the building is produced on a natural way. The panels are integrated in the facade, which gives the facade a modern appearance.

TOWER	116 x
LOWRISE	100 x
880x2600	2.288 m ²
216 x 2.288	494 m ²
ROOF	1100 m ²
TOTAL	1594 m²
OUTPUT/M2	150 kWh
TOTAL OUTPUT	239,100 kWh/J





FACADE MATERIALS

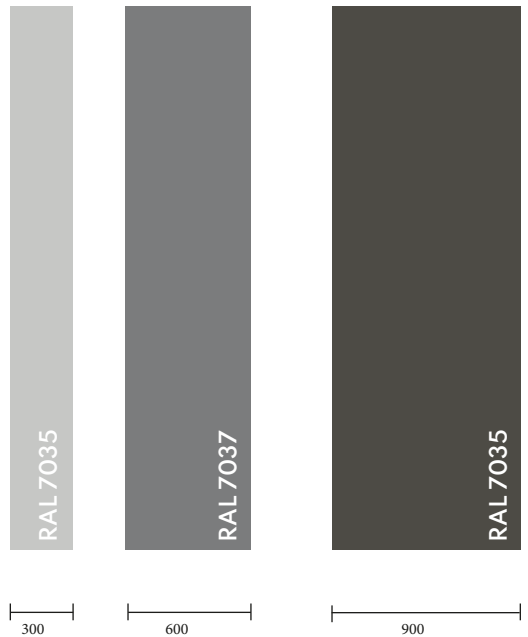
The facade of the building is built up out of different materials. One of the most eye-catching facade elements are the almost 200 solar-panels. These provide a large part of the energy the building needs.

Next to those solar panels the rest of the facade is alternately constructed of glass, wood and rockstone panels

Especially in the lower part of the building, the largest part of the facade is clad with glass. In the studio dwellings this was needed to provide enough daylight into the dwellings, and in the hallways glass facades are used to give you direction and daylight on the inside of the building.

Wood is used on the outside of the building to counterbalance the cool materials and colors. There are some small wooden details to get this done.

The rest of the facade is clad with rockpanel plates in three different shades of grey, in three different sizes. With those 3 sizes it's possible to create different 'random' patterns to break up the large facade surfaces.



Rockpanel

Rockpanel is a sustainable and completely recycleble material which is produced out of a combination of vulcanic rocks and recycled used stone wool products.

Together this materials creates a very flexible and strong material with a life span of more than 50 years which is 100% recycleble and durable.



FIRE RESISTANT MATERIAL



FLEXIBLE MATERIAL



NATURAL MATERIAL



HIGH SELF-CLEANING ABILITY



ENVIRONMENTAL FRIENDLY



100% RECYCABLE



DURABLE MATERIAL



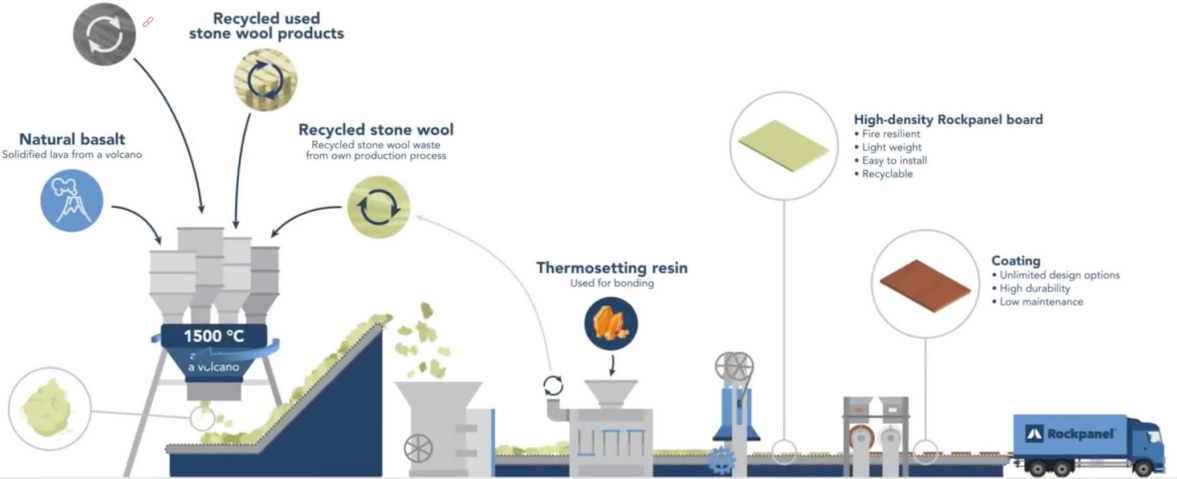
HEATED ON 1500 C



ENDLESS COLOUR POSSIBILITIES

Secondary raw materials

Recycled content from other industries



STEP 1
Producing stone wool fibres

STEP 2
Pressing the boards

STEP 3
Coating the boards

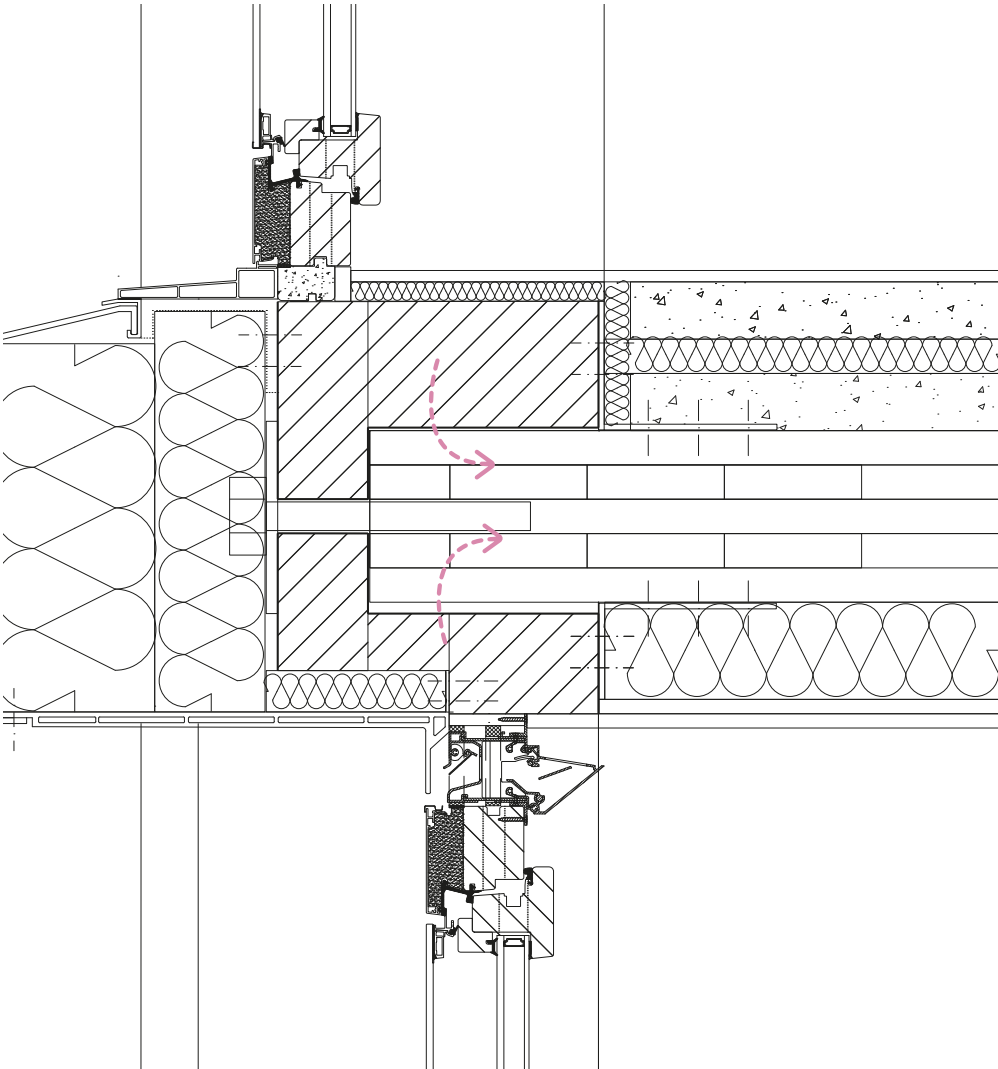
SOURCE ROCKPANEL

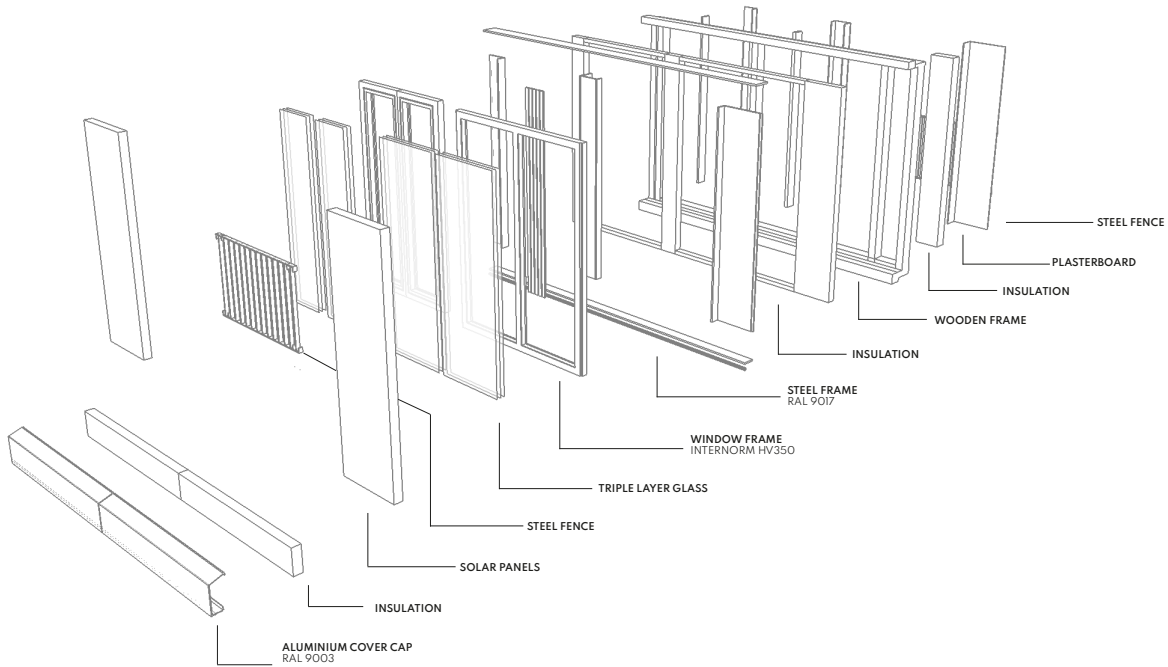
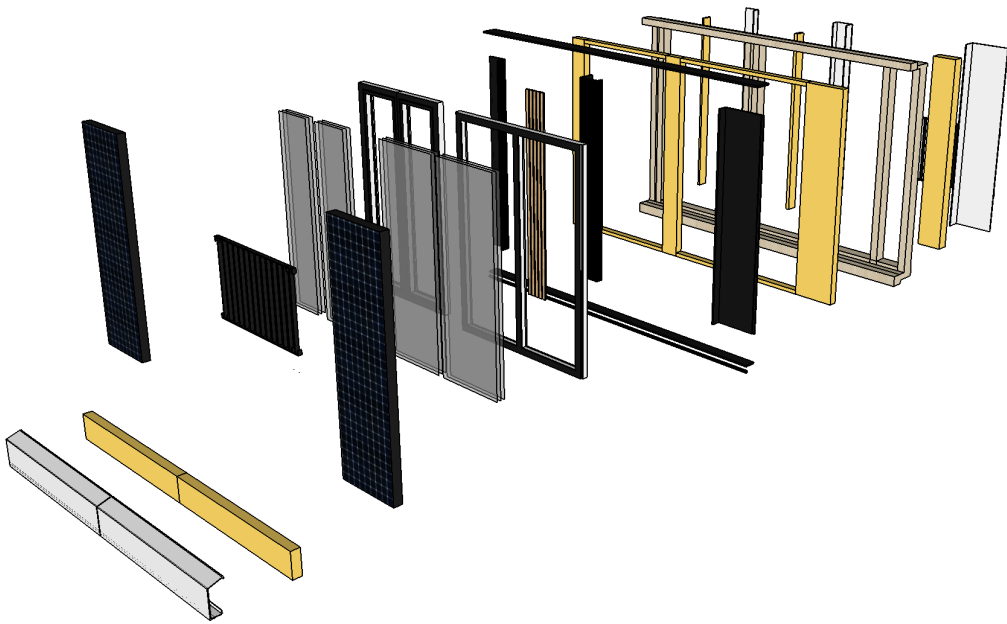


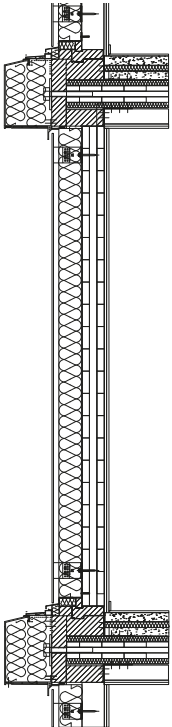
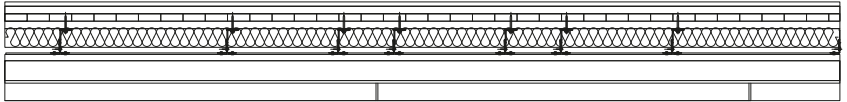
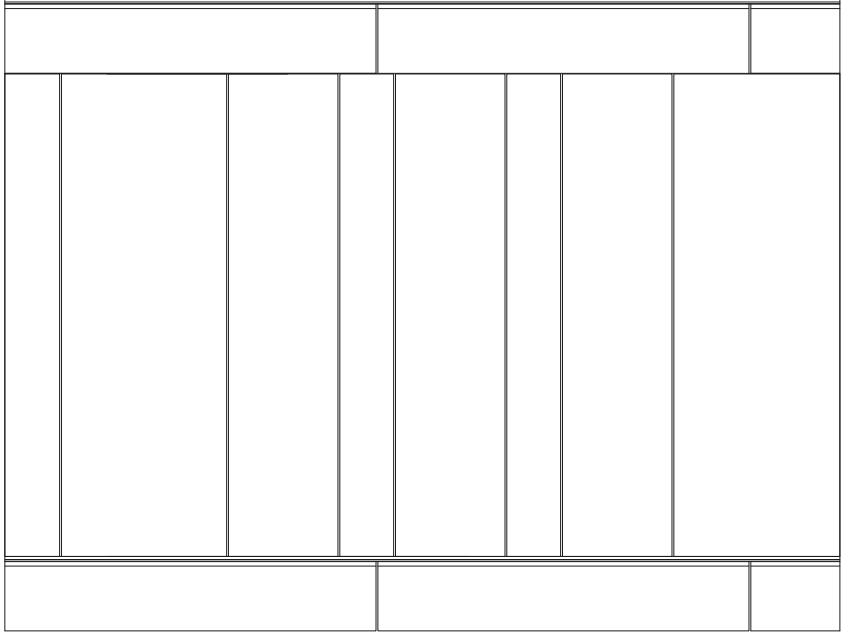
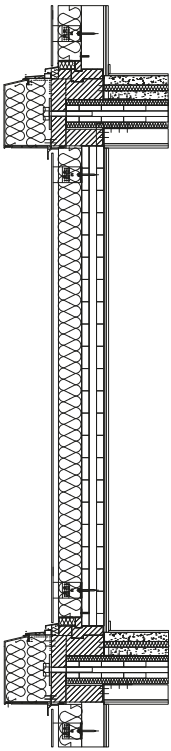


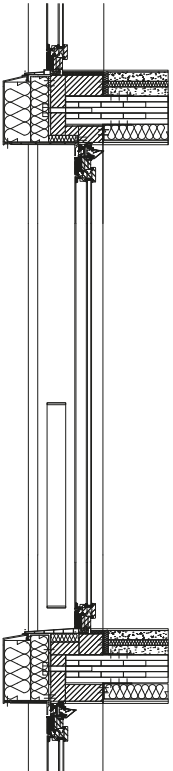
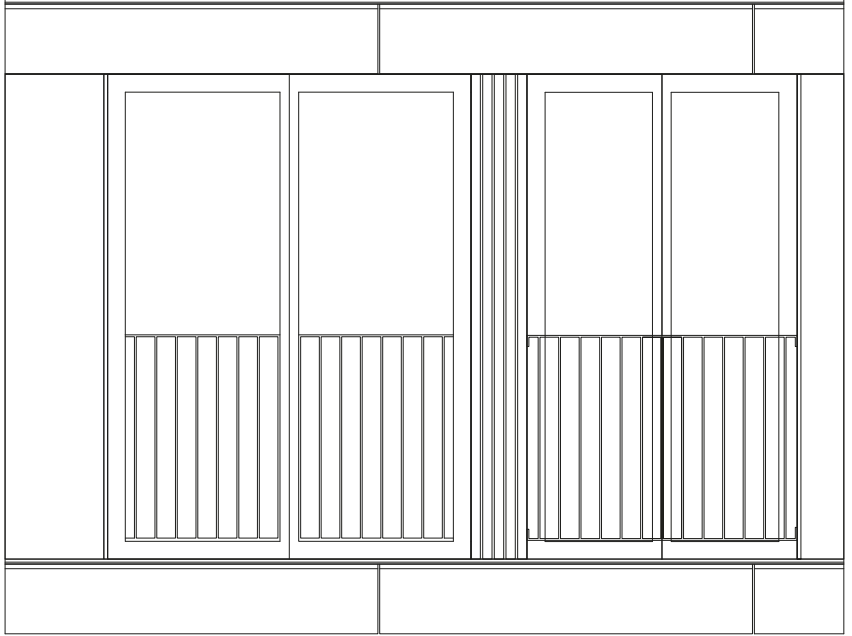
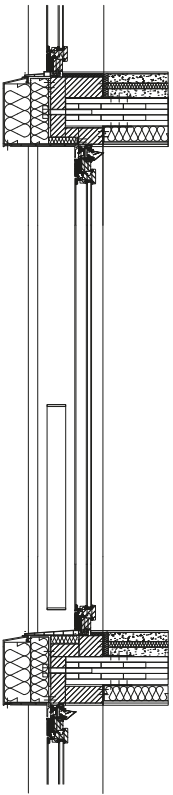
TOWER FACADE
Own Work

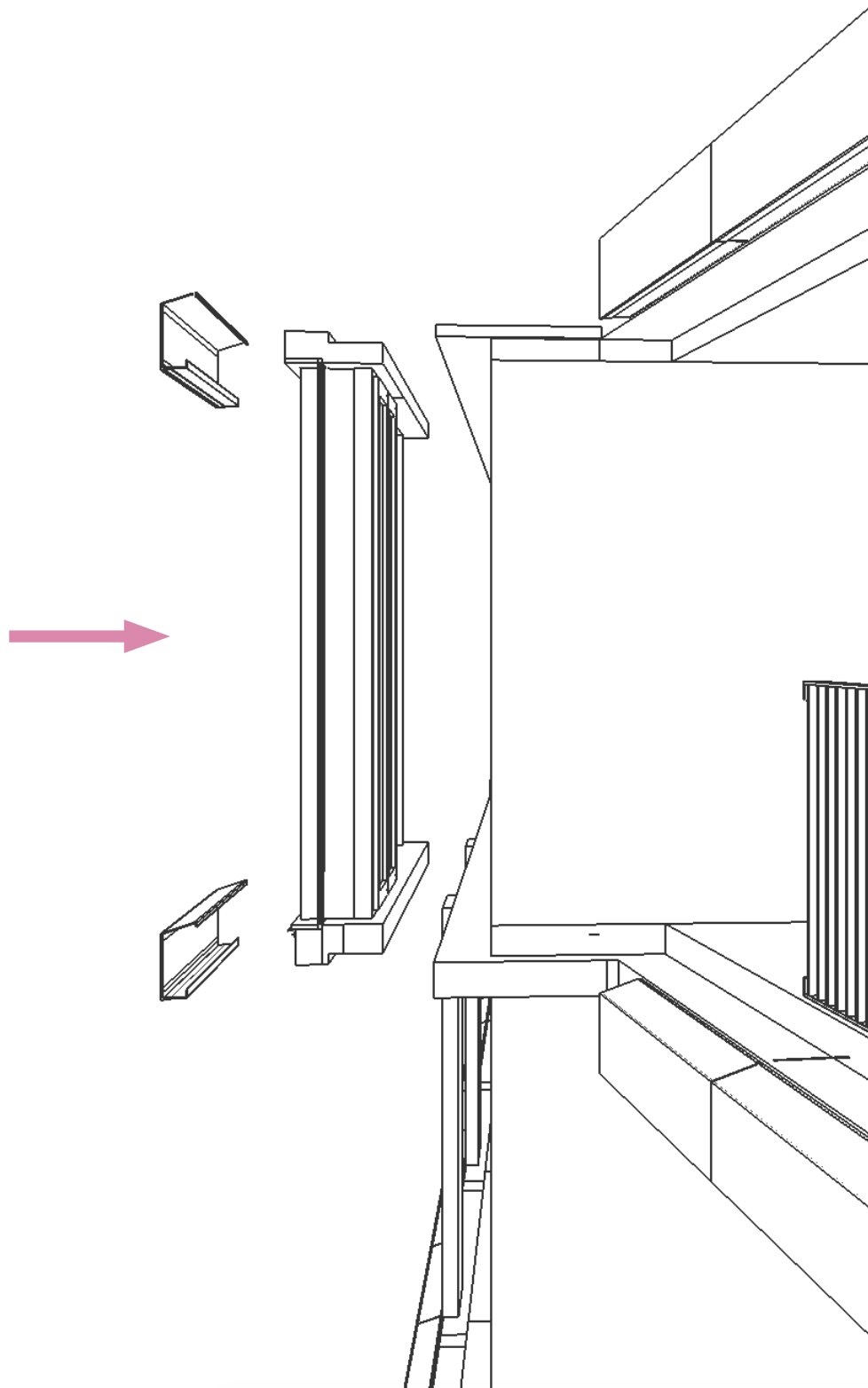
FACADE ELEMENTS

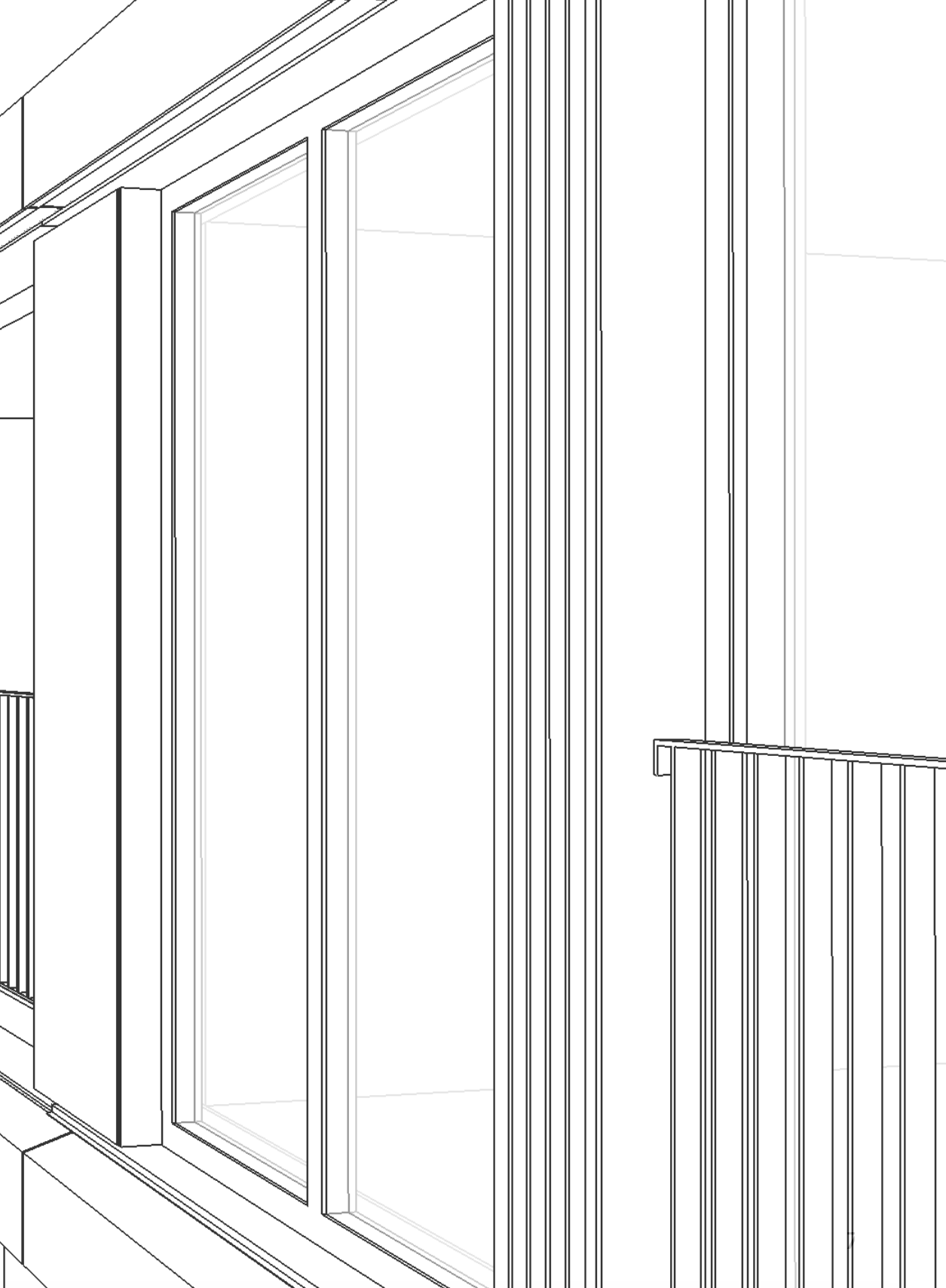


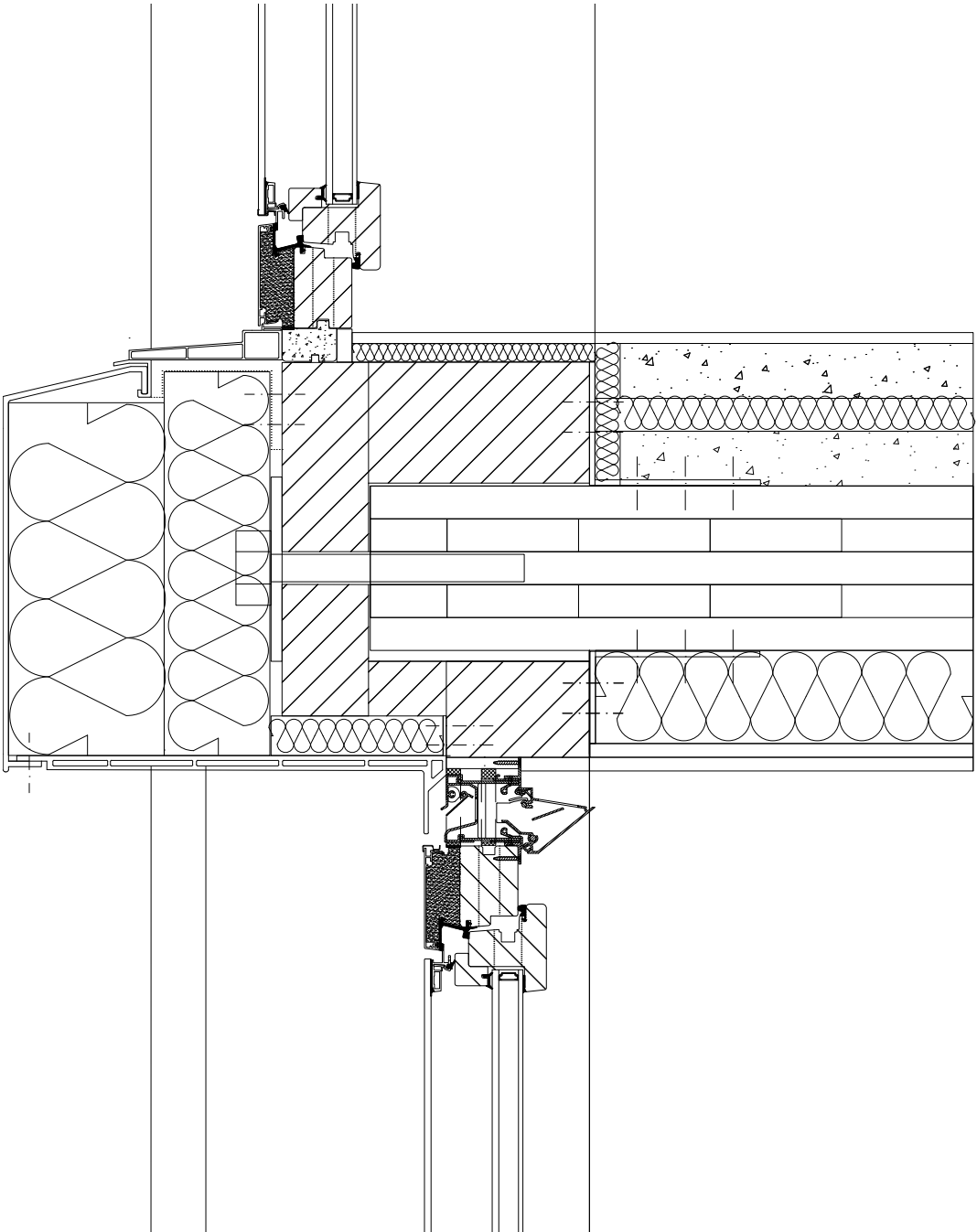




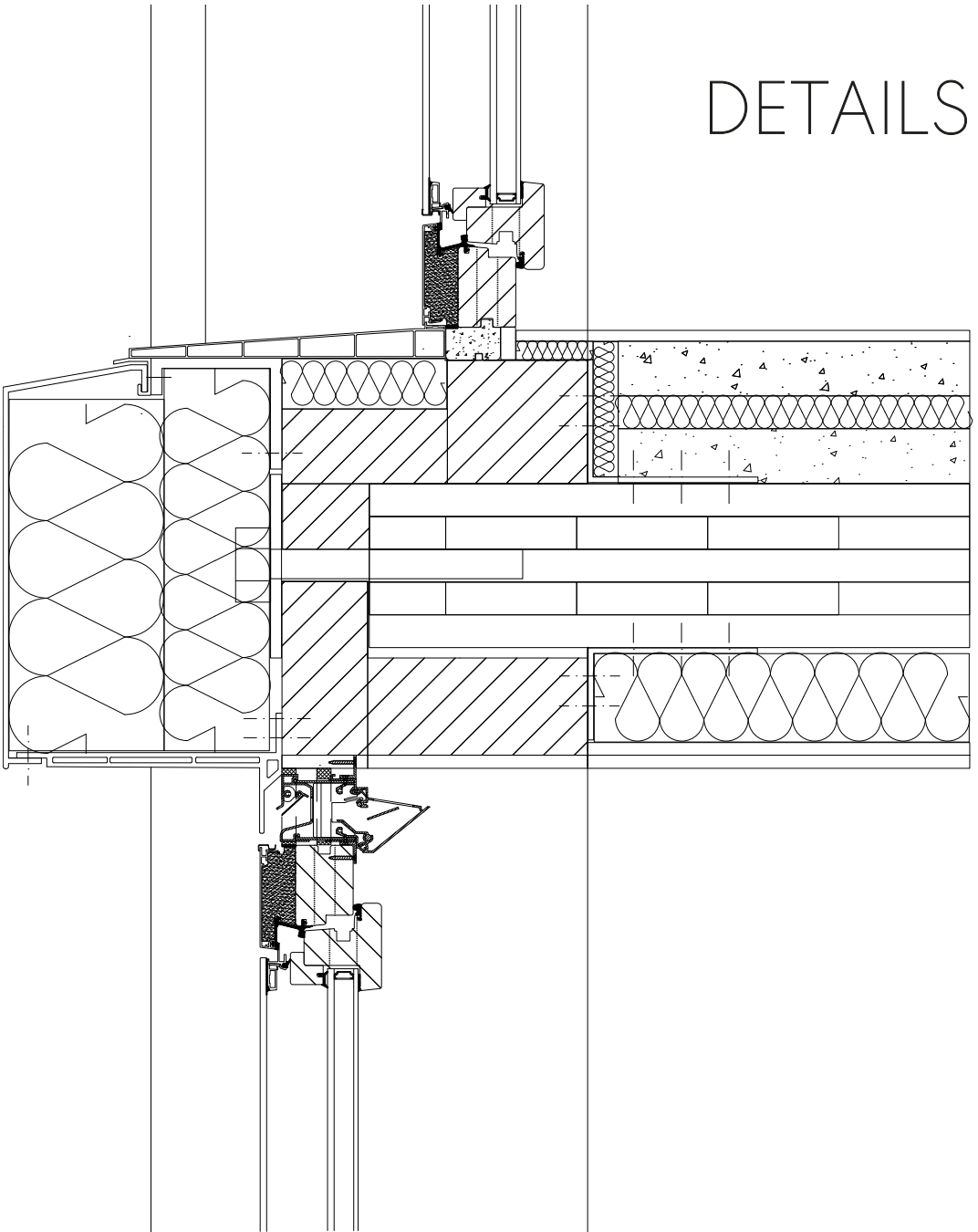


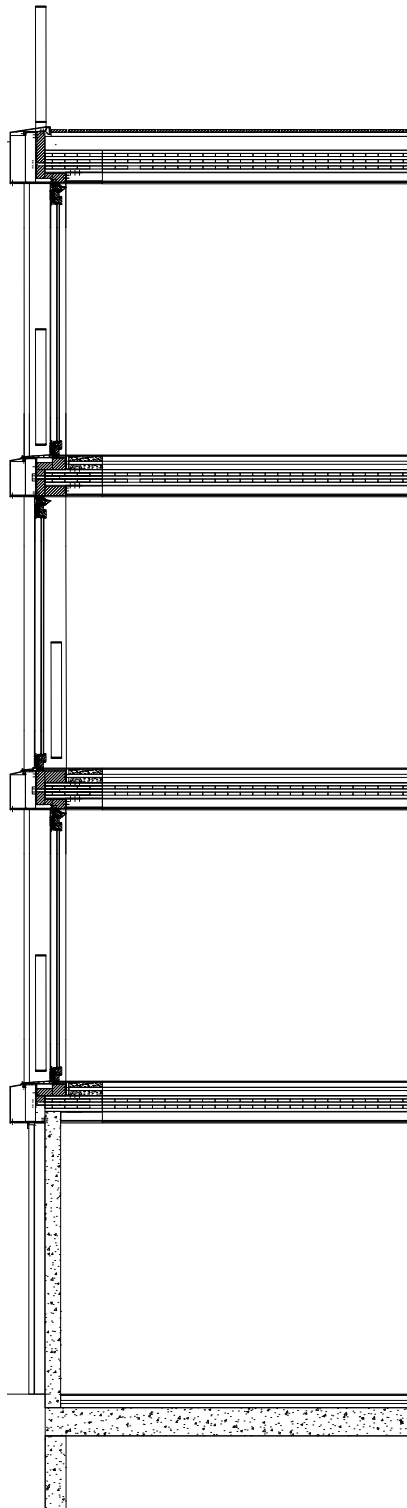






DETAILS

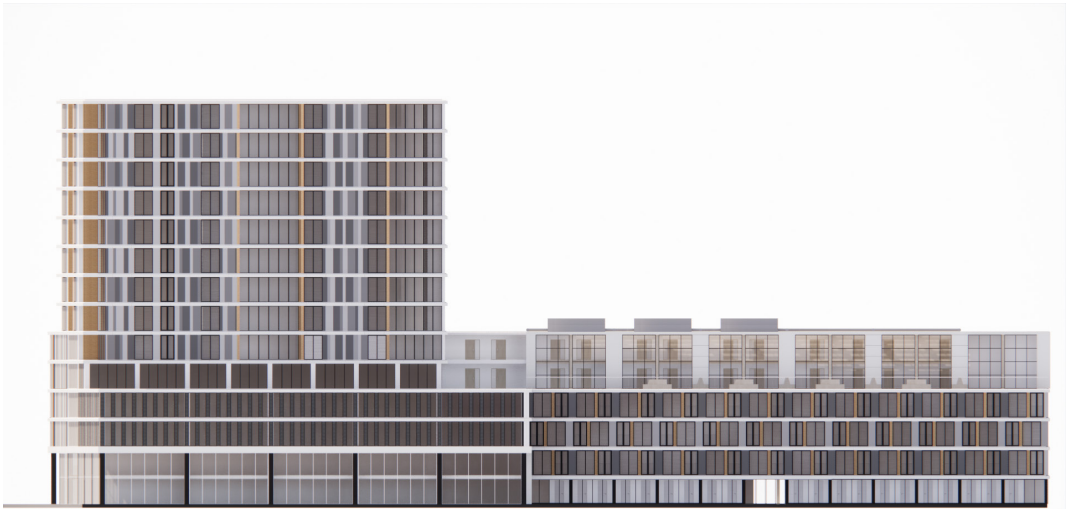




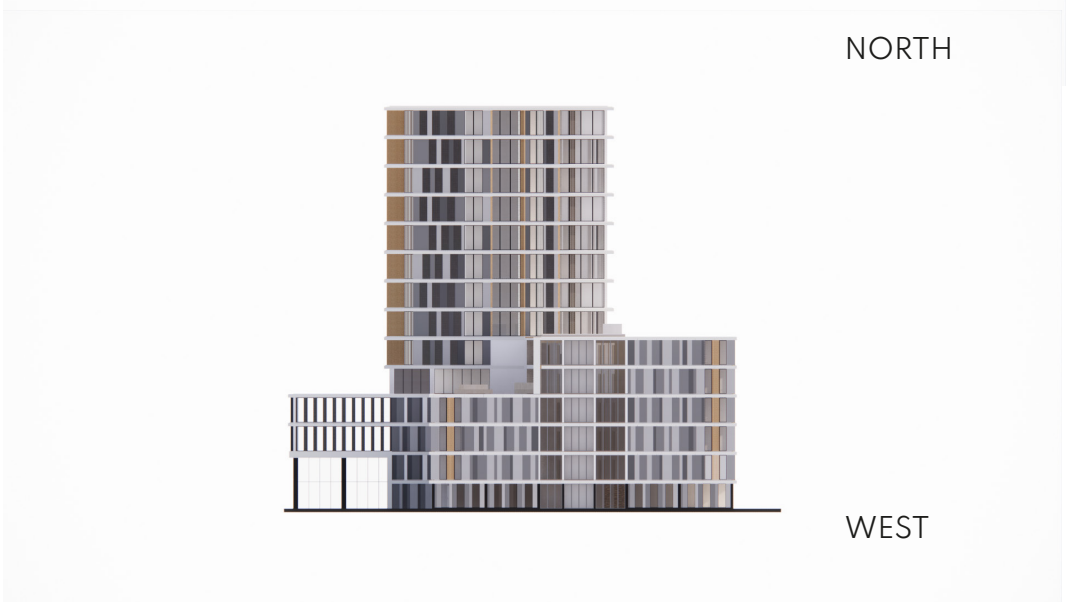
SECTION



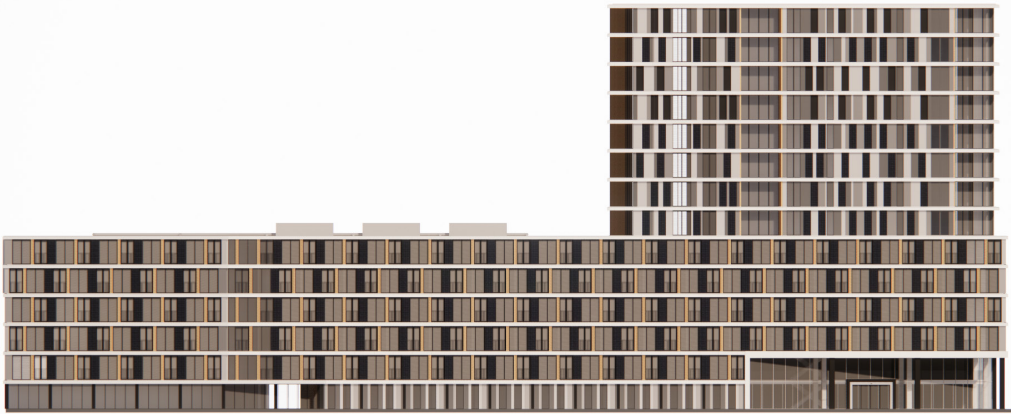
ELEVATIONS



NORTH



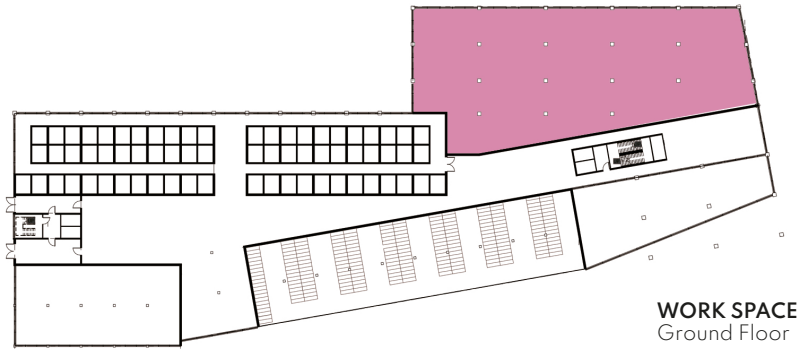
WEST



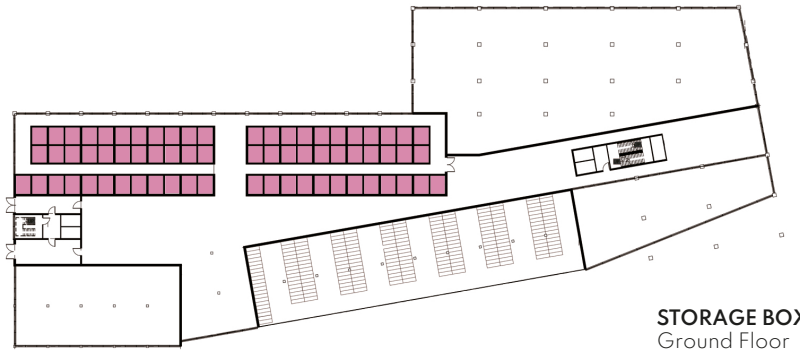
SOUTH



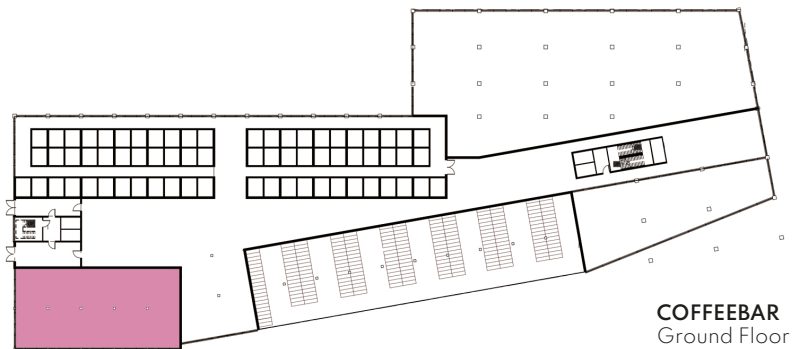
EAST



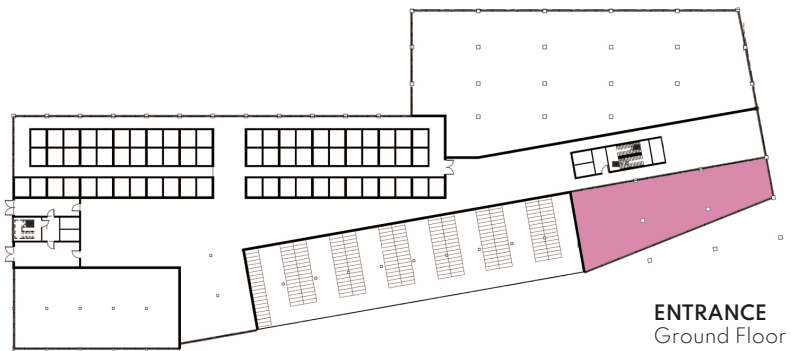
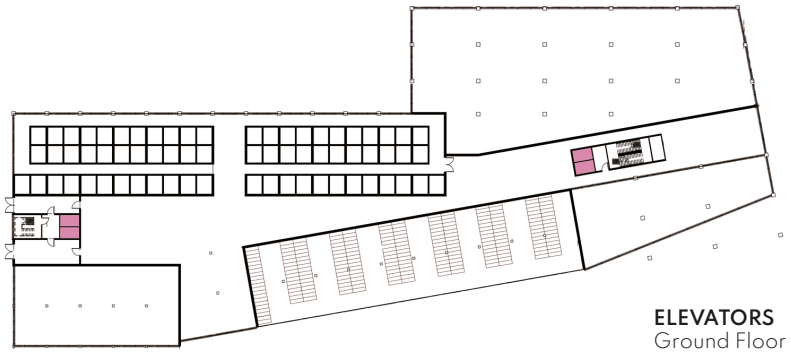
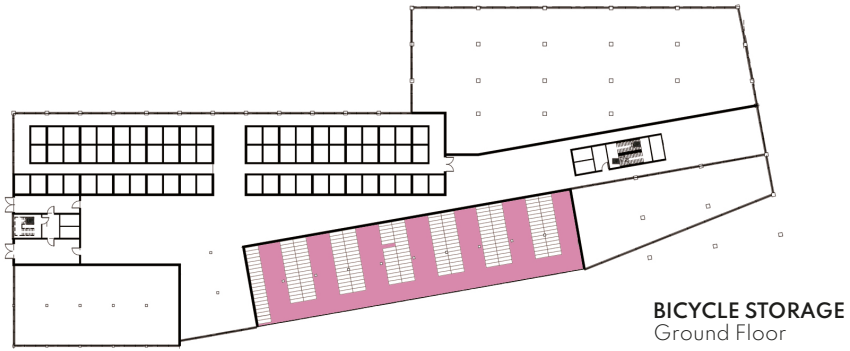
WORK SPACE
Ground Floor



STORAGE BOXES
Ground Floor



COFFEEBAR
Ground Floor

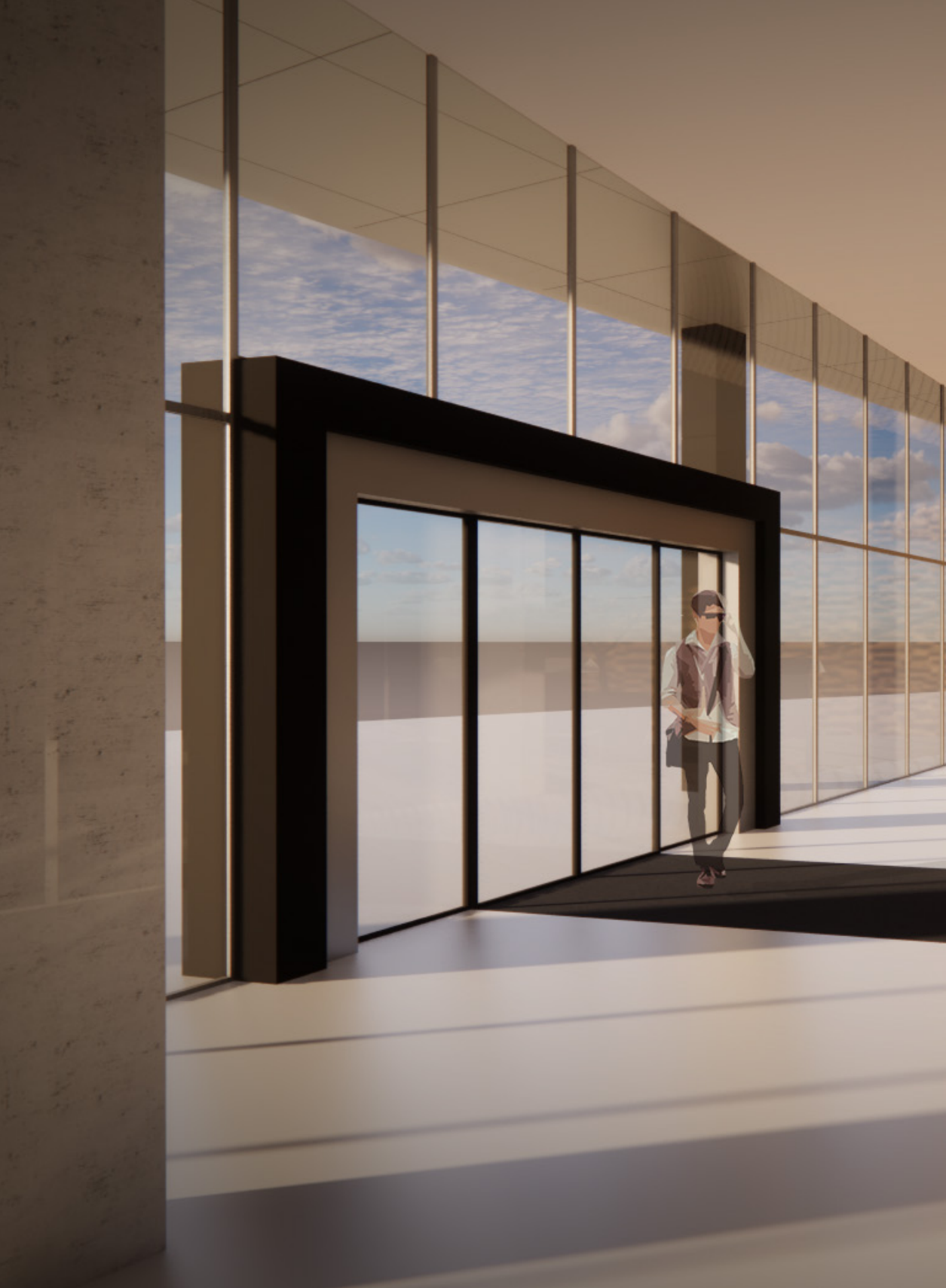


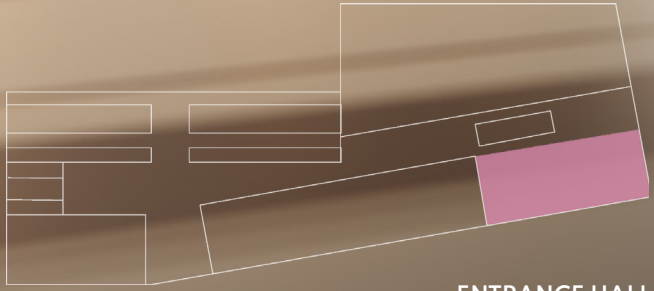


STARBUCKS



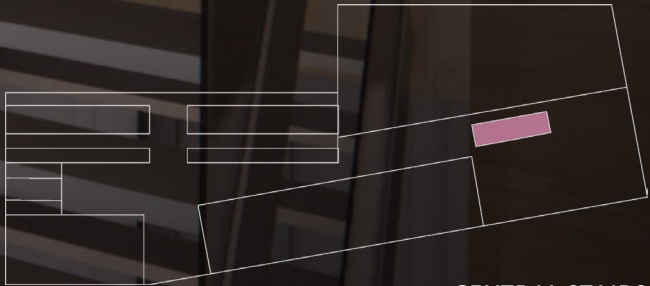
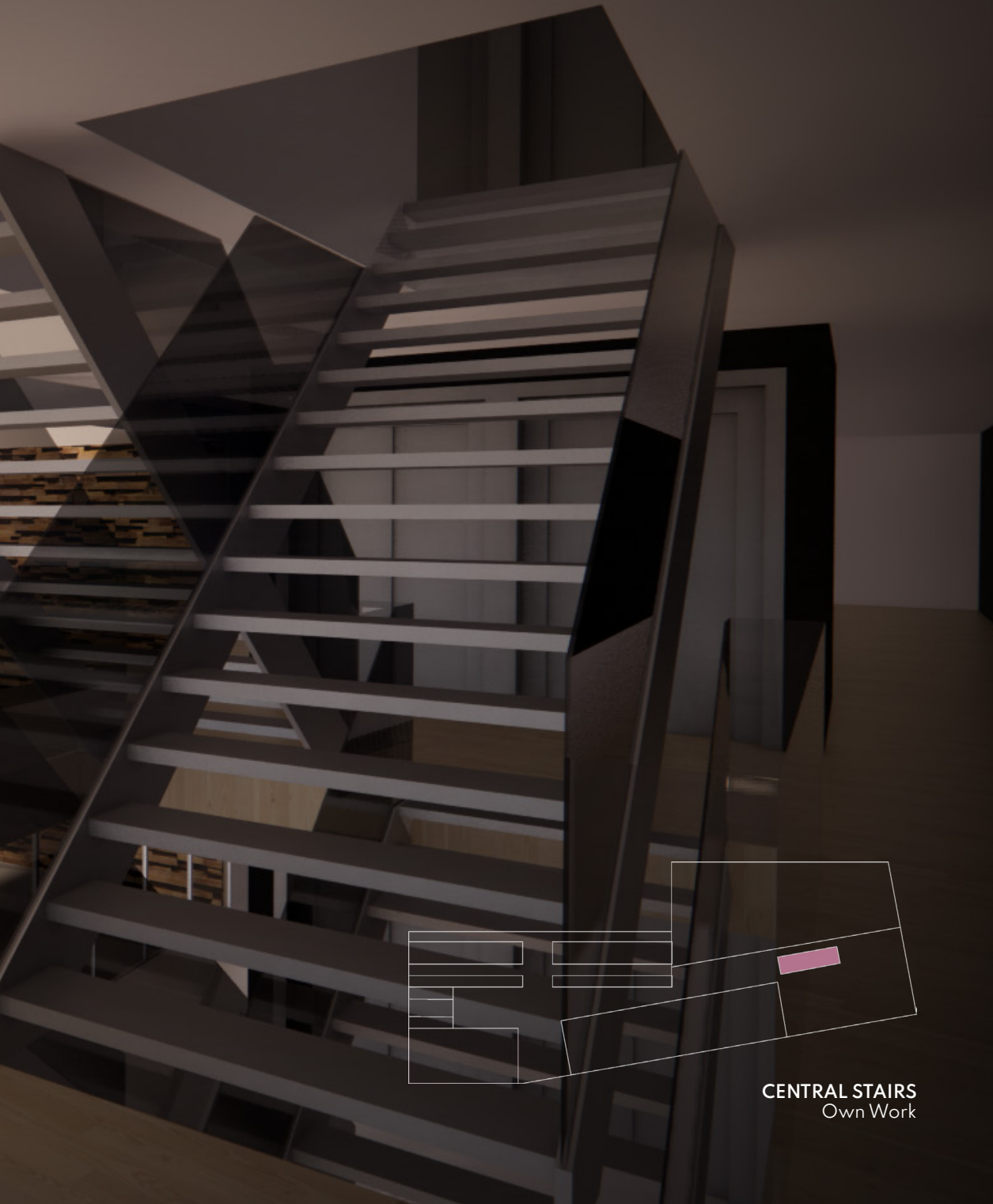
COFFEE BAR
Own Work





ENTRANCE HALL
Own Work





CENTRAL STAIRS
Own Work





ATRIUM TOP
Own Work







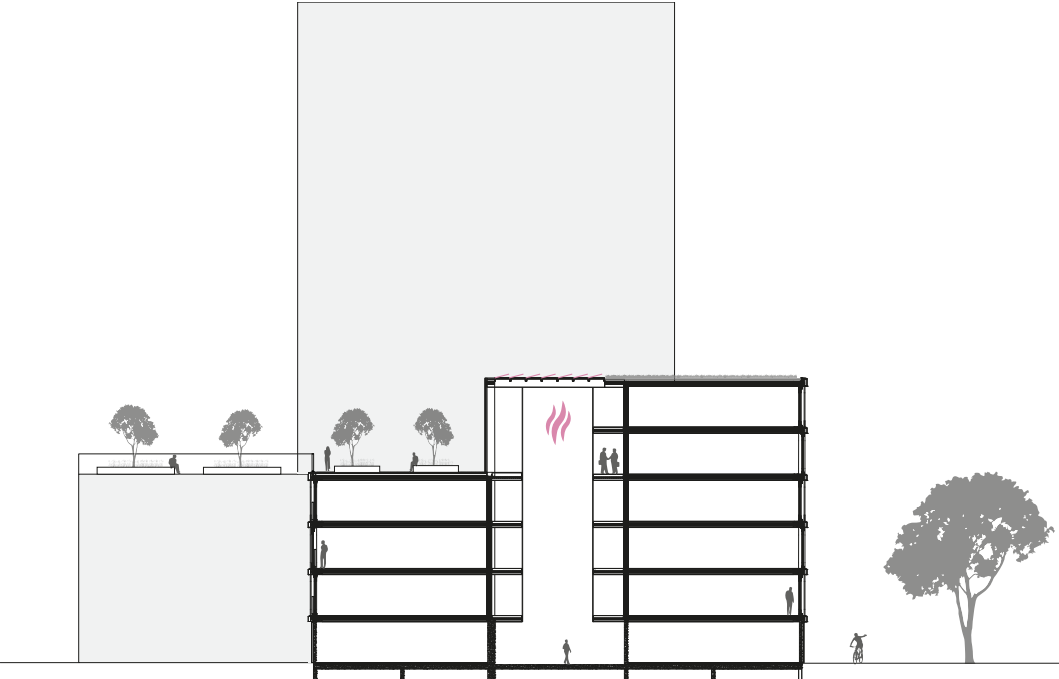


ATRIUM
Own Work

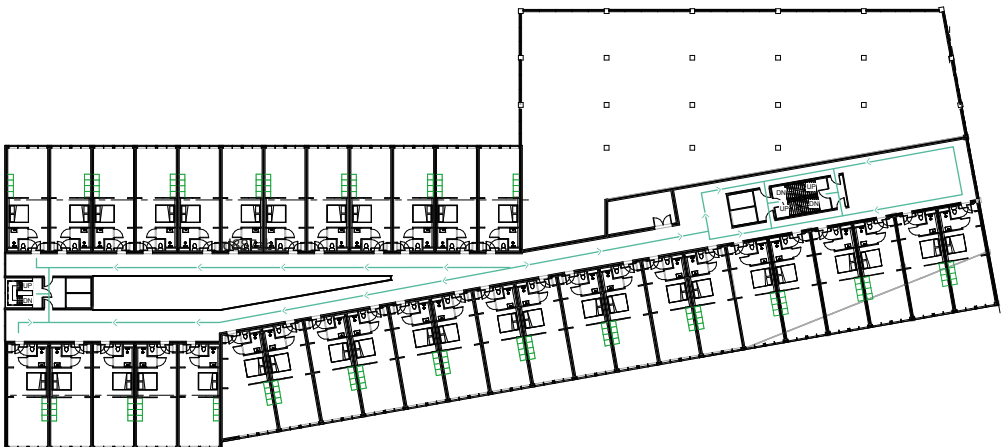
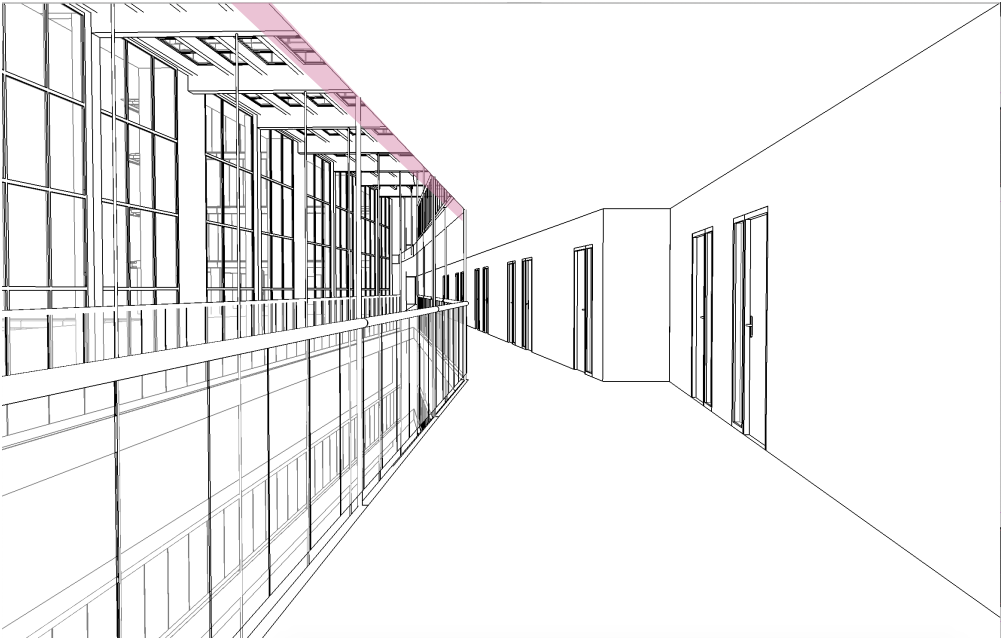




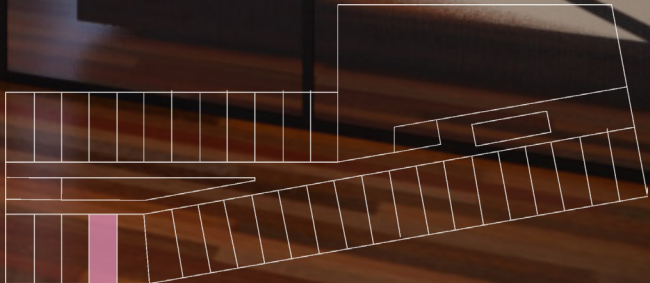
HEAT ESCAPE



FIRE SAFETY







Studio Interior
Own Work

DWELLINGS

The building is divided in two parts. The 'high rise' and the 'low rise'. Those two parts both have their own characteristics.

The low-rise has a corridor access typology with studios and in the high-rise the apartments are situated with a core access typology.

The studio's in the lower part of the building are one-person households, with a stronger demand for collectivity. These studios are situated in the low-rise to have a good connection with the shared facilities.

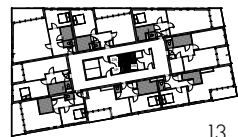
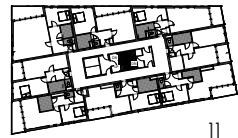
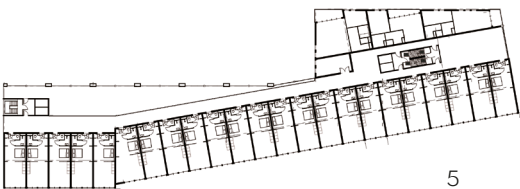
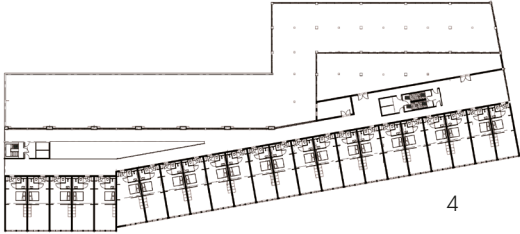
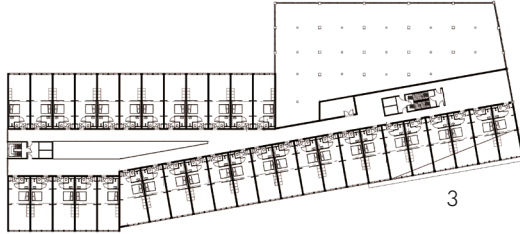
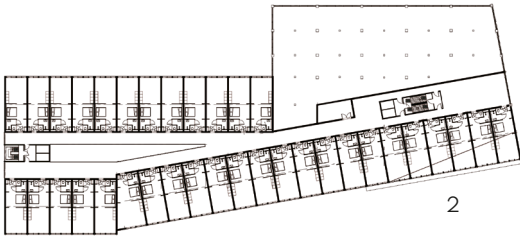
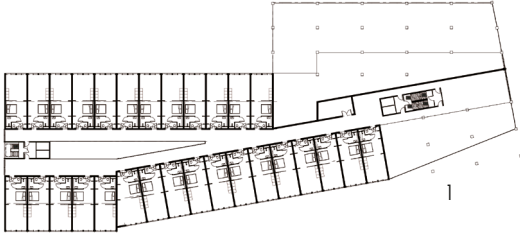
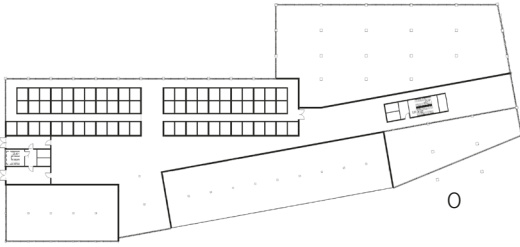
In the high-rise the apartments are situated. Those are larger houses for two-person households, and are less connected to the shared facilities.

Those apartments are larger with more private space, and room to own a washing machine. These apartments also have their own private outdoor space. So the connection with the shared facilities is less important.

On the ground floor there is a shared bicycle parking facility for all the residents. Also the storage boxes for the apartments are situated on the ground floor.

DWELLING TYPES

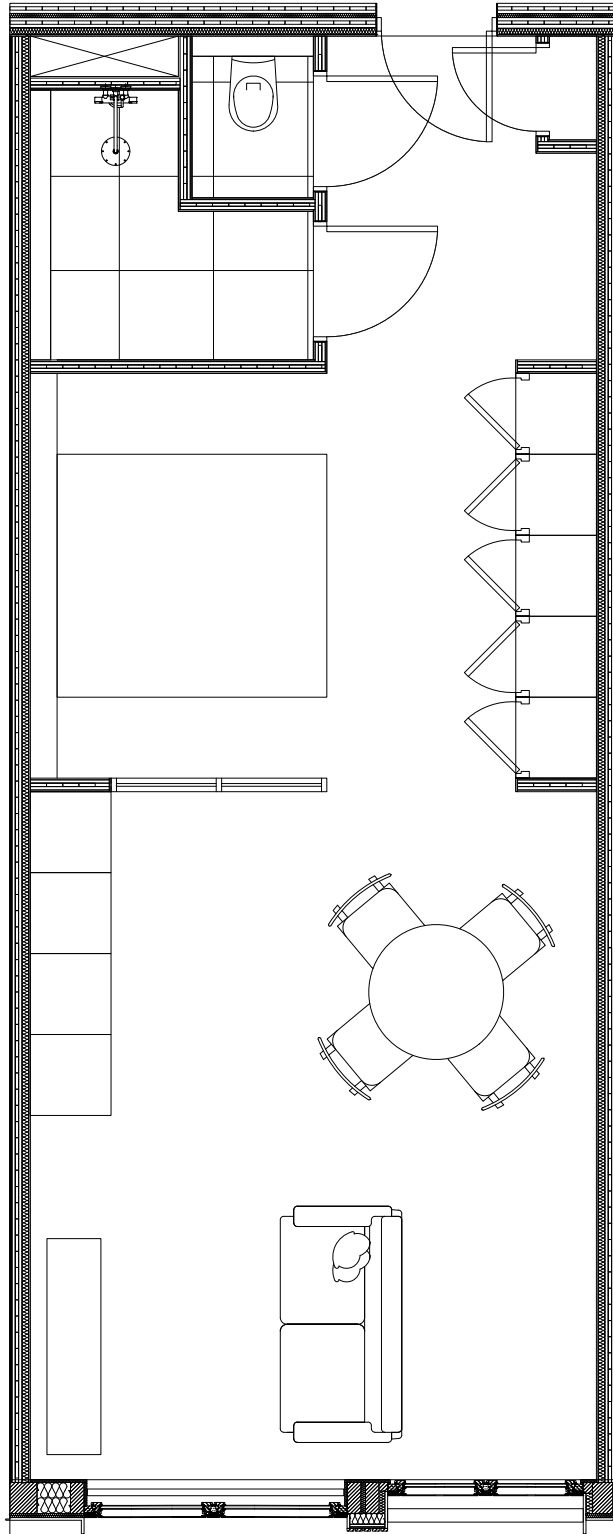
STUDIO	±45 M ²	145
APARTMENT	60-80 M ²	67 X
TOTAL AMOUNT		212 X

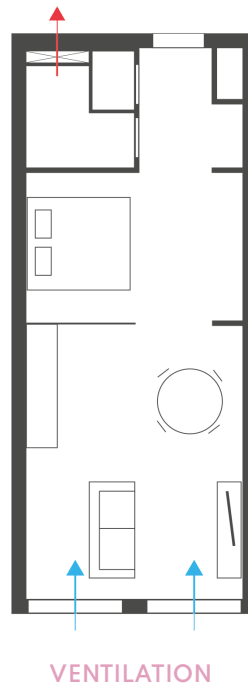
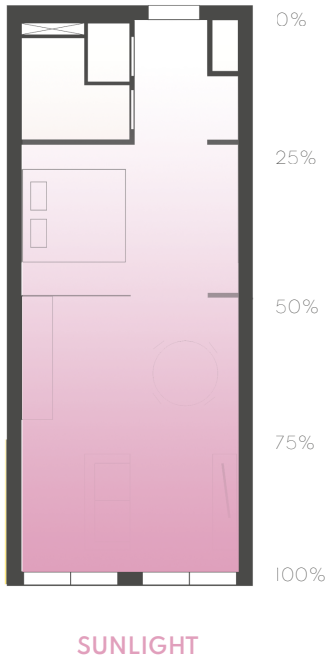
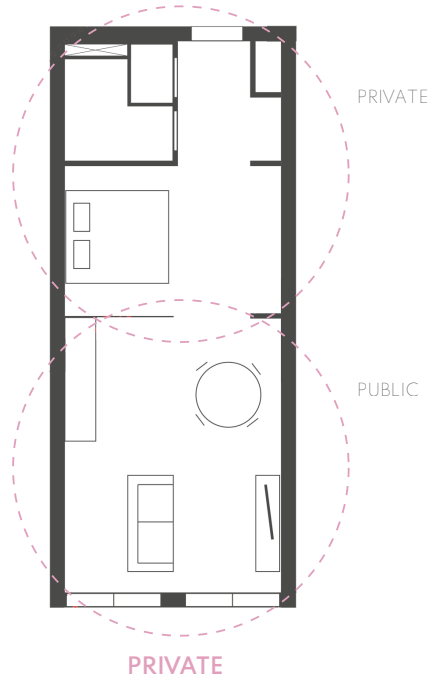
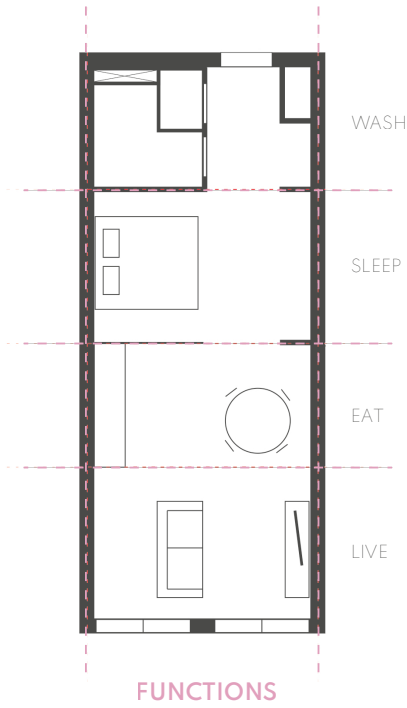






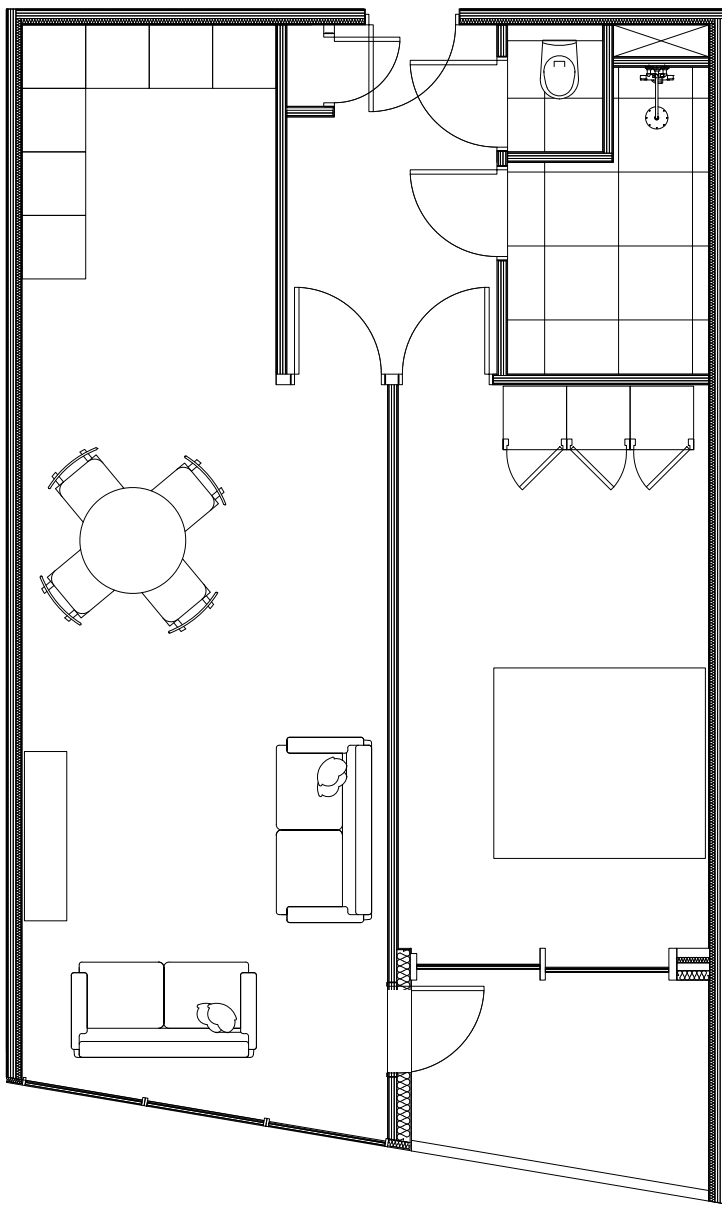
Studio Interior
Own Work





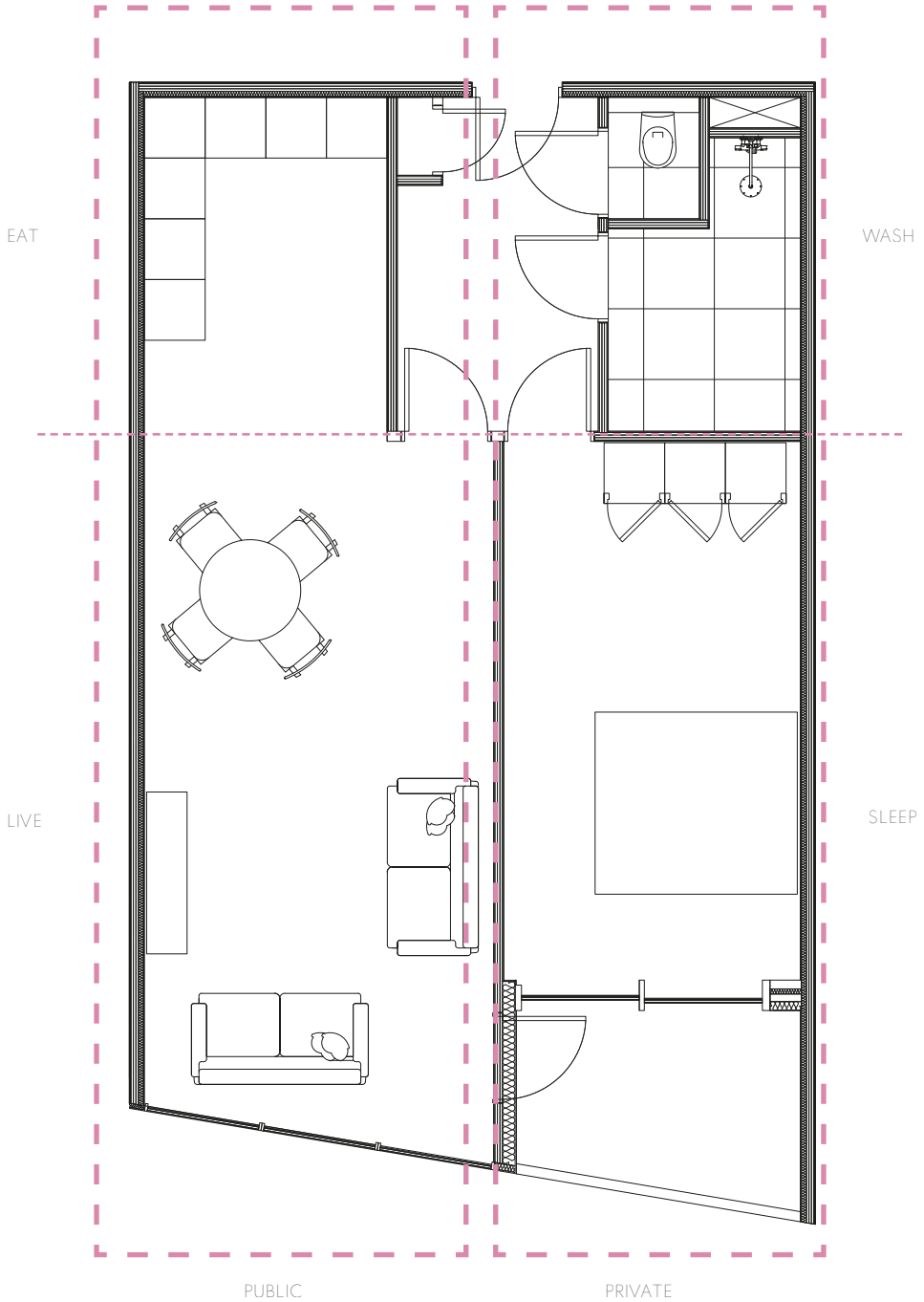


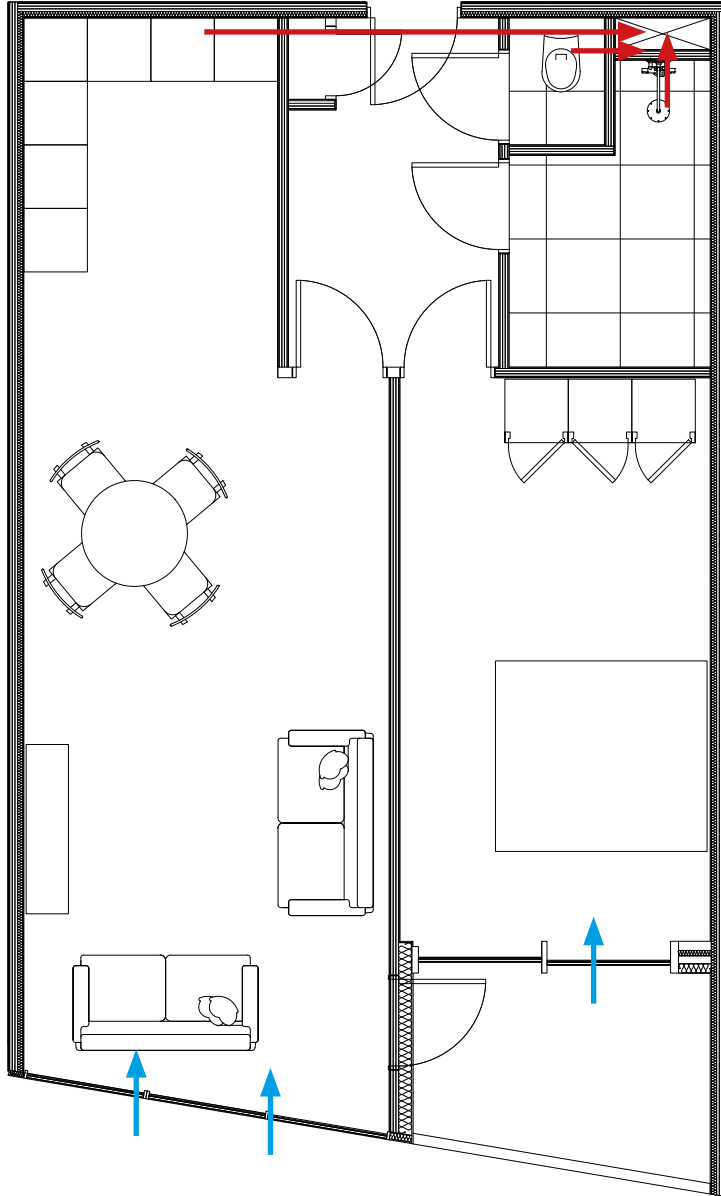


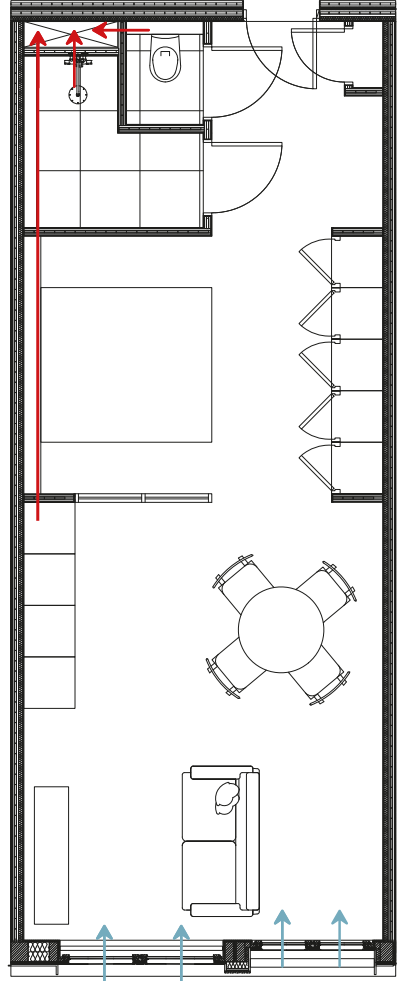
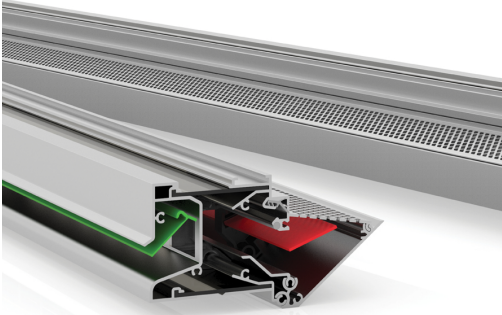


APARTMENTS









TYPE C VENTILATION

- Natural Supply
- Mechanical Drain

Fresh air is provided by heated climatop 60 ventilation grilles above the windows. The drain is mechanical by a central system placed on the roof of the building. The air is exhausted in the kitchen, toilet and bathroom. Together this 3 rooms provide enough capacity to refresh the air for the whole room.

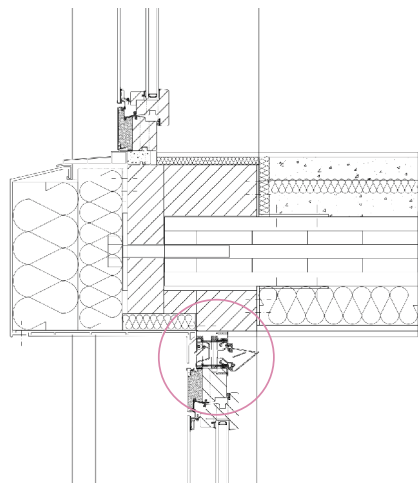
TOILET	7 dm ³ /s
BATHROOM	14 dm ³ /s
KITCHEN	21 dm ³ /s
	42 dm³/s

MINIMUM	
46m ² x 0.9 =	41,58 dm ³ /s

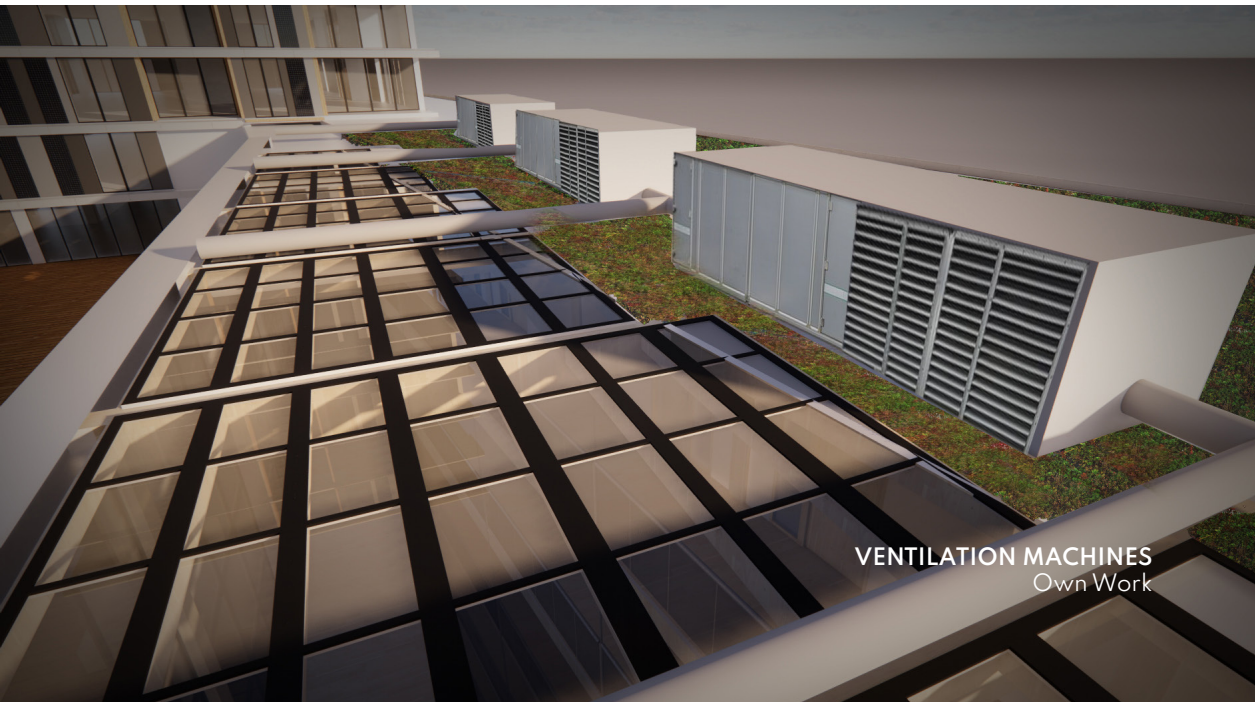
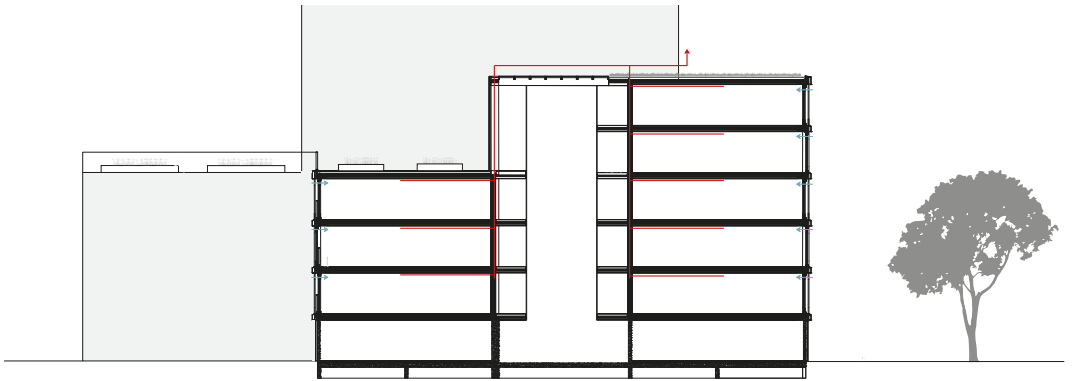
PREHEATED AIR

Climatop 60	12 dm ³ /s/m
Width	3.5 meter

3.5 x 12 = 42 dm³/s

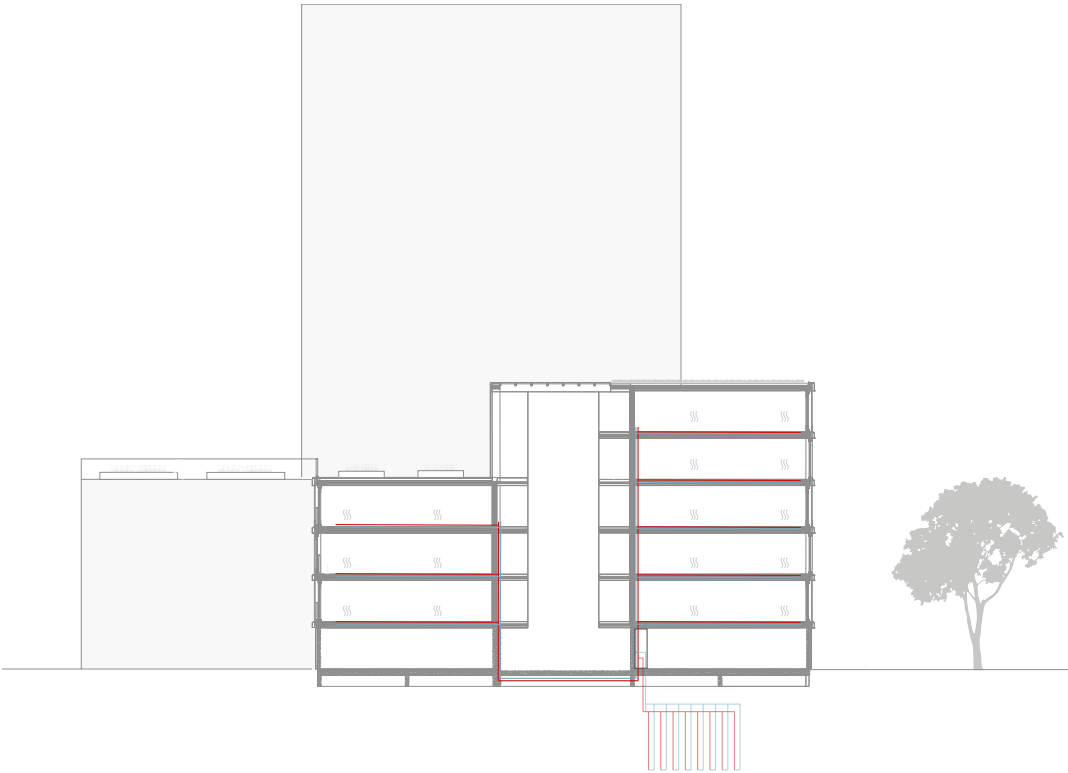


VENTILATION

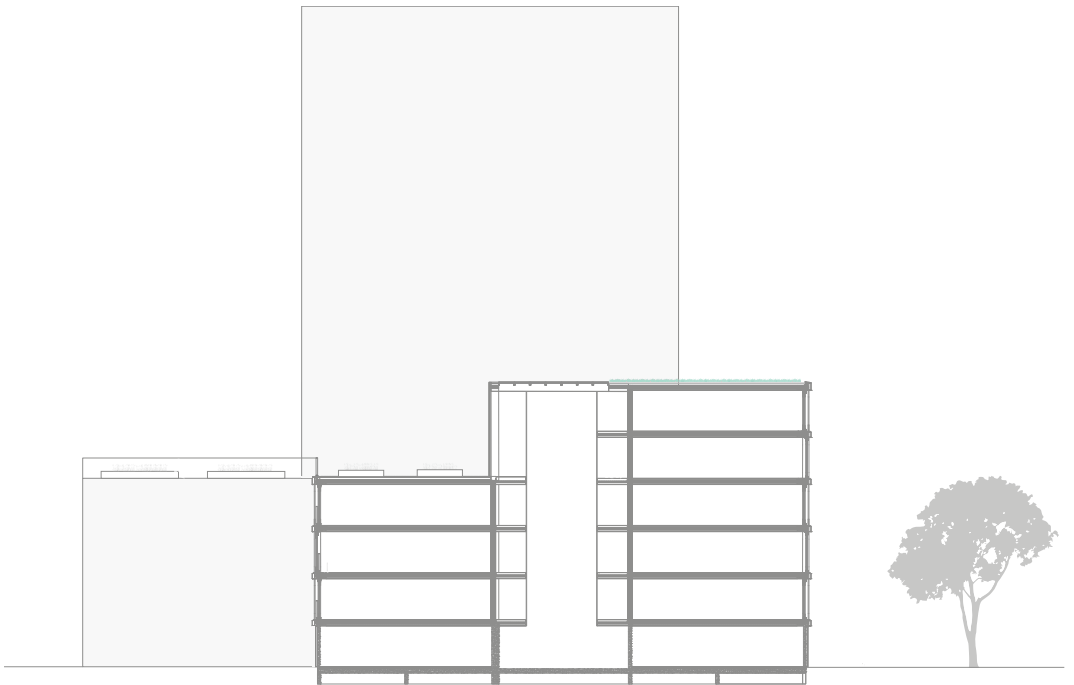


VENTILATION MACHINES
Own Work

HEATING PUMP



GREEN ROOF

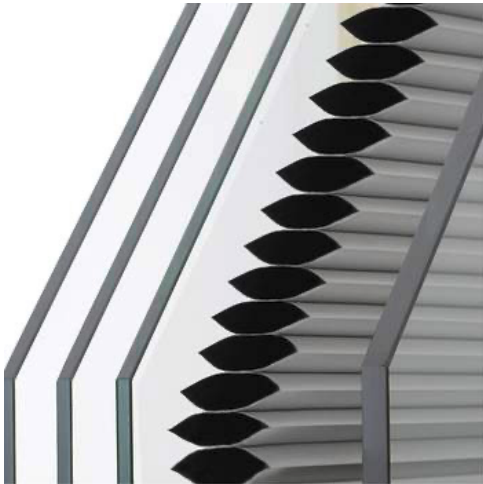
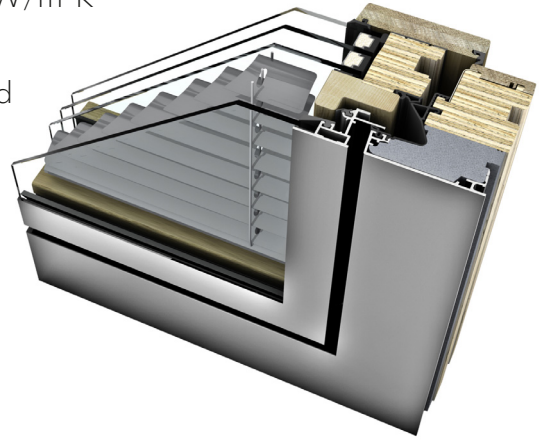


THERMAL INSULATION
SOUND REDUCTION
SECURITY
LOCKING

Uw 0.62 W/m²K
41-46 dB
RC2
Concealed

INTERNORM HV450

The chosen windows are from the producer internorm, and are built out of a combination of wood and aluminium. The wood is sustainable and the aluminium on the outside is to make the product durable and free of maintenance.



INTEGRATED SUN PROTECTION

Between the layers of glass, sun protection is integrated in the windows. This blinds are electrically controlled, and can be controlled individually.

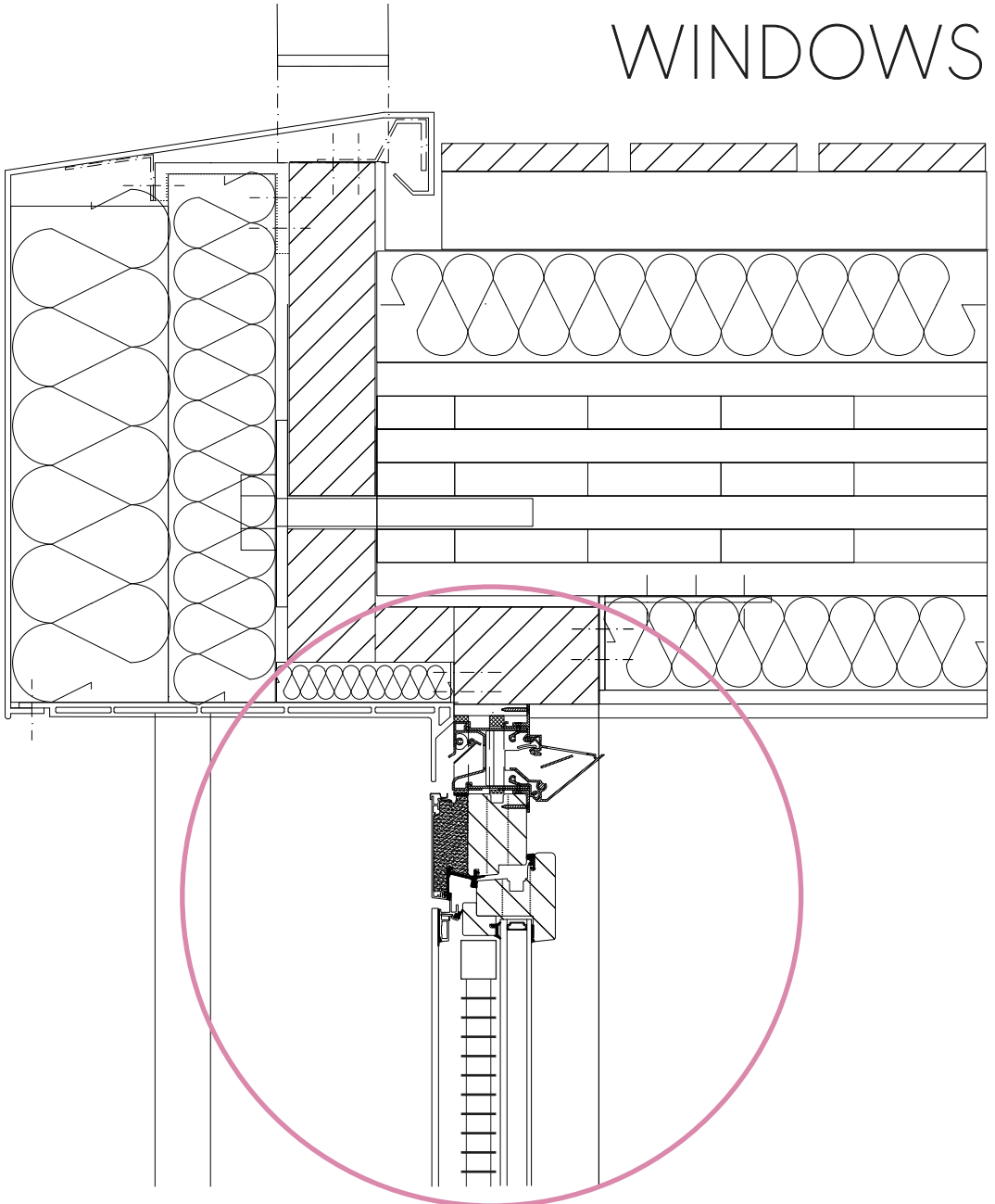
These blinds also can provide in privacy, so they can be used as blinds, as well as curtains. One of the positive effects of this integrated blinds is the uniformity on the outside of the building.



PHOTOVOLTAIC MODULE

The photovoltaic module which is integrated in the window provides the energy for the blinds to go up and down. This totally fits the idea of the self-sufficient building. The third layer of glass is also openable for maintenance reasons.

WINDOWS





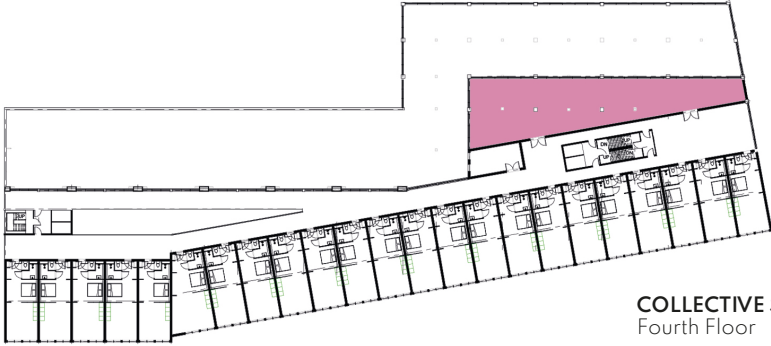
WORK SPACE
Third Floor



CORRIDOR
Every Floor



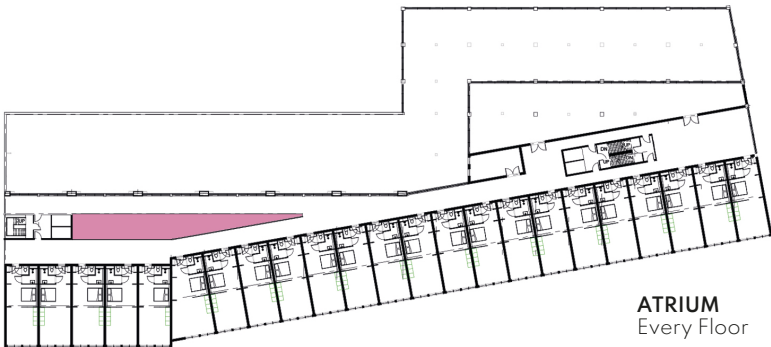
WASHING ROOM
Every Floor



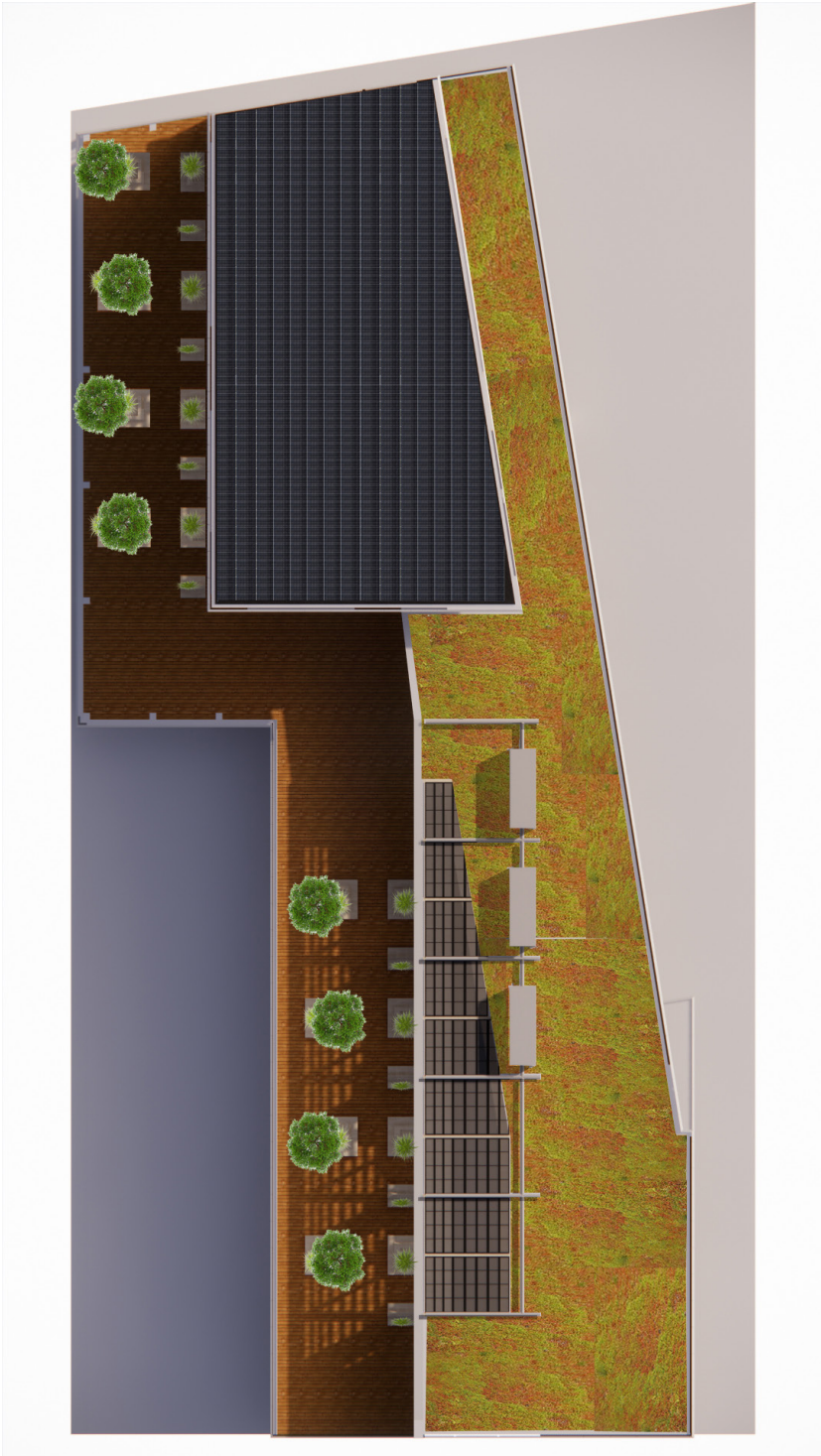
COLLECTIVE SPACE
Fourth Floor



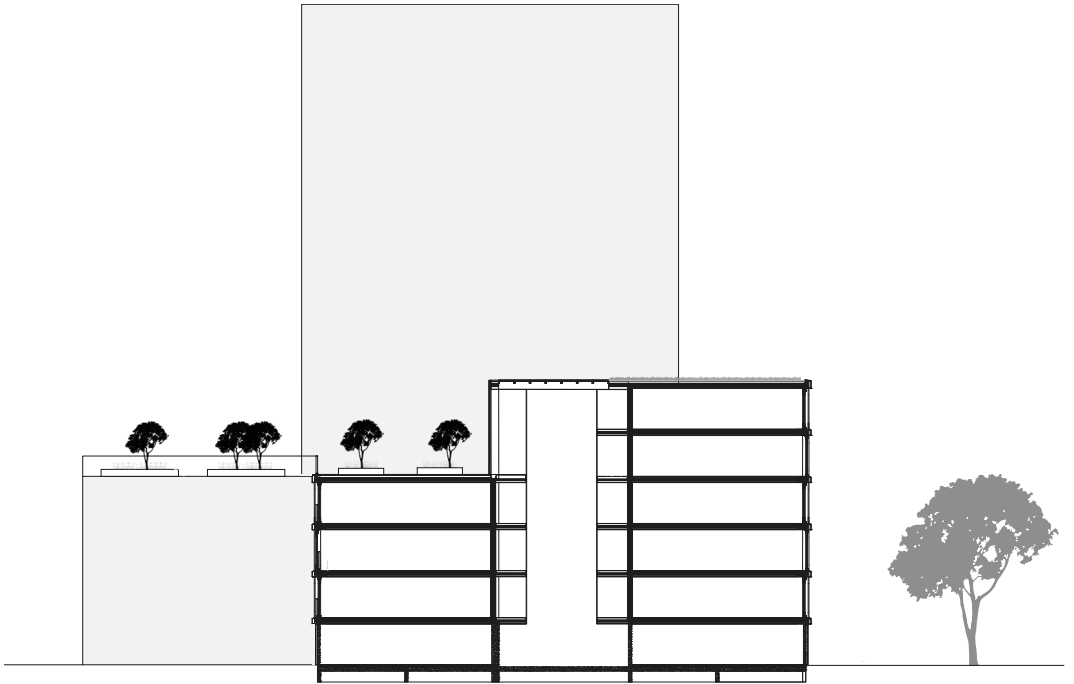
ROOF GARDEN
Fourth Floor



ATRIUM
Every Floor



ROOF GARDEN







Roof Terrace
Own Work





REFLECTION

REFLECTION

'Designing is about different kinds of knowledge, about developing a personal system of preferences, and about using a specific language of sketching and modelling.'

For experienced designers the process is not splitted up in separate steps and actions but the process is an undivided whole with automatic, unconscious steps, actions based on common practice or routine, and moments of reflection and exploration.' (Schön, 1991)

This words from Donald Schön for me perfectly describe the designprocess as a whole. Designing a building is not a linear process with a starting-point and endpoint. It's a multidisciplinary process with several aspects where you work on different fields at the same time. One of the important aspects of the design process is doing research. Conducting research makes it possible to make well-founded choices which you can defend.

But what is research? In his paper 'Methods and Techniques for research', Theo van der Voordt describes: 'Research is collecting, edit and analyze data to gather new information.' This explanation of research is very general but when looking further into his paper he specified scientific research in 5 important aspects:

- o Methodical
- o Objective
- o Controllable
- o Trustable
- o Relevant

He also defines scientific research in three different categories: **Fundamental research** which is exclusively focussed on increasing knowledge, **Applied research** which is focussed on providing building blocks for design and **Development research** which is focussing on producing new materials or products based on existing knowledge.

'Many choices have to be made during the design process of a building. Scientific research is an important means of making decisions as responsible as possible and weigh alternatives against each other.' (van der Voordt, 1998)

In the designing process of a building, many decisions have to be made. As well for making a decision in one specific design assignment, as for research intended to generate more generally applicable knowledge.

But scientific research in Architecture is very difficult. By doing scientific research the goal is - most of the time - looking for the truth, while designing is looking for the best solution in a particular situation. Architecture therefore asks for a different type of research.

An often used research method in Architecture is the plananalysis. By looking into comparable buildings and solutions used elsewhere you get a frame of reference which provides you architectural knowledge. During my studies at the TU Delft, Plananalysis was an often used method to gather information and inspiration.

Last but not least designing is also an intuitive process. As described by Elise van Dooren (et al.) in her paper: *'Making explicit in design education: generic elements in the design*

process' Designing is conceived as a complex, personal, creative and open-ended skill. Performing a well-developed skill is mainly an implicit activity which is not always easy to describe, or to reflect on.

For that reason she created a conceptual framework to make the design process more explicit. These five 'generic elements' - she claims - are coming back in every design process, and can be seen as a tool to make the design process more explicit.

These elements are:

- o Experimenting
- o Guiding Theme
- o Domains
- o Frame of Reference
- o Laboratory

These elements describe, in broad outline, the essential aspects of the design process. The framework is a construction, an abstraction of the rich and differentiated design process, but the reality is much richer and more differentiated. It is a cyclical process of doing, experimenting, reflecting and understanding. The framework helps in becoming aware, in reflecting and understanding. That's also how I will use this framework in this reflection report.

During the dutch housing graduation studio the focus was on creating a lively and vibrant live-work environment in the new M4H area in Rotterdam - The new 'Makers District'. Also the collectivity inside and outside the building played an important role.

The program of the studio was divided in different parts, which all contained a combination of research and design. The different parts of the assignment were:

- o Creating the urban plan
- o Research on a target group
- o Research on collectivity
- o Conceptual building design
- o Research by Design

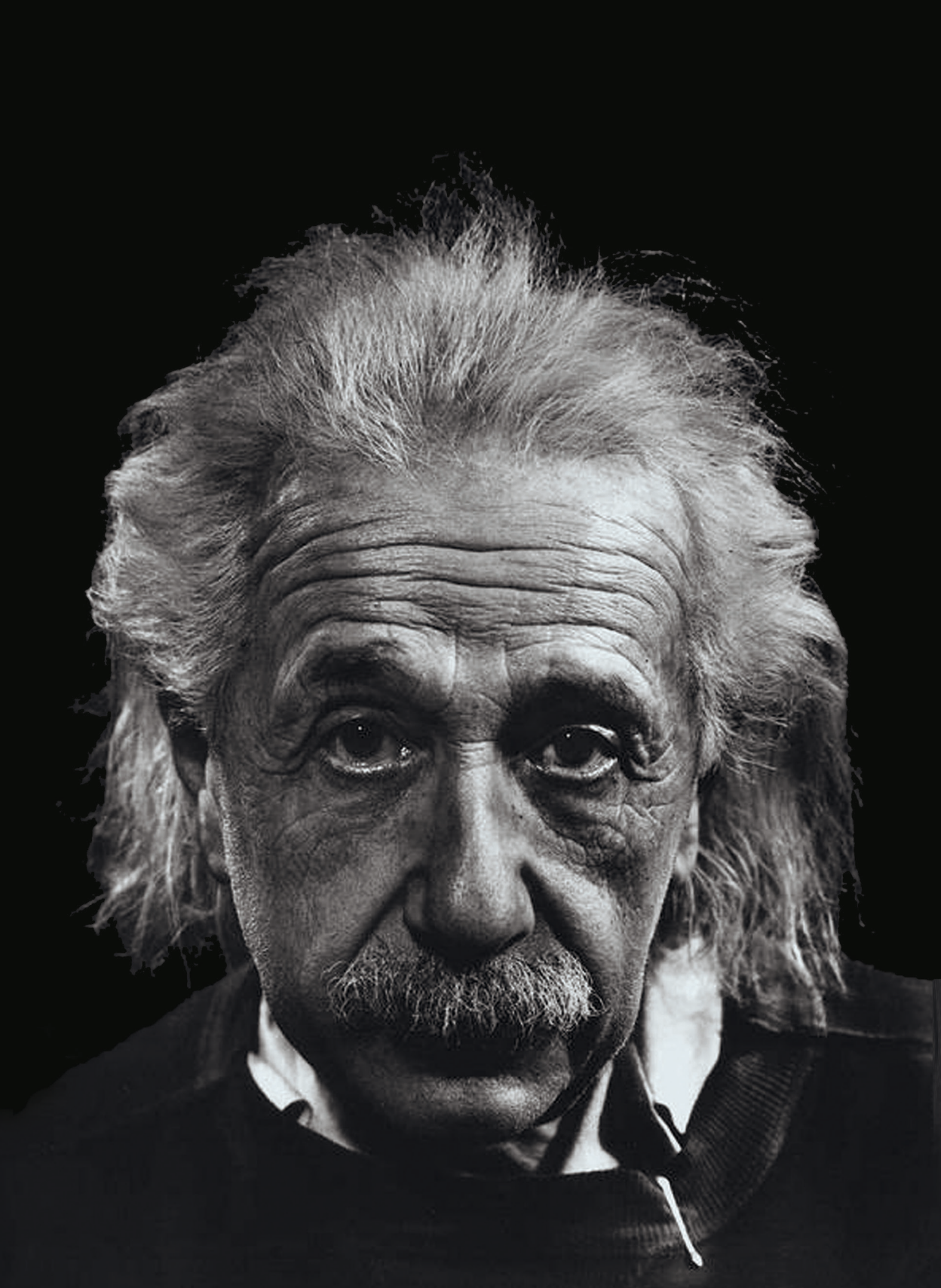
In all these different phases of the project, there was a strong relationship between research and design.

In the first semester the focus was more on research. In addition to designing the urban plan we also had to make some essential choices that affected the rest of the design process like choosing the design location and target group for the building. In this phase literature study was very important. At the end of this period we handed in our 'Research Report' which contained the outcome of the research and the first conceptual design of the building.

In the second semester the focus was more on the design and the technical elaboration of the building. Research remained important, but changed more into 'research by design'. Looking into comparable buildings, and building details, to see which possible solutions you could use to solve a problem, and to find inspiration.

This classification is also how this reflection will be structured. In the first chapter I will focus on the period before the P2 presentation, the 'Research Part'. In the second chapter the focus will be on the period between the P2 and P4 presentation, the 'Design Part'.

In this reflection i will review my research based on the 'research methods and techniques' as written by van der Voordt (1998). To organize the process of designing the building I will use the five 'generic elements' formulated by van Dooren et al. (2013).



If we knew what it was
we were doing, it would
not be called research,
would it?

Albert Einstein

RESEARCH

URBAN PLAN

‘Spatial planning often starts with establishing a misfit between demand and supply in the urban area, or the desire to invest in one building or area with the aim of economic profit.’ (Schön, 1991)

In the case of the M4H area in Rotterdam it was a bit of both. There is a large housing shortage in Rotterdam, which causes a misfit between demand and supply. At the municipality there is also the the desire to invest in this area, to create a new succesful neighbourhood which will generate economic profit for the city.

But before we could start with creating the urban plan for this area, we started with the first part of the research: [A fieldtrip to the area](#). A former harbour area in Rotterdam. It was a rough area, with a lot of monumental but mostly dilapidated buildings which gave the area an industrial and rugged look and feel. During this day there was also a [lecture about the plans of the municipality](#) with this area by Jeroen

de Bok. We had to take this ideas into account in our urban designs for the area, so this was our starting point for the first phase of the project.

Initiative

During this first phase we designed - in groups of four - the urban plan for the ‘Keilekwartier’ area. During the design of this area two questions were really important for us:

[What is the current urban quality of this neighbourhood?](#)

For us the answer to this question was already given during the fieldtrip and by looking at the monumental buildings in the area. The biggest quality of this part of the ‘keilekwartier’ was the finesses of this neighborhood. The narrow alleys and different (unpredictable) building shapes, gave this area it’s character.

Another important characteristic of the area was the height difference.

The 'low' facades at the street side, against the higher towers of the 'soundport building' and 'Joep van Lieshout'. We wanted to keep this two elements alive in the new urban plan.

Through what interventions can this quality be kept and improved?

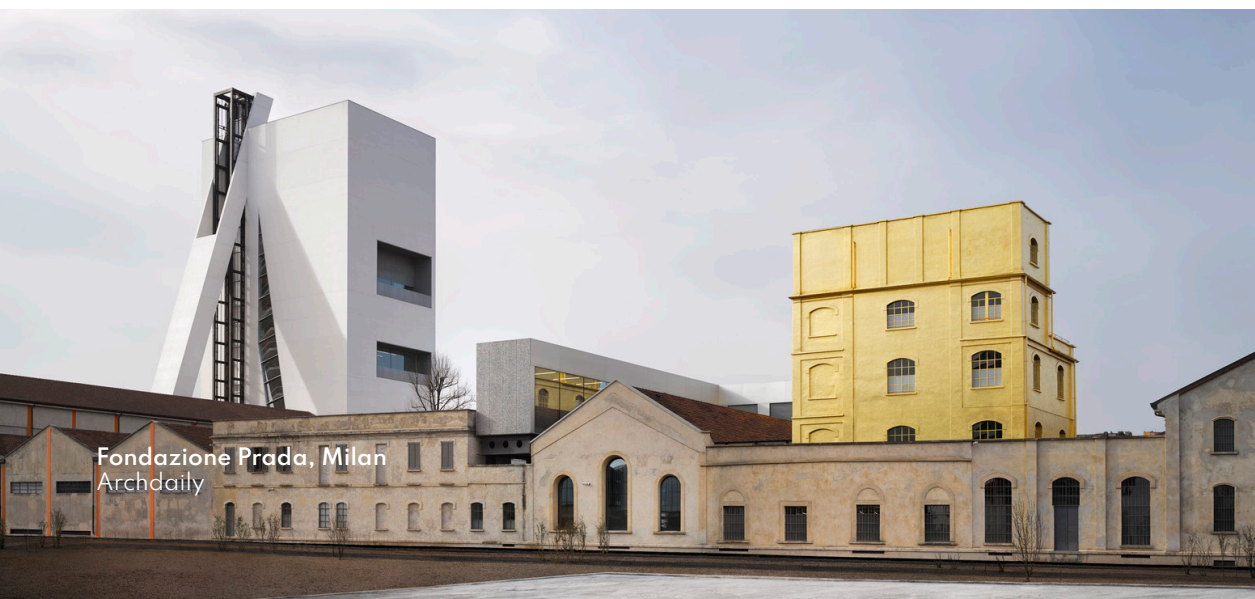
For the design of the new urban plan, we've had an extensive look into comparable newly built areas in the Netherlands, [a plananalysis](#). For example we've looked into the new NDSM area in Amsterdam - a comparable former harbour area - and Holland Park - a transformed former office area - but these projects didn't fit our thoughts about this area. So we started [experimenting](#) by making different sketch designs for this area. From high rise to low rise and everything in between, to see the spatial effects of the choices we've made.

Very soon we saw that only high rise or only low rise was not an option.

With only highrise we would lose the whole character of the neighborhood, and with only lowrise it was impossible to reach the asked density of the area. It had to be something in between.

We made four different sketch designs in which we tried different configurations of building blocks. None of them was really the solution.

Then we came across pictures of *Fondazione Prada*, in Milan. The appearance this project, with a more uniform lower facade and different higher towers on the inside which break, but also complete the overall picture, was exactly the style we were looking for. Also the combination of lowrise and high rise was ideal for our location



Fondazione Prada, Milan
Archdaily

we've also tried to keep the mazed structure of the area, by folding the buildingshapes around eachother. in the 'arpits' of these buildings arose small squares. These were inspired on the *Hunziker complex* situated in Zurich.

Combining the ideas and strengths of those plans, helped us to come to an first conceptual urban plan for this area. We now had a **guiding theme** and a **frame of reference** to start with designing the urban plan.

Designing

Than the real puzzle started. How to create the ideal configuration of buildings, open squares and reach the right density of the area. For this configuration we used an idea gained from Rasmussen (*Experiencing Architecture*, 1959) to create cavities instead of solids. At the starting point we saw the whole area as one solid, and started to cave out the monumental buildings we wanted to remain, and squares in front of them.

After that the streets caved out, with the idea that every street had to change direction at the end of a building, to create a mazed structure.

At every place where a street ended to a building, we placed a tower. To give the people who walk there a point of reference to walk towards. With this towers it was possible to create the density we needed in the

area. At the end of the area, next to the big road, we placed higher towers, which can function as a sound barrier between the road and this living area.

For the building heights and facade lines we have used the existing buildings in the area, like the sounport building, to ensure a coherent whole

In this way we setted up a toolpallette for all the buildings, which will be used as a starting point by the future architects of the buildings. This to ensure that all the new buildings in this area will act as one coherent neighborhood, while designed by different architects.

Used Research Techniques:

- A **Fieldtrip** where we saw the strong points of the area.
- **Lectures** where we got information about the ideas the municipality had with this area.
- **Plananalysis** of comparable projects to find possible solutions for our design.
- **Experimenting** with different building shapes, to see how to get the ideal configuration.

TARGET GROUP

Simultaneously with the design of the urban plan, the selection of a target group for the building started. This was immediately one of the most important decisions during the project, because the whole research and design project would be influenced by this choice. So how to start with this?

Problem Reporting

For me, one of the most important principles by searching for a target group was to select a group of people that was currently having relevant problems finding a suitable place to live.

By [reading news articles](#) about housing shortage, one theme and target group came up repeatedly. Starters, and then especially the group of people who are just graduated from higher education. Due to the current housing shortage in the Netherlands it's really hard to find a fitting house for these just graduated starters.

Problem Analysis

To find more information about what caused this problem, I did more research into this subject. One of the methods I used for this is a [literature study](#) on this subject, but finding scientific papers on this specific subject was hard. However I found some of them and in combination with the [news articles](#) and by reading some [government reports](#), I got a good idea about the real problem.

Most of the houses in the Netherlands are built to live with a family, but the way we live changed fast in the last 50 years. Young couples are not living together instantly and even more married couples are splitting up. This causes a rising number of one-person households. This, in combination with an increasing population number causes a large housing shortage.

Another problem that emerged here is that the current housing stock does not meet the requirements of the

current society. When living alone - which is often the case within this group of young starters - you don't need a family house. So I came up with the following research question:

How to create a building block which perfectly meets the requirements and wishes of the young graduated starter?

By approaching the design assignment in this research question as a building block, I defined that I wanted not only to create good fitting homes for the residents, I also wanted to create a good environment for the community that lives in this building.

This resulted in the following sub-questions:

- o Which wishes, and requirements does young starters have for their home?
- o How to create a good working communal building?

Research Design

For this two questions I did different kinds of research. To answer the first question I studied different kinds of **literature**. To answer the second question we did a group **plan analysis** on existing buildings. I will discuss this plan analysis in the next chapter.

Collecting Data

There are a lot of **academic papers** about the current housing shortage in the Netherlands, but finding the wishes and requirements of young starters in this papers was really hard. So i had to use other ways to find out these preferences.

Reports of municipalities gave a better view of this subject. As already mentioned, the difficulty for starters to find a house is a very 'hot topic' at the moment, so different municipalities in the region of Rotterdam already did research on this topic.

In retrospect, it would have been better also to conduct interviews with this target group myself. To see if the outcome would be the same, but due to the smart lockdown in the country during that time, this was a lot harder to set up. For a next research this can be an improvement.

But in this case I could suffice with existing data. I compared different reports which all contained almost the same outcome. This reports and data gave me a good insight in the wishes and requirements of this target group, and gave me enough support as a 'backbone' for my design.

Therefore i will categorize this part of the research as an Applied research,

Processing the Data

By analyzing and processing the data I found out that this target group consists of three categories.

- o Young Singles
- o Young Couples
- o Young Internationals

These different categories of people have different preferences for their homes. Since I wanted my building to be a place for all this different groups I set up a framework which could be used by designing for these people. This target group and the created framework are the **Guiding Theme** for this design project, so it was important to formulate these as clear as possible.

Conclusions

The conclusions of this research formed the starting point of my conceptual design. One of the most important and visual decisions made after this research is to design small houses. Because most of the residents in this target group are single, and affordability is one of the most important requirements this would best suit this target group.

Report

The outcomes of this research are merged into my research report. This

report contains the sources and outcomes of this target group research as well as the collectivity research, described on the next page.

This report also contains the drawings and explanations of the first conceptual design for the building which is based on the urban plan, the framework created on the basis of the Applied research, and on the ideas I gained at the quickstart of this course.

Used Research Techniques:

- o Reading **News Articles** to get insight in the current problems on the housing market, and to get an idea for which target group the building would be designed.
- o **A Literature Study** on the subject, and the chosen target group to get a better insight on the current problems.
- o Reading **Government Reports** to get a better insight on the exact numbers, but also to get insight in the preferences and requirements of this particular target group.
- o Reading **Academic Papers** on this subject, to get a better insight in the real problem.

COLLECTIVITY RESEARCH

With the whole group of graduation students together we did a research on collectivity in residential buildings. This research is done through a **plan analysis** of 15 buildings around the world. This research was to elaborate on a wide variety of housing typologies.

Main issues as the type of housing, functions in the building, accessibility, the relation between public and private and movement in the building have been studied.

This has resulted in a representative route of a resident through the building with possible collective encounters. Spatial aspects which influence these encounters have been pointed out to emphasize the relation between architecture and collectivity. A brief overview of this research is documented in a report.

By doing this research it was possible to gather more information about the use of collective spaces in residential buildings. To see which kind of spa-

ces worked and which don't, but also to get an insight on the more informal meetings in the circulation spaces. This was very helpful for gathering more information about the subject of collectivity.

At the end of the report we formulated a conclusion with different approaches for adding collectivity to a building. These were really helpful during the design of my own building. We saw the following approaches: Common Staircase, Small Squares, Shared Facilities, Communal living spaces and Visual connections.

Used Research Techniques:

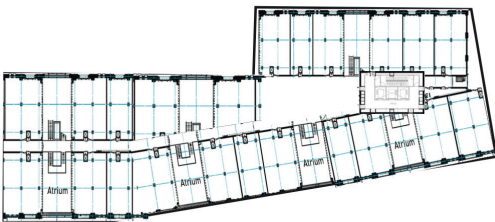
- o A **Plan Analysis** where we looked into different buildings around the world and how collectivity plays a role in those buildings.

PLAN ANALYSIS

To come up with a conceptual design for the building, [plan analysis](#) played an important role. By looking into comparable buildings, with a similar group of residents, the first ideas for the concept of the building arose.

Quick Start

During this studio we started to analyse different kind of residential buildings around the Netherlands and worldwide. Buildings with a different way of stacking, circulation and orientation. We did this to get insight in the different ways a residential building can be built up.



Quickstart
own work

During the first weeks we started to gather information about these buildings to see the different typologies used. Then we had the 'Quick Start' workshop, in which we tried to fit in those existing buildings into our own building blocks.

This was a nice way of [experimenting](#) to get a quick insight in the possibilities of the building block, and to try different ways of combining different typologies in one building. During this workshop the first conceptual idea for the organization of my building-block arose. Here I came up with the idea of putting smaller dwellings with a corridor in the low-rise part of the building (based on St. Jobsveem) and putting apartments with a core circulation in the high-rise (based on New Orleans).

This would eventually become the basis for the design of my building, but during this phase more plan analysis was used to

come to the conceptual design.

Plan Analysis

During this conceptual design phase I looked into different comparable buildings to see what kind of solutions they came up with for comparable problems. This plan analysis will act as a **Frame of Reference** during the design process.

One of the largest problems I was facing was the depth of the building. With a depth of 30 meters the building was not wide enough to create two-sided oriented houses on both sides, but too wide to create livable one-sided oriented dwellings.

By looking into comparable buildings like the design for SCYE010 in Schiedam, and the 'Van Vollenhovenkwartier' in Rotterdam I came up with the idea of creating Deep and small studio dwellings. This also perfectly

fitted my targetgroup.

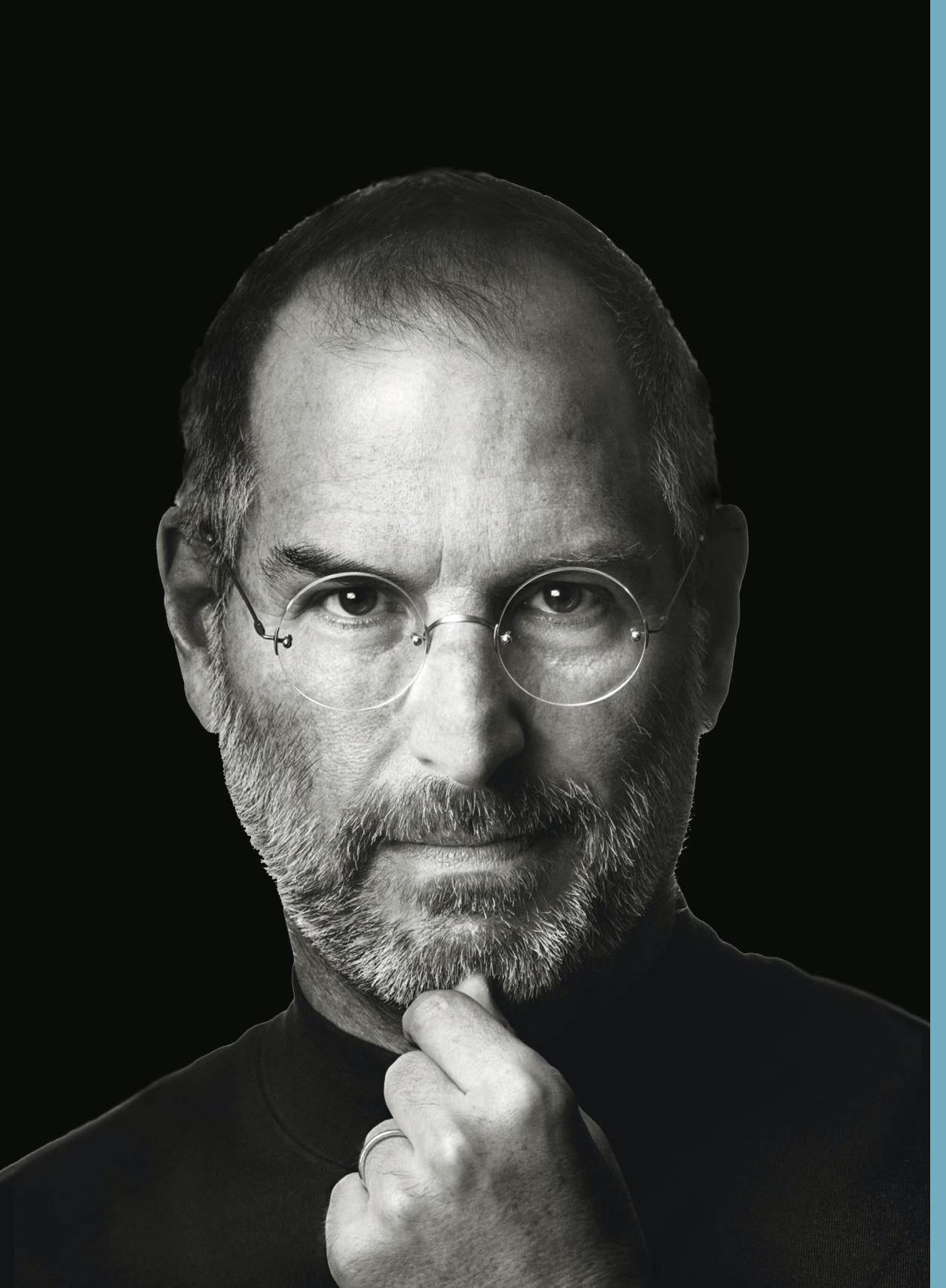
For the apartments in the tower I looked into VOLT in Delft. This is a complex of three different - not straight angled - towers which contains apartments for just graduated knowledge workers, exactly the same design assignment i had.

Looking into these projects really helped me to come up with the first ideas for my conceptual design as presented during the P2 presentation.

Used Research Techniques:

- o **Plan Analysis** was a good way to make the essential choices for the conceptual design of the building
- o **Experimenting** Espacially during the quickstart, this was a good way to create a starting point for the conceptual design.





Design is not just what it
looks like and feels like.
Design is how it works.

Steve Jobs

DESIGN

DESIGN

“The design process is a process of thinking in broad outlines and in detail, of doing and reflecting, of intensive work and taking distance, of naming and valuing, of questioning and answering, of diverging and converging, and of seeing what is and what could be there. (Van Dooren, 2013)

In the second semester of the studio the focus of the assignment was on converting the conceptual design into a definitive design. During this process the focus was on themes like Construction, Materials and Sustainability. In this new phase the role of doing research was more in the background, but was absolutely still present.

New kinds of research started by looking into [governmental rules](#), like the building regulations and the climate goals, but also looking into existing building details and materialization.

In this phase the research is not purely scientific anymore. One of the most

important requirements of scientific research is that it's objective and that somebody else will get the same output by the given input.

At this point also personal preferences come abroad, the design part. That's why I saw this phase of the project more as the [research by design](#) phase. By trying different solutions for a problem, you see which solution works the best. It was also the phase of making final decisions.

Where the first semester was a period of gathering a lot of information, now the time had come to make the concrete decisions on all different layers of the building. A period of analyzing, discovering alternatives and reducing possibilities to make the final decisions in the design.

I will give structure to the reflection of this design process by using the 5 generic elements of designing (van Dooren, 2013) as described in the introduction.

GUIDING THEME(S)

“Designing is exploring and deciding within a potentially endless number of possibilities, To be able to create a coherent whole, a designer needs an inspiring direction or order. Using a guiding theme not only gives the design its character and identity in the complex and open design process, it also helps in making choices.” (van Dooren, 2013)

The guiding theme of this design project was already partly given in the studio assignment. In the main question of this studio **collectivity** played an important role. This also was a large part of the research, so this theme is also clearly visible in the design for my building.

The other part of the guiding theme is formed during the first phase of the project. Selecting a **target group** was an important part of the design assignment, and by doing research into this future target group of the building the overall designing theme is formulated. Here

some important choices have been made which would affect the whole design of the building.

Because of the small dwelling sizes, the collective spaces are playing an important role in the perception of the building.

Wide hallways with informal meeting areas, a collective space where you can go with your friends, or meet up with your neighbours. The lack of personal outdoor space is compensated by a roof garden.

But also some other functions are organized collectively, to keep the studio's affordable. Shared laundry rooms, and bicycle sheds. Functions which came out of my research as functions the people are eventually are willing to share.

The apartments are in a slightly higher segment, and have more space, so they have their own storage space on the ground floor,

and enough space for their own washing machine. Of course they may also use the shared facilities if they wish.

Last but not least there was another 'guiding theme' which had a major influence on the design: **Sustainability**. An important topic at the moment and with new governmental rules coming up in January I absolutely wanted to take this in account.

One of the most visible decisions made here is to construct the building in wood. By building in 'Cross Laminated Timber' not only the CO₂ emission during construction is much lower, also the construction period can be increased, and there is a marked reduction in construction waste.

All these aspects will cause less impact on the environment, and will help to get to the asked climate goals.

Another very visible intervention in this design based on the climate goals are the solar panels in two of the facades. Not only these panels play an important role in reducing the energy needs of the building, they also play an important role in the facade layout. They are really integrated in the building design.

So during this project three guiding themes lead me to the final design of the building:

- o **Collectivity**
- o **Target Group**
- o **Sustainability**

The first two guiding themes (collectivity and the target group) were set up during the first semester and are further investigated in my research report. For the sustainability of the building I looked into the BENG2 requirements set up by the Dutch government. Every choice during the design process is made by keeping these three themes in mind.

"Every design begins with a search for an idea or for an intuitive understanding of how an assignment should be solved. This idea is the start of a long journey on which the designer defines the idea more precisely, modifies it, adds details and repeatedly rejects results" (Bielefeld & El Khouli 2007: p.7).

Used Research Techniques:

- o **Plan Analysis** on collectivity from the research report
- o **Literature Study** on the target group from the research report
- o **Governmental Reports** For building regulations and the climate goals

FRAME OF REFERENCE

“One of the paradoxes of creativity is that, in order to think originally, we must familiarize ourselves with the ideas of others... These ideas can then form a springboard from which the creator’s ideas can be launched.” (Lawson, 2006)

When designing a building the use of reference projects is an essential part. As an architect you don’t have to invent solutions for every problem, while most of them are already solved in other projects. The trick is to combine these different existing solutions and fit them within your new design.

The knowledge architects are using, is already embedded in the artificial world. This collected knowledge can be analyzed and stored in images and diagrams. In this way designers can build up a library for use during the design process.

That’s why looking into reference projects is an important part of the de-

sign process. This frame of reference is built over the years by searching, collecting and analysing projects you come across. Analyzing reference projects (Plan Analysis) was also an important part of the education at the TU Delft, and an often used research method in the field of Architecture.

During the first semester we already studied different plans to gather more information about collectivity in residential buildings, and to investigate different ways of organizing the dwellings inside those blocks.

This research was documented in the research report and was an important frame of Reference on these subjects. The outcomes of this research was used intensive during the final design of the building and was a good designing tool.

During this second part of the project the use of these projects became more concrete. Looking into floorplans of existing single houses, and how they were organised for

example. But also looking into different facade materials to find out how to give the building the envisioned appearance. On all the different scales of the building these references were a source of inspiration.

The horizontal lines in the facade for example are inspired on the facade of 'Calypso', another building in Rotterdam. With these horizontal lines the focus is on the length of the building, instead of the height.

The organization of the floorplan was also quite difficult. Because of the depth of the dwellings and the one-sided orientation it was hard to come up with a liveable floorplan, which contained all the qualities I wanted on this small amount of square meters. By looking into several comparable buildings, and by combining the best parts of each of those

floorplans I found out the best solution for the floorplan.

At last I have used several images from the internet - from websites like Pinterest - which provided me with inspiration for the building and facade design.

Used Research Techniques:

- o **Plan Analysis** To find solutions for upcoming problems during the design process, and to find inspiration for the building design



DOMAINS

“An architect is a juggler, who’s got six balls in the air. An architect is similarly operating on at least six fronts simultaneously and if you take your eye off one of them and drop it, you’re in trouble. The only way to keep them all in mind at once, as it were, is to oscillate very quickly” (Lawson 2006: p.151).

When designing a building you work on different scales, and on different aspects of the building at the same time. Van Dooren ordered these different aspects in 5 main domains of designing.

These **domains** does not come in chronological order. As an architect you work on them simultaneously. Nevertheless for reflecting on them I will separate them.

Context

The research for the context of the design started by creating the urban plan. By looking into the area, and the rich history of it, we automatically

investigated the historical en cultural elements of this area. The remains of the **old harbour** given this area it’s unique character but also the temporary infill of the area - The Rotterdam Makers District - with room for different workshops and **creative craftsmanship** which the municipality like to see back in the new designed neighbourhood.

This background was important for creating the urban plan, but also for decisions on building level. Also the fact that the area is laying **outside the dikes**, was an important aspect we had to take in account during the design.

Site

The site of the building offered a variety of **different atmospheres** which had an influence on the designing process. With a park on one side, a busy road at another and on the back side narrow alleys with a small square. All these different atmospheres had impact on the layout of the build-

ding, the orientation of the dwellings, but also on the design of the facade. All those different surroundings gave the building an dynamic look and feel.

Function/Route

The main function of the building is residential, but there is a lot more to experience.

- o Workshop + offices for startups in robotics
- o Collective spaces
- o Roof garden

All those different functions together with a dynamic target group, will provide for a dynamic building and community in a dynamic new and young area.

This dynamic character of the building isn also visible in the organization and routing of the building. All the different functions are accessible through the same entrance, to stimulate interaction between the different users. Also the roof garden and other collective spaces are accessible for all the users.

The large atrium will stimulate interaction between the residents of the different floors, and also will provide natural sunlight at everybody's front door. All those interventions will facilitate a feeling of collectiveness inside the building, based on the research done in the first semester

Form and Space

The Shape of the building - the composition - was roughly already determined during the creation of the urban plan. Based on the interaction with the surrounding buildings, and sunlight lines. Another important aspect was to try to limit the height on the side of the park, and at the narrow alleys. for that reason the height of the building is at the side of the big road.

Also the facade layout is based on this principle. At the park side there is a focus on the horizontal lines, where on the street side the vertical lines are more emphasized.

Material

For choosing the materials sustainability played an important role.

The construction is made of CLT - a cross laminated timber wood structure - except for the ground floor. This is built in concrete because the risk of flooding. When the ground floor was built in wood

and there was a flood the structure would rot. That's not sustainable at all. So the construction of the ground floor - and on the places with a double ground floor layer like the entrance and workshop hall the first two floors - as well as the foundation are made in concrete.

One of the great advantages of CLT, is the possibility to pre-fabricate large parts of the building. This will increase the building time, and thereby the effect on the environment and the neighbourhood. Also the amount of building waste is very low with this construction method.

The cladding of the facade is executed in Aluminium. This is by itself not the most sustainable material to produce, but it's an easy recycleble material, and very easy to maintain. It's also well resistant to the weather.

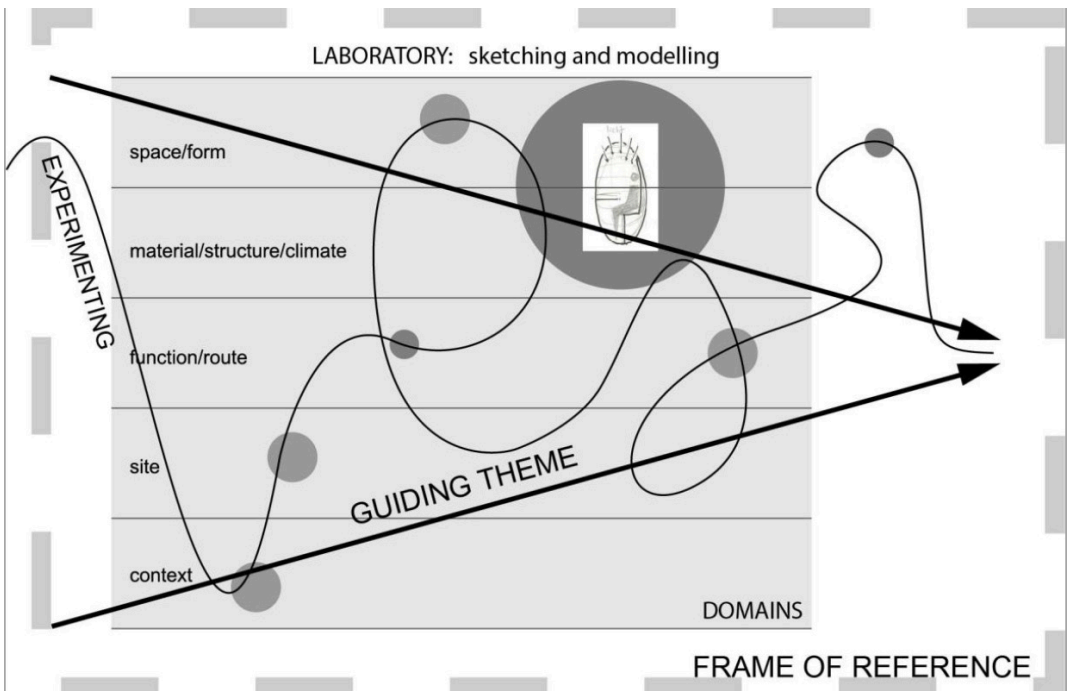
Another important cladding material are 200 solar panels. Also this panels are not that sustainable at production, but by supplying energy they will help the building to reach

the climate goals.

Last but not least glass plays an important role in the facade. It started with the simple fact that the 10m² facade of each dwelling needed to contain at least 6.5 m² of window to provide in enough daylight in the dwellings. To ensure the insulation of the building i've added tripple layerd glass, for the best possible insulation value.

During the design of this building all these differnt domains played a role by coming to the final design, but in my eyes these 5 elements does not cover the whole design process.

During the design process there are a lot more aspects you have to take in account. Like construction methods,



consultation with other parties and last - but in this case absolutely not least - the financial aspects. All those factors and actors normally playing an enormous part during the process of building design.

During the education at the TU Delft, these factors were left out of consideration to stimulate the creative process and stimulate students to look for possibilities instead of obstacles. That's the reason why these factors are not included in the report of Elise van Dooren. This report is focussing on how to educate designers, and not on how to evaluate an professional architect.

But now that we are graduating, these are factors we have to take in consideration. In this design project, i took many of those factors in consideration, which also had effect on the final result.

Nevertheless for us as students it stays difficult to estimate what the costs are for different solutions. We are only able to make a rough sketch of which solutions are cheaper, and which are too expensive by thinking logically. I have tried to do that as good as possible.

Another aspect i've worked on are the construction methods for the building, and especially for the facade. By choosing prefab elements, and design them in a way they are easy to connect to eachother, the build-

ing time is significantly reduced, also assambling the building is way more easy which prevent the project against unexpected costs.

For me personally it was really interesting to dive into a design this deep for the first time and learn completely new aspects of the design process which didn't come up earlier in the education. Aspects that weren't named by van Dooren, but are really important in building design.

Used Research Techniques:

- o **Plan Analysis** To come up with the best solutions for the problems i came across.

EXPERIMENTING

"The design process is a process of balancing between opening up possibilities, seeing new ways, analyzing, discovering alternatives, associating, encircling a subject and abstracting on the one hand and on the other hand reducing possibilities, testing, selecting, evaluating and making decisions.

To summarize all these dialectical and often paradoxical actions: designing is first and foremost a process of exploring and deciding, of experimenting."(Van Dooren, 2013)

Experimenting plays an important role during the design process, and it has done so during my own. By experimenting you can try different solutions for a specific problem and see which one will work best. Experimenting was the best crossover between research and design. it's a so called 'research by design' method.

As you could have read in this reflection paper, experimenting was a research method i've used in almost every step during the process, because it's a clear way of conduct

and deduct different solutions for the same problem. By experimenting the designer evaluates his moves in a threefold way: in terms of the desirability drawn from the normative design domains, in terms of their conformity to or violation of implications set up by earlier moves, and in terms of his appreciation of the new problems or potentials they have created (Schön, 1985)

As an architect it is important to be open and to consider designing as a step-by-step exploration. To see experimenting as a process of trial-and-error. The best design decisions are created by accidentally making mistakes, and see new solutions.

During my process i have tried a lot, drawn a lot and throwed a lot away. A good way to experiment in architecture is through laboratory.

Used Research Techniques:

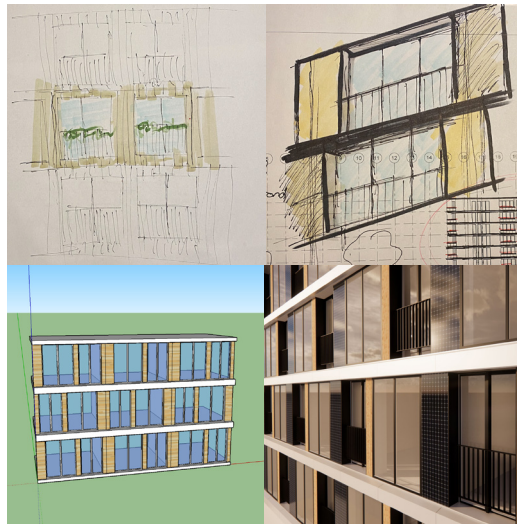
- o **Experimenting** Tried different options to find the best solution.

LABORATORY

Engineers have laboratories for experimenting. Designers have their own laboratory for the process of experimenting: the language of images. Apart from its function in presenting a design result, the visual language of sketching and modelling is a way of thinking out loud during the design process. Through the sketching and modeling, the design process unfolds. (Van Dooren, 2013)

To come to the final design of the building, many different options came across for every situation. By sketching, drawing and modelling different options, I came across several options for upcoming problems. Due to the limited accessibility of the faculty and materials it was hard to make physical models. As a solution for this problem I used sketchup a lot for quick digital models.

In the following image you see the evolution of the facade from one of the first sketches to the final design. This evolution went from a single hand drawing with the first principle, to an advanced facade design.



By trying different options and experimenting a lot I came up with a first digital design, which by practical and sustainable decisions transformed into the final design.

This route I took for every important design decision in the building. In this way it was possible to come up with the best solutions.

Used Research Techniques:

- o **Experimenting** Tried different options to find the best solution.

REFLECTION

At the end of this reflection report it's time for an over all reflection on this project and look back to the project as a whole, and the relationship between research and design. It was an eventful year, and this report was a perfect way to look back on it as a whole.

When we started in Februari 2020 nobody had an idea what this year would be like. The lockdown in March was far in front of us. And also was the deadline for the final presentation. The assignment looked big and unreachable.

By tackle the assignment step by step, now almost a year later there is a project and a buildingdesign i am really proud of.

In this last part i will look back on this proces by reflecting. I will do that by answering the 5 questions as formulated in the graduation manual of the faculty of architecture.

What is the relationship between Research and Design?

Research and design are closely related. Architecture is an academic field, and choices made during the design process has to be based on research. This can be fundamental research but most of the time it's applied research.

It's important to base your choices on research to come to the best solution and to make it possible to explain to other people why the proposed design is the best choice or solution.

As already showed in this reflection report this research can be done in many different ways. And i have done it in different ways. Reading academic papers or analyze existing buildings and everything in between. This really helped me to make a better - and better substantiated- building. Every kind of research is good as long as it underpins your design choices, and helps you to declare your choices.

What is the relation between the graduation topic, the studio topic, your master topic and the master programme?

The topic of this studio was advanced housing design for modern households in the city. My subject 'Starters in the City' perfectly fitted this studio topic by making it possible not to design for traditional family housing (which is by far the biggest part of the existing housing stock) but to create a - In the Netherlands - quite uncommon type of small studio housing for one-person-households.

In the Advanced Housing studio we've explored design solutions for affordable housing and had to deal with live-work interactions, environmental challenges and sustainable design solutions. In my design for the M4H area all these aspects came up. At the Faculty of Architecture students develop an independent and academic attitude and are given the opportunity to design their own projects in the speciality of their choice. The research and design during this graduation course I trained and finally could show both capacities.

Elaboration on research method and approach chosen by the student in relation to the graduation studio methodical line of inquiry, reflecting thereby on the scientific relevance of the work.

During this studio we have used different research methods. The most used method was plan analysis, but also other methods are used. The structure of the studio was also mainly based on this way of research. From the beginning we were feeded with projects to find inspiration and get a grip on the assignment.

On urban scale, Collective scale, but also on subjects like parking. These reference projects helped to understand the scale and different solutions.

However the scientific relevance of the research is not that big in my eyes. The research was mainly used as design tool, and not as a goal itself. As described by van der Voort the research we did was not necessarily Fundamental research but Applied research. However, this still can be seen as scientific research. Due to the corona virus for me it was hard to go to libraries, and doing interviews with people was harder. For me it was possible to find a lot of useful information from governmental reports, but the scientific relevance is debatable. For a next research there is room for improvement in this area.

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

Sometimes the reality was hard to find during education at this faculty. One of the things I really liked about this graduation studio was that the assignment was really close to reality. Government rules, money issues, building techniques, etc. all passed by during the assignment.

During this course we actually are prepared for a job in architecture.

The fact that this studio was close to reality also made sure that the results of the assignment are quite real. Apart from the fact that it was impossible to work out the entire building in the given time. Many of the outcomes of this design project could be implemented in other designs.

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

Espacially during the creation of the conceptual design, some ethical dilemma's i've had to decide in. Not all the preferences of the future residents of the building could be implemented, because their wishes doesn't always agree with their wallet. I've had to decide which of the preferences were the most important, and create a line between wishes and requirements.

The fact that i've had chosen to create studio dwellings without a private outdoor space was the best decision for connecting my building to my target group, but doesn't necessarily is their dream house. Nevertheless the designed houses does fit the requirements these people have for their first house, and by adding collective services they can collectively use the most of their preferences.

Taking this kind of decisions is always hard, because you personally decide how a large group of people will spend a part of their lives.

On the other hand it's always someones own choice if he/she wants to live in a building like this. As long as you are aware of the effects of the choices you make, an the impact it has on somebody's life. in my eyes it's hard to make a wrong choice, as long you stands behind it yourself.

For me - at every decision i've made - an important question was: Would I live here myself? At all the final made decisions the answer was yes.

BIBLIOGRAPHY

- Baele, Kristel. Bormans, Ron. Propositie Rotterdamse Politiek EUR. Erasmus Universiteit Rotterdam. 2018
- Bendit, Edward. Frenkel, Amnon. Kaplan. 'Sigal Residential location choice of knowledge-workers: The role of amenities, workplace and lifestyle.' 2013
- Bielefeld B. & El Khouli S. (2007).
Design Ideas. Basel: Birkhauser Verlag AG
- Bochove, Marianne van. Engbersen, Godfried. Rusinovic, Katja. 'Over de rode loper. Kennismigranten in Rotterdam en Den Haag.' Nicis Instituut, Januari 2010
- Diepenhorst, Dennis. Thijm, Theo. Het aantrekken van hooggekwalificeerde en gekwalificeerde arbeidsmigranten. INDIAC NLEMN NCP. September 2013.
- Dooren, E. van, et all. (2013). Making explicit in design education: generic elements in the design process. International Journal of Technology and Design Education.
- Engelenburg, Hans van. Stuijtzand, Sarah. Actieprogramma: 'Bind de Kenniswerker'. Gemeente Delft. 2014
- Gebiedsagenda Zuidvleugel/Zuid-Holland. Naar een metropolitane topregio. Bestuurlijk overleg MIRT, 29 oktober 2009
- Groot, Stefan. Gessel, Gusta van. Raspe, Otto. 'Foreign Knowledge workers in the Netherlands.' Internationalisation Monitor - HIO. PBL, Den Haag, 2013
- 'Kansen zien, Kansen grijpen. Beleidsvisie en uitvoeringsstrategie regionale economie en energie 2012-2015'

Langeweg, Simone. 'Buitenlandse Kenniswerkers in Nederland; Waar werken ze en waarom?' Planbureau voor de leefomgeving. PBL, Den Haag, November 2014

Lawson, B. (2006).
How designers think, the design process demystified.
Amsterdam: Architectural Press.

Rasmussen, S.E. 'Experiencing Architecture' The MIT Press, Cambridge, 1959

'Ruimtelijk Raamwerk Merwe Vierhavens Rotterdam. Toekomst in de maak'
2019

Schön, D.A. & Wiggins, G. (1992).
Kinds of seeing and their functions in designing.
Design studies 13 (2) pp.135-156

Sennet, R. 'Building and Dwelling, Ethics for the city' Penguin Books, 2018

Starters op de woningmarkt. Bouwfonds MAB ontwikkeling, 2005

van der Voordt, T. (1998). Methoden en technieken van onderzoek.
Delft: Publikatiebureau Bouwkunde.

