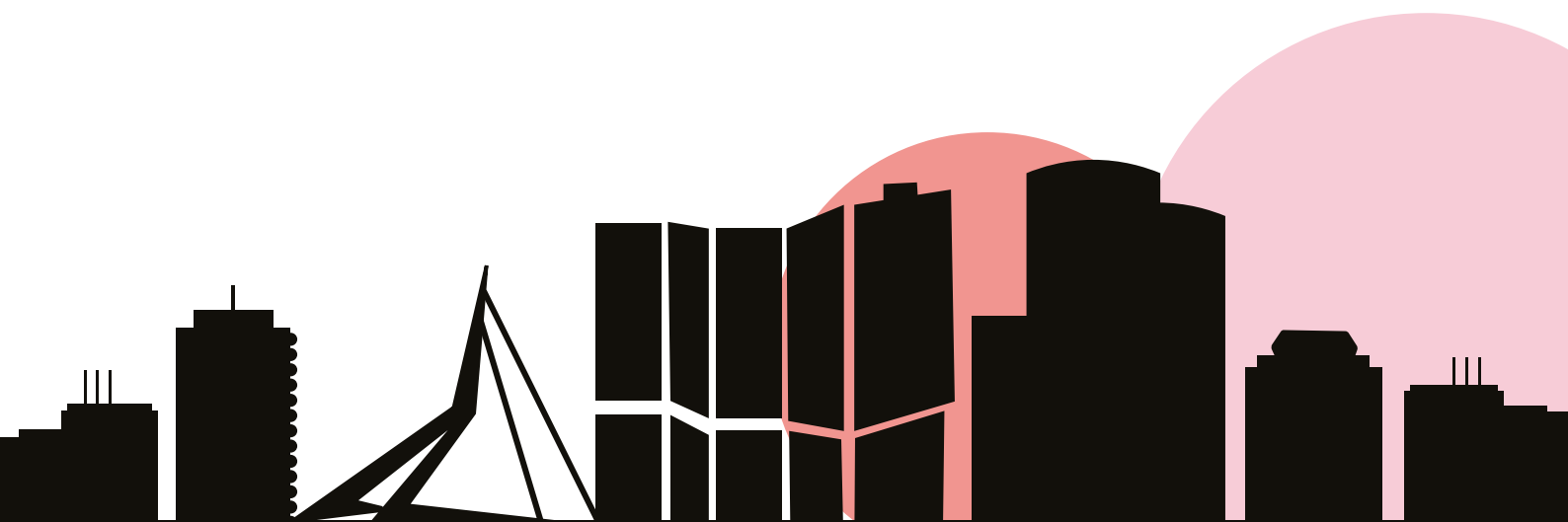




A FEMALE FUTURE

*Developing gender inclusive neighbourhoods
in Rotterdam-Zuid*



*“A woman without a man
is like a fish without a bicycle.”*

- Irina Dunn

COLOPHON

A female future

Developing genderinclusive neighbourhoods in Rotterdam-Zuid

MSc graduation thesis

July 2023

Delft, the Netherlands

Keywords: gender, inclusivity, urban design, Rotterdam

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▲ *Front page illustration: skyline of Rotterdam (adapted from Vecteezy.com, 2022)*



ACKNOWLEDGEMENTS

This report describes my graduation project for the master of Urbanism at the TU Delft. The whole graduation process, which began in September of 2022, is described in this report from start to finish, with all the steps that have been taken to understand the layers that make up this thesis. In this report, you will find the work that has been done throughout the whole project, which ended in July 2023. This thesis has unveiled new discoveries on the relation between gender and the built environment, and translated them to design principles and spatial elements that can be implemented and applied to cities to ensure gender inclusivity in urban environments.

I want to thank the people that supported me in the whole graduation year. In particular, my thanks

go out to my mentors, Teake Bouma and Machiel van Dorst, which I give my utmost gratitude for sharing their knowledge and expertise, and their very useful (and sometimes even moral) guidance. In the earlier stages of this graduation process, I also received a great deal of guidance and understanding from the coordinators of the master thesis course, which I also want to thank them for.

Lastly, I am most thankful for the support from my friends and family, because I couldn't have successfully finished this year-long endeavour without them. During the times when I felt down and unsure of myself, they gave me the support, motivation and inspiration I needed. From friends at the faculty that I could brainstorm with, to help generate new ideas, and to other friends and family, that helped me with their moral support or supported me in any other way. I want to also thank everyone that reached out to their extended circles to help fill in my survey, to extend the reach of respondents.

I hope you will enjoy reading this report, and gain new insights from my thesis.

Donne

ABSTRACT

In recent decades, gender inequality has been discussed increasingly in different fields of society. Since long ago, aspects like power dynamics in traditional households, or studies on the human anatomy, have influenced men and women's place in society. This gender inequality has also impacted how cities have been designed by and for men, although the existing hypothesis is that the needs of men and women in a city differ. Evidence already shows that women feel more unsafe in cities than men, which can be caused by design of urban environments not being fit for women. This leaves the questions what this relation between gender and the built environment actually entails, whether cities are currently gender inclusive, and if not, how urban design can contribute to make them to do so.

This research has found that men and women have different user patterns and perceptions when it comes to their presence in urban environments. This impacts the way they use and perceive the city. In this study, these differences have been translated into design principles that can positively impact women's use and perception of the urban environment. These design principles were used to analyse the current state of gender inclusivity in urban environments, through the locations of Hillesluis and Zuidwijk, a pre- and post-war neighbourhood in Rotterdam Zuid with a high cultural diversity and a low socio-economic status. The analysis generated a set of spatial elements that either negatively or positively influence a woman's perception of space. After testing these spatial elements through a survey, the findings were combined with the design principles, to design a proposal on how the current urban environments could be improved to be more gender inclusive. Guided by these end products, a universal framework was created, that can test all urban environments in their gender-inclusivity.

Keywords: gender, inclusivity, urban design, Rotterdam-Zuid, urban environments, perception of space.

Prelude

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PERSONAL MANIFESTO

For me, this graduation journey started with an intrigue for a location: Rotterdam-Zuid. Even though I grew up in a small village in Zuid-Holland, I have been drawn to the city (more specifically to Rotterdam) since I was little. I had increasingly big parts of my life happen in Rotterdam, which made me fall in love even more with the inhabitants' cultural diversity, their work ethic, no nonsense attitude and collective pride for their city, all of which probably stem from the city's intriguing history. And of course, I have an architectural background, so its architecture also has a special place in my heart. Because where other big cities in the Netherlands pride themselves in their traditional and authentic townhouses along the canals, Rotterdam is unique in its modern and tough architecture. This all makes me consider myself a 'Rotterdammer' at heart, even though I only lived there for a few years.

A lot of Rotterdam-focused projects have come by since my bachelors at the faculty of Architecture, but one project piqued my interest, its location being Rotterdam-Zuid. This project made me more passionate about the relation between social and spatial, and how spatial structures and urban

design can help improve the non-tangible structures of a city. It also made me more interested in Rotterdam-Zuid itself, because it almost feels like a completely different city. People living north of the river Maas view the south as having a completely different identity, and also think of it as 'lesser' than their Rotterdam. This view probably stems from the poor socio-economic status of the south, crime and safety issues, and they correlate it to diverse cultural identities. But even though it lacks in its image, I think Rotterdam-Zuid also has so much good to offer, and aspects like cultural diversity also bring so much quality and beauty to a city. This has sparked my ambition to help lift up Rotterdam-Zuid and its image, to let others see how great it is and can be.

Since Rotterdam-Zuid has been the subject of a lot of research already, I wanted to find an angle for my thesis that could add new knowledge to the discourse on Rotterdam-Zuid through a different lens. I discovered the discussion on gender inclusivity in the built environment, and how it wasn't a big discussion yet at all. Combining the location and theme with this subject made perfect sense to me, since I consider myself a feminist and part of the LGBTQ+-community. Researching and designing a topic that combines my interest in the location with the drive for equality and inclusivity through the lens of gender, made all of my passions come together, which is why I couldn't be happier to hopefully contribute to all of these discourses through new knowledge. I hope that in the end, my idealistic vision of a fully equal and inclusive society will once come to life, and that this thesis will help contribute even a little bit to that.

01

Introduction

This chapter will serve as an introduction into the project, as well as showcase the background information that is important for the context and structure of the subject. After explaining the general structure of the report, a few definitions, such as 'gender', will be framed, as to not cause unclarity later in the report.

Subsequently, there will be a general introduction into the problem field that this project is concerned with. Showcasing the extent of the problem field and how and where it is apparent, also supports the relevance of this project, which is discussed later in the chapter. The elaboration on the problem field is concluded through a summarizing problem statement.

The chapter continues by further elaborating on the structure of the report through the research plan, which stems from the problem field. This plan consists of the research aim, the societal and scientific relevance of the project, and research questions that will be answered in this project.

Finally, this chapter will provide some global background information on the location of this project, as a way to showcase the context and argue the choice of location. Further elaboration on the location will be done in a later chapter of this report.

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1.1 / ABOUT THIS REPORT

Before elaborating on the actual content of the report, the structure of this report will be explained.

As can be seen in the table of contents, this report consists of six chapters. This first chapter, 'Introduction', will be a showcase for the background of the project and show an introduction into the subjects this thesis handles, and what questions will be answered by the end. The second chapter, 'Approach', builds onto the introduction, and gives more insight into the approach that was taken for the execution of the research. This concerns the methodology, concepts and theory that underpin the project, and shows the time division of the project through a timeline.

The other four chapters will be dedicated to answering the research questions posed in the introduction. These main- and sub questions will be laid out more specifically later in this chapter,

but they generally concern the relation between gender and the built environment, the current situation of the location, implementation of the findings into a design, and defining a universal measuring system. This is similarly structured in the report through chapters 3, 4 and 5. Chapter 3, 'The social', will answer the first sub question about the relation between gender and built environment. Chapter 4, 'The spatial', will further elaborate on the context and analyse the location, thus answering the second sub question. Chapter 5, 'Fusion', will answer both the third and fourth sub question, while combining the findings of chapters 3 and 4. At last, chapter 6 will combine all findings and provide conclusions while answering the main research question. The final chapter also provides a discussion and reflection on the project, and give recommendations for further research on the subject.

1.2 - Men gather in a public space enjoying themselves, with women off to the side in Amsterdam (Nicole Roach via womeninurbanism.ca, 2021)



1.2 / DEFINITIONS

The subject of this thesis has a few concepts and terms in need of framing, to prevent confusion about their definitions later in the report. The following definitions have been chosen for the accompanying terms:

- Man** *"A person assigned a male sex at birth, or a person who defines himself as a man." (European Institute for Gender Equality, n.d.-a)*
- Woman** *"A person assigned a female sex at birth, or a person who defines herself as a woman." (European Institute for Gender Equality, n.d.-b)*
- Sex** *"refers to the biological and physiological characteristics that define men and women." (World Health Organization, 2017)*
- Gender** *"refers to the socially constructed roles, behaviours, activities, and attributes that a given society considers appropriate for men and women." (World Health Organization, 2017)*
- Gender identity** *"a person's innate sense of their gender (chiefly used in contexts where it is contrasted with the sex registered for them at birth)." (Oxford Languages, n.d.)*

Understanding gender

This report generally talks about gender inclusivity in terms of creating something female friendly. I recognize that the division between man and woman is not always clear, and that someone's gender can be fluid or not fall in one of these two categories at all. Besides this, I am aware that someone's gender does not define their whole identity, thus not every woman would need the same elements in an urban environment to make it suitable for them.

It is not the intention of this report to see all women as the same and generalize, but to find the common needs all women share, and the aspects that are decided by gender, and use these to improve urban design. If I wanted to include all fluidities of the gender spectrum in this report, it would be more than one year's worth of work, so for this case, men and women will be defined through gender identity, as by the definitions shown before.

In a broader sense, this report tries to achieve an end product that is inclusive and equal for all people, with a special focus on minorities. In a more specific example, this means that the focus will be on different gender identities than the one that has mainly dominated in urban environments and urban design thus far, this mainly being traditional male identities. For the sake of complexity in the report, women will be used as the defining target group for this report. Even though only one minority group is the focus, in the end, this project aims to create an urban environment that is inclusive for all gender identities to use freely and feel welcome. It is the idea that in making the city more female-friendly, it will be more comfortable for everyone to be in.

Equality, equity or inclusivity?

The words equality, equity and inclusivity are often used interchangeably when discussed in a context of gender. To prevent confusion as to what is meant with each definition, I want to elaborate on them.

According to the European Institute for Gender Equality (2016c), gender equality is defined as "equal rights, responsibilities and opportunities of women and men and girls and boys". However, in some instances of creating equal opportunities, the generated outcome is not equal. So, while the opportunities are fair, does not create fair and equal outcomes. This is the main difference with gender equity, where the opportunities and responsibilities are fairly distributed to create equal outcomes (European Institute for Gender Equality, 2016d).

There are mixed opinions on the definition of gender inclusivity, or inclusion. Some sources, like the Handbook for Gender-Inclusive Urban Planning and Design (Terraza et al., 2020), state that gender inclusivity is the approach to creating equitable rights and opportunities by considering

and including everyone, thus with the aim of improving gender equity. Definitions from other fields of study, such as one from Heinz & Urwin (2023), define gender inclusivity as a broader social goal, which when achieved, makes people of all genders feel a sense of belonging and acceptance, encouraging their involvement and engagement in the context.

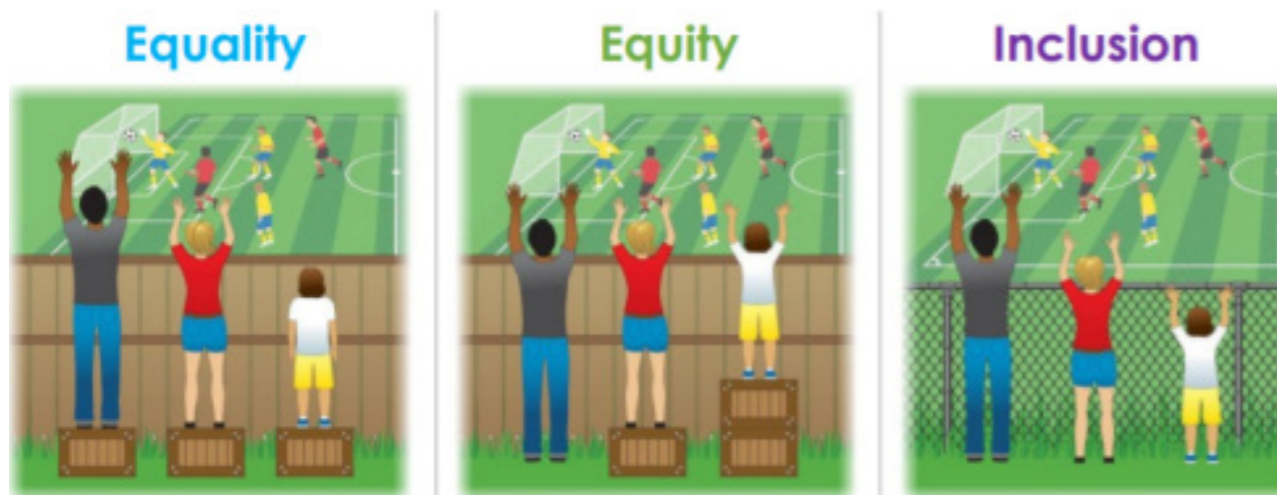
In the aforementioned definition of gender equality, it is seen that the current urban environment already somewhat caters to this goal, since there are equal opportunities for men and women to use the city. However, this does not mean women's needs are being met in the current urban environment. This means we need to at least design for gender equity, so the outcomes are equal, and all needs are met.

The ideal outcome, however, is designing for gender inclusivity, since this will mean that all people will feel a sense of belonging, engagement and acceptance in the city they move through, motivating them to engage and interact with others. Thus, in the case of this project, the aim is to design for gender inclusivity.

“Feminism is the radical notion that women are people”

- Marie Shear

1.3 - Illustrating the difference between equality, equity and inclusion (Active Oxfordshire, n.d.)



1.3 / PROBLEM FIELD

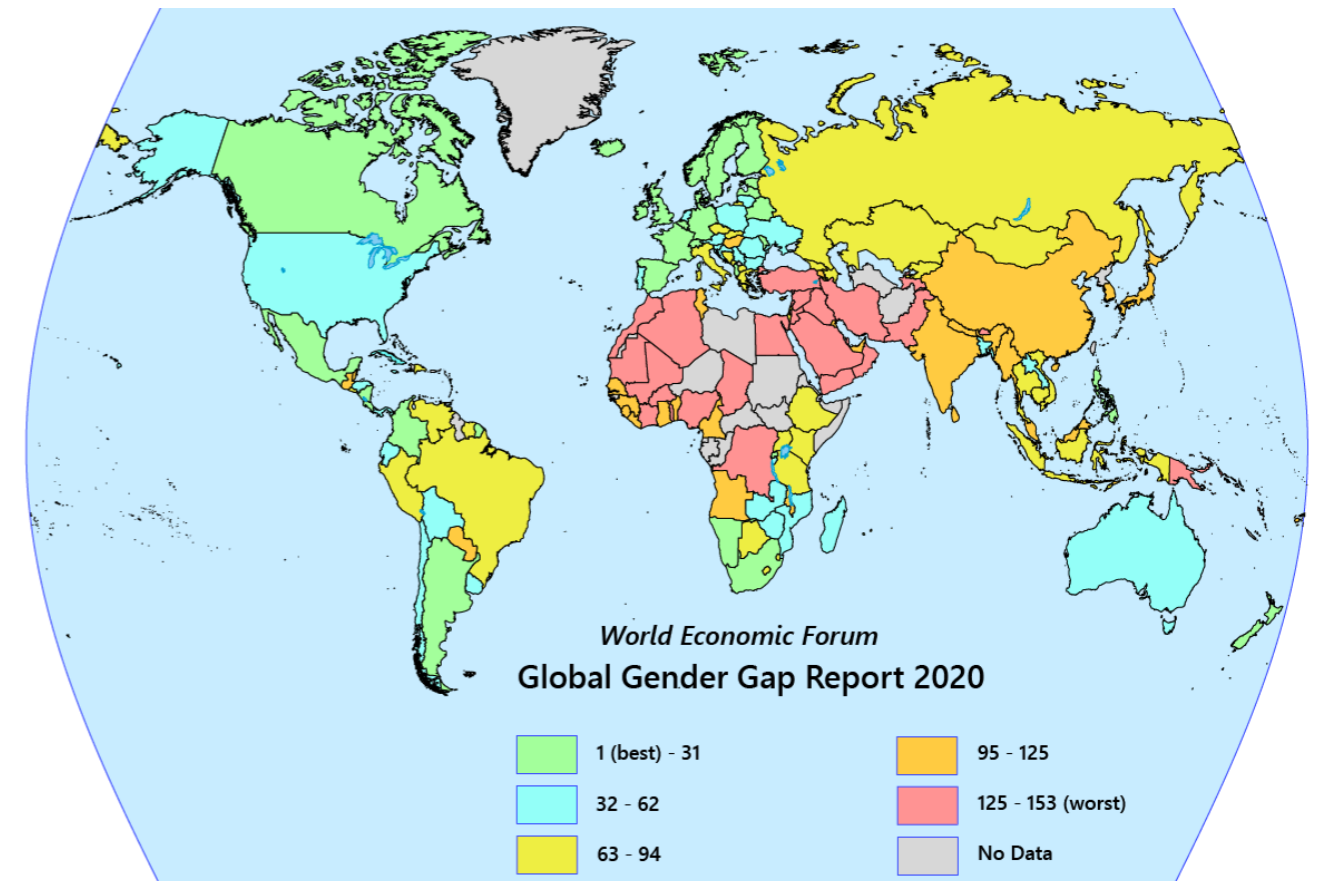
The case for equality

Gender equality has globally become an upcoming discussion in recent years. Since the beginning of the century, there is an increasing amount of research being done on the subject. Because of increasing activism and feminism, the importance of the topic has run through to higher governmental agencies. For example, the United Nations Development Program has looked into life-course gender gaps in all countries of the world since 1990 with a Gender Gap Index, and the World Economic Forum has released a yearly "Gender Gap Report" since 2006. Both continuously show that there is a slow trend of increased gender equality, but that there is still a lot of work to be done to change society's ideas on the equality of men and women.

In 2016, the United Nations developed a set of 17 Sustainable Development Goals (SDG's): "as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity" (United Nations, 2016). Goal number 5, "Gender equality", is their response to the aforementioned upcoming discussion. With this goal, their ambition is to end all discrimination

against women, and give them equal rights in all layers of society. This is an ambitious goal to achieve, since according to the report of the World Economic Forum (2022), at the current rate of improvement, the worldwide gender gap will be closed in 132 years. However, there are stark cultural differences. For example, Europe has the second highest gender parity, which means the gender gap is closed for 76.6%, and would take around 60 years to close. The worst gender parity is found in South Asia, with a closed gender gap of 62.2%, and 197 years until it is expected to close.

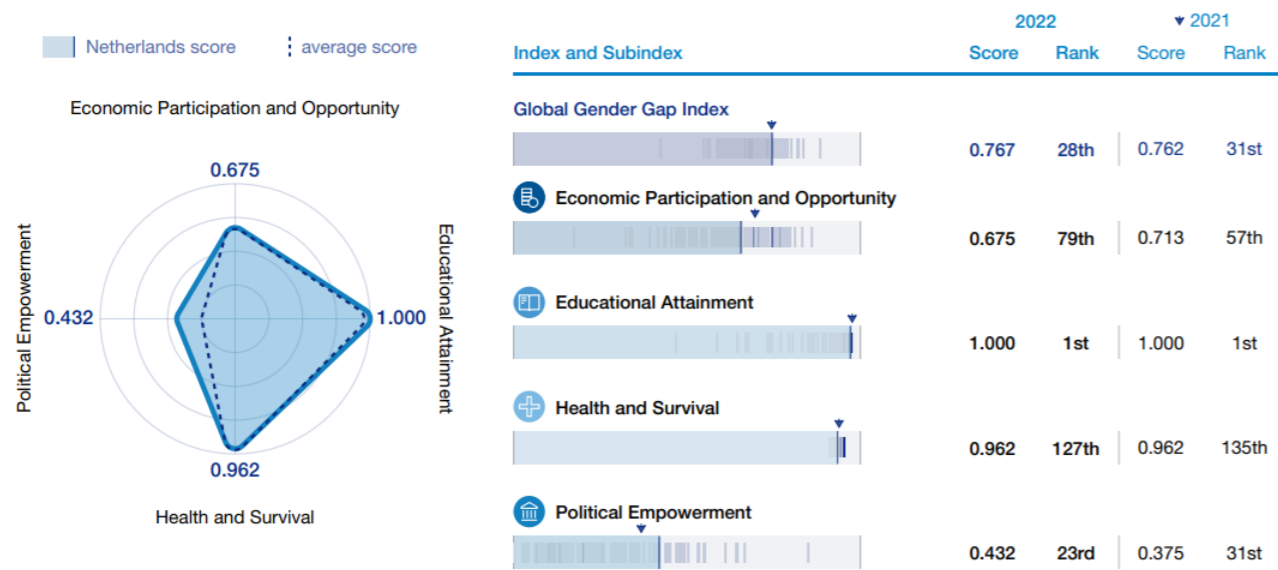
The relation between a country's dominant culture and gender equality is also found by Inglehart and Norris (2003), who also relates this to a country's political climate and prominent religion. They state that "perceptions of the appropriate division of roles in the home and family, paid employment, and the political sphere are shaped by the predominant culture – the social norms, beliefs, and values existing in any society, which in turn rest on the levels of societal modernization and religious traditions." Another trend in this theme, is that when people (mostly men) in power in a country with predominantly traditional views on gender equality, try and oppress more modern views on gender equality. This in turn oppresses free speech in their country, which makes it even harder to break the traditional views. One recent example in this vein was seen in Iran during the Mahsa Amini protests, where many women protested against the mandatory hijab law, after a woman was beaten to death by officers, because of wearing her hijab incorrectly (Mahsa Amini Protests - Wikipedia, n.d.). These protests were met with fights and riots, ending in many protesters' deaths.



▲ 1.4 - Map of the world ranking from the WEF Global Gender Gap Report 2020 (Jerome Taylor via Wikipedia, 2020)

▼ 1.5 - Mahsa Amini protests in Iran (Taymaz Valley via Flickr, 2022)





▲ 1.6 - Results of the 2022 Global Gender Gap Report for the Netherlands. (WEF, 2022)

In the Netherlands, the gender gap is currently not at the extreme point of violent protests and oppression, thankfully. More so, the Netherlands currently ranks 28th out of the 146 countries in the Global Gender Gap report in terms of gender equality (World

Economic Forum, 2022). As is seen in figure 1.6, the Netherlands does comparatively well on the themes of Educational Attainment and Health and Survival, but strides can still be made on the themes of Economic Participation and

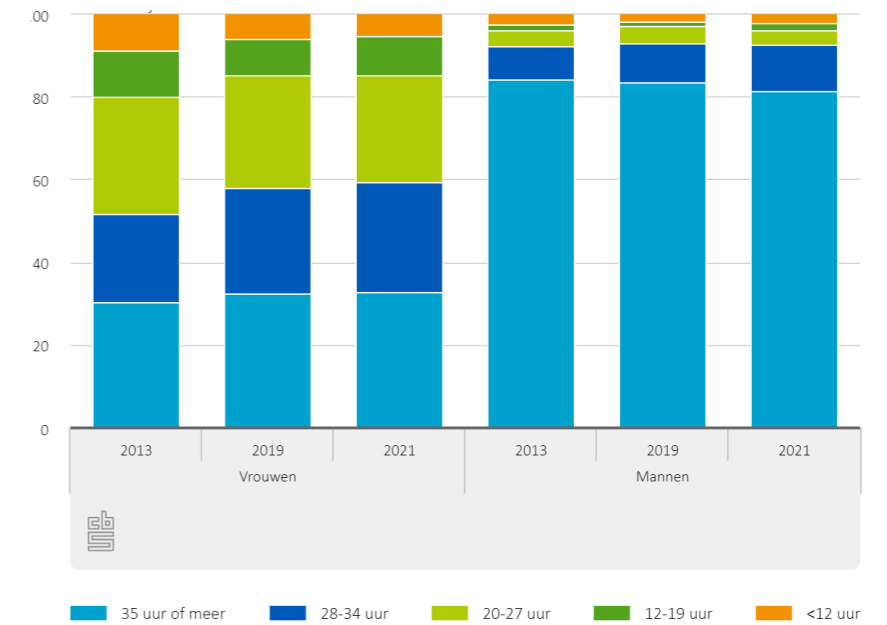
Opportunity. This mostly trickles down into the relatively low number of female leaders in Dutch-based businesses, as well as women's estimated earned income (as is seen in figure 1.7)..

▼ 1.7 - Details on gender (in)equality in Economic Participation and Opportunity in the Netherlands, from the Gender Gap Report 2022 (WEF, 2022)

Indicator	Rank	Score*	Compare with Global average	Gap F-M	Female vs Male		Min Max
					Female	Male	
Economic Participation and Opportunity	79th	0.675		-	Min	Max	-
Labour-force participation rate %	28th	0.876		-8.87	62.44	71.32	0-100
Wage equality for similar work 1-7 (best)	69th	0.660		-	-	-	-
Estimated earned income int'l \$ 1,000	104th	0.556		-31.02k	38.86k	69.88k	0-150k
Legislators, senior officials and managers %	101st	0.356		-47.53	26.24	73.76	0-100
Professional and technical workers %	70th	0.993		-0.37	49.81	50.19	0-100

The Dutch government is already attempting to stimulate female financial independence and tries motivating women to work through multiple initiatives, for example through the project "Educatie voor Vrouwen met Ambitie (EVA)" (Education for Women with Ambition) (Rijksoverheid, n.d.). The government acknowledges that women work less than men, and also have a higher percentage of parttime employment. This was, among others, discovered by the Emancipatiemonitor (Emancipation monitor) from Centraal Bureau voor de Statistiek (CBS, 2000, 2022). The figures 1.8 and 1.9 show women's increased labour participation from 2000 up to now, but explain that women still tend to work parttime more often.

Besides these statistics, the culture of the Netherlands also shows significant room for growth in some parts of society. A few recent prominent examples include sexism among student associations, like in the summer of 2022, when misogynistic slurs were cited during an anniversary speech (NOS, 2022).



▲ 1.8 - Percentage of women (left) versus men (right) and their hours of work. The light blue represents 35 hours or more in a week. (CBS, 2022)

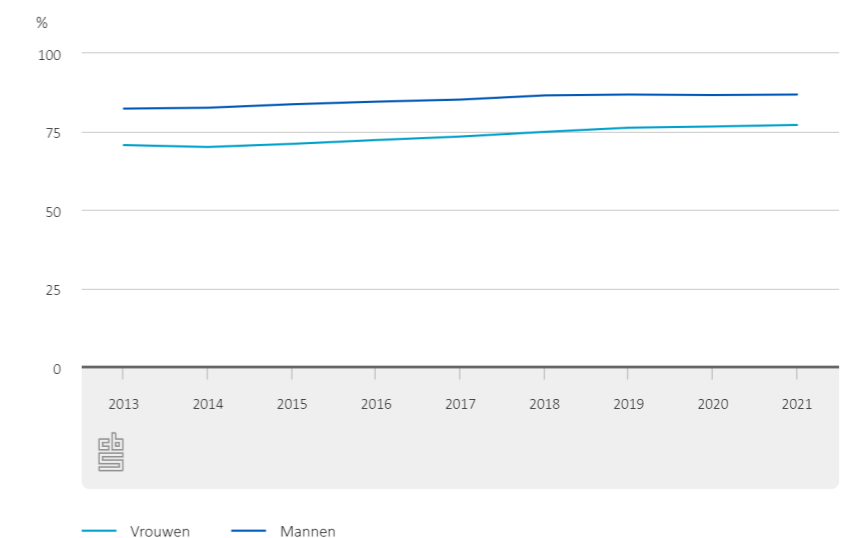
▼ 1.9 - Percentages of labour participation for women and men, in 1990 and 1999. (CBS, 2000)

	brutoparticipatie				nettoparticipatie			
	vrouwen		mannen		vrouwen		mannen	
	1990	1999	1990	1999	1990	1999	1990	1999
15-24 jaar	47	46	47	49	41	42	43	46
25-34 jaar	59	74	92	94	53	71	88	92
35-44 jaar	49	64	93	94	43	59	90	92
45-54 jaar	36	53	85	90	33	50	82	88
55-64 jaar	12	18	43	46	11	18	42	45
totaal	44	54	75	79	39	51	71	76

a Bruto-arbeidsparticipatie: het aandeel van de werkzame en werkloze beroepsbevolking in de totale bevolking van 15-64 jaar
b Netto-arbeidsparticipatie: personen die ten minste 12 uur per week werken in % van de bevolking van 15-64 jaar.

Bron: CBS (Enquête beroepsbevolking; Arbeidskrachtentelling 1990-1999)

▼ 1.10 - Percentages of labour participation for women and men, from 2013 to now (CBS, 2022)



(In)equality in design

Besides statistics and anecdotal evidence, gender inequality nowadays is mainly seen in the context of many different fields through (sometimes unconscious) patriarchal bias. Many examples of this are given by Criado Perez (2019), such as the continuously increasing size of phones, which makes them too big for some women's hands. Another example is in airbag testing, which is done with dummies that have a masculine appearance, even though the anatomy of women differs from a man. This bias has an expensive price, since it makes women 47% more likely to be seriously injured. The female anatomy is something that is vastly under researched, since men were

often seen as the standard in medical research. This great lack of understanding of the female body it has created, also impacts the diagnosing of heart attacks in women, as symptoms of illnesses can present differently compared to men's bodies.

This one-size-fits-men approach continuously disadvantages women, Criado Perez states. And it is not only apparent in the design of products, but in our buildings and cities as well. Many Dutch cities experienced vast population growth in the 20th century, and thus rapidly developed new neighbourhoods. Since patriarchal bias was so common in society during that time, it is no surprise that those ideas were prominent in urban design as well. This created designs where women's bodies and experiences were not considered. A specific example of this is visible in the design of sidewalks, where people with children, strollers, or

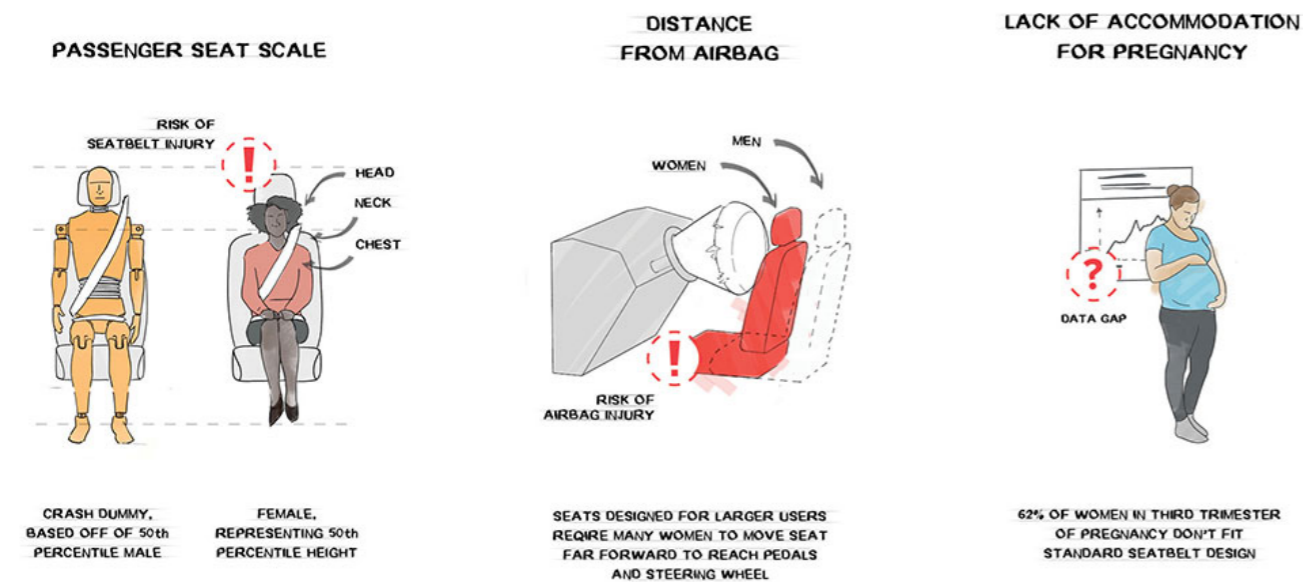
wheelchairs weren't considered, making it difficult for them to use. It also wasn't considered that women might have different needs when it comes to feeling comfortable in the city, even though it has since been found that women tend to perceive and appreciate aspects of urban environments differently (Kraus, 2021).

Regardless of the history, the conclusion remains that cities were designed by and for men, without including the other 50% of the population. And since cities are quite rigid in their permanence, the impact of this is still felt today. An example of this is visible in the percentage of men and women that use public spaces, starting from a young age. In research done by Helleman (2021), girls play outside less than boys starting from as early as infancy. From 0 to 4 years, this division is 45 to 55 percent, but this gap gets larger as the age increases. When kids are 13 or older, girls make up 23 percent of the people that play outside, compared to boys with 78 percent.

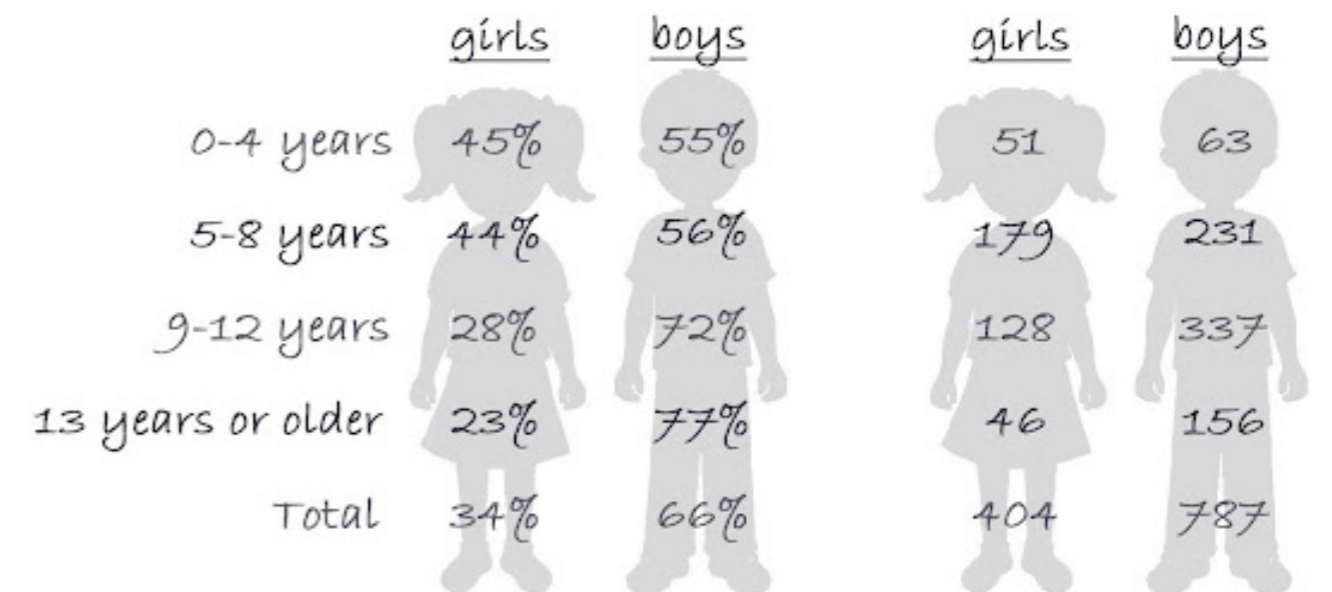


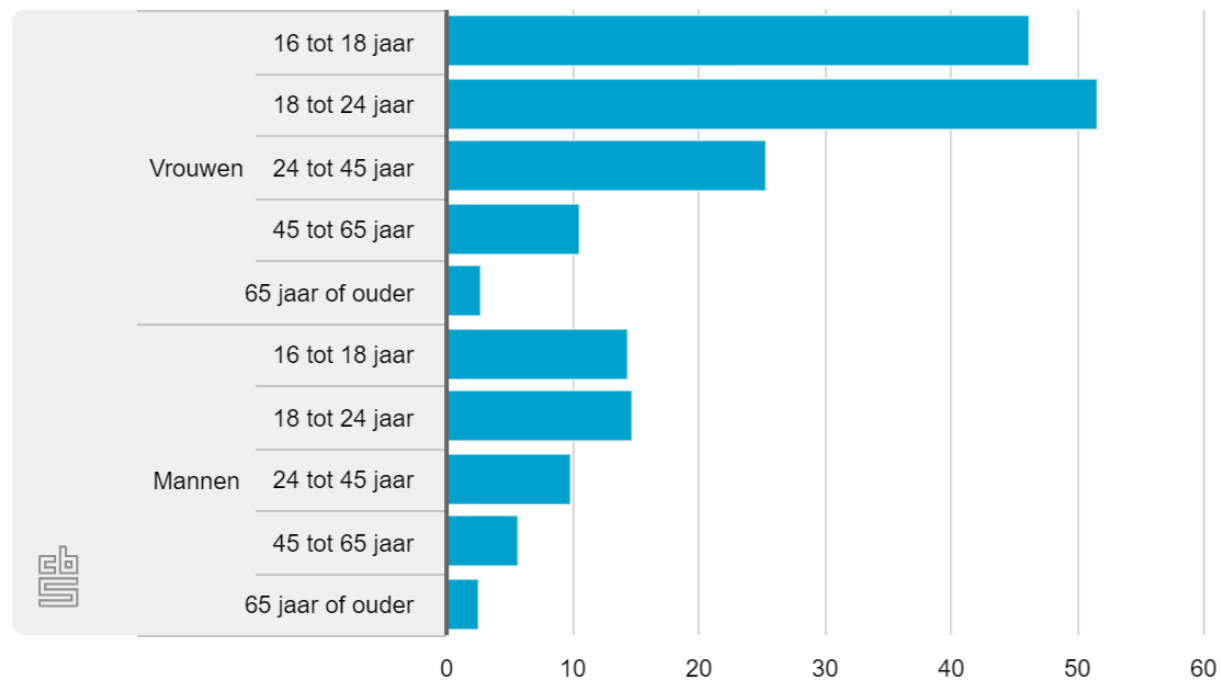
▲ 1.13 - A group of boys playing on a football field (Urban Springtime, 2021)

1.11 - Patriarchal bias in airbag design (Andrew Jernberg, 2019)



▼ 1.12 - Amounts of children playing outside, by gender (Urban Springtime, 2021)





1.14 - Percentage of victims of sexual harassment, 2022 (CBS, 2023)

A big cause for this could correlate to women's feeling of (un)safety in public spaces, which gets passed from mother to daughter. According to research by Centraal Bureau voor de Statistiek (2023), more than half of young women were sexually harassed in 2022. On the streets, this number was even higher, with 2 out of 3 young women being catcalled or harassed on the streets between 2020 and 2021 (Centraal Bureau voor de Statistiek, 2022b). This developed feeling of unsafety has also partially been influenced by the power men seem to hold over women, since the traditional gender roles and power dynamics have been around for long. But besides this, as has been stated above, the city is simply not made with women in mind, which could also subconsciously contribute to women not using participating in urban environments as much. Besides, this patriarchal bias in urban design also reflects back and affects the gender construction, with the symbolic meaning of spaces sending gendered messages that keep up the gender inequality in society (Falú, 2023).

All of the discussed facets of gender inequality begs the question whether it is true that women don't feel welcome to use the city freely, because it is not made for them. The current literature, as partially discussed above, has already proven this to some extent, but it mainly focuses on the younger female demographic, the smaller scale and on the aspect of safety. Besides, current research only gives general themes in terms of which aspects can be improved to make an urban environment more gender inclusive. However, the hypothesis is that the current make-up of cities impacts women universally, and has an impact throughout multiple scales. Besides, there might be a trend as to what elements specifically makes an urban environment more attractive for women. This thesis hopes to find more clarity on this hypothesis.

Problem statement

Gender inequality has been written into society for many centuries. This is apparent in many fields today, like in medical research, sizes of phones and design of air bags in cars. In urbanism, male-centeredness is prominent in the design of cities by and for men. These ideas made sense in the past, since society had more traditional views on gender roles. However, these ideas have changed over the past decades, making women more equal in participating in the built environment.

Since cities have a very permanent structure, the urban environments that were built with the traditional views on gender roles are still mostly the same, even though society and a woman's role in it have changed. So even though women are more equal in participating in the built environment, their needs might not be met, making them feel less comfortable and welcome to participate equally.

There was, and still is, little research done on what women need to feel equally comfortable to participate in urban environments, but there is evidence that men and women use and perceive the built environment differently. The evidence shows that women feel less safe in some parts of cities compared to men, and that girls and boys play differently in public spaces. This gives the indication that cities in the current situation are not suited to meet women's needs, and thus need a redesign in order to make them do so.

1.4 / RESEARCH PLAN

Research questions

For this project, I created a set of research questions to guide and frame the project. The main question I will be

answering, together with the sub questions that it has been divided into, are seen below.

As was mentioned before, the report is divided into three chapters, which can also be seen as the themes of the questions, as seen below. In the next chapter of this report, there will be a more in-depth explanation of the relation between the questions.

“How can cities be redesigned to be gender inclusive?”

The social

SQ1
“(In which ways) does gender relate to the built environment?”

The spatial

SQ2
“Focusing on the case of Rotterdam-Zuid, in which ways does the built environment currently cater to gender inclusivity?”

Fusion

SQ3
“How can gender equality in Rotterdam Zuid be achieved through urban design?”

SQ4
“In which ways can the principles used in Rotterdam-Zuid be applied to all urban environments?”

Research aim

After briefly describing the problem field, it has become clear that gender inequality is embedded in the fabric of our cities. The relation between the built environment and gender is still insufficiently explored in research. The aim of this project is thus to gain a better understanding of this relation, and to uncover how the current design of cities can impact the gender (in)equality in urban environments. Lastly, the aim is to gain better understanding on how urban design can contribute to gender equality in said environments.

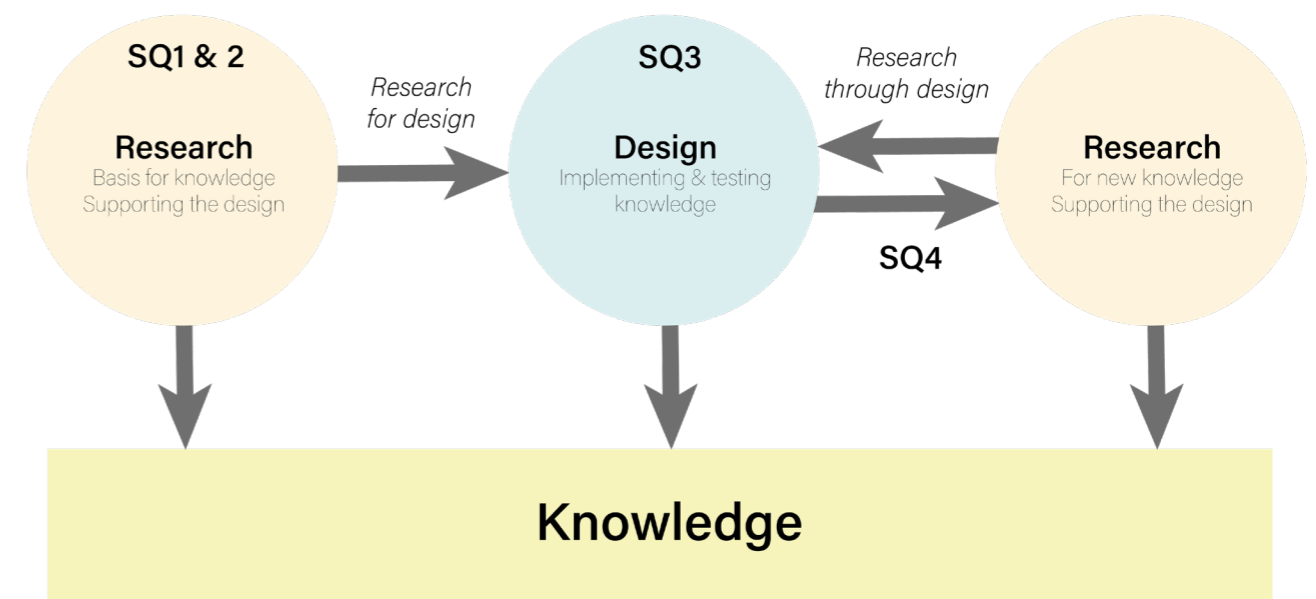
After investigating the relation between the concept of gender and the built environment (the social and spatial structure of the city) through different research methods, a set of design principles will be created. These principles will be applied to a case study through a design in the

location of Rotterdam-Zuid in order to test its effectiveness. Testing the principles through design will hopefully lead to new discoveries that support or alter the findings of the research, which enables the improvement of the principles.

Besides using the location as a design case study, it will also be a source of further research. The location will be researched through design and analysis in order to find the specific spatial elements that make a space more or less comfortable for women. These hypothesized spatial elements will be tested in a survey, to confirm whether these spatial elements are indeed universally (un)desirable for women. The resulting “ideal” spatial elements also improve the design principles and thus the design. In the end, all the improvements on the principles and design will lead to application on new research, that will form a universally applicable framework that tests urban environments on its female-friendliness.

Through this approach, research and design will be intertwined in this project. Research will feed into the principles, thus into the design. The design will then allow testing and generating new evidence and research, thus knowledge. This way, research for design and research through design are used interchangeably in this project to answer the research questions. In the end, this project will hopefully create a framework and set of principles that helps urban designers consider gender inclusivity in their urban design- and transformation projects.

1.16 - Relation between research and design in the project (Author, 2023)



Relevance

In recent years, people have vouched for more gender inclusivity in cities, which has created a more prominent discourse around the subject. This need for discourse in urbanism is strengthened by the fact that over the last decade or so, traditional gender roles of a household have shifted significantly with the increased percentage of women working and focusing on a professional career, which impacts how the city is used and perceived by men and women.

In practice, when observing and researching use of public spaces, it is known that girls and women use certain spaces in the city differently, and feel less welcome to use others. It is striking that while women make up half of the world's population,

they don't have the same amount of power in the city that is their home, where they live and move through, and where they should be the most comfortable. This has made me passionate in exploring the possibilities of creating a more gender inclusive city.

Of course, it would be too idealistic to think the design of a city could suddenly solve all issues surrounding gender inequality, but I certainly think having a better understanding of how our urban designs can impact gender inclusivity, can help shift urban designs to ones that help cater to societal changes, and strengthen their impact.

These societal changes cater to a few Sustainable Development Goals, or SDGs, that were also already mentioned in the problem field. Besides goal number 5, "Gender equality", this project hopes to do this by also combining the themes of goals number 10, "Reduced inequalities", and number 11, "Sustainable cities and communities". Indirectly, it also hopes to apply to a few other SDGs, that together makes our world a better place.

The main discourse that is currently prominent on the subject mainly focuses on creating safer public spaces for girls and women. More specifically, this mostly concerns the theme of safety, caters to a younger age group, and is applied on a quite small scale so far. However, I also believe there to be changes that can be implemented throughout multiple scales to encourage gender inclusivity. Small-scale changes can only impact the bigger whole of the city if they are implemented in a larger-scale coherence, while larger-scale implementations could also impact the smaller scale. Besides, only considering the smaller scale has the risk of only considering options that only apply to the specific location, and cannot be applied universally.

A big part of the relevance of this project also lies in the fact that there is still an existing knowledge gap on the relation between gender and the spatial layers, more specifically on multiple scales. This project hopes to contribute to revealing and partially closing this knowledge gap, as well as generating awareness for the knowledge gap, the problem, and its possible solutions.

1.17 - An overview of the UN Sustainable Development Goals, or SDG's, with the three highlighted SDG's as the ones applicable for this project (UN, 2016)

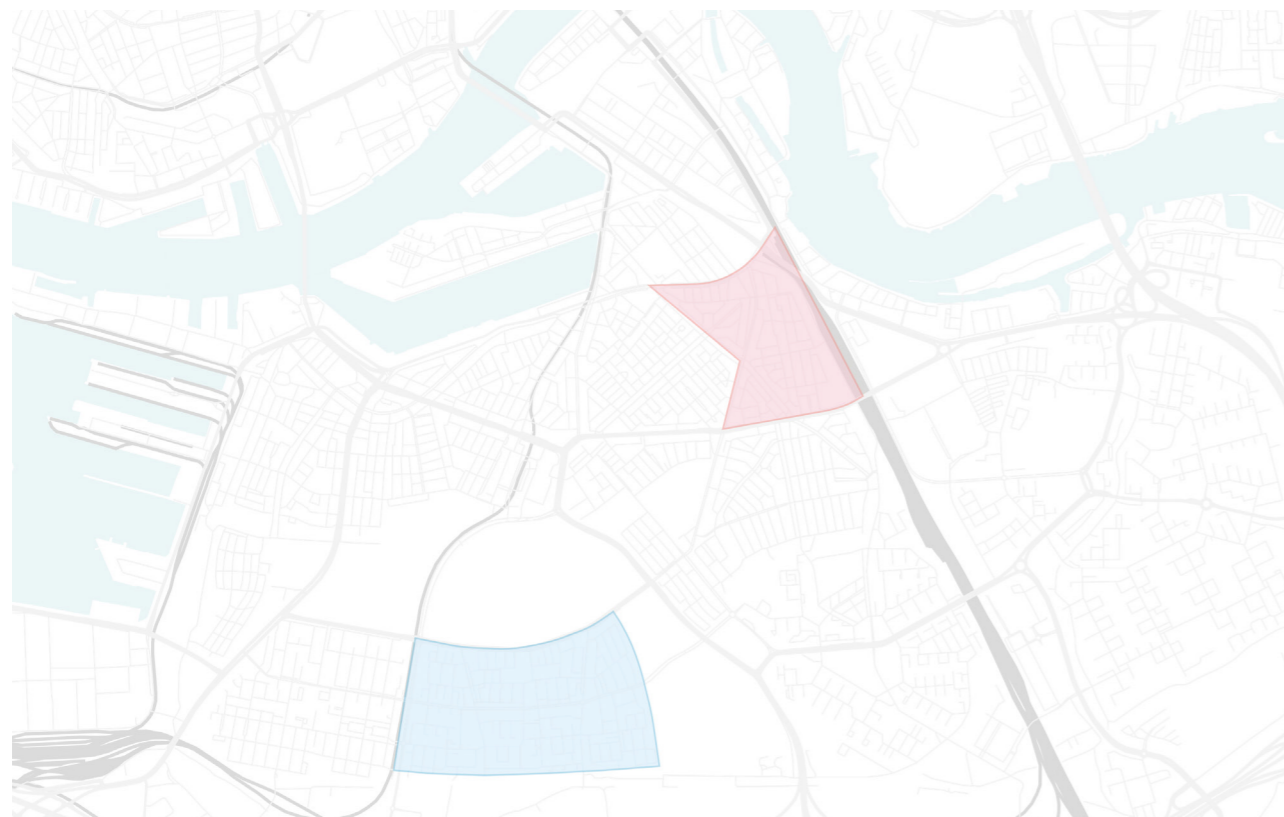


1.5 / CONTEXT

For this project, it was decided to use Rotterdam-Zuid as a location to research and design with the help of the design principles. Besides a personal connection with Rotterdam-Zuid, there are other reasons Rotterdam-Zuid is a fitting location for this project. Detailed explanations and analyses on the location are shown in chapters 3 and 4 of this report, but this serves as an introduction into the context and the connection with the subject of the project.

Rotterdam-Zuid is a city district of Rotterdam that is defined by its location south of the river Maas. This caused the city to be separated from the rest of Rotterdam quite early on. Zuid started to develop after the opening of the Nieuwe Waterweg in 1872, which gave an economic boost to the harbour and created a lot of new jobs. Workers from many different backgrounds flocked to the city in need of housing, thus being located in housing in Rotterdam-Zuid developed by their employers. This made Rotterdam-Zuid inhabited with many different cultural identities from the start, which increased the social separation from the rest of Rotterdam. The range of different cultural identities being put together also caused friction, which didn't improve the social cohesion. This all caused the image of Rotterdam-Zuid and its inhabitants to start worsening.

1.18 - An overview map of Rotterdam-Zuid (adapted by Author from Open Street Map, n.d.)



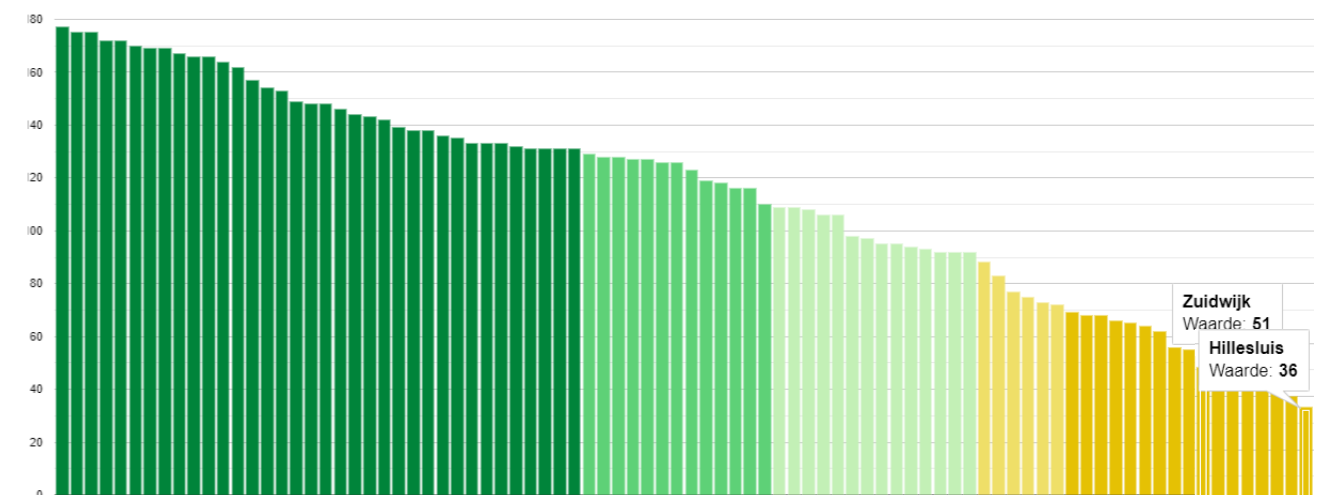
Over the years, the municipality has made their efforts to improve the situation in the district, since it deals with challenges like poverty, violence, and crime, which doesn't help the image of the district and its inhabitants. The image also causes an increased feeling of unsafety by people in Rotterdam. As is seen in the graph below, neighbourhoods from Rotterdam-Zuid receive an overall lower safety-index rating, which measures people's perceived feeling of safety in that neighbourhood. The two neighbourhoods that were chosen for this project to elaborate on the smaller scale, Hillesluis and Zuidwijk, also measure quite lowly on that scale. I believe that improving the conditions in the urban environment for gender inclusivity, can also improve the related issues like unsafety and low social cohesion.

universally gender inclusive environment in Rotterdam-Zuid, helps consider this diverse set of identities. After experimenting, this makes the principles more reliable in the end.

As was stated earlier, besides Rotterdam-Zuid, the project will focus on two neighbourhoods to elaborate on the smaller scale, which are Hillesluis and Zuidwijk. These neighbourhoods were chosen for their different historic background, since Hillesluis is a pre-war neighbourhood, and Zuidwijk is a post-war one. Analysing and designing in both neighbourhoods shows the different impact the application of the design principles can have on different spatial structures, thus making it more universally applicable. A detailed analysis of the neighbourhoods can be found in chapter 4.

The inhabitants of Rotterdam-Zuid are very culturally diverse, which also has an impact on gender inclusivity. Therefore, designing for a

1.19 - Subjective safety index of neighbourhoods in Rotterdam, with Hillesluis and Zuidwijk almost at the bottom (Gemeente Rotterdam, 2022)



02

Approach

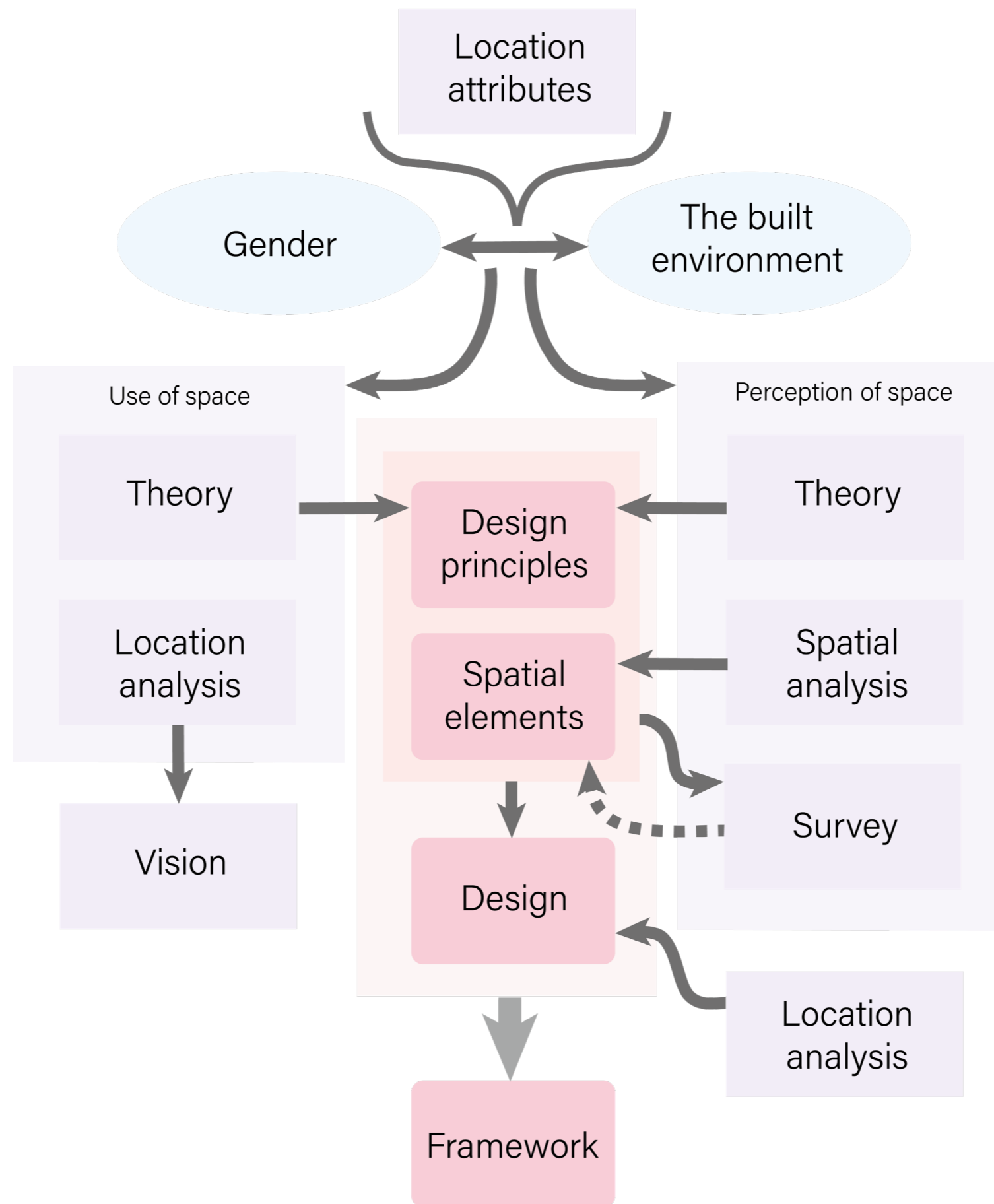
This chapter will highlight the approach taken for this project, thus elaborate on the structure and process to reaching end products, answers, and conclusions. To start, this will be done by elaborating on the research framework that will guide the project. Next, the most important themes of theory and literature for the project will be discussed. Subsequently, a first hypothesis following the research questions will be shared, followed by an explanation of the methods that will help answer the research questions, thus help confirm the hypothesis. Lastly, a timeline for the thesis will be shared and explained, to show the phasing and next steps in the project.

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2.1 / FRAMEWORK

To better understand the relation between all themes and products that play a role in the project, a research framework was created, as is shown on the right.

This project starts with the relation between the main concepts of gender and the built environment. This thesis also explores what role location attributes play a role in this relation, for example a culturally diverse location. It will be explained later that the main relation is made up of two main aspects, namely the use and perception of space. Theory on both aspects make up the design principles. In the use of space, the combination of theory and analysis shape a vision for the design. For perception, the location is analysed further to develop spatial elements that hypothetically improve the perception of space. These spatial elements are tested through a survey, and with improvements, these elements and design principles feed into the design as well. This all together guides the creation of a universally applicable framework, which can measure female-friendliness of spaces.



2.2 / HYPOTHESIS

Based on the research explained in the problem field, I constructed a hypothesis to work off of during this project. This hypothesis is as follows:

“Women use and perceive the city differently than men. Current cities have been built by and for men, with traditional household roles in mind. Thus, the city is not built for women. This calls for a redesign of the city that is gender inclusive.”

The rest of the research will focus on answering the research questions, and with that, prove whether the hypothesis is correct.

2.2 - Project research framework (Author, 2023)

2.3 / THEORIES

As a way to clarify the focus of this thesis, I wanted to explain the main theories I will consult and discuss in this project.

Since most of the literature about gender and the built environment concerns safety in public spaces, this is something that will be considered. The aim is to translate these theories onto the bigger scale of neighbourhood structures. Besides this, there is the idea that women and men use and perceive the built environment differently. There is not much research to support this idea, but I hope to prove this through my own research and find new conclusions, which is explained more in the methodology. A theory that might help support this research, is related to the preference framework of Kaplan & Kaplan (1983). Besides this, to find my design principles, literature will be researched on bordering fields of literature, like general design for inclusivity, and case studies, to be translated to fit the specific aspect of gender inclusivity.

The difference between men and women also raises the question of whether these differences between men and women are nature or nurture based. This is a very old question that has no real conclusion yet, but these theories also may help us understand the cause of this difference.

There is also some spatial theories that are relevant to elaborate on in this project. One of these examples is the theory of "de wijkgedachte" (Neighbourhood idea in English), which is a typical applied theory of some post-war neighbourhoods in Rotterdam-Zuid. This idea also shows some parallels with the Garden City theory & movement by Ebenezer Howard. This will give more insight into the actual ideas behind the design of cities, in which way they were inclusive, and how they were spatially translated.

Finally, to investigate the influence of race and ethnicity on the relation between gender and the built environment, some theories on intersectionality will also be researched. This can hopefully help in separating location-bound principles from the general framework, as is shown in the conceptual framework.

Furthermore, in all these theories it is important for me not only to read the text, but also to explore the context in which it was written. For example, I will be looking into who wrote the texts and theories, if they understood the feminine perspective, and in what times they were written. This will reveal a new layer of depth and transparency in the theoretical support. Together, this hopefully creates a broad sample of literature that can be connected to support my thesis.

2.4 / METHODOLOGY

To explain the methods I will be using to find answers to the research questions of my project, I created a methodology framework, as is shown on the next pages.

In my first research question, I will explore the possible relation between gender and the built environment. To firstly prove that there actually is a relation between the two terms, I will do a historic analysis on gender and the impact it has had on ideas in the built environment. Creating a historic timeline of the social climate and spatial design ideas, supported by socio-spatial theory, will hopefully prove that there is a relation, and also prove that gender inequality was prominent in design and development of cities in the past. At the end, this will give me a set of design principles that can be applied to the different scales of the location.

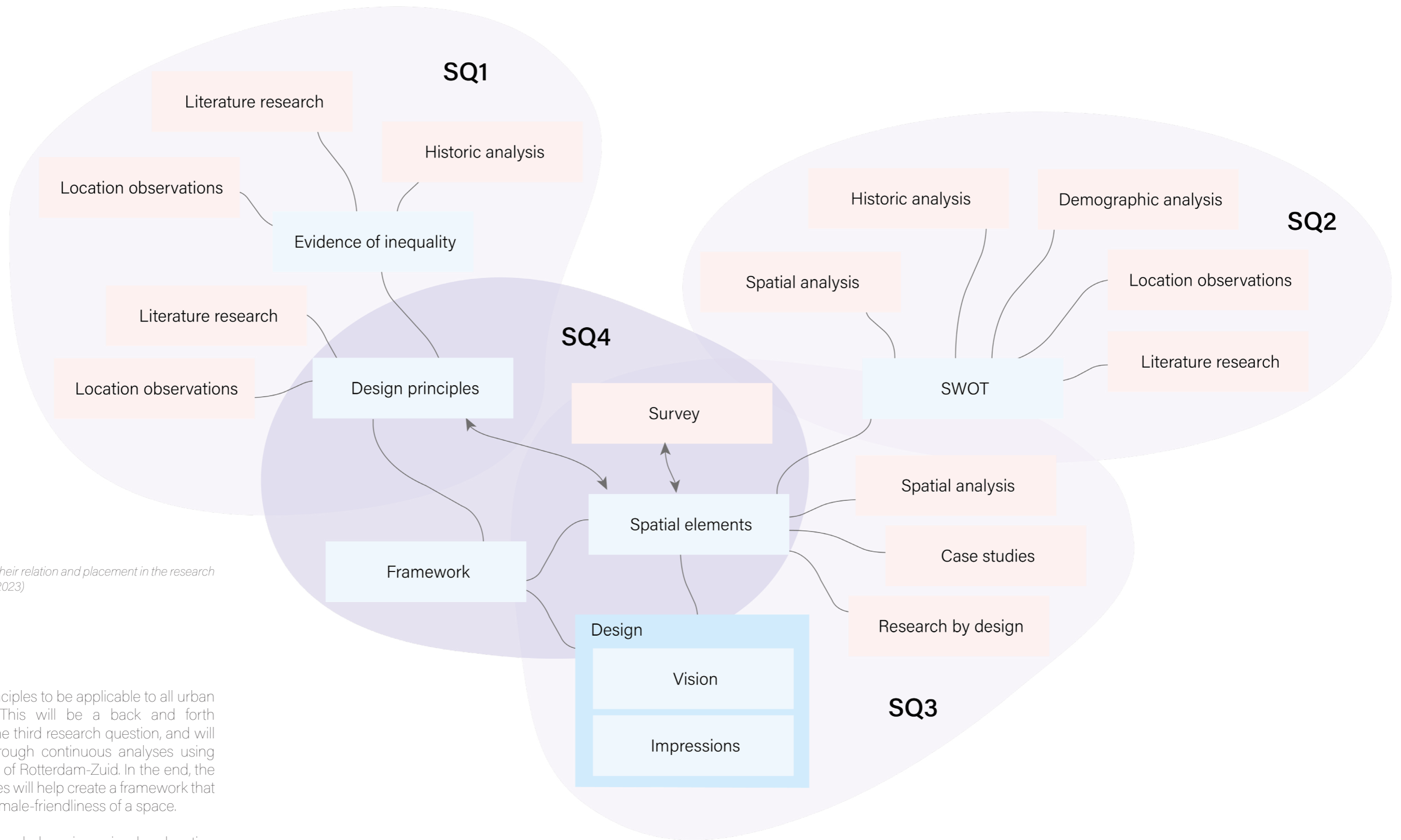
Since Rotterdam-Zuid is very culturally diverse, this might also be an important factor in the earlier mentioned methods, thus it could affect outcomes. To help take this into account, some literature and reference studies will be done, more specifically on the application of theories on intersectionality.

My second research question will be about if and how gender inclusivity is currently catered to in the design of my project location. My main method to answer this question will include a deeper historic and spatial analysis, to reveal how the earlier found

design ideas in the past were applied to my specific sites. This analysis will be done on multiple scales, and will end with some findings and conclusions on what aspects of the structure need changing. Adding to this, observations will be done on location to support the findings on a smaller scale. All findings will be summarized in a SWOT-analysis.

An important method connecting multiple sub questions is the conducting of a survey. This survey will firstly uncover whether there is an actual difference in the perception of space between men and women, thus discovering the actual relation between gender and (perception of) the built environment for the first research question. Consequently, it helps translate the wants of women into specific spatial elements, which feeds into the design impressions of sub question 3. Lastly, the survey helps translate the spatial elements into revised design principles, by concluding new themes in the outcomes.

My third research question will combine my earlier findings into a vision for Rotterdam-Zuid, together with design impressions for Hillesluis and Zuidwijk. This will be done through experimenting and research by design, with application of the design principles, outcomes of the SWOT-analysis and the spatial elements. Together, this will lead to a vision and designs that make a more inclusive Rotterdam-Zuid, and a framework and principles that can hopefully also be applied on other projects. Finally, my fourth research question will use the design of Rotterdam-Zuid to synthesize and

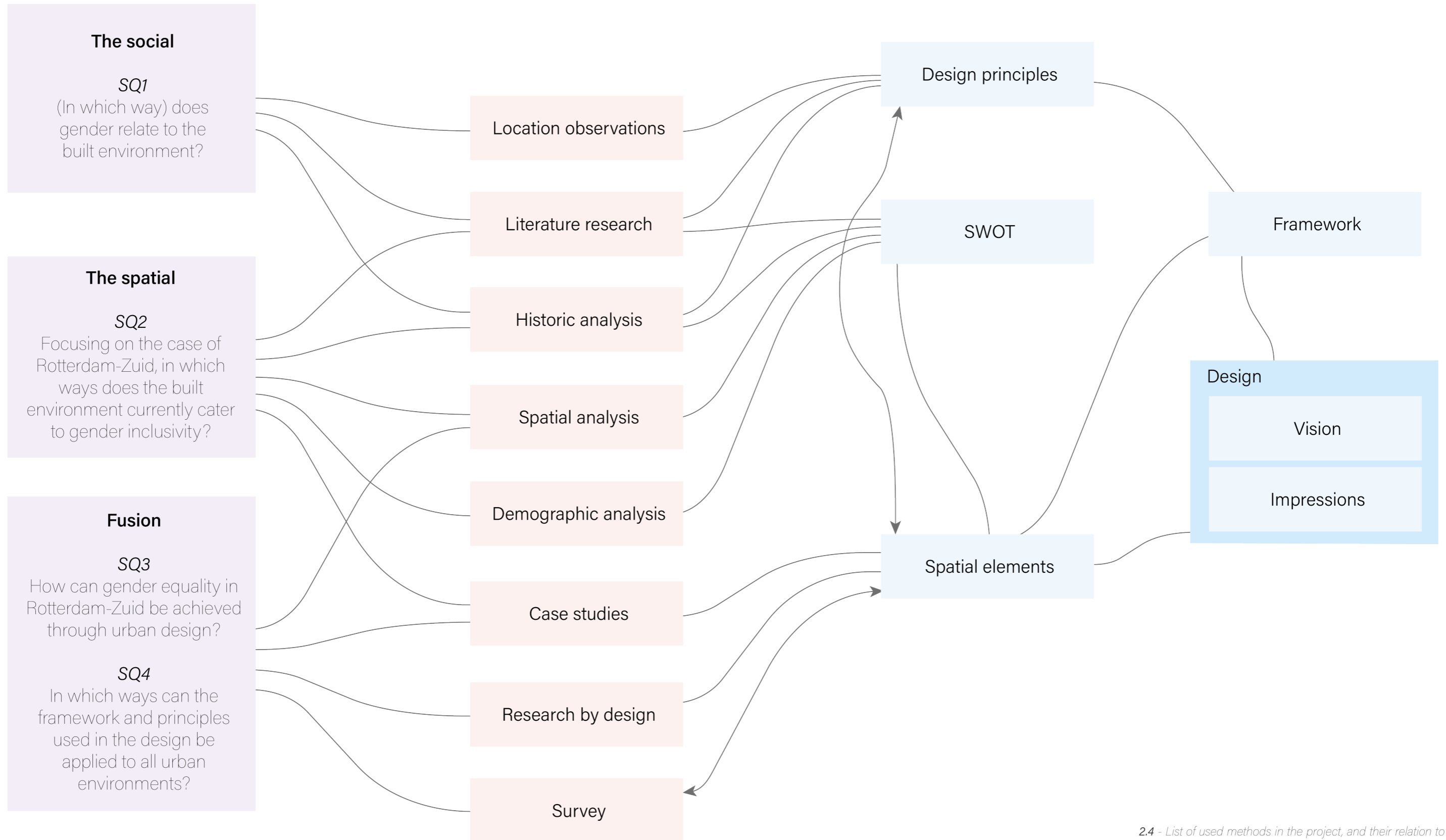


2.3 - Methods and their relation and placement in the research questions (Author, 2023)

analyse the principles to be applicable to all urban environments. This will be a back and forth together with the third research question, and will be revealed through continuous analyses using the new design of Rotterdam-Zuid. In the end, the revised principles will help create a framework that can measure female-friendliness of a space.

The images shown below give a visual explanation of the methodology for my project, and clarify how the methods are related in answering my research questions. The last image shows the relation between research and design and the use of research for design and research through design in my project.

“How can cities be redesigned to be gender inclusive?”



2.4 - List of used methods in the project, and their relation to the end results (Author, 2023)

2.5 / TIMELINE

To conclude this chapter about the approach of my project, this illustration below showcases the planned phasing of the project. As can be seen, up until

P2, a lot of time was spent on framing the subject of this thesis, including setting up the structure and problem field of the project (chapters 1 and 2 of the report).

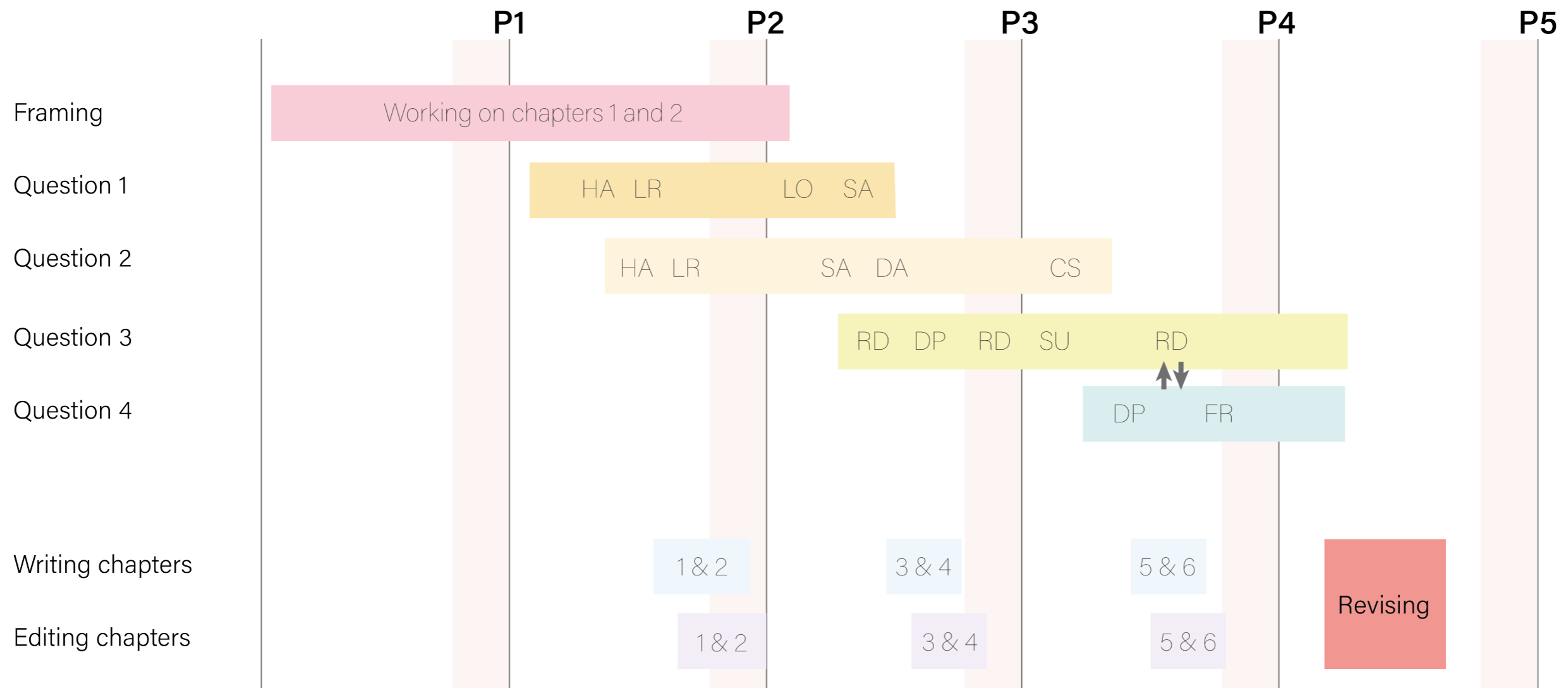
Since P1, there has been some exploratory work done on the first research question, in the form of a historic analysis and literature research. Up until P2, a start on research question 1/chapter 3 has been made. This has continued into the next quarter with more fieldwork. Question 2 has also been started on similarly. Halfway between P2 and P3, when enough principles have been concluded from the research, a start on the design and

question 3 will be made. Once the design has been set up well enough, this can be evaluated with a survey, scheduled to start after P3.

Together with this, I gave myself some blocks in which to write and edit chapters of the report, since this can often get lost in the process and end up needing to happen all at once at the end. These blocks helped remind me to schedule in some time for writing.

An important note to make, is that even the methods seem to be very planned after each other in the timeline. During this process, I was very aware that not all methods will happen one after the other, but more so, happen simultaneously. The

process of design research, as is well known, is quite complex and not dividable in easy weeks and to dos. The aim of this scheduling of methods was to give myself themes to focus on each period. This does not mean I was only focused on that aspect or method, because when my research called for it, I have worked on other methods throughout every week. The same goes for the writing and editing of chapters, which has also happened in between the blocks given in the timeline, as to write down quick ideas and points important for the report. This also took stress off the project halfway through.



Legend

HA = Historical Analysis
 SU = Survey
 RD = Research by Design

LR = Literature Research
 SA = Spatial Analysis
 DP = Design Principles

LO = Location Observations
 DA = Demographic Analysis
 CS = Case Studies

FR = Framework

03

The social

This chapter will elaborate on the relation between gender and the built environment. As was explained in a previous chapter, multiple methods are used to explore this relation. First of all, since the built environment is quite rigid, the underlying fabrics have existed for quite some time. To understand what society was like when those choices were made in the built environment, research has been done into the history of gender inequality. Following this, the impact these views in society had on popular ideas in the built environment will be detailed.

After the historic analysis, the theory on the relation between gender and space will be reviewed. This will include theories from different perspectives and scales, and create clarity on the difference between men and women in some of these themes.

Since Rotterdam-Zuid is known for being a culturally diverse location, this brings new facets of identity to the table for the project. This is why the concept of intersectionality will be explored further, to gain knowledge on how these different layers of identity might impact someone's view on space.

In the end, all knowledge gained from the research on theories will lead to the formation of a first set of design principles. This will guide the project further in the other chapters of the report.

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3.1 / HISTORIC (IN)EQUALITY

Past inequalities

Before we look into the relation between gender and the built environment, we need to establish that there is an actual relation. This will be investigated through a historic analysis, to get an idea of how gender inequality was shaped by society over time.

Since we have already seen that societal changes don't happen that easily, it seems like gender inequality has been built into our society since the beginning of time. It is exactly what biblical references and historic movies about the Victorian ages have taught us. However, a deep dive into history has shown us that that actually wasn't the case. Namely, it was discovered that the idea of a 'traditional' household did not exist in the earliest stages of human evolution.

According to Buijs (2021), the hunters and gatherers lived as a community, with tasks like childcare and hunting being mostly equal. The patriarchal bias existing in the field of anthropology, among many others, made many archaeologists think that men were hunters, and women gatherers. But in practice, a hunter didn't mean a man, and a gatherer didn't mean a woman. An example of this bias was seen in archaeological diggings in Peru, where hunters were found with a female pelvis, but not believed to be women. After DNA testing, the sex was confirmed, but it just made some researchers believe the bones were in the wrong place (Criado Perez, 2019). This showcases the bias we have been taught in our old history books is very stubborn and leads people to be more closed-minded. In the oldest communities, the concept of alpha males still partially existed in the earliest evolution (although not in the way that was often thought). However, it was quickly abandoned

as soon as humans came to live in the savannah (van Schaik & Michel, 2020). The size of the communities and number of children made it so men simply couldn't be dominant over women anymore, which made men take care of the children more, and created a more complex power dynamic and system in the communities.

So where in history does this unequal power dynamic, and the dominance of men over women originate from? The theories and opinions are divided. Schaik & Michel focus on the start of agricultural societies, where differences between poor and rich started to develop. According to them, a big factor was also the influence of patriarchal religions, which started developing around that time. Religious works, like the Bible, deemed that the male God placed man above woman, thus the woman was inferior. Others say the inequality gained momentum in the Victorian

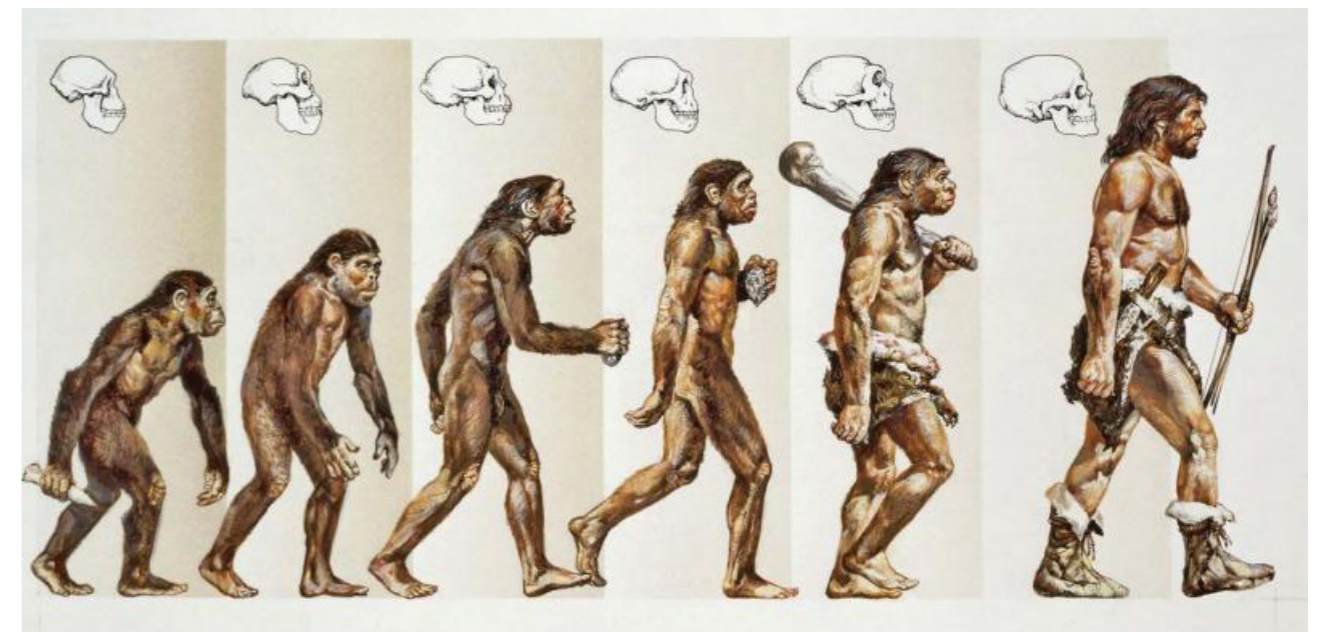
ages, where strict gender ideals and stereotypes were formed (Cossar, 2021). According to Buijs (2021), Charles Darwin's Theory of Evolution also contained patriarchal gender ideas, even though Darwin was known for his nuance and objectivity. He stated that "man is more powerful in body and mind than woman, and in the savage state he keeps her in a far more abject state of bondage than does the male of any other animal; therefore, it is not surprising that he should have gained the power of selection..." (Darwin, 1871). Because his ideas were very popular, this might have had a lot of influence on gender inequality in society. However, the gender inequality we know in today's society could also have been caused by a combination of influences throughout the history of time.

However gender inequality came to be, its impact is clear. In the 20th century, the traditional gender roles in households were cemented into society

3.2 - A cave painting with female hands (Smithsonian Magazine, 2013)



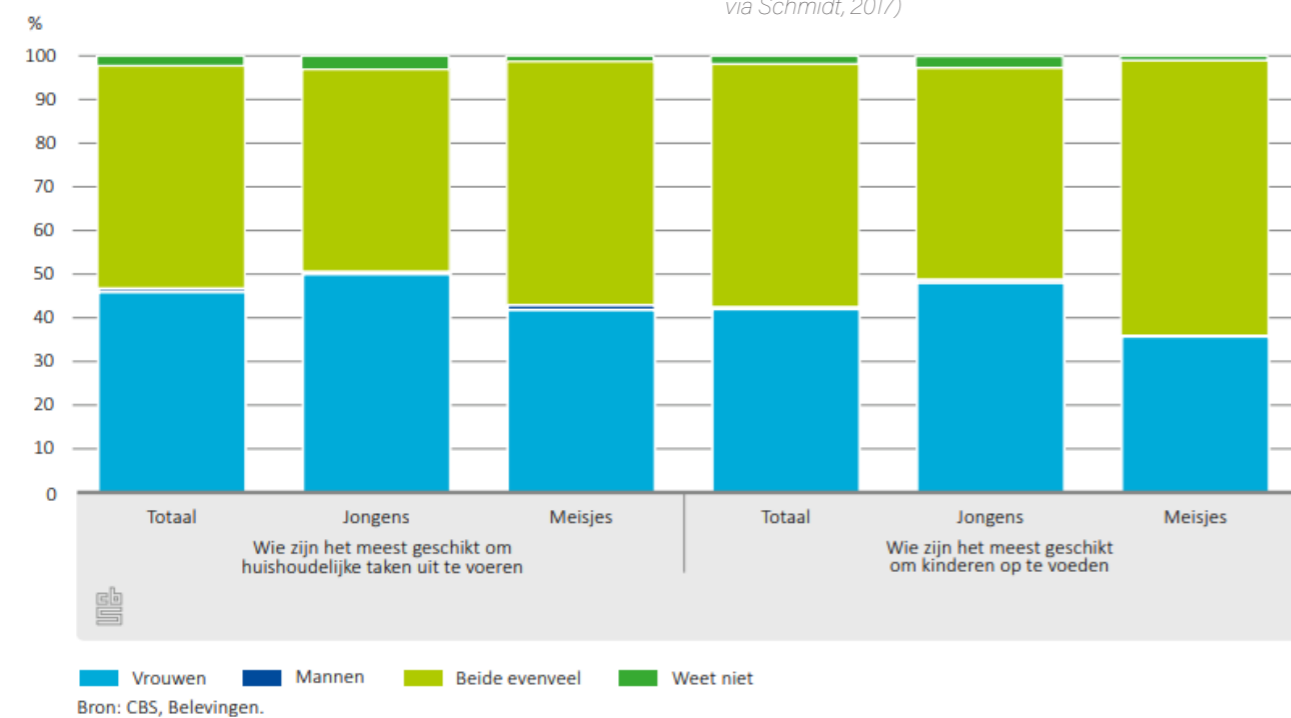
3.3 - The evolution theory of Charles Darwin (Deccan Chronicle, 2018)



even further. Nowadays, these traditional gender roles are still hard to break from (NOS Nieuws, 2020). Even though we see that younger generations have more modern views on gender norms, their views on care duties and who should be in charge of them, are still very favourable for women (Centraal Bureau voor de Statistiek, 2016).



▼ 3.4 - Are men or women most fitted for care tasks in the household? According to youngsters, 12 to 25 (CBS, 2016)



▲ 3.5 - Illustration from the 1950s, translated into "Mother in the family, not in the factory!" (Katholieke Arbeiders Beweging via Schmidt, 2017)

Rising against

With gender inequality being cemented into our society as much as it was, it is a surprise to see we are taking steps towards a more gender inclusive society. A big reason for this, in the Netherlands at least, was the feminist movement, rising against the patriarchal society and fighting for women to have a voice that's equally heard. These steps toward gender equality started in the 1850s with the first feminist wave, as you can see in the timeline illustrated on the next page. This timeline also shows important people, events and changes in law that created the first steps towards gender equality in the Netherlands.

Up until now, there have been four feminist waves that shaped the feminist movement, each with their own new standpoints, and each one "radical" for that time. The first feminist wave, from the 1870s to 1920s, fought for equal rights for women. More specifically, they wanted women to have the equal right to vote, equal access to higher education, and to be able to do paid work. This resulted in similar law being instated at the end of the wave.

The second wave was prominent from 1965 to 1995, and pleaded against female discrimination, which were seen in points like legal abortion, access to childcare, and acknowledgement and heavier punishments for female abuse. The second wave is still seen as the most well-known and radical one, as a few radical groups had playful methods to protest, which then gained traction and generated media coverage, thus making them

3.6 - "Baas in eigen buik" (Boss in own belly) protest of the Dolle Mina activist group, during the second feminist wave (Atria, n.d.)



more widely known and popular. This wave also generated a lot of new laws toward a more gender equal society. It can be said that where the first wave was about gender equality, the second one strived for more gender inclusivity.

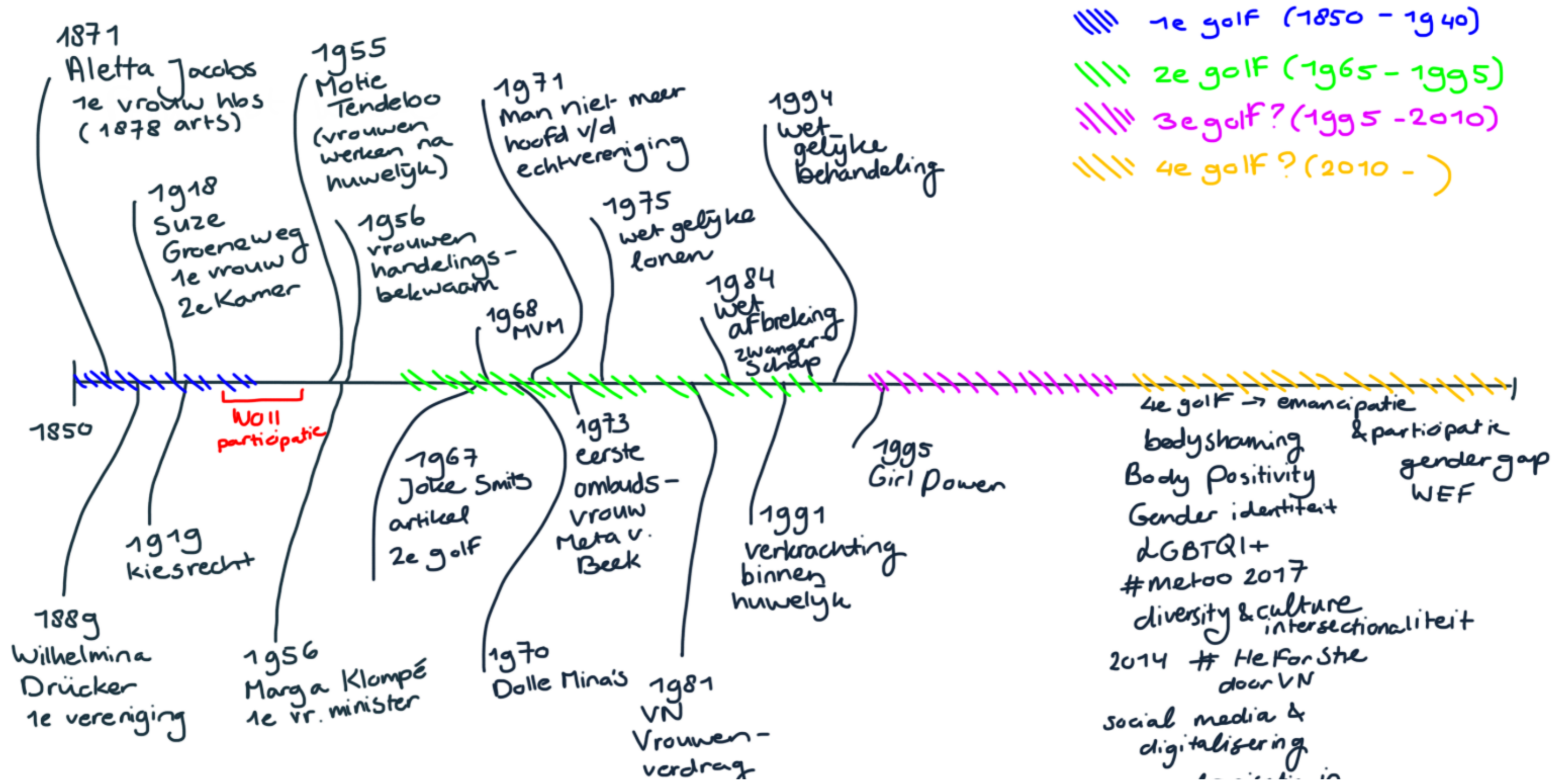
Different sources don't agree on the timeline after the second feminist wave. Some say the second wave, and some state that it was followed by two more waves in the feminist movement. The start and end of both the third and fourth wave is blurrier,

as were the main prominent themes and standpoints. It can also be said that the third and fourth wave were mainly internationally popular, and not as significant for laws in the Netherlands specifically. However, the third wave seems to be signified by the gained popularity of pop music girl groups, such as the Spice Girls, their music empowering young women with messaging about Girl Power.

The fourth wave still strives for gender inclusivity, but also stands for inclusivity of all minority groups. This includes people with ethnic backgrounds, sexual orientations and body types that are different from the "ideal" man and woman. In this sense, the third and fourth wave have similar themes. The last wave is signified by the rise of social media, and movements like body positivity and #metoo. This wave is believed to be the one we are still in today.

The main events stated in the timeline could have had an impact on how women use and perceive space in the city. For example, when women received the right to vote in 1919, or in 1956, when women were able to receive their own bank account, this made new steps towards women's independence, which perhaps made them go outside more. These changes in law and policy slowly paved the way for more equality in cities as well, although by this time, women had probably already been conditioned to oppression and unsafety in public spaces.

3.7 - Timeline of the feminist waves in the Netherlands, starting from 1850 (Illustrated by the author, based on the collection of sources stated in the bibliography 2022)



3.2 / SEX(ISM) AND THE CITY

Development of Zuid

In chapter 3.1, we have seen the development of gender inequality in society over time. Since the urban fabric embedded with gender inequality originated in the past, it is important to see how this fabric was formed. So, to connect the development of the social layer to the spatial layer, we now look at the development of Rotterdam-Zuid, and explore the ideas in urbanism that were prominent during the time of expansion for Rotterdam-Zuid.

In the figure below, we see a timeline showing the history of Rotterdam-Zuid, since around 1850. As was mentioned before, the development of Rotterdam-Zuid started really taking off in 1872,

when the Nieuwe Waterweg (or New Waterway) was finished, and created opportunities for the harbour to expand. The Nieuwe Waterweg meant that the harbour of Rotterdam could handle bigger ships, and experiment with modern and innovative techniques, which made it very efficient and thus attractive for new ships to dock their goods there. This created such popularity, that the harbour was quickly expanded afterwards with the Rijn-, Maas-, and Waalhaven. To fulfil the need for modern techniques, an electricity network was constructed in these harbours as well.

Since these new harbours needed people to work there, they attracted many new workers from many different backgrounds. The new harbour work was especially the most popular among farmers from Brabant, because an agricultural crisis there slowed down work for them. This caused many Brabanders to move to Rotterdam to work in the harbours.

All of these new workers also needed a place for them and their families to live. Luckily, around the same time of the development of the Nieuwe Waterweg, annexation of surrounding villages Feyenoord and Charlois had happened, making them officially part of the city of Rotterdam. This created room for the port owners to build housing for their workers, since Rotterdam-Zuid was and close by the harbours. That's how Rotterdam-Zuid slowly started developing into living areas for harbour workers, mainly former farmers from Brabant, with the living areas being owned by port owners or other private ownership.

The idea that farmers from Brabant lived in Rotterdam-Zuid, already started the image problems for the district early on. People from the northern side of the river quickly called Zuid the "boerenzij", or the farmer's side. Since they were not really born and raised in Rotterdam, and were their own community, they didn't fit in with the rest of Rotterdam, with the river creating an even bigger

barrier between the two groups. This separation was strengthened by the fact that Zuid stayed behind and was much more rural, with still old village cores. A contrast with the rest of Rotterdam. In 1913, the municipality starts regulating housing development in Zuid, in an attempt to tame the chaotic sprawl of small-scale private development housing, while still gaining popularity. This also created opportunities for the municipality to experiment, for example with "garden villages" (tuindorpen), like in Bloemhof and Vreewijk. Rotterdam-Zuid was seen as the testing ground for modern public housing, centred around creating educative and healthy living environments, which was believed to make people work harder.

In the 1940s, during the Second World War, a group of housing experts formed a study group that developed a new living concept called "De wijkgedachte". The neighbourhoods Pendrecht, Lombardijen and Zuidwijk were developed following this concept. After the war, there was a

3.8 - The harbours of Rotterdam in 1899 (Gemeente Rotterdam, 1899)



3.9 - Impression of garden village Vreewijk (Gemeente Rotterdam, 1925)



great housing shortage due to the bombing on Rotterdam, which these neighbourhoods were very useful for. These neighbourhoods were divided into smaller communities, with daily amenities always nearby. It followed the idea of living in a city with a village atmosphere.

In the 50s and 60s, the post-war focus was on rebuilding and expansion of the city. This caused older neighbourhoods to become neglected. Residents of the older villages moved to the new neighbourhoods, causing many vacant buildings in the neglected areas of Zuid. A stream of 125.000 immigrant workers arriving in the 60s, and they started living in these neglected neighbourhoods.

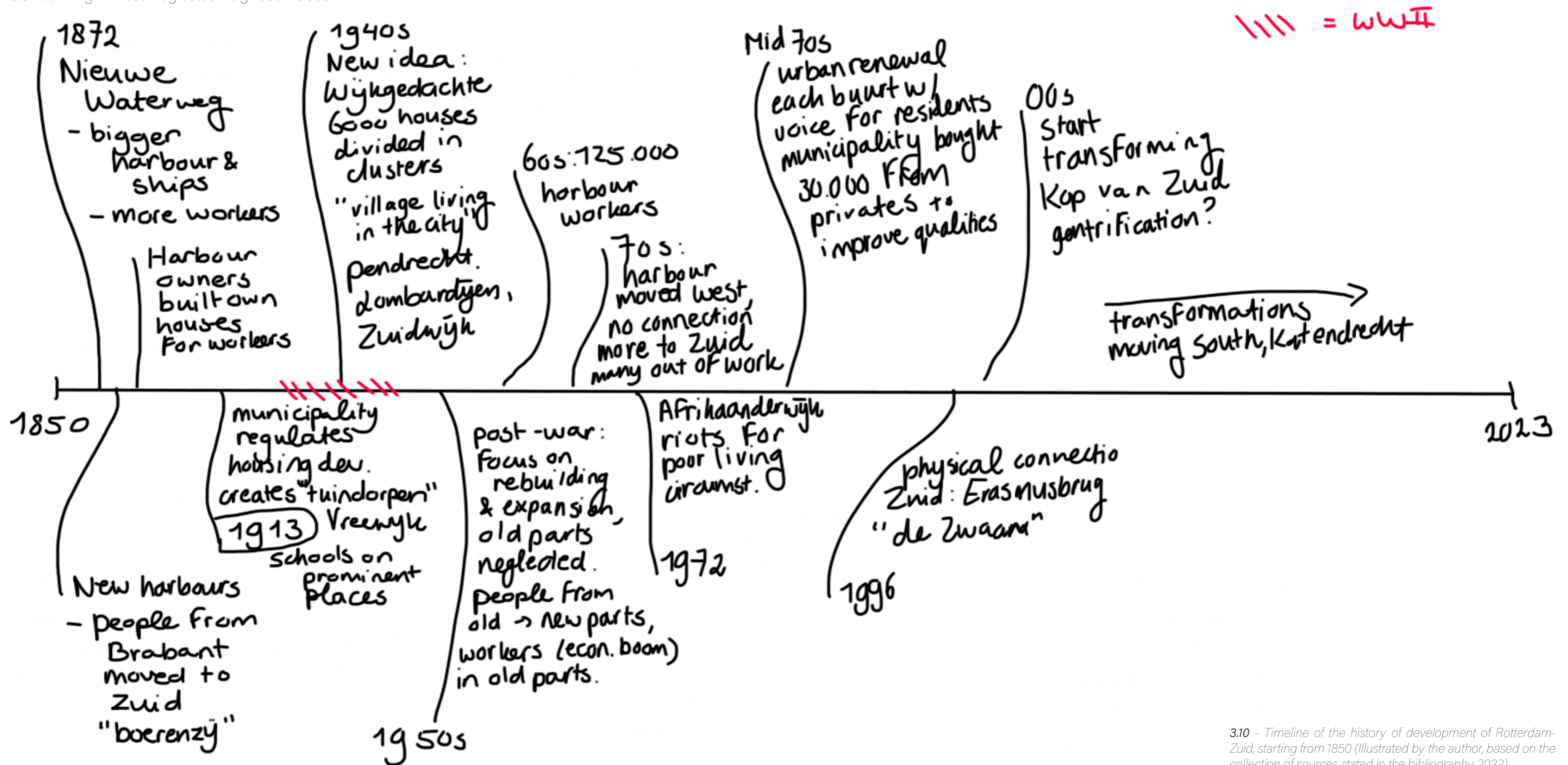
Together with this, in the years leading up to the 70s, the harbour started moving west, giving the harbour better expansion opportunities. This made the harbour lose its connection with Zuid. Many harbour workers lost their jobs because of this, which caused unemployment rates to rise up until sometimes 30% within one neighbourhood.

In 1972, the dissatisfaction of inhabitants got to the point of riots in the Afrikaanderwijk. As a result, new laws wanted to regulate the percentage of immigrant workers in a neighbourhood up to 5%. It was also the start of the municipality's plan for city renewal: restructuring Zuid, neighbourhood by

neighbourhood, with participation from residents' voices. The municipality bought 30.000 houses from private owners in order to renew them. In total, 70.000 houses were renewed, with them focusing on increasing the living comfort and giving more air and space in areas that were too dense. In this period, the shopping centre of Zuidplein was also developed, under the belief that Rotterdam-Zuid was its own small city, so it should have its own centre with amenities.

In 1996, the first visible connection between Zuid and the rest of Rotterdam was created, in the form of the Erasmusbrug. Before this, the main

connection was the Maastunnel, which opened during the Second World War. This new visible connection between both sides of the river increased connectivity in terms of infrastructure, but also created a figurative bridge and connection. Since then, more efforts have been made to review the vision of Zuid as a separate entity and to connect both sides as one whole of Rotterdam.



3.10 - Timeline of the history of development of Rotterdam-Zuid, starting from 1850 (Illustrated by the author, based on the collection of sources stated in the bibliography 2022)

Urban developments

Both timelines on gender and Rotterdam-Zuid show a relation in revealing the underlying culture and norms in society, which had consequences on the views and ideas in other fields, like urban development. Since most expansion of Rotterdam-Zuid happened from around the 1900s until the urban renewal of the 70s, this period of urban development will be focused on.

In the Netherlands, beautification of the city image had long been the main goal in urban development. That is, urban development as it was known in the 17th century and onwards, since cities weren't nearly as big as they are now. Up until the 1900s, urbanism as a craft did not really exist yet. This was mainly due to the fact that up until that point, most developments were done by private owners, with only building lines as guides on what to build on.

This created a chaotic urban fabric. In 1901, the Housing law was instated in the Netherlands, thus institutionalizing urban development by law. This meant good things for controlled expansion, and also for hygiene, since it caused many streets to have insufficient connections to water and the sewage systems.

More tasks came into the hands of the municipality, with often even having their own in-house urban developer. Since the craft of urbanism was fairly new, the urban designers were still figuring out the best ideas and views. Additionally, there was an added complexity to creating a plan for Rotterdam-Zuid as it existed of old village cores, surrounded by agricultural land. It was mostly a rural area, with a patchwork of developments from the many private owners, thus in need of connectivity. The planners looked at neighbouring countries like Germany and Britain for inspiration, for example at the Garden City concept by Ebenezer Howard.

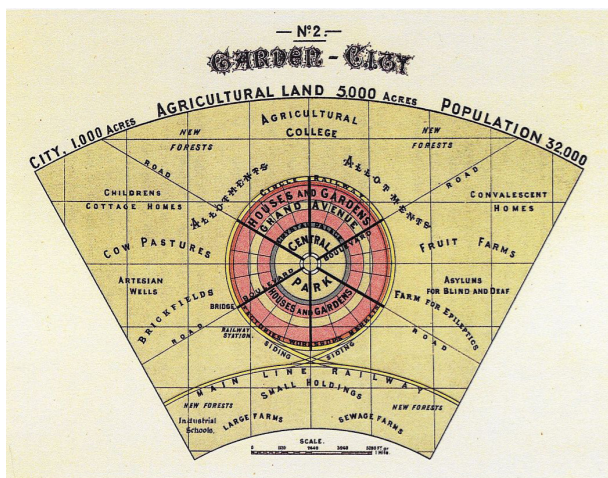
These references created the first idea for "tuindorpen", or garden villages in the Netherlands, which are city neighbourhoods with a village-like character. Where the Garden City concept was set-up on a bigger scale, with a garden city meant to be its own entity, the garden villages were meant to be more part of the city. Both of these aspects of the concept made it very fitting for expansion of the villages and rural landscape of Zuid.

Around this time in the 20th century was also when patriarchal ideas were very prominent in society and thus urban design. An example of this is the ideas of Le Corbusier, who in the 1940s developed the Modulor, a measuring system based on a 6 feet (1.83m) tall British policeman, since "in English detective novels, the good-looking men, such as policemen, are always 6 feet tall" (le Corbusier, 1954). This system failed to include measurements for women however, thus excluding them from participating in his designs

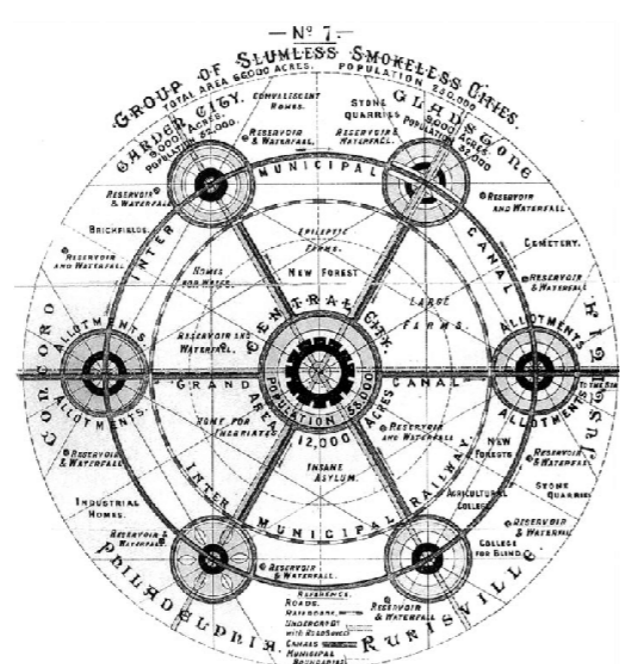
equally. The same counts for an edition of the "The measure of man", published in the 1960s, which, as the title suggests, only includes measurements for the male body and its movements (Dreyfuss, 1960). This also fails to consider people with children or strollers, for example in the design of sidewalks.

Since these were popular ideas, it has influenced the way neighbourhoods and cities have been designed at least since the 20th century. In the Netherlands, this has had a specific impact on post-war neighbourhoods, since the Dutch programmatic approach to developing neighbourhoods really skyrocketed after World War II. Before then, neighbourhoods were less planned and zoned, which created a less organized and more fragmented ownership in the city. Because of this, the gender inequality is probably less seen in the planning, and more in between the lines and context of the development of the city.

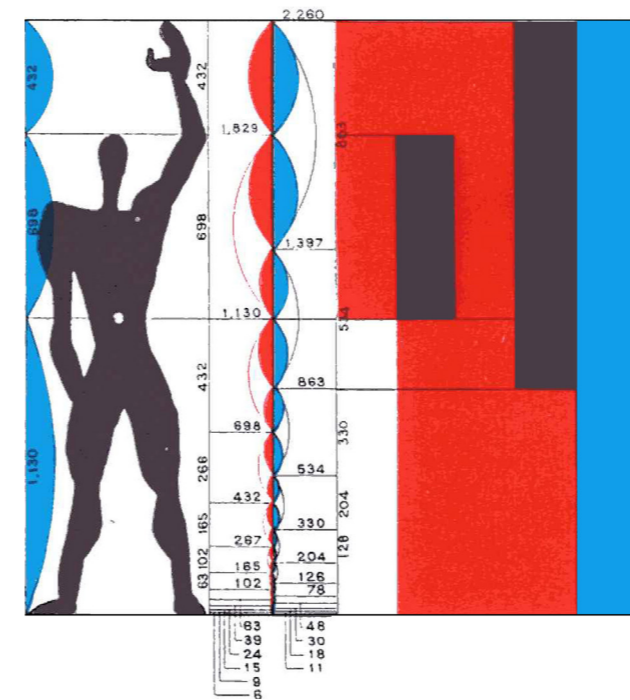
3.11 - A Garden City diagram (Ebenezer Howard via Wikimedia Commons, 1898)



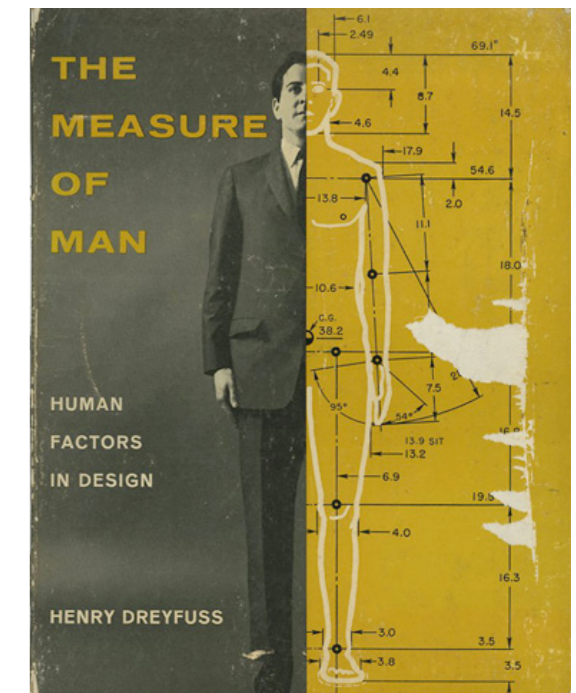
3.12 - Garden cities of tomorrow (Ebenezer Howard via Giorgia Tucci, 1902)



3.13 - Le Modulor by le Corbusier (Forgemind ArchiMedia via Flickr, 2010)



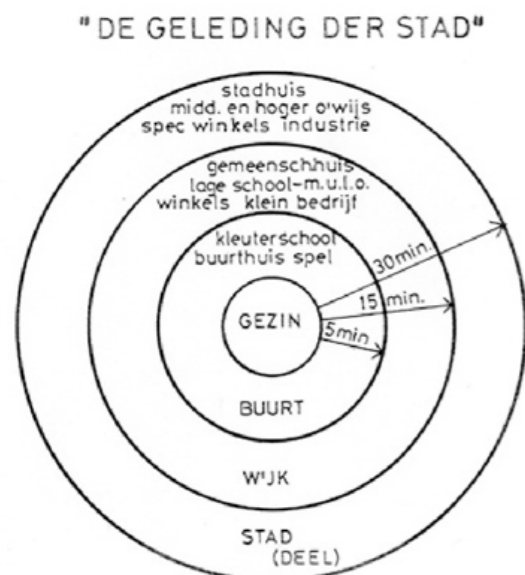
3.14 - the Measure of Man by Henry Dreyfuss (Dreyfuss via Modernism101, n.d.)



After the Second World War, the main goal of beautification of the city image was traded for the goal of functionality, mainly for the reason of rebuilding the city and providing the booming city with more housing. During the war, the concept of the "wijkgedachte" was developed, as mentioned before. Thus, after the war, and during the time of rebuilding the city, was the ideal time to put this concept to use and develop multiple neighbourhoods through this concept.

The main idea of de wijkgedachte was that a neighbourhood should consist of smaller communities, with everything nearby. This meant that a neighbourhood existed of a few different rings of proximity; starting with the home, then the street, the quarter, the neighbourhood, the district, and finally the city. In the closest rings, you would find the necessary amenities for daily groceries, while in the bigger rings, these amenities would become for bigger and less daily needs. De

3.15 - "Der geleding der stad", explaining the different rings of de wijkgedachte (via Canon Sociaal Werk Nederland, n.d.)



wijkgedachte also compared the rings to the circle of life; as a child, you would only need the first ring, and expand your reach as you got older. All of this created a very structured design of neighbourhoods, with each new ring separated by a road for cars. A prime example of this concept is seen in Zuidwijk, which will be spatially analysed later.

De wijkgedachte was developed in the 1940s, during WWII. In this time, women participated increasingly in society by working in factories, supporting their men at war. This was something great for gender equality, but was quickly turned back as soon as the war was over. However, you would think that due to the development of de wijkgedachte during a more participative time for women in society, the concept would consider the other half of the population.

When looking into the text and context of the development, this seems not to be the case. The

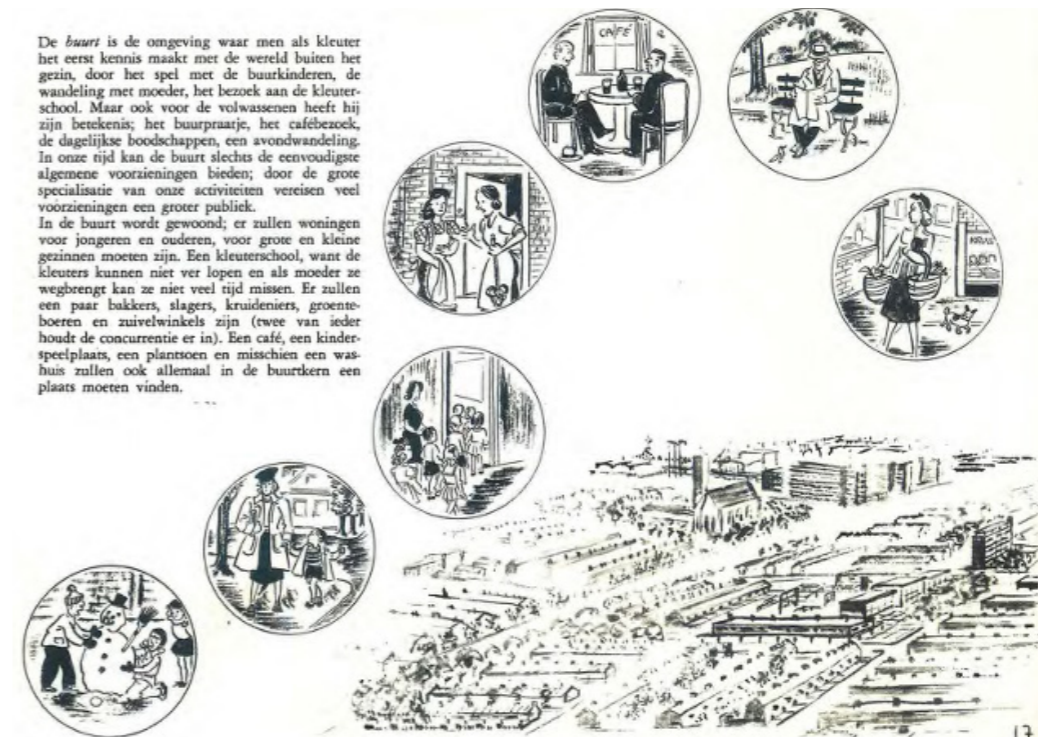
3.16 - Scheme explaining the traditional family as the core of the urban community in de wijkgedachte (via Rijksdienst van het Cultureel Erfgoed, n.d.)



key book that explains the idea of de wijkgedachte, called "De stad der toekomst, de toekomst der stad", shows a key difference in how men and women are supposed to behave in the different rings of the concept. According to the book (Bos, 1946), the quarter has all amenities a woman needs to take care of the family, and gives room for small talk with the neighbours. And on the neighbourhood scale, she has way less interests, only for some shopping and more separated contacts. She appears to have different interests than the man, who uses these rings as a way of leisure after coming home from work, like cafés and life in societies. A compelling quote says (translated) "The district-level is barely a part in the life of a young child and housewives, but very important for all organised activities on a bigger scale, something which mainly the mature youth and men have a need in." This assumed that women come outside less, and have way different needs than men.

It does seem to make sense for the ideas at the time. During the development of de wijkgedachte, four out of twenty people of the committee were women, with some even in their role of the National Women's committee (Geyl, n.d.). In the 1940s and 50s, however, their idea of women in society was as a support to the men (Tellegen, 1979). As a result of this, the neighbourhoods were designed with men in mind, as seen in the car centrality for example. In this, it is also prominent that the ideas of the wijkgedachte seem to mostly consider urban design as a way to support a working and productive life, in which way it can contribute to the economy, instead of considering everyday life.

3.17 - A page from the book "Wij en de wijkgedachte", explaining de wijkgedachte. The images show the difference in tasks men and women do in the neighbourhood (via Canon Sociaal Werk Nederland, n.d.)



3.3 / LAYERS OF IDENTITY

As was previously explained, Rotterdam-Zuid is known for its culturally diverse residents. The municipality of Rotterdam currently has the highest percentage of second-generation migrants in the Netherlands, with 19,7% of people having non-Dutch parents, while being born in the Netherlands themselves. Rotterdam is also in the top 5 when it comes to the highest percentage of a non-European migrant population, with 22,9% of the population being so. Rotterdam only stands beneath Amsterdam and its adjacent municipalities in that fact (VZinfo, 2022).

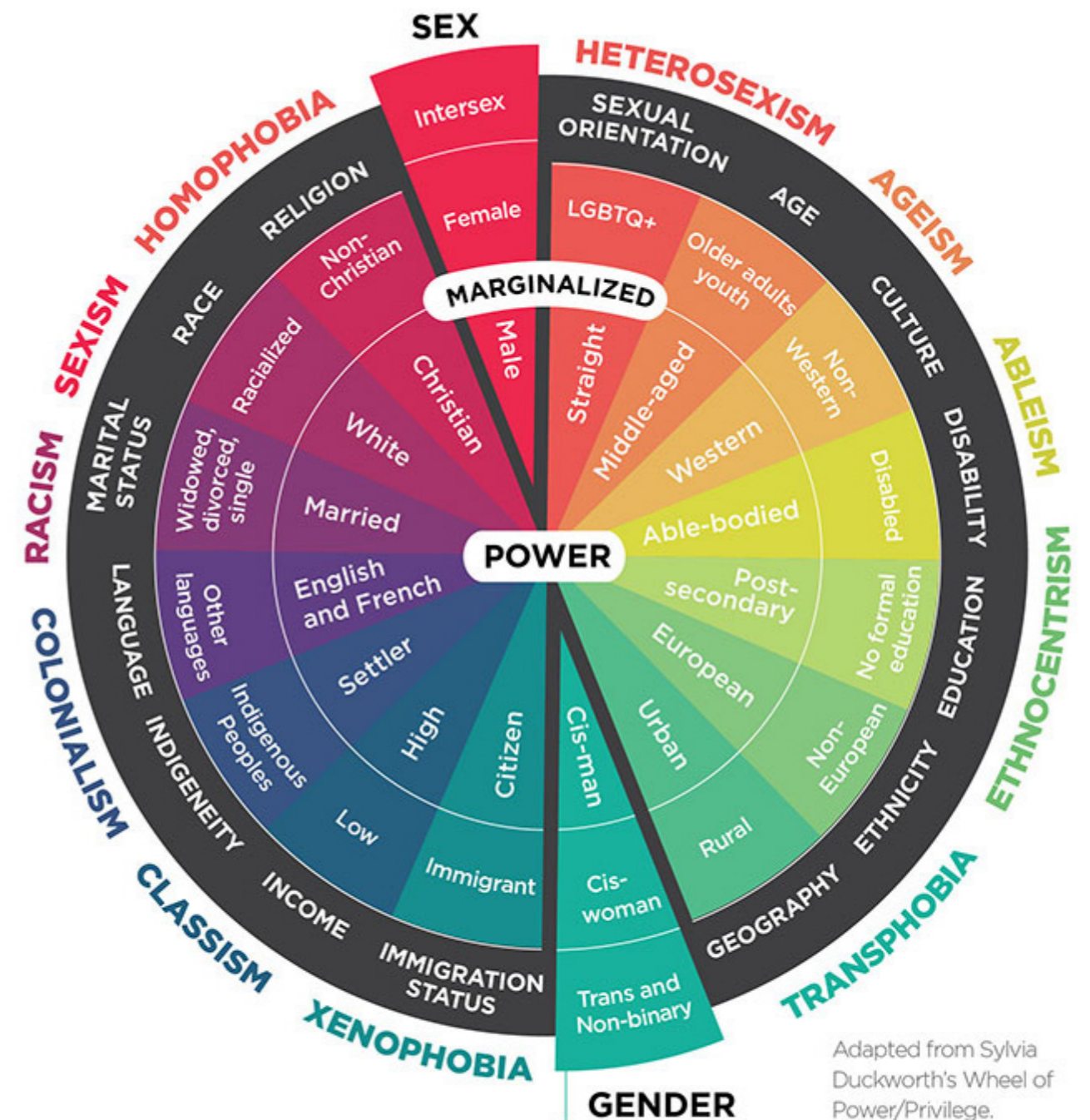
The source of this cultural diversity can be found in the historic development of Zuid, which has shown that it originated from the different waves of immigrant workers that came to the city over time, all with diverse backgrounds. This multicultural identity in Rotterdam-Zuid has often been put into relation with issues of violence and unsafety that the city currently deals with. Even though this could be seen as partially true, these claims are unfounded, and probably only develop through the association that cultures other than the norm are unknown and threatening of the known culture, and thus are seen as fearful and unsafe.

Even though this project is focused on the relation between gender and the built environment, one's gender is not the only factor that could influence their perception and use of the (urban) environment. This, together with the multicultural nature of Rotterdam-Zuid, would make the project unreliable if not touched upon the other layers of identity that could influence the perception and use of space.

These layers of identity are well-explained in the concept of intersectionality, which was first coined in an essay by professor of law and civil rights activist Kimberlé Crenshaw in 1989 (Cooper, 2015). Even though this term was primarily meant as a legal concept, it is now often applied elsewhere as well (Coaston, 2019). Intersectionality explains the fact every person is at an intersection of factors, that together make up someone's identity. These factors together can create a combined (dis) advantage, or influence their amount of privilege and discrimination in society. Some of these factors of identity might include gender, class, sex, race, ethnicity, or physical appearance (Crenshaw, 1989). Where during the first and second feminist wave, the focus was more towards equal rights for white, cisgender women, intersectionality acknowledged that black women did not only have their gender against them, but their race as well, increasing the inequalities between them (Intersectionality - Wikipedia, n.d.).

Intersectionality describes how a combined set of identity factors can influence how they are viewed and treated in society. Logically, this also means it impacts the way they view and interact with the environment. This way, a white man and a black woman can have wildly different views on the space, based on the way they are treated in environment. This difference in perception and use is a result of the combined experience of being a woman, and being black.

In relation to this, Rotterdam-Zuid not only has diverse prominent cultures, but is also known for stark contrasts between rich and poor, which can also partially be attributed to migration. One's income can also become a factor that influences use and perception of space. An explicit example of this, relates to the fact that poorer families tend to have more children, and have to travel further to their destinations (Falú, 2023). This impacts their user behaviour and perception of the environment as well.



Some gender identity terms include:

Agender	Genderfluid	Gender neutral	Transgender man
Bigender	Genderqueer	Non-binary	Transgender woman

3.18 - Wheel of Power/Privilege (Canadian Institutes of Health Research, 2021)

Not only is an individual's experience of the environment influenced by their own identity, but also by their social environment and culture. As was explained earlier, the current contrast of gender disparity knows stark cultural differences, which is known to correlate to religion as well. This causes some countries and cultures to have more traditional views on gender roles in households. Since some residents, especially in Rotterdam, have come from some of these cultures, their more traditional upbringing has influenced the way they view these gender roles, even if they move to a country that has more modern views on this. However, it is seen that second-generation immigrants tend to have more modern views on some of these aspects, which shows us that one's environment and society has a bigger impact on their views than their parental upbringing might have.

The prominent cultures in Rotterdam-Zuid tend to still have the more traditional views on the role of men and women in the household, which are similar to the ideas that were prominent when developing the *wijkgedachte* in the 1950s. In practice, this means that men take care of the family financially, and thus tend to travel further distances from home for work-related trips. Meanwhile, women will primarily take care of the children and the husband, through cleaning and cooking.

From a more modern point of view, this way of dividing household tasks could be seen as a form of oppression, since it doesn't align with current

views on equality in the Netherlands. However, even though these traditional views are different than ours, that does not mean they are unwanted. In some cases (although not all), the traditional division of household tasks is a free choice, agreed on by both men and women in the family. Some women like being the caretaker in the family and having a supporting role towards the husband. Because of this, we as designers must be careful to not force our more modern views on the users of the space. Rather than creating an urban environment that encourages the "oppressed" women towards an equal power dynamic in space, the space should only create the opportunities for women to equally use and own their environment.

It has been concluded that even though women share their gender unequal experiences, their intersectional identities make it so they still have wildly different experiences in the urban environment. And while this project focuses on women as a whole, and my personal perspective is one of a white bisexual woman, it aims to cater to the wants and needs of all women on all intersections. The project hopes to find the threshold of inclusivity in a space where all feel comfortable and welcome, and design accordingly to it. In the end, this comes down to listening to women's wants and needs and catering to them in redesigning the environment. This means creating opportunities without forcing a certain use and perception of the space, and listening to a broad spectrum of people, since everyone is made up of different layers in their identity.

3.4 / GENDER & SPACE

Triad of social space

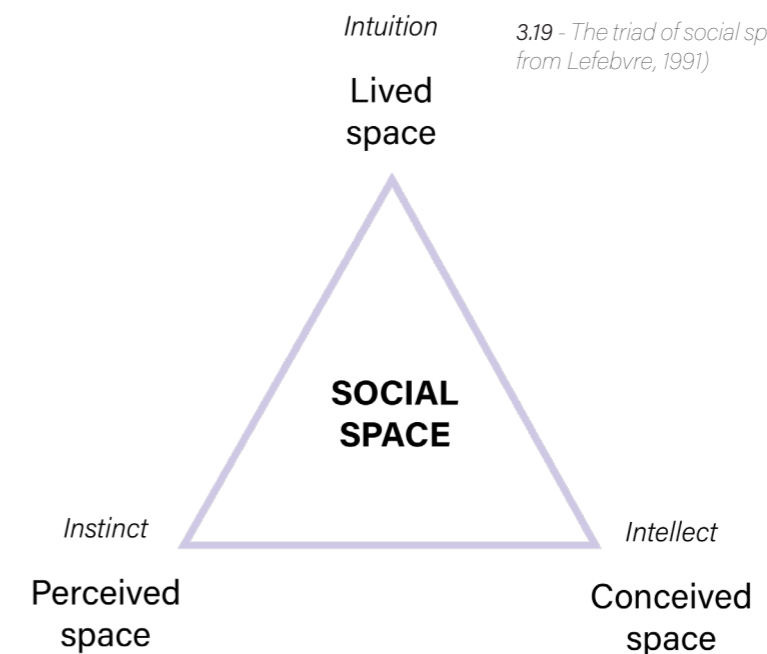
The evidence shows that the patriarchal views of gender in society trickled down into urban planning, thus showing a relation between gender and the built environment. What this relation actually entails today, is explored next.

Since the subject of gender in the built environment has little research, there are few theories on the relationship between gender and space. However, it has become apparent that it is related to the way women use and perceive the urban environment differently. The theory of the spatial triad from Lefebvre (1991) explains this concept quite well, as seen in the image below. He constructed a triad of three types of space, that together produce social space: the social layer of space which lays upon its physical one. In this triad, Lefebvre explains the concepts of lived space, perceived space, and conceived space. In parallel, lived space means

how the spaces is used, perceived is related to perception and experience of a space. The third, conceived space, explains the way the design of space is created and thought of to use and perceive, as urban designers and other experts do.

Throughout this research, it has been found that use and perception can also influence each other in multiple ways. Namely, when someone has a negative perception of a space, it can influence the way they use it. Consequently, when someone uses a space in a certain way, it can influence the perception, and thus the use, of someone else. This creates a continuous cycle of perception and use influencing each other, although this does translate from person to person. It can become a negative vicious cycle when perception of fear leads to abandonment of the space. Examples of this cycle, which is visualized in the figure you see below, will become clear later in this chapter.

In current literature, the use and perception of space according to gender is discussed separately, so it will be discussed separately here as well.



3.19 - The triad of social space (Author, 2023, adapted from Lefebvre, 1991)

Use of environment

Boys and girls

As was highlighted before, research has found that there is a difference in the number of boys and girls that play outside. But as it turns out, they use the spaces differently too.

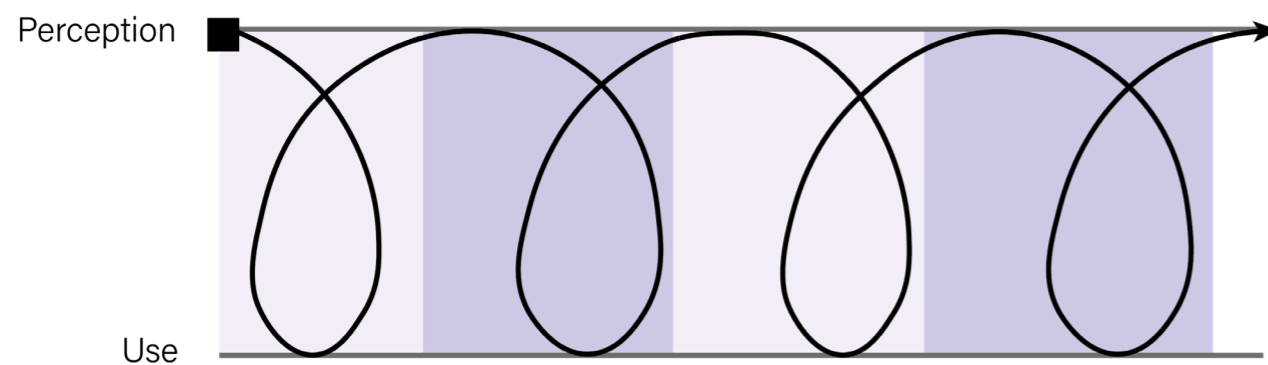
Boys play outside more than girls. As toddlers, this distribution seems about 50-50, but as they get older, there is a shift towards more dominance by boys at playgrounds (Helleman, 2021). According to literature research by Helleman, this is probably a remnant of the 1960s and 70s, when boys were allowed to play outside and become dirty, and girls were expected to stay clean and help with the household.

According to Helleman, there are a few causes for this. The first one states that the current outdoor spaces possibly do not match the needs of girls. Playground research has concluded that boys and girls have different preferences when it comes to types of areas to use for play. Helleman's research (2021), firstly found that girls were more supervised

than boys. Besides this, the locations of play also differ. A study from (Meire, 2020) found that both boys and girls prefer playing on the streets, but where boys prefer sporting terrain, girls tend to go to playgrounds. Sporting terrains are not popular for girls at all. Helleman's research also supports this, with sports fields (92%) and lawns (82%) begin dominated by boys.

This also relates to the main types of activity boys and girls participate in. A literature study done by Helleman (2022) concluded that boys like more vigorous, rough, and physical play, where girls participate more in socializing, passive, symbolic and creative play. Girls enjoy natural elements, a bigger variety of play equipment, and play in smaller groups than boys. Helleman's research itself found that boys mainly participated in ball sports, while girls were climbing, hanging, or balancing. They also enjoyed relaxing and talking to other children. Meire (2020) found that boys mostly participated in playing games with rules and low-intensity activity, such as kicking ball and cycling around. Girls in this situation preferred social activity and more receptive play, such as hanging and looking around. The surprise was that they found both boys and girls equally enjoy high-intensity play, for example running and climbing.

3.20 - Relation between perception and use of space (Author, 2023)



Female user patterns

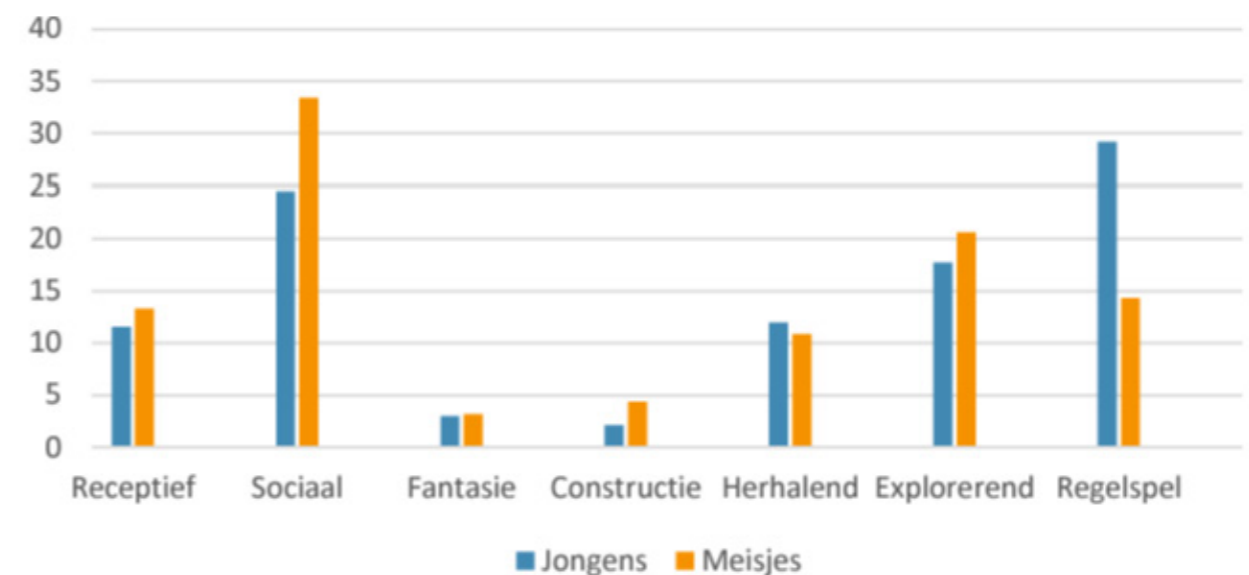
As we get older, there is less play involved in our lives. However, this doesn't mean these gender differences in uses of the city just disappear.

Men and women have different travel habits, in reasons for travelling and destinations. According to Criado Perez (2019), men mostly travel twice daily as they commute for work, but women's user patterns are more complex. Since women do 75% of the unpaid care work/household work, they drop off the children before school and do grocery shopping on the way home. This is supported by Cahill et al. (2020), stating that a woman's primary reason for travelling is to drop off and collect children and other family members, while men travel for work. Women take on more caring responsibilities, and also rely more heavily on the car for this, even though they often don't have access to one. They are also impacted more heavily by safety issues in public transport, according to Cahill et al. From cities in France and the US, research has found the trend that around two-thirds of the users of public transport are women, while men tend to use the car more often (Criado Perez, 2019).

These differences make sense, when it is clear that girls and boys of the same age are in different development stages (Roos & Daniëls, 2018). With these different stages belong different activities, which is also probably why children aren't as interested in interacting with the other gender when playing, and don't want to participate in the other activities.

When looking at public spaces in cities, it partially explains why girls play outside less: since most public spaces are open spaces with only a few set objects. These are ideal for the activities of boys, but don't cater to the needs of girls. Besides, seeing spaces being claimed by boys also makes girls feel less welcome to use a space. This coincides with the decreased feeling of safety from parents, which together shows that one's perception of space can influence their use. Some solutions Helleman states for gender inclusive design include creating social and traffic safety, plus better design of the public space.

3.21 - Gender differences in types of play children exhibit in public space (Meire, 2020)



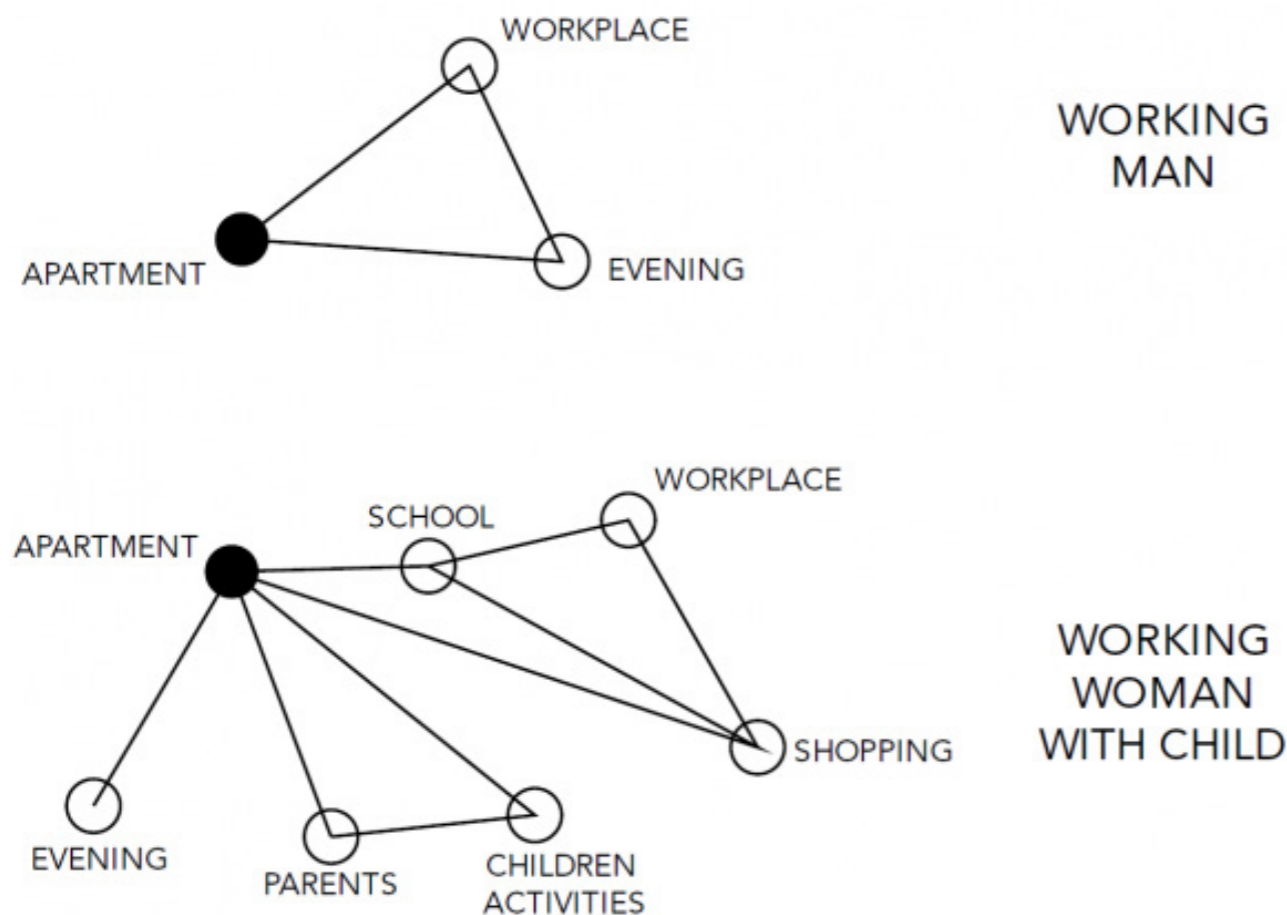
Another interesting difference in user patterns is one regarding trip-chaining; taking multiple stops in one trip, or having connected trips. Since women generally take on most of the care in the household, they trip-chain more (Granberry, 2018; McGuckin & Murakami, 2000). In London, this gender difference is 25%. They are also three times more likely to drop a child off at school (Criado Perez, 2019). According to Criado Perez, this figure is highest in families with young children, where a woman increases her trip-chaining by 54%, compared to a working man by only 19%. Besides this, their time of departure is more spread-out throughout the day compared to men (Ng & Acker, 2018), and purposes of trips also clearly differ, with women taking more shopping and social trips than men (McGuckin & Murakami, 2000).

These shopping trips also have an impact on accessibility of amenities. According to Reynolds & Weinstein (2021), women tend to spend a larger part of household income on clothing, goods for children, and meals. As a woman's earnings increase, their relative control over household decision-making does as well. And as they also take on more of the household duties, they purchase more than men. Even though they might

make more than 70% of household purchases, women feel underserved because their preferences are not met by the market. Research from Reynolds & Weinstein concludes that in terms of natural amenities, they value public parks and places with more progressive gender role attitudes. In terms of consumption amenities, the value of different kinds of amenities stay the same, but that does not mean that the variety of amenities are currently met in the needs of women

Another important type of amenities for women is childcare, since women still tend to take care of children more compared to men. It is found that places for childcare are actually decreasingly available and accessible in more vulnerable areas (Falú, 2023), such as Rotterdam-Zuid. This is a striking contradiction, since women in those areas actually tend to have more children, as was explained earlier in chapter 3.3. This means that while there are more children residing there, there are decreased opportunities for women to drop their children off at childcare, and thus work for their own and increase their independence and equality. The needs for these amenities is not met either.

3.22 - Gender differences in daily routing and trip-chaining (Granberry, 2018)



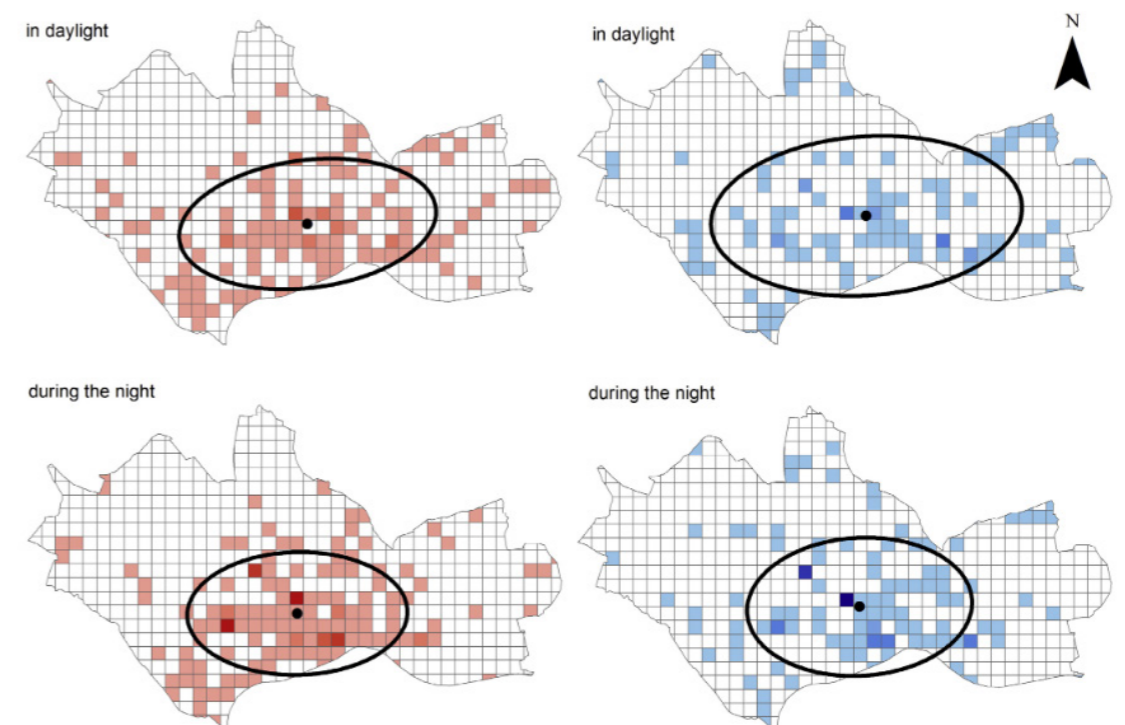
Perception of environment

Besides one's use of space making up the triad of social space, perception is also a big aspect of social space for a woman. Research has shown that women have different perceptions of green than men (Braçe et al., 2021), and are also more sensitive to the quality of a public space (Kraus, 2021). Green has a positive effect on health and well-being of urban residents in general (Braçe et al., 2021), but also improves the perception of spaces for women. And this is important, since women use public spaces more often, due to walking to work, accompanying children to school or shopping (Kraus, 2021).

However, it has been shown that women walk less overall, which is possibly caused by an increase feeling of unsafety (Schmitt, 2018). In Dublin, 47% of women will choose a longer route while walking if it prevents them from feeling unsafe (Cahill et al., 2020). More so, women have stronger perception of unsafety and fear when walking in the city (Rišová & Sládeková Madajová, 2020). Research has also shown us that perceptions of security can be positively linked to the visibility of urban greenery (Li et al., 2015). In this, women also prefer urban green spaces integrated into the neighbourhood that double as socializing spot.

This need for socializing is also seen when teenage girls were asked what they want in their cycling route (Gardiner, 2021). In conclusion, they do not necessarily value the fastest route, but one that creates space for a "social moment". Other important aspects are in relation to warm colours, and an "intimate room" type space, as a venue to cycle to, where they could stop and talk to each other. They also expressed the desire to see other

3.23 - Gender differences in fear perception when walking in Banská Bystrica, Slovakia (Rišová & Sládeková Madajová, 2020)



people in the space, while retaining control of how they were viewed themselves. This all increases the quality of the public space and also the sense of community, which has been known to be associated with increased well-being and feelings of safety (Francis et al, 2012).

In Vienna, similar guiding principles were created, that are currently basics in every public space design or redesign there. Some of their principles include decent lighting and clear routes that give eyes on the street, increasing the feeling of public safety. This does inevitably create tension between different city users, and raise questions like maintenance, for example with drinking water and public restrooms. However, it is the belief that to achieve equality of public space, the focus has to be on the group that is excluded. Most times, inclusive for the minority is inclusive for all.

Overall, this research has found that a woman's perception of space is in relation to the readability of said space. An important theory that explains this fine line of readability, is the matrix of environmental preference by Kaplan & Kaplan (2005), as shown here below. On the top row, it explains in what depth a place is read. As Kaplan and Kaplan explain, understanding is about making sense and increasing one's sense of familiarity. Exploration goes past understanding

and expresses the ambition to find out more about the space. In the left column, the matrix explains how quickly aspects of an environment can be perceived. For example, to understand a space, one needs to be able to read its coherence, which is something that can be judged very quickly. On the other end of the spectrum, when one wants to explore a space, the amount of mystery needs to be judged over time. Overall, they conclude that the perception of a space is combined of four aspects: the environment's coherence, complexity, legibility (or readability), and mystery. All these four aspects carry positive and negative consequences when they are present in the space: a space can be coherent and legible, thus easy to understand, or too predictable. That is when a space can be tested by its complexity or mystery to fulfil the need for exploration. It is believed, however, that there can't be any exploration before a space is understood. Only when the coherence and/or legibility of the space is sufficient, it creates a baseline of comfortability from which can be explored.

This project will continuously try and find the balance in this framework; in creating spaces that either provide at least understanding, or exploration as well. These aspects can be used to highlight in what aspect current spaces are lacking, and are in need of a redesign.

	Understanding	Exploration
Immediate	Coherence	Complexity
Inferred	Legibility	Mystery

3.24 - Kaplan's preference model (Kaplan & Kaplan, 2005)

(Un)wanted behaviour

The figure before highlighted the relation between one's use and perception of space, and concluded that not only do both impact each other, but one person's use of space can lead to behaviour that positively or negatively impacts another person's perception of said space. Thus, in the quest to find what women prefer in their urban environments, we not only have to look at women's own behaviour and preferred spatial elements, but also what behaviour of others is (un)attractive to women. Subsequently, we need to try and eliminate the unwanted behaviour, and thus figure out what physical elements contribute to that behaviour.

The definition of the term public space has become more debated over recent years, mainly because the line between public and private in spaces has become blurrier. For users, this raises questions such as: Am I allowed to be here? And is this space meant for me? It is in this ambiguity of ownership of a space that women feel more uncomfortable, though loitering youth are found there most often, in group settings, along seating arrangements, and with loud music. And while they mostly don't do

anything illegal, the activities feel unsafe. As (Burney, 2005) states, the loitering youth "have become synonymous with disorder and public threat", which actually stems from anxieties about a loss of social control of the space. Besides, their behaviour can also often be interpreted as anti-social behaviour (ASB), which can be defined as "behaviour that unreasonably interferes with other people's rights to use and enjoyment of their home and community" (Burney, 2005).

This sense of control and ownership of a space is important in contributing to one's feeling of safety. And it also has to do with a certain power dynamic in the environment: loitering youth claim power over the space, by often seating themselves in the middle and sitting higher than the eye-level. This makes the space easier for them to oversee, and gives them a sense of dominance in the space. This behaviour of asserting dominance shows similarities to the kind of territorial behaviour we often see in animals. It gives the indication that the groups feel threatened and feel the need to defend themselves.

Loitering youth tend to place themselves in areas they are familiar with, because they understand the space and know all the exits. They also value a sense of anonymity, meaning they want to oversee everything that happens in the space, but don't want to feel watched or lose control over the space. That is why they often choose locations that are relatively nearby, but not too close to their home.

In these conflicting power dynamics, women often lose, which causes them to feel less control and ownership over the space, and thus feel unsafe. As a result, women tend to avoid certain routes or places, or refrain from going outside altogether. To combat this trend and increase comfortability for women in the urban environment, the strategy of defensive design has been implemented in many spaces. More specifically, this often means making certain hangout spots for youth less attractive, by making the attractive elements less accessible or eliminating them altogether. This is often done by installing metal bars or spikes along places that would be used for seating. These examples of hostile architecture are used to restrict the unwanted behaviour. However, this usually has the opposite effect: it makes a space even less attractive and less accessible for the minority groups, and decreases the boundary between public and private space even further. Consequently, the increased animosity of the space makes it more attractive for youth to hang around again. They usually will find their way around the barriers and find another place to sit.

The implementation of hostile architecture, or defensive design, often leads to spaces that seem more neglected than before. A neglected space

also consequently makes a space less welcoming. As was explained before, women are more sensitive to the quality of public spaces, and neglected spaces reduce the perceived quality. The same counts for maintenance of the space, since littered spaces decrease their attractiveness as well. It is found that youngsters actually want to care for their space if they have the right facilities to do so, like accessibility to garbage cans, and feel a sense of belonging in the space. This makes them want to participate and contribute to keeping the space clean. This means that, instead of trying to eliminate youngsters and the behaviour from the environment altogether, we should try and redirect towards positive behaviour through design.

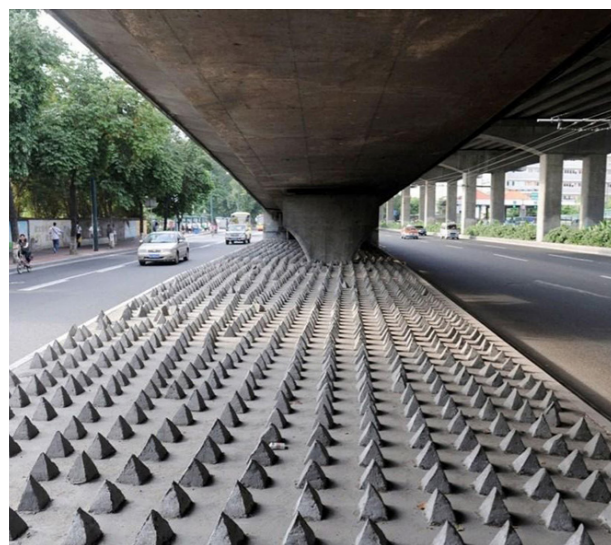
A way of stimulating wanted behaviour is through providing the environment with an identity that positively connects with the youth. This identity can give them a sense of civic pride, which makes them want to take care of the space. A clear identity also gives them more clarity on the boundaries of the publicity of the space, and makes them see what spaces are and are not meant for them.

Besides redirecting their negative behaviour while in the space, loitering youth also need to give up their sense of control to give everyone equal

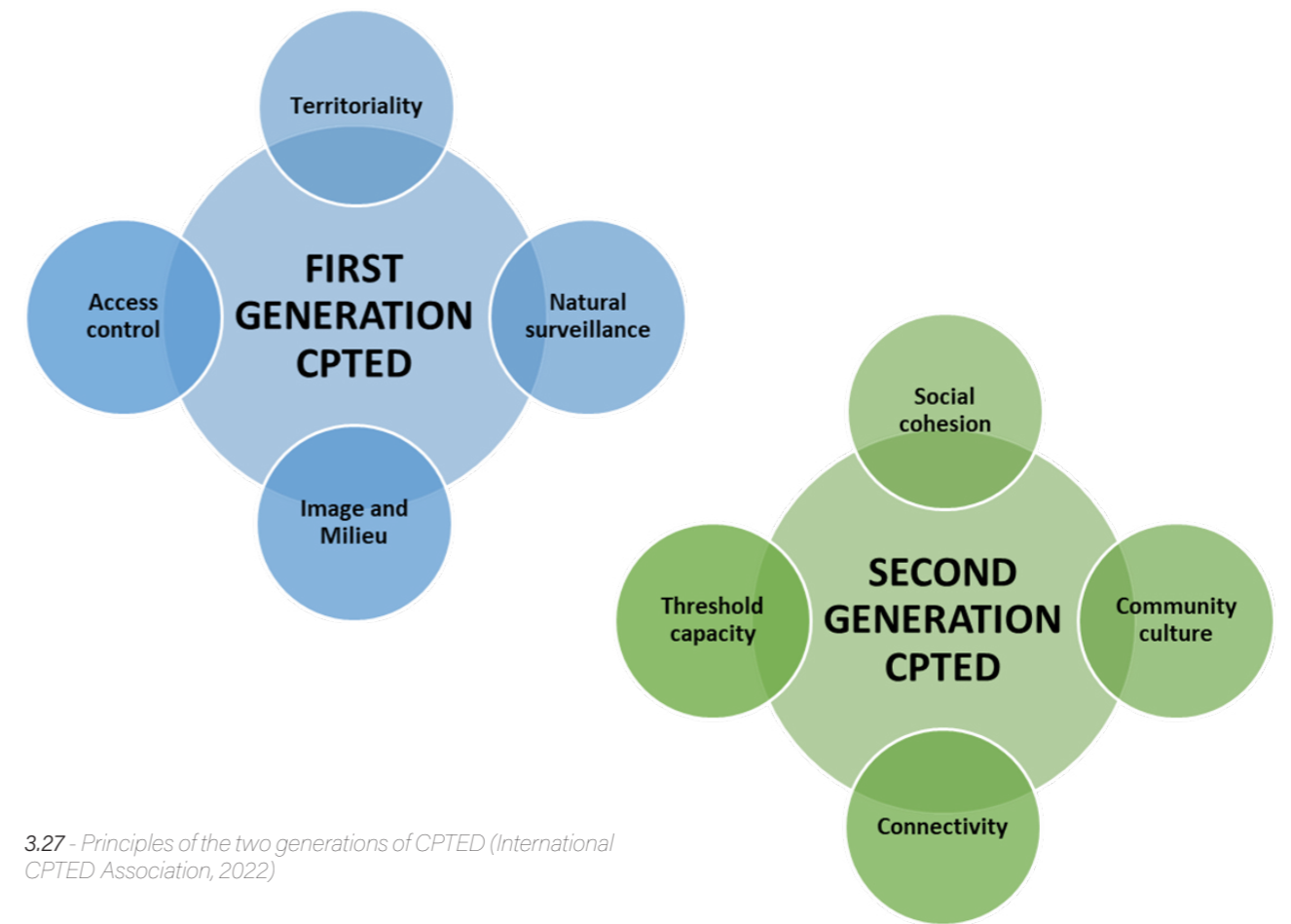
opportunities in the environment. This is difficult, since the youth like their control of the space and are quite defensive of their territory. When this is policed by a form of formal control, for example through police or camera's, this sense of control is threatened, and could have counterproductive effects. The youth could become more hostile towards defending their space, or simply move to a different space nearby. Alternatively, there are opportunities to instigate a sense of informal control. For example, a corner store located close to the space, with a shop owner that is closely connected to the community. This is more informal than including the police, but in hierarchy, the shop owner has more ownership over the space than a resident, since his shop is located there. This has a two-way effect: firstly, it increases the feeling of safety for women, since there are more eyes on the street. Subsequently, it also makes the youth feel a different sense of control, but without fully understanding it, as would be the case with more formal control. If they would fully understand the form of control that is trying to oppress them, they will understand what is accepted and what is not. Instead, they will be more thoughtful with their behaviour.

An approach that summarizes the strategies to redirect unwanted environmental behaviour, is also known as Crime Prevention through Environmental Design (CPTED). According to their website, the CPTED movement first originated from Jane Jacobs' book "The death and life of great American cities", and gained traction through books from Oscar Newman and C. Ray Jeffery in the 1970s (International CPTED Association, 2022). The movement aims to prevent crime, motivate positive attitudes and reduces physical opportunities for crime. The CPTED movement is divided into two generations, with the first generation being divided into four principles, according to Newman (1972): Territorial control, natural surveillance (or informal control), image and milieu, and access control. The second generation, introduced in the two decades after the first generation, connected and added to the first generation, while focusing on the small-scale environments. These four principles included social cohesion, community culture, connectivity, and threshold capacity. As can be seen, all of these principles have been discussed in this chapter beforehand, which highlights that all of these principles are relation to each other, even when discussed in a differently themed context.

3.25 - Hostile architecture under a viaduct (Rethinking the Future, n.d.)



3.26 - Spikes near an underpass in Washington DC (Hidden Hostility DC, 2018)



3.27 - Principles of the two generations of CPTED (International CPTED Association, 2022)

3.5 / WHAT WOMEN WANT

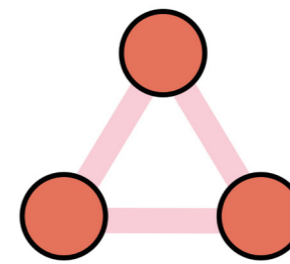
Concluding from the discussed theory, combined with my own female perspective, a few prepositions are made in terms of the spatial elements that could contribute to a gender inclusive design on different scales. These prepositions were translated into principles, as can be seen on the right. They guide the course of analysis and design in this project on three different scales, which is shown by the clustering of the principles.

On the biggest scale, three principles inspire the vision for the district, which concern the network, green structures, and amenities. From the discussed theory, it is concluded that women are in need of reliable and safe public transport, and safer and less car-dominant streets, which together caters towards their trip-chaining behaviour, instead of the current max-capacity planning. This could be combined with the clustering of amenities to shorten trip times. Amenities should furthermore promote low threshold interactions and cater to the high diversity in needs, especially in terms of childcare. These amenities can be located along a green structure, stimulating safer slow traffic through characteristics like lighting, colours and materials.

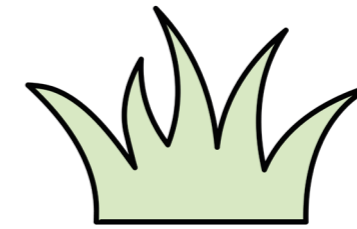
On the smaller, neighbourhood scale, these first three principles will be combined with three on a smaller scale: breaking barriers, facilitating wayfinding, and creating viewpoints. These principles all relate to increasing the feeling of ownership and safety on the street, since the opposite will give women the feeling of not being able to escape or lost and unwelcome. The adding of clear routes and viewpoints can also add to the level of interaction within the neighbourhood, thus reducing fear.

The smallest scale concerns the public space scale, with which the last three principles are added. In these spaces, identities will be strengthened, ownership will be defined more clearly, more eyes will be on the street to increase feelings of safety and sense of community.

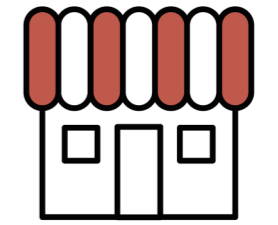
As a way to test the reliability of these principles, they will be combined with further location analysis into a survey, which will add research and confirm whether these principles need changing. These principles will also guide the forming of the universal framework which will measure female-friendliness of spaces.



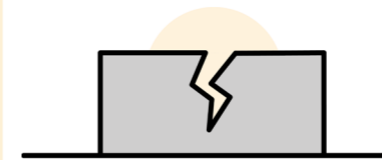
Network



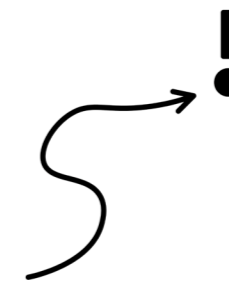
Green structure



Amenities



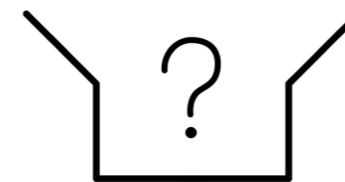
Break barriers



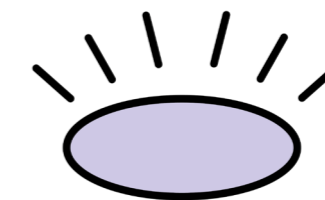
Wayfinding



Viewpoints



Ownership



Identity of place



Being seen

3.28 - Gender differences in fear perception when walking in Banská Bystrica, Slovakia (Rišová & Sládeková Madajová, 2020)

04

The spatial

This chapter will contain all knowledge on the spatial layer of this project. This is mostly concerned with the spatial location analysis, and will show how the current situation of the district and neighbourhoods currently caters to gender inclusivity. The chapter will showcase an array of analyses done on Rotterdam-Zuid, as well as the two chosen neighbourhoods within them. The focus of analyses was guided by context-specific aspects, such as the historic spatial layer, together with the principles mentioned in the previous chapter. As a conclusion, the positives and negatives of the location will be shown through a SWOT analysis in conclusion. In the end, this forms the input for the design, so it is known what qualities of the place to strengthen, and what should be changed.

4.1	District	72
4.2	Neighbourhoods	82
4.3	Qualities and pitfalls	118
4.3.1	<i>Hillesluis</i>	118
4.3.2	<i>Zuidwijk</i>	119

4.1 / DISTRICT

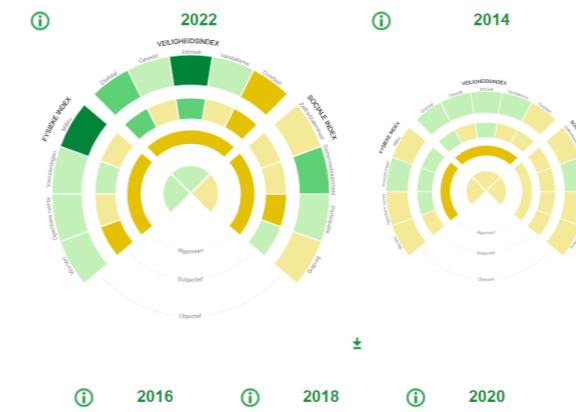
Introduction

Rotterdam-Zuid is the part of Rotterdam that lies south of the river Maas. It mostly exists of three districts: Feyenoord, Charlois and IJsselmonde. In this research, the main focus is on Charlois and Feyenoord, since they are mostly located closer to the city centre. Rotterdam-Zuid counts around 240.000 inhabitants, many with diverse cultural backgrounds.

The history of Zuid has been explained in an earlier chapter, but the main challenges Zuid faces today concern poverty, crime and low liveability. This can

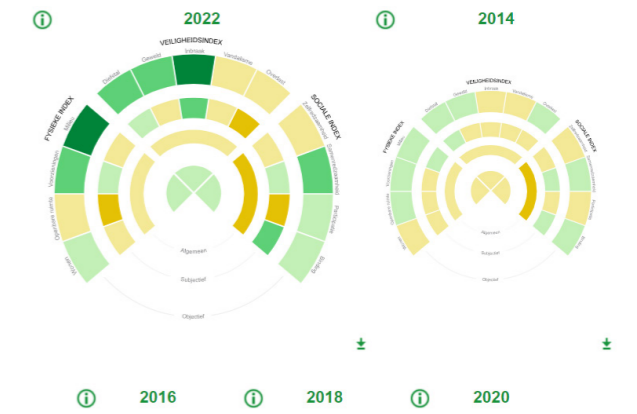
be seen in the neighbourhood profiles, as well as the liveability index, as you see on the right. After a set of neighbourhoods from Zuid was named "Vogelaarswijken," or special needs neighbourhoods, the Nationaal Programma Rotterdam Zuid (NPRZ) was created, to try and combat the challenges. All of this worsened the image of Rotterdam-Zuid: many news articles shed them in a bad light today, as you can see in the Google searches below.

Verandering 2014 - 2022



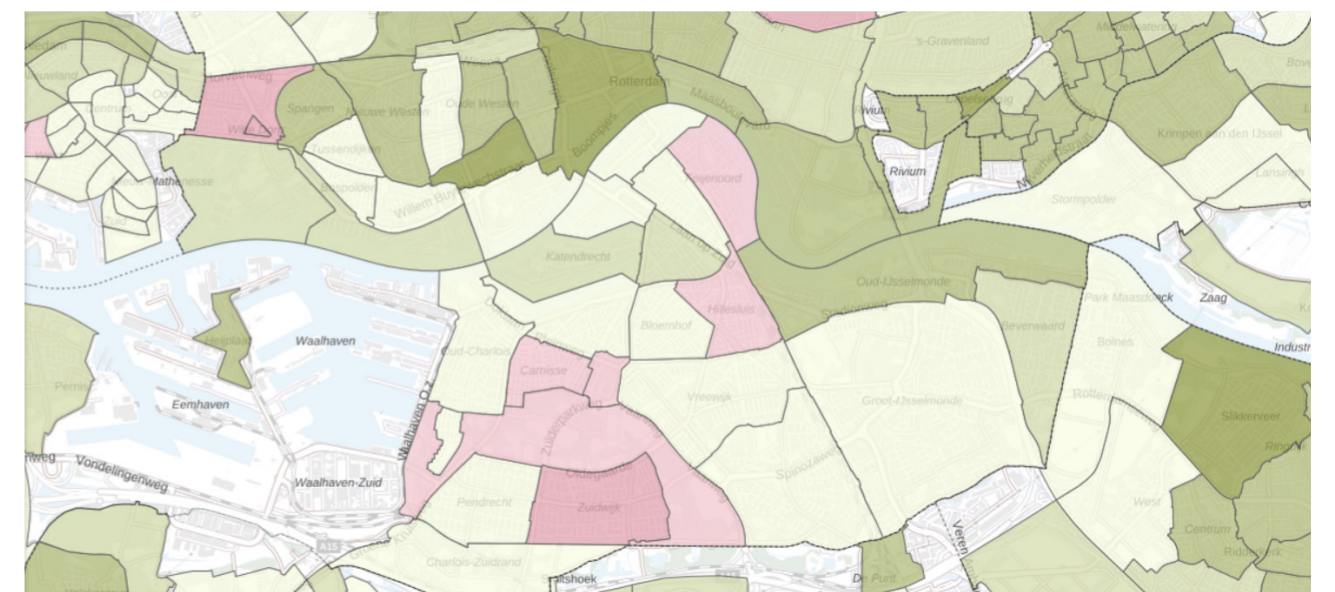
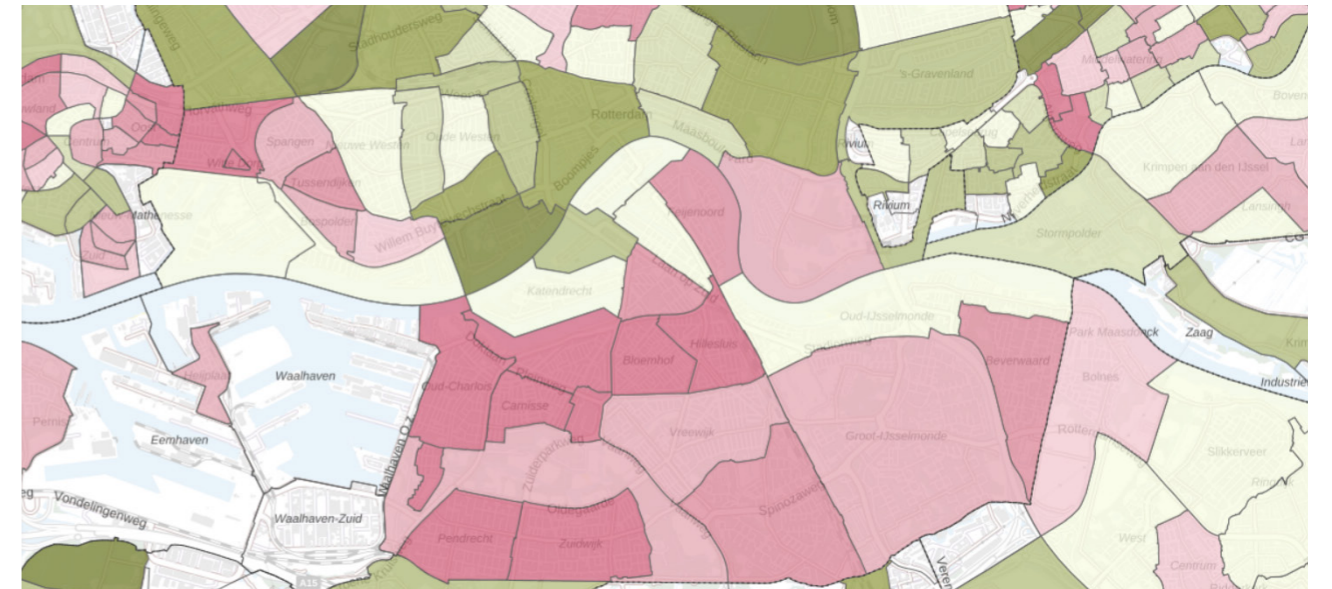
4.3 - Neighbourhood profile of the Charlois-district in Rotterdam-Zuid (Gemeente Rotterdam, 2023)

Verandering 2014 - 2022



4.4 - Neighbourhood profile of the Feyenoord-district in Rotterdam-Zuid (Gemeente Rotterdam, 2023)

4.5 - Liveability compared to the Dutch average (Leefbaarometer, 2023)



4.6 - Liveability development between 2012 - 2020 (Leefbaarometer, 2023)



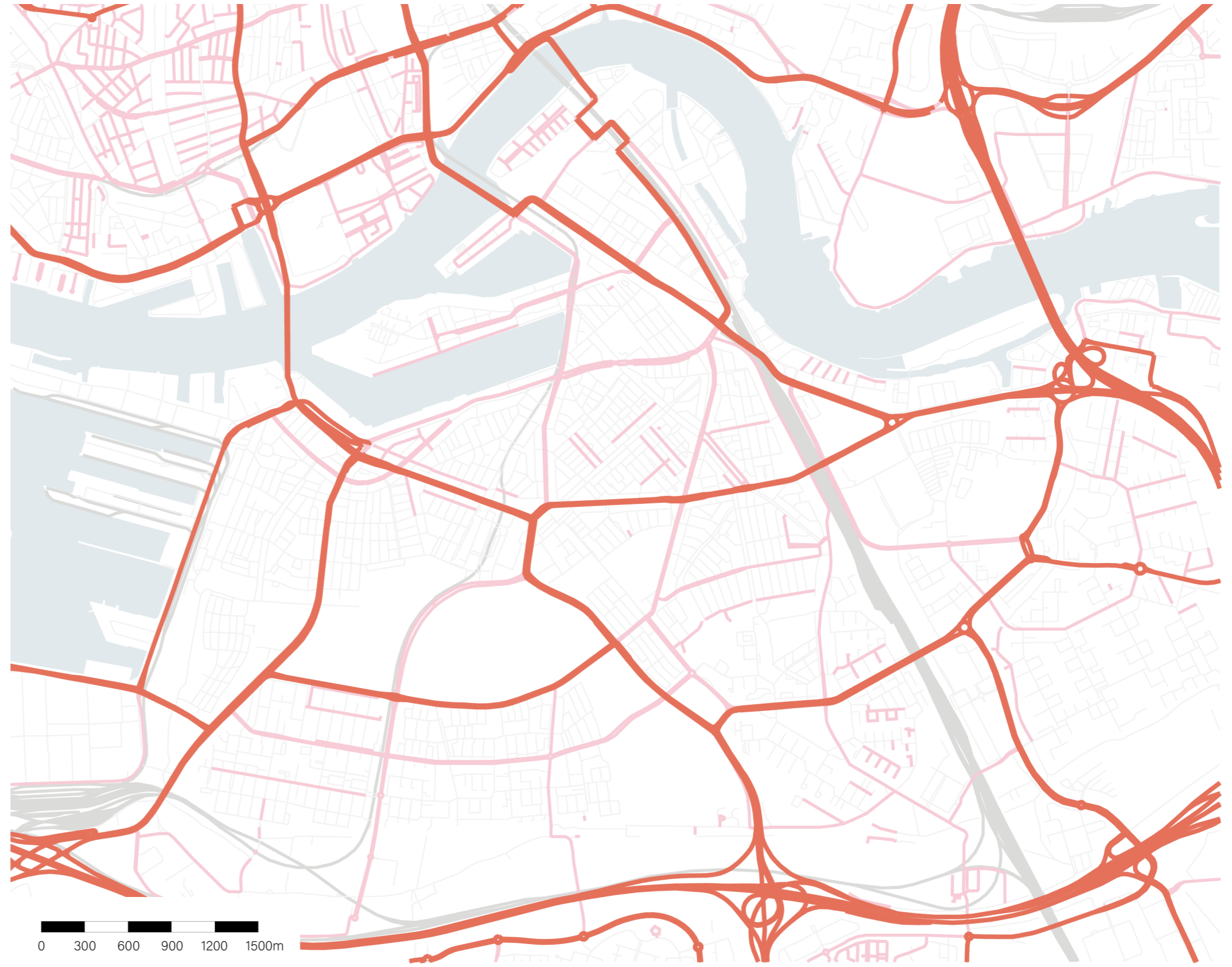
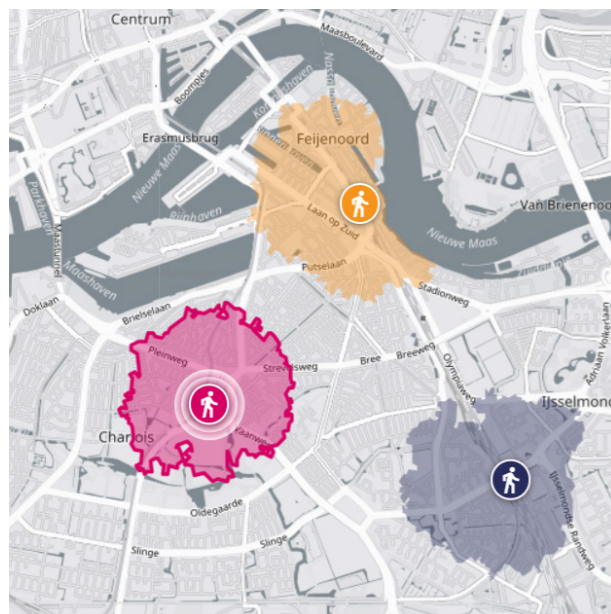
4.2 - A Google search on Rotterdam-Zuid (Google, 2023)

Network

On the district level, a spatial analysis was made for according to the three guiding principles for that scale. Firstly, an analysis of the current network was done.

Rotterdam-Zuid knows many big roads, which make the car network quite accessible for them. In terms of public transport and slow traffic, however, this is not the case. As is seen in the scheme below, a 15 minute walk from some prominent public transport stations, doesn't get you very far into the districts, which means more accessibility is needed in that area.

4.7 - a 15 minute walk from popular stations (TravelTime Map, n.d.)



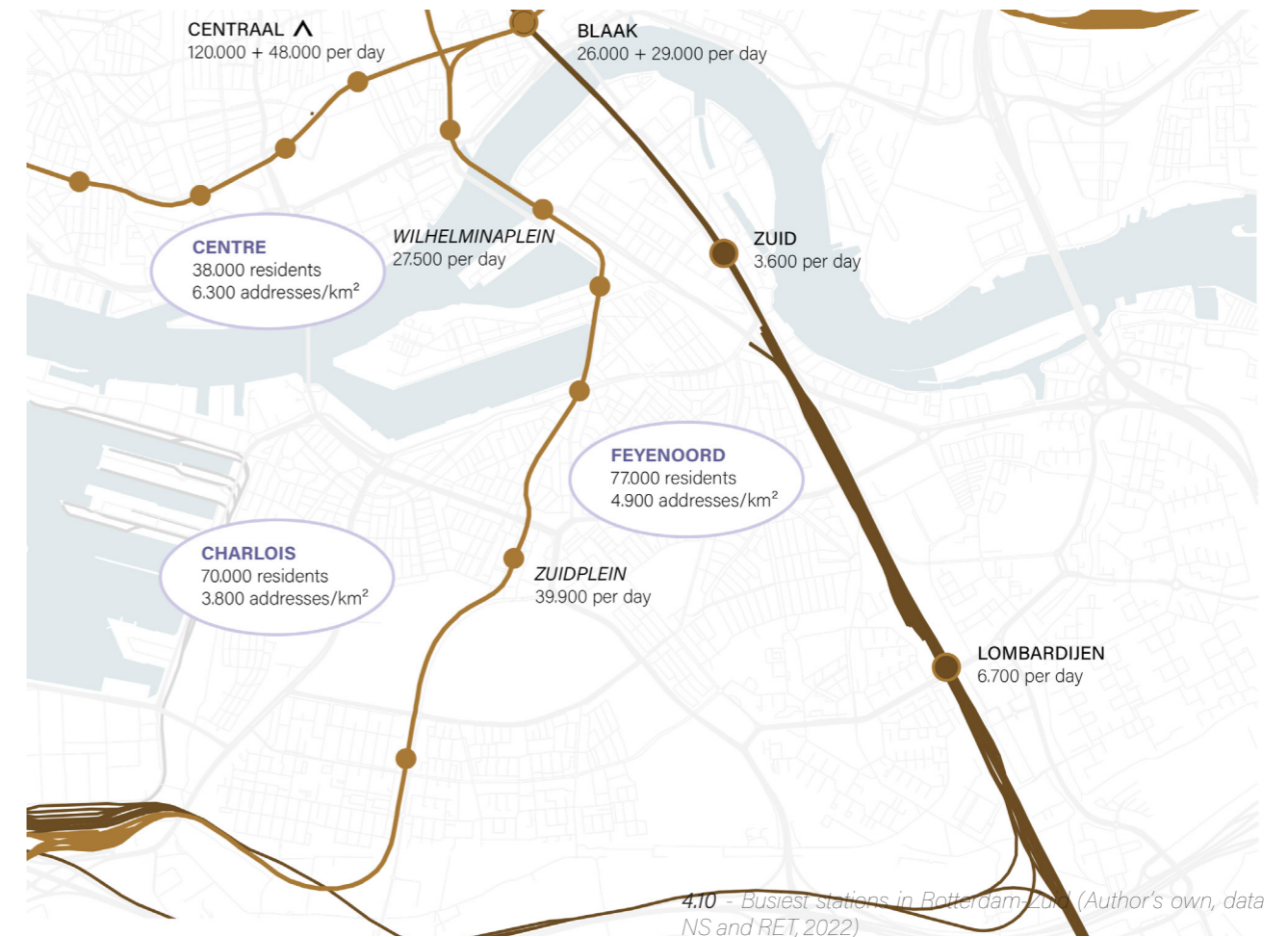
4.8 - Road network in Rotterdam-Zuid (Author's own, 2023)

In terms of public transport, there is many routes available, but a trip to the main parts of the city are not very easy, in terms of connecting routes and transfers. The most accessible, and also visited line, is the metro, which is indicated in the illustration on the right. This line doesn't have that many stops on Zuid, however. The train line is not quite located accessibly for the whole district, with one station (Rotterdam Stadion, not pictured in the illustration) only being open during football matches.

Besides this, it was found that the address density of Rotterdam-Zuid is much lower than it is north of the Maas. This creates the need for more stops as well.

It was also found that there are almost no bike paths on the smaller scale. Due to the culturally diverse identities in Rotterdam-Zuid, many don't own a bike either. However, they don't have a car more often than compared to north as well, which means these people are more dependent on walking and public transport.

Walking and public transport are also often see as the most unsafe modes of transport by women, which is why it is important to create safe and accessible walking and public transport routes.



OVERALL TRANSPORTATION ACCESS

	Dutch	Western	Non-western
car	69%	53%	34%
bike	85%	73%	50%
no car	28%	-	-
no bike	11%	-	-
no car or bike	16%	-	-

NOORD

car	47%
bike	74%
public transport	92%

ZUID

car	57%
bike	69%
public transport	85%

4.9 - Travel behaviour in Rotterdam-Zuid (Author's own, data Gemeente Rotterdam, 2023)



Green structure

In terms of green structure, we can say that although it looks like there is an okay structure of green in Rotterdam-Zuid, but many of this green is underused, and actually only a grass field. Besides, the green is mostly made up of the Zuiderpark and a few smaller pieces of green, but towards the north, it become less and less. There is a great opportunity to grow in that area.

On the smaller neighbourhood scale, we will see that the structure of neighbourhoods can differ to an extent that some areas might have more opportunities for green than others. However, I believe creating the bigger structure gives an opportunity for everyone to get equal access to diverse greenery.

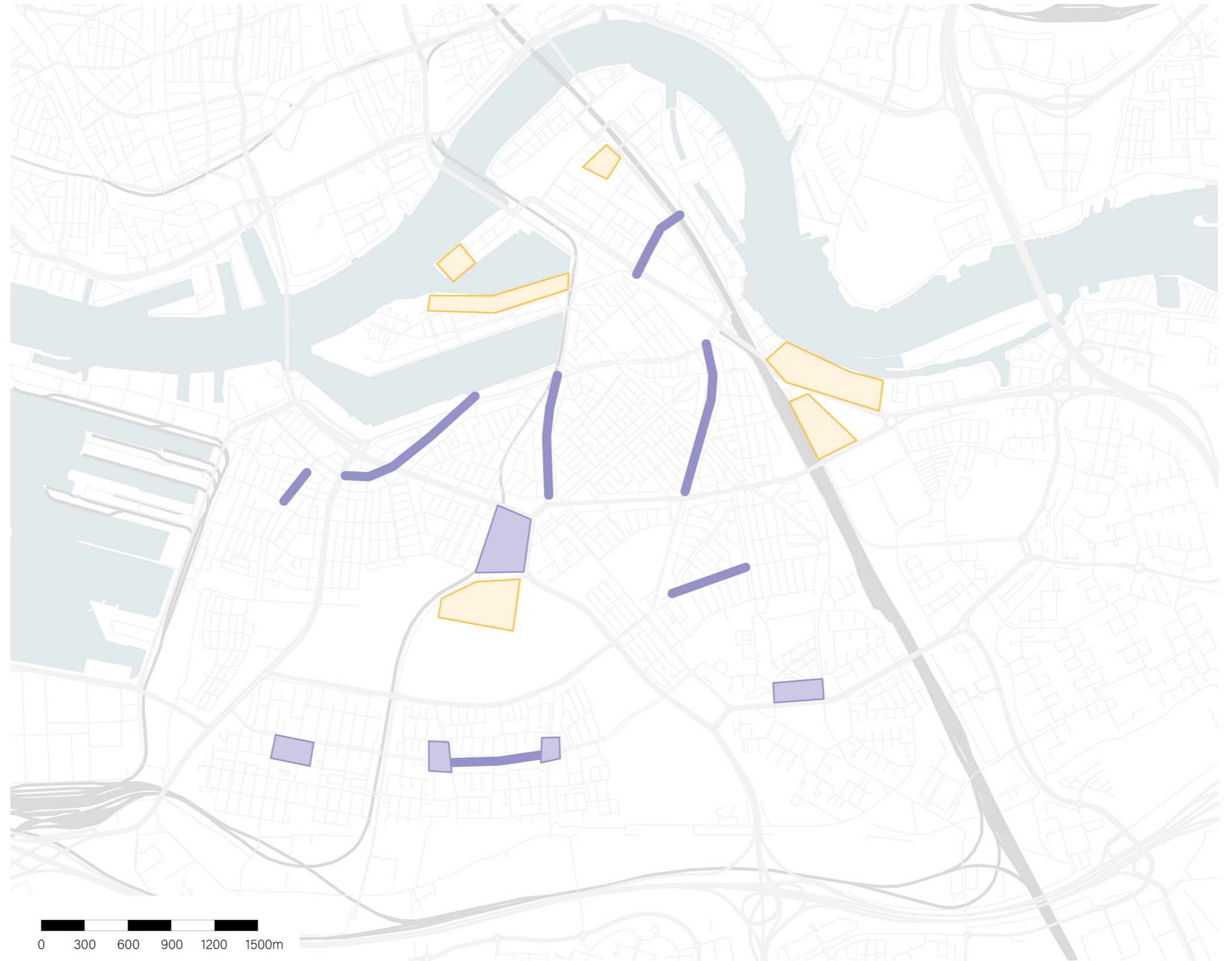


4.12 - Green structures in Rotterdam-Zuid (Author's own, 2023)

Amenities

Shopping amenities (indicated in purple) are mainly clustered through streets in Rotterdam-Zuid.

The cluster of Zuidplein was designed as the city centre of Zuid, as was explained before, which is why it is clear there is an abundance of amenities there. Besides this, mainly shopping streets make up the purple amenities in Zuid. In terms of recreation, there is the concert hall of Ahoy, the Feyenoord area (although separated by the train tracks), and some new development along the Maas. Other than this, it mainly happens on the smaller scale or within shopping streets as well. It helps to structurally cluster these areas, since it gives people a destination with known identity to go to.



4.13 - Amenities in Rotterdam-Zuid (Author's own, 2023)

4.2 / NEIGHBOURHOODS

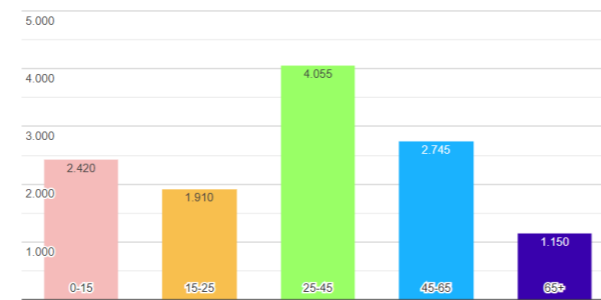
Hillesluis

Where? Feyenoord
 Area 90 hectares
 Inhabitants 12.280
 Households 5.645
 Men-women 50,4% / 49,6%

Main areas of concern poverty, negligence, crime

The chosen neighbourhoods are Hillesluis and Zuidwijk, both located in Rotterdam-Zuid. The main reason for choosing these two neighbourhoods, is

Inwoners naar leeftijd - buurt Hillesluis



4.15 - Inhabitants ages of Hillesluis (Allecijfers, 2022)

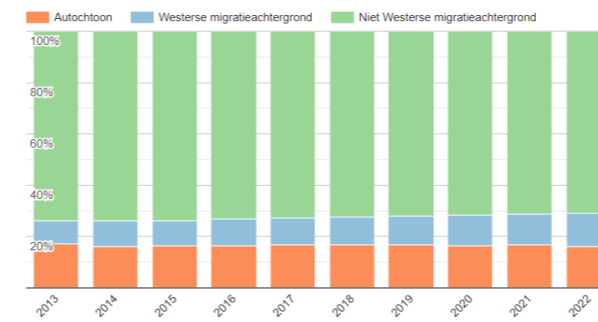
because they have different historic backgrounds as a pre- and post-war neighbourhood. This could showcase how the urban fabric impacts gender inclusivity, and what this means for design.



4.14 - Map of Hillesluis

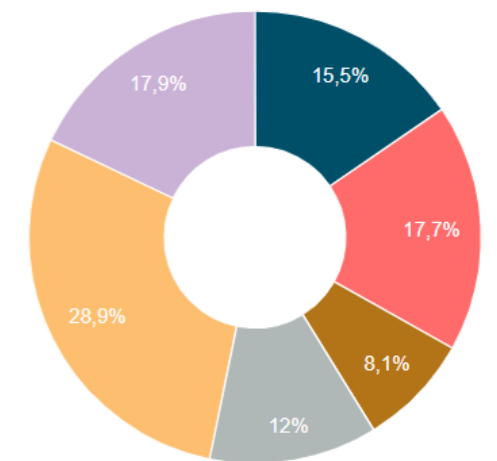
Autochtoon of migratieachtergrond:

Verdeling van de bevolking naar autochtone inwoners en inwoners met een Westerse of niet Westerse migratieachtergrond voor de buurt Hillesluis. Gegevens voor de jaren 2013 tot en met 2022.



4.16 - Cultural background in Hillesluis (Allecijfers, 2022)

Westers Marokko Antillen Suriname Turkije Overig

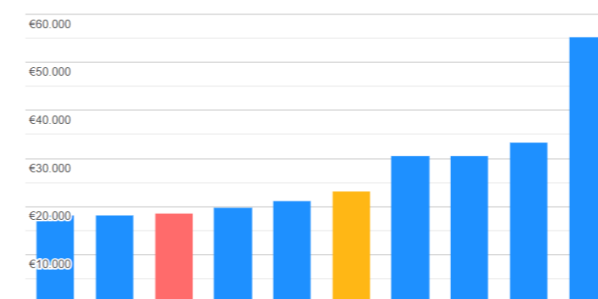


4.17 - Ethnicities in Hillesluis (Allecijfers, 2022)

Gemiddeld inkomen per inwoner (€18.500)

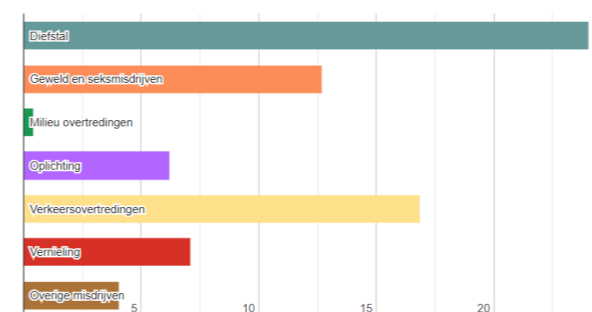


Gemiddeld bruto jaarinkomen in buurt Hillesluis.



4.18 - Average income in Hillesluis (Allecijfers, 2022)

Criminaliteit - buurt Hillesluis



Criminaliteit: aantal misdaden per 1.000 inwoners in 2022 in de buurt Hillesluis.

4.19 - Crime in Hillesluis (Allecijfers, 2022)

Hillesluis is a neighbourhood in the Feyenoord-district, and was a typical neighbourhood for harbour workers. It is separated on the eastern side by a train rail, and main roads on the other sides. The main important road is the Beijerlandse laan, which is a popular shopping streets in Rotterdam-Zuid, This street gives the neighbourhood a sense of identity and opportunity for interaction. Main challenges of Hillesluis are the low incomes, negligence of space and crime.

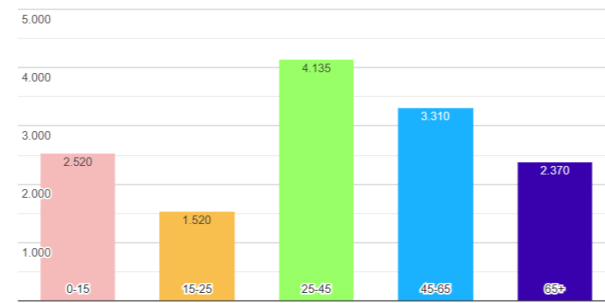
Zuidwijk

Where? Charlois
 Area 153 hectares
 Inhabitants 13.855
 Households 7.005
 Men-women 49,8% / 50,2%

Main areas of concern social cohesion, poverty, safety

Zuidwijk is a neighbourhood in the Charlois-district, and is part of the Zuidelijke Tuinsteden developed with the wijkgedachte in the 60s, as was explained before. Compared to Hillesluis, Zuidwijk is located further away from the city centre, and is set up with a lower density and more space. It has actually been found that in gender-equality, location and proximity is essential, and areas tend to have a higher vulnerability when the urban fabric is more extensive and low-density (Falú, 2023). The neighbourhood is surrounded by

Inwoners naar leeftijd - buurt Zuidwijk



▲ 4.21 - Inhabitants ages in Zuidwijk (Allecijfers, 2022)

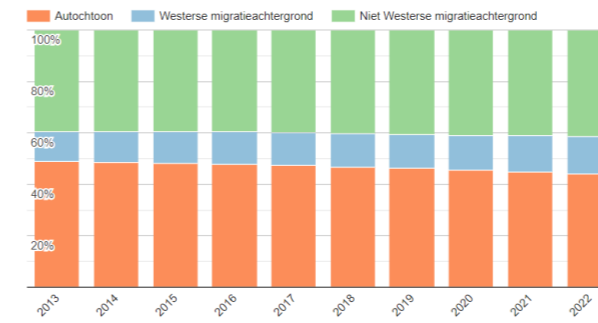
green and water on south and east, but also separated by a road on the north and a metro rail on the west. The main roads are located in an orthogonal cross, with the main shopping being along the biggest road, going straight through the neighbourhood crossing west to east. Main areas of concern in Zuidwijk are poverty, lack of social cohesion and safety.



▲ 4.20 - Map of Zuidwijk

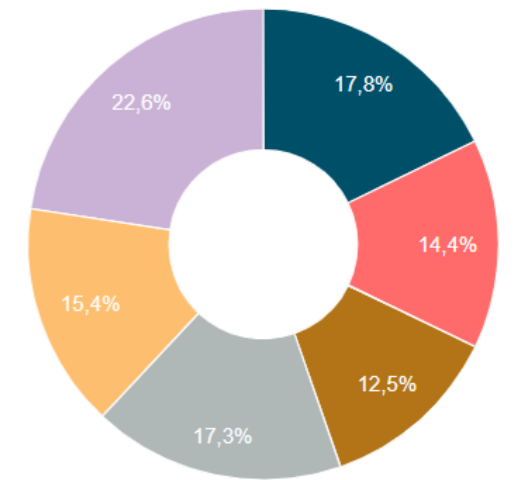
Autochtoon of migratieachtergrond:

Verdeling van de bevolking naar autochtone inwoners en inwoners met een Westerse of niet Westerse migratieachtergrond voor de woonplaats Rotterdam. Gegevens voor de jaren 2013 tot en met 2022.



▲ 4.22 - Cultural background in Zuidwijk (Allecijfers, 2022)

● Westers ● Marokko ● Antillen ● Suriname ● Turkije ● Overig

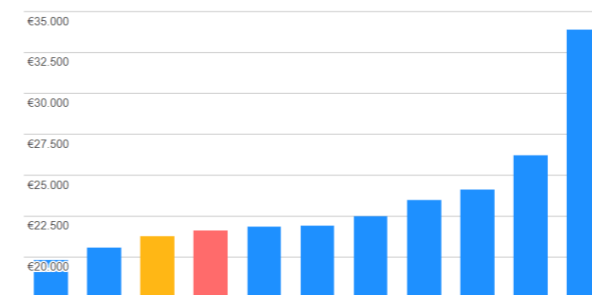


▲ 4.23 - Ethnicities in Zuidwijk (Allecijfers, 2022)

Gemiddeld inkomen per inwoner (€21.600)

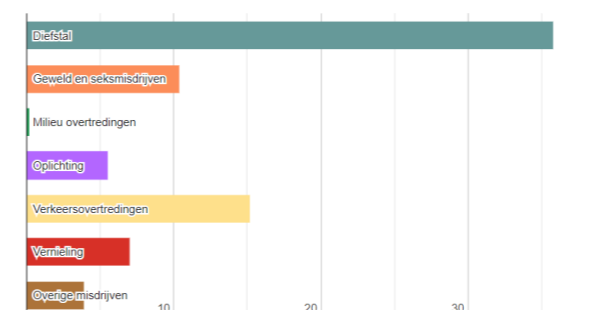


Gemiddeld bruto jaarinkomen in buurt Zuidwijk.



▲ 4.24 - Average income in Zuidwijk (Allecijfers, 2022)

Criminaliteit - buurt Zuidwijk



Criminaliteit: aantal misdaden per 1.000 inwoners in 2022 in de buurt Zuidwijk.

▲ 4.25 - Crime in Zuidwijk (Allecijfers, 2022)

History

Hillesluis was built as a neighbourhood for harbour workers in the 1930s, while Zuidwijk was one of the post-neighbourhood housing projects to combat the housing shortage. Hillesluis was built up more organically, as smaller projects after each other, while Zuidwijk was built as one project. This is also seen when the historic layer is laid over the current one. It is seen that Hillesluis was built with a lot of the then current structures in mind, with the old dyke and some old roads still as main arteries of

the neighbourhood, and even taking into account the old polder structures in the smaller-scale structure. In Zuidwijk, however, this has a stark contrast, with almost no old structure visible in today's structure. You can see that surrounding Zuidwijk, some old roads were kept intact, but it seems that the old structure was almost purposefully removed before building Zuidwijk, and a blank slate was created to built on top of. This also coincides with the popularity of the bulldozer, which gained traction for spatial projects from the 1940s.



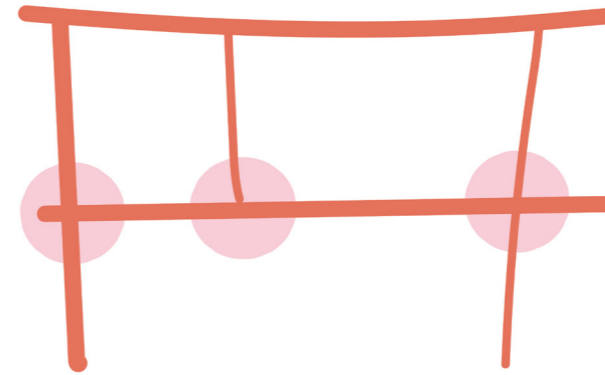
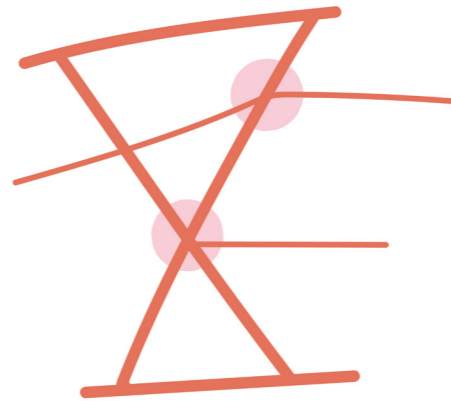
4.26 - History of Hillesluis (Author's image, 2023)



4.27 - History of Zuidwijk

Connectivity

Both Hillesluis and Zuidwijk have similarities in its spatial network and accessibility by public transport. Both neighbourhoods contain a few main roads that come together in nodes, which are more busy places. This is the same connecting point for public transport, which makes it more inclusive.



The difference in their structures is also related to the historic buildup of the neighbourhoods. Hillesluis has a spiderweb-like network of roads, with a few nodes bringing together many roads. In Zuidwijk, the layout is very structured, similar to the ideas of the *wijkgedachte*. In this sense, the roads create a bigger barrier between different areas in Zuidwijk, while this is less apparent in Hillesluis. This separation has a big impact on anonymity and thus inclusivity for women.



0 50 100 150 200 250m

4.28 - Connectivity of Hillesluis

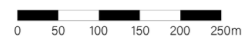
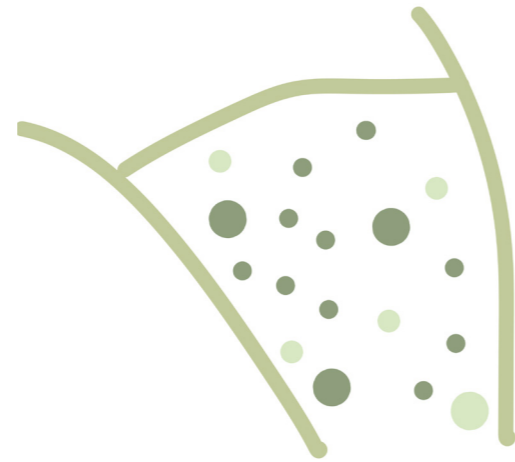


0 50 100 150 200 250m

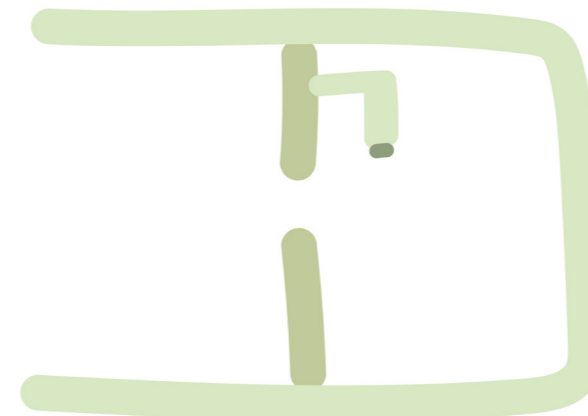
4.29 - Connectivity of Zuidwijk

Greenery

In terms of green structure, there is a stark difference seen in the way the neighbourhoods were developed. In Hillesluis, more private developers each built their own housing for their harbour worker, which resulted in public green structures becoming not as valuable.

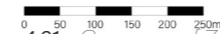


4.30 - Greenery of Hillesluis



In Zuidwijk, the plan was set up with big and open green structures in mind, which is very apparent. As a result, Hillesluis has a few larger connected green structures, but has few smaller-scale spaces for people to enjoy. The systemic approach of green in Zuidwijk results in a green structure that is thought out through the scales, from the private garden to the larger park which surrounds the neighbourhood.

On the downside, the way the green structures are set up result in a loss of feeling for ownership of the spaces. the openness of the green makes it too undefined for people to enjoy it, since they don't know if they are welcome there.



4.31 - Greenery of Zuidwijk

Types of greenery

The pictures below showcase the types of greenery in both neighbourhoods. Even though Zuidwijk has more green spaces, it is apparent that both neighbourhoods lack diversity in their greenery. While they do add some spaces for activity, the green spaces could really be used to promote interaction and activity as well.

4.32 - Greenery of Hillesluis



4.33 - Greenery of Zuidwijk



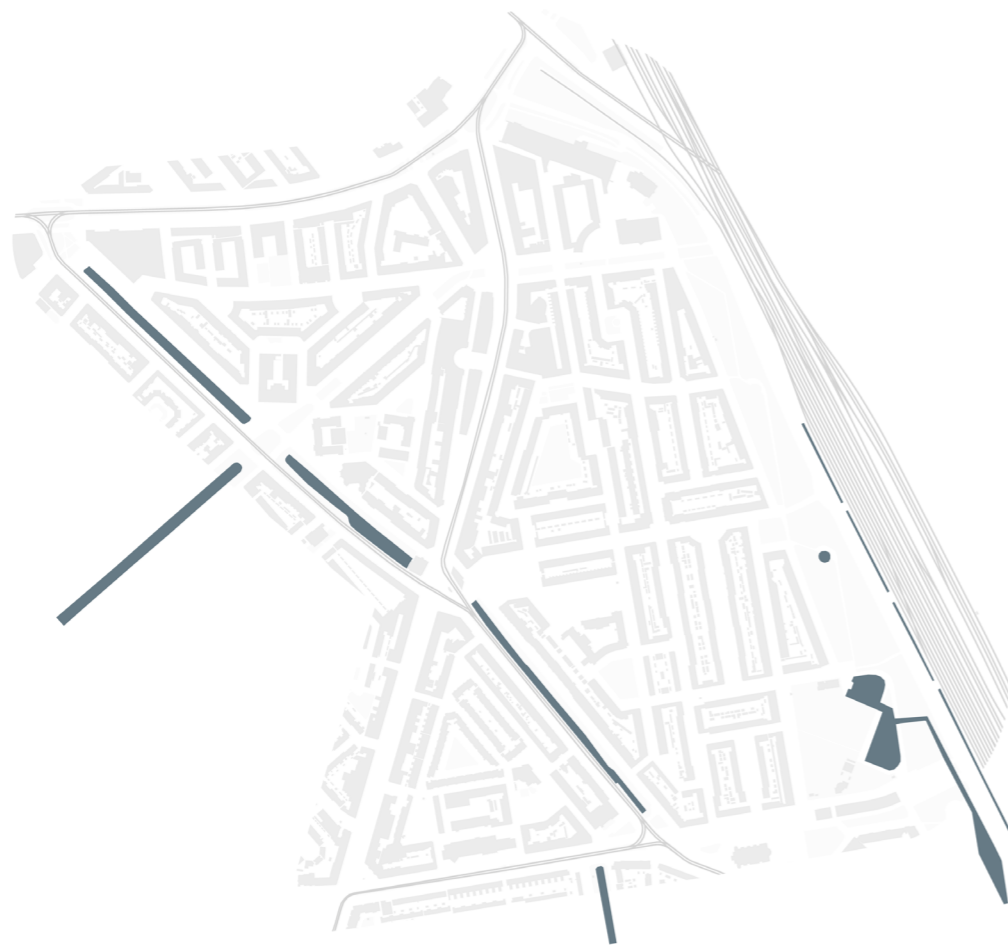
4.34 - Greenery of Zuidwijk



4.35 - Greenery of Zuidwijk

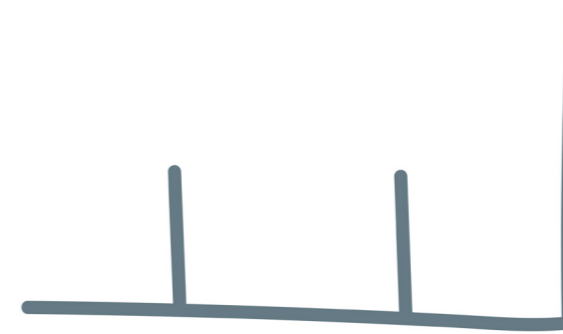
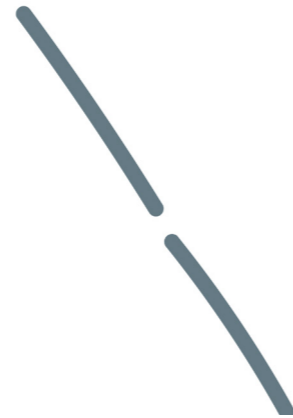
Water

The water structure in both neighbourhoods mostly follow the green structure, but was still analyzed because of the role of the water structure in strengthening the borders of the neighbourhoods.



0 50 100 150 200 250m

4.36 - Water of Hillesluis



This mostly happens in Zuidwijk, where even the sections within the neighbourhood are sectioned off by the water structure. This doesn't give a blockade in the view as much, but does create a physical barrier, discouraging anyone from crossing into another area. It also creates the barrier into an entirely different world of green that Zuidwijk is surrounded by.

In Hillesluis, the water structure is less of a barrier, and more of a strengthening factor in the direction of one of the main axes.

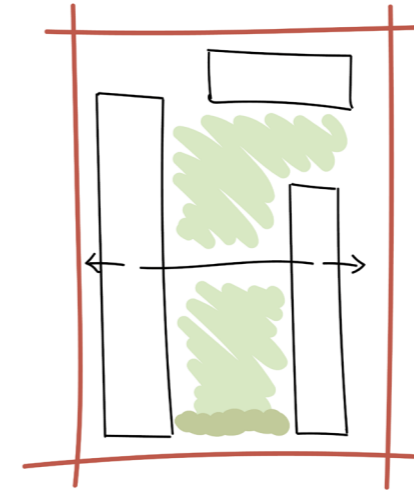
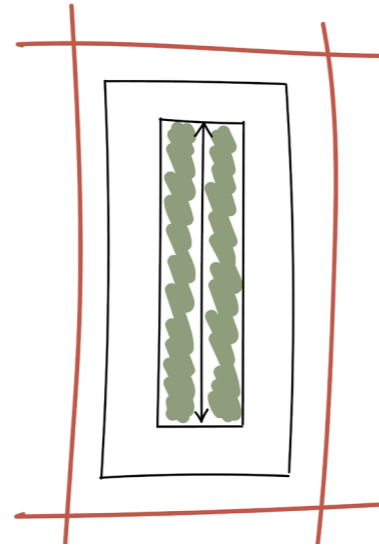


0 50 100 150 200 250m

4.37 - Water of Zuidwijk

Building blocks

The structure of building blocks in both neighbourhoods are very typical of the era they were built in. These analyses also showcase the amount of open space in between the blocks, which has been held open for green structure in Zuidwijk, and a more paved open space in Hillesluis.



The building blocks are quite closed off in Hillesluis, which creates a very defined space for private or collective gardens within the block. In Zuidwijk, it looks like these blocks are ripped open into different pieces, which creates space for more public greenery, and leaves it more openly accessible. However, entering via the new openings in the blocks is not as easy, since they are blocked off by shrubs or don't have a pathway into the green, which makes it not very inviting. The greenery doesn't have a defined entrance, except for the underpasses that go through the buildings. However, this doesn't create an inviting atmosphere to enter either.



0 50 100 150 200 250m

4.38 - Buildings of Hillesluis

0 50 100 150 200 250m

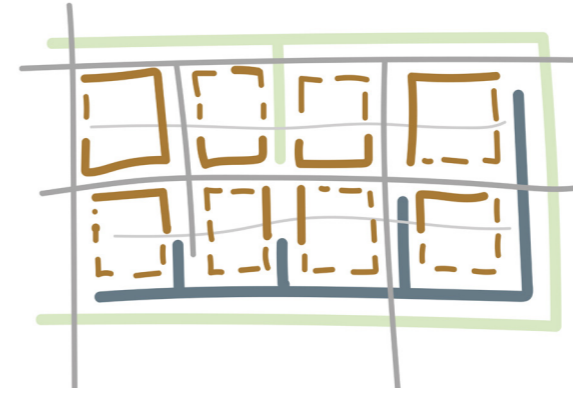
4.39 - Buildings of Zuidwijk

Borders

The wijkgedachte on which Zuidwijk was built, is strengthened by the structure of borders; every new ring and scale of publicity is sectioned off, creating a lot of barriers for people to interact.



0 50 100 150 200 250m
4.40 - Borders of Hillesluis



It is apparent that these borders are mostly made up from roads and the green and water structure from the start. Additionally, the structure and direction the building blocks are set up in, also play a role in this. In Zuidwijk, the building blocks are set up in such a way that each "buurt" is blocked off by its own buildings. There is one winding road that connects a few, and in turn connects the bigger whole.

In Hillesluis, the main axes are also separated by building blocks from the more quiet living area behind it. In both cases, it serves a purpose of separating the busier roads from the more quiet residential area. In Hillesluis however, the residential area is more spread-out and better connected, as can be seen in the east of Hillesluis.



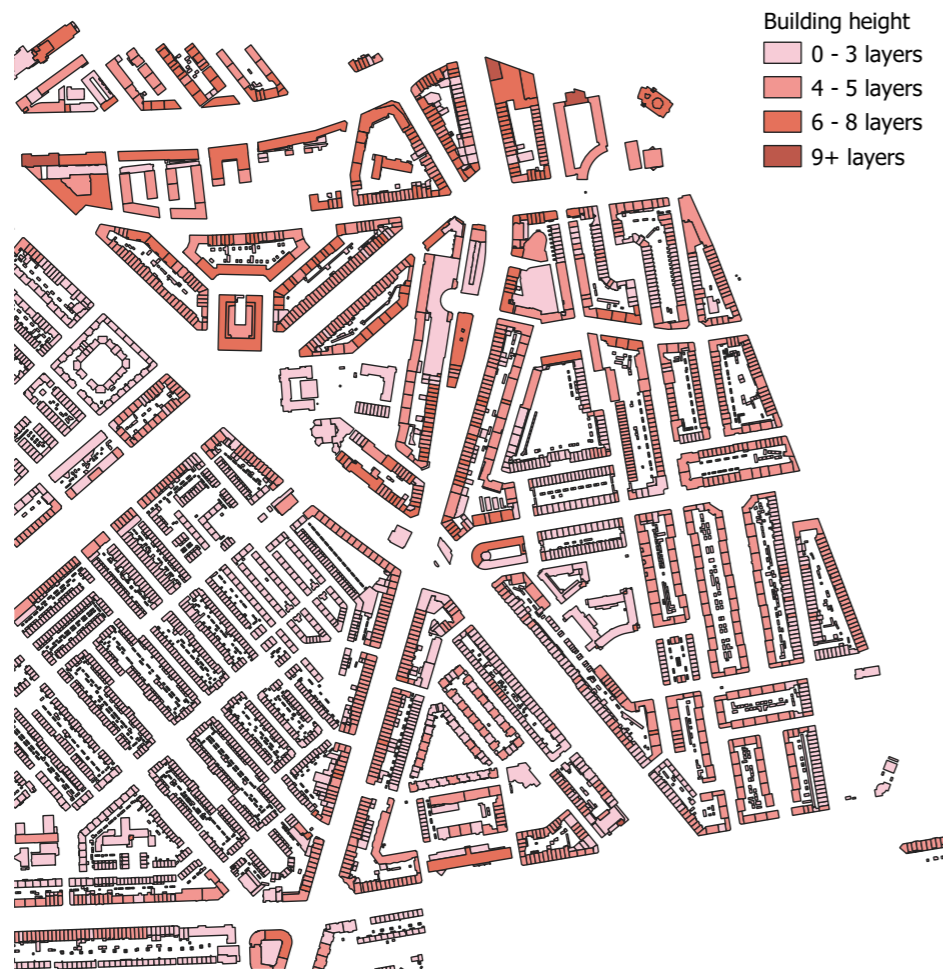
0 50 100 150 200 250m
4.41 - Borders of Zuidwijk

Building height

In terms of building heights, both Hillesluis and Zuidwijk have buildings that usually don't have more than 8 layers. Hillesluis tends to have some higher blocks, especially along the busy shopping street. In many ways, the higher buildings surround the lower buildings there.



In Zuidwijk, something similar happens, all be it less extreme. The buildings there are lower overall, and the neighbourhood is more similar in height. The busy shopping street blocks off the residential, but the height largely remains the same.



4.42 - Building heights of Hillesluis

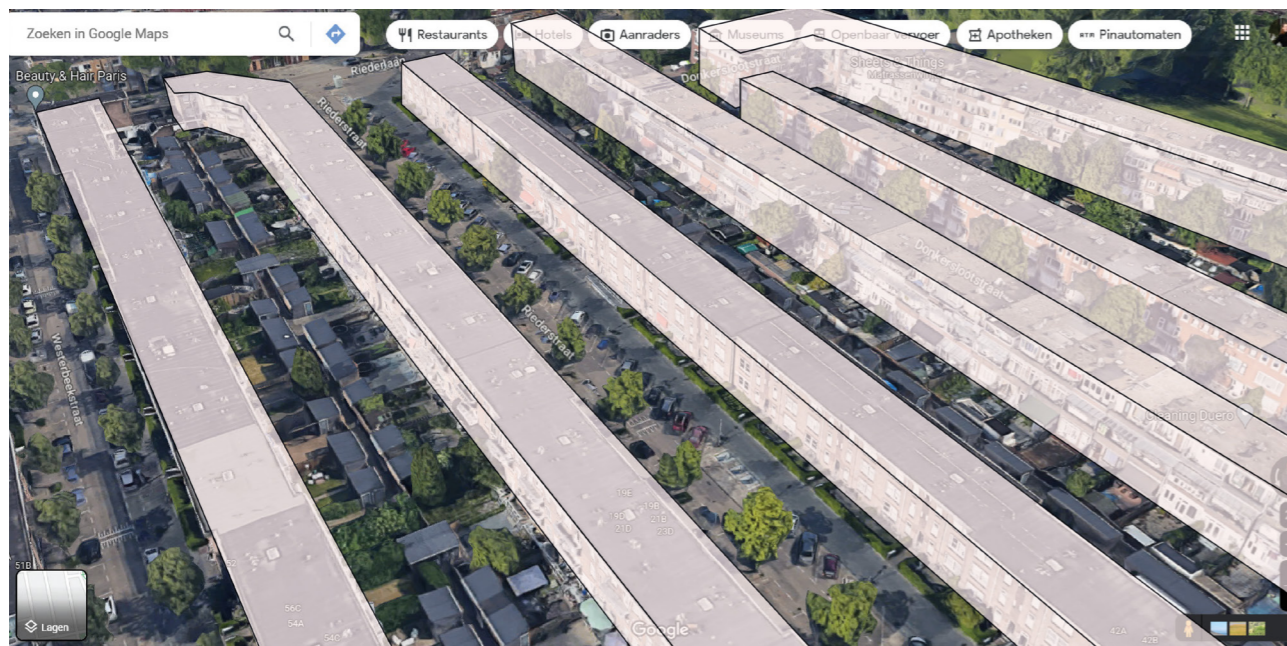


4.43 - Building heights of Zuidwijk

Building height

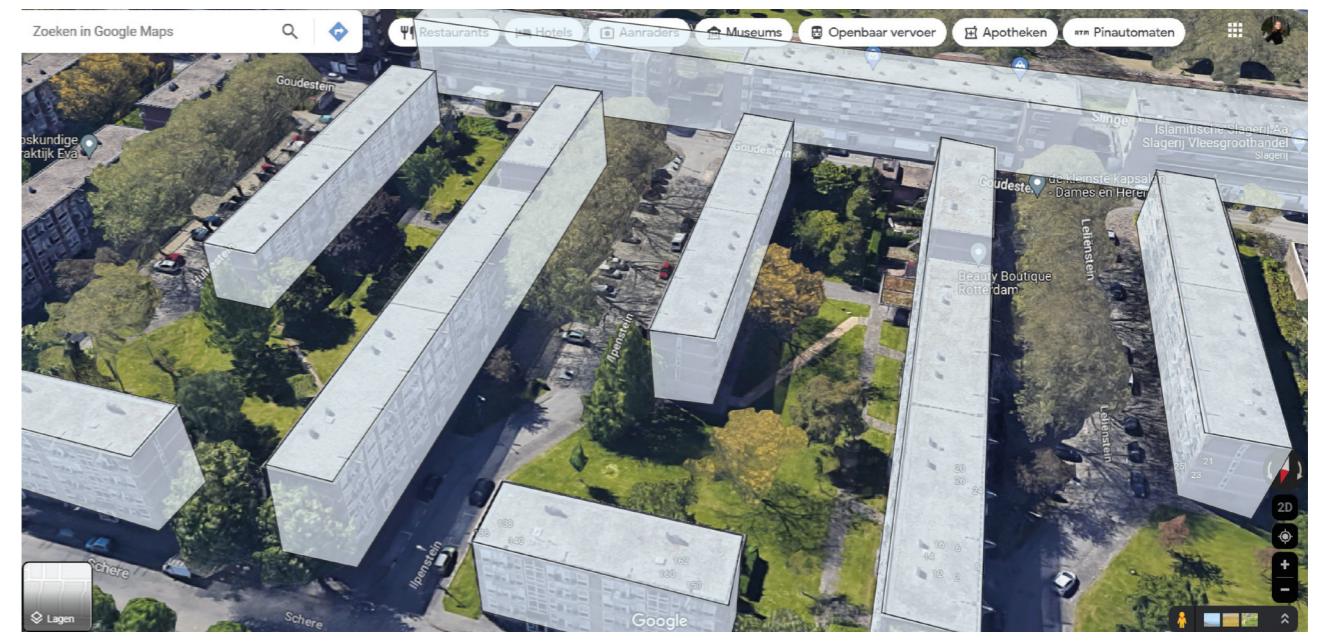


As is seen in the analyses below, both neighbourhoods have large areas that have mainly the same building height. On a street-level, this makes it so the street is perceived as more monotone and not diverse. Since the blocks are all so similar, there is not one focal point that draws your attention. Because of this, there is no hierarchy in the street level.



4.44 - Building heights of Hillesluis

4.45 - Building heights of Hillesluis



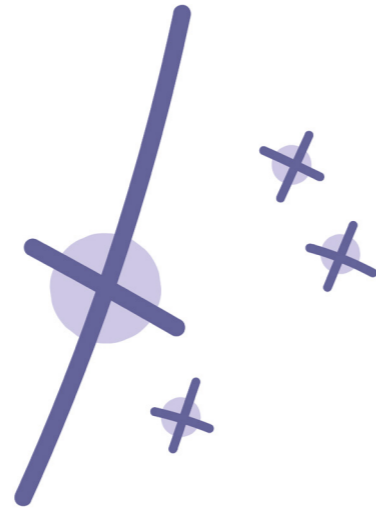
4.46 - Building heights of Zuidwijk

4.47 - Building heights of Zuidwijk



Amenities

In both neighbourhoods, the commercial amenities are located among the main road. Bigger amenities, like schools and churches, are located close to the other amenities, but reserve a separate place as a landmark.



Where Hillesluis and Zuidwijk differ, is in the accessibility of smaller corner stores throughout Hillesluis. Where Zuidwijk has one designated street and two squares where all commercial activity takes place, the corner stores are spread out through Hillesluis, which also creates more places for interaction in the neighbourhoods, beside a busy street.



0 50 100 150 200 250m

4.48 - Amenities of Hillesluis

0 50 100 150 200 250m

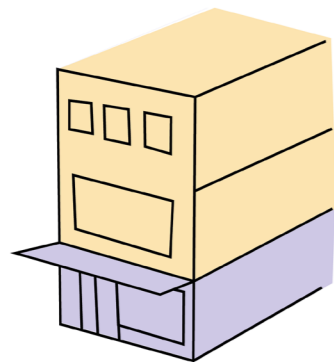
4.49 - Amenities of Zuidwijk

Typologies

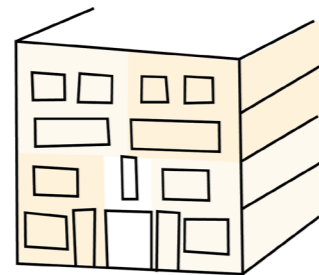
Both the amenities and residents are housed in similar typologies in both neighbourhoods. The commerce is located in mixed-use blocks, which have an active plinth, and housing on the floors above.

In terms of buildings designated for housing, both neighbourhoods have a lot of portiekflats, or communal entrances. In Zuidwijk, there is a higher amount of single-family homes, or row houses, and some gallery apartments. In Hillesluis, upstairs-downstairs apartments are also quite apparent.

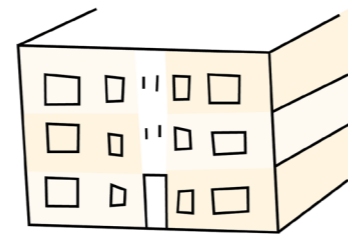
Even though the types are quite similar, the difference in the appearance in the neighbourhoods counts in how the blocks are set up in relation to each other, and the materialisation of the area, which will be discussed later.



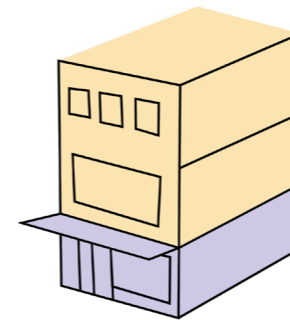
Living and retail



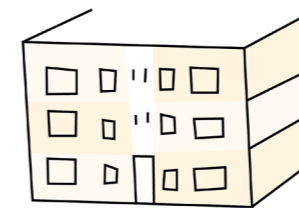
Upstairs-downstairs apartment (beneden-bovenwoning)



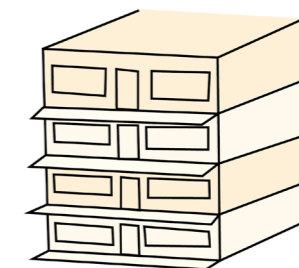
Apartments with communal entrances (portiekflat)



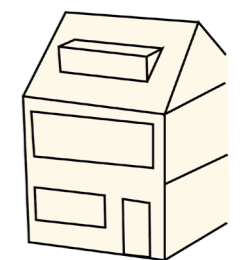
Living and retail



Apartments with communal entrances (portiekflat)



Individual entrance apartments (gallerijflat)



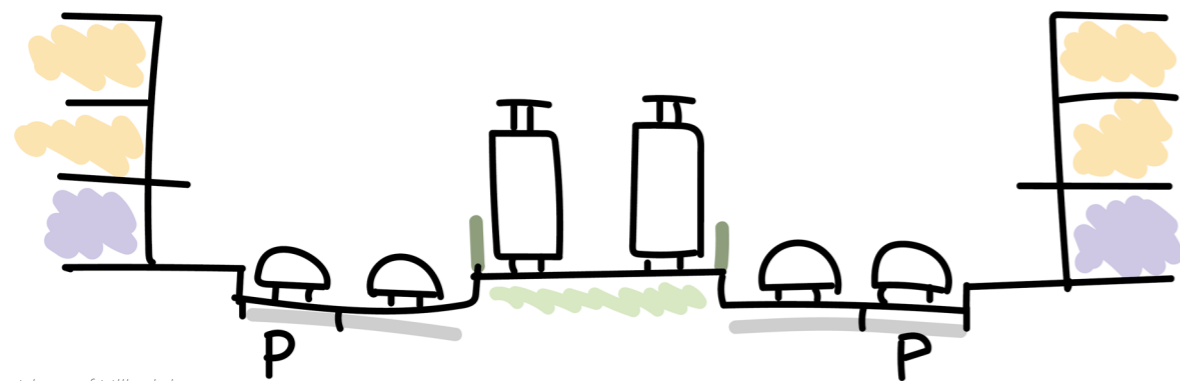
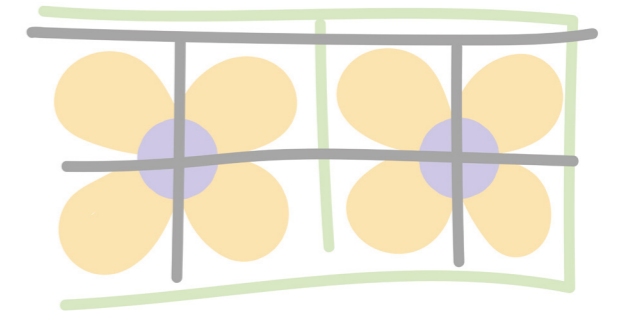
Single family homes (rijtjeshuizen)

Ideas

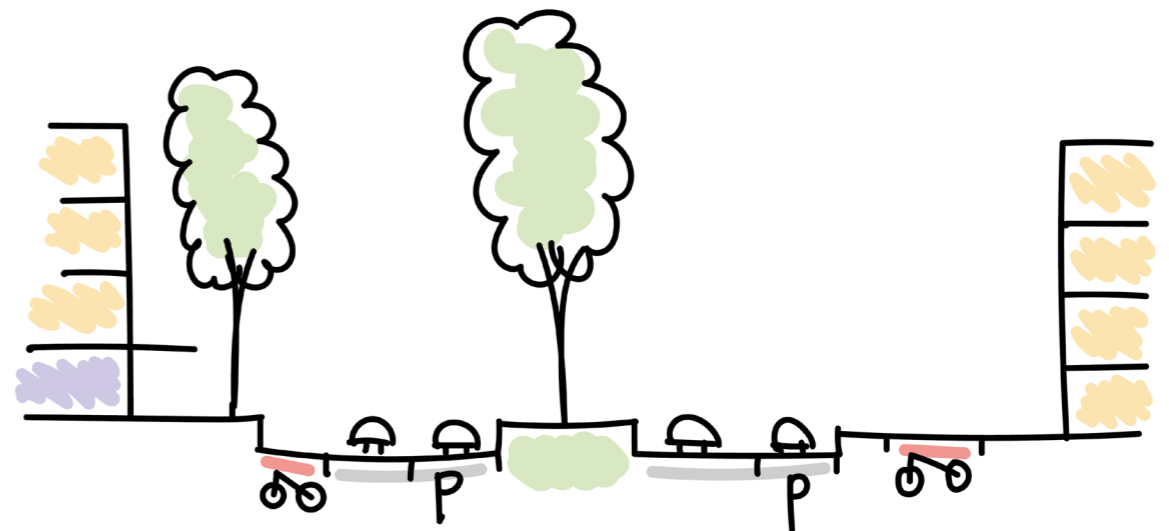
Bringing a few spatial analyses together, this page shows the ideas or concept behind the development of the neighbourhood.

As was mentioned before, the build-up of Hillesluis happened more organically than in Zuidwijk, where the *wijkgedachte* carried the concept of the whole neighbourhood. This is visible in the flower-like structure shown on the right. In Zuidwijk, the yellow petals, or more private residential areas, are quite separated from each other, and lead into a node with more vibrancy, amenities and thus interaction. In Hillesluis, the residential areas are separated in two by the main road, but are otherwise quite cohesive, and thus provide more interaction.

Even within the main street, the difference in separation is apparent. The road in Zuidwijk is wider, and a barrier of green with trees in between both sides of the road. Additionally, both sides of the street have a different atmosphere in terms of vibrancy, partially due to the different programme located on both sides. In Hillesluis, both sides of the street have a similar programme, which makes it more cohesive and defined as one shopping street. Overall, it is apparent in both neighbourhoods that the car is very dominant in the space, which leaves little to no room for pedestrians and cyclist.



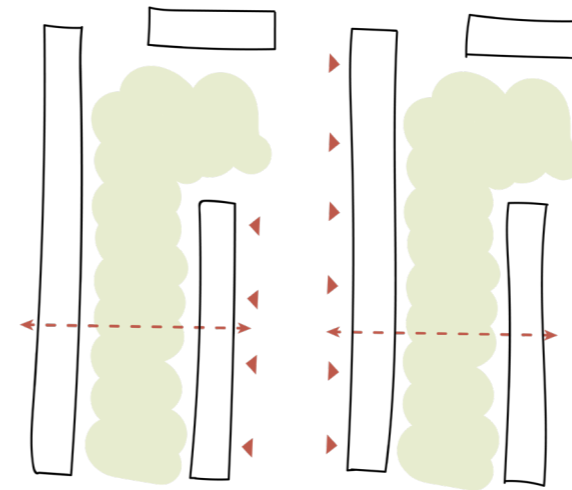
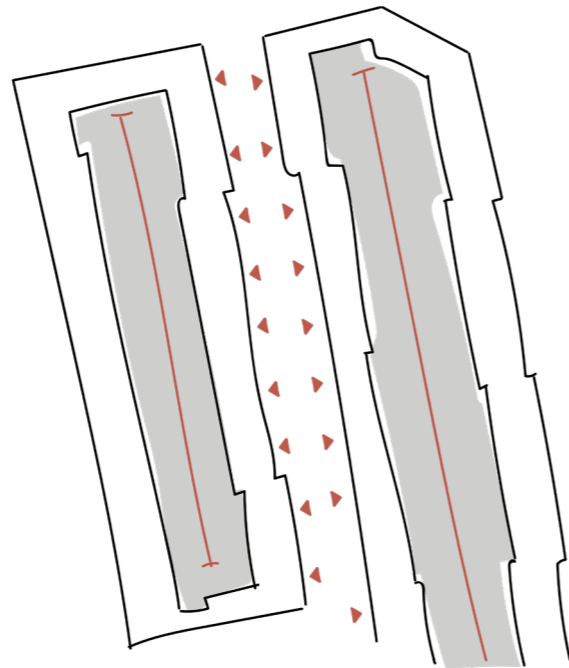
4.52 - Ideas of Hillesluis



4.53 - Ideas of Zuidwijk

Ownership

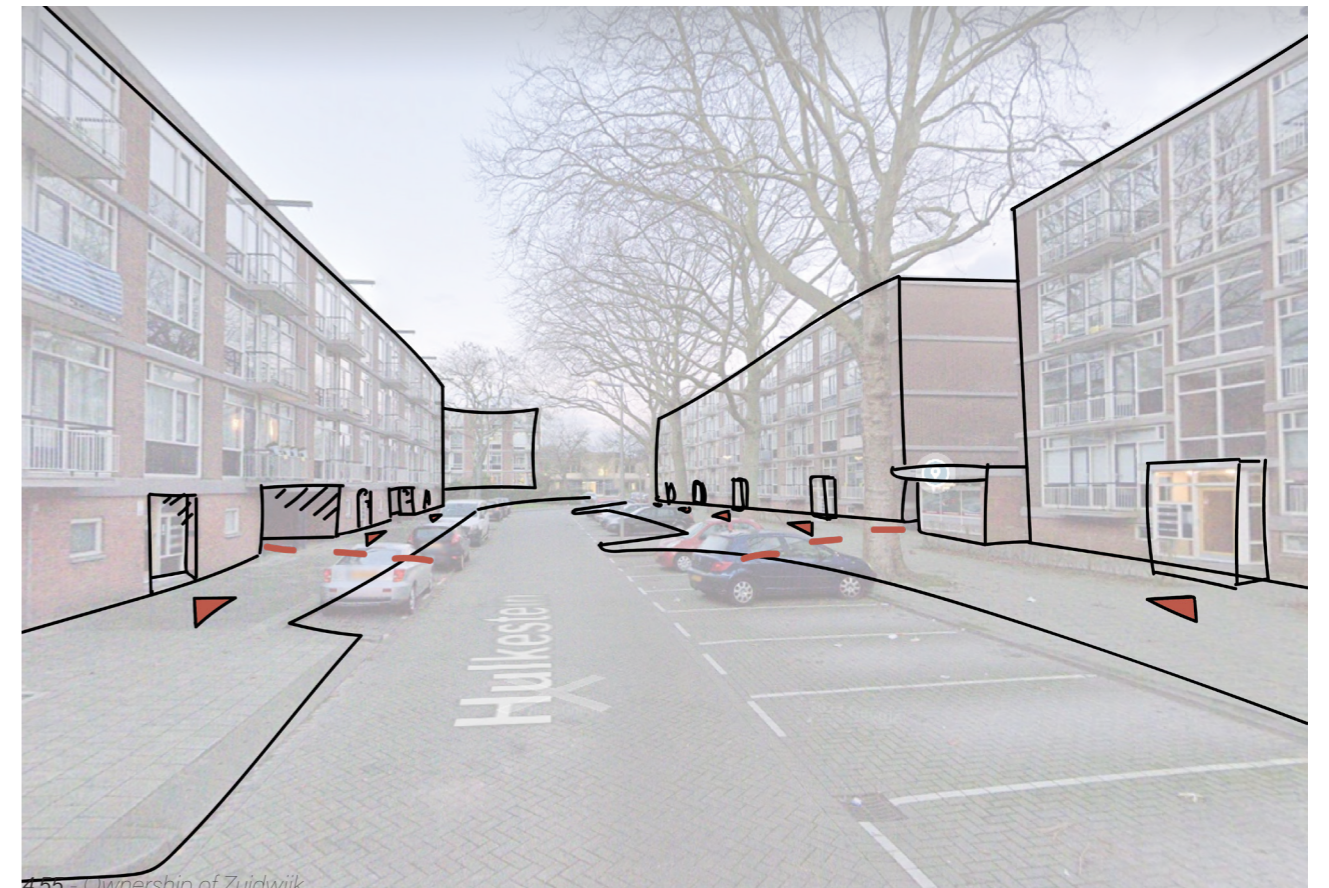
Elaborating further on the block scale, even though Hillesluis and Zuidwijk have a closed versus open structure, the impact off the blocks on the feeling of ownership is similar. Both neighbourhoods have similar numbers of entrances, which are all shared in similar housing types. The main difference is that the houses in Zuidwijk have balconies, while Hillesluis don't seem to have them.



The entrances themselves are more clearly presented in Zuidwijk compared to Hillesluis. In Hillesluis, the entrances are hidden in a set-back, or short tunnel of some sort. Besides, the path towards the entrances is long and narrow, with unclear ownership of space surrounding it. In Zuidwijk, the housing entrances are way clearer, but something similar to Hillesluis happens with the tunnelled entrances into the green space in between the blocks. The entrances are hidden away, with low ceilings, and thus overall not as inviting.



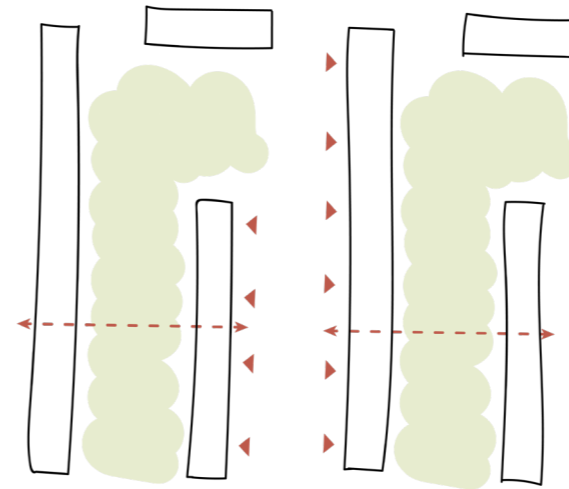
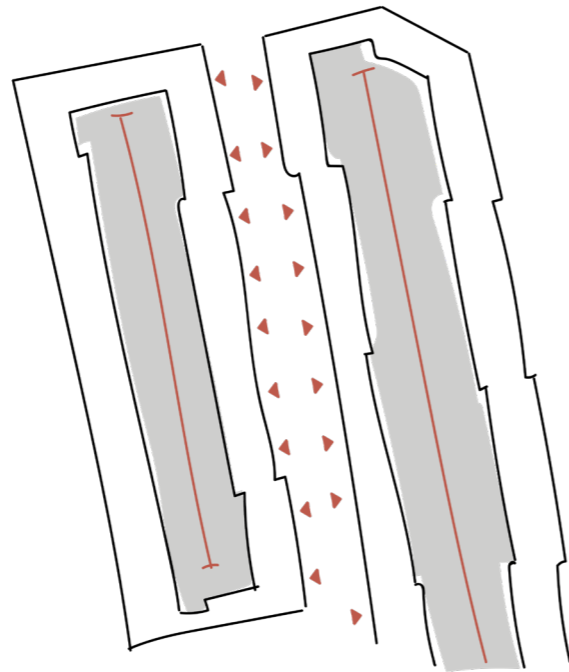
4.54 - Ownership of Hillesluis



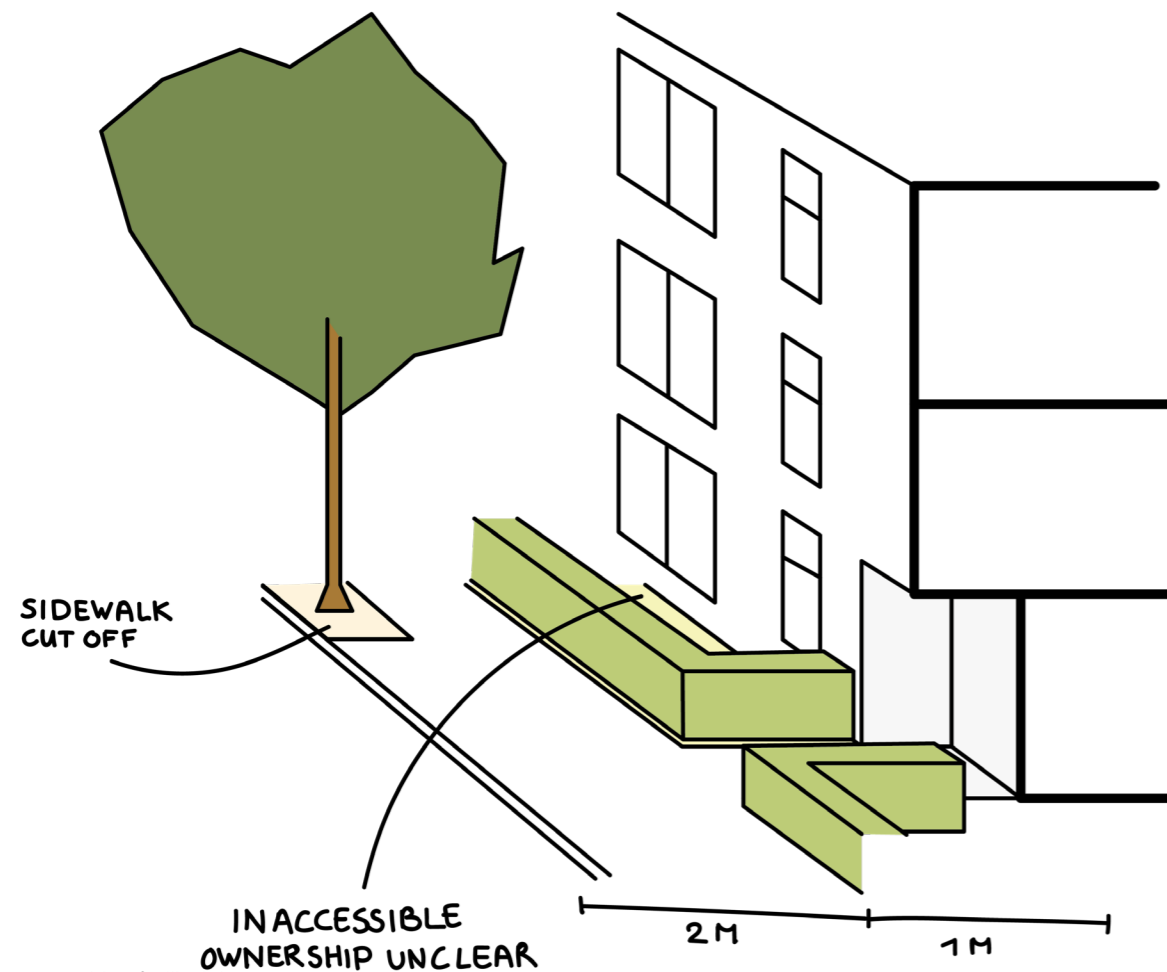
4.55 - Ownership of Zuidwijk

Ownership

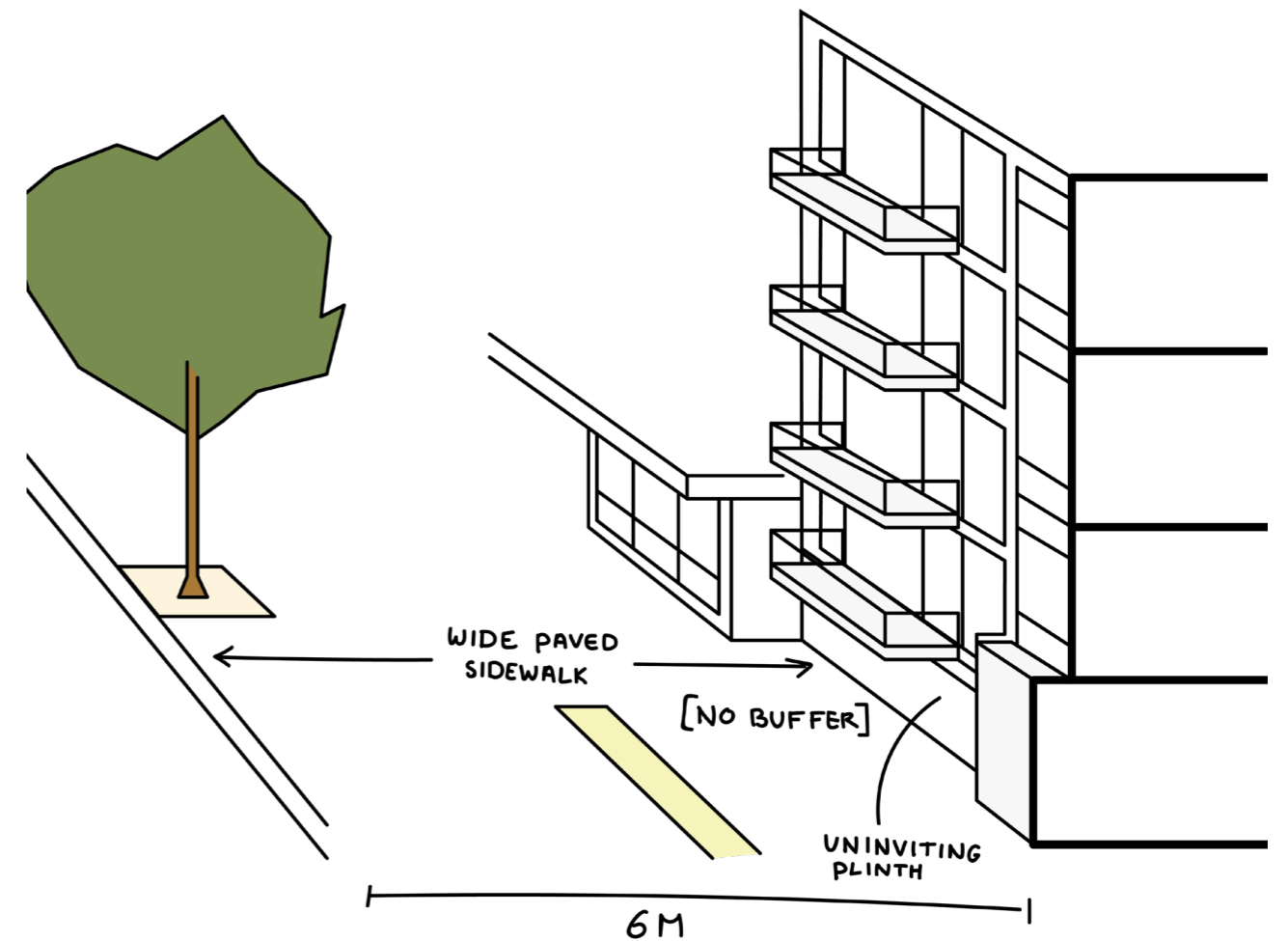
These aspects were also concluded in an analysis of the buildings plinths. As we see in Hillesluis, the plinths are captured by these empty patches of grass, with hedges surrounding them. In many of these patches, there is not even an entrance. In some of them, there is a small gate, but either way, it is very unclear who this space belongs to, and who is allowed to go there. Besides this, the sidewalk is of sufficient width, but is cut-off by trees with too little space to grow.



The plinths in Zuidwijk are not surrounded by green, and also not by anything. Half of the lowest floor is just a closed wall, which is very uninviting. The housing starts only halfway on the ground floor, which doesn't feel safe from a passerby perspective. Compared to Hillesluis, the sidewalk is very wide, and although it has some separate elements, they are incoherent, thus the space feels empty and uninviting as well.



4.56 - Ownership of Hillesluis



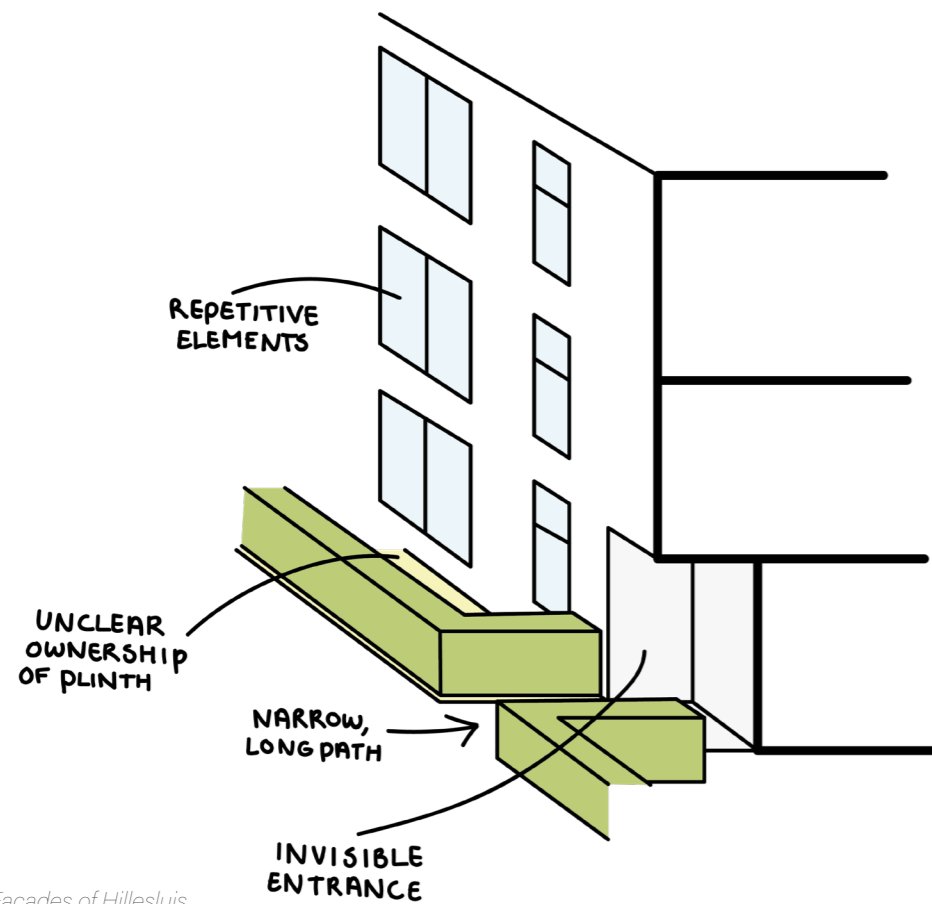
4.57 - Ownership of Zuidwijk

Facades

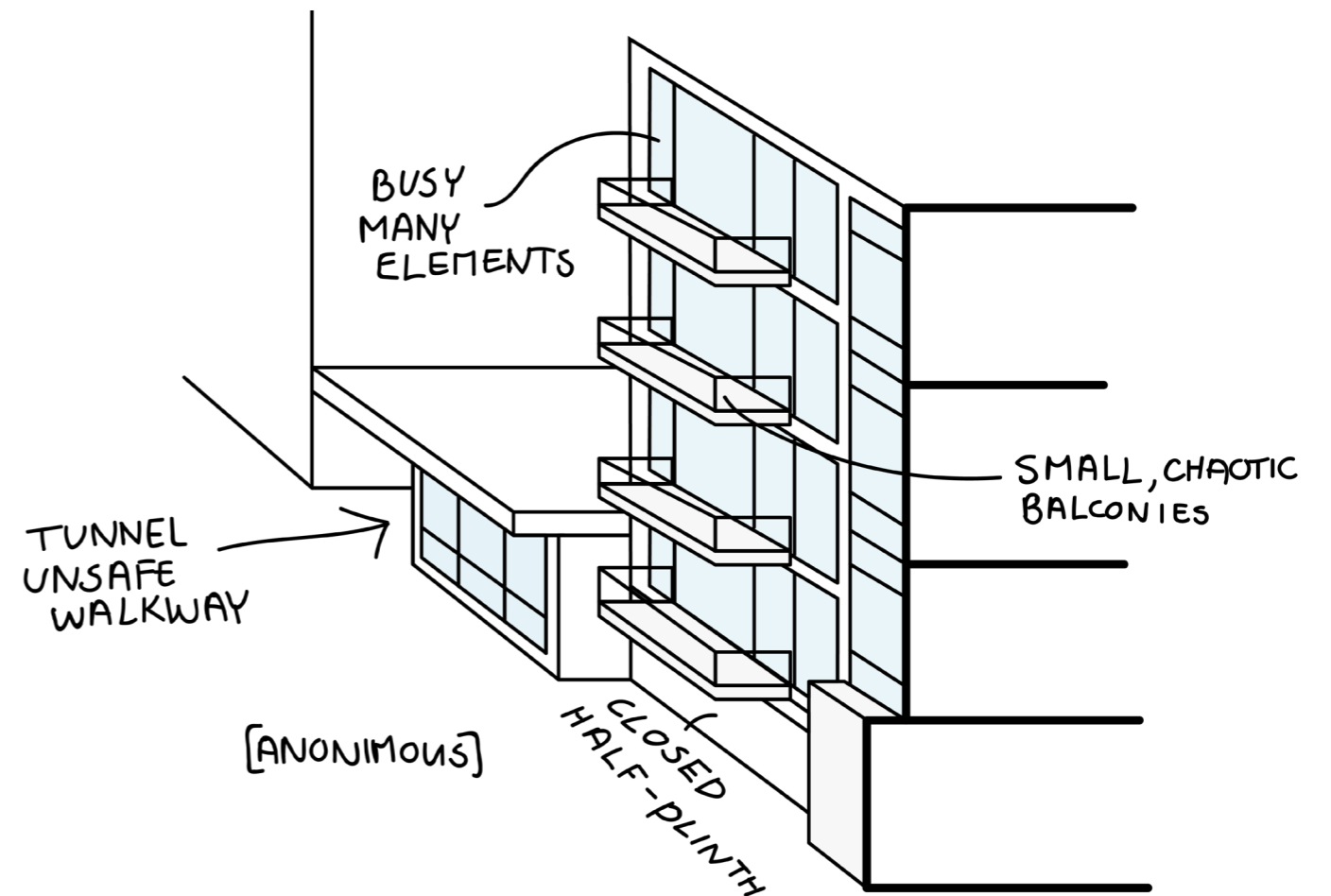
It seems a big aspect of the welcomeness of the space is related to the facades in these cases, which is why they were analysed as well. In Hillesluis, this invisible entrance, together with the long and narrow path, limits the friendliness of the facades. Together with this, and the building height that was discussed earlier, the repetitive façade elements in the windows don't give the blocks any identity or vibrancy.



Facades of Zuidwijk are the opposite in the fact that their elements are too busy. They have the similar repetition to Hillesluis, but the lay-out makes them too chaotic and unreadable. The same goes for the balconies, which are small and badly maintained. The brick façade at the ground moves right into the brick of the floor, which is in need of a buffer zone. Both plinths thus have no clear identity and ownership of space, and feel anonymous, albeit because of different elements.



4.58 - Facades of Hillesluis



4.59 - Facades of Zuidwijk

Maintenance

The final analysis shows the maintenance, which is a result of negligence and abandonment of the space. This is probably caused by the fact that the residents don't feel a sense of ownership or belonging in the spaces, which negatively affects their sense of duty to take care of them.



4.60 - Maintenance of Hillesluis



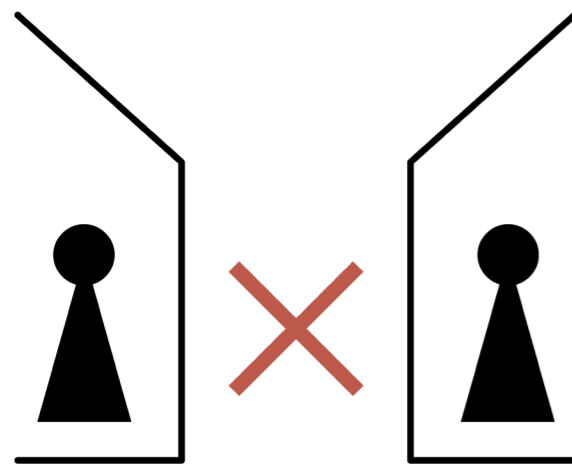
4.61 - Maintenance of Zuidwijk

4.3 / QUALITIES AND PITFALLS

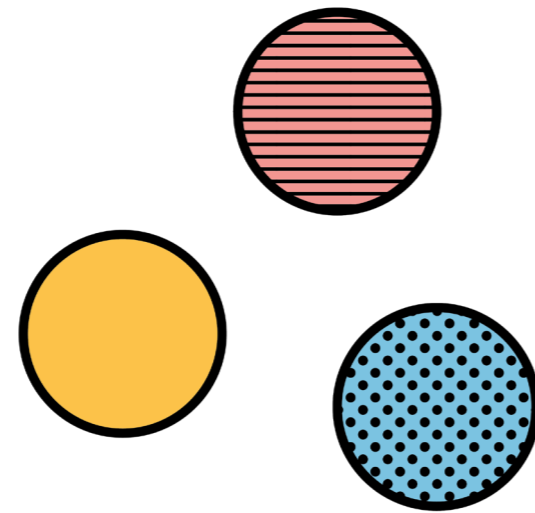
Hillesluis

From these spatial analyses, a few conclusions can be drawn. In Hillesluis, it is more apparent that the neighbourhood already has some character, which stems from its historic background, viewpoints and overall coherence in space. However, the closed block structure makes it so it is very private-oriented.

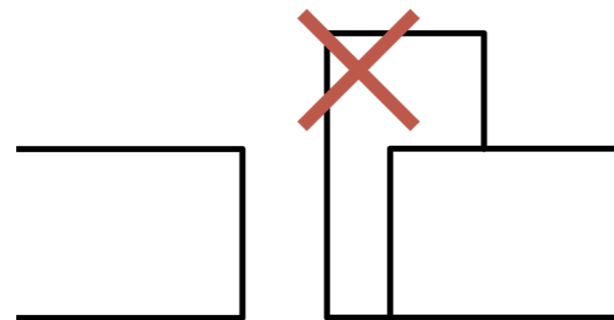
There is few public spaces, and an overall lack of green space in the neighbourhood. This, together with the levelness of Hillesluis, creates the need for diversity in public spaces in the neighbourhood. When looking at the street view like a painting, your eyes are not drawn to one point, because it is all so similar.



Few public spaces



DIVERSITY



All the same level

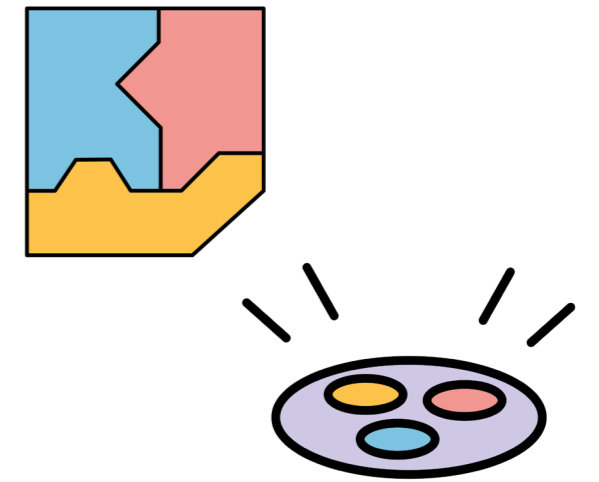


Lack of green

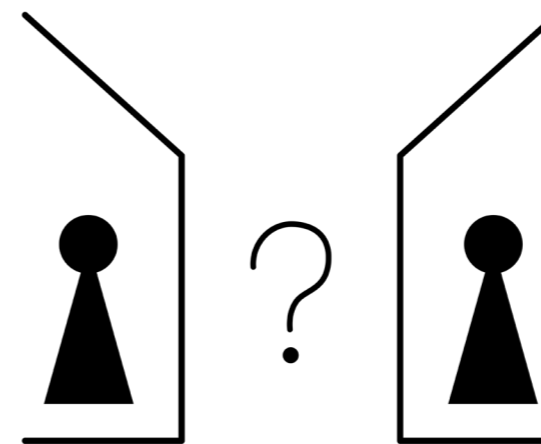
Zuidwijk

Zuidwijk knows the same challenges in diversity that Hillesluis has, but has an added issue: the lack of character and coherence.

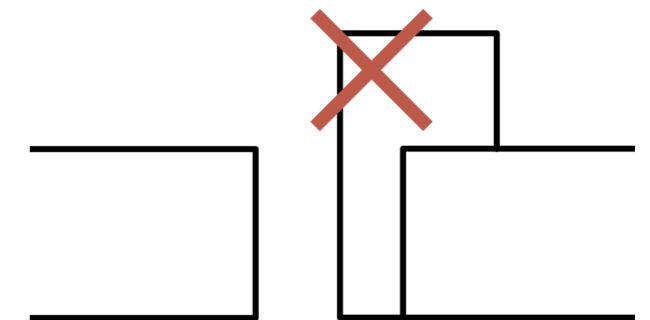
Where in Hillesluis, there is a lack of public spaces, this is available in Zuidwijk. However, the identity of the space is undefined and thus unclear. This impacts the way it is used and perceived, for example in the unclarity of ownership. The green mostly only exists of grass fields, and thus has no purpose. Besides, the levelness is also an issue in Zuidwijk that decreases the character and coherence further.



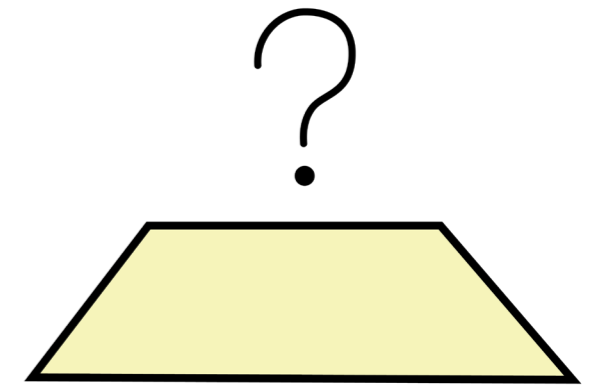
CHARACTER & COHERENCE



Unclear ownership



All the same level



Green without purpose

In the end, it is clear that both neighbourhoods have challenges in their urban fabric that impact gender inclusivity of the spaces. It is believed that both the use and perception of space for women can be increased through the found theory and guiding principles, together with the survey results, which will explain what spatial elements can lead to this gender inclusivity in space.

05

Fusion

This chapter will bring together the social and spatial layers and knowledge of the previous chapters, and fuse them into a vision for the district, and recommendations of how to restructure the neighbourhoods to make them more female-friendly. Firstly, the conducted survey will be explained and its results will be discussed. It will also explain what this will mean for the principles and design of the neighbourhoods. Next, the vision for Rotterdam-Zuid will be showcased and explained. For the neighbourhoods, recommendations will be shown for restructuring, together with impressions of what this could look like on the smaller scale. Finally, the possibilities of creating a universal framework will be discussed, which will measure female-friendliness of spaces. This framework will be inspired by the frameworks explained in chapter three, plus the design principles and preferred spatial elements, coming from the results of the survey.

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5.1 / WHAT WOMEN PERCEIVE

Interpretations of space

In chapter 3, there was research done of the gender differences in perception of space. To gain a more specific idea of what elements can either influence the positive or negative perception of space for women, and with people in general, a survey was conducted. The results of this survey can feed back into the design principles, the design of the neighbourhoods and the creation of the universal framework.

For the survey, a set of spatial elements was curated to present to respondents. To figure out which spatial elements to present, a set of analyses was done on the location of this project, as a case study. A few perspective photos were taken in multiple locations, in both Hillesluis and Zuidwijk. These were divided into photos of streets and squares, or public spaces based on moving and staying.

Since drawing and analysing perception is not common, a new way of notation and interpretation needed to be found to make the feelings spaces give more explicit. An inspiration I found for this, was based on the photo you see below, by Swedish artist Karl Jilg. It showcases the way pedestrians might interpret a space when looking at all spaces that unappealing, or even hazardous due to cars.

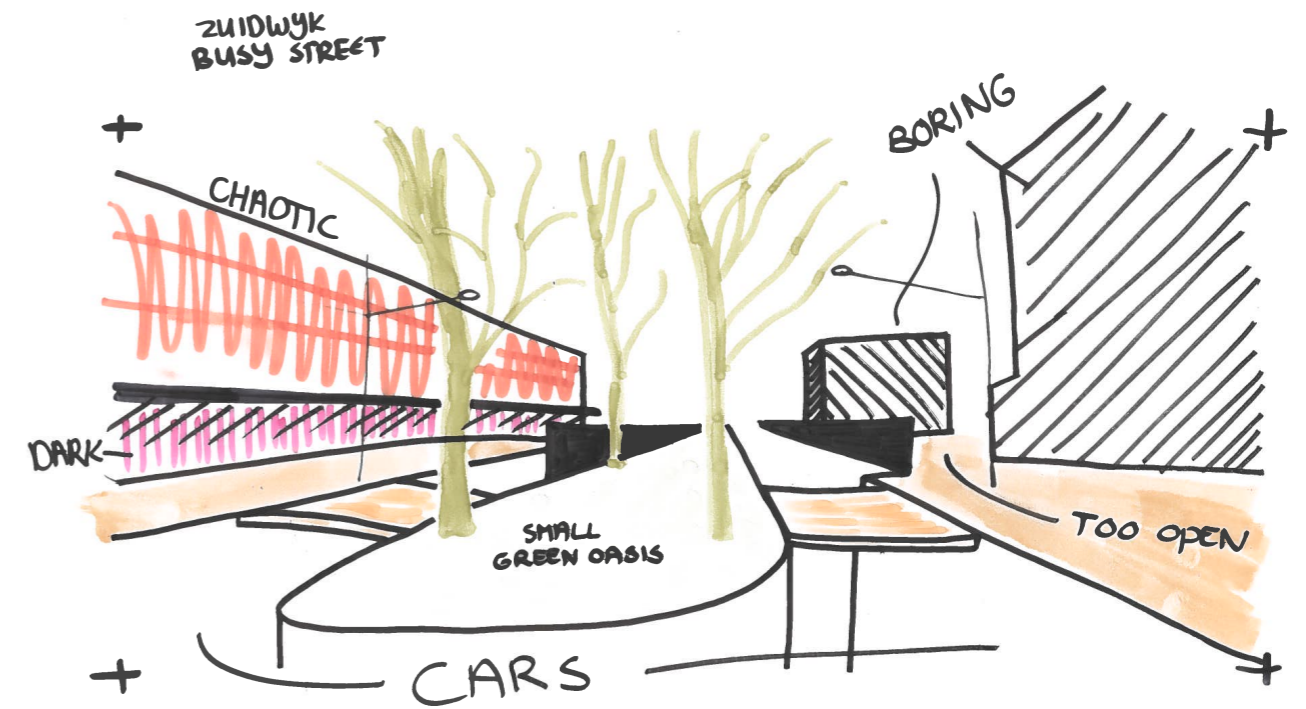
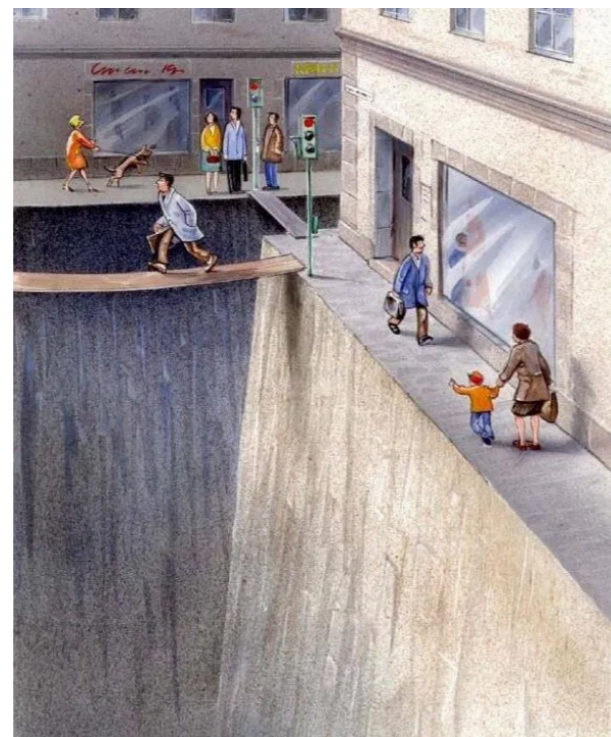
As the pedestrian point of view was also used in the perspective photos and the survey, this was a fitting perspective.

The photos were then analysed from that pedestrian point of view, together with the method of notating what feelings the space might give someone, based on my personal perspective as a

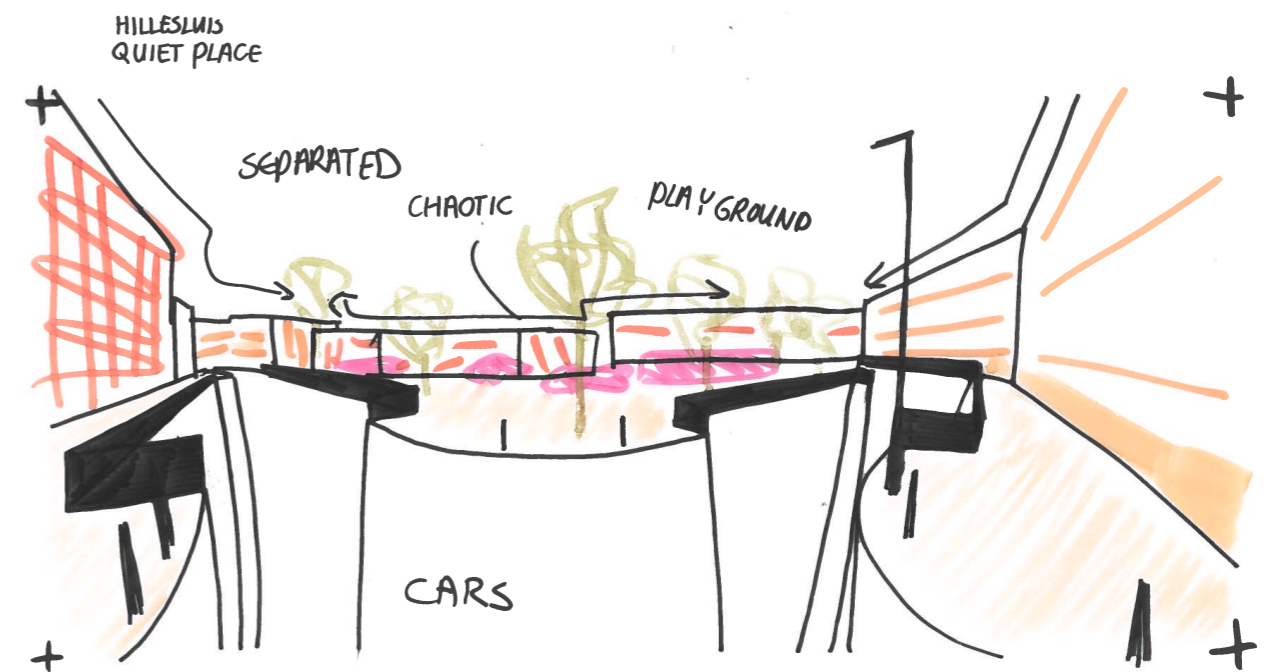
woman. Each perspective photo was given around four feelings, of which 2 positive and 2 negative (if possible). Two examples of these analyses are shown on the right, the others can be found in appendix A.

From these analyses, conclusions were found in the feelings each neighbourhood gave, together with what themes or elements gave these feelings. These themes showed some similarities with the design principles that were found before. From the themes, a set of 20 spatial elements was created for the street, and 16 for the square. The spatial elements were applied to a standard public space, and drawn in the same style to reduce the chance of bias. Two of the spatial elements can be found on the right, and the others, together with the survey, are shown in appendix B. A few overview sketches/drawings on the working method explained here, is also shown on the next pages.

5.2 - Illustration showing the car-centricness of our streets (Karl Jilg via Vox, 2014)



FEELINGS: OVERWHELMED
TENSE
SCARED
UNEASY
CONFIDENT

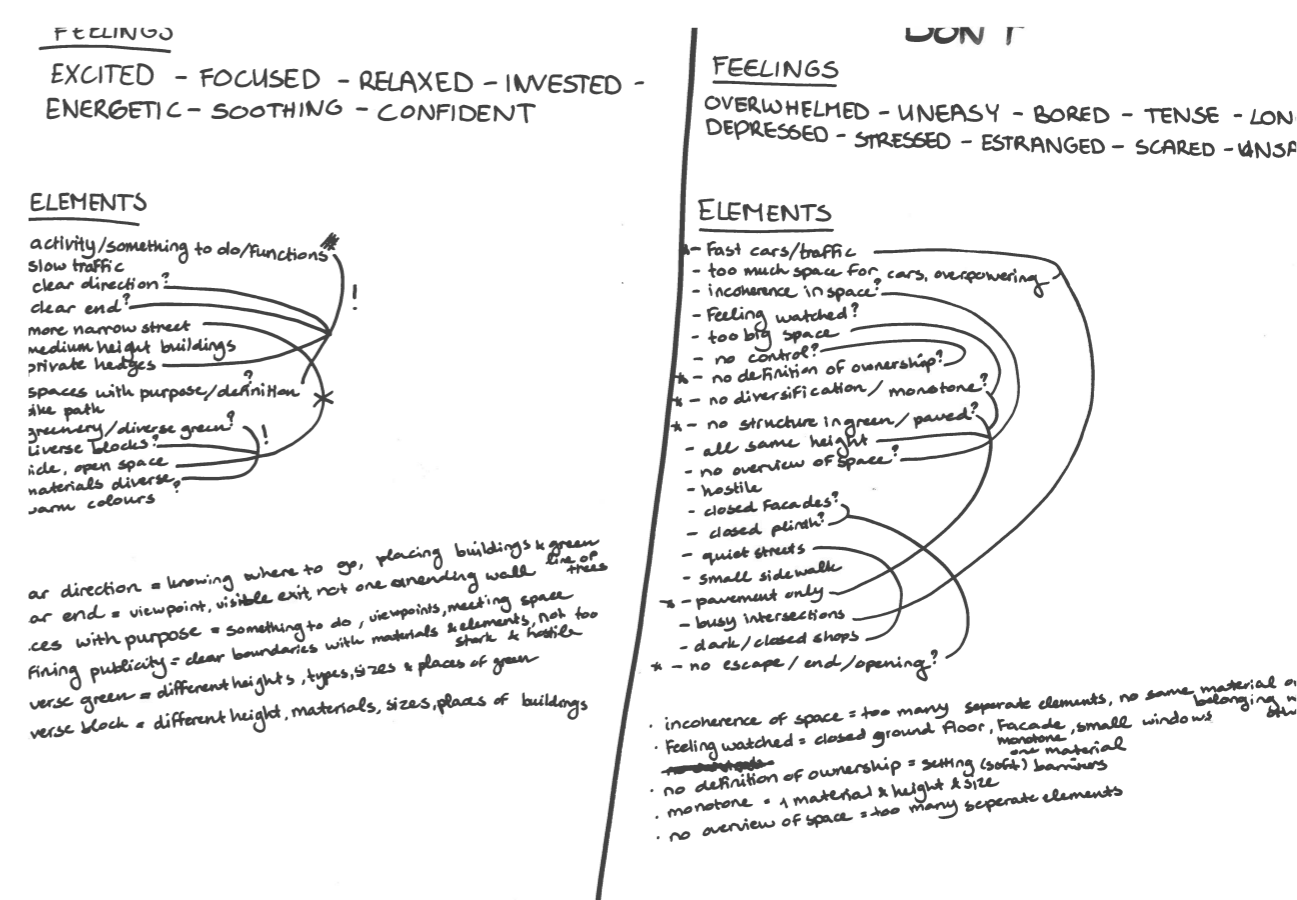
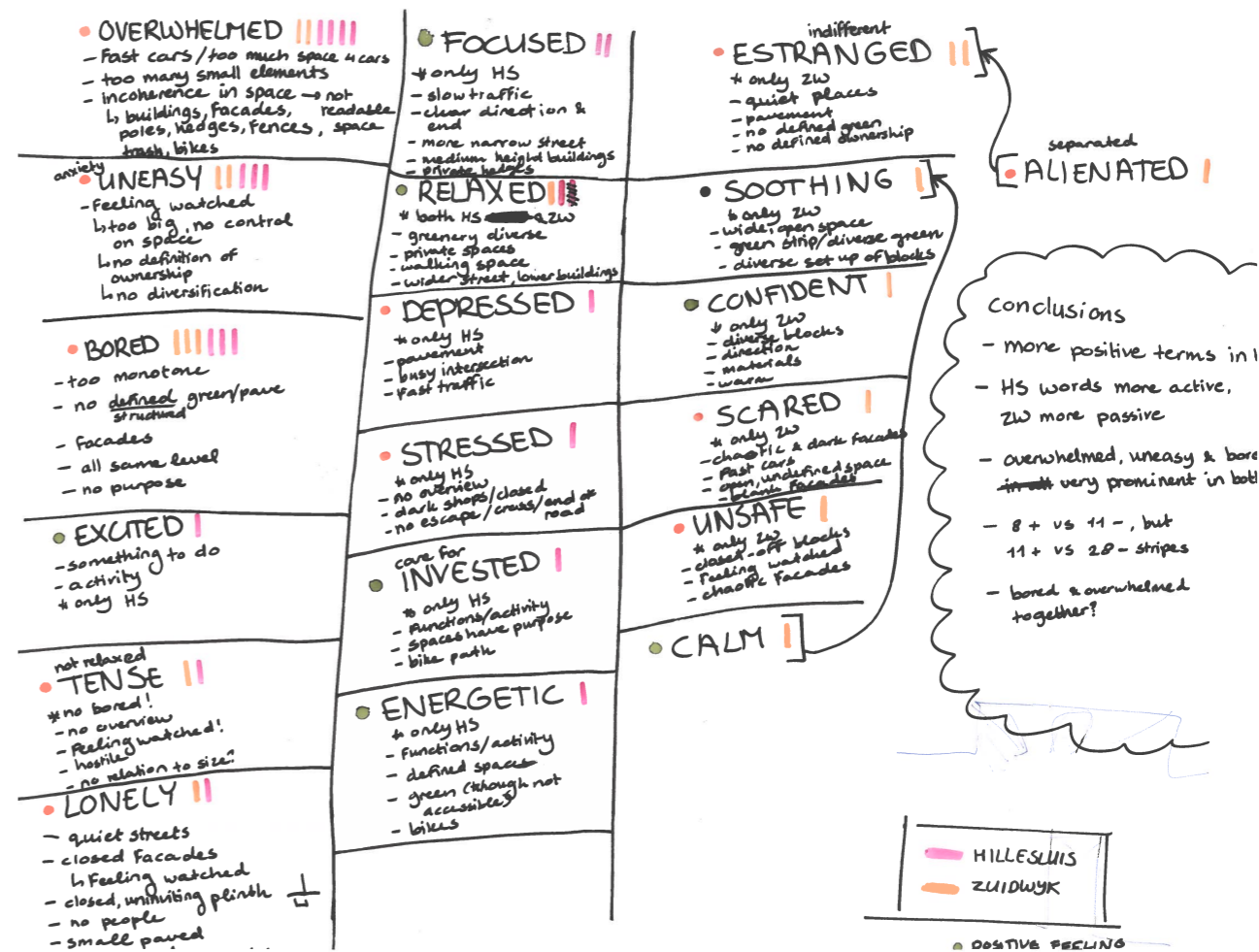


FEELINGS: OVERWHELMED
BORED
EXCITED
UNEASY

5.3 - Feeling sketches



5.4 - Feeling sketches



5.5 - Feeling sketches

Survey structure

In the survey, which you can find in appendix B, the spatial elements are each shown side-by-side in sets of two. The respondent is asked to choose the one they perceive as more pleasant. After this, they are asked to rate how positively they perceive the chosen space. In the first part of the survey, this was done for the street, and in the second part for the square.

v The matchups of spatial elements are randomized for each respondent, so that spatial elements were not compared to the same elements each time. This way, the elements that were chosen the most, had been in matchups against every other spatial element. Since the street and square were separated, only comparable spaces were shown, and no matchup was between a street and a square.

At the end of the survey, a few general questions were asked: gender, age, and whether they had a non-western ethnic background. The questions of age and ethnic background were included to see if these aspects could also influence perception on space, since the location of my project has a population of diverse age groups and cultural backgrounds.

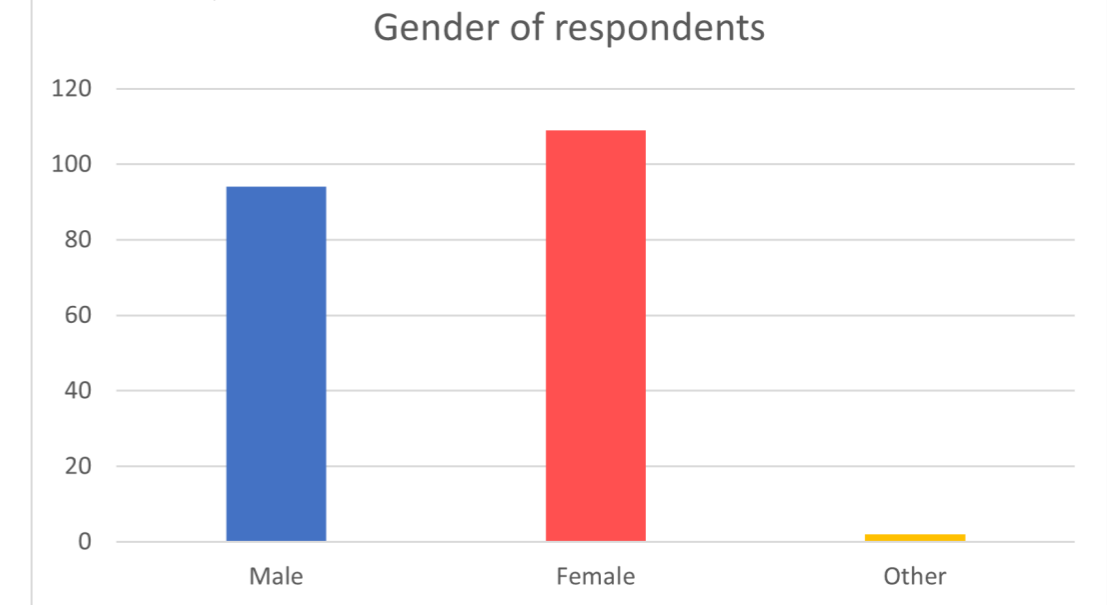
The introduction of the survey stated only that the survey was regarding research about someone's perception in public spaces. Nothing in relation to gender was mentioned, as to not create bias in the respondent's decision making in the survey.

Results

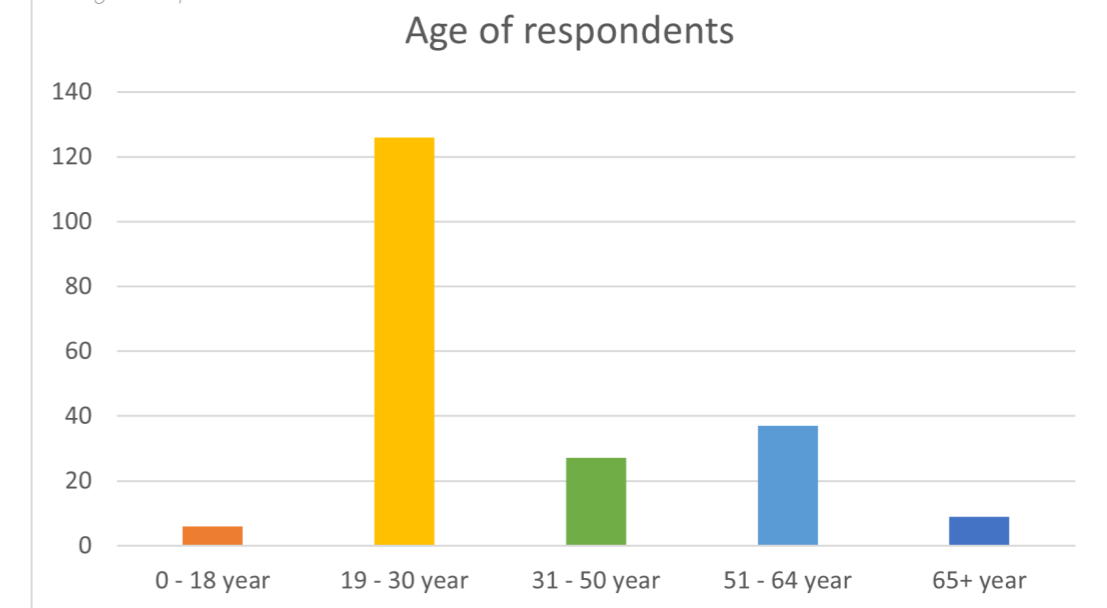
Generally, there were 205 complete responses on the survey, of which 94 were men, 109 were women, and 2 defined as "other." For the sake of this research being about female-friendliness, and the amount of "other" respondents not big enough to be representable, those two responses were left out of the results. This means that 46,3% of respondents were male, and 53,6% were female, which concludes to around 50-50.

In terms of ages, the results show that a majority of respondents were between 19 and 30 years old. This makes sense, since the survey was distributed among those circles. For the ages 0-18 and 65+, there were too few respondents to accurately say if this influenced their perception of spaces. The same counts for the people with a non-western ethnic background.

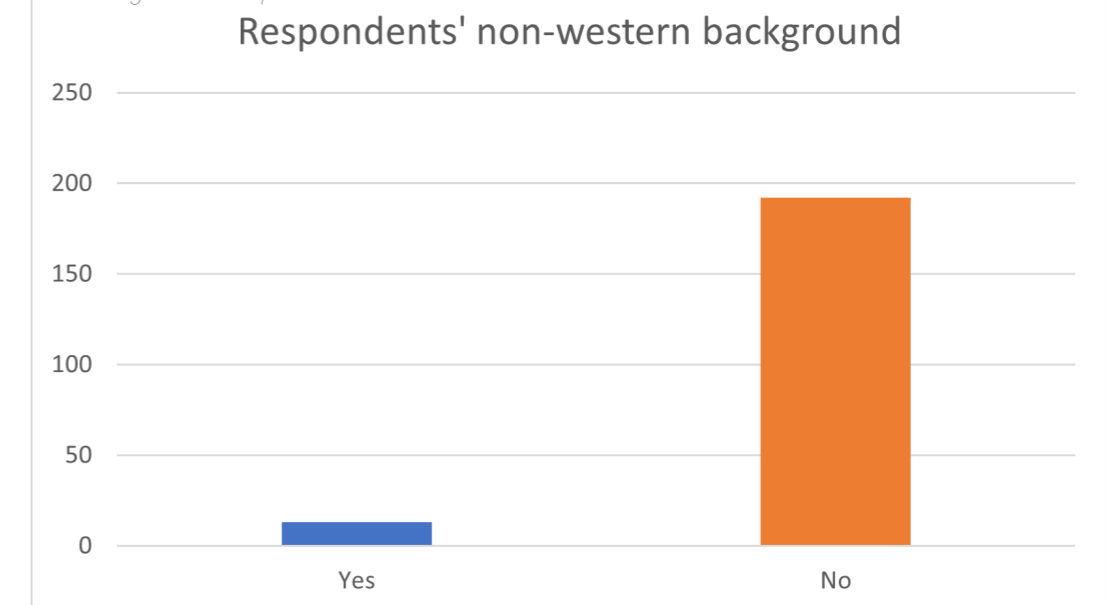
5.6 - Gender of respondents



5.7 - Age of respondents



5.8 - Background of respondents



Street results

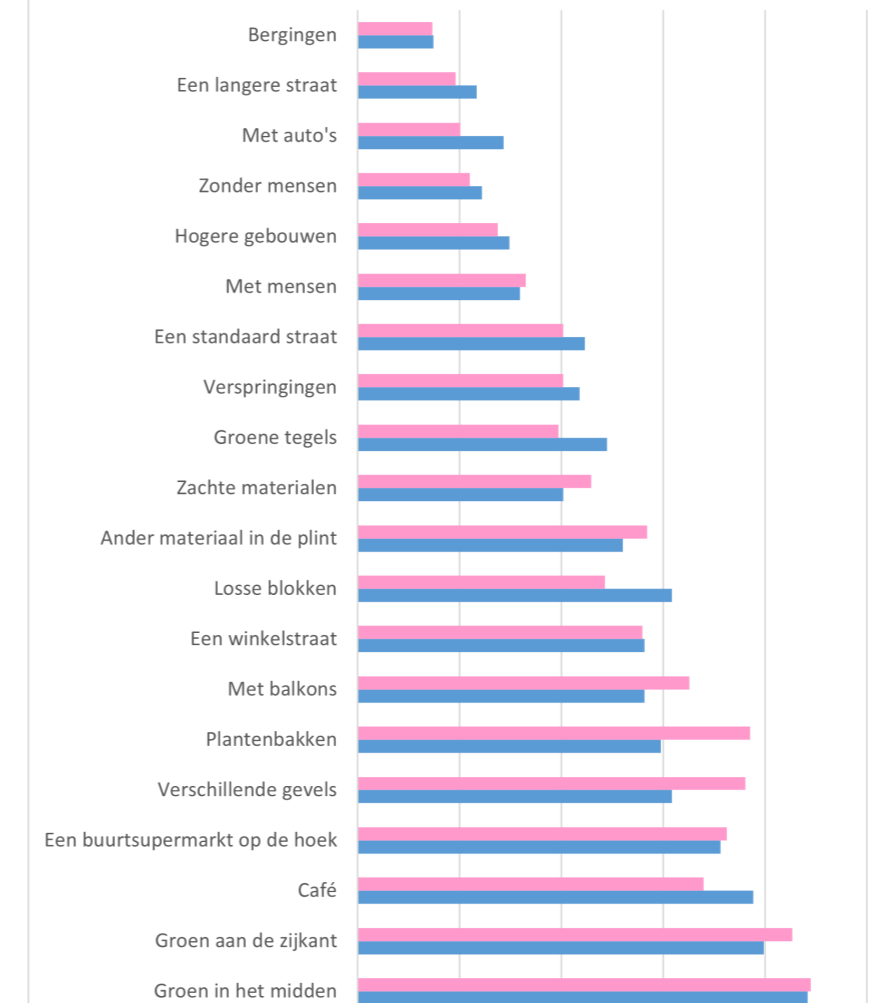
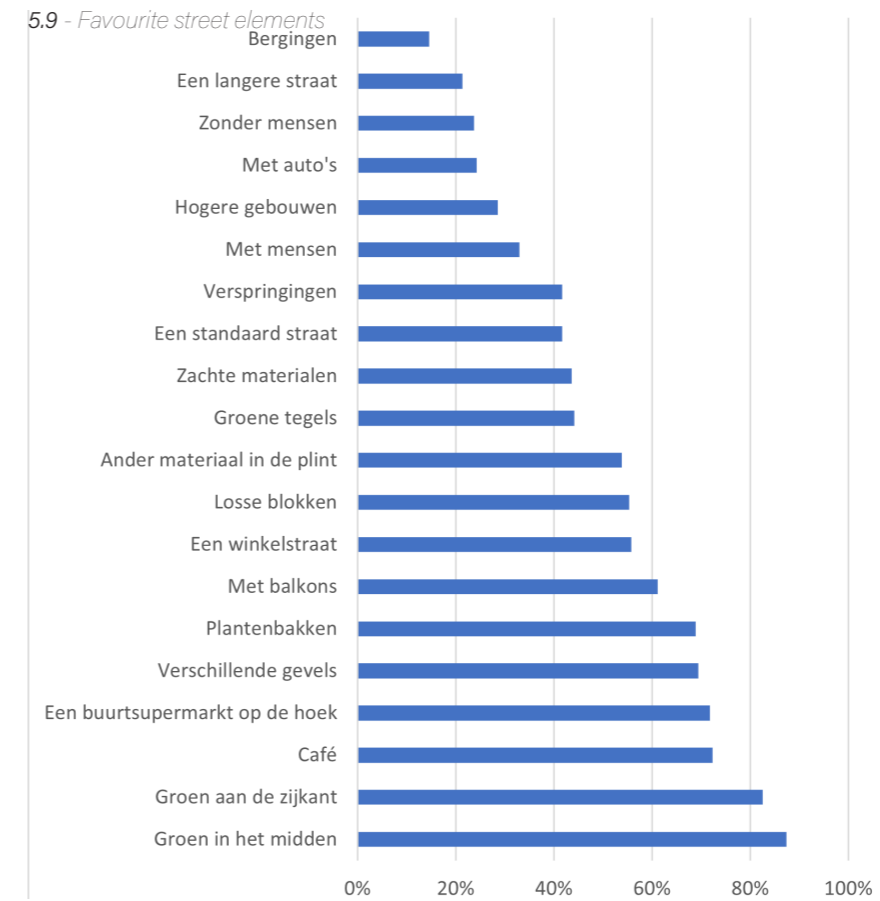
Since there were 203 responses, this means every spatial element street was matched up 203 times. Out of those 203 matchups, the two options with green were chosen the most. The least popular element was the street with storage. This was in line with the expectations, since green is known to increase attractiveness of a space. Storage decreases the attractiveness of the plinth, since it is more anonymous.

The standard streets was chosen a little bit then half of the time, which was in line of the expectations. Surprising was that green tiles seem to not do as well as other green, since it is maybe less visible. The corner store also did surprisingly well, even though one response noted that this might be less popular due to opportunities for hang youth to gather there.

Longer streets, streets with cars, and streets without people or hang youth did less well, which was also in line of expectations. The other changes in dimensions and materials had varied popularity, in which a trend couldn't be discovered thus far.

When looking at the responses through a gender lens, many spatial elements were about the same in popularity. The biggest difference was found in the planters, which women appreciated more.

Women also generally appreciated the difference in materials more, which is in line with the theory that women are more sensitive to the quality of spaces. The same goes for the balconies, which might increase the feeling of safety due to the eyes on the street. Men valued the street with cars more, since they probably use the car more, together with the café, green tiles and separated blocks. The trend in these preferences couldn't be found as of yet.

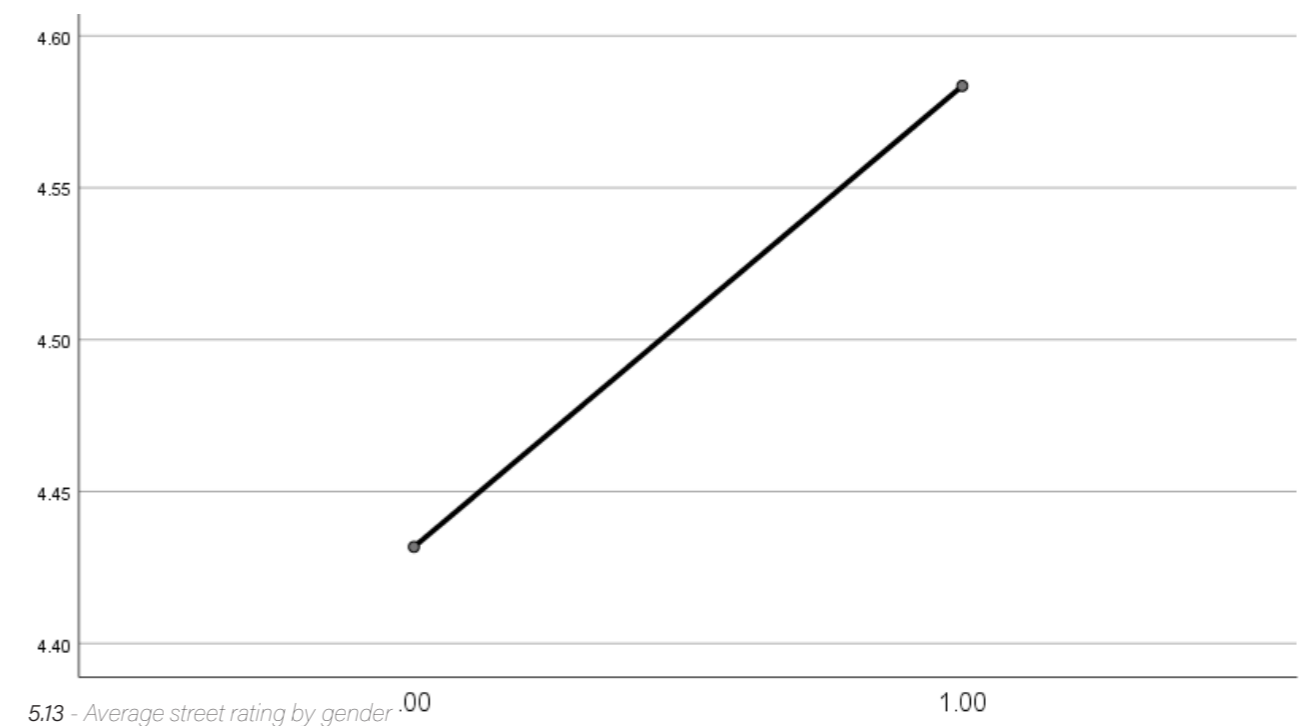
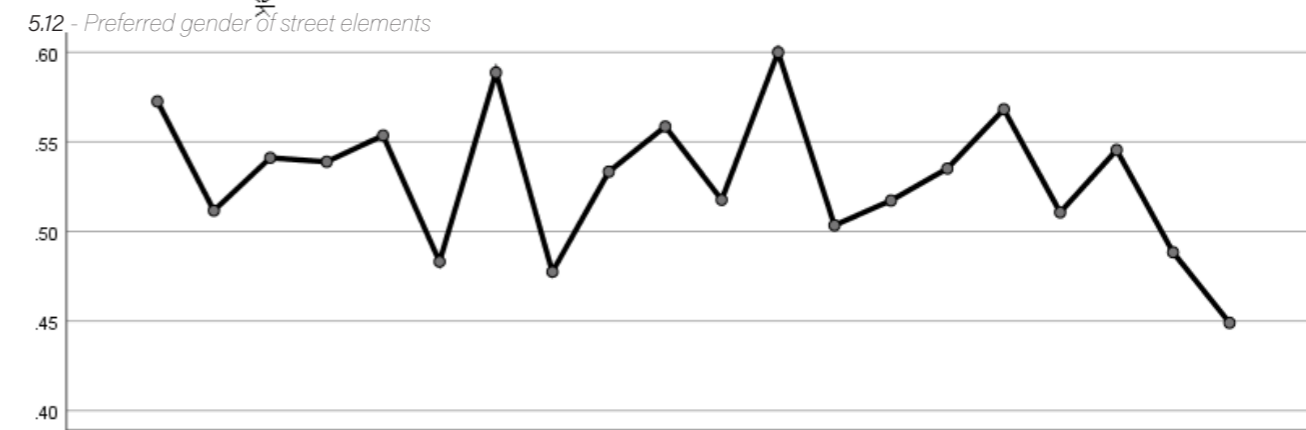
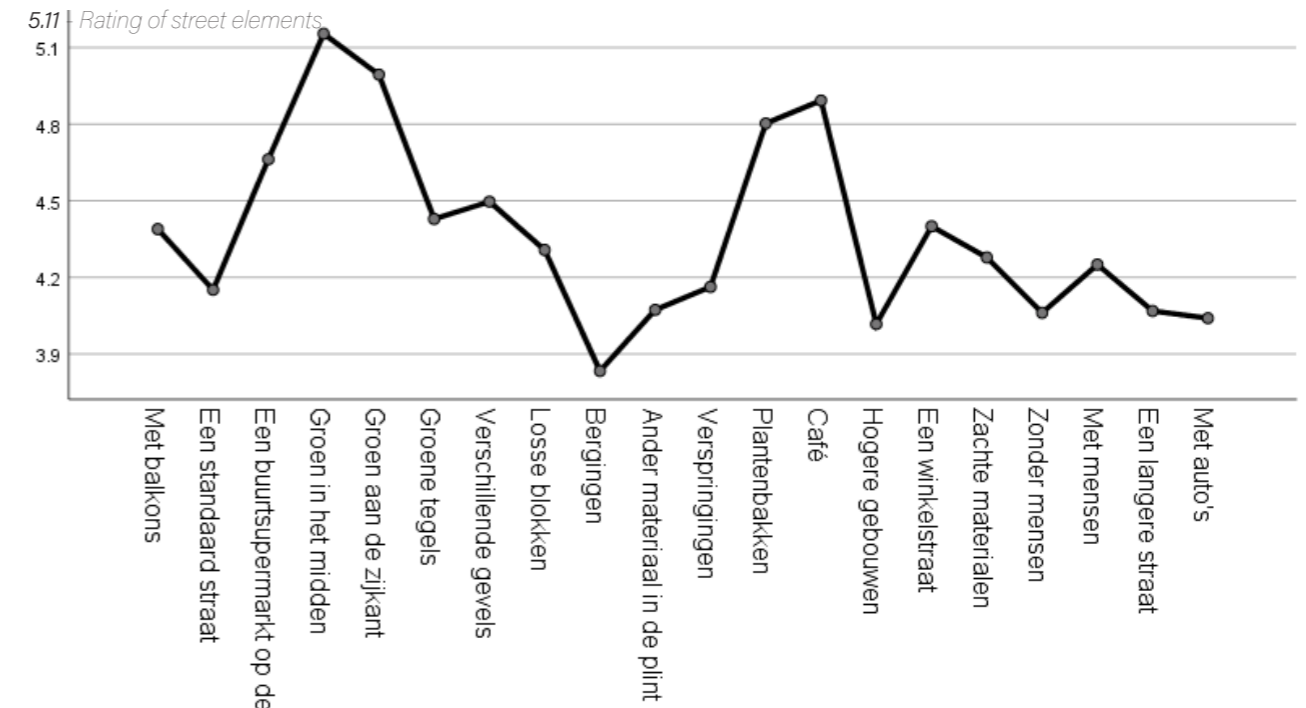


Street results

When relating all these preferences to the feeling given to them, we find some other interesting answers. The streets could be rated from very negative (1) to very positive (6).

Overall, the streets were quite positively rated, with the highest ones being related to greenery and the café. The green tiles were rated more negatively in comparison to the other greenery options. The street with storage was rated the lowest by far, with cars, a longer street, and without or with more people also rated negatively.

The second graph shows if elements were chosen more by men or women. Cars was chosen by men the most, and planters by women. This is in line with the results in the chart on the previous page. Another interesting find was that overall, men rated streets slightly more negatively than women, with an average rating of 4.43 compared to 4.58. A reason for this couldn't be found so far.



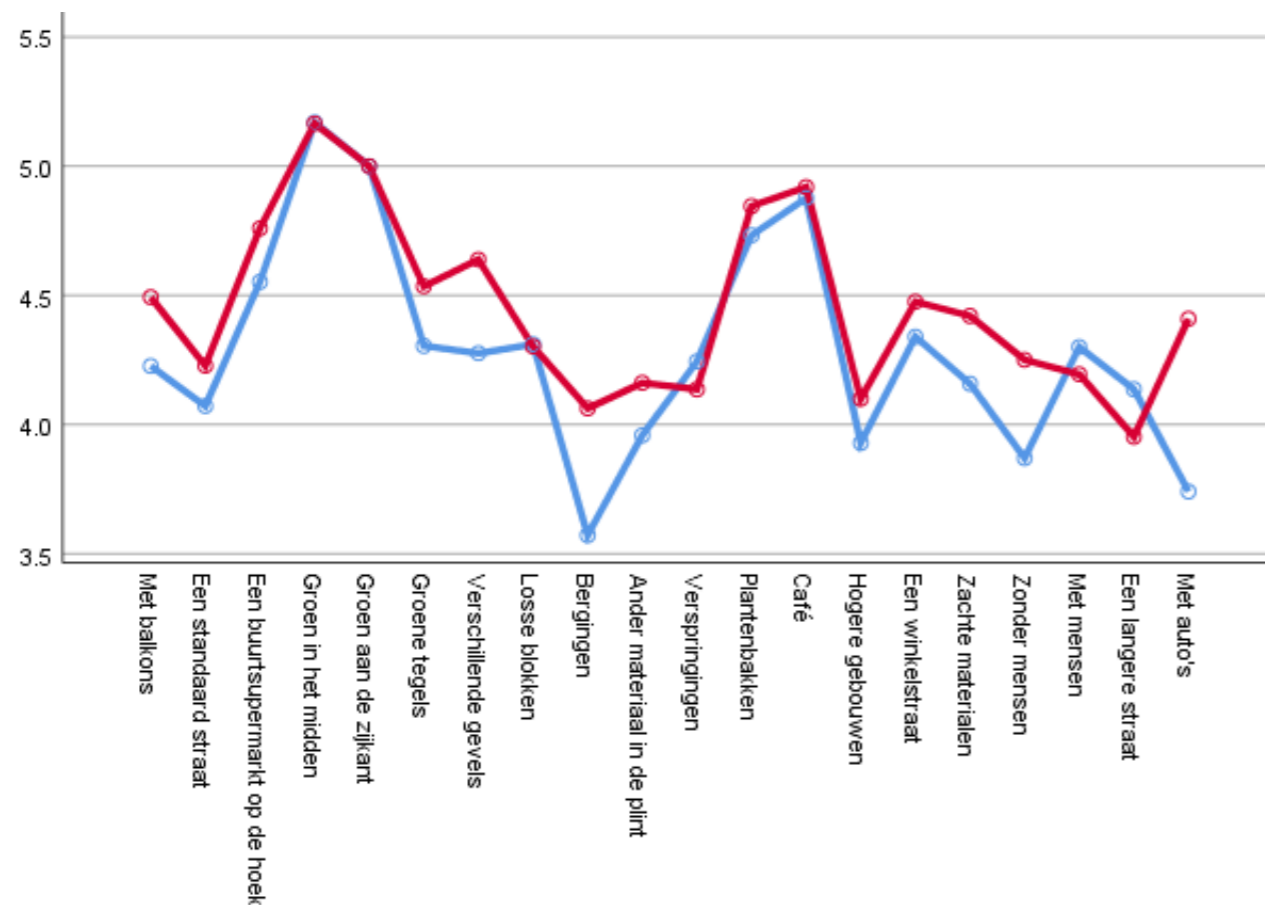
Street results

This last graph shows how women and men rated the elements separately. You can see that overall, ratings of men versus women are quite similar, although women tend to rate many streets somewhat higher than men. This could very well be because of the fact that men gave lower ratings overall, and that there is a different reason for this.

The biggest gender differences can be found in the rating for the street with storage and with cars.

Women rate these higher, which seems contradictory compared to the amount of times they were chosen. Similarly, even though cars were chosen more by men than women, they were rated less positively by men. It is contradictory, but it could be because the average rating is made up of less ratings, plus the fact that men were more negative overall.

Other than this, men rated the longer street and street with hang youth higher overall, which could be an indication that they don't perceive these streets as unsafe as much. This shows that men and women have different perceptions of safety, as was proven by theory.



5.14 - Average street element rating by gender

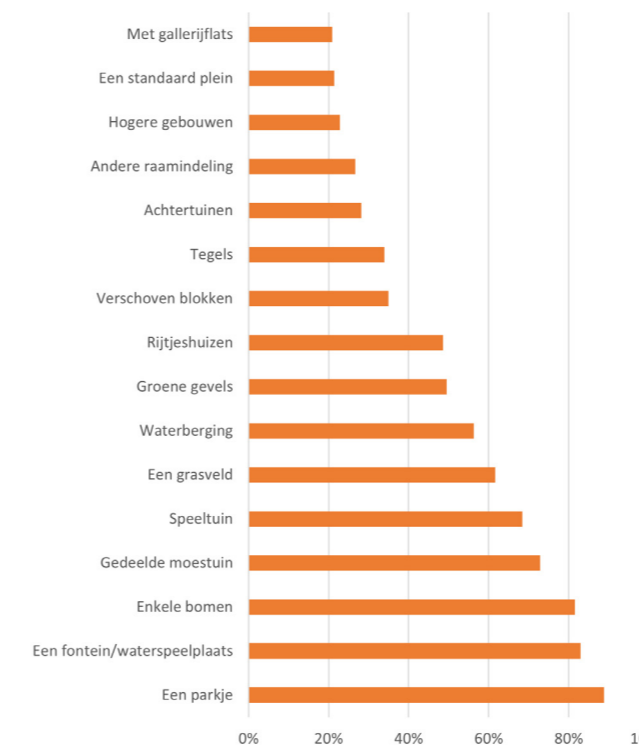
Square results

For the spatial elements in the square, the same analyses were performed. In terms of the most chosen elements, park is the most popular, followed by fountain. The highest rated elements were related to more greenery again. The grass field was rated lowest of them, which was also expected, since it is green, but doesn't have much of a purpose. The basic square chosen as one of the lowest, which makes sense, since it doesn't have much of an identity either.

The lowest rated square was one with gallery apartments. This was sort of surprising, since it was expected this would be perceived as more safe.

However, the plinth does have a greater sense of anonymity, which could be the cause of the lower amount of votes. Besides, the square itself stays without purpose with this element. Besides green, the spaces with more purpose are generally chosen more often. Change in the façade and buildings seems to do less in this case. Of this, terraced housing is rated around the middle, which was expected, since it does have more front doors and makes the space feel less anonymous.

In terms of gender differences, the square with water storage was chosen more often by men. The similar goes for the grass field. This could be because it is a nice place to play ball and skateboard for example, which are more active uses of the square. Women give more preference to the allotment gardens, and all other options with greenery.



5.15 - Favourite square elements

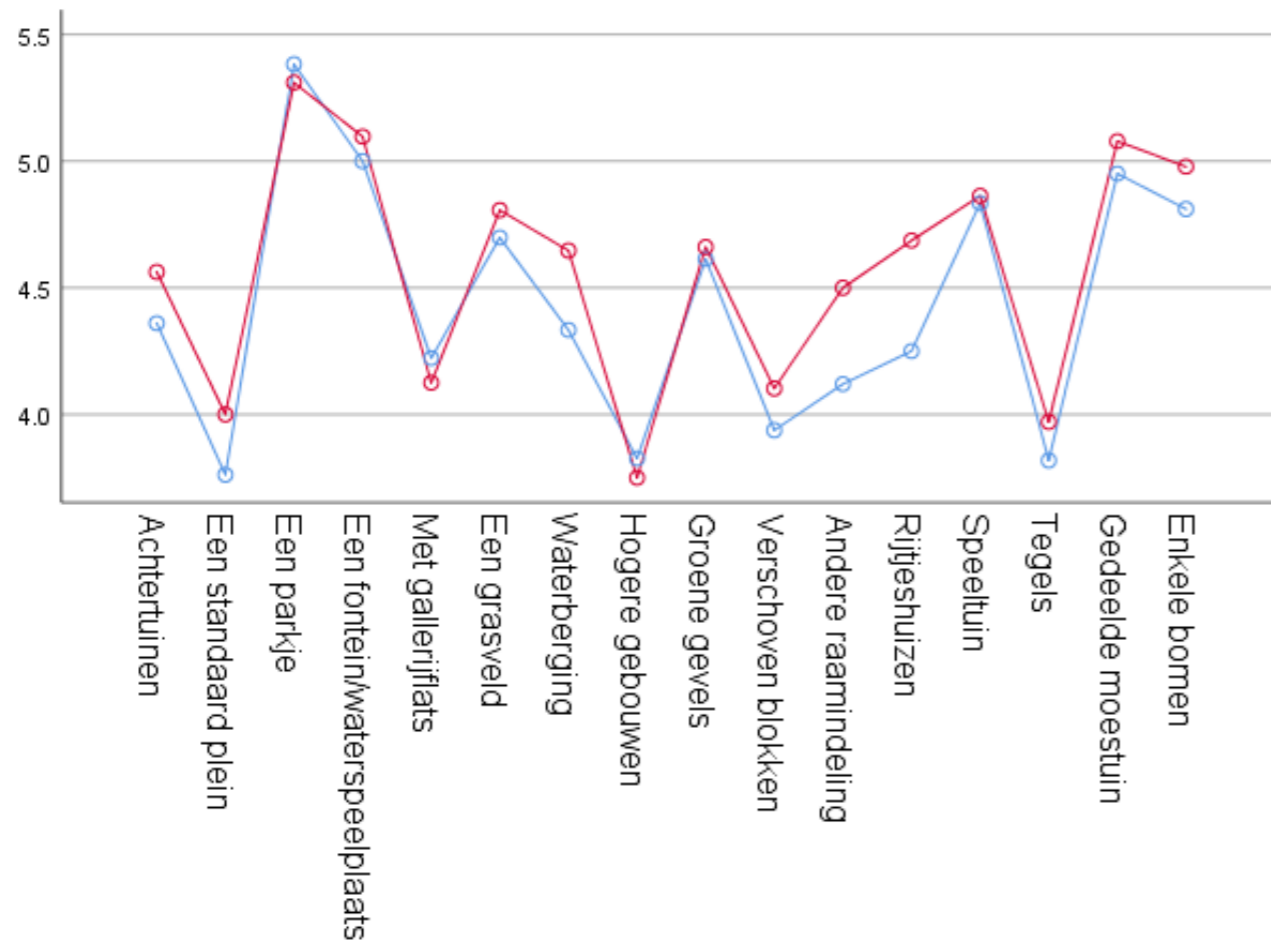


5.16 - Favourite square elements, by gender

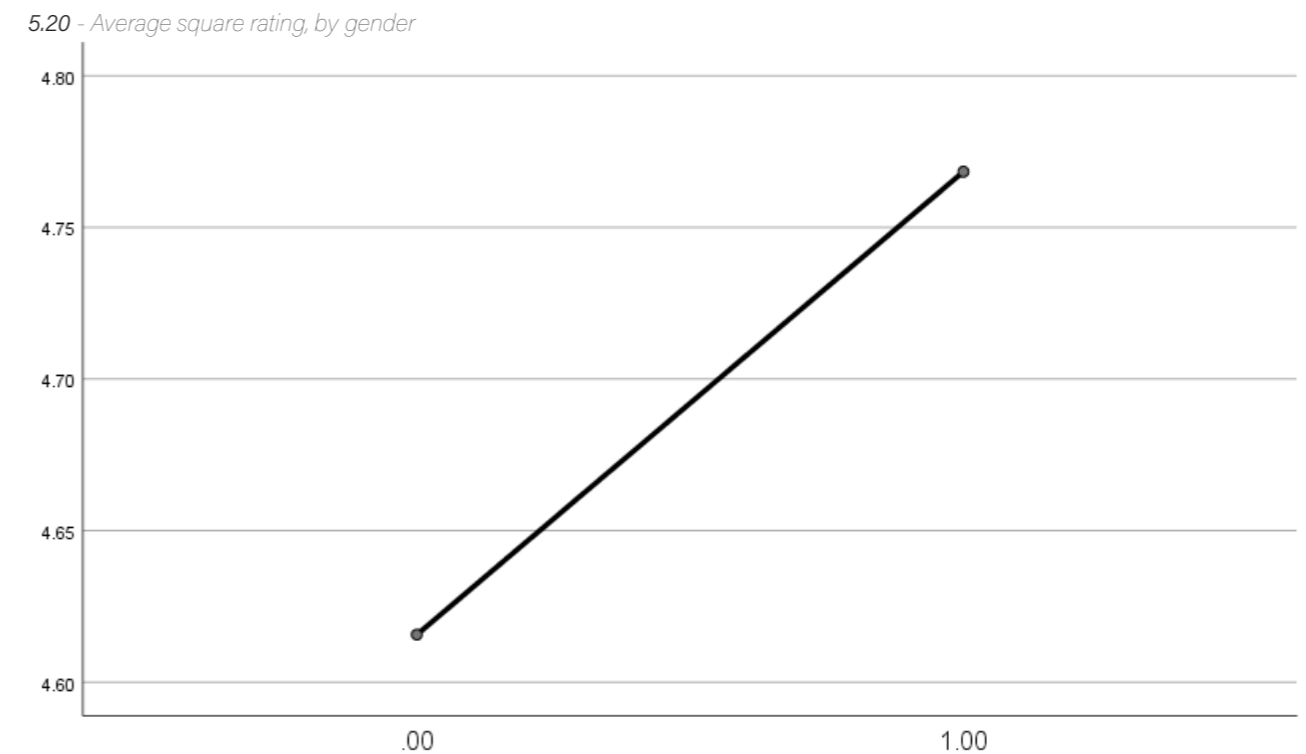
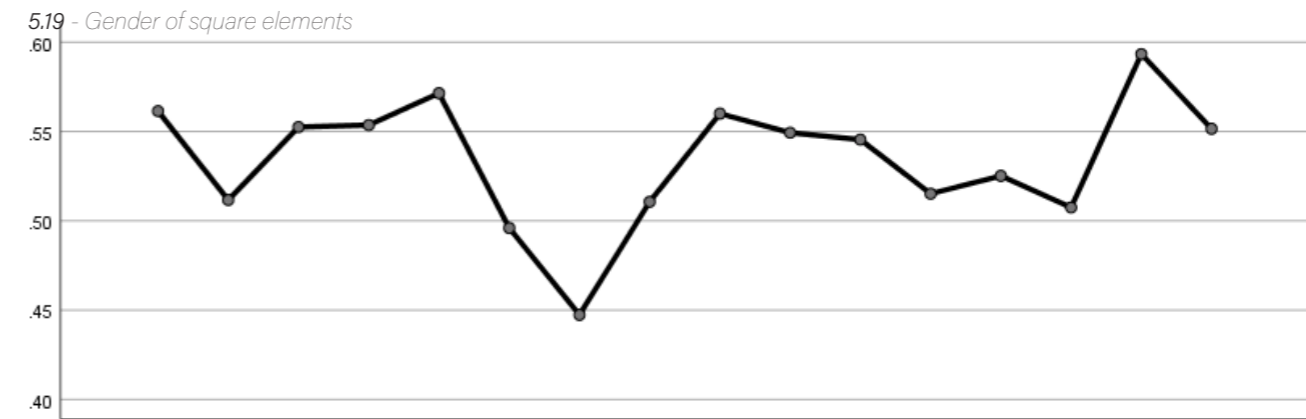
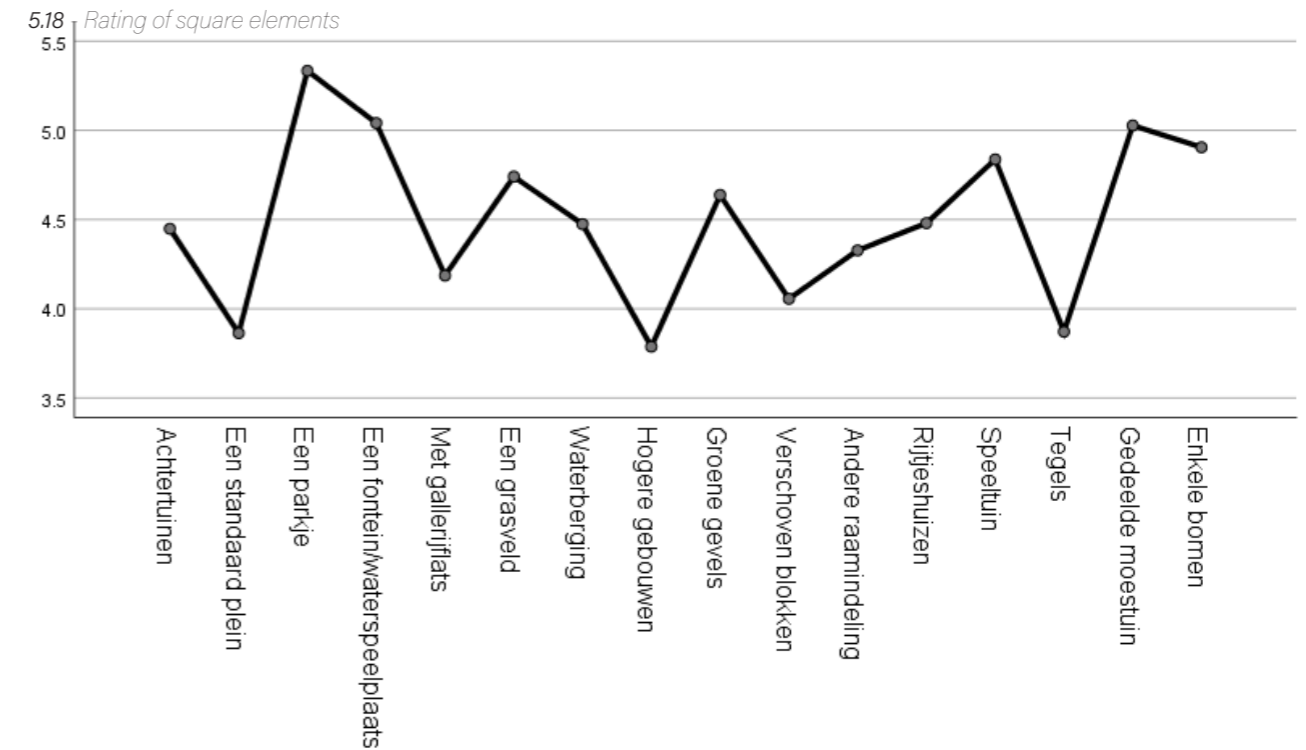
Square results

The rating for the spatial elements again shows that greenery and water/fountains get a higher compared rating. The higher buildings, standard square and different tiles have the lowest rating, probably since they add the least amount of dynamics and identity to the square. This is also in similar relation to the amount of times these options were chosen. In the square again, the men seemed to have rated the elements lower than women, this time with a difference in rating of 4.62 versus 4.78.

In the gender differences of rating of the squares, there seem to be little when comparing men to women. The highest difference is found in the rating of the terraced housing and different layout of windows in the façade, which is rated higher by women. This seems a trend in almost all rating gender differences, which again could be explained by the fact that men have a more negative perception in general. The park and the higher buildings are the only elements which are rated slightly higher by men. This is possibly explained by the fact that they don't feel as unsafe in those spaces, even though the trees in the park give less overview for example.



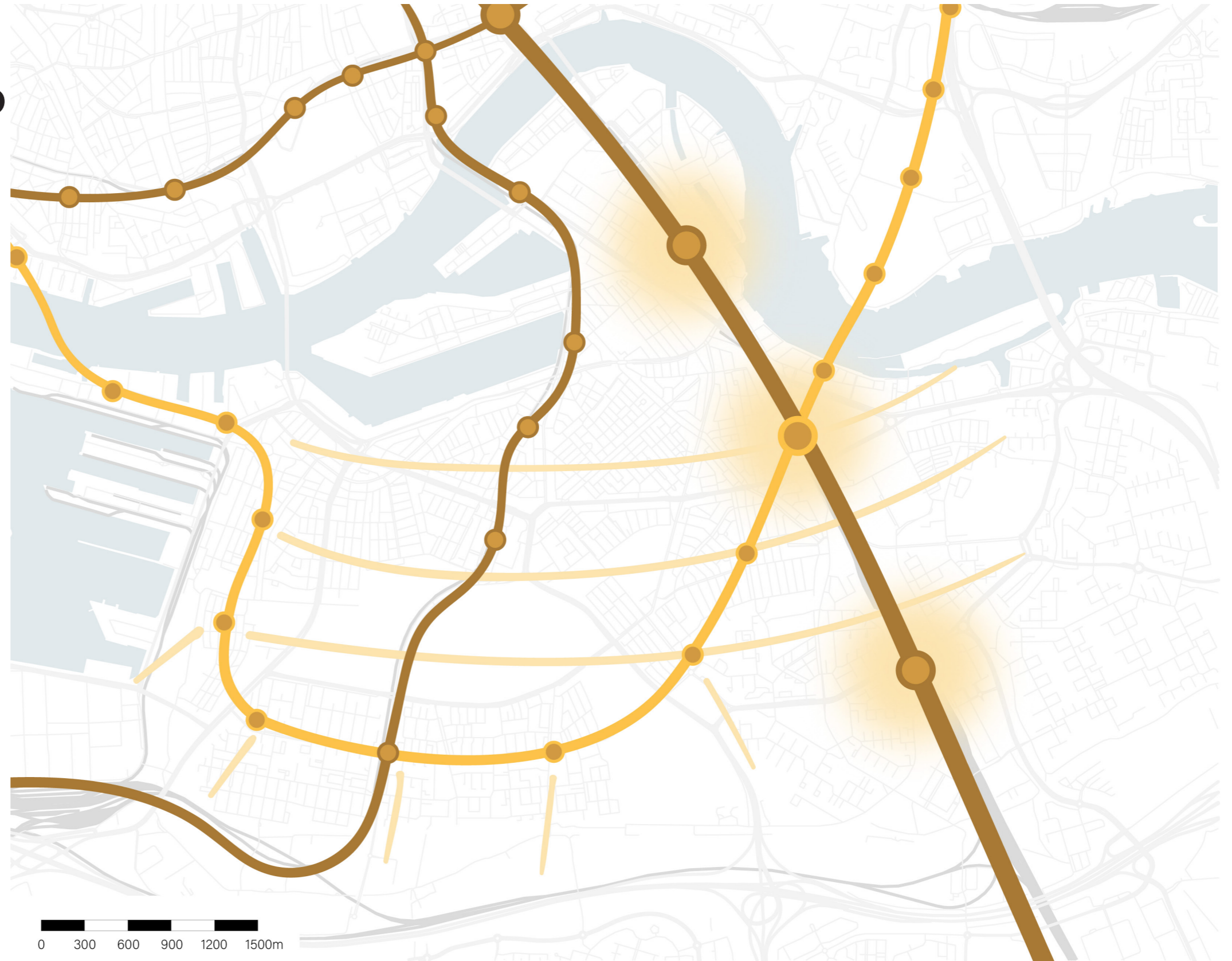
5.17 - Rating of square elements, by gender



5.2 / A VISION FOR ZUID

The vision for Rotterdam-Zuid on a district level is made up of improvements in the themes of the three design principles for this scale; network, green structure and amenities.

First of all, in terms of network, a new metro line is added to increase connectivity in Rotterdam-Zuid. This line will span east to west on Zuid, and curve up to north, over the Maas, towards Rotterdam-West. This will increase connectivity and accessibility within the neighbourhood. Besides this, the current train-stations will receive an upgrade, also in terms of walking accessibility, to gain attractiveness. The station of Rotterdam Stadion, which is next to the Feyenoord football stadium, currently only opens during football matches, which will increase in the future. This will create a new transport hub, which connects the train and metro-line.



5.21 - Network vision for Rotterdam-Zuid

5.2 / A VISION FOR ZUID

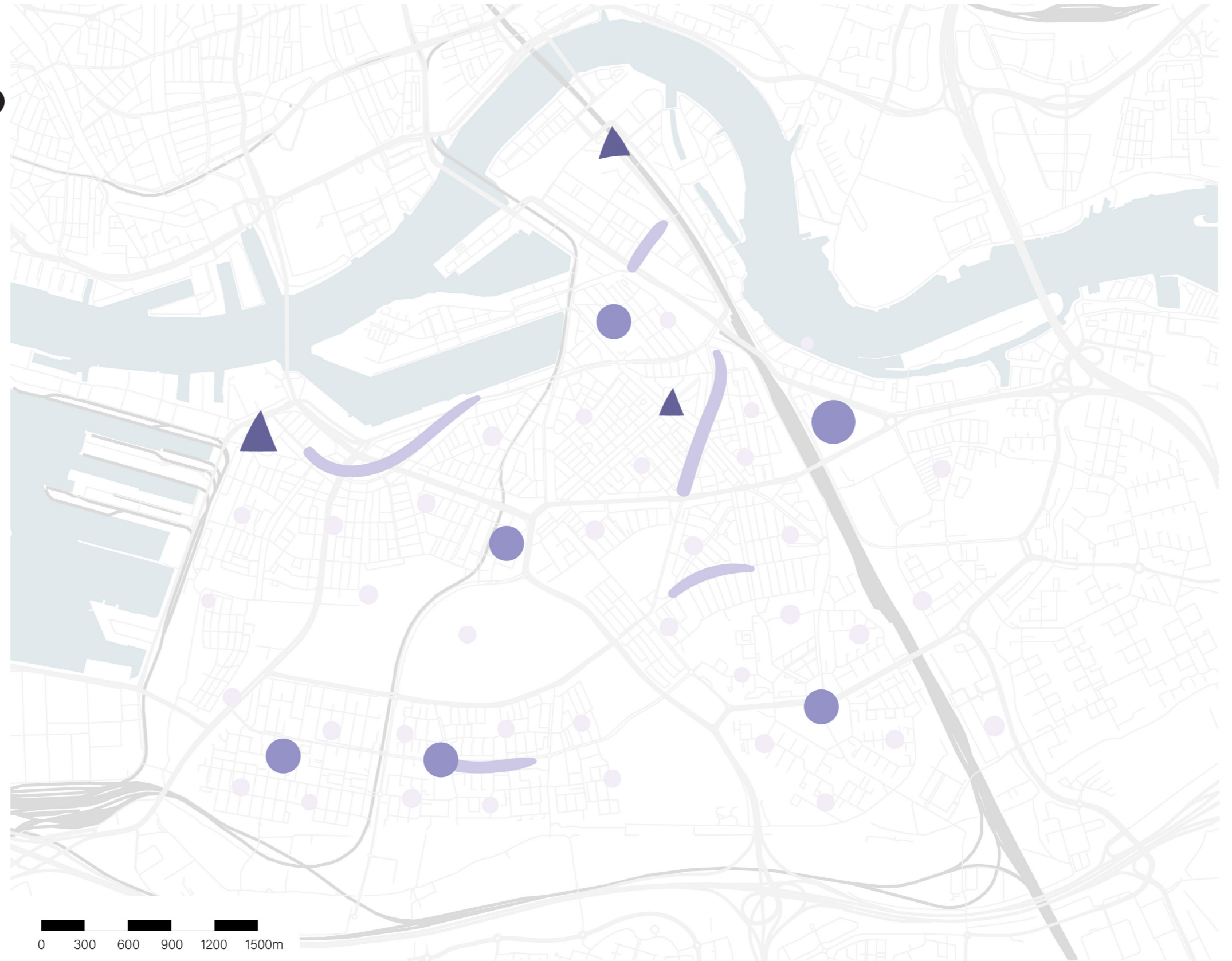
Next, the walking infrastructure is improved through a strengthened green structure. This green network makes use of the existing greenery in Rotterdam-Zuid, and increases its accessibility. The green connecting street increase attractiveness of walking and cycling. This green network is already situated along some roads, which will be in need of transformation. The green network ends along the Maas, where there is opportunities for mixed-use and recreation along blue and green. The green network is also situated along the main shopping streets, to increase accessibility for those too.



5.22 - Green structure vision for Rotterdam-Zuid

5.2 / A VISION FOR ZUID

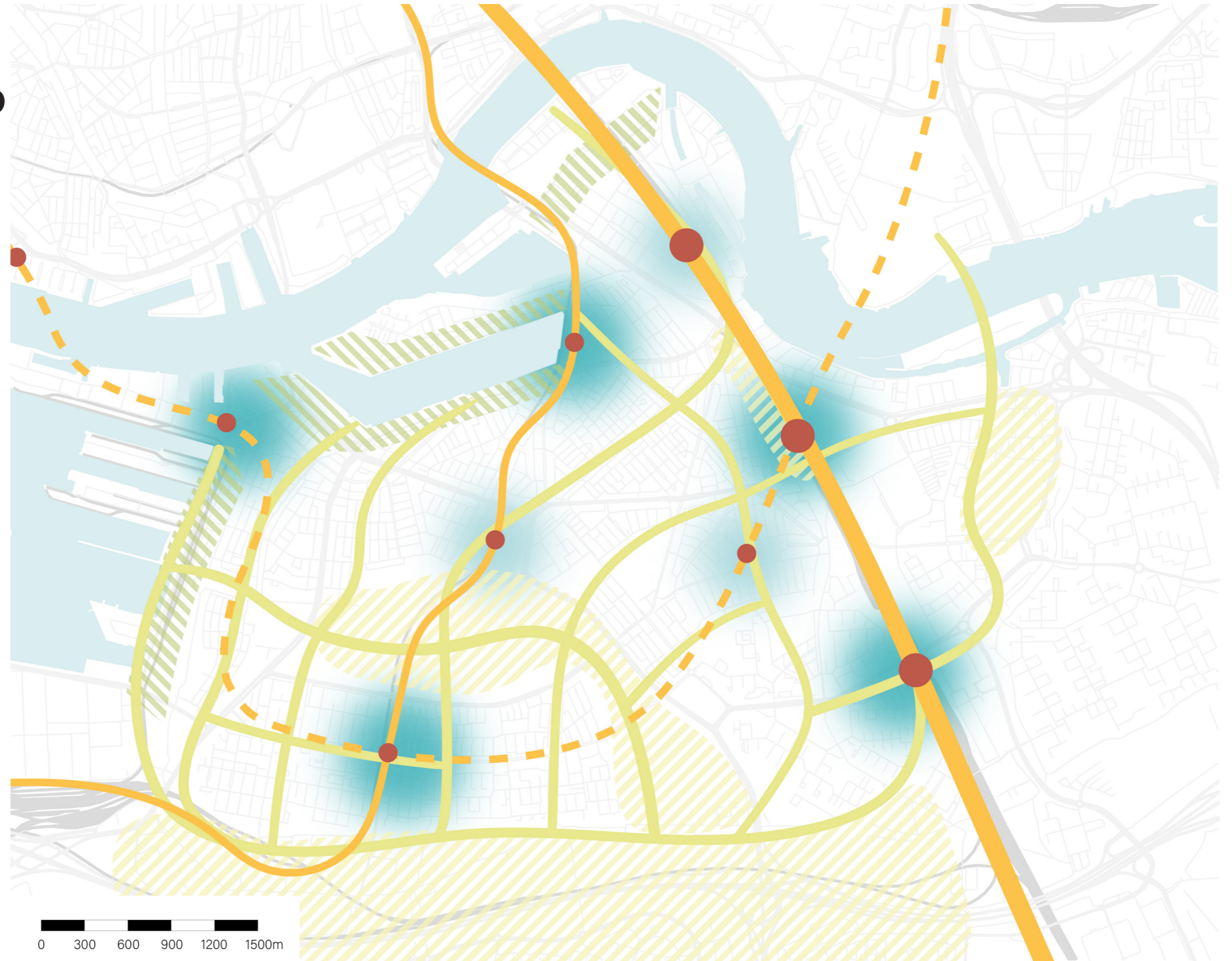
Lastly, the current amenities in Rotterdam-Zuid have a decent quantity, especially in terms of shopping streets. To increase accessibility for all neighbourhoods, and give more opportunities for small community-scale interaction, more corner stores will be spread out throughout the neighbourhoods. In terms of cultural amenities, access to these will be strengthened as well, with the triangles representing the old village cores, since the old historical and cultural value will increase attractiveness and draw more people to the area. This is why connectivity to those areas is also strengthened.



5.23 - Amenities vision for Rotterdam-Zuid

5.2 / A VISION FOR ZUID

Together, it is clear that all three themes work together to create a network with overlaps, so that accessibility and activity is promoted. The zones with public transport and amenities are spread throughout the district, with easy slow-traffic access through the green structure. It makes great use of the already existing green structures, which will be of great use in this case.



5.24 - Vision for Rotterdam-Zuid

5.3 / NEIGHBOURHOOD ADVICE

Hillesluis

For the neighbourhood scale, a map with guidelines for increased gender inclusivity was made, in the case that the municipality might restructure this neighbourhood.

The vision map of both Hillesluis and Zuidwijk were created with the idea that it showcases the female preferred perception. This is why the legend annotates barriers, connectors and landmarks for example. Through this, it showcases the ideal vision for a gender inclusive neighbourhood.

Principles from the bigger scale are extended into the smaller scale, for example with the green network and the strengthening of corner stores. The (green) arrows showcase the expanding of the green structure into the smaller scale. From the eastern Varkenoordsepark, the green is moved into the rest of the neighbourhood, connecting the (currently mostly inaccessible) green spaces of the neighbourhood. The corner stores (blue triangles) in the neighbourhood already exist and thus are kept, with the condition that these mainly stay along the green routes. Since corner stores are also opportunities for youth to hang around, creating more of a purpose for the space reduces that risk.

Moving onto the smaller scale principles, some of the blocks in Hillesluis are too long, which creates barriers that give a feeling of unsafety and inability to escape. Together with this, the block structure in the east is quite orthogonal and rigid, which makes it feel boring and unattractive. It is these zones that thus need improvement in the fabric. Shortening and giving the structures different angles creates a more dynamic and interesting perception.

Along the shopping street, this also happens, together with the fact that the openings into the residential area are quite small, and thus invisible. This is increased by the fact that the shopping street buildings are higher, thus hiding the residential area behind it. To increase that visibility, these openings should become wider.

Finally, there are a few (historic) buildings that are a focal point in the neighbourhood, and act as the end of a view. These view lines should be strengthened to increase wayfinding, and perhaps also added where this makes sense.



5.25 - Vision for Hillesluis

Impressions

On the smallest scale, some impressions were made to elaborate on the impact of the smaller scale principles on the space.

An exemplary street in Hillesluis was redesigned in the residential area. This impression is a vision of what the streets could look like in the future. The impressions were guided by the conclusions of the spatial analysis, together with guidance from the principles and the preferred spatial elements through the results of the survey. Examples of the implemented spatial elements are adding green in the centre, removing cars, increasing diversity in materials, planters, and added balconies. All of these elements aim to increase the direction, purpose and identity of the space. In the left, a block was broken open, to make the street feel less long. The setbacks in the facade were not added, but only strengthened through the use of different materials. The front doors of the buildings are way more visible than before, and have accessible green in front. At the end of the street, instead of a wall, an opening was created, to prevent people from feeling locked in the space. The car was removed to make this space more pleasant for slow traffic, which makes the space level and feel much more open.

In terms of the principles, this all together contributes to a space with a better sense of ownership, more dynamic materialisation and a feeling of being seen. It also contributes to the placemaking, although not in its extreme, since not every street has to have its own identity. In terms of the spatial analyses, different heights and setbacks were implemented, together with the increased amount of public space and green, to create more diversity in the space in the end.



5.26 - Hillesluis street, before

5.27 - Hillesluis street, after



Similarly to the street, a typical square in Hillesluis was chosen to shape a vision for. The focus for this space was to create a square with more green and coherence, which makes it more inviting.

The trees in the middle are a more natural way to create a barrier between spaces in the park. Instead of adding 5 different spaces into one, the purpose of the space is more uniform. Different and softer materials were introduced to soften the rigid paved square. Besides, this requires cars to slow down while driving. Planters with green climbing up along the facades make the plinth less of a rigid barrier. Some buildings were heightened to create more dimensions in the view. The school in the middle is quite visible with the striking façade materials.



5.28 - Hillesluis square, before

5.29 - Hillesluis square, after



Zuidwijk

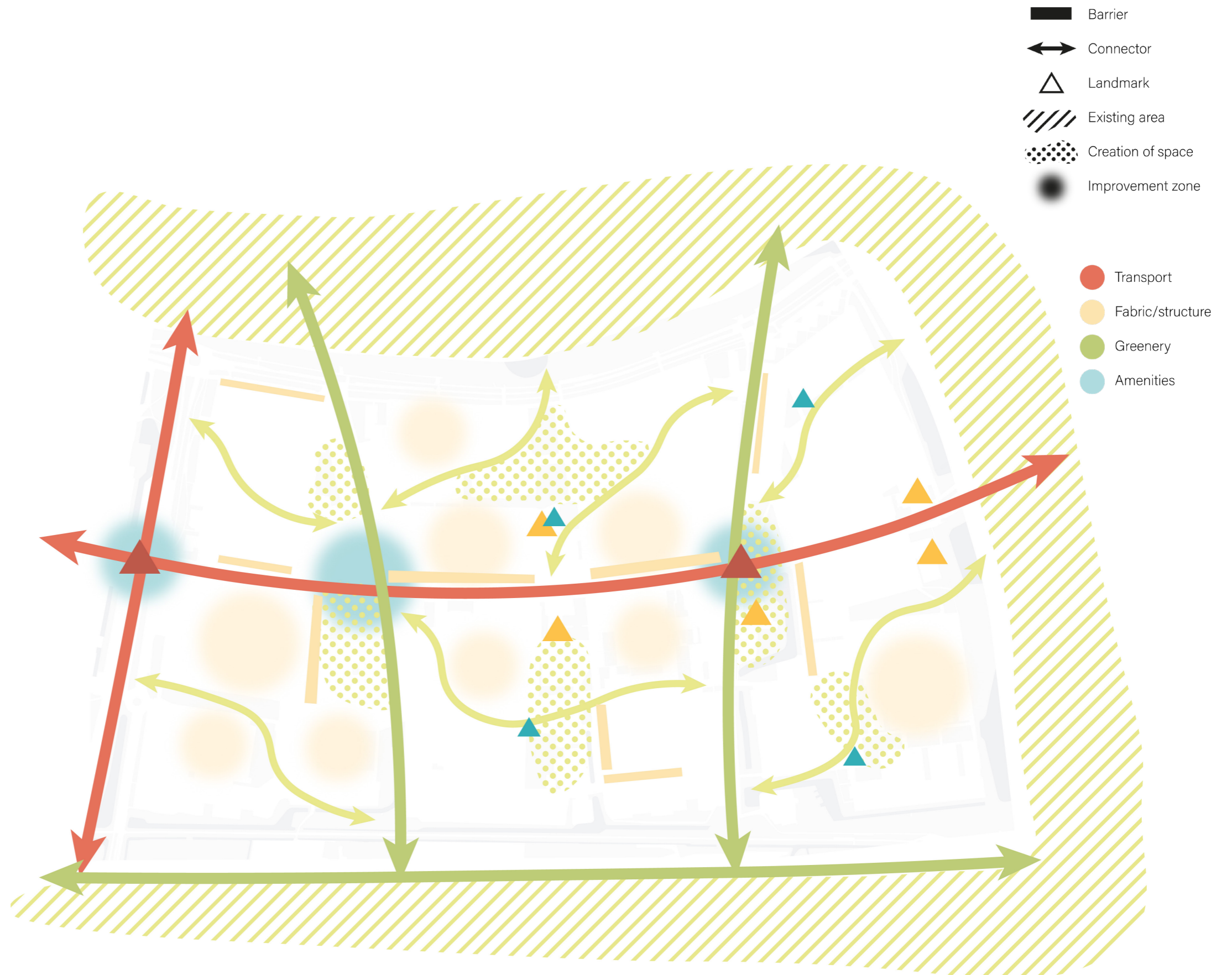
For Zuidwijk, a similar vision was made, with the same elements of perception as explained before.

A few strengthened green structures connect the neighbourhood with its surrounding park and rural area. These larger structures are connected by smaller green paths, that promote walkability of the neighbourhood. These also connect the already existing green areas, which in turn will be diversified and with added purpose.

An added metro line now goes through the neighbourhood, albeit underground. This creates more points of interest along the transport routes, which are also connected to the amenities already existing. The new corner stores are located along the green routes.

In terms of structure, Zuidwijk has a very orthogonal and rigid fabric. In a few zones this needs to be changed, to improve the flow of the neighbourhood. Long and orthogonal blocks create barriers and are not inviting.

Overall, some character and coherence needs to be added in the neighbourhood, which will be done on the smaller scale.



5.30 - Zuidwijk vision map

Impressions

For Zuidwijk, an impression was made of the main busy road, and a quiet, typical street.

Firstly, the main road doesn't feel very safe, because of the fast cars and lack of accessibility for slow traffic. To create more room for them, the fast and slow traffic are separated, instead of mixed, like it was before. This way, there is more room for interaction and diversification in the pedestrian zone. Entrepreneurs also get the opportunity to create a terrace, and greenery adds quality, while also creating a barrier between the safe and unsafe zone. On the other side of the street, the plinth is made more inviting and coherent. As is the overarching theme in all impressions, this goes together with diverse building heights and materials, while preventing the space from becoming overwhelming.



5.31 - Zuidwijk busy street, before

5.32 - Zuidwijk busy street, after



In terms of the quiet street, the main issue was the unclarity of ownership and incoherence of the space. This is improved through the added green structures in the street. The street now has an added corner store or café, which promotes informal interaction and ownership. The green space in "the back" of the buildings on the right is now heightened to make the space feel more collectively-owned, but people are still allowed in. The entrance is also strengthened in terms of increasing the size, which makes it more of a gate. This is done at the end of the street as well, towards the busier road.



5.33 - Zuidwijk square, before

5.34 - Zuidwijk square, after



5.4 / FRAMEWORK

Measure gender inclusivity

After doing research on designing for gender inclusivity on a specific location, some lessons can also be learned in terms of how this applies to all urban environments. To do this, a tool was developed in the form of a framework, that can measure female-friendliness of a public space.

In the theory, it has been found that women's use and perception differ, which makes spaces less attractive for them. Since one's use of space can be easy to test, for example when looking at accessibility or user-data, this framework will measure how positively a space is perceived by women.

It was found in theory that women value being able to see how coherent and legible a space is. In the preference framework from Kaplan & Kaplan, this is a reaction to if a space can be understood. This has been found to be one of the key elements that provides comfortability for women in a space, and decides whether women want to move towards the space.

It is this coherence and readability that can be measured with the framework, which is a tool that be applied to any image of a public space, which means it is only meant for the smallest scale thus far. A few measurable elements have been concluded to decide the legibility and coherence of the space, which can be seen on the right. These measure bars can together be a first test towards the average female-friendliness of the space.

The bars are divided into two themes: elements and vision. The elements stem from the set of 32 elements that were used in the survey. Obviously, there are many more spatial elements, which can be grounds for further research. However, in this initial test of female-friendliness in perception, a balance has to be found between the amount of elements, the amount of themes they find themselves in, and the spatial impact they have. For example, a space can have many different elements, but they are all within the theme of green, and/or don't have a huge impact on the space (for example, they only take up 20% of the image). This means the space is still quite readable and coherent. All in all, this means that when all bars measure at the extreme ends, a space will probably not be as female friendly.

The second theme concerns vision of the space. In order for a space to be readable, people need to be able to see all the ends of the space, and don't find any ambiguous spots. That is why the second set of bars has two questions, with one good and one bad end. Different than the first set, this is not a case of balance, but a clear-cut answer.

The bars are slidable and don't have set indicators in-between. This was done on purpose, since all spaces compared to each other might have different indicators. When comparing specific spaces within one study, it might be useful to add these indicators to one's preference.

In the end, all the bars together can give an indication of how female-friendly a space is. However, when using this tool, it might be useful to test compare different spaces to each other, to see the difference in the amount of elements there can be. In further research, it might be interesting to see how this framework can be developed further, and can also consider the perception of complexity and mystery for exploration, as was explained in the preference framework from Kaplan & Kaplan (2005).

Amount of elements



Spatial impact of the elements



Amount of themes from elements



Can you see all?



Can all see you?



06

Concluding

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6.1 / CONCLUSION

This research started with the observation of gender inequality in public spaces, which raised the question “How can cities be redesigned to be gender inclusive?”. To conclude this research, each of the sub questions will be answered, to shape the full scope of answers this research has found.

SQ1: (In which ways) does gender relate to the built environment?

The most common notion relating to gender in public space, is the fact that women tend to feel more unsafe in cities than men. Rather than only dedicating this difference to the fact that women are more vulnerable, there is this inherent inequality that shows that cities might not be made for women at all.

Since the creation of societies and divisions between rich and poor, gender inequality has started shaping, with the help of religious works like the Bible. When cities started developing, and planning their developments, the planners in charge were men for a large period in history. It made sense in society at the time that only men were researched, and only their point of view was considered, which caused women to be forgotten in the planning of cities. And not only women, but other people that fell outside the cisgender white hetero male perspective, were left out as well. Each layer of identity that differs from the norm, was not considered.

This research has found that there are actual differences in the way women use and perceive the city, which can be accounted to their gender. From a young age, boys and girls are found to have different preferences in types of play, and thus the locations they tend to go to. It is also found

that, unsurprisingly, playgrounds are mostly made for boy-play. It helps that boys only need a grass field to play football, while girls have more specific needs in their playgrounds.

As women get older, these different needs shift into user patterns that make up the way they use the city. Women tend to travel more by public transport and increasingly make use of trip chaining, which is the concept of making multiple interconnected trips. This creates a different need for women in the construction of the network.

Not only use differs according to gender, but perception does as well. It is concluded that women are more sensitive to the quality of public spaces, and thus feel unsafe or uninvited more often. It is also found that women perceive a green space as more positive compared to men. This all together makes it so the quality of the public spaces is lacking in regards to the female perception. These can be attributed to spaces lacking in either coherence, legibility, complexity and/or mystery of the space.

These are only a few examples of ways in which men differ from women when it comes to their behaviour in cities. In the end, it was found that a set of 9 principles can help improve spaces to improve the perception and use of the space for women. On the biggest district scale, these principles concern the network, green structure, and amenities. On the neighbourhood scale, it concerns breaking barriers, wayfinding and creating viewpoints. On the smallest scale, it is important to create clear ownership, identity of place, and the feeling of being seen.

In the end, designing according to these principles creates a more gender inclusive environment in cities.

SQ2: Focusing on the case of Rotterdam-Zuid, in which ways does the built environment currently cater to gender inclusivity?

The two neighbourhoods chosen for the spatial analysis are a pre- and post-war neighbourhood in Rotterdam-Zuid. These different historic layers have created different urban fabrics, thus have different needs when it comes to improving for gender inclusivity.

Along the principles that were found before, it has been found that the neighbourhoods could be

improved in quite a few of them, although not all of them were completely lacking. The main difference between fabrics can be found in the fact that Hillesluis has a closed block structure, creating clearer boundaries between public and private, and thus showing a clear ownership of the space. Furthermore, while Zuidwijk has green space, but without a purpose, Hillesluis doesn't have much green space altogether. As a conclusion, Hillesluis needs to cater to the principles in terms of diversity, while Zuidwijk lacks the character and coherence needed according to theory.

SQ3: How can gender inclusivity in Rotterdam Zuid be achieved through urban design?

A set of 32 spatial elements were tested through a survey to conclude which spatial elements positively or negatively contribute to the female perception of public spaces. These spatial elements were collected through a spatial perception analysis in the project locations. It was found that both men and women prefer green spaces, as the theory suggested. Besides this, women preferred elements that created a space with purpose and diversity. However, it could very well be that combining too many spatial elements can decrease the coherence and legibility of the space. It was also concluded that men tended to see less safety issues in spaces with cars and hang youth for example.

Rotterdam-Zuid can become more inclusive through adapting the set of guiding principles to their location in a guiding vision. These guiding principles are specifically applied to the aspects that were found in the spatial analysis to be lacking in terms of gender inclusivity. In the district as a whole, the slow traffic and public transport network is strengthened to increase its accessibility, which overlaps with a new green network and diverse amenities. In the neighbourhoods themselves, this district vision and the principles trickle down in scale, with greenery and amenities still being prominent aspects, together with improvements in the orthogonal structure in the fabric and breaking down barriers.

On a public space scale, the preferred (and unwanted) spatial elements from the survey were used to recreate impressions of the vision on the smallest scale. In this scale, the principles, analysis and survey conclusion all come together. The spatial elements were implemented with the principles and analysis as a guideline, creating

readable and coherent spaces. In the end, both of these aspects improve the feeling of ownership women feel in a space, which has been found to be very important in designing gender inclusive spaces.

SQ4: In which ways can the principles used in Rotterdam-Zuid be applied to all urban environments?

Rotterdam-Zuid is a specific location in the fact that it has a characteristic history and a diverse background of inhabitants. This together all creates a set of variables that make the gender inclusive design for the locations very location-specific. However, since the guiding principles stem from theory and are not location bound, these principles can be used to apply gender inclusive design to multiple urban environments. However, this doesn't mean that the explicit meaning and elaboration of the principles can be adopted one-on-one. The guiding principles are general in the sense that they need further elaboration, which can be taken from a location-specific spatial analysis. This spatial analysis makes the application of the guiding principles more specific to the location.

On a smaller scale, the framework can also be used to analyse and measure the spaces in their gender inclusivity. Since use of space is more easy to measure, the framework focuses on the ways to measure a woman's perception of a space, and thus how female-friendly a space is in terms of perception. This perception consists of readability and coherence of the space. The framework is a tool that uses a set of 5 scale bars, that can compare spaces and find balance in this readability and coherence.

In the end, this study has proven that gender inequality has a relation to the built environment, and that the built environment enforces this gender inequality as well. Since women use and perceive the city differently, research and redesign to include women is needed. This research has given a first glimpse into how this could be done in existing urban environments, and hopefully will be researched further in the future.

6.2 / DISCUSSION

Limitations and bias

This research project considers the problem of gender inequality in the urban environment as something that has been related since the beginning of societies and other inequalities forming. However, during research, actual proof of the impact of gender inequality on the urban environment and its design was only found starting from the 1940s.

It could very well be the case that gender inequality was not apparent in the urban environment before that, which does seem very unlikely. It is a more probable scenario that before the 20th century, urban design and spatial planning were not as intentional as they are today, making the design more chaotic, and the design decisions less substantiated with evidence. Thus the gender inequality was less proven in the urban environment, but these differences were more unintentional.

In the steps towards a design, some prepositions were made as to what spatial elements could contribute to gender inclusivity in the built environment. These prepositions were either found based on own experiences and perspective, or taken from research conclusions

that were done in a different context, for example on a smaller scale and with the specific angle of safety in mind. However, in these prepositions, little theoretical underpinning was found as proof to the actual contribution to solving the problem statement of my project. These hypothetical spatial elements thus will be used in the design, with the ambition that they will be proven to work throughout the practice of designing. If this would not completely be the case, however, it might make the research less reliable, with more research needing to be done on other possibly related elements. Adding to this, in terms of future scenarios, this research caters to a future that is desirable, but not among the most probable, as seen in the scheme below. This gives the need to work in a more hypothetical manner, with creating proof through practice.

As a way to strengthen the evidence on the prepositions, one of the methods that was done for this research, is a survey. This mainly reached a target audience that is similar to my personal circle. It also showed some bias and was thus less reliable as to people's wishes in the specific context of my research. This was mostly seen in the lack of cultural and age diversity. However, it might show some universal differences in how different genders perceive and use spaces, that don't have to be attributed to other personal factors. To ensure this is the case, further studies can be done in the future with broader audiences.

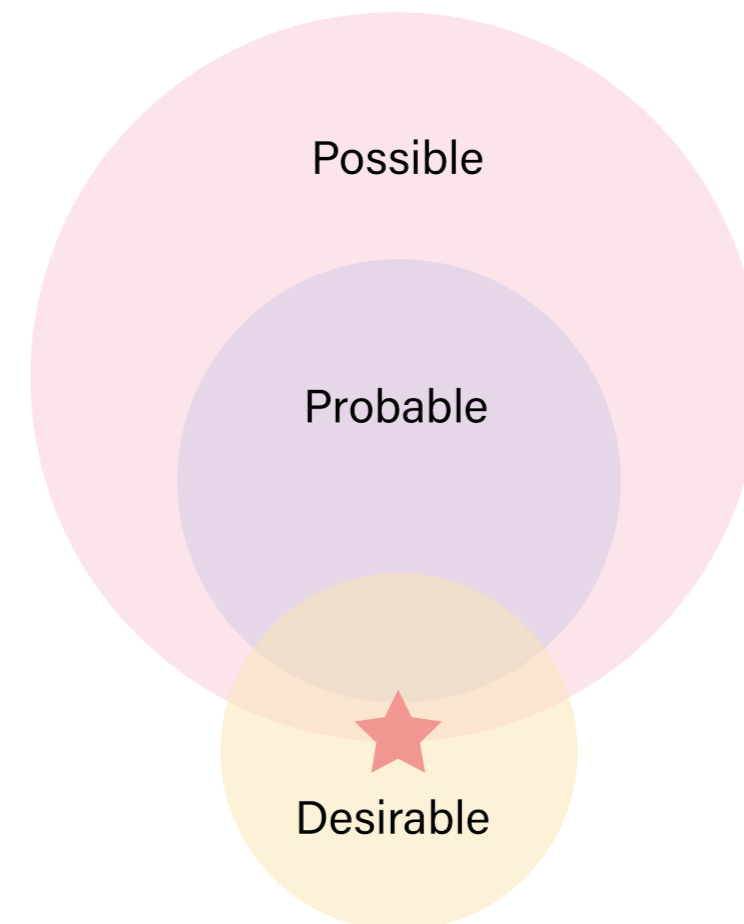
Other methods that were considered consisted of interviewing and cognitive mapping. However, these ideas were dismissed in the end due to two main reasons. First of all, finding a target audience in this specific context was previously found difficult. Subsequently, a small amount of interviews would not generate as much data, and thus would not be as reliable either. Studies in this sense can also be considered in future research on the subject.

In the results of the survey, it was also seen that elements were generally rated quite positively. A reason for this could be that the style of the element drawings were too colourful and cartoonlike, and thus not as realistic. This might make it hard for people, especially ones who are not urbanism students, to empathize, or see themselves in the spaces. Also, the randomized presentation of elements could have led to some interesting comparisons, which people might have found hard to compare.

The elements that were chosen were only a subset of possible elements you can find in urban environments, but I tried to find general ones that

respondents could more easily relate to. In some elements, it might have been the case that a combination of elements could have been presented accidentally, which could work contradictory in the perception of space. Lastly, the amount of respondents could have been increased to increase the reliability of the conclusions. On all these aspects, further research could be conducted to prove the validity of the conclusions.

Finally, the framework can still be improved in its reliability. Currently, the framework only considers legibility and coherence as important aspects of perception in the urban environment, while the Kaplan & Kaplan preference framework includes two more aspects. Besides, the scale bars of the framework only considers the elements and vision, while the elements are a vast theme with many variables. Which other themes could be considered for the framework, should thus be elaborated on in further research. Similarly, the tool could currently be useful to compare spaces to each other in their female-friendliness. However, to individually test spaces, further research is needed in how to divide the scale bars or give them universal and objective indicators.



6.2 - Scenarios of this project

6.3 / RECOMMENDATIONS

This thesis has only scratched the surface in terms of what design steps can be taken to improve women's comfortability in cities. Since the subject is quite new, the topic still has more knowledge gaps that can be explored. For example, the range of spatial elements that influence women's comfortability in spaces can be expanded. In this survey, only 32 spatial elements were used and chosen according to hypotheses. A bigger range of elements can expand the toolbox of inclusivity for designers. Besides, the validity of the survey can be improved, which has been considered in the discussion.

Furthermore, a first idea for the framework of measuring female-friendliness of spaces has been created. In further research, this framework can be elaborated on and expanded to include all four aspects discussed in the preference framework from Kaplan & Kaplan. Only a few measurable scales have been shown, but to increase the reliability of the framework, these aspects could all be researched further. Subsequently, but in a different field, elaborating research can also be done in the implementation of gender inclusive design from a policy and management perspective. If the municipality of Rotterdam wants take steps towards creating a gender inclusive city, I recommend that the principles are a great way to start seeing what aspects need improvement. Additionally, the framework can be used to test which spaces need most improvements.

The survey results have shown that small spatial elements can already be very positively impactful in creating gender inclusive spaces. This means not much restructuring is needed. However, when only implementing small elements and separate plans, there is the risk that the space will lose coherence as a whole. That is why I recommend that one vision and plan is used as a guideline, so that all future plans will contribute to inclusivity. Implementing guidelines into policy will also make sure that private developers also consider them. In this sense, Vienna also has made similar steps towards a gender inclusive city, so it is useful to look to them for reference.

6.4 / REFLECTION

Learning curves

This graduation process has given me many new insights into my strengths and pitfalls, that help me better cater the project to what I am capable of. A big part of this is slowly letting go of my perfectionism and fear of failure, which consequently also helps me become more confident in myself.

At the beginning of the graduation process, I looked up to my master thesis as being the final project; one where everything had to be done perfectly. However, during these past months I have learned that this is not a final project at all, but only a new learning experience. It is "only" a master's thesis, with only as little as half a year to actually conduct my research, thus letting me focus on the things I still want to learn before going to work in practice. In this process, I am slowly coming to terms with the fact that my research will never be perfectly reliable in only a few months, and that through this, I have to focus on the main goal of this project, which is to gain knowledge and experience in the learning goals I can set for myself. In that aspect, I have already learned so much about using different methods, the whole process, and my personal pitfalls, for example what to do when I get stuck in my process.

I have also learned from myself that I am usually doing better in terms of productivity than I think I am, so I expect a lot from myself and fear to get disappointed by myself. However, the reassurance from peers and mentors made me more confident in my abilities, and helped me see that I was on the right track. It has made me see that I can be more confident in myself as an urbanist, and that I have the capabilities and expertise to make well thought-out decisions on design and research.

Also during these last few months, I have continuously been confronted with the high expectations I have set for myself. Especially during points I find very important to get right, for example in terms of my report, this has made me anxious and tempted my brain and body to freeze. However, I am proud of how far I have come in comparison to years ago, when I just started my studies and this reaction to anxiety hindered my progress. In this past year, I have seen what I am capable of when working through these downs. It also shows me how far I have come in terms of knowing myself, my limits and what works for me. In terms of my high expectations, I know that I have to communicate and coordinate with others' expectations of my tasks. It also helps now that I have learned what environments help me stay productive and less anxious, which I think will also be very helpful in the rest of my career and life. But most of all, I have slowly learned to let go, trust my instincts and be proud of the mind I have. I can't wait to see, how this mind will contribute to society's urban environments.

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4.5 <https://www.leefbaarometer.nl/kaart/?indicator=0&schaalniveau=0&periode=6&referentiekaart=1&locatie=&latitude=&longitude=#kaart>

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4.7 <https://app.traveltime.com/search/0-lng=4.50965&0-tt=15&0-color=%23f7941d&0-mode=ferry&0-title=Rosestraat%2C%20Kop%20van%20Zuid-Entrepot%2C%20Feijenoord%2C%20Rotterdam%2C%20South%20Holland%2C%20Netherlands%2C%203071%20SX%2C%20Netherlands&0-lat=51.90448&1-lng=4.48845&1-tt=15&1-color=%23d60064&1-mode=ferry&1-title=20%2C%20Metroplein%2C%20Zuidplein%2C%20Charlois%2C%20Rotterdam%2C%20South%20Holland%2C%20Netherlands%2C%203083%20BB%2C%20Netherlands&1-lat=51.88702&2-lng=4.53-105&2-tt=15&2-mode=walking&2-title=Rotterdam%20Lombardijen%2C%20>

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4.8 – 4.13 Author's image, 2023

4.14 Author's image, via <http://milvusmap.eu/>

4.15 – 4.19 <https://allecijfers.nl/buurt/hillesluis-rotterdam/>

4.20 Author's image, via <http://milvusmap.eu/>

4.21 – 4.25 <https://allecijfers.nl/buurt/zuidwijk-rotterdam/>

4.26 – 4.63 Author's image, 2023

Chapter 5

5.1 Author's image, 2023

5.2 <https://www.vox.com/xpress/2014/11/18/7236471/cars-pedestrians-sidewalks-roads>

5.3 – 5.25 Author's image, 2023

5.26 Google Maps

5.27 Author's image, 2023

5.28 Google Maps

5.29 Author's image, 2023

5.30 Author's image, 2023

5.31 Google Maps

5.32 Author's image, 2023

5.33 Google Maps

5.34 Author's image, 2023

Chapter 6

6.1 Author's image, 2023

6.2 Author's image, 2023

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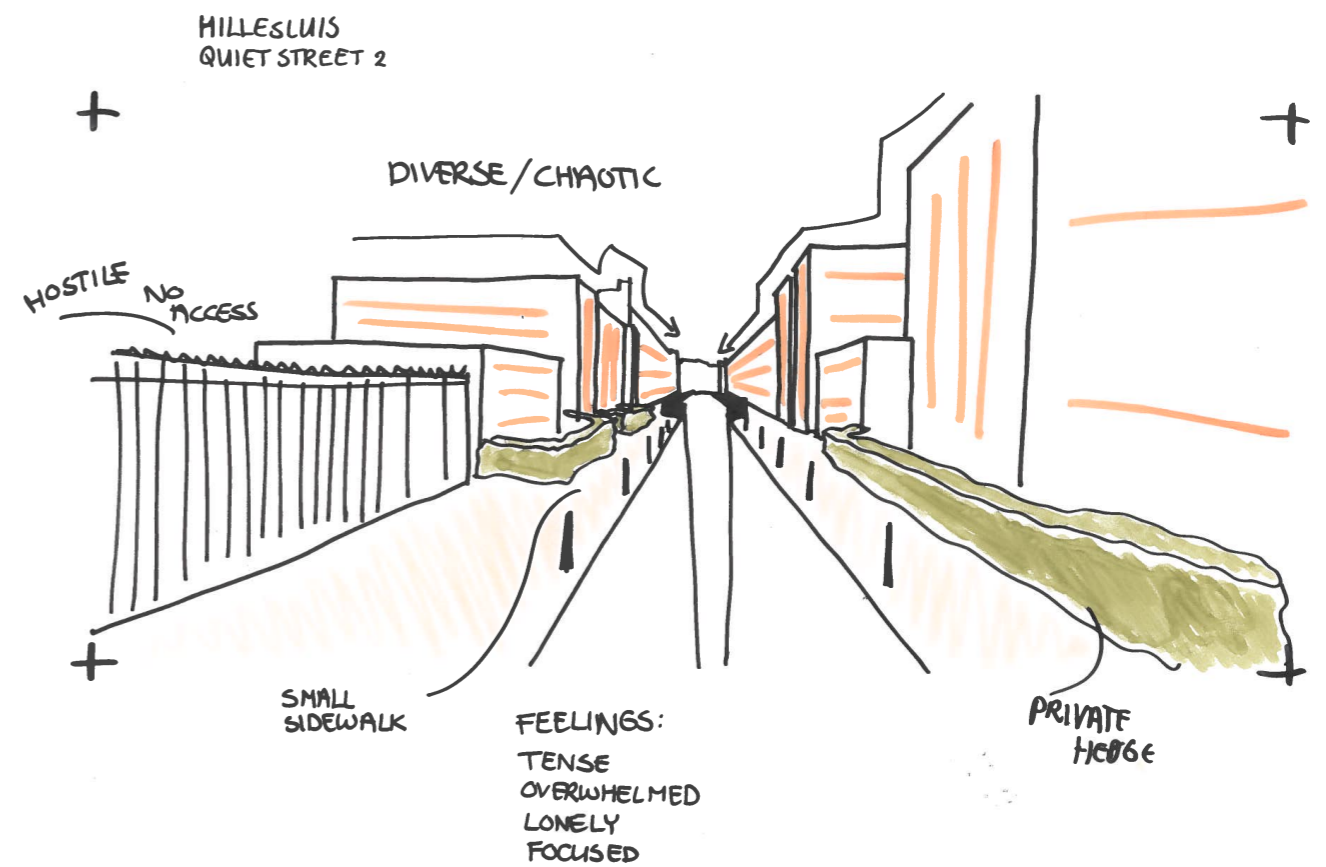
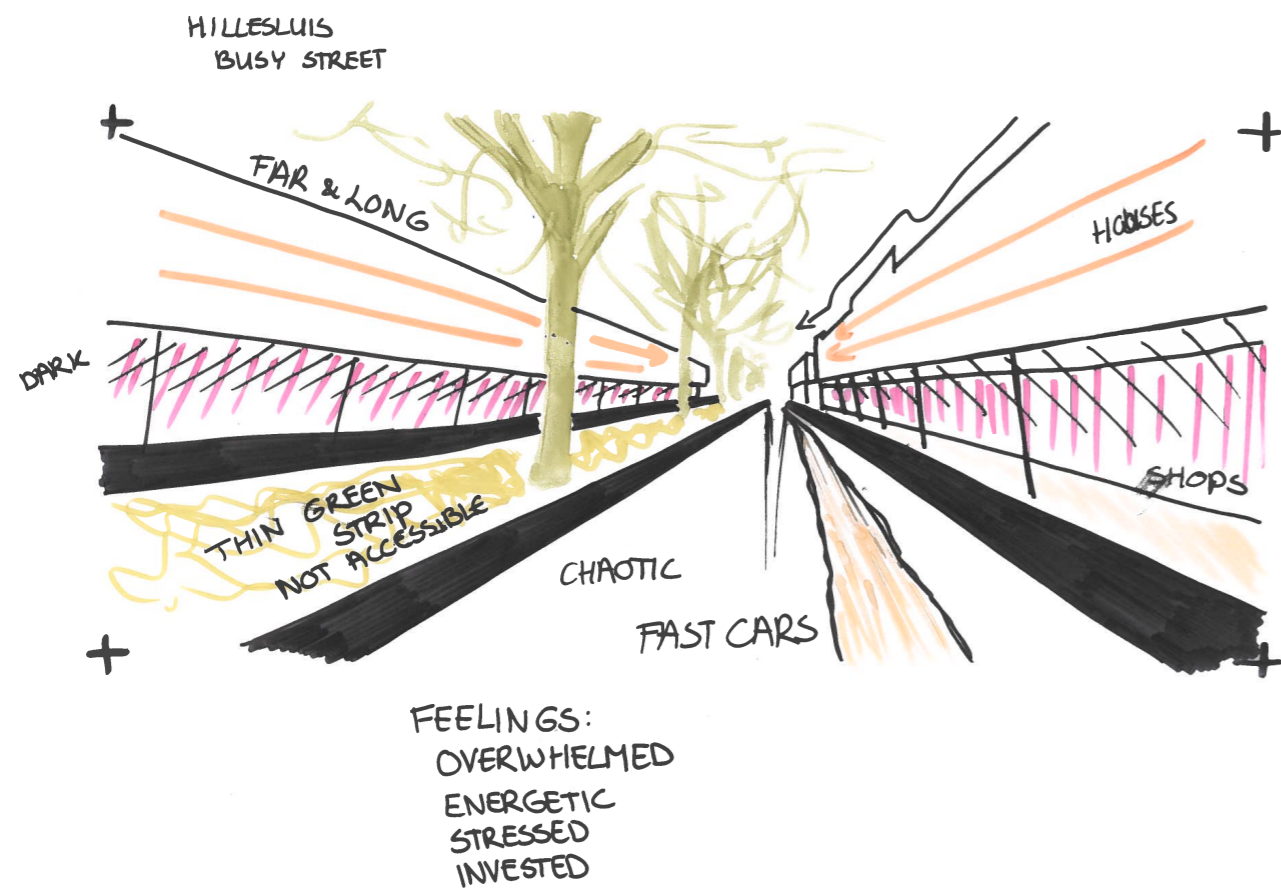
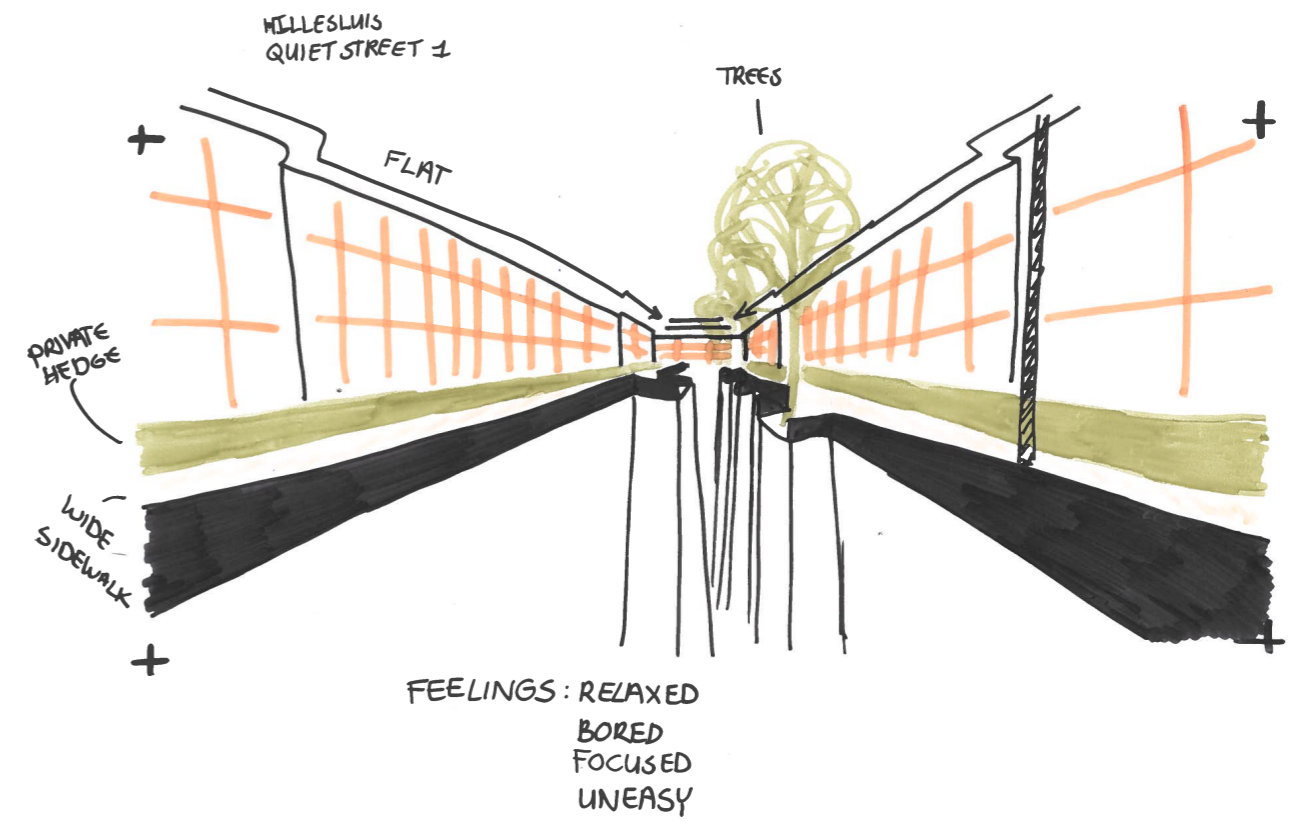
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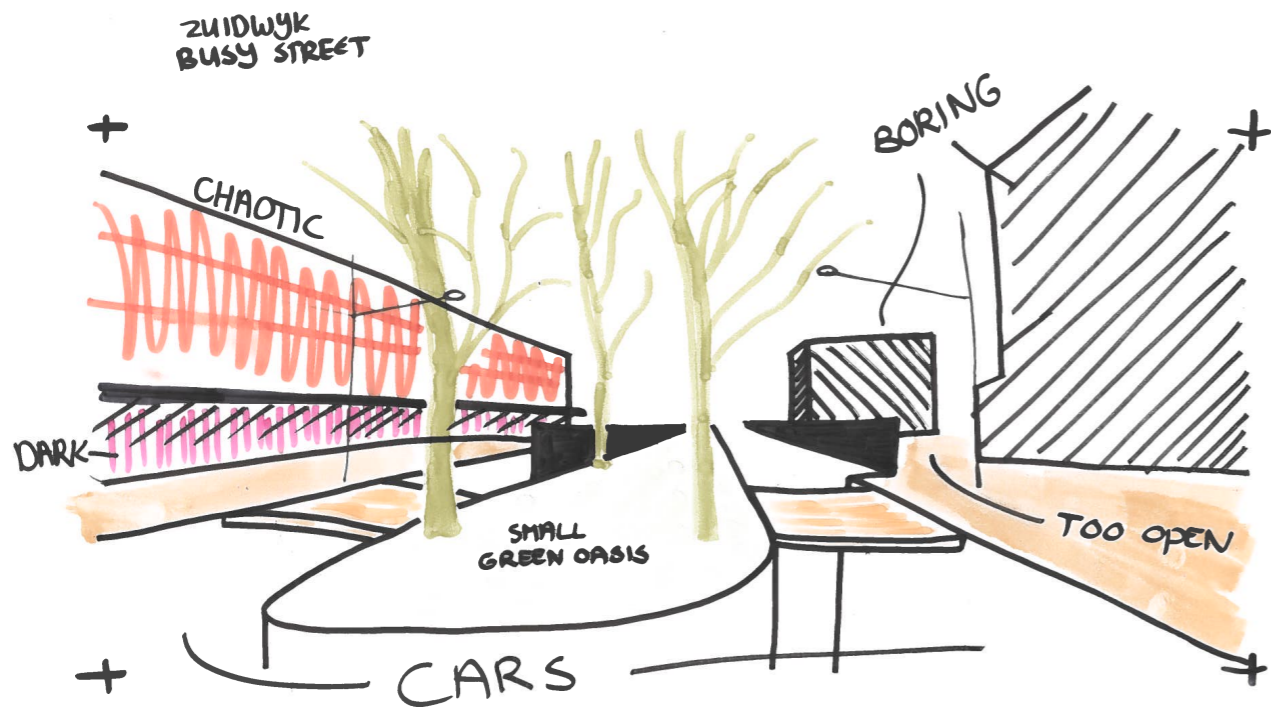


Appendices

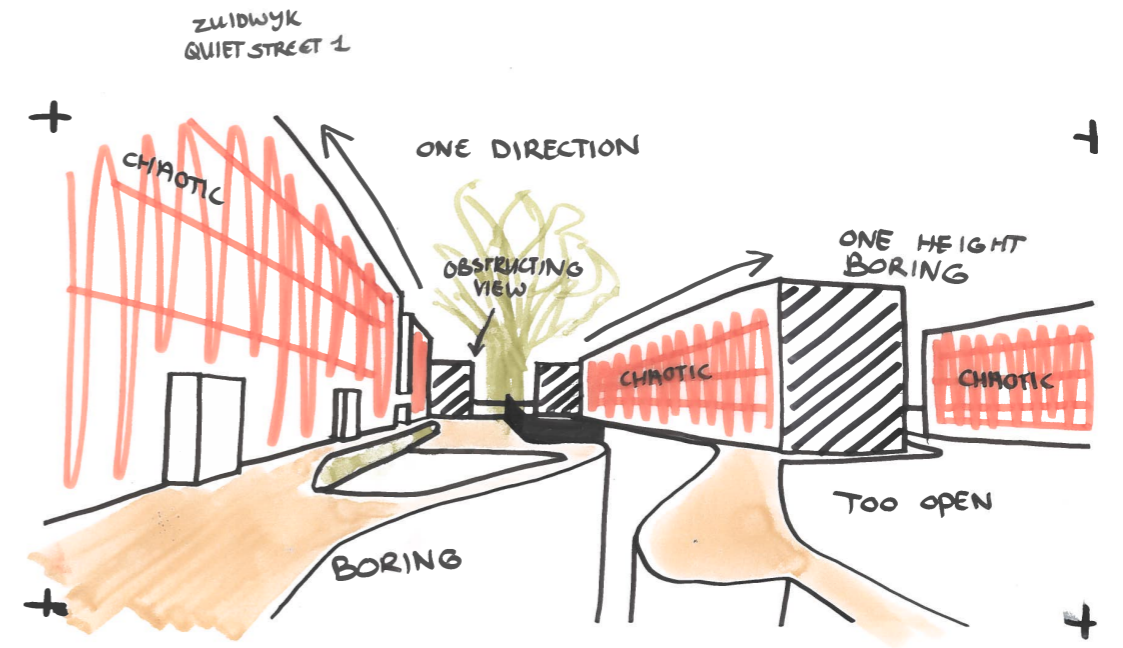
A / FEELING SKETCHES

Streets

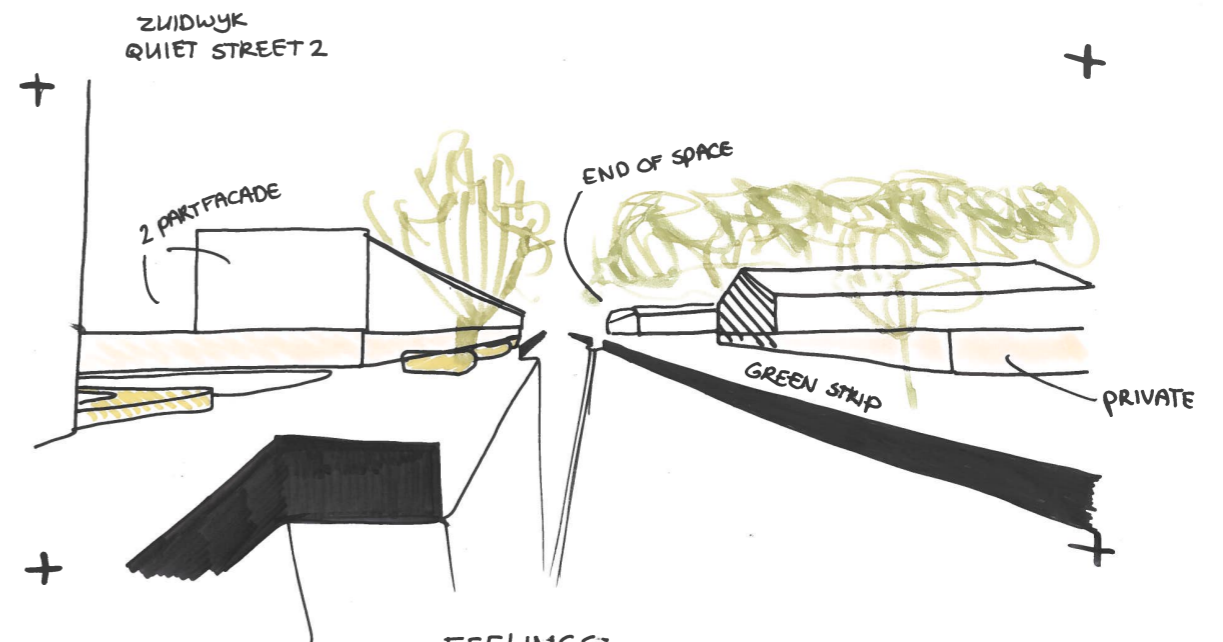




FEELINGS: OVERWHELMED
TENSE
SCARED
UNEASY
CONFIDENT

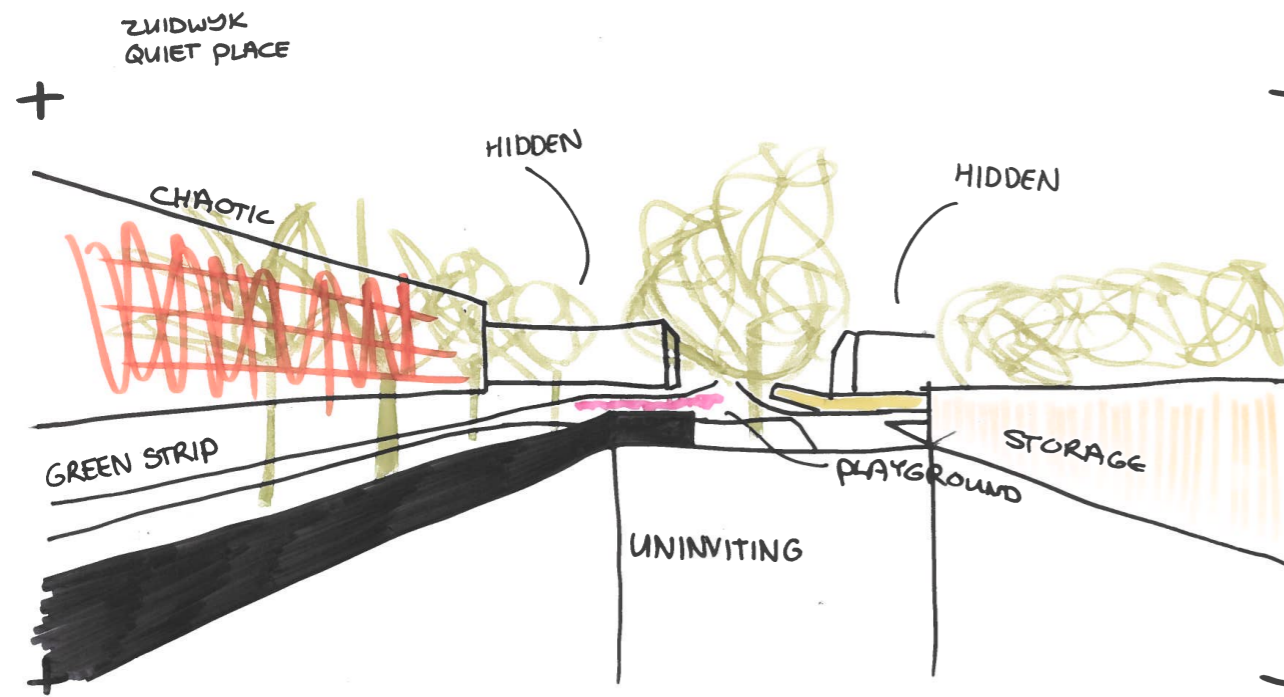


FEELINGS: BORED
~~SCARED~~
UNEASY
~~SCARED~~
LONELY
ESTRANGED
UNSAFE

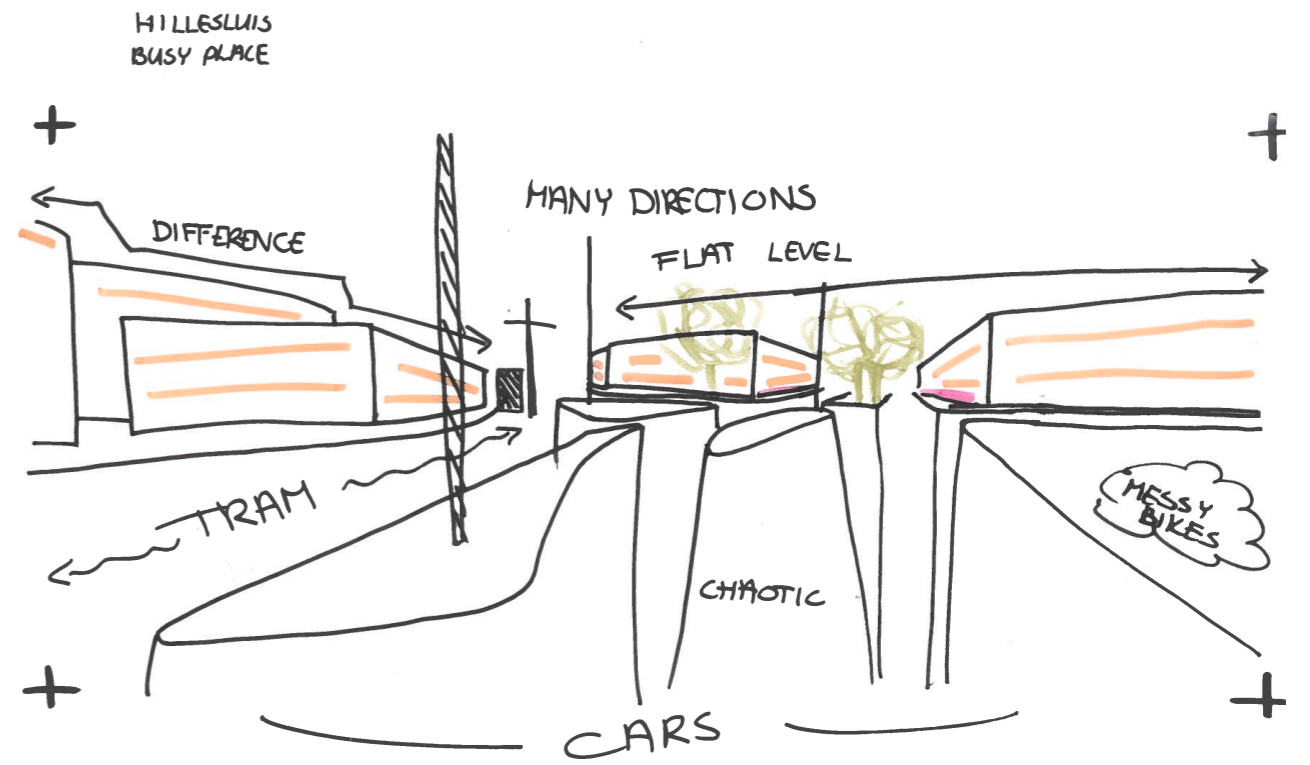


FEELINGS:
CALM
RELAXED
BORED
ALIENATED

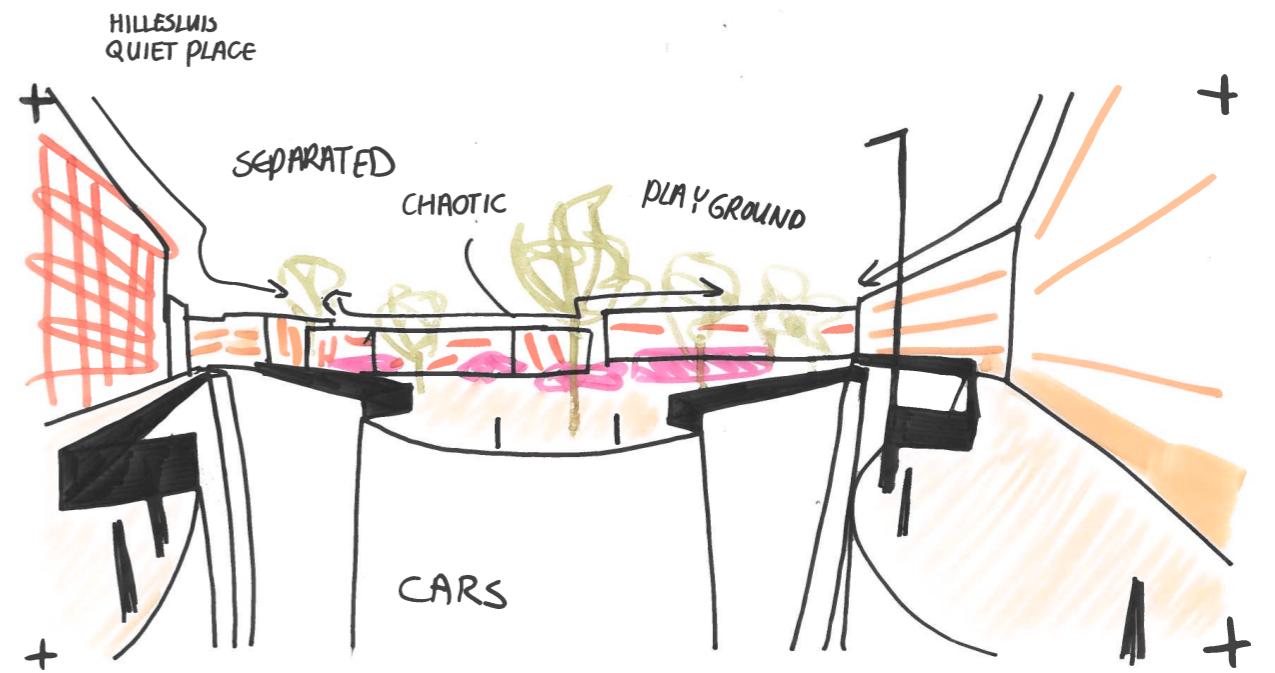
Squares



FEELINGS:
OVERWHELMED
BORED
ESTRANGED
SOOTHING



FEELINGS: OVERWHELMED
DEPRESSED
BORED
UNEASY



FEELINGS: OVERWHELMED
BORED
EXCITED
UNEASY

B / SURVEY

Enquête intro + deel straat

Beste respondent,

Bedankt dat je de tijd neemt om deze enquête in te vullen!

Deze vragenlijst is onderdeel van mijn afstudeeronderzoek naar hoe verschillende ruimtelijke elementen in de openbare ruimte de menselijke ervaring beïnvloedt.

Het invullen van de enquête duurt ongeveer 5 minuten, en is volledig anoniem en op vrijwillige basis. De verzamelde informatie uit deze enquête wordt uitsluitend gebruikt voor dit afstudeeronderzoek.

Voor verdere informatie of vragen over deze enquête of het onderzoek, kun je contact opnemen door te mailen naar d.gerlich

Het eerste deel van deze enquête bestaat uit 10 vragen.

Bij elke vraag krijg je twee afbeeldingen van een straat te zien.

Kies bij elke vraag de straat die je het prettigst zou vinden om doorheen te wandelen.

Geef vervolgens aan in hoeverre de gekozen straat je een positief of negatief gevoel geeft.

Welke straat ervaar je als prettiger?

Een standaard straat



Met auto's



Wat voor gevoel geeft de gekozen straat je?

Erg negatief



Negatief



Een beetje negatief



Een beetje positief



Positief



Erg positief



Welke straat ervaar je als prettiger?

» Zachte materialen



» Groen in het midden



Wat voor gevoel geeft de gekozen straat je?

Erg negatief



Negatief



Een beetje negatief



Een beetje positief



Positief



Erg positief



Welke straat ervaar je als prettiger?

» Een standaard straat



Erg negatief



Negatief



Een beetje negatief



Een beetje positief



Positief



Erg positief



» Groen in het midden



Welke straat ervaar je als prettiger?

» Verspringingen



Wat voor gevoel geeft de gekozen straat je?

» Een winkelstraat



» Een langere straat



» Losse blokken



Wat voor gevoel geeft de gekozen straat je?

Erg negatief

Negatief

Een beetje negatief

Een beetje positief

Positief

Erg positief

Welke straat ervaar je als prettiger?

Wat voor gevoel geeft de gekozen straat je?

Erg negatief



Negatief



Een beetje negatief



Een beetje positief



Positief



Erg positief



Welke straat ervaar je als prettiger?

» Een langere straat



» Verschillende gevels



Wat voor gevoel geeft de gekozen straat je?

Erg negatief



Negatief



Een beetje negatief



Een beetje positief



Positief



Erg positief



Welke straat ervaar je als prettiger?

» Groene tegels



Erg negatief



Negatief



Een beetje negatief



Een beetje positief



Positief



Erg positief



» Groen in het midden



Welke straat ervaar je als prettiger?

» Verspringingen



Wat voor gevoel geeft de gekozen straat je?

» Café



» Hogere gebouwen



» Groen aan de zijkant



Wat voor gevoel geeft de gekozen straat je?

Erg negatief



Negatief



Een beetje negatief



Een beetje positief



Positief



Erg positief



Welke straat ervaar je als prettiger?

Wat voor gevoel geeft de gekozen straat je?

Erg negatief



Negatief



Een beetje negatief



Een beetje positief



Positief



Erg positief



Welke straat ervaar je als prettiger?

» Plantenbakken



» Losse blokken



Wat voor gevoel geeft de gekozen straat je?

Erg negatief



Negatief



Een beetje negatief



Een beetje positief



Positief



Erg positief



Als je nog toelichting wilt geven op je keuze van één of meerdere straten, kun je dat hieronder kwijt.

Enquête deel plein

Het tweede deel van deze enquête bestaat uit 8 vragen.

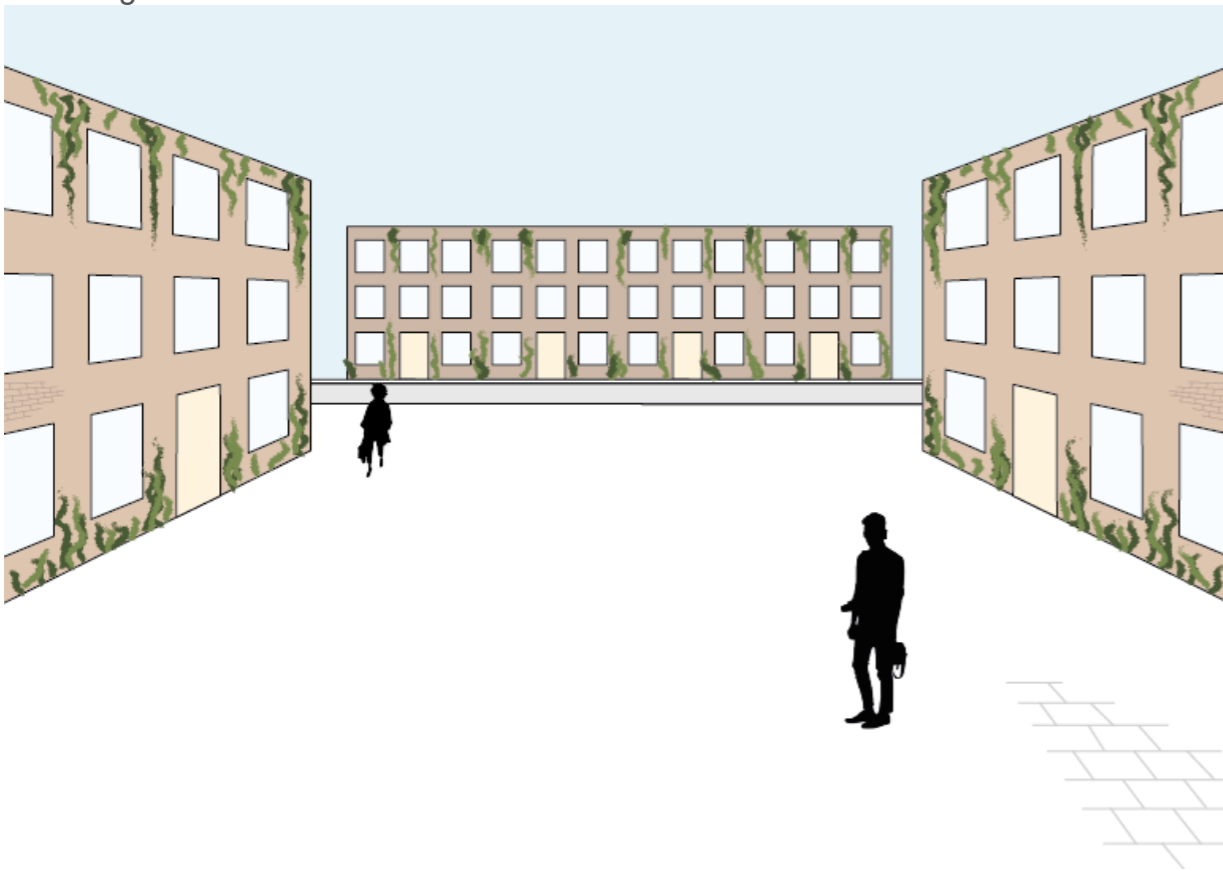
Nu krijg je bij elke vraag twee afbeeldingen van een plein te zien.

Kies bij elke vraag het plein dat je het prettigst zou vinden om te zijn.

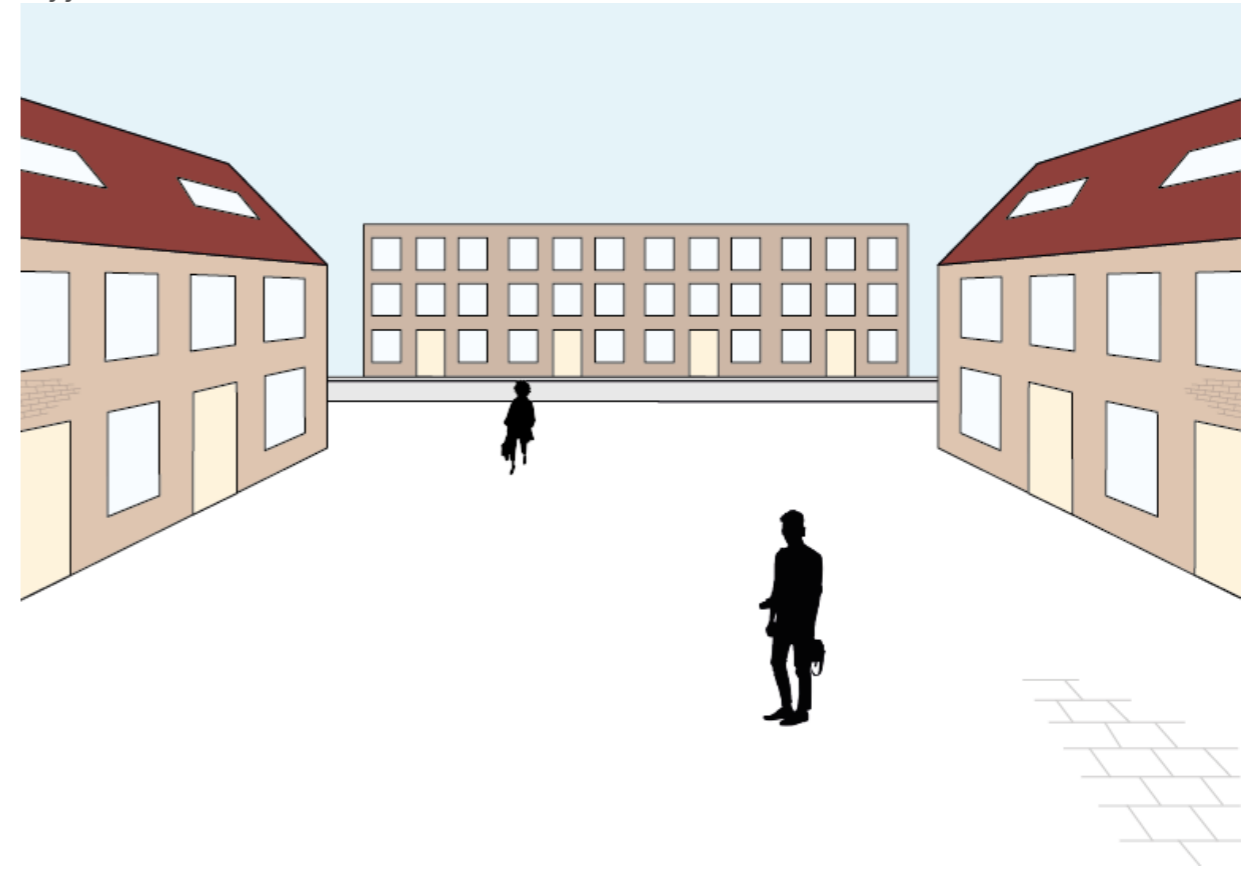
Geef vervolgens aan in hoeverre het gekozen plein je een positief of negatief gevoel geeft.

Welk plein ervaar je als prettiger?

Groene gevels



Rijtjeshuizen



Wat voor gevoel geeft het gekozen plein je?

Erg negatief

Negatief

Een beetje negatief

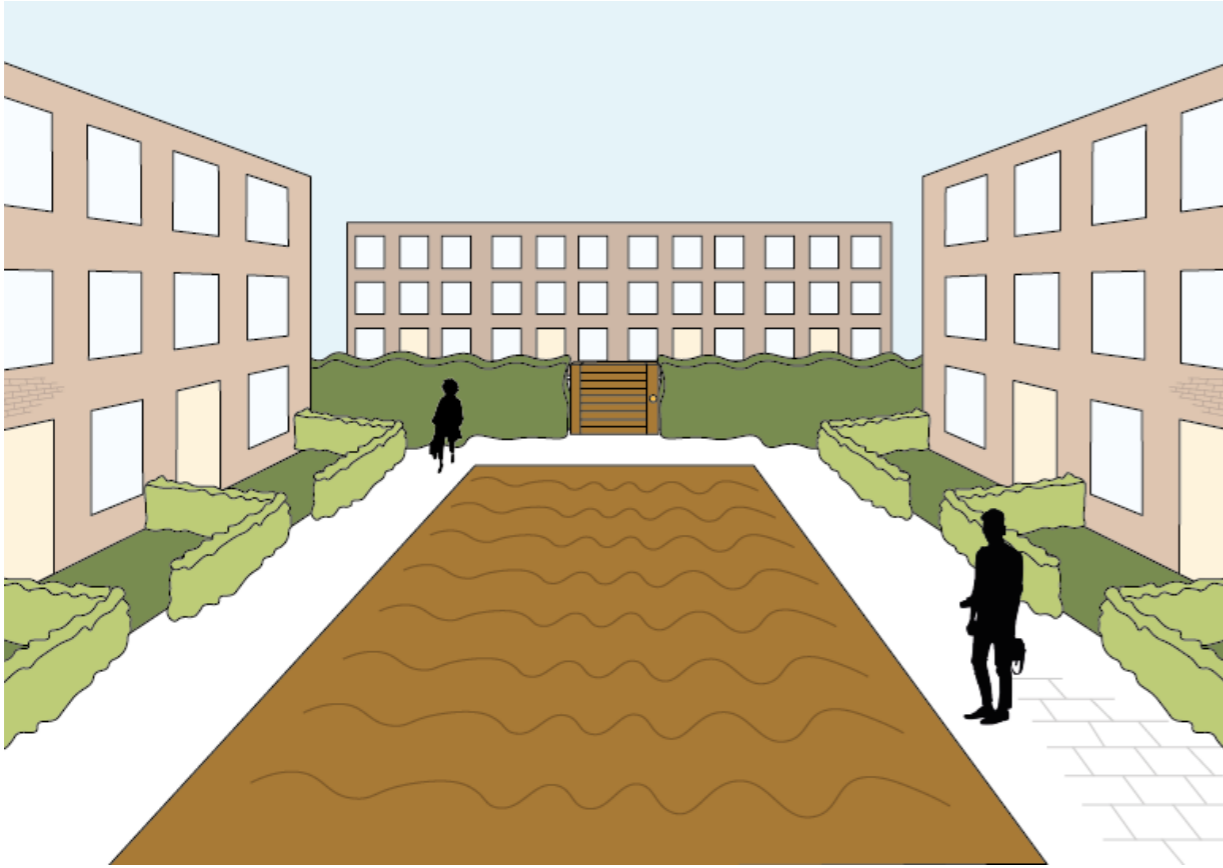
Een beetje positief

Positief

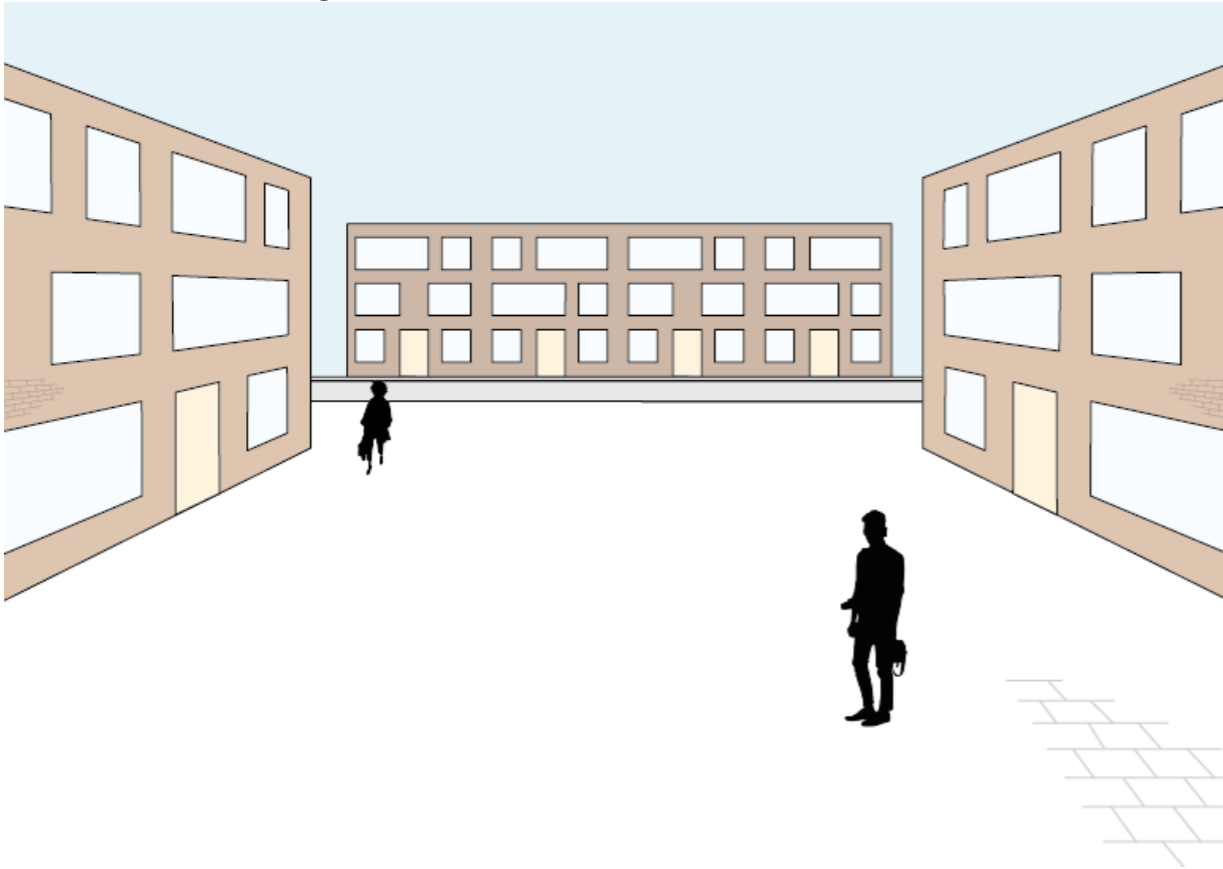
Erg positief

Welk plein ervaar je als prettiger?

» Gedeelde moestuin



» Andere raamindeling



Wat voor gevoel geeft het gekozen plein je?

Erg negatief



Negatief



Een beetje negatief



Een beetje positief



Positief

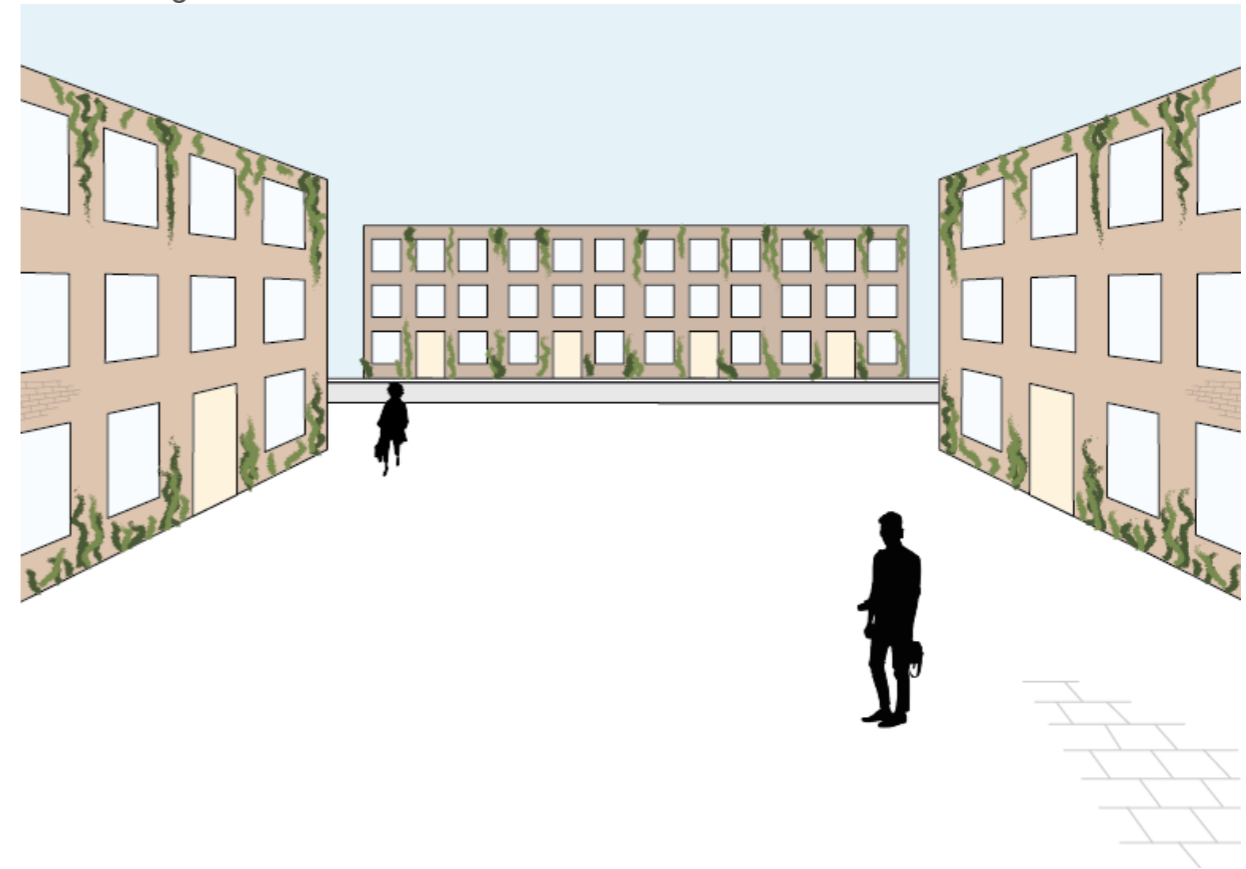


Erg positief



Welk plein ervaar je als prettiger?

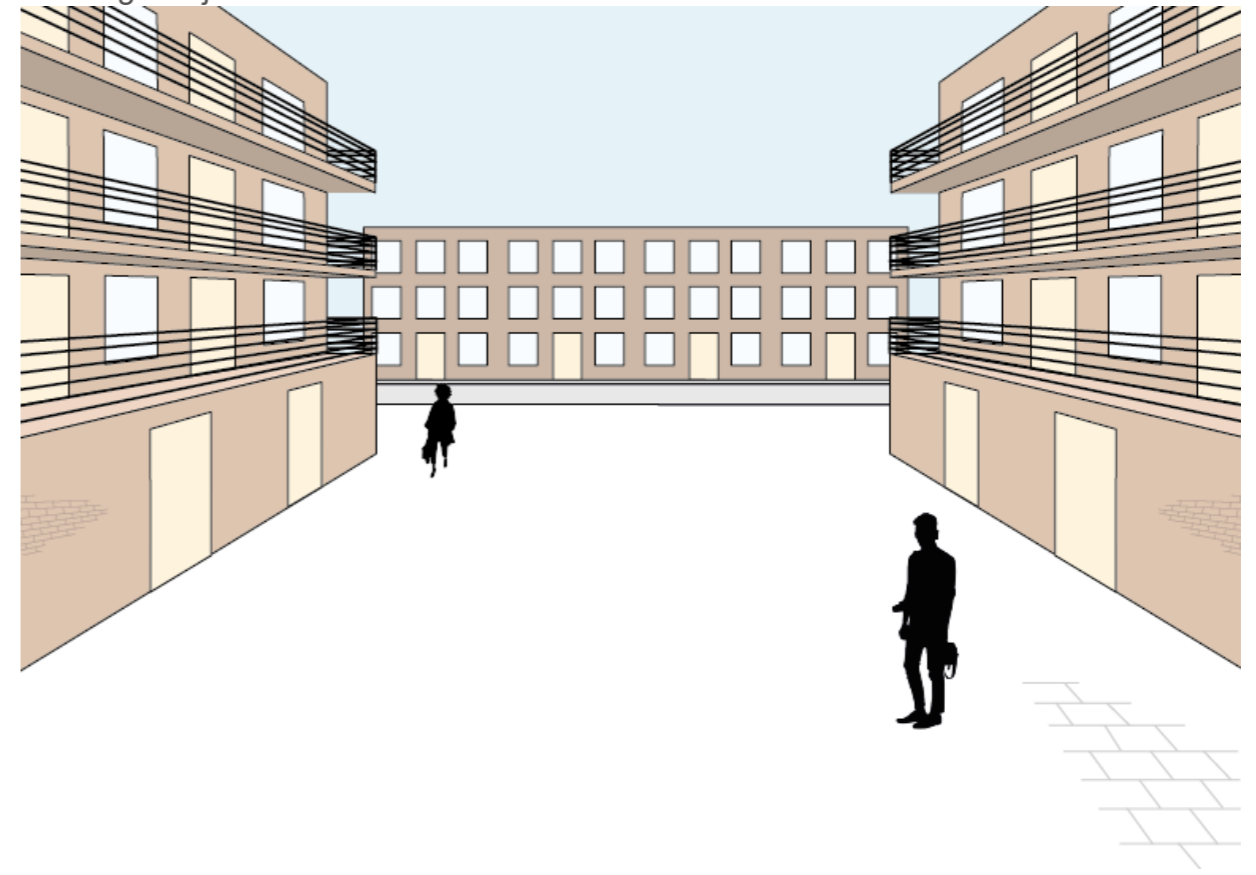
» Groene gevels



» Enkele bomen



» Met galerijflats



Wat voor gevoel geeft het gekozen plein je?

Erg negatief

Negatief

Een beetje negatief

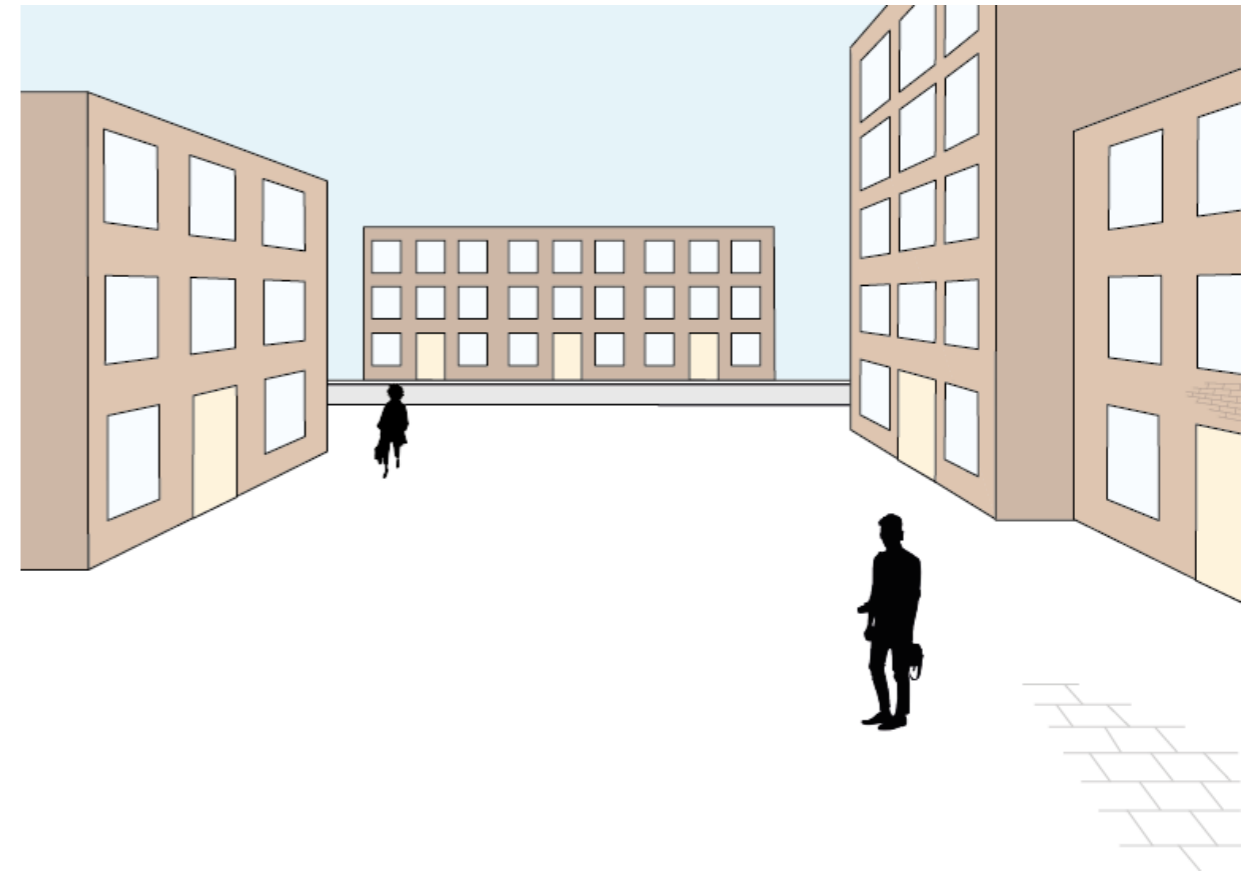
Een beetje positief

Positief

Erg positief

Welk plein ervaar je als prettiger?

» Verschoven blokken



Wat voor gevoel geeft het gekozen plein je?

Erg negatief



Negatief



Een beetje negatief



Een beetje positief



Positief

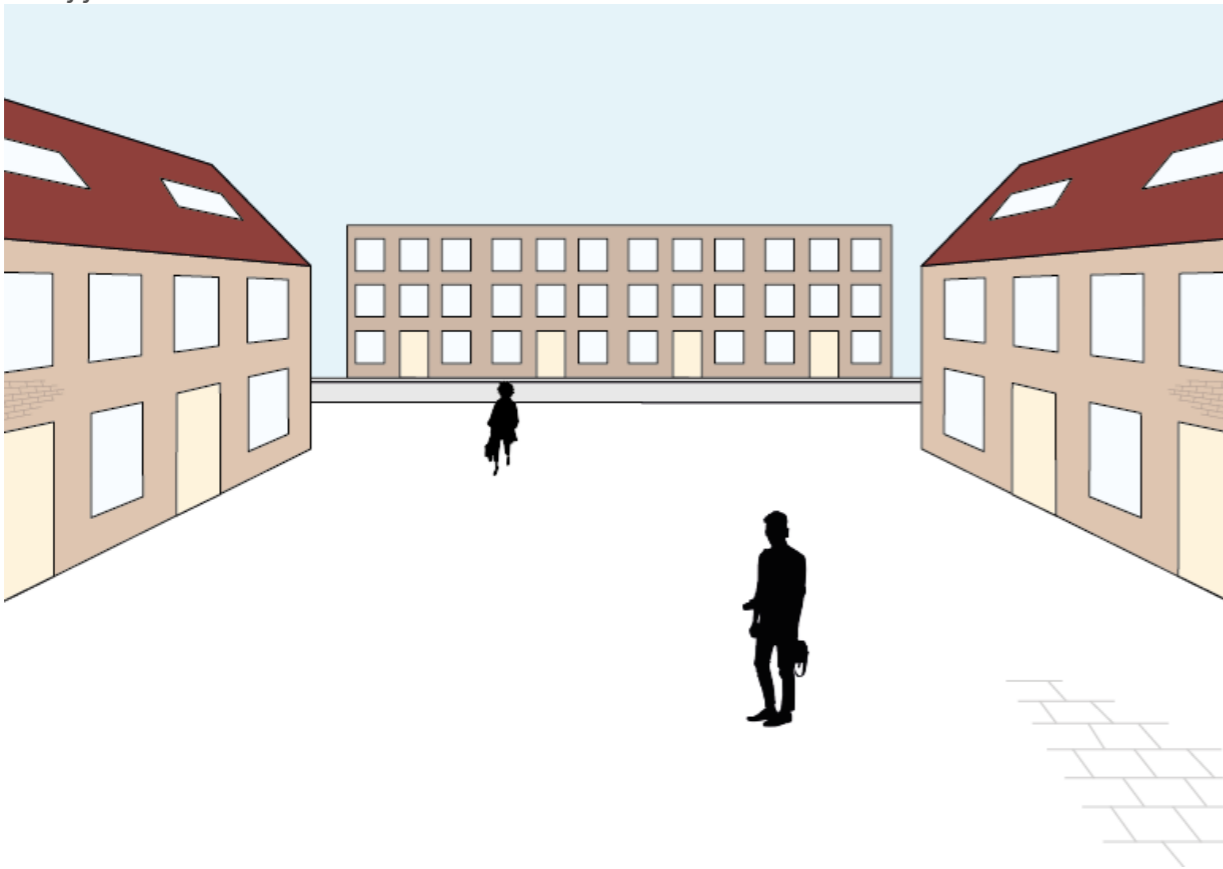


Erg positief

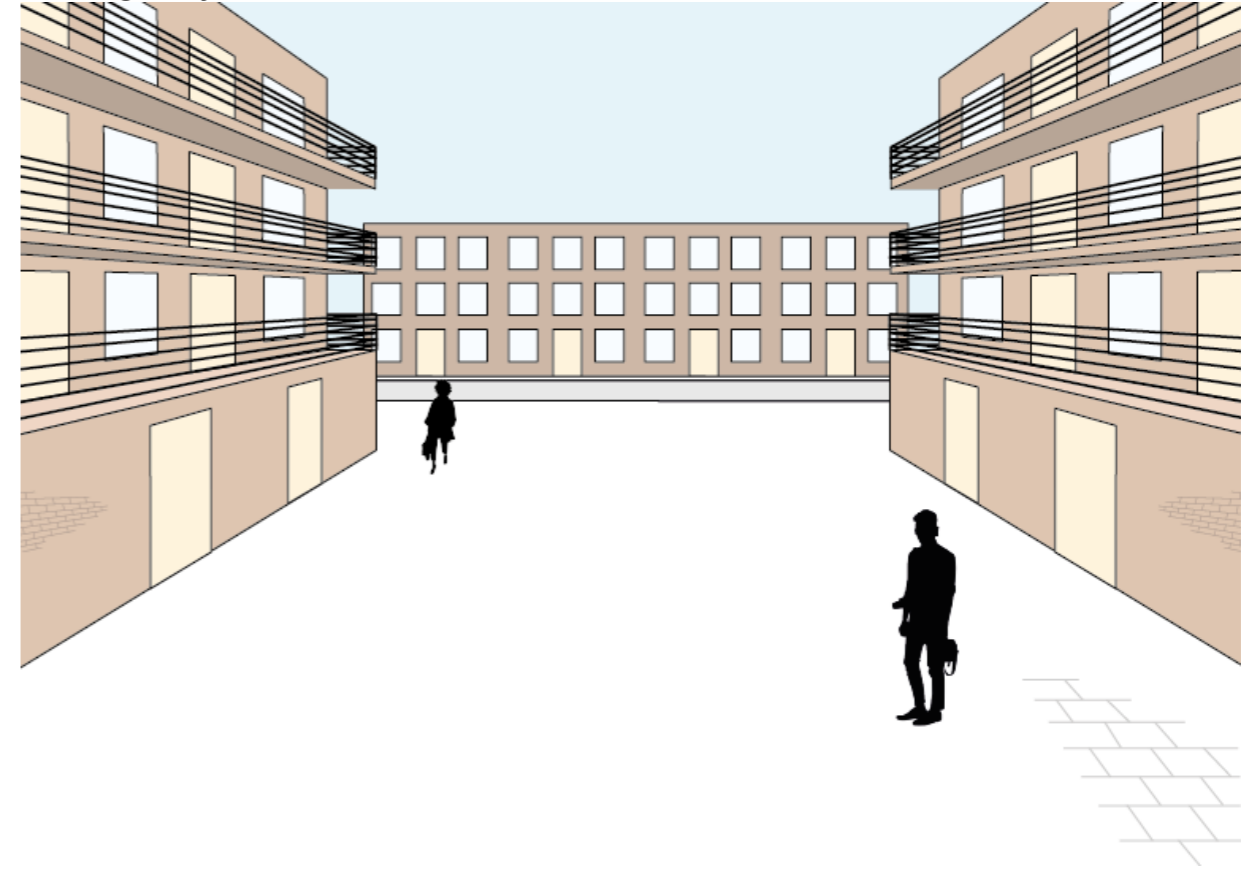


Welk plein ervaar je als prettiger?

» Rijtjeshuizen



» Met galerijflats



Wat voor gevoel geeft het gekozen plein je?

Erg negatief



Negatief



Een beetje negatief



Een beetje positief



Positief

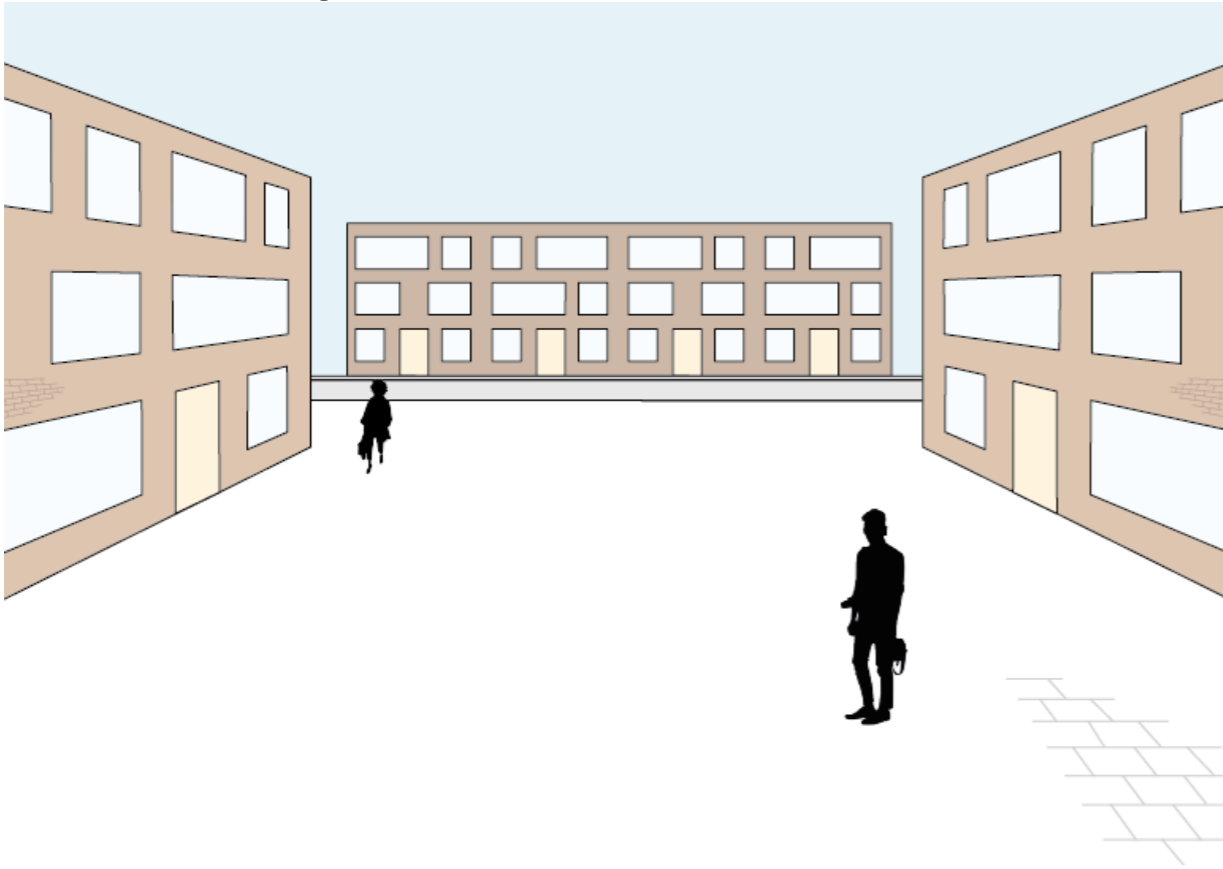


Erg positief



Welk plein ervaar je als prettiger?

» Andere raamindeling



Erg negatief



Negatief



Een beetje negatief



Een beetje positief



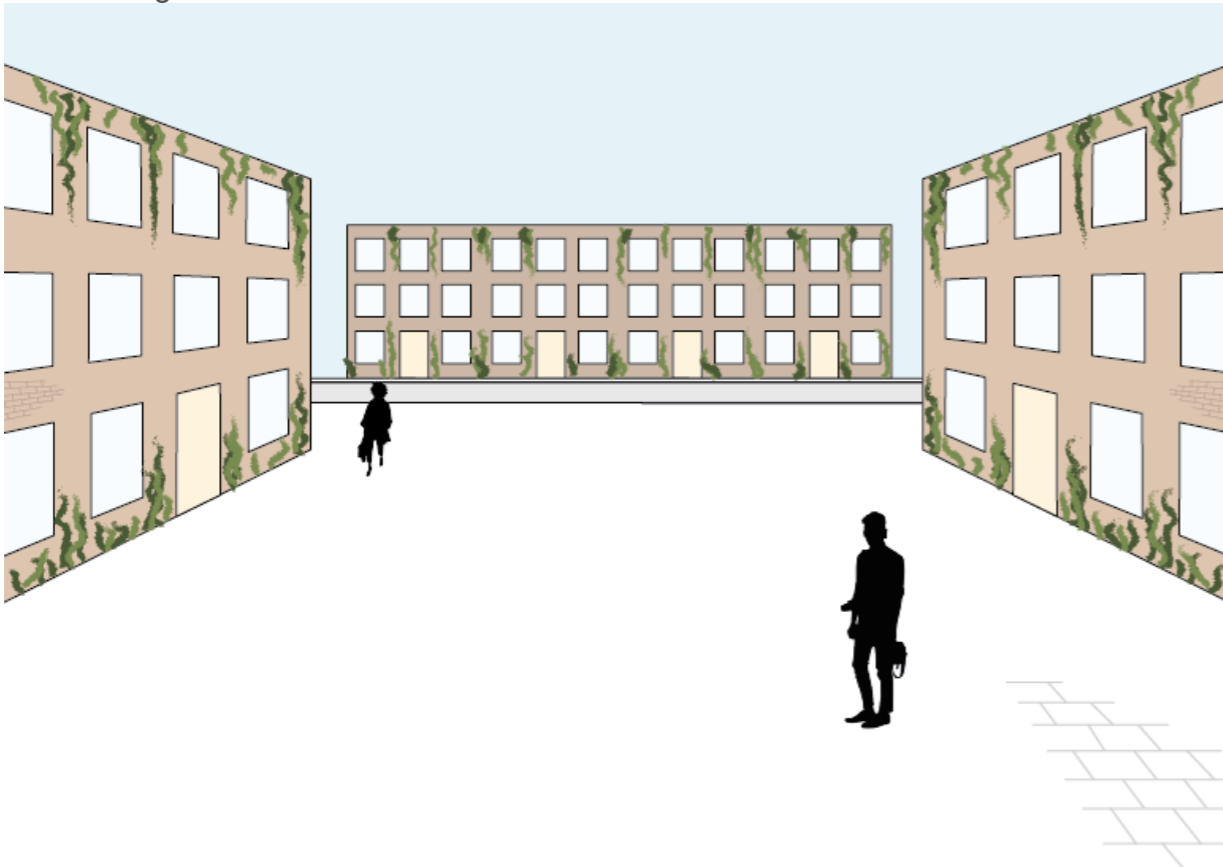
Positief



Erg positief



» Groene gevels



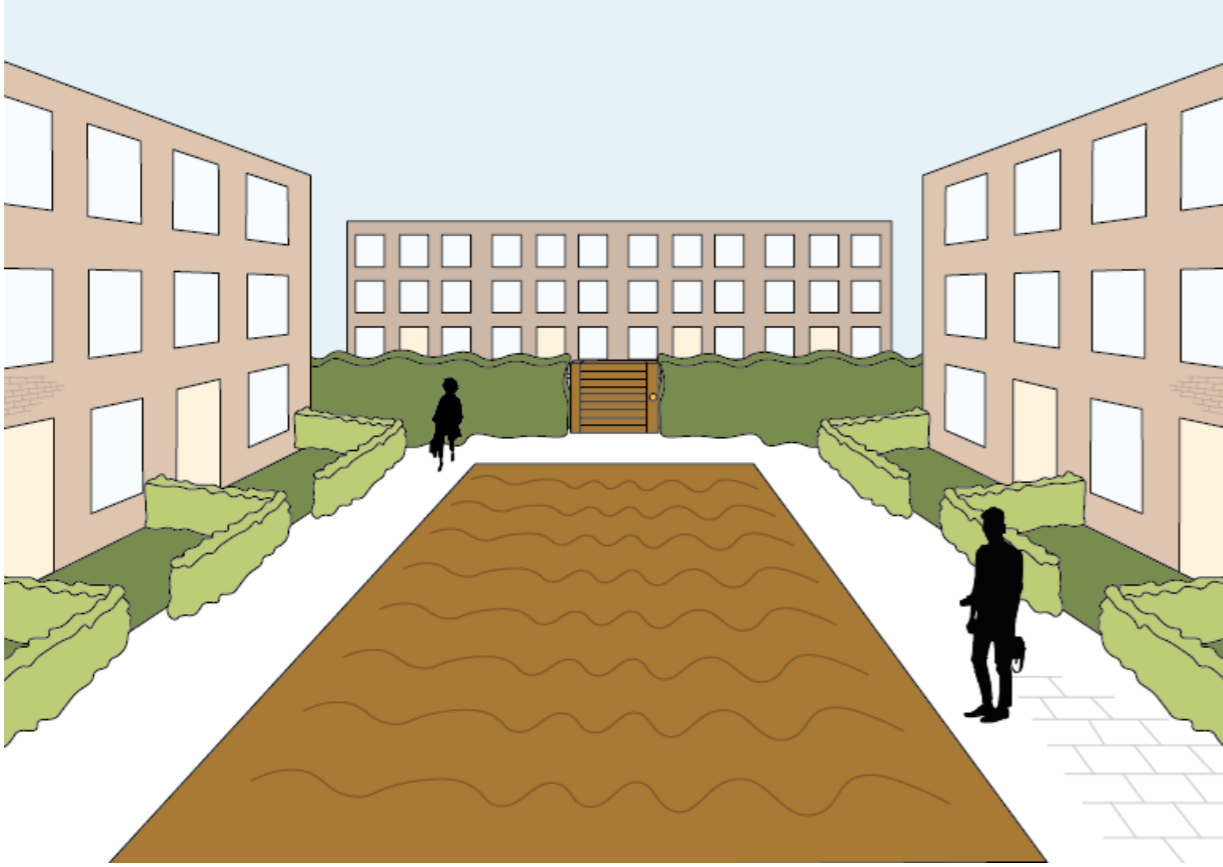
Welk plein ervaar je als prettiger?

» Enkele bomen

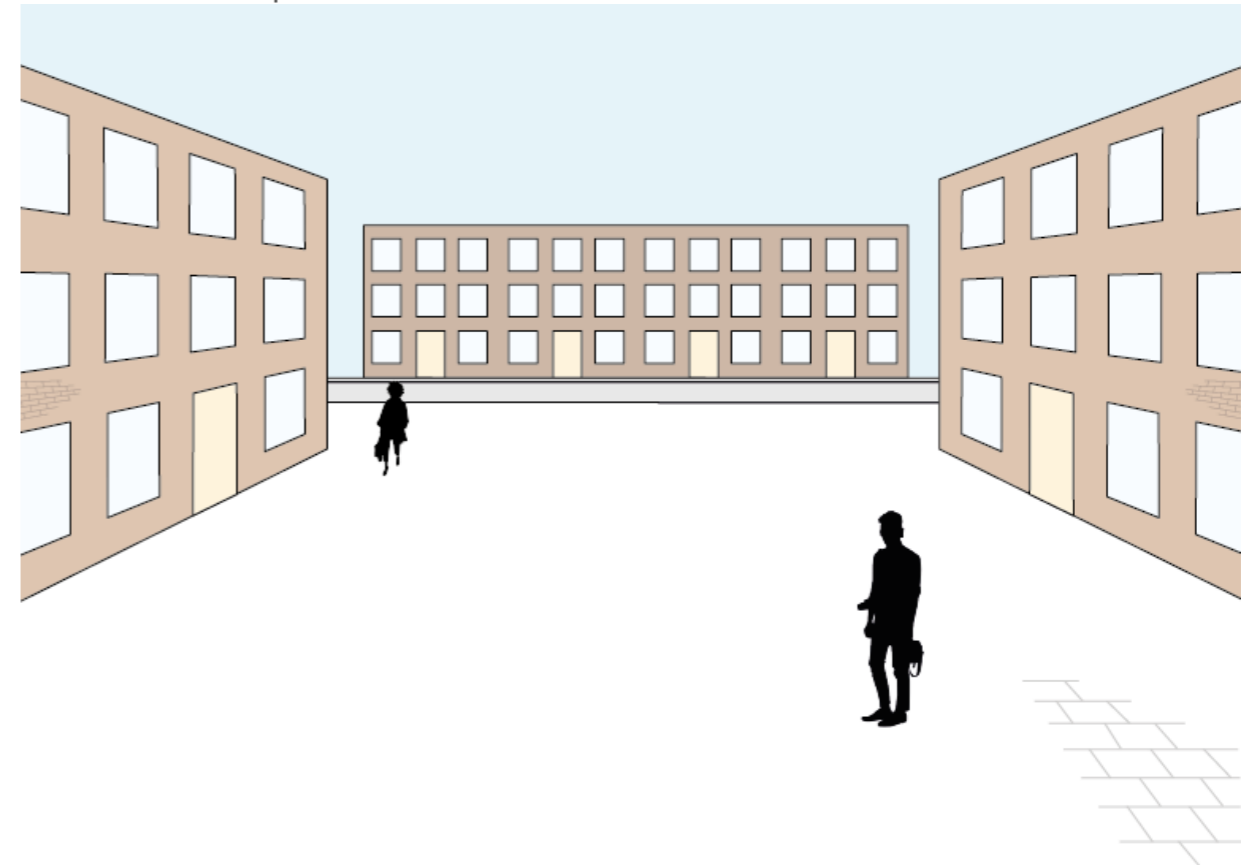


Wat voor gevoel geeft het gekozen plein je?

» Gedeelde moestuin



» Een standaard plein



Wat voor gevoel geeft het gekozen plein je?

Erg negatief



Negatief



Een beetje negatief



Een beetje positief



Positief

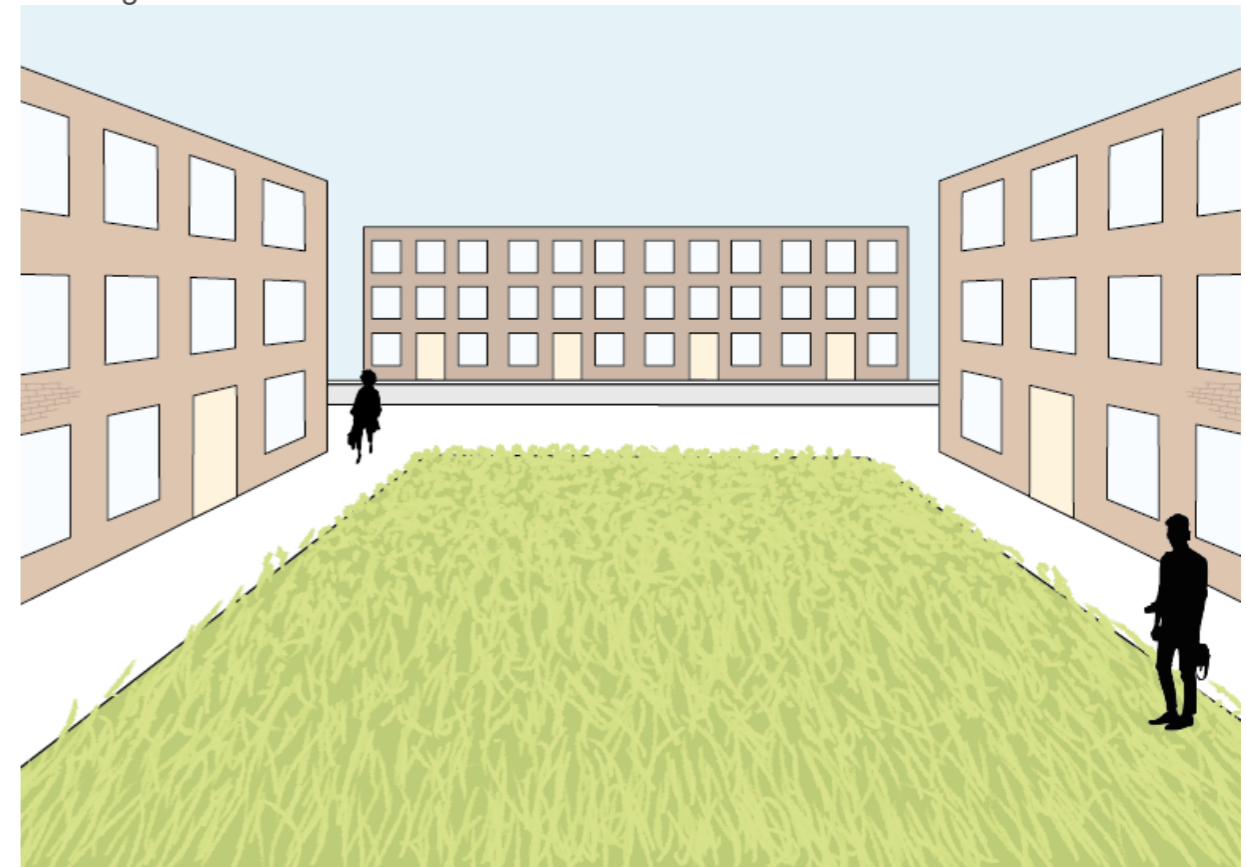


Erg positief



Welk plein ervaar je als prettiger?

» Een grasveld



Wat voor gevoel geeft het gekozen plein je?

Erg negatief

Negatief

Een beetje
negatief

Een beetje
positief

Positief

Erg positief

Ben jij of één van je ouders in een niet-westers land geboren?

 Ja Nee

Powered by Qualtrics

Als je nog toelichting wilt geven op je keuze van één of meerdere pleinen, kun je dat hieronder kwijt.

Algemene vragen

Het laatste deel van de enquête bestaat nog uit een paar algemene vragen.

Wat is je geslacht?

 Man Vrouw Anders

Wat is je leeftijd?

 0 - 18 jaar 19 - 30 jaar 31 - 50 jaar 51 - 64 jaar 65+ jaar