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BICYCLE GARAGE IN UTRECHT - A CASE STUDY AND ANALYSIS

BACHELOR THESIS

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“A rising tide doesn’t raise people who don’t have a boat. We have to help build the boat for them. It’s not good enough to raise the tide. We have to give them the basic infrastructure to rise with the tide.”

~ Rahul Gandhi, vice president of India's ruling Congress Party, in his address to the special plenary session of Confederation of Indian Industry in New Delhi on April 4, 2013

ABSTRACT

This work examines the bicycle parking facility 'Fietsenstalling Stationsplein' in Utrecht, investigating parameters that promoted its construction, the enhancements it brings to the city, and why it is so effective.

The work analyzes the bicycle garage and evaluates it in terms of functionality and benefits. It discusses three theses which show the feasibility of viable change and may serve as a scientifically researched 'best practice' example for the implementation of sustainable change in mobility and infrastructure.

The foundation for the analysis are my own experiences and collected data in Utrecht regarding the use of the bicycle parking garage, the statements from the municipality and architects, as well as previously researched data from literature and online sources.

The bicycle parking facility improved Utrecht, both in its structure and infrastructure. Despite local and management challenges, the needs of the population and city and the supply/demand ratio justified high expenditure, initiative and effort concerning the facility. The parking garage is spacious, safe and well organized, its usage quick and convenient. It works because of the effective surrounding infrastructure, which in turn is enhanced thanks to the effectiveness of the facility. The project can be used as a positive example for implementation of large scale sustainable projects in urban context.

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I. HISTORICAL PHOTOGRAPHS AND PLANS



Fig. 1 Bicycle parking around Utrecht Centraal before 2017



Fig. 2 Bicycle parking around Utrecht Centraal before 2017



Fig. 3 Aerial view of the area from the south before replanning



Fig. 4 Hoog Catharijne before the replanning (01.07.1998, Utrecht)

II. PLAN DOCUMENTS

These plans are to be folded out and read simultaneously while reading the work, to better understand layout and concept of the project.

Fig. 5 Site plan city of Utrecht with marked project area

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Fig. 7 Top view of 'Stationplein' with 'Bollendak'

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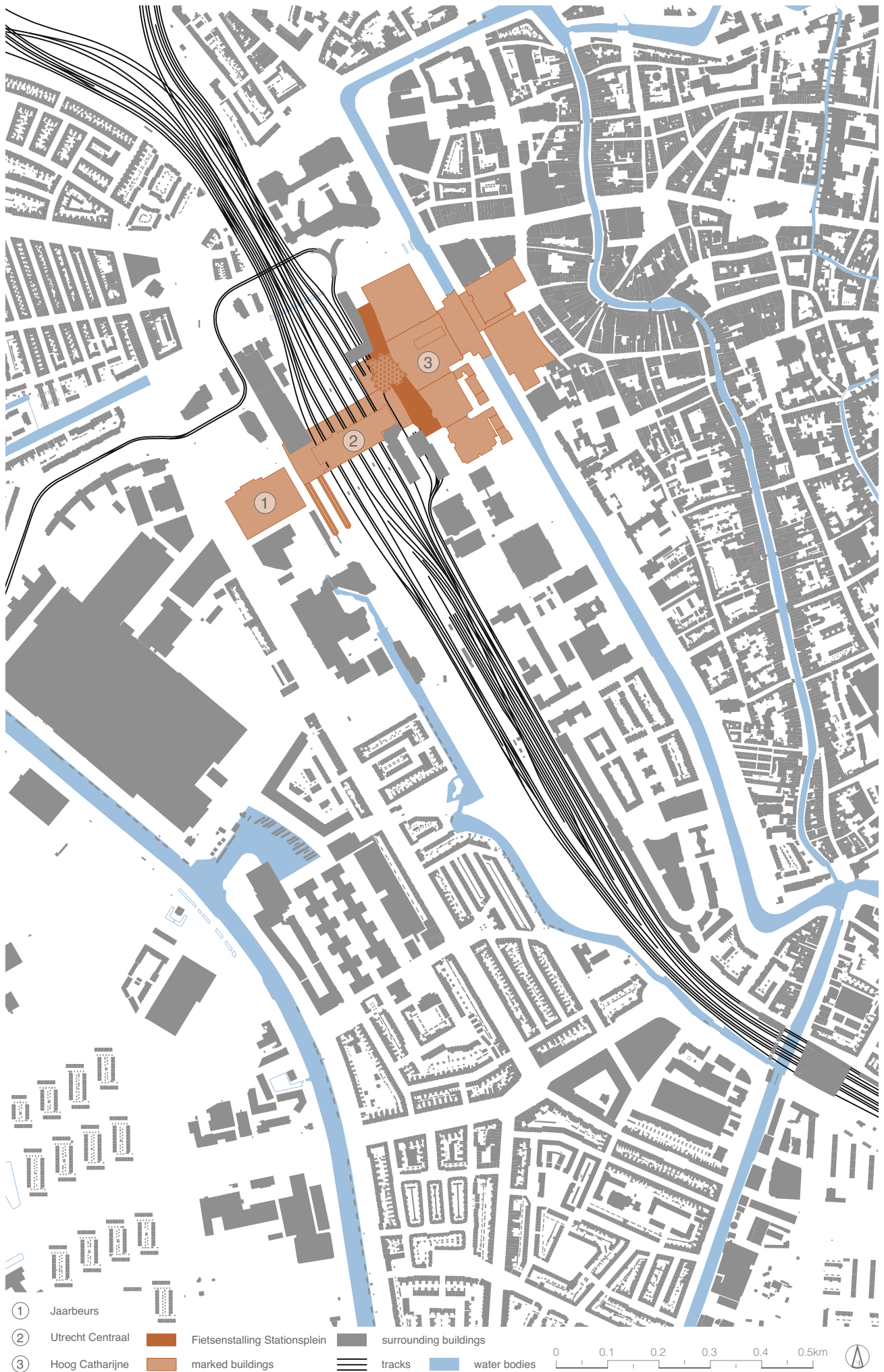


Fig. 5 Site plan city of Utrecht with marked project area, scale 1:10.000

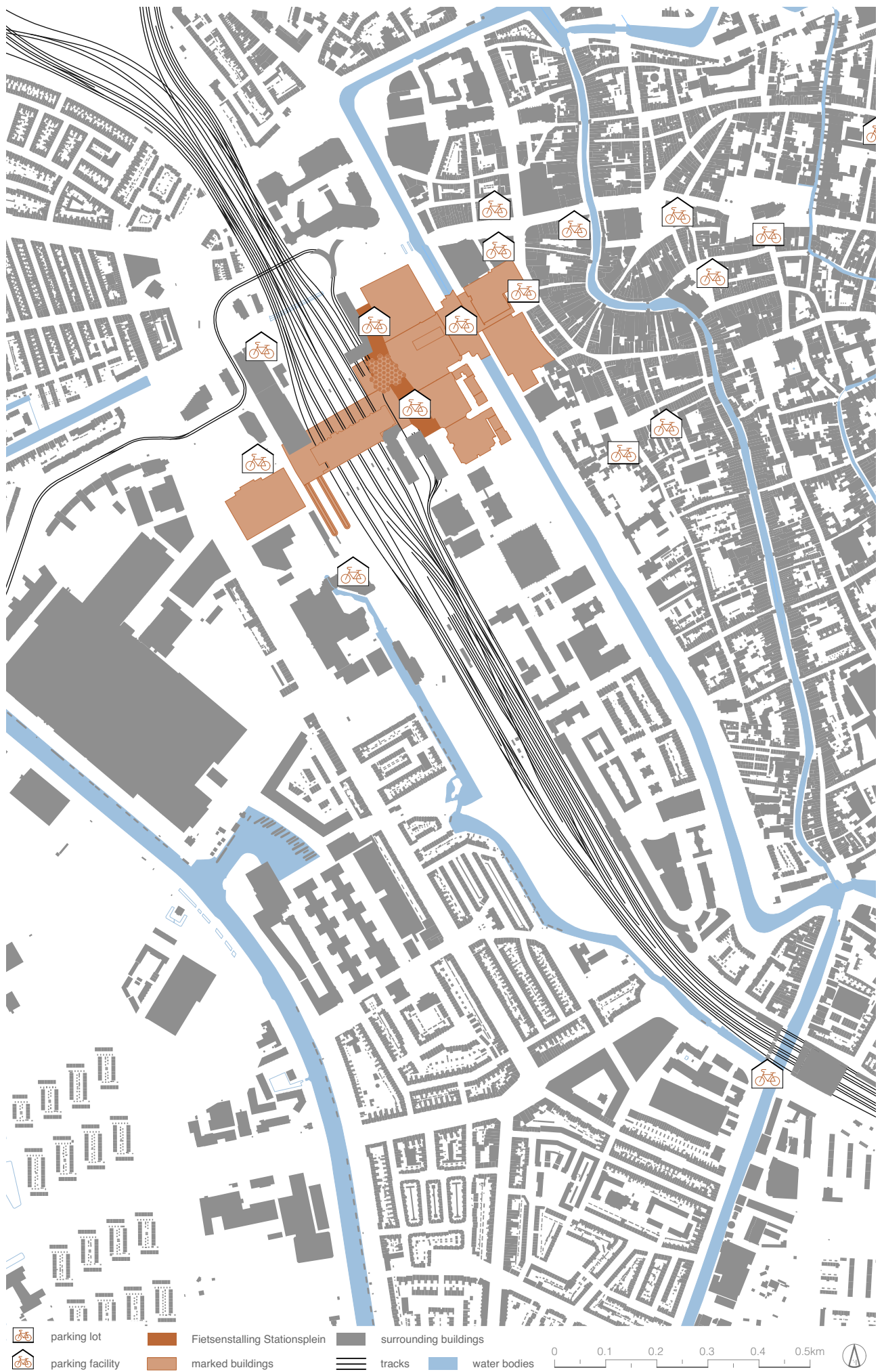


Fig. 6 Site plan city of Utrecht with marked bicycle parking, scale 1:10.000

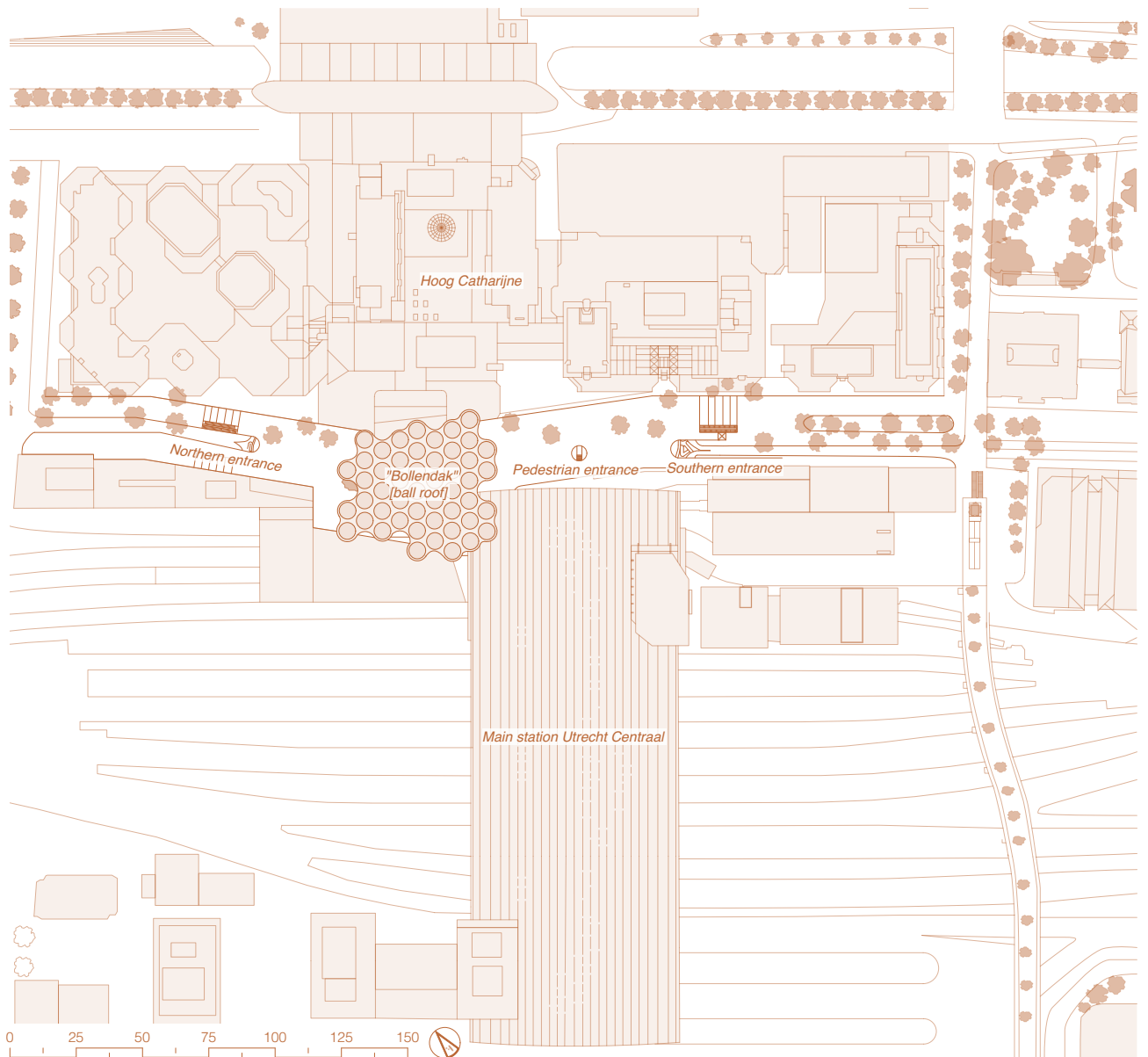


Fig. 7 top view of 'Stationsplein' with 'Bollendak', Scale 1:2500

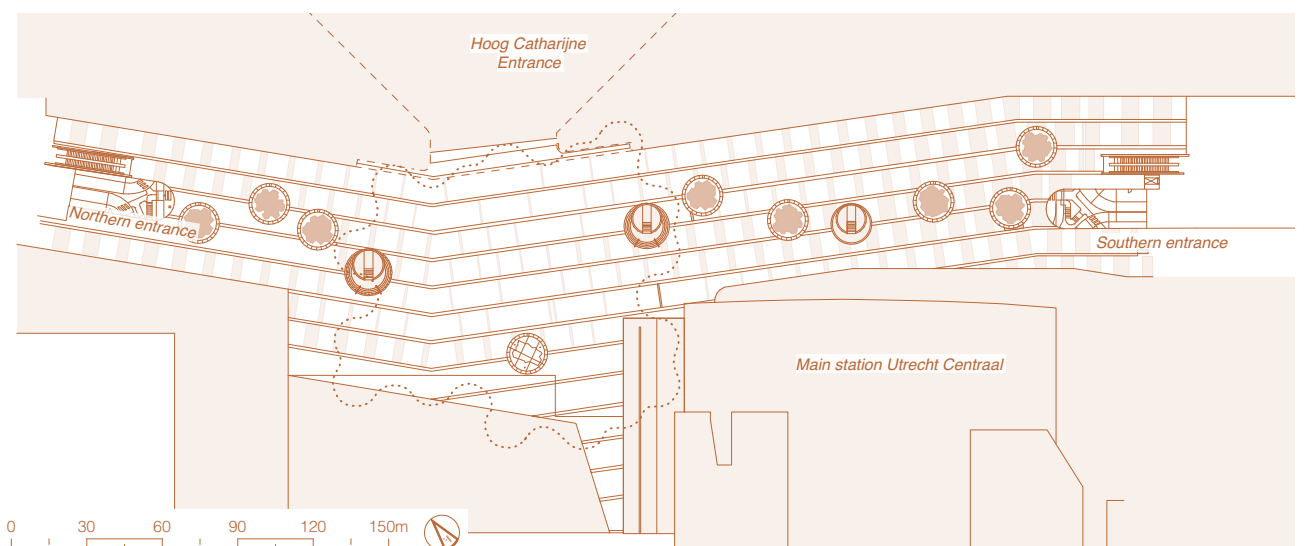
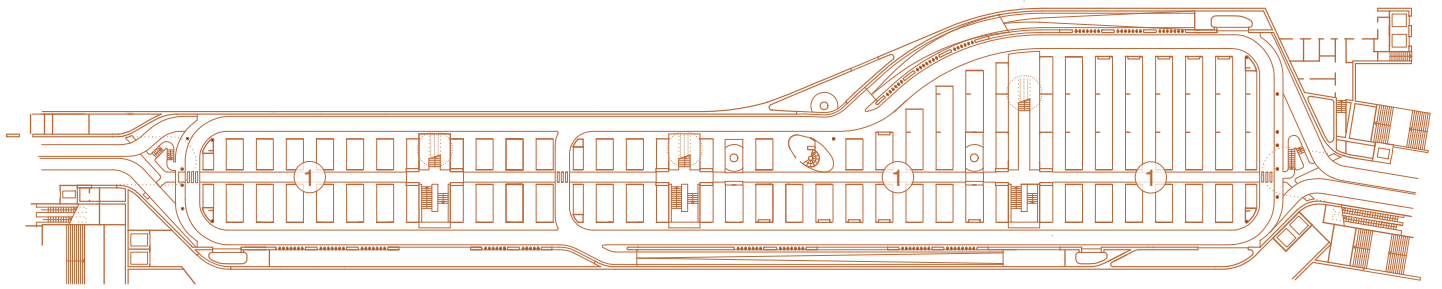
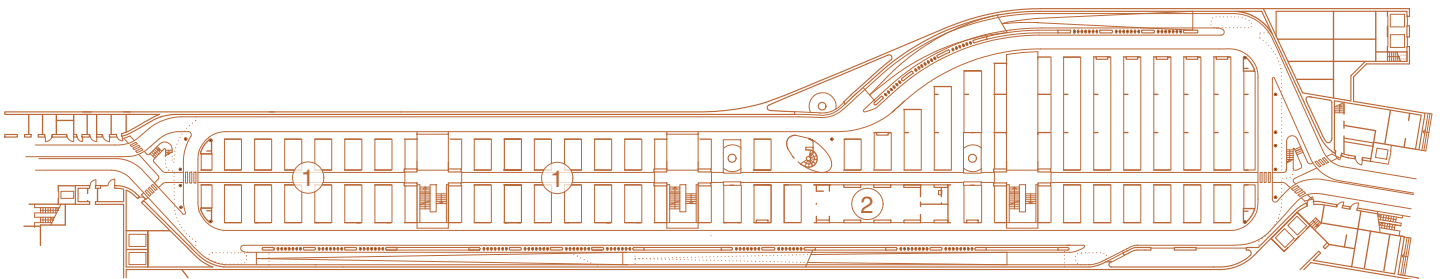


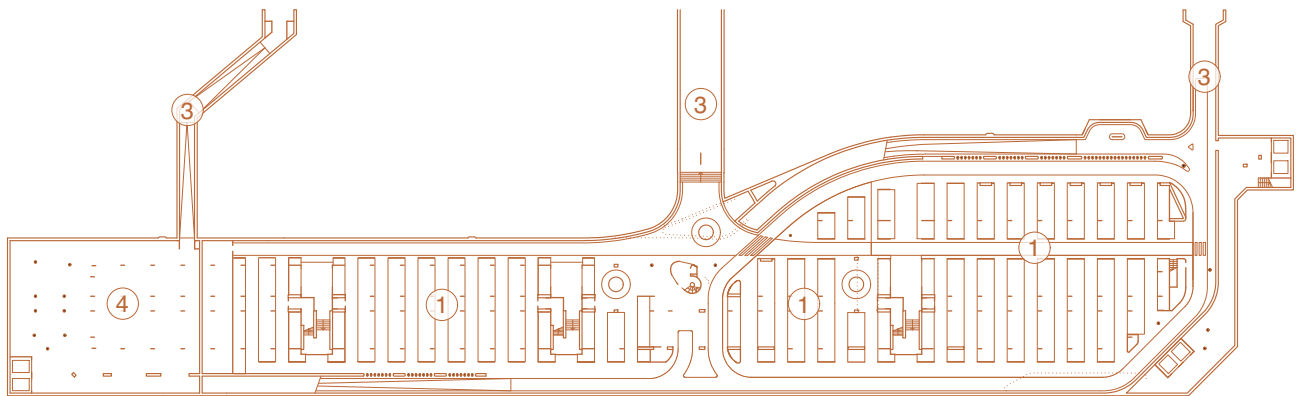
Fig. 8 top view of 'Stationsplein' without 'Bollendak', scale 1:3000



floor 1



ground floor



floor -1

- ① bicycle parking ③ connecting tunnel to railway tracks
- ② bicycle workshop ④ storage space of railway company



Fig. 9 floor plans of the bicycle parking facility 'Stationsplein Fietsenstalling', scale 1:1100

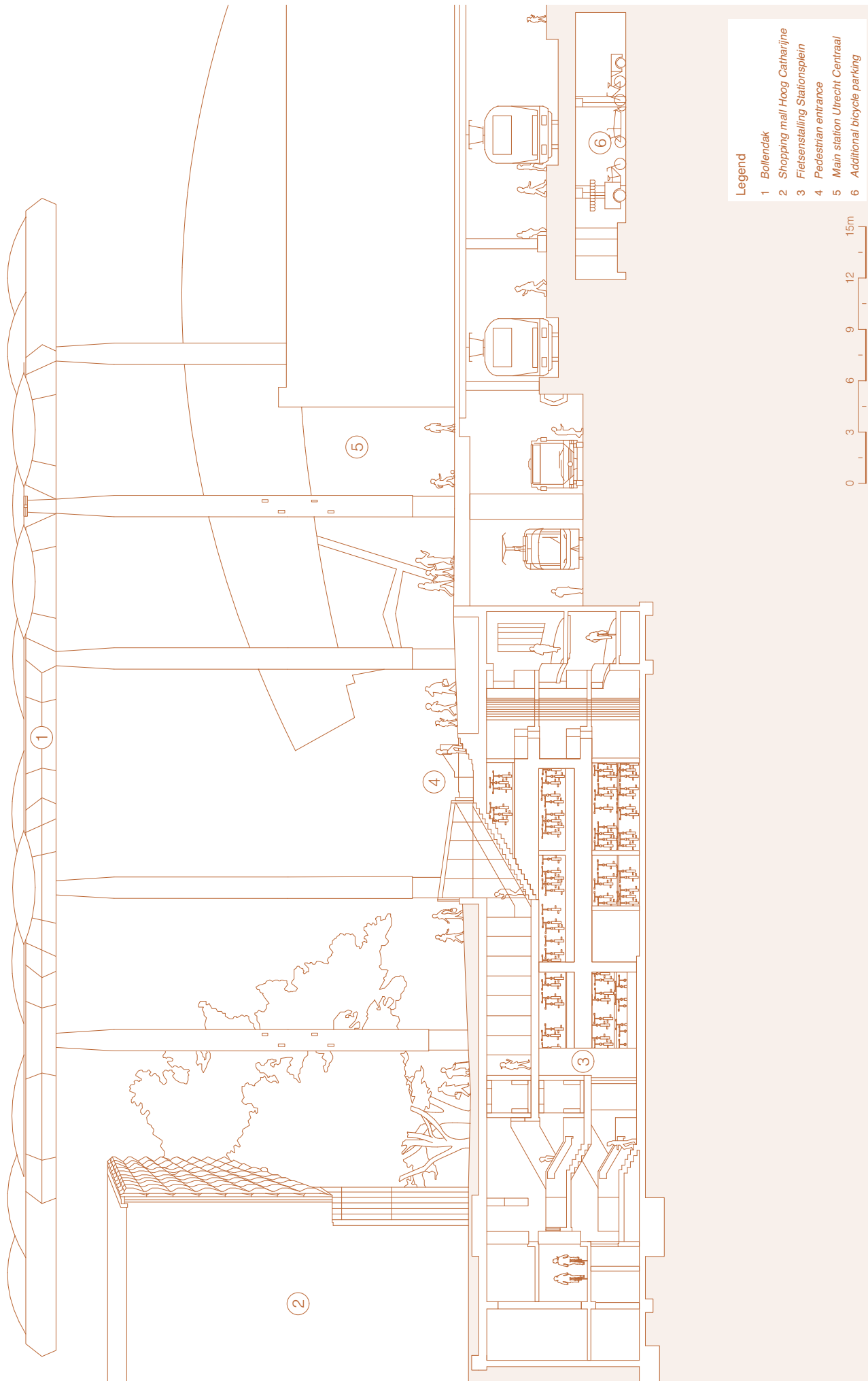


Fig.10 section 'Stationsplein' south-east view, scale 1:300

III. PHOTOGRAPHS UTRECHT



Fig. 12 Different pavements for bicycles and cars (15.05.2023, Henrike Kramer, Utrecht)



Fig. 13 Bicycle shop, bicycle lanes and parking spots (14.05.2023, Henrike Kramer, Utrecht)



Fig. 14 Bridge for bicycles and pedestrians (14.05.2023, Henrike Kramer, Utrecht)



Fig. 15 Bicycle and pedestrian bridge, bicycle traffic light (14.05.2023, Henrike Kramer, Utrecht)



Fig. 16 Parked bicycles near Utrecht Centraal (15.05.2023, Henrike Kramer, Utrecht)



Fig. 17 Parked bicycles near Utrecht Centraal (15.05.2023, Henrike Kramer, Utrecht)

IV. PHOTOGRAPHS 'STATIONSPLEIN'+ FACILITY



Fig. 18 Main station, 'Stationsplein' square, mall Hoog Catharijne (16.05.2023, Henrike Kramer, Utrecht)



Fig. 19 View of Stationsplein, out of Hoog Catharijne (16.05.2023, Henrike Kramer, Utrecht)



Fig. 20 View of Stationsplein and entrance to bicycle garage (16.05.2023, Henrike Kramer, Utrecht)



Fig. 21 Entrance of the facility, with check-in stations (15.05.2023, Henrike Kramer, Utrecht)



Fig. 22 Entrance of the facility with staircase to the square above (15.05.2023, Henrike Kramer, Utrecht)



Fig. 23 Pedestrian entrance to the facility from Stationsplein (15.05.2023, Henrike Kramer, Utrecht)



Fig. 24 Pedestrian walkway through the facility (15.05.2023, Henrike Kramer, Utrecht)

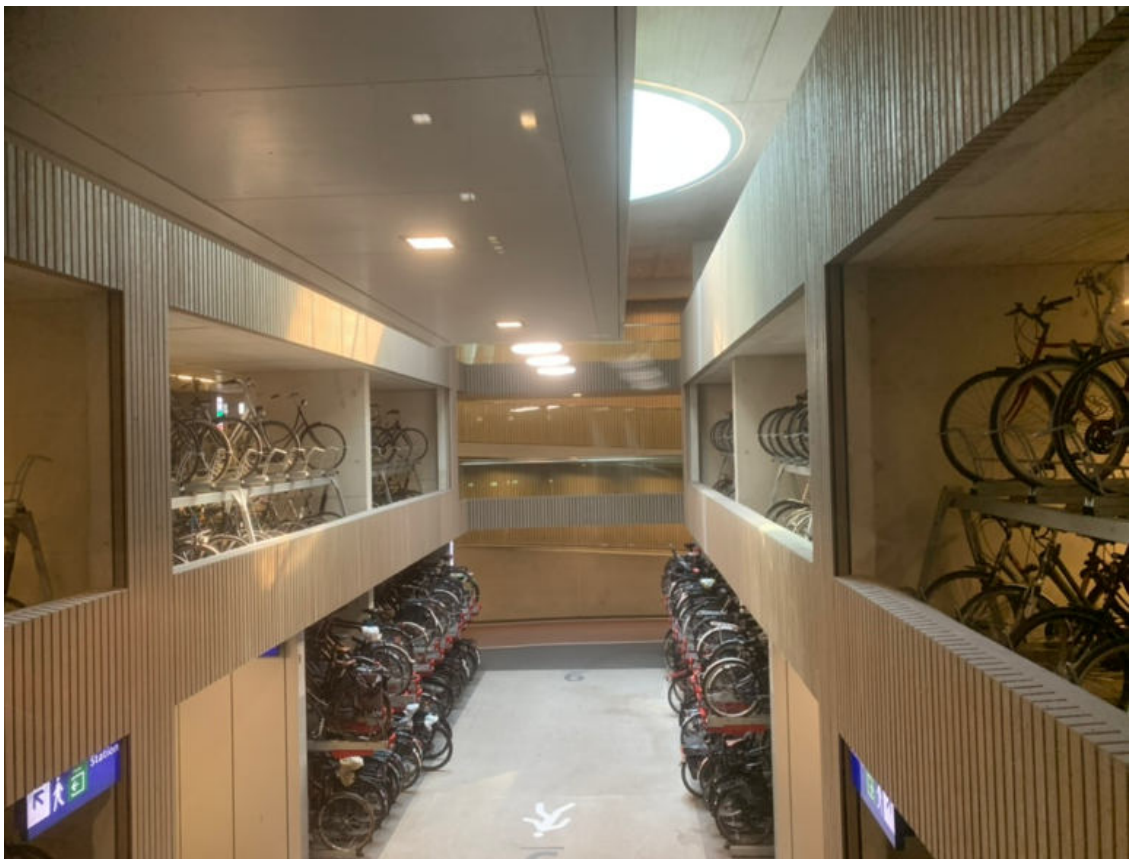


Fig. 25 Atrium with skylight and visible ramps to different levels (15.05.2023, Henrike Kramer, Utrecht)



Fig. 26 Entrance from inside the facility (15.05.2023, Henrike Kramer, Utrecht)

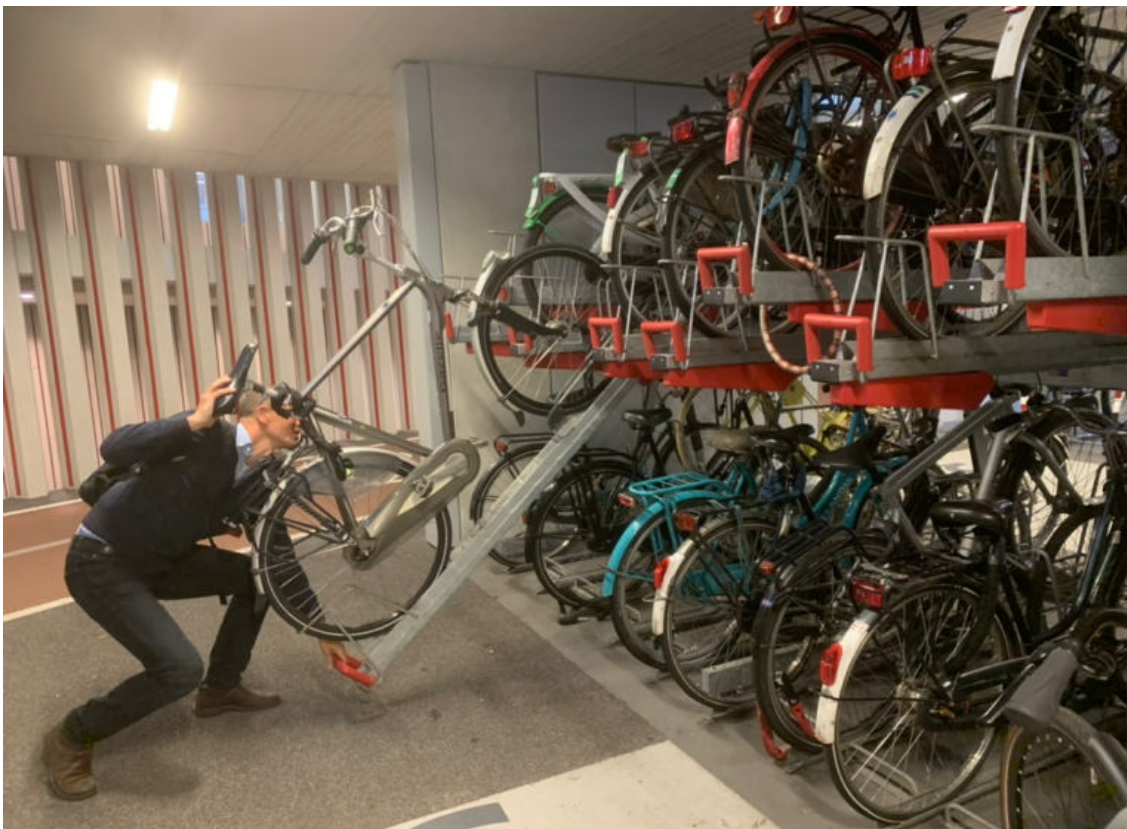


Fig. 27 Usage of the upper bicycle racks (15.05.2023, Henrike Kramer, Utrecht)



Fig. 28 Note to remove abandoned bicycle (15.05.2023, Henrike Kramer, Utrecht)

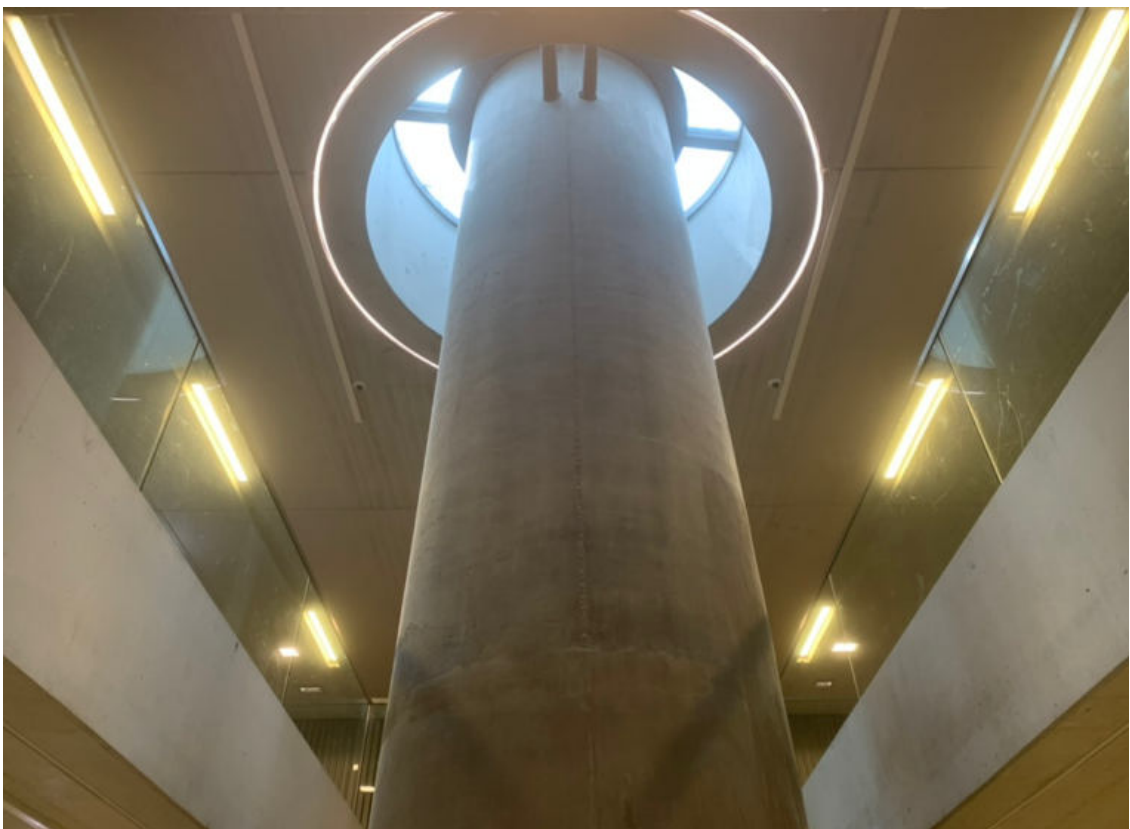


Fig. 29 Concrete pillar (15.05.2023, Henrike Kramer, Utrecht)



Fig. 30 Pedestrian exit from inside the facility (15.05.2023, Henrike Kramer, Utrecht)



Fig. 31 Staircase to the square (15.05.2023, Henrike Kramer, Utrecht)



Fig. 32 Window to the bus station, different levels (15.05.2023, Henrike Kramer, Utrecht)

1 INTRODUCTION

According to a study from 2021 there were around 23.4 million bicycles in the Netherlands, a country with 17.5 million inhabitants. This calculates to an approximate 1.3 bicycles per person. The total number of bicycles in the Netherlands has increased in recent years, especially between 2005 and 2021 when it rose by about 30 percent.¹ This trend very clearly shows the Netherlands as a nation of cyclists. But what is the reason for this extensive cycling behavior?

When it comes to the possible reasons why Dutch people cycle, there are many prenotions and misguided claims. Possibly even more stigmas exist as to why that should not be possible for the rest of the world. Melissa and Chris Bruntlett, write in their book “The Dutch Blueprint for Urban Vitality – Building the Cycling City”: “The Dutch don’t cycle because their county is flat [...], because the weather is nice [...], because they’re morally superior to the rest of the globe [...]. No, the Dutch cycle because they’ve built a dense, 35,000-kilometer network of fully separated bike infrastructure, equal to a quarter of their 140,000-kilometer road network.”² The authors then go on to name even more reasons, including calming traffic in urban spaces, the large amount of money the Dutch government spends on cycling a year, and the very feasible benefits these improvements have, including fewer accidents and cleaner air.³ This suggests the reason why the Dutch cycle so much is their extensive cycling infrastructure. If it is a convenient and attractive option, people will cycle. Ensuring safe infrastructure for this is the way forward.⁴

A prime example of well implemented biking infrastructure is the city of Utrecht, in the center of the Netherlands. With more than 367,000 inhabitants, it is the fourth largest city in the country⁵. It also hold the largest transportation hub in the Netherlands, for both trains and busses: ‘Utrecht Centraal’.⁶ The central station lays between one of the most successful commercial undertakings in the city: ‘Hoog Catharijne’, a shopping mall, and the ‘Jaarbeurs’, an exhibition and conference center (see fig. 5).⁷ Utrecht’s history shows a city built for cars. But discovering after all the problems that come with that, like air pollution and an increasing number of accidents, especially with children, a lot of changes were made to the city in the last decades. One of these changes was the so called ‘CU2030’ plan from 2005, aiming to solve problems around Hoog Catharijne and the main station.⁸

¹ <https://www.statista.com/statistics/819839/volume-of-bicycles-in-the-netherlands/> (17.07.2023)

² Bruntlett/ Bruntlett (2018), p2

³ Bruntlett/ Bruntlett (2018), Introduction: A nation of Fietsers

⁴ Bendiks/ Degros (2013), Fietsinfrastructuur, Cycle infrastructure, p8

⁵ http://www.citypopulation.de/de/netherlands/admin/NL31__utrecht/, (19.07.2023)

⁶ <https://cu2030.nl/utrecht-centraalbe#:-:text=De%20openbaar%20vervoersterminal%20Utrecht%20Centraal,het%20grootste%20station%20van%20Nederland>, (19.07.2023)

⁷ Buijze (2013), p9

⁸ De Bruin/De Kam/ Van Vliet (2022), p147-9

There are many great examples of remarkable changes in cycling infrastructure in Utrecht, many of which I got to witness when visiting the city in May 2023. A few good examples are the first bike lane in the Netherlands, or the ‘Daphne Schippers Bridge’ (where a bike path partly runs over a school roof due to the height difference to the city). The sheer number of bicycle parking facilities in the city is also astonishing. Arguably one of the biggest and most important changes in that regard is the biggest bicycle facility in the world, which was constructed right next to the station and fully opened in August of 2019.⁹ The parking garage, called “Fietsenstalling Stationsplein” has been operating 12,500 public parking spaces for bicycles the last three and a half years, as well as 1,000 public-transport bicycles, called OV-bicycles. It offers parking spaces on three levels, the top and bottom for bicycles parked there free of charge for a day, the level in between is for people with parking cards. Both train and bus station are easily and quickly accessible through both stairs and a tunnel.¹⁰

While talking about the main station in connection to the bike garage, Stijn Rademakers, who was one of the architects, stated: “With this hub of connectivity, you need to make sure that it also becomes a destination, so we do the utmost to create the biggest density possible, to use that opportunity well.”¹¹ To determine if the opportunity has indeed been used well, I will evaluate the project through three theses:

- 1.) The introduction of the bicycle parking garage ‘Stationspleinstalling’ into the city of Utrecht was only possible thanks to many impacting factors, both political and sociological in nature.
- 2.) The bicycle parking garage in Utrecht improves the city, increasing bicycle mobility through good urban planning and enhancing its infrastructure.
- 3.) The design of the bicycle parking garage is sensible, practical and efficient.

⁹ <https://utours.nl/5-surprising-bicycle-feats-from-utrecht> (19.07.2023)

¹⁰ <https://www.utrecht.nl/city-of-utrecht/mobility/cycling/bicycle-parking/bicycle-parking-stationsplein/> (19.07.2023)

¹¹ Kramer (2023)

2 ANALYSIS

2.1 Preconditions

Historical background

Today's Utrecht is filled with bicycles and pedestrians, but originally it was a city built for cars. After the second world war, the further development of the city was a serious point of debate. To deal with the rapidly growing population and the resulting traffic problems, the German Urban developer M.E. Feuchtinger implemented a traffic plan, which saw a ring road in the ancient city moat, as well as many wide roads for cars in the city center.¹²

In the 1930s already, the city government and private businesses operated a significant number of public and private bicycle parking facilities, like wooden bike racks at the city's main office and theater or covered bike sheds at schools. In 1938, the State Railroad Company even built what was probably the first underground bicycle parking facility in the country, right underneath the Central Station. Even though the city recognized the need for bicycle parking, people still felt that parking for cars benefited the local economy more. So between 1945 and 1970 Utrecht's urban planners focused more on cars than anything else. In the 70s that started to change. People now began to question the extensive traffic measures to accommodate cars. More cycling lanes were implemented and cycling organizations were formed. In the 1990s, many radical changes were made ban cars from the city while simultaneously making the center more appealing to cyclists and pedestrians. The path for a large scale integration of bicycles into the city was mostly set when Utrecht became the pilot city for a bicycle sharing program called OV-Fiets. This included public transport bikes in 2001 (which is now implemented all over the country), and finally the election of a green-left coalition in 2010.¹³

Political actions

The model of bicycle-train-bicycle journeys became more and more popular amongst Utrecht's inhabitants. However, cycling policy still proved to be a continuous point of negotiation for the years to come.¹⁴ In retrospect, it was especially the sets of measures adopted by the green-left coalition, within the traffic development plan "Traffic Circulation Plan 2010-2015", the strategy paper "Utrecht attractive and accessible 2015- 2020" and the action plan "Utrecht - we all cycle!", that decisively changed the level of cycling infrastructure in Utrecht. Between 2015 and 2020 alone, investments amounted to around EUR 186 million just in cycling infrastructure. The plans expressed a clear policy line and contained clearly defined objectives and actions. Political continuity played an important role for the implementation. The right level of staffing was also a

¹² De Bruin/De Kam/ Van Vliet (2022), p139-41

¹³ Oldenziel/Emanuel/Albert de la Bruhèze/Veraart (2016), p32-6

¹⁴ <https://international.fhwa.dot.gov/pubs/pl18004/chap04.cfm> (21.07.2023)

decisive factor. The staff was increased in line with the political orientation and processes were optimized step by step. If there was a shortage of qualified staff, external consultants were brought in. Financial resources and personnel were also increased. Many projects were initiated, processed and realized in parallel in order to achieve the goals from the strategy plans. In the administration, a good cooperation of all departments (e.g. traffic and urban planning) was indispensable, since most of the measures aimed at improving the general quality of life of the citizens and are not to be seen as mere mobility projects.¹⁵

Rademakers, one of the Stationsplein parking facility's architects, supports this by stating that the city, in cooperation with many people including the architects of the parking facility, was both very transparent with their actions every step of the way, and very efficient in cooperating with and managing all the different parties involved with this project alone. He goes on to explain the cooperation with the state architect and railway architect, and praises the municipalities approach to the project, including being very open to new ideas and constructive criticism.¹⁶

One of the cornerstones for improving bicycle traffic in the 'Traffic circulation plan 2010-2015' was the planning of five main routes through the city. These were selected so that all parts of the city could be easily reached by bicycle. At the same time, every citizen should be able to experience an improvement of the infrastructure within a radius of one kilometer from the place of residence. To make Utrecht more attractive, other important measures were focused on, such as traffic reduction through car-free streets or streets for residents only, more quality of stay in the urban space, bicycle lanes on which cars are quite literally guests, bicycle-friendly switching or dismantling of traffic lights, closing gaps through bridges and tunnels, and better bicycle parking facilities at train stations.

The strategy paper 'Utrecht attractive and accessible 2015-2020' on the other hand, aimed to improve the balance between accessibility, attractiveness and quality of life by 2030. For this purpose, the city made clear infrastructure policy decisions, which focus on three points: cyclists and pedestrians have priority, individual motorized traffic must, as far as possible, be diverted to the ring road around the city, and public transport must be improved and its use promoted.¹⁷

In the fast-growing city, which had gained 50,000 inhabitants between 2012-2022 alone,¹⁸ the key to achieving the goals lay in a more efficient use of the limited road space, according to the municipality. This was to be supported by investments in local public transport, bicycle traffic and a new approach to urban development. When implementing the strategy paper, the following guidelines were taken into account: the bicycle was and is considered the most important

¹⁵ https://www.adfc.de/fileadmin/user_upload/Expertenbereich/InnoRAD-Projekt/adfc_innorad_quick_web.pdf (24.07.2023)

¹⁶ Kramer (2023)

¹⁷ https://www.adfc.de/fileadmin/user_upload/Expertenbereich/InnoRAD-Projekt/adfc_innorad_quick_web.pdf (24.07.2023)

¹⁸ <https://www.macrotrends.net/cities/21949/utrecht/population> (25.07.2023)

means of transport in the city and focus was to be laid on the quality of life in urban areas. Another important part was creating smooth and easy-to-use traffic junctions between pedestrian and bicycle traffic as well as public transport and transforming the inner-city ring road into a boulevard with sufficient space for bicycle and pedestrian traffic, as well as reducing the speed for motor vehicle traffic. Within the general strategy paper, there was the additional action plan "Utrecht - we all cycle!", in which the measures of the 2010 transport development plan were further developed.¹⁹

Cycling infrastructure

Ronald Tamse, Utrecht's general transport planner and developer of cycling infrastructure, explained in an interview in 2022, that building and planning bike lanes should not be an ideology, as bike lanes are a tool. Converted intersections and pathways are always different, and it depends on the circumstances, on pedestrian flows, and how cars are directed and diverted. Tools that are used are white lines, different pavements, parking spaces placed a little higher next to the roadway, and barriers that don't necessarily look like such. He further explains that sometimes it is psychological in nature, as the people are the intended users.²⁰ Proof of these many already implemented changes towards a more bicycle-friendly city can be seen all over the city nowadays (see [fig. 12-15](#)).

When changing the bicycle infrastructure of the city, several bike lanes along the main roads were already at full capacity and could only be expanded to a limited extent. For this reason, the city decided to improve its cycling network by adding missing connections (e.g. tunnels and bridges). In addition, new alternative routes were created to bypass busy areas. Some examples are the extension and reconstruction of the Vredenburg route, the busiest bicycle route in the Netherlands with 33,000 cyclists per day, and the reopened canal system around the historic city center, which was developed into a bicycle ring.

Bicycle parking was also given a high priority, so that more citizens could park their bicycles safely and conveniently. In order to reduce the pressure on public space at street level, Utrecht placed a strong emphasis on underground bicycle parking facilities. Some of the projects realized, beside the bicycle parking facilities right next to the station, 'Stationsplein' and 'Jaarbeursplein', include: temporary pop-up parking at busy bus stations or during events and a bicycle parking guidance system with digital signs that show the nearest bicycle parking space and the number of available spaces throughout the city.²¹

¹⁹ https://www.adfc.de/fileadmin/user_upload/Expertenbereich/InnoRAD-Projekt/adfc_innorad_quick_web.pdf (24.07.2023)

²⁰ <https://taz.de/Der-Siegeszug-des-Fahrrads-in-Utrecht/!5869288/> (24.07.2023)

²¹ https://www.adfc.de/fileadmin/user_upload/Expertenbereich/InnoRAD-Projekt/adfc_innorad_quick_web.pdf

Location before

The city of Utrecht lies in the geographical center of the Netherlands, and has been its religious center for centuries. It has a medieval old town, many canals, Christian monuments and a venerable university.²² The city spends 132 euros per citizen per year on cycling infrastructure (around 250 million since 2015); in Germany, the figure is 2-10 euros per year depending on the municipality, rarely more than 20.²³

One of the results of these large investments by the municipality of Utrecht is the Stationsplein. The main station lies between two of the most prominent profit makers of the city, the conference and exhibition center 'Jaarbeurs' and the aforementioned Hoog Catharijne (see [fig. 5](#)). The latter had been a large-scale urban planning project from the 1960s and 1970s, in which the station area had been transformed (up until 2007-2018) into a large indoor shopping complex. It included the then biggest indoor shopping center in the country and Utrecht's central station, as well as entertainment units like a music center, a cinema, a sports hall. Lastly it also housed many offices and apartments. The building complex was accessible via a then-new city highway which ran through the area and via then newly constructed bus lanes underneath. The shopping center itself was redeveloped, and in the process was also largely disconnected from the other larger buildings of the old complex starting in 2007. In 2018 this separation process was completed with the station becoming separate as well.²⁴ This major project was part of the comprehensive CU2030 plan, in which the entire station area was transformed again, starting in 2007.²⁵ When the shopping mall was still part of the main station, it overcame the different elevation levels in the city by forming a bridge over the bus terminal, essentially making it difficult to get to the city center from the station without going through the mall itself, as can be seen in [fig. 3](#) and [4](#).

One of the main goals of restructuring the area was to reconnect the two separated parts of the city that were cut by both the central station and railways, as well as the streets going underneath Hoog Catharijne, and the different city levels. So a better transition between the mall, the main station and the city center was very important. The allure and the safety of the area was furthermore to be improved.²⁶ There was a very unsafe atmosphere in and around the indoor shopping complex, mostly associated with drug problems, which had become concentrated there. The space underneath the mall lacked a proper function and was not used up to its potential. To make the area additionally attractive, the moat next to the mall which previously had been boarded up and turned into a highway, was refilled with water.²⁷

²² <https://www.visitutrechtregion.com/de/die-region-utrecht-entdecken/utrecht> (26.07.2023)

²³ <https://taz.de/Der-Siegeszug-des-Fahrrads-in-Utrecht/!5869288/> (24.07.2023)

²⁴ https://www.verdus.nl/assets/uploads/2019/11/URD_CONTEXT-Report-4_Utrecht-Station-Area.pdf

²⁵ <http://www.bouwpututrecht.nl/2020/10/13/terugkijken-in-de-bouwput/> (25.07.2023)

²⁶ Buijze (2013), p9-10

²⁷ De Bruin/De Kam/ Van Vliet (2022), p148

Another aim was to increase the number of facilities made available to the public, in light of the steadily growing population and increasing traveler numbers through Utrecht Centraal.²⁸ When the works on the bike garage next to the main station had just started on the east side in 2014, another bicycle parking facility, 'Jaarbeursplein', had just opened on the west side. The bicycle park underneath the stairs to the west of the central station, leading up to the station itself was the first of many changes surrounding the main station that were to come. It housed 4,200 bikes, up to that point the largest bicycle parking facility in Utrecht. The facility had been such a success, that even though it had only opened in May the previous year, in January 2015 the millionth bicycle parked there could be celebrated. By 2014, Utrecht Centraal had been the largest railway station in the Netherlands as well, with up to 900 trains leaving there every day.²⁹ Nowadays the number has gone up to 1000³⁰.

Being both located right in the city center and the biggest transport hub in the Netherlands had made the station very attractive for cyclists. The number of parking spots available for bicycles however, could not cover the demand for them: "In Utrecht there are a lot of people coming to the station on bicycle and it was a mess, bikes being left everywhere, so this was needed," Tatjana Stenfert, project manager at Utrecht station's square, said in 2017, when the bicycle facility under Stationsplein had officially opened its first part.³¹ This claim is supported by many pictures and blogs about the bicycle parking situation before the opening of 'Fiestenstalling Stationsplein', like 'A Flamingo In Utrecht'³², or the blog 'I do not despair' by Kevin Mayne, who both posted pictures of the bicycle parking facility next to the main station before it was enlarged and put underground. (see [fig. 1-2](#)) In Mayne's own words: "I came out of the station and saw the cycle parking. And the cycle parking. And more cycle parking. I have seen Dutch, Danish and Flemish railways stations before. I have seen the 6000 bike multi-story bike park in Amsterdam. But I have never, ever seen anything like the number of bikes in around Utrecht station."³³ The absolute abundance of bicycles in these pictures, as well as the constantly full bicycle parking facilities, clearly indicate a very urgent need for more parking space.

²⁸ Buijze (2013), p10

²⁹ <https://bicycledutch.wordpress.com/2014/07/03/utrechts-indoor-bicycle-parking-facility/> (21.07.2023)

³⁰ <https://utrecht-monitor.nl/fysieke-leefomgeving/mobiliteit/openbaar-vervoer> (21.07.2023)

³¹ <https://www.theguardian.com/world/2017/aug/07/worlds-biggest-bike-parking-garage-utrecht-netherlands> (22.07.2023)

³² <https://oranjeflamingo.wordpress.com/2014/08/20/now-where-did-i-park-my-bike/> (22.07.2023)

³³ <https://idonotdespair.com/2014/04/17/utrecht-station-cycle-parking-is-absolutely-astounding-see-it-before-it-disappears-underground/> (22.07.2023)

2.2 Implementation

Costs and parties

In the last few years, the Netherlands have focused more and more on the financial support of bicycle infrastructure, more so than most other European countries.³⁴ In the year 2017, when the first part of the Stationsplein biking facility opened, the Dutch government invested around 100 million euros in projects concerning cycling. 2018, another 75 million euros were supplied to construct bicycle parking facilities.³⁵ With the implementation of the new bicycle parking garage, altogether over 30 million euros were spent. More specifically, this adds up to more than 2,400 euros per parking spot.

The main investor was the national railroad company ('Prorail' and infrastructure management), who contributed about 60%, followed by the city of Utrecht and the Ministry for Transport, who each contributed about 20%. Additionally, the rail passenger transport administration ('Nederlandse Spoorwegen') and the European Union also contributed through a program called Connecting Europe Facility.³⁶ The city of Utrecht, ProRail and NS all contributed both in terms of resources as well as staff deployment. The parking garage Stationsplein is the third parking facility that was put into practice as part of the bicycle parking pilot in the city of Utrecht (the first being the 'Jaarbeurspleinstalling', the second the 'Knoopstalling'). Including all the other new bicycle parking facilities around Utrecht Central, the above mentioned parties have invested well over 50 million euros to redesign the area.

Utrecht was also the first city where cyclists were directed to free parking spots via digital signs on the street, in five different bicycle parking facilities and on an app, provided by the NS. The other monitored facilities around Utrecht central station include the 'Jaarbeursplein' (with 4,900 spaces), the 'Knoop' (with 3,000 spaces), the 'Sijpesteijn' (with 1,240 spaces) and the 'Laag Catharijne' (with 300 spaces).³⁷

The municipality of Utrecht owns and manages most of the facility. To meet the costs of maintenance and daily management, financial agreements have been made with all of the other parties who were involved in the development. The parking garage functions 24 hours a day, 7 days a week, and Utrecht employs circa 40 people to run and manage the facility, manning the entrances and exits, as well as the service and repair shop, etc. The customers can park their bicycles for free during the first 24 hours, after which the cost is 1,25 euros per day. The separate garage underneath platforms 1 and 2, which used to be a parking garage for cars, is now part of the new bicycle parking garage, but still belongs

³⁴ <https://thenextweb.com/news/the-dutch-commitment-to-cycling-is-a-challenge-to-the-whole-of-europe>

³⁵ <https://www.railtech.com/policy/2019/08/21/netherlands-opens-worlds-largest-bicycle-parking-at-train-station/?gdpr=deny> (24.07.2023)

³⁶ <https://bicycledutch.wordpress.com/2019/08/20/finally-fully-open-utrechts-huge-bicycle-parking-garage/> (24.07.2023)

³⁷ File ENGELS_Feiten en cijfers Stationspleinstalling DEF[82] provided by the municipality of Utrecht

to the railroad. It is currently used as a space to park bicycles that cannot be parked in the main area, like bicycles with child seats or more than one seat. Furthermore, the 1,000 OV-Fietsen, so public transport bicycles, are stored there (see [fig. 10](#)).³⁸

Construction phases

The plans for changes that were to be made to Stationsplein were finally set into action by the municipality, when in 2011 they made a public tender to collect ideas for the space that was to be created at the Stationsplein, and the competition was won by Ector Hoogstad Architecten in collaboration with Sant&Co and Royal Haskoning DHV who designed the parking facility. The commission to implement the bicycle parking garage in Stationsplein with more than 12,500 spots, adding up to 22,000 spots with all of the surrounding parking systems already in place, was taken up by the architects in the same year. The involved parties that made up the commissioners included the railway company, the municipality itself, Infrastructure and Water management, and the owner of the shopping mall Hoog Catherijne, that previously occupied the space were the new bicycle parking facility was to be built.³⁹

The official start of construction for the bicycle parking facility was in November 2014. In view of the fact that the project was such a major intervention, and in addition was placed at the center of the city and connected to the largest mobility hub in the Netherlands, the parties involved decided to carry out the construction in phases. This meant that the first part of the facility could be opened as early as August 2017 (with 6,000 spaces) and another part in October (raising the number to 7,500) of the same year, with the second part simultaneously still being under construction. Even with only half of the facility open, the parking garage already won and was nominated for multiple prizes before the final opening in 2019. Among these were the 'Betonprijs' in 2017 and the prize in the 'Transport' category of the 'Architizer A+ Awards' in 2018. It was also nominated for the Dutch Design Awards in 2019 and the national steel prize.⁴⁰

Yet the system was not without its problems during this period. On the contrary, the architect states: "Because the whole building process took so long, at some point it was decided that we were going to open half the parking first, and then, about two years later, we would open the second-half. So we had half the structure intact, which also had a big impact on its comfort. Partly we would have ramps, partly would have stairs. People had a lot more difficulty finding their way. [...] There was quite a lot of critique there [...]." He then further gives examples of issues people had, like safety, orientation and comfort, and explains that the

³⁸ <https://www.railtech.com/policy/2019/08/21/netherlands-opens-worlds-largest-bicycle-parking-at-train-station/?gdpr=deny> (24.07.2023)

³⁹ <https://archello.com/it/project/the-worlds-biggest-bicycle-parking> (23.07.2023)

⁴⁰ File ENGELS_Feiten en cijfers Stationspleinstalling DEF[82] provided by the municipality of Utrecht

facility could only be truly tested when opened. The architects later had to deal with even more issues and had to readjust both flooring and signage.⁴¹

The completion of the second part was finished in August 2019, and the grand opening took place on the 7th of August, adding 5,000 spaces, making the total number 12,656 spaces, and adding a further 480 parking spaces for special bikes such as tandems.⁴² The opening event was accompanied by speeches, dancing, music and a photography exhibition.⁴³ In the year of the opening, Utrecht had 245 km protected cycling paths. About 60% of the people took the bicycle to get to the city center and almost half of all the distances traveled under 7,5km were traveled by bike.⁴⁴ National and international news agencies quickly reported on the now biggest bicycle parking facility of the world, taking over from Tokyo, which had 9,400 parking spots and opened in 2008,⁴⁵ and it became an international topic of interest, putting Utrecht into worldwide focus for being one of the most bicycle friendly cities in the world.⁴⁶

Solving issues

Even though the project had great public support from the start, the preliminary planning was entangled in disagreements between sponsors and other stakeholders (primarily the railway company and Klépierre, the owner of the shopping center) for 6 years. The project had to face many challenges from the get go: the city needed feedback from the cyclist community, had to navigate complexity and ensure safety in an area with many other construction projects. At the same time, the municipality wanted to maintain momentum, avoiding delays in the planning process. This meant aligning and engaging the interests of the stakeholders and representatives, who had differing goals and ideas for the project. The issues ranged from commercial interests and user friendliness to aesthetic value.⁴⁷

When asked why they won the competition, the architect Stijn Rademakers states: “[...] They picked us because we had told them, that we did not have a set agenda beforehand, and that was very important to them. I mean we won with a plan, but it was more like a strategy [...], rather than a design. And we had said that we were very open to discuss every aspect with them and their stakeholders.” This openness for change, new ideas, constructive criticism, and

⁴¹ Kramer (2023)

⁴² <https://www.hetzelmedia.com/holland-das-fahrrad-walhalla-groesste-fahrradgarage-der-welt-eroeffnet-in-utrech/> (26.07.2023)

⁴³ <https://www.google.com/search?client=safari&rls=en&q=utrecht+stationsplein+bike+park+opening+ceremony&ie=UTF-8&oe=UTF-8#fpstate=ive&vld=cid:1a4d2cba,vid:JiyjWqWfa8> (26.07.2023)

⁴⁴ <https://www.adfc.de/artikel/utrecht-in-zehn-jahren-zur-fahrradstadt-der-superlative> (26.07.2023)

⁴⁵ <https://bicycledutch.wordpress.com/2019/08/20/finally-fully-open-utrechts-huge-bicycle-parking-garage/> (24.07.2023)

⁴⁶ <https://www.bloomberg.com/news/articles/2019-07-05/how-the-dutch-made-utrecht-a-bicycle-first-city> (27.07.2023)

⁴⁷ <https://www.pmi.org/learning/library/pedal-power-largest-bicycle-parking-garage-netherlands-11090> (30.07.2023)

the general flexibility continued to be a big part of the forthcoming process, and helped immensely when it came to facing issues that were to be dealt with.⁴⁸

As the goal was to design a parking garage that cyclists would use, a focus group - consisting of Utrecht's bicycling program manager and partner organizations operating other bicycle parking facilities - regularly reviewed the project and provided insight from the perspective of potential users. They particularly focused on quick and easy access and exit possibilities of the project, as they would otherwise park their bicycles outside to catch the train. This was addressed by the architect through a low slope ramp for easy access to all levels on bike, which had not been done in any other parking facility yet.⁴⁹ As a result, the average time needed to park is less than 3 minutes, for people with an abonnement even less.⁵⁰ Other problems that were to be solved were issues with construction and foundations of the surrounding construction projects, which is why the Stationsplein facility opened 13 months later than originally planned, and the installment of interior equipment. In the end however, these problems were resolved thanks to open and honest communication and intelligent project management.⁵¹

⁴⁸ Kramer (2023): Interview

⁴⁹ <https://www.pmi.org/learning/library/pedal-power-largest-bicycle-parking-garage-netherlands-11090> (30.07.2023)

⁵⁰ Kramer (2023): Protocols

⁵¹ <https://www.pmi.org/learning/library/pedal-power-largest-bicycle-parking-garage-netherlands-11090> (30.07.2023)

2.3 Functional analysis

“A better understanding of the effect of the quality and quantity of bike parking can help estimate bicycle demand at home, work, businesses, and public transport stops and stations. A supply of bicycle parking that meets quantity and quality demands can encourage cycling.” - Buehler/Pucher (2021) p.104

Public transport - parking

Commuters make much longer trips than those of 3-5 km, in which cycling is the most common form of transportation in the Netherlands. Consequently, the country maintains a very effective train network, and promotes the symbiosis of trains and bicycles: as the trains are already very well used, space for bicycles on the train is limited, especially at rush hour. The country therefore recommends that people have one bike at home to ride to the local train station, and another one to get from the station to work.⁵² Another program promoting this, while simultaneously avoiding abandoned bicycles and blocked parking spaces, are the OV-Fiets rental bikes, which are available in over 300 locations in the Netherlands. They are rentable with the national transport cards, easily located via the national railway app (NS-App), and usually very close to train stations.⁵³ Even though 6000 public transport bicycle journeys were made from ‘Stationsplein Stalling’ every week in 2018,⁵⁴ it is reasonable to assume that people who already have a bike (which is most people in the Netherlands), usually prefer to avoid the fees and take their own. Safe bike parking adjacent to train stations is therefore a necessity, which is why there are parking facilities located next to train stations in most cities and towns.⁵⁵

Bicycle parking at public transport stops like train stations or bus stops can increase the demand both for biking and for public transportation.⁵⁶ When cycling, the radius of possible users for public transport expands due to the speed and individual freedom of cycling, thereby reducing the demand for feeder services like busses. Most papers on bicycle parking at public transport hubs indicate a beneficial relationship between the supply of bicycle parking facilities and the number of people using both public transport and bicycles.⁵⁷ The type of parking facilities for bicycles ranges from unprotected systems like a simple rack or bollard, to bike lockers and bike lockups or garages.⁵⁸ Studies suggest that cyclists prefer covered bike parking or lockers with weather protection to those without. While full service bike garages are appreciated, though parking fees reduce the probability of usage.⁵⁹ Parking in public or video surveillance areas or areas close to public transport is generally preferred by cyclists.

⁵² <https://www.resilience.org/stories/2018-11-15/when-good-is-not-enough-extending-the-bicycles-reach-in-the-netherlands/> (29.07.2023)

⁵³ <https://www.ns.nl/en/door-to-door/ov-fiets> (30.07.2023)

⁵⁴ File ENGELS_Feiten en cijfers Stationspleinstalling DEF[82] provided by the municipality of Utrecht

⁵⁵ Buehler/ Pucher (2021) p.104

⁵⁶ Krizek/ Stonebraker (2011) p.162-167

⁵⁷ Harvey (2016) p.50-60

⁵⁸ <https://www.reliance-foundry.com/blog/bike-parking-guide> (29.07.2023)

⁵⁹ (Geurs/ La Paix/ Van Weperen (2016) p. 8-25; Molin/ Maat (2015) p.3-12

Abandoned bicycles at stations on the other hand, are deterring the usage by blocking the space and creating an impression of an unsafe parking location.

City center - parking

Obstruction and clutter are only a few of the consequences of insufficient bicycle parking facilities. As a consequence, functional bike parking is essential in benefiting all road users, pedestrians and cars as well as cyclists. To choose the right sort of parking facility for the right location, it is important to stay mindful of both the space itself and the surrounding transportation systems. The aim should be to create a convenient and safe space that enhances the existing traffic flow instead of disrupting it.⁶⁰

Especially high density areas demand good bike parking, as it encourages cyclists in their choice of transportation if it is convenient. It should be effective, secure and efficient for cyclist biking to work, for leisure, into the city or home.⁶¹ Most studies point out that bicycle parking at work encourages commute to work via bicycle⁶², while some show that the better the quality of the parking, the greater the number of cyclist,⁶³ especially when it comes to weather protection.⁶⁴ The importance for bike parking around universities and schools should not be underestimated either: the reason for not cycling to school is repeatedly mentioned to be insufficient or inadequate parking space for bicycles.⁶⁵ Finding proportionate parking space for bicycles in cities can present a challenge for urban planning departments however, so the level and quality of these facilities vary from city to city. The issues connected to informal and improper parking as well as abandoned bicycles make the importance of safe and regulated parking evident.⁶⁶

Location now:

The city of Utrecht lies in the region of Utrecht, where cycling infrastructure continues throughout, and connects to other regions and cities. The province of Utrecht started the project 'Op de Fiets' (onto the bike) in 2003, and has encouraged people to not only cycle within the city perimeters, but to explore the surrounding region as well. The project quickly became popular, which is made possible by the intricate cycle path system in place not only in the city, but in the countryside as well.⁶⁷

The city of Utrecht is a worldwide pioneer when it comes to bicycle numbers: 94 percent of all households have one or more bicycles, with a total of more than one million in the city of 360,000 inhabitants. Every third household does not

⁶⁰ Buehler/ Pucher (2021) p.104

⁶¹ <https://www.reliance-foundry.com/blog/bike-parking-guide> (29.07.2023)

⁶² e.g.: Bopp et al. (2016) p. 387-91; Maldonado-Hinarejos/ Sivakumar/Polak (2014) p.1287-1304

⁶³ Mrkajic/ Vukelic/ Mihajlov (2015) p. 51-6

⁶⁴ e.g.: Heinen/Maat/Van Wee (2013) p. 23-4; McDonald et al. (2013) p. 243-8

⁶⁵ e.g.: Wang, Akar and Guldman (2015) p. 122-30

⁶⁶ Buehler/ Pucher (2021) p.105-6

⁶⁷ Provincie Utrecht (2009), p. 5

have a car. For every 1,000 inhabitants, there are 302 cars, compared with 580 in Germany. Almost 60 percent of the city's residents cycle into the city center, and 51 percent cycle to school or to work (in Germany, a modal split of 15 percent is already a high figure).⁶⁸

Part of the appeal of the city is that even with numbers like these, the municipality does not stagnate, and keeps planning for the future. With the help of regular contact with and feedback from the inhabitants of Utrecht, the city remains faithful to their wishes: the municipality constantly pulls polls and encourages people to give feedback on public transport, infrastructure and bicycle parking, both online and offline.⁶⁹ Currently the municipality is working toward the Utrecht 2040 plan. The city is aspiring to become a 10 minute city, where all connecting intersections can be reached in under ten minutes by bicycle or on foot. To achieve this, creating free space and making the best use of the spaces that already exist is a priority.⁷⁰ The city center still shows many improperly parked bicycles and overly full bicycle racks (see [fig. 16-17](#)).

Part of the plan is the distribution of bicycle lanes and bicycle parking facilities. The current placement of bike parking can be seen in [fig. 6](#). The bicycle parking facility only works when seen in context: within approximately 2.5km² around 'Stationsplein', just under 32,400 public and private bicycle parking spots are provided. There are still car parking units, mostly underground, but without the bicycle parking units the city would lose a lot more parking space to cars and have to deal with a lot more expenses.⁷¹

In the city center, most of the bike parking facilities are free within the first 24 hours. All in all there are 21 bicycle parking facilities distributed in Utrecht, of which 18 are monitored and manned.⁷² 20% of Utrecht inhabitants are students. More than 70.000 people study at a large number of educational institutions in the city, 11 of which in the immediate area around the central station.⁷³ A few of the most attractive employers of the city are located right next to the main station: the city hall with about 1,500 employees,⁷⁴ and the Jaarbeurs (conference and exhibition center). Thanks to the direct connection between the bicycle parking facility at Stationsplein and the main station, it can take about 6 minutes from entering the facility on bike to entering the station.⁷⁵

The facility reconnects the station with the historic city center. The pedestrian only area on the elevated square on top creates an immediate connection to the shopping center. The paths on the ground level on the other hand connect to the city center and the cathedral.⁷⁶

⁶⁸ <https://taz.de/Der-Siegeszug-des-Fahrrads-in-Utrecht/!5869288/> (24.07.2023)

⁶⁹ <https://www.utrecht.nl/wonen-en-leven/verkeer/fiets/fiets-stallen/nieuwe-buurtstalling/> (27.07.2023)

⁷⁰ <https://www.sazbike.de/markt-politik/radverkehr/utrecht-zehn-minuten-stadt-2788836.html> (27.07.2023)

⁷¹ <https://irishcycle.com/2018/07/15/utrecht-is-too-modest-about-bicycle-parking/> (21.07.2023)

⁷² <https://www.utrecht.nl/city-of-utrecht/mobility/cycling/> (28.07.2023)

⁷³ <https://www.utrecht.nl/city-of-utrecht/studying/> (29.07.2023)

⁷⁴ <https://www.apollo.io/companies/Gemeente->

Utrecht/54a1357d69702d352f59e400?chart=count#employee-metrics (29.07.2023)

⁷⁵ Kramer (2023): Protocols

⁷⁶ <https://www.archdaily.com/920287/bicycle-parking-ector-hoogstad-architecten> (01.08.2023)

Structure

The separation of the Hoog Catharijne shopping mall and the main station allowed the insertion of a new public street and square (Stationsplein), together with the bicycle parking garage. (see [fig. 10-11](#)) The “Stationsallee”, a street aimed mainly at pedestrians, overcomes a height difference of 6 meters via 30 meter wide staircases, a lift and a slope, to then widen into a square. Both the main entrances to the shopping mall and to the station are located on the square.⁷⁷ To walk dryly between the two, an enormous 25 m high roof covers the square, made of steel and a membrane. Its supports widen below ground into the parking facility to form a characteristic trumpet shape.⁷⁸ Due to the unusual design, the locals call it the ‘Bollendak’, translated as bubble roof (see [fig. 7 ,10,18](#))⁷⁹.

On bike the facility is accessible via two streets: Smakkelaarskade turning into Smakkelaarshoek on the north, and the Moreelsehoek on the south. There is a public bicycle path running through the ground floor (which takes about 1-2 min⁸⁰), used as a shortcut between these two streets. In order to park, it is necessary to check in and out with a card used for public transport in the Netherlands, called OV-Card, by simply holding it against an electric card reader on both entrances (see [fig. 21](#)). The facility is divided into three floors: on the ground floor, the only floor with entries for bicycles (see [fig. 9, 11, 22](#)), lay the parking spaces for people with an annual subscription. The other two floors can be reached very quickly (about 1 min) via ramps up to the first floor and down to the basement. Daily parking spaces are situated on floor 1 and -1. Travelers who want to catch a train prefer to park their bicycles on floor -1, as two tunnels that lead to the platforms are located there. (see [fig. 11, 22](#)). People who work around the area surrounding the station prefer to park on the upper floor, where the access to the square is quicker. Throughout the facility a one-way traffic system for cyclists is put in place, 2,5 meters wide and arranged in a loop-like pattern, with a 15km/h speed limit. A digital ‘p-route fiets’ bicycle space indication system helps finding free parking spots and the entire facility is under video surveillance.

To enter the bike garage on foot, the three different staircases located on the square ‘Stationsplein’ lead to the different levels of the facility (see [fig. 30](#)). While the bicycle route runs circularly around the parking zone, a straight pedestrian path along the vertical axis of the facility connects all bike racks, which are arranged in a horizontal pattern (see [fig. 11, 22](#)). This path connects both entrances on the ground floor, as well as the other three staircases that lead up to the square. When leaving the with anti-slip coating paved cycling route, dismounting your bike becomes mandatory to ensure the safety of all users. To make this possible a 1,2 meter wide curb offers enough space for exiting the cycling track. The bicycle racks are two-storied to offer double the parking space. On the upper rack-level, the bikes can be lifted mechanically (see [fig. 27](#)). There

⁷⁷ <https://archello.com/de/project/the-worlds-biggest-bicycle-parking> (23.07.2023)

⁷⁸ Detail (2019)

⁷⁹ <https://taz.de/Der-Siegeszug-des-Fahrrads-in-Utrecht/!5869288/> (24.07.2023)

⁸⁰ Kramer (2023): Protocols

is also the option of entering the bike garage on the same streets on foot as you would on bike. A pedestrian walk and crosswalk lead into the facility, and separate staircases on both south and north entrances create the ascent to the parking facilities roof. It simultaneously functions as the square between the station and mall (see [fig. 18, 20](#)).^{81, 82}

Every level has a level manager, taking care of operations. If a bike is left for longer than two weeks, a note is attached to inform the owner that after 28 days the abandoned bicycles will get removed by the responsible level manager (see [fig. 28](#)). Additionally, the members of staff working in the facility are placed at the entrances and exits, as well as the bike repair shop on the upper floor and the OV-Fiets rental service on the ground level. The last two, in addition to the level managers offices, are the only spaces that are thermally insulated and heated.⁸³

The goal was to make using the facility comfortable, quick and safe, while also providing cyclists with enough space to park their bicycles, making the transition to the main station and the city center as easy and fast as possible.⁸⁴

Atmosphere

The facility is largely made up of durable materials like concrete, steel and chemically treated wood. Combined they create an atmosphere that still mostly feels warm and pleasant. Three of the concrete columns that support the roof over the square continue throughout the parking area in trumpet shaped elements. They start with a diameter of 1.2 meters at the top, and form into 5 meters at the floor level. Each column is cast as a single element,⁸⁵ and appear as large enigmatic figures, revealing their purpose on the square above (see [fig. 29](#)).

The staircases and the side walls that border the ramps are clad with impregnated, fire-retardant wooden slats. The stair flights consist of black colored concrete walls. The tracks and ramps are coated with red liquid plastic, the stair flights are made of black concrete partitions. The remaining walls are concrete, and color-coded to indicate routing and help with orientation. Another factor helping with orientation is daylight: the stairwells are open concept and covered by cylindrical skylights on the square above (see [fig. 23, 30, 31](#)), windows in the outer walls overlooking the bus station help with lighting and atmosphere (see [fig. 32](#)). Most other surfaces in the building are kept light, to ensure maximum natural lighting and avoid a constricting atmosphere.⁸⁶

⁸¹ File ENGELS_Feiten en cijfers Stationspleinstalling DEF[82] provided by the municipality of Utrecht

⁸² Detail (2019)

⁸³ <https://archello.com/de/project/the-worlds-biggest-bicycle-parking> (23.07.2023)

⁸⁴ <https://www.pmi.org/learning/library/pedal-power-largest-bicycle-parking-garage-netherlands-11090> (30.07.2023)

⁸⁵ Detail (2019)

⁸⁶ <https://www.pmi.org/learning/library/pedal-power-largest-bicycle-parking-garage-netherlands-11090> (30.07.2023)

3 EVALUATION

3.1 Thesis 1 - How did it start?

The introduction of the bicycle parking garage 'Stationspleininstalling' into the city of Utrecht was only possible thanks to many impacting factors, both political and sociological in nature.

Generally, there are many factors that influenced the construction of the bicycle parking garage. Its implementation can only truly be understood in connection with the surrounding changes in infrastructure: it was neither the first large bicycle parking garage in Utrecht, nor at the station area, and could be well integrated into the bicycle infrastructure that was being built and expanded in roughly the same period. Nevertheless, there were many political and socio-logical obstacles that had to be overcome before the facility could be planned and finally implemented.

Looking at the historical development, it becomes clear that the bicycle is not a novelty in the city. Nevertheless, the subsequent planning of the infrastructure in favor of cars had significantly complicated the later replanning and sustainable urban development towards a pedestrian and bicycle friendly city. Factors here included differences in elevation throughout the city between car streets and houses that were difficult to overcome, as well as the necessary construction of parking areas for bicycles and infrastructure for pedestrians and bicycles that needed to be expanded. But growing support from politicians and the public demanded change, as did the general upward trend in cycling.

In view of the completely crowded bicycle parking garages and the sheer mass of parked bicycles in general in the city center and especially around the central station, it can be assumed that there was a high demand from the population for more space to park their bicycles. There was still no prospect of alleviating the pressure on bicycle parking from users, as both the population of Utrecht and the number of daily travelers at the Central Station were steadily increasing. The increasing number of cyclists in Utrecht, presumably thanks to the infrastructure around it changing towards bicycles, most likely added more pressure. The conditions of the previous parking lots suggest that security against theft and weatherproof parking spaces took a high priority among cyclists and daily commuters as well. The new bicycle parking garage was intended to meet these requirements.

There was a lot of political and social support for both the project itself and the largely car-free replanning of the city into a bicycle city. The left-green political election and the subsequent plans "Traffic Circulation Plan 2010-2015", "Utrecht attractive and accessible 2015- 2020" and "Utrecht - we all cycle!", ultimately gave a strong momentum to the urban transformation, part of which was the reconstruction of the train station and the Hoog Catharjine, between which the world's largest bicycle parking garage was to find its place. The progress of the

project was also helped by the funds that were made available: The state itself has been strongly promoting the development of its bicycle infrastructure for years, and the city of Utrecht also invested large amounts of money in infrastructure in general. Additionally, the project of the bicycle parking 'Stationspleininstalling' was financed not only by the municipality, but also by several other parties, such as the national railroad company and the Ministry for Transport, with more than 30 million euros.

Bureaucratic and management difficulties due to the high number of simultaneous changes the city was undergoing, and the sheer size of the project itself, as well as the high number of parties involved in the project, were overcome thanks to the municipality's high level of initiative and willingness to compromise, as well as the effective and open cooperation of all parties involved.

In summary, despite local issues and planning obstacles, the need of the population and the city, as well as the supply/demand ratio gave reason for the high expenditure, initiative and effort concerning this project.

3.2 Thesis 2 – How does it improve the city?

The bicycle parking garage in Utrecht improves the city, increasing bicycle mobility through good urban planning and enhancing its infrastructure.

The bicycle parking facility at 'Stationsplein' cannot be seen separately, but only within the surrounding city. To place the biggest bike parking facility of the world next to the biggest transport hub of the country puts a great emphasis on the bicycle as a one of the most important forms of transportation, especially in connection with public transportation. It provides the inhabitants and travelers with a sustainable possibility to get to the city center as well as out of the city, without using a car. It is plausible to assume a beneficial relationship between the bicycle parking facility and the number of people using both public transport and bicycles.

Cycling becomes a viable option thanks to the efficient transition between parking and station (thanks to short distances and direct tunnels), and the low effort required to park the bicycle. Previous research implies that the constant surveillance and consequent assured safety in addition to weather protection of the parked bicycles positively impacts biking behavior. The facility therefore improves the city's operability by being convenient and efficient. The overall quality of bicycle parking around the area has significantly improved.

A definite improvement around the city can be noticed in and around the train station. The overabundance of bicycles parked there could be accommodated to a large extent in the bike parking facilities that have been built around it. The streets of the city center were thus more cleared and decluttered. Nevertheless, many bikes remain parked on the surrounding roadsides. The demand for sufficient parking is still steadily growing.

Accessibility to the city and ground level from the train station has also been greatly improved. Attractive pedestrian walkways, handicapped-accessible paths and bicycle-friendly surrounding streets create and strengthen the city's connectivity. Many urban planning mistakes from the past century were reversed with these replanning efforts.

Ultimately, the opening and effective use of the largest bicycle parking garage in the world was good publicity for the city of Utrecht: on a national and international level, reports were made about the high sustainability of the city, the practical urban planning and efficient cooperation.

All in all, the city has decidedly improved by the implementation of the bicycle parking facility, both in bicycle and public transport infrastructure and in the cities structure in general.

3.3 Thesis 3 – Why is it effective?

The design of the bicycle parking garage is sensible, practical and efficient.

Above all, the bicycle garages design is practice-oriented. As early as in the planning stage experts who already were part of the eventual user group were consulted. The final operation and use of the facility was kept in mind and prioritized during planning and implementation. Consequently the parking garage is spacious, safe and well organized, its usage quick and convenient.

One of the most prominent reasons for the implementation of the facility was the lack of parking space before. The station now, being the largest in the world, holds a great number of parking spots and uses the available space wisely. The two rack system offers space for double the amount of bicycles and is easy to operate. Non-conforming bicycles like cargo bicycles or bicycles with child seats are also given enough space in separate areas.

Convenience and speed are vital for the effectiveness of the bicycle parking facility. Stationsplein Fietsenstalling is both convenient in its location and design. It functions as a useful shortcut between two streets for people passing through, as a structure holding up the square 'Stationsplein' between Hoog Catharijne and Utrecht Centraal, and as a parking facility. Parking and passing through the facility is made easy and quick due to the straightforward layout. Users can cycle their bicycle both to floor 1 and floor -1 using ramps. A digital system shows free parking spots, creating shorter travel times within the area. The facility is designed for local context. Speedy transitions are possible both to platforms for busses and trains via direct tunnels. The mall and city center are easily reachable through stairs and pedestrian walks. Additional facilities like the rental outlet and the cycle repair shop are convenient for a parking facilities of this scale. Using the public transport chipcard is likewise practical and quick.

Safety and security play a big part in why the parking garage is so effective as well. Theft and destruction of the bicycles are prevented both by video surveillance and manned front desks. Cycling in the facility is made safe by anti-slip flooring. Separate paths for cyclists and pedestrians with an area for disembarking the bicycle in between and a strict walking rule when leaving the bicycle tracks make sure that everyone is safe.

The simple layout of a ring bicycle path around the parking area and one straight pedestrian path between the bicycle racks makes quick orientation possible. The color coding and high amount of sunlight in the stairwells render the paths to the exits intuitive. Windows towards the bus terminal and additional signage complete the orientation system in the facility.

Management helps with questions and problems as well as cleaning and decluttering the parking lot, for example by removing abandoned bicycles. It is

logical to assume that the cost-effective parking, free of charge within the first 24 hours, has had high impact on the usage of the facility.

By cleverly utilizing the possibilities the already advantageous location has to offer, the design of the facility works in a highly effective way. The parking garage offers sufficient space and a speedy and convenient usage, as well as comfort and safety.

4 CONCLUSION AND OUTLOOK

To conclude, the facility only works successfully because of the effectiveness of the surrounding infrastructure. The surrounding infrastructure only works so well because of the practicality of the facility. Even though the project size and the large quantity of involved parties and simultaneously running construction projects in the area were challenging, the political and sociological factors surrounding the project largely promoted its implementation. Utrecht was demonstrably improved by the parking facility, both thanks to its primary use as a parking space and its use in reconnecting the city's infrastructure and station.

The bicycle parking garage is definitely a real step in the right direction. Nevertheless, the problem of parking space shortage for bicycles remains a big issue in Utrecht. Population growth continues, the tourism industry is expanding, and more and more travelers are visiting the city. The climate crisis and oil shortage will likely continue to support the trend toward bicycles. Therefore, the search for more sustainable solutions for transportation is necessary, and further developments in infrastructure are needed.

In this case, the city of Utrecht is in close cooperation with the citizens of the city. An active participation in the design of infrastructure is needed and welcomed. Among other things, this includes calls for recommendations to make bike parking facilities better or even ideas for additional parking options.⁸⁷ The commitment of the Netherlands, and in particular the city of Utrecht, to invest money, time and effort in the lasting development of sustainable infrastructure is clearly visible throughout the city.

In the future, Utrecht will likely need more bicycle parking. With plans like Utrecht2040, the city clearly shows its commitment in expanding the bicycle infrastructure throughout its borders. The Dutch in general know that the work of being the world's leading cycling nation is never done and are now looking even farther afield to further reduce the number of cars on their roads with new ideas and technologies.

This work serves as a well-founded example of commitment to sustainability and people-friendly infrastructure. It makes clear how the implementation of such a large scale project can successfully work. I personally think that there is a lot to be said for both the Dutch approach to sustainability and their urban planning culture. Even though translating such ideas into countries and cities without the same bicycle infrastructure might be challenging, the serious ambition and will to implement sustainable projects are the best way to proceed. In the words of Melissa and Chris Bruntlett: "By building superior places to cycle, the Dutch have also built superior places to live. And the entire world has a great deal to learn from their story."⁸⁸

⁸⁷ <https://www.utrecht.nl/wonen-en-leven/verkeer/fiets/fiets-stallen/nieuwe-buurtstalling/> (31.07.2023)

⁸⁸ Bruntlett/Bruntlett (2018) p. 6

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6 LIST OF ABBREVIATIONS

e.g. - for example

et al. - and others

fig. -figure

s. - scale

w.a. - author not known

w.y. - year of publishing not known

7 APPENDIX

I. Interview

with one of the architects, [Stijn Rademakers](#), 11.05.2023, Microsoft Teams, conducted by [Henrike Kramer](#)

On the 29th of April I sent an email to Ector Hoogstad Architecten, in the hopes of speaking to one of the architects who were involved in the project of the mainstation and the biggest bike parking garage in the world in Utrecht. On the 2nd of May one of the architects responded, and we decided to get together on Microsoft team, where the interview would take place on the 11th of May. Stijn Rademakers has worked for Ector Hoogstad BV. architects for over 23 years, and is a project architect, as well as the office manager.

H: Hello Stijn! Thank you so much for doing this interview with me!

S: Hello! Yes no problem!

H: Do you feel comfortable with me recording this interview, so that I can transcribe it later?

S: Yes, that's fine!

H: Ok, perfect, thank you. So first question: how did you come to the project in the first place?

S: That's a relatively easy and very difficult question. It was a public assignment, right? So it's done by the client, who is the municipality of Utrecht, which means it's public money. In Europe, public money needs to be spent in transparent ways. So that means there was a tender system involved, and we won the public tender, which was hosted by the by the city. That's the easy question.

The difficult question is, why they chose us? Because, actually, the competition was quite big and also it was a an assignment on an urban scale that we had limited experience in. So why did they pick us? Well, they picked us because we had told them, that we did not have a set agenda beforehand, and that was very important to them. I mean we won with a plan, but it was more like a strategy almost, rather than a design. And we had said that we were very open to discuss every aspect with them and their stakeholders. That actually is what triggered them to give the commission to us, rather than to some of the esteemed colleagues that were also competing, and where they had the feeling that they were going to just decide: we want to do it like that. Is that a sufficient answer for you?

H: Yes, absolutely, thank you. Did you work with any city planners or urban planners? Who were you supported by, if like you say, you didn't have that much experience with this scale?

S: Well, we worked with their urban planning department, but we weren't actually the urban planner for this part. So their urban planning department was rather understaffed, so we had a supervisor on their side, that especially helped us with all the procedures that we had to go through, and he managed the lots on their side. But the design part was done by us. However, in this case, our project was part of the total development around the central station, where we were working on the east side of the city center. But there was also work done on the other side, on the on the west side, and there is still stuff going on. As well as the entire station that that needs to be renewed, I'm sure you know, so there was more money involved than simply the municipalities money. They also got a lot of state money and so we had a quality control team, and another external supervisor, which was twofold: first there was the state architect who was involved. And there is, I think you have that in Germany too, where some cities have like a "Stadtbauamt", like a supervisory architect, a city architect. We have that too, but we also have one on the state level, let's say the state architect. And there's also a specific one, which is probably translated best as the railway architect or rail infrastructure architect. So we have an "Reichsbaumeister", a state architect who deals with all kinds of issues where state is involved so that can be state real estate like things that have to do with the defense, and we have a "Sporbaumeister", a specific one who has to do with all the railway infrastructure and all the railway stations.

There's someone heading them that's really the architect, but they have a whole team. So we had a supervisory board, basically consisting, among others, of these two let's say higher level architects or urbanists, right, that we're looking over our shoulders. The reason for that was of course because the state is investing a lot of money in it, right, so basically they said 'we're paying for it, so we want to have a say'.

H: Yes, that makes sense. How did the population feel about the project beforehand? Did they know about the project and did the municipality make it public?

S: The city population?

H: Yes.

S: Yeah. Yes, the whole city, the whole area development, there has been an endless debate on that. Already 20 years before they were doing this, they had several referenda on the city scale on how to do it. So yes, it's been very much in the public eye. However, when we came aboard, the framework of the whole thing had been established already. So I would

think that most of the people in Utrecht were rather happy with the fact that something was happening.

If you look at our project level, we had direct neighbors, right, people just living right next door. They felt slightly different, because, we were adding quite a lot of real estate there, which basically took away their view. I mean, they had a nice advantage of having a view over the whole railway complex, where they had kilometers of free space in front of them sometimes. And, well, one of the reasons why the whole project started is: you are at the biggest and best public transport hub in the Netherlands. You need to make sure that the opportunities that are there, to put offices there, to put housing there, are used. You're not going to keep this space empty: if people live there, they don't need a car. If people have an office there, they will come by train. With this hub of connectivity, you need to make sure that it also becomes a destination, so we do the utmost to create the biggest density possible, to use that opportunity well. And that's good for the people that are coming there, but the people that were already there already had a nice space, they didn't really like it. So we had a number of meetings with them, and this this was kind of twofold, because they were opposing quite a lot of our proposals, but in the end I think mostly they also understood. And they had a rather weak position, because since we were doing this, their property was getting worth a lot more. So we were actually helping them financially, but still they didn't really like it.

H: Right. Thank you for like answering so fully, it really helps me! What do you think are the points that helped the project get started the best or the most?

S: I have to say, the way the city had organized it. It was a very complicated situation, where the city wanted to do quite a lot, but the city only owned part of the property. There's the National Railway company, which was willing to cooperate, but under their own conditions. Then there is, as you know, this huge shopping mall that is owned by the biggest real estate company in in Utrecht in that area. They own that thing and more or less 50% of the inner city, basically most of the shops in the city. So they were very important party. And, as I said, to align all these interests was going to be the most difficult thing about it. A lot of the work had been done beforehand, because like I said, the framework of our project was largely set. But I do think what really helped the thing get along, has been the way the municipality decided to go for this design process in the most transparent way. To not say 'OK we're going to make a design and we're going to show it to you'. Instead, basically every step of the way, everyone was involved. And that's how they did it. Also, every time someone said 'yeah, but I'm not sure about this, can we try something else?', the municipality always said 'sure, we're gonna try it! OK, try it, and then we'll see!'. That of course gave us a lot of work, but on the other hand it helped to see 'the pros are this, the cons are this'. It was very transparent, how the whole thing came along, and that helped a lot. I mean it's not a very

architectural thing, but let's say this has to do with how you organize a city. But I thought that was a very interesting way of dealing with it, because often it doesn't work that way, that you put everyone on the table and you're 100% open about everything.

H: That's true. Were there other large projects involved or like the you said that they plan more of the infrastructure, especially around biking, around that time too right? What can you tell me about that?

S: Yes. I must say, it's already been a while, so I don't have all the numbers present. But if you think of just bike parking, we made the biggest bike parking in the world with 12 to 12 1/2 thousand bikes. However, that's just a part of the whole bike storage capacity that is around there. I cannot say exactly, I think in the direct surroundings there's like a 200 or 300, I don't know exactly what the radiuses are that that we calculated with, but I think there was some region where we would need to have 30,000 bikes, of which we would do a third. And in a larger circle around it, we would even have 45,000 bikes that were supposed to be stored there, so they had huge ambitions in creating good bike mobility and a good bike infrastructure.

H: Were there any criticisms of that project in advance? Did you have any criticism or doubts about the project before you started? Did anyone else?

S: At this time no, not that much I think. No, there has always been a huge enthusiasm for it. I mean, there have been some difficult and very complicated concerns. Like the place where we build it used to be street, so there was always a question of whether or not any traffic would be able to go through. Just think of police cars or emergency vehicles. Do they need to have to be able to drive through the bike park from one side to the other? As soon as you start to cut the road, these questions pop up. But we deeply investigated those and decisions had been made. I don't think that there was any criticism beforehand. When we just opened, I think the biggest point of criticism, in terms of the bike parking structure and its functionality, was when we had the temporary opening. Because the whole building process took so long, at some point it was decided that we were going to open half the parking first, and then, about two years later, we would open the second-half. So we had half the structure intact, which also had a big impact on its comfort. Partly we would have ramps, partly would have stairs. People had a lot more difficulty finding their way. So there was a period of about two years, when we were only half open and we were still building the other half. There was quite a lot of critique there, like 'it's very difficult to orientate yourself, it doesn't always feel safe, it's not always comfortable'. But that had a lot to do with these temporary structures that we needed to do in order to have it function without having the complete system in place. Afterwards I think that kind of disappeared, that kind of vanished. There have still been some safety issues that have to do with for instance the type of flooring. In the end








some people slipped when it was wet, even though it was like anti slip floor, it was not rough enough. So yes, there have been some concerns that we had to adjust to, also some signing that needed to be adjusted. In the end when it's used, then you basically get the test whether everything works perfectly. But beforehand, no, not too much. Not in terms of that. What was difficult, looking at the bike infrastructure, one of the things that was quite critical at some point was that the huge shopping mall had been connected by a wide footbridge with the central station for the last 30-40 years. Meaning really everyone that wanted to go to the city center had to go through that shopping mall. And of course the owners of the shops and the owner of the shopping mall said they were very happy with that. So when the city wanted to open that up, there had been quite a debate. That's actually the main reason why that huge roof is on top of that square. Because the shopping mall said 'OK, we're willing to cut through our, let's say, our lifeline: that footbridge. But we want to get the same quality back for our clients, so that's why we need a roof. We need them to be able to enter our shopping mall, without getting wet.'

H: That makes sense. Do you think the construction of the garage has improved the city in retrospect? I mean, probably yes, but what are the points that it improved, how did it improve it?








S: You could say it's repaired some mistakes that had been made at the outset in the in the 60s. I would really see our project as part of a bigger story, of that development. There's been a number of things that have been repaired. I think it really was a mistake to make this separation in the middle of this city. That is a concept of architecture, to separate these flows of mobility. So cars and trains on the ground floor and all the people on a different level, and they don't mix. That kind of created a ground level in the center of your city, which was quite uninhabitable. And another part of it was that there had been all kinds of problems with safety, with security. But that's also the part where most of the bikes were. So it became a mess and a very unorganized place. I think what this project did, is to reclaim the ground floor for pedestrians and for city use. And I think that is a big benefit. At the same time, it enhanced the quality of being able to park your bike, of slow traffic, of bike traffic, along with that. And in that sense, it really stimulates the use of train and bike in the city overall. And lastly, and I think that's what makes it super nice, because we were able to do that, the whole area became much more attractive. So it's very attractive and easy to find developers that want to build there. It's also pays for itself. I think it's a really good thing to, as I said before, have this huge mobility hub and try to use the potential also in its in its developments. People should live there, in that area, people should work there. I mean better to do that there, than to build all these houses outside of the city.

- H: Absolutely. OK, last question. Can you talk a little bit more about how exactly you reused the building, because it was a shopping mall before. What were the difficulties?
- S: Well, the shopping mall still there. What we did is: the thing is very 3D, so partly we built underneath the shopping mall. The shopping mall actually extends slightly on top of our parking garage. We are partly building over a tram station. Everything is kind of interconnected. But the logic of it is basically: you had the shopping mall, you had the railway station, and there was a street in between. And our parking is mostly where that street used to be. And that street basically now goes up, in a cascading landscape, with these stairs, onto an elevated square. We did incorporate some old structures which were on the side of that street, but most of our structure is new.
- H: Alright, I think that's pretty much it. Any anything else you want to add?
- S: No, I think I'm good.
- H: Perfect. OK. thank you so much, this is going to help me a lot
- S: Ok. So I wish you good luck, and if there's anything I can do for you, let me know and we'll try to get in touch.
- H: Thank you so much!
- S: Thanks! Bye bye!
- H: Bye!








II. Protocols

Nr.		Time	Activity	Notes
7		00:06:21	General	Specific
1		00:00:02	Check-In on bike	Taking the left entry on bike, Check-In with OV-Cad
2		00:01:06	Biking to a parking spot	Looking for a parking spot while on bike (spot number displays)
3		00:00:52	Parking the bike	Parking the bike on the upper rack, with little strenght
4		00:01:20	Walking to the staircase	Walking from the bike towards the next staircase
5		00:01:34	Walking up the stairs	Walking up one flight of stairs
6		00:00:04	Exiting on the square	Exiting the bike garage on the square between mall and station
7		00:01:03	Walking to the staion	Walking between the bike garage exit and the train station

Protocol 1 - Checking into the station

Nr.		Time	Activity	Notes
7		00:07:54	General	Specific
1		00:01:38	Walking from the staion	Walking between the train station exit and the bike garage entrance
2		00:00:01	Entering the bike garage	Taking the nearest bike garage entrance on the square
3		00:01:21	Walking down the stairs	Walking down 1 flight of stairs into the bike garage
4		00:01:26	Walking to the bike	Walking towards the spot where I parked my bike
5		00:01:03	Taking the bike out	Taking my bike out of the upper rack, with a few difficulties
6		00:02:21	Biking	Biking from the parking spot towards the exit
7		00:00:04	Check-Out on bike	Taking the right exit on bike, Check-Out with OV-Cad

Protocol 2 - Checking out of the station

Nr.		Time	Activity	Notes
5+2		00:09:51	General	Specific
1		00:00:02	Entering	Entering the bike garage on the right side of the station
2		00:02:06	Walking	Walking towards the bike rental area
3		00:01:12	Renting a bike	Talking to the bike rental worker, renting a bicycle
4		00:02:20	Driving out	Biking through the bike garage to the other exit (further away)
5		00:01:34	Exiting	Exiting the bike garage on bike
1		00:00:34	Entering on bike	Entering the bike garage on bike, driving to the rental area
2		00:02:03	Giving the bike back	Giving back the bike

Protocol 3 – Renting an OV-Fiets bicycle

III. Statutory Declaration

I herewith formally declare that I have written the submitted dissertation independently. I did not use any outside support except for the quoted literature and other sources mentioned in the paper.

I clearly marked and separately listed all of the literature and all of the other sources which I employed when producing this academic work, either literally or in content.

I am aware that the violation of this regulation will lead to failure of the thesis.

Henrike Kramer

121795

Student's name

Matriculation number



Student's signature , Weimar, 01.08.2023

Eidesstattliche Erklärung

Hiermit erkläre ich eidesstattlich, dass ich die vorgelegte Bachelorarbeit selbstständig verfasst habe. Ich habe mit Ausnahme der zitierten Literatur und sonstiger in der Arbeit genannter Quellen keine fremden Hilfsmittel benutzt.

Die von mir bei der Anfertigung dieser wissenschaftlichen Arbeit wörtlich oder inhaltlich benutzte Literatur und alle sonstigen Quellen habe ich deutlich gekennzeichnet und gesondert aufgeführt.


Mir ist bekannt, dass ein Verstoß gegen diese Regelung zum Nichtbestehen der Arbeit führt.

Henrike Kramer

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Name der/des Studierenden

Matrikelnummer



Unterschrift der/des Studierenden, Weimar, 01.08.2023