

# **MSc3 Graduation studio Dwelling Dutch Housing**

**Between standard and ideals**

**The future of housing in The Netherlands**

## **Live longer at home**

**A design for elderly people and elderly people with dementia**

**Jeroen Ezink - 4287754**

**Research document**

**MSc3 Graduation studio Architecture**

**Dwelling - Dutch Housing 2019-2020**

**Pierijn van der Putt & Theo Kupers**

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# Between standard and ideals



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**AR3AD131 Dutch Housing Studio**

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Hi grandma, how are you today?  
Grandma always said: "Becoming an old person is nice,  
but to be an old person is hard."

...Grandma got dementia...

Hi grandma, how are you today?  
Grandma always said: "Becoming an old person is nice,  
but to be an old person is hard"

...Grandma after one year of dementia...

Hi grandma, how are you today?  
Grandma always said: "Becoming an old person is nice,  
but to be an old person is hard"

...Grandma went to a home for elderly...

Grandma said: "I do not want to live in this way. My life was good  
enough. The time has come."

Grandma was 94 years old.





# Preface



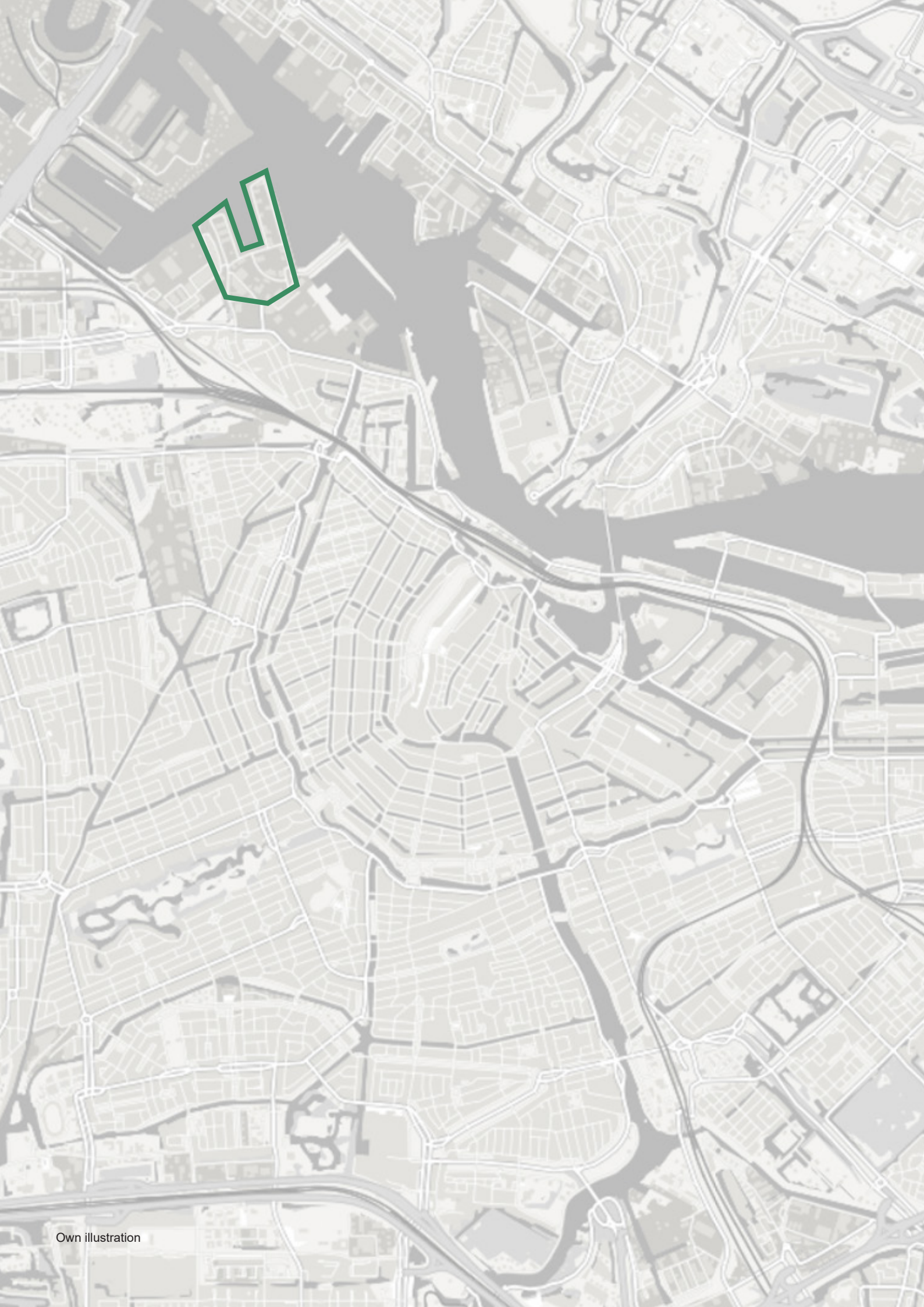
Everyday a small walk to the shops in the shopping center nearby. Despite the age, it was never a problem for my grandparents. Even the abatement of the physical conditions did not matter for them. Becoming old was nice, but to be an old person was sometimes hard, is what they said. Fortunately, my grandparents were gilt with a big social network, from the nearby neighbors and the family towards the employees of the shops in the shopping center. Because of their strong mindset and the social interactions, I never taught about the small aspects in life which could destroy a complete life. Until the moment was there, my grandmother got dementia. Even one of the strongest persons I have ever met, turned into a person who became dependent of the care, starting from a small dependency, but ended with complete dependency.

As a future architect, I felt myself a little bit responsible for my grandmother. She must live the last years of her life in an environment which did not match with her disease, dementia. For my graduation project at the TU Delft, Architecture, I have the assignment to design dwellings for a certain target group in the North-West of Amsterdam, Minervahaven. During this graduation project, I have the possibility to choose my own subject, which is elderly people and elderly people with dementia. With this graduation project, I will focus on dementia and how architecture can have a positive influence on the living environment for elderly people and elderly people with dementia. With this project, I will design a living environment for elderly people whereby they could continue their life in the same living environment and house if they get dementia. Elderly people who get dementia should be able to still live at their trusted, familiar environment.

With this research paper I have developed and enriched my knowledge and mind about elderly people and dementia, and the influence of certain architectural aspects for a dementia friendly living environment. After reading this document, I hope it is clear what architecture can mean for the living environment for elderly people and elderly people with dementia. Becoming older and dementia are often seen as a painful aspect in life that should be concealed and not spoken about. Let this project break through this way of thinking.

With kind regards,

*J.B. Ezink (Jeroen)*



# Introduction



## Motivation

The project *'Live longer at home; a design for elderly people and elderly people with dementia'* is an architectural concept for a pleasant living environment for elderly people and elderly people with dementia. Because of the radical changes in the Dutch care system and the exponential growth of both target groups, it becomes more and more a deteriorate situation. The care houses are getting less money and less support from the government while the situation is getting more worse. The Dutch nurse Bert Keizer wrote in the Parool that *"the care houses for people with dementia are the drains of our society"*.<sup>1</sup> It causes dementia unfriendly living environments. However, at the same time, other, more intensive 'care indications' are getting a higher priority which leads to postponing of admission to care houses. It results in a situation where elderly people with dementia must live at their own house for a longer period. Inadmissible, because their houses are not designed for 'living with dementia', while there is also a shortage of suitable housing for elderly people.<sup>2</sup> An untenable situation for everybody, the patient and the family.

Unfortunately, I have experienced this situation from a close distance. As already explained in the preface, my grandmother got dementia and was forced to live at home. It caused dangerous situations for her and for their environment. With this project, I will find out the design aspects to design a living environment for elderly people and elderly people with dementia, for all different kind of phases of dementia. With these 'design aspects', I will make a 'dementia friendly environment' design, where elderly people live and if they get dementia, they could continue their life in their own, familiar house and environment.

Another worse aspect of the disease dementia is the invincible situation whereby the two people, who are living together, will be separated from each other because of the disease. In the current care houses, there is only space for the person with dementia, not for the other family member. Together with the untenable situation of living for a longer period at their own house, it made me frustrated and curious at the same time, to research a new way of elderly housing and living with dementia.

But, what if we, as a society, decide that people with dementia should life in their own house, instead of living in a care house. How can we connect them to our (daily) living environment?

The collective and public spaces, the friends, family, neighbors, an even the unknown people from the surroundings. *What does that mean for the spatial qualities of their houses and the (nearby) living environment?*

During my own experience in the care houses, I experienced from a close by what it is to live in the current care houses as an elderly person, an elderly person with dementia or as partner/family. It consists of long corridors with a lack of natural daylight, dark places, and a small community room for social interaction and daily activities. The only connection with the outside world was the view from their small, private room to the public garden outside. Or when we take here for a walk outside.

In the care houses, despite the good care of the professional care givers, she lost the connection with the environment and the outside world.

To come up with a suitable design for both target groups, elderly people and elderly people with dementia, I need an understanding of the wishes and needs of elderly people, but also of the elderly people with dementia and the disease itself to create a suitable and pleasant living environment for both target groups.

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1. Van der Aa, E. (2016)

2. Reijnen Rutten, E., Van der Ploeg, H. (2019)





# Topic research Part 1

**Target group research**



# 'Verpleeghuis met dementerende ouderen is de schuur van de losers'



PLUS

© ANP



Verpleeghuizen met dementerende en zieke ouderen zijn het afvoerputje van onze maatschappij, zegt arts en filosoof Bert Keizer. 'We hebben een hekel aan ouderen.'

DOOR: EDWIN VAN DER AA 5 JULI 2016, 16:16



▲ Ouderen willen in appartementen wonen met goede voorzieningen in de buurt, maar die zijn niet beschikbaar. © Marlies Wessels

## Schreeuwend tekort aan appartementen voor ouderen, markt oververhit

Twee op de vijf gemeenten in Nederland kampen met een tekort aan huizen voor ouderen. Dat probleem wordt alleen maar erger met de toenemende vergrijzing. Gevolg: de markt is oververhit, de prijzen voor appartementen rijzen de pan uit.

Eric Reijnen Rutten & Harry van der Ploeg 02-05-19, 09:39 Laatste update: 09:58 Bron: De Gelderlander

## Geef dementiepatiënten een perspectief en ze kunnen langer thuis blijven wonen

SAMENLEVING  
Dirk Waterval – 21.09, 26 september 2018



▲ Een thuiszorgmedewerker helpt deze vrouw 's ochtands met wassen en aankleden, omdat ze alzheimer heeft. © Hollandse Hoogte

Vier gemeenten starten op kosten van de minister met experimenten om dementiepatiënten langer thuis te laten wonen. Dat zou honderden miljoenen schelen.

ANP, "Verpleeghuis met dementerende ouderen is de schuur van de losers", Het Parool, July 5, 2016. <https://www.parool.nl/nieuws/verpleeghuis-is-met-dementerende-ouderen-is-de-schuur-van-de-losers~b31cef79/>

Marlies Wessels, "Schreeuwend tekort aan appartementen voor ouderen, markt oververhit", AD, May 2, 2019. <https://www.ad.nl/wonen/schreeuwend-tekort-aan-appartementen-voor-ouderen-markt-oververhit~a7bc3652/>

Hollandse Hoogte, "Geef dementiepatiënten een perspectief en ze kunnen langer thuis blijven wonen", Trouw, September 26, 2018. <https://www.trouw.nl/samenleving/geef-dementiepatiënten-een-perspectief-en-ze-kunnen-langer-thuis-blijven-wonen~a3ee62c7/>



## Relevance

At this moment, there is a shortage of housing for elderly people. Two of the five municipalities in The Netherlands have too less apartments for elderly people, while the expectations shows an increase of elderly people in the future.<sup>3</sup> Although the prognosis shows an expected increase of more than 40% of elderly people in The Netherlands in 2040, the amount of suitable housing for this group and the quality of (personal) care is decreasing. Remarkable, because elderly people need more and more care when they become older.<sup>4</sup>

One of these 'types of care' for elderly people is for elderly people with dementia. Dementia is a disease in which the mental faculties have seriously decreased. As a result, the person may be less able or even unable to perform daily activities, that where in the past 'easy' to perform. This involves activities such as getting dressed, preparing food, taking correct medication, paying the bills, etcetera.<sup>5</sup>

People with dementia live with this disease for an average of eight years. During the process of different phases of dementia, both the amount as the severity of the complaints increase. At this moment, there is still no cure for dementia. Ultimately, the patient dies from the effects of dementia.<sup>5</sup>

At this moment, around 270.000 people in The Netherlands have dementia. Almost one third of this group has still no diagnosis and almost 70.000 people live in a care house. But dementia is not only a disease that occurs in elderly people. Around the 12.000 people with dementia are people younger than 65 years old,. That is around five percent of the total amount of people with dementia. Every hour a day, at least five people in The Netherlands are diagnosed with dementia.<sup>5</sup>

Top 10 doodsoorzaken, 2016

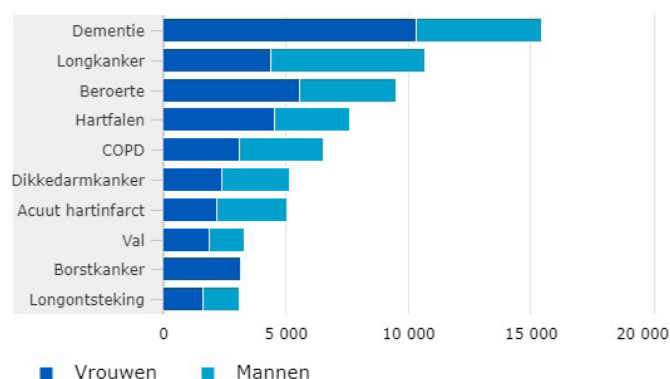


Fig. 1. CBS, 2017.

According to the CBS, dementia is on the first place on the ranking 'causes of death'. Even different types of cancer are lower on the list compared to dementia. In 2016, around 10.000 women and 6000 men lost their life because of dementia.<sup>6</sup> A shocking number of people.

In the future, the expectation is that more people will get dementia. In almost twenty years, the amount of people with dementia will grow exponential towards more than a half million people, 538.000 people in 2040. That is an increase of 94%.<sup>7</sup>

According to the Dutch website of Alzheimer Nederland, there are in Amsterdam around 8000 people with dementia in 2018. However, the expectation is that this amount will increase to 17.000 people in 2040. That is an increase of 112%. In 2050, the amount of people with dementia will even increase until 22.000 people.<sup>8</sup> That is almost 4% of the Dutch population.

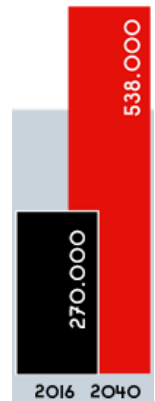


Fig. 2. Alzheimer Nederland, 2018

Although the prognosis of dementia shows bad developments for the future, more and more people with dementia cannot live in an attractive, safe and friendly environment because of the lack of proper care and houses. While there is a need for well-designed living environments for (elderly) people with dementia, less space is available, in The Netherlands but in particular Amsterdam.<sup>9</sup>

Besides the fact that dementia is on first position on the rank of causes of death, and the expected growth of the amount of people with dementia, there are also other relevance aspects for this topic. The last few months, the care in The Netherlands was a hot topic in the newspapers. Because of the cost reductions in the care, the quality of care became on a lower level, in particular care for people with dementia. As a result, these people must live longer at their home. This causes more, and even too much pressure on the caregivers, the mantelzorgers.<sup>10</sup> Together with the shortage of carers, there is no well-defined place for people with dementia.

*But why should we design and build for elderly people and elderly people with dementia just in Minervahaven Amsterdam? An interesting question which will be answered on the next page.*

3. Rutten, E., Van der Ploeg, H. (2019)

4. CBS, 2018

5,7. <https://www.alzheimer-nederland.nl/factsheet-cijfers-en-feiten-over-dementie>

6. CBS. (2017)

8. <https://www.alzheimer-nederland.nl/sites/default/files/directupload/factsheet-dementie-per-gemeente.pdf>

9. Sevil, M. (2018)

10. Spaans, V. (2018)







As already explained, already a lot of people in The Netherlands and Amsterdam have dementia or have people in their surrounding with dementia. Out of research of Alzheimer Nederland can be concluded that one of the three women gets dementia in The Netherlands and one of the seven for men.<sup>11</sup>

The municipality of Amsterdam has published a report called 'Amsterdam dementievriendelijke stad 2020'. With this rapport, Amsterdam shows that it wants to be a dementia friendly city, already in 2020.<sup>12</sup> Because of this vision, Amsterdam is an interesting location for the development of a dementia friendly living environment. Together with the development vision of the municipality for Minervahaven and the current shortage of elderly housing in Amsterdam, this location will be interesting for the development of a dementia friendly living environment. Together with the shortage of elderly housing, both problems can be combined whereby Minervahaven could be an interesting solution for both problems.



**I op de 3 vrouwen krijgt  
dementie in haar leven.  
Bij mannen is dit 1 op 7.**

Fig. 3. Alzheimer Nederland, 2018

With all this information in mind; the current amount of people with dementia, the expectation of the increase of elderly people and elderly people with dementia, the first position of dementia on the rankings list 'causes of death', the housing shortage for elderly people, the lack of well-designed living environment for elderly people with dementia and the enormous housing development in Minervahaven, why should we ignore the possibility to design and develop a living environment for elderly people and elderly people with dementia in Minervahaven? A location full of possibilities, in their own, trusted and familiar hometown, Amsterdam.

This design project will create a living environment for elderly people, with the focus on dementia. If the elderly people will get dementia, they could still continue their life in their own house and living environment. According to several literature, this will slow down the process of damaging of the brains. Elderly people who get dementia, could still live at home with the right care nearby.

Minervahaven can support in solving the care and housing problems in Amsterdam and give a pleasant place to live for elderly people and elderly people with dementia, without the need to move or to live divided from their partner. For every person with a soul and hearth, a heartbreaking scenario. Why is it, at this moment, not possible to live together with their partner and in their trusted, familiar own environment if they get dementia? Exactly that aspect of their life which is familiar, trusted.

## Problem statement and research questions

In short, there are several problems related to living with dementia in The Netherlands:

- There is a shortage of elderly housing.
- The prognosis shows an increase of elderly people the coming decades.
- Dementia is the 'cause of death' number one in The Netherlands
- Doubling amount of people with dementia expected in 2040 in The Netherlands and Amsterdam
- Lack of well-designed living environment for people with dementia
- No place for people with dementia in care houses because of cost reductions in care
- Too much pressure on the so-called caregivers, the mantelzorgers

These aspects create the following problem statement:

*"There is a lack of well-designed living environments for elderly people and elderly people with dementia where they can get the right care and enjoy their last years of life."*

With this problem statement and personal experiences in mind, I have formulated the following research question for this graduation project:

*"How can architecture provide a dementia friendly living environment in which elderly people and elderly people with dementia can live (longer) at home?"*

Out of this research question can be concluded that this project will not be a care project but will focus on the design of a dementia friendly living environment, where elderly people can live and still can live if they get dementia.

11. <https://www.alzheimer-nederland.nl/factsheet-cijfers-en-feiten-over-dementie>

12. Ben Sajat Centrum. (2015)



## Subquestions:

- Why is there a need for elderly housing?
- Why is there a need for a dementia friendly living environment?
- What is dementia?
- What are the main themes of all stadia of dementia and how could these different phases of dementia live together?
- What are the stadia and characteristics of dementia?
- What is the lack of care for elderly people with dementia nowadays?
- What are the aspects in the daily life which have a positive influence on the people with dementia?
- Which kind of (building) typologies are capable/ preferred for elderly people and elderly people with dementia?
- Which kind of building examples are already built and a success? What are the successful aspects of it?
- What are the architectural aspects which have a positive influence on the people with dementia?
- What architectural aspects are needed in the urban design of the neighborhood?
- What are the similarities for elderly people and elderly people with dementia, regarding the wishes and needs for housing and living environment?
- What are the surfaces and needed facilities for elderly people with hard dementia?
- What kind of facilities are needed for the caregivers for the hard dementia people?
- Which people are involved in the living environment of elderly people and elderly people with dementia?
- What are the different influences of the several stages of dementia on the architectural design?
- When can elderly people with dementia not live at home anymore?
- What are positive elements of the urban master plan for elderly people and elderly people with dementia?
- What are the maximum walking distances for elderly people and elderly people with dementia?

# Elderly



The amount of elderly people, people over 65, in The Netherlands is increasing. At this moment, there are around 3.159.000 elderly people in The Netherlands. From this group, 49.6% had one or more long-term affections and 50.4% indicated that they felt limited by their health.<sup>13</sup>

The most common problems that elderly people face as a result of their age and chronic disorders are loneliness and performance problems, such as self-care and mobility. This makes it difficult for elderly people to live at their home independently for longer in the current way of housing. Due to the increasing amount of elderly people, from 18% of the total population in 2017 to 26% of the total population in 2040, the amount of elderly people with old-age diseases will increase in the coming decades. Old age diseases that will increase sharply are dementia for instance.<sup>14</sup>

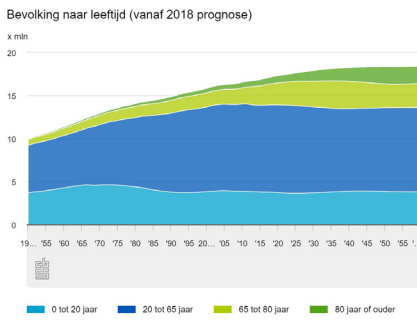


Fig. 4. CBS, 2018

The same situation is happening in the city of Amsterdam. The amount of elderly people is increasing whereby 44% of the total population of Amsterdam consist of elderly people in 2030. Because of this increase and the separation between housing and care, it has left its mark on the housing market, such as housing typologies for elderly people with and without the need of care. The traditional care-homes are disappearing, while the elderly people continue to live independently to an old age. The municipality of Amsterdam is responding to this and has shown its central objective that the city will have enough suitable housing for the elderly people by 2030.<sup>15</sup> In particular, the disease of dementia is a central subjective for the municipality of Amsterdam. In already 2020, the city of Amsterdam should be a dementia friendly city.<sup>16</sup>

The next chapter will continue about the topic of dementia, first the vital elderly people will be researched as part of the target group of the graduation design studio.

Because of the separation of housing and care, there is a need for new forms of housing for elderly people.

The elderly people want to live independently, but at the same time close to care and good facilities, such as supermarkets and public transport. The vital elderly people do not feel old and usually do not yet have a need of care but are already preparing for a future in which they will age.<sup>17</sup>

Many elderly people are attached to their home and neighborhood, their living environment. They would prefer to live in their trusted environment.<sup>18</sup> In particular for elderly people with dementia it is important to give them the opportunity to stay at their trusted environment to slow down the process of demolition of the brains.<sup>19</sup> Both aspects created a challenge in making existing homes and designing new homes suitable for elderly people where they can live well. Also, the mobility and walkability decrease for people older than 75 years old. The risk of isolation increases with this group. Proper design of the house, building block and living environment can create conditions for social interaction, which increases self-reliance and together.<sup>20</sup>

The different types of households will also change for the target group of elderly people. A part of the households will already exist of one person, but also couples and widows are part of this design target group.

According to the statistics of the CBS, several expectations could be made for the different households. The statistics, shown in figure 5, shows a few expectations. In 2018, there are 130.000 couples and 105.000 one person households. The households of elderly people from above 85 years consists mostly out of one-person households, while the elderly people between the 65 and 84 most of the time consist of couples. In 2040, the expectations show that there are around 145.000 households of couples and 175.000 single-person households. In comparison with the households in 2018, there are more single-person household already from the age of 75 in 2040. This means that elderly people will consist of more one-person households in the future.<sup>21</sup>

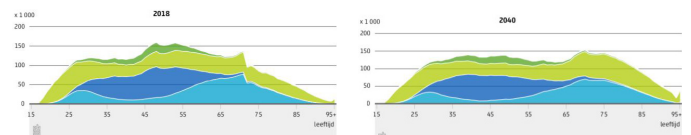


Fig. 5. CBS, 2018

- ★ The amount of elderly people, people over 65, will increase to 26% of the total population in 2040. In the city of Amsterdam, it will increase to 44% of the total population of the city.
- New forms of housing for elderly people is needed
- because of the separation between housing and care. The new housing typologies should provide a 'normal' housing typology but with the future possibilities for care.
- More one person households will be needed in the
- future according to the statistics of the CBS. The ratio couple dwellings and one person dwellings will be 1:1.2.

13. CBS, 2018

14. <https://www.loketgezondleven.nl/gezonde-gemeente/themadosiers/gezond-en-vitaal-ouder-worden/feiten-en-cijfers-ouderen>  
15,17,18,20. Gemeente Amsterdam. (2018)

16. Ben Sajet Centrum. (2015)

19. <https://modernedementiezorg.nl/upl/Notitie%20Woningaanpassingen%20bij%20dementie,%20definitief.pdf>

21. Van Duin, C., Te Riele, S., Stoeldraijer, L. (2018)



In addition to the preference to continue their live in their own, familiar living environment, also the wishes and needs for the elderly people as regards the housing typology is important. In particular Amsterdam has a great diversity among the elderly people. As a result, there are also many different housing requirements. The needs, wishes and possibilities in housing and care vary and demand a diversity of housing typologies where customized care can also be provided.<sup>22</sup>

Because of the focus point of elderly people and elderly people with dementia, the wishes and needs for the housing typologies can be clarified in an easier way.

- ★ Most of the time, the elderly people prefer a smaller, single-storey house that is close to the facilities, such as a supermarket and public transport. They are searching for a normal house or apartment in an environment with people with the same age.<sup>23</sup> Hereby, several surfaces for the houses are wished. The one-person household prefers a housing surface around the 50 sqm and the couples around the 90 sqm.<sup>24</sup> Besides the housing surfaces, also other aspects of the housing typologies are important. For example, the outdoor space is important for the elderly people. Just like other target groups, also the elderly people prefer an outdoor space at their house or close by their house, such as a balcony or terrace. A few elderly people also prefer a small garden, but most of this target group think that the maintenance of the garden is too much. Also, a shared outdoor space, such as a shared garden and roof garden are interesting for the elderly people. Or a wide gallery as an outdoor space, access for the houses or meeting place at the same time is preferable.<sup>25</sup>

The children are moved, and less space is required.

- ★ The elderly people spend more time at their house and prefer a view from the inside of the house to the outside space which also give a spacious feeling of their house. In addition, smart circuits and dual use of spaces help to make better use of a compact home.<sup>26</sup>

The size of the houses also depends on the availability of common areas. There must be a balance between private spaces and shared spaces. For example, a small house with a larger communal space encourages meeting and helps to prevent loneliness. Hereby also the choice for an extra room depends on the layout of the building block. A shared storage, hobby, caregiver or guest room could be designed as common space in the building block or as a private zone as part of the house.<sup>27</sup>

- ★

Besides the wishes and needs of the houses, there are also important preferences as regards the building block. The elderly people have different wishes regarding to the type of accommodation. These wishes vary from an individual suitable house between other households, to a more clustered living environment with only the elderly

people.<sup>28</sup>

- ★ To be able to reach their own front door in a pleasant way, accessibility and social safety are important aspects for this target group. With the decreasing mobility, the elderly people will make more use of a walker, mobility scooter or wheelchair. This requires space to move, turn and storage. An elevator and barrier-free and wide routing makes it possible for the less vital elderly people to stay active. The design of common routing can also stimulate spontaneous meeting in the direct surrounding. A common garden, roof garden, wide gallery or a collective meeting space are possible solutions to stimulate the social interactions.<sup>29</sup>

At least, also the urban environment is important for the elderly people. The presence of different public activities is important, such as the public transport. The elderly people

- ★ will cycle less and walk more. For longer distances, they will use a mobility scooter or walker. Hereby it is important to create interesting and pleasant routings with different facilities on this routing, such as benches, and public transport stops. However, the walking-radius decreases, and elderly people will be less mobile. The maximum walker radius will be around 250-500 meters. In this distance should be different public activities be designed. Hereby activities such as care facilities, supermarkets and social facilities are important within the walking distance.<sup>30</sup>

Also, dementia will occur more and more among the aging city dwellers. Older people with early dementia will live longer at home and will continue to use their environment. For this target group, recognizability is an important factor for orientation and a sense of certainty. This can be achieved both in public spaces and in the design of the building block. Art in the public spaces also contribute to this.<sup>31</sup> In the next chapters will be explained more about the topic of dementia.



- The elderly people prefer to live in a smaller house, around the 50 sqm more one person households, 90 sqm for couples in a single-storey house.
- The presence of an outdoor space is important. It could be private or shared outdoor space.
- The presence of communal spaces is preferred to support the social interaction between the residents and decrease loneliness.
- Facilities should be within the walking distance of 250-500 meters, from public transport to social activities, care facilities and supermarkets.
- A wider routing for moving with walker, mobility scooters and wheelchairs, and for activities.

22,25,26,27. Gemeente Amsterdam. (2018)

23. Lijzenga, J., Van der Waals, T. (2014)

24. Meerpoel, J. (2016)

28,29. Gemeente Amsterdam. (2018)

30. Molster, A. (2016)

31. Marquardt, G. (2011)

# Dementia



## General

Dementia is a collective term for various affections in the brains and causes the loss of memory. The information is gone and will not come back. Dementia is more serious in comparison with normal forgetfulness. The causes of dementia are different and depends on the phase of dementia. But in all the different phases, the brain will be defected and result in more and more loss of memories. People who have dementia will forget the names of people, even the close by people, but will also not recognize people anymore after a while. Slowly, all the information, stored in the brains, will be unaccessible.<sup>32</sup>

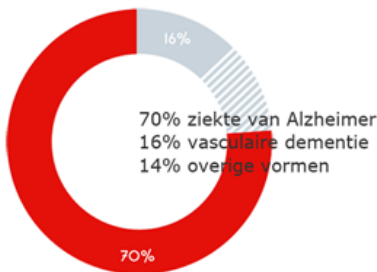
## Impact of dementia

At this moment, around 270.000 people in The Netherlands have dementia. Because of the aging, the amount of people with dementia will increase in the future.

- ★ Expected, an increase of 50% to more than a half million people and even 690.000 people in 2055. According to the CBS, that year will be the peak of the amount of people with dementia.<sup>33</sup>

## Alzheimer and dementia

The most common variant of dementia is Alzheimer. At least 70% of dementia is the Alzheimer-variant, followed by vascular dementia.



De meest voorkomende vorm van dementie is de ziekte van Alzheimer (70%).

Fig. 6. Alzheimer Nederland, 2018

But what is the difference between dementia and Alzheimer? Alzheimer is a variant of dementia, but not all the aspects of dementia are the same as Alzheimer. Alzheimer is dementia, but dementia is not always Alzheimer. There are a lot of different variants of dementia, more than fifty variants. Alzheimer is the most known and occurring variant of dementia. Unfortunately, all variants of dementia are incurable at this moment.<sup>34</sup>

## Causes

By getting dementia, there are several causes and aspects which could be responsible for getting the disease. Aspects like smoking, too less sporting, high blood pressure, obesity, less mental activities and diabetes could influence the chance of getting dementia. From the age of 45 years old, it becomes important to live a healthy life. For sure, it is always important, but from this age it is even more important. However, it is not scientific grounded that there is a relation between a healthy life and dementia, but it will support your body in a positive way. According to several researchers, people could slow down the process of dementia by keeping the brains active.<sup>35</sup>

- ★ Besides the deter of the process of dementia by keeping your brains active, dementia is also a disease which is heritable. In most cases, dementia is developed because of the heredity. By getting dementia at a younger age, heredity is the cause. The healthy way of living has less impact on these types of dementia, but it keeps important to defend your body against other diseases.
- ★ The chance of getting dementia increases when people becomes older. Despite this fact, still 12.000 people younger than 65 years old have dementia.<sup>36</sup>

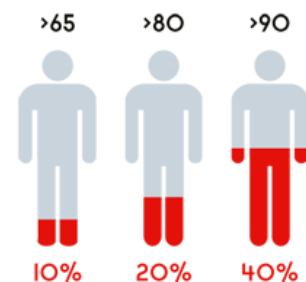


Fig. 7. Alzheimer Nederland, 2018



- In 30 years, there is the prognosis that more than a half million people will have dementia in The Netherlands. That is an increase of more than 50% and therefore an important design issue.
- To slow down the process of demolition of the brains by people with dementia, they should stay active in their daily life. In their living environment, it is important to give them this opportunity to stay active.
- The older people are, the more chance they will get dementia. Target group will be elderly people.

32,33,34,35. <https://www.alzheimer-nederland.nl/factsheet-cijfers-en-feiten-over-dementie>

36. <https://www.alzheimer-nederland.nl/sites/default/files/directupload/factsheet-dementie-per-gemeente.pdf>



## Facts about dementia

Dementia is a collective term for various affections in the brains and causes the loss of memory. It can be split-up in different types of dementia, as seen in figure 8.

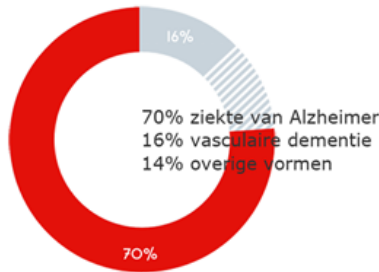


Fig. 8. Alzheimer Nederland, 2018

Dementia is the number one on the list of causes of death in The Netherlands, followed by lung cancer and heart attack. The average of the life expectancy of people with dementia is eight years. The most known variant of dementia is Alzheimer, 70% of dementia is Alzheimer.

Because of the increasement of aging, the amount of people with dementia is fivefold. In 1950, around 50.000 people had dementia in The Netherlands. In 2016, 270.000 people are registered as dementia patient in The Netherlands.

The expectation is that the next 25 years, the amount of people with dementia will double to more than 500.000 people.

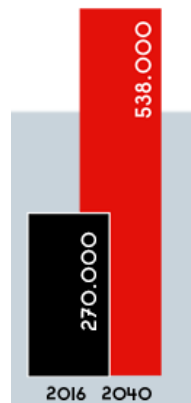


Fig. 9. Alzheimer Nederland, 2018

The chance of getting dementia increases when people getting older. Around 10% of the people above the 65 years old have dementia, 20% above the 80 years old and 40% above the 90 years old. Despite these facts, dementia is not only a disease related with age. Around 12.000 people, younger than 65 years old have dementia.<sup>37</sup>

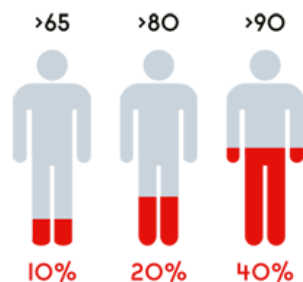


Fig. 10. Alzheimer Nederland, 2018

There is also a difference between women and men. One of the three women's get dementia, while one of the seven men get dementia. In general, every hour a day, at least five people in The Netherlands get the diagnosis of dementia.



Fig. 11. Alzheimer Nederland, 2018

The impact of dementia is, according to researchers and physician, the biggest one. Dementia has the biggest impact of all the diseases in The Netherlands on the patient. The acknowledgement of the patient takes a long period. The average time-period of the acknowledgement and diagnosis of the disease is fourteen months. People who have dementia will be more and more limited in their daily activities. Eventually, most of the dementia patients become bedridden.<sup>38</sup>

## Dementia and caregivers

Besides the impact of dementia on the patient themselves, the disease also has an impact on the partner, family and friends. During the first stadia of dementia, the partner must take care for the person with dementia. The partner is the caregiver. In The Netherlands, there are around 300.000 caregivers, someone who takes care of a person with dementia who still lives at home. The half of the caregivers combines it with a fulltime job or the care of their children. The average age of the caregivers is 65 years old and 70% of the caregivers is a female.<sup>39</sup>

De gemiddelde leeftijd van mantelzorgers is 65 jaar,



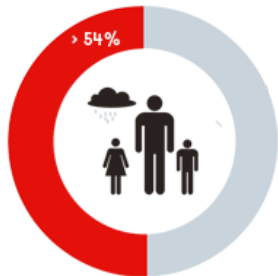
Fig. 12. Alzheimer Nederland, 2018



- By designing for elderly people with dementia, not only these people should be noticed in the design process, but also their partners in their role of caregivers.
- The design of the building block should provide an environment where the elderly people with dementia can walk around, have a (visual) connection with outside and are not bedridden.



The caregivers must take care for the patient for approximately twenty hours a week, during a time span of five years. Around 54% of the caregivers sees it as a hard job and 4% of this group is even overloaded.



54% van de mantelzorgers van mensen met dementie is zwaar belast. Daarvan is 4% overbelast.

Fig. 13. Alzheimer Nederland, 2018

Besides the intensity of the care for the caregivers, also the safety for the patient and its environment is an important task for the caregivers. The caregivers are most concerned about the safety in their own house. One of the three caregivers is working on the safety in their house, on daily base. Three of the four caregivers clarify that some dangerous situations have happened in their house.



Driekwart van de mantelzorgers geeft aan dat zich onveilige situaties in huis hebben voorgedaan...

Fig. 14. Alzheimer Nederland, 2018

The intensity of the care and the safety are not the only important aspects for the surrounding and society. Namely, dementia is the most common disease in the society and has the highest costs for care. Because of the strong increase of the amount of people with dementia, the care costs and fees will increase for the society. In 2015, the costs for the care of people with dementia was around 4,8 billion euros, which is 5% of the total care costs in The Netherlands. The costs for care of dementia are increasing every year with 2,9%.<sup>40</sup>

## Stadia of dementia

The average time span of dementia is eight to ten years. During the process of the disease, the cognitive capacities deteriorate. In the last two years, most of the patients with dementia cannot live and function on individual basis anymore.

When people get dementia, they are still the same person.

While there are various kind of types of dementia and it differs for each person, there are three main types of dementia, according to different scientific studies:

1. Mild (starting) dementia
2. Medium dementia
3. Hard dementia

The type of dementia is based on the fact how connected people are with their environment. It depends the way of autonomy, independency of the patient. During the different stadia of dementia, people become more unconnected with their environment and their world becomes smaller.

The first phase of dementia is the loss of memory for new information. People with dementia are not able anymore to store the new information in their brains. After a while, they will forget the day and time and even in a more worse phase getting lost in their own environment and forget how to do their trusted activities, like cooking. Also, problems with speaking are a common negative aspect of dementia. For people with dementia, it is hard to find the right words and to use them in the right way. Also, their behavior can change; they could be more frustrated, impatient or other expressions, which are the opposite of their old behavior. The first stage of dementia is named 'the threaten I'.<sup>41 42</sup>

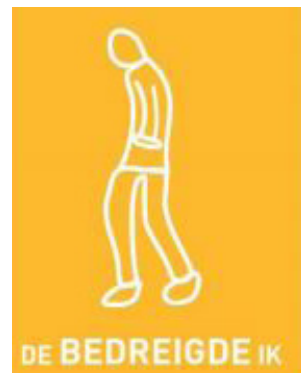


Fig. 15. Gevers scholing, (nd.)



- The feeling of safety and living in a safe environment are as well as for the caregivers as the elderly people with dementia important aspects for the living environment. The design should provide a safe environment for both groups, whereby the partner or caregiver should not control the activities of the person with dementia every moment a day.
- There are different stadia of dementia which differs for each person with dementia. Only some common similarities could be noticed. The design should provide an overall layout which supports these common similarities to support the life of these people.

40. <https://www.alzheimer-nederland.nl/factsheet-cijfers-en-feiten-over-dementie>

41. <https://dementie.nl/over-dementie/geheugenverlies-vergeetachtigheid-of-dementie>

42. Gevers scholing, (n.d.)



★ The second stadia of dementia consist of the disorientation of the patient. After losing memory, disorientation causes another problems. Still at this level, the patient is not dangerous for anyone, but literally lost his way. For instance, the patient has no longer a sense of time, does not know what day of the week it is and what time it is. A lot of times, the patient does not know where he or she is. It often happens that the patient goes somewhere but forgets where to go. At the last phase of this second stadia, the patient is starting to recognize (dear) people from their environment no longer or the recognition of people becomes more worse. This stage is also named 'the lost I'.<sup>43</sup>



Fig. 16. Gevers scholing, (nd.)

★ The third stage is characterized as complete reservedness. The patient is completely lost in his own world, without any sense of time, place and/or person. During this period, the surrounded people thought that it is better to leave the patient alone, but that is not the right solution. Because of that, the patient gets lost even more and become very lonely. The patient is very introverted and he or she will not search for interaction with its surrounding. That does not mean that the patient does not want any interaction. During this third stage, the patient is also endlessly engaged with certain movements and/or sounds. This stadia is also known as 'the concealed I'.<sup>44</sup>



Fig. 17. Gevers scholing, (nd.)

★ The last stage of dementia is the hardest one. The fourth stage is characterized by contactlessness. During this period, the patient with dementia has such a hard type of dementia, that the patient hardly responds. Most of the time, the eyes are closed, and eye contact is almost impossible. The patient is not far away from the death. This stage is the hardest one for the environment, the partner, family and friends, because the patient is only physically present. The senses of the patient are still sensitive and can be stimulated by playing music, or via smell of something, food and physical contact. This last stage of dementia is also known as 'the drowned I'.<sup>45</sup>



Fig. 18. Gevers scholing, (nd.)

The process of the disease; from mild, medium to a hard form of dementia. The world becomes smaller for the patient during the disease whereby the connection with its surrounding becomes more worse during the time span of the disease. During the process of the disease, the cognitive capacity of the patient will become more worse.



Fig. 19. Pinterest, (nd.)





## Physical impacts

- ★ The deterioration of the brain happens not in one part of the brain, but in several parts. The brain can be divided in two parts, the upper brain and the lower brain. These two parts of the brains can be subdivided in four different levels. Each level has its own functions, qualities and complexities.

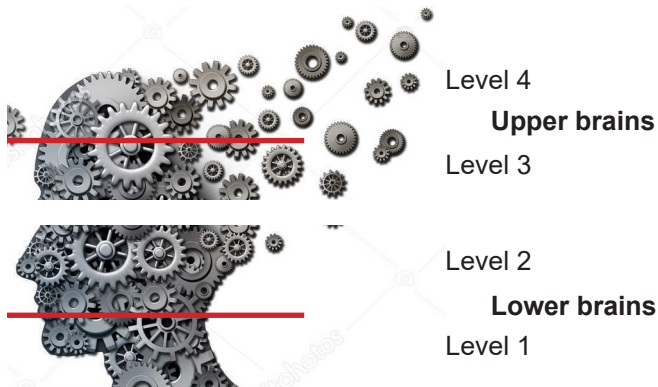


Fig. 20. Digitalista, 2018

- ★ The upper brain consists of the 'thinking and understanding' sensors. With this part of the brains, people can think and understand what is happening or what they should do in a certain activity. It is also known as the 'independent thinking brain'. The lower part of the brain consists of the sensors for our bodily functions, such as our heart, breathing and digestion. Also, the sensors of feeling and touching are placed in this part of the brain. The lower brains are also called the 'brains of feeling'.<sup>46</sup>
- ★ During the disease of dementia, the upper brains will collapse. This means that the functions, such as thinking and understanding are gone. Only the lower brains are still working. An important aspect of the lower brain is the amygdala, the core of anxiety. This part of the brains reacts when something strange or dangerous is happening. The amygdala is working to heavy by people with dementia because of the damage of the upper core. Because of this, people with dementia cannot criticize the situation and will have more anxiety compared to 'mental healthy' people.<sup>47</sup> During the last phase of dementia, even the cognitive parts of the brains are collapsed. The person with dementia only behaves, based on the sense organs. The person with dementia can only criticize the activities based on the smell, sound or by touching an element.<sup>48</sup>

The upper brains consist of two levels and the lower brains consist of two levels. The first level is part of the lower brains and is still working during the final phase of dementia. This level consists of the basic elements of a human body, the sense organs. This level of brains is responsible for what we can see, feel, taste, hear and smell.



Fig. 21. Digitalista, 2018

The second level is also part of the lower brains. It is responsible for the basic emotional activities of a person. With this level of brains, we can show and experience behavior such as anxiety, happiness and sadness.



Fig. 22. Digitalista, 2018

The third level of the brains is part of the upper brains. During the middle phase of dementia, this part of the brains is collapsing. The third level is responsible for the emotional experiences, the awareness. With this part of the brains, people can recognize certain emotions and are able to control it.



Fig. 23. Digitalista, 2018

The fourth level of the brains is also part of the upper brains and is responsible for the total awareness of the human activities. Because of this level of brains, people can take responsibility, to think and to understand and to know and remember time, date and emotions. This is the first part of the brains which collapse during dementia.<sup>49</sup>



Fig. 24. Digitalista, 2018



- The layout of the brains can be divided in two parts and four groups. Each groups consist of certain activities and proceedings. During the time span of dementia, several parts will collapse. The world of the person will become smaller during the disease. The design of their living environment should provide an layout where they can go through these stadia without any problems. From a large to a small world.

46. <https://www.alzheimermuziekgeluk.nl/breinkunde/>  
 47. <https://crdl.com/nieuws/rust-voor-het-dementerend-brein>  
 48. <https://dementie.nl/fasen-dementie>  
 49. Van der Plaats, A. 2016



## Symptoms of dementia

The brain functions of people with dementia become more worse in a certain time span. The 'collapse' of the brain can be divided by ten main symptoms:

1. **Forgetfulness:** the first stadia of dementia which causes that the patient forgets new information and forget (important) dates, such as birthdays or meetings.

2. **Unable to do certain activities:** Also, part of the first stadia, is the problem that the patient is unable to do daily tasks, such as banking or doing its hobby.

3. **Problems with sense of time and space:** After the first stadia, the patient start having problems with the sense of time and place. The patient cannot recognize spaces anymore and cannot remember the time during a day.

4. **Problems with speaking:** Besides the problems with the sense of time and space, the patient also develops problems with speaking. It will be hard to follow a conversation and the patient starts also to forget names and words. The conversations are less fluently, and the patient will repeat parts of the conversation.

5. **Misplacing:** The patient will lose his awareness of where his properties are positioned. For instance, materials or items that do not belong in the fridge are placed over there, such as telephone or toilet paper. The sense of storage is gone.

6. **Worse judgement:** For a patient with dementia, it is harder to judge some situations or activities.

7. **Retirement of activities:** The patient will retire itself from social activities because it becomes harder to participate with sports or other activities. The patient will retire itself from the surrounding and will have less social interaction.

8. **Depression:** Another bad aspect of the disease is the fact that the patient can show different kind of behavior, which differs from depression, anxiety to anger. However, the patient will be aware of his behavior.

9. **Nervousness:** The patient will become nervous during the different stadia of the disease. He or she will have problems with their sleep and will be impatient. It is a horrible situation for the patient, because it is hard to find some rest for the patient.

10. **Visual problems:** This symptoms are based on several issues, such as problems with reading, assess of distance and the evaluation of colors.<sup>50</sup>

In short, the first stage of dementia consists of the loss of memory, while there are still no physical restrictions related. During the medium stage, the second phase, the patient needs for the first time care. The situation is getting more worse and there is physical and mentally abatement. During the last phase, the hardest stadia, only the primary senses are working and there is intensive care needed. The patient is completely in his own world and is physically and mentally lost.



- The different symptoms of dementia should be implemented in the design of their living environment. Problems, such as visual affections, depression and nervousness should be prevented to give this target group a pleasant living environment. Aspects, such as a certain routing and less stimulations are important design aspects.



## Stages of dementia

Different aspects of dementia are explained; the meaning, the facts, the stadia and the symptoms. The last part of the explanation about dementia is about the different stages of dementia. The evolvement of dementia differs for each person with dementia. There is not a common trend visible.<sup>51</sup>

To make the knowledge about dementia more complicated, there is also no common model that shows the different stages of dementia. However, in general there are two kind of used models which describes the different stages of this disease. The first model shows four stages of dementia, while the second model shows seven stages of dementia. However, both models shows the same information, whereby the more extended model show more detailed information.

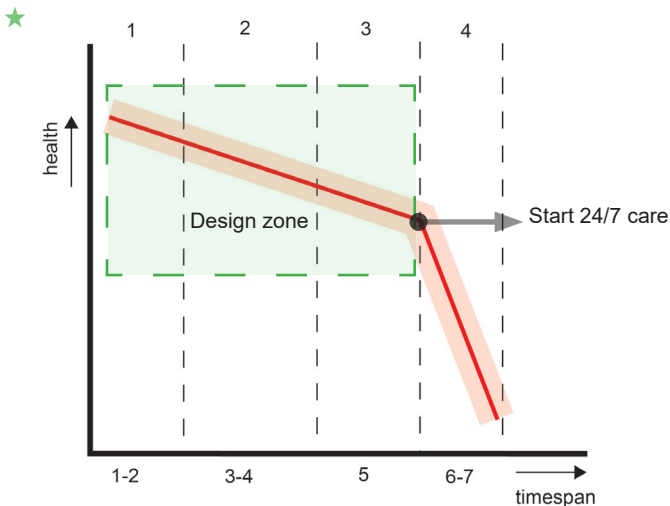


Fig. 25. Own image. Chart of the phases of dementia; two models

In figure 25 are the two models visualized. The chart shows the deterioration of the brains during the timespan of dementia. However, there is no common timespan for each phase of dementia. Every person with dementia experiences the disease differently, but people tend to experience a similar trail from the begin to the final phase of dementia.<sup>52</sup> The red line shows the demolition of the brains and the health of the people with dementia. This line shows us the average development. The pink area around the line shows the fluctuations of this development of demolition.

Every stage of dementia consists of different affections. During the first stage of dementia, phase 1 or 1&2, the health of the person is still quite good. The quality of health is getting less, but life is still good. The second phase of dementia, stage 2 or 3&4, shows the first problems. The quality of health has decreased and the first problems, caused by dementia are visible. At the end of the third phase, stage 3 or 5, the abatement of the health of the person with dementia is decreasing very fast. The fourth

phase, stage 4 or 6&7 consist of the last moments of life. The quality of life is very worse and only the human sensors are still working.

In general, the different stadia are divided, based on the symptoms:

### ★ Phase 1 - No Impairment<sup>53</sup>

- Stage 1: Dementia not detectable, no memory problems or other symptoms
- Stage 2: Small memory problems, but seen as normal aged-related memory loss



Fig. 26. Dreamstime (n.d.) Brains during phase 1

### ★ Phase 2 - Medium decline<sup>54</sup>

- Stage 3: Start noticing cognitive problems, less performance on memory tests. Difficulties to find the rights words, organizing and planning, remembering new names, loss of personal possessions.
- Stage 4: Clear-cut symptoms of dementia are noticeable. Difficulties with simple arithmetic, poor short-term memory, forget details about their life histories.



Fig. 27. Dreamstime (n.d.) Brains during phase 2

51. <https://www.lentis.nl/probleem/dementie/fases/>

52,53,54. <https://www.alzheimers.net/stages-of-alzheimers-disease/>



### ★ Phase 3 - Medium hard decline<sup>55</sup>

- Stage 5: Person with dementia needs help with many daily activities. They experience difficulties with dressing appropriately, significant confusion. But they are still able to maintain their functionality, such as bathe and toilet independently. Still recognize family members and some detail about their personal histories, especially their childhood and youth.



Fig. 28. Dreamstime (n.d.) Brains during phase 3

### ★ Phase 4 - (Very) Hard decline<sup>56</sup>

- Stage 6: During this phase, there are almost complete out of working. The people with dementia needs constant supervision and frequently required professional care during this fourth phase. People are a lot of time confused or shows unawareness of environment and surroundings. They are unable to recognize faces, except for the closest friends and relatives. They are unable to remember most details of their personal history. They also lose the control of the bladder and bowel and shows potential behavior problems and major personality changes. From this moment, these people need help by daily activities, such as bathing and toileting.

- Stage 7: This stage is the last phase of dementia and the hardest one. People are nearing to death. People lose the ability to communicate or respond to the environment. They are still able to utter words and phrases, but they do not have any insight into their own conditions. They need help for every daily activity. During this last phase of dementia, people could even lose their ability to swallow.



Fig. 29. Dreamstime (n.d.) Brains during phase 4



- The different phases of dementia shows the different affections and problems for the people with dementia for their living environment. After the third phase, the hardest and last phase of dementia will start. From this moment, it is not possible anymore to live at home. Special and intensive care is needed. This should be provided in the design.

# Target groups



## General

By designing for a dementia friendly living environment, not only the people with dementia are involved in the design process and the final use of the building. In particular this graduation studio, the focus of the design is based on the elderly people. Hereby, the focus is based on the main target group, the people with dementia. Besides the elderly people and the people with dementia, also other target groups are involved in the design. For instance, the partner of the person with dementia. But also, a specialized care giver during the medium and hardest phase of dementia. The person with dementia needs care from a specialized caregiver. And at least the surrounded people from the nearby neighborhood. How are these target groups integrated or connected within this design?

## ★ Elderly

The elderly people are one of the main target groups for this graduation design. The design needs to provide a home where the elderly people can live during their life. This target group consist of people from 65+ years old from which the children are moved out. The elderly people live together with their partner or alone. In particular this target group different kind of affections can pop up, from physical to mental problems. This means that the houses should be accessible for people with these kinds of affections; from people in wheelchairs till people with mental problems.<sup>57</sup>

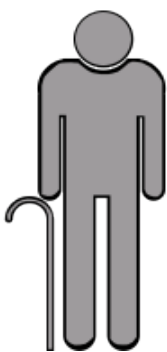


Fig. 30. Own image. Elderly people

Elderly people prefer one-level-houses without thresholds. They also prefer a spacious dwelling with a (small) outside, private space. Besides the design on housing-level, also the interaction with the environment is important. They prefer an environment where they can socialize and meet other people.

## ★ People with dementia

Together with the elderly people are the people with dementia the other main target group for this design. The design should provide a living environment for elderly people where they can still stay if they get dementia during their elderly life. The design needs to provide a living environment for the people with dementia. Hereby, it is not only about the design of the houses and the building, but also about the design of the environment and the outdoor space. How can the people with dementia be related with the environment and the outdoor spaces and what is needed to provide a safe environment for them? Out of the research can be concluded that during the different phases of dementia, physical and mental activities are important to slow down the process of this disease. This means that there should be an opportunity to connect the people with dementia with the social activities. Beside it, the design of the dementia friendly living environment should also be designed as their 'own house' and their 'own living environment'. The projects should not be a care-house but needs spaces for care.<sup>58</sup>



Fig. 31. Own image. People with dementia

## ★ Partner

Besides the people with dementia, most of the time their partners are also involved in the process. While they have no physical issues with this disease, they still must live with a person with dementia. Nowadays, most of the time the person with dementia is divided from his or her partner. A horrible situation to get divided from each other after (most of the time) a long marriage. The partner is the person who is most of the time responsible for the care. Because of the cost reductions in the care, less space is available for people with dementia in the care houses. This means that they have live longer at their home.

With this graduation design, the housing will provide an environment where the partner can live together with the person with dementia. Because of the clustering of people with dementia, their partners and the 'healthy'

57. <https://www.alzheimer-nederland.nl/nieuws/sociaal-isolement-man-telzorgers-van-mensen-met-dementie>

58. <https://www.alzheimer-nederland.nl/dementie>



elderly people, the care can be shared and will provide a larger system of care. Besides the practical advantages, also the social network will be supported. Other partners in this environment have the same problem; a partner with dementia. At least, the partner can partly gather their daily life, because their partner with dementia is in a safe environment with the needed care possibilities.<sup>59</sup>



Fig. 32. Own image. Partner with his/her partner with dementia

### ★ Professional caregiver

During the first phase of dementia, the person with dementia does not need (intensive) care. The needed care can be given by the family or the partner. However, during the medium and hardest phase of dementia, the person with dementia needs intensive care. During the hardest phase, most of the time the partner cannot live anymore together with the person with dementia.

A professional caregiver is needed to provide the right care. Nowadays, the person with dementia must go to an elderly house or a hospital. With this graduation design, the environment will provide this care support at their home.

Because of the care support of the partner, the pressure on the caregivers, but also on the partners will decrease. By working together, the given care can be divided over the partner and the professional caregiver. Both will benefit by reduction of stress and pressure. The amount of time for professional, personal care will increase and support a better life for the person with dementia.<sup>60</sup>



Fig. 33. Own image. Professional caregiver

59. <https://dementie.nl/impact-partner>

### ★ Neighborhood

The last target group who are involved in the design are the people from the neighborhood and the neighbors. The environment should provide social interaction between the elderly, people with dementia and the partners, and the neighborhood. It is important to show the neighborhood the elderly residents and the people with dementia and to make the 'dementia environment' part of the neighborhood. Functions such as public, common spaces could provide these interactions.<sup>61</sup>



Fig. 34. Own image. Neighborhood connected with the residents



- During the disease of dementia are not only the people with dementia part of the affections and limitations. Also their partner, professional caregivers, the neighborhood and the vital elderly in the close by living environment are part of this target group. In the design of a dementia friendly living environment, also these target groups should be noticed and could get their wishes and needs in the design.
- The design should provide places and housing for vital elderly people, for elderly people with dementia, their partners, and professional care spaces. Hereby, also the urban scale of the environment should be noticed.

60. <https://dementie.nl/professionele-zorg-regelen/professionele-zorg-voor-mensen-met-dementie>

61. <https://www.innovatiekringdementie.nl/a-319/omgevingszorg-belangrijk-voor-mensen-met-dementie>



## Walkability in neighborhood

Besides the design of the living environment for people with dementia, also the connection and interaction with their environment is important. The interaction and contact with the neighborhood can create more mental activities which could support the quality of the brain.<sup>62</sup> To support the interaction and the contact between the people with dementia and their neighborhood, it is important to create a dementia friendly neighborhood. This could mean the placement of several elements, such as benches, routing and recognition points.

Besides these supporting elements, also the walkability of the elderly and the people with dementia is important. Research of 'Kenniscentrum Sport' shows two types of distances which could be achieved by elderly and people with dementia. The average distance of walking elderly people is ten minutes. During this walk of ten minutes, they can walk a distance of 500 meters. The goal of this walk is mostly to visit the basic amenities, such as the supermarket and health center. It is important to have these kinds of basic amenities nearby their living environment, in a radius of 500 meter.<sup>63</sup>

★ Out of research, published by the Volkskrant in 2017, is shown that elderly people with a walker have a maximum walking distance of 300 meter.<sup>64</sup> Because of these walking distances, it is important to consider the location of the new living environment for elderly and people with dementia, but also the realization of new amenities in the close by surrounding.

★ To support the walkability of the elderly, it is necessary to have most of the basic amenities in a maximum radius of 300-500 meters. These amenities are the supermarket, postal office, grocery, a park or a walk without a certain reason.<sup>65</sup>



Fig. 35. Own image. Walkability 300 meter



Fig. 36. Own image. Walkability 500 meter



- To keep the elderly people, with or without dementia, active, the environment should provide activities within a walking distance of 300-500 meters.

- Daily activities, such as supermarkets, public transport and care facilities should be implemented in this walking radius.

The routing for this target group should provide  
- benches to create resting spaces for the elderly people during their walk. Also clear routing and recognition points are important on this routing.

62. <https://www.alzheimer-nederland.nl/over-dementie/oorzaken-en-preventie/risicofactoren-en-het-voorkomen-van-dementie/tips-voor-t-brein>

63. 65. <https://www.allesoversport.nl/artikel/vijf-vuistregels-om-openbare-ruimte-in-te-richten-waarmee-ouderen-meer-in-beweging-kunnen-komen/>

64. <https://www.volkskrant.nl/economie/zo-maken-we-nederland-klaar-voor-de-grote-vergrijzing~b791ba4b/>



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# Topic research Part 2

**Architectural research**



# Architectural design aspects



## General

The previous part of this research paper made clear about the scientific and common knowledge about dementia. Obtaining this knowledge is important to be able to make the translation to architectural design aspects. Which architectural design aspects could be influence a certain phase of dementia and what are the aspects which are crucial for people with dementia to be able to life in an attractive way. There is already done some research the last five years. One of these research organizations is KCWZ, a knowledge organization for living and care. In April 2018, they have published a document which could be used as a toolkit by designing for dementia. Supported by other scientific literature, the most important design aspects for designing for people with dementia are explained in this paragraph. All these design aspects are focused on the spatial experience of people.

## Orientation

For people with dementia it is important to know where they are in a certain space. It is a daily happening that people with dementia forget the function of a door. Because of this, it is important that this people will not be derived by other activities or happenings. It is important that they can find their goal easily. Aspects, such as symbols, signs or objects could help this people by orientating themselves. By living in a group (community) it is important to have a clear, clarifying and recognizable layout of the communal space, such as the communal living room and kitchen. Objects, such as mirrors could frustrate people with dementia because of the reflection of objects.<sup>66</sup> Orientating objects are important to clarify the environment, as well as the inside as the outside world.

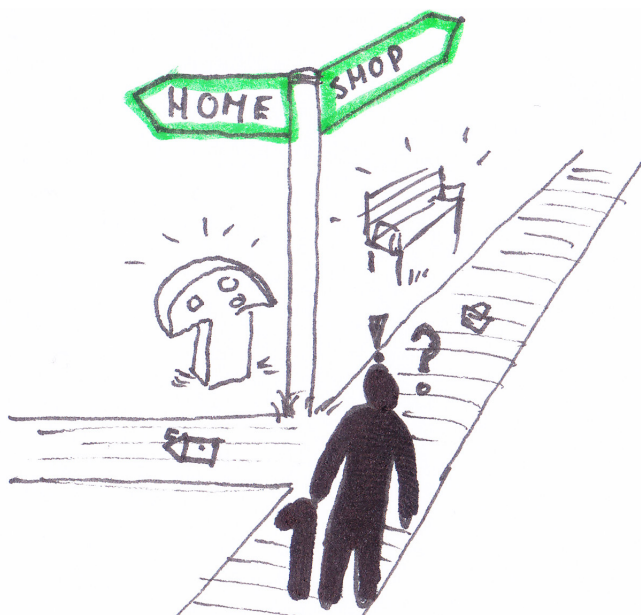


Fig. 37. Own image. Orientation

## Routing

A bad designed routing can cause for wander by people with dementia. Because of this, they can be confused or even angry. Because of this, it is important to have a clear and easy designed routing. The amount of stimulations is important for people with dementia, to protect them against distraction or confusion.<sup>67</sup>

During a walk, people with dementia could forget their goal and will be confused. To prevent against this happening, resting places can be designed. Because of this stimulation, people can sit, relax and enjoy the view, for instance. They forget their goal and will continue their walk or go back to their apartment or communal room.

The design of the routing depends on the clearness, the amount of stimulations and the shape of the routing (ending or non-ending routing).

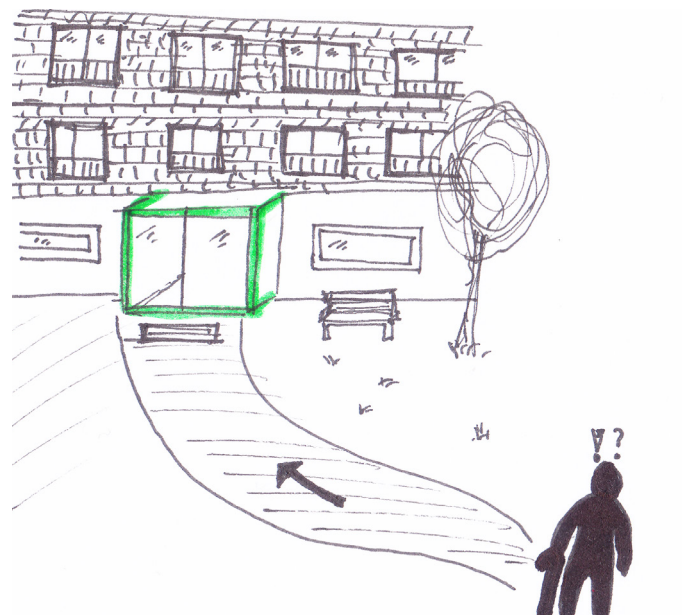


Fig. 38. Own image. Routing

66. <https://modernedementiezorg.nl/upl/Notitie%20Woningaanpassingen%20bij%20dementie,%20definitief.pdf>

67. <https://dementie.nl/dwalen/omgaan-met-dwaalgedrag-van-mensen-met-dementie>



## Contrasts and colors

The use of colors can be used to create calmness for the people with dementia. Out of research is shown that the color 'old pink' has positive stimulations on the people with dementia because of its softness. The harder colors, such as red and blue will create confusion and bad behavior by these people because of the hardness of these colors.

Colors can also be used as orientation tool for people with dementia. During the phases of dementia, the quality of seeing will become more worse. By using colors, people with dementia could recognize the different elements and spaces because of these colors. Hereby it is important to create contrasts. Contrast could support the visual recognition of different elements, for instance the difference between the floor, wall, ceiling and the furniture.

The use of the color black should be prevented. People with dementia could see black elements as holes. For example, a black door-mat could be seen as a hole in the floor and could cause confusion by people with dementia.<sup>68</sup>

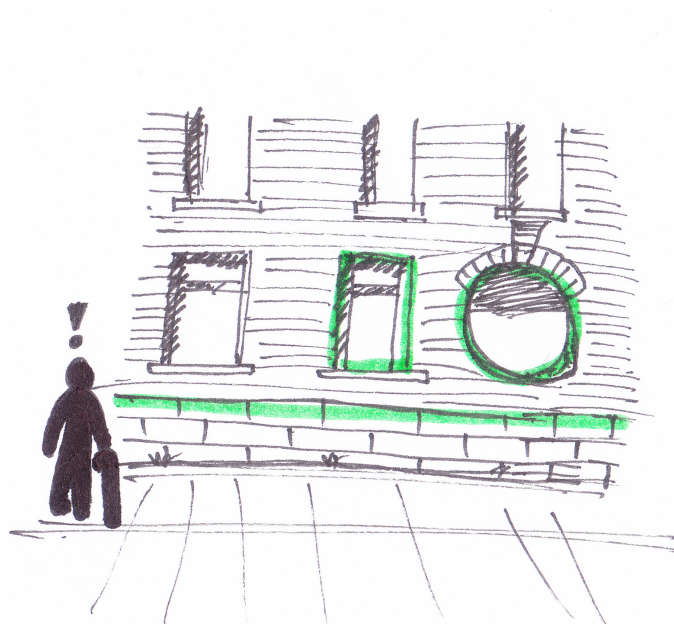


Fig. 39. Own image. Contrast

## (Day)Light

Positive, calmness stimulants can support the behavior of people with dementia. These people are looking for calmness and positive stimulations. Aspects, such as a lightshow could already give a stimulation. Also, the use of daylight is very important. Not only because of the health effects, but also for experiencing the environment. Hereby it is important to prevent the design of windows from floor till ceiling. People with dementia could imagine it as if they are outside. It could cause agitation. It is better to show the window frames, to make it clear that it is a window.

Also, the use of light is important. Each moment of a day needs a different kind of light. For example, after the lunch more subdued light is wished. It could give positive, calmness stimulations. During the day it is important to have a lot of daylight. It can be designed by large windows, or by supporting it with artificial light which could imitating daylight. With this design aspect, the day-night rhythm can be promoted.<sup>69</sup>

The windows are also important because of the visual relations. For people with dementia, it is important to have a visual relation with the outside world. It keeps the brain clearer.

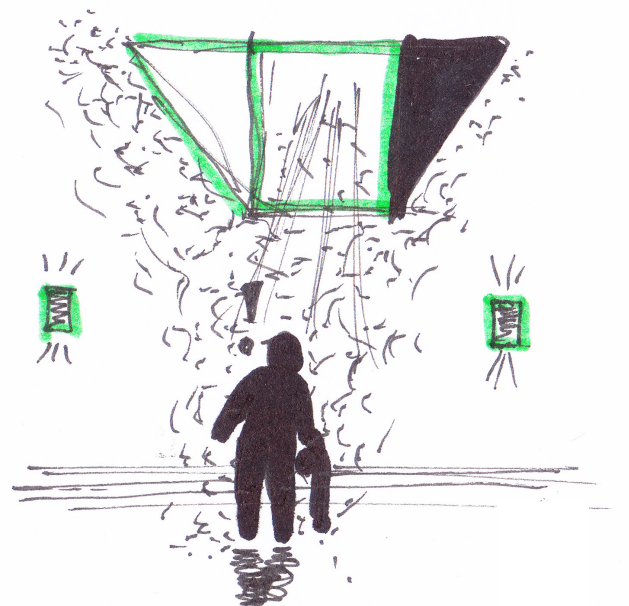


Fig. 40. Own image. Daylight

68. <https://www.ontwerpvoordementie.nl/kleuren.html>

69. <https://www.ontwerpvoordementie.nl/licht.html>



## Acoustics and smell

Negative acoustics such as resonance and echo are unnecessary stimulations for people with dementia. It can cause confusion and pressure for the people with dementia, for sure by different kind of acoustics at the same time.

There should be found a balance between the amount of acoustic stimulations. Too less stimulations can cause bad behavior by people with dementia because of the lack of stimulations. Too much stimulations can cause confusion and pressure.<sup>70</sup>

The smell of something can create the knowledge of time. The smell of food could, for instance, mean that it is dinner time. Because of the smell, people can remember and recognize activities. The smell can be connected in the brains with memories.<sup>71</sup> These kinds of memories are saved during the whole process of dementia. However, during the design of the 'smell-elements' it is important to notice that the smell is not misleading the certain activity. For instance, the smell of food in a bathroom.

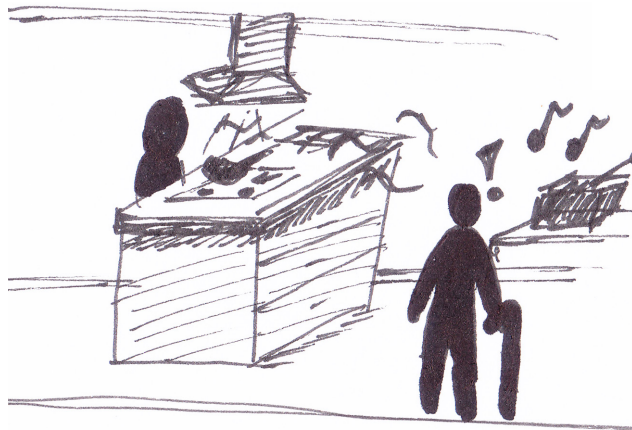


Fig. 41. Own image. Acoustic and smell

## Recognition

People with dementia remember mostly the historical aspects of their life during the disease. It can differ from memories until old furniture's and devices out of their youth. The most recent memories will lose as first and new memories will not be saved in the brains. It can be assumed that modern devices will not be recognized by the people with dementia which can cause unpleasant circumstances and behavior. Because of this, it can be recommended to design with common historical aspects in mind. It can differ from the routing of historical housing until the 'old fashioned' furniture of the people. Also, aspects such as curtains, and visible window frames could be used. The fact of visible window frames is based on the process of thinking of people with dementia. Without a visible window frame, they could think that there is a gap in the wall. With a visible window frame, they will recognize it as a window.<sup>72</sup>

The environment could be made clearer for people with dementia by designing recognition objects, as well inside as outside the building.



Fig. 42. Own image. Recognition



## Their own place (room)

A cozy atmosphere is important for people with dementia. According to psychologist De Vos should the kitchen, living room and dining room differ from each other in atmosphere and disposition. The used furniture should be unique and connecting with the experience of the residents.<sup>73</sup>

The living room and kitchen are the most important spaces for people with dementia.<sup>74</sup> These spaces are on the one hand important because of the smell of food which will arise, and on the other hand is the living room the space where these people will spend the most time of the day (sitting, looking, relaxing).

It is important for people with dementia to have their own space, to have a fall back when other spaces are too busy.

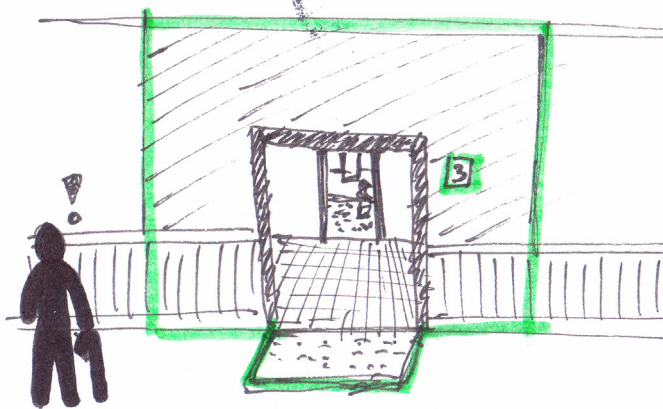


Fig. 43. Own image. Their own place

## Clearness

Avoiding unclear situations can prevent against confusion by people with dementia. Basic spaces, such as a kitchen and living room are recognizable functions and could give intelligibility for these people what that are going to do.

Because of the clearness, confusion can be prevented. To create a clear environment, it could be recommended to minimize the number of doors and gangways. By connecting different spaces and create openness, it will be visible for the people with dementia what is going on.

It is important to connect with the experience of the people with dementia.<sup>75</sup>

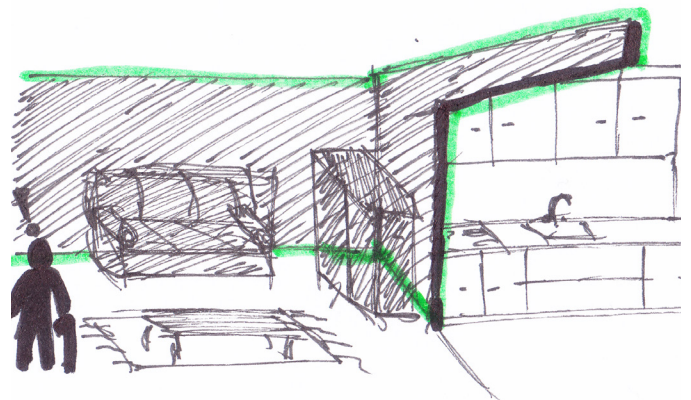


Fig. 44. Own image. Clearness

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# Plan analysis

## **comparison of elderly housing and dementia housing**

inside and outside, collective services, routing

The general research question for the case study is:  
“How is the connection and use of the outdoor spaces designed, related to the different dwellings.”





Location De Klinkenberg 1:10.000

## General information

Location: Ede

Realised: 2018

Architect: Wiegerinck architecten

Contractor: Vilente

Dwellings: 120 apartments

## Internal functions

Bedroom	Gangway
Livingroom + kitchen	Guest room
Bathroom/Toilet	Elevator/Staircase
Outdoor space	Office
Facilities	
Communal room living room, kitchen	

- 1 Secondary school      4 Commercial farms (cheese-, pancake farm)
- 2 Restaurant            5 Park
- 3 Supermarkets        6 Dentist            B Bus



Routing visitor - Ground level De Klinkenberg 1:2000



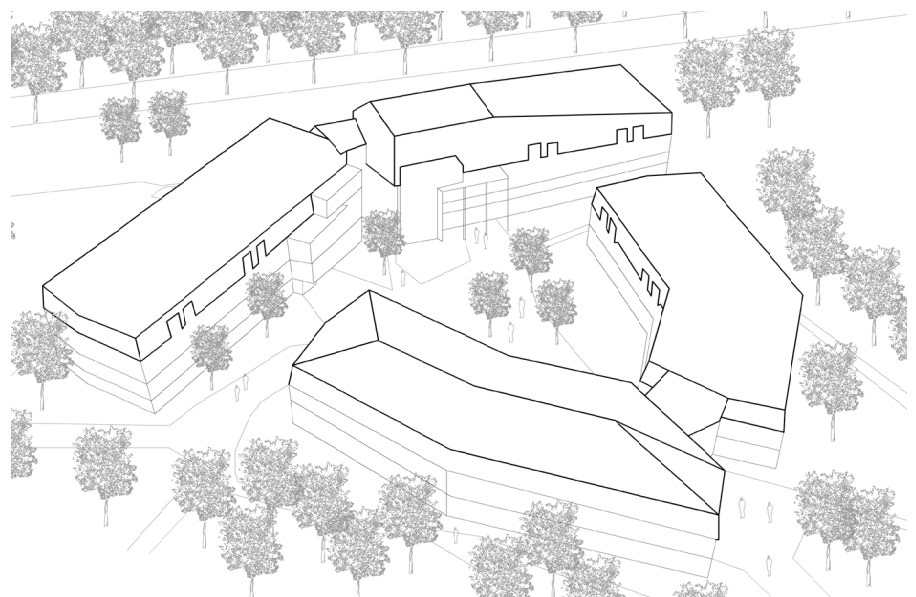
Routing passer-by - Ground level De Klinkenberg 1:2000



Routing resident - Ground level De Klinkenberg 1:2000

De Klinkenberg is a small care community for people with dementia or physical problems. The project consist sof four clusters on each level. Every clusters consist of ten living rooms and one communal room. In total, block A consist of four levels and block B of three levels. There is space for 120 two-rooms apartments and 13 one-room apartment for short-term care.

The project is in a green environment with a lot of trees and greenery, surrounded by villas. Because of the shape of the buildings, there are no fences needed to keep the people with dementia inside their living environment.





# Clustering

dementia and elderly



- A** Apartment, two rooms
- O** Office for caregivers
- C** Communal room; shared living & kitchen



Ground level cluster A De Klinkenberg 1:400

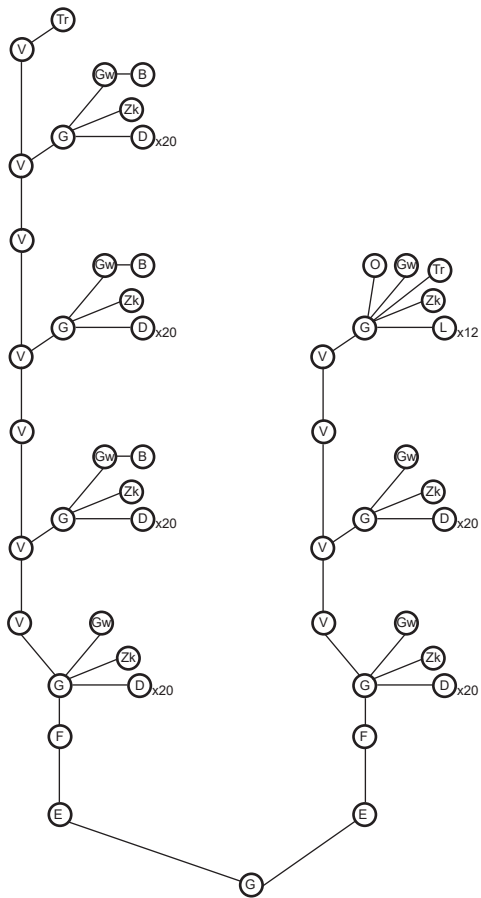
## Clusters

De Klinkenberg consist of four clusters, divided in two building blocks, block 1 and 2. Block 1 consist of two clusters and block 2 consist of two clusters, both connected via a corridor.

Each cluster consist of ten apartments, a communal room with a shared living room, a kitchen and an office for the caregivers. The routing of each cluster is based on two staircases and one elevator.

The apartments have a surface of 45 sqm and consist of a bathroom, a living room with kitchen and a bedroom. On the second level in block 2 are 13 short-term rooms realized for the short-term care of people. These apartments consist of a bedroom and bathroom and have a surface of 33 sqm.

The design of each cluster is based on a repeating routing on each level and in each cluster. Hereby, the routing via the corridor always starts or ends at the communal room with the shared living room, kitchen and office for the caregivers. Next to it is the vertical routing located with an elevator and a staircase.



- B Balcony
- D Dwelling
- E Entrance
- F Foyer
- G Garden
- V Vertical routing
- Gw Communal room
- Zk Office caregivers
- Tr Technical room
- O Additional space
- Lk Short-stay room





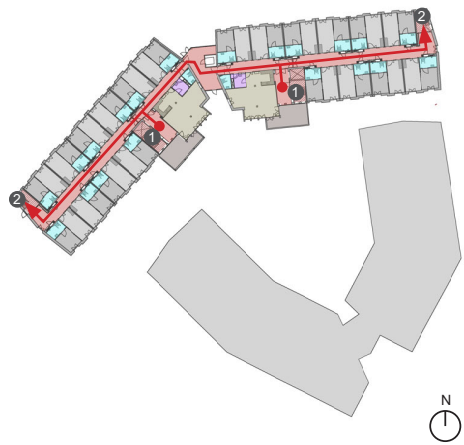
Ground level De Klinkenberg 1:1500



First level De Klinkenberg 1:1500



Second level De Klinkenberg 1:1500



Third level De Klinkenberg 1:1500

## Routing

The routing inside the building block is a repeating routing with the same structure. It has the same principles for all the four clusters of this building block.

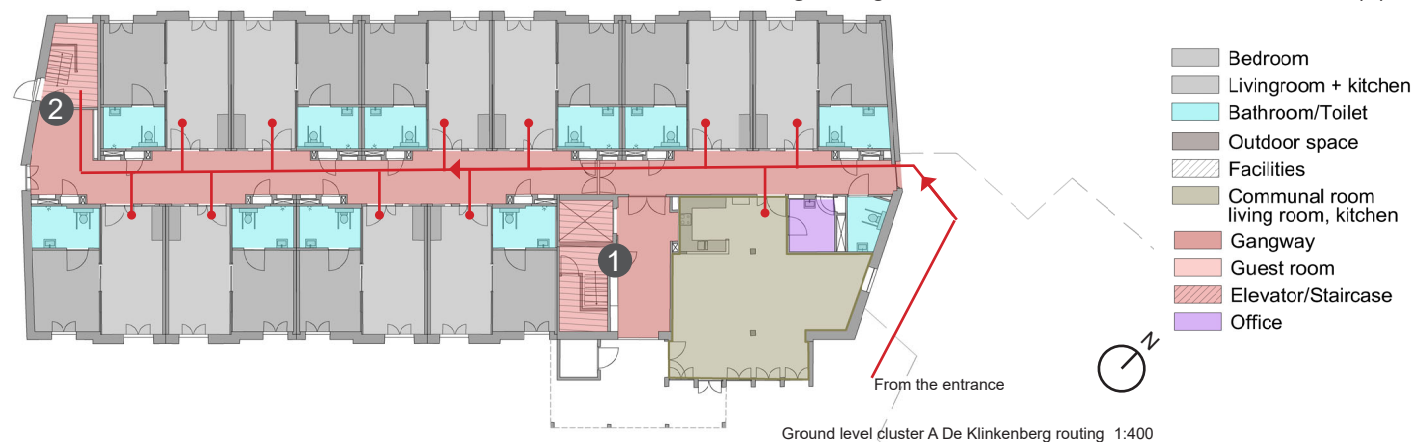
The routing starts at the entrance on the ground floor, in the middle of the two clusters (E). From here, people could go left or right, depending on the cluster where they live. Via the corridor, they can walk to their apartment. Each apartment has its frontdoor at the side of this gangway. Window frames, with a larger depth could be used as point of recognition. People could place plants or other personal belonging in this window frames to make it more personal.

Residents who live on other floors have two options to go to their apartment. They can take the staircase or elevator (1) or the staircase at the end of the gangway (2). From this point, the same principle of routing is used as on the ground floor.

Several stimulations are designed during the routing. For example, small windows with places to sit and relax. Another aspect of the routing is that it always starts or ends at the communal room with shared living room and kitchen. Next to it is the main routing designed with the elevator and staircase (1).

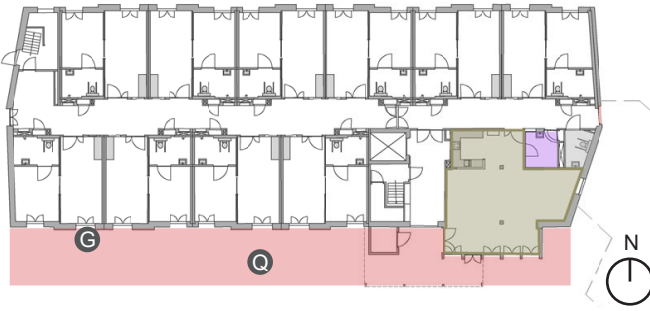
### Legend

- E** Entrance building
- 1** Staircase & Elevator
- 2** Staircase
- 3** Garden

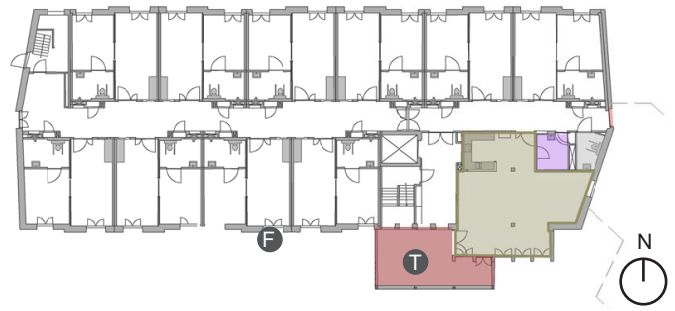


Ground level cluster A De Klinkenberg routing 1:400

- Bedroom
- Livingroom + kitchen
- Bathroom/Toilet
- Outdoor space
- Facilities
- Communal room living room, kitchen
- Gangway
- Guest room
- Elevator/Staircase
- Office



Ground level cluster A De Klinkenberg outdoor space (out of scale)



First level cluster A De Klinkenberg outdoor space (out of scale)



Roof terrace at communal room, shared outdoor space residents **T**



Square as outdoor space on ground level, accessible for public **Q**




French balcony with French door to create private outdoor space **F**  
Ground level; French doors with small greenery as 'fence' **G**

### Outdoor space

The outdoor space of De Klinkenberg consist of three types, based on the floor levels. The first type of outdoor space is the square in the middle of the building blocks (Q). This square is not only outdoor space for the people with dementia, but also accessible for the people of the environment. It is a public outdoor space. Because of this, it can be assumed that there will be interaction between the people with dementia and the neighborhood. This square can be used for different activities, but also as place where people can sit and enjoy the weather and environment.

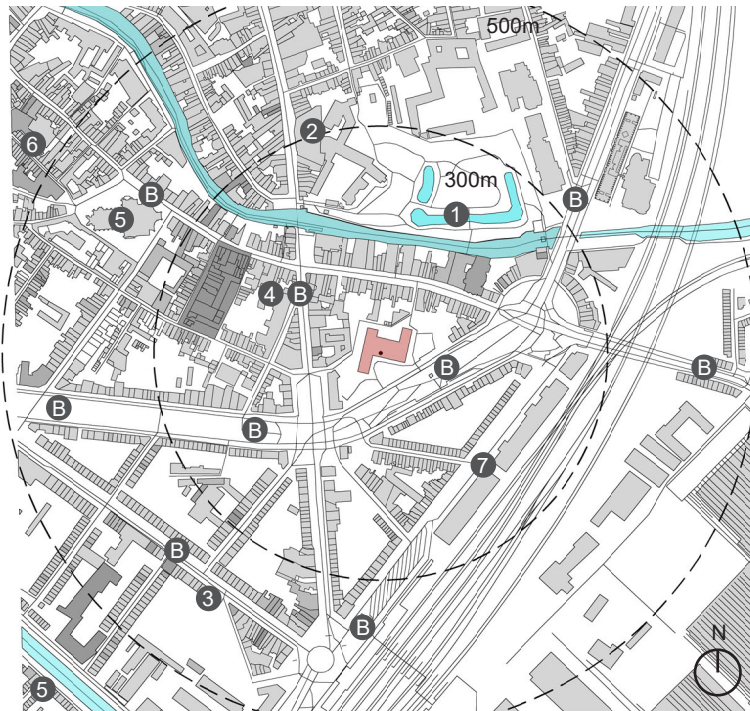
The second type of outdoor space is the communal balcony at the first, second and third level. It is connected with the communal room. This balcony is only accessible for the people with dementia, and possible guests, such as family. Each cluster has its own balcony. Because of this, ten apartments share a communal balcony. It is a semi-private balcony. Private for the residents, but public because of the communal function.

The third type of outdoor space is created by the apartments of the residents. Because of the French doors with the French balconies, the living room can be visual (and partly physical) connected to the outside world. The people with dementia can open their French doors and behave like they are outside, but still sitting in their own living room. Because of this, the people with dementia are always able to have a look to the outside world and see what is happening.  The visual relations are defined by large windows.

- A protected, closed living environment is important for elderly people with dementia. Hereby, it should not be a building block, completely closed of from the outside world. (visual) Connection should be still possible.
- The people with hard dementia are located on the top floors of this building block surrounded with care.
- The connection from the inside to the outdoor space is important for this target group. Interaction with the outside.







Location Hof van Egmont 1:10.000

## General information

Location: Mechelen (Belgium)

Realised: 2021

Architect: EGM architecten

Contractor: -

Dwellings: 210 apartments

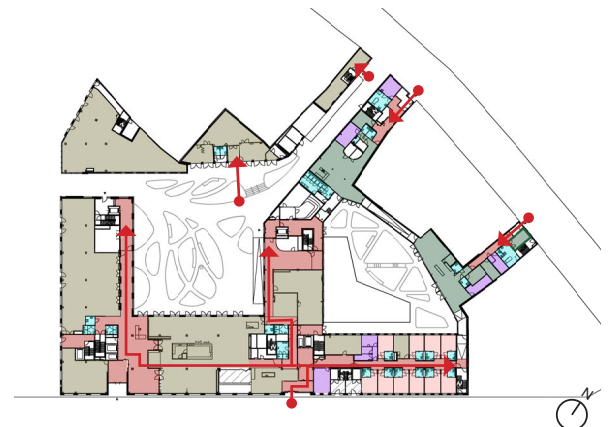
## Internal functions

Bedroom	Outdoor space
Livingroom + kitchen	Facilities
Bathroom/Toilet	Communal room
Gangway	Daycare
Short-term stay	
Elevator/Staircase	
Office	

- |                  |         |               |
|------------------|---------|---------------|
| Park             | Theatre | Train station |
| Supermarket      | Church  | Bus           |
| Secondary school | Library |               |



Routing visitor - Ground level Hof van Egmont 1:2000

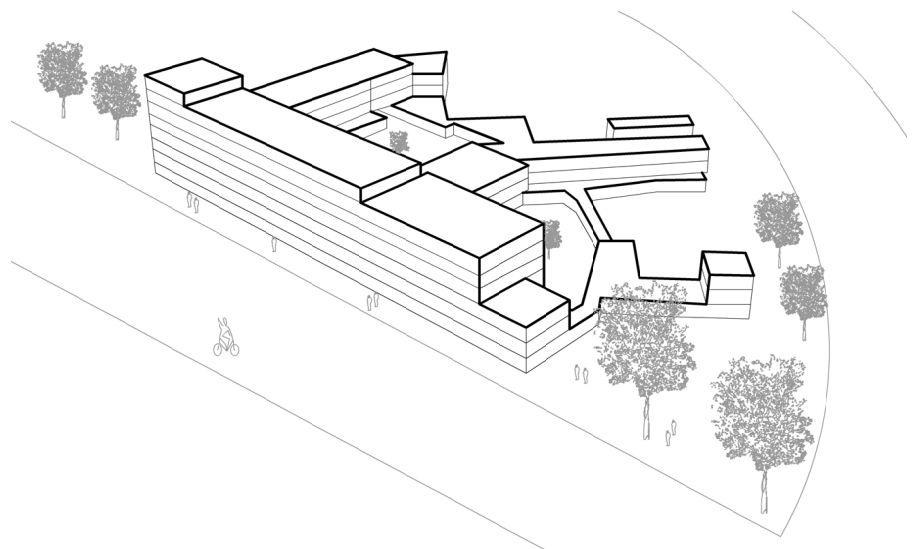


Routing resident - Ground level Hof van Egmont 1:2000

Hof van Egmont is a new build project in the city center of the Belgium city Mechelen. The project is meant for elderly people with affections of various types, from mental to physical.

The project consists of eight stories and a basement. At this moment, the expected time span for the building process is two years, until 2021.

Hof van Egmont accommodates different target groups, such as appartements in the West wing and short-stay rooms with shared bathrooms in the East wing. On the ground level are also commercial functions added, such as a restaurant, creative workspace and a public accessible garden.

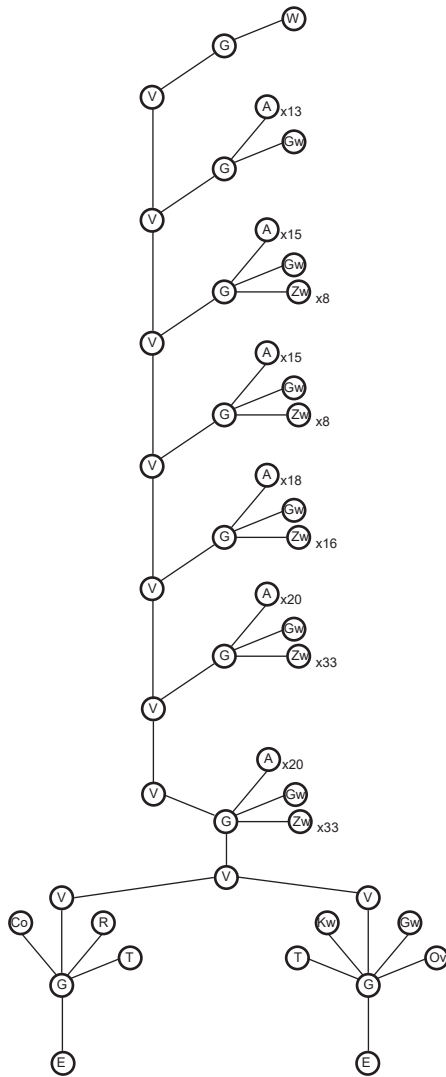




- A** Apartment, two rooms
- O** Office for caregivers
- C** Communal room; shared living & kitchen



Ground level cluster 1 Hof van Egmont 1:500



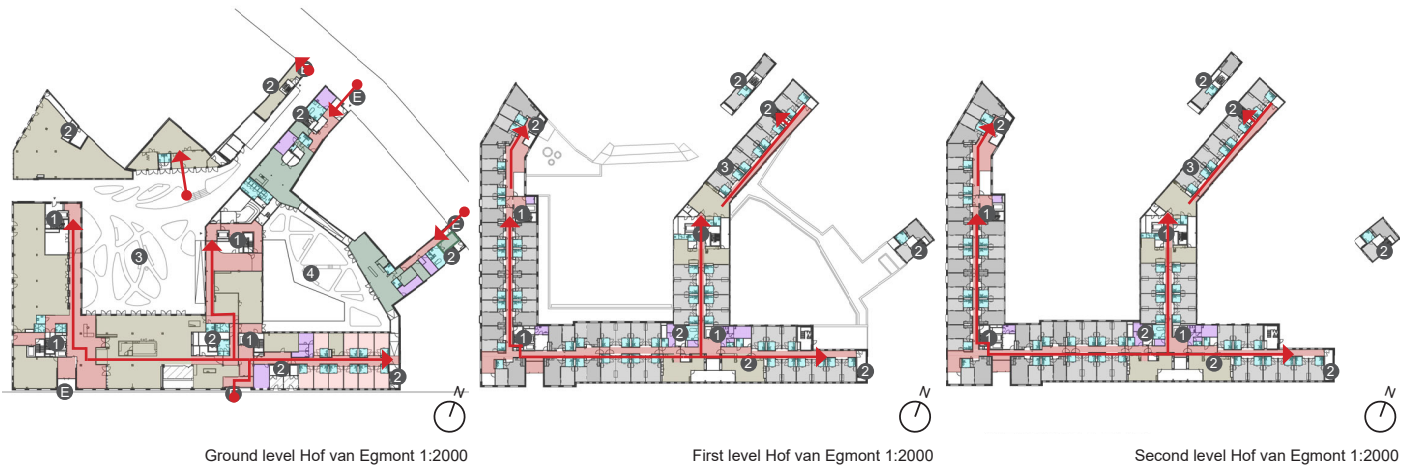
### Clusters

Hof van Egmont can be divided in several clusters. It could be done by dividing it by housing types. This means that clusters will arise with only apartments and short-stay rooms which consist of a sit-sleep room and shared living rooms and bathrooms.

By doing this, five clusters can be mentioned. All these clusters are connected with each other via a corridor. The corridor of the short-stay rooms always ends/starts at the communal space with the shared living room and kitchen. Furthermore, all the corridors are connected with the vertical routing, the elevator with staircase or only a staircase.

The short-stay rooms have a surface of 25 sqm and consist of a small bathroom and bedroom. The apartments consist of a bedroom, a bathroom and a living room with kitchen. These apartments have a surface of 50 sqm.

- A Apartment
- E Entrance
- G Gangway
- R Restaurant
- T Garden
- V Vertical routing
- W Wellness
- Co Collective space
- Gw Communal room
- Kw Short stay room
- Ov Additional space
- Zw Care dwellings



## Legend

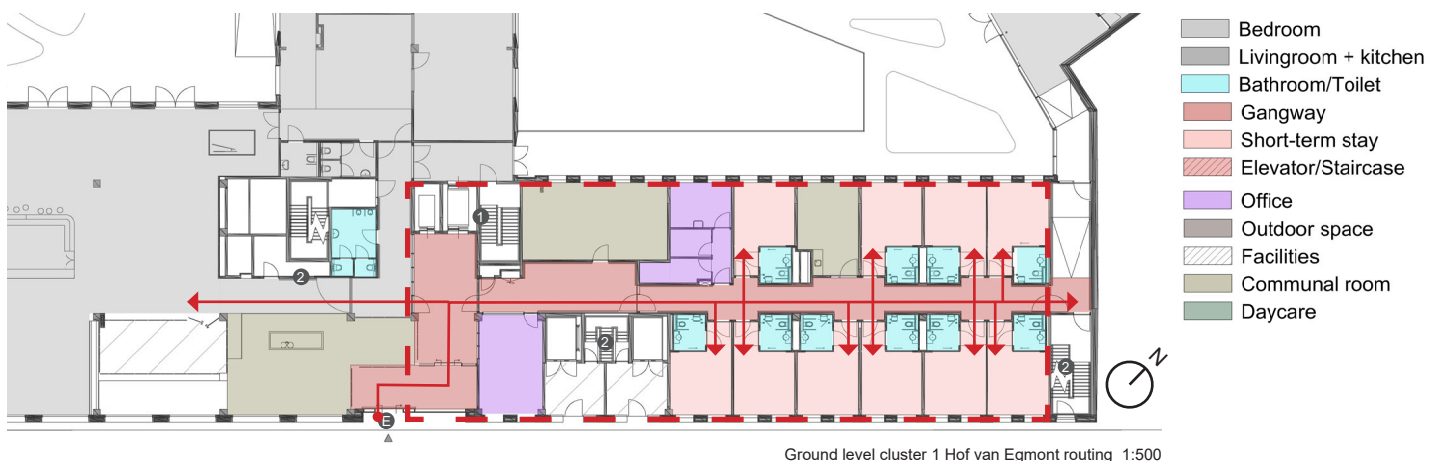
- E Entrance building
- 1 Staircase & Elevator
- 2 Staircase
- 3 Garden
- 4 Garden for hard dementia

## Routing

The routing of this project consists of a corridor. All different clusters are connected with each other via different corridors. The routing for the residents and the visitors does not differ. Only the entrance is different, whereby different entrance is made for the visitors and the residents.

The routing starts at the entrance on the ground level (E). A small hallway leads towards the corridors and from this point can several directions been chosen. This means that the residents can walk through the whole building, without getting lost. To create some stimulations, some setbacks are designed in the corridors for some places to sit. Because of this, the residents can decide the layout of these setbacks and make it more personal.

Residents who live on the upper floors can take the elevators (1) or the staircases (2) and will enter their apartments via the corridors.





# Outdoor space composition

dementia and elderly



Ground level Hof van Egmont - outdoor space (out of scale)



First level Hof van Egmont - outdoor space (out of scale)



Public accessible outdoor garden **A**

## Outdoor space

The outdoor space of Hof van Egmont consists of two parts. The first one is the outdoor space which is accessible for everyone (A). This could mean that different kind of interactions will arise between the neighborhood and the residents of this building block.

Besides that, this is also the only outdoor space in this building block. Even on the highest levels are no outdoor spaces designed and no balconies or French doors. This means that everyone of this building block is forced to visit the outdoor, public accessible, garden.

The second type of outdoor space is the closed garden. This outdoor space is designed for people with hard dementia and other hard mental affections. To give them the possibility to go outside, this garden is designed at the other side of the East wing and closed off from the other parts of the building (B).

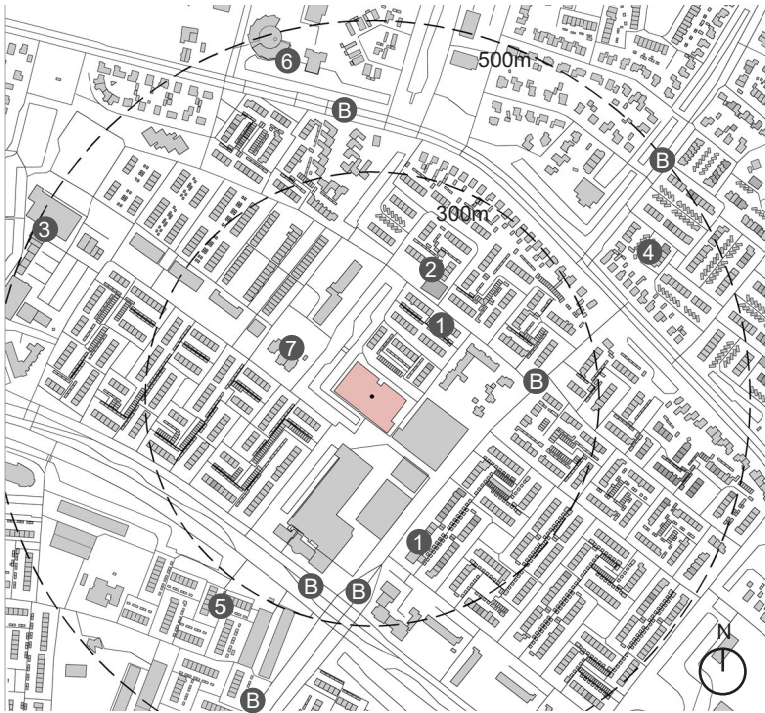


- This design provides a protected, closed living environment for elderly people and elderly people with dementia. It is closed off from the busy street side of the city, and opens up at the other side with the communal garden.
- The people with hard dementia are located on the ground floor of this building block surrounded with care.
- There is a special garden for the people with hard dementia and the other residents.









Location De Componist 1:10.000

## General information

Location: Apeldoorn

Realised: 2017/2018

Architect: LEVS Architecten

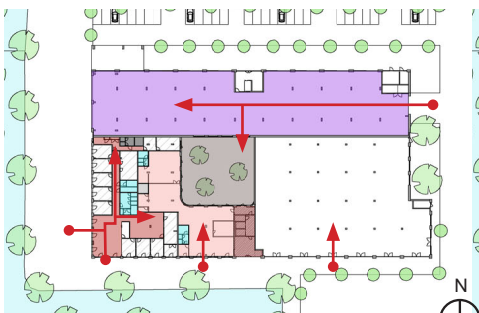
Contractor: Aan de Stegge

Dwellings: 69 dwellings

## Internal functions

- Bedroom
- Livingroom + kitchen
- Bathroom/Toilet
- Gangway
- Offices
- Elevator/Staircase
- Communal space
- Outdoor space
- Facilities
- Parking

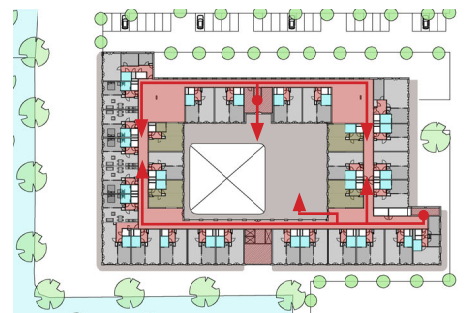
- ① Medical center
- ④ Hospice
- ⑦ Social meeting
- ② Dentist
- ⑤ Primary school
- B Bus
- ③ Supermarkets
- ⑥ Sports



Routing visitor - Ground level De Componist 1:2000



Routing resident - Ground level De Componist 1:2000

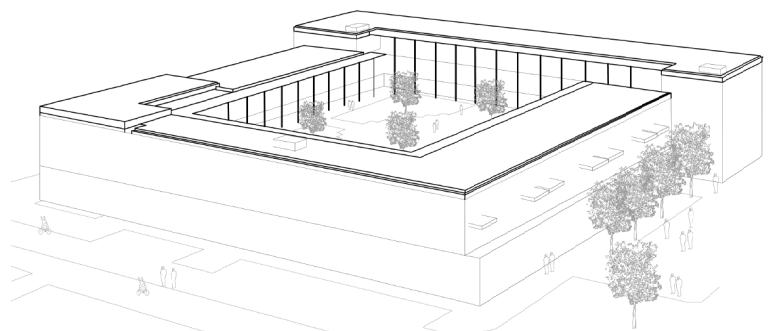


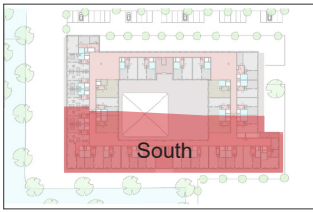
Routing resident - First level De Componist 1:2000

De Componist is a new built project in Apeldoorn. It is a small living community for elderly, but at the same time a shopping area with several public functions on the ground floor, such as daycare, physiotherapy and a restaurant. The building is designed for 'healthy' elderly but also for elderly who needs care. Because of the 'blocked O-shape' of the building is a courtyard designed on top of the roof of the ground level. This creates a protected living environment for the elderly.

The project consists of two parts, the North and South part. The North part consist of two levels and the South part consist of three levels. Both levels have the public ground floor underneath. In total, there are 69 dwellings designed and 1300 sqm of commercial space on the ground floor, 520 sqm of physiotherapy and 370 sqm of care facilities.

The project is in an urban environment, divided by roads and other building blocks. Because of the shape of the building, and the elevated living area, there are no fences needed to keep the people inside their living environment.





First level North cluster - De Componist 1:750

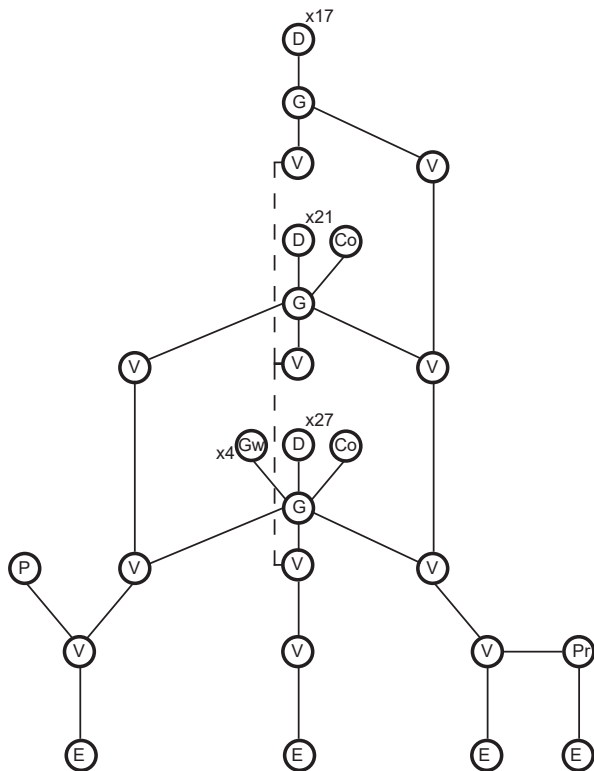
## Clusters

The building block is divided into two clusters, the North part and the South part. In the middle of each cluster is the vertical routing designed which consists of an elevator and a staircase.

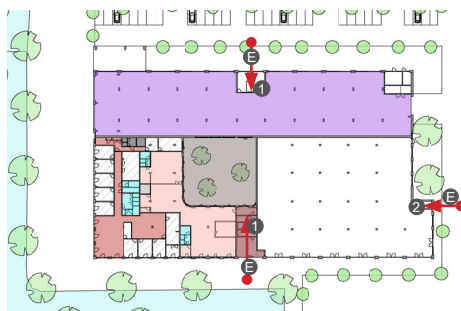
Because of the public functions on the ground level, the living environment is upgraded to the first level. From this level, there are three levels at the South side and two levels at the North side.

Each cluster at the North side consists of 13 life cycle-proof houses and two communal rooms where the residents have a shared living room and kitchen. At the South side are 14 of these houses designed and two communal rooms. In the middle of the block is a courtyard designed as a protected outdoor space.

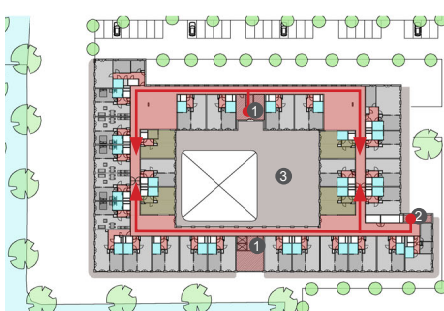
All the houses have their frontdoor at the same side, orientated to the inside of the building, connected with the corridor. At the outside side of the building are balconies designed as private outdoor spaces for the residents.



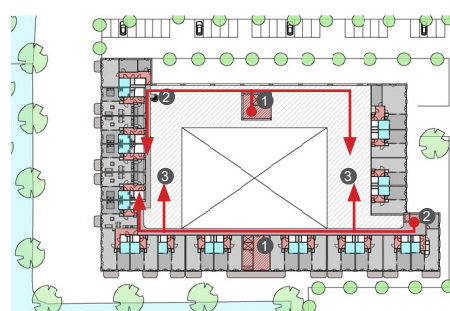
- D Dwelling
- E Entrance
- G Gangway
- P Parking
- Pr Health center
- V Vertical routing
- Gw Communal room
- Co Courtyard



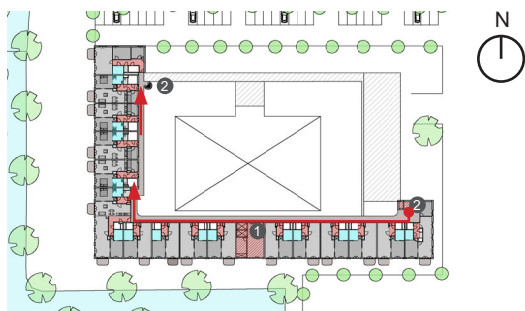
Ground level De Composit 1:2000



First level De Composit 1:2000



Second level De Composit 1:2000



Third level De Composit 1:2000

### Legend

- E** Entrance building
- 1** Staircase & Elevator
- 2** Staircase
- 3** Courtyard
- Communal space

## Routing

The routing to each dwelling in the building block starts from three different orientations. At the north, south and east side of the building are the entrances to the dwellings (E).

The routing inside the building block is a repeating system. It starts at the ground floor at the North or South side with the elevator or staircase (1), or at the East side with the staircase (2). From this point, people are in the middle of the building and could go left or right to their apartment, via the corridor. From the second level, the corridor changes to a gallery connected to the courtyard (3). Because of this, the elderly are directly connected to the outside world.

During the routing, at the East and West side are two communal rooms designed for each cluster. However, these are not connected with/located nearby the vertical routing, but at the end of each cluster.

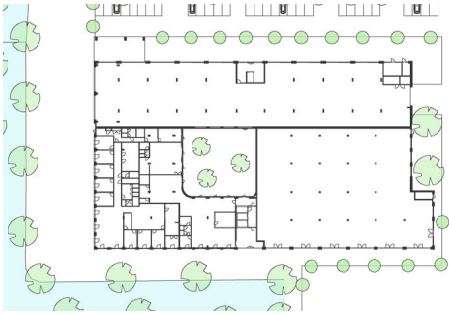


Ground level cluster A De Composit routing (out of scale)

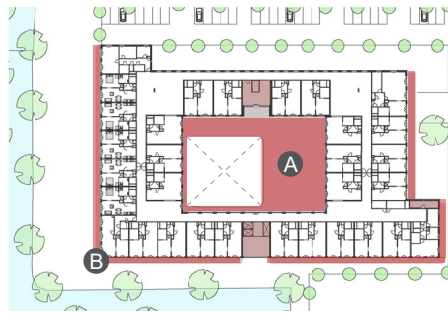


# Outdoor space composition

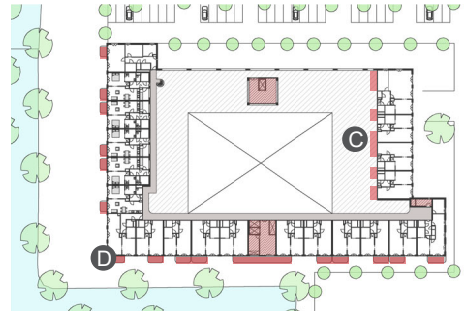
elderly



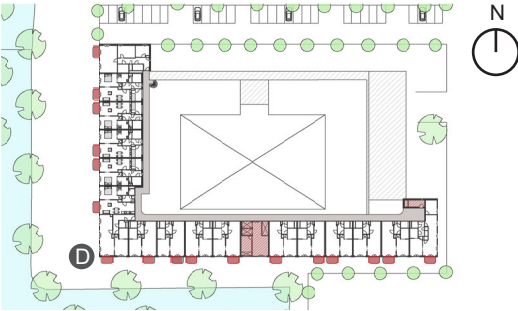
Ground level De Composit 1:2000



First level De Composit 1:2000



Second level De Composit 1:2000



Third level De Composit 1:2000

## Outdoor space

The outdoor space is designed in various principles in this building block. Because of the location of the living environment at the first level, there is no, or less, outdoor space available on the ground floor. With outdoor spaces is meant, available space for the residents to sit and relax in the outdoor environment.

On the first level is the outdoor space defined by two different environments. In the center of the building block is a courtyard created on top of the roof of the ground level (A). At the side of the dwellings are elongated balconies designed. These balconies are not designed as overhangs, but on top of the roof of the ground level (B).

The second level consist also of two types of outdoor space. The dwellings on the South and South-West orientations are defined with balconies (D). These are private outdoor spaces. The dwellings at the North-East orientation are defined by small private front gardens, at the inside of the building block (C). This is probably done because of the sun orientation and to compensate with the balconies of the other dwellings.

The third level consist of one type of outdoor space, balconies (D). These balconies are private outdoor spaces. The balconies and front gardens are directly connected with the dwellings (B,C,D). The courtyard at the center of the building is only accessible via the gangway, and creates a more shared outdoor spaces. Because of this, the residents could decide to visit to communal outdoor space or their private outdoor space.



Visual relations balconies **B D**



Outdoor space gallery and courtyard **C A**

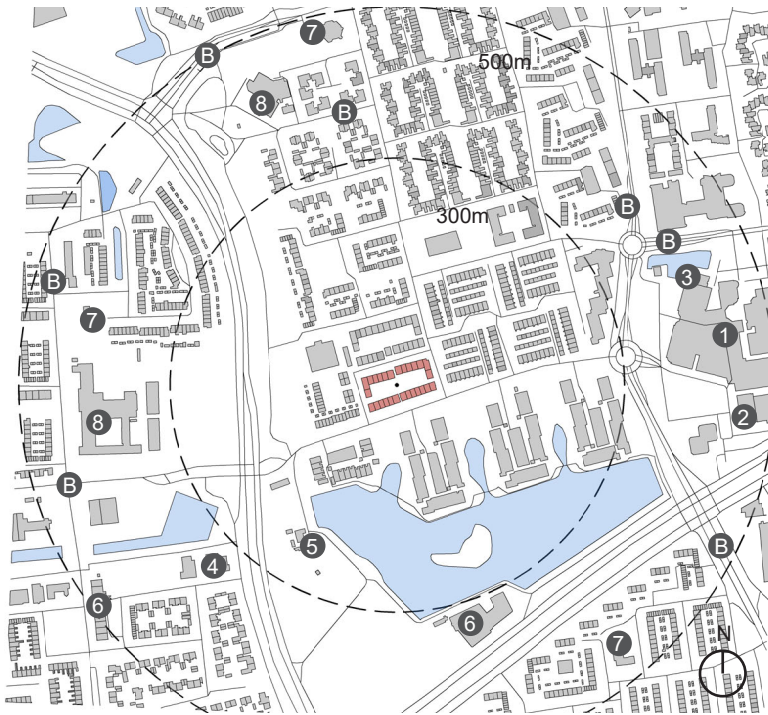


- A protected, closed living environment is created by lifting up the living environment from the ground floor. On the ground floor are public functions designed to create social interaction around the building block.
- With lifting up the ground floor, an protected, but still open living environment is created, with interaction to the outside world.
- In the center of the building block is a communal garden created, connected to the gallery and front doors of the houses. On the other side are private balconies.









Location Krasse Knarrenhof 1:10.000

## General information

Location: Zwolle

Realised: 2018

Architect: INBO Heerenveen

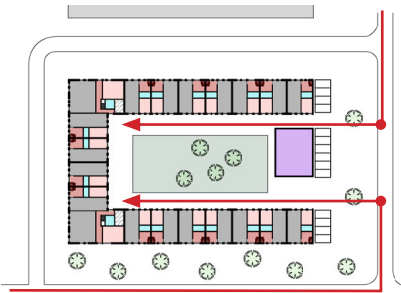
Contractor: Trebbe

Dwellings: 48 dwellings

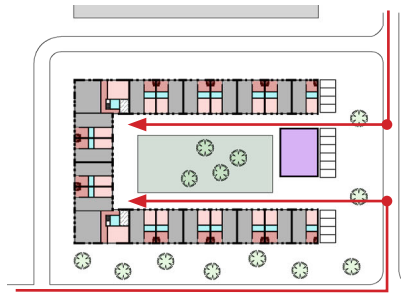
## Internal functions

- Bedroom
- Livingroom + kitchen
- Bathroom/Toilet
- Gangway
- Offices
- Elevator/Staircase
- Communal space
- Outdoor space
- Facilities
- Parking

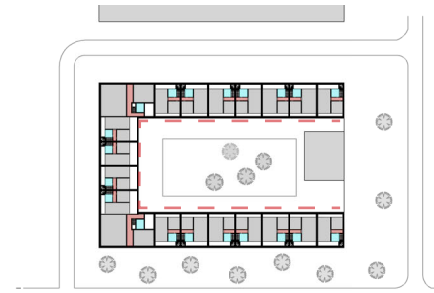
- ① Shopping center
- ④ Red Cross
- ⑦ Church
- ② Sport center
- ⑤ Wine farm
- ⑧ Secondary school
- ③ Physiotherapy
- ⑥ Care house
- B Bus



Routing visitor - Ground level Knarrenhof 1:2000



Routing resident - Ground level Knarrenhof 1:2000



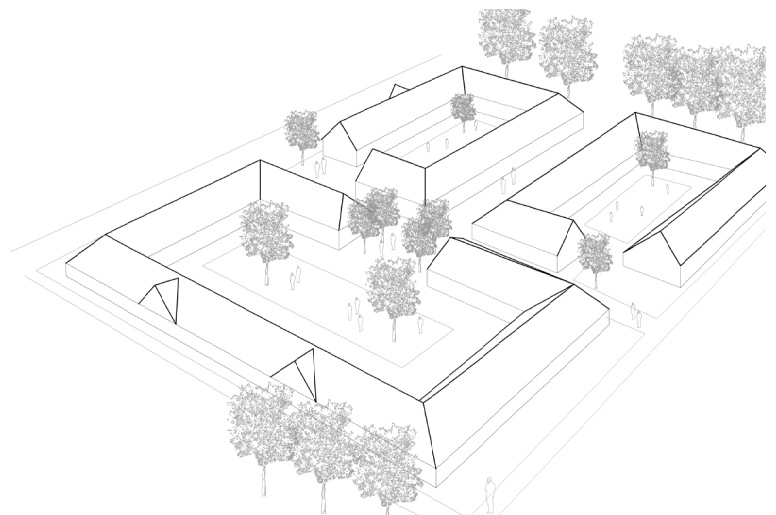
Routing resident - First level Knarrenhof 1:2000

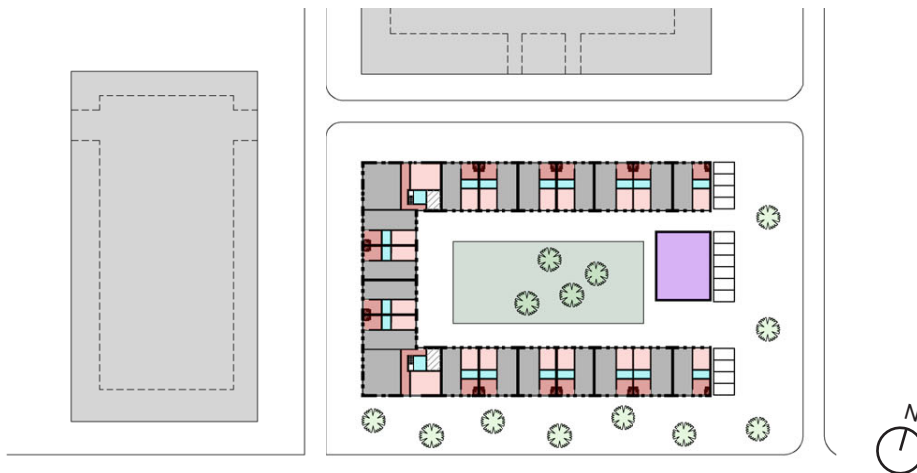


Krasse Knarrenhof is a new housing concept realized in several cities in The Netherlands. One of the first projects is the project in Zwolle. The concept consists of a small living community with shared outdoor spaces in the middle of the 'closed' building block. It is a combination of several courts, based on the history but with the living standard of the present.

This concept creates a safe way of living because of the closed shape of the building block and at the same time an interesting concept of transition spaces, from private to collective. The concept is focused on sharing and helping each other and is meant for elderly people, with or without affections.

The project of Krasse Knarrenhof in Zwolle consists of three courts, which can be seen as three clusters. Each cluster consist of 20 dwellings. Every dwelling consists of two floors whereby each residents can design its own lay out of the dwelling, based on the wished and the needs of the residents.





Ground level North cluster - De Componist 1:1000

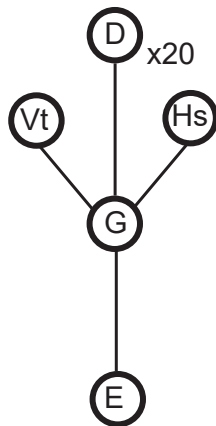
## Clusters

This project consists of three small courts, which could be seen as three clusters. Each cluster consist of a U-shape building block with several openings to the environment. Each cluster consist of 20 dwellings whereby each house possess two floors.

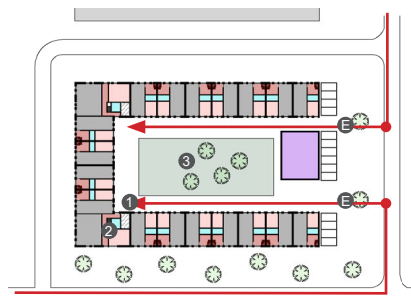
Each cluster has a communal garden in the middle of the plot. Together with the several openings in the building block, are these spaces the communal entrances of each court. Each house has its front door orientated to the communal outdoor space at the inside of the court. This means that social interaction could be arise when people are leaving or entering their houses.

Besides the function of arrival area has the communal outdoor space also another function. Because of its communal function, the maintenance of this outdoor space should be done by the residents themselves. This could create interaction between the residents and a livable environment.

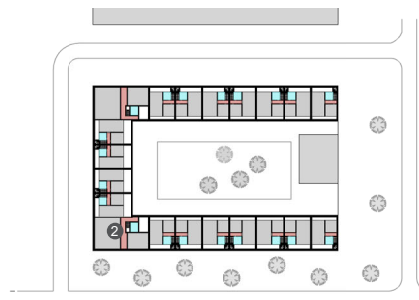
By entering the front door of the house, the collective zone stops and changes to a full private environment. This transition is made smooth because of the front gardens as smooth division between the collective and private spaces.



- D Dwelling
- E Entrance
- G Garden
- Vt Front garden
- Hs Hobby space



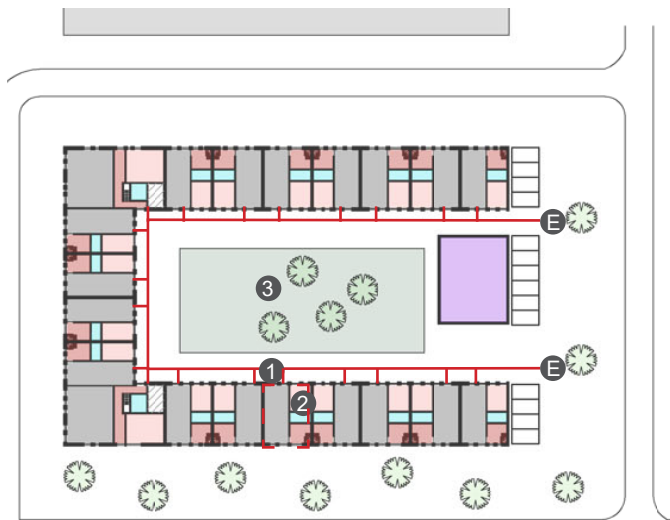
Ground level De Componist 1:2000



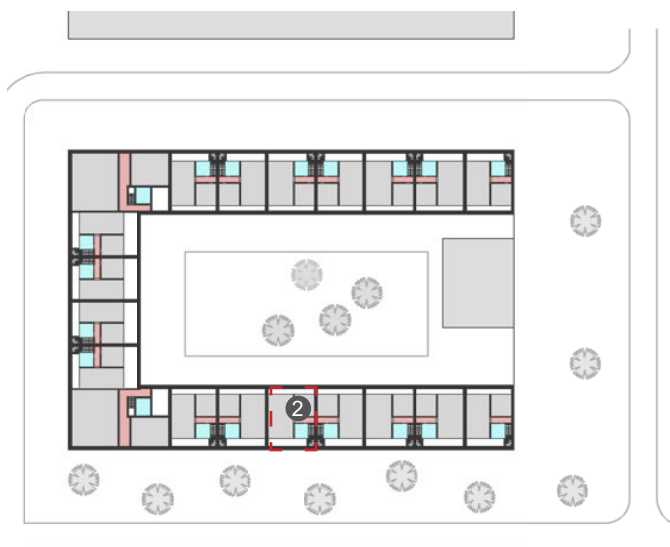
First level De Componist 1:2000

### Legend

- E Entrance building block
- 1 Entrance dwelling
- 2 Staircase inside house
- 3 Communal outdoor space



Ground level cluster A Knarrenhof routing (out of scale)



First level cluster A Knarrenhof routing (out of scale)

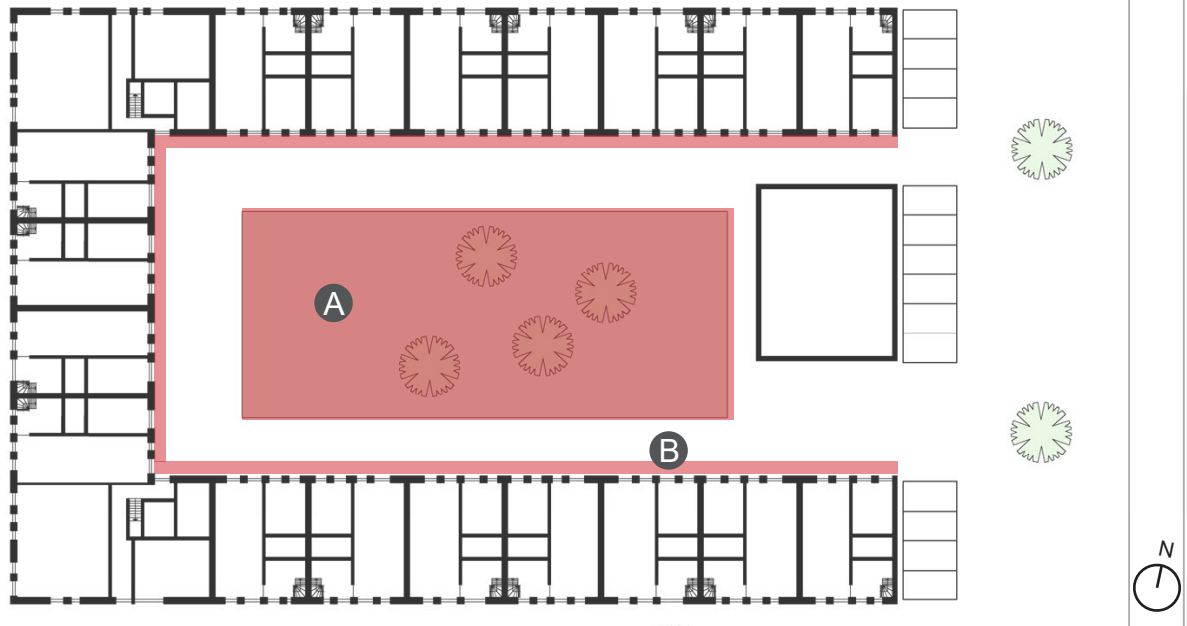
- E Entrance building block
- 1 Entrance dwelling
- 2 Staircase inside house
- 3 Communal outdoor space

## Routing

The routing of this project consists of one source. At one side of the building are the parking places and the openings in the building blocks (E). From this point, the communal outdoor space will be entered (3). To enter your front door, you are forced to enter this collective space. By entering the front gardens, the front door of the house can be accessed (1).

Inside the house is one routing designed. Via the staircase, directly designed next to the front door, can the second level be reached (2). Because of the open lay-out of the floorplans, the function of each floor can be designed by the residents themselves.

The routing of this project consist of a certain routing which starts at the collective zone, changes to a semi-collective zone and ends at the private zone by entering the house.



Ground level Knarrenhof 1:750



Communal outdoor space **A**



Front garden **B**

## Outdoor space

The outdoor space of the Knarrenhof consist of two types of outdoor spaces. The first type of outdoor space is the communal outdoor garden in the middle of the site (A). This place is designed for collective maintenance of the garden and several activities, such as gardening and 'jeu des boules'. Because of this, it can be assumed that several interactions will arise between the residents of this courts.

The second type of outdoor space is the transition zone from the collective outdoor garden to the private front door. This zone is the front garden and is a semi-collective zone. People can sit and relax at the front of their house, without having directly contact with the communal outdoor garden. However, the residents can still have a short talk with their neighbors or have visual interaction with the communal outdoor space.

Inside the houses, in the private zone, are no outdoor spaces designed. That means that this project is focused on sharing spaces and creating interaction by using the communal outdoor space.



- This project is based on the concept of communities. The building block is closed from the streets and opens up at one side. The entrance is created by the communal garden.
- The front doors are orientated at the side of the communal gardens and divided from eachother with a small front garden.
- Social interaction is supported because of the communal outdoor spaces and lack of private balconies or private, closed gardens.







## Research tutorial and Quick start “New type of gated community”

**How to open a closed building block and (visual) connect with its environment**

Closed, protected living environment elderly  
(Social) interaction with environment





# Quick start



Before the start of the design process for the conceptual design of the Dutch Housing Graduation studio, a Quick start is done, tutored by Mo Sadighi. Different kind of typologies and building shapes were researched and evaluated to develop certain design schemes and principles for the start of the Quick start design.

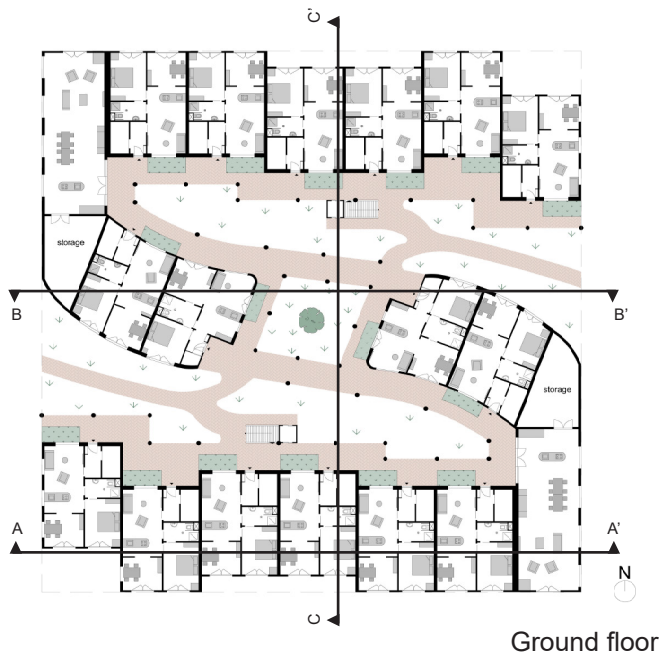
During this design week were the case studies the main point of the design choices. Based on the obtained knowledge of the case studies, interesting and useable architectural aspects were used and superimposed in the chosen site of the urban plan, Minervahaven in Amsterdam. The design is located on the same site as the graduation studio but was during this week not limited to the urban design principles and rules of the masterplan. The Quick start week was meant for experimenting with the scale of the site and the design issues during design process of housing.

Showed below is the outcome of the Quick start week. The design consists of three typologies, which are superimposed from the Hogeweyk, Klinkenberg and De Componist. The first two projects are designed for elderly with dementia and the last project is living environment for elderly. All three projects are focused on the relation between the inside and outside space and on living in small communities, clusters.

The design of the Quick start forms two clusters connected with the outdoor space. With the knowledge, obtained from the case studies is a closed building block with several opening designed. The shape of the building creates two closed, 'protected' living environments, connected with each other via a central collective outdoor space. Because of the open parts in the building block is it still possible for the environment to access the plot and create social interaction with the residents. Because of this, a safe living environment for elderly and people with dementia is designed, but still with the possibility of social interaction.

To create an interesting routing inside the plot, are different levels connected with each other with the galleries. Because of this, a certain routing can be used without an ending gangway or closed door. Besides that, also the front doors are orientated to the inside of the plot, which means that all the residents enter the collective outdoor space.

Inside the building are housing typologies designed for single elderly, couples and for short-term care for people with hard dementia. On different locations on each level are communal rooms designed with shared living rooms and kitchens. The housing typologies are designed as single apartments, with different rooms.



Ground floor



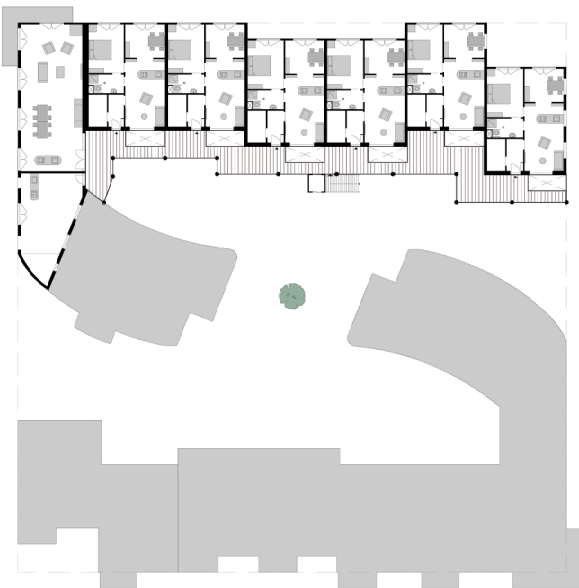
First floor



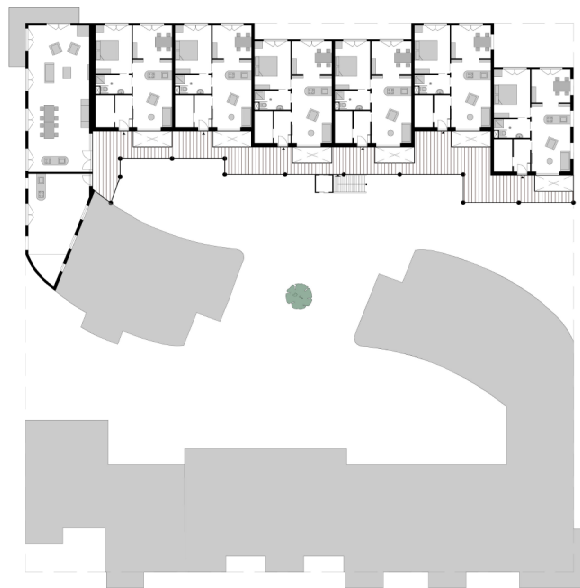
Second floor



Third floor



Fourth floor



Fifth floor



Impression



The sections show the different height of the levels and the lay-out of the floorplans of the different housing typologies. Based on the sections, architectural elements can be evaluated, such as the different heights of the building block and the transition zones from the private house to the semi collective gallery and the collective outdoor garden.

The sections also show the main problem of this design compared to the sun orientation and the starting points, formulated at the beginning of this Quick start week. The first aspect, the sun orientation, shows that to little

sunlight will reach the outdoor garden. In particular the parts in the corners of each cluster will have a lot of shadow. The other aspect is the starting point of 'creating a closed, protected living environment but still with the possibility of social interaction. With this design, some large openings are designed. This could create interaction with the environment, but does not create a closed, protected living environment for the elderly. Because of the sections, the measurements of these openings became visible.



Section AA' 1:400



Section BB' 1:400



3D section CC'



# Virtual Reality



The Virtual Reality, tutored by Sven Volkers, was the continuation of the research done during the Quick start week. It goes further on the design of the closed building block, the design and interaction with the outdoor space and the character of the building block.

## Introduction

At the end of March, I have contributed to the graduation course Housing Tutorial, part of the Dutch Housing Studio. During this course, the tool Virtual Reality was introduced into the architectural design process. During the Master 2 I already worked with the Virtual Reality during the course Future Envelope. The use of Virtual Reality is an improvement of the design and research process and could enrich the knowledge and insights of the project. During the past course with Virtual Reality, this method was used as final presentation tool. During this course, the understanding of Virtual Reality as research tool became clear. My opinion about the use of Virtual Reality changed and became not only a tool to show the final product/design but could be used for my design projects as research tool to be able to imagine the way of living of people with dementia. With this tool, this research can be done.

## Method

The focus of this course was based on the visual and physical relation between the building block and the outdoor space. Different elements, such as the building height, shape of the building, opening to the outside world and the width of the building were important. Based on the obtained knowledge of the case studies and the feedback of the Quick start week, several building shapes were researched and evaluated.

The first weeks of this course was theme of creating the research topic whereby the Virtual Reality could be used. Finding a good topic was not easy due to the overload of obtained information in the previous weeks. Because of that, too much architectural elements were introduced in the first weeks as research topic. Elements, such as building height, visual relations, orientation to the sun, connection with the environment and human scale. After a tutoring session with Sven Volkers, the main theme for this course became clear; the connection between the building (indoor space) and the outdoor space (garden). Based on this theme, the following research question was formulated: *“what are (the) important architectural elements for designing the outdoor (closed) space for people with dementia?”*.

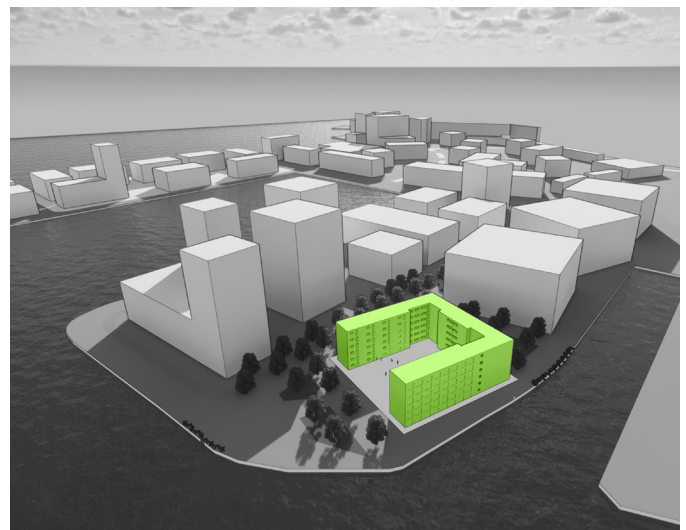
## Design option 1

The first design option consists of the basic volume of the urban master plan. This volume is a square block of 50x50 meters and a maximum height of 30 meters. There was no connection with the environment and no space for outdoor spaces, such as gardens. The first steps was

getting the right feeling of scale whereby elements such as trees, people and vehicles were implemented in the plan. The design itself did not have a clear shape at this moment, but by creating understanding of the environment, some first building shapes were developed.

## Design option 2

This design consists of a U-shape with a huge opening to the waterfront. I started with low-rise and an open field in the middle of the building block. With VR, I researched the influence of building height, connected with placing building volumes in the middle of the field. Different kind of open and closed spaces were created. Because of the VR, I became clear that the shape of the building was very orthogonal and gave a less pleasant environment. Because of the huge open part at the waterfront and the closed U-shape, the connection with the environment was gone. It felt like a jail, isolated in a building volume without any functional outdoor space for the residents.



## Design option 3

The second design option had some architectural problems. On the one hand, the building block was closed and protected from its surrounding because of the closed facades at the side of the city. On the other hand, the building had a large opening at the North side of the building. Even though that this part is orientated to the waterfront, the building had no closed, protected shape anymore. The outdoor space was directly connected with its surrounding and was an open field, without any courts or small clusters.

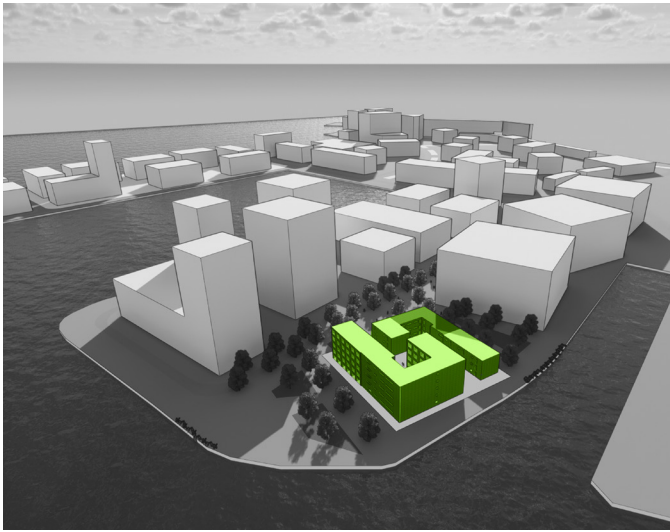
Because of this, I came up with a different form which consist of four L-shapes. Because of this, different connections were created with environment, while there was also a closed, protected outdoor space.

By focusing on the experience of the outdoor space, one of the main research themes, the experience of the



of the outdoor space was not good designed. Because of the L-shape of the building blocks, different small 'gardens' were created. But, compared to the measurements of this space and the height of the building felt these spaces oppressive.

However, the concept of closed block with open elements to improve the social interaction with the environment was interesting. Although the L-shape was not pleasant, the idea of creating small courts inside the plot was useable for further research.

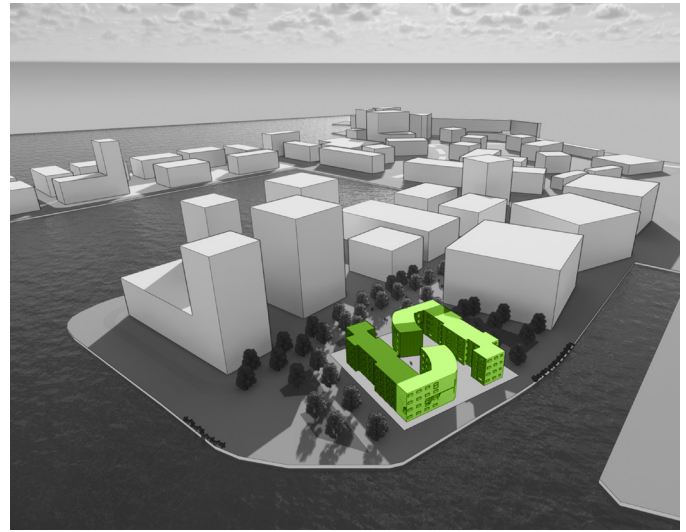


#### Design option 4

The fourth design option was more focused on the connection between the outdoor space and the built environment. By adding a shape and dividing the building mass in two parts, two L forms were designed. The same concept of the third design option was taken as starting point.

A curved part was added in the wings to characterize the outdoor space in a more interesting way and to decrease the feeling of oppressive space. The building height was still four stories.

Because of the curved part, the outdoor space was more characterized. The start of the curve created a visual barrier, while the center of these small courts had enough visual space for some activities or social interaction. At the street side, the curves created a visual closed entrance for the people inside the plot. This could be interesting for people with dementia. Without using fences is the end of the plot characterized. The 'healthy' people could understand that it is possible to enter and leave this plot. Despite it was a good continuation of process, I was curious what other building heights should do with the experience of the outdoor space.

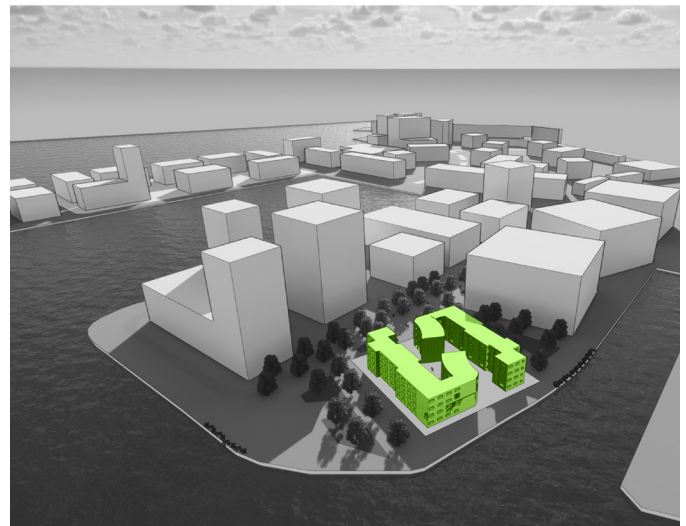


#### Design option 5

The fifth design option was a copy of the third option, only with the curved wings mirrored. Because of this, the curve was orientated to the outdoor space. With the Virtual Reality it was interesting to research this design choice and experience visual connections inside the plot.

The VR showed a narrow, closed, kill and unpleasant outdoor space. Because of the larger opening at the end of the building (caused by the curve of the building), it could happen that the residents will leave this plot and attract to leave the built environment. Something what is not pleasant by people with dementia.

The opposite of the fourth design option was experienced. A narrow, oppressive small court with a visual opening to the street side. Instead of staying around the small courts, are people visual attracted to leave this court and go outside the plot. Because of this experience, this option was not interesting for further research.





### Design option 6

The sixth design option was also a copy of the fourth design option, but with a larger amount of levels. Instead of four stories, the building was made of ten stories.

The curve, orientated to the outside, was taken back into the design. This created again the open experience of the smaller courts. The curve of the wings still created a larger outdoor space with a more visual closed end.

Despite these interesting architectural elements, the new height of the building mass created a narrow, dark and closed outdoor space. The same feeling as the third and fifth design options were experienced in VR. The smaller courts felt like an unpleasant, oppressive space without enough sunlight. Because of the height of the building mass, the visual connection between the outdoor space and the building mass was muggy.



This made me realize that the most interesting building height, compared with the connection between the outdoor space and building mass should be between the four and six levels height. During the research of the previous design options, this building height gave a pleasant feeling. Also, the curve, orientated to the outside, was still interesting. It created an visual open garden and a pleasant atmosphere for social interaction or activities. This design was interesting for further development. It was the basis for the second design phase.

### Design option 7

During the last phase of the Virtual Reality research session, I developed the research of the design of the outdoor space in connection with the built environment. I researched the orientation of the front doors for example, whereby the building mass of the fourth design option was taken as basis.

The first option was with several orientations of the front

doors. This gave a confusing experience of composition for the outdoor space. It felt like one part of the outdoor space was connected to the front side of the house while the other part was as a leftover space at the backside of the house.

The second option had all the front doors at the same side located, connected with the outdoor space. Because of this, the outdoor space was experienced as an interactive and social space where people could meet each other by accessing their houses.

By making this decision, the next step was to connect an interactive and pleasant routing to these front doors. Hereby, the routing should (visual) connect with the outdoor space inside the plot. The choice of a gallery routing was made because of the orientation of the front doors, which was at one side, so other options were not possible.

With the Virtual Reality, the influence of the different measurements of the galleries were researched. Galleries with a width of 3.5 meters created a too oppressive outdoor space because of a lack of openings and daylight. Because of this, the decision was made to create galleries with a width of 2.5 meter.

The height of the building mass was also optimized. Because of the orientation of the sun, parts of the building were made lower to increase the amount of daylight inside the plot. Because of this, there is enough daylight into the outdoor space, despite the galleries, and are interesting visual connections realized with the neighborhood and waterfront.

To create some transition zones, from the collective outdoor space towards the private dwellings, a semi-collective zone was designed. By researching different depths of the setbacks of the dwellings, small niches were designed, connected with a small front garden. Because of these niches, a visual transition zone was created which could be used by the residents themselves.





## Reflection

The process of using Virtual Reality as research method has obtained me some interesting insights and knowledges about the building mass, the shape and the connection between the building mass and the outdoor spaces inside the plot.

Mainly the connection between the building height and the outdoor space is important. But, also the shape of the building, the orientation of the front doors compared to the outdoor space and the type of routing.

Firstly, I had the idea to create a more orthogonal U-shaped block with a large open field in the middle. However, this Virtual Reality research process showed me new options and design aspects for a new shape of the building mass and the outdoor space.

The use of Virtual Reality could be very interesting during further research and the design process. Certain design choices could be researched, for example how people with dementia it could experience. This will have an important value for the design of this target group.

The use of the Virtual Reality made it possible to see and experience certain design choices without making renders. It is a great research tool, but not that easy to start with. Virtual Reality was mostly known as presentation tool to show the final presentation, rather than an analytical tool. Just at the start of second phase, I realized the analytical use of Virtual Reality.

Overall, VR has enriched my knowledge and input for my design process. I have found interesting design elements for my further design and it could support the development of design during the design process for target group, people with dementia.

## Conclusion

Virtual Reality is an interesting and supporting addition for the design process. Not only for the final presentations, but also as a research tool. In my opinion, it should be introduced in an earlier stadium in the master to be able to optimize the use of this tool. Because of the use of Virtual Reality, also some personal (and encoring) problems became clear; too much themes to research.

Not everything is possible to research by using Virtual Reality during this time span. Besides that, also the use of Virtual Reality has obtained me new insights for the further design process. The influence of the building height, shape of the building and connection between the building mass and the outdoor space inside the plot became much clearer for me by experiencing it in VR.

At his moment, I realize that the current shape of the building is not optimal and should be improved. For the further phase of designing and researching, I am interested to use Virtual Reality to experience the different design options and choice like people with dementia will do. It could benefit my design.

The design developed during this course will function as basis for the further design process. Although the building form is not optimal and not directly connected to the obtained knowledge of the last week and the urban master plan rules, some aspects, such as the building height and connection between the building mass and the outdoor space inside the plot can be taken into new design options.





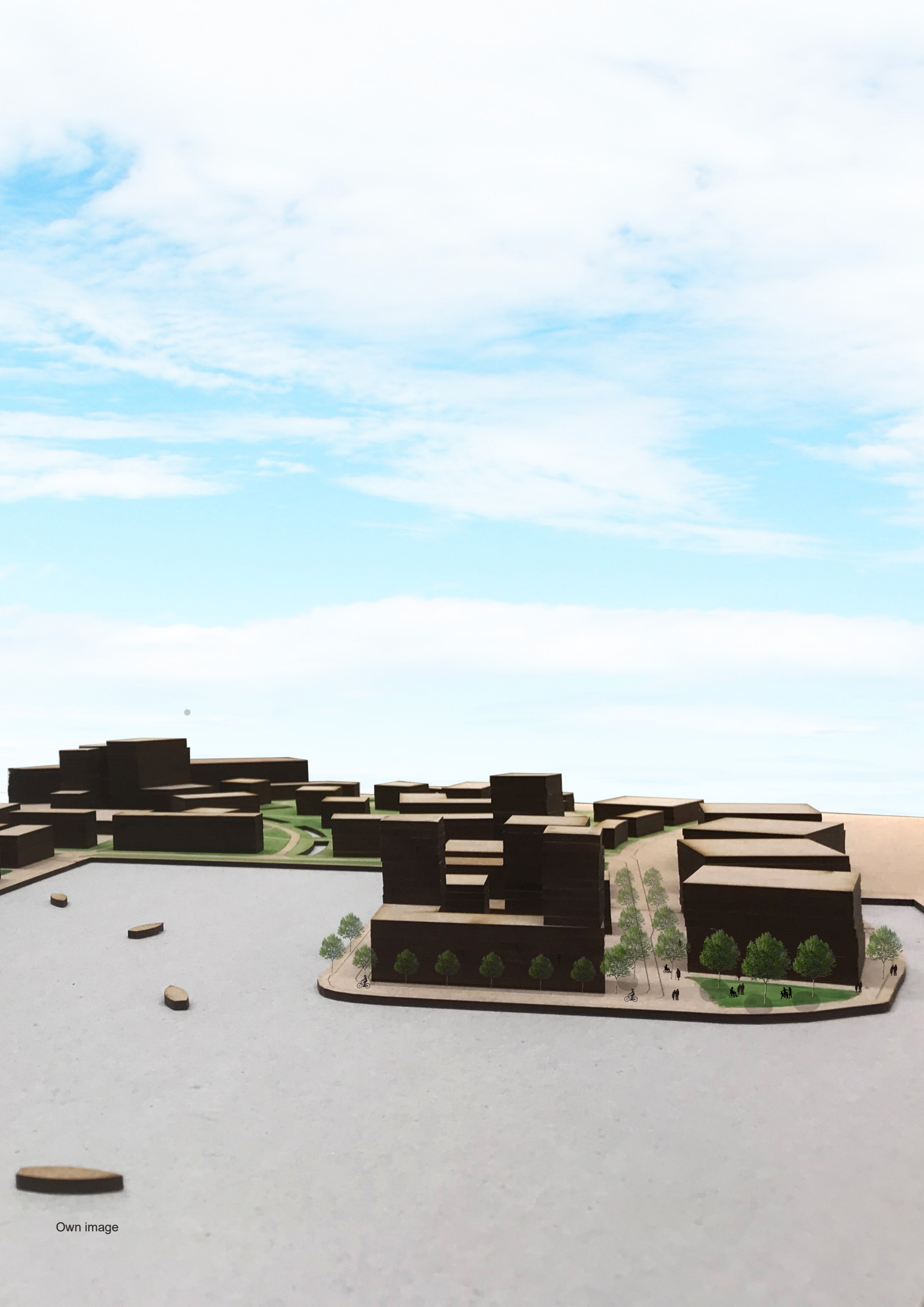




# Urban master plan “Minerva-campus”

## Spatial urban masterplan

Green environment  
Connection with surrounding  
Outside space as spatial routing





The 'Minerva-campus' is designed with the concept of the campus idea; an open space or field with different kind of building mass and functions. The design is based on two different types of campus master plans, the Mullerpier in Rotterdam and the Chassee Campus in Breda.

The campus feeling is created by dividing the urban master plan in two parts. Both piers are based on the concept of the Mullerpier, the middle part below the both piers are based on the Chasse campus model.

The middle part of the urban master plan gives spaces for the nature. Based on the concept of an open space in a field typology, different building forms are in this 'open field'. Because of the open form of this part of the urban master plan, different routings are designed to enrich the environment and connect the different parts of the master plan. Several functions are in this part, because of the public transport close by, such as the subway and the bus.

The both piers are partly based on rebuild and partly on transformation. Relatively new buildings, which supported the idea of campus are kept. A higher density is created on both piers, based on the concept of the Mullerpier. Instead of creating high towers, some lower, but bigger blocks are designed on the piers.

A campus model also means a freedom of designing, also for the shapes of the buildings. To implement it in a right way, several blocks are placed in the urban master plan, mostly on the left pier. These blocks have a freedom of designing but are restricted to several design principles related to the urban master plan.

The Minervacampus is an ideal concept for various target groups to live. In the center of the urban master plan is the open field interesting for young families with (small) children. There is a safe environment where they can play, and the parents are close by the public transport.

The both piers are interesting for young professionals. Because of the higher density and the higher buildings in comparison with the 'open field' concept in the center of the urban master plan, working and living can be combined in this part of the master plan. They are also nearby the public transport and on the left pier will a pedestrian and bicycle bridge be built, combined with a ferry. Living at this location will be relatively cheaper in comparison of the rest of the city, while they are still close by the city center.

This urban master plan also attracts elderly people to live in this 'campus model'. As well as in the center of the master plan as on both piers, interesting living environments can be created. Also, for this target group is the presence of public transport in their close environment important.

In the center of the master plan can this target group life in a green, but busier environment. On the left pier, they can life in a calmness, relax environment with several beautiful views on the river and the green environment.

The Minervacampus will reduce the number of motorized vehicles. Only the ring road will be accessible for motorized vehicles. The both piers are only accessible for local traffic. The project provides a diversity of activities. Because of the open experience of the urban master plan, together with the reduction of the motorized vehicles, the streets will turn into collective spaces with space for social interaction and various activities.

The Minervacampus is a place for every target group, from young to old and workers to non-workers. This is the place where people can be old.

MASTERPLAN 1:5000



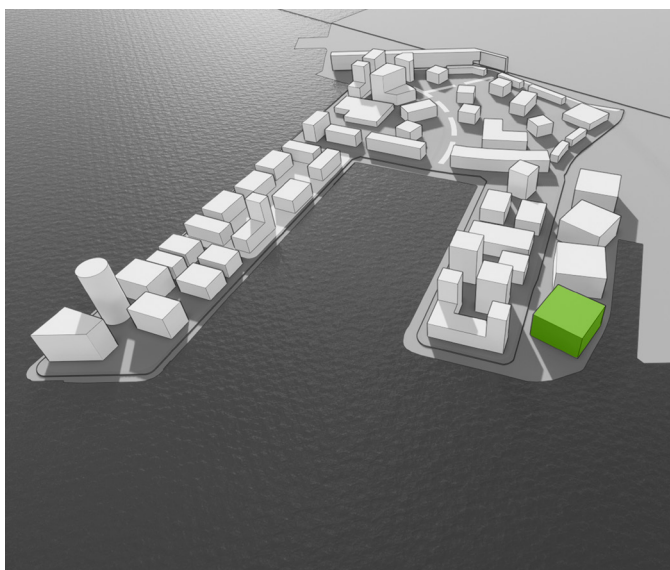


## Design and limitations

Minervacampus is based on the principles of two urban case studies, the Mullerpier in Rotterdam and the Chasseie campus in Breda. The lay-out is based on the open spaces, a field concept. The open field is the leading concept whereby the different building blocks are places in this open field. The focus of this layout is the nature, the open spaces instead of the building blocks. The building blocks differs from small to massive building blocks which taking the attention from all the sides of the environment. There are no front or backsides. Different routings connect the various parts of the urban master plan together. Social interaction could easily be created because of the open space and the four sides orientated building blocks.

The four massive building blocks at the North pier are interesting for the target group of this graduation studio. The target group, elderly and elderly with dementia could live in a calmness and relax environment. They are still close by the public transport and other collective functions, such as the supermarkets and health care. The waterfront, together with the greenery in the surrounding could create interesting and attractive sightlines.

The iconic, massive building blocks have a freedom of designing. This means that every shape could be designed. However, a few limitations are made in the urban master plan to control the development of these building blocks and the view of this part. It is not allowed to design extension outside the boundaries of the plot. This means that the building mass should fit between the plot of 50x50 meters. The maximum building height is ten stories, whereby each level is defined with a height of three meter.

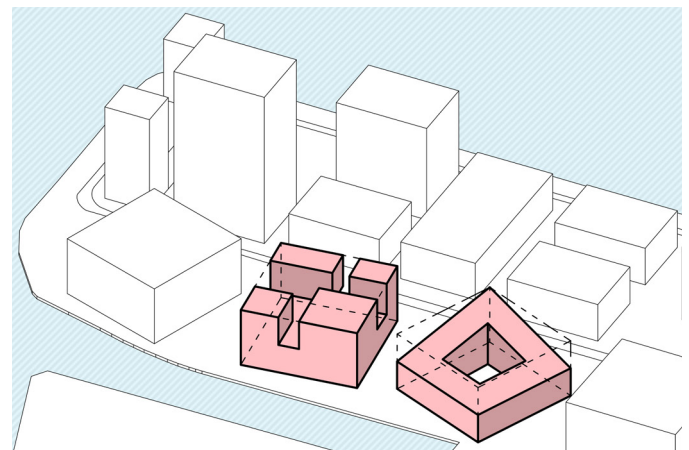


An extension of the building height of 30 meters is possible. A maximum extension of two stories (each three meters) is allowed, except considering the sun orientation. Also, a minimum use of 40-80% of the total building mass (2500 sqm) should be used as building mass. The other amount could be used as outdoor space. At least, there is a free choice of materials, as well as the structure as the cladding.

The specific chosen building block of the actual design proposal is the building block on top of the North pier. This standard building block has a height of 30 meters on a plot of 50x50 meters. The building block is surrounded by the waterfront on the North and the West side. At the East and South side is it surrounded by other building blocks with the same height. The building block should provide housing for elderly and elderly with dementia, but also public functions, such as working space and health care.

This chosen building block is interesting for the target group of elderly people and elderly people with dementia because of a few reasons. Out of the research, based on literature and case studies a calmness and relax environment is wished for elderly people and elderly people with dementia.<sup>76</sup> It promotes the mood of this people in a positive way. Also, the waterfront, greenery and collective streets with space for several activities give different interesting views and sightlines for elderly and elderly people with dementia. Because of the attractive environment, the process of breakdown of the brains by people with dementia is decreased and causes longer positive behavior for this people. Although this location shows calmness and a relax environment, the public transport and center of the plan is nearby for this target group, within a radius of 300-500 meters. In this way, the vital elderly people could still travel without walking long distances.

The freedom of building shapes makes it possible to create a building block, optimized for the orientation of the sun and wind.





## Concept of Minervacampus

Minervacampus is based on the concept of a campus in two different ways, the open field and the type with a higher density. The two types create central places of activities because of the open spaces in the fields. Even on the both piers, the higher density is still designed in an open environment with outdoor spaces in between the buildings.

The building blocks are all surrounded by green spaces which is meant to be used by public functions and creating social interaction on the streets. Motorized vehicles are only allowed on the ring roads around the urban master plan. Only local traffic can access the living areas. Because of the decrease of the motorized vehicles in the living areas, the street could be used as places for public activities.

The building blocks does stimulate this social interaction because of their four-sided facades. At each side of the facade could be interaction with the environment. No left-over spaces will be created in this way. The positions of the building blocks are not placed following a strict grid, as well as the campus concept.

The concept of open fields with different sightlines, various building blocks and social activities on the streets are the main concepts for this Minervacampus urban master plan. Living in a green, spacious environment.



Typologies



Greenery



Activities





## Functions

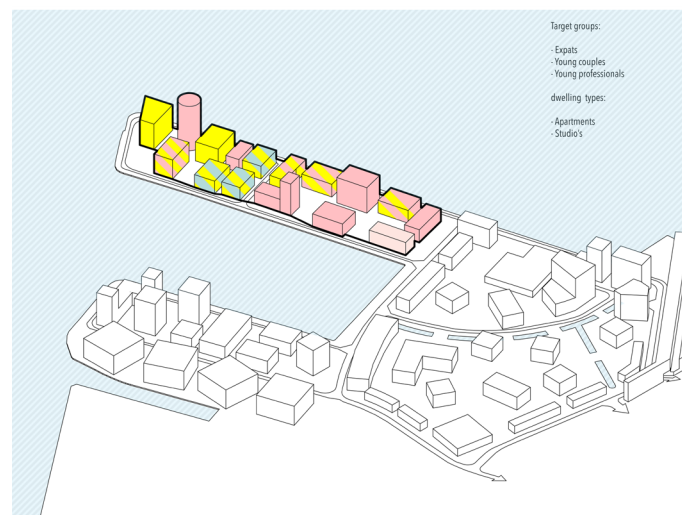
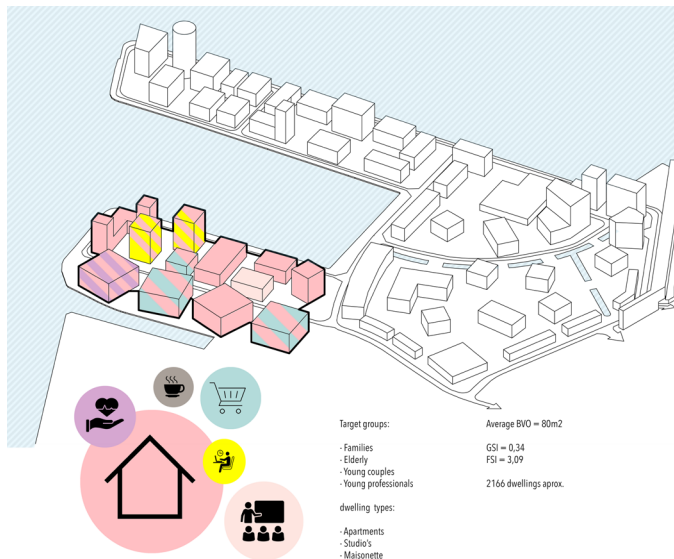
To create living environments which are attractive and suitable for all different target groups, several functions are added in the urban master plan of Minervacampus.

To create an equally dispersed of several functions, the urban master plan is divided in three parts; the left pier, the right pier and the center. Each cluster should consist of several functions to provide an optimal living environment for all target groups.

To formulate the right functions in each cluster, the already existing buildings and functions were researched and evaluated in their way of functioning. Based on this evaluation and different sources of the municipality of Amsterdam, main themes are developed for the lay out of the functions. In the schemes below are the different

lay outs shown for each cluster. The functions are implemented in each building, as well as new buildings as existing buildings. The spaces in between the building blocks are not formulated because of the fact that social interaction will arise on these places because of the four sided building blocks.

In the chosen building block for the graduation studio should three types of functions being implemented according to the scheme; workspaces, health care and housing.



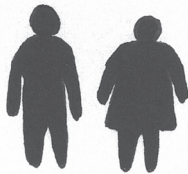


## Accessibility of Minervahaven for elderly

Minervahaven is an urban master plan, designed for different kind of target groups. The lay out of the urban master plan could have an important value for the living experience of the elderly and elderly with dementia. Recognizable routing and other architectural aspects could influence the experience of the surrounding and make it possible to survive in this context, even with dementia.

The target group of this graduation studio can be divided in four different groups; the vital elderly people, the elderly people with the first phase of dementia, the elderly people with the medium phase of dementia and the elderly people with the hardest phase of dementia.

Each of those four target groups have different 'worlds' which they can access, caused by the affections of dementia. The vital elderly people could reach a larger



Vital elderly people have the largest 'world of experience' in this target group. This group can walk distances between the 300 till 500 meters and could visit several parts of the urban master plan. The routing should be designed to help this target group by using the public spaces.



The elderly people with the first phase of dementia already have a smaller 'world of experience'. They get the first affections because of the disease, such as disorientation and forgetfulness. It could create a frightening feeling which could cause by entering only the close by environment of the building block.



The elderly people with the medium phase of dementia could have some troubles with walking and orientation. Their world is limited to the building block itself.

distance compared to the people with dementia. That means that their perception of the urban master plan will differ. Not only the building block, but also the urban master plan should play an leading and understandable role in the design for elderly people and elderly with dementia. Especially the close by public environment around the chosen building block.



The elderly people with the hardest phase of dementia are out of cognitive control. Only the sense organs are still working, and intensive daily care is necessary. Their world of perception is limited to their own living cluster and a small part of the outdoor space, inside the building plot.



- - - Vital elderly people
- - - Elderly people medium phase dementia
- - - Elderly people first phase dementia
- Elderly people hardest phase dementia

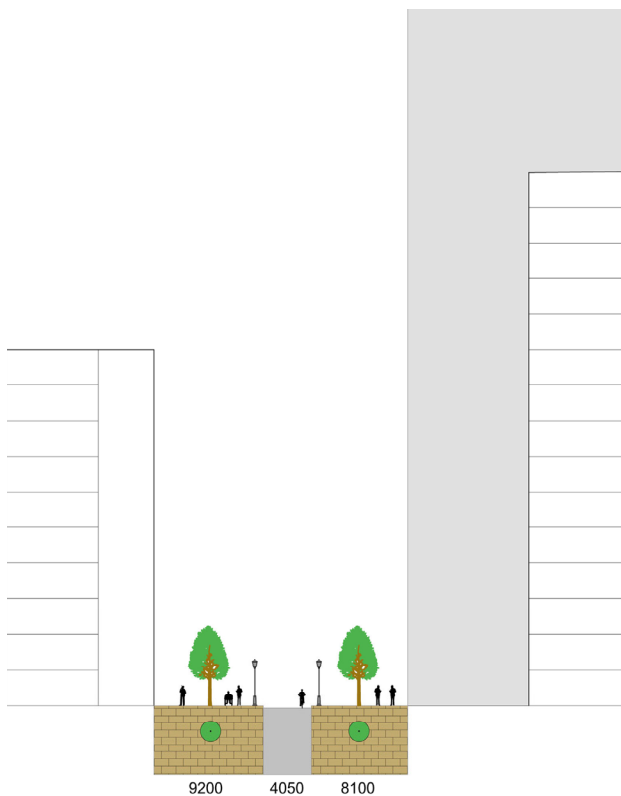
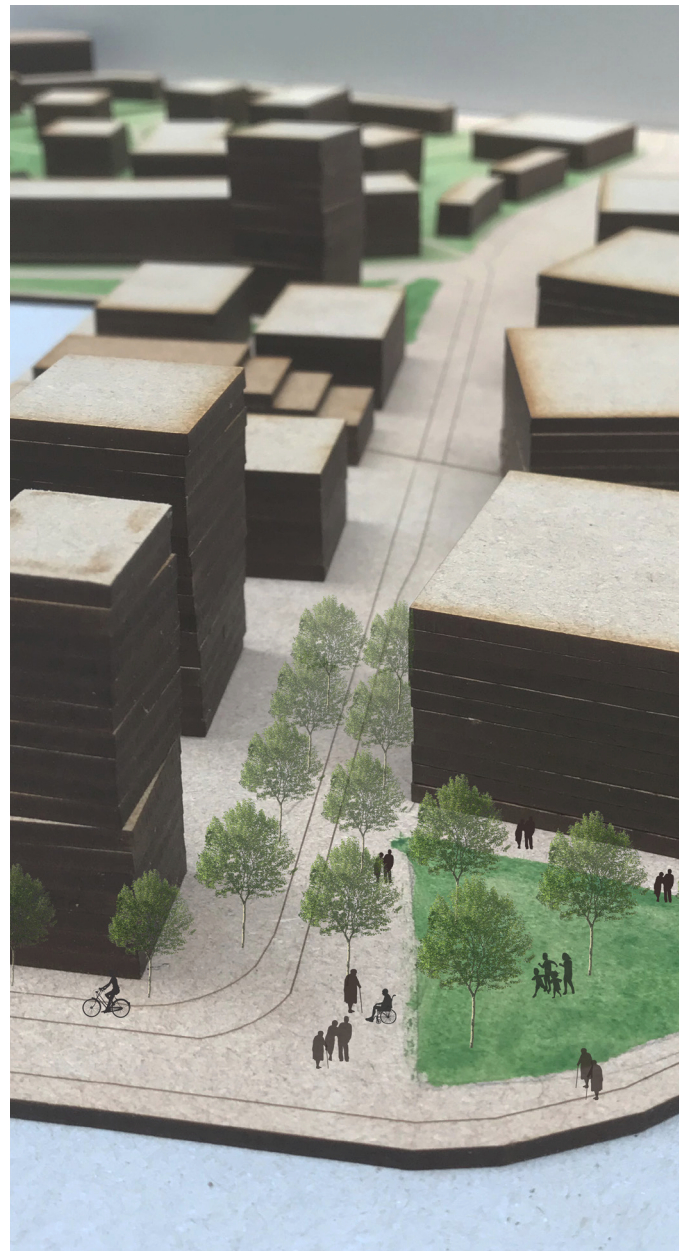


## Street profile 1:400

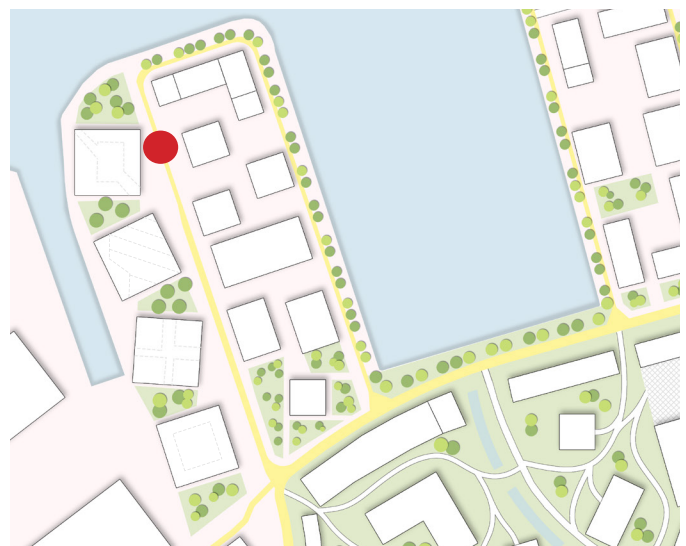
The massive building block has the dimensions of 50x50 meter as size of the building plot. These dimensions are given as design principles in the urban master plan. The building is located at the top of the left pier and directly connects with the waterfront at two sides of the building block, the North and West side.

The context of the building gives no defined sightlines or specific building lines which could shape the building. Compared with the design principles of the urban master plan can the building block not extended in width and two stories in height as maximum.

At the street side, the East and South side, is the building block connected with a broad pedestrian way and a road, only accessible for local traffic. In the section below are the measurements, spaces and visual relations between the building block and the outdoor spaces and other building block shown.



Street profile - Section A



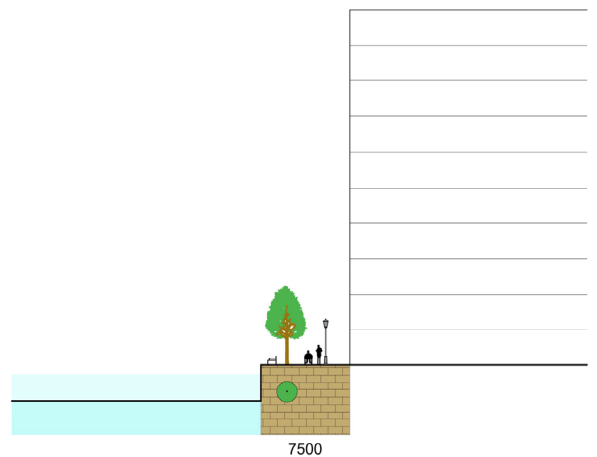
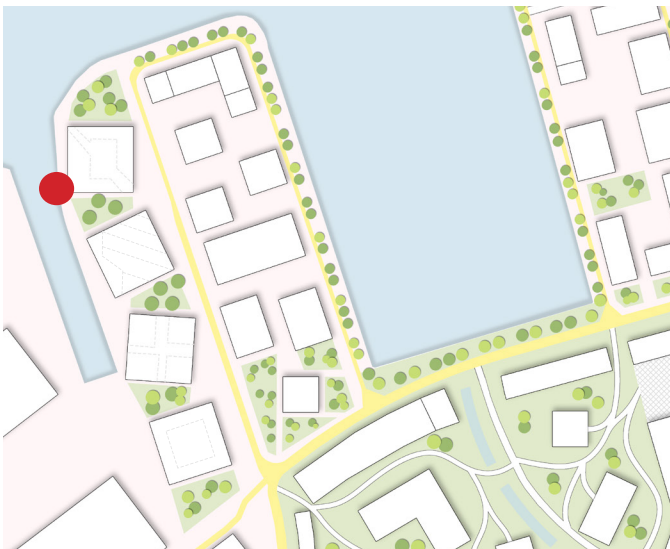


The height of the building blocks is based on two aspects, the needs and wishes of the municipality of Amsterdam about the needed amount of housing in Minervahaven, but also on the orientation of the sun.

Because of the orientation of the sun, the building blocks on the North side of the urban master plan are higher compared to the building located at the South and West side of the urban master plan.

The chosen building block in the urban master plan for the graduation studio has a maximum height of 30 meters. An extension of two stories is possible if the sun orientation is considered. The building blocks at the East side of the plot are higher because of this sun orientation.

To guarantee enough daylight inside the building plot, 40-80% of the building plot can be filled with building mass. Also, the maximum height of 30 meters will create enough daylight.



Street profile - Section B







## **Brief Conceptual design**

**“Live longer at home”**

**A design for elderly people and elderly people with dementia**







## Design brief

### Housing for elderly people and elderly people with dementia

The design brief for the design project “Live longer at home; a design for elderly people and elderly people with dementia” is a conclusion of the obtained knowledge of the demographic and architectural research, together with the plan analysis projects. The design brief shows the architectural and technical needs for the design project.

#### Neighborhood

- Interactive plinth visible from four directions of environment
- Entrance of public activities via inside street and visible and accessible from the streetside and waterfront side
- Health care and public functions on ground level

#### Building block

- Public activities on the ground floor
- Protected living environment residents building block
  - elevated living deck
  - elevated living environment
- Divided entrance public activities - living environment
  - entrance residents at streetside via reception
  - central routing with elevator and staircase for residents
- Height and width building block comparable with surrounded buildings
- (visual) Interaction of building block with surrounding
- Gradual decrease of ‘the living world’ of elderly people; from large (collective) to smaller (private) spaces
- Circulation, horizontal and vertical on each level to support wander and activity
  - gallery minimal 2.5 meters width
  - connection between different levels
- Hard dementia living environment divided from other parts of the building block
  - hard dementia on top floor
  - walking circuit for wander

#### Dwellings

- +/- 90 - 110 dwellings
- Different dwelling sizes from 49 - 75 sqm, 21 sqm for hard dementia rooms
- Minimal 1 flexible room for each dwelling
  - flexible use/function (bedroom/hobbyroom)
- Dwellings larger than 50 sqm a private outdoor space
- Minimal 2 bedrooms for couple dwellings
- Minimal 1 bedroom for one-person dwellings
- Flexibility floorplans;
  - three one-person dwellings could be transformed to two couple dwellings and vice versa
- Open layout floorplans
  - minimal use hallways and doors
- Private outdoor space via balcony or French balcony

#### Facilities

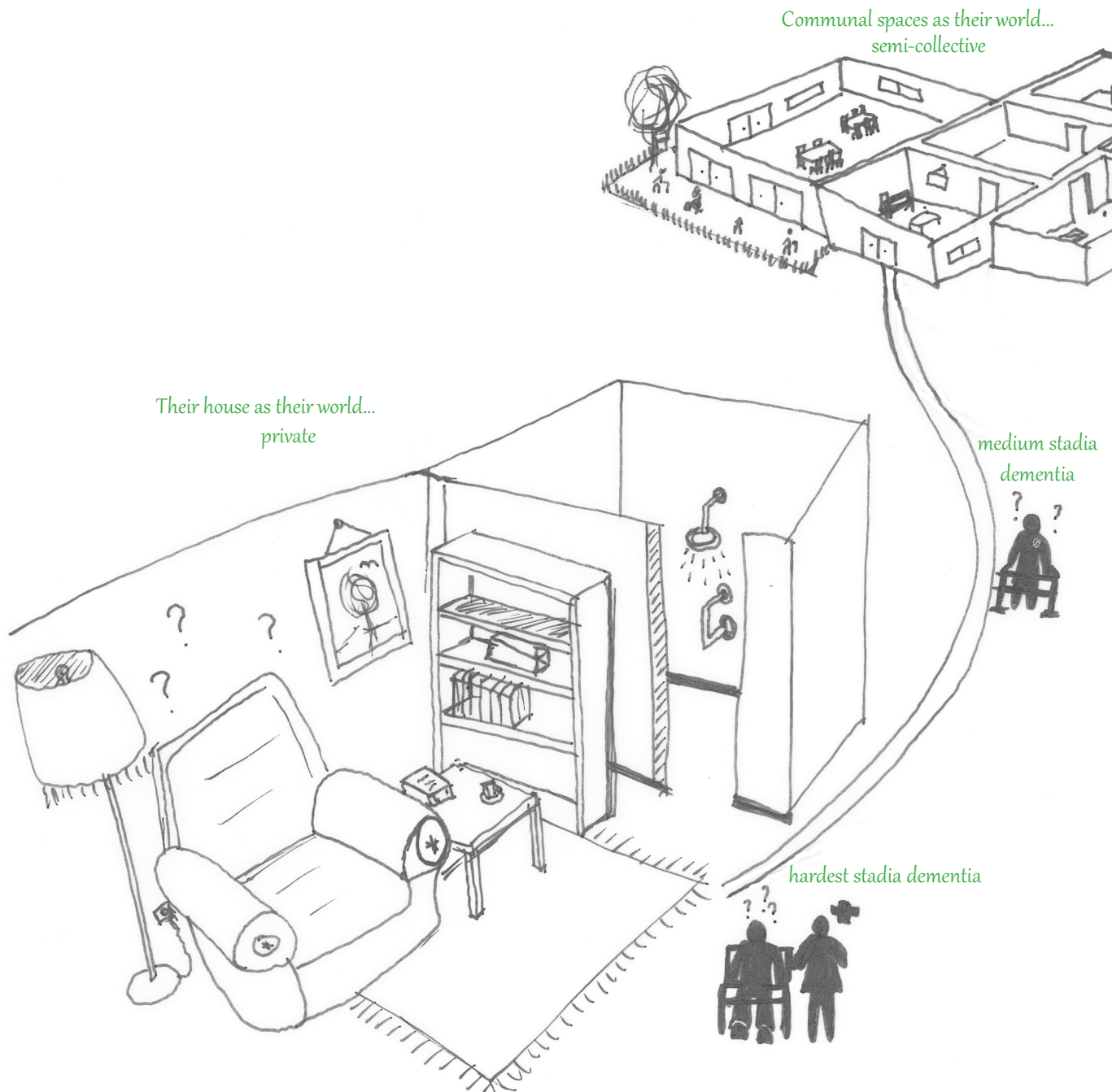
- Divided access from residents building block
    - entrances via inside street
  - 🏠 - Care facilities
    - nearby elderly people building block
    - Farmacy and doctor’s practice
  - Social interaction
    - ☕ - lunchcafe
    - 👤 - working spaces
    - 📖 - library
  - 👥 - Communal spaces
    - residents
    - divided communal for space hard dementia
    - located around routing
  - Storage
    - ground level
    - for scoot mobiles and walkers
- #### (outdoor) Communal spaces
- Designed for all types of elderly people
    - vital elderly people
      - neighborhood
      - public street
      - public activities
      - roof garden
      - gallery
      - communal rooms
    - start phase dementia
      - public activities
      - roof garden
      - gallery
      - communal rooms
    - middle phase dementia
      - roof garden
      - gallery
      - communal rooms
    - hard phase dementia
      - outdoor garden (only hard dementia)
      - communal space (only hard dementia)
  - Vertical and horizontal routing
    - possibility to wander
    - go through different ‘sizes of worlds’
  - Social interaction neighbors
    - care for each other
    - social control

\* Knowledge gained from plan analysis

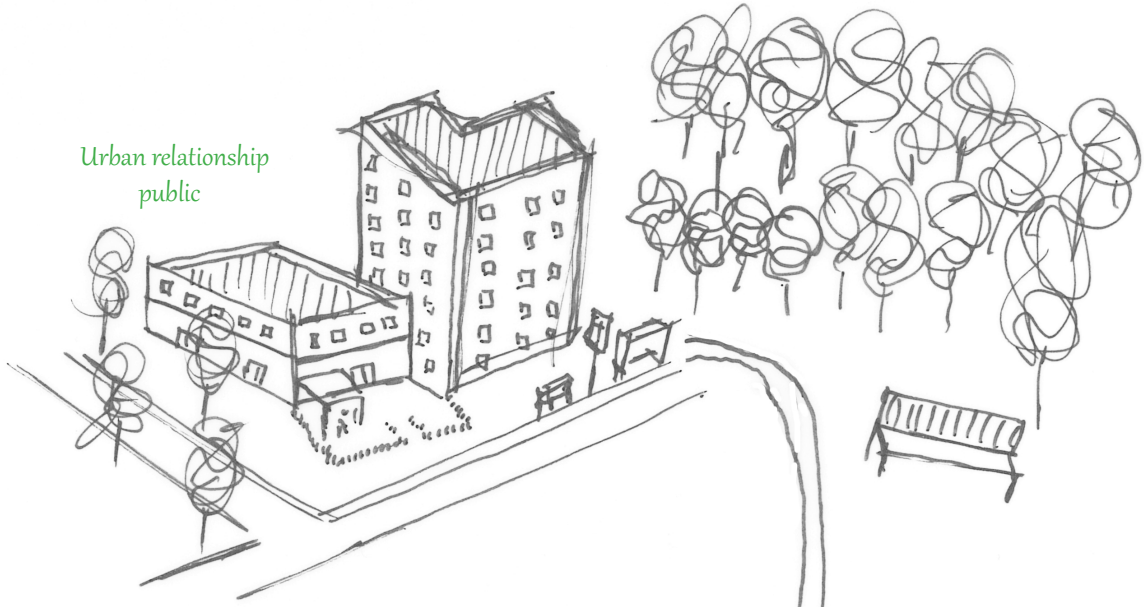
\* Knowledge gained from urban master plan

## “When their world becomes smaller...”

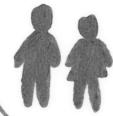
Dwellings are one of the most important places in daily life. It is more than only a place to live. A house is a place which protects against danger, provides you rest and creates a private environment. Besides the house, also the (nearby) environment is important to encourage walking, transporting and interacting. In particular elderly people experience these aspects, the different worlds of living. While elderly people become older, the amount of diseases because of aging increases. They will become less mobile and their world becomes smaller. In particular elderly people with dementia. Their world starts as a vital elderly person who can access the neighborhood, but will change to a smaller world, limited to their own house. With this design concept, the elderly people could go through these different phases of life and continue living in their own, trusted house while their world becomes smaller...



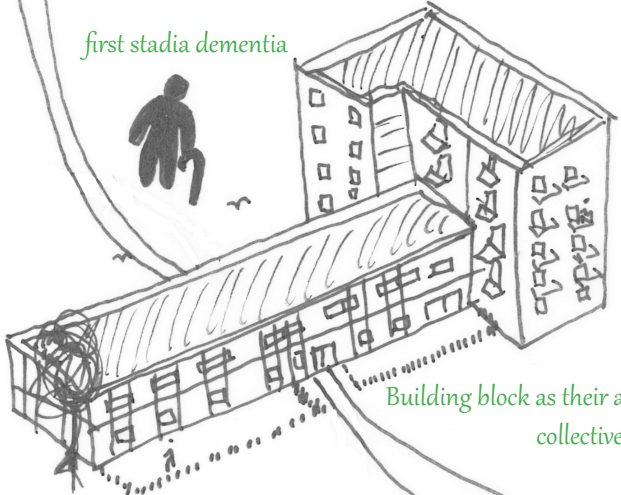
Urban relationship  
public



vital elderly



first stadia dementia



Building block as their accessible world  
collective





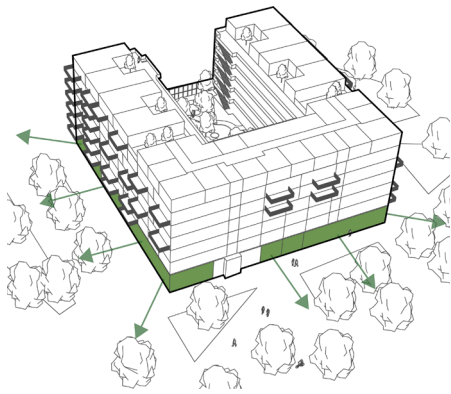
## Conceptual design

**“Live longer at home”**

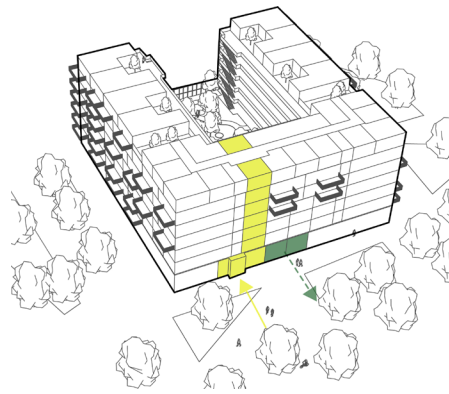
**A design for elderly people and elderly people with dementia**



## Design diagrams

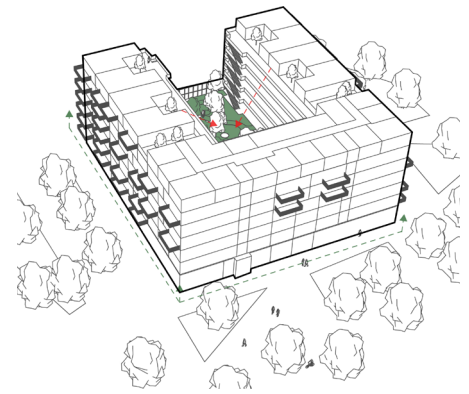


Public functions on ground floor

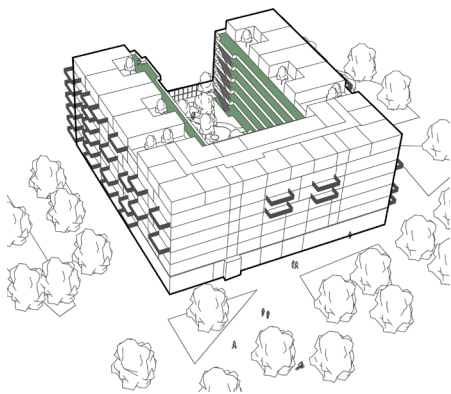


Entrance residents and public functions separated

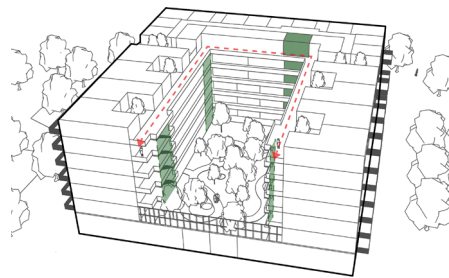
- Entrance public functions
- Entrance residents



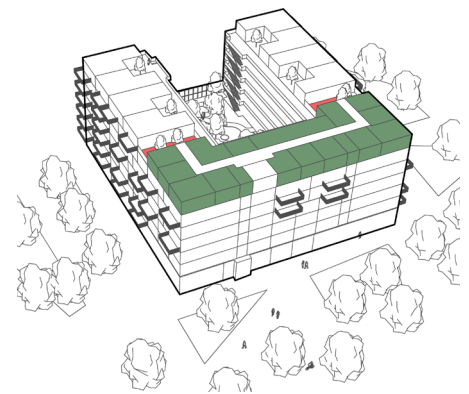
Living area lifted up from ground level; protected living environment with communal roof garden



Galleries for horizontal routing, elevator and staircase for vertical routing

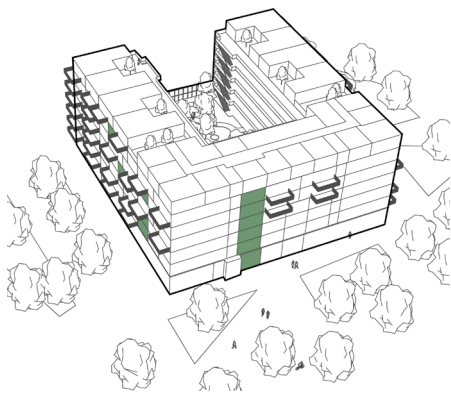


Vertical routing points, horizontal routing and fire escape

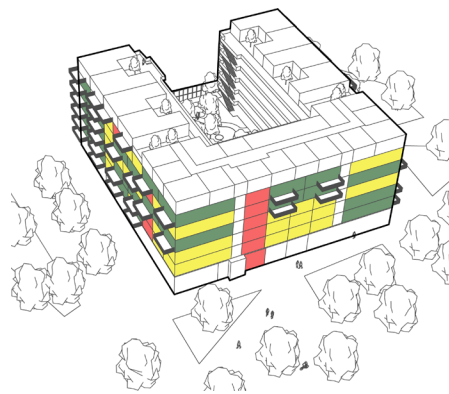


Hard dementia and short stay on top floor, connected with outdoor gardens

- Hard dementia
- Outdoor garden hard dementia

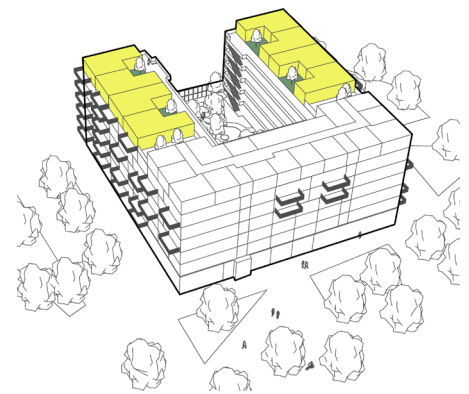


Communal rooms around central routing and on different places on several floors



Different kind of typologies on each floor

- Couple dwelling
- One-person dwelling
- Communal spaces



Different typology on top floor, couple dwelling with outdoor garden



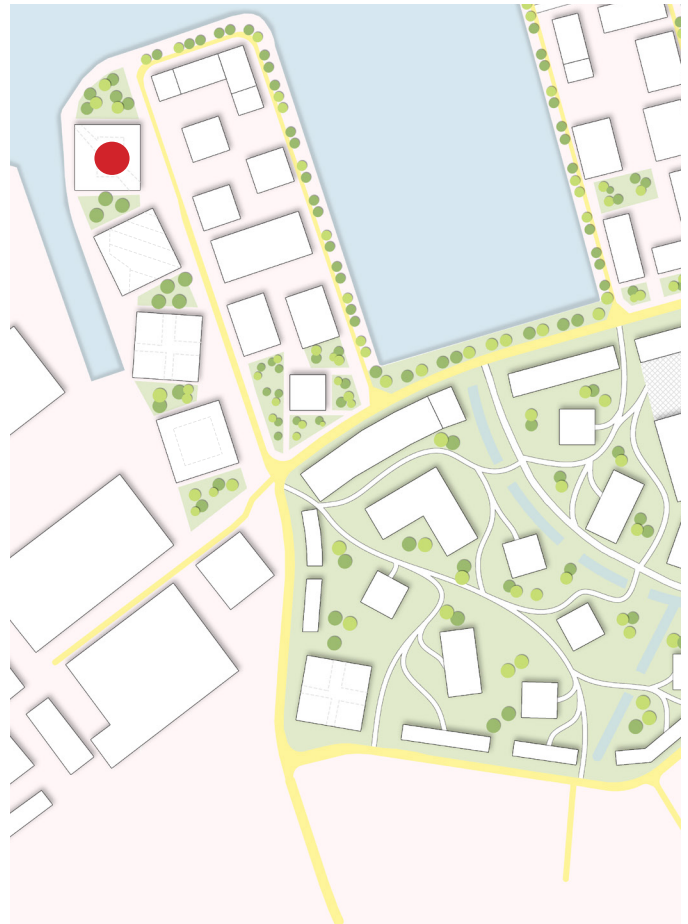
## Urban context

The building block is located at the top of the left West pier in the urban master plan Minervacampus. The building is part of three other building mass with a 'freedom of design shapes'. The building block is on two sides, the North and West side, connected with the waterfront. At the East side is a road, meant for local traffic, and a broad walkway located. Furthermore, the building is located in a calmness, green environment.

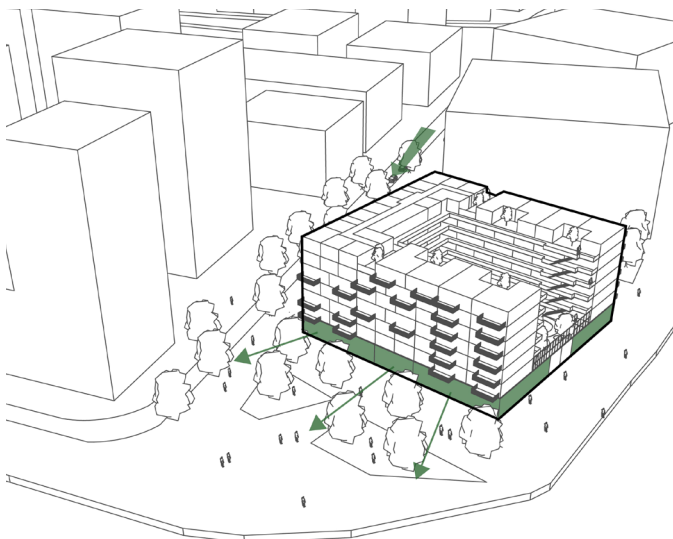
To create possibilities for interaction between the building block and the environment, are several public functions designed on the ground level of the building block. People could visit these functions and create social interaction with each other and the residents of the building block.

To form a connection with the surrounded buildings, the height and width of the building block is comparable with the surrounded buildings, around the 25 meters. Also the shape of the building block is comparable with the surrounded buildings. From the streetside, East-side, is the building block designed as a mass, comparable with the other three building blocks. At the side of the waterfront gets the building an open shape, because of the U-shape. Because of this, the visual relation with the waterfront is created.

Because of the center of the plan at the South orientation and the location of the public transport in the South, most people will enter the building area from the South orientation, via the road of walkway. Because of this, the entrances of the public functions and living environment (seperated) are located at the East side, streetside, of the building.



Location building block



Overview



Artist impression urban scale



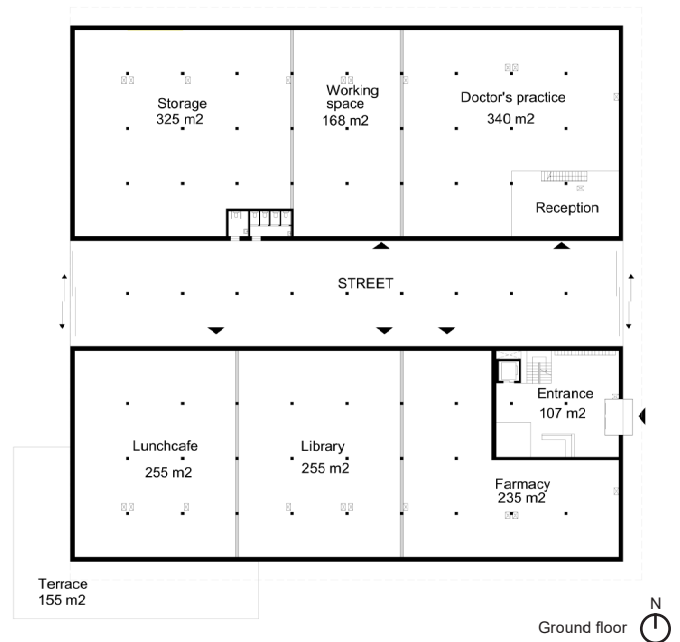
## Ground floor

In the urban master plan of Minervacampus are a few design principles noticed. One of these principles is the obligation to have public functions in the building block, such as health care, working space and public activities. Because of this, two elements are introduced in the building block to create an interactive plint. At the East side, street side, are health care facilities orientated, such as a pharmacy and doctor's practice. Furthermore could facilities such as working spaces, a library and a lunchcafe be designed to create an interactive plint. With these functions, the amount of social interaction between the environment, and residents and environment could be improved. The health care facilities are interesting for the target group of elderly people to have care facilities nearby their living environment.

To separate the entrances of the residents and the public users, two types of entrances are designed. At the streetside is a entrance for the residents, which consist of an entrance hall with reception, place to sit and meet, postboxes and the central routing with an elevator and staircase.

The entrance of the public activities is designed via an inside street, from East to West. Because of this, the entrances of the public functions are located at the inside of the building, via the street. The inside street should not only be a place for moving, but also a place to sit, relax and meet each other. A reference impression is shown next.

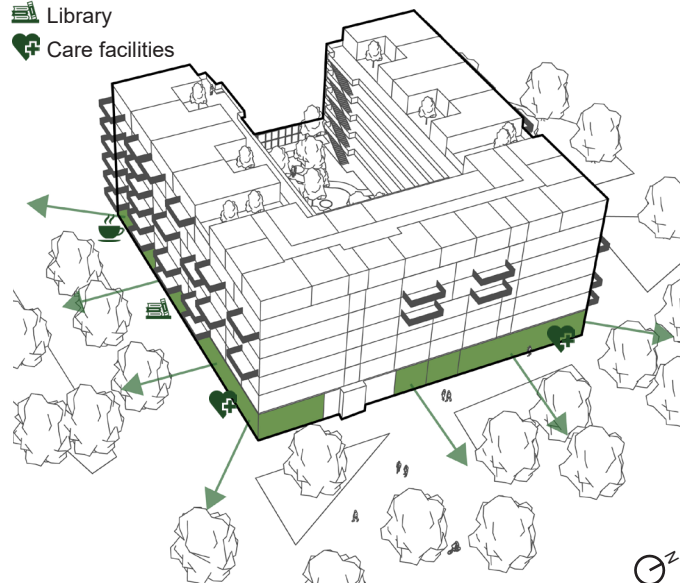
With this principles, an interactive plint will be created with a the entrance for the residents of the building at the outside of the building, via the walkway, and for the public users via the inside street.



Reference; impression public street

### Legend

- Lunchcafe
- Library
- Care facilities







## Middle floors

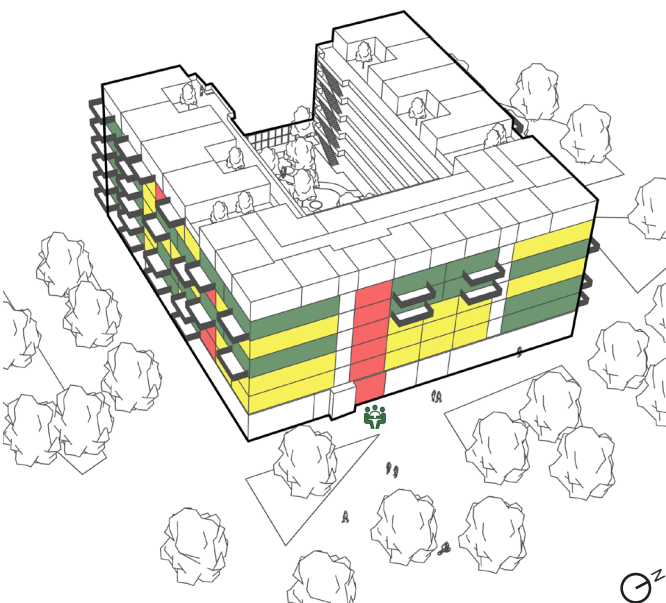
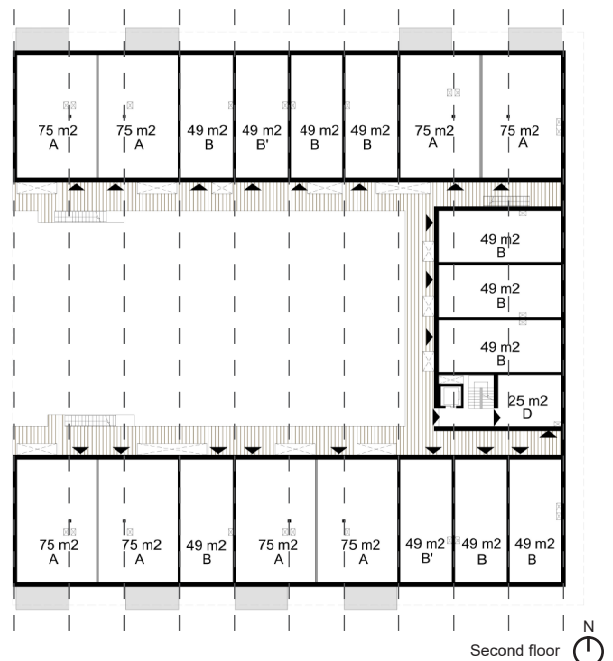
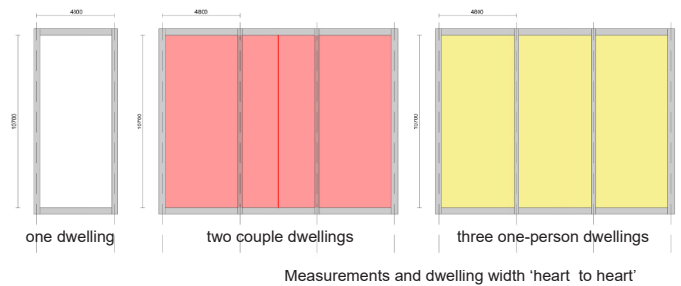
The living environment of the residents starts at the first level of the building. The living environment is lifted up from the ground floor, because of the public functions on the ground level.

Because of the lifted up living environment, a protected living area is created for the elderly people. However, because of the entrance on the ground level, the U-shape of the building and the communal rooms orientated to the inside and outside of the building, there will be still (visual) interaction with the outside world/environment.

The first floor consist of a communal roof garden. The residents could enter their living environment via the central orientated routing, the elevator or staircase, and could enter the roof garden. On the higher storeys are galleries designed for the horizontal routing. Besides the central vertical routing, also other vertical routing is designed. At the West side of the building are staircase designed, connected with each galery on each level. Because of this, a walking circuit is designed. To optimise the fire escape, these staircases, the central routing and the staircase at the East side could be used.

The middle levels consist of two types of dwellings. Type A consist of couple dwellings with a surface of 75 sqm. Type B consist of one-person dwellings with a surface of 49 sqm. These surfaces are based on the wishes and needs of elderly people, gained from the research part. For all dwellings is dwelling width 'heart to heart' used of 4.8 meters and a depth of 11.1 meters. The GFA consist of 4.55 x 10.7 meters.

Because of these measurements, two couple dwellings could be transformed to three one-person dwellings, and vice versa, as shown in the image at top of this page.



- A Couple dwelling; 75 sqm
- B', D Communal spaces
- B One-person dwelling; 49 sqm

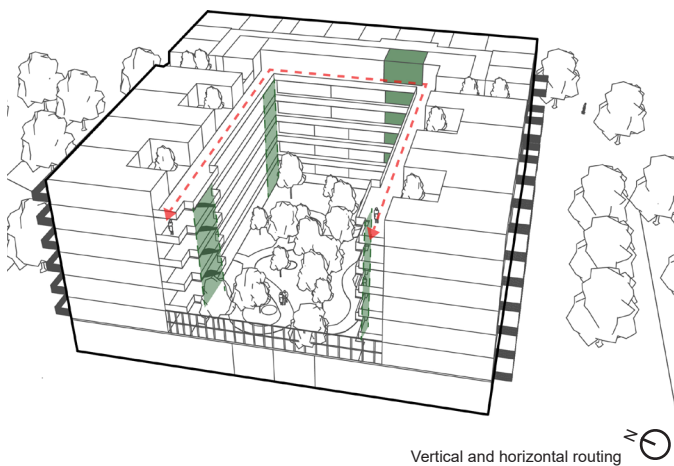


The dwelling types A, for couples, have a private balcony. The dwelling types B consist of a French balcony. The position of the balconies are based on the 'heart to heart' distance of the walls. By transforming the two couple dwellings into three one-person dwellings, the balcony will always be a part of one dwelling. Furthermore are shared outdoor spaces possible on the gallery, because of its width of 2.5 meters. Also the roof garden on the first level could be accessed via the staircase of the gallery or the central routing.

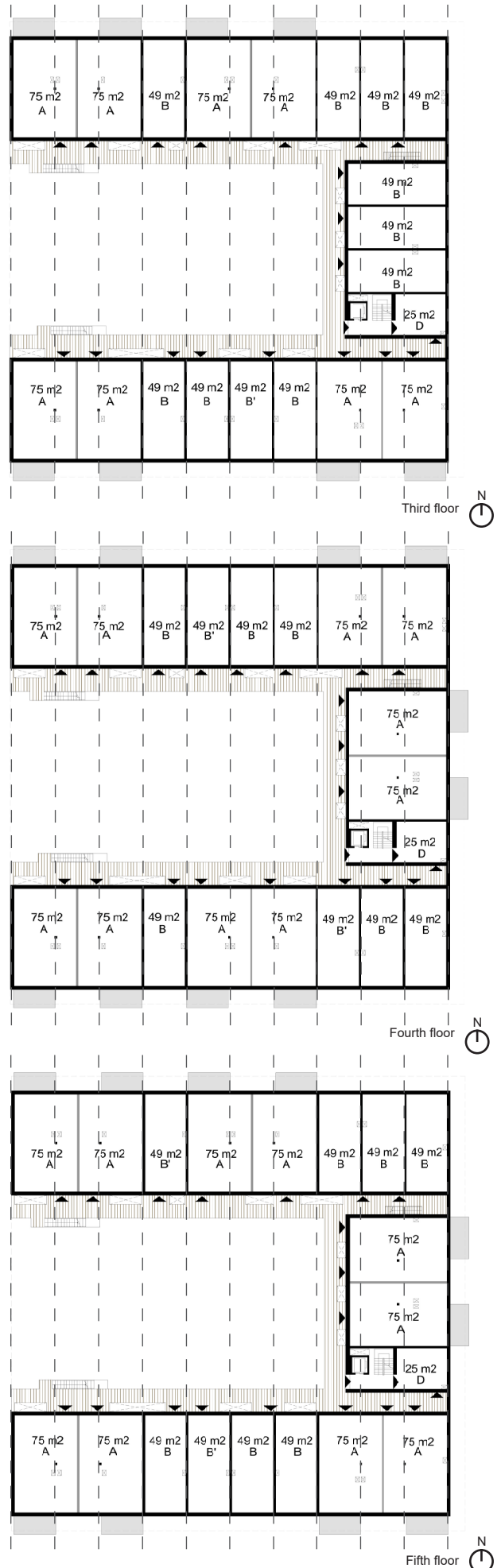
Divided on several places on each level, are communal rooms designed. They spaces could be used for social meeting, shared cooking or other activities. Around the central routing is always a communal space designed.

To provide a pleasant living environment for elderly people and elderly people with dementia, the possibility to wander is designed. This is done with creating a walking circuit, consisting of the gallery with its staircases, which connects the galleries of each level, and the central routing. To create social control and interaction, the entrances of the dwellings, central routing and communal spaces are orientated at the inside of the building block, connected to the gallery or roof garden.

Furthermore, the layout of the dwellings will be an open layout will minimal use of hallways and doors, to provide an open space with clearness for the person with dementia (and its partner). In the later design process, design elements such as materials, use of colors, contrasts will be researched into depth and designed to improve the living environment for elderly people with dementia.



The vertical routing of the building consist of the central routing with elevator and staircase, two staircases at the Westside and one at the Eastside. These can also work as fire escapes. The horizontal routing consist of the galleries on each level together with the roofgarden.





## Top floor

The top floor of the building block consist of two types of housing. Type C is a variant of couple dwelling with a surface of 58 sqm. The surface is smaller, in comparison with the couple dwellings on the middle levels, but consist on the top level of two types of outdoor spaces and interesting view.

At the entrance is outdoor garden designed, inbetween two apartments. The entrance of the dwelling should be reached via this garden. This garden will be shared with the neighbors, next to your dwelling.

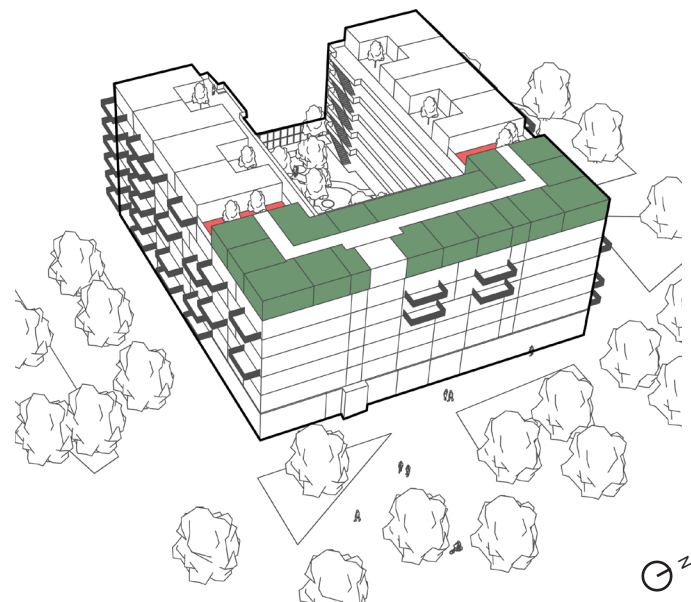
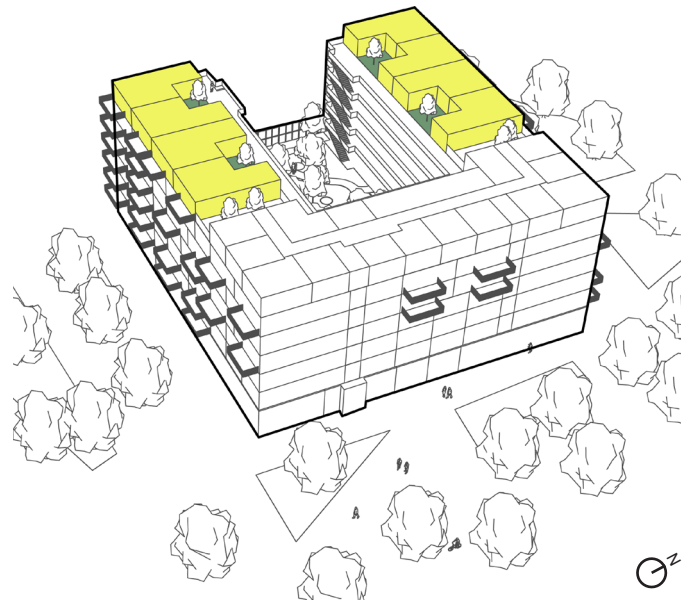
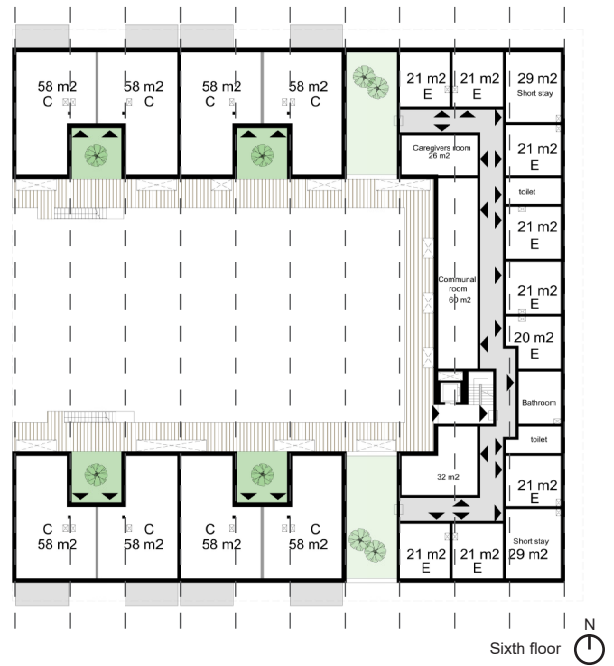
At the other side of the dwelling is a private outdoor space designed, a balcony.

The second type of housing is the area for elderly people with hard dementia, type E. Because of this facility, the elderly people with dementia should not move to a care house or other place when they are in the hardest phase of dementia. They could continue their life in the same living environment.

Each hard dementia dwelling consist of a sit-sleep room and a toilet with a surface of 21 sqm. The bathroom is shared. Furthermore are two short-stay rooms of 29 sqm designed, for short stay of family or care givers and two rooms for the caregivers.

There are two types of communal spaces. A communal space with living room and kitchen. The other type is the outdoor gardens, connected with the corridor of the hard dementia area. Because of this, the elderly people with hard dementia could wander, via the corridor, communal room and outdoor gardens. These are only available for the hard dementia people.

With the position of hard dementia on the topfloor, they are still part of the living environment, but the other residents are not faced with the circumstances of hard dementia. Besides that, they have a great view from the top floor on the surrounding.

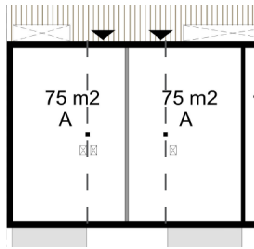


- E Hard dementia room; 21 sqm & short stay rooms; 29 sqm
- C Couple dwelling; 57 sqm
- Outdoor garden hard dementia



## Typologies and shafts

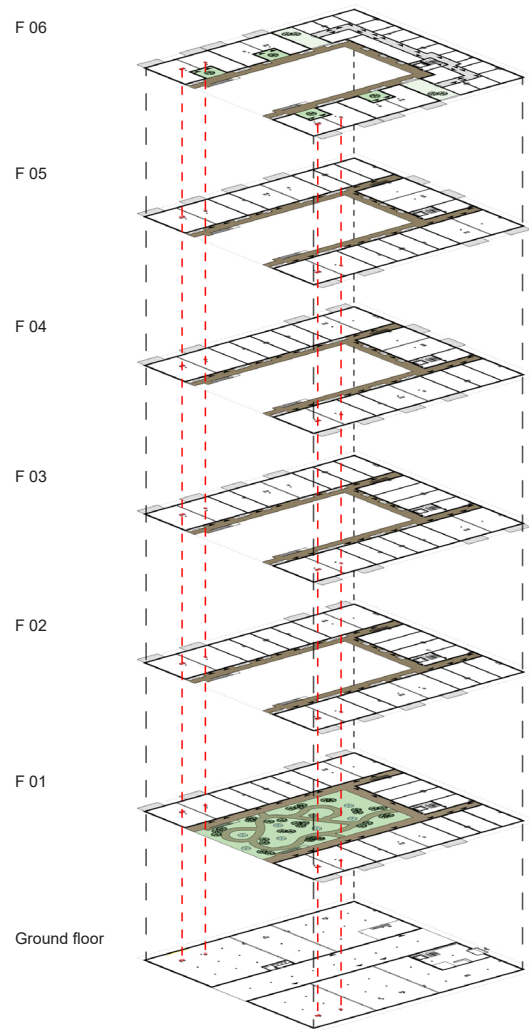
The positioning of the shafts is important for the flexibility of the housing typologies. Because of this, the location of the shafts of three single dwellings are designed as following: two shafts against each other at one wall and one single shaft in third dwelling. Because of this, every couple dwelling, consisting of 1.5 single dwellings consist of one shaft whereby all shafts are located above each other.



For the layout of the dwellings, the 'wet cells' will be located in the middle of the dwelling, with the kitchen and bathroom next to each other.

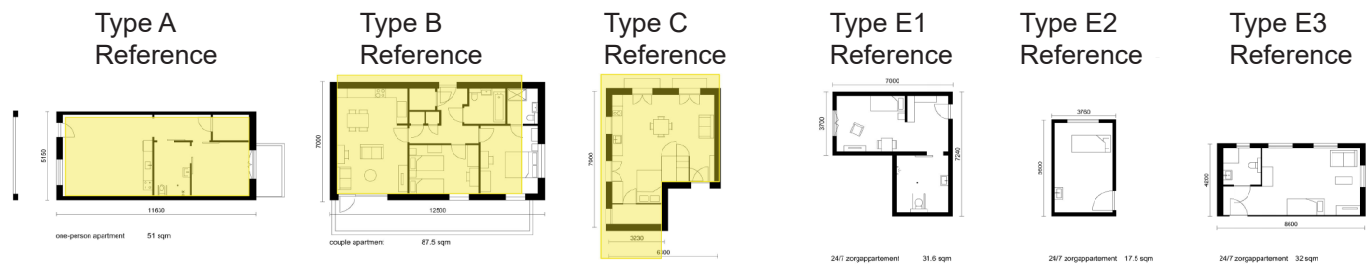
At this moment, the construction of the building block will consist of columns on the ground floor to provide flexible layouts for the public functions.

The dwellings will consist of load-bearing walls. The couple dwellings will have columns on the positions of the load-bearing walls of the one-person dwellings (shown in image above).



Typology stacking and shafts

## Fitting typologies



## Conceptual typologies



### Type A

Amount: Apartment  
 Size: 49 sqm  
 Dimensions: 4.8 x 11.1 meter  
 Bedrooms: 1  
 Extra room: 1

### Type C

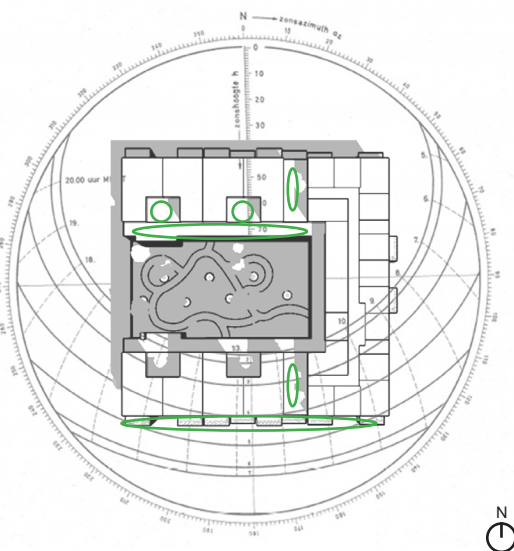
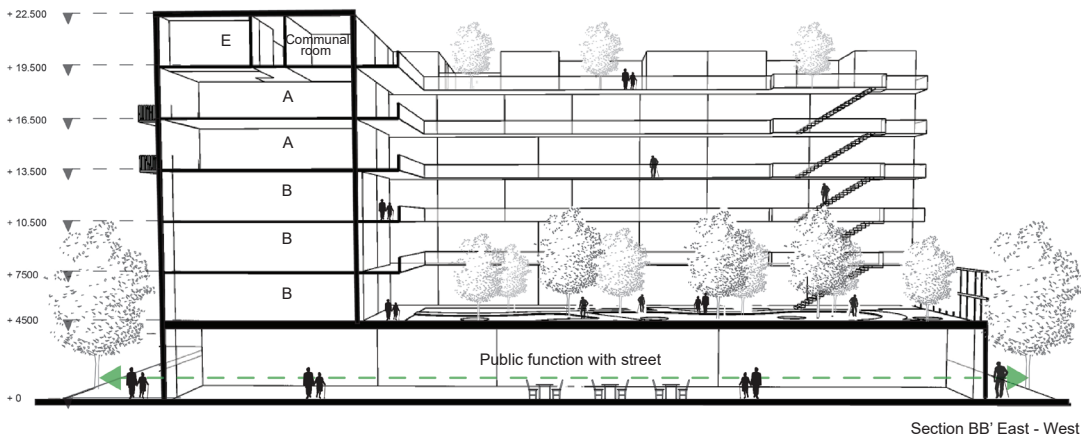
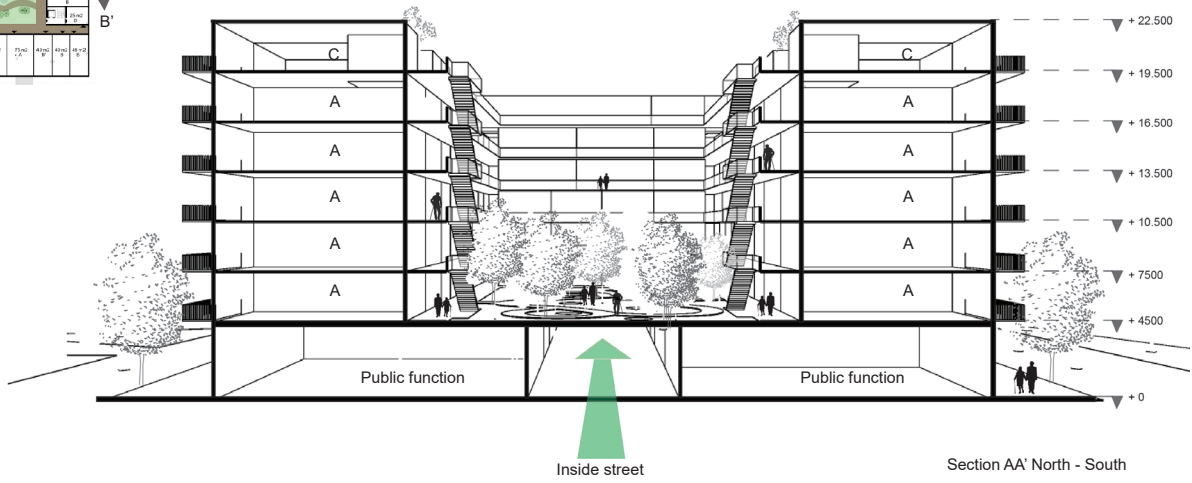
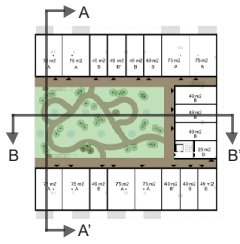
Amount: Apartment  
 Size: 57 sqm  
 Dimensions: 4.8(7.2) x 11.1 meter  
 Bedrooms: 1  
 Extra room: 1

### Type B

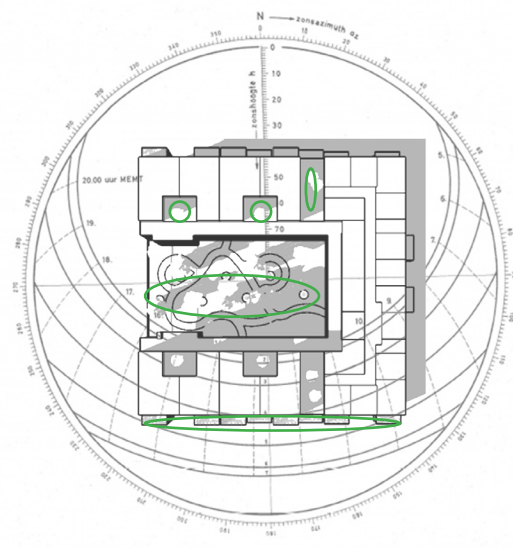
Amount: Apartment  
 Size: 75 sqm  
 Dimensions: 7.2 x 11.1 meter  
 Bedrooms: 2  
 Extra room: 1

### Type E

Amount: Care dwelling  
 Size: 21 sqm  
 Dimensions: 4.8 x 5.1 meter  
 Bedrooms: 1 (sit-sleep room)  
 Extra room: -



12:00 March 21: Lunch break, elderly people will be active on the galleries, in the communal rooms, gardens or balconies



18:00 March 21: Dinner time, elderly people will have a dinner or other activities on the roof garden, outdoor garden on the top floor or balconies





# Graduation plan

## “Live longer at home”

**A design for elderly people and elderly people with dementia**

Jeroen Ezink - 4287754  
Dutch Housing Graduation Studio  
2019 - 2020



# Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences







## Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners ([Examencommissie-BK@tudelft.nl](mailto:Examencommissie-BK@tudelft.nl)), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

<b>Personal information</b>	
Name	Jeroen Berend Ezink
Student number	4287754
Telephone number	06-43692998
Private e-mail address	<a href="mailto:jeroeneman@msn.com">jeroeneman@msn.com</a>

<b>Studio</b>	
Name / Theme	Dutch Housing Graduation Studio
Teachers / tutors	Pierijn van der Putt and Theo Kupers
Argumentation of choice of the studio	<p>The MSc1 Dutch Housing studio was already an interesting course which showed the actual problems of the current design approaches in the urban city. During my graduation, I see the MSc3 and MSc4 Dutch Housing as a continuation of this learning process. It is the basis for the knowledge and architectural tools, needed for the architectural work in practice. This graduation studio is the starting point of my future job as an architect. It is not only about aesthetics, but also about learning how to densify in the Dutch cities and about Dutch housing. These aspects are the focus points. Hereby it is interesting to get the possibility to design for the practice, in corporation with the municipality of Amsterdam. With a good and well thought design, I could already have an input for the society. An important aspect for me, as an architect in practice in a few months. Because of this, the Dutch Housing course is the starting point to prepare myself for the future life of an architect, in practice.</p>



<b>Graduation project</b>	
Title of the graduation project	Live longer at home; a design for elderly people and elderly people with dementia
<b>Goal</b>	
Location:	Minervahaven Amsterdam; Moermanskkade Urban master plan: Minervacampus
The posed problem,	<p>The amount of elderly people, people over 65, is increasing, in The Netherlands, but also in Amsterdam. Because of this, also more care is needed for these elderly people. While the amount of elderly people will increase with more than 40% in The Netherlands in 2040, and even 44% of the total population of Amsterdam will consist of elderly people in 2040, there is a shortage of housing for elderly people. Even two of the give municipalities have a shortage of elderly housing. This is also happening in Amsterdam, with an shortage of 6.6% of the housing stock, according to Capital Value.</p> <p>Besides the increase of elderly people and the shortage of elderly housing in The Netherlands and Amsterdam, the quality of care is decreasing. Already at this moment, the quality of care is not good enough to provide enough personal care for individual people. Because of the cost reductions in the care, people are obliged to live longer at home. As a result, the partner, or the family, becomes the caregiver (mantelzorger) of this care-needed person. According to the newspaper Parool, is 17% of these people overloaded with this function. In particular the elderly people with dementia need the right, good, intensive and personal care. At this moment dementia is 'the cause of death' number one in The Netherlands, according to the CBS. While the prognosis shows us an increase of more than 50% for elderly people with dementia in 2055, the right care is not available. Living longer at home will cause dangerous moments, high stress levels for the care givers and a full time job as caregiver to give the right care for their partner.</p> <p>Not only the lack of housing, the lack of right care and the lack of well designed living environments for elderly people and elderly people with dementia are the current problems. Also our current living environment need to be improved to become more elderly and dementia friendly where the elderly people are integrated in their environment.</p>



	<p>There is a need for a well designed living environment for elderly people where they can continue their life if they get dementia, without moving to other houses or environments or being isolated from the outside world, and with the right care nearby.</p> <p>Problem statement:</p> <p>"There is a lack of well designed living environments for elderly people and elderly people with dementia where they can get the right care and enjoy their last years of life".</p>
research questions and	<p>The <u>main research</u> question is:</p> <p><i>"How can architecture provide a dementia friendly living environment in which elderly people and elderly people with dementia can live (longer) at home?"</i></p> <p>To answer the research question, a few <u>sub questions</u> have to be researched and answered. Hereby, the sub questions are based on as well as the urban scale as the building block and housing scale.</p> <ul style="list-style-type: none"><li>- Why is there a need for elderly housing?</li><li>- Why is there a need for a dementia friendly living environment?</li><li>- What is dementia?</li><li>- What are the main themes of all stadia of dementia and how could these different phases of dementia live together?</li><li>- What are the stadia and characteristics of dementia?</li><li>- What is the lack of care for elderly people with dementia nowadays?</li><li>- What are the aspects in the daily life which have a positive influence on the people with dementia?</li><li>- Which kind of building typologies are capable/preferred for elderly people and elderly people with dementia?</li></ul>



	<ul style="list-style-type: none"> <li>- Which kind of building examples are already built and a success? What are the successful aspects of it?</li> <li>- What are the architectural aspects which have a positive influence on the people with dementia?</li> <li>- What architectural aspects are needed in the urban design of the neighborhood?</li> <li>- What are the similarities for elderly people and elderly people with dementia, regarding the wishes and needs for housing and living environment?</li> <li>- What are the surfaces and needed facilities for elderly people with hard dementia?</li> <li>- What kind of facilities are needed for the caregivers for the hard dementia people?</li> <li>- Which people are involved in the living environment of elderly people and elderly people with dementia?</li> <li>- What are the different influences of the several stages of dementia on the architectural design?</li> <li>- When can elderly people with dementia not live at home anymore?</li> <li>- What are positive elements of the urban master plan for elderly people and elderly people with dementia?</li> <li>- What are the maximum walking distances for elderly people and elderly people with dementia?</li> </ul>
<p>design assignment in which these result.</p>	<p>A design for elderly people where they can continue their life, in the same familiar environment if they get dementia. (without moving to other houses or places, with the right care nearby and the possibility to live at home as long as possible (with their partner). It is an integral design with the possibility to be a part of the inclusive city.</p>
<p>The goal of this design project is to create a protected, but still interactive living environment for elderly people and elderly people with dementia. The building should provide spaces so that elderly people, from vital to every phase of dementia, could life together and continue their life in their own, trusted house. Even a space for the hardest phase of dementia should be provided in the building.</p>	



## Process

### Method description

Several methods are used during the research and design process of this graduation studio.

Research:

#### Desk research:

- relevance elderly housing, elderly care, prognosis
- relevance dementia housing, prognosis
- what is dementia
- what is dementia friendly designing and what are the wishes and needs
- case studies
- research of the urban master plan
- what are successful reference projects for elderly housing and housing for elderly people with dementia
- what are architectural design aspects which are important for elderly people and elderly people with dementia (wishes and needs for housing and living environment)

#### Site visit:

- Photographs of the current location
- Researching history and possibilities of the location
- Public activities in the nearby environment, tested with the walking radius of elderly people

#### Case studies:

- Analysis of the connection between indoor and outdoor space and types of outdoor spaces
- Analysis of the housing typologies and types of care
- Analysis of clustering
- Analysis of routing, circulation and public activities based on walkability of elderly people

Interview with professional caregiver (done in April)

Interview with Senior architect of Wiegerinck Architecten, Jarno Nillesen (done in April)

#### Design

- Massing study of different conceptual designs (and tested in urban model)
- Sketching floorplans, sections and elevations (digital and handmade)
- Making 3D models and researched in Virtual Reality
- Quick start design week



## Literature and general practical preference

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## Reflection

The prognosis of the amount of elderly people and elderly people with dementia in The Netherlands and Amsterdam, shows a giant increase of these groups. While the care system in The Netherlands is under pressure, whereby (professional) care givers are overloaded and the quality of personal care is not available anymore, the need of good care is more important than ever before. Moreover, while the group of elderly people is growing, there is a shortage of (well-designed) elderly housing for vital elderly but also for elderly people with dementia.

Already at this moment, but also in the future, there is a need in The Netherlands and in Amsterdam for well designed living environments for elderly people and elderly people with dementia. Hereby it is important for both groups to stay in their own, trusted and familiar living environment.

This design creates a pleasant living environment for both elderly people as elderly people with dementia. In a calmness, relax environment, still nearby the city centre of Amsterdam, is a protected living environment designed for elderly people and elderly people with dementia. There is place for vital elderly, but also for elderly people with different phases of dementia, from soft to hard phases. The projects shows the possibility for elderly people to continue their life in their trusted, familiar environment, even when they get dementia. They are not forced to move for care, because of the care facilities in and nearby their living environment.

While previous and current projects for these target groups shows building blocks, closed from the environment, this project will create social interaction with the environment because of the open shape of the building block and the public activities on the ground level, while the residents could life in a protected living environment because of the elevated living environment.

The interaction between the different elderly people could provide care for the neighbours (also in case of dementia) and will also provide social benefits and making the elderly people more part of the neighbourhood and environment. The elderly people could continue their life in their own house and environment, even if they get affections, in particular dementia.



With this topic, an relevant and current problem will be researched and improved in an inclusive, high density city in The Netherlands, Amsterdam. Several housing typologies will be designed and social aspects be improved, in a high dense and sustainable way. With designing a pleasant living environment and well designed building block, this graduation topic will improve the architectural knowledge and designs of elderly people and elderly people with dementia.

With this project, a new type of housing and living will be designed. Several target groups, vital elderly people, elderly people with affections and elderly people with dementia will life in the same environment. It will create social benefits, such as social interaction and giving care for the neighbors. Even if dementia would be cured in the future, this project for elderly people could still work, because of the social interaction with the neighborhood and the prevention against loneliness because of the communal gardens and spaces. With this design, not only the problems of dementia could be improved, but also aspects as loneliness, social interaction and being part of the urban environment, as elderly people.

## Planning

MSc4	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10
Conceptual design adjustment(s)								P3	P3	
Virtual Reality (research)								P3	P3	
Urban plan 1:500								P3	P3	
Floorplans 1:100								P3	P3	
Elevations 1:100								P3	P3	
Sections 1:100								P3	P3	
Structure 1:100								P3	P3	
3D model								P3	P3	
BT fragment facade 1:20								P3	P3	
BT details facade 1:5								P3	P3	
Building Technology								P3	P3	
Reflection paper								P3	P3	
Deadline								P3	P3	
P3 adjustment(s)								P3	P3	

MSc4	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10	2.11
Conceptual design adjustment(s)				P4	P4					P5	P5
Urban plan 1:500				P4	P4					P5	P5
Floorplans 1:100				P4	P4					P5	P5
Elevations 1:100				P4	P4					P5	P5
Sections 1:100				P4	P4					P5	P5
Structure 1:100				P4	P4					P5	P5
3D model				P4	P4					P5	P5
Fragment building block 1:50				P4	P4					P5	P5
BT fragment facade 1:20				P4	P4					P5	P5
BT details facade 1:5				P4	P4					P5	P5
Building Technology & Climate				P4	P4					P5	P5
Reflection				P4	P4					P5	P5
Deadline				P4	P4					P5	P5
P4 adjustment(s)				P4	P4					P5	P5
Reflection paper				P4	P4					P5	P5
Model making P5				P4	P4					P5	P5

# Between standard and ideals



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