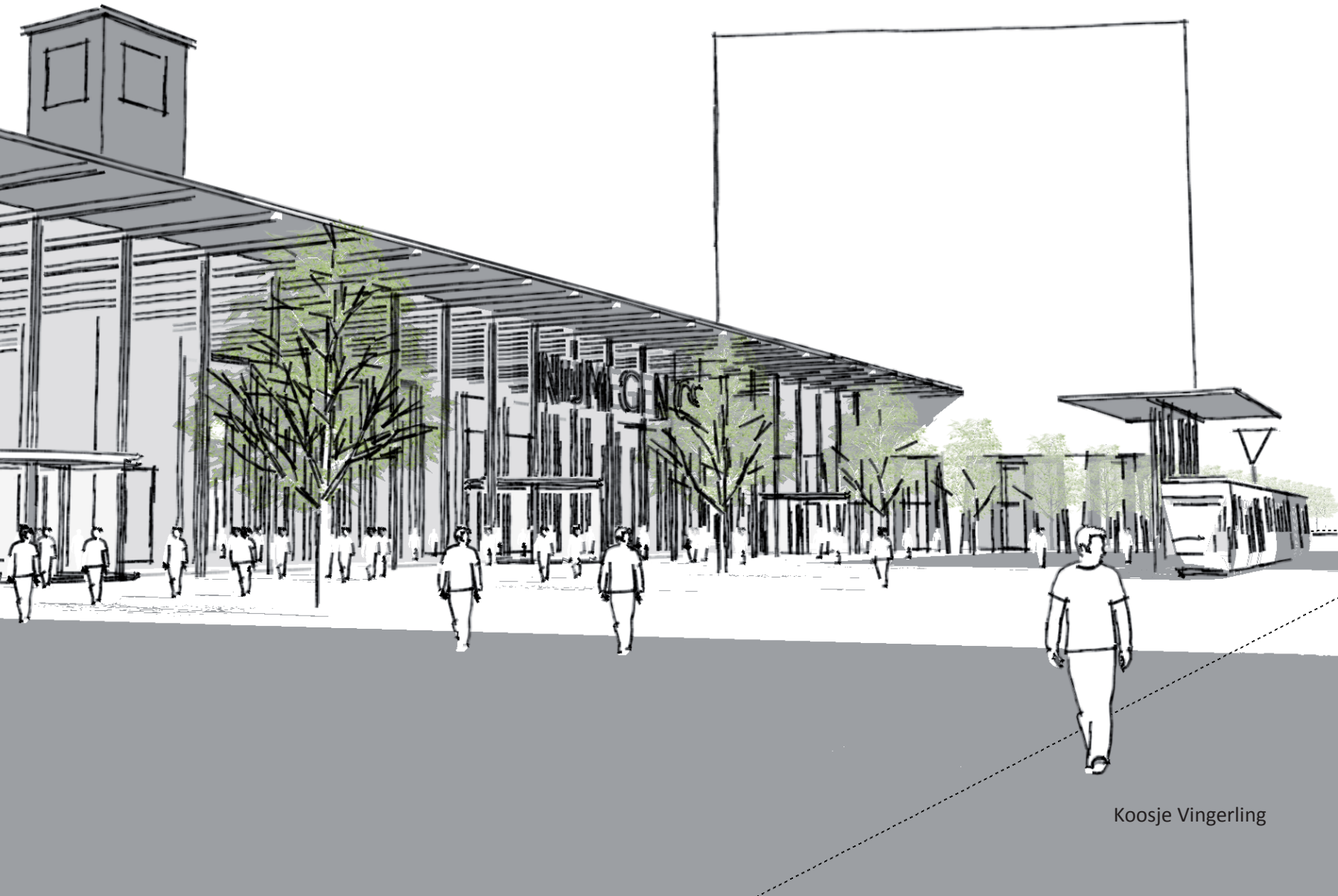


# NIJMEGEN CENTRAAL

A new concept for the Dutch railway station environment of Nijmegen



Koosje Vingerling

**NIJMEGEN CENTRAAL:**

A new concept for the Dutch railway station Nijmegen

Koosje Vingerling  
koosjevingerling@hotmail.com  
1169831

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MSc 4 Urbanism Graduation Lab (AR3U100)  
Departement of Urbanism  
Delft University of Technology

**Mentor team:**

Ir. W.J.A. Hermans - Urban Design  
Dr. arch. A.M. Fernandez-Maldonado - Spatial planning & strategy  
Ir. L.P.J. van den Burg - Urban compositions

Ir. W. Willers - External mentor

# NIJMEGEN CENTRAAL

A new concept for the Dutch railway station environment of Nijmegen





This is the final thesis for the graduation project of Urbanism. During one year I have been working on the railway station environment of Nijmegen to make a design which increases the accessibility, spatial quality and identity of the railway station environment.

Railway station are fascinating parts of the city, often crowded with people and located in the centre of the city. All the ingredients are there for a dynamic, attractive and vital part of the city. But I was always wondering why railway stations are not the core of the city in terms of business and leisure activity. Why does it seem so hard to create a railway station environment which is the most lively and attractive place of the city? It is a very accessible place where thousands of people come and go every day but the quality of the public space is always very bad. The places are often windy and cold and people do not like to hang around on railway stations.

Therefore I set myself the objective to search for a new concept for a railway station in the Netherlands in such a way that it would become an attractive and vital part of the city again.

This graduation project started as an internship by Movares. The formal engineering office of the Dutch Railways seems to be the best place to start designing a new railway station for Nijmegen. During this graduation project I have learned a lot about the way the different actors are involved for making an urban design proposal for a railway station, and also why it is so hard making a attractive railway station environment.

Second part of the graduation project is done on the TU Delft. I am very grateful for the help, support and advices of my mentor team.

Willem and Leo for their help and advises during the design process, pointing out elements to improve and Ana Maria for her support on the theoretical part of this project and her mental support during the hard days.

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Finally I have to thank my family for their support and last but not least I would like to thank Jules for his endless support and help during this year.

Thank you all so much!

Koosje Vingerling  
5 april 2011

Previously railway stations were seen as a traditional point of arrival and departure. Now the railway station becomes much more a junction between various systems of traffic flows and transport, but also an attractive part of the urban fabric, richly equipped with shopping and other facilities (Ferrarini, 2004). The stations metaphorical definition as an urban gateway to the industrial city is being replaced by its new description as a square for social interaction (Paganelli, 1999, p.1). Its central position in a large network, makes a railway station both an accessible node and place for many different people (Bertolini and Dijst, 2003).

Unfortunately in many Dutch cases the railway station environment is not developed so far. The railway station is not very often an attractive part of the urban fabric yet and therefore frequently a desolate area in the city.

The new role of modern-day railway stations is part of the reorganization of cities, focusing on the quality of public spaces as a response to the demand for greater community participation in urban life. The railway station as new landmark of urban life (Paganelli, 1999, p.4-6)".

This thesis aims at developing a new concept for the railway station and its environment in Nijmegen. The focus is on the public domain in and around the railway station located at the urban fringe of the historic centre of a medium-sized Dutch city. The case for this graduation project is Nijmegen. It is the aim to improve the accessibility, spatial quality and identity of the public space and public interior of a railway station environment.

The main research question of this graduation project is: *How can we improve the accessibility,*

*spatial quality and identity of the railway station and its environment in Nijmegen?* The answer to this main question is presented in the form of an urban design for the railway station environment in Nijmegen.

Elements that contributed to the development of this urban design are:

1. *Literature study* on the work of famous authors in the field of the relation between social activity and the quality of the public space and public interior. The literature study resulted in two lists of criteria for designing public space and public interior.

2. *Analysis of Nijmegen* to define the strengths and weaknesses of the public space and public interior in the railway station environment. The lists of criteria are used as structuring elements for the analysis.

3. *Case study research* to three comparable railway stations in the Netherlands. Again the lists of criteria are used to define and accentuate recommendations for the design of Nijmegen.

## 1. Literature study: part B

The aim of the literature study was to find spatial criteria that contributed to social activity in public space and in public interior. The general findings of the literature study are used to define elements in the public space around railway stations and the public interior inside the railway station. It is concluded that social activity in the public domain is depended on:

1. Location
2. Diversity
3. Safety
4. Composition

## Necessary activities

### 1. LOCATION

Accessibility of the location

- Regional accessibility
- Accessibility by bus, car, bicycle and pedestrian
- Link between railway station and city centre

## Optional activities

### 2. DIVERSITY

- Mixed use (more than 2 primary uses)
- Density of the railway station environment
- Mixture in building type (more than 2 types)
- Human scale (ratio built-open)

### 3. SAFETY

- Use of the plinth
- Traffic safety for pedestrians
- Pattern in opening hours

## Social activities

### 4. COMPOSITION

- Sitting places (integrated and furniture)
- Sightlines
- Illumination
- Edge zone
- Positive sensory experience (trees, plants, water)

### Necessary activities

#### 1. LOCATION

- Lies on an urban pedestrian route
- Logic of the flows of people
- Entrance (width and location)

### Optional activities

#### 2. DIVERSITY

- Mixed use (more than 2 primary uses)
- Human scale (width and height)

#### 3. SAFETY

- Transparency of the facades
- Pattern in opening hours

### Social activities

#### 4. COMPOSITION

- Sitting places (integrated and furniture)
- Availability of daylight
- Edge zone

All four main criteria are subdivided into more specific sub criteria (see table) for public space and for public interior.

#### 2. *Analysis of Nijmegen: part C*

For the analysis of Nijmegen the list of criteria for social activity in public space and public interior are used to define the strengths and weaknesses of the railway station environment of Nijmegen. The conceptual framework is used to structure the analysis and to define clear design goals.

#### 3. *Case study research: part D*

A case study research is done to three comparable railway stations in the Netherlands: Leiden, Den Bosch and Amersfoort. The cases are chosen because of specific developments. In Leiden the public interior works quite well, Den Bosch has a successful development on both sides of the railway station and Amersfoort is working very hard on making a multifunctional railway station environment. The cases are researched with help of the list of criteria for public space and public interior to find elements that can be useful for the design of the railway station environment in Nijmegen.

#### 4. *Design proposal: part E*

The main research question asked to improve the accessibility, spatial quality and identity of the railway station and its environment in Nijmegen. All the results of the previous parts are used to define a clear design concept for the railway station environment of Nijmegen. It has been proved that a multifunctional railway station environment with the railway station as essential link between both sides of the railway is a successful solution for Nijmegen. It is important for the liveliness on ground floor and the quality of the surrounding public space

that the emphasis in terms of activity lies in the wings of the railway station. The relation between the public interior and public space is an important condition for a successful and lively public domain. Finally the identity of the railway station environment is increased by strengthen the historic characteristics of the location and finding architectural elements that contribute to a railway station that will function as new landmark in the city!

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part A

# Introduction

Problem field  
Project aims  
Research questions  
Methodology  
Relevance & disciplines



Figure 1.1: Roof of Berlin Hauptbahnhof (Flickr, 2010)



### 1.1 Introduction

The construction of railways and stations was an important moment in urban development, because they marked a new era in urbanization. Railway traffic made it clear for everyone that the new era was connected with an improvement in technological development. Travelling times decreased and out-of-the-way villages became more accessible. While the ancient fortifications opened to the world and started to expand, the new railway traffic introduced new elements like railway embankments and crossovers. The stations were considered as the monuments of this new era. With their squares they formed new centers of urban development compared to the historical city centers (Van Duin, 2008). During the short history of railway stations in cities, there have been some changes. Not only the location of the railway station in relation to the city but also the character of the station in the city has changed a lot. In the past stations were considered as monumental, civic buildings. Nowadays another type of building is needed and the relation with the urban fabric around the railway station plays a more important role.

The understanding of the changing character of the railway station in time, is elaborated in the following part. After that the development of the Dutch railway station over the last 150 years will be explained because the case for this graduation project is the Dutch railway station Nijmegen. Finally the main available theories about the network city are elaborated to understand the abstract approach of railway stations as nodes and places in a larger network.

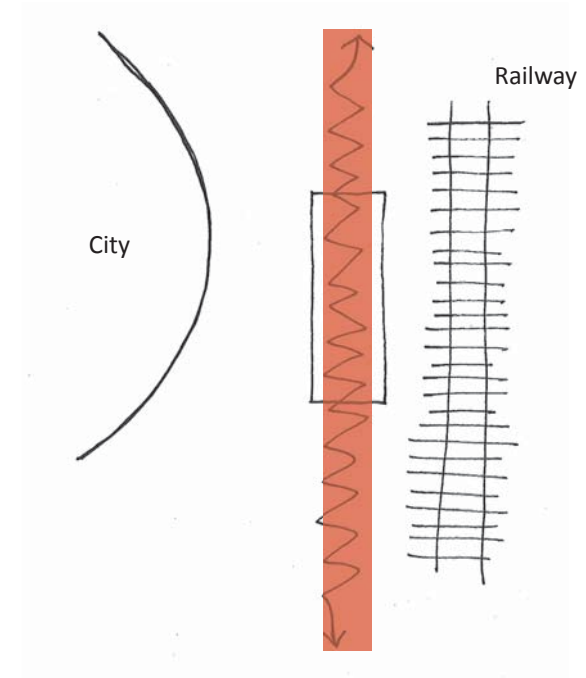


Figure 1.2 Example of the first railway station in Great Britain (Ferrarini, 2004, p. 7)



Figure 1.3 Berlin Hauptbahnhof, example of multifunctional railway station (Flicker, 2010)

# 1 PROBLEM FIELD



Railway station as filter between  
the railway and the city

*Figure 1.4: Railway station as filter or boundary between the railway  
and the city (made by author)*



*Figure 1.5: Stuttgart 21, Arnhem CS and Euralill (2010)*

## 1.2 Changing character of the railway station in the city

For many years, railway stations were considered as the ‘monuments’ around which large modern cities developed, structures that reflected the nature and embodied the characteristic features of their urban location (Ferrarini, 2004, p.5). Railway stations were a new and unfamiliar type of building in the city structure. From the earliest days the station consisted of two conjoined parts. The train shed, which reflected the industrial space of the station and the station building, to receive travelers. The station building was a filter or boundary between the urban fabric of the city and the railway (see *figure 1.4*). The impact of the new railway in the urban fabric was reduced by a station building that was presented in familiar terms. Therefore many of the late-nineteenth-century stations are in a neoclassical or neo-baroque style. The station was a place of transit where two different types of traffic – trains and people – interacted and coexisted (Ferrarini, 2004).

Proust (*source unknown* in Ferrarini, 2004) saw train stations as containing the very ‘spirit’ of the city, just as they were identified with its name on a large platform signpost. These buildings reveal the essence of the city because, to a certain extent, they are the mirror of it; their size and structure reflecting many characteristics of urban existence and life (p.5). Besides this, train stations are also an expression of the architectural and artistic trends of the period in which they are built, sometimes even the most significant expression of such trends. In the late nineteenth and early twentieth century, the representative role of the station was performed by a large building which fronted that functional structure.

According to Ferrarini (2004) the railway station is an urban monument to progress; a gateway to the city, it is also a machine in its own right, the place where traffic is *in actu* (p.5).

As said before the station was a new type of building in the city and the debate is still going on to find a language of architectural form that would reflect the specific character of this type of building. In the late nineteenth century, during the Second Industrial Revolution, the flows of people using the train increased. The area which divided all the people to the platforms was not only an entrance to the train but became also a kind of street with shops and services for passengers. These were the first attempts to establish other facilities around the railway station, not only for economic purposes but also to make the relation with the city stronger. To create an urban promenade that would function as an attractive public meeting-place.

In the decades after the Second World War, other forms of transport like cars and air planes became competitors for the train. Not until the 1980s, railway stations got a new interest as significant urban locations. This has resulted in a common new view: first it was seen as the traditional point of arrival and departure, now the station becomes a junction, an interchange of different means of transport, which might also serve to meet a variety of other needs (Ferrarini, 2004, p.10). This idea has been elaborated further and now railway stations are often used as the centre for the reorganization of its surrounding area because they are located on the junction of many different kinds of traffic.

The new stations, introduced because of the high-speed train, are often seen as a place to

pass through; the waiting rooms are replaced by shopping areas or by zones in which waiting is nothing more than a brief pause. New projects like Stuttgart 21, Arnhem and Euralille (*figure 1.5*) show all one basic idea: the railway station can be seen as a junction between various systems of traffic flows and transport, but the station is also an attractive part of the urban fabric, richly equipped with shopping and other facilities and therefore attractive for a variety of different people.



# 1 PROBLEM FIELD

## 1.3 Development of the railway station in historic Dutch cities

The previous part described the development of the railway station in Europe and America from the early nineteenth-century until now. This part explains the development of the railway station in the Dutch city. How did the railway station changed over time and what influences contributed to the current problems and potentials of Dutch railway stations?

In 1839 the first railway line in The Netherlands was opened between Amsterdam and Haarlem. Because the relatively small cities were all walled, the railroads were kept outside the city. The advantage of doing this was that there was no direct confrontation between the historical city and the new means of transportation (Cavallo, 2008, p.32). *Figure 1.6* shows the location of the earliest railway lines outside the walls of the historic Dutch cities. Those railway stations were in the 19th century considered as the new gates to the city.

This typical Dutch case with the railway station positioned at the border of the historic city centre is the subject of this thesis. Therefore the development of the Dutch railway station is shortly described to understand the problem of this project better.

The first railway stations were quite simple, provisional facilities consisting of a platform, some buildings surrounded by a fence and sometimes a wooden shed built across a number of well-organized and easily manageable facilities. Nowadays railway stations are complex structures with railway tunnels and transfer machines where flows of people move around between train, busses, taxis, bicycles, metro, car and tram (Van Duin, 2008).

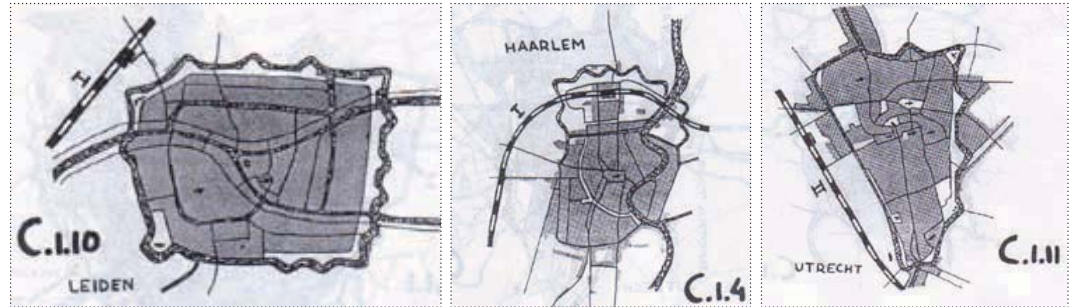


Figure 1.6: Historical placement of railway stations in the Netherlands (Cavallo, 2008, p.36)

In the development of the major railway stations in historic Dutch cities four phases are recognizable. The first phase started at the end of the 19th century. The Dutch Government started around 1880 to build new railway stations in major Dutch cities designed by famous architects. Those new buildings created an improvement of the quality and accommodation value of the railway station environment and an improvement of the transfer possibilities. The design for the Central Railway Station in Amsterdam was very progressive. The platforms are located on the second floor what resulted in an open public space at the first floor for facilities. An important aspects of those 19th century railway stations are the architectonic value of the buildings.

Because of the rise of the individual car, truck, bus and the tram around 1920 and the unfavourable location of the railway station outside the city, the train became less popular. After the Second World War cities grew rapidly, these expansions often enveloped the railway stations to the city (see figure 1.7). In these times the composition of the urban elements, where the railway station was part of, became more important in the design. Also the connection with the city and the recognition of the building got a major priority. The result of

these design ideas was the Central Station of Rotterdam, built in 1957.

In the early sixties the 'umbrella concept' was introduced. After 100 years of façade buildings all the railway station facilities were located below an open roof. Examples of these railway stations are Tilburg and Schiedam. Characteristic for this phase is that the transfer between the various modalities like the train, bus and tram became less important. As a result of this, the quality of the transfer decreased and therefore the meaning of the railway station node for the city and region decreased.

Since the eighties the popularity of the train grew again mainly because of the attention for environmental issues. Main goal for the development of railway station environments was to change their solitaire position in the city. Railway station should become part of the urban fabric and become important urban (sub)centres for commercial development. Hoog Catharijne (central station in Utrecht) is a result of these ideas. Unfortunately this railway station had no clear identity and it worked not efficiently. After this attempt, Den Bosch and Amersfoort are built as more successful Dutch railway stations.

## 1.1 PROBLEM FIELD



Figure 1.7: Example of Delft: development of the city, the railway zone is enveloped in the urban fabric (Van Duin & Claessens, 2008, p.106)



Figure 1.8: Monumental railway station of Amsterdam Central Station, railway station of Rotterdam built in 1957, the 'umbrella concept' in Tilburg Central station and the railway

# 1 PROBLEM FIELD

As already mentioned in the introduction, the case for this graduation project is Nijmegen Central Station. The central station of Nijmegen is a railway station with an important regional meaning.

In the Netherlands six types of railway stations can be distinguished, see *figure 1.9*. This division is made by the Dutch Railways (Nederlandse Spoorwegen – NS), which is responsible for the maintenance and exploitation of the railways in The Netherlands. The central station of Nijmegen is classified as a type 2 railway station. This are railway stations on the fringe of the historic centre of a medium-sized city.

The Dutch Railways recognize the problem that many Dutch railway stations do not fit in the urban fabric and their environment lacks spatial quality (NS Poort, 2010). Therefore the NS has developed a new vision for Dutch railway stations. The main objective of the property division of the Dutch railways (NS Poort, 2010) is to develop railway stations as meeting places of the future (NS Poort, 2010) which means that railway stations should become multifunctional nodes in the city where people can live, work, recreate and travel. This vision follows the international developments of major railway stations on the world as described in the part '*changing character of the railway station in the city*'.

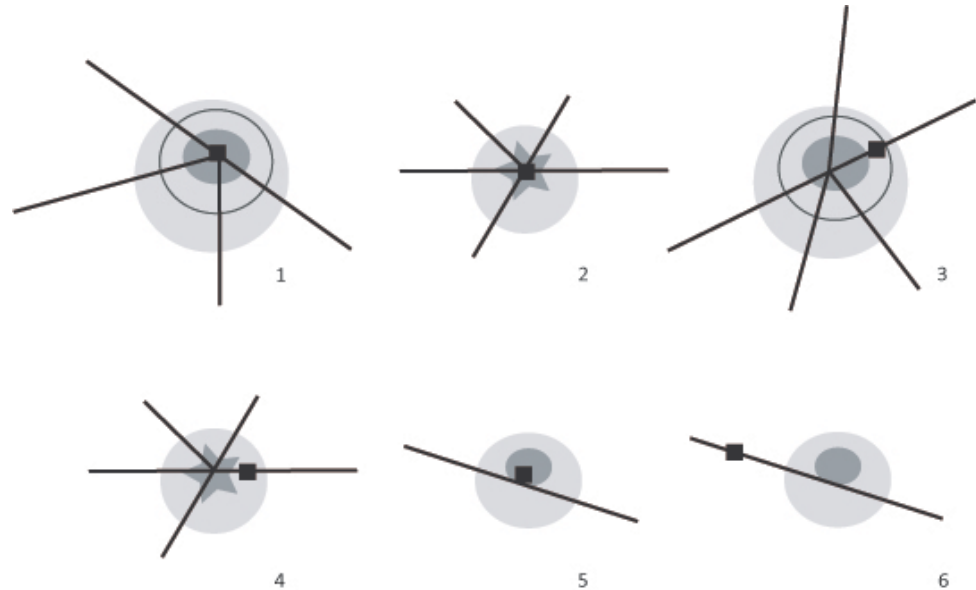


Figure 1.9: Classification Dutch railway stations made by the Dutch Railways (NS, 1999)

1. Major railway station in major city (Amsterdam CS)
2. Railway station on the fringe of the historic centre of a medium-sized city (Nijmegen CS)
3. Railway station in the periphery of a major city (Amsterdam Zuid)
4. Railway station outside the centre of a medium-sized city (Delft Zuid)
5. Minor railway station in a (small) village (Houten)
6. Minor railway station outside the village (Den Helder Zuid)



### 1.4 Railway station as node and place in the city network

A crucial quality of locations like railway stations is their physical accessibility (Bertolini and Dijst, 2008, p.27). If the railway station is accessible on many various scale levels, the railway station will attract a larger group of people and therefore function better.

To understand the way railway stations work in the network structure of a city, we need to understand the theory of the network city. Traditionally a city could be defined as the concentration of buildings around one centre. This definition of a city does not fit the urban development's of the last decades. The notion 'urban agglomerate' represents the reality much better, but relates too much to the centre-periphery thinking, which belongs to the traditional city (Rooij, 2005, p.2).

Nowadays the city consists of several concentrations of economic, social, and/or cultural functions, activities and facilities, which has given reasons to use the notion 'multi-nodal city' (Jacobs, 2000a in Rooij, 2005).

Dupuy (1991) proposed a theory of networks with those nodes in the city as parts. He recognizes three levels of 'operators' of networks that organizes the urban space in the city. *Figure 1.10* illustrates the three levels and the relation between those three. The first level are the physical elements of the network such as streets, highways, cables and so on. The second level are the suppliers of the functional networks which are the networks of production, consumption and distribution. And at the third level the operators are the people in their daily life. They make use of the first two networks to create their personal networks by interpreting possibilities and linking activity places, space

possibilities and linking activity places, space and services (Rooij, 2005).

The three networks come together at nodes. One major example of such a node is the railway station. The railway station connects the (inter) national network with the local network and is therefore an interesting place for development and for people (Bertolini, 1998).

Bertolini (1998) developed the node-place diagram to assess and compare the node and place value of a location (see *figure 1.11*). The notion 'node' and 'place' are derived from Castells work '*The rise of the network society*' (1996). The node is the node function of a connector in traffic networks and infrastructure. The notion 'place' means a specific location with buildings, functions and open space.

According to Van der Spek (2003) this node/place value of a location has nothing to do with the quality of the spatial environment and the organization of a transfer point (p.60). Those dimensions are missing in this theory. So the spatial quality of a railway station environment cannot be measured by this model.

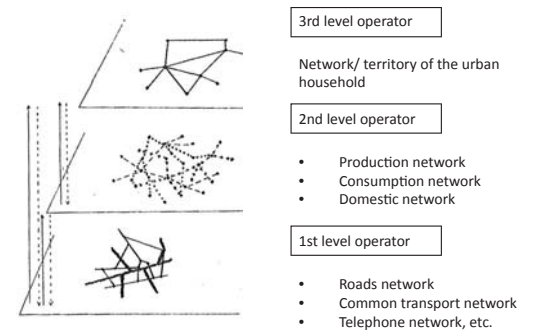


Figure 1.10: Levels of network operators (Dupuy, 1991, p. 25)

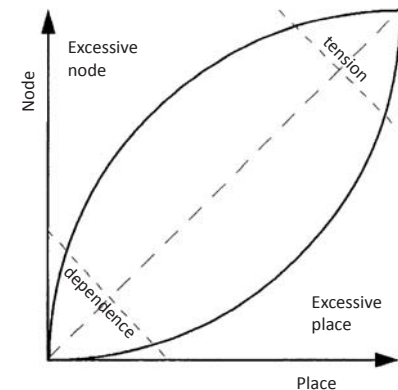


Figure 1.11: Node-place diagram (Bertolini, 1998, p.5)



Figure 1.12: Interior Antwerpen Central Station (Flickr, 2010)



### 1.5 Problem statement

During the last decades, the economic growth of the western world has produced an increase of the mobility of people. Traffic flows between cities have increased since and due to this the pressure on our transport system is growing. Highways have not enough capacity to handle this growth so the train could be a competitive and attractive alternative for the car because of its speed and comfort. Besides capacity reasons, the train is also a more sustainable alternative than the car (Rooij, 2005).

Previously railway stations were seen as a traditional point of arrival and departure. Now the railway station becomes not only a junction between various systems of traffic flows and transport, but also an attractive part of the urban fabric, richly equipped with shopping and other facilities (Ferrarini, 2004). The stations metaphorical definition as an urban gateway to the industrial city is being replaced by its new description as a square for social interaction (Paganelli, 1999, p.1). Its central position in a large network, makes a railway station both an accessible node and place for many different people (Bertolini and Dijst, 2003).

Unfortunately in many Dutch cases the railway station environment is not developed so far. Most of our railway stations are not an attractive part of the urban fabric yet and therefore frequently a desolate area in the city. The following fragment written by Paganelli (1999) reflects the concept of the future railway station very good:

*“The railway station is no longer viewed as a simple urban gateway but as a three-dimensional site serving practical purposes. Although there are still some traces of heroic*

*monumentalism, the idea of a building-machine is being developed with even greater emphasis. Stations will tend to look less and less like they were designed in the 19th -20th centuries: they will no longer have a tightly knit central nucleus, but rather a number of different junctions and intersections. The introduction of the high speed ground transport played a key part in the architectural re-elaboration of railway complexes. It is the tendency nowadays to design stations in the form of intricate urban complexes. The new role of modern-day railway stations is part of the reorganization of cities, focusing on the quality of public spaces as a response to the demand for greater community participation in urban life. The railway station as new landmark of urban life (p.4-6)”.*

Cavallo (2008) also emphasized that the railway station becomes an important symbol of the modern city. According to him the question is whether there is still place for monumental railway stations or for the current design developments where the railway station is considered as a multifunctional building that should fit to the complexity of current life?

This multifunctional building including the railway station corresponds with the ideas of the NS. But how can this idea of the railway station as an urban complex be elaborated? Most of the Dutch railway stations still have the spatial organization of the traditional railway station, which does not fit in the surrounding urban fabric anymore. The quality of the environment does not match with the ambitious ideas of municipality, government and Dutch railways.

The question is how we can improve the spatial quality and accessibility of the Dutch railway station by making a multifunctional building?

The main topic of this graduation project deals with this question. The search for a new type of railway station in such a way that we can improve the spatial quality and accessibility of public space and public interior of the Dutch railway station located at the urban fringe of the historic centre of a medium-sized city.





Figure 1.13: Interior Haarlem Central Station (Flickr, 2010)

Main objective for this graduation project is the search for accessibility, identity and spatial quality for Dutch railway stations and in particular for the Dutch railway station in Nijmegen. The central station of Nijmegen is subject of this project and needs to receive a certain identity and spatial quality. So the objective is to find a typology for a new kind of railway station which fits in the current urban fabric and functions as a landmark for new city life.

The spatial quality, identity and accessibility of railway stations are central themes in this project. In the end the answer to the main research question will lead to conclusions and recommendations for the design of Dutch railway stations in general.

Another important aspect of this graduation project is the search for spatial criteria that stimulates social activities in public space. This information will be used to upgrade the public space in and around railway stations.

Furthermore it is the objective to learn from (inter)national examples of railway stations that fits in their city structure. How are those examples elaborated and organized and how can we use the results in the Dutch case?

But the main objective is to create an accessible and lively railway station environment for the railway station of Nijmegen that fits in the current urban fabric.

# 3 RESEARCH QUESTIONS

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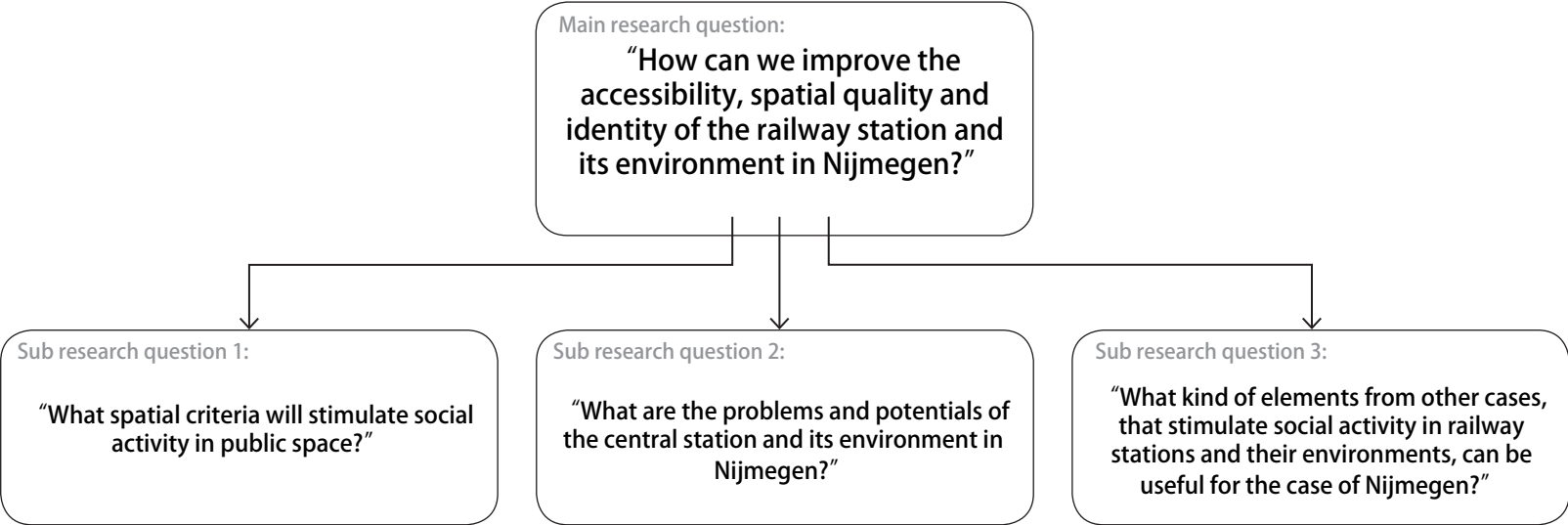


Figure 1.14: Set-up research questions



In this chapter the research questions of the graduation project are discussed. First the main research question is explained, after which the sub research questions are introduced. The methods that will be used to answer the questions are explained in the following chapter '*methodology*'.

The main research question is:

**“How can we improve the accessibility, spatial quality and identity of the railway station and its environment in Nijmegen?”**

Important notions in this question are the accessibility, spatial quality and identity of railway station environments in general. These are key themes of this graduation project and will be elaborated later on.

To be able to answer the main research question, three sub questions are formulated. The relation between these and the main research question is illustrated in *figure 1.14*.

First we need to define what we mean with the accessibility, spatial quality and identity of a railway station environment. A literature study to the relation between the quality of the physical environment and the activity level in public space should help to define the elements. Therefore the first sub question that comes up is:

**1. “What spatial criteria will stimulate social activity in public space?”**

Secondly we need to know what the problems and potentials are of the current situation in the railway station environment of Nijmegen. We

need to check if the defined spatial elements for social activity in public space are available in Nijmegen and we need to define the problem of the railway station environment in Nijmegen. Therefore the second sub question that we could ask is:

**2. “What are the problems and potentials of the central station and its environment in Nijmegen?”**

Finally we need to define guidelines for the design of the railway station environment of Nijmegen. The guidelines are based on the outcomes of the analysis of Nijmegen. But we also need to find elements in other railway station environments that contribute to the social activity in public space. These elements are defined in sub research question 1 and tested in the analysis of Nijmegen.

A case study research to comparable railway stations in the Netherlands should help us to define a design concept for the railway station environment of Nijmegen.

So the last sub question that we could ask is:

**3. “What kind of elements from other cases, that stimulate social activity in railway stations and their environments, can be useful for the case of Nijmegen?”**

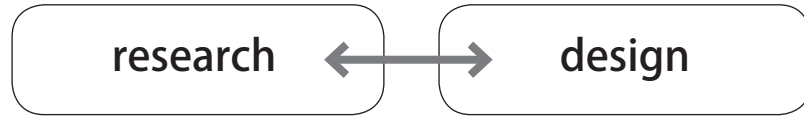
The answer to these three sub questions will lead to the answer of the main research question.

The next chapter discusses the methodology that is used to answer these research questions.

## 4 METHODOLOGY

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The methods which are used during this graduation project to answer the research questions are discussed in this section. Overall approach of the project can be characterized by *research by design*. This means that there is a constant interaction between the research and the design. During the design process, elements were point out to research better, the results from this research were immediately tested and implemented in the design. *Figure 1.15* shows this relationship.



*Figure 1.15: Interaction between research and design*

Other main methods during this project are:

### Literature study

The literature study is a basic tool to understand the context of the project. To find out in what way railway stations are developed during approximately the last 150 years and how this process is elaborated in Dutch cities, a literature study is done to understand this.

Furthermore the literature study is used to develop a conceptual framework of spatial elements that contribute to activity in public space and public interior. This conceptual framework forms the basis for the theoretical framework of this project. The conceptual framework is used to analyze the city of Nijmegen and to define the elements for the case study research

### Case study research

Case study research is the second method used during this project. To understand the context of the project better and to search for useful design examples in other railway stations.

Three comparable Dutch railway stations are

chosen as research projects. The objective is to find elements that can be useful for the design of the railway station environment of Nijmegen in light of accessibility, spatial quality and identity.

### Mapping

Mapping is one of the most important instrument used to define the current problems and potentials in Nijmegen during the analysis of the city and to translate those problems and potentials to clear design objectives. Mapping is also necessary to communicate in the field of urban design.

### Site visit

During the project a site visit is used several times to understand the location better. Not only the design location is visited but also many other railway stations. To experience the transport organization, accessibility, spatial quality and identity of the railway station better.

### 4.2 Interrelationship between the research questions

All the three research question are related with one another. *Figure 1.16* shows the relationship between the research questions.

The conceptual framework derived from the literature study in sub research question 1, forms the structure for the analysis of Nijmegen and the case study research.

Sub research question 2, the analysis of Nijmegen got its input from the literature study and forms directly the input for aspects in the case study analysis. The elements analyzed in the case study research are derived from the analysis of Nijmegen and the design project.

Sub research question 3, the case study research is used to find guidelines for the design of the railway station environment of Nijmegen and to understand better the elements that can be used for the design of the public space and public interior in a railway station environment.

### 4.3 Structure of the project

Figure 1.17 presents the overall structure of this graduation project and the relation between the different parts.

A conceptual framework derived from literature study forms the baseline of this graduation project. The theory helped to structure the analysis and to define which elements should be analyzed to improve the accessibility, spatial quality and identity of a railway station and its environment.

Except for the elements from literature study, the location characteristics are analyzed too.

Next the analysis divided the results in generic and specific outcomes. The generic outcomes of the analysis are the input for the case study research.

The outcomes from the analysis of Nijmegen and the case study research are used to formulate a clear design concept for the railway station environment of Nijmegen.

The design concept is the starting point for making a design proposal for the railway station and its environment in Nijmegen.

Final step is to test and evaluate the design proposal using the theoretical framework. Then it can be concluded if the design proposal does improve the accessibility, spatial quality and identity of the railway station environment and with that stimulate social activity in public space.

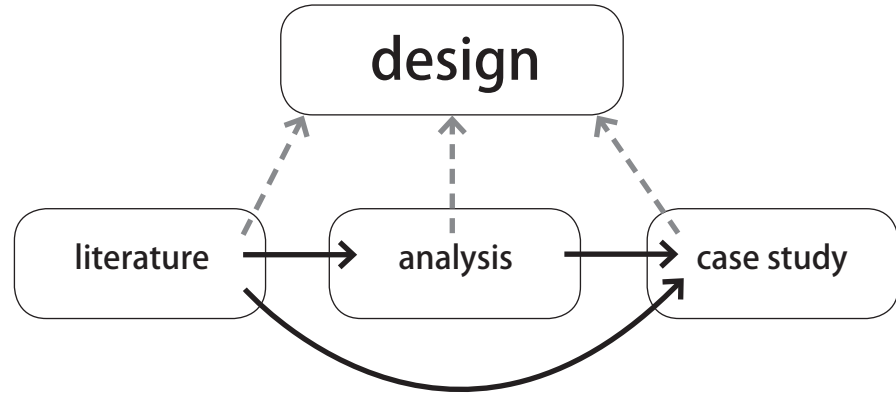


Figure 1.16: Interrelationship between research questions

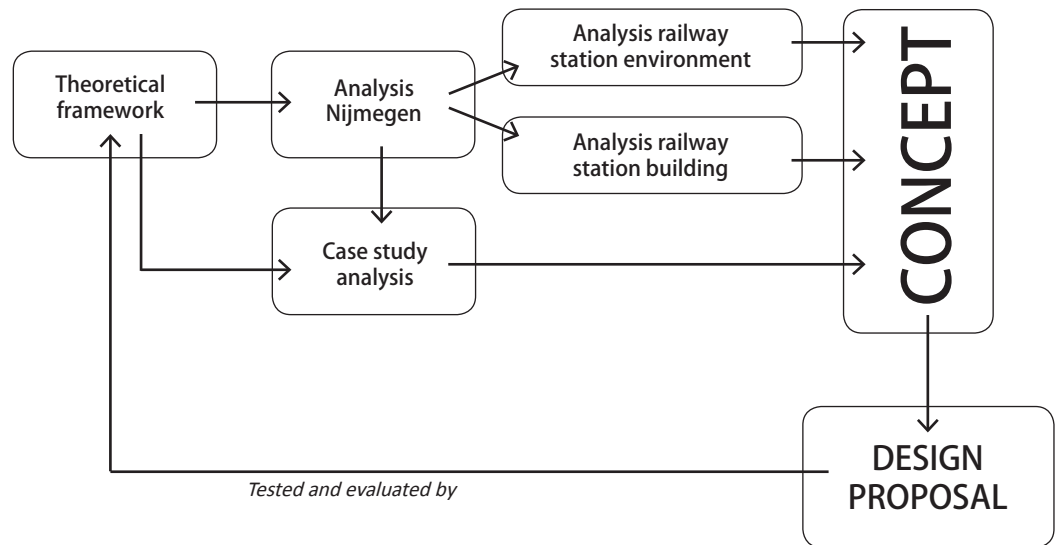


Figure 1.17: Structure graduation project

## 5 RELEVANCE & DISCIPLINES

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### 5.1 Scientific relevance

The graduation project contributes to the existing body of knowledge by suggesting a conceptual framework for different types of activity in public space. This conceptual framework can be used in all kind of public spaces and helps to create lively places with attention for design details.

Furthermore this project demonstrates that another type of railway station in the Dutch city will contribute to identity and spatial quality of the railway station environment.

### 5.2 Social relevance

The current lack of identity and spatial quality makes the railway station a place where people feel unsafe and unpleasant. This does not contribute to the integration of the railway station environment in the urban fabric. So by improving the identity and spatial quality, the integration in the city structure will be stimulated.

By developing a new type of railway station that fits in the current urban fabric, the spatial quality of the railway station environment will improve. So the first image of the city by visitors will be more positive which increases the competitiveness in terms of city marketing.

Furthermore creating a new railway station with attention for the quality of the environment and an optimal organization of the railway station will stimulate people to use the train which is important for the competitiveness between the train and the car and with that for the environment.

### 5.3 Involved disciplines

The involved disciplines in this graduation project are Urban Design and Design of Public Space (mentor Willem Hermans), Spatial Planning and Strategy (mentor Ana Maria Fernandez Maldonado) and Urban Compositions, theory and methods (mentor Leo van den Burg).

Furthermore an important actor in the project is Movares, which is an engineering office specialized in the design and realization of railway stations and their environment. An important client of Movares is Prorail. ProRail is responsible for the construction, maintenance, management and safety of the Dutch railways. Movares is the previous engineer division of the Dutch Railways (Holland Railconsult) and has therefore a lot of know-how in the development of railway stations (mentors Ad Anker and Marloes Huijsmans). During this graduation project, the first 7 months were carried out as a graduation internship by Movares.

### 5.4 What follows?

The following parts of this thesis represent a sub question of the graduation project. We will start with the literature study, then explain the results of the analysis of Nijmegen and continue with the recommendations of the case study research.

There after, a design concept is formulated which forms the base of the design proposal. Finally the last part summarizes all the work done and draw general conclusions.





*Figure 1.18: Lyon Airport Railway station  
designed by Santiago Calatrava in 1994*





part B

# Theory

Introduction

Criteria for social activity in public space

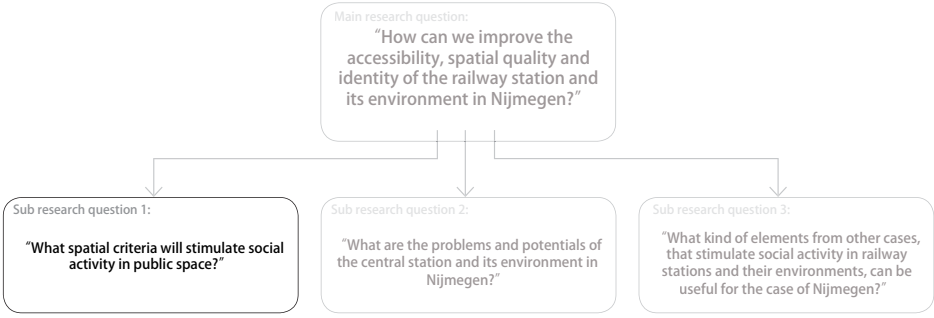
Theoretical framework

From theory to analysis

This part of the thesis answers the first sub research question *‘what spatial criteria stimulates social activity in public space’*. A literature study to the most famous and influencing authors of the second half of the twentieth century is done to be able to answer this question. The criteria derived from this study are used at first as direct input for a case study analysis and second as detailed design prescriptions for the design project. This literature study is originally written in the form of a paper.

During years many researchers, designers and planners have tried to find the elements that makes public space successful. Organizations like Project for Public Space do exclusive research to the relation of the physical environment and the liveliness of a place. What makes certain places attractive and why are people feeling attracted to those places.

The following sections describe a conceptual framework for the assessment of the quality of the physical environment and with that the availability of public space to serve as meeting place.



# 6 CRITERIA FOR SOCIAL ACTIVITY IN PUBLIC SPACE

## 6.1 Introduction

People are the most basic factor for successful public space, this is so obvious that it is often overlooked (Whyte, 1980). Activities of people like walking, sitting, eating, sleeping, talking or watching are of high value for public places, because they generate liveliness (Gehl, 1996). People produce vitality to places, without people spaces are boring and unsafe. But how to create a place where people are willing to come and stay?

Gehl (1996) demonstrates that it is possible to influence how many people use public space, how long the individual activities last, and which activity types can develop (p.30). This depends on the quality of the physical environment.

The relationship between space and the social experience has been well discussed by several different but sometimes overlapping articles. Among others the extensive observational work of Gehl (1996) has proved that physical planning can influence the character of the outdoor activities and with that the presence of people.

Jacobs (1961) emphasizes in her famous work *'The death and life of great American cities'* the importance of safety in city streets and which aspects of this safety are important for the presence of people in the street. She focuses on the importance of mixed use and diversity to create lively, vital public places. With many examples she demonstrates how these elements contribute to this safety.

Hajer and Reijndorp (2001) call the place where the exchange between several different social groups can and will occur, the public domain. This exchange only happens when the quality of the physical environment invites you to stay and move around instead of come and

go (Gehl, 1996). Public domain will strengthen the social quality of a neighbourhood (Jacobs, 1961). This public domain can be found anywhere. According to Oldenburg (1989) familiar places in the neighbourhood where you can meet acquaintances in an informal way will strengthen the unity of neighbourhoods, cities and society. He calls these places the 'third place', it is no home and no work but it is a place where you can feel comfortable. The main activity of such places is conversation and the objective is providing a social, inviting environment.

## 6.2 Key elements of public space

To understand the nature and complexity of public space, Carmona et al. (2008) distinguish three key dimensions that together define its character. One of those elements is what they call the 'kit of parts', which is the constituent component of public space (p.11).

This kit of parts consists of buildings, landscape, infrastructure and uses. These together define the conditions for public space. It is clear that the first three are completely physical in nature. The last one, uses, deals with human activities and is therefore the hardest but at the same time most significant one to give public space its character (Carmona et al., 2008).

As urban designers, the physical elements are the tools we can use to determine the spatial layout of a place and with that the way people can use the space. This objective is important because the presence of people and activities are one of the most important qualities of public space, and thus of cities to exist (Jacobs, 1961; Whyte, 1988; Gehl, 1996; Montgomery, 1998).

During the last 30 years various researchers have done extensive observational research to

the relation between the behaviour of people and their physical environment. To understand why certain plazas like the Piazza del Campo in Siena are lively places and why others like the Schouwburgplein in Rotterdam are not, observations are done to determine the differences between the lively and the empty places.

As said in the introduction, Gehl (1996) illustrates with his work that the physical environment is a factor that influences the outdoor activities of people. In an physical environment where the quality is assumed to be good, the number and variation of human activities is very high. Gehl (1996) has divided the outdoor activities of people in three categories namely the necessary activities, the optional activities and the social activities. He concluded that the better the conditions in the public space are, the higher the level of social activities in the public space is. *Figure 6.1* shows this relationship between the quality of outdoor spaces and the rate of occurrence of outdoor activities.

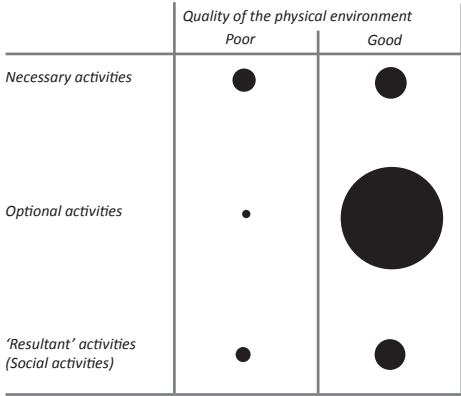


Figure 6.1: Relation quality physical environment with level of activities (Gehl, 1996, p.33)

# 6 CRITERIA FOR SOCIAL ACTIVITY IN PUBLIC SPACE



## What Makes a Great Place?

- key attributes
- intangibles
- measurements

Figure 6.2: Place making diagram (Project for Public Spaces, 2010)



It has been proved that necessary activities are hardly influenced by the physical environment because they need to happen to continue the daily life. But optional activities such as window shopping, watching other people or sitting on a pavement only occur when the conditions of the physical environment are optimal. Therefore these activities can function as a kind of barometer of the quality of the public space. Finally the social activities depend on the presence of other people and are a result of the other two (Gehl, 1996 cited in Carmona et al., 2008, p.11).

### 6.3 Activities in public space

The division, as discussed in the previous part, between the different levels of activities made by Gehl (1996) will be used to classify the following discussed authors and to determine which criteria are needed for which activity level in public space.

#### 6.3.1 Necessary activities

As explained in the previous part, the necessary activities are hardly influenced by the spatial layout and character of a place. During one of his studies, Whyte (1980) observed the relation of activity in public space. He emphasizes that the most difficult things to change are the most important ones: the location of the place and its relationship to the street (p.35). If the place does not have a good location, people will not come there not even for the necessary activities. It is preferred to have it on a busy route, so people are used to visit the place. Furthermore it is desired that the place is both physical and visual accessible. But the public space should also be part of the street life; the social activities in the space should flow back and forth between street and square (Whyte, 1980). Finally he mentioned that the physical

level of the public space should be the same or almost the same as the level of the pavement of the street. Study has proved that spaces that are too low or too high are used less (idem).

#### 6.3.2 Optional activities

When optional activities can function as a barometer for the quality of public space, it is interesting to establish which elements are responsible for this increase of activity. Jacobs (1961) argues that the safety on the street determines the presence of people because a well used street is a safe street, while a deserted street is apt to be unsafe (p.120) and people will not use public space if they fear.

Her main message is to have users on the street because people attract people (Jacobs, 1961; Centre of Public Space Research, 2004). She argues the need for eyes upon the street. This is a quality which provides a casual surveillance; the idea of this is that the street is being watched by the neighbourhood and the existing social network. To enlarge this casual quality it would be better to have various kinds of enterprises around. This will attract more people and offer a better close watch.

Besides, when there are bars, coffee shops or cafés around, there is a pattern in opening hours and evening activities which again provide a certain amount of people during the whole day. As already stated, the eyes upon the street are of high importance for the sense of safety and therefore presence of people in public space.

But safety is not the only thing that contributes to optional activities in public space. It is the first step but a safe place without any activity is a boring place. Therefore it is also interesting to determine how activity attracts people.

The Project of Public Space (PPS) evaluates thousands of public spaces around the world. Based on all this gathered knowledge, they developed The Place Diagram, as a tool to design successful public space (PPS, 2010).

They discovered that a great place should have four qualities, which are shown in *figure 6.2*. The place should be accessible, there should be activities for people, the place should be comfortable and it should have a good image. This all will create a social place, where people meet each other and come to visit (PPS, 2010).

Activity in public space results in animation, diversity and versatility (Davies, 2000 cited in Carmona et al., 2008). Without this activity, there can be no urbanity (Montgomery, 1998, p.97), so activity is one of the main factors of successful public space. As Montgomery (1998) is arguing, activity is a product of two concepts: vitality and diversity and this vitality is what distinguish successful urban areas from the others. To generate some activity there should be a diversity in important functions for people otherwise the space will be underused and thus unsuccessful (Carr et al., 1992).

Jacobs (1961) has identified four deterrents which set the conditions for activity in public space. She considered those deterrents as the main message of her work. The conditions which generate activity on the street are: a mixture of primary use, intensity, permeability of the urban form and a mixture of building types, ages and conditions.

This is also confirmed by the Centre of Public Space Research in Denmark. They did exceptional studies to the relation between façades and the behaviour of people and how the façade design and functions can influence

## 6 CRITERIA FOR SOCIAL ACTIVITY IN PUBLIC SPACE

Figure 6.3: Example of an attractive and boring façade (Gehl, 1996, p.20)

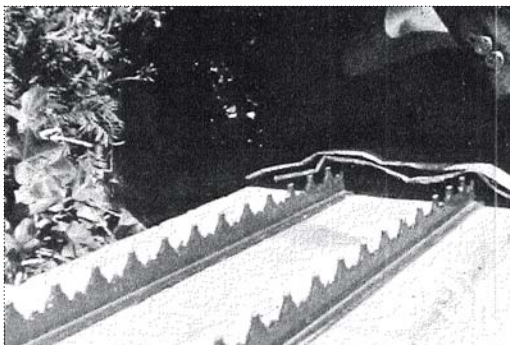


Figure 6.5: Good and bad example of integral seating in public space (Whyte, 1980, p.47)

Figure 6.4: Summary of detail design conditions based on Gehl (1996, p129-175)

### Walking

- Routing
- Pavement conditions
- Avoid differences in level
- Ramp instead of stair

### Standing

- Edge zone
- Standing places near trees/columns
- Irregular facades

### Sitting

- Opportunities to sit
- Sitting places along edge
- Create primary seating
- Create environment of 'watch and be watched'

### Seeing, hearing, talking

- Unobstructed sightlines
- Lightning
- Conversation landscape



the activity level in the street. In *figure 6.3* are two examples showed of an attractive and boring facade.

The study, done by this centre is based on the quantitative behaviour of pedestrians like their speed of walking and visual scene. They conclude that at first the space should be pedestrian friendly otherwise it will have no success. Supported by these measurable aspects, they made a list of criteria which can help to assess the quality of the relation between façade layout and pedestrian behaviour on eye level (p.7):

1. Scale and rhythm of the façade: small units provide a wide range of experience.
2. Transparency: eyes upon the street.
3. Appeal to many scenes: a wealth of sensory impressions and shopping opportunities.
4. Texture: good materials and fine details are an attraction for people.
5. Diversity of functions: wide functional variation.
6. Vertical façade rhythm: the distance seems shorter than horizontal details.

The outcomes of this research and the conclusions of others like Jacobs (1961) and Montgomery (1998) have many things in common. They all emphasize the importance of mixture of functions and the transparency of the façade for both safety as leisure reasons.

### 6.3.3 Social activities

When the location of the public space is on a busy route and the functions and activities attract people, the next step is to provide

conditions for social activities in the public space. As mentioned before, Whyte (1980) and Gehl (1996) have done studies to the influence of the physical environment on the behaviour of people. They tried to understand what the difference is between well used and bad used public spaces in terms of social activity.

Gehl (1996) argues that attention for the detailed design of the conditions for moving and participating in public space is needed. Without the awareness for these details, social and recreational activities will not happen. In his work *"Life between buildings"* Gehl describes these detail conditions for basic activities like walking, standing and sitting. All these features are summarized in *figure 6.4*.

Gehl (1996) demonstrated that places to sit are of high importance for the use of public space. 'People tend to sit most where there are places to sit' (Whyte, 1980, p.28).

Also Whyte (1980) describes in his book *"The social life of small urban spaces"* many examples of the relation between the presence of people and sitting places. He emphasizes among others the importance of integral seating places such as stairs, edges and railings in public space. *Figure 6.5* shows a good and bad example of integral seating in public space. As can be seen in the pictures is that some design interventions are destructive for the opportunity of social activities.

Besides the 'natural' seating's in public space, the place should be easy accessible for everyone. Do not separate functions and facilities for disabled people. 'The idea is to make all of the place useful for everyone' (Whyte, 1980, p.33). Special design solutions or additions for specific groups of people make the place more

complex and divide social groups. The design features should raise the standard for everyone (Wagener and Van der Spek, 2006, p.2).

### 6.4 Conceptual framework

This paper demonstrates many criteria for the design of public space in such a way that optional and social activities can and will occur. This part will describe a framework which is derived from the previous sections. It will also explain how this theoretical framework will be used for the graduation project.

The objective of this paper was to derive design criteria for a meeting place. As explained this meeting place can be understand as a place where social activities can and will occur (Hajer and Reijndorp, 2001). The division of necessary activities, optional activities and social activities is used to classify the various design conditions.

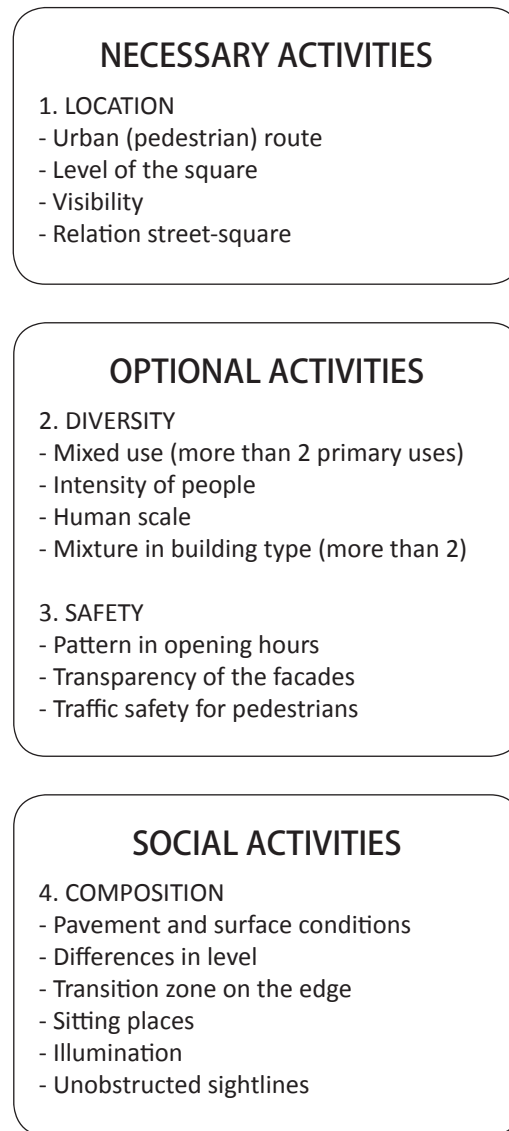
Based on the conclusions derived from among others Jacobs (1961), Whyte (1980), Gehl (1996) and Montgomery (1998) the framework demonstrated below is made.

The idea of this division is elaborated below. The necessary activities depend of the location of the public space. When the location is on a busy route, and the place is easy accessible and has a clear relation with the street, it will be used by people to cross (Whyte, 1980).

Diversity and safety in public space are required to have optional activities. The conditions which generate activity are mixed use, the intensity of functions, a pattern in opening hours and the stimulation of evening economy and the permeability of the buildings (Jacobs, 1961; Montgomery, 1998).

## 6 CRITERIA FOR SOCIAL ACTIVITY IN PUBLIC SPACE

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*Figure 6.7: Conceptual framework  
based on literature study*

Safety on the street is required because people will not use space if they fear it (Jacobs, 1961). The safety is based on pedestrian priority, eyes on the street and the pattern in opening hours. When people are using the space all the time, it is less deserted and therefore it feels safer.

Detailed design interventions are required to generate social activities. As described before, this depends on the availability of (integrated) sitting places, the amount of light, a clear overview of the space, the maintenance of the place, the atmosphere of watching and being watch and the availability of a transition zone on the edge of the space where people can stand (Whyte, 1980; Gehl, 1996).

To come to a conclusion of all these features the four criteria described in *figure 6.6* are divided in several sub criteria.



Figure 6.6: Four main criteria

Public space provides necessary activities when the location is:

- On a busy route;
- Easy accessible;
- Visible from the street.

Public space provides optional activities when the public space has a diversity in activities. This happens when the district has:

- Mixed use;
- A pattern in opening hours;
- Building blocks of human scale;

But people should also feel safe in the public space. A place is considered safe when:

- There are eyes on the street;
- The pedestrian has priority;
- There is a pattern in opening hours.

Finally, to be able to provide social activities, detailed design criteria are needed. This social interaction will be able to happen when the public space:

- Is well maintained;
- Has sitting places;
- Is illuminated by night;
- Has the atmosphere of watching and being watched;
- Has unobstructed sightlines;
- Has a transition zone on the edge.

### 6.5 Conclusions

A meeting place is public space where social activities can and will occur (Hajer and Reijndorp, 2001). These social activities will strengthen the unity of a neighborhood (Oldenburg, 1989) and are therefore of high importance for the quality of a place. Last decades much research has been done to the relation between the presence of people and the quality of the physical environment. This paper discussed the various ideas of several authors which should create a lively and attractive public space.

The classification made by Gehl (1996) of necessary activities, optional activities and social activities is used to divide all the other reviewed works and discussed criteria. The only condition which is provided for the necessary activities is the location. The optional activities depends of the diversity and safety of the place and finally the design criteria provide the availability for social activities. These criteria can be used to determine to what extent a public space can and will function as meeting place.

## 7 RELATION TO OTHER SCIENTIFIC WORK

In the introduction part of the thesis, the network theory of Dupuy (1991) was introduced. The main idea of this theory is that the city is organized as a network with different levels of 'operators'. In *figure 7.1* are those levels shown again. The first level are the physical elements (streets, highways etc.). The second level are the suppliers of the functional networks (networks of production, consumption and distribution). The third level are the people in daily life who make use of the first two networks to create personal networks. Those levels of networks can be understood as networks on different scales. This means that the first level is a network on the highest scale and the third level is a network on the smallest scale.

Many researchers have made additions to this proposal of network layers since. The following part will discuss shortly the most important conclusions of additional research and finally link this network theory to the conceptual framework derived from literature study in the previous part.

Meyers (2000) reviewed the levels of 'operators' of Dupuy (1991) and translated them into three types of network with each their own function. According to him the first level can be understood as the physical network with a node function, the second level can be understood as the spatial-functional network with a place function and the third level can be understood as the social-institutional network with a meeting function.

The node and place value of junctions has been studied extensively by Bertolini (1998). He developed the node-place diagram (see *figure 7.2*) to assess the development potential

where many kind of networks interconnect like railway stations. He explains the notion 'node value' as the accessibility of transport modes and the notion 'place value' as the intensity and diversity of activities. Meyers (2000) studied the theories of Dupuy and of Bertolini and concluded that the meeting function (which is the function of the social-institutional network) is underexposed at nodes. There has been much attention for the node and place value but less for the meeting value. Meyers extended the node-place diagram of Bertolini with the meeting function to measure to what extent a node has a quantitative meeting potential.

Calabrese (2004) has linked the three levels of networks operators to scale and urban spatial structure which is illustrated in *figure 7.3*. She envisages the first level as the *city level* where the highways, transit systems and major transport terminals are the dominant elements impacting the spatial structure. The second level can be seen as the *district level*, which is a conglomeration of various communities, on this scale level the urban spatial structure is influenced by main roads and specific employment and service zones. The third level is the *community level*, where the urban structure is influenced by the street patterns and the location of residences and basic services (p.36).

The conceptual framework that is proposed in the previous section of this thesis 'criteria for social activity in public space' can be understood as three levels of activity (see *figure 7.4*). If we link those three levels of activity to the three levels of scale of the network layers of Dupuy (1991) and network functions of Meyers (2000) we introduce an addition to this theory. The first level, necessary activity, corresponds with

the physical network and the node function. The second level, optional activity, matches with the spatial-functional network and place function. Finally the third level, social activity, corresponds with the social-institutional network and the meeting function. See *figure 7.5* for the levels of activity translated to levels of network and function.

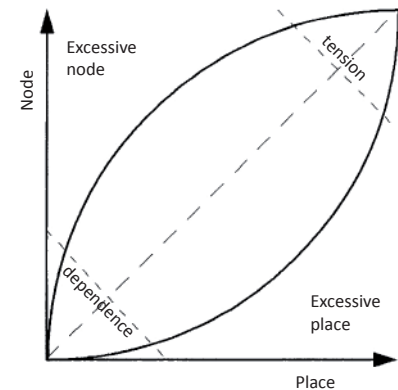


Figure 7.2: Node place diagram (Bertolini, 1998)

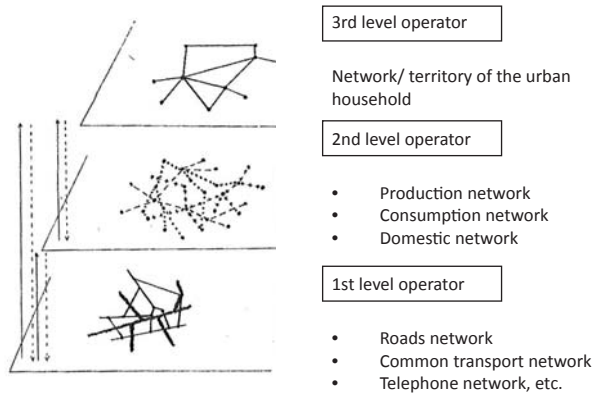


Figure 7.1: The three levels of network operators organising the urban space according to Dupuy (1991, p.91)

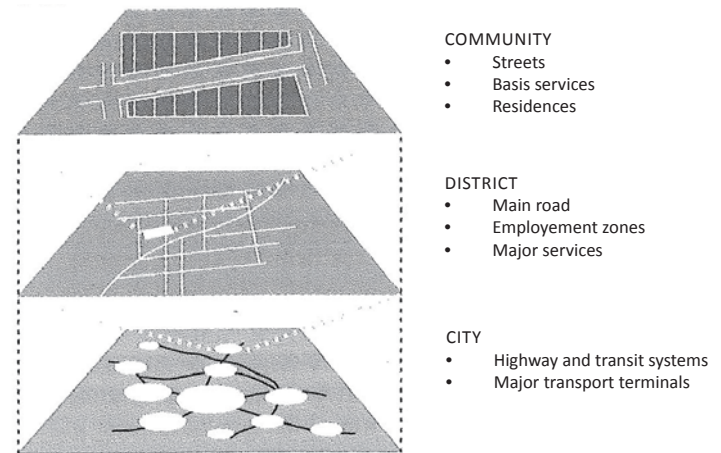


Figure 7.3: Components of the spatial structure (Calabrese, 2004, p.36)

## Necessary activities

1. Location

## Optional activities

2. Diversity

3. Safety

## Social activities

4. Design

Figure 7.4: Levels of activity (Vingerling, 2010)

## LEVELS OF NETWORK

### Dupuy (1991)

- Social-institutional network
- Spatial-functional network
- Physical network

## LEVELS OF FUNCTION

### Meyers (2000)

- Meeting function
- Place function
- Node function

## LEVELS OF ACTIVITY

### Vingerling (2010)

- Social activity
- Optional activity
- Necessary activity

Figure 7.5: Levels of network and function linked to levels of activity

# 8 CONCEPTUAL FRAMEWORK

Sub question 1 asked for criteria that stimulate social activity in public space. The conceptual framework presented in *figure 8.1* gives the answer for that question. As stated in the main research question of this project it is important to improve the accessibility, spatial quality and identity of the railway station and its environment. This means that we need to improve the public space around the railway station and the public interior inside the railway station. To make the set of conditions useful for a railway station environment and the public interior of a railway station we need to make some adoptions. The current list of criteria is based on a ‘regular’ public space in the city, while a railway station has some feature and characteristics that are not taken into account in this list. Also some qualities and characteristics of the interior of public buildings is not involved in the list yet.

Therefore the list of criteria derived from the literature study is adapted into two new lists. First a list of criteria that stimulate social activity in the public space around the railway station. Second a list of criteria that stimulate social activity in the public interior of the railway station. In both cases the current conceptual framework presented in *figure 8.1* is the starting point to make new ones. The following part will explain how both of the new frameworks are derived.

## 8.1 Criteria that stimulate social activity in public space of railway stations

As explained in the theory paper, there are three levels of activity in public space. The main criteria for these levels of activity are presented in *figure 8.2*.

The first criterion for necessary activity is the

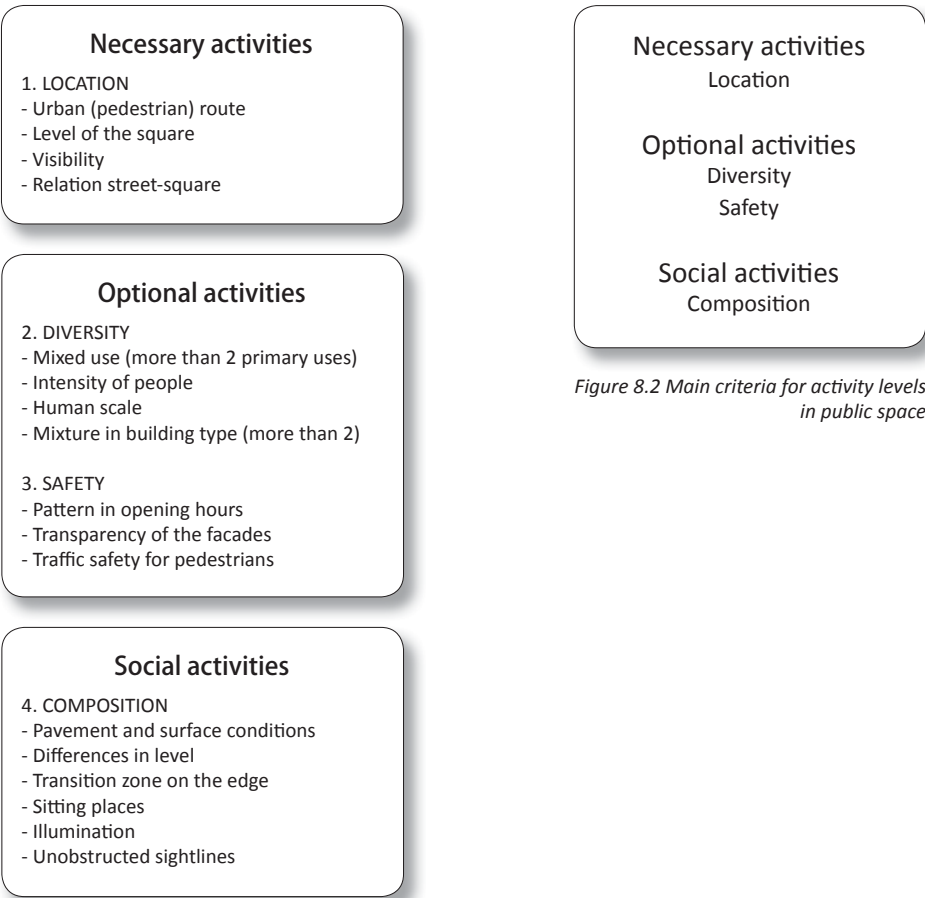


Figure 8.1 List of criteria for social activity in public space



Figure 8.2 Main criteria for activity levels in public space

location. In the case of a railway station, it is already an accessible place for the train. To improve the accessibility of a railway station from the city it is interesting to know how the railway station is embedded in the city network. Therefore the accessibility by bus, car, bicycle and pedestrian will be tested too.

As the subject of this graduation project is a railway station located at the edge of a medium-sized Dutch city. The link between city centre and railway station is also an important aspect.

The criteria for optional activity are diversity and safety. As explained in the literature study the criterion diversity is subdivided in mixed use, intensity, human scale and mixture in building type. For a railway station environment it is also interesting to know how those elements are represented. Except for the criterion intensity. A railway station has always a high intensity of people who come from and go to the trains. To make this criterion more useful it is adapted to the criterion density of a railway station environment expressed in the Floor Space Index (FSI), Ground Space Index (GSI) and Open Space Ratio (OSR) (Spacemate, 2000).

The criterion safety is primarily based on the work of Jacobs (1961) and Alexander (1977) subdivided in transparent facades, traffic safety for pedestrians and a pattern in opening hours. These elements are of interest for the public space of railway stations.

Finally social activity is depending on the design of the public space, which is summarized in the criterion composition. Based on the findings of Gehl (1996), White (1981) and Alexander (1970) this criterion is subdivided in qualitative sitting places, sightlines, illumination, edge zone and a

positive sensory experience. These aspects are also interesting to analyze in a railway station environment because they contribute to the liveliness of a place.

## Necessary activities

### 1. LOCATION

Accessibility of the location

- Accessibility by bus, car, bicycle and pedestrian
- Link between railway station and city centre

## Optional activities

### 2. DIVERSITY

- Mixed use (more than 2 primary uses)
- Density of the railway station environment
- Mixture in building type (more than 2 types)
- Human scale (ratio built-open)

### 3. SAFETY

- Use of the plinth
- Traffic safety for pedestrians
- Pattern in opening hours

## Social activities

### 4. COMPOSITION

- Sitting places (integrated and furniture)
- Sightlines
- Illumination
- Edge zone
- Positive sensory experience (trees, plants, water)

*Figure 8.3 List of criteria for social activity in public space around railway stations*



### 8.2 Criteria that stimulate social activity in the public interior of railway stations

The findings of the literature study provide the criteria for this conceptual framework as well. So the four main criteria (location, diversity, safety and composition) will be the same in this case.

Public interiors are a specific kind of place with typical characteristics. Here a short overview is given based on the book 'Public interiors' by Kloos (1993), on the work of Alexander (1977) and on several articles about the conditions for an attractive and lively public interior. This overview is used to make a conceptual framework with criteria that contribute to social activity in public interiors.

Not every building with a public function has a public interior. The most essential criteria for public interiors are anonymity, non-commitment and comfort. When buildings do have a code of behavior in order to keep out certain types of people, then this interior cannot be considered as public. However, the code of behavior is often intended to guarantee anonymity; in the public interior you should not have to be confronted with bothersome people.

The extent to which a building is public is primarily determined by what type of building it is: a railway station, arcade, town hall, post office, or library. But also by the way it is used. This depends on its location in the city, the position of the entrance, its accessibility, the impression it radiates, and the atmosphere of the interior. Many of these factors are determined by architectural or town-planning considerations (Kloos, 1993, p.10).

The pedestrian subway under a railway line is not usually considered a public interior, because although it is roofed and public it is not a place in which one would like to linger; however, the large railway station halls are certainly public interior. Most visitors come with a specific purpose in mind, but a non-committal visit is also possible. Much more happens than the purely commercial function of the building requires.

A good public interior lies on an urban route, and is therefore easily accessible. It is covered to protect the public from the climate and is, in principle, accessible to everyone. Entering is non-committal, implies no compulsion, and visitors do not need to concern themselves with the management of the building; that is taken care of by others (p.19).

The coming of the railways and railway stations initially seemed to bring about a dislocation of the city too. Now we must do our best to preserve them as gateways in the middle of the city, as public interiors with a clear function, interiors that also provide space for numerous other aspects of urban life. It is precisely such buildings which people will continue to need as long as they want to enjoy what city life has to offer (p.31).

The need of public interiors stays important for both private as business meetings. You can meet people on neutral territory in the city. Not at home or at the office which creates expectations or obligations. But it is also not desirable to meet in open air; people need a roof above their head on more or less public terrain.

According to De Boer (2007) public interiors

have several architectonic and urban characteristics in common. The public interior should be embedded in the urban pedestrian network of the city, they need entrances on the right location, they require spaces that are high enough and they need the incident of daylight through a glass roof, atrium or vide.

Also Alexander (1977) has made a list of 5 criteria that are required for a successful building thoroughfare. According to him public places are meant to invite free loitering, so the location should invite you to hang around. This means that a building needs to have a public thoroughfare which slice through them, lined with places to stop and loiter and watch the scene (p. 495). Furthermore the width and height of the indoor street is important even as the width of the entrance. Finally the involvements along the edge need to be attractive to invite free loitering and create a atmosphere of watching and being watched.

To summarize the findings of the different authors we will discuss each criteria location, diversity, safety and composition and use those to explain how the conceptual framework for public interiors works.

The first criterion location can be subdivided in three elements. First the public interior should be located on an urban pedestrian route in the city, so people will pass the building. Secondly the location and width of the entrance is important for the necessary activities, people should feel invited to enter the building. Finally we are of course dealing with a specific kind of public building, the railway station, so the logic of the flows of people through the building is also significant.

Second criterion is diversity. As already concluded in the literature study diversity is subdivided in four criteria mixed use, intensity, human scale and mixture of building types. Because we are dealing with a railway station, the primary use is already clear. Therefore we are interested in the number of secondary uses inside the building. To create a lively interior there is a need for activity and involvement along the edge of the thoroughfare. Also the human scale of the public interior requires minimum measurements for the wide and height.

The intensity of people is for railway stations not so interesting because we know that we will always have a minimum number of travelers a day. Furthermore the mixture of building types is not important inside a building.

The third criterion safety can be subdivided into two elements, which are the transparency of the facades along the edge and the availability of a pattern in opening hours. Both elements will contribute to a safe and lively place during the whole day.

Finally the last criterion is the composition of design elements. In the case of a public interior there are three sub criteria needed. To create a public interior where social activity can and will occur we need qualitative sitting places, there should be enough space where people can loiter during the day. Furthermore there is a need for the incident of daylight and an attractive edge zone.

Figure 8.4 presented the conceptual framework for the public interior of railway stations. This framework can be used for the analysis of Nijmegen and for the case study research.

### 8.3 What follows?

The list of criteria forms a direct input for answering sub question 2: The criteria are translated into a measurement tool that was used to validate Nijmegen and three comparable cases. The analysis of Nijmegen is explained in the next part, part C, of this thesis.

#### Necessary activities

##### 1. LOCATION

- Lies on an urban pedestrian route
- Logic of the flows of people
- Entrance (width and location)

#### Optional activities

##### 2. DIVERSITY

- Mixed use (more than 2 primary uses)
- Human scale (width and height)

##### 3. SAFETY

- Transparency of the facades
- Pattern in opening hours

#### Social activities

##### 4. COMPOSITION

- Sitting places (integrated and furniture)
- Availability of daylight
- Edge zone

Figure 8.4 List of criteria for social activity in the public interior of railway stations



part C

# Analysis Nijmegen

Analysing Nijmegen

- Public Space

- Public Interior

Conclusions & recommendations

# 9 ANALYSIS NIJMEGEN

The first step in making a design proposal for the railway station environment of Nijmegen was making a spatial analysis of the current situation. To be able to answer the second sub question *“What are the problems and potentials of the railway station and its environment in Nijmegen?”*, the railway station and its environment are analyzed. The spatial analysis is structured by using the conceptual framework derived from the literature study.

## 9.1 Conceptual framework

As explained in the chapter methodology, the analysis of Nijmegen consists of two parts.

1. The spatial analysis of the public space around the railway station;
2. The spatial analysis of the public interior inside the building.

The analysis of Nijmegen will be introduced by a general description of the city, historic development of the city, the landscape characteristics of the location and the future developments that are planned. All these elements are important to understand the location and form a vision for a design concept for the railway station and its environment in Nijmegen.

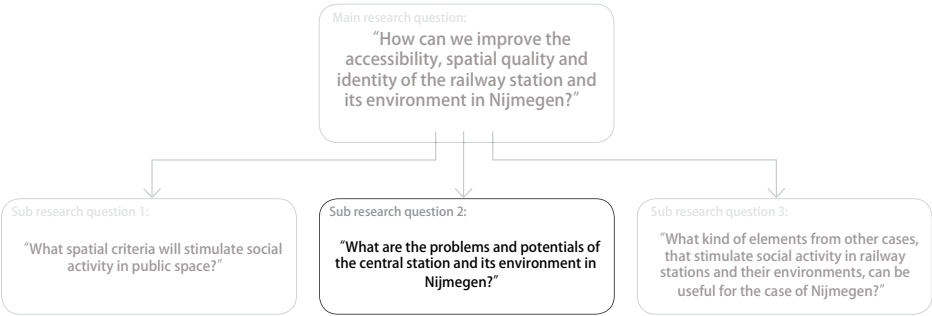
The conceptual framework for analyzing public space and public interior is used to structure both analyses.

As we have seen in the previous chapter four main criteria for social activity in public space are developed from a literature review. The four main criteria (*location, diversity, safety and composition*) are similar for the framework for public space and public interior. These four criteria are all subdivided in measurable

criteria. The sub criteria for analyzing public space (*figure 9.1*) differ from the sub criteria for analyzing public interior (*figure 9.2*).

All the sub criteria are evaluated and measured for the railway station environment to get an indication of the current situation in Nijmegen. Each topic is concluded with recommendations. All these recommendations are used to create a design concept for the railway station environment of Nijmegen.

The following part will start to explain how the criteria will be measured and used in the analysis. Next the conclusions and recommendations of the general analysis of the location are given and finally we demonstrate the conclusions and recommendations of the analysis of public space and public interior.





## Public Space

## Necessary activities

## 1. LOCATION

Accessibility of the location

- Accessibility by bus, car, bicycle and pedestrian
- Link between railway station and city centre

## Optional activities

## 2. DIVERSITY

- Mixed use (more than 2 primary uses)
- Density of the railway station environment
- Mixture in building type (more than 2 types)
- Human scale (ratio built-open)

## 3. SAFETY

- Use of the plinth
- Traffic safety for pedestrians
- Pattern in opening hours

## Social activities

## 4. COMPOSITION

- Sitting places (integrated and furniture)
- Sightlines
- Illumination
- Edge zone
- Positive sensory experience (trees, plants, water)

Figure 9.1: Criteria for social activity in public space

## Public Interior

## Necessary activities

## 1. LOCATION

- Lies on an urban pedestrian route
- Logic of the flows of people
- Entrance (width and location)

## Optional activities

## 2. DIVERSITY

- Mixed use (more than 2 primary uses)
- Human scale (width and height)

## 3. SAFETY

- Transparency of the facades
- Pattern in opening hours

## Social activities

## 4. COMPOSITION

- Sitting places (integrated and furniture)
- Availability of daylight
- Edge zone

Figure 9.2: Criteria for social activity in public interior

9.2 Measurable criteria

To make the list of criteria useful for the assessment of the public space and public interior of the railway station of Nijmegen we need to explain how the individual criteria are used to measure the separate elements. We will explain this step by step and start with the criteria of the public space.

Some of the criteria can be translated in numbers or measurable elements, but some of them cannot. The criteria which cannot be translated in measurable elements will be evaluated and compared to other cases to get an idea of the quality of that specific element.

Criteria Public Space

Necessary activities

- 1. LOCATION
  - Accessibility by bus, car, bicycle and pedestrian
  - Link between railway station and city centre

*Accessibility by bus, car, bicycle and pedestrian*

The first criteria is measured with help of the two-steps analysis. The two-steps analysis is a local static measurement tool to show the local catchment area two topological steps away from it. If a street covers most of the surrounding area within two topological steps than the street seems to be a vital street in the area (Van Nes, 2009).

*Link between railway station and city centre*

The second criteria is measured with help of the validation tool developed by Brouwer (2010). She made a tool to assess the link between city centre and railway station in terms of liveliness, human scale, legibility and safety and comfort.

Optional activities

- 2. DIVERSITY
  - Mixed use (more than 2 primary uses)
  - Density
  - Mixture in building type (more than 2 types)
  - Human scale (ratio built-open)
- 3. SAFETY
  - Use of the plinth
  - Traffic safety for pedestrians
  - Pattern in opening hours

*Mixed use*

The criteria mixed use is derived from the work of Jacobs (1961). According to her you need more than two primary uses in an area

to have a lively area. The number of primary uses is counted per street or square. So the assessment of the availability of more than two primary uses is based on the availability of primary uses per street.

The primary uses are characterized by:

- railway station
- residences
- offices
- shops
- leisure facilities
- healthcare
- places of education

*Density*

The density of the railway station environment is calculated with help of Spacemate. Spacemate is an effective instrument for describing space usage in both quantitative and qualitative terms.

It clearly sets out the linkage between densities on the one hand and land development, urbanization and non-built space on the other (Spacemate, 2010).

The density is expressed in the Floor Space Index (FSI), Ground Space Index (GSI) and Open Space Ratio (OSR) and compared to other railway stations to get an idea of the values.

*Mixture in building type*

The mixture in building type is based on two aspects. The variety of age of buildings, it is good to have a mix of buildings with different ages (Jacobs, 1961). Second criterion is the type of building, which is also important to have a mix of.

The types of buildings are characterized by:

- row houses

- villa's
- apartments
- gallery flats
- public buildings (like schools, hospitals, railway station etc.).

### **Human scale**

The assessment of the human scale is based on two aspects. The size of the open space in front of the railway station and the way how the space is limited. Secondly the human scale is assessed with help of a section of the space. The proportion between the (height of the) buildings and the size of the open space is evaluated.

### **Use of the plinth**

For this criteria it is important that there can be surveillance from the edge to the street. So we have to look to the availability of open facades and the kind of facilities in the facade.

### **Traffic safety for pedestrians**

The assessment of the traffic safety for pedestrians will be done with the counting of 'conflict moments'. The possible routes of the pedestrian and car will be mapped and then we look how many times the pedestrian has to cross a traffic barrier. If this is more than once the criteria will be evaluated as not good.

### **Pattern in opening hours**

The pattern in opening hours is necessary for a use along the day. This will stimulate the liveliness of the area. We will look to the opening hours of the available facilities. There are made three categories:

- During the day
- Evening
- Day + evening

A mix of these three categories is good for the liveliness of the area along the day.

#### **Social activities**

##### **4. COMPOSITION**

Sitting places (integrated and furniture)  
Sightlines  
Edge zone  
Positive sensory experience

### **Sitting places**

To assess the quality of sitting places we will look in the first place at the availability of sitting places. Then we assess if the amount and location is good. This is based on criteria of Gehl (1996). The sitting places should contribute to the possibility of seeing, hearing, talking, listening and eating.

### **Sight lines**

Sight lines are important for the survey ability of the public space. To assess this criterion we will look to what extend it is possible to have an overview over the space. It is important for a railway station environment to orientate yourself immediately.

### **Edge zone**

For the assessment of the edge zone we will look to facade details like niches, holes, gateways, stairs and so on (irregular facades) and columns, trees, plants, furniture and so on to place yourself in the space near something. These elements are based on the work of Alexander (1977).

### **Positive sensory experience**

The positive sensory experience is about the presence of trees, plants and/or water in public space. These elements will contribute to a more positive experience of the place. We will look

if there are any of these landscape elements available and what their quality is.

The analysis of each criterion is drawn and the conclusions are presented. Second list that has to be explained are the criteria for the assessment of the public interior.

### **Criteria Public Interior**

#### **Necessary activities**

##### **1. LOCATION**

Lies on an urban pedestrian route  
Logic of the flows of people  
Width and location of the entrance

### **Urban pedestrian route**

For this criterion we will make an abstract map of the city network where all the streets are drawn as lines. The railway station will also be drawn in this map. If the railway station is part of a (pedestrian) route through the city than the criterion will be evaluated as good.

### **Logic of the flows of people**

To assess the logic of the flows of people we have to translate all the possible flows of people through the building to an abstract scheme. Important conditions for logic of the flows are the continuity and the way you can enter the platforms and walk through the building.

### **Width and location of the entrance**

The location of the entrance should lie on the pedestrian route through the building. The entrance of a thoroughfare building should be quite wide - more a gateway than a door. An entrance that is 5 meter wide begins to have this character (Alexander, 1977, p.497).

### Optional activities

#### 2. DIVERSITY

Mixed use (more than 2 secondary uses)  
Human scale (width and height)

#### 3. SAFETY

Transparency of the facades  
Pattern in opening hours

### **Mixed use**

The number of secondary uses should be more than two (Jacobs, 1961). The available secondary uses will be characterized by:

- shops
- leisure activities
- residences
- offices
- places of education

We will count the number of available facilities and if this is more than two this criterion will be evaluated as good.

### **Human scale**

The human scale of the public interior is based on the width and height of the thoroughfare. The minimum width for three people passing three people is eight meters (Alexander, 1977, p.621). Furthermore the thoroughfare should be high in the middle and low on the edge. The space should be at least 4 meters high.

### **Transparency of the facades**

For this criteria it is important that there can be surveillance from the edge to the street. So we have to look to the availability of open facades and the kind of facilities in the facade.

### **Pattern in opening hours**

The pattern in opening hours is necessary for a use along the day. This will stimulate the

liveliness in the building. We will look to the opening hours of the available facilities. There are made three categories:

- During the day
- Evening
- Day + evening

A mix of these three categories is good for the liveliness of the area along the day.

### Social activities

#### 4. COMPOSITION

Sitting places (integrated and furniture)  
Availability of daylight  
Edge zone

### **Sitting places**

To assess the quality of sitting places we will look in the first place to the availability of sitting places. Then we assess if the amount and location is good. This is based on criteria of Gehl (1996). The sitting places should contribute to the possibility of seeing, hearing, talking, listening and eating.

### **Availability of daylight**

To be able to assess if there is enough daylight we will make an analysis of the incident of daylight inside the building through vides, windows or atrium.

### **Edge zone**

For the assessment of the edge zone we will look to facade details like niches, holes, gateways, stairs and so on (irregular facades) and columns, plants, furniture and so on to place yourself in the space near something. These elements are based on the work of Alexander (1977).

The following chapters describe the results of the analysis of Nijmegen. Because not all important spatial elements for making a design proposal are involved in the conceptual framework the analysis starts in the first place with a general description of the location. Most important characteristics and influences will be discussed which are necessary for making a realistic design proposal.

After that the results of the analysis of the public space and public interior are discussed conform the conceptual frameworks.

Figure 9.3 Gammeltorv square Copenhagen  
(Flickr, 2011)







### 9.3 Results analysis location characteristics

This part forms the introduction to the analysis of the public space and public interior of the railway station environment of Nijmegen. To understand this, we need to understand what kind of city Nijmegen is. Furthermore the location has some important features that are not included in the conceptual framework. First we will give a short introduction of the city Nijmegen, then we will explain shortly the historic development and landscape characteristics and we will finish with the main planned developments in the city.

#### Introduction

The city Nijmegen is located in the east part of the Netherlands (*figure 9.4*) and is, with more than 160,000 inhabitants the biggest city in the Province of Gelderland.

Figure 10.x presents a map of Nijmegen. As you can see the city is located around the river Waal and has many different landscape characteristics. Nijmegen owes its green character because of the rivers the Waal, the Rhine and the IJssel with their floodplains between the wooded lateral moraines of the Veluwe.

Characteristic for the city of Nijmegen is the presence of a historic city centre with many valuable remains. Also the university and healthcare institutes play an important role in the city. Nijmegen presents itself as knowledge-based university town. Most of the healthcare and university facilities are located in Heyendaal (*figure 9.5*).

Nijmegen has also a major soccer stadium of the football club NEC. Dukenburg has a major shopping mall and in Lent are many new residences, leisure activities and shopping facilities built.



Figure 9.4 Map of the Netherlands with the location of Nijmegen

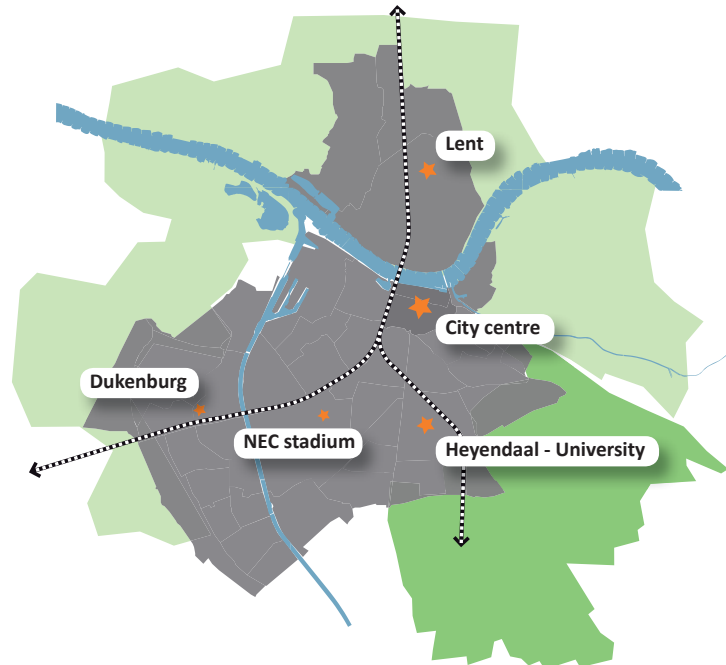


Figure 9.5 Map of Nijmegen with the most important activity nodes

## Historic development

Nijmegen is started around 2000 years ago as Roman army base along the Waal river. The city is assumed to be the oldest city of the Netherlands.

The historic city centre has many remains of the last 1000 years. Until the 19th century the size of the city stayed more or less the same. The walls around the city prevented city expansion which is visible in *figure 9.6*.

Around 1865 the municipality started to make plans for the expansion of the city and the development of the railway. The result of these plans is the first city expansion made by Brouwer (1865) which is presented in *figure 9.7*. Characteristic about this city expansion are the wide, green avenues and the Kronenburgerpark. The typology of the structure of this part of the city is very unfamiliar and extraordinary for the Netherlands.

Part of this urban plan is the location of the first railway station of Nijmegen. The station building was located at the end of the Van Schaeck Mathonsingel, which should become the overwhelming entrance of the city. The new designed railway station was finally opened in 1885 and can be categorized as a neo-classical railway station (*figure 9.8*).

Unfortunately the city was bombed during the Second World War. During this bombardment the railway station and large parts of the historic city centre were ruined.

After the Second World War the city was rebuilt and expanded very fast. In 1954 a new railway station building (the current building) was designed and built on almost the same location. This new building was designed in a

time that the automobile was very upcoming and people started to travel more and further. The train became a less popular transport type and the car received a prominent place in the public space.

The historic city centre is almost completely recovered and is still a beautiful centre with many ancient, valuable building.

In the railway station environment you can see many elements of different times. The current railway station building contains elements of the first railway station which are involved in the design of the current building. The historic ax with the historic buildings along the ax refers to the first city expansion and the other buildings reflect influences from the last decennia's.

## Recommendations

*The rich history of the city is an important part of their identity. Many of the historic layers come together in the railway station environment, it is valuable to maintain this. A new intervention should fit in these characteristic structure.*

Figure 9.6 Historic development of Nijmegen



Figure 9.8 First railway station of Nijmegen

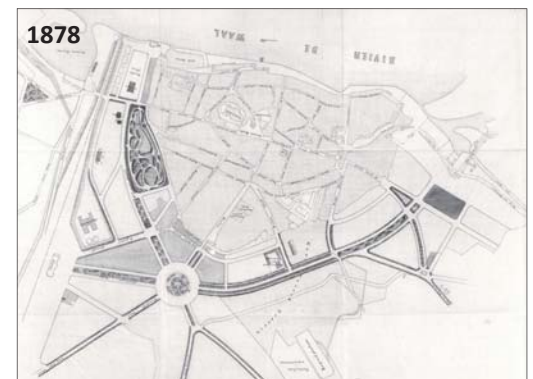
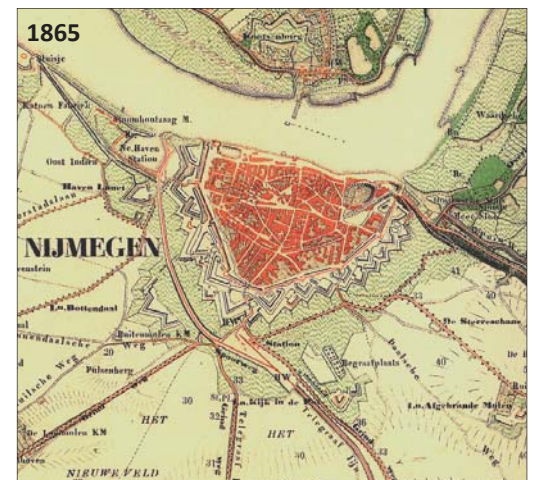
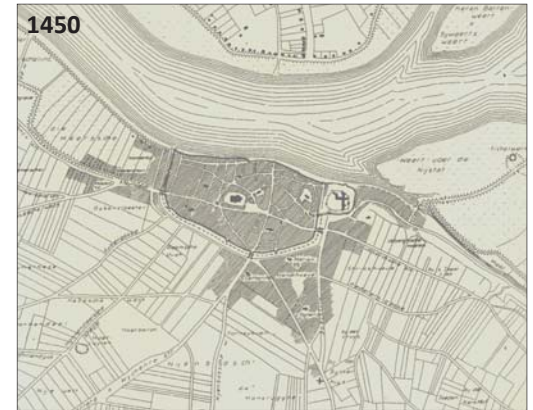


Figure 9.7 First city expansion made by Brouwer

## 9 ANALYSIS NIJMEGEN

### **Landscape characteristics**

Typical for the landscape structure in Nijmegen are the differences in height in the region, because of a lateral moraine. These differences in height are also visible in the area around the railway station. The railway is located on an embankment, this landscape element emphasizes the contrast between the east and west side. The west side of Nijmegen lies eight meters lower than the east side (see *figure 9.9*).

Furthermore the broad lanes and avenues are very characteristic and structuring elements on the east side of Nijmegen. These avenues, which are part of the first city expansion, form a green structure around the city centre. The Van Schaeck Mathonsingel is designed as a park. This overwhelming green ax should impress visitors and provide an imposing link between railway station and city centre.

Part of the ambitious first city expansion is the Kronenburgerpark, which was the outer space for city life during the 19th century.

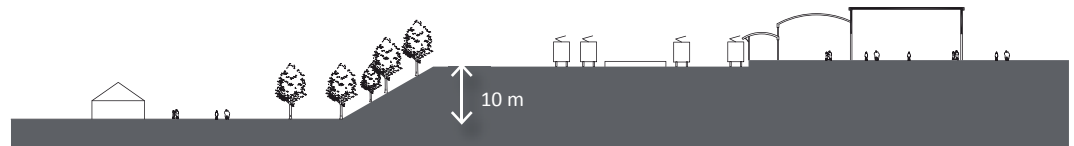
The imposing green lanes are only realized around the city centre in the east side of Nijmegen. In the west part of Nijmegen is a lack of green public spaces. The railway embankment has a rural character, it is covered with bushes and trees.

### **Recommendations**

*The 'green character' of Nijmegen is an important part of their identity so this should be maintained and improved. The west side of the city misses the style of the east side, so we should continue the green character in the ring road through the city. Furthermore we need to add green public space on the west side of the city.*



Figure 9.9 Map of the railway station environment of Nijmegen  
(Geoloket, 2010 edited by author)



### Future developments

The municipality of Nijmegen has planned some major development in the city. Figure 9.10 presents the map with the different plans.

First development is the Waalfront area, which is the former harbour of the city. The whole area will be transformed in a residential area with leisure, retail and office facilities. The Waalfront is located on the west side of Nijmegen, this development will give a positive impulse to the west side of the city.

Because of all these new developments a new bridge will be built on the west side of the city. With this new bridge a ring road is created through the city which will strengthen the accessibility of Nijmegen.

The municipality is building a new parking garage under the Van Schaeck Mathonsingel. This parking garage receives a capacity of 700 parking places among others for the railway station.

The railway zone in Nijmegen is very big because of the shunting-yards. Those areas have no function anymore so a major area will come available for new developments.

Finally a new transport system is proposed. This rapid transit bussystem (in Dutch: HOV - Hoogwaardig Openbaar Vervoer) should improve the connection between the university campus, railway station and city centre and the connection between Dukenburg, railway station, Waalfront and Lent. This development will improve the accessibility of the central railway station in the city.

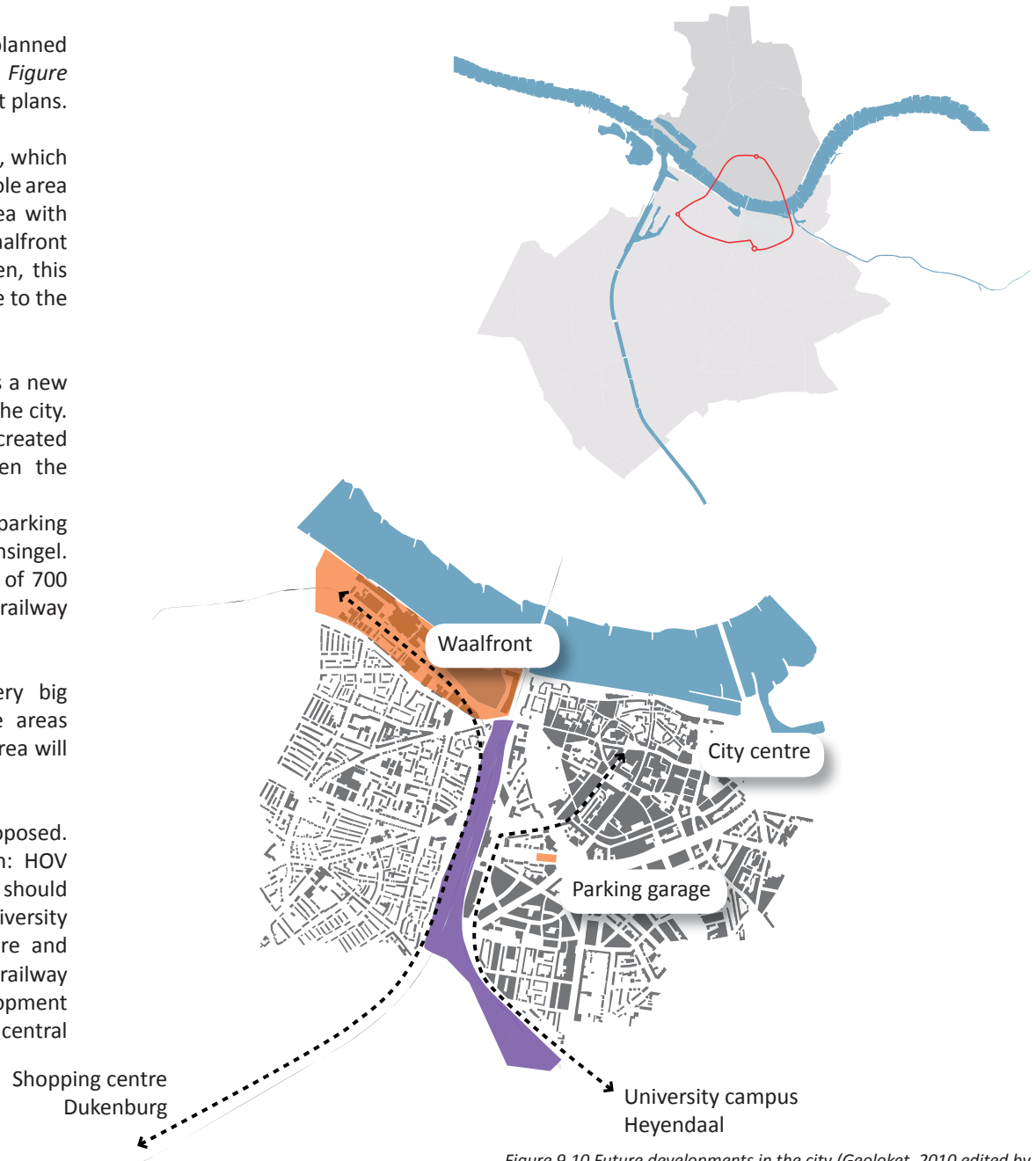


Figure 9.10 Future developments in the city (Geoloket, 2010 edited by author)



## 9 ANALYSIS NIJMEGEN

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### 9.4 Results analysis public space

The list of criteria is used to determine which elements should be analyzed for the public space around the railway station in Nijmegen. This chapter will discuss the main conclusions of the analysis per main criterion.



Figure 9.11 Current railway station building and square (Google Streetview, 2011)



Figure 9.12 Current situation of the public space on the west side of the railway (made by author)

## Necessary activities - Location

### ✗ Accessibility by bus, car, bicycle and pedestrian

Figure 9.13 shows the result of a 2-step analysis. As can be seen is that the network on the west side of the railway is not accessible at all within two steps. This criterion is evaluated as not good.

#### TO DO:

Railway station should be better connected to the network on the west side of the city.

### ✗ Link between railway station and city centre

The link between the railway station and city centre is very weak (figure 9.14) in Nijmegen (Brouwer, 2010). There are almost no involvements along the edge and the pedestrian has no priority.

#### TO DO:

Improve the link between railway station and city centre by improving functions and developing a pedestrian zone.

## Necessary activities

### 1. LOCATION

#### Accessibility of the location

- ✗ Accessibility by bus, car, bicycle and pedestrian
- ✗ Link between railway station and city centre

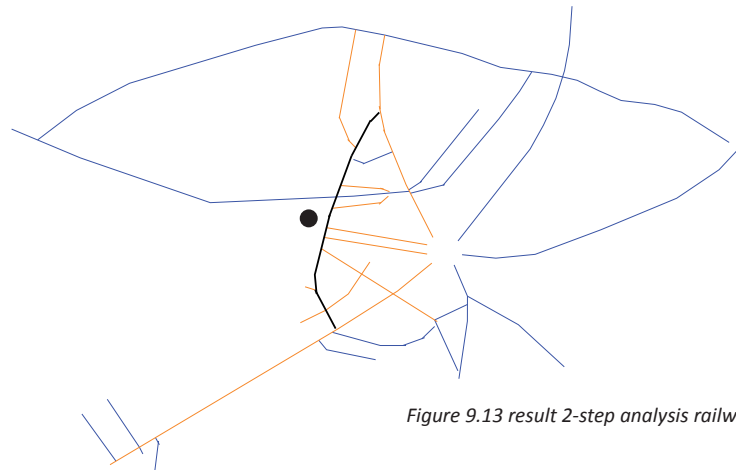


Figure 9.13 result 2-step analysis railway station Nijmegen



Figure 9.14 broken link between railway station and city centre



## Optional activities - Diversity

### ✖ Mixed use

The diversity of the public space is not good. Both the east and west side of the railway have a low mix of primary uses which makes the area not very lively.

TO DO:

Increase the number of primary uses on both sides of the railway.

### ✖ Density

The FSI and GSI in the railway station environment are very low (corresponding with a suburban area, Spacemate, 2006). The result is an area with a very high OSR which explains the enormous amount of open (public) space. See figure 10.15 for the result of the calculations.

TO DO:

Add new buildings to decrease the OSR and to increase the FSI and GSI.

### ⚙ Mixture in building type

The mix in buildings is good for the east side of the railway. There is a high variety in age and type of building.

The mix in buildings is not good for the west side of the railway. The current supply is very limited.

TO DO:

Improve the mix of buildings on the west side of the railway. Add new types of building.

### ✖ Human scale

The relation between open space and built area is out of proportion (see figure 9.16).

TO DO:

Make clear edges of the space.

## Optional activities

### 2. DIVERSITY

- ✖ Mixed use (more than 2 primary uses)
- ✖ Density of the railway station environment
- ⚙ Mixture in building type (more than 2 types)
- Human scale (ratio built-open)

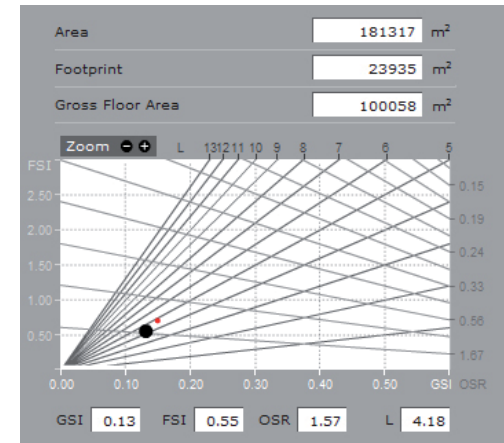


Figure 9.15 Calculation of FSI, GSI and OSR with help of Spacemate (Spacemate, 2006)

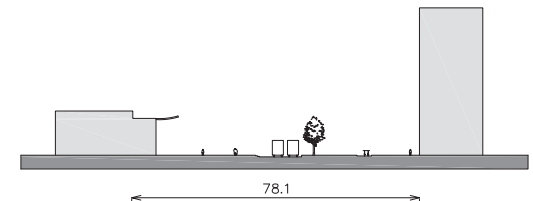
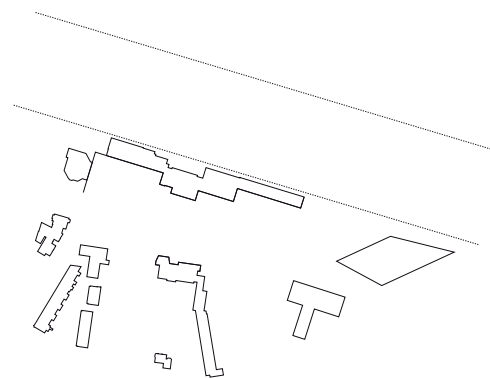


Figure 9.16 Overview of landscape details around the railway station

## Optional activities - Safety

### ⚠️ *Use of the plinth*

The transparency of the plinth on the east side is reasonably good. Most of the plinths do have a relation with the street (*figure 9.17*).

The transparency of the plinth on the west is not good at all. There is no relation between building and street and you feel very unsafe.

TO DO:

West side needs buildings with an attractive and transparent plinth.

### ⚠️ *Traffic safety for pedestrians*

Traffic safety for pedestrians is only analyzed for the east side of the railway because there is no entrance at the west side.

The traffic safety is not good at all. The pedestrian has to cross many roads and has no priority, see *figure 9.18* for the result.

TO DO:

Improve the pedestrian routes and give pedestrian priority compared to other traffic.

### ✅ *Pattern in opening hours*

The available functions around the railway station do have a good pattern in opening hours. From 6.30 am until 01.00 am various shops and bars are opened and provide some liveliness.

But the intensity of primary uses in the area is not so high, so if the number of primary uses increase than the pattern in opening hours will help by creating a lively area.

## Optional activities

### 3. SAFETY

- ⚠️ Use of the plinth
- ⚠️ Traffic safety for pedestrians
- ✅ Pattern in opening hours

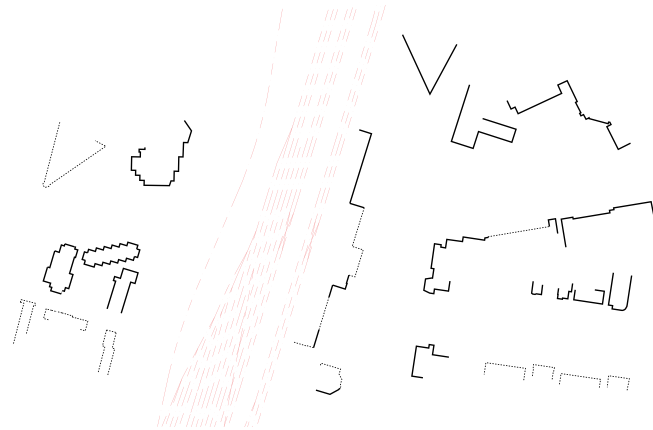


Figure 9.17 transparency of the facades (closed/open)

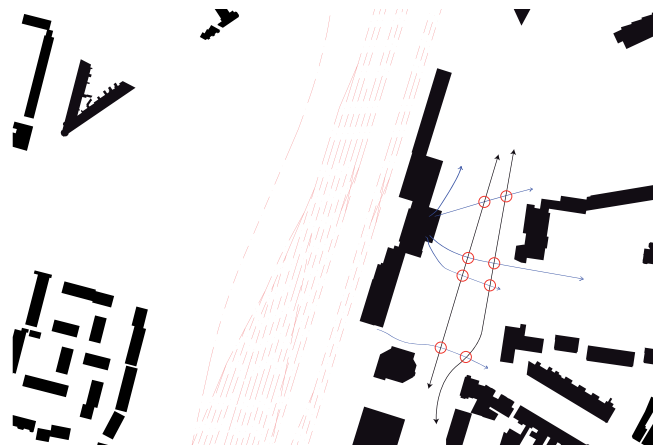


Figure 9.18 Conflict moments for pedestrians

## Social activities - Composition

### ✗ *Sitting places*

The number of (quantitative) sitting places is very low. There are almost no sitting places available in public space. Unfortunately there are also no stairs or sheltered corners to sit.

#### TO DO:

Create attractive zones for sitting and pay attention to design details in public space where people can sit and loiter.

### ✓ *Sightlines*

The area in front of the railway station (east) has clear sightlines and is very surveyable. The west side of the railway has no relation with the railway station yet.

#### TO DO:

Create a surveyable place on the west side.

### ✗ *Edge zone*

In *figure 9.19* the edge zone around the square in front of the railway station is partial drawn. The orange parts of the facade are good because they have interesting facade details. The black parts are boring and unattractive.

#### TO DO:

Improve the 'black' parts of the building facade.

### ✗ *Positive sensory experience*

The availability of trees, plants or water is very poor in front of the railway station. At the moment the whole square is made out of stone (see *figure 9.20*).

#### TO DO:

Increase the positive sensory experience with trees and plants and strengthen the 'green' character of Nijmegen.

## Social activities

### 4. COMPOSITION

- ✗ Sitting places (integrated and furniture)
- ✓ Sightlines
- ✗ Edge zone
- ✗ Positive sensory experience (trees, plants, water)

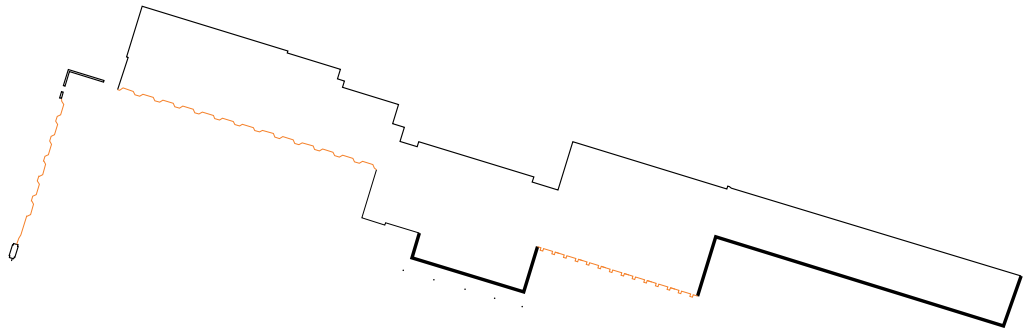


Figure 9.19 Edge zone around the square in front of the railway station

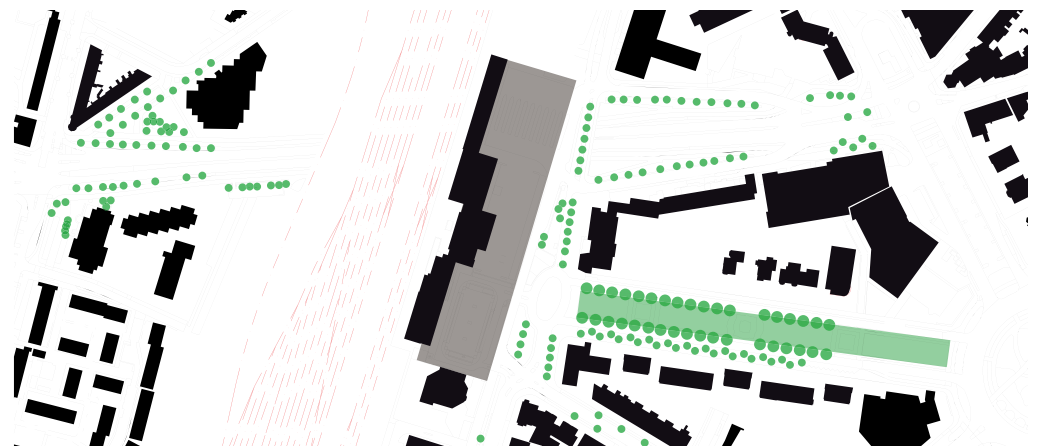


Figure 9.20 Overview of landscape details around the railway station

## 9.5 Conclusions

Figure 9.21 presents the results of the analysis of the public space around the railway station. The conclusions and recommendations will be used to formulate a design concept. Furthermore the conclusions are used to determine which elements will be researched in the case study research.

If we look at the results we can distinguish two parts: location specific results and results that are more generic.

The necessary activities can be considered as location specific. The embedding of the railway station in the city network is specific for Nijmegen, even as the link between the railway station and the city centre.

The optional activities and social activities are on the other hand more generic. Those elements are about the number of primary uses and density of the area. But also the design of a railway station square.

The generic elements (optional activities and social activities) are therefore interesting aspects for the case study research.

We can use the case study research to provide more specific guidelines for designing the public space around the railway station.

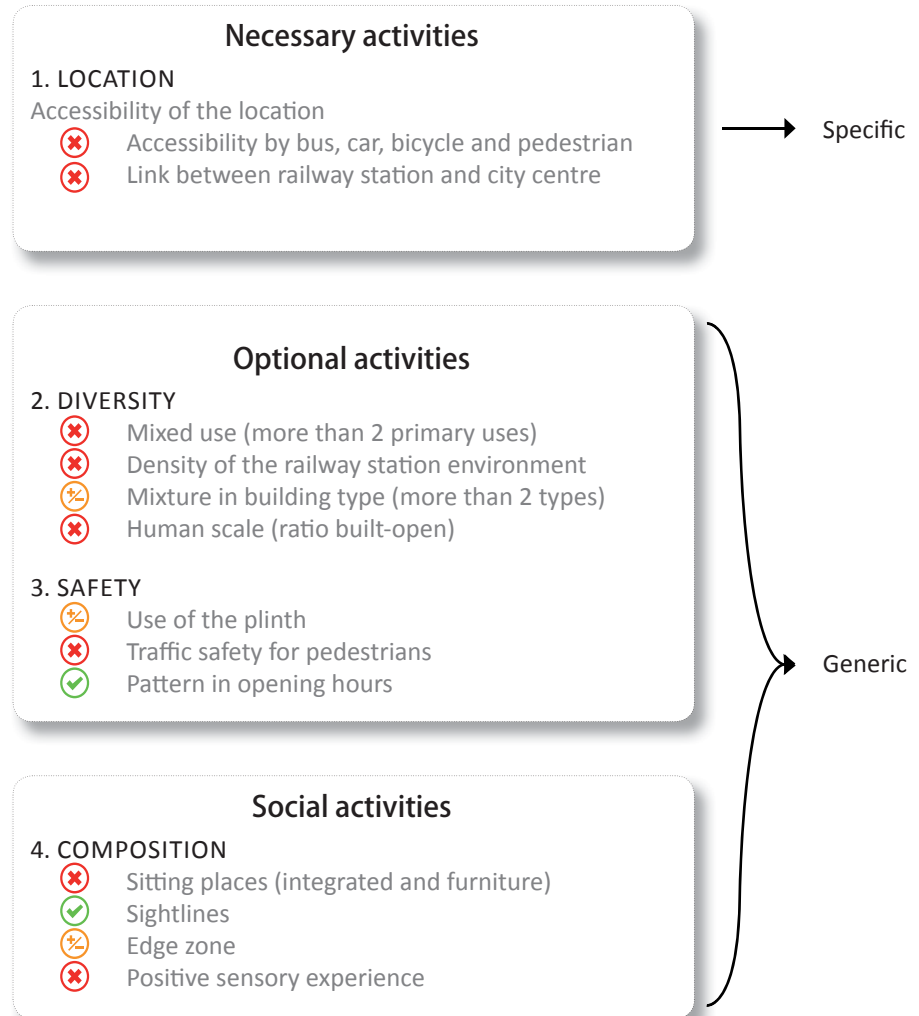


Figure 9.21 Results analysis of the public space. Necessary activities are specific for the location and optional and social activities are more generic and thus interesting for case study research

### 9.6 Results analysis public interior

The list of criteria is used to determine which elements should be analyzed for the public interior inside the railway station in Nijmegen. This chapter will discuss the main conclusions of the analysis per main criterion.

Figure 9.22 presents the map of the railway station of Nijmegen. The public interior of Nijmegen consists of an entrance hall (part A) and a broadening of the first platform (part B). Furthermore there is a pedestrian subway (part C) to the third and fourth platform. Most of the facilities are located inside the entrance hall.

Figure 9.23 illustrates the interior of the railway station of Nijmegen.

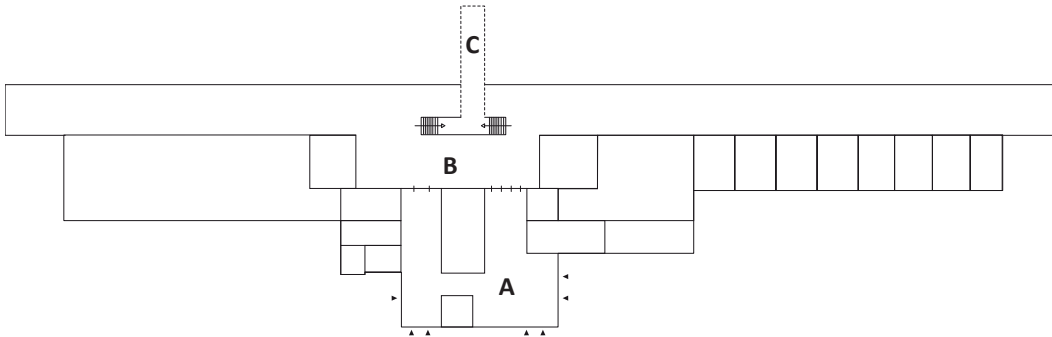


Figure 9.22 Map of the railway station building of Nijmegen (made by author)



Figure 9.23 Interior of the railway station of Nijmegen. First the broadening of the first platform (part B) and second and third the thoroughfares of part A (made by author)

## Necessary activities - Location

### ✖ *Urban pedestrian route*

The railway station of Nijmegen is not part of the urban pedestrian network at all. *Figure 9.24* shows the network and the location of the railway station. The building lies on a dead end.

TO DO:

Make the public realm part of the pedestrian network in the city.

### ⚡ *Logic of the flows of people*

*Figure 9.25* shows the flows of people through the building. There are two main flows which divide the building in two parts.

TO DO:

Figure out with case study research what the most logic division of flows is.

### ✖ *Entrance (width and location)*

There are many entrances in the building which are all very small. The location of the entrances emphasises the division of flows. Result of all these entrances is emptiness in front of the building.

TO DO:

Create a clear entrance of the building that is positioned at the route through the building. The entrance should also invite you to enter the building without any commitment.

## Necessary activities

### 1. LOCATION

- ✖ Lies on an urban pedestrian route
- ⚡ Logic of the flows of people
- ✖ Entrance (width and location)

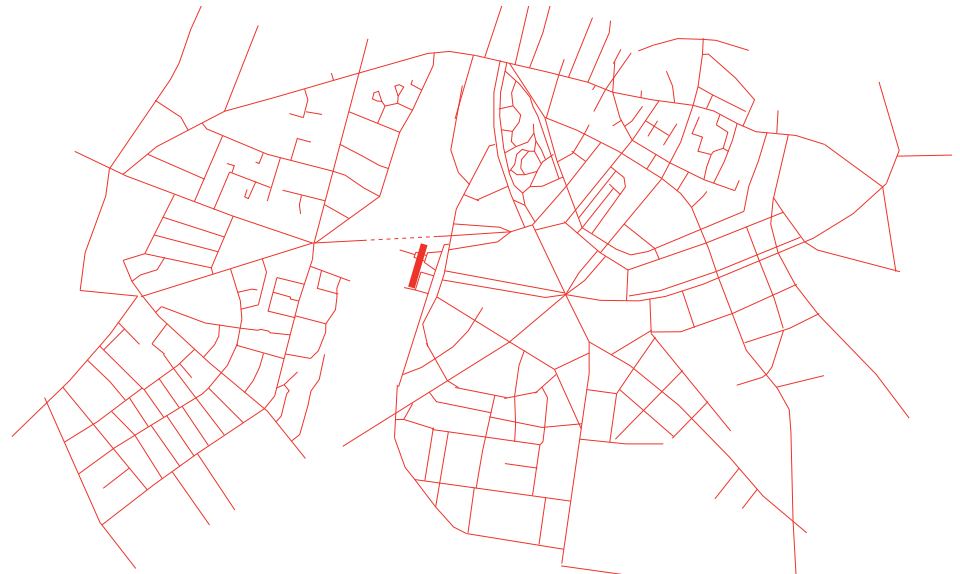


Figure 9.24 urban pedestrian network in Nijmegen with location of the railway station building in red

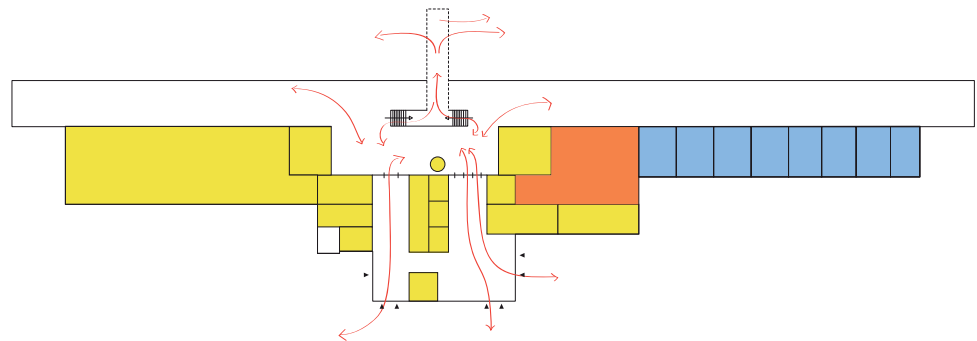


Figure 9.25 flows of people through the railway station



## Optional activities - Diversity

### ✖ Mixed use

The mix of secondary uses in the railway station is not good (see *figure 9.26*). The available functions are mainly shops and one restaurant. The shop supply is also very unvarying. Furthermore the functions are only available in the building, the passenger subway is very dull and unattractive.

### TO DO:

Increase the number of secondary uses in the railway station and add functions in the passenger subway, to create a multifunctional building.

### ⚡ Human scale

The width of the thoroughfares inside the building is good. The width of the passenger subway is too small. *Figure 9.27* illustrates the dimensions.

The height of the several spaces is not good. It is too low for a public interior which gives the space a closed feeling.

### TO DO:

Enlarge the passenger subway and heighten the ceiling of the indoor spaces to avoid a poky little space.

## Optional activities

### 2. DIVERSITY

- ✖ Mixed use (more than 2 secondary uses)
- ⚡ Human scale (width and height)

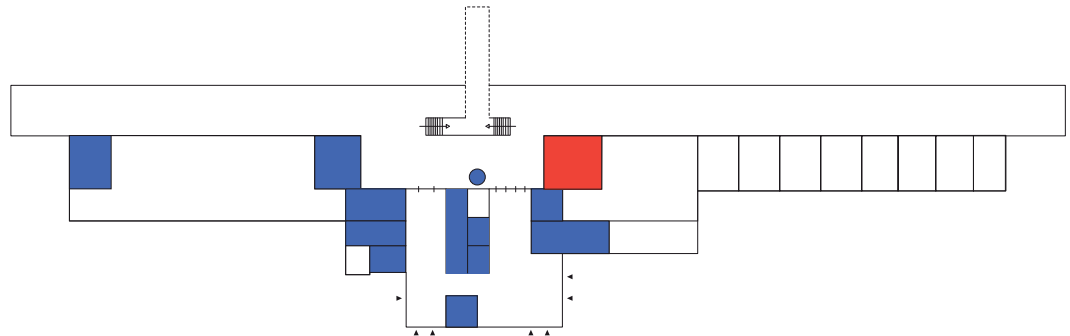


Figure 9.26 Secondary uses inside the railway station

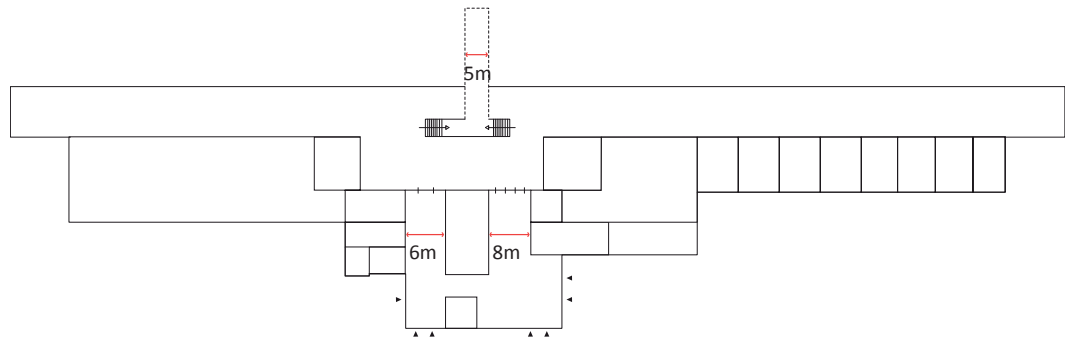


Figure 9.27 Width of the thoroughfares inside the railway station building

## Optional activities - Safety

### ⚠️ *Transparency of the facades*

The transparency of the facades inside the building is reasonably good. Half of the plinths is transparent and accessible for public. Unfortunately there are also parts that are closed and inaccessible (see *figure 9.28*).

The facades of the passenger subway are completely closed.

#### TO DO:

Improve the transparency of the facade in the passenger subway.

Improve the transparency of the closed facades inside the railway station.

### ⚠️ *Pattern in opening hours*

The pattern in opening hours is reasonably good. *Figure 9.29* shows the variety in opening hours. The Albert Heijn To Go is open from 06.00 am until 00.00 pm. Other facilities have limited opening hours and are therefore not distinguishing from other facilities in the neighborhood.

#### TO DO:

Make the facilities exclusive in the area by having large opening hours.

## Optional activities

### 3. SAFETY

- ⚠️ Transparency of the facades
- ⚠️ Pattern in opening hours

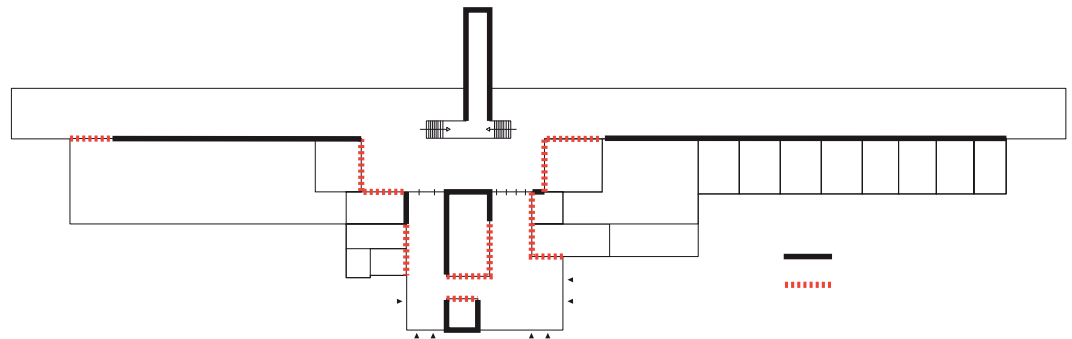


Figure 9.28 transparency of the facades (closed/open)

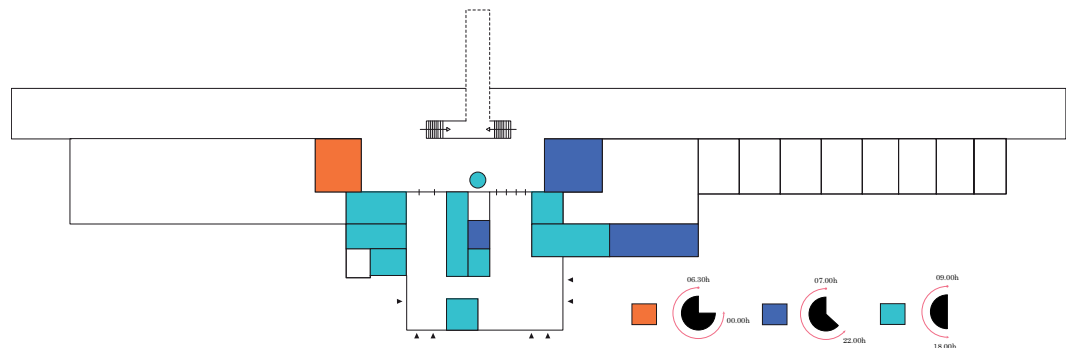


Figure 9.29 Pattern in opening hours of the secondary uses inside the railway station

## Social activities - Composition

### ✗ **Sitting places**

The number of (quantitative) sitting places is very low. There are no sitting places available in the public interior (see *figure 9.30*). Unfortunately there are also no stairs and sheltered corners to sit. Only at the platform are benches to wait.

#### TO DO:

Create sitting places to stimulate social interaction and an atmosphere of watching and being watched.

### ⚡ **Availability of daylight**

*Figure 9.31* illustrates the availability of daylight in the railway station. Inside the railway station is not much daylight. Along the edges it is better, but not good enough.

#### TO DO:

Inside the railway station should be more incident of daylight.

### ✗ **Edge zone**

The edge zone inside the railway station provides no space for loitering or waiting. The thoroughfares are too small and there are no places to 'hang around'.

#### TO DO:

Create an attractive edge zone with activity pockets along the edge and enough space to loiter and watch the world go by (Jacobs, 1961).

## Social activities

### 4. COMPOSITION

- ✗ Sitting places (integrated and furniture)
- ⚡ Availability of daylight
- ✗ Edge zone

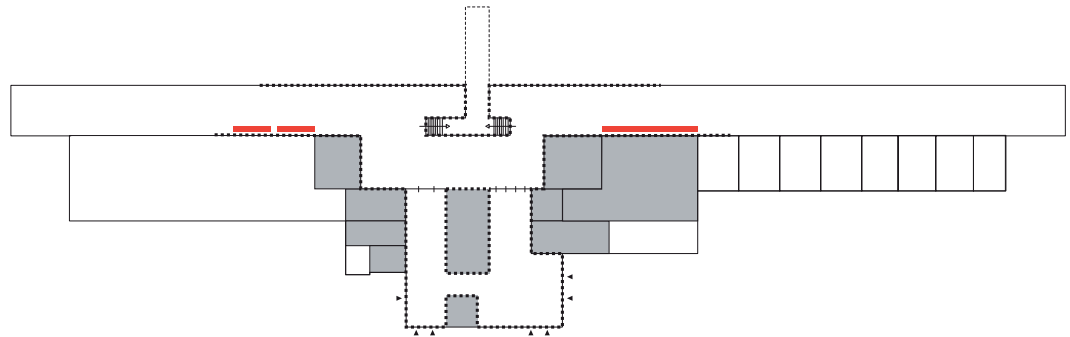


Figure 9.30 Sitting places inside the railway station building

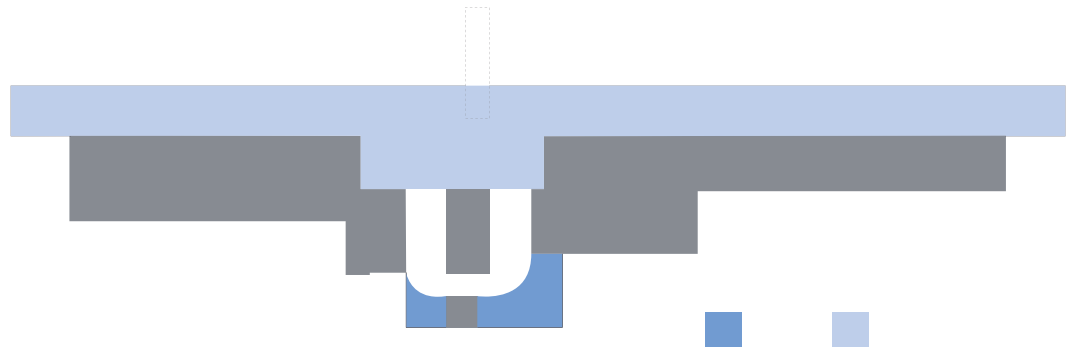


Figure 9.31 Incident of daylight in the railway station of Nijmegen

## 9.7 Conclusions

Figure 9.32 presents the results of the analysis of the public interior inside the railway station. The conclusions and recommendations will be used to formulate a design concept. Furthermore the conclusions are used to determine which elements will be researched in the case study research.

In contrast with the results of the public space analysis, we can consider the framework of the public interior as generic.

The generic elements of the necessary activities are the flows through the building and the location and design of the entrances.

For the optional activities it is interesting to know how the human scale is in other railway stations. Is the space large enough and are there zones for standing and going?

Finally the social activities are compared in case studies to find guidelines for Nijmegen. How are edge zones designed in other cases and are there qualitative sitting places available.

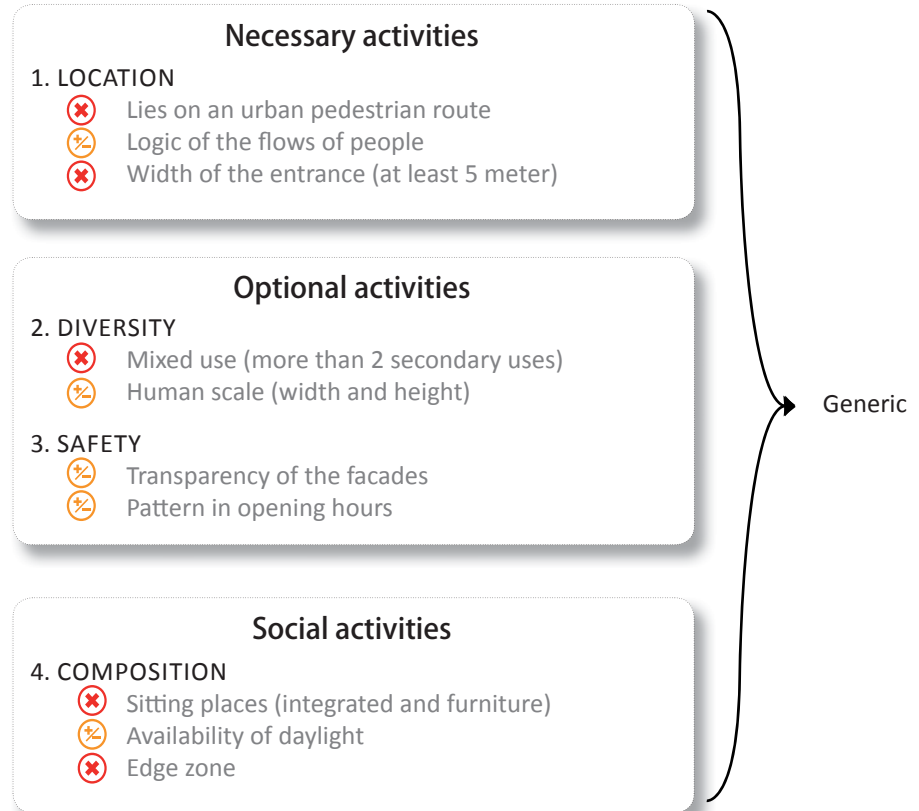


Figure 9.32 Results analysis of the public interior. Necessary activities, optional and social activities are generic and therefore interesting for case study research

### 9.8 General conclusions

The analysis of the location characteristics, public space and public interior of the railway station environment of Nijmegen has given us many recommendations for the design.

To translate all those separate recommendations to a design concept we need to combine those.

First we will start with the recommendations derived from the analysis of the location characteristics in Nijmegen.

The railway station environment in Nijmegen has a number of exceptional characteristics that must be taken into account.

In the first place the railway station of Nijmegen lies on a railway embankment that separates the east and west side of the railway. The east side of the railway has the same level as the railway and the west side of the railway lies 10 meters lower than the railway.

To include the west side of the railway to the railway station environment we have to find a solution to bridge this difference in altitude. Furthermore we need to make an entrance on the west side of the railway.

Secondly Nijmegen derives an important part of its identity from its valuable history. The different phases of time are visible in the city which is a strong element. Many of these historic layers come together in the railway station environment, therefore it is valuable to keep this.

Furthermore it is important to add a public green area for the west side of the city. There are no parks or landscape zones. This will contribute to an upgrade of the west side of the city.

Finally there are many major developments planned in the city. The development of the Waalfront area can contribute to an upgrade of the west side of the city. Also the coming of a rapid transport system (HOV) will improve the accessibility of the railway station environment in the city.

Second part of the analysis consisted of the analysis of the public space around the railway station. The following part summarizes those recommendations.

We have seen that it is important to improve the integration and accessibility of the railway station in the surrounding city network. The railway station should be part of the network on the west side of the railway. This will improve the position of the railway station in the city. Furthermore it is important to improve the link between the railway station and city centre.

To stimulate optional activities in the railway station environment we need to increase the number of primary uses on both sides of the railway. Furthermore the OSR needs to decrease and the FSI and GSI should increase. This will contribute to the liveliness of the area and have a positive influence on the human scale of the railway station environment. The relation between built and open area is out of proportion at this moment.

We need to add new types of building on the west side of the railway to improve the mix of buildings.

To increase the safety in the area we need to improve the use of the plinths of buildings. This is also in combination with the density of the area. Avoid close facades and stimulate activity in the edge.

Furthermore it is important to create zones where the pedestrian has priority. This improves the safety and liveliness. Finally a pattern in opening hours will contribute to a lively area along the whole day.

For social activities in the railway station environment it is crucial to have much attention for the detailed design aspects.

First of all there is a lack of places to sit. So there need to come zones where people can sit and loiter. Furthermore the edge of the building should contribute to the relation between public interior and public space. The extension made by Cepezed does not contribute to the relation between public interior and public space. Finally the positive sensory experience is negative at this moment. With trees and plants we can improve this criterion and strengthen the 'green' character of Nijmegen.

The last part of the analysis was the analysis of the public interior of the railway station building. The next part explains the main recommendations derived from this analysis.

To make the railway station building part of pedestrian network in the city we need to make a pedestrian route through the building, otherwise people will not 'just pass by'. Furthermore we need to find out what the best organization of flows of people through the building is for a railway station and the entrances of the building should be positioned on the pedestrian routes and be wide enough to invite people to enter the building.

Secondly the number of secondary uses should increase. The railway station environment should distinguish itself by having a exclusive supply of facilities with extended opening

hours. The human scale of the thoroughfare should be wide enough to progress large amounts of people and to create an attractive space. Finally the transparency of the facades is important for the liveliness and thus safety of the public interior.

Thirdly the social activities are dependend of the availability of sitting places where people can sit non-commital, there should be create areas where people can sit because those are not available yet.

Furthermore it is necessary to have much more incident of daylight in the building and the thoroughfare.

Finally the edge zone inside the building should be more attractive. Activity pockets in the edge will stimulate the liveliness and design details and columns or furniture will provide space for people to loiter.

### **9.9 What follows?**

The described results of the analysis of Nijmegen will be used to make a design proposal for the railway station and its environment.

But to formulate clear design guidelines we need to test the criteria in case studies. This will give us much more precize information about the criteria and how we can use them in Nijmegen.

The following part describes the case study research of three comparable cases. The list of criteria will be used to identify elements and guidelines that can be useful for the design of the railway station and environment of Nijmegen.





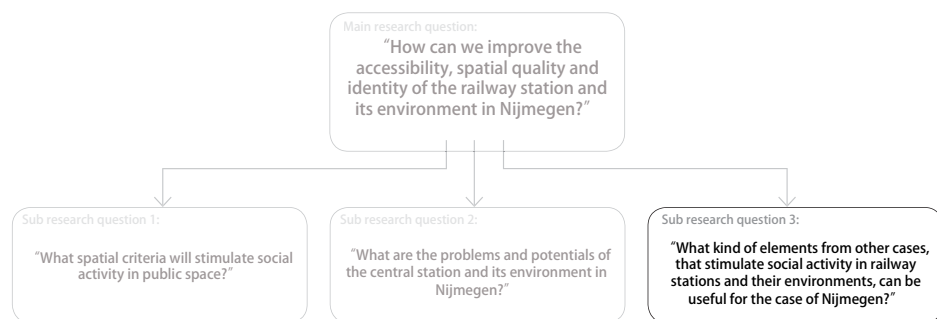
part D

# Case study research

The cases  
Results case study research  
General conclusions

This part of the thesis corresponds with sub question 3: *Which elements, that stimulate social activity in railway stations and their environments, can be useful for the case of Nijmegen?* The question is answered with the help of a case study research on 3 Dutch railway stations. The objective was to find guidelines for the design of the public interior of a railway station and the public space around a railway station.

The following chapters discuss which cases were selected and on what ground they were selected. The method that is used for testing the cases is the same as used for the analysis of Nijmegen. The results of the case study research will be discussed per theme. Each theme is ended with conclusions and recommendations for the design. Finally general conclusions are discussed.



### 11.1 Selecting the cases

The first step in doing the case study research was selecting the cases. The cases were selected on the following grounds: the location of the railway station in the city should be comparable, the railway station should have a public interior that forms a link between both sides of the railway and both sides of the railway should be developed.

The selection criteria are derived from the analysis of Nijmegen. The main conclusions from the analysis of Nijmegen to improve the railway station environment were:

- Use the public interior to connect both sides of the railway and make an entrance on the west side;
- Develop the west side of the railway and find a balance in character between east and west.

A comparable location in the city means that the railway station should be located at the fringe of a historic city centre of a medium-sized city in the Netherlands. This type of railway station is qualified as type 2 (see *chapter Problem field*). Figure 10.1 illustrates most of the type 2 qualified railway stations in the Netherlands.

Second objective was the presence of a public interior that linked both sides of the railway. This means that there should activity pockets in the pedestrian subway under the railway.

Finally both sides of the railway should be developed. This means that there should be a balance between the centre-side and the 'other' side of the railway in terms of function mix and density.

1. Leiden Centraal: 60.000
2. Eindhoven: 50.000
3. 's Hertogenbosch: 40.000
4. Arnhem: 30.000
5. **Nijmegen: 30.000**
6. Den Haag HS: 30.000
7. Haarlem: 30.000
8. Amersfoort: 30.000
9. Groningen: 30.000
10. Zwolle: 30.000
11. Tilburg: 20.000
12. Delft: 20.000
13. Breda: 20.000
14. Alkmaar: 20.000
15. Dordrecht: 20.000
16. Maastricht: 10.000
17. Hilversum: 10.000
18. Gouda: 10.000
19. Almere Centrum: 10.000
20. Leeuwarden: 10.000
21. Deventer: 10.000
22. Apeldoorn: 10.000

Figure 10.1 Type 2 railway stations in the Netherlands with number of passengers boarding and disembarking per day (NS, 2008)

In consultation with my mentor team and Movares we finally choose three cases. Leiden Central Station, Den Bosch Central Station and Amersfoort Central Station.

All the cases are located at the fringe of a historic city centre and have (except for Leiden) a similar amount of travellers a day.

Furthermore all the cases have a public interior that connects both sides of the railway. Finally in all the cases both sides of the railway have a specific development.

#### Leiden CS

Leiden is the test location of the NS. The public interior has been developed and improved by adding a specific mix of functions. Furthermore both sides of the railway station do have a specific character.

#### Den Bosch CS

In Den Bosch the 'other side' of the railway has been successfully redeveloped. A new urban area is created with a mix of residences, offices and places of education.

Den Bosch has been a popular example for successful development of a railway station area since.

#### Amersfoort CS

Amersfoort is an interesting case because the municipality is developing the entire railway station environment. Furthermore Amersfoort has a public passage that connects both sides of the railway and has two completely different residential areas on both sides of the railway station.

## 10.2 The cases

### Leiden CS

The city Leiden is located in the north part of the Province of Zuid-Holland between Amsterdam and Den Haag.

The oldest university of the Netherlands is settled in the city which is an important part of their identity. Other characteristics are the historic city centre with the famous Dutch canals, a large amount of valuable monumental buildings and court of almshouses (hofjes).

During the Second World War the city was deeply afflicted by bombardments. The railway station environment was almost completely ruined. Fortunately the historic centre has been preserved.

Figure 10.2 presents a map of Leiden with the railway station environment in the red circle. Leiden has had many railway station buildings. The first railway station was opened in 1842. In 1879 this was replaced by a new building. Unfortunately this building was ruined during the Second World War, so the third railway station was opened in 1955. This building could not progress the large amounts of travelers so a new station was needed. Finally in 1995 the current railway station building is opened.

Leiden is the fifth railway station of the Netherlands with 60.000 travelers a day. Since two years, the railway station has been a test location for the NS. New concepts for better facilities in and around the railway station are first tested in Leiden.

Leiden has developed both sides of the railway station and is still working on the improvement of the environment. The south side of the railway is the centre side (figure 10.4), the north side is called the Zeezijde (figure 10.3).



Figure 10.2 Part of the city Leiden, red circle is the railway station environment (Geoloket, 2010 edited by author)



Figure 10.3 Railway station Leiden at Zeezijde



Figure 10.4 Railway station Leiden at Centre Side



### Den Bosch CS

The city Den Bosch is located in the north part of the Province of *Noord-Brabant* in the south of the Netherlands. Den Bosch is characterized by its historic city centre which is the biggest walled area of the Netherlands. The historic centre is one of the most complete and undamaged centers of the Netherlands.

Figure 10.5 presents a map of the centre of Den Bosch with the railway station in the red circle. The current railway station is already the fourth railway station in the city. The first railway station was built in 1868 outside the town ramparts and made of wood so it could be dismantled easily if there was danger. In 1896 the wooden building was replaced by a historic, neoclassical building. Unfortunately this beautiful building was completely destroyed in the Second World War. Only the steel covering of the platforms has been preserved. In 1951 Sybold van Ravesteyn (same architect as current railway station Nijmegen) designed a new, modern building where the original steel covering of the platforms was part of. Finally this railway station is replaced in 1998 by a new, modern building: the current railway station.

Exceptional for the railway environment of Den Bosch is the development of both sides of the railway and the difference in character between both sides. The east side of the railway is the centre side (figure 10.7) and characterized by mainly historic buildings. The west side of the railway is the Paleiskwartier (figure 10.6) and derives its identity from major office buildings and apartments and modern architecture.

The development of the Paleiskwartier is an important example for urban area development (*integrale gebiedsontwikkeling*) since.

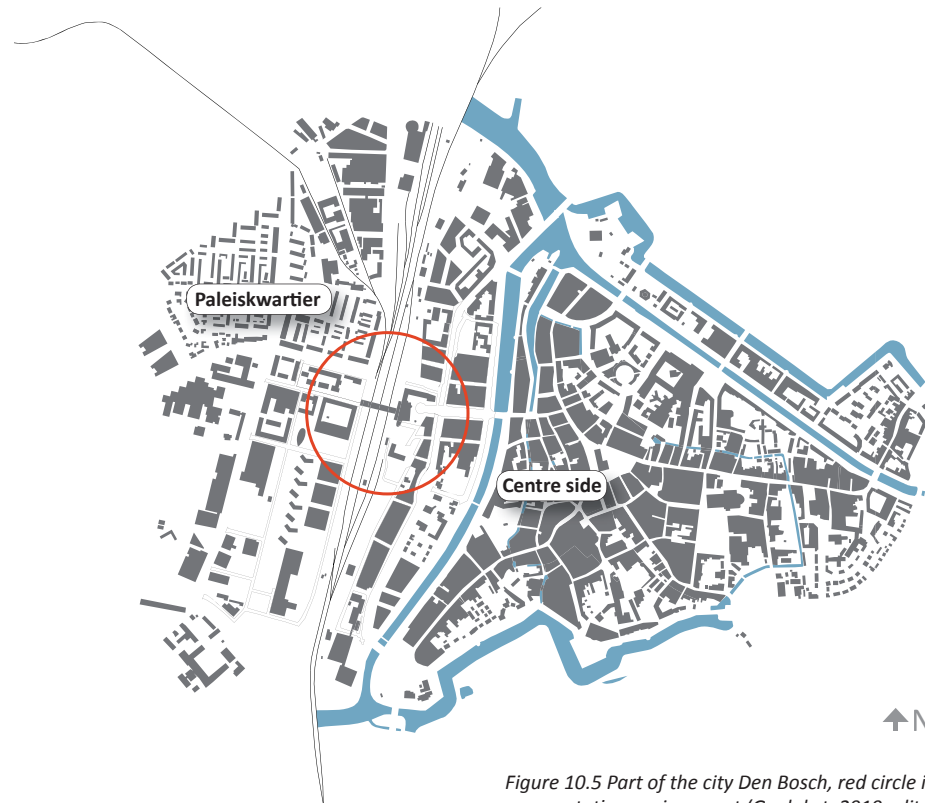


Figure 10.5 Part of the city Den Bosch, red circle is the railway station environment (Geoloket, 2010 edited by author)



Figure 10.6 Railway station Den Bosch at Paleiskwartier



Figure 10.7 Railway station Den Bosch at Centre Side

## Amersfoort CS

The city Amersfoort is located in the middle of the Netherlands in the Province of Utrecht. It is the second city of the Province. Amersfoort is characterized by its historic city centre with the famous Dutch canals, a large amount of valuable monumental buildings and courts of almshouses (*hofjes*).

Figure 10.8 presents the map of Amersfoort with the railway station environment in the red circle. The railway station of Amersfoort is one of the biggest nodes in the Netherlands. It forms the link between the Randstad and the north and east part of the Netherlands.

The location of the railway station has changed many times in history. The first railway station was located more to the east and closer to the historic centre. To provide the best transfer for travelers it was necessary to move the railway station to the west where all the railway lines come together.

The current railway station is built in 1997. There is created a large amount of space for major office buildings and other facilities. A passage above the railway forms the connection between both sides of the railway.

Amersfoort is still working on the development of the railway station environment especially on the north side. New buildings should improve this part of the city and include it in the railway station environment.

The north side of the railway station is called the Soesterkwartier (figure 10.9) and the south side is the centre side (figure 10.10).



Figure 10.8 Part of the city Amersfoort, red circle is the railway station environment (Geoloket, 2010 edited by author)



Figure 10.9 Railway station Amersfoort at Soesterkwartier



Figure 10.10 Railway station Amersfoort at Centre Side

### Testing the cases

As concluded in the chapter Analysis Nijmegen, the public space and public interior of the cases will be tested for the generic parts of the conceptual framework.

All the generic parts of the conceptual framework for public space and the conceptual framework for public interior are used to define guidelines for the design of the railway station building and environment of Nijmegen.

Figure 10.11 presents once again the list of criteria for evaluating public space in a railway station environment and evaluating the public interior of a railway station building.

The following chapter describes the results of the case study research. The elaborated version of the case study research can be found in Appendix B (Case study research).

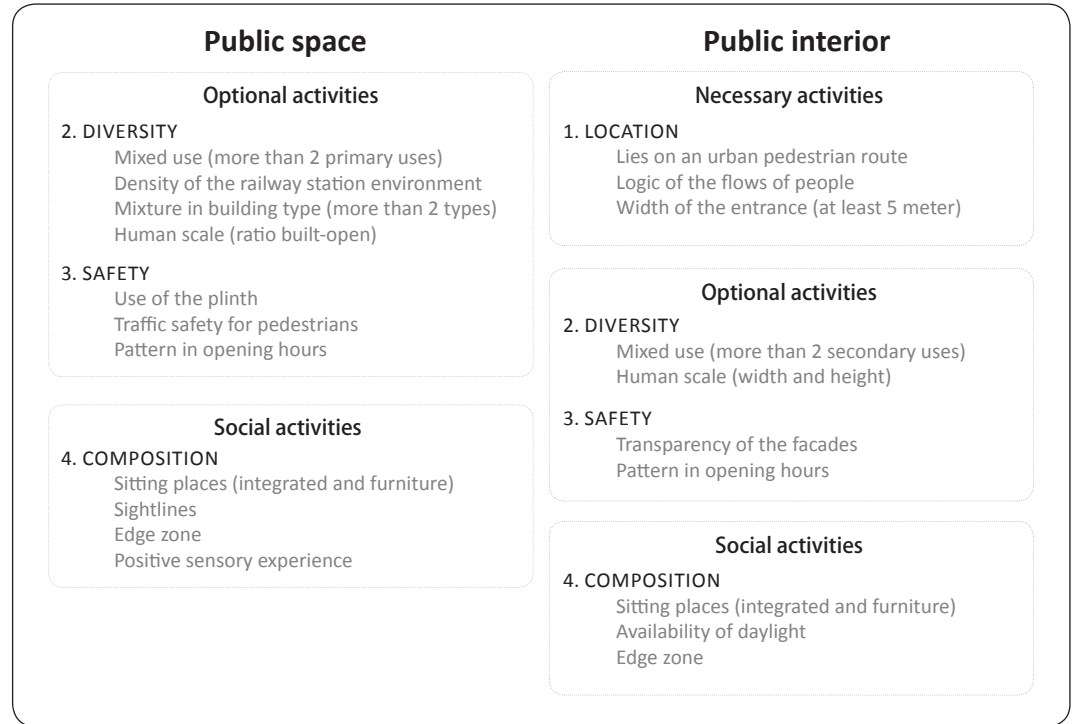


Figure 10.11 conceptual framework for public space and public interior that will be used for the case study research

# 11 RESULTS CASE STUDY RESEARCH

## 11.1 Public space

In the following chapter the results of the case study research about the public space are discussed.

The results of the three cases will be presented per main criteria. So the outcomes are comparable. Each sub criteria is concluded with recommendations for the design of Nijmegen.

### Optional activities - Diversity

#### Optional activities

##### 2. DIVERSITY

- Mixed use (more than 2 primary uses)
- Density of the railway station environment
- Mixture in building type (more than 2 types)
- Human scale (ratio built-open)

#### Mixed use

The diversity of the primary uses is in all the three cases good (see *figure 11.1*). There is also a good balance in functions between both sides of the railway.

In all the three cases the centre side is primarily aimed at leisure and shopping activities.

Leiden has a clear division in types of function on both sides. The Zeezijde has more public facilities like healthcare and educational functions.

In Den Bosch the Paleiskwartier is a new district with a mix of (major) office buildings, education institutes and residences.

Amersfoort has mainly residences on both sides mixed with (major) office buildings. The neighborhoods on both sides of the railway have their own character and qualities.

### RECOMMENDATION

Create on both sides of the railway an area with a clear own character. Search for a balance in type of primary uses.

#### Leiden



#### Den Bosch



#### Amersfoort

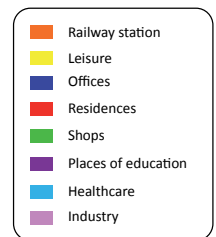


Figure 11.1 Availability of primary uses in Leiden, Den Bosch and Amersfoort



### Density

The density of the railway station environment is determined with the help of the Floor Space Index (FSI), Ground Space Index (GSI) and Open Space Ratio (OSR). The calculations are done with help of Spacemate.

Figure 11.2 presents the maps of the cases with in black the built area and in white the open area and the results of these calculations.

Important comment to compare the FSI with other built areas is the presence of the railway. Around 20 % of the area is used for railway.

For both Leiden and Amersfoort it is notable that the non-centre side has a low density and a high amount of open space.

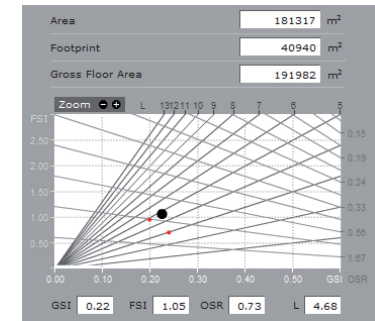
Furthermore Amersfoort has a relative low FSI because of the Villa district in front of the railway station. Therefore the OSR is very high.

Den Bosch has a better balance between both sides of the railway station and the most 'urban' density (Spacemate, 2006).

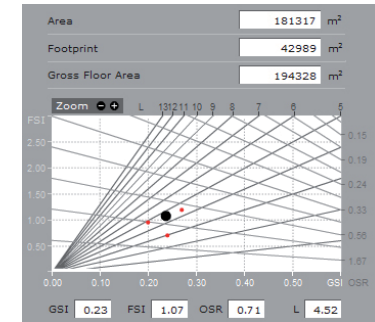
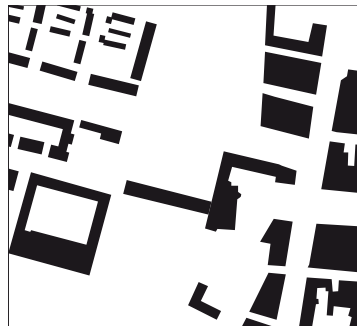
### RECOMMENDATION

*The FSI of a railway station environment should be at least 1.0 with a maximum of 1.5. It is desirable to have a GSI around 0.25, this will limit the amount of open space.*

#### Leiden



#### Den Bosch



#### Amersfoort

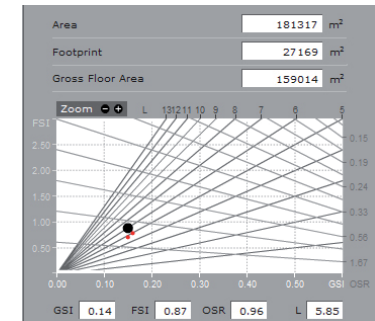


Figure 11.2 Calculation FSI, GSI and OSR with help of Spacemate



# 11 RESULTS CASE STUDY RESEARCH

## Mixture in building type

The mixture in building types is very different for the three cases. *Figure 11.3* presents the types of building around the railway station. To determine the mixture in building types the age and type of the buildings are observed.

Leiden has a very different character in building types on both sides of the railway station. The Zeezijde has mainly major public buildings which are developed in the last 100 years. So there is also a mix in building age. The centre side has a mix of impoverished gallery flats, new office buildings and historic buildings. The condition of the buildings on the centre side is not so good.

Den Bosch has a clear difference in building type and age on both sides of the railway. The Paleiskwartier consists of a modern mix of apartments, major office buildings, major public buildings and row houses. The centre side has a historic character with a variety of historic buildings.

The main type of building in the railway station environment of Amersfoort is ground-floor housing. The centre side has a valuable collection of villa residence and major office buildings. The Soesterkwartier consists mainly of working-class houses. New developments have been started to upgrade this side. So in the near future major apartment and office buildings will be built.

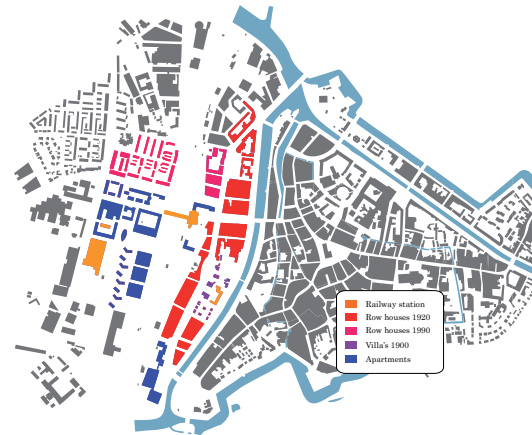
## RECOMMENDATIONS

*In Nijmegen we should add new types of buildings on the west side to achieve a more valuable mix of buildings which will attract other types of people.*

Leiden



Den Bosch



Amersfoort



Figure 11.3 Types of buildings around the railway station

### Human scale

The human scale of the railway station environment is based on the proportion between open space and the built area in front of the railway station.

Figure 11.4 presents the borders of the space on both sides of the railway. Furthermore a section is made for each space to define if the edges are high enough to enclose the open space.

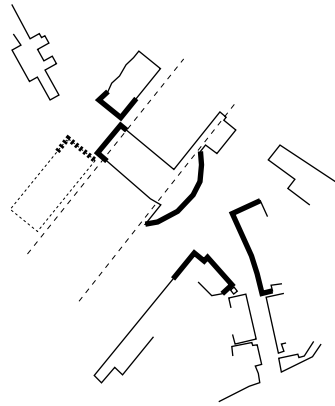
Leiden and Den Bosch are both cases where the human scale of the public space is very good. The squares have clear borders and the buildings are high enough to enclose the space. Most of the buildings are around 20 meters high with accents of 30 meters.

In Amersfoort the railway station building plays an important role in the definition of the space. On both sides the building runs over a great length. The corners of the building are curled around the space by which the space is enclosed. The buildings have enough height to compensate the amount of open space. The height of the buildings is around 25 meters with accents of 40 meters.

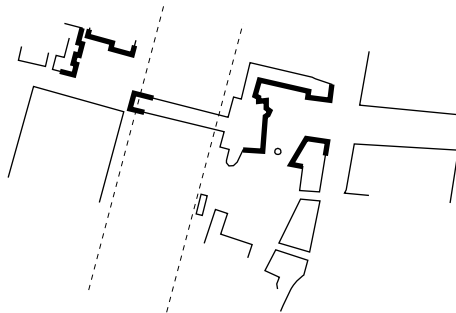
### RECOMMENDATIONS

In the current situation of Nijmegen the buildings around the edge of the space should be much higher (around 20 meters) or the space should have more limitations.

Leiden



Den Bosch



Amersfoort

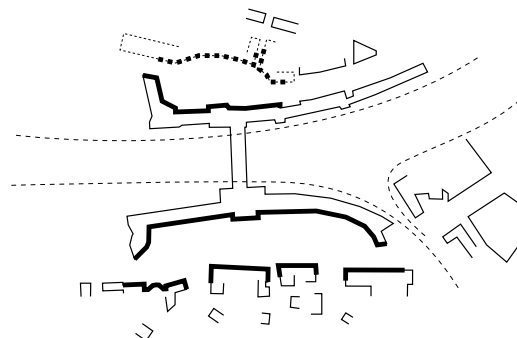
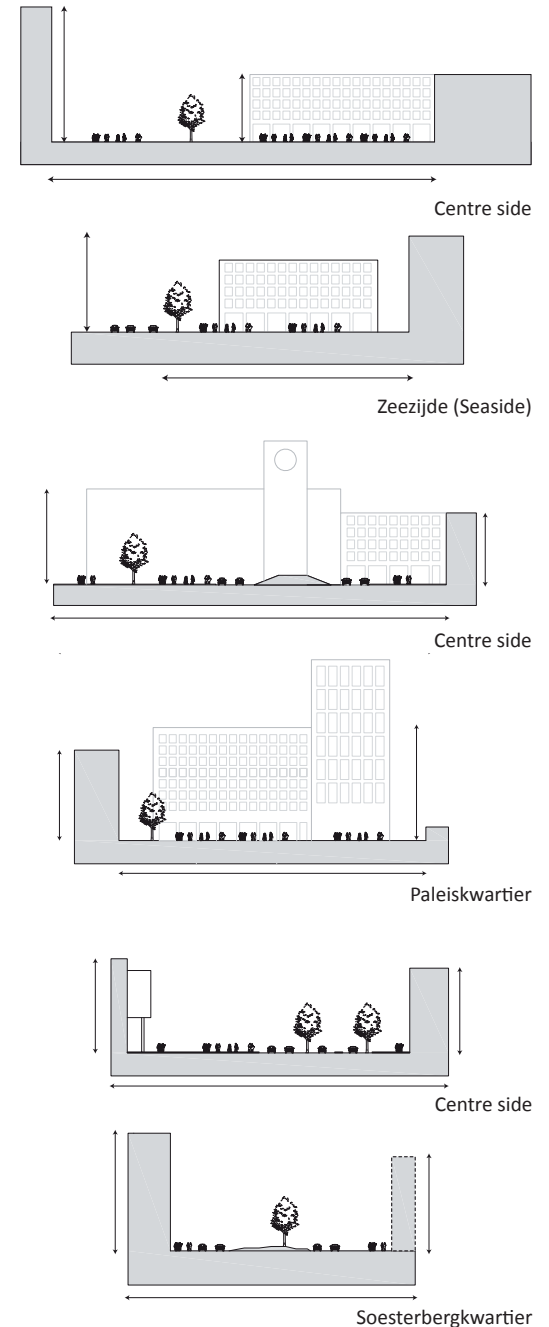


Figure 11.4 Borders of the public space on both sides of the railway



## Optional activities - Safety

### Optional activities

#### 3. SAFETY

- Use of the plinth
- Traffic safety for pedestrians
- Pattern in opening hours

### *Use of the plinth*

Figure 11.5 shows the drawings with the transparency of the facades around the railway station. There is made a distinction between closed and transparent facades. The transparent parts of the facade can work as the 'eyes on the street'.

The transparency of the facades in the direct surrounding of the railway station in Leiden is good. Especially on the centre side. Only the facade along the bus station is closed and should change.

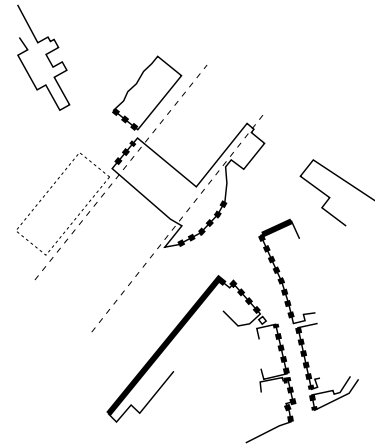
In Den Bosch there is a major difference between the east and west side. The east side has many transparent facades and is very open. But the west side is more closed, main reason are the major office buildings.

Amersfoort has many transparent facades which is good. The only problem is that many parts of the facades belong to major office buildings. So during the day, there is surveillance but outside the ordinary business hours it will be very dark and closed.

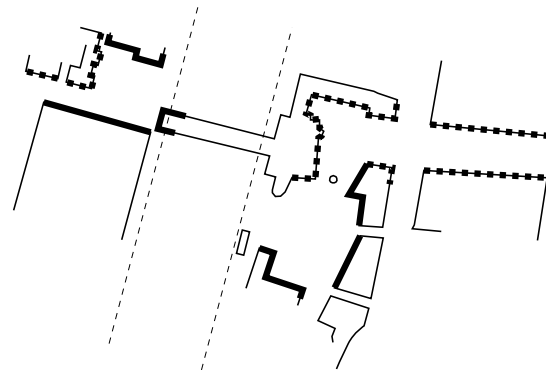
### RECOMMENDATION

*To achieve 'eyes on the street' it is not only important to create transparent facades but also to create spaces on the ground level with public facilities, so there will be much surveillance during the whole day.*

### Leiden



### Den Bosch



### Amersfoort

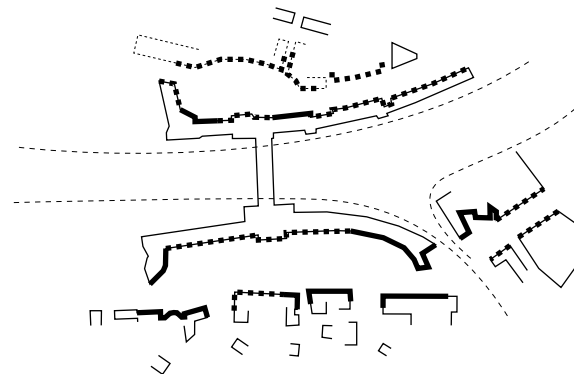


Figure 11.5  
Transparency of the  
facades around the  
railway station

### ***Traffic safety for pedestrians***

The three cases do all have clear pedestrian routes to the railway station. Particular the routes from the railway station to the city centre. Furthermore the car plays a minor role in all the three examples, the pedestrian has always priority.

Figure 11.6 presents the result of the three cases for the traffic safety of pedestrians.

Leiden has a very good pedestrian zone on the south side of the railway station, there are no traffic barriers at all.

On the north side you have to cross a minor car road, after that there is again a very good pedestrian zone.

Den Bosch has also clear pedestrian routes on both sides of the railway station which makes it very safe for pedestrians.

Finally Amersfoort has a clear route between railway station and city centre. The square in front of the railway station has major pedestrian zones which makes it safe to be there.

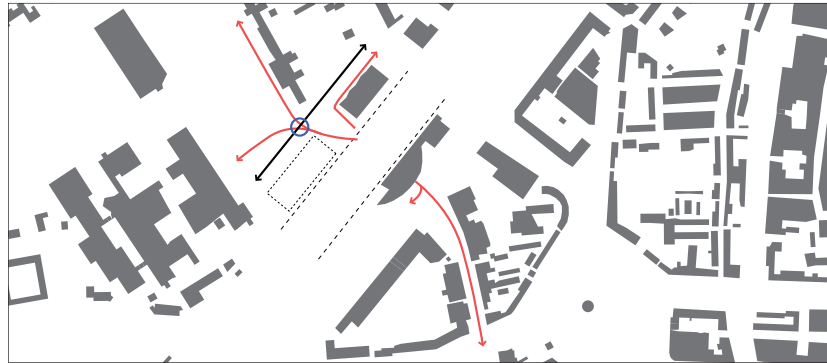
The north side of the railway station is much more quiet and therefore safe. Pedestrian crossings give the pedestrian priority where needed.

### **RECOMMENDATIONS**

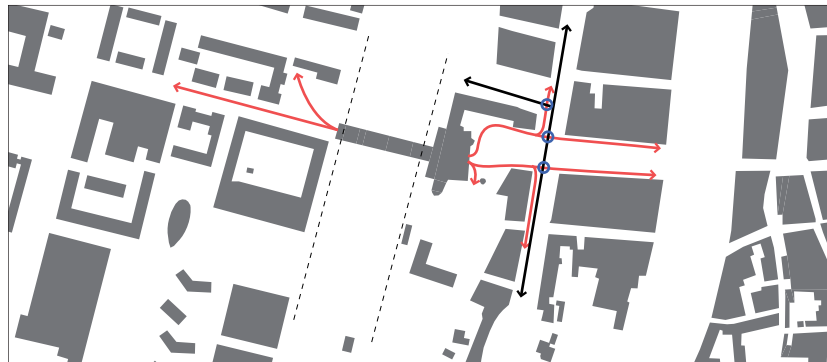
*Create pedestrian zones and routes that will not crossed by cars. This makes it possible to create lively places where people will stay.*

*Figure 11.6 Traffic safety for pedestrians from and to the station*

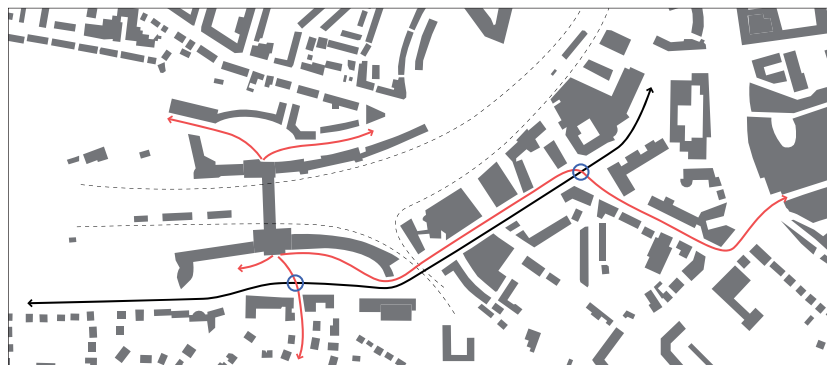
**Leiden**



**Den Bosch**



**Amersfoort**



# 11 RESULTS CASE STUDY RESEARCH

## ***Pattern in opening hours***

The pattern in opening hours is almost comparable in all the three situations.

The surrounding environment of Leiden is not exclusive in their opening hours. The shops, leisure activities and social and business services have limited opening hours which makes the area not very lively outside opening hours.

The situation in Den Bosch and Amersfoort is better because there are more restaurants and bars available with extended opening hours.

## **RECOMMENDATION**

*It is hard to make a design recommendation for this criterion. Of course it is recommended to enlarge the opening hours because the railway station can then become a new commercial and lively (sub) centre for the city. But it will not influence the spatial design for the railway station.*



*Figure 11.7  
Leiden, Den Bosch and  
Amersfoort*



## Social activities - Composition

### Social activities

#### 4. COMPOSITION

- Sitting places (integrated and furniture)
- Sightlines
- Edge zone
- Positive sensory experience (trees, plants, water)

### Sitting places

Figure 11.8 presents the public space in front of the railway station on both sides of the railway with in red the availability of (integrated) sitting places.

The availability of sitting places is not good in Leiden. In the entire public space is one bench and two integrated sitting places.

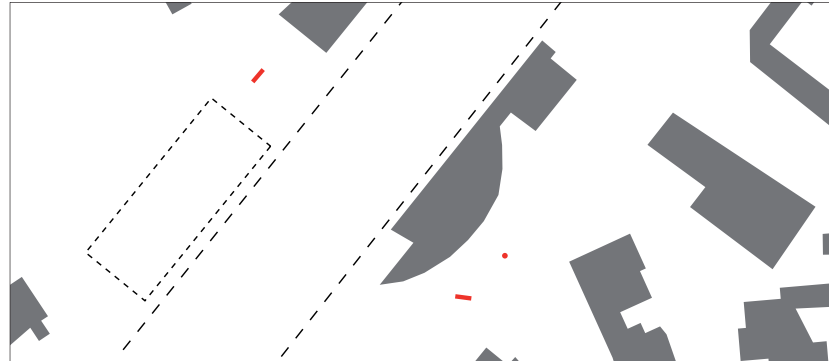
Also Den Bosch has not many sitting places in public space. There are some outdoor cafe's but there is almost no possibility to sit noncommittally.

Finally the sitting places in Amersfoort are good. There are many options to sit on large benches or concrete blocks. The quality of the sitting places is also good.

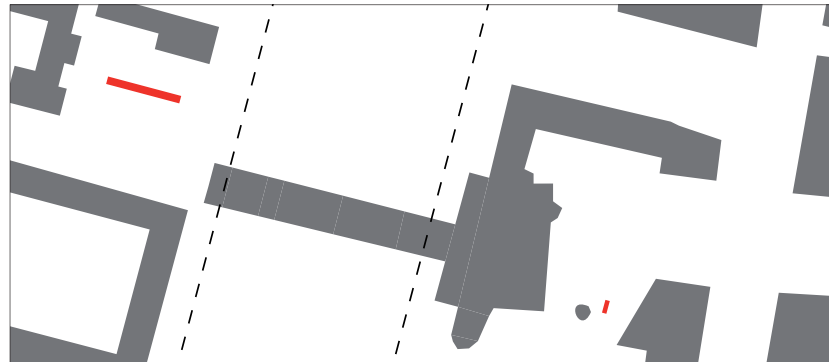
### RECOMMENDATION

*Pay attention to the location, availability and quality of sitting places in public space. Make it attractive for people to stay.*

Leiden



Den Bosch



Amersfoort

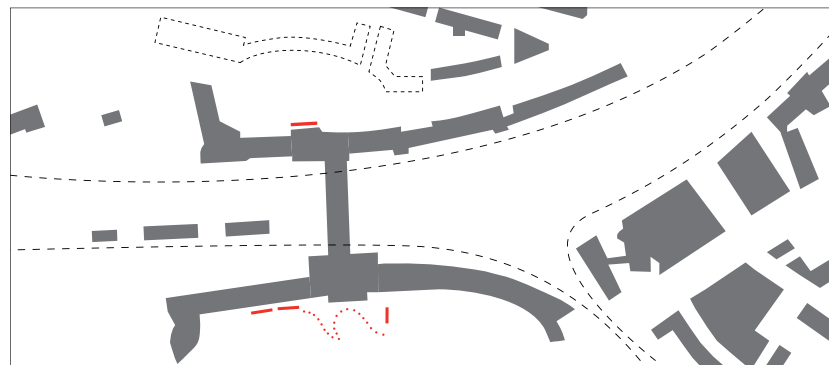


Figure 11.8 Sitting places in the public space on both sides of the railway

# 11 RESULTS CASE STUDY RESEARCH

## Sightlines

Figure 11.9 presents the analysis of the sightlines in front of the railway station. To evaluate the surveyability of the public space, the sightlines are drawn.

As you can see the three cases have all quite surveyable public spaces, which is characteristic for railway station squares. The open space makes it more easily to orientate.

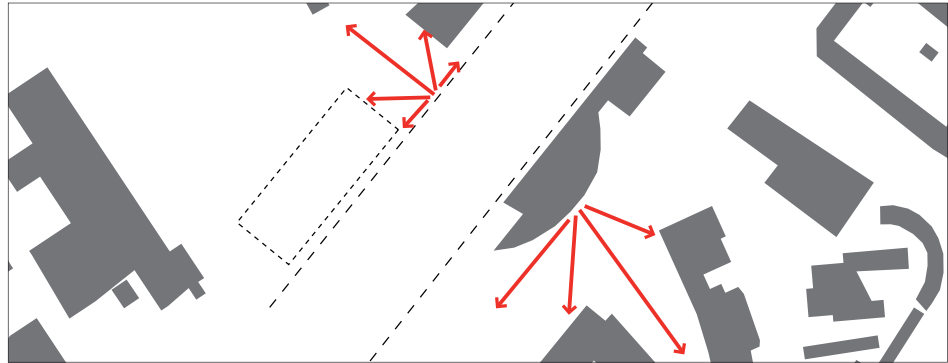
The challenge is to make the public space surveyable without making it boring. Furthermore it is important for a railway station to be able to orientate yourself immediately when you are entering the space.

### RECOMMENDATION

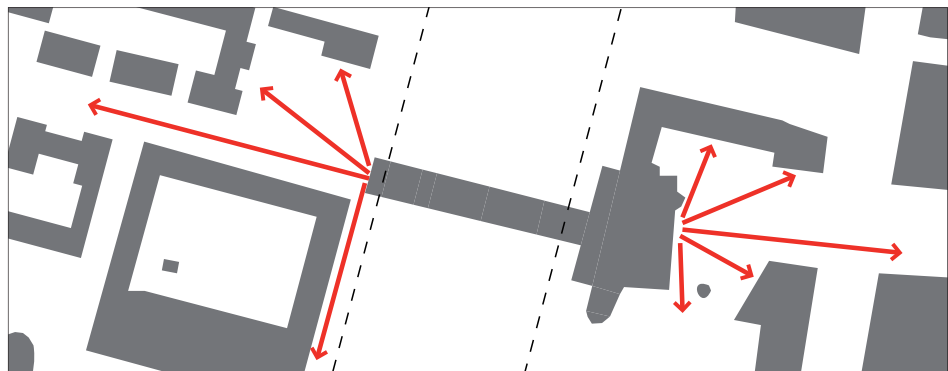
*Combine this criterion with the criterion sitting places. It is important to have an overview over the place from where you sit.*

*Furthermore it is important to immediately orientate when you are entering the space from the railway station.*

## Leiden



## Den Bosch



## Amersfoort

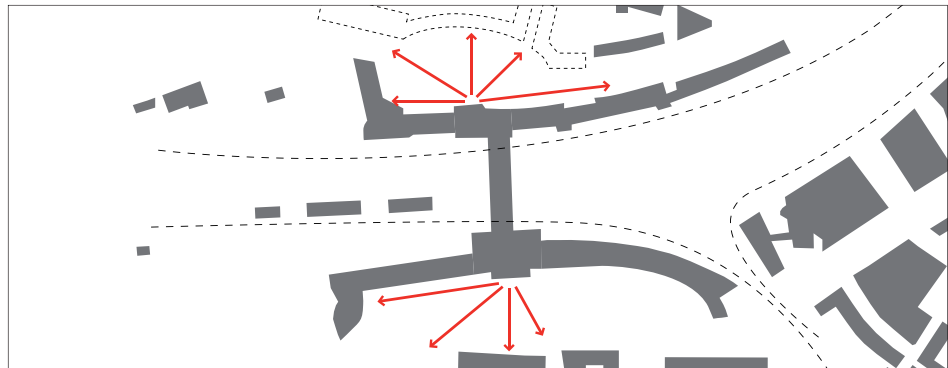


Figure 11.9 Sightlines in public space

### Edge zone

Figure 11.10 presents the drawing of the edge zone for the three cases. Important conditions for this criterion are the details in the facade and the activity pockets along the edge.

The environment of Leiden on the centre side has a good edge zone. There is much variety in building blocks and much activity along the edge. Because the buildings are most of the time historic, there are also many facade details.

The edge of the railway station could be better. There is enough space for people to position themselves along the edge but there is not much relation between the public space and public interior.

The edge zone in Den Bosch is reasonably good. There are activity pockets which makes it interesting and there are differences in the form of the edge, but the design details that contribute to an attractive facade could be better.

Amersfoort has a good edge zone on the centre side. There is made a modern gallery which forms a transition between the public interior and the public space. There are also many activity pockets along the edge.

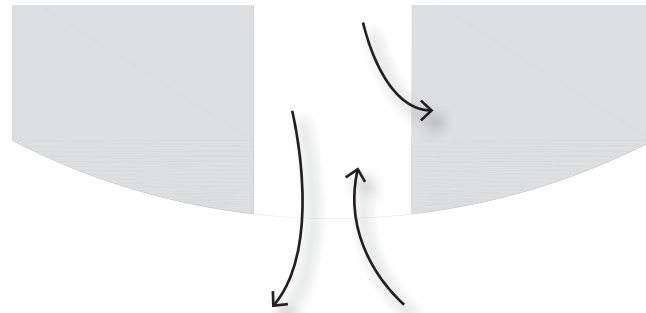
The edge zone on the north side of the railway station is reasonably good, the size of the building blocks is too big and there is less activity.

### RECOMMENDATION

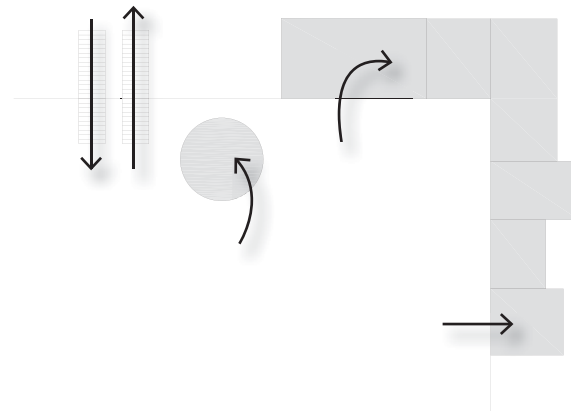
*Create an edge zone that can function as a transition zone between the public interior and the public space.*

Figure 11.10 Edge zone of the three cases

#### Leiden



#### Den Bosch



#### Amersfoort



# 11 RESULTS CASE STUDY RESEARCH

## **Positive sensory experience**

The positive sensory experience is based on the availability of trees, plants or water in public space because this will contribute to a better experience of the place.

Figure 11.11 presents the drawings with available trees, plants and water in the railway station environment of the three cases.

Leiden has only some trees on the south side of the railway station. The trees are very young and therefore still very small. The area is almost completely made of stone.

In Den Bosch is paid more attention to the influence of green in the railway station environment. The green avenue from the city centre stops in front of the railway station which contributes to the experience of the place. On the west side are many trees which is good.

The centre side of the railway station in Amersfoort is completely paved. There is one major, old tree and a couple of flower boxes on the square but there could be much more attention for trees, plants or water.

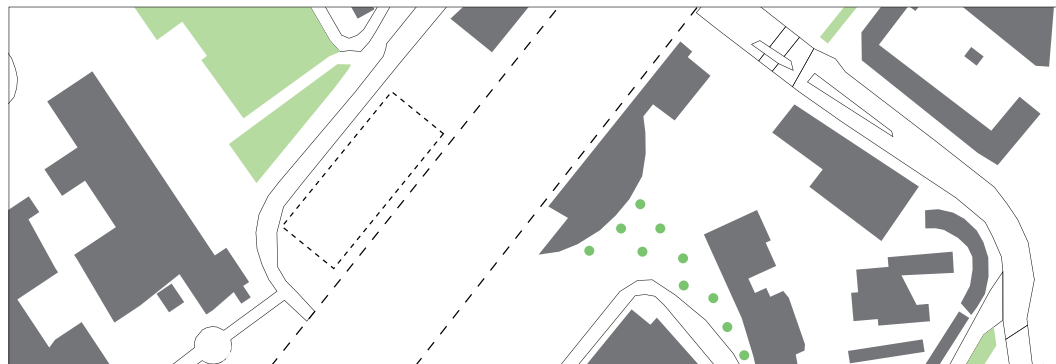
It is difficult to say something about the north side of the railway station because this is still under construction.

## **RECOMMENDATION**

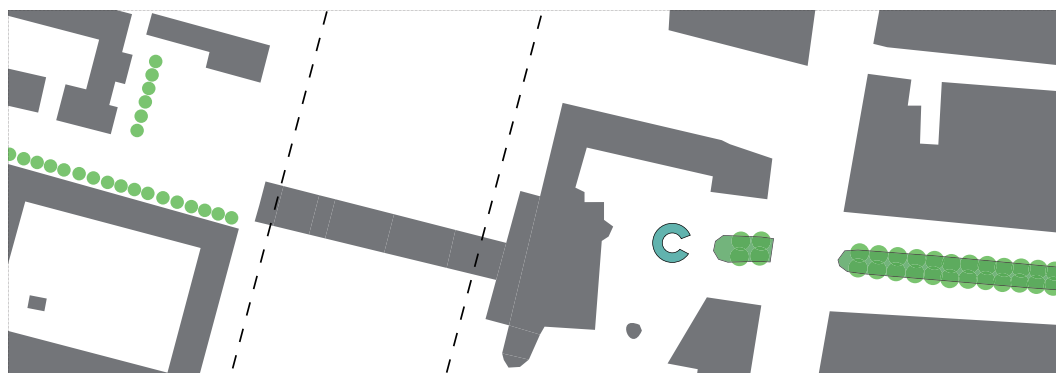
*Prevent a completely paved area with no attention for any trees, plants or water elements. The public space will feel much more attractive with those elements and they also contribute to the human scale of the area.*

Figure 11.11 Positive sensory experience (trees, plants, water)

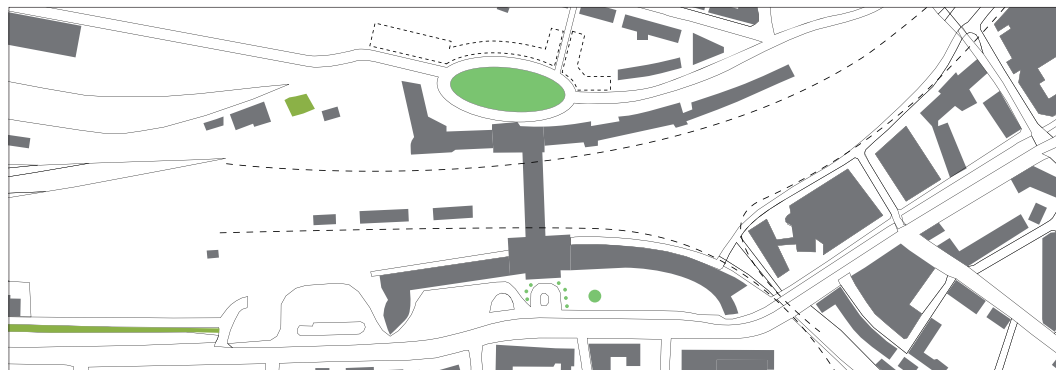
### **Leiden**



### **Den Bosch**



### **Amersfoort**



## 11.2 Conclusions

After analysing the criteria that contribute to optional and social activity in public space in the railway station environment of Leiden, Den Bosch and Amersfoort we can formulate a number of design recommendations for the railway station environment of Nijmegen.

### *Optional activities*

- Add new functions on the west side of the railway to find a balance between both sides of the railway. Add new types of buildings that strengthen the residential character of the west side of Nijmegen and attract other people.
- Intensify both sides of the railway. The current FSI and GSI are much too low. We need to reach a FSI around 1.25 and a GSI around 0.25 this affects the amount of open space which should decrease to 0.7.
- The plinths of the surrounding buildings should have public facilities in the edge. This strengthen the surveillance. It is furthermore desirable to add more residences to the area with windows on the railway station environment.
- Create pedestrian zones and routes that be not crossed by cars.

### *Social activities*

- Pay attention to the location, availability and quality of the sitting places. Make zones for sitting places in both sunny as shadow places. From the location you sit you should have a good overview over the area. Furthermore it is good to position

the sitting places around activity pockets or along flows of people. So you can watch other people when you are waiting.

- Make a zone along the edge of the building that functions as a transition zone between the public space and public interior. Use facade details to make a place along the edge by adding niches or doorsteps. Amersfoort has a modern gallery which has depth and a covering. The many columns invite you to lean and walk around.
- The three cases do not pay a lot of attention to elements that contribute to a positive sensory experience of the place. It is very important to avoid a completely paved area (which is easy to maintain). The influence of trees and plants is much more important than we think.

# 11 RESULTS CASE STUDY RESEARCH

## 11.3 Public interior

This part of the thesis discusses the results of the case study research about the public interior.

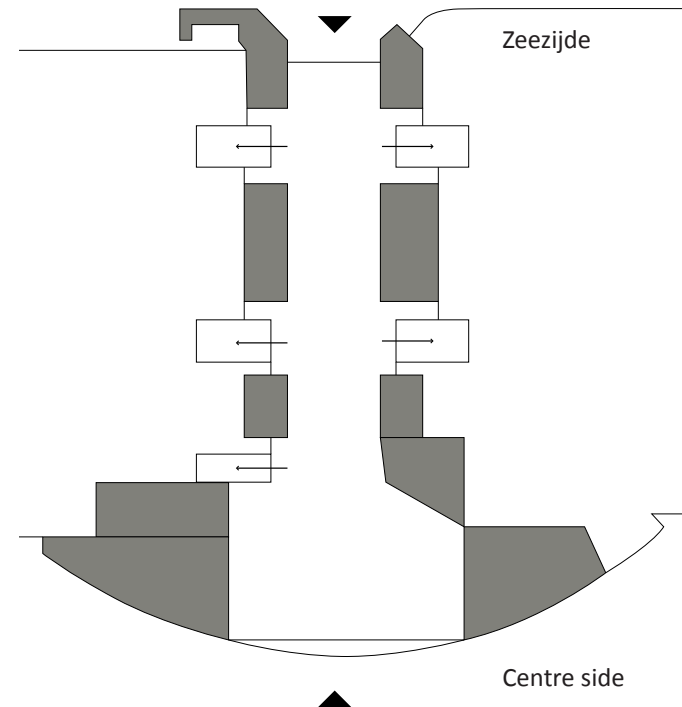
The results of the three cases will be presented per main criteria. So the outcomes are comparable. Each sub criteria is concluded with recommendations for the design of Nijmegen.

Figure 11.12, 11.13 and 11.14 present the public interiors of Leiden, Den Bosch and Amersfoort. Characteristic for the three cases is that the building is emphasized on the centre side of the railway. Certainly for Den Bosch and Amersfoort.

### Leiden CS



Figure 11.12 The thoroughfare of the public interior (Photo made by author, 2010)

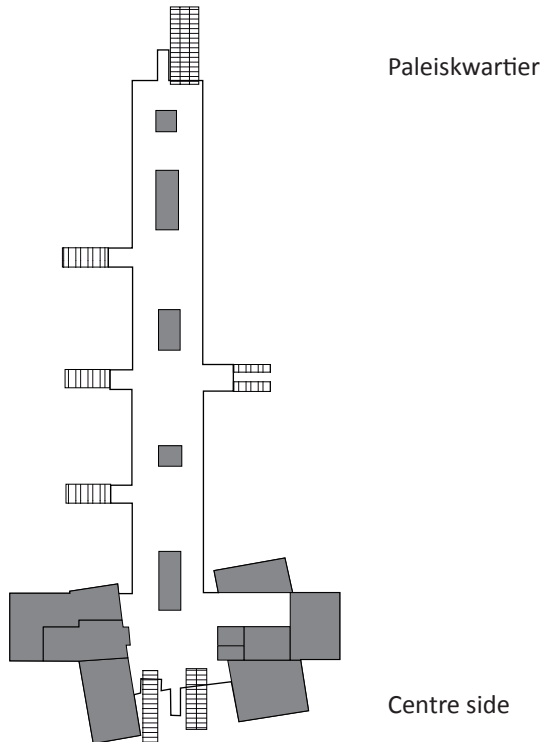




## Den Bosch CS



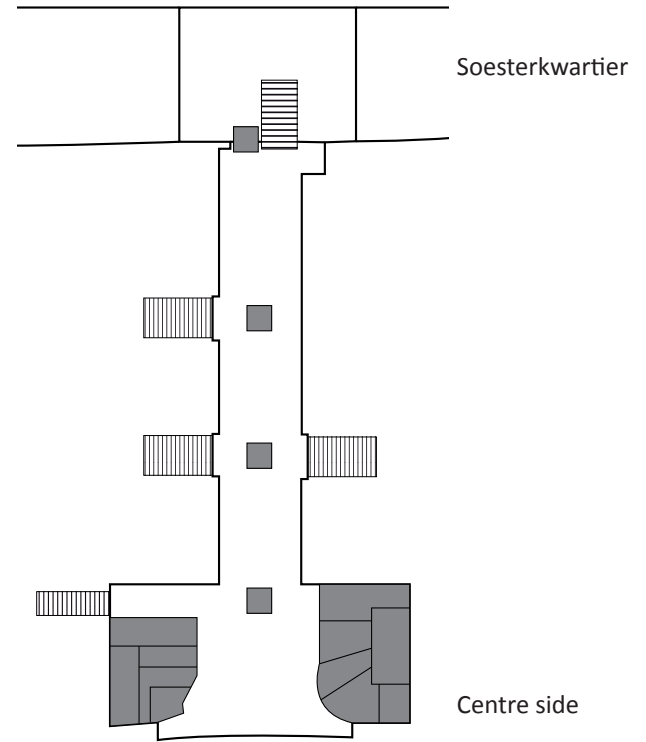
Figure 11.13 The thoroughfare of the public interior (Photo made by author, 2010)



## Amersfoort CS



Figure 11.14 The thoroughfare of the public interior (Photo made by author, 2010)



## Necessary activities - Location

### Necessary activities

#### 1. LOCATION

Lies on an urban pedestrian route  
Logic of the flows of people  
Entrance (width and location)

### Urban pedestrian route

Figure 11.15 presents the location of the railway station in the pedestrian network of the city. In all the three cases the railway station forms a link in the pedestrian network of the city. So the railway station is part of an urban pedestrian route through the city, which is good.

Important note is that the public interior of the railway station of Den Bosch and Amersfoort is located on the first floor. Therefore the railway station of Leiden is the best example of a public interior (located at ground level) that lies in the urban pedestrian network.

### RECOMMENDATION

*The railway station should form a link in the pedestrian network of the city and should connect both sides of the railway. It is desirable to have a public interior on ground level.*



Figure 11.15  
Pedestrian  
network of the  
three cases  
with the railway  
station building  
in red

## Flows of people

Figure 11.16 presents the public interior of the three railway stations with the main flows of people. Remarkable is that all the three cases have one main flow which has forks to the platforms.

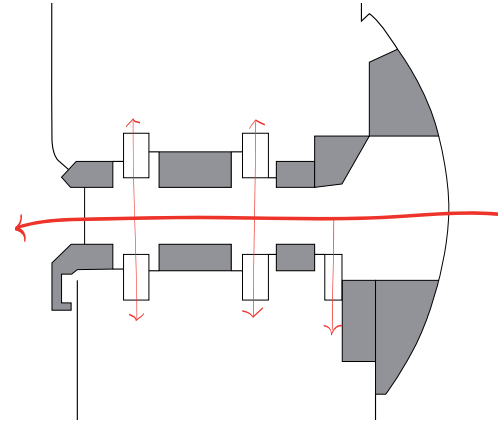
The advantage of this system is that it is very surveyable and functional to process large amounts of flows of people.

## RECOMMENDATION

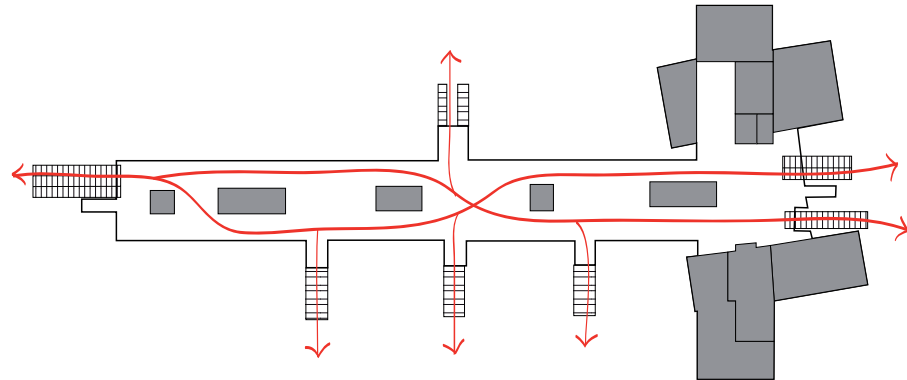
*The public interior of a railway station should always process large amounts of people as quick as possible. Therefore it is desirable to create one main flow with forks to other places (like platforms).*

*There should be enough space to create areas for staying and moving.*

Leiden



Den Bosch



Amersfoort

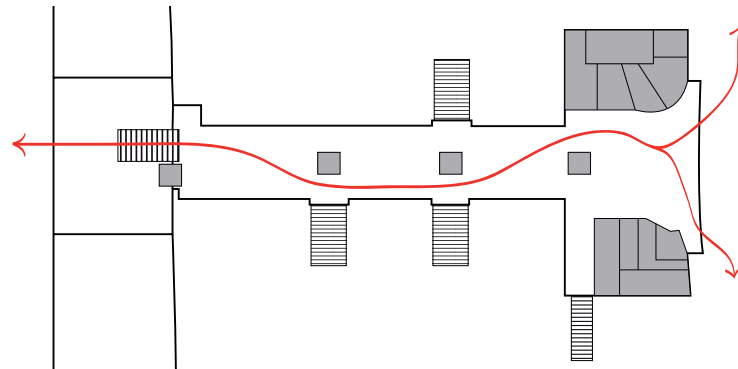


Figure 11.16  
Flows of people  
through the  
building

# 11 RESULTS CASE STUDY RESEARCH

## **Entrance (width and location)**

Figure 11.17 demonstrates the three buildings with the location of their entrances.

In the case of Leiden the entrances are on both sides subdivided in a number of small entrances which are located on the urban pedestrian route which is good.

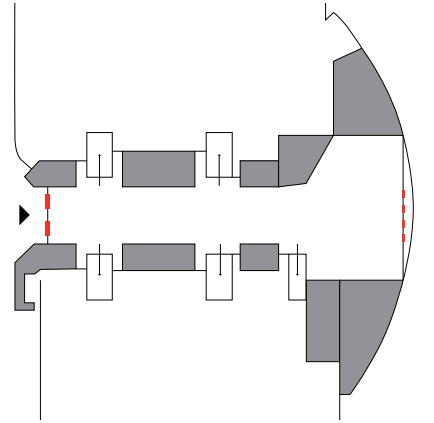
In Den Bosch both entrances are escalators. Which bring you immediately to the first floor. The location and width of the entrance is also good.

Finally Amersfoort has on the centre side four entrances which are located on several routes. Result of these scattered entrances is that the space in front of the railway station is most of the time empty.

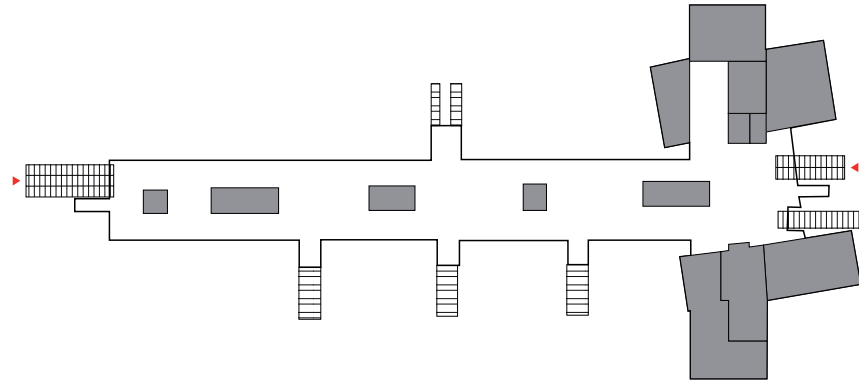
## **RECOMMENDATION**

*Create entrances on the pedestrian route through the building preferably in the middle of the building. This will stimulate the activity level in front of the building.*

Leiden



Den Bosch



Amersfoort

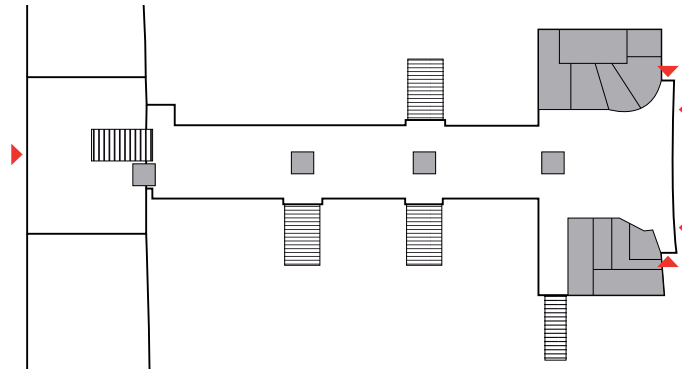


Figure 11.17  
Entrances of the  
building

## Optional activities - Diversity

### Optional activities

#### 2. DIVERSITY

Mixed use (more than 2 secondary uses)  
Human scale (width and height)

#### Mixed use

The diversity of the secondary uses is in all the three cases reasonably good (see *figure 11.18*). Unfortunately most of the functions have the character of 'to go' so there are not many places to stay.

Furthermore most of the functions are located at the centre side of the railway station building. The 'other' side is often boring and vacant.

Only Den Bosch has 3 secondary uses: shops, leisure activities and office space.

Leiden has a good supply of types of shops and food industry. This mix of type of shops and restaurants is the result of the test location of the NS.

The availability of functions in Amersfoort is a bit low, there is not much variety in the supply of shops and leisure activities.

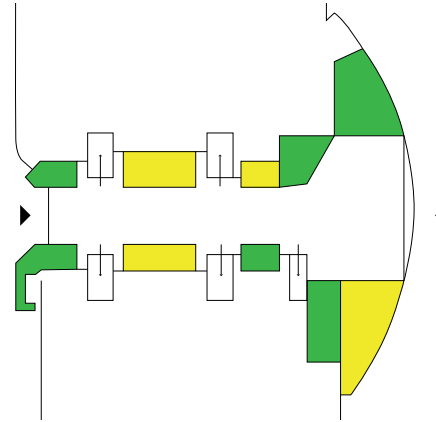
At this moment there is not enough space in the railway station buildings of the three cases to accommodate other facilities than there are now.

### RECOMMENDATION

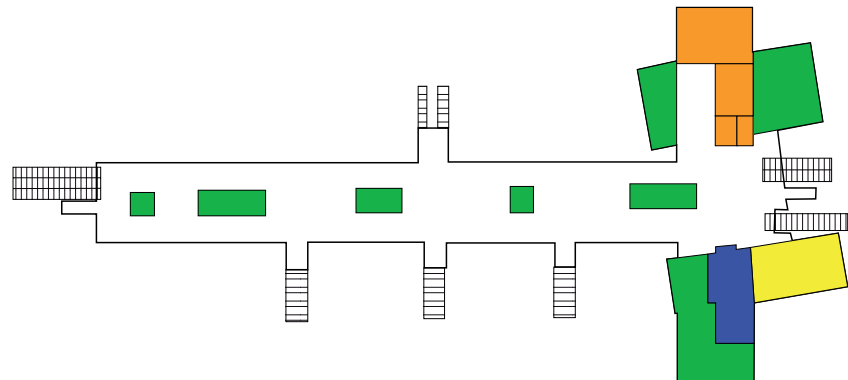
*Create enough space for secondary uses in the railway station. Find a good balance between the 'To Go' shops and 'normal shops' and restaurants.*

*Create activity pockets on both sides of the building.*

Leiden



Den Bosch



Amersfoort

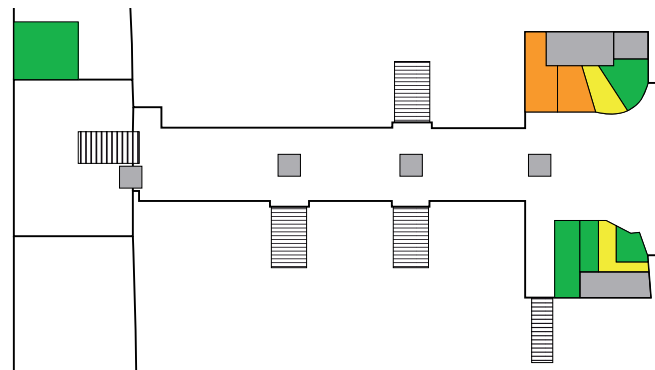


Figure 11.18  
Diversity of  
secondary uses

# 11 RESULTS CASE STUDY RESEARCH

## Human scale

Figure 11.19 demonstrates the width of the thoroughfare. In all the three cases the width is good enough.

To create zones along the edge for waiting and shopping, the space should be broader.

At this moment only Leiden has activity pockets along the edge, which makes the public interior a lively and attractive place. It would be desirable to broaden this thoroughfare.

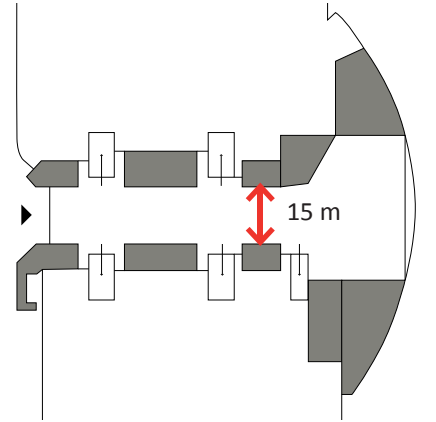
Amersfoort and Den Bosch do not have any activity along the edge. The public interior can be better qualified as a pedestrian subway instead of a public interior. Only the top of the building is designed as a public interior.

The height of the space is good for Den Bosch and Amersfoort and reasonably good for Leiden. Because there is a lack of daylight the place is a bit dark and feels therefore narrow.

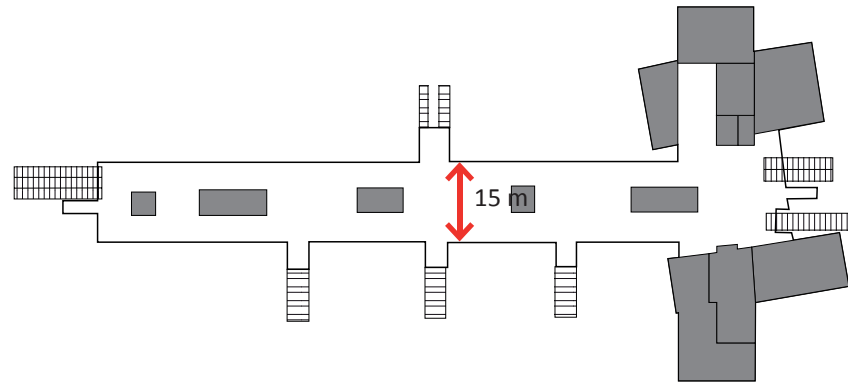
## RECOMMENDATION

*To stimulate optional activities the thoroughfare should be at least 20 meters width. This is enough to make zones for staying and flowing. Furthermore the public interior should be at least 5-6 meters high, it is desirable to have the highest space in the middle.*

Leiden



Den Bosch



Amersfoort

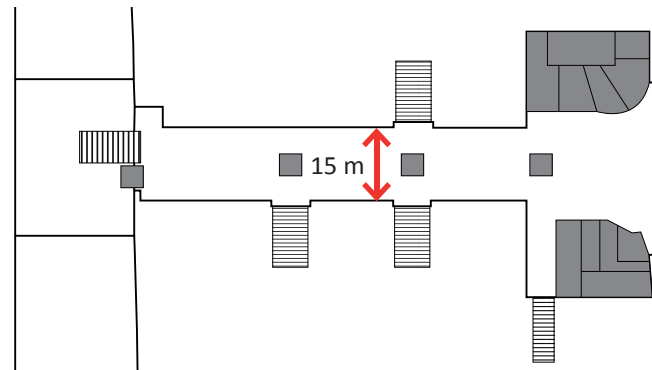


Figure 11.19  
Human scale of  
the building



## Optional activities - Safety

### Optional activities

#### 3. SAFETY

Transparency of the facades  
Pattern in opening hours

### Transparency of the facades

Figure 11.20 illustrates the transparency of the facades in the railway station. The main difference between Leiden and Den Bosch/Amersfoort are the facades of the thoroughfare.

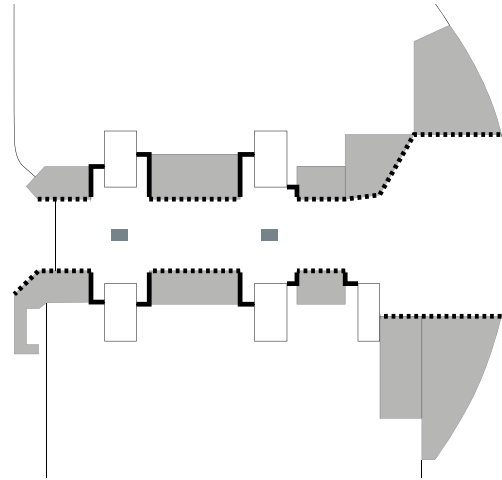
In the case of Leiden there are many facilities located along the edge with transparent facades and therefore they work as 'eyes on the street' (Jacobs, 1961). So the transparency of the facades in Leiden is very good.

Den Bosch and Amersfoort do have glass facades in the thoroughfare, but because they are located at the first floor their is hardly any surveillance. Therefore the transparency of the facades is evaluated as reasonably good in these two cases.

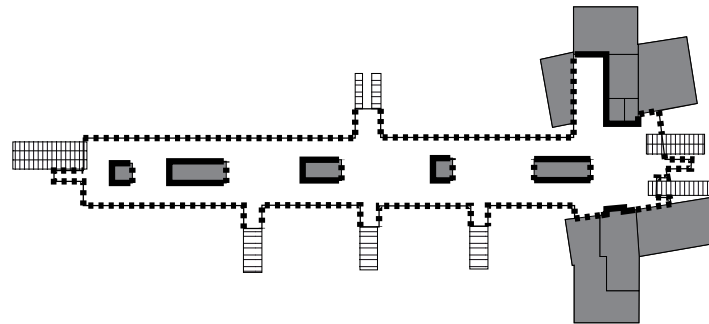
### RECOMMENDATION

*Create facades with enough space for activity so there is surveillance in the public interior from the edge.*

Leiden



Den Bosch



Amersfoort

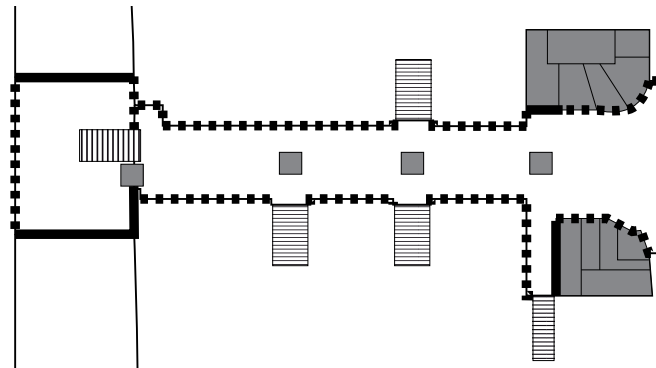


Figure 11.20  
Transparency of  
the facades

# 11 RESULTS CASE STUDY RESEARCH

## ***Pattern in opening hours***

The pattern in opening hours inside the building does have the same note as the pattern in opening hours in the public space.

The situation is for all the railway stations comparable again. Based on the studies to the Hauptbahnhof in Berlin it is recommended to enlarge the opening hours of the facilities inside the railway station.

In this way the railway station can become a unique and therefore interesting new subcentre in the city.

Most of the shops inside the railway station are already opened 7 days a week which makes them distinguishable from the 'regular' facilities in town.

## **RECOMMENDATION**

*It is hard to make a design recommendation for this criterion. Of course it is recommended to enlarge the opening hours because the railway station can then become a new commercial and lively (sub) centre for the city. But it will not influence the spatial design for the railway station.*



Figure 11.21  
Leiden, Den Bosch  
and Amersfoort

## Social activities - Composition

### Social activities

#### 4. COMPOSITION

Sitting places (integrated and furniture)  
Availability of daylight  
Edge zone

#### *Sitting places*

The availability of qualitative good sitting places is very varying for the three cases. In *figure 11.22* are the three railway stations drawn with the sitting places in red.

Leiden has one area in the middle with sitting places. It can be characterized as a 'sitting landscape'. The sitting places are very good. They contribute to the possibility of social activities like talking, watching, eating and listening. But you can also have enough individual space if you prefer.

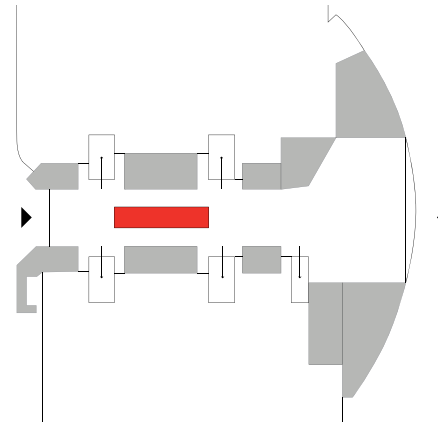
The public interior of Den Bosch does not have any sitting places at all. Which is evaluated as not good.

Finally, the case of Amersfoort does have sitting places. Unfortunately they cannot be qualified as good. There are a couple of benches in the middle. The benches do not invite any social activity and are positioned in the middle of the rush of people which makes it unattractive to sit.

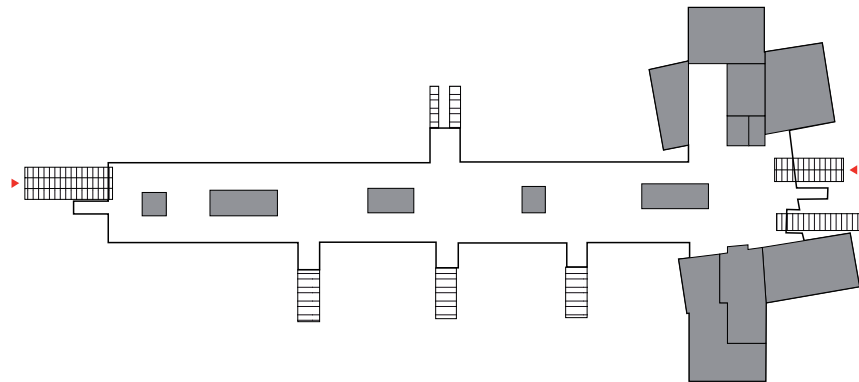
#### RECOMMENDATION

*Create zones for sitting instead of independent benches. The zones should invite you to stay like terraces do, but it should be able to sit without any obligations to buy something. Furthermore it is desirable to place the sitting places in an area where you can watch other people.*

Leiden



Den Bosch



Amersfoort

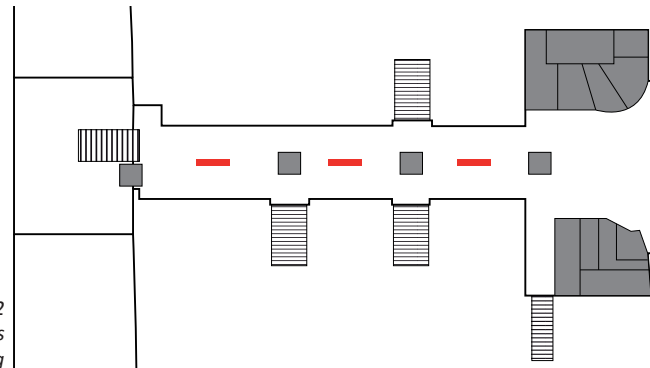


Figure 11.22  
Sitting places  
inside the building

# 11 RESULTS CASE STUDY RESEARCH

## Availability of daylight

Figure 11.23 presents the availability of daylight for the three cases.

Leiden has much daylight in the entrance hall on both sides of the railway station. Furthermore there is incident of daylight from the vides above the entrances to the platforms.

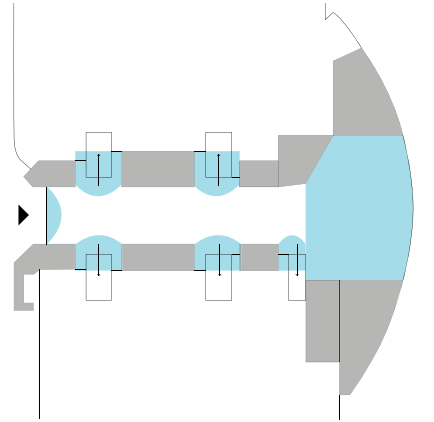
The thoroughfare is on the other hand quite dark. This is in combination with the height of the subway. If the thoroughfare was higher than it would not feel so narrow and dark. But in general we can say that the incident of daylight is reasonably good.

Both Den Bosch as Amersfoort have glass facades which makes the thoroughfare very light. Therefore the incident of daylight is in these both cases evaluated as good.

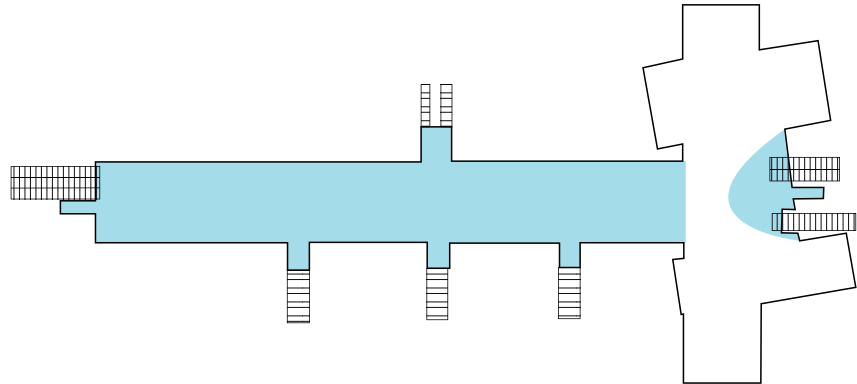
## RECOMMENDATION

*Creates enough possibilities for the incident of daylight. If the thoroughfare is under the railway, create many vides and a high thoroughfare.*

Leiden



Den Bosch



Amersfoort

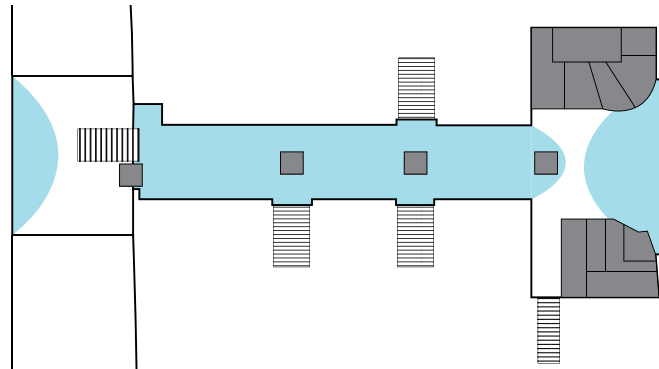


Figure 11.23  
Incident of  
daylight

### Edge zone

For the evaluation of the edge zone inside the building is looked to the activity pockets along the edge and the level of detail of the edge. *Figure 11.24* illustrates the analysis of these aspects for the three cases.

Leiden has an attractive edge zone with many types of activity along the edge. There are not many design details but the edge is alive which makes it interesting.

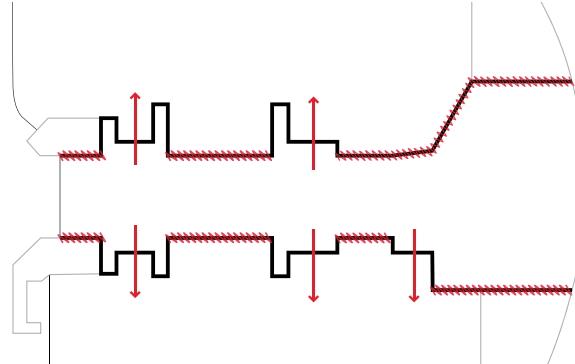
For the case of Den Bosch there is only activity in the first part. The corridor has boring facades with no design details and no activity pockets. The corridor is almost only used to arrive at the platforms.

This is also the case for Amersfoort. The corridor is more not designed as a lively public interior but more as a pedestrian subway to serve the platforms.

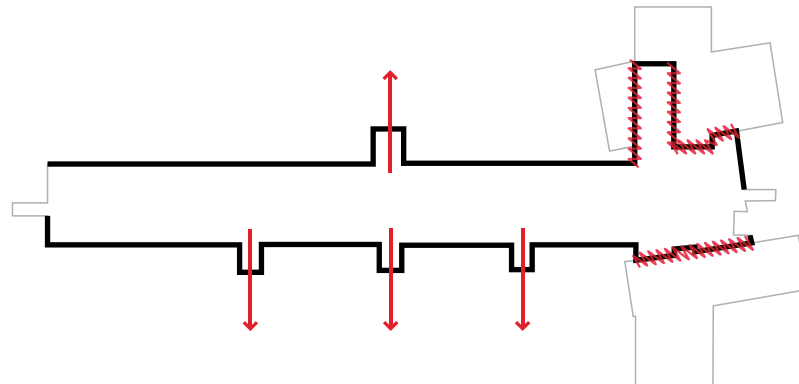
### RECOMMENDATION

*Pay attention to the edge zone of the public interior. Facade details are important even as activity pockets. The edge of the thoroughfare in Leiden is very lively and attractive while the thoroughfare in Den Bosch and Amersfoort is boring and more a pedestrian subway.*

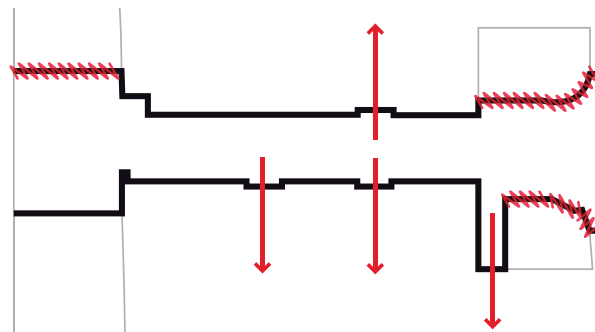
#### Leiden



#### Den Bosch



#### Amersfoort



*Figure 11.24 Use and details in the edge zone*

## 11.4 Conclusions

After analyzing the criteria that contribute to necessary, optional and social activity in the public interior of the railway station of Leiden, Den Bosch and Amersfoort we can formulate a number of design recommendations for the public interior of the railway station of Nijmegen.

Before we will discuss the specific recommendations of the case study research. We can at first conclude something about the way the building is used in each case. The emphasis of the use of the building is in all the three cases different and this has influence on the use of the public space around the building. This is something that should be taken into account for the developing of a concept for the railway station of Nijmegen.

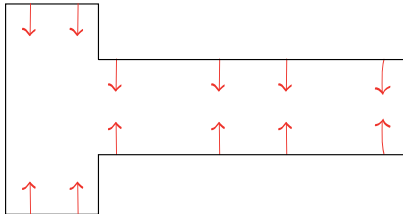


Figure 11.25 Diagram railway station building

Figure 11.25 presents the schematic reflection of the railway station of Leiden. It can be characterized as a public thoroughfare with many activity in the edge. The liveliness of the railway station occurs in the thoroughfare and to a small extend in the entrance hall of the building. Result of this concept is a relatively low interaction between the public interior and public space. The edge zone around the building could be much stronger. The railway

station is very much internal oriented. Furthermore it is notable that the building is emphasized to one side (centre side). By doing this you downgrade the importance of the other side and make it immediately more a 'back side' which is something you should try to avoid.

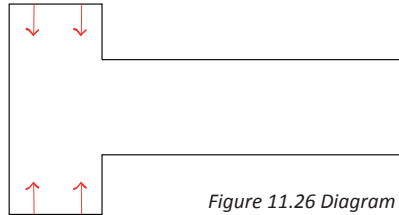


Figure 11.26 Diagram railway station building

Figure 11.26 presents a diagram of the use of the railway station of Den Bosch. The emphasis lies on the first part of the building, which is the centre side. The liveliness is also stressed on this part. The thoroughfare in the building that connect both sides is more a public subway than a public interior; the lack of activity and function makes it a very functional space. Finally the railway station has only an elevator as entrance on the 'other side'. This has immediately its influence on the liveliness of the public space around. There is nothing to do, so nobody will stay.

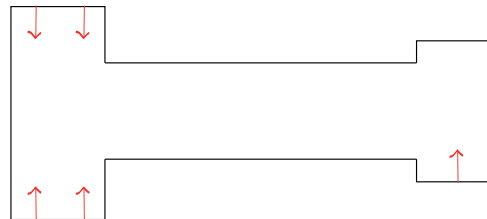


Figure 11.27 Diagram railway station building

Figure 11.27 presents the diagram of the use of

the railway station in Amersfoort. Amersfoort is the only railway station of the three cases with an entrance space on both sides of the railway. Unfortunately the activities are mainly clustered at one side. At this moment it is hard to say something about the relation of the entrance halls and the public space around because the public space is still under construction.

It is hard to divide these concepts in good and bad, but it is important to be aware of the consequences of your choices. Furthermore it is important to have attention for the relation between the public interior and public space.

The following part discusses the results of the case study research.

### Necessary activities

- To strengthen the position of the railway station building in the pedestrian network of the city, the link between both sides should be on ground level. This makes it obvious to take the route.
- One flow through the building as continuity of the pedestrian route will contribute to the liveliness in front of the railway station. It is also more efficient to process large amounts of people.
- The location of the entrance should be on the pedestrian route through the building. The size of the entrance can be divided over several smaller ones. It is important that people feel invited to enter the building.

### Optional activities

- Create enough space for secondary uses in



the railway station and find a good balance between the 'To Go' shops and normal shops and restaurants. It is also important to create space for activity pockets on both sides of the railway station building. Make a clear distinction between type of functions between both sides (they can have another character).

- Make a thoroughfare of at least 15-20 meters wide. The width depends on the availability of activity pockets along the edge. If there is activity than the thoroughfare should be at least 20 meters otherwise 15 meters is enough. Furthermore is desirable to create a space which is high in the middle and lower on the edges, this contributes to the spatial experience of the space.
- The plinths inside the building should have public facilities in the edge. This strengthen the surveillance.
- The facilities should have extended opening hours so the railway station can distinguish itself from the other activity nodes in the surrounding areas. It also contributes to the social security inside the building.

### ***Social activities***

- Create zones for sitting instead of independent benches. The zones should be placed in an area where you can watch other people (along the flow or around the entrances).
- Use facade details to make a place along the edge by adding niches or doorsteps. Use elements like columns and furniture to

make a distinction between the edge zone and the flows of people. This is especially important in railway stations because people need to have space where they can wait and loiter.

- Create as many incident of daylight as possible. When the pedestrian subway/thoroughfare is under the railway, create as many vides as possible.

### **11.5 What follows?**

The results of the case study research will help with the formulation of clear design objectives and guidelines for the railway station building and environment of Nijmegen. Not only in numbers but also as examples of possible solutions for the several criteria.

The following part will describe the design proposal for the railway station environment of Nijmegen. The results of the analysis of Nijmegen and the case study research form the base of the design concept and the underpinning of design choices.



part E

# Design proposal

Introduction  
Design concept  
Design process  
Design proposal  
Conclusions

---

In this part of the thesis the design proposal for the railway station environment of Nijmegen will be discussed

Before this proposal is presented the design concept that is based on the described theory about the character of railway stations will be discussed, the presented results of the analysis of Nijmegen and the results of the case study research in the previous part. Also the ideas and vision of the NS are incorporated.

Secondly the outline of the design process is described. As explained in *chapter 4 - Methodology*, this graduation project can be understand as *research by design*. The constant interaction between the design and research process have lead to several design proposals. The most important one's will be discussed.

Finally in *chapter 15* the *Design proposal* is presented and all the elements of the design for the railway station environment of Nijmegen will be explained step by step.

For making a reliable urban design for the railway station environment of Nijmegen a convincing view is required. Many important aspects for a design proposal are not included in the conceptual framework. Therefore the following chapter will discuss first an elaborated view for a railway station environment. This vision is based on all the previous research and literature, but also on the visits to and studies of many other railway stations.

The chapter will start with explaining the ideas of the character of a railway station building and the organization of the transportation facilities. Next the ideas for the location and railway station environment are discussed. All the conceptual ideas are formulated with the objective to increase the accessibility, spatial quality and identity of the railway station environment of Nijmegen.

## 12.1 Character railway station and its environment

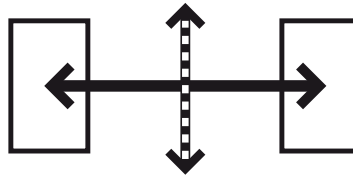
### **Railway station building**

A railway station is a special kind of public building that should be part of the pedestrian network in the city. Then it can become part of a set of public buildings in the city again. It is the objective to make the railway station an attractive part of the urban fabric, richly equipped with shopping and other facilities and therefore attractive for a variety of people. This idea fits also with the vision of the NS for 2020. The aim of the NS is to realize multifunctional railway stations where you can travel and stay. A variety of facilities should support this concept. According to them railway station should be important urban (sub) centres for commercial development (NS Poort, 2009).

The main aim of this graduation project is to

improve the spatial quality of the public space around the railway station and the spatial quality of the public interior in the railway station. The design process should help to find a language of architectural form that would reflect the specific character of a multifunctional building.

For Nijmegen the first thing that we need to do is to make a railway station that links both sides of the railway. The west side of the city is not included in the railway station environment yet and one of the objectives is to fix this. *Figure 12.1* is the abstract reflection of this conceptual idea.



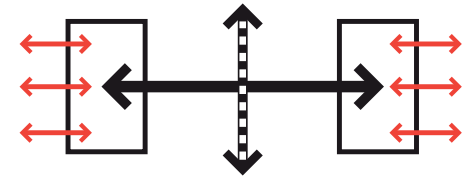
*Figure 12.1 Concept railway station*

A link between both sides of the railway gives us the opportunity to use the railway station as a motor for new development and an upgrade of the west side of the railway station environment.

Because it is an important objective of this graduation project to improve the spatial quality of the railway station environment, it is necessary that there are activities in public space around the railway station building. There should be a balance between the east and west side in available facilities.

During this project, design research has proved that a multifunctional building, with all kinds of facilities inside the building does not contribute to a lively railway station area on this location.

In the next chapter Design process, this will be further explained. So it is important for the spatial quality and meaning of the public space that the railway station building has on both sides a relation with the public space. *Figure 12.2* presents this idea.



*Figure 12.2 Concept relation building - public space*

The connection between both sides of the railway will be a public thoroughfare which has two meanings. In the first place to make a connection between east and west. The thoroughfare has to be wide enough and have enough daylight to function as an attractive, alternative pedestrian route between east and west and to be the entrance to the platforms. Furthermore the thoroughfare has to bridge the difference in height (10 meters) between the east and west side.

The character and use of the public thoroughfare is a very important determinant for the use of the railway station environment. If we put too much emphasis in terms of activity in the central part of the railway station, this will affect the use of the outer parts.

To avoid this the public thoroughfare has to be a beautiful, designed space with travel related activities in the edge zone. All the other kinds of facilities like shopping, residences, offices and leisure activities has to be located in or around the buildings on both sides of the railway.

### **Transport organization**

The available transport facilities are the train, tram, rapid transport system bus (HOV bus), busses, cars and bicycles. To stimulate the use of the train we need to make the transfer between the different transport facilities as quick and easy as possible. Therefore it is the objective to cluster as many transport lines as possible. This idea is based on the studies to the Hauptbahnhof in Berlin and the proposed new railway station in Breda. The transfer between the various transport types is very compact organized.

Furthermore the different transport facilities will be divided between east and west to create a balance in functions.

Both sides of the railway station should get a bicycle shed with a capacity of 3000 bicycles. It is important that the bicycle sheds are located on the route to the railway station building. It should be the best location for parking your bike. Finally it is needed to create a parking garage where additional functions are available, this will anticipate on the user-friendliness of the traveller, tenant or office worker.

### **The location**

The location of the railway station at the end of the historic ax (Van Schaek Mathonsingel) refers to a specific era in the history of Nijmegen. Also the architectonic style of the current railway station building is of important meaning for the city. The exceptional length of the building inspired on the Italian renaissance is very unusual for the Netherlands. In the building are several elements incorporated that refer to the original building from 1865 which is destroyed during the Second World War.

To strengthen the historic character of the city

and to represent the influences and changes of the city over time, the railway station should reflect this historic lamination.

So the historic ax should be more involved in the use of the railway station (*figure 12.3*). Further the current railway station building should be recovered to the original design and furthermore maintained and involved in a new design for the east side of the city.

For the west side of the railway station is a new building required. This new building becomes the expression of the railway station on the west side of the railway.

Both sides of the railway should get their own identity. The east side should get an urban character and the west side should fit in the residential character.

The new railway station of Nijmegen has to be a very accessible place for all kinds of transport. So the railway station should get an address along the ring road, this will strengthen the accessibility and visibility of the railway station in the city.

### **Railway station environment**

To make the railway station a more important part of the city network we should include the west side of the railway in the railway station environment.

Furthermore it is important to strengthen the link between the railway station and the city centre for pedestrians to improve the relation between both.

The surrounding environment of the railway station should be densified to limit the amount of open space. A FSI of 1.25 and a GSI of 0.25 are desirable. For the east side of the railway

station the series of major public buildings should be intensified and continued, see *figure 12.4* for this concept.

Besides, the buildings around the railway station should get a public plinth, which will be good for the liveliness of the area and the surveillance from the edges. To improve the liveliness in the public space around the railway station, the area should have pedestrian priority. This makes the environment safe and attractive for pedestrians to come and stay.

The character of the public space should differ from one another to fit in the existing urban fabric. For the east side will this result in an urban character of the public space. The west side will get a public square with many landscape details which fits in the residential character of the west side.

The green structure of the railway station environment should become part of the green structure in the city and the west side should join this character.

The green structure of the east side of the city should be continued at the west side. The entire future ring road should have the same character and style as the avenues on the east side.

Besides in the west side of the city a green public space like a park is missing, therefore the area on the west side of the railway (part of the railway embankment) will be used to create a new park and make a green connection with the Waal river. *Figure 12.5* presents the drawing of the concept for the green structure in the railway station environment.

To create more balance in character between east and west a new traffic square is proposed on the west side as a counterpart of the Keizer



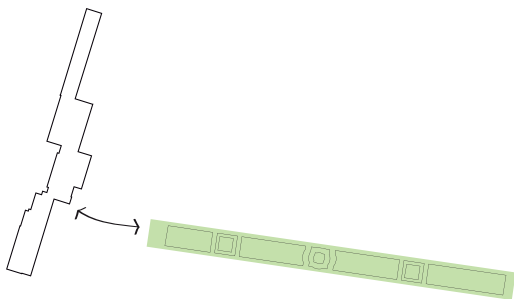


Figure 12.3 Relation historic ax and railway station

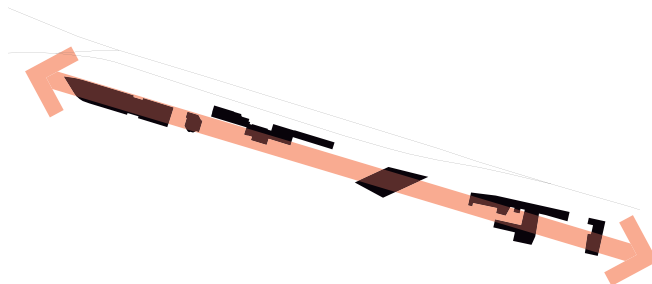


Figure 12.4 Intensifying the series of major public buildings on the east side of the railway



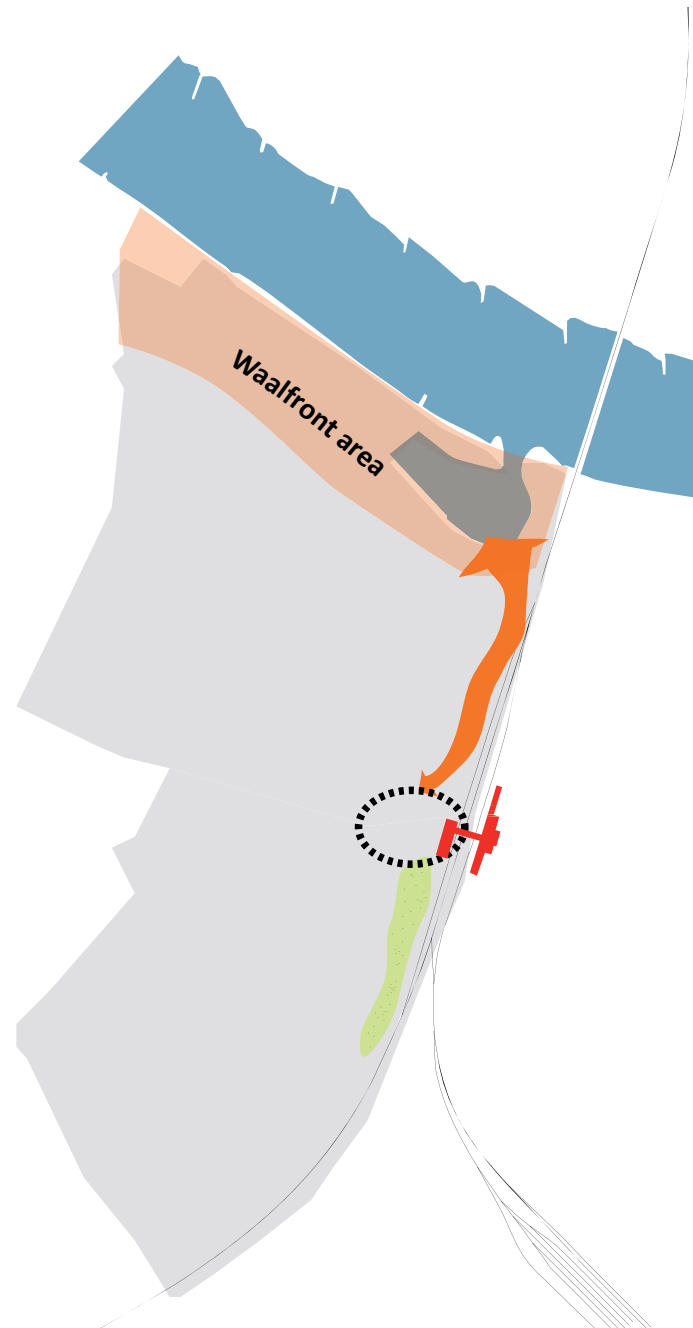
Figure 12.5 Concept green structure in the railway station environment

## 12 DESIGN CONCEPT

Kareplein. This roundabout should be half the size of the Keizer Karel plein.

The west side of the railway embankment will be partly designed as park area and partly as a new residential area.

This residential area should be a connection between the proposed area and the railway station. The supply of residences should be a new building type and form an addition for the current building stock on the west side of the railway. *Figure 12.6* presents this concept.



*Figure 12.6 New residential area is a connection between proposed railway station environment on the west side and the Waalfront area*



## 13 DESIGN PROCESS

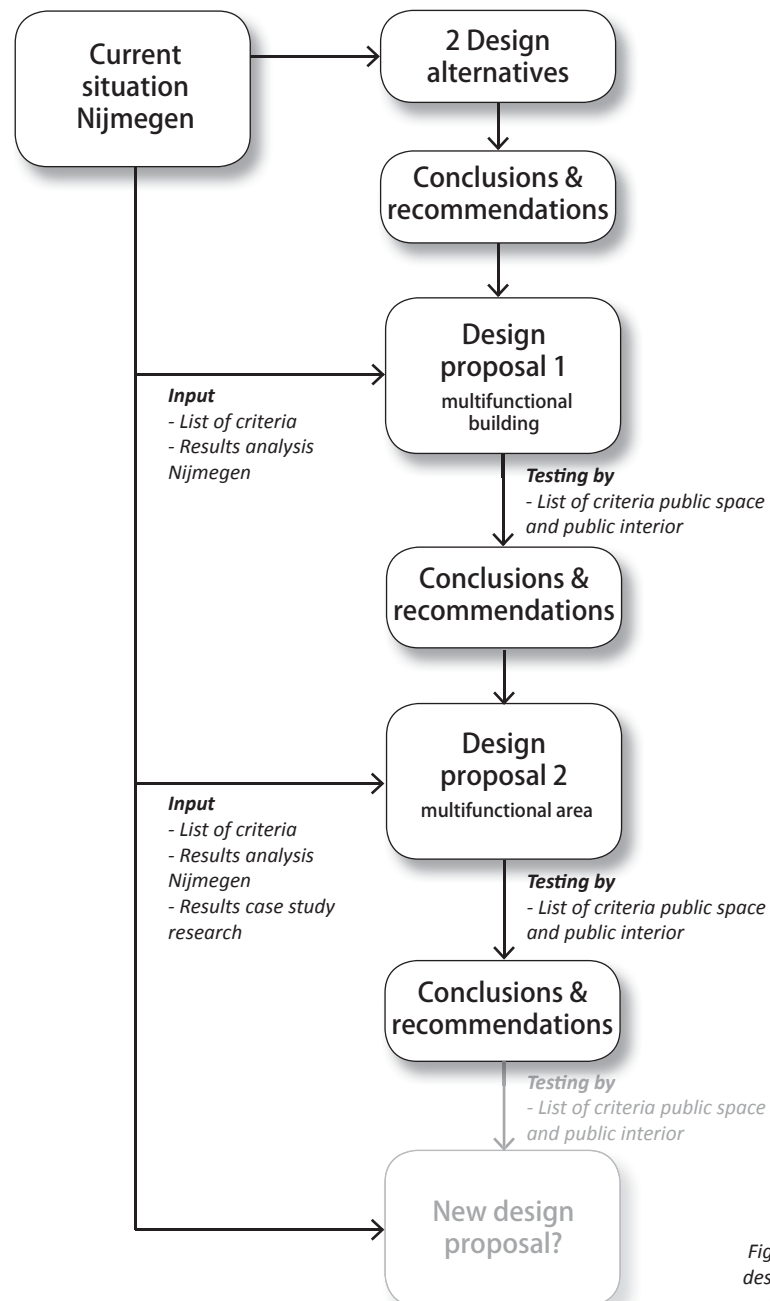
Before we explain the design proposal we will discuss the design process. The design process consists of three phases. In each phase is made a design proposal which is evaluated, the recommendations of the evaluation were used to create a new design. *Figure 13.1* presents the structure of the design process of this graduation project. There was a constant interaction between the design and research part of the project. The design gave reasons for more specific research and the research helped by refining the design guidelines and objectives.

The starting point of this project is of course the current situation in the railway station environment in Nijmegen. The first design proposal consisted of two design alternatives. The objective of this proposal was to define the limitations of the possibilities.

Aim of the first alternative was to find the minimum intervention that was required to achieve the design goals. The objective of the second alternative was to search for all the interventions that were required to achieve all the design goals.

Both of the alternatives were analyzed and the conclusions and recommendations are used for a new design proposal. The list of criteria is used to evaluate and test this new proposal. The conclusions and recommendations of this evaluation are used for two proposes. In the first place to accentuate the design objectives for a new design proposal and secondly to improve the list of criteria.

All this has resulted in the final design proposal and the final conceptual framework. The following chapters will shortly discuss the several design phases and the main conclusions and recommendations of each phase.



*Figure 13.1 Structure design process of the graduation project*

## 13.1 Design alternatives

Figure 13.2 presents alternative A. Key intervention of this minimum alternative is a railway station that links both sides of the railway with a passengers subway. Both the east and west side should have an entrance area that fits in the urban fabric. Also the link between the railway station and city centre is very important, in public space is tried to emphasize this direction with buildings.

The subway is being broadened and extended to the west side (see figure 13.3). It should also accommodate facilities like shops and small restaurants.

Figure 13.4 presents alternative B. Key intervention of this maximum alternative is the relocation of the tunnel. The current tunnel is used as a new railway station. The new railway station is part of a route between east and west and can accommodate many various functions (figure 13.5). The surrounded public space is used for new developments on both sides of the railway like offices and residences.

After evaluation it is concluded that the supposed objectives are not reached with the two presented alternatives. The intervention of a new tunnel in alternative B is too expensive for the profits but the link between both sides of the railway is very good. The public space in alternative A is still empty and lifeless but the enlargement of the tunnel is a good intervention to link both sides.

## Recommendations

Combine the strong elements of both alternatives to make one new design proposal. It is important that the new design does link both sides and bridges the traffic barriers.

Figure 13.2 Design alternative A: minimum

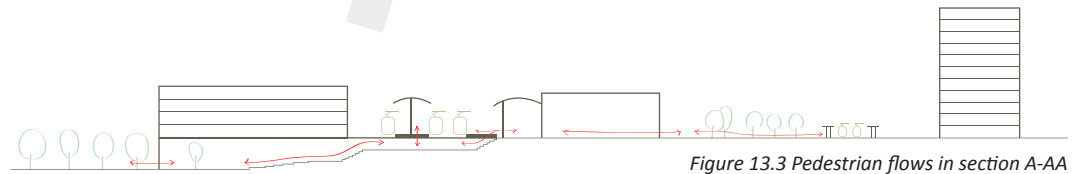
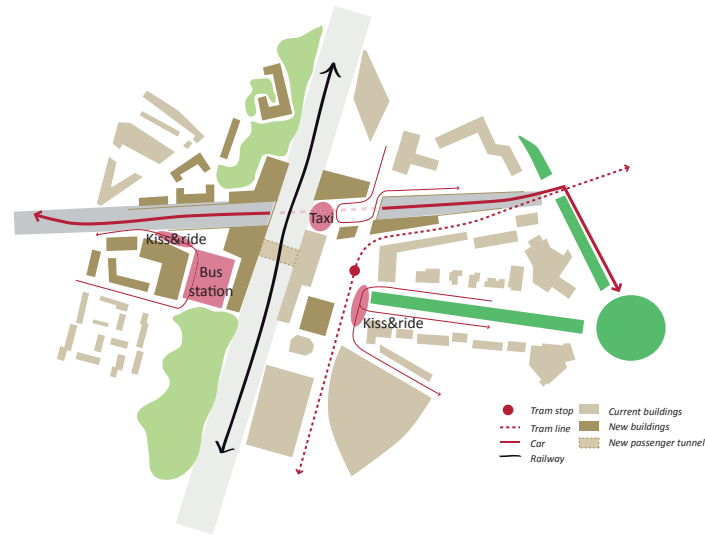


Figure 13.3 Pedestrian flows in section A-AA

Figure 13.4 Design alternative B: maximum

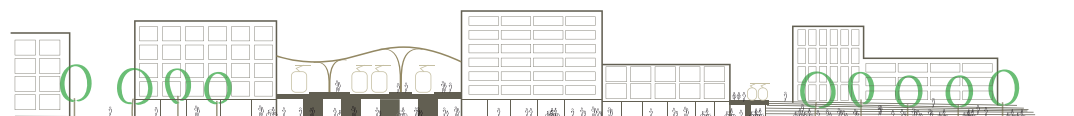
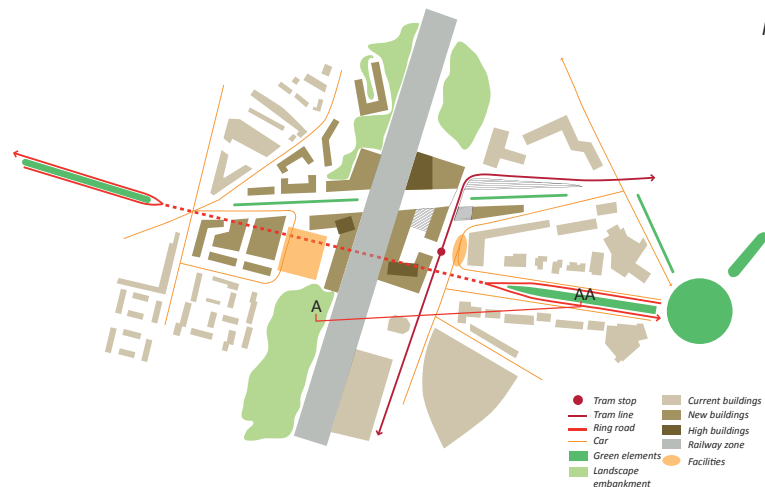


Figure 13.5 Section A-AA

# 13 DESIGN PROCESS

## 13.2 Railway station as multifunctional building

The conclusions and recommendations of the design alternatives contributed to the design proposal of the second phase.

The second design proposal is based on the conceptual idea of the railway station as a multifunctional building. The objective was to create a railway station where all kinds of facilities and transportation are organized in one complex (see *figure 13.6*).

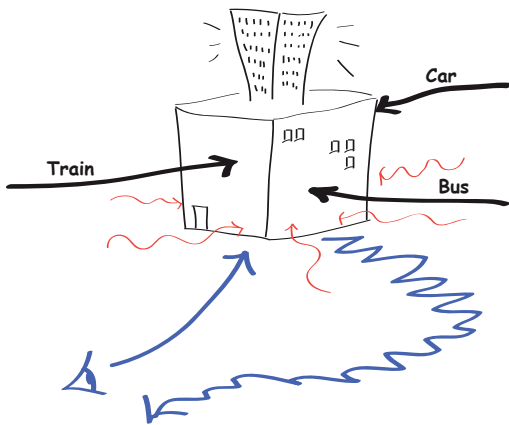


Figure 13.6 Concept of a multifunctional railway station

The idea was to create a multifunctional building that would fit with the ideas of the

NS about the railway station of the future. All kinds of facilities like residences, shops, leisure activities, offices and parking facilities are combined with the transportation facilities and assembled in one building complex.

This building complex should be accessible from all sides and form the connection between the east and west side of the railway. Furthermore it was important to create a strong and vital link between the railway station and city centre.

Main solution to create one complex was the mezzanine (*figure 13.7*).

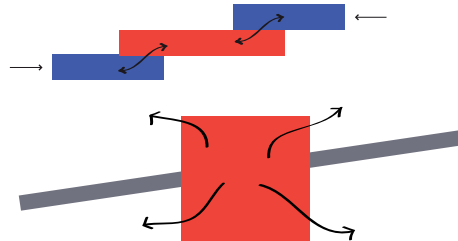


Figure 13.7 Function of the mezzanine

The mezzanine is the layer that forms the connection between the east and west side. To bridge the difference in height between both sides you can come down from east and rise from west to the central level. From this central

level you can reach all sides of the building and the platforms, there is space for a variety of facilities. The mezzanine would function as a public inner court. And the ring road and railway would not be a barrier between both sides of the railway anymore.

*Figure 13.8* presents the map of the urban design for the railway station environment of Nijmegen in this phase.

The major building in the middle is the new proposed railway station complex which has replaced the current railway station building. The railway station consists of the mezzanine with on both sides three towers. In the towers are facilities like residences, offices, conference rooms and leisure activities located. The bottom of each tower is destined for public facilities like shops and leisure activities. *Figure 13.9* presents the section of the railway station. The location, composition and orientation of the towers are based on sightlines from the east and west side.

There are four areas created in public space which have a relation with the railway station complex. The west side of the railway has got the bus station and the east side the tram stop.

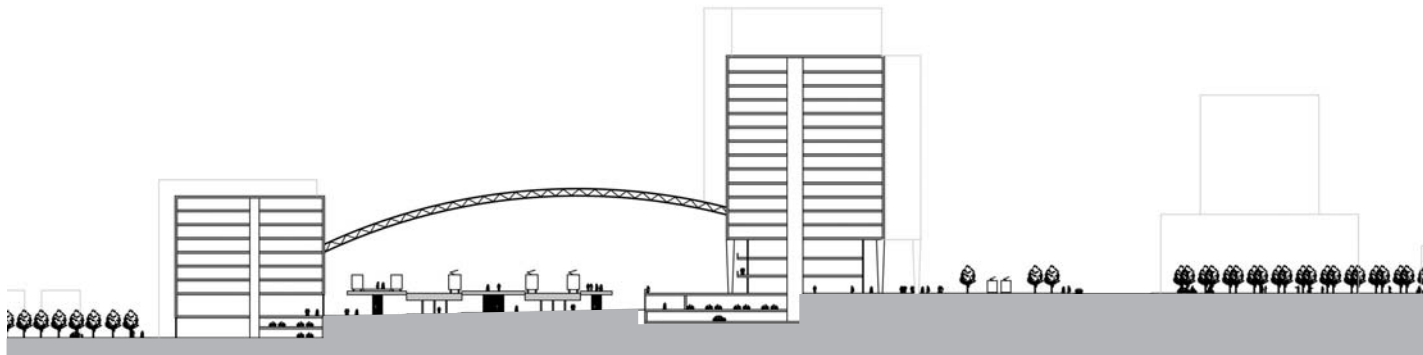


Figure 13.9 Section of the railway station building with on both sides the towers



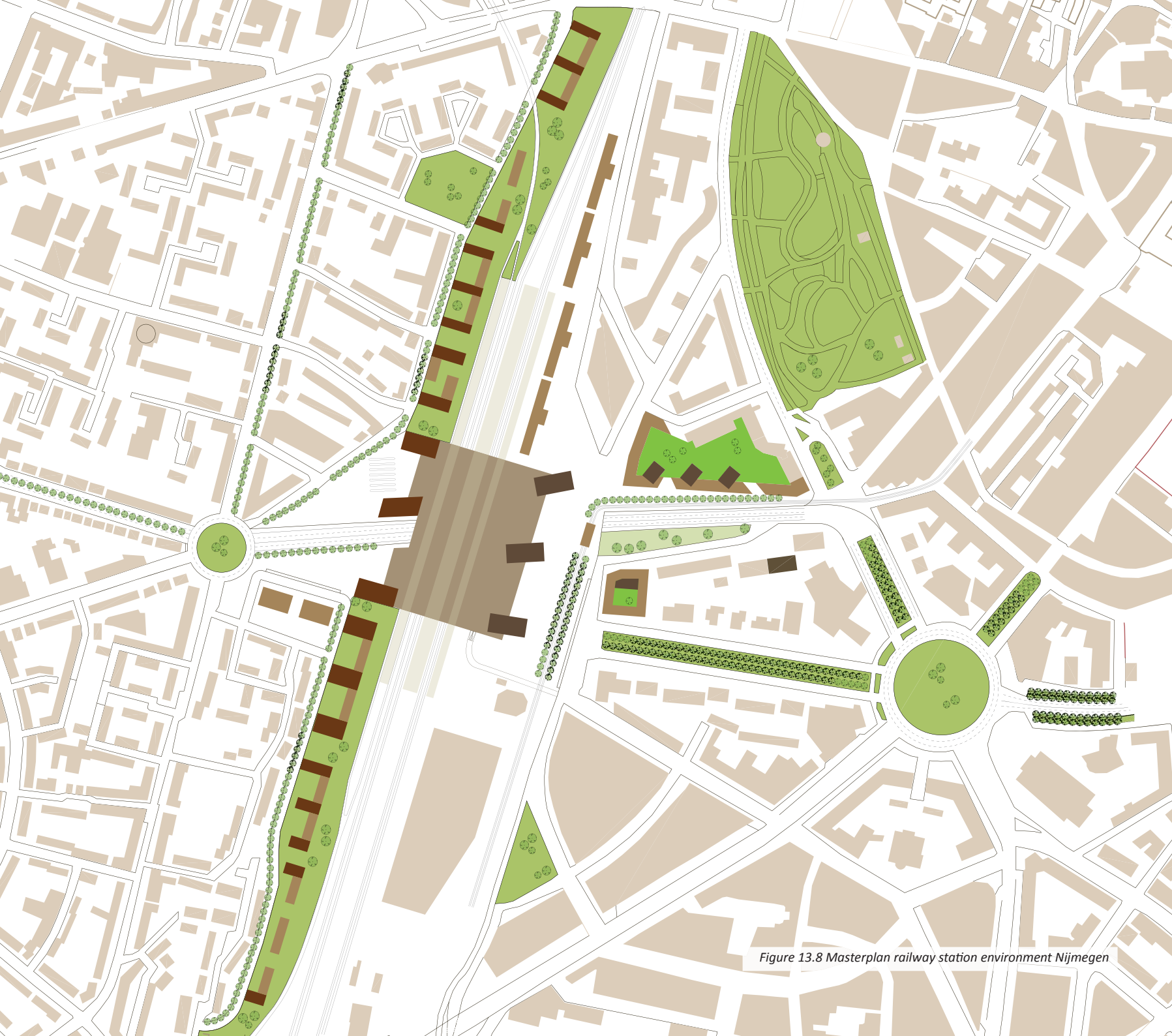


Figure 13.8 Masterplan railway station environment Nijmegen

Conclusions

The design proposal for the railway station as multifunctional building is tested and evaluated with the conceptual framework for public space and public interior. The design proposal is also used to determine the contribution of this design to the spatial quality, accessibility and identity to the railway station and its environment. This section will discuss the results of the evaluation briefly after which conclusions and recommendations for a new proposal are done.

Public space

Figure 13.10 presents the result of the evaluation of the public space of the design. Not all elements will be discussed extensively only the most outstanding features. As can be seen the design scores good for the necessary activities. The location of the new railway station has become a very accessible place from both the east and west side of the railway. Furthermore the link between the railway station and city centre is improved by adding facilities in the plinth and making it a pedestrian zone. So the first objective of this graduation project is evaluated as good.

The optional activities score worse than the necessary activities as can be seen in the conceptual framework. Main criteria that influences this score are the density and the human scale of the railway station environment. Furthermore the use of the plinths are reasonably good but it can be better.

Figure 13.11 shows the result of the calculations of the Ground Space Index (GSI), Open Space Ratio (OSR) and Floor Space Index (FSI). Also the results of the current situation and the advisable situation (derived from case study

research - see chapter 12) are listed.

The design proposal does not reach the supposed objectives, the amount of open space is still very high. This does not contribute to the human scale of the surrounding environment. The ratio between open space and built area is still out of proportion. Furthermore the activity level of the surrounded open space is very low. This all does not contribute to spatial quality of the railway station environment.

Finally the social activities will not happen if the optional activities fail because they are a result of the optional activities. There is no possibility for qualitative good sitting places, which are depended of the location and activity level of the surrounding public space.

Optional activities

3. SAFETY

- Use of the plinth
- Traffic safety for pedestrians
- Pattern in opening hours

Optional activities

2. DIVERSITY

- Mixed use (more than 2 primary uses)
- Density of the railway station environment
- Mixture in building type (more than 2 types)
- Human scale (ratio built-open)

Optional activities

3. SAFETY

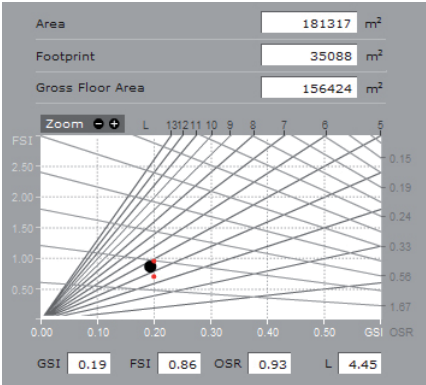
- Use of the plinth
- Traffic safety for pedestrians
- Pattern in opening hours

Social activities

4. COMPOSITION

- Sitting places (integrated and furniture)
- Sightlines
- Edge zone
- Positive sensory experience (trees, plants)

Figure 13.10 Evaluation public space



	Current situation	Design	Advisable situation
GSI	0.13	0.19	0.25-0.3
OSR	1.57	0.93	0.7-0.8
FSI	0.55	0.86	1.0-1.5

Figure 13.11 Results calculations Spacemate and the comparison of the advisable, current and new situation

### Public interior

Figure 13.12 presents the result of the evaluation of the public interior of the design proposal.

The design scores good for the necessary activities because the mezzanine makes a connection between both sides of the railway and both sides of the ring road. So the building lies on a crossing of pedestrian routes through the city. Inside the building is not a organization of flows of people arranged. Because the public interior can be characterized as a public inner court, people can choose many routes which makes the space not very conveniently arranged.

Because of a variety of facilities the mixed use is good, it is the objective to accommodate around 5 or 6 types of secondary use. Also the transparency of the facades and the pattern in opening hours are good, the railway station can function as a very distinguishable commercial centre for the surrounding environment.

Only the size of the public inner court is not good. The dimensions of the public interior in relation to the height of the space are out of proportion. You get the feeling that you are arrived in a dark narrow box. Also does the size of the railway station building not fit for Nijmegen. There is created too much space for the needed facilities.

Finally the availability of daylight is the only criterion of the social activities that is evaluated as not good. This is of course in relation with the human scale of the mezzanine. The combination of both of these elements makes it a dark, poky space.

Main point of criticism is the emphasis in terms of facilities inside the railway station building. Because this building has tried to accommodate all possible facilities inside, this has resulted in an empty public space around the railway station building without hardly any activity.

The current objective of the NS is to create railway stations with many facilities inside the building. Working, living, traveling and relaxing should join one another in the railway station environment.

This design proposal has proved that the concept of a multifunctional railway station with all kinds of facilities accommodated inside one building complex does not contribute to optional and social activities in the railway station environment. Figure 13.13 presents this conceptual idea. The supposed objectives of spatial quality and identity in the railway station environment are not reached.

### Recommendation

*After evaluating this design proposal and concept of a multifunctional railway station building with all facilities accommodated inside one complex it is advisable to make a new design proposal.*

*Next step is finding a solution for a railway station that links both sides of the railway and can function as a modern gateway to the city. Furthermore it should accommodate a variety of functions without withdrawing activity from the surrounding public space. The emphasis of the railway station should not be in the core of the building but on the edges on both sides of the building. The amount of square meters railway station should also be limited.*

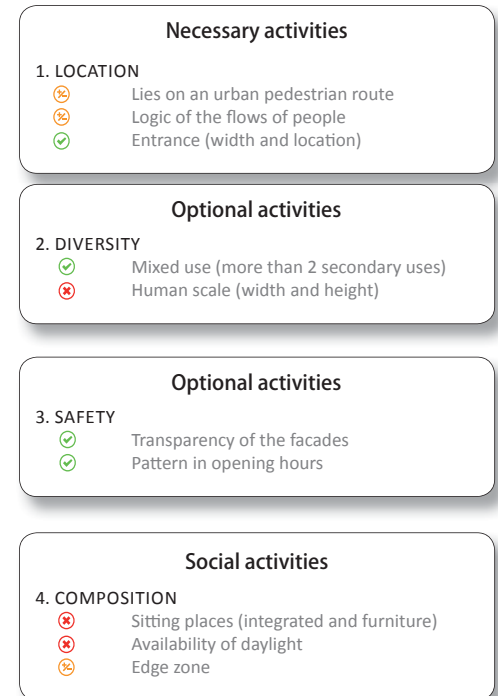


Figure 13.12 Evaluation public interior

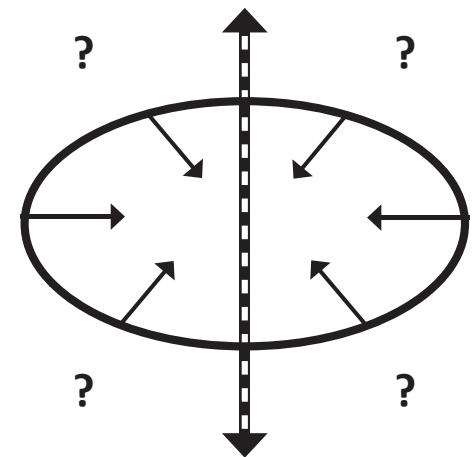


Figure 13.13 Abstraction of a railway station building with the emphasis in the core of the building

## 14 URBAN DESIGN

This part of the thesis describes the design proposal for the railway station environment of Nijmegen based on the previous described conclusions and recommendations.

The main research question of this graduation project was:

*“How can we improve the accessibility, spatial quality and identity of the railway station and its environment in Nijmegen?”*

The emphasis of this project lies on the accessibility, spatial quality and identity of the railway station environment in Nijmegen.

The previous chapters have all discussed and answered a sub question that leads to the answer of the main research question (see figure 14.1).

The urban design proposal is the result of this graduation project. All interventions are done to improve the accessibility, spatial quality and identity of the railway station and its environment in Nijmegen.

Before the elaborated design proposal for Nijmegen is explained, the answer to the main research question is discussed to understand how the various elements contribute to a railway station environment in Nijmegen where the accessibility, spatial quality and identity are improved.

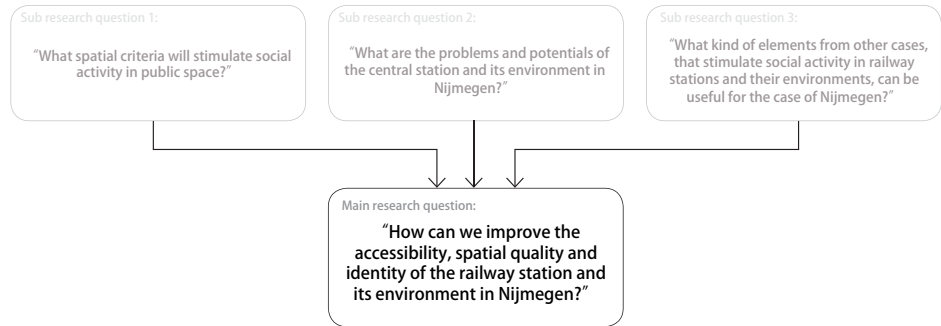


Figure 14.1: Relation sub research questions with main research question

### Accessibility

The accessibility of the railway station environment is improved by including Nijmegen West in the railway station environment (see figure 14.2).

A new railway station on the west side of the railway, linked through a new designed corridor, will make a connection between both sides of the railway and therefore improve the accessibility of the railway station in the city.

Furthermore the transport system is upgraded. A new HOV (rapid bus system) is introduced to improve the accessibility of the various parts of the city with the railway station. For the east side of Nijmegen this has resulted in a tram which connects the city centre with the university campus via the railway station.

A rapid bus is introduced on the west side of the railway to improve the accessibility of the new Waalfront area, with Nijmegen Lent and Dukenburg via the railway station.

### Spatial quality

The spatial quality of the railway station environment is improved by adding a public interior on both sides with a variety of functions. The public interior will be most of the time accessible for everyone and accommodates several places with different objectives (see figure 14.3).

Furthermore the surrounding public space is designed for pedestrians, the activity level on ground floor is very important to improve the livability of the area and to improve the relation between indoor and outdoor.

Finally the availability of design details is improved in the design. Places to sit and stay are created which will stimulate the use of the area.

### Identity

The identity of the railway station environment of Nijmegen is improved by having attention for the *genius loci*. Which means that the historic meaning of the location played an important role in the design.

The current historic character of the location is improved by adding a new 'layer' to the railway station building. Also the meaning of the characteristic formal ax (Van Schaeck Mathonsingel) is recovered by giving it a new function as kiss&ride and taxi stop.

Furthermore the identity of the railway station is strengthened by adding recognizable objects on both sides of the railway. Three new towers improve the recognition of the railway station from both sides.

### What follows?

The following chapters explain the design proposal for the railway station environment of Nijmegen. It starts with the explanation of the design on city scale and discusses the connection between the design and the existing structures in the city.

Secondly the guidelines for the surrounding areas that are important for the connection with the existing city are explained. The areas are a park, a residential area and the link between railway station and city centre.

Finally the urban design for the railway station is discussed. The various elements of the design are discussed in the light of accessibility, spatial quality and identity.

The elements are the new railway station building, the station towers and the surrounding public space.

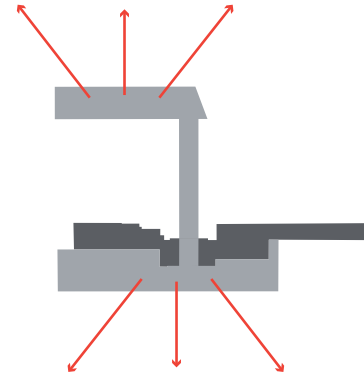


Figure 14.2 Railway station is accessible from both sides

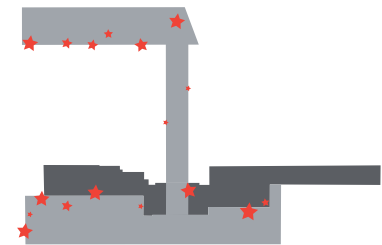


Figure 14.3 Public interior accommodates many facilities

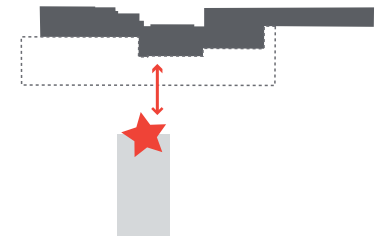


Figure 14.4 Giving meaning to the historic characteristics of the location

### 14.1 Railway station in the city

*Figure 14.5* presents the map of Nijmegen with the new design for the railway station environment.

The map shows the current bridge across the river Waal at the east side of the city, the new proposed bridge across the river Waal at the west side of the city and the current railway bridge in the middle.

A ring road arises because of the new proposed bridge on the west side of the city. The ring will use the current railway tunnel and therefore be part of the railway station environment. In the drawing the ring road is coloured red.

As explained in the chapter *design concept* (H12) the ring road should get a green character on both sides of the railway. So the west part of the ring (Marialaan) has to be broadened to create enough space for cars, a separate bicycle path and pedestrians.

Also both sides of the railway have received a traffic square to divide the flows of traffic through the city. The new traffic square on the west side of the railway is quite smaller than the existing Keizer Karel Plein.

Furthermore a new park zone for the west side of Nijmegen is introduced. Because many railway lines are not necessary anymore, the railway embankment can become narrower. This vacant ground is used to create a new park for west. Part of the green zone will be designed as residential area and part is designed as park.

The accessibility is improved by adding the west part of the railway in the railway station environment. It has received a new entrance

building that forms a connection between both sides of the railway. A new square on the west side of the railway provides an entrance for West. The available space is used for a variety of functions to improve the spatial quality.

The railway station is located along the ring road. For the accessibility by car and the transfer between car and train, the railway station has an address along the ring road. The railway station has received various height accents by means of towers, so it will be visible and recognizable from all sides which strengthen the identity.

Next part explains the guidelines for the new proposed park area, the new residential area and the link between the railway station and city centre. Those structures are important to understand the surrounding environment of the railway station.

*Figure 14.5 Map of the city Nijmegen with the new design proposal for the railway station environment*





Proposed new city bridge

Bridge for railway and bikers

Current city bridge

Residential area

New proposed park

Railway station environment

Ring road



## 14 URBAN DESIGN

### Park zone

The first guideline for the design of the railway station environment is the park area. The slope on the west side of the railway embankment is designed as a park on the south side of the railway station.

The character of the park zone on the west side of the railway embankment is destined as a rural landscape park with a lot of room for opportunities to play. Important is the rural character of the area and the availability of outdoor equipment to play.

The park should accommodate rural playing objects like the landscape playground (natuurspeeltuin) Woeste Westen in the Westerpark in Amsterdam. Tree-stumps and twigs of the willow tree are examples of landscape elements that can be used in this park as playing objects. *Figure 14.6* shows some examples.



Figure 14.6 Playground Wilde Westen (Wilde Westen, 2011)

### Residential area

Second element is the residential area in the north of the railway station environment. The area in the north of the railway station on the west side of the railway embankment is reserved for residents. The green character of the landscape park is continued, the slope of the railway is used for new residences.

The proposed residences are urban villa's like the example in *figure 14.7*, which is a new type of building for the west side of Nijmegen. The residential area is in line with the proposed Waalfront development. It will form a link between the Waalfront and railway station.



Figure 14.7 Example of urban villa's in a landscape environment (Timpaan, 2011)

### ***Link between railway station and city centre***

The link between railway station and city centre is improved by redesigning the profile of the road to the city centre.

Most important adaption are the new plinth along the route, which is used to increase the human scale of the link and the liveliness of the link.

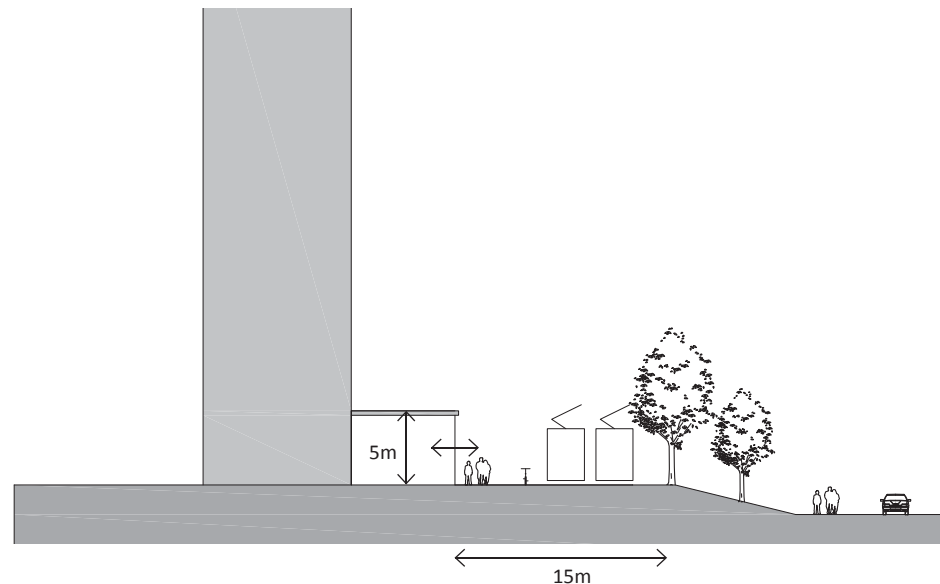
The new plinth is added to the existing building, which is visible in *figure 14.9*. The plinth can accommodate shops, leisure activities and social and business services. Furthermore the street is designed as shared space for the tram to the city centre, bicycles and pedestrians. The street is not accessible for cars anymore.

Finally the scale of the street profile of the Tunnelroad is decrease by dividing the area in smaller parts. *Figure 14.8* presents the image of the new link to the city centre. The new designed street is enclosed with major trees, so there will be a visual relation but the space has a clear limitation.

*Figure 14.9* presents the cross section of the street with the dimensions of the plinth and street area.



*Figure 14.8 Image of the new link between railway station and city centre*



*Figure 14.9 Cross section of the future link between railway station and city centre*



### 14.2 Design railway station environment

The urban design for the railway station environment of Nijmegen is presented in *figure 14.10 and 14.11*.

The design consists of an entrance area on the west side of the railway, a new public square on the east side of the railway and the new railway station building with three new towers. The design will be discussed per theme and the translation of the design concept is explained.

The entrance area on the west side consists of a triangle shape. The ring road is an important part of the entrance area.

The space is limited on the west side by the new railway station building. Furthermore the south side closes the space with two residential building blocks. Finally the space is limited on the north side by the three major building blocks.

The public square on the east side consists of the public space around and in front of the new railway station building.

On the north side is added a new major public building. The railway station is extended with a new entrance hall and station towers and finally there are two major building blocks added on the east side of the railway station building.

The following chapters will explain the design for the railway station in Nijmegen per theme. It will start by explaining the role and meaning of the new railway station building. The building consists of a new railway station on the west side of the railway, a corridor that links both sides of the railway and the entrance hall on the east side of the current railway station building.

Then it will continue by explaining the design

of the three station towers. The composition and design rules are discussed.

Finally the role, meaning and design of the surrounding public space is elaborated.

Each of these elements is discussed in the light of accessibility, spatial quality and identity. The design is elaborated and underpinned with the help of sketches and images.

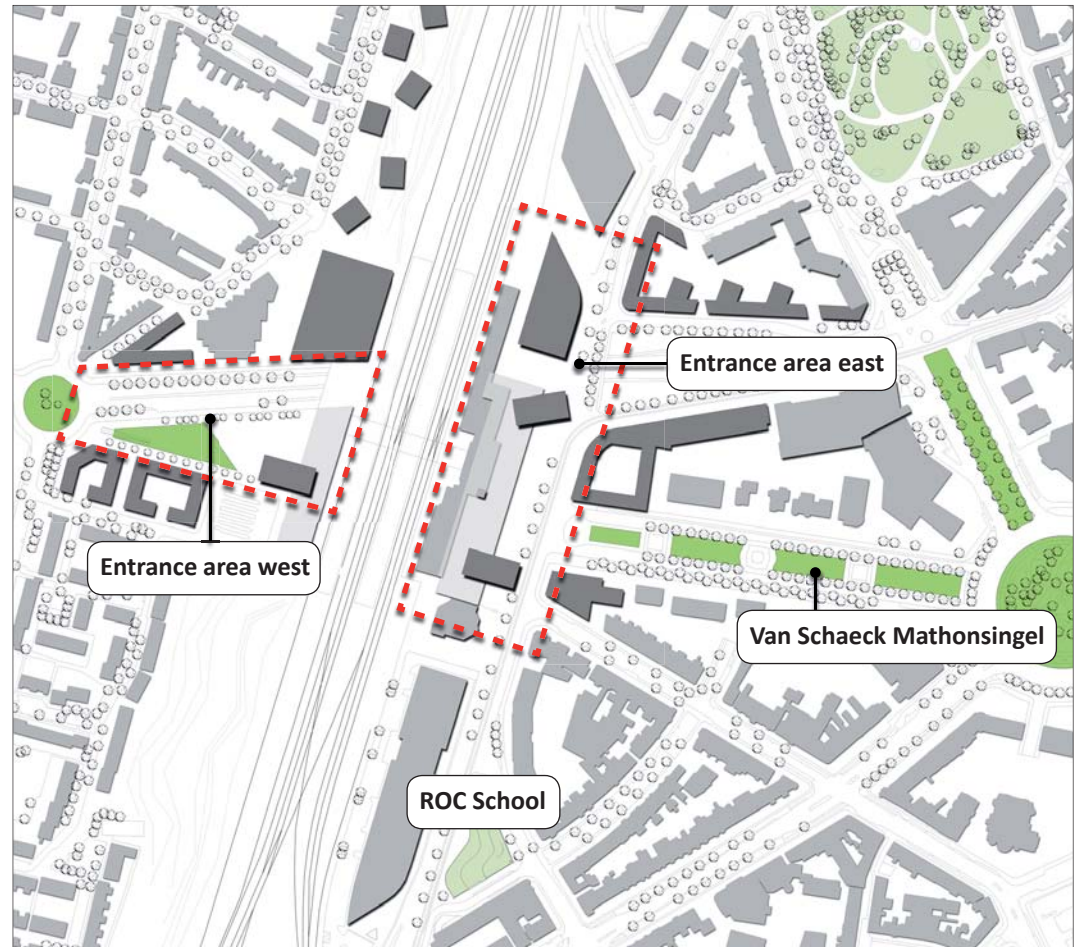


Figure 14.10 Design proposal for the railway station environment of Nijmegen with the most structuring elements

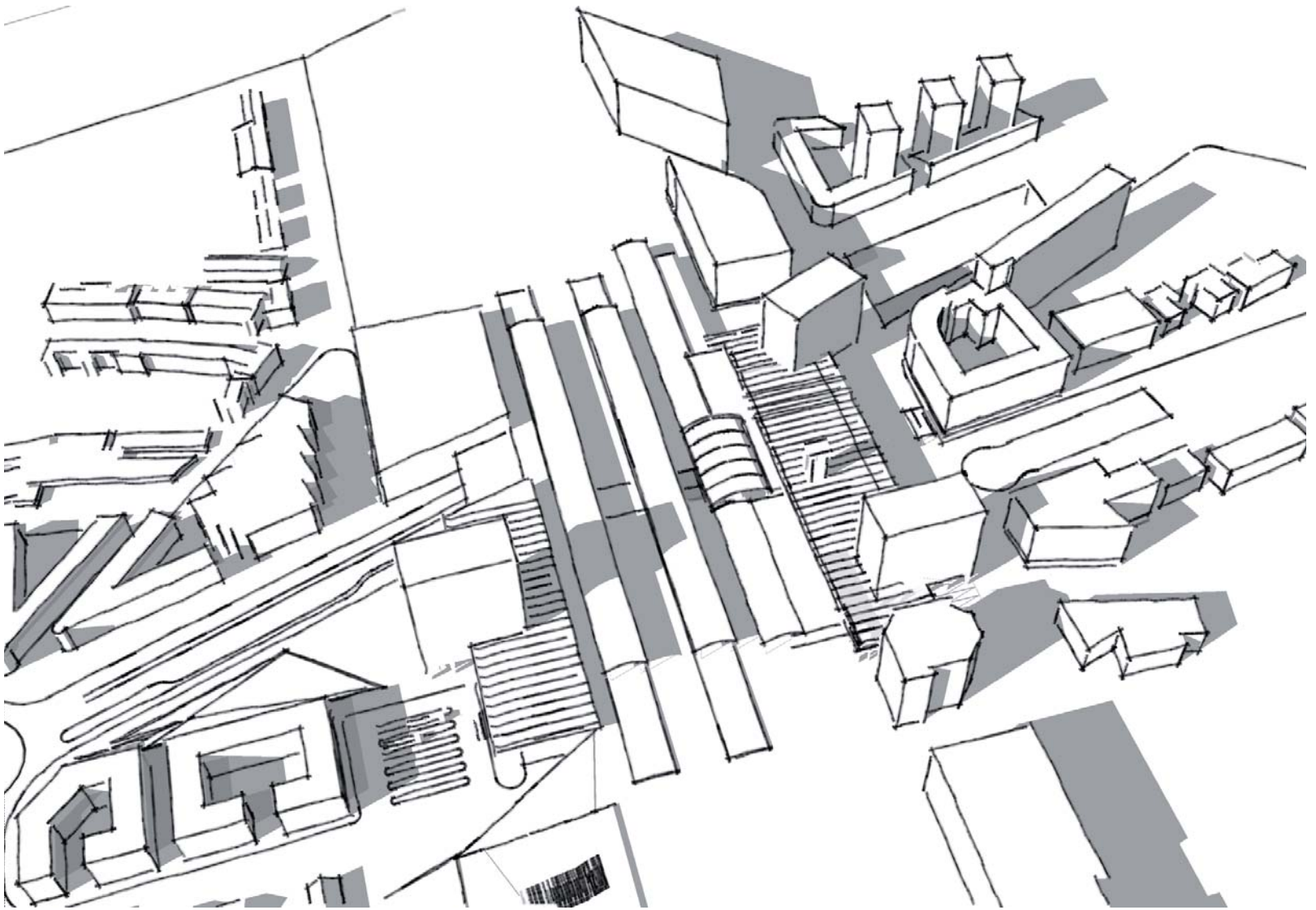


Figure 14.11 Bird's eye view of the design proposal for the railway station environment of Nijmegen

### 14.3 Railway station building

Main element in the design for the railway station environment is the role and function of the railway station building.

The new railway station building is composed of three parts. A new entrance hall on both sides of the railway and a corridor that connects both sides.

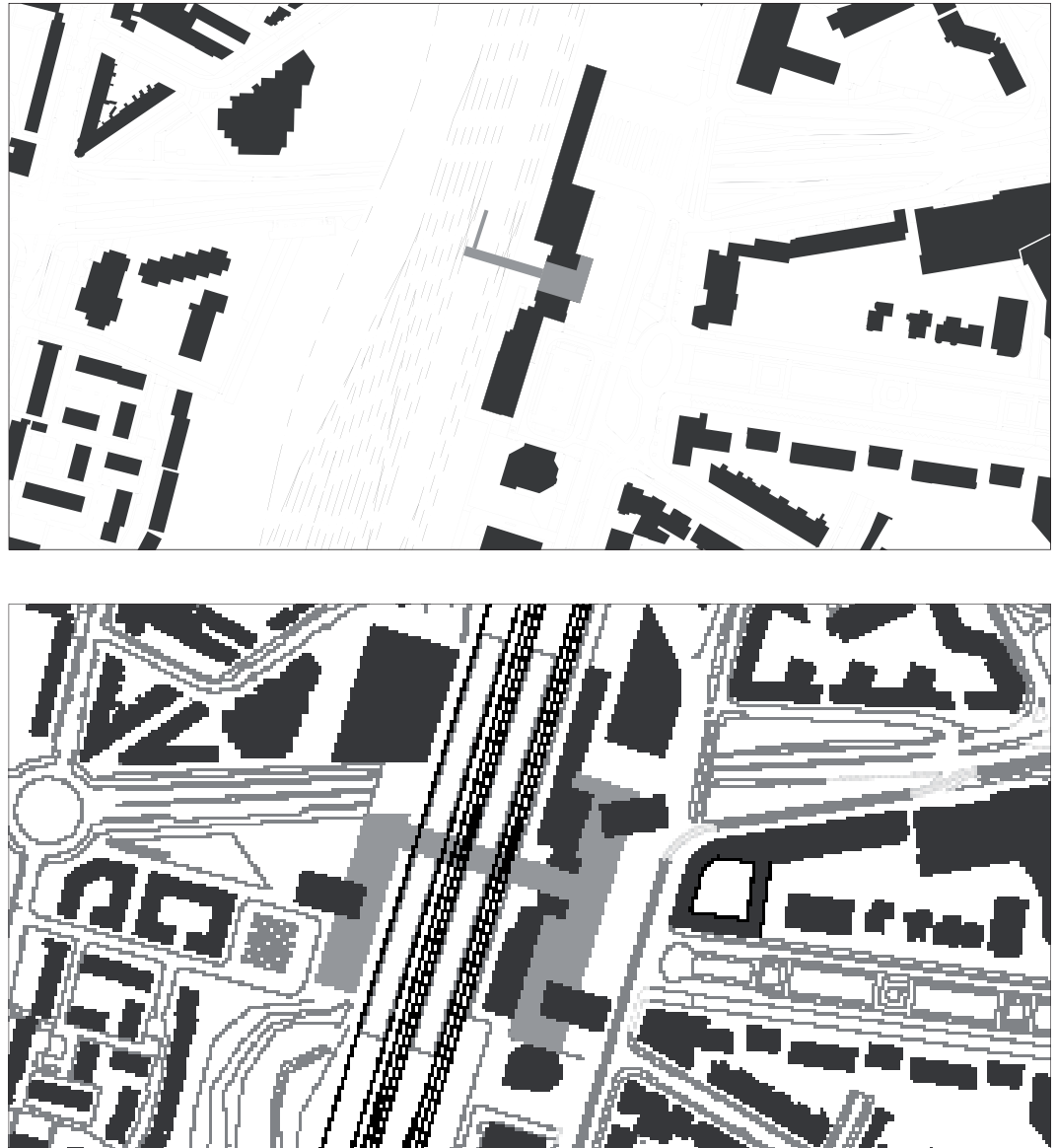
*Figure 14.12* presents the current and new situation of the railway station building. The public interior of the new railway station plays an important role in the area. It connects both sides of the railway and suggests an interaction between public space and public interior.

This chapter starts by explaining the design of the corridor as a solution for the railway station of Nijmegen. Then it will discuss the new entrance hall on the west side and it ends by explaining the entrance hall on the east side.

#### Corridor as link between east and west

Main solution to improve the railway station environment in Nijmegen is making a connection between the east and west side of the railway with the use of a public interior. For the use and interaction of the public interior with the surrounding public space it is important that the emphasis of the railway station lies on the wings of the building and not in the core.

The design of this corridor is explained by discussing the criteria accessibility, spatial quality and identity.



*Figure 14.12 The top figure is the current situation of the railway station environment and the lowest figure is the design for the railway station environment. In grey is the public interior presented.*



### Accessibility

The accessibility of the railway station environment is improved through the corridor. It makes a link between the east and west side of Nijmegen through the building.

An attractive pedestrian route links both sides of the railway as an alternative for the existing tunnel (see *figure 14.13*). This connection is made by means of a corridor. The corridor connects the new entrance hall on the west side of the railway with the expanded railway station hall on the east side and bridges in the mean time 10 meter difference in height.

The accessibility of the platforms is also improved. There is made one main stream with forks to the platforms which was recommended from the case study research. *Figure 14.14* shows the flows through the corridor.

### Spatial quality

The spatial quality of the corridor is important for the perception of the route. Therefore some conditions are made for the availability of daylight, the size and height of the corridor and the accessibility of the thoroughfare.

As said before, it is important that the emphasis in terms of activity is realized in the outer parts of the railway station building. The corridor functions as an overwhelming hallway between both sides and should not be a destination of the building itself, it is a means to an end.

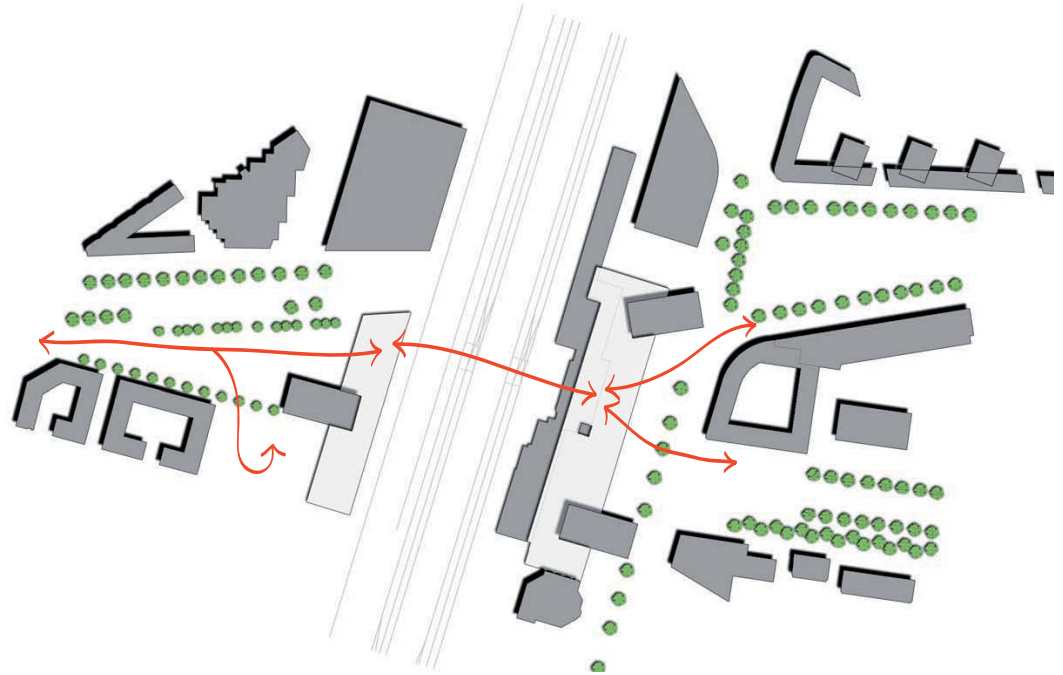


Figure 14.13 Route through the railway station building for pedestrians

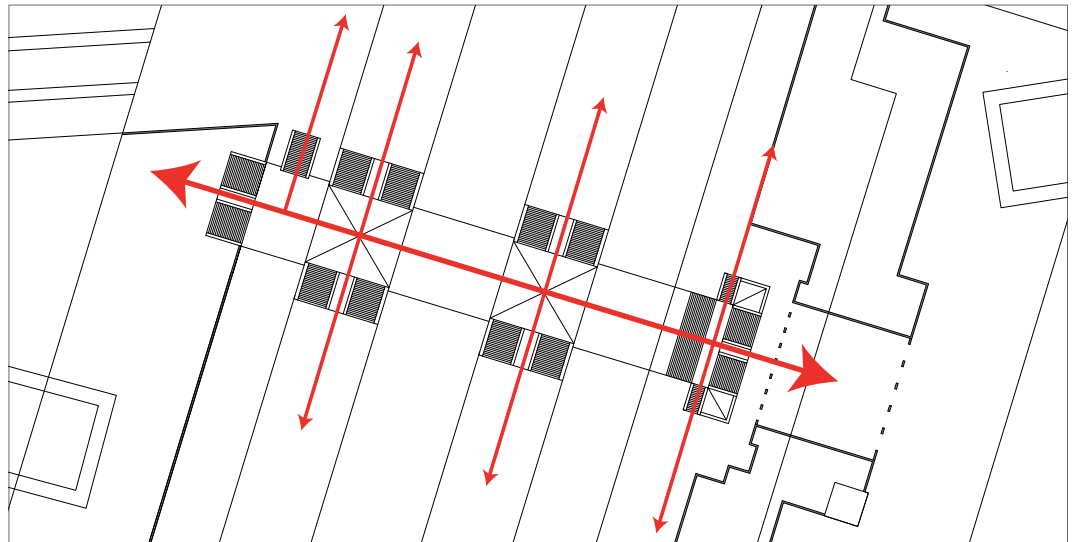


Figure 14.14 Division of flows in the railway station building

## 14 URBAN DESIGN

The corridor is on both sides accessible via a major stair case. *Figure 14.15* presents longitudinal (cross) section of the corridor with on both sides the stair cases. The platforms are accessible via the corridor. The length of the corridor is around 70 meters.

*Figure 14.16* presents the cross section on two places in the corridor. The size and height of the hallway is based on previous findings in case study research and literature study. The width of the corridor is 20 meters which is in line with the recommendations of Alexander (1977) and the width of the corridor in the railway station of Leiden. The height of the corridor is 4 meters in cross section A and 6.5 meters in cross section B.

*Figure 14.17* presents the image of the corridor. Based on the recommendations of Alexander (1977) the corridor is made high in the middle and lower on the edges.

Important condition for the spatial quality of the corridor is the availability of daylight. Cross section A presents the corridor below the railway, the availability of daylight is not possible in these places. Therefore the roof of the corridor is almost completely open in place of the platforms so the incident of daylight is possible. In *figure 14.17* you can see the incident of daylight in the corridor. In places of the entrance of the platforms, the corridor is has much incident of daylight. Below the railway it is more dark which should be overcome by the use of illumination.

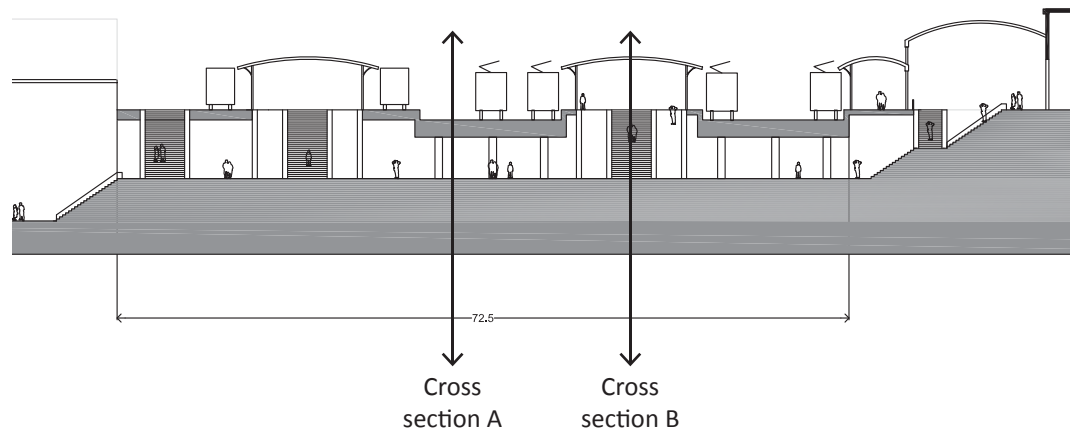
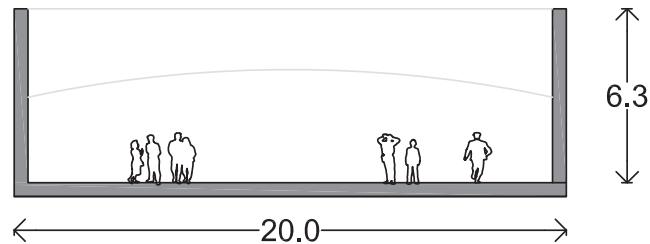


Figure 14.15 Longitudinal cross section of the corridor

Cross section A



Cross section B

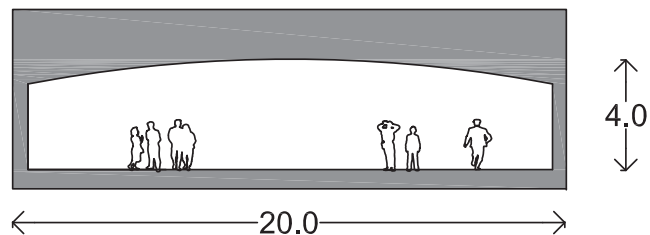


Figure 14.16 Cross section on two places in the corridor



Figure 14.17 Image of the corridor, important qualities are the incident of daylight, the shape of the space and the presence of overwhelming stairs. The view in the corridor is from west to east.

### Identity

The identity of the corridor is based on the experience of the place. Not only the identity of the place is important but also the identity that a group of persons has with that place (Relph, 1976, p.104).

Therefore another major condition for the perception of the corridor is also the architecture which is important to give the corridor a clear character.

*Figure 14.18-14.20* shows some of the pedestrian subways in Moscow. Special about these public interiors is the exceptional, overwhelming architecture and attention for design details. On both sides of the corridor is a platform for the subway. These examples show the possibility to create a spatial quality and identity to a pedestrian subway.

As can be seen in the figures is that the attention for design details is important, just like the kind of material. But also the form of the space is in all the three examples the same, which is high in the middle and low on the edges. All these elements are used as inspiration for the design

of the corridor in Nijmegen.

*Figure 14.21-14.28* shows the route through the corridor from east to west and from west to east.

### Route east-west

*Figure 14.21*

The corridor starts on the east side of the railway with a major stair case and escalator. You can enter the corridor from all sides. The major stair case gives the corridor an overwhelming character.

*Figure 14.22*

In the corridor you can see the west side of Nijmegen, the incident of daylight comes from the openings in place of the platforms.

*Figure 14.23*

Through the opening in the platform you can see the station tower on the west side of the railway.

*Figure 14.24*

The corridor ends on the west side, where you have a clear overview of the entrance hall.

### Route west-east

*Figure 14.25*

The corridor starts also on the west side of the railway with a major staircase, you can look inside the corridor from the entrance hall.

*Figure 14.26*

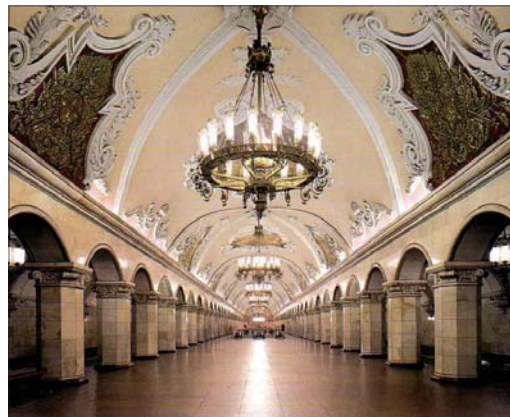
When you enter the corridor you can see the staircase to the east side at the end of the corridor. Furthermore the space is high in the middle and low on the edge and you can see the incident of daylight.

*Figure 14.27*

This image shows the entrances to the platforms via large staircases and escalators.

*Figure 14.28*

Finally the corridor ends on the east side where you can see immediately the entrance hall. The image shows the major staircase. It is possible to enter the corridor from all sides.

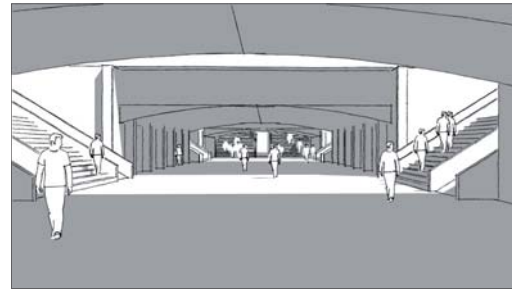


*Figure 14.18 - 14.20 Pedestrian subway in Moscow (First to figures are from Flickr, last photo is made by author)*

Route east - west (figure 14.21-14.24)



Route west - east (figure 14.25-14.28)





## New entrance hall east

Second element of the railway station building is the new entrance hall on the east side of the railway.

Figure 14.29 presents the new glass entrance hall which is added to the existing railway station building to provide room for additional functions and to create a public interior where people can stay. The current extension made by CePeZed is removed and the original facade is recovered.

The design of the entrance hall is explained by discussing the three elements accessibility, spatial quality and identity.

### Accessibility

The accessibility of the railway station building is improved by making much more entrances in line of the arriving flows. Figure 14.30 shows the entrance hall with the several entrances and the flows through the building.

The entrance hall can be used to arrive in the corridor, which can be used as an alternative pedestrian route for the current Tunnel road below the railway.

Furthermore the availability of bicycle sheds are increased and improved. The capacity for bicycle parking is divided over two bicycle sheds. The existing underground bicycle shed is kept, so people can park their bicycle and enter the entrance hall. Second new bicycle shed is located in the north wing of the current railway station building. The north wing is renovated as new indoor bicycle shed. From here the first platform is immediately accessible but it is also possible to enter the entrance hall.

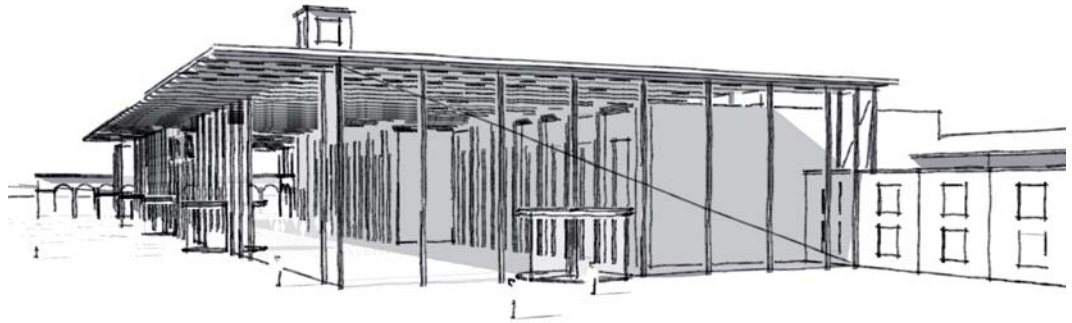


Figure 14.29 Image of the added glass layer to the current railway station building

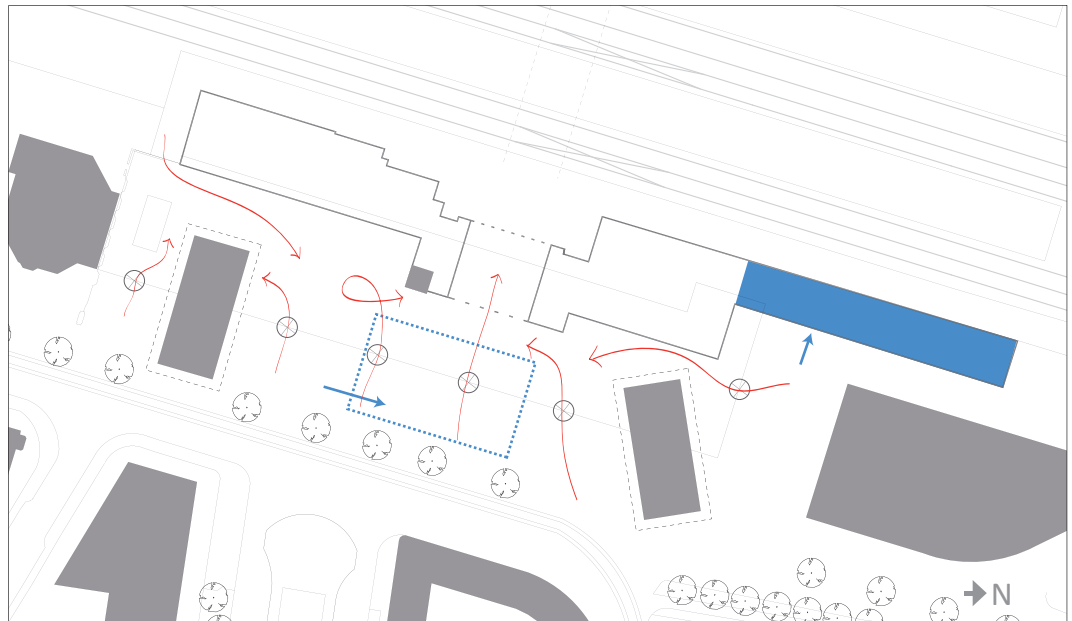


Figure 14.30 Railway station east side: in blue are the bicycle sheds illustrated



### Spatial quality

The current railway station building is conserved and a new entrance hall is added to provide room for additional functions and to form a transition between the railway station and the surrounding public space which will improve the spatial quality of the railway station.

In this transition zone is much room for many other functions to increase the liveliness and level of optional and social activities.

The spatial quality of the entrance hall is based on the on the availability of functions, the availability of daylight, the use of the surrounding plinths, the size and height of the space and the availability of several domains with various functions.



Figure 14.31 Image of the new entrance hall: it shows the relation between public interior and public space

The entrance hall is shown in *figure 14.31*. As can be seen it has an overhang to increase the use of the area in front of the entrance hall. The new hall is made of glass to increase the relation between the public interior and public space and to increase the incident of daylight. The roof of the entrance hall is partly closed and partly open to increase the incident of daylight. The overhang has to function in the first place as protection for people against bad weather and secondly it will work as a save transition area between the public interior and public space.

The public interior in the entrance hall can be used for many purposes. In the edge of the current railway station building is room for many facilities like shops and leisure activities. The first floor of all the surrounding buildings is used for public functions. *Figure 14.32* presents the map of the public entrance hall of the new railway station of Nijmegen on the east side.

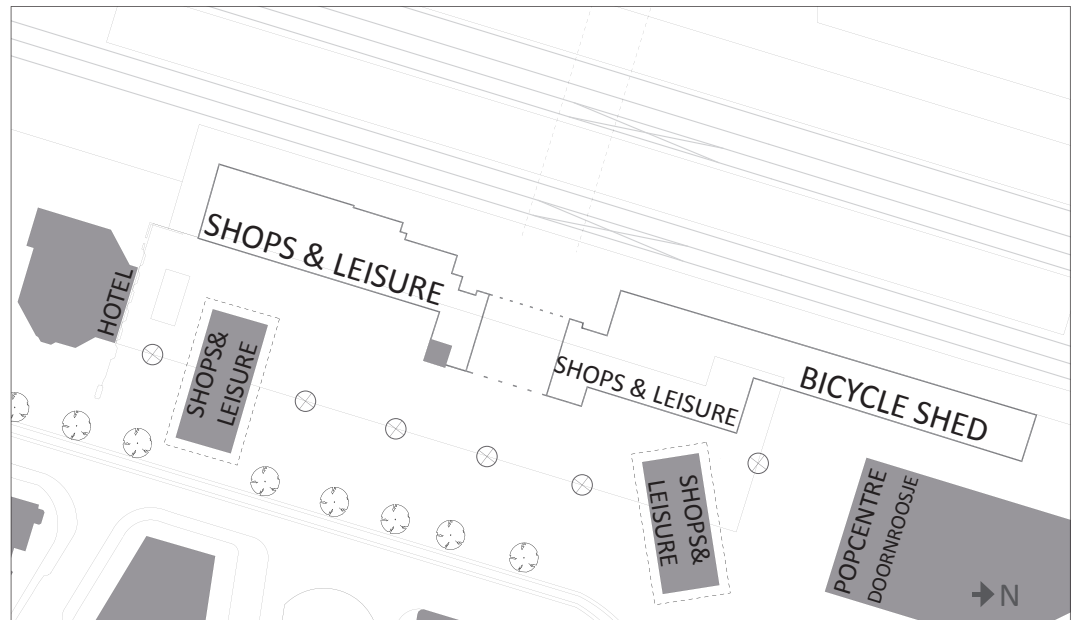


Figure 14.32 Map of the entrance hall with the various facilities

## 14 URBAN DESIGN

The entrances of the described facilities are all located at the ground floor because the use of the ground floor level is important to increase the livability.

Figure 14.33 presents a cross section of the railway station with the entrance hall in red. The height of the entrance hall is 12 meters which is based on the existing height of the highest point of the current railway station building. The width of the entrance hall is 20 meters. So a zone of 20 meters is used as a transition between the railway station and public space where all kinds of facilities can accommodate.

Finally the entrance hall is divided into three different domains (see figure 14.34) by the location of the station towers. The first domain is the arrival hall in front of the current railway station building. The space is in the first place reserved to process large amounts of people. During rush hour it will be very busy and full of people.

The second domain is the area in front of the hotel. Figure 14.35 presents the image of the second domain. The current Mercure hotel gets an entrance inside the public interior in front of the railway station. A winter garden will give this part of the building another character than the entrance part. Figure 14.36-38 shows the Atocha railway station in Madrid which has a winter garden inside and is an example of the proposed winter garden in Nijmegen. This area should get a more private and enclosed character so it distinguishes itself by being a complete other space as can be seen in the drawing.

The last domain is a routing with many shops and facilities in the edge.

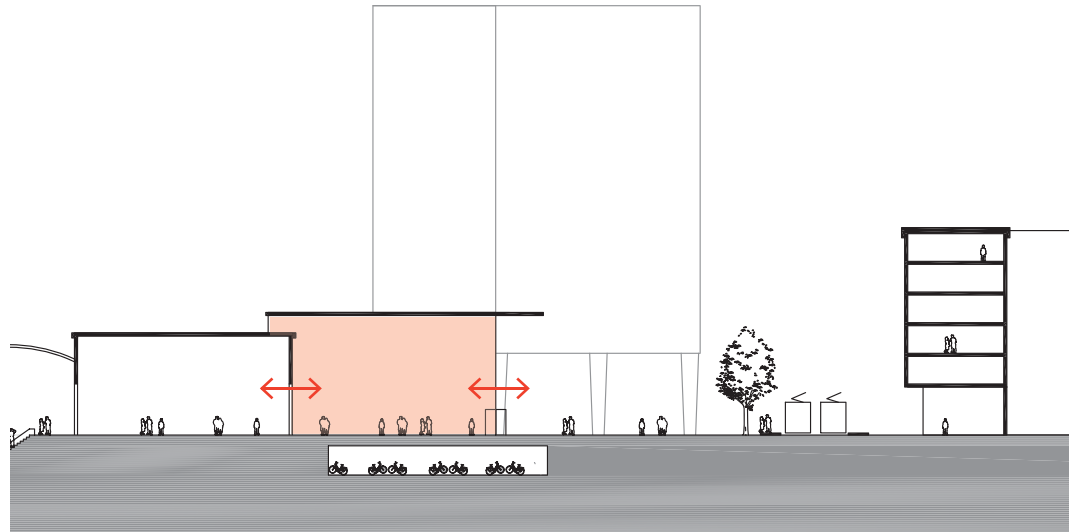


Figure 14.33 Cross section of the railway station building with in pink the new added entrance hall

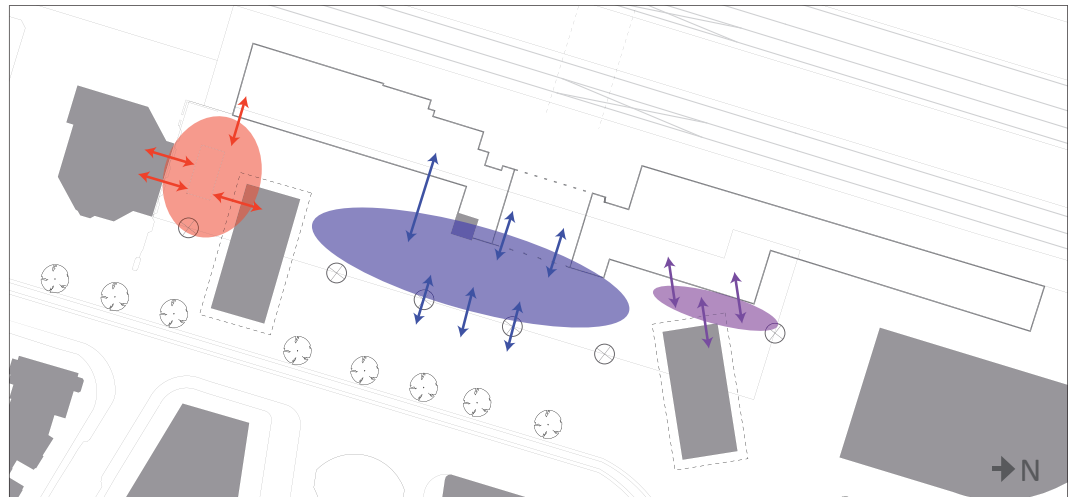


Figure 14.34 Map of the railway station building with the three various domains



Figure 14.35 Image of the winter garden

### Identity

The identity of the entrance hall on the east side is derived from the genius loci. The historic character of the location is used to strengthen the meaning and role of the railway station in the city.

The glass entrance hall can be assumed as a new layer in time. It is made of glass to provide insight into the different phases during history.

The current railway station consists of two parts. The first part remains from the first railway station building and is still undamaged and the second part is the facade of the current building which reflects to a specific era in time. Both of the parts contribute to the identity of the railway station building which is a strong point. To strengthen this identity, there is chosen for a new glass layer by which the current layers are still visible.



Figure 14.36-38 Winter garden in the Atocha railway station in Madrid (Spain)

## New railway station west

Last element of the railway station building is the new entrance hall on the west side of the railway.

Figure 14.39 presents the new glass entrance hall which is the new railway station for the west side of Nijmegen. It provides also room for additional functions and creates a public interior where people can stay.

The design of the new entrance hall is explained by discussing the three elements accessibility, spatial quality and identity.

### Accessibility

The accessibility of the railway station is much more improved only by the fact that there is an entrance to the railway station for the west side of the city now.

A new building on the west side of the railway station creates an area around the railway station which can offer a variety of facilities for the west side of Nijmegen.

Figure 14.40 presents the map of the new railway station building. As can be seen, the new building lies on an urban pedestrian route through the city which makes it an attractive alternative for the current route through the tunnel.

The building on the west side accommodates also the new bus station. A central waiting room is created inside the building where people can wait for their bus. If the bus arrives people can go to their platform.

A central waiting room with additional function will make the waiting much more pleasant, comfortable and safe.

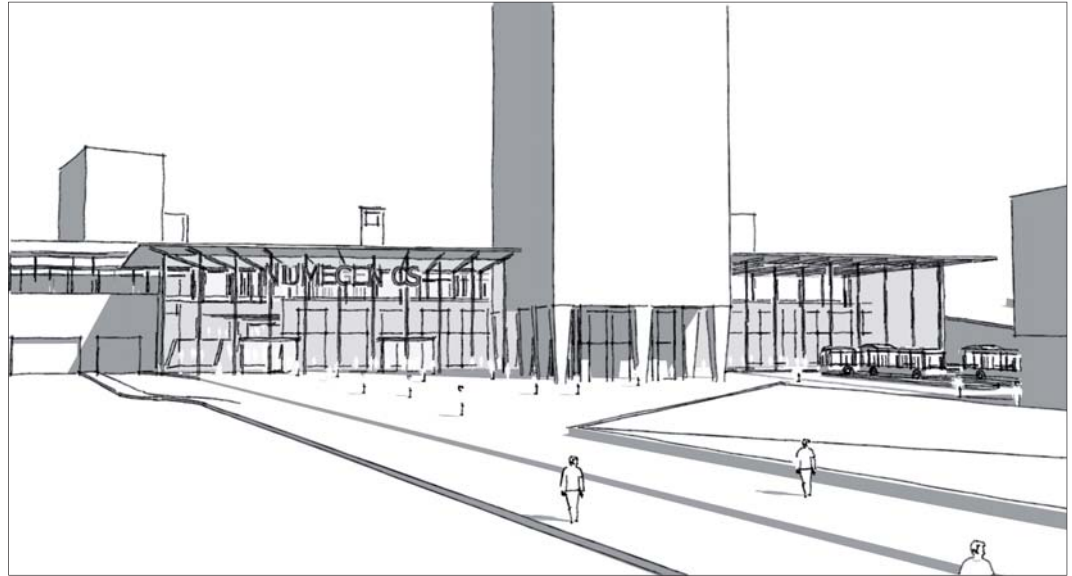


Figure 14.39 Image of the new railway station building on the west side

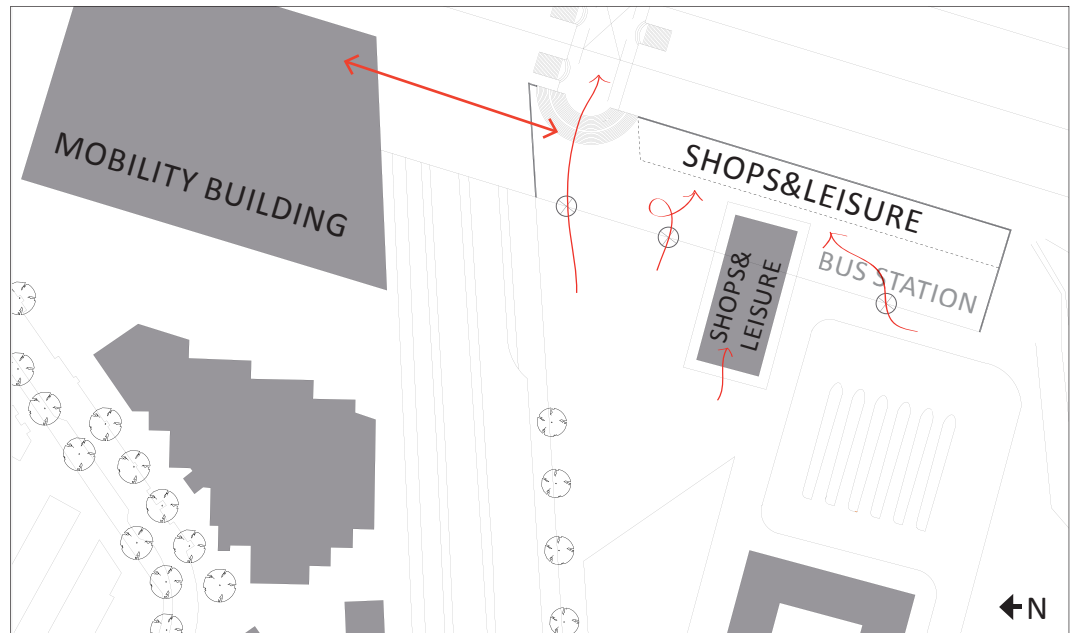


Figure 14.40 Map of the new railway station with the several flows of people and available facilities



Finally the mobility building on the other side of the Tunnelroad (see *figure 14.40*) is connected with the railway station on the west side.

The accessibility for cars is therefore very much improved. People can almost park their car inside the railway station and transfer to the train, bus or tram.

#### *Spatial quality*

As can be seen in *figure 14.40*, the new glass entrance hall is a stretched building which accommodates a variety of facilities. The station tower divides the space in two domains; the arriving hall and the bus station.

The back side of the entrance hall is reserved for shops and leisure activities which are accessible via the ground floor. So the presence of people on ground floor is stimulated.

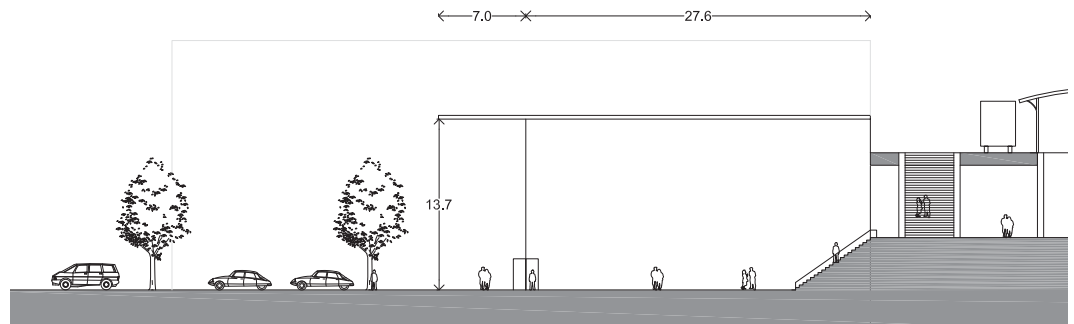
*Figure 14.41* presents the image of the entrance hall. The entrance hall has also a glass facade that provides an interaction between public space and public interior. The entrance hall is extended in public space by an overhang so people can wait in a protected, sheltered area outside and to create a relation between indoor and outdoor.

The cross section in *figure 14.42* illustrates the overhang and size of the entrance hall. The entrance hall is around 13 meters high and 30 meters broad, which is geared to the height of the railway. The size of the overhang is 7 meters.

The glass facade of the entrance hall provides also the incident of daylight which is important for the spatial quality of the entrance hall. The back side of the entrance hall has a small strip of glass for the incident of daylight.



*Figure 14.41 Image of the new entrance hall on the west side of the railway, the relation between indoor and outdoor is very important*



*Figure 14.42 Cross section of the new entrance hall on the west side, important is the overhang as a transition between public space and public interior*

#### *Identity*

To strengthen the identity of the railway station in the city there is chosen for the same architectural language on the west side as the east side. Therefore both sides do have a glass entrance hall. However the use of the entrance hall is very different.

### 14.4 Station towers

Second element of the design of the railway station environment in Nijmegen are the station towers. There are three station towers added with different objectives. The following part explains the role, function and composition of the station towers in light of the accessibility, spatial quality and identity.

*Figure 14.43* presents a bird's eye view of the railway station with the three new station towers. As can be seen there are two towers built on the east side of the railway and one tower on the west side.

#### *Accessibility*

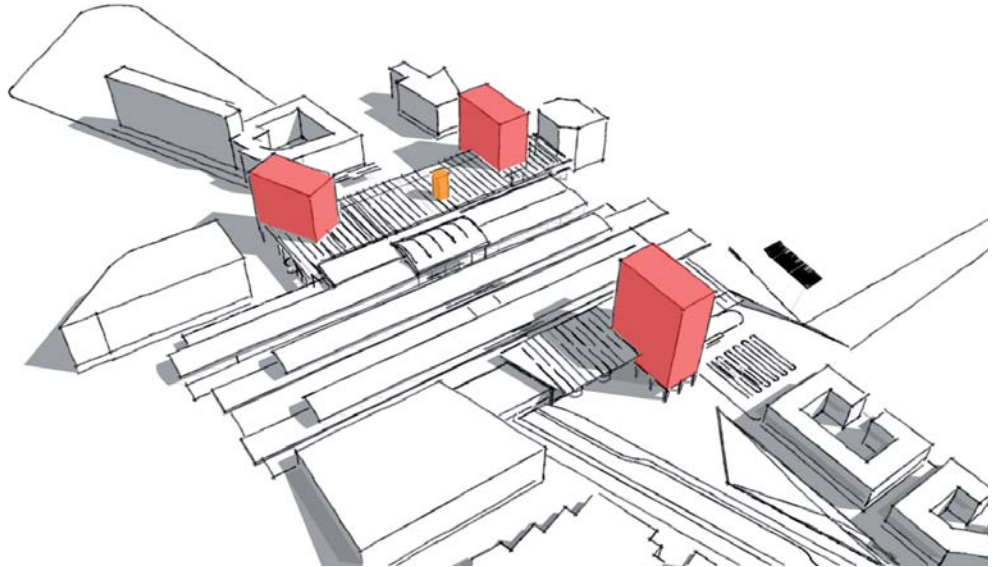
The station towers contribute to the accessibility of the railway station because of their visibility from all sides. They function as new landmarks in the city, which makes them very recognizable.

The towers are accessible by public transport and car. The parking places for the functions inside the station towers are divided over the mobility building on the west side of the railway and the underground parking garage below the Van Scaeck Mathonsingel.

#### *Spatial quality*

The spatial quality of the towers is based on the composition of the tower, the availability of the functions and the dimensions. The three station towers are similar in size and design. The only thing that differs is the height of the tower.

*Figure 14.44* presents the image of the station tower. The tower consists of two parts: a public plinth and a top. In the plinth is room for



*Figure 14.43 Bird's eye view of the railway station environment with the three towers in red*

shops or leisure activities. All the facilities are accessible via the ground floor to stimulate the use and availability of people in public space. The second reason for the division between foot and top is the human scale. The legs of the tower create a covered arcade which gives people protection in public space and functions in the same time as an attractive edge zone.

The plinth consists of an inner core of two floors where the facilities are located. The height of the plinth is 8 meters. Around this inner core are the legs of the tower located which creates an covered arcade to stimulate the interaction between indoor and outdoor.

The top of the tower, which is everything above the second floor is destined for offices and conference rooms.

The towers on the east side of the railway have a height of 45 meters. The tower on the west side of the railway does have a height of 60 meters. From all sides the towers seem to have almost the same height, but because the west side of the railway lies 10 meters below the east side, the tower on the west side is made higher.

The surface of the tower is 20 meters by 40 meters which is based on the size of regular office buildings.

*Figure 14.45-46* shows the residential tower of Liesbeth van der Pol in Amstelveen. The tower has a public plinth and also columns around to create an arcade. This image has been an important inspiration for the station towers in Nijmegen.



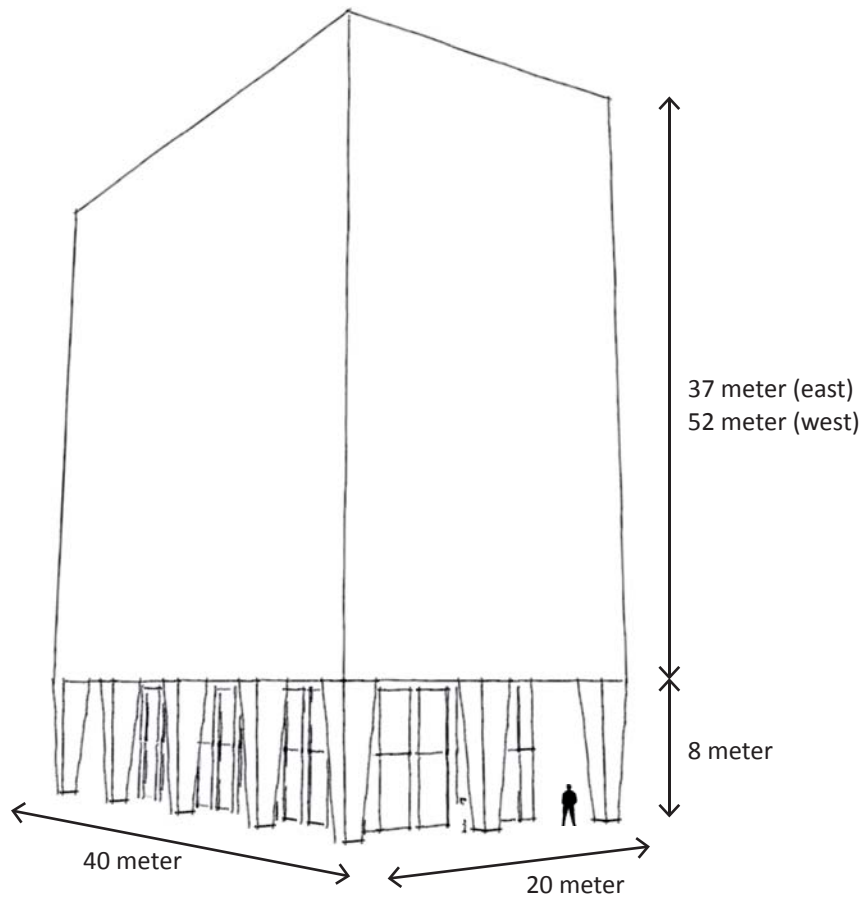


Figure 14.44 Image of the principle of the station tower



Figure 14.45-46 Residential tower with public plinth in Amstelveen by Liesbeth van der Pol (Dok Architecten, 2011)

### *Identity*

The towers are an important part of the new identity of the railway station. Because of the height of the towers, they can function as landmarks for the railway station. They are always visible from all sides of the railway station.

Furthermore the towers emphasize the two-side development of the railway. Arriving from one side, the tower(s) on the other side alert someone of the development on the other side of the railway.

The location and composition of the towers is based and adapted on the location of the existing railway station and several sightlines.

For the location of the towers it was important that the current railway station tower kept visible from all sides, it should not be hidden behind the new towers. Therefore the current station tower is located in the midpoint of the three new towers.

In figure 14.47-49 the relation between the current station tower and new towers is explained from three sides with help of images. The images are each explained.

#### *Figure 14.47*

From the west side, the new station tower on west is immediately visible with on the left side the current station tower. The image shows the view on the new and existing tower and demonstrates the relation between both.

#### *Figure 14.48*

From the Van Schaek Mathonsingel, the first view is on the existing station tower. Coming

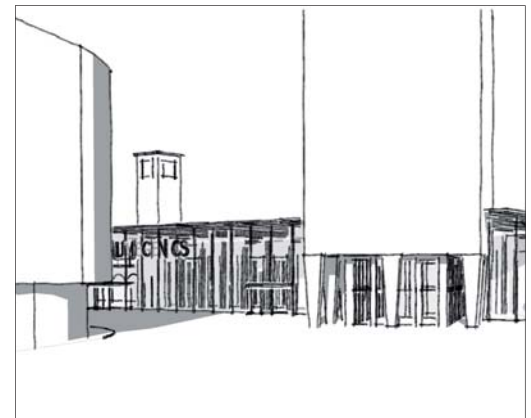
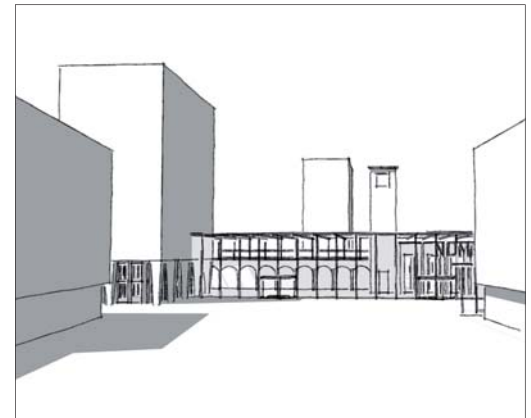
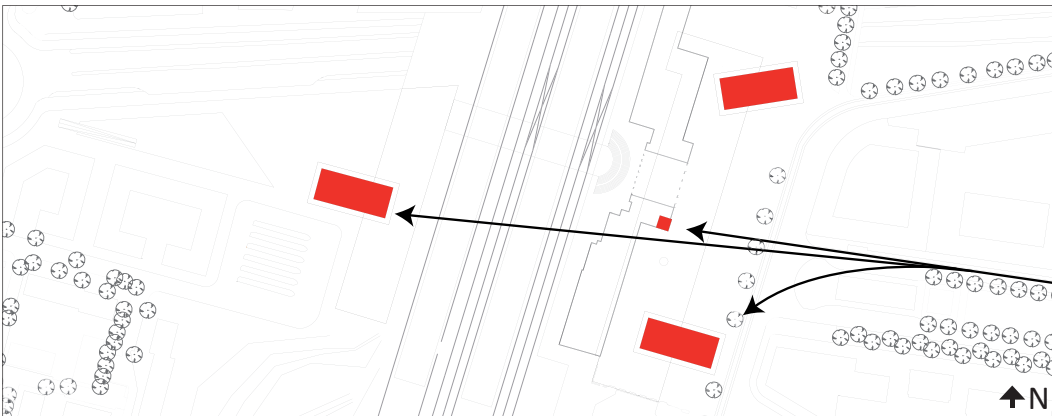
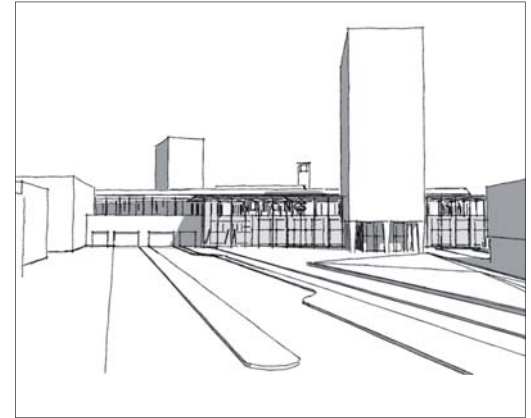
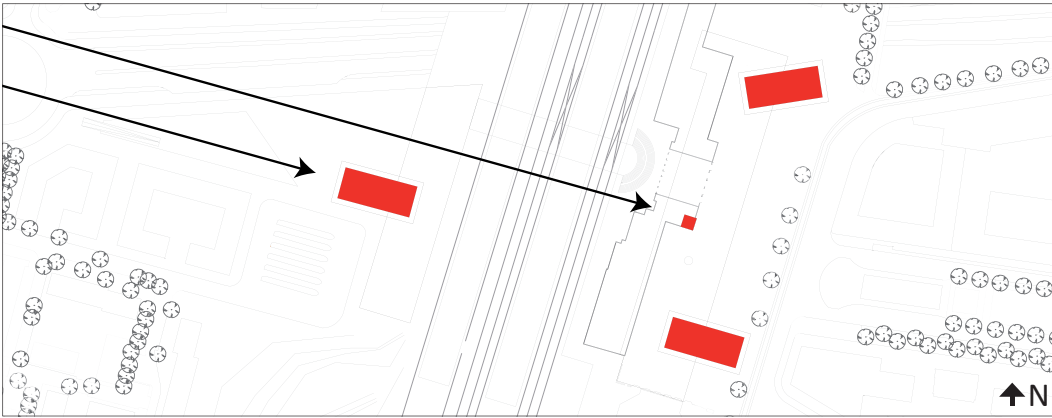
closer to the railway station first the station tower on the west side arises and second the station tower on the east side is visible.

#### *Figure 14.49*

From the Tunnelroad, the view is always on the new station tower. Coming closer the railway tunnel, there is a view through the buildings on the existing station tower.

So the composition and location of the new towers are geared to the composition, location and visibility of the current station tower.

*Figure 14.47-14.49 Sightlines of the current and new station tower explained with maps and images*



### 14.5 Public space

The last element of the design of the railway station environment is the design of the surrounding public space.

The surrounding public space consists of two parts. The public space on the east side of the railway and the public space on the west side of the railway.

Figure 14.50 presents the map of the railway station environment with the public space on both sides of the railway.

This chapter discusses first the public space on the east side of the railway and then the public space on the west side of the railway following the structure of accessibility, spatial quality and identity.

#### Public space east

The public square on the east side of the railway is located between the new entrance hall, the two towers and the new residential blocks (see figure 14.50).

Figure 14.51 presents the image of the public space. The two towers are together with the residential building blocks the 'gates' to the railway station square.

#### Accessibility

Figure 14.52 presents the map of the public space on the east side with the different flows of traffic.

The accessibility of the public square is improved by making a tram connection between the university and the city centre via the railway station. Furthermore the railway station square

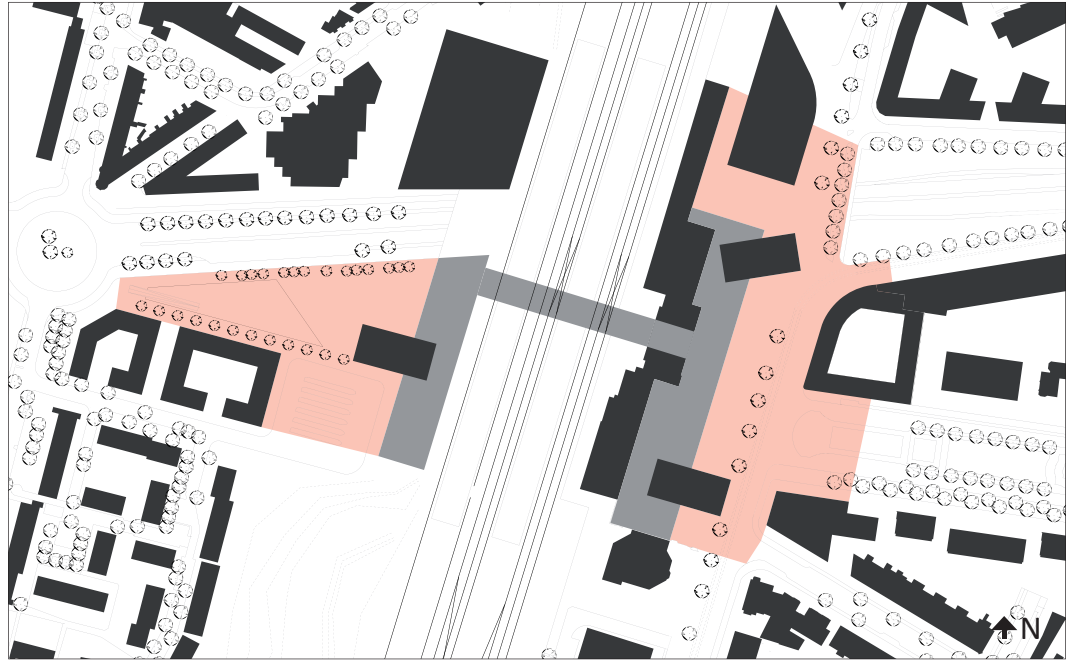


Figure 14.50 Map of the design of the railway station environment with in pink the surrounded public space



Figure 14.51 Image of the public space on the east side of the railway

is designed as a shared public space for the tram, bicycles and pedestrians.

Cars are not allowed in this area, they can enter the railway station environment via the Van Schaeck Mathonsingel. The kiss and ride and taxi stop are located at the top of the Van Schaeck Mathonsingel. In this way the formal historic ax receives a new function and meaning for the railway station environment.



Figure 14.52 Map with the various flows through the public space

### Spatial quality

Important objective of this graduation project is to improve the spatial quality of the public space around the railway station.

The spatial quality is improved by limiting the amount of open space. Figure 14.53 presents the map of the railway station square with the edges in black. Also the image of figure 14.51 shows the definition of the public square. The station towers play an important role in the limitation of the space.

Exceptional element of this public square is the facade of the entrance hall. The facade is made of glass because the interaction and relation between public space and public interior is important. The overhang of the roof emphasizes the use of the facade.

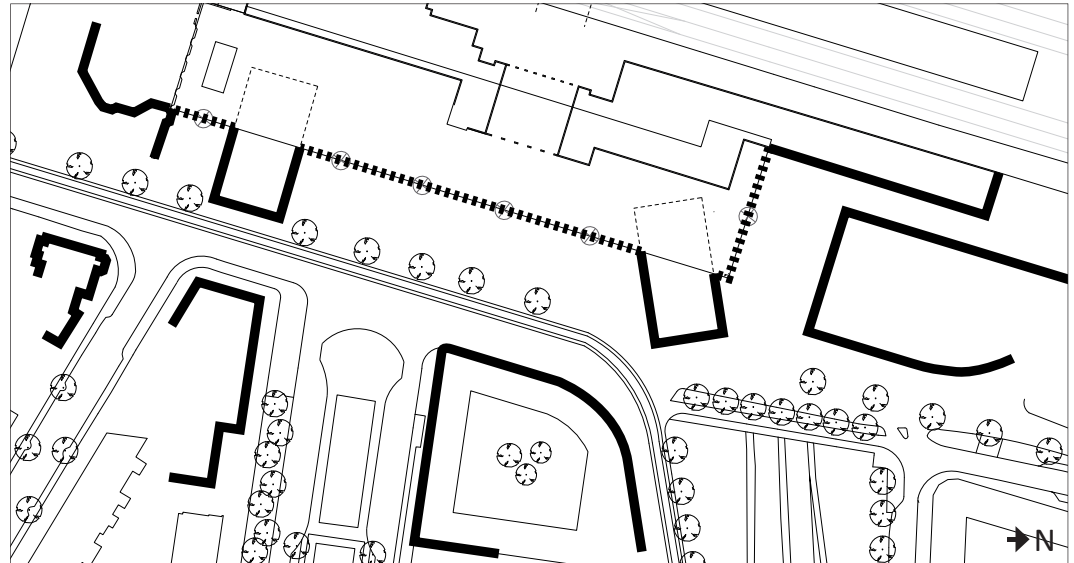


Figure 14.53 Edges of the public space



## 14 URBAN DESIGN

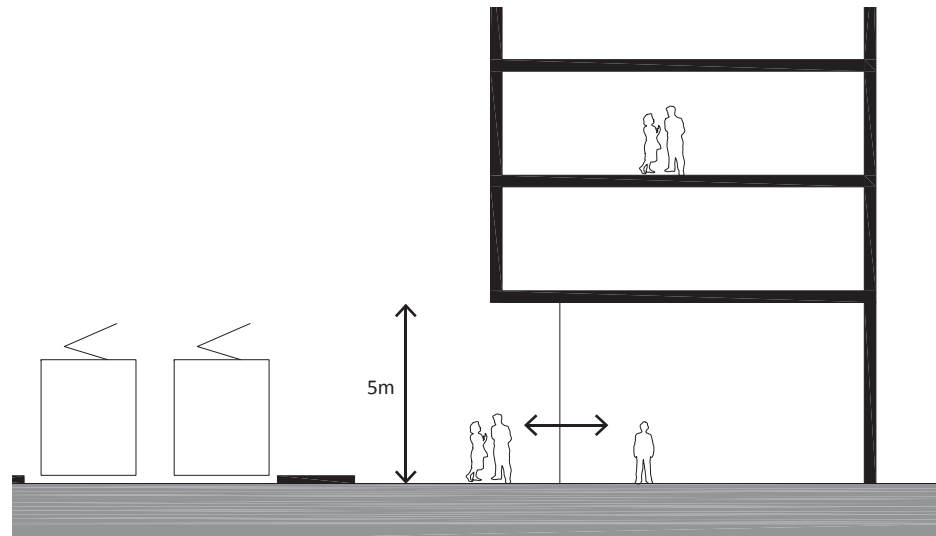
The plinths of the station towers and the size of the entrance hall contribute to the human scale of the public square. The height of the surrounding plinths is geared to the size of the open space. So people can identify themselves in space (see *figure 14.54*).

Secondly the use and facilities of the surrounding plinths are an important aspect of the success of the public space. It is a condition for the livability of the public square that the surrounding plinths are open and accommodate public facilities like shops, leisure activities or cultural facilities.

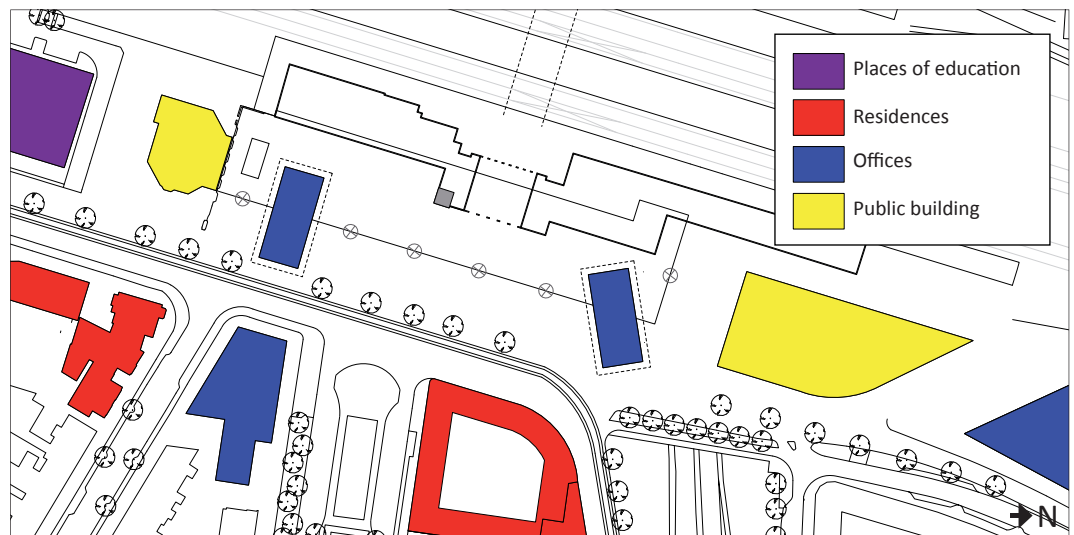
*Figure 14.55* presents the map of the east side with the several available functions above the plinths.

The station towers are reserved for offices and conference rooms. The urban block is reserved for residences with a public inner court. And the major new public building on the north side of the railway station building is reserved for a pop centre. The municipality of Nijmegen is looking for an alternative and accessible accommodation for this pop centre.

Finally the pedestrian safety is improved by creating a shared space. The square is reserved for pedestrians, cyclists and the tram. Cars are not allowed which makes the place much safer.



*Figure 14.54* Cross section of the plinth along the public square, interaction is very important



*Figure 14.55* Map of the east side with the functions above first floor

### Identity

The square derives its identity because of the connection to existing (historic) structures. The formal Van Schaeck Mathonsingel has received a new function as kiss and ride and taxi stop (see *image 14.56*). The re-use of this element will bring the identity of the exceptional structures in the city to the railway station environment again. Combined with the visual relation between public space and the public interior, the place can function as a showpiece of the city. The first and last view on Nijmegen will be one to remember again!



Figure 14.56 Image of the Van Schaeck Mathonsingel with view on the railway station. The new function of the Van Schaeck Mathonsingel is kiss&ride and taxi stop

## Public space west

A new entrance area for the railway station on the west side of the railway asks also for a design of the public space in front of the railway station.

As can be seen in *figure 14.57* the shape of the public square in front of the railway station is triangular. The ring road goes along the public square and is therefore an important part of the character of the space.

### Accessibility

Most important meaning of the public space on the west side is improving the accessibility of the railway station for the west side of the city.

*Figure 14.58* presents the map of the public space on the west side with all the various flows of traffic.

The location of the new square along the ring road makes it easy accessible for cars. Also the presence of the new mobility building on the other side of the ring road increases the accessibility for the drivers.

To create a balance in traffic functions between the east and west side of the railway, the bus station is moved to the west side.

The new bus station is located in front of the entrance hall, to improve the transfer between bus and train.

Furthermore there was a demand for a major bicycle shed. The user friendliness of the traveler was an important starting point for the bicycle shed. Even as the quality of the design. The result is a landscape element with



Figure 14.57 Image of the public space on the west side of the railway

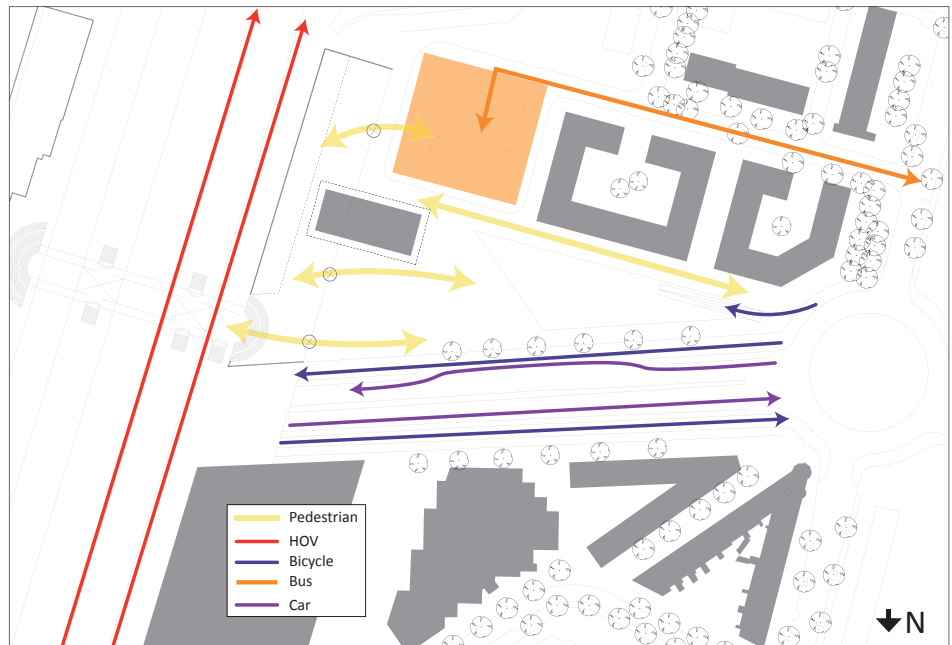


Figure 14.58 Public space west with various flows

an underground bicycle shed below (see figure 14.59). The design of the landscape element is based on a work of landscape art (see figure 14.60).

The edges of the landscape element are made of stone, so people can use it as sitting places.

### Spatial quality

The spatial quality is improved by making a public square for the west side of the city. During the design process it was an important objective to make a place which invite people to visit and stay.

The first intervention in making a square was defining the edges of the space. Figure 14.61 shows the shape of the space with the edges in black.

The space is further defined by the ring road which crosses the space and the bicycle shed in the form of a landscape element. The triangle shape of the landscape element divides the space in two routes to the railway station. The first one along the ring road and the second one along the buildings.

The level of activity was an important issue for the west side. To make a square with a meaning for the west side of Nijmegen there was a demand for a supply of various facilities. Therefore the plinths of the surrounding edges are reserved for public functions like shops, leisure activities or social and business services.

The activity level on ground floor is important for the liveliness of the public space, therefore the interaction between indoor and outdoor activity is been stimulated by making attractive edges. The facades of the surrounding plinths

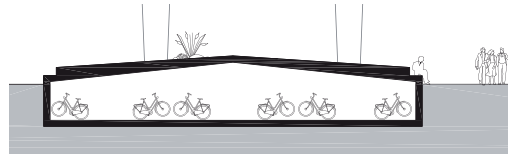


Figure 14.59 Cross section of the bicycle shed below the landscape element

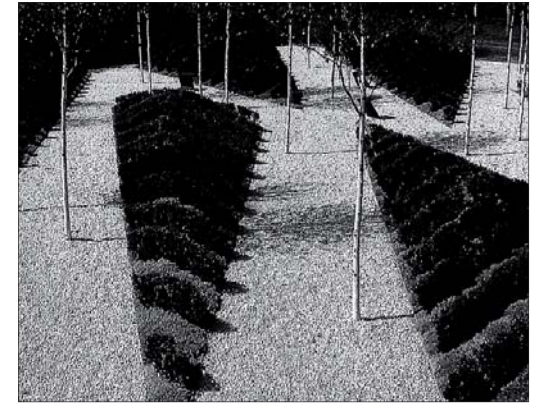


Figure 14.60 Inspiration elements of landscape art

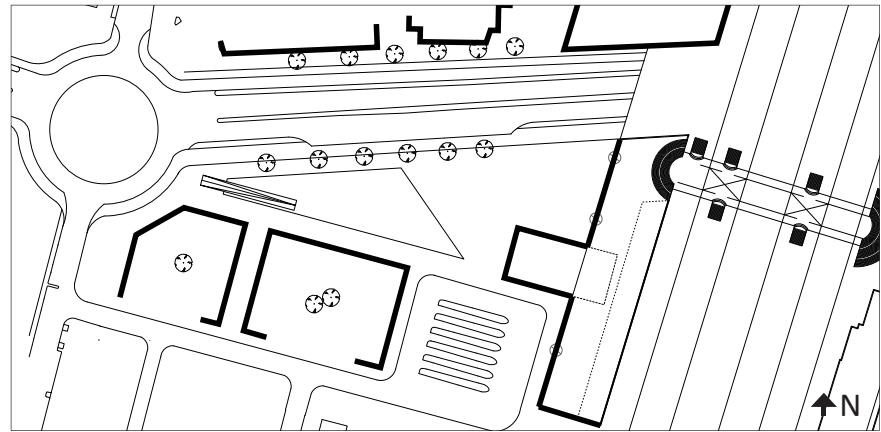


Figure 14.61 Edges of the square on the west side

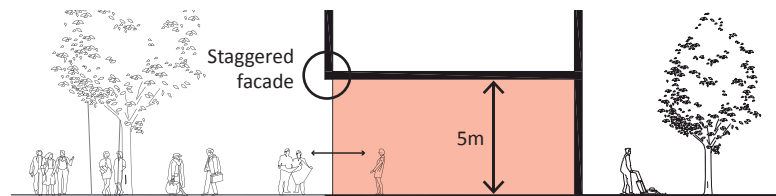


Figure 14.62 Cross section of the public plinth with public space



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should be transparent on ground floor to stimulate the interaction (see *figure 14.62*). The plinths are also used to create a human scale in the area. The plinths have a height of 5 meters and the distinction between private top and public plinth is emphasized with a staggered facade.

*Figure 14.63* presents the image of the route along the facades of the building blocks. As can be seen, the route is guided with trees to make an enclosed space. Another recommendation from the research is to create sitting places. The image shows the availability of sitting places along the route, integrated in the landscape element. The interaction between public space and the facades and the staggered facade are emphasized in the drawing.

Besides the public facilities in the surrounding plinths, the top of the buildings do have a more private character. The facades are more closed and reserved for residences.

*Figure 14.64* presents the map of the environment with the various functions above first floor. Most of the buildings are residences to join the residential character of the Nijmegen-West. A new type of dwelling (apartements in building blocks with a private inner court) increases the building stock of Nijmegen-West.

Finally the pedestrian safety in public space has been an important issue during the design process. To make a lively and attractive public space it is important to make it safe for pedestrians otherwise people will not use it. Therefore the whole area is reserved for pedestrians, a bicycle path along the square makes it accessible for them too.



Figure 14.63 Image of the route along the facades of the building blocks

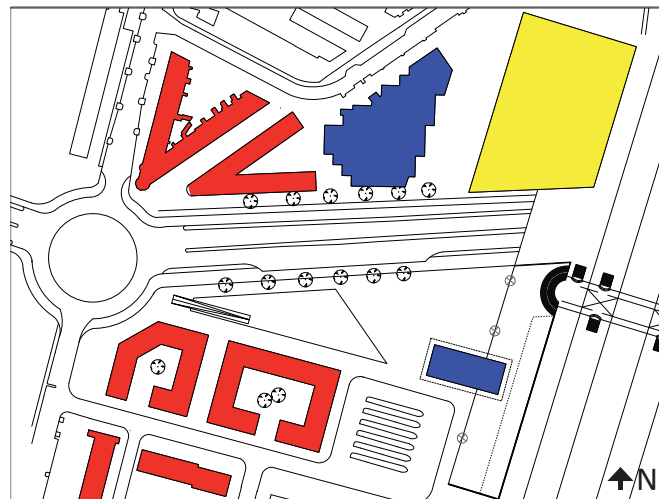


Figure 14.64 Map of the environment with the various functions above first floor



### Identity

The identity of the square should join the landscape character of the location. Therefore trees are used to define the space and to strengthen the 'green' image of the city. Also the landscape element in the center of the square contributes to this image. *Figure 14.65* presents the total image of the public space on the west side.

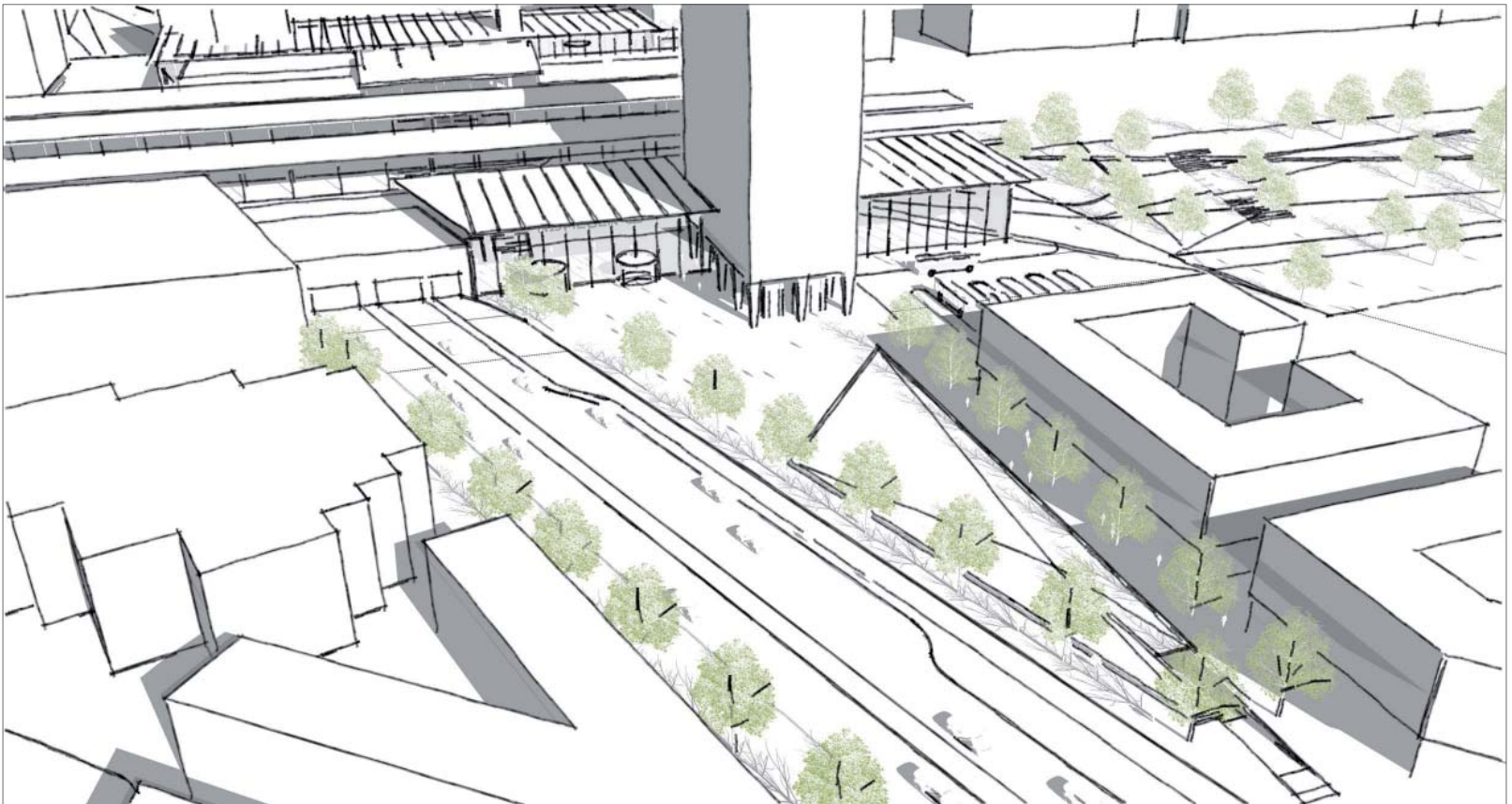


Figure 14.65 Image of the public space on the west side of the railway

## 14.6 Conclusions

After explaining and describing the design proposal in light of the accessibility, spatial quality and identity for the railway station environment in Nijmegen, the design is tested with the conceptual framework for public space and public interior.

This chapter describes briefly how the elements derived from literature, analysis and case study research are involved in the design.

### Public space

The conceptual framework of the public space is used to assess the various criteria. Below the results are briefly discussed.

### Necessary activities

**Accessibility by bus, car, bicycle, pedestrian**  
 The accessibility of the location is improved by including Nijmegen west in the railway station environment. *Figure 14.66* shows the result. The accessibility for cars, busses and bicycles is on both sides improved by making a mobility building, bicycle sheds and a new bus station. The new tramline and HOV bus increases the accessibility of the railway station in the city.

**Link between railway station and city centre**  
 The link between railway station and city centre is improved by making an attractive edge zone and a pedestrian area. The liveliness, human scale and safety are therefore required elements that are improved.

Necessary activities

1. LOCATION

Accessibility of the location

✓

Accessibility by bus, car, bicycle, pedestrian

✓

Link between railway station and city centre

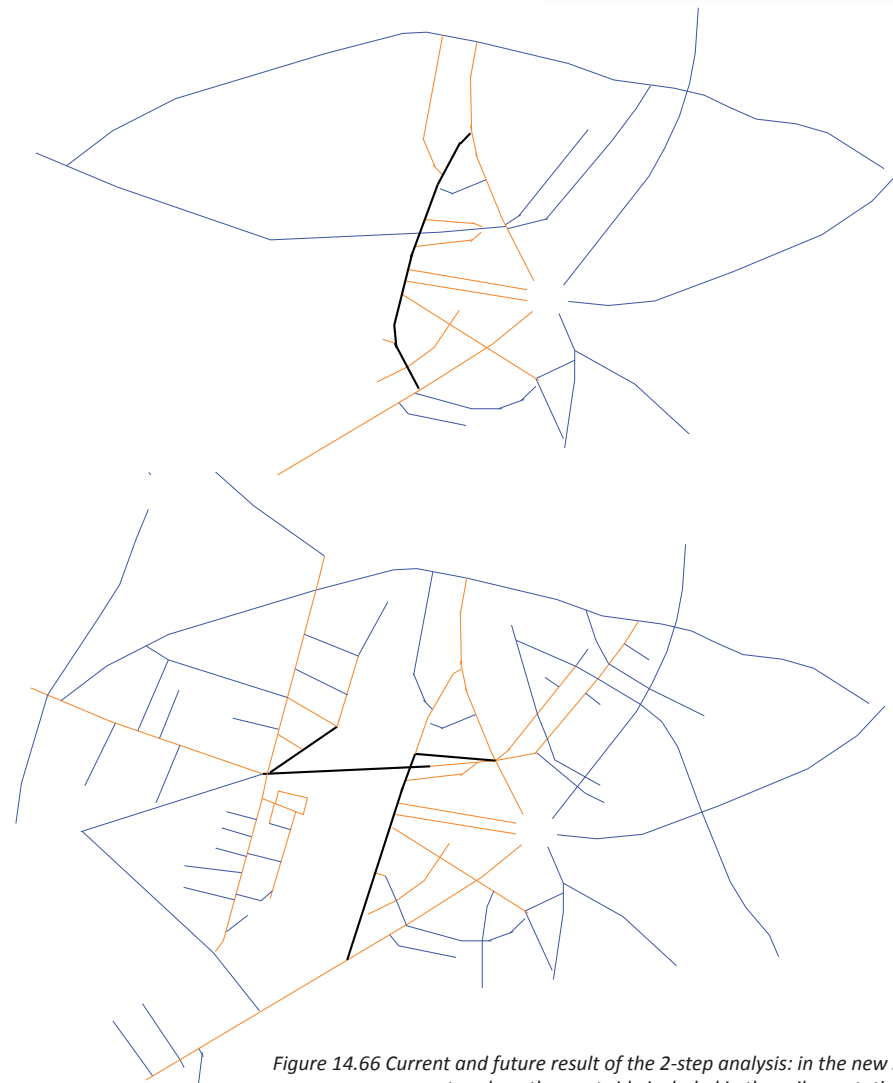


Figure 14.66 Current and future result of the 2-step analysis: in the new situation is the network on the west side included in the railway station environment

Optional activities

2. DIVERSITY

- ✓ Mixed use (more than 2 primary uses)
- ✓ Density of the railway station environment
- ✓ Mixture in building type (more than 2 types)
- ✓ Human scale (ratio built-open)

Optional activities

✓ *Mixed use*

The availability of primary uses is increased by making room for a variety of functions. A new pop centre, residences, offices, conference rooms, leisure activities, shops and social and business services are added to create a lively area.

✓ *Density*

The density of the railway station environment is increased extremely. *Figure 14.67* presents the result of the Spacemate calculation of the current situation, the advisable situation and the design.

The FSI and GSI are doubled and the OSR is halved which means that the amount of open space is half of the amount it was.

✓ *Mixture in building type*

Both sides of the railway have received additions to their current building stock. Apartments with private inner courts, highrise office buildings and new public buildings are added to increase the variety in types of buildings.

✓ *Human scale*

The human scale of the area is improved by making accessible edge zones. Furthermore the amount of open space is limited, the difference between the current situation and the design is shown in the cross sections of *figure 14.68*.

	Current situation	Design	Advisable situation
GSI	0.13	0.26	0.25-0.3
OSR	1.57	0.66	0.6-0.8
FSI	0.55	1.12	1.0-1.5

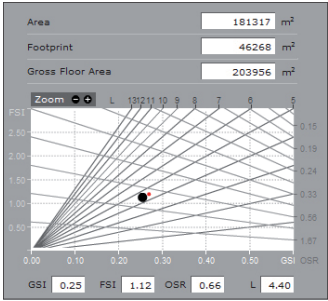


Figure 14.67 Results calculations Spacemate and the comparison of the advisable, current and new situation

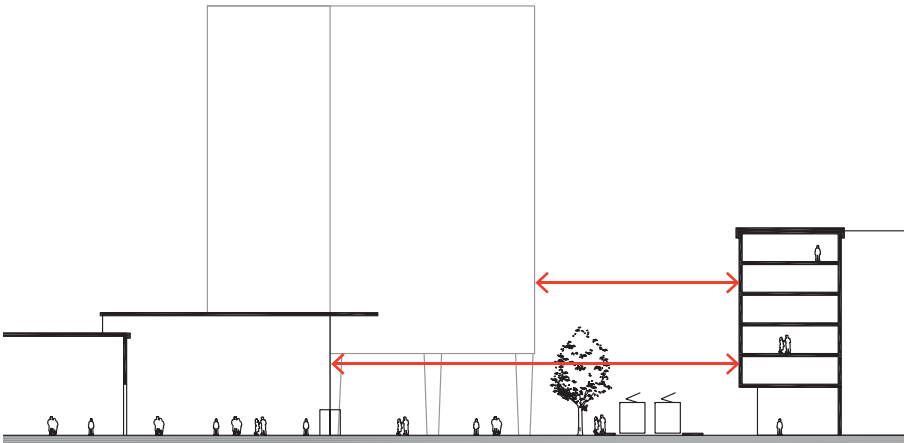
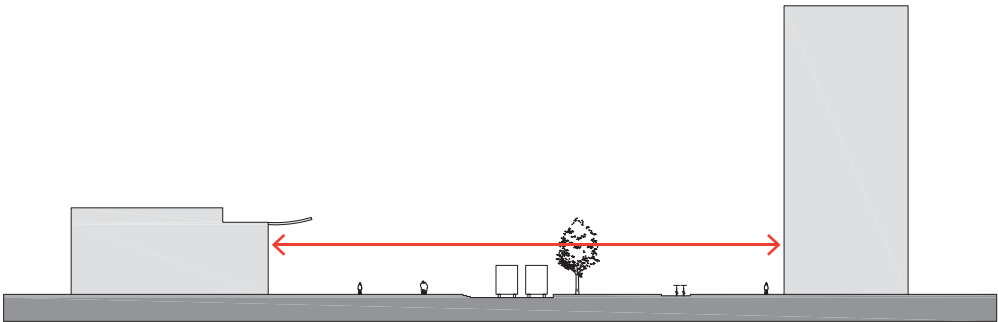


Figure 14.68 Cross section railway station square east (current situation and new situation)

## Optional activities

### 3. SAFETY

- ✓ Use of the plinth
- ✓ Traffic safety for pedestrians
- Pattern in opening hours

#### *Use of the plinth*

The use of the plinth is improved by making public, transparent plinths in the buildings in the railway station environment. The entrance hall of the railway station is made of glass which increases the visible relation between indoor and outdoor. *Figure 14.69* shows the relation between the surrounding facades and public space.

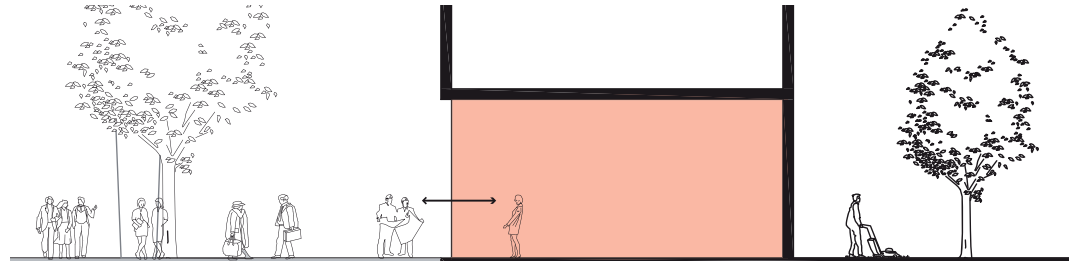


Figure 14.69 Principle of the relation indoor-outdoor

#### *Traffic safety for pedestrians*

The traffic safety for pedestrians is increased by making a shared space on the east side for tram, bicycle and pedestrian. And a pedestrian zone on the west side. The pedestrian has no traffic barriers anymore (see *figure 14.70*).

#### *Pattern in opening hours*

This criteria cannot be evaluated because it cannot be designed. However it is highly recommendable to enlarge the opening hours of the facilities inside the railway station to make the railway station an exclusive commercial centre in the city. This is based on the studies to the Hauptbahnhof in Berlin.

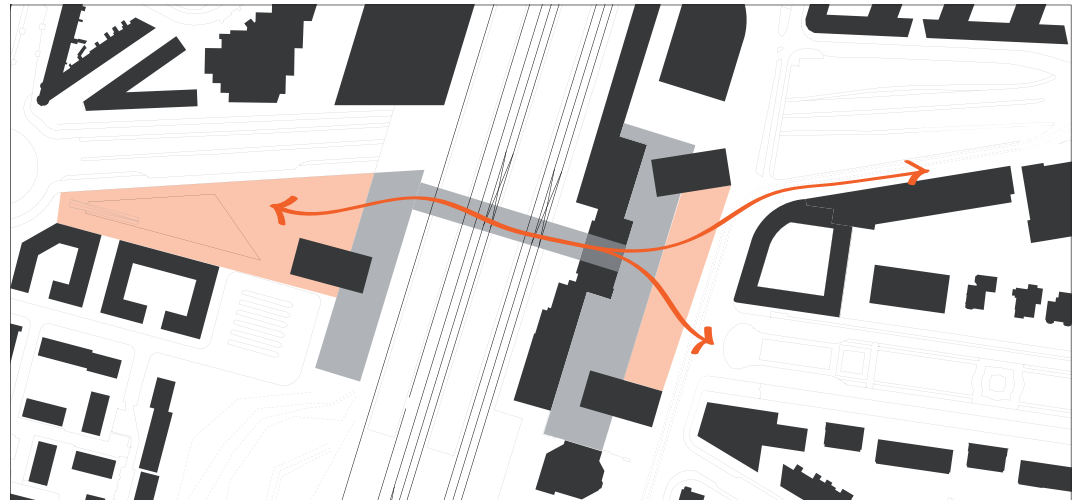


Figure 14.70 Pedestrian zone with main pedestrian flows

### Social activities

#### 4. COMPOSITION

- ⊗ Sitting places (integrated and furniture)
- ✓ Sightlines
- ✓ Edge zone
- ✓ Positive sensory experience (trees, plants)

### Social activities

#### ⊗ Sitting places

The availability of sitting places in public space is very good for the square on the west side of the railway. The attention for integrated elements in was always there. *Figure 14.71* shows the landscape element, which is used to make enough sitting places on the square. Both in the sun as shadow, to avoid social interaction or search for it.

The public space on the east side however does not have many sitting places yet. It is recommended to design them as well.

#### ✓ Sightlines

Both squares are very surveyable, you have immediately a clear overview of the space

#### ✓ Edge zone

The edge zone of the surrounding buildings is improved very well. The edge is used to create interaction between indoor and outdoor and to increase the activity on ground floor. It has always been the objective to stimulate the use of ground floor.

#### ✓ Positive sensory experience

Both squares have received trees to increase the landscape character and with that the positive sensory experience. The landscape element on the west side contributes to the green character of the public space.

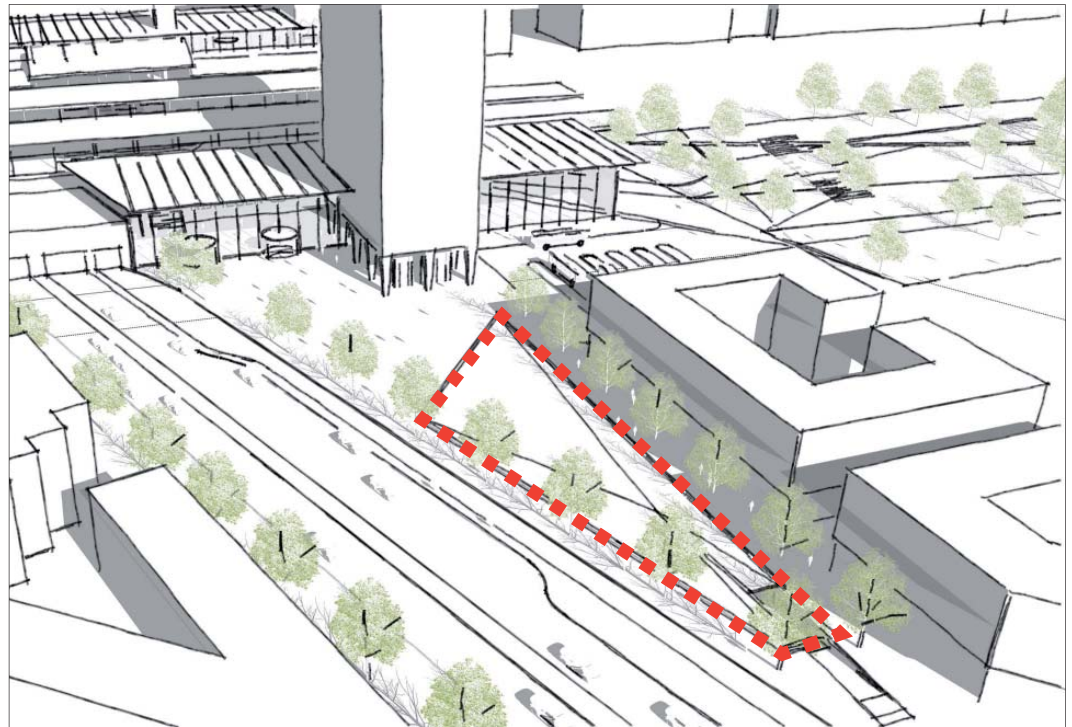
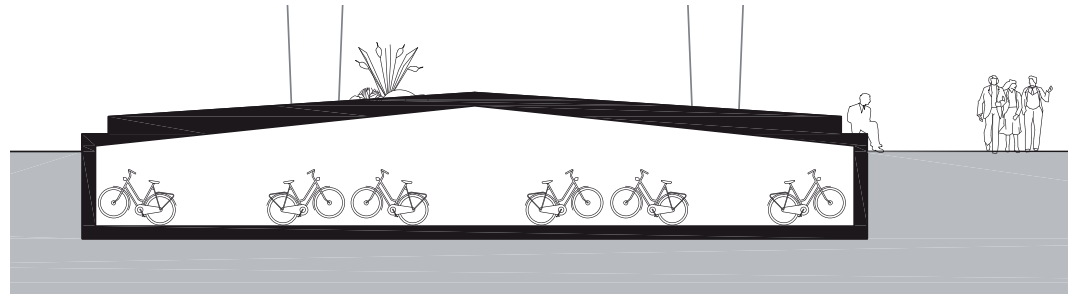


Figure 14.71 Landscape element with integrated sitting places on the west side of the railway



## Public interior

### Necessary activities

#### 1. LOCATION

- ✓ Lies on an urban pedestrian route
- ✓ Logic of the flows of people
- ✓ Entrance (width and location)

### Necessary activities

#### ✓ *Lies on an urban pedestrian route*

Figure 14.72 shows the location of the railway station in the network of the city. The railway station building has become part of the urban pedestrian network in Nijmegen.

#### ✓ *Logic of the flows of people*

Based on the recommendations of the case study research there is one main flow through the building with clear forks to other parts and platforms. It has been concluded that this is the most efficient and surveyable situations for a railway station.

#### ✓ *Entrance*

The new railway station building has on both sides many entrances which are all located on a route to the building. The size of the entrances is adapted to the size of a revolving door, the objective to invite people to enter the building is also done with help of the glass facade.

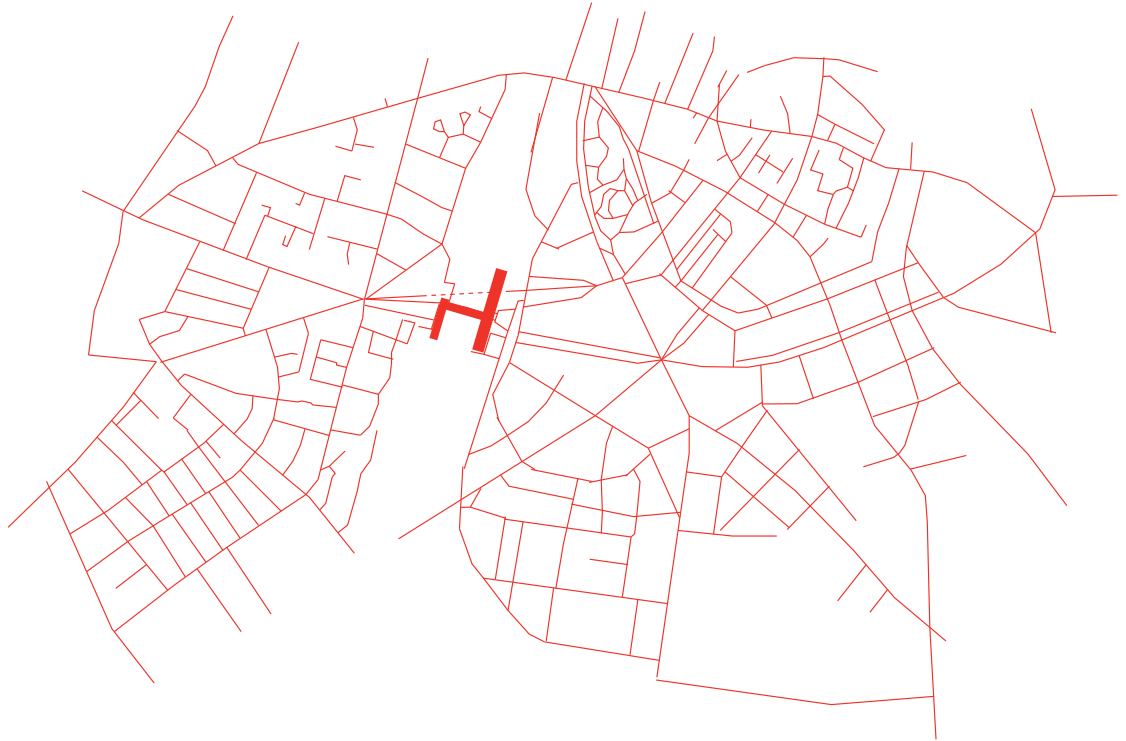


Figure 14.72 Railway station in urban pedestrian network

### Optional activities

#### 2. DIVERSITY

- ✓ Mixed use (more than 2 secondary uses)
- ✓ Human scale (width and height)

#### 3. SAFETY

- ✓ Transparency of the facades
- ✓ Pattern in opening hours

### Optional activities

#### ✓ *Mixed use*

The availability of secondary uses is increased enormously. Both entrance halls have received many square meters for shops, leisure activities and social and business services.

#### ✓ *Human scale*

The human scale of the public interior is based on the recommendations from case study research and the findings of Alexander (1977). Important issue was the spatial perception of the corridor, therefore the form of the corridor is high in the middle and lower on the edges (*figure 14.73*)

#### ✓ *Transparency of the facades*

The facades inside the building are used for a variety of facilities so most of the facades will be transparent to watch the scene.

#### ✓ *Pattern in opening hours*

It is recommended to enlarge the opening hours of the facilities inside the railway station to create an exclusive commercial centre for the city.

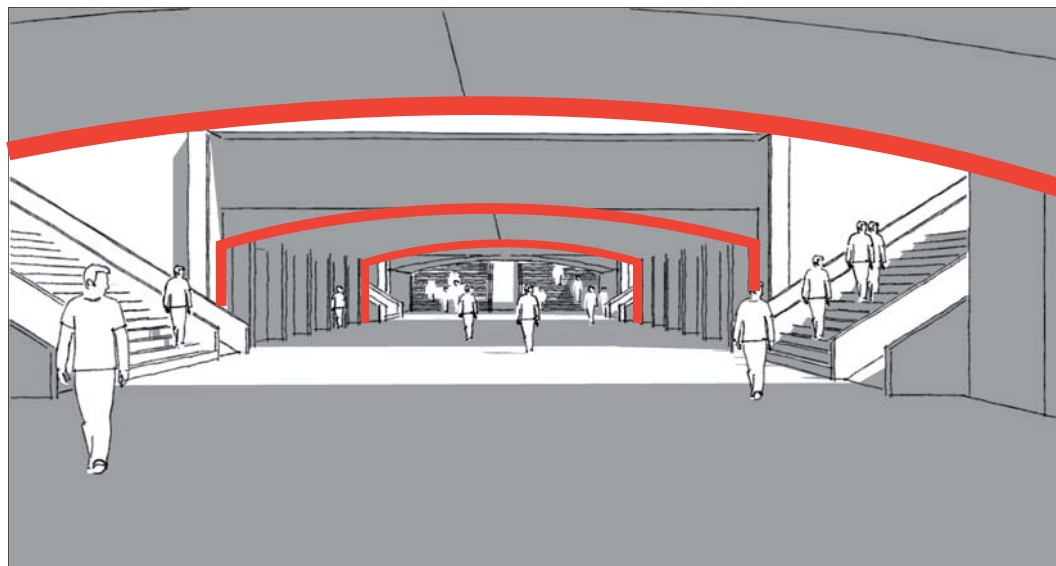


Figure 14.73 Image of the human scale of the corridor

## Social activities

### 4. COMPOSITION

Sitting places (integrated and furniture)

- ✓ Availability of daylight
- ✓ Edge zone

## Social activities

### *Sitting places*

The sitting places inside the building are not designed yet. There are some elements inside which can be used as sitting place, like the winter garden. But it is highly recommendable for the architect to design sitting places.

### *Availability of daylight*

Important quality of the public interior is the incident of daylight. Both the facades on the east and west side are made of glass to provide enough daylight. For the corridor it was hard to design a pleasant and attractive thoroughfare. The incident of daylight below the railway is a difficult but very important issue. Therefore there are made major voids in the roof of the corridor to receive enough daylight (see figure 14.74).

### *Edge zone*

The edge zone of the facades inside the building consists largely of the current facade of the railway station building, which was evaluated as an interesting facade. Furthermore the edges of the towers consists of a covered arcade to create more private areas. The glass facade of the entrance hall is used to stimulate the interaction between indoor and outdoor.

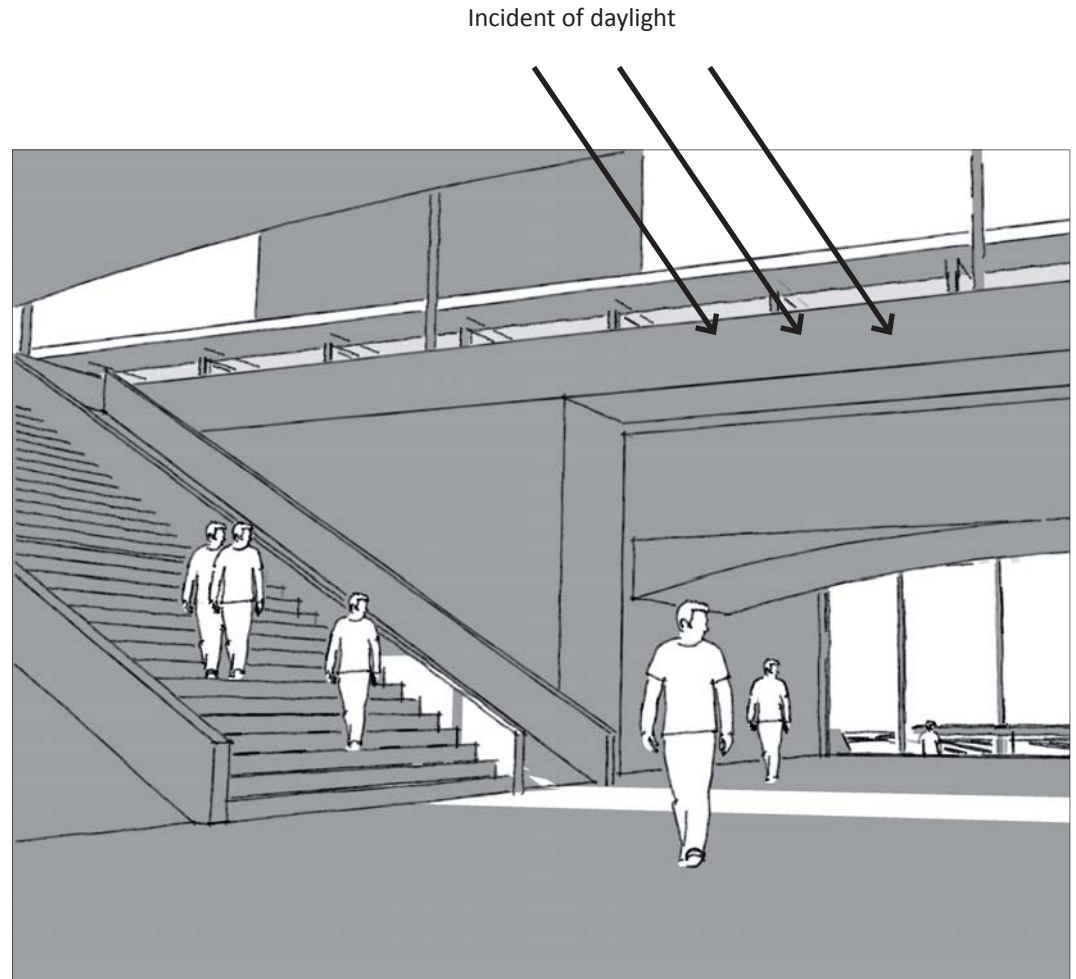


Figure 14.74 Image of the corridor with the incident of daylight

After testing the design following all the elements of the conceptual framework for public space and public interior it can be concluded that almost all the elements are involved in the design.

But what does this mean? The conceptual framework is based on a literature study to the spatial elements that contribute to social activity in public space and public interior. Secondly the conceptual framework is adapted for railway station environments to get an insight in the spatial elements that are needed to stimulate social activity in public space.

So after evaluating the design according this conceptual framework it can be concluded that the design for the railway station contains all the ingredients for a public space and public interior that stimulates social activity.

#### **14.7 What follows?**

As explained in the introduction of this chapter the design gives the best possible solution to improve the accessibility, spatial quality and identity for the railway station environment in Nijmegen. In light of this research project, the design proposal does fit best to the stated problem and defined objective. The chapter explained how the main research question is answered with which design elements.

The following part summarizes the thesis, repeats the main conclusions that are made during this project and make some recommendations for future research and design.





part F

# Conclusions & recommendations

The last part of the thesis gives an answer to the main research question of the graduation project (How can we improve the accessibility, spatial quality and identity of the railway station and its environment in Nijmegen?). To answer this question three sub research questions were formulated. The sub research questions are answered in part B, C and D of this thesis. The findings of the literature study, the analysis of Nijmegen, the case study research and the design form the input for the answer to the main research question. First the graduation project is summarized with all sub conclusions mentioned that contribute to the answer of the main research question. After this recommendations are given for future work and a reflection on the graduation project.

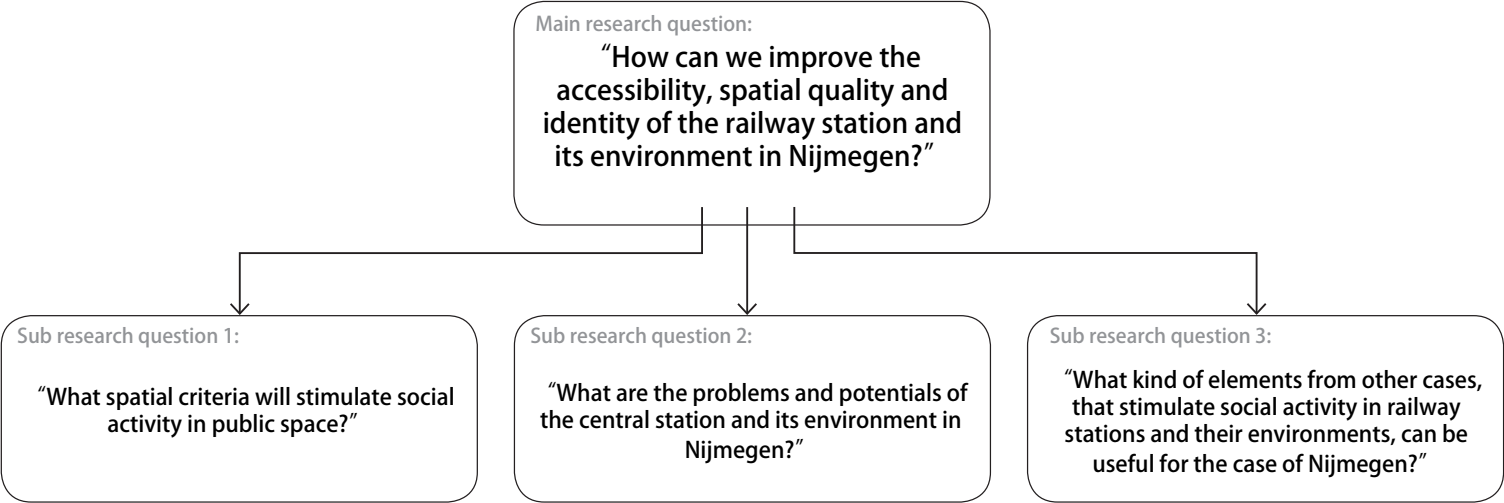


Figure 15.1 Set-up research questions

At the beginning of this thesis it was stated that the accessibility, spatial quality and identity of the public space around many Dutch railway stations is lacking in quality. In many cases the first introduction to the city is when people arrive by train, so the quality of the surrounding environment is an important aspect for the image of the city. The current tendency of the Dutch Railways (NS) to create multifunctional railway stations was a starting point of this project.

During this project it was the objective to find a new type of railway station in such a way that the accessibility, spatial quality and identity of the public space and public interior of the Dutch railway station located at the urban fringe of the historic centre of a medium-sized city would be improved. Nijmegen has been the case for this graduation project as an example for other projects in the future.

The main research question of the graduation project was: *How can we improve the accessibility, spatial quality and identity of the railway station and its environment in Nijmegen?* To answer this question three sub questions were formulated, all discussed in a separate part of this thesis (figure 15.1).

The answer to sub question 1 (*What spatial criteria will stimulate social activity in public space?*) was a list of criteria for social activity in public space and social activity in public interior (figure 15.2). The list was based on a literature research on the relation between the quality of the physical environment and the activity level in public space. The general findings of this literature study were applied to public space and public interior of Dutch railway stations. The main conclusion was that the level of

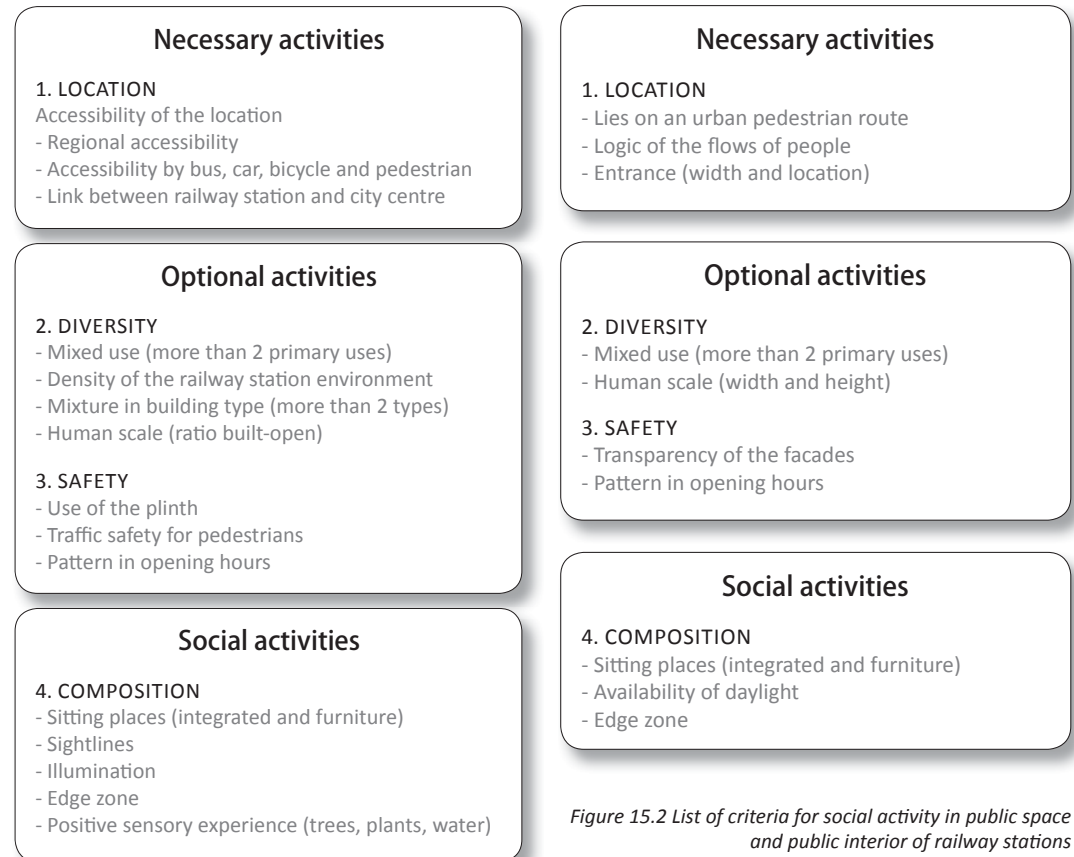


Figure 15.2 List of criteria for social activity in public space and public interior of railway stations

activity is dependent of:

Necessary activities

1. Location

Optional activities

2. Diversity

3. Safety

Social activities

4. Composition

For answering sub question 2 (*What are the problems and potentials of the central station and its environment in Nijmegen?*) the list of criteria is used to evaluate the public space and public interior of the railway station environment in Nijmegen. The list of criteria helped to structure the analysis of Nijmegen and pointed out the most essential aspects to improve in terms of accessibility, spatial quality and identity. Figure 15.3 (next page) demonstrates the main conclusions of the analysis of Nijmegen in light of the accessibility,

# 15 SUMMARY & CONCLUSIONS

spatial quality and identity. The results are used as starting point for a new design proposal in Nijmegen. Making the analysis using the lists of criteria made clear however that there are more elements involved in making a design. Part C of the thesis discussed therefore also the location characteristics of the railway station environment in Nijmegen.

## Accessibility

- West side of the railway is not included in the railway station environment
- Link between railway station and city centre is very weak
- The railway station is not part of the urban pedestrian network

## Spatial quality

- High amount of useless open space
- Relation between built and open space is out of proportion
- West side of the railway has an unilateral building stock
- The availability of several types of primary uses is very weak on both sides of the railway
- The density of the railway station environment is very low
- The size of the thoroughfare in the building is too low and too narrow
- The interaction between public interior and public space is weak
- There are no sitting places available
- There is hardly any relation between the edge zone of the surrounding buildings with public space

## Identity

- The historic and green character of the city is not visible in the railway station environment
- The railway station is no landmark in the city because it is hardly visible

Answering sub question 3 (*What kind of elements from other cases, that stimulate social activity in railway stations and their environments, can be useful for the case of Nijmegen?*) helped to define a design concept for the railway station environment of Nijmegen with help of studying other cases. Three comparable cases are analyzed and compared using the list of criteria for public space and public interior. The outcomes are used to define the guidelines for the design of a railway station environment. The three cases that are used as examples are Leiden, Den Bosch and Amersfoort (see *figure 15.4 - 15.6*).

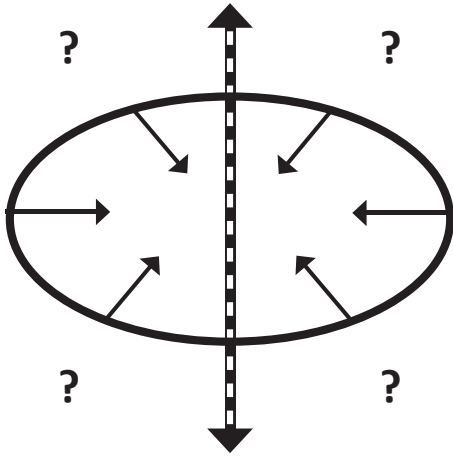
The results of the three sub research questions helped to define a clear design concept for the railway station environment in Nijmegen. However for making a reliable urban design for the railway station environment of Nijmegen a convincing view is required. Many aspects are important for making a design proposal which are not included in the conceptual framework.



*Figure 15.3 Summary main conclusions analysis public space and public interior railway station environment in Nijmegen*

*Figure 15.4 - 15.6 Railway station of Leiden, Den Bosch and Amersfoort (photos made by author)*

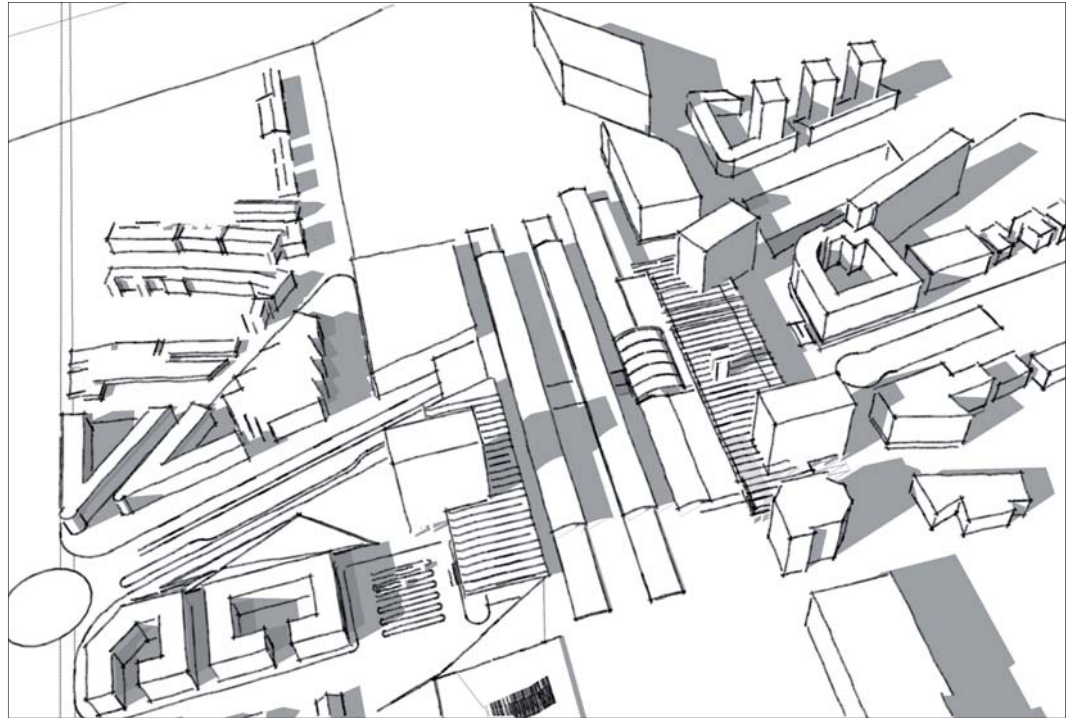
The design process figured out that the supposed concept of a railway station as multifunctional building with all facilities accommodated inside one complex does not contribute to the spatial quality of the surrounding public space. The building complex absorbs all the activity and puts the focus of the activity in the core of the building (see *figure 15.7*).



*Figure 15.7 Railway station with the emphasis in the core of the building*

There is not enough demand for facilities to feed the surrounding environment. Because the objective of this graduation project is to improve the spatial quality of the surrounding environment, a new type of building complex is suggested. The idea of the Dutch Railways (NS) to create a multifunctional railway station where working, living, traveling and relaxing is combined is therefore not recommendable.

The main research question asked for an improved accessibility, spatial quality and identity of the railway station environment in Nijmegen. *Figure 15.8* presents an image of the result of this research project



*Figure 15.8 Image of the result of the design for the railway station environment in Nijmegen*



## 15 SUMMARY & CONCLUSIONS

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After studying the literature, location and comparable cases it can be concluded that the answer to the main research question is as follows:

### **Accessibility**

The accessibility of the railway station environment is improved by including Nijmegen West in the railway station environment .

A new railway station on the west side of the railway, linked through a new designed corridor, makes a connection between both sides of the railway and therefore improve the accessibility of the railway station in the city.

Furthermore the transport system is upgraded. A new HOV (rapid bus system) is introduced to improve the accessibility of the various parts of the city with the railway station. For the east side of Nijmegen this has resulted in a tram which connects the city centre with the university campus via the railway station.

A rapid bus is introduced on the west side of the railway to improve the accessibility of the new Waalfront area, with Nijmegen Lent and Dukenburg via the railway station.

### **Spatial quality**

The spatial quality of the railway station environment is improved by adding a public interior on both sided with a variety of functions. The public interior will be most of the time accessible for everyone and accommodates several places with different objectives. It forms the transition zone and link between the surrounding public space and the public interior of the current railway station building.

Furthermore the surrounding public space is designed for pedestrians, the activity level

on ground floor is very important to improve the liveliness of the area and to improve the relation between indoor and outdoor.

Finally the availability of design details is improved in the design. Places to sit and stay are created which will stimulate the use of the area.

### **Identity**

The identity of the railway station environment of Nijmegen is improved by having attention for the genius loci. Which means that the historic meaning of the location played an important role in the design.

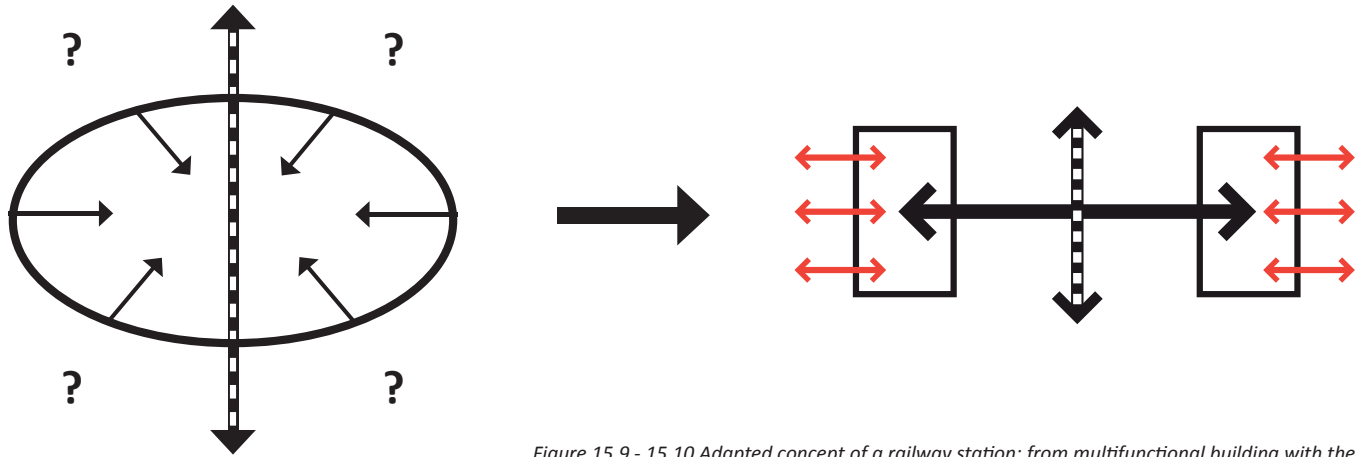
The current historic character of the location is improved by adding a new 'layer' to the railway station building. Also the meaning of the characteristic formal ax (Van Schaeck Mathonsingel) is recovered by giving it a new function as kiss&ride and taxi stop.

Furthermore the identity of the railway station is strengthened by adding recognizable objects on both sides of the railway, three new towers function as landmarks in the city.

### **In general**

The concept for a new railway station at the urban fringe of the historic city centre of a medium-sized city is adapted from a multifunctional building where all the facilities are accommodated inside the building (see *figure 15.9*) to a multifunctional environment where the railway station is an essential link between both sides of the railway (see *figure 15.10*). The relation between the public interior and surrounding public space is an important aspect for the liveliness of the area on ground floor which is essential for the spatial quality of

the surrounding environment. Therefore the emphasis in terms of facilities lies on the wings of both sides of the building.



*Figure 15.9 - 15.10 Adapted concept of a railway station: from multifunctional building with the emphasis in the core to multifunctional environment with the emphasis in the relation between the public space and public interior along the wings*

## 16 RECOMMENDATIONS

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The result of this thesis can be summarized in the following products:

- A list of criteria for designing public space around the railway station;
- A list of criteria for designing public interior inside the railway station;
- A new concept for a railway station on the urban fringe of the historic centre of a medium-sized city;
- An elaborated design proposal based on this new concept.

In the introduction is mentioned that the accessibility, spatial quality and identity of the railway station environment should be improved. The end products have all helped to do so. First of all the end products are discussed shortly, after which the main design solution is reflected.

For the list of criteria for social activity in public space and public interior it is recommended to use it as a guideline during the design process. The list of criteria is not meant to use as a validation tool for your design, because for making a reliable urban design many other aspects are required that are not included in the conceptual framework.

The list of criteria says little about the quality of the individual elements. For example the criterion sitting places is included because it is important to have sitting places in public space to stimulate social activity. But the criterion is not about the amount of sitting places but more about the quality of the sitting place, which is based on the location, material, composition and so on. So the list is a guideline for design elements that are necessary to stimulate social activity and not a design solution for social

activity in public space. The elements are in general not quantitative.

Furthermore the list of criteria is based on a literature study to social activity in 'regular' public space. During the project the list is adapted to the public space around the railway station. These adaption's are made based on the study to many different cases. It is recommended to search for more specific literature to refine the list and make it more useful. The same goes for the list of criteria for social activity in 'regular' public interior.

This graduation project searched for a new concept for the Dutch railway station and its environment in Nijmegen. The process of this project is explained as research by design. Testing design solutions and pointing out elements for research which resulted again in design recommendations has been the general way of working.

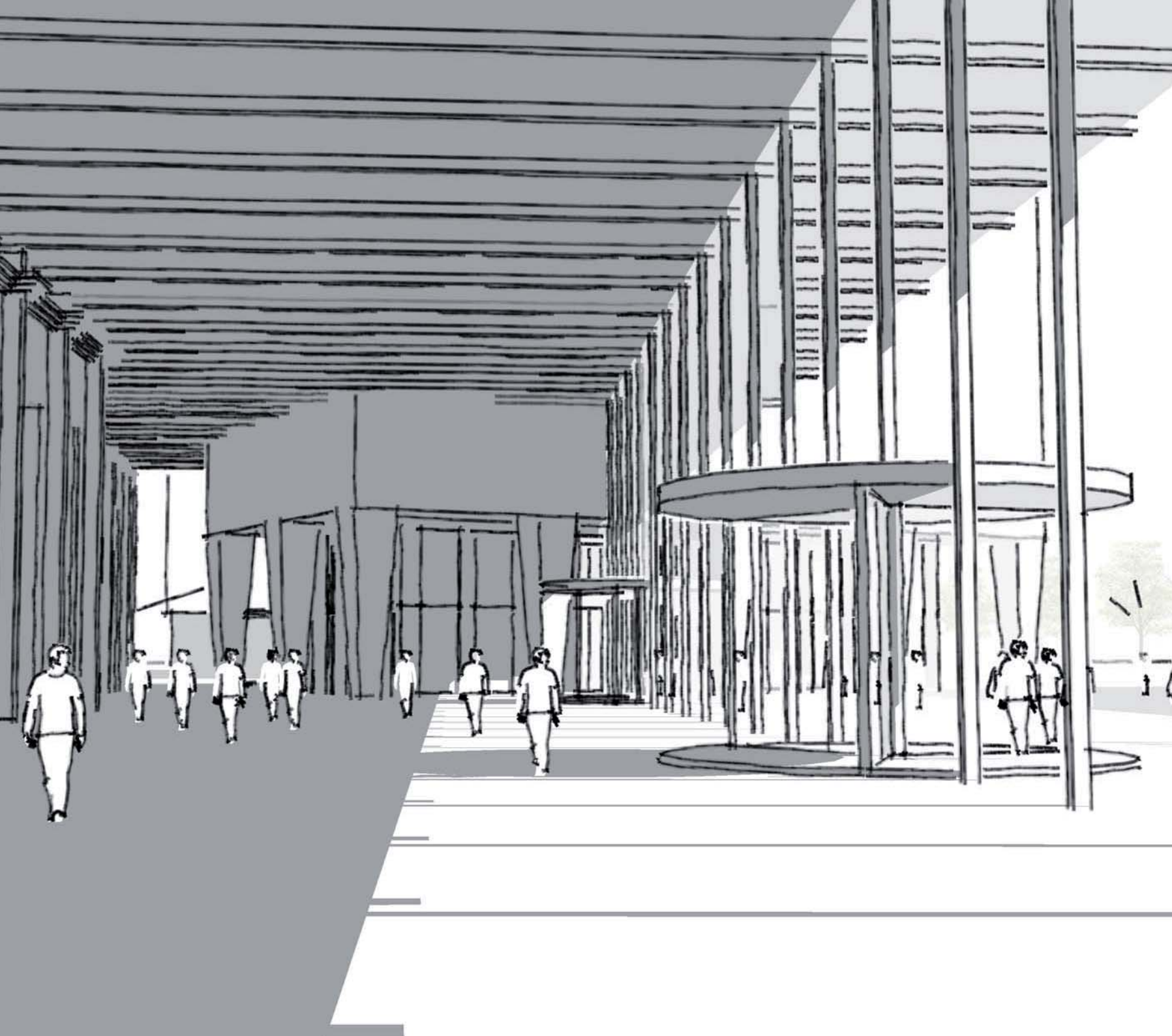
As explained in chapter 13 Design process, there have been done several design proposals during this project. At first the aim of the graduation project was to improve the accessibility, spatial quality and identity of the railway station environment of Nijmegen by making a multifunctional railway station building with all the various facilities accommodated inside the building. The emphasis of the use of the public domain was in the core of the building. The idea of this multifunctional building is based on the vision of the Dutch Railways (NS) about the 'railway stations of the future' (NS, 2010). The NS suggest to make buildings where living, working, traveling and relaxing go hand in hand with one another.

The first design proposal was based on this idea

of the multifunctional building. As explained in the chapter conclusions (h15) one of the main conclusions of this graduation project is that the railway station as multifunctional building does not contribute to the spatial quality of the surrounding public space. The final design proposal has proved that a multifunctional railway station environment with the railway station as link between both sides does contribute to the spatial quality of the public space in Nijmegen.

The graduation project had a clear focus on a specific type of railway station: the railway station located at the urban fringe of the historic centre of a medium-sized Dutch city. The main case has been Nijmegen as an example of a railway station where the accessibility, spatial quality and identity is lacking.

It is recommended however to test this concept on comparable railway station environments in the Netherlands. The results can be useful to strengthen the conceptual idea and to work on a better railway station environment for the city where the accessibility, spatial quality and identity are obvious elements. Then the railway station can become an attractive and lively part of the city again!







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