Improving the Connection:
Transforming the Metropolitan station area of Holland Spoor

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Master Thesis:
Improving the Connection: Transforming the Metropolitan station area of Holland Spoor

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Cover image by author (3-D image of new Holland Spoor area).
Preface

The Hague is part of the Randstad and is the political capital of The Netherlands, housing our national government. It comes as no surprise that lots of people come and go to The Hague on a daily basis. The car as a method of transport is part of political debate for a long time now, however potential solutions can be found in already existing alternative methods of transportation.

The main motive of this graduation project has been traffic congestion from start to finish. This project started out as a project to create a large network for cyclists (as for and after transport) within Haaglanden, named ‘The Bicycle works Better’. However because of the large scale of that network for a graduation project and the plans of the Stedenbaan this project was shaped into the subject of improving the train station Holland Spoor, with still an emphasis on slow traffic (cyclists and pedestrians) to help improve the mobility issue of The Netherlands.

This thesis report has been realized in support of the graduation project for the master Urbanism at the Technical University of Delft and will focus on the reconstruction of the station area Holland Spoor to become a good functioning, good quality and competitive metropolitan station of The Netherlands.

I would like to give thanks to Dr. Luisa Calabrese and Ir. Fransisco Colombo for guiding me through the graduation project.
Part 1: Project description
Part 1 will discuss, in detail, all the components necessary to describe the graduation project, including personal motivation, the problem description and expected end products.

It is the thesis plan and basic layer for the graduation project which includes guidelines, where the required methodology is described and the timeline to realize all the elements.
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1.1 Motivation

Mobility is of high importance to society. People are in motion every day connecting to work, school, social interactions and recreation. Mobility contributes on a high level to the social-cultural development of any society. However we desire to get from our front door to the point of destination as fast and safely as possible, without delay and in a clean and sustainable manner.

1.1.1 Traffic congestion

Over the past decades The Netherlands has seen a high increase of mobility and use of cars, with the result of traffic congestion clogging up our infrastructure network on a daily basis. Despite the fact, that people get aggravated to spend more time then necessary in the car or arrive late at the office, we continue to use the car every day. These daily movements have resulted in economic damage (loss for corporations are estimated to almost 500 million euros per year) (Miljoenennotadebat, 2008), obvious pollution to the environment, lack of physical exercise and difficulties to fully operate local public transportation (Bach, 2006). Also parking possibilities become slim, specifically in city centers and work related functions. Traffic congestions prove to be a problematic issue in The Netherlands and will continue to play a large role in our overcrowded country. Figure 1.1 shows the amount of corporations that are reachable within reasonable traveling time in the Randstad in 2008 (left side) and future prospects in 2020 (right side) during morning rush hours. The map is based on a national traffic prognoses model in OmniTRANS (a software company specialized in traffic and transport) (Bereikbaarheidskaart, 2010). But what are the causes of these traffic jams?

1.1.2 Causes of traffic congestion

Demographic development is regarded as a factor on this issue, with a growing population and number of households (fig.1.2), increasing even more in the future, specifically in the Randstad region (fig.1.3). The booming developments of the car as transportation method in the 1960’s, lead into improved road infrastructure. With these improved, growing networks, possibilities grew stronger for people to expand their destinations, having people move further away from work, creating more long distance commuting. However people also have the tendency to travel short distances by car, creating the difficulty for the infrastructure to foresee these extensive amount of travelers (Bach, 2006).

From an economic perspective, job offers and economic growth created more freedom for consuming for a large number of households to own one or more cars. The amount of cars has increased a staggering 44% between 1990 and 2007 (with a growing population of 10% in the same time period (Ruimtemonitor, 2007).
1.1.3 Solutions for traffic congestion

Although traffic congestion has become a part of the everyday Dutch life and has been part of Dutch policy from the 1980s and still is, the issue has been addressed extensively. Previous solutions have been limited, by expansion of road networks or increasing car taxes to limit car use (Nieuwsblad Transport, 2009). These short term solutions that have been opted could have some effect, but the fact remains that mobility issues are of high concern and will also be in the future with prospects of traffic congestion increasing, specifically in the Randstad region.

There seems to be no definitive singular solution to solve the issue of traffic congestion, but there are methods to stimulate the use of alternative transportation methods that will have a positive influence on traffic. In the past years the government has increased investments in other methods of transport, such as public transportation and cycling. The development of the Stedenbaan (fig.1.4) aims to improve the quality of the train infrastructure, for and after transport and the use of space 1.200m surrounding the train stations (Stedenbaan, 2010). The development of public cycling proved a successful method for people to use bicycles as transfer transportation at train stations at relatively cheap costs.

Although investments in singular other means of transportation like the use of public bicycles would stimulate more use of bicycles and a minor decrease in car use, it will however not decrease traffic congestions on its own. The short distances would be traveled more by bicycles, but the extra space created on the roads would stimulate other car owners to use the car more creating a balancing effect on the long run (AVV, 2005).

Investing in multiple transportation methods however could create the sustainable solution The Netherlands is looking for to help solve the mobility issue.

1.1.4 Conclusion

Based on the issues on traffic congestion and the future prospects as showed in the reach ability map it is clear that a sustainable perspective is necessary to improve the mobility of commuters, not only concerning their trips from point A to B, but also in relation to safety and speed of the connection.

As described previously a singular short term solution is not available to solve traffic congestions. There are however great possibilities in combining several opportunities that could have great influences on decreasing congestions. The Ministry of Traffic and Water aims to provide more varieties in transportation methods for people without the pretension of solving all mobility related issues, but to provide the traveler with choices that not only has prospects to decrease traffic congestion, but also in a way that will have a positive influence on the environment, economy and the freedom in movement (Ministerie van Verkeer en Waterstaat, 2010). In the Nota Mobiliteit of The Netherlands plans describe to invest in all methods of transportation to create a variety of methods for door to door mobility that provides people with choices in mobility and could have a positive effect on traffic congestion (The Hague Municipality, 2009c).
1.2 Scope of the project

An obvious distinction can be made as to where the main issue of traffic congestion is situated. The Randstad contains a number of cities, where extensive commuting takes place (fig.1.5). The Hague is one of the Randstad cities of The Netherlands, with international recognition as city of peace and justice where these traffic congestions take place every day making a connection to the city difficult in terms of motorized transportation. The main entrance to The Hague by car is the Utrechts Baan, a highway formatted from a heavy transfer node where the main highways from Amsterdam, Rotterdam and Utrecht come together, the Prins Clausplein (Fig.1.6).

The graduation project will focus on the Haaglanden region (fig.1.6), with the city of The Hague functioning as centre of the network connecting from and to the surrounding communities, part of Haaglanden. These communities include Delft, Leiden, Zoetermeer, Westland, Leidschendam-Voorburg, Rijswijk, Pijnacker-Nootdorp, Wassenaar en Midden Delfland.

Why Haaglanden?
It is important to create good connections to The Hague on various scale levels, on an international level, considering the location of internationally well known instances like the International Court of Justice, Interpol and embassies, and on a regional level, because most commuting within Haaglanden takes place from and to The Hague. The Haaglanden region has an acceptable travel distance layout between the included communities for all travel purposes, such as commuting. To provide for short distance travel an alternative transport method other then cars, which are not only healthy, but also relatively cheap, could decrease traffic if the necessary conditions are created.

Potential
There is a lot of potential for better connections to The Hague on various scales. On an international level Schiphol and Rotterdam Airport include straight connections to The Hague and on a regional level Haaglanden includes an expanded network of public transport connections including Veolia and HTM most of these connections connected to the five train stations of The Hague strategically placed at the border of the city (fig.1.7) which all differ in terms of size and use. The Hague includes two metropolitan train stations, Central Station and Holland Spoor. It are these train stations where most public transport methods come together on an international, regional and local scale, giving the stations a strategic layout and main entrance towards the city of The Hague.

Next to the strategic layout of train stations in The Hague, there are currently plans and developments taking place that could have an advantage for the use of alternative transportation methods other then cars. On a national level the future development of the Stedenbaan (fig.1.4) will give all train
stations a more prominent role, including the stations of The Hague, including the small scale train stations, by creating a better train product, which is faster and more frequent.

Other developments include the successful use of the Public Bicycle (OV-Fiets) which will increase with plans to expand the amount of cycles per station (OV-Fiets, 2011). The bicycle makes for a good alternative transportation method for short distances, not only for the little space it requires, but also for environmental and health purposes it serves. People find half an hour cycling acceptable for commuting, covering about 7,5 kilometers making it possible to connect to various surrounding communities. Recent studies showed that people are even willing to travel up to 15km if the bicycle infrastructure is fast and comfortable (Ministerie van Verkeer en Waterstaat, 2010c) making it highly effective for commuter travels.

Within the city centre of The Hague there are developments taking shape to accommodate slow traffic, to create a clean and safe environment. The car will be banned on selected areas, with the ring of the city centre shaping to accommodate incoming and outgoing traffic, without the car necessarily entering the city centre (fig.1.8) (Gemeente Den Haag, 2010). The city center will therefore completely focus on the use of slow traffic and public transportation.

The Hague, with the surrounding communities, can therefore be regarded as an interesting case to become the subject of a wide scale mobility change where public transportation and cycling will play a more prominent role.
1.3 Problem statement

On an international level, The Hague has ambitions to become a Worldcity at Sea, by further development of the international position, with a sustainable quality, by way of safe, clean and attractive living surroundings and a strong social structure. This includes the main goals of Haaglanden:
- A strong international position;
- A good functioning regional network;
- Good quality living surroundings

(Gemeente Den Haag, 2005).

1.3.1 Zones

The Structure Vision 2020 that will help realize these ambitions, divides several characteristic zones within The Hague that are topic of redevelopment: the coastal zone, the international zone, the city center zone, the business zone and the A4/Vlietzone (fig.1.9). The layout of these zones have an East-West orientation as is visualized in figure 1.9, however the most characteristic and commonly known city program on all scale levels of The Hague is clearly located within an actual North-South oriented zone which includes the International elements of the city (Scheveningen, World Forum, city center, Binckhorst) and regional qualities (most work related program located within the city center) (fig.1.9). The city center ring, located within this North-South oriented zone, is an important connection by car from outside the city towards the city center, but also houses the two main train stations of The Hague, the Metropolitan stations Central Station and Holland Spoor.

Fig.1.9 Zones with city centre ring (Koeling, 2010)
1.3.2 Metropolitan station areas

The metropolitan stations are high dense areas with a very high use intensity in which reach ability plays an essential role and which requires a high quality urban space in terms of architectural and urban qualities and program diversity. On these requirements the two metropolitan stations differ extensively.

Within the city center ring several living environments can be distinguished, in which Central Station has the upperhand with high quality living surroundings, characterized by historical city center living (fig.1.11), but with Holland Spoor divided into metropolitan qualities in Laakhaven (fig.1.12) and lacking quality appeal in Stationsbuurt (the area first visible ones entering the city) characterized as a problem area (fig.1.13).
1.3.3 Central Station

Central Station (fig.1.14) is located within the green urban city center. As discussed previously, Central Station provides high quality living surroundings and good quality public space by way of green surroundings and diverse programmatic value and a quality city skyline (fig.1.15 to 1.18). Central Station is currently part of a large redevelopment plan, named The Hague New Central, where not only the station itself is being redeveloped to accommodate the growing use of the large station area, but also the surrounding public space where the connection between station and city center is strengthened by way of program and quality public space (fig.1.21).
The existing connection (fig. 1.19 and 1.20) is a quality street (Lange Poten) including tree lines, shops and quality housing. An attractive connection towards the city center passing the popular horeca filled Plein, straight towards shopping street Spuistraat. Although also an existing connection, the improved connection (fig. 1.19 and 1.21) starting at an improved entrance/exit at the side of Central Station, will be expanded in high rise (office/residential) and shopping and horeca facilities, ending up at city hall and Spuiplein.

The routes are clear and rich in quality and program.
1.3.4 Problem statement: Holland Spoor

Holland Spoor, also located within the city center ring (fig.1.22), however is located on the border (visually shaped by a hill on which the railway runs) of two separated areas that differ in program and quality. On the Southside the Laakhaven area is located with a metropolitan living/working quality (fig.1.23-1.26). These qualities are recognizable in its architectural elements and urban layout, including large corporations such as T-Mobile headquarters and The Hague University (fig.1.26). The Laakhaven area is an excellent addition to the qualities required for a Metropolitan station area. However the main orientation from Holland Spoor is not emphasized towards the South, where a small scale entrance of the station from Laakhaven does not fit within the qualities of the Metropolitan area. The main entrance/exit of the station has a Northern orientation towards the Stationsbuurt.
Problem area: Stationsbuurt

The North side and the main entrance of the station, is characterized by a poor quality problem area (Stationsbuurt, fig.1.27), and shaped as a boundary between Holland Spoor and the city center of The Hague (fig.1.22). It is this side that travelers enter the city and can be regarded as lacking in quality appeal.

Councilor Martijn Bordewijk of political party D66 explains: “When you come to The Hague by train and leave Holland Spoor, you do not get the feeling that you have entered a ‘Worldcity at Sea’. The building opposite the station has been abandoned for some time now and doesn’t feel welcoming to the city (fig.1.28). The windows are boarded up and the building looks as if it lacks maintenance. This is one of the first buildings that for example international travelers witness.” Councilor Kim Waanders of D66 adds, “next to that, the ground floor contains posters on the doors. These posters are piled up so much it is easily visible how long the building hasn’t been worked on.” (D66 Den Haag, 2010).

Next to that the area provides unappealing shopping facilities, with some of them empty and diners, including several foreign take out diners (fig.28).

A railway station, and with that the area outside the station, is the first impression people get ones entering the city and should therefore not only identify to the city itself, but also posses attractive public space.
**Problem area: barrier/connections**

As discussed previously the main barrier shaped between the two different areas Laakhaven and Stationsbuurt is visualized by a crest on which the railway for the incoming and outgoing trains rests (fig.1.29). The crest is open on selected areas, by way of an opening for ongoing traffic between North and South on the East side (Rijswijkseweg, fig.1.31), the station hall itself (which comes to a complete stop making it only possible to enter the station from the Stationsbuurt, fig.1.33) and a inconspicuous bicycle passage (fig.1.32) connecting North and South. The next available connection between North and South is available all the way at the Calandstraat in the West (fig.1.29 and 1.30). This railway barrier has very little effect on the relation between Laakhaven and Stationsbuurt and should be taken in to account for realizing a unified metropolitan station area.
**Problem area: mobility**

Another issue that should be addressed is mobility at Holland Spoor. As explained before a metropolitan station areas rests on the use intensity and with that the reach ability from and to the station by all methods of transportation. The Stationsplein in front of the main entrance is a dangerous square where trams, cars, bicycles and pedestrians cross over and hinder one and other without the use of traffic lights (fig.1.34/1.35). Coming out of Holland Spoor immediately shows the intense traffic located outside with trams passing by directly in front of the station (fig.1.35) making it uneasy to cross over moving towards the city center and the added car route (Stationsplein) includes aggressive drivers creating an unsafe situation for slow traffic. The bicycle does not play an important role in the area since there are unclear marked and with that incomplete bicycle routes available. This is a problem that has a large effect on the safety of slow traffic and the quality of the urban space provided.

Also the Rijswijkseplein includes an intense traffic crossing, characterized as one of the busiest crossings of The Netherlands, where an inconsistent overview lacks, making it uneasy to manoeuvre because of all mobility methods combined on one square.

Fig.1.34 Crossings traffic heavy (Koeling, 2011).

Fig.1.35 Trams passing Holland Spoor entrance (Googlemapss, 2010) and heavy traffic crossing Stationsplein without traffic lights hindering slow traffic (right) (Koeling, 2011).
1.3.5 Developments

The Laakhaven side with its metropolitan qualities is still subject of change (fig.1.38), including master plans for Laakhaven West (fig.1.39) and Binckhorst (fig.1.40), two business areas where living and working will be mixed.

Stationsbuurt is subject for redevelopment, but is currently limited by several small scale changes around the station and lacks any sufficient master plan to have Holland Spoor become the metropolitan area it requires and deserves to be. Unlike Central Station, Holland Spoor has a good quality characteristic cultural historical main building (fig.1.27) which makes for an attractive and quality feature to the area and a potential competing station to Central Station, which identifies with the Dutch cultural historic heritage.

The area of Holland Spoor is therefore the subject for this graduation project to be redeveloped, with the emphasis on the connection between Laakhaven and Spoorwijk, but also the connection towards the city center of The Hague.
1.4 Project aims

As described in the previous chapter, The Hague has ambitions to become a Worldcity at Sea, by strengthening the international position, creating a good functioning regional network and creating good quality living surroundings.
This graduation project will help realize these ambitions of The Hague by putting the main focus on The Hague Holland Spoor in not only making the necessary adjustments required in improving transfers for commuters, but also restructuring the station area into a metropolitan quality station area based on the elements discussed in the problem statement (public and built space, connections between Laakhaven and Stationsbuurt and mobility safety specifically for slow traffic).

This will include an improvement of the public space surrounding the station to make it more appealing and user-friendly for visitors and commuters and improvements for the possibility of a wider range of three different scenarios in commuting (fig.1.41):

1. Public transportation > Bicycle
2. Bicycle > Public transportation
3. Bicycle > Bicycle

These scenario’s will create free choice for the travelers in what way they want to continue their journey, to make it easy to either transfer to public transportation or bicycle or to continue their journey by cycling depending on the distance of destination.

Fig.1.41 Three different scenarios for the transfer hubs in The Hague. (Koeling, 2010)
1.5 Research questions

The following main research question will address the previously described mobility issue:

*How can the Holland Spoor station area be restructured into a metropolitan quality station area that identifies with the city itself and unites both sides of the station in terms of quality and program with an emphasis on the use of public transportation and slow traffic?*

The following sub research questions will underpin the previous main research question to come to the necessary final products:

- How is the spatial structure shaped of the Haaglanden region and how will this change in the future?
- How are the current travel behaviors and commuting patterns functioning in the Haaglanden region related to all mobility possibilities (car, public transportation and bicycle)?
- What changes are underway with the restructuring of the city centre of The Hague to promote slow traffic?
- What are current theories and good practices on mobility based on cycling?
- How are the current metropolitan train stations functioning for commuters within The Hague and how is the public space formed around these stations?
- How can Holland Spoor be improved as transfer hub for commuters transfers between public transportation and cyclists?
- How will an improved mobility network help shape the public space of Holland Spoor?

How these questions will be examined, will be discussed in the chapter ‘Methodology’.
1.6 Methodology

To examine the research questions, certain methods will be necessary to help provide the answers. The key methods for this graduation project are divided into research and design.

The research consists of:
- Location based research;
- Mobility based research;
- Transfer hubs research.

The design consists of:
- Concept design;
- Strategic design.

The image on the right side of the page (fig.1.42) shows the main goals, including the related methods, which will be conducted for the graduation project.

A detailed description of these methods will be explained in the following sub chapters.

Fig.1.42 Project scheme with methods. (Koeling, 2010)
1.6.1 Research: Location
The first part of the research will explore the current spatial structure of the Haaglanden region and future developments based on the 2020 structure vision of Haaglanden. The following sub research questions will be answered based on the obtained information:
- How is the spatial structure shaped of the Haaglanden region and how will this change in the future?
- What changes are underway with the restructuring of the city centre of The Hague to promote slow traffic?

To fully explore this topic the following methods will come in play to come to the necessary conclusions:

**Literature review**
This research will start of with exploring extensive literature resources, including books, articles and internet to develop a theoretical background on spatial arrangement for the proposed design for Holland Spoor and to learn more on the current and future spatial qualities.

**Mapping**
The previously explored literature review will be completely mapped to help visualize the obtained information and underpin the theoretical background by way of maps.

1.6.2 Research: Mobility
The second part of the research is focused on the current and future mobility in the region Haaglanden. A methodology study will also be conducted on cycling which will result in a paper. The following sub research question will be answered based on the mobility based theoretical framework:
- How are the current travel behaviors and commuting patterns functioning in the Haaglanden region?
- What are current theories and good practices on mobility based on cycling?

The following methods will be used to help answer the previous research questions:

**Literature review**
This research will start of with exploring extensive literature resources, including books, articles and internet to develop a theoretical background on mobility for the proposed design for Holland Spoor.

**Mapping**
The previously explored literature review and fieldwork will be completely mapped to help visualize the obtained information and underpin the theoretical background by way of maps.

**Paper**
In addition to this part of the graduation project a theory paper will be written on the subject of current policy in bicycle use (see chapter).

1.6.3 Research: Transfer stations
The existing transfer hubs will be explored analyzing the program and quality and the future developments that will take place in and surrounding these hubs. The following sub research questions will be answered based on the obtained information:
- How are the current local and metropolitan train stations functioning for commuters within The Hague and how is the public space formed around these stations?

The following methods will be used to help answer the previous research question:

**Literature review**
The smaller stations will explored in terms of program with the metropolitan stations examined in terms of program and spatial arrangement by way of a theoretic background analysis with the use of internet, books and articles.

**Fieldwork**
To personally experience these stations fieldwork will be put in play to fully understand the functioning of these stations.

**Mapping**
The previously explored literature review and fieldwork will be completely mapped to help visualize the obtained information and underpin the theoretical background by way of maps.
Evaluation
Based on the mapped out metropolitan stations an evaluation will take place to come to design criteria for Holland Spoor. The goal is to have Central Station and Holland Spoor compared to one and other in terms of mobility, program and public space.

1.6.4 Design: conceptual
The first part of the design will include a concept/vision of Holland Spoor based on the theoretical background of both the location and mobility.
The vision will include a concept for Holland Spoor including the required design criteria. With the concept of the design the following sub research questions will be answered:
- How can Holland Spoor be improved as transfer hub for commuters transfers between public transportation and cyclists?

Design (concept)
The main purpose of this part of the design is to form a basis for the final design (chapter 1.6.5).

Evaluation
The concept will be completely evaluated by feedback of the theoretical background obtained in the research part (chapters 1.6.1 to 1.6.3).

1.6.5 Design: Strategic Holland Spoor
The final part consists of working out the finalized concept (chapter 1.6.4) and designing the strategic design elements within Holland Spoor.
The strategic design will include a design part and an evaluation part.
With the strategic design the following sub research question will be answered:
- How will an improved mobility network help shape the public space of Holland Spoor?

Design (final)
The finalized design including mapped out plans, sections and facade of Holland Spoor and 3-D images of the surrounding area, forming a strategic design, involving the developments in public space and mobility.

Evaluation
The design will be completely evaluated by feedback of the theoretical background obtained in the research part (chapters 1.6.1 to 1.6.3) and based on the vision for the area with the design criteria (chapter 1.6.4).
1.7 Relevance

1.7.1 Social relevance
The issue of traffic congestion has been addressed extensively on a political level. For some time now mobility has been debated, to come to beneficial conclusions that will help on our social-cultural based society. Mobility is of high importance to any society. It unites people to engage in social interactions.

The issue of traffic congestion obstructs the ability to connect people in a profound way, not to mention environmental and other social problems that arise, such as noise aggravation (approximately 27% of Dutch inhabitants experience serious interference by traffic noise, resulting in sleeping disorders and health issues (VROM, 2010)), atmospheric pollution (with the main global warming gas being CO2 created by traffic) and safety (although mortality has been decreasing over the past few years, cars are still causing the most fatal accidents (CBS, 2009)).

And although the bicycle is still a popular method of transportation, The Netherlands still has ambitions to increase cycle use in the upcoming decades, with the government assigning an extra 10 million euros for the bicycle, not only by improving the existing regional and local bicycle infrastructure, but also by investing in new solutions for cycling (chapter 1.7.2 Scientific Relevance).

Developing new solutions to promote alternative transportation methods, such as the bicycle, creates a new dimension on a social level, such as an increasing social interaction between commuters. The promotion of slow traffic within cities also stimulates a social atmosphere within the public space. A clear, clean and safe city engages people to visit and interact with each other.

1.7.2 Scientific relevance

Because of the growing concern for increasing auto mobility in the Netherlands, the Bicycle Union (formerly ENWB in 1975 and ENFB in 1978) was founded, with a main goal to reintroduce the bicycle into the everyday city life. What started off with protests, to bring the issues of pollution to the attention of authorities, developed into a professional corporation that focuses on bicycle mobility (Fietsersbond, n.d.). Since 2000 the Bicycle Union receives funding from the Ministry of Traffic and Water to conduct extensive research on bicycle environment in communities to evaluate slow traffic infrastructure within cities and surrounding transfer stations: the bicycle balance (Fietsbalans, 2007).

The first bicycle balance was established from 2000-2004, with over 125 communities participating, and with results. Based on an evaluation conducted in 2004, 90% of the communities used the outcome of the research to their advantage, to restructure their cities to improve bicycle mobility. What followed was the development of the second bicycle balance, which started in 2006 and the results organized into an award for bicycle city of the Netherlands (Fietsersbond, 2007).

This shows, that the bicycle is of high value to the people currently and maintains desired within the infrastructure of cities.
To establish a well-constructed bicycle mobility city, is not easily realized. Exploring new methods for the bicycle has been conducted for some time. Fietsberaad (Bicycle Policy, established in 2001 as initiative of the Ministry of Traffic and Water) is an organization focusing on this issue. The goal of this organization is to develop and exchange practical ideas on knowledge of bicycle policy (Fietsberaad, 2009). These ideas have a practical purpose to promote the bicycle. Based on research and experimentation, new practical solutions are conducted, such as the electrical bicycle (fig.1.43) and the bicycle highway (fig.1.44), to establish a restructuring in mobility and use the bicycle in a new way. The development of the Public Transport Bicycle has proved to be an excellent contribution to mobility in The Netherlands with the Fietsersbond conducting several evaluations on use, concluding that the bicycle provides good quality and that the system should be further expanded at train stations for public use (Fietsersbond, 2009).

1.8 Description of final products

The expected end results of the research and all components (see chapter methodology) will be included in the final thesis, as will the final design. The final product will take shape in a final thesis report including extensive research and a master plan of Holland Spoor area.

This graduation project will consist of the following final products:

**Research including:**

- Location based research of Haaglanden on the formation of the existing spatial qualities in terms of living, working and green qualities and the future developments;
- Location based research on the existing program of the existing train stations of The Hague and the surrounding spatial qualities in terms of living, working, green and infrastructure and future developments;
- Mobility based research in the Haaglanden region.

**Review paper**

Including a research on current policy in cycling in The Netherlands and explored methods in strengthening the current bicycle infrastructure.
**Design including:**
- Design of Holland Spoor including all changes in built and public space and mobility.

On selective dates the thesis will be updated with conclusive findings, depending on the phasing the project is situated (see chapter 1.9 phasing and 1.10 time schedule).

**1.9 Phasing**

The graduation project consists of four phases.

The first phase will include the research focused on the location and mobility of Haaglanden and The Hague specifically and the analysis of the existing train stations. The second phase includes the translation of the previous obtained conclusions of the research into design solutions. The third and final phase is the translation of the design solution into a strategic design within the location.

The next chapter shows the time schedule for the graduation project.
1.10 Time schedule

Legend activities:
- Project description
- Research
- Design
- Methods
- Thesis

Products:
1. Preliminary Thesis Plan
2. Abstract Paper
3. Final Thesis Plan
4. Review Paper
5. Preliminary Thesis
6. Final Thesis
7. Final Thesis

Presentations:
- Poster
- Poster Feedback
- Presentation Feedback
- Presentation Go / No go
- Final Presentation
1.11 Involved disciplines

One of the main involved disciplines in this graduation project is of ‘urban design’. The strategic design that will be developed in the graduation project will focus on the city centre of The Hague. This will involve several strategic design objectives for city planning and organization. This discipline also includes slow traffic mobility.

The second involved discipline is of ‘spatial planning and strategy’, to require a strategic network placed within the region Haaglanden and the spatial arrangements necessary to connect to the city centre of The Hague.

The first mentor involved in this graduation project is of the chair ‘urban design’ from the urbanism department: Dr.L.M. Calabrese.

The second mentor involved in this graduation project is of the chair ‘spatial planning and strategy’ from the urbanism department: Ir.F.F. Colombo.

Fig.1.45 Involved disciplines (Koeling, 2010)
Part 2: Research & Analysis
Part 2 will focus on research and analysis. Chapter 2 will explore the spatial arrangement of Haaglanden, chapter 3 will focus on mobility and chapter 4 shows an analysis of the transfer hubs.

The spatial arrangement will help explain the current structures and functions of the Haaglanden region, including living, working, green and mixed functions and the future developments based on the 2020 Haaglanden vision. This will help further develop the design area in terms of what is lacking, but also what is required.

This chapter will help answer the following research questions:
- How is the spatial structure shaped of the Haaglanden region and how will this change in the future?
- What changes are underway with the restructuring of the city centre of The Hague to promote slow traffic?

The results of the analysis have been mapped to help visualize the research results.
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2.1 Introduction

The Netherlands has been and still is growing in population and number of households. According to the statistics from CBS, The Netherlands counts a total population of 16,485,787 and 7,312,579 households in the year 2009. Most of the inhabitants live in the city regions of The Netherlands.

City regions are different from individual communities in terms of legal tasks, by collaboration between the included communities, with the Mayor of the largest community usually being the chairman. The tasks for city regions include traffic and transportation, living and working and spatial planning. Every city region has its own funding to disperse covering these tasks. The Netherlands contains eight city regions (fig. 2.1):
- City region Amsterdam;
- City region Rotterdam;
- City region Haaglanden;
- Grouping Eindhoven;
- City region Arnhem-Nijmegen;
- Region Twente;
- Administration region Eindhoven;
- Parkcity Limburg.

City region Haaglanden

The Haaglanden region, located in the West of the province South-Holland, is one of the eight city regions of The Netherlands covering 40,261 ha of space. Over 6% (approximately 1,017,937 inhabitants) of the entire population of The Netherlands inhabits the Haaglanden region, making it the most overcrowded city region of The Netherlands.

Haaglanden is the third largest region, in terms of population following city regions Amsterdam and Rotterdam. Considering the lower amount of built space in Haaglanden in relation to the city region Amsterdam and city region Rotterdam, Haaglanden is the most overcrowded region of The Netherlands.

Some basic statistics (2009):
Size: 45,000 ha
Communities: 9
Inhabitants: 1,007,560
Residents: 466,565
Office space: 6,826,700 m²
Corporate space: 1,595 ha
Shops: 7,497
Corporations: 67,393
Employment: 476,561 people
Employees: 521,949 people
Unemployed: 26,082 persons
Budget region: 535 million euros

Fig. 2.1 City regions in The Netherlands (Koeling, 2010).
History
In 1994 it became clear that collaboration between communities in various regions was necessary. This resulted in the framework ‘Policy in transition’. This temporary framework was applied to collaboration areas surrounding Amsterdam, Rotterdam, The Hague, Utrecht, Eindhoven, Helmond, Arnhem/Nijmegen and Enschede/Hengelo: the current seven city regions. The communities were tasked to collaborate on numerous elements, including housing, infrastructure, economics and environment. The collaboration created successful results which led to a strong policy basis, specifically designed for these seven city regions, called the Wgr-plus (Wet gemeenschappelijke regelingen-plus, bill joint arrangement-Plus) established in 2005. This bill made it possible for the regions to have the regions focus on planning on housing, improvement of infrastructure, creation of business areas, green areas, cycles paths and public transportation in a strong collaborating way (Stadsregio’s, 2010).

(Inter) national meaning
Haaglanden has international recognition where several communities include international instances and corporations. Delft includes a knowledge centre with the Technical University for international students and a historic city centre. The Hague is, next to New York, Geneva and Vienna, an important United Nations city, which serves as the location of the International Court of Justice. On a national level the Binnenhof houses the national government and the residence of the royal house, but also includes a historical city centre, the Scheveningen beach, embassies and several international corporations such as Interpol and Eurojust. Haaglanden can be divided in to several international zones (fig.2.2) including the coastal zone, the International zone, city centre zones, a knowledge zone and various business zones such as the Binckhorst area. Haaglanden is strategically located between the two airports Schiphol and Rotterdam and is directly accessible in one straight connection by train and/or metro to the train stations of The Hague making an international connection easily possible (fig.2.2).

Regional meaning
Haaglanden offers diversity in recreational and natural surroundings, such as Veenweides, dunes and the coastal area of the North Sea. A strong character compared to other city regions. The Haaglanden region is the most overcrowded city region in The Netherlands. Haaglanden includes nine communities (fig.2.4), with The Hague being the largest community:

Delft
Delft is internationally well known for Delfts Blue art of Johannes Vermeer, but also for its knowledge centre, including TNO and the Technical University Delft, making Delft an ideal student city. The historical city centre makes Delft a quality addition to Haaglanden.

The Hague
The Hague is a well known community on a national and international level. Apart from being the capital of the province South-Holland and being part of the major cities (next to Amsterdam, Rotterdam and Utrecht) of the Randstad (one of the West-European most important urban concentrations), it also houses the international legal system, known as the international court of justice and several other internationally well known corporations, such as Europol and Eurojust. This gives The Hague the status of being the national legal capital of The Netherlands and an international city of peace and justice.
Rijswijk
Rijswijk is a quiet, small community between Delft and The Hague, located close to the A4, making the city very well reachable. The city includes the large shopping centre ‘In de Bogaard’.

Midden-Delfland
Midden-Delfland includes large green landscapes, which includes the communities Maasland and Schipluiden, dominated by Veeteelt.

Leidschendam-Voorburg
Leidschendam-Voorburg is a green community, including a variety of parks and well known shopping centre Leidschenhage.

Pijnacker-Nootdorp
Pijnacker-Nootdorp is a rising community where new developments are taking place well suited for families.

Wassenaar
Wassenaar is one of the largest communities in size, but contains a small population. The city is well known for villa parks and other luxurious quality residents surrounded by green areas.

Westland
Westland is well known as ‘Glass city’ because of the amount of greenhouses located in the community.

Zoetermeer
Zoetermeer is the second largest community by population, attractive to families, because of the amount single houses.

<table>
<thead>
<tr>
<th>Community</th>
<th>Size</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delft</td>
<td>2.631</td>
<td>96.301</td>
</tr>
<tr>
<td>The Hague</td>
<td>9.821</td>
<td>464.469</td>
</tr>
<tr>
<td>Rijswijk</td>
<td>1.448</td>
<td>48.046</td>
</tr>
<tr>
<td>Midden-Delfland</td>
<td>5.446</td>
<td>17.973</td>
</tr>
<tr>
<td>Leidschendam-Voorburg</td>
<td>3.566</td>
<td>73.670</td>
</tr>
<tr>
<td>Pijnacker-Nootdorp</td>
<td>3.861</td>
<td>36.053</td>
</tr>
<tr>
<td>Wassenaar</td>
<td>6.200</td>
<td>25.653</td>
</tr>
<tr>
<td>Westland</td>
<td>8.450</td>
<td>96.406</td>
</tr>
<tr>
<td>Zoetermeer</td>
<td>3.706</td>
<td>112.584</td>
</tr>
</tbody>
</table>

Fig.2.3 Communities in size and population.

The Hague is the largest in terms of size and population (fig.2.3) but also employment making it the most important city within the Haaglanden region.

Local meaning
The Hague includes 44 neighborhoods (fig.2.5), with the Schildersbuurt containing the highest amount of inhabitants and Kraayenstein being the largest in size.

Ambitions for Haaglanden
April 2008 saw the determination of the Regional Structure Plan of Haaglanden 2020. It includes the top 10 subjects on which the region wants to focus.

Haaglanden has very diverse characteristics, including layout towards the sea, the location of the national government and green house locations, but also diversity in living surroundings such as modern suburbs, villa’s and historical city centers. These qualities
supply to an ambition of attracting new business and therefore increase employment. To fulfill this ambition new housing is required and quality enhancement of existing spatial structures and infrastructure (reach). The structure plan is not aiming to create new enhancements within urban structures, but to locate them within the inner city, such as around train stations. This would increase possibilities for a good functioning public transportation. Also the bicycle network will be enhanced and better improvements in connections. By locating new dwellings within the city, would maintain the qualities of green structures.

To further develop the existing economic qualities of Haaglanden, such as instances for peace and justice in The Hague, the Delft center of knowledge and technology, the European Octrooi agency in Rijswijk, the Westland domain of green houses and toeristic destinations such as beaches, attraction parks and historical city centers, the structure plan of Haaglanden aims to:
- create adequate amount of space and meet with the demands for business;
- improve the reach ability;
- offer required amount of dwellings;
- stimulate offer for a variety of cultural instances;
- invest in the co-operation between; governments, education and corporations.

To improve mobility throughout the region Haaglanden the structure plan aims to:
- connect dunes, meadows, landscapes, parks and recreational areas and to further develop them;
- improve connections between urban and green landscapes;
- increase connections with other regions, foreign and domestic;
- bring the public transportation within the region to a higher level;
- make bicycle connections faster and more comfortable;
- make the road network more liable.

The quality of the living surroundings is mainly determined by the residential areas. The structure plan includes some overall quality ambitions:
- the living environment should be clean, quiet, and safe and offer space;
- neighborhoods should differ from one and other, with own identities;
- improvement of older neighborhoods.

The top 10 subjects for Haaglanden (fig.2.6 and 2.7):
- Expanding World Forum to become hart of the World Legal Capital;
- New Binckhorst with an international profile;
- grow of the Technological innovations complex Delft;
- dynamics and innovation strength in Greenport;
- enrichment of toeristic and recreational offering;
- anticipate climate change;
- development of sustainable mobility;
- strengthening landscapes;
- restructuring and intensifying use of urban neighborhoods;
- restructuring and intensifying use of business areas (Haaglanden, 2008).
Ambitions for The Hague
The structural vision for The Hague (structural vision The Hague, 20?) to become a World city at Sea includes the spatial structure developments of the city. The main ambition is to have The Hague remain a healthy and therefore attractive city. This includes the necessary amount of housing within an acceptable price range for every target group.

The Structure Vision describes 9 separate development areas (fig.2.8):
1. Binckhorst
2. Erasmusveld-Leywegzone
3. International zone
4. Kijkduin
5. Hub Moerwijk
6. Lijn 11 zone Transvaal and Regentesse South
7. Lozerlaan-Uithof
8. Scheveningen coast
9. A4/Vlietzone

Fig.2.8 Location of the 9 development areas of the Structure Vision 2020 (Wereldstadaanzee, 2010).
2.2 Spatial structure

The first part of the location research will explore the spatial structure of the Haaglanden region in terms of living, working, green qualities and different functions. The research will examine the current spatial structure and the future developments based on the structure vision of 2020 for the Haaglanden region.

Land use statistics

The largest space of the Haaglanden region is for farming (34.6%) followed by 30.6% for built space, 10.5% of wooded areas, 8.7% for recreational grounds and 3.8% of water areas. A total of 5.1% is outside water area. Figure 2.9 shows the distribution of land use within Haaglanden.

From all communities The Hague includes the largest space for built space and traffic networks. More then half of the community includes built/semi-built space (36% of built space in the whole region) and although only 6% of The Hague includes traffic, it still covers most traffic space in the Haaglanden region (almost 30%). Wassenaar is the greenest community of Haaglanden with more then half of the total space of forests and open natural grounds located in the community. Although The Hague includes the largest amount of space for recreational purposes. Agriculture can mainly be found in Westland and Midden-Delfland with 32% of Haaglanden agriculture in Westland and 25% in Midden-Delfland. Water amounts are limited with outside water located around the coastal area and the largest space for inside water located in Leidschendam-Voorburg (approximately 17% of the region and the rest relatively equally spread over the other communities).

Fig.2.9 Spatial arrangement per community in Haaglanden (Koeling, 2010).
Characteristics Haaglanden

Residential

Business

Nature

Functions
2.2.1 Residential (current)

Fig. 2.10 Current residential space Haaglanden (Koeling, 2010).

Statistics
The amount of inhabitants in the Haaglanden region in the year 2009 was 1,007,560 people.
The statistics of CBS show that although the overall population has grown in the Haaglanden region, The Hague increased the most with a growing percentage of 5.3% from 457,726 in 2002 to 481,846 in 2009. Households show similar growths, up to 4.3% growth in the past seven years to 240,303 total households in Haaglanden in the year 2009.
CBS shows the amount of residents in the Haaglanden region was 466,560 in the year 2009. From all neighborhoods the Schilderswijk includes the most inhabitants.

Regional
Haaglanden includes a variety of quality living surroundings. The map in figure 2.11 displays the diversity of these surroundings with The Hague dominating in green and urban living.
The Hague contains a large area of linked high quality urban living surroundings with a large space of pre-war residents stretched over the city with all the characteristic qualities, such as large amount of small scale urban economics, popular neighborhoods and youthful neighborhood.
Wassenaar provides villa neighborhoods in close proximity to the urban fabric of The Hague and located in the North of Wassenaar a transformation to more suburban qualities. These small suburban qualities can also be found in Westland and Midden-Delfland, with Westland dominated by agriculture, but in close reach of urban surroundings within The Hague and Delft and green/blue qualities formed by dunes and sea in the North.
Pijnacker-Nootdorp characterizes itself by a combination of small suburbs and more recent developments of VINEX locations.
Next to The Hague, the most urban living qualities can be found in Delft and Zoetermeer, which differ by the qualities of an historic centre in Delft and a modern city centre in Zoetermeer.

Local
The map in figure 2.12 clearly shows how the diversity in living qualities is distributed, with the centre dominated by urban centre living...
qualities leading into green living surroundings located at the city’s boarders including occasional suburban areas.

2.2.2 Residential (future)
Haaglanden is expected to grow more in population in the upcoming years. Prospects show the population of Haaglanden growing up to 1.047.621 in 2020, a growing percentage of almost 4%. The amount of inhabitants is expected to grow in all communities, instead of Rijswijk, where the population is expected to decrease in 2020. The amount of households are expected to grow up to 9,7% to an amount of 524.011 in the year 2020. Rijswijk is in this case also the only community where the amount is decreasing.

Vision regional
To accommodate the heavy grow of population the structure vision for the Haaglanden region concludes that until the year 2020 an amount of 75.000 to 80.000 dwellings will be made available. From this amount 30% will take place in the social segment. Figure 2.13 shows the map of the future ambitions on living for 2020. The ambition will focus mostly on developments within the urban fabric of the cities, concentrating more on the influential areas of the Stedenbaan around the train stations. New green quality living areas will be created in the Westlandse Zoom within The Hague and Westland. The low amount of green urban and suburban grounds for residents and apartments will be increased if the necessary space is available, with opportunities to fulfill these desires located in Rijswijk-Zuid and the A4/Vlietzone. The main ambition is to provide residents to more target groups, including families within cities.

Vision local
On a local scale The Hague aims to improve the living qualities of The Hague by strengthening, restructuring and transforming existing living environments (fig.2.14). The vision for The Hague foresees prospects on a variety of target groups. The diversity of opportunities within The Hague create prospects for families, students, internationals, empty nesters and commuters resulting in locations as is shown in the maps on the next page (figures 2.15 to 2.19).
Fig. 2.15 Prospects youth and students (The Hague Municipality, 2009a).

Fig. 2.16 Prospects families (The Hague Municipality, 2009a).

Fig. 2.17 Prospects internationals (The Hague Municipality, 2009a).

Fig. 2.18 Prospects empty nesters (The Hague Municipality, 2009a).

Fig. 2.19 Prospects commuters (The Hague Municipality, 2009a).
2.2.3 Business (current)

Statistics
CBS counted a total of 54,535 corporations in the Haaglanden region in the year 2009, with the largest amount located in The Hague. The past years the amount has been growing slowly in all communities, whereas The Hague saw the amount growing the most. The space for business in Haaglanden was 1.595 ha in the year 2009. Employment shows variety in increase and decrease per community, with The Hague showing the most significant growth. Employment was approximately 228,800 in the period of 2007/2009. Compared to the amount of 213,100 nine years before, employment has grown 7.4%.

Regional
Next to inner city small scale work related features, Haaglanden offers a wide range of diversity in terms of business locations. As well as the location of the national government, The Hague stands out as diplomatic character with the housing of several international organizations. The inclusion of diversity of schools in Delft (TU Delft) and The Hague (Haagse Hogeschool) contributes to the educational function of the region. South of this so-called ‘Brain port’ lays the ‘Green portal’, an intensified green house locations in Westland providing work on several agricultural levels. Delft and Zoetermeer contribute to more industrial diversity.

Local
On a local scale, The Hague includes several large business locations, with Binckhorst being the most commonly well known area (fig.2.24 and chapter 2.2.7). The most offices can be found in the city centre and within the Binckhorst which lies in close proximity of the transfer hubs of The Hague, an attractive feature for commuters (fig.2.21). The city centre includes a wide range of shopping facilities, but also the location of Binnenhof, which houses the national government, diversity in cultural events such as Mauritshuis and various social facilities including restaurants, bars and theater.
2.2.4 Business (future)
In the future it is expected that the demand of high quality business areas will increase.

Regional
The vision of 2020 for business related areas (fig.2.22) will focus mostly on the existing business areas such as the Binckhorst (fig.2.24), which will include investments to fully restructure/transform the existing spaces to high quality areas. Also the A4 Vlietzone will play a prominent role in the (re)development of business related features. Figures 2.23 and 2.26 show the business areas that will be redeveloped in the future.

Local
On a local level these investments in business areas will include diversity in program, where work/living/green features are united into a high quality spatial arrangement.
Most of the redevelopments will take place around the entrance of The Hague, surrounding the highways and rail infrastructures including Binckhorst (fig.2.24), Laakhaven (fig.2.25) and the A4-Vlietzone.
Fig. 2.26 Business areas to be redeveloped (The Hague Municipality 2009b).
2.2.5 Nature (current)

Fig. 2.27 Current natural spaces Haaglanden (Koeling, 2010).

Statistics
Haaglanden includes a large amount of natural ground. In 2006 cbs statistics showed an amount of 25,921 ha of natural grounds. The following types of natural ground can be found in Haaglanden:

1. Recreational ground includes city parks, sport parks, allotments and day recreational areas.
2. Farming grounds
   This also includes greenhouse space.
3. Wooded areas
4. Water areas

Westland includes the largest space for agriculture (more then half of the community, 54.4%), not surprising considering the community is known for its greenhouses.

Wassenaar includes the largest amount of forest grounds (42% of the community) and The Hague the largest space reserved for recreational purposes (13% of the community).

Regional
Well known nature areas include the dune areas at the coast and the greenhouse areas in Westland, but also other spread out agricultural landscapes in Midden Delfland and around Zoetermeer. The largest amount of green space is specifically located surrounding the large urban areas of The Hague, Rijswijk, Delft and Leidschendam-Voorburg (fig. 2.27).

Local
On a local level, Scheveningen is well known for its tourist beach sight and dune landscapes.
Large parks such as Haagse Bos and Scheveningse Bos and Zuiderpark are large natural parks located within the city of The Hague (fig. 2.29).
2.2.6 Nature (future)

Regional
The natural areas of Haaglanden need to be preserved as much as possible to cope with the amount of urban areas. This means that urban and natural grounds should be connected in a physical and metropolitan park construction way. The vision of Haaglanden on a regional level aims to create recreational green areas with attractive routes connected to and between these areas, the so called 'Green Rings of Haaglanden'. A more robust quality of the green spaces is created by realizing a strong ecological structure, with dense branches on a regional and local scale (fig.2.30).

Local
On a local level the project ‘Kern Gezond’ (Health Core) in The Hague provides plans for a healthy, safe and green city centre, by improving green connections within the city. One of these ambitions is to strengthen the existing main green structure with long distance connections (fig.2.31) and connecting existing public spaces such as within the city center (fig.2.32 and 2.33).
2.2.7 Characteristic zones

As explained in the introduction of the research (chapter 2.1) Haaglanden provides several characteristic zones, including the International zone, Coastal zone, city centre zone and knowledge zone. These different zones all provide certain specific elements that characterize these areas. This chapter will explore these different zones and will provide several typical required mixed functions within the region.

Coastal zone

The coastal zone is characterized by its strategic location towards the sea, with international recognition by its well known beach location and Pier. There are however several zones defined within the coastal zone, such as recreational beach locations Scheveningen and Kijkduin, but also dune landscapes in between these two locations. The harbor of Scheveningen provides a business location at the coast.

The future developments of the coastal zone are the highlighted features in figure 31, including two of the nine development areas of the structure vision (chapter 2.2), Kijkduin and Scheveningen Harbor (fig.2.38) and Boulevard (fig.2.36and 2.37). Kijkduin will offer comfortable beaches emphasis on luxury and care. The area will focus mostly on families and the elderly offering an addition to the busy more urban Scheveningen. Scheveningen Harbor will focus on strengthening and expanding fishing industry, more tourism at the harbors and living on the Norfolk area. Also included will be a new added harbor for cruise ships. These elements will provide for a more lively and attractive area. Also included is a congress center, museum and a pedestrian bridge for people to continue there beach walks without interruptions (The Hague Municipality, 2009a).
Fig. 2.36 Artist impression Scheveningen Pier (Skyscrapercity, 2010).

Fig. 2.37 Impression new Scheveningen Boulevard (The Hague Municipality, 2010).

Fig. 2.38 Sketch of the future Scheveningen Harbor (Future Scheveningen bath, 2010).

Fig. 2.39 International zone with the five different highlighted developments (Koeling, 2010).

The International Zone includes a large diversity of green, living and business related features, where the most obvious feature is the international instances such as the Peace palace housing the International Court of Justice, Word Forum (the heart of the International Zone, named after the World Forum Convention Center) and various international related elements such as embacies and corporations such as Europol and Eurojust. The International Zone has a strong international character with its use of international instances combined with quality public space and green.

The five different development areas (as depicted in figure 2.39) vary in development stages and planning stages.

The World Forum area includes an almost completely realized new building for Europol (fig. 2.40), a new location for Eurojust (currently situated at the Binckhorst and desired to position itself in close proximity of Europol, because of its close collaboration), an expansion of the existing World Forum Convention Center, redevelopment of the public space creating more natural space and the planning of a tunnel under the passing road of World Forum (Johan de Witlaan) for a more safe, representative and reachable area.

The ambitions for the Haagse Beek include improving the green zone and public space and offering space to attractive living surroundings, international instances, international education and other elements. The Hubertus viaduct area includes the expansion of the Promenade Hotel. The barracks in the East of the Zone will include several redevelopments and the Peace palace.
will strengthen its position to attract more foreign and domestic tourists (fig. 37), including a visitor’s center and the relocation of the French embassy (The Hague Municipality, 2009b).

City centre zone

In close proximity of the two busy train stations Central Station and Holland Spoor, the city center zone officially covers a large area including the shopping center area with various public spaces and a large variety of housing. The international identity of the city center however houses in the core of the area, where the national government is located (Binnenhof) as well as The Hague City Hall with its main public library, the shopping center (Spui straat, Grote Marktstraat) and cultural activities (Mauritshuis, Escher museum, Gevangenenpoort).

The main development taking place in the city center is Traffic Circulation Plan (fig. 2.42). This plan creates a safe, clean and attractive environment within the city center by banning cars in selected areas and therefore creating more space for slow traffic (fig. 2.43 and 2.44). With that comes an expansion of green structures connecting various public spaces to one another in a natural way. Main traffic route surrounding the city center will be adjusted to accommodate heavy traffic (The Hague Municipality, 2010).
Business zone

The business zone (fig.2.45) in the South of The Hague is bordered by the train railway. The railway forms a barrier between the business zone and the residential area just North of the railway. It includes the well-known business area Binckhorst, which houses a large variety of (inter)national corporations. The strategic location towards the station areas and road network makes Binckhorst an important addition to the city’s industry (fig.2.46). Next to Binckhorst lay the Laakhaven areas, divided into Laakhaven East, including several corporations such as T-Mobile and the Haagse Hogeschool, Laakhaven Center with the Megastores and other business-related functions and Laakhaven West, which part of a large transformation where business, culture and living come together as a potential ‘Hot Spot’ (fig.2.47). (Laakhaven, 2010)
### 2.2.8 Mixed functions
The mixed functions in this report include the location of hospitals, shopping and retail, schools, theaters and museums.

#### Regional
The current functions in Haaglanden (fig.2.48) see an extensive amount located within The Hague and Delft connected to the historic city centers. The Hague includes the largest amount of hospitals strategically dispersed over the city and shopping areas located near the boarder of The Hague. The beach areas are obviously located at the coastal zone, with Scheveningen being the largest. All varieties of schools are spread out located in most residential neighborhoods, with large international colleges Haagse Hogeschool and TU Delft more located at the transfer hubs of Haaglanden.

#### Local
On a local scale The Hague offers most functions within the city center, including cultural facilities such as Binnenhof and museums (Mauritshuis, Esher museum, Poort), shopping facilities (Spui) and various social activities such as restaurants/bars and theaters.

Fig.2.48 Locations mixed functions Haaglanden (Koeling, 2010).
3. Mobility

The second part of the research of this report includes the research of a theoretical framework on Dutch policy of cycling in The Netherlands and will explore the current commuter patterns including all methods in mobility: car, public transportation and bicycle. The mapped results will lead in an examination on how the mobility is functioning in The Hague.

This chapter will help answer the following research questions:
- How are the current travel behaviors and commuting patterns functioning in the Haaglanden region?
- What are current theories and good practices on mobility based on cycling?
3.1 Theoretical framework

Introduction
Back in the 1960s, when car popularity increased, numerous urban developers and traffic engineers focused on this new popular transportation method concentrating more on door-to-door mobility in a fast way, neglecting the functional and spatial context. Slow traffic was pushed aside to make way for faster connections, resulting in separated traffic flows, with more space created for motorized transport and less space for slow traffic. This ambitious drive to provide for these developments and to create fast connections on a regional and local level, resulted in plans to expand the road networks further and, for environmental purposes, increase car taxes to encourage people to use other transportation methods (Bach, 2006).

One of the main issues in The Netherlands in terms of mobility is the increasing amount of traffic congestions, specifically around large cities. Statistics show that distances from 2,5km to 7,5km are mainly traveled by car (mobiliteit in cijfers) whilst people find a distance of 7,5km as an acceptable travel distance to travel by bicycle. It are these short distances, next to the expanded road networks and growing population and car ownerships, that have great influences in clogged up road networks. Recent studies even showed that people are even willing to travel up to 15km if the bicycle infrastructure is fast and comfortable (Ministerie van Verkeer en Waterstaat, 2010c).

The importance of slow traffic has been reestablished by the Bicycle Policy. And even though The Netherlands still invests more in motorized transportation, slow traffic investments have also increased in the past years. In The Netherlands the government stimulates all communities to have the bicycle become the primary method of transportation. Considering the problematic mobility issues, that have taken shape in The Netherlands the past years, such as traffic congestion, there is no question that the government and spatial planners have been driven to explore other solutions as well. And why not explore one of our classic transportation methods, the bicycle?

Bicycle
Under the growing use of cars, the use of bicycles has remained stable. Cycling is part of Dutch tradition. The Netherlands has international recognition as bicycle country. Foreigners are surprised at the amount of cyclists moving to work, school and shopping. The Netherlands is the only European country that has more bicycles then inhabitants, with an average amount of 1,11 bicycle per inhabitant (figure 3.1) (Fietsberaad, 2009).

It comes as no surprise that The Netherlands established itself as bicycle country, considering the flat layout of the landscapes, making it easy to move around in a fast way. But next to cycling being part of Dutch tradition, they contribute on a number of other obvious elements:

Health – The NNGB (Nederlandse Norm Gezond Bewegen, the Dutch Norm of Healthy Exercise) recommends a minimum of 5 days 30 minutes activities. This covers a 7,5km travel distance by bicycle (Sportzorg, n.d.)

Safety – Danish research established that communities with more cycling mobility, the chances of cycling accidents are less then communities with less cycling mobility (Atsma, 2008).

Space – Cycling lanes require less space compared to car lanes similar to the size required for parking spaces and facilities.
With the smaller size of this transportation method it makes reach ability of more spaces possible including car free zones.

**Environmental** – Cyclists are one of the most environmentally friendly mobility participants. The Environment and Natural Plan Agency, along with the Bicycle Policy calculated that the CO2 will decrease up to 6% by use of the bicycle. By replacement of short trips by cars up to 7,5km by bicycle, 2,4 million tons of CO2 will be spared (Atsma, 2008).

**Faster connection** – Cycling creates improvement in traffic flows within cities.

**Financial** – Unlike cars, bicycles need very little to none work that have financial influences. Cars require yearly obligated inspection and obviously petrol. Bicycles require the occasional amount of air the fill the tires.

These are all motivational elements to stimulate bicycle use in The Netherlands. The AVV foresees great possibilities to increase the use of bicycles, by recently stating that within a travel distance of 7,5km the car can have great competition of the bicycle, with even 60% of all movements within this distance (AVV, 2004a). But how can these short distances stimulate people to use bicycles instead of cars more?

With that a well organized safe structure contributes to a well functioning cycle city (VNG, 2010). Safety measures are not the only qualities a smart bicycle structure should have however. Other main requirements include:

**Direct connections** – Short and rapid routes from A to B with open bicycle lanes with smart passages and tunnels, signs and traffic lights;

**Comfortable** – One of the main reasons the car beets the bicycle in traveling choice is the comfort the car provides. For the bicycle the comfort lays in good surfaces, generous space and little interference of other transportation methods;

**Attractive** – The bicycle infrastructure should include an attractive and socially safe environment, without smell or noise interference (approximately 27% of Dutch inhabitants experience serious interference by traffic noise, resulting in sleeping disorders and health issues (VROM, 2010);

**Cohesion** – To contribute to a fast route a logical and cohesive structure is necessary (Crow, 1993).

Bicycle use is highly dependent on the availability of connected, direct, continuous and constantly pleasant and safe routes without missing links (Evaluation of the Delft Bicycle Network, 1986). Current good functioning cycling cities state that increasing bicycle use within cities by way of good quality cycling network requires a continuous attention to policy. Where some handbooks describe examples of cycle structures and planners copying these structures without thought designs have
neglected to structure the network by deepening in the mind of future users of the cycle structure and balancing function, shape and usage (CROW, 2006).

Structures
In the past various projects have been realized with a main focus on bicycle mobility. In the 1980s Delft saw a massive change in the bicycle infrastructure to improve the quality and amount of cyclists. The realization of this large investment resulted in an effective increase of cyclists up to 7%. An evaluation conducted in 1993 however showed that the plan did not meet with the ambitions of Delft which was to reduce car use. The main causes were the lack of program, such as bicycle storage, realized within the structure and the amount of obstacles created for bicycles, such as the encountering of motor vehicles, traffic crossings and the clear indication of routes (Fietsersbond, 1994).

Another more recent bicycle infrastructure investment saw the community Houten change massively in quality in terms of mobility, even resulting in an award for best bicycle city of The Netherlands. What made the plans of Houten so different from Delft and other communities was realizing a bicycle structure giving the residential areas priority. The main car route is guided by a road circling the community making the residential areas only part of local traffic (figure 3.3). This created more safe areas attractive for the cycling population and less encounters with motorized transportation made the community more appealing for cycling (Gemeente Houten, 2010). The restructured infrastructure resulted in Houten winning an award for bicycle city of The Netherlands in the year 2008 (Verkeerskunde, 2008).

Availability facilities
The design book for bicycle traffic explains that the power of the bicycle lies in the short distances traveled by bicycle and the use as for and after transport of public transportation. The Master plan Bicycle determined that the largest threat for cycling in The Netherlands is the increasing expansion of cities and therefore the increasing distance between housing and city centers (CROW, 1993). Within a distance of three kilometers between these areas people have the tendency to travel more then people living further away. City centers contribute on a large scale of social activities and work related features, making a connection to city centers of high importance.

The creation of new residential neighborhoods within a distance of three kilometers travel is therefore advised, making it one of biggest opportunities in bicycle policy (Fietsersbond, 2006).

Creating guarded bicycle sheds
Every year approximately 800.000 bicycles are stolen in The Netherlands. An evaluation of the Bicycle Union concluded that 45% of all cyclists do not use bicycles in fear that they might get stolen. The Dutch government has ambitions to have this amount decrease by 100.000 (Ministerie van Verkeer en Waterstaat, 2010a).

The availability of guarded bicycle sheds help realize this ambition. Between 2009 and 2013 rail administrator ProRail will realize 100.000 new parking places within bicycle storages at stations as part of the program ‘Ruimte voor de Fiets’ (Space for the bicycle). The main purpose is to create new storages and extend existing storages (Ministerie van Verkeer en Waterstaat, 2010b).

Fiscal benefits for businesses
This provides the ability for employers to provide bicycles for their employees making the costs for the bicycles deductible from the profits. By way of a corporate bicycle plan it is possible to receive a bicycle from the office with a fiscal advantage for employers and employees in collaboration with tax agencies. This method benefits not only the overall stimulation of bicycle use and the financial
benefits for businesses, but also the amount of space required for parking near the office for cars and the reduced amount of employees calling in sick. Obviously cycling improves health and the reduced amount of sick employees benefits income of corporations (Atsma, 2008).

**New innovations**
Numerous developments realized today could help cyclists move around in a safe and faster way. The realization of bicycle highways are being developed in a variety of areas within The Netherlands such as the connection between Leiden and The Hague to create long distance commuter travels for cyclists by making a straight connection from city to city making traveling in a fast continuous pattern possible (Goudappel Coffeng, 2010).

On a local level the development of rain sensors for traffic lights (first established in Oosterhout in 2007, designed by traffic engineer Remi Kok) helps cyclists continue their route in bad weather by having traffic lights turn green during a specific amount of rain/snow (Verkeervooroen Veiligheid, 2007).

Also the ideas such as the Lightlane, a laser light constructed on the bicycle to create more visibility of the bicycle lane at night has a lot of potential to fully complete a cycle structure and in this case an extra safety measure for bicycle traveling (Lightlane 2009).

**Public transport bike**
By far one of the best new additions within the bicycle network is the ability for people to use bicycle sharing systems. With city centers becoming more to the attention for slow traffic, new approaches are being used on an international level for the public renting bicycles for a small price, with renting bicycle storages located on a strategic location easy for people to recognize in or near public locations such as train stations. This method provides people a transfer point from public transport to bicycle.

What started off with a test run in 1968 in Amsterdam by Luud Schimmelpennink, resulted in a booming global development for the bike sharing project. According to Ronald Haverman, creator of the OV-Fiets, Luud Schimmelpennink was way ahead of his time concerning the bike sharing system. The fact that there was no way yet to track down the bicycle and user made the users throw the White Bicycles in the canals without any consequence for the users (Stoker, 2008).

Currently in Holland the bike sharing method is commonly known as the OV-Fiets (the Public Transport Bicycle), formed in 2003 as an individual foundation and taken over by NS in 2008. The OV-Fiets makes transfers possible from public transportation to bicycle by placing OV-Fiets renting areas in/around train stations (Fietsersbond, 2009). This makes the OV-Fiets a good and successful method of after transport as the results of evaluation have shown. In 2009 the amount of OV-Fiets users has doubled compared to 2007. According to the users of the OV-Fiets, the method has a positive effect in terms of car use, with 8% of the people using the car prior to the OV-Fiets, 3% of the people were usually being picked up by car prior to them using the OV-Fiets and 15% claiming to replace multiple car rides to the combination of the train and the OV-Fiets (AVV, 2005).

**E-Bike**
The E-Bike is the new bicycle in terms of faster connections. Luud Schimmelpennink sees the electrical bicycle as the future for bike sharing systems including smart distribution control systems and low tech storing stations. “His design is based on a pedal-assist electric bike with a chainless shaft drive and a hub motor in the back wheel.”. The electrical bicycle would make it possible to travel faster with less effort compared to the traditional bicycle making it a bicycle with a lot of potential. According to the research conducted by TNO commuters cross an average distance of about 6,3km with a normal bicycle which would increase to an average distance of 9,8km by use of the electrical bicycle. In another research conducted by TNO on health concluded that the amount of exercise, although less than normal bicycles, is still adequate (Streeter, 2010).

The use of public bicycles would stimulate more use of bicycles and a minor decrease in car use. It will however not decrease traffic congestions. The short distances would be traveled more by bicycles, but the extra space created on the roads would stimulate other car owners to use the car more creating a balancing effect on the long run (AVV, 2005).
3.2 Mobility research

From all motives for travel in The Netherlands the most take place to commute followed by shopping (fig.3.4). Apart from hiking/touring and services the car is the most popular method of transport.

Commuters

CBS statistics show that most people have jobs in their home community, with the exception of Leidschendam-Voorburg and Rijswijk where more people commute to The Hague. It is also clear that most commuters travel to The Hague from all surrounding communities, with the exception of Midden-Delfland where Delft is the secondary commuters’ destination. It is clear that from the total amount of commuters in Haaglanden, most people travel to The Hague for business making The Hague centralized point for business.

The order of commuter amount to The Hague from surrounding communities is as followed (fig.3.5):

1. Zoetermeer 13.500
2. Leidschendam-Voorburg 10.700
3. Rijswijk 7.100
4. Westland 6.700
5. Delft 5.100
6. Pijnacker-Nootdorp 3.600
7. Wassenaar 2.100
8. Midden-Delfland 600

A total of amount of 49.400 people within the Haaglanden region travel to The Hague to work in the year 2009. The order of commuter amount from The Hague to surrounding communities is as followed (fig.3.6):

1. Rijswijk 8.200
2. Westland 5.800
3. Leidschendam-Voorburg 5.300
4. Delft 4.300
5. Zoetermeer 4.000
6. Pijnacker-Nootdorp 900
7. Wassenaar 800
8. Midden-Delfland 300

A total of amount of 29.600 people within the Haaglanden region travel from The Hague to the surrounding communities to work in the year 2009. This makes Leidschendam-Voorburg and Zoetermeer the most important links from The Hague and Rijswijk the most important link to The Hague.
3.2.1 Connection: Car (current)
The use of cars is still one of the most popular transportation methods in The Netherlands. This is also the case in the Haaglanden region.

Highways
The main highways going through the Haaglanden region are the A4 coming from Amsterdam passing Leiden, the A12 from Utrecht passing Zoetermeer and the A13 from Rotterdam passing Delft all coming together at traffic hub Prins Clausplein into the main route to The Hague (Utrechtse Baan A12). This is also the main access route to The Hague for the car. There is also a direct access point to The Hague from the A13 (before connecting to the A4) leading into the Rotterdamseweg and the Haagweg. The A4 and A13 are highways where traffic congestion occurs on a daily basis, specifically during rush hours. These two routes are part of the top 10 recorded traffic congestion routes of the past few years.

Regional
The busy road ring ‘Ring The Hague’ is an international ring surrounding The Hague which passes not only through The Hague but also Rijswijk and Leidschendam-Voorburg. The ring includes regional roads but also local roads.

Local
On a local scale The Hague includes a city centre ring where all the heavy traffic passes through the city.

3.2.2 Connection: Car (future)

Highways
The 2020 vision of Haaglanden will have the A4 highway endpoint in Delft lengthened to Schiedam and Rotterdam. This development is to foresee the heavy traffic currently passing over the A13 from The Hague to Rotterdam.

Regional
The Ring The Hague will see improvements in the road structure.

Local
The VCP plan for the city center of The Hague is currently being developed. The plans include parts of the city center to become car free with the ring road of the city center to be improved to accommodate the amounts of cars with the goal to have the city center only destined for local traffic and to create a safe good quality city center.
3.2.3 Connection: Public Transportation (current)

Haaglanden includes in variety of public transportation methods that serve (inter)national regional and local purposes.

On an international scale the train network NS and the Metro network connects to Schiphol and Rotterdam Airport respectively. The regional and local public transportation is expanded covering a large portion of the Haaglanden region specifically The Hague. It includes the light rail Randstadrail (part of the HTM network) the regional bus lines of Veolia (formerly known as Connexxion) and the HTM networks including trams and busses. The next page will describe these different public transport providers in more detail.

Recently the OV-Chipcard has been introduced in the public transportation system of The Netherlands. This new method for public transportation payment creates the ability for people to use a single card within all types of public transportation resulting in an easy way to travel having the public transportation move faster.

Fig.3.9 All public transportation networks in the Haaglanden region (Koeling, 2010).
**Train**
The NS train network of Haaglanden provides a variety of trains, including Intercity, Fast trains and slow trains. All these trains connect to Central Station and Holland Spoor. Fast Trains connects to Central Station Holland Spoor and Laan van NOI and Slow Trains connect to all stations in The Hague (ns, 2010).

**Metro**
The metro rail is an addition of the lightrail of the Randstad, which makes a straight connection possible between The Hague and Rotterdam (including Rotterdam Airport). The metro line is connected to two train stations in The Hague (Laan van NOI and Central Station). The metro rail also makes a connection possible for Pijnacker and Noordorp within the Haaglanden region. Approximately 7,000 people use the metro on a daily basis which is expected to grow to an amount of 28,000 in 2010 (RandstadRail, 2010).

**RandstadRail**
The RandstadRail is a light rail network provided by HTM connections, which includes two separate lines connecting to Zoetermeer. Both lines move through Haaglanden connecting Zoetermeer to two train stations (Laan van NOI and Central Station) and the West boarder of The Hague. The light rail was created to provide a fast and comfortable and easy accessible public transportation device to connect The Hague to Zoetermeer to accommodate the amount of commuters traveling from and to The Hague. Approximately 17,000 people use the Zoetermeer line expected to grow to an amount of 42,000 in 2010 on a daily basis (RandstadRail, 2010).
**Veolia**
The development of Veolia created the ability to provide an environmentally friendly public transportation method of busses driving on natural gas.
The busses are accessible for anyone and include cameras for safety measures. Veolia’s main connections are to the Central Station of The Hague (Veolia-Transport, 2010).

**HTM**
HTM is the public transportation network for The Hague including busses, trams and light rail connections.
HTM helps 134 million people arrive at their point of destination every year, with 350,000 people traveling by trams every day and 100,000 people by bus.
HTM busses provide transfers in The Hague, Rijswijk and Leidschendam-Voorburg. HTM trams are the backbone of the connection lines of Haaglanden moving through The Hague, Rijswijk, Voorburg, Leidschendam, Nootdorp, Delft and the VINEX locations Wateringse Veld and Ypenburg (HTM, 2010).

**3.2.4 Connection: Public Transportation (future)**
Public transportation and the bicycles will play a more prominent role in Haaglanden. The main goal for Haaglanden in terms of public transportation is to provide safe and fast connections.
The current main new addition within the public transportation network is an upgrade of three HTM tram connections (tram 9, 11, 12) to a light rail connection. This is created to create a faster connection to Scheveningen where all three lines end (The Hague Municipality, 2009c).
3.2.5 Connection: Bicycle (current)

The current regional bicycle infrastructure (fig.3.16) is mainly united with the regional and local car road network. In total 650 kilometers of cycling paths are located within Haaglanden, making connections possible to work, living and social activities. Based on the previous research part on spatial arrangement the most important cycle connection can be determined. Figure 3.17 and 3.18 shows the most important connections based on the locations of the most residential and business related areas within The Hague and the necessary straight connection towards the train stations for a potential for and after transport of the bicycle.

The main connections on an international level by train from Schiphol and Rotterdam Airport are to the main train stations Central Station and Holland Spoor and Laan van NOI. From these three international train stations the main bicycle routes lead towards Scheveningen connecting to the coastal zone, International zone and the city center zone (fig.3.19).
Five separate routes can be determined for the connection towards the coastal zone passing the city centre zone and the international zone (fig.3.20). It is clear that from all these routes the main route from Holland Spoor is not only incomplete, but is also not clearly marked by way of a basic bicycle lane. This connection from an international zone station is important considering its direct connection to the city center of The Hague.

3.2.6 Connection: Bicycle (future)

The future vision will see an expansion of the bicycle network by including missing links and the development of the bicycle highways connecting The Hague with Leiden (fig.3.16). Also the amount of Public Transport bicycles will be expanded in the region.

On a local level the development of the Traffic Circulation Plan will create more possibilities for cycling in the city centre. By creating car free areas within the city center slow traffic (cyclists and pedestrians) will have the ability to safely move around within the shopping area without any interference of cars (The Hague Municipality, 2010).
4. Transfer hubs

This second part of the research will explore the existing train stations of the The Hague in terms of connections and program. The research of the location will examine the current features of the stations and the future developments.

The following research questions will be answered by this part of the research:
- How will an improved mobility network help shape the public space of Holland Spoor?

Currently there are six train stations in The Hague, with five of them located on the boarder of the city and one located in Ypenburg. The five train stations on the boarder of The Hague are located in one line, forming a portal to the city. Figure 4.1 and 4.2 shows the location of these stations.

The purpose of this research is to clearly recognize the difference between the smaller stations and the metropolitan stations and to examine the flaws of Holland Spoor to come to a list of demands and eventually a design for the area.

Fig.4.1 Location stations The Hague (Koeling, 2010).

Fig.4.2 Train stations The Hague (Koeling, 2010).
4.1 Local stations

The smaller stations of The Hague (fig.4.3) are mainly focused on destination travelers to the direct surrounding environment. They mostly contain residential areas in close proximity to the stations and contain and require little connections from and to the station since the use of these smaller stations is very little. To help clarify this the train stations Laan van NOI, Moerwijk and Mariahoeve will be explained in terms of program and connections.

Fig.4.3 Location of the local stations (Koeling, 2010).
4.1.1 Station Laan van NOI

The small train station Laan van NOI (fig.4.4) is located at the Laan van Nieuw Oost Indie on the border of Voorburg and The Hague and is the first connection from The Hague Central Station and The Hague Holland Spoor towards Amsterdam. It does play a prominent role in The Hague with a straight connection possible from Rotterdam Airport making it a good addition for international connections.

Program/Elements

The station foresees a small amount of travelers and therefore provides decent amount of bicycle storage. The public transport bicycle is also available (NS, 2010).

Public transportation

The small scale train station NOI unites NS trains, the Metro rail, the Randstadrail and the HTM busses and trams, making the station very diverse in its connection methods. The scheme on the left (fig.4.4) shows the types of connections possible at this station (HTM, 2010).

Reach

Figure 4.5 shows the reach ability within The Hague connected to Laan van NOI. The reach ability network is not as expanded as the other international station, but sill reaches a wide range of areas in far distances.

Cars

The station is connected to one of the main routes running through The Hague: the Laan van Nieuw-Oost Indie, moving from Voorburg all the way into the Van Alkemadeelaan to Scheveningen. The connection is good and the possibilities for drop-offs are acceptable. There are also limited parking facilities available including a P+R location (4.4).

Bicycle

All accommodations for cyclists are basic, with cycle lanes passing the main roads. Parking is possible for cyclists on the North and South side of the station (fig.4.4).

Developments

The amount of public transportation bicycles (OV-Fiets) will be expanded to accommodate commuters more.
4.1.2 Station Mariahoeve

The station of Mariahoeve is a small local train station located in the East of The Hague and is the first station from train station NOI towards Amsterdam.

**Program/Elements**
The station foresees a small amount of travelers and therefore provides decent amount of bicycle storage. The public transport bicycle is also available (NS, 2010).

**Public transportation**
The station unites NS trains, Vaelio busses and HTM trams and busses. For a train station the amount of possibilities connecting to the station is very limited. The station provides for local surroundings. The scheme on the left (fig.4.6) shows the types of connections possible at this station (HTM, 2010).

**Reach**
The reach from Mariahoeve towards The Hague (fig.4.7) is limited mainly connecting to the West of the city, by only two HTM connections also connected to The Hague Central Station.

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<thead>
<tr>
<th>NS</th>
<th>Start</th>
<th>End</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stadhagen</td>
<td>Mariahoeve</td>
<td>Amsterdam/Den Haag/Lisseendonk</td>
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<table>
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<tr>
<th>HTM</th>
<th>Start</th>
<th>End</th>
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<tbody>
<tr>
<td>6</td>
<td>Lobbescheiding</td>
<td>Leidschendam</td>
</tr>
<tr>
<td>24</td>
<td>Mariahoeve</td>
<td>Nieuwkoop</td>
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</tbody>
</table>

**Cars**
The station has a good drop-off zone for travelers, mainly because the small scale station and the smaller amounts of people it must provide for traveling. There is also a good amount of parking space available at the South side of the station (fig.4.6).

**Bicycle**
Accommodations for cyclists are basic, with cycle lanes passing the main roads. Parking is possible for cyclists on the South side of the station. The public transport bicycle is also available (fig.4.6).

**Developments**
The amount of public transportation bicycles (OV-Fiets) will be expanded to accommodate commuters. There are also plans of housing redevelopments in Mariahoeve (The Hague Municipality, 2010).
4.1.3 Station Moerwijk

Train station Moerwijk is small local train station in the South of The Hague and is the first connection from Holland Spoor to Delft and Rotterdam.

Program/elements
This station provides little to no program for travelers in terms of shops and parking facilities (NS, 2010).

Public transportation
The station unites NS trains and one HTM tram and one bus. For a train station the amount of possibilities connecting to the station is very limited. The station provides for local surroundings. The scheme on the left (fig.4.8) shows the types of connections possible at this station (HTM, 2010).

Reach
The reach from Moerwijk towards The Hague (fig.4.9) is limited mainly connecting to the West of the city, by only two HTM connections with one also connected to The Hague Central Station.

Cars
Moerwijk station is reached from all directions but includes limited parking within the direct surroundings (fig.4.8).

Bicycle
An attractive cycling environment with green connections passing the station. There is however no cycling storages available.

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<tr>
<th>NS</th>
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<tbody>
<tr>
<td></td>
<td>Station Moerwijk</td>
<td>Amsterdam/Den Haag/Zuid</td>
</tr>
<tr>
<td>HTM</td>
<td>Start</td>
<td>End</td>
</tr>
<tr>
<td></td>
<td>Den Haag L3</td>
<td>Wateringen</td>
</tr>
<tr>
<td></td>
<td>Moerwijk Station</td>
<td>Hoogland</td>
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Developments
The North side of the station is part of one the main development areas of the ambitions of The Hague becoming a world city at sea. The hub Moerwijk (fig.4.10) will include an extensive program surrounding the station, such as new housing and business oriented functions, but also bicycle sheds (1,500 spaces) and the Public Bicycle will also play a role in the plans (The Hague Municipality, 2009).
Fig. 4.10 Master plan Moerwijk
4.2 Metropolitan stations

The Metropolitan stations (fig.4.11) are characterized by high dense areas with high-rise structures including a large diversity in functions, such as residential and business, but also catering and shops. The areas foresee a very high use intensity in which reach ability plays an essential part. But not only does the metropolitan station function as a transfer hub, it also requires a high quality urban space.

The following aspects are of high importance to the metropolitan station areas:
- Program of national and international meaning;
- Attention to urban and architectural quality;
- Quality of the public space.

Fig.4.11 Location of the metropolitan stations (Koeling, 2010).
4.2.1 The Hague Central Station

The Hague Central Station (fig.4.12) is the most common train station of the city with the highest use intensity. In 2003 over 83,000 people traveled through the station per day. Although this amount decreased in 2007 to just over 80,000 travelers (a decrease of approximately 3%) the station still holds an impressive number of travelers. From all the stations part of the Stedenbaan, it is the second largest commuters’ station behind Rotterdam Central Station (which had an amount of just over 93,000 travelers per day in 2007) (Stedenbaan, 2009).

Program/Elements
The public transport bicycle is available at Central Station clearly marked and located at the side of Central Station visible from the main bicycle route passing the station. There is also a taxi standpoint with a route at the side of the station, making it easy accessible for taxi’s.

The station includes several fast-food diners and shops such as Albert Heijn To Go, Burger King, Smuller’s, Jambelle, Tiny Tokyo and a Free Record Shop (NS, 2010).

Public transportation
The Hague CS unites the NS, the Metro railway, the Randstadrail, Vaelio busses and HTM trams and busses (fig.4.13) (NS, 2010). The reach ability of the station on a public transportation point of view is of high quality and is the main entry point of The Hague for visitors on a (inter)national and regional level. The matter in which the different transports have been built up works very well. A tunnel provides for motorized transportation from Binckhorst to the city centre. Ground level sees the trains and metro pulling in entering within the station, as well as the HTM trams on the West side passing the station and the second level provides tracks for the Randstadrail and a bus platform for HTM busses (fig.4.14).

This way of separated levels creates a low dense mobility network at ground level, making it effective for slow traffic passing by.

Reach
Figure 4.15 shows the reach ability within The Hague connected to Central Station. From this map it is clear most parts can be reached in a single connection by public transportation.
Fig. 4.14 Public transportation at Central Station including trams on separated levels (left) and bus platform (right) (Google maps, 2010).

Fig. 4.15 Reach ability from Central Station in to The Hague (Koeling, 2010).
**Cars**
Central Station is accessible at the front of the station (Koningin Julianaplein) where a P+R location is located. Central Station area has cleverly solved passing traffic by providing an underground tunnel for the North-South connection passing the station. This effectively creates the ability of passing traffic that is not destined to go to Central Station to drive on without any interference of other mobility methods at ground level (fig.4.16).

**Slow Traffic**
The station is well reachable by cyclists, from all sides, providing a basic cycling route. Also the bicycle lanes are clearly marked, creating less confusion for people in first contact of the station area. From the inside of the station underground bicycle parking is accessible. The frontal public green space is an extra feature provided for slow traffic. Not only is the starting point for the tunnel located here, it also provides a green park for slow traffic formed between Central Station and Malieveld. This attractive landscape is a quality feature of the station area green space (fig.4.17).

Fig.4.16 Car routes including taxi location (left) and tunnel for ongoing traffic (right) (Google maps, 2010).

Fig.4.17 Bicycle routes (top) with clear view OV-Fiets (middle left), parking facility (middle right) (Google maps, 2010) and green space for slow traffic (bottom) (Virtual Earth, 2010).
Public space
The surrounding space (fig.4.18) of Central Station includes a large amount of green space at the front of the stations’ entrance, including a cow camp (fig.4.19) and the Malieveld (fig.4.20) on which a variety of activities are organized throughout the year such as festivals, markets and circus. There are also clear routes (fig.4.21) with additional functions added in the facades such as bars and shops creating a clear oriented route towards the city center of The Hague (fig.4.22).
Development
Currently the central station is being transformed into a safe, clear and accessible station to accommodate the expected increasing number of people using the station, with an obvious title, The Hague New Central. People will be able to clearly orientate through the station, making all transportation methods including taxi space clearly visible. In addition an underground bicycle parking facility will be realized to accommodate 6,000 bicycles. Also the amount of public transportation bicycles (OV-Fiets) will be expanded.
By the time all projects have been realized, the bus platform will be built over creating new offices.
Babylon is being transformed into New Babylon, creating new living and working functions.
A new building will arise on the Anna van Buerenplein containing a living/working/cultural program.
The Haags Startstation Erasmus will connect The Hague to Rotterdam with the Erasmus line. A modern station will be realized above the bus platform of The Hague Central Station (Den Haag Nieuw Centraal, 2010) (fig.4.23).
With the development of The Hague Nieuw Centraal comes the improved connection towards the city center connected to the new cultural center located at Spui. The Turfmarkt, as part of Wijnkwartier district, is the main straight connection where the functions will be expanded, creating a lively connection, including a mix of living, working, culture, shopping and catering (fig.4.24) (Den Haag Nieuw Centraal, 2010).
4.2.2 The Hague Holland Spoor

The second most common traffic hub in The Hague is the oldest train station of The Hague: Holland Spoor (fig.4.25) located in the South of the city centre ring of The Hague. Unlike Central Station, Holland Spoor has seen a grow in usage. In 2003 an amount of 30.000 travelers per day has grown in 2007 up to 36.000, an increase of 21% (Stedenbaan, 2009), making it an important addition to the metropolitan station of The Netherlands and to the city of The Hague. With that comes the characteristic cultural main building strengthening its appeal.

**Program/Elements**
Like Central Station the public transport bicycle is available at Holland Spoor as well as storage for bicycles. Also included are some small shops and catering related functions, situated within the station hall, the outside frontal square and the passage (fig.4.26 and 4.27) (NS, 2010).

**Public transportation**
Holland Spoor unites NS trains, Veolia busses and HTM trams. On the right side a scheme shows all connections to Holland Spoor. Although the amount Veolia busses is limited, HTM connections are highly expanded, making Holland Spoor an excellent station connected to The Hague in all directions. For an overview of all connections, see figure 4.28.

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Fig.4.25 Location (Koeling, 2010), front façade (CDA The Hague, 2010) and all public transportation connections of Holland Spoor (Koeling, 2010).

Fig.4.26 Map of ground floor including the locations of shops (Koeling, 2010).

Fig.4.27 Map of second floor including the locations of shops (Koeling, 2010).
Holland Spoor functions average on public transportation. The diversity is acceptable, however the scattered connections make it unclear, with Vaelio busses in the backside of the station and HTM trams in the front, one might find himself searching the necessary connection by moving back and forth all the time (HTM, 2010).

**Reach**

Figure 4.29 shows the reach ability within The Hague connected to Holland Spoor. From this map it is clear most parts can be reached in a single connection by public transportation.

![Figure 4.28 Public transportation routes and stops Holland Spoor (top), including a busy crossing (right) and separated bus network located on the back side (far right) (Google maps, 2010).](image)

![Figure 4.29 Reach ability from Holland Spoor in to The Hague (Koeling, 2010).](image)
Cars
There is a long lane for taxi’s available and main car route (part of the city centre ring of The Hague) passes by the station, however the infrastructure layout makes for a dangerous environment. Lack of lights and an inconsistent structure for mobility creates dangerous surroundings, with a car/cyclist/tram crossover and no traffic lights (fig.4.30). Rijswijkplein is also considered to be problematic in terms of clarity, where drivers have to carefully choose their route before taking a wrong turn.

Slow traffic
From East to West directions bicycle lanes connect to the station with a passage cycle route under the train tracks connected to the South of the station towards Rijswijk (fig.4.31). Cyclists have the opportunity to use parking facilities for a specific price and the public transportation bicycle is also available, however caution is necessary ones entering the public domain of infrastructure, where safety lacks on many levels. Bicycle parking facilities can only be accessed by first moving outside. The mobility infrastructure is unsafe, caused by aggressive driving on the one way lane passing the station (4.30), the bicycle lane vastly changing position and therefore lacking continuity and added is the large amount of HTM trams moving over the frontal square. There is too much movement going on ground level that safety is an issue, not to mention the unpleasant and dangerous environment created in front of the station by nightfall.
For pedestrians the tourist maps indicate walking a straight line from the stations’ exit leads you to the city centre, this does not come clear after a minimum 10 to 15 minute walk. Clear enough is the public transportation transfer, right in front of the station. The back side of the station has a totally different view, where the public space has a modern layout surrounded by large corporations and connected to the Haagse Hogeschool.

Also in walking distance are the Megastores and the new Mondriaan College at the Leeghwaterplein.

**Built and public space**

Apart from several characteristic features (fig.4.32) such as the attractive main building of Holland Spoor (A) which brings cultural historical value to the area, The Strijkijzer (B) and the availability of a near by park (3), the frontal layout of Holland Spoor includes very unappealing closed of surroundings, including shut down buildings on the list to be renovated/demolished and small scale shops run by local inhabitants with mostly mixed cultural backgrounds (fig.4.34).

The green surroundings (fig.4.33) are limited, including some private green (2) and the large Huijgenspark which is however completely isolated (3).

The back side includes a variety of large corporations in large buildings. There is however an appealing layout of built up area and water, with water integrated within the public space surrounding the Haagse Hogeschool (D) and the availability of quality functions such as Megastores (C).

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**Fig.4.32** Most characteristic elements surrounding Holland Spoor, including The Hague University (D) (middle left), Strijkijzer (B) (bottom right) and Megastores (C) (bottom left) (Google maps, 2010).

**Fig.4.33** Green surroundings Holland Spoor (top) with a large but isolated Huijgenspark (middle, nr.3 in 4.32) and semi-private green space (bottom, nr.2 in 4.32) (Google maps, 2010).
There is a clear difference in style, program and layout between the two sides of the station (fig.4.34) with Laakhaven being the much improved quality metropolitan area the station requires bordered by railway from the low quality frontal station area (fig.4.35).

Fig.4.35 Frontal view Holland Spoor (top, nr.1 in 4.32) and back view Holland Spoor (bottom, nr.4 in 4.32) (Google maps, 2010).
Development

Although for the developments in and around Holland Spoor are still in a planning stage, some areas have been the subject to change resulting in the following program (fig.4.36):

1. To accommodate people for storing bicycles 2,000 new storage possibilities will be created, with 1,000 on the Laakhavenside and 1,000 on the city centre side. Also the amount of public transportation bicycles (OV-Fiets) will be expanded.

2. The Waldorpstraat directly connected to the station on the Laaksheide will be transformed to accommodate the traffic flow.

3. The connection between the Stationsbuurt and Laakhaven will be improved for slow traffic.

4. The Stationsplein will be improved for slow traffic to create a safe area for all flows of transportation.

There are however no design solutions available yet for the previous three areas.

5. Rode Dorp, redevelopment housing.
6. Offices
7. Mixed functions (horeca/living)
8. Mixed functions (detail/catering/leisure/living)
9. Hotel de Margadant
10. Sigma location
11. Duwo Towers (living/offices)
12. Mondriaan fase 2/public space (offices/parking)
13. Bus platform, no design solutions available yet.
(The Hague Municipality, 2010)
5. Conclusions

Theoretic framework
To increase bicycle mobility among people, all the necessary ingredients for a cycle structure are required to gain the attractiveness for cycling. The level of availability could persuade people to pick up the bicycle more. From tradition Holland has been and still is an ideal country for cycling considering the flat layout of the landscapes and next to that covering obvious other advantages such as health, environment and space.

Dutch policy focuses on a variety of developments to help stimulate people to use the bicycle more, by improving the existing bicycle infrastructure, stipulating that the structures will truly function if they are complete. This includes availability of elements such as bicycle storage as well. Past projects, such as the demonstration project in Delft, proved that by recognizing missing links within the individual cycle program by exploring several scale levels. By providing new links, including bridges, missing links were solved in a costly matter however the incompleteness of the structure did meet the goals of the community. Houten focused on a different perspective by making residents the most important element of the community and having the cyclists become the primal traveling device within the design. The less interference from motorized transportation created a successful bicycle city.

With the complete infrastructure cycling becomes more effective when the main routes for cycling become safe and secure cycling facilities are close by, such as cycling storages. By exploring new developments such as the bicycle highway longer connection from city to city are possible and the cheap transfer methods of bike sharing methods are helping the use of bicycles more as after transport. On the long run however the latter will not diminish traffic congestions. The effects on car use are slim. People are unlikely to change their method of transportation only based on infrastructure improvement.

Location research
Haaglanden includes a large variety in terms of functional space. The main urban textures lay within The Hague, connected to Rijswijk with a surrounding green barrier. Also business is mainly located in The Hague. The future shows a steady amount of development taking place, where housing and business and green connections will dominate The Hague. In the prospects some of these developments/plans take place around the transfer stations, specifically the metropolitan stations as Holland Spoor, including potential for commuters, internationals and youth. The amount of business areas and offices are large surrounding the two main stations Holland Spoor and Central Station.

Mobility analysis
The Hague is the most important city of Haaglanden where commuters come and go on a daily basis. In early 2008 the regional employment included 530,000 jobs with 30% of this amount living outside the region. Due to the location of government and other non-profit instances in The Hague and surroundings a lot of incoming commuters travel to this region (approximately 110,000 persons per day). With the road network already heavily clogged up the increase of employment in the future could result in extensive problems for traveling if the necessary adjustments aren't made.

Car routes are the main issue when it comes to mobility. The main highway (Utrechse Baan) is the access of The Hague, but is a very busy road. This is where traffic congestions happen on a daily basis. The development of the expansion of the A4 would have a positive effect on the connection from The Hague to Rotterdam and vise versa, but they both still end up at the Utrechse Baan, which makes the public transportation system of high importance.

Haaglanden includes a large variety of mobility with the public transportation having good connections on all scale levels. The two airports can be reached by train and/or metro in one straight connection and the communities within Haaglanden can also be
reached by the different public transportation methods. The transfer hubs on their own have trouble to be reached with Moerwijk and Mariahoeve being the two local stations with very little connections. Future developments of upgrading existing tram routes create a faster connection towards Scheveningen, connecting to all zones in between.

The bicycle network is expanded, but when it comes to a good connection to the newly formed transfer zone, some stations (such is the case of Holland Spoor) have an unclear route or are missing links, as discussed in previous chapter. The realization of new routes would have large improvement to bicycle infrastructure, but there are some missing links within the structure. The development of the Traffic Circulation Plan will create more potential for the bicycle to play an important part of the city.

In terms of important connections the bicycle routes display lower results then public transportation. Clarity in a continuous route, specifically around the transfer hubs is important as well as including all train stations to promote faster connections and transfers in commuting.

**Transfer hubs research**
The train stations of The Hague play their parts in terms of connection on their own level of scale. The research clearly shows differences between the local stations and the metropolitan stations in terms of program, usage, size and reach. The Hague Central Station has a good layout towards the surrounding elements. It is on walking distance from the main shopping centre of The Hague, public spaces such as Plein and the Malieveld (on which numerous activities take place) and cultural spots such as Binnenhof and Mauritshuis. The space in front of the station has been arranged to create an open view, so the station is visible from further distances, with a close proximity of green spaces (Cow camp and Malieveld).
The Hague Central Station functions well, because of the variety of transportation placed on different levels, with an underground tunnel for cars and with train, metro and HTM trams connected to the station on ground level and the Randstadrail and Vaelio and HTM busses connected to the station on the first level (busplatform). Although the budget of The Hague could not realize the large ‘M’ shaped building in front of Central Station, it is clear that the city is highly determined to invest a lot in the metropolitan station to further develop The Hague in becoming a World city at Sea. Holland Spoor however is lacking in its qualities as metropolitan station area. Although connections are excellent within the city, the spatial quality is poor in the Stationsbuurt. It is this district, contrary to the metropolitan qualities on the Laakhaven side, which is the main entry point of The Hague from Holland Spoor. Hazardous mobility crossing points, unattractive public space and unappealing built areas can be found in here. The area does show potential however, including the quality of historical main building of Holland Spoor and green spaces (Huijgenspark) not being used to their advantage.
Part 3:
Concept & Design
Part 3 will discuss the vision for Holland Spoor in chapter 6 with the required design criteria. Chapter 7 will discuss the final design for Holland Spoor in full detail related to public space and mobility.

This chapter will help answer the following research questions:
- How can Holland Spoor be improved as transfer hub for commuters transfers between public transportation and cyclists?
- How will an improved mobility network help shape the public space of Holland Spoor?

The design has been realised by way of mapping and 3-D imagery.
6. Design (vision)

The vision will show the main elements that need adjusting for the station area to come to a finalized design for Holland Spoor.

Vision

Based in the previous research conclusions on spatial arrangement, mobility and transfer hubs, the main points for the vision of Holland Spoor include:

- Keep the existing mobility connections from and to the station area and improving safety features to accommodate slow traffic.
- Make better use of the green/blue qualities and expanding them.
- Improving the connections between North and South of the station.
- Improving the spatial qualities of the station area in terms of functions and architecture.

It is important to have the existing connections in the design, because the metropolitan train station requires good connection not only by train product from an international, national and regional perspective, but also from local point of view to be able to reach the entire city of The Hague easily. It helps maintain the intensive usability of the station.

It is however necessary to create safe connection, where slow traffic gets a quality impulse. The current situation provides very little at the station square and Rijswijkseplein where dangerous situation can occur.

There a good quality green spaces and blue connections available throughout the region which can be served a higher purpose in the realization of good quality urban space, that is appealing for destination travelers. People require good green spaces,

Connections between Stationsbuurt (North) and Laakhaven (South) is important to have the two different styled areas come together (fig.6.2). The barrier of the railway isolates the quality zone of Laakhaven from the main entry to the city, which is Stationsbuurt. The connections should be realized not only by better mobility connections, but also by the quality of the two different spaces in terms of arrangement and architecture.

Stationsbuurt is currently a problem area with a poor quality style spatial and built arrangement, but it also is the main access point to the city when entering The Hague at Holland Spoor. The image it presents should represent the city and the metropolitan station area it deserves. Laakhaven is not directly visible, but contains a high quality metropolitan space. The two areas should be shaped as a united metropolitan quality area, where space and architecture is required to be of high priority within the Stationsbuurt. With that comes the development of an attractive and safe station square in front of the beautiful main entry building of Holland Spoor.
7. Design (final)

This chapter includes the final design for Holland Spoor. Based on the conducted research and analysis and the realized vision for Holland Spoor, this chapter will further explain in detail of the content of the design including spatial arrangement and mobility for the new metropolitan station area Holland Spoor.

The purpose of the design was to create a complete metropolitan station area which unites Laakhaven with the poor quality Stationsbuurt, including adjusted mobility connections for cars, public transportation and road traffic with the emphasis on slow traffic to not only create a good functioning transfer station, but also to provide a good quality area for residents, business and tourism.
7.1 Built space
For the design (fig.7.5) some of the planned buildings for the station area as part of the redevelopment plans by the government will be added (fig.7.3 and 7.4), including the two DUWO towers in the West next to the railway, the newly designed building for the Sigma location next to the Strijkijzer and the added function of the hotel, the latter being relocated however.

To provide for a metropolitan space such as the case in the South side of the station (Laakhaven area) the North side will also feature more high-rise built space to improve the quality of the metropolitan station area. Another demand for the design area was to have most of the cultural historical buildings unharmed. These buildings are a very clear representation of Dutch history and are of high importance to our cultural heritage. They also create a clear visible flow between metropolitan space into surrounding suburban neighborhoods.
The buildings for the design are shaped in a composition based on the existing built environment (fig. 7.6 and 7.8). The hotel is located in the West frontal location of the station (fig. 7.8 and 7.9), easily visible for visitors to the city. The curved shape of the hotel is based on the oval buildings in the surrounding area, including the atrium of the Haagse Hogeschool, the oval residential building on the East frontal area of the station and oval residential building North of the Huijgenspark. The curve shape of the hotel also reflects the Croissant building in the North side of the area, the reason why the hotel is an oval shape. The hotel design is inspired by Hotel Bellagio in Las Vegas. The two towers symmetrically placed in front of the station, which will include business related functions, are mirrored reflections of the two buildings at South side of station. The two new towers also signify the location of Holland Spoor from a further location as part of the skyline of The Hague.

The buildings in the center of the design are reshaped, creating a new public square (fig. 7.6 and 7.7). In the center a passage for pedestrians is added for a straight connection towards Huijgenspark, creating a symmetrical shaped building Block. Added are a Total of seven flats circling the square. These flats will accommodate the residential demand, including student housing and internationals.
The train station will be completely adjusted on several levels, but with the main building remaining intact, because of its high cultural historical value to the area. For a better connection from North to South and for a connection for arrivals towards the South side the station hallway will be transformed into a passage from North to South (fig. 7.12 and 7.17), including the required shops and catering. Added within the station are tram stops underground and on the First level (fig. 7.16 and 7.17). The existing bicycle passage at the West side will be broadened for cyclists and pedestrians. To strengthen this connection between North and South, the passage will have a more appealing entrance on both sides of the station by way of a combined steel and glass curved construction which flow over into the similar roofing for the tram stop on the North side and the bus stop on the South side (fig. 7.15 to 7.20). The construction on the South side over the bus/taxi stop is a Santiago Calatrava inspired construction, based on the Liege Guillelmus train station (fig. 7.18). In it is room for café's, waiting areas for busses and a parking facility for Greencars.
Fig. 7.15 New front facade Holland Spoor (Koeling, 2010).

Fig. 7.16 New back facade Holland Spoor (Koeling, 2010).

Fig. 7.16 Section through passage Holland Spoor (Koeling, 2010).

Fig. 7.17 Section through station hall Holland Spoor (Koeling, 2010).
Fig. 7.18 Inspiration for the back side steel/glass construction for Holland Spoor, the Liege Guillemin train station of the Spanish architect Calatrava (Wikimedia, 2010).

Fig. 7.19 Steel/glass construction over the bus/taxi stop including waiting areas and Greenwheel vehicles (Koeling, 2010).

Fig. 7.20 Entrance bicycle passage front side (Koeling, 2010).

Fig. 7.21 Entrance bicycle passage back side (Koeling, 2010).
An extra feature is the daycare center (fig.7.22) located between the existing oval residential buildings and the new tower in front of the station. The location within green settings makes for a good function for children surroundings and can easily be used by people who have to commute and leave their children at the transfer point.

In terms of extra architectural features an entrance to the new underground parking facility and tram stop (fig.7.23) is created in the center of the main route straight from the train station (chapter 7.4). Also added is curved roofing for the taxi stop in front of the station and the over the new underground bicycle storage facility. For the frontal facade of Holland Spoor this creates a flow of curved features flowing from taxi stop to the bicycle storage ending into the new arched modern entrance of the bicycle passage surrounding the classical architecture of the main building of Holland Spoor.

And in terms of maintaining the cultural historic features of classic facades of the shopping street next to the new large hotel at the Stationstraat, a Haagsche Bluf quality has been added where a building block with a glass facade has been placed behind the existing classic facade of cultural historic buildings (fig.7.24).
7.2 Functions

With the new buildings added within the design, including a hotel, two business towers and residential flats, the area will also be expanded in functions to create a more functional and attractive urban area (fig. 7.26). With area already including a large number of shops (with most of them boarded up for some time already) the shopping functions will be expanded including the new square in the center of the plan area and the Huijgenspark. Catering will also be added to create a more appealing night life experience, including bars and restaurants at the station square and square located in the center. Shops and catering will also be added within the train station to accommodate travelers such as an Albert Heijn To Go.
7.3 Green/blue

The expanded blue connections are based on larger scale layout of the blue structure, where the canals end at Schenkkade and will continue within the design of Holland Spoor. The water moving in front of the hotel is a reflection of the water structure within the area of the Haagse Hogeschool (fig.7.29). The existing small green park is expanded passing the newly shaped building Block in the center. Added is an expansion of the tree Lines including improved connections towards other existing green areas.
7.4 Mobility
Based on the vision for Holland Spoor the final design and the requirement for urban station areas to include a large amount of connections to the station, all connections will remain available for cars, public transportation and slow traffic. One of the most important demands for the station area in terms of mobility was, next to the availability of connections, creating more safety at selected hazardous cross points, as discussed in chapter 1.3.4. To clarify the changes made for the station area the following sub chapters will discuss all mobility possibilities from and to the station.

Cars
A large area has been created in which cars are restricted (fig.7.31). Destination traffic throughout the area will be redirected surrounding this slow traffic friendly space. The present busy car route in front of the train station will be moved underground to still provide a connection for ongoing traffic. Because of the excellent location of the taxi parking space next to the station, the space will remain for taxi’s including a Kiss & Ride location. This space will be enlarged to accommodate a larger amount of vehicles and will noticeable by way of a mirrored projection of the roofing for the bicycle parking facility in the frontal West side of the station. Also a new underground parking facility is created under the hotel to provide parking space for people staying at the hotel and people working in the area. The access of the parking facility is on the North side of the hotel. An added entrance/exit for people

Fig.7.30 Car routes old situation (Koeling, 2010).
Fig.7.31 Car routes new situation (Koeling, 2010).
Fig.7.32 Inspiration main entrance car park, bicycle parking entrance Eindhoven (Europa, 2010).
is located in front of the train station on the newly shaped square. The entrance will be an architectural element for the area (fig. 7.32).

On the South side of the train station the previous two car lanes both on different levels (one on the same level as the station entrance and one on a higher level) are limited to a singular car lane on the higher level for ongoing traffic. This creates a safe space for slow traffic passing by the station entrance. The car lane moves over the station passing the train tracks. The space between the car lane and the railroad (previously a small parking space) will include the planned bus platform, including three lanes. The outer lane is the car lane for ongoing traffic between East and West, the centre lane will include a taxi stop and Kiss & Ride location and the inner lane includes the bus stop.

**Public transportation**

As provided for the car route in front of the station the passing tram routes are also moved underground (inspired by the tram tunnel of The Hague (fig. 7.35), where more safe space is created for slow traffic). Because of the variety of public transport connections from and to the station (chapter 4.2.2) some trams will be redirected next to the trains (the trams coming from the West entering the station area on the higher level, as discussed in chapter 7.1). This will make it possible for people to enter the tram stop from within the train station. To execute this, some of the existing train platforms will need to be narrowed seeing that there is limited space provided between the existing train...
railway and the main building of Holland Spoor making it possible for only a singular tram connection to be placed. This means that the trams coming from the South entering the station on the lower level will not be entering the station next to train railway, but will coming in underground creating a two level tram stop, one underground and one on the First level next to the trains.

The trams 11 and 12 which will be moved underground in front of the station will have a shared entrance with the car parking facility entrance.

The bus stop is moved to the bus platform as discussed in the topic cars.

The mobility diversity next to one and other within the station provides a good overview easily reached when transferring to different transportation.

**Cycling**

The previously discussed mobility changes for cars and public transportation creates more space for slow traffic including cyclists. The routes for cyclists will be expanded (fig.7.37) and clearly marked to avoid confusion amongst travelers. To avoid collisions with pedestrians coming out of the station a small part of the bicycle paths will be lowered so pedestrians can easily move over cyclists by way of bridges. On both sides of the train station underground guarded bicycle parking facilities will be provided to create more space for cyclists traveling to the station, but also from the station by expanding the amount of Public Transportation bicycles. The style of the
parking facilities is inspired by the facilities at the central station in Groningen (fig.7.38) where curved roofing tops the facility with large holes expanding visibility into the storage. The storages can be entered on both sides of the station (from bicycle tunnel and from within the main station hall). In front of the taxi stop in front of the station an extra underground bicycle storage is created.
Extra parking facilities are placed at the station square for people visiting the area.

Pedestrians
Pedestrian have a larger area to safely walk around. The new squares create more free space and are designed in a composition based on the new built area (fig.7.39). Huijgenspark remains intact by shape and arrangement with more shopping functions added in the surrounding buildings. Through the passage the first square includes shops and catering and access points to the new residential buildings (fig.7.43). Also included is partial roofing from Poly-Ned (fig.7.42 and 7.43), designed to cover the square to create freedom in activities (such as markets and live shows) with less interference from weather, which can be taken down leaving only the main poles with the lighting in between.

From this square a broad pedestrian route (including the bicycle route) leads to the station square (fig.7.40), including a lively area for businesses and visitors with new functions including the hotel, office buildings and catering functions with terraces. The inspiration source is of the square located in front of the old city hall building in Rotterdam where a lively catering inhabitant square maintains excellent visibility on the classic city hall building (fig.7.39). For sections of the main pedestrian routes see figures 7.44 to 7.48.
Fig. 7.47 Section 3 (Koeling, 2010).

Fig. 7.48 Section 4 (Koeling, 2010).
Station square.

View from station entrance.

Old situation
View to East of station.

Old situation

View over new centre square.

Old situation
Rijswijkseplein. Overview design

Old situation
8. Conclusion

This thesis report addressed the problematic increase of traffic congestion within The Netherlands. And although solutions are slim, the use of alternative methods for travelers, specifically commuters, could provide the solution our overcrowded country is looking for. Investing in train stations is something that is already being done and with the development of the Stedenbaan, specific stations within the Randstad including the spatial arrangement surrounding these stations are the main ingredient to stimulate the use of public transportation and better develop these areas. Public transportation and cycling are good alternatives if the necessary elements to operate them as good as possible are available.

From the two metropolitan stations, Holland Spoor proved to lack on a variety of fields, such as dangerous crossing points and an unappealing public and built space. The design realized for this graduation project aimed to make better use of the station area of Holland Spoor by providing what is required for a metropolitan station: good connections from and to the station, architectural elements and good quality urban space.

By way of research of the location and on mobility, the design created for Holland Spoor maintained all existing connections, but by changing the spatial structure to accommodate slow traffic and create new functions in the Stationsbuurt, such as an expanded shopping district with catering facilities. The design aims for the Stationsbuurt to connect to the Laakhaven area on a spatial structural approach, but also by changing the station to create better physical connections from North to South.

Although it is clear, that the mobility issue in The Netherlands can not be solved by a singular solution we should take into consideration that by making better use of what we already posses, in this case transfer hubs, could have better results on the long run.


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**Figures**

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