Design research to the integration of Stedenbaan / Transit-Oriented Development in local urban regeneration areas

Case: Oude Lijn Leiden region

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Preface

This report is the final product of my graduation project of the study Urbanism at the Faculty of Architecture of Delft University of Technology: “New Life for the Old Line”, a design research to the integration of the regional transportation and urbanization programme of Stedenbaan Zuidvleugel in local urban areas, in this case the area along the Oude Lijn (“Old Line”) railway in Leiden.

The project is made in the framework of the Urban Regeneration graduation studio, which is concerned with the planning and design related to the regeneration of urban areas in the context of the processes that lead to the transformation of cities.

Stedenbaan is the Dutch variant of the strategy of dealing with growing mobility and urban development issues by the regional planning of spatial developments along (high-quality) public transport lines in existing urban areas, which is generally recognized as being sustainable. Qualifying aspect of this strategy is the focus on the quality of the total regional network as a condition for a cohesive regional Network City, in this case the (Southern part of) Randstad Holland.

The motivation of this study was partly based on personal experiences. Considering the fact that I currently live and work in Leiden, I have studied in The Hague, Rotterdam and Delft, I have had an internship in Voorburg, I sometimes shop or go out in the Hague and occasionally in Rotterdam, Amsterdam or Utrecht, I realized that I am really having a Network City lifestyle. I also realized that most of these movements have been taken place along one single railway corridor: the Oude Lijn railway.

Through the years I also witnessed the increase of passengers, capacity problems and the resulting overcrowded trains. Together with growing annoyance caused by delays, missed connections, the awkward changing of modes and so on, it was clear that the system and its material did not meet the needs of the market anymore. Due to the unreliability of the public transport I sometimes even drove to Delft by car in spite of probable congestion problems. In my opinion, ambitious programmes like Stedenbaan are very hopeful signs for a future in which we are able to meet our mobility and urban development needs in a responsible, sustainable way.

First I would like to thank my mentors Frank, Remon and René, who have been guiding and shaping the project and myself during the process. Also many thanks to my fellow members (students and teachers) of the Urban Regeneration studio who have contributed with discussions and comments and, last but not least, to my dear family and friends, for their mental support and especially their everlasting patience with me.

Maarten Tjon Sie Fat,
Leiden, October 2008
Summary

Introduction

Because of its polycentric organization the system of the urban network of Randstad Holland is very much dependent on the connecting infrastructure lines between the sub agglomerations and urban centres. The use and efficiency of the infrastructure network has been the subject for debate for the last years, resulting in programs that consider strategies related to the American theory of Transit-Oriented Development, which refers to a regional network of higher density, mixed-use, living environments centred around public transport stops, to be one of the possible answers to the rising mobility and urbanisation problems, which are considered a major threat to the international competitive position of the Randstad. The Stedenbaan project in the southern part of Randstad Holland (Zuidvleugel) that deals with this issue, is about the improvement of the regional public transport system by ‘regionalizing’ existing national railway corridors with spatial developments along the network, which would have to add to the realisation of a single cohesive metropolitan area with a heightened level of interaction between functions. (Atelier Zuidvleugel 2006)

Because of the fact that in many cases these lines run through existing built environments, the main focus of the developments will be in the framework of restructuring and transformation, which can be seen as the motive for this study.

In this context, local neighbourhoods in the vicinity of railway infrastructure are going to be confronted with the regional scale if a new station will be realised together with a Transit-Oriented Development related strategy.

In addition, the perspective of the large infrastructure within the city, often considered as physical and psychological barriers between city districts and exceptional elements in the urban tissue, will change.

Research questions

The main research questions of this thesis are:

- Can a regional programme as Stedenbaan, based on the principles of Transit-Oriented Development, be deployed for local urban regeneration?
- How should we treat infrastructure barriers within this context?

Approach

The study consists of two main parts: A ‘Body of Knowledge’, which consists of a theoretical framework and a documentation of the location-specific context (Atlas) and an implementation of its outcomes in a design case.

The theoretical framework consists of a reflection on the existing theories and on Transit-Oriented Development and Stedenbaan and their backgrounds.

Design Case

The design case is about the Oude Lijn (“Old Line”) railway through the Leiden region, which will be used to host the Stedenbaan system, and the potential new station area of Leiden De Mors, of which it is mentioned to be realised in the period after 2020. Its location on a crossing of roads, waterways and railroads already provide enough complexity for a single design case. The Stedenbaan conditions will only add more complexity to this.
Local vs. regional: Neighbourhoods facing Transit-Oriented Development strategy

As mentioned, neighbourhoods in the vicinity of railway infrastructure are going to be confronted with the regional scale if a new station will be realised together with a Transit-Oriented Development related strategy. In these cases, an active interaction between the regional overall ambitions and possible and desirable implications at the local scale is important to gain a balanced end result. The dual character of station areas as being nodes and places, provide these areas great potentials for playing an important role within and in between networks on different scales levels. This potential can be exploited to the most if these areas are seen in the framework of a complementary network. TOD has the ambition to play an important role in communities in which the creation of place is one most important conditions. The design and planning of station areas as both local and regional places is therefore a qualifying aspect. Spatial-functional, spatial-physical and social scale differences are important themes within this framework. The dominance of economic driving forces at station development processes could be a serious threat for existing social structures and the success of TOD. Broad public and private support, awareness and understanding of each other’s interests is essential for the parties involved. An important aspect is also the changing meaning of the areas adjacent to the railways from back side to front side of the city. Spatial attention is required to the spatial-functional transitions and relationships between existing local centralities and the new local-regional centrality around the station.

Stedenbaan conditions for the realization of the project on the local scale level

Stedenbaan will have to become an essential part of a cohesive Zuidvleugel metropolitan area with a heightened level of interaction between functions. (Atelier Zuidvleugel 2006) The regional scale is guiding in the planning and realisation of Stedenbaan, but the strength of the Zuidvleugel is mainly because of its diversity in local qualities. Previous Stedenbaan studies already started to think of the Zuidvleugel in terms of networks and relationships, but the most recent concrete agreements primarily relate to the position of Stedenbaan within the transportation networks. Stedenbaan does not clearly acknowledge the importance of the place-aspect as basic condition for its station areas, while Transit-Oriented Development principally does. It is a condition that clarifies what is expected from such areas. The lack of such a vision keeps a clear gap between what is regionally expected and locally possible or desirable. Because the responsibility for the planning and realisation is designated to the local authorities there is a need for a clear position-taking on the way Stedenbaan should be implemented on the local scale. Conditions for the local implementation of Stedenbaan should therefore partially be derived from overall visions for the Randstad and Zuidvleugel, which Stedenbaan is part of. It places decisions in a wider perspective, which asks for high quality standards. The greatest strength of the Randstad is the diverse character, which has to be increased with the strategy of creating more diverse and
high-quality urban living environments. The desired heightened level of interaction between functions sets conditions for the station areas to act as nodes between local and regional places. The focus should be on connecting local qualities with at least regional allure that are able to represent what Zuidvleugel and Randstad are all about.

Towards a Stedenbaan station area
If it comes to the design and planning of the station area, Stedenbaan is not much explicit in comparison with theories on Transit-Oriented Development. The focus is very much on the transportation aspects. (node-aspect) It is important to acknowledge that possibilities to restructure or transform areas in the direct station surroundings will be critical. A location with more possibilities for restructuring within walking distance shall eventually provide better conditions for a well-functioning station area. A core area of a 250 to 300 metre radius around the station entrances, which represents a 5 minute walk, could be used as primary stop service area. From this core area most of the profit can be made. At station areas, also the place aspect is very important, at which the slow-traffic (especially the pedestrian) has priority and a convenient place-quality has to be provided. Recurring themes are social and traffic safety, place quality, efficiency and comfort. In this, the routing from and to the station needs special attention. The design and layout of the station itself will also be influencing the functioning of the station environment.

Integration of infrastructure and transportation in the city
Reference studies to local station areas in Berlin (Stadtbahn, Hackescher Markt) and the Rotterdam region (Capelle, Spijkenisse) showed the importance of place-making as a strategy to integrate station areas, the transportation systems they connect including its infrastructure, in the city. By considering a station area as a qualitative place with sufficient choices in activities and living environments, initial problems as scale differences and spatial-functional barrier effects could be overcome.

On the scale of the station area it is more about people than about transit, which makes it might even be better to speak about people-oriented development and design rather than Transit-Oriented Development.

Urban design principles
As a generic conclusion of what Stedenbaan means for the urban design and planning task at multiple local scale levels, an overview of the urban design and planning instruments for the approach of Stedenbaan/transit-oriented development at local scale that have been identified during the process, has been made.

Network quality
Randstad/Zuidvleugel and Stedenbaan is about thinking in terms of networks. First in terms of the transportation networks, but also thinking in which other spatial-functional relationships Stedenbaan could be having with its surroundings.

Efficient land use
Stedenbaan aims at intensified land use around the stations. At city and district scale this means getting an overview of existing land use patterns in the Stedenbaan service area and the way they relate and should relate to the Stedenbaan product.
Diversity of special living environments
Stedenbaan is part of the strategy of increasing the competitive position of the Randstad, which strength is characterized by its diversity. The diversity has to be expressed on different scales, not only on the Randstad/Zuidvleugel scale, but also within the specific agglomeration and further on within districts and station areas.

Experience of the city
Stedenbaan has to gain a permanent position in the structure and activity networks of the Zuidvleugel. Stedenbaan symbolizes a change in the use of the existing railway network and its relationship with its surroundings. It therefore needs a distinct character, focused on its central location in the urban areas, which should be different from the character of the parallel motorway networks along the edges of the urban areas. It is important to experience going through the city instead of passing along.

Principles at different scales
At a city scale, the focus has to be on finding local ingredients with at least regional allure that can be connected to the Stedenbaan network, to express the quality of the local diversity of the Zuidvleugel and Stedenbaan networks. It is also about defining the urban dynamics that could support or be supported by Stedenbaan.

Also the experience / perception of Stedenbaan and the urban area has to be noticed. Conditions have to be shaped which could attract Stedenbaan passengers to make use of the diverse qualities of the local station areas. Stedenbaan has to be considered in the framework of the total accessibility of the Zuidvleugel, which also involves local accessibility. At city scale it means getting comprehension of the quality of the local transportation networks and the possibility for Stedenbaan to connect to this.

At a district scale the focus has to be on shaping conditions that strengthen the reach and position of the station area, which, in its turn, should strengthen the Stedenbaan product. From the transportation point of view, it means giving special attention to sustainable transport modes as walking and cycling. At this scale, the focus has to be on creating direct bicycle routes to the station area. It also means defining the limitations of the urban structure, especially barriers, that are threats to the efficient use and accessibility of the station area. For Stedenbaan/TOD the core (R=300m) around the station is essential. At this scale the local networks also have to be determined that could be connected to the regional networks provided by Stedenbaan.

At a station area scale, the quality of the station surroundings is essential. The focus has to be on the quality as being as node in transportation networks as well as its place quality (place-making).

It is about creating an attractive, walkable, people-oriented mixed-use environment, in which the station itself forms an integral part. Next to the basic conditions for a good station area like comfort, safety, efficiency and legibility, Stedenbaan/TOD require an active role for the core station area within the local community networks and the connection to the regional scale. This requires a view how to deal with scale differences and side effects that would occur with the realisation of the station.
A blueprint for the ultimate station area simply does not exist, nor does it for a Stedenbaan station area. It all depends on the location-specific characteristics, which should be employed to provide this station area type with identity to distinguish itself from other station areas in the network.

Conclusions and recommendations

Under certain conditions, Stedenbaan can be deployed for local urban regeneration.

As a primarily spatial development programme, Stedenbaan itself cannot be used to solve local social problems and issues. Local actors have to ensure that social needs are being taken into account.

Interaction between the regional overall ambitions and possible and desirable implications at the local scale is important to gain a balanced end result.

At locations where it is possible, a new orientation towards the public transportation network could be used to provide the urban structure with new dimensions. Areas that are to be regenerated in this way could obtain a new position within local and regional networks.

In cases where a Stedenbaan station area is able to really fulfil a central role within its surroundings, it can be a starting point for local urban regeneration, but the direct station surroundings have to offer sufficient development opportunities, especially within a radius of 300 metres around the station. Designing and planning a Stedenbaan station area as being a place is essential to attract people and to create a centre of activities.

There are certain conditions that should be acknowledged:
First, Stedenbaan has to take a clear position in what should be accomplished with the local station area (re)developments. In its current

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Design of the Leiden case

The city scale vision concentrated on defining and connecting local qualities to Stedenbaan, the experience of the railway zone as new urban centrality and front side of the city and the search for a large meaning for Stedenbaan in regional and local networks.

The design task has made it clear that an integral approach of the railway zone can indeed be of value to the spatial-functional relationship between city and railway line. An approach focused on one complete partial section provides opportunities for an urban area to present and position itself as being coherent under a Zuidvleugel/Randstad umbrella.

The station areas are obviously the key elements of Stedenbaan, but a decreased distance between stops provide less possibilities for former intermediate zones to be neglected.

For the design of the Stedenbaan station area at Leiden De Mors the focus was primarily on the balance between place and node, the relationship between old and new centralities and the realisation of compact and diverse urban living conditions in a higher building density.

Also without a Stedenbaan station the location offered more than enough starting points for a spatial design task, which provided it with more body, but also more complexity.

The final result differs rather radically from the current situation, especially in relation to the spatial and programmatic intensification of land use that has been established, which resulted in the transformation of a rather ordinary residential neighbourhood and a little attractive industrial site into a district with Randstad quality with a distinguishing local identity.
New Life for the Old Line

Spatial-functional transitions and relationships between existing local centralities and the new local-regional centrality around the station. The success of Stedenbaan depends on the relationship between three components: The public transport product, the area around the stops and the quality of the networks that are connected to this area.

**Barrier effects**

(Infrastructure) barriers could limit the service area of a station area, which is negative for the accessibility and use of the transportation product. To increase the reach of the area it is important to decrease the spatial-functional and psychological limitations of barriers. Place-making is an important strategy to integrate station areas, the transportation systems, and its infrastructure, in the city. By considering a station area as a qualitative place, initial problems as scale differences and spatial-functional barrier effects could be overcome.

Local actors should be made aware of the fact that Stedenbaan is part of an extensive strategy to increase the international competitive position of the Randstad as a whole. It should be emphasized that local qualities are the main ingredients for Stedenbaan and an active participation of local actors is very important.

Possible future regeneration areas (past 2020) should be part of planning process in an early stage. To make sure Stedenbaan will be able to add value to the local urban regeneration programmes of tomorrow, these areas should already be defined and explored.

As Stedenbaan aims to gain a permanent place in existing urban networks and to become the backbone of the Zuidvleugel the change it stands for and the importance of the spatial scale it connects to have to be emphasized thoroughly. A spatial attention is required to the...
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Introduction to the study

Part I.
1 Introduction

1.1 Motivation & backgrounds

The perspective of the public transport system as the backbone of spatial developments has been a hot topic in issues concerning the relationship between mobility and urbanisation over the past decade.

Although connecting spatial developments to public transport routes cannot be seen as a complete new urbanisation strategy, the remarkable success of recent developments in the car-loving United States that used a more integral approach from broader visions for a sustainable future shed new light on this issue. Started as a possible answer to the notorious urban sprawl, this urbanisation concept is known as Transit-Oriented Development (TOD). (Calthorpe 1993; Dittmar & Ohland 2004)

In brief, TOD refers to a regional network of higher density, mixed-use, human-scaled living environments centred around public transport stops in which development and exploitation of public transportation and urban uses are combined.

TOD should be viewed in a broader historical and theoretical framework. Transportation modes have always been influencing the structure of urban areas. Until the Industrial Revolution cities were mainly built for pedestrians and because of their limited reach, these urban areas remained compact. First informal suburbanisation patterns came with the first public transportation modes as the horse cars and trams that connected the cities with their surroundings. Howard’s Garden City model was the first urbanisation model that used public transportation to structure urban growth with the planning of self-sufficient human-scaled communities in rural areas with a direct railway connection to the main city. (Howard 1902)

As reaction to 20th century auto-oriented society with unlimited urban sprawl, this model was followed by town planning concepts as the Copenhagen ‘Finger Plan’ (1947) which regulated urban growth along transportation corridors (both motorways and railroads), which was also applied in other European cities like Stockholm and Amsterdam. The 1970’s Dutch “groeikernen” policy, in which existing towns or villages were
designated to become satellite towns of nearby cities, resulted in some examples of towns (Zoetermeer, Houten, Spijkenisse) with good access to high quality public transportation. Especially Houten is famous for its urban structure which stimulates people to travel by bike and train. In the last decades there is increasing interest in the redevelopment of station areas, especially in the main nodes in the public transportation networks. In the Netherlands this is often referred to as “knooppuntontwikkeling” (transport node development).

In relation to these previous developments, Transit-Oriented Development is different because it relates to the total regional network and because it encourages compact mixed-use urban growth, especially within existing urban areas.

In Europe, urbanisation strategies related to TOD have started to evolve since the last decade. In the United Kingdom the concept of the Transport Development Area (TDA) is being developed for a number of years now. (Hine et al. 2002)

In the Netherlands, especially in the Randstad, the use and efficiency of the infrastructure network has been the subject for debate for the last years, resulting in some programs that consider TOD to be one of the possible answers to rising mobility and urbanisation problems.

The existing (heavy) railway infrastructure lines are considered to be the main hosts of these developments. Because of the fact that these lines in many cases run through existing built environments, the main focus of the developments will be in the framework of restructuring and transformation. The Stedenbaan project in the southern part of Randstad Holland (Zuidvleugel) that deals with this issue, is about the improvement of the regional public transport system by ‘regionalizing’ existing national railway corridors with spatial developments along the network, which would have to add to the realisation of a single cohesive metropolitan area with a heightened level of interaction between functions. (Atelier Zuidvleugel 2006)

This strategy can be seen as the motive for this study.
1.2 Problem field

The use of existing rail infrastructure through existing urban environments to host a new regional oriented public transport product faces many complexities.

Most means of transport have certain characteristics that are better suited to particular circumstances and they will function relatively badly under other spatial circumstances. (Rooij 2005:343) Major (inter)national or interregional rail connections need solid grounds to carry the heavy rail traffic and grade separated junctions to avoid confrontations with other traffic.

Large infrastructures through urban areas consume excessive amount of space while only serving a relatively small area. The indirect claims on space are often several times larger than the direct. (Van der Hoeven 2001:165) Because of this, large infrastructures like these are often considered as physical and psychological barriers between areas on the local scale.

Taking the most probable changes of the transportation networks as the contextual background, the meaning of the infrastructure for the local urban environments will change. Physical connections to the regional public transport network (possibility of new stations) will have consequences for the adjacent districts and neighbourhoods that will be confronted with the regional scale level.

The nature of these consequences will strengthen the relationship between the city and the railway track on a functional-spatial level. The interregional character will shift towards a more intraregional identity, which in a physical-spatial sense leads to the hypothesis that the railway through the city should change into a railway that is more part of the city, as an urban railway.

From the local point of view this will change the perspective of a structure that was always considered as an exceptional element in the urban tissue, but in spatial sense this will not
immediately be the case. The presence of this gap can be seen as the most important task and opportunity to add an extra dimension to the way the infrastructure and its surroundings are positioned inside the urban fabric.

Research questions
The main research questions of this thesis are:

- Can a regional programme as Stedenbaan, based on the principles of Transit-Oriented Development, be deployed for local urban regeneration?
- How should we treat infrastructure barriers within this context?

To be able to answer the main research questions, it is important to understand:

- What are qualifying aspects for the approach of existing neighbourhoods in the vicinity of railway infrastructure that will be confronted with the regional scale due to the use of a TOD related strategy?
- Which conditions are set by the region oriented Stedenbaan project for the realisation of the project on the local scale level?

- What instruments are available to reduce the experience of barrier effects of rail infrastructure urban areas? In which situations are they applicable?
- What instruments have been used in Dutch projects, similar to TOD, to connect the different scales and to integrate the infrastructure in the urban fabric?

In this document these questions are referred to as ‘operational questions’.

1.3 Ambitions and objectives
The main objective of this study is to provide guidelines and recommendations for the approach of Transit-Oriented Development programmes as Stedenbaan in existing urban fabric and the way existing railway infrastructure can be used. The study has to add to the overall knowledge of the implementation of these regional programmes on the local scales and what this means for urban regeneration programmes and urbanism in general.

Hypothesis
An integral approach of a Transit-Oriented Development programme and the reduction of spatial barrier effects will have greater results than the sum of the parts.
Body of Knowledge

MOTIVATION

PROBLEMFIELD

Main RQ

Evaluation

THEORETICAL FRAMEWORK

- TOD
  - TOD Practice
  - Stedenbaan
    - Barrier effects
      & Local integration

PAPER

- REF STUDY

REVIEW

DESIGN RECOMMENDATIONS

ATLAS

LINE - URBAN FORM - LANDSCAPE

Station locations

Socio-economic structure
Policies plans

DESIGN GOALS LOCATION

DESIGN

Masterplan Railwayzone - transformation scheme
Strategic design location - station area

Fig. 1-4: Scheme study structure (Tjon Sie Fat 2008)
1.4 Methods and approach

Approach
Figure 1.4 shows the structure of this study, which has been written down in the study plan. (Tjon Sie Fat 2008)
The study consists of two main parts: A 'Body of Knowledge', which consists of a theoretical framework and a documentation of the location-specific context (Atlas) and an implementation of its outcomes in a design case.
The theoretical framework consists of a reflection on the existing theories and on Transit-Oriented Development and Stedenbaan and their backgrounds.

Although the scheme might show a pretty linear process, design related research is everything but that: the parts are very much interrelated and are constantly alternating with each other during the study.
There is also much interaction within the subparts: In the body of knowledge for example, outcomes of the theoretical study have set boundaries for the aspects to were analyzed and documented in the Atlas. The other way around, the already designated project location and its characteristics limit the theoretical framework.

At some moments during this process, additional knowledge was needed, especially on the way Transit-Oriented Development and station area (re)development issues have been implemented in practice.

Starting points
The railway line as connector, generator and object
The problem description and the main research questions already emphasized the dual character of the railway infrastructure in this project. For the approach of the study it was needed to distinguish several functions or appearances of the railway line:

- The line as a connecting element that provides accessibility
- The line as a driving force for urbanisation along the network
- The line as a spatial element in the urban tissue

The first two form the essence of Transit-Oriented Development strategies as Stedenbaan...
and is referred to as the ‘dual-purpose strategy’ (Atelier Zuidvleugel 2006).

The third has to do with its presence as a physical object in the city space, what refers to the experience of the object itself and how it relates to the city and the operations within the city. As an object above ground level, it also has to with the way the city is experienced from the outside. The line as an object has a mutual relationship with the organization of the (underlying) landscape and the development and organization of the surrounding urban tissue.

**Randstad: Urban network / Network City?**

The Dutch National Spatial Strategy of 2006 designates six national urban networks, of which Randstad Holland (the western part of The Netherlands) is the largest and most important. The objective in the National Spatial Strategy for this area is to strengthen its international competitive position. (Ministerie van VROM 2004)

In this National Spatial Strategy, Randstad Holland is subdivided into three economic core areas: Noordvleugel (literally ‘North wing’, the northern part of the Randstad), Zuidvleugel (literally ‘South wing’, the southern part of the Randstad) and Utrecht region.

The subdivision of the Randstad in ‘wings’ is partly because of operational reasons, but also because of the activity patterns of people for which the ‘wing’ is the highest relevant scale (Zonneveld & Verwest 2005).

Thinking in urban networks is about thinking in terms of relationships and activity patterns of people. According to Castells (Castells 1996) it is about ‘space of places’ (the physical world) and ‘space of flows’, in which the combination and interaction between places and flows would be crucial.

Because of its polycentric organization the system of the urban network of the Randstad is very much depending on the connecting infrastructure lines in between the sub agglomerations and urban centres. In the Network City terms these infrastructure lines provide the physical conditions for the flows and related to rail infrastructure, station areas are the link between the flows and the places.

The fact that the Zuidvleugel is aiming to develop into single cohesive metropolitan area with a heightened level of interaction between functions, in which Stedenbaan has to play an active role (Atelier Zuidvleugel

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**Fig. 1-7:** Leiden region in the Zuidvleugel

**Fig. 1-8:** Research area within the Leiden region
2006) emphasises the importance of including the theory of networks into this study.

**Design case: Oude Lijn Leiden/Leiden De Mors**

For the design case, it was important to seek for a location that had some qualifying conditions: First, the location had to be part of the Stedenbaan programme and because of the focus on urban regeneration, it had to be located within an existing urban area. For the design case on the scale of the station area surroundings, potential ‘strategicness’ and complexity have been important criteria. It was also important that the location would provide sufficient possibilities for changes.

The case of the Oude Lijn (Old Line) railroad through the Leiden region was able to meet most of these conditions.

**Brief introduction to the Leiden case**

The track through the Leiden region is part of the Amsterdam-Rotterdam railway line (Oude Lijn / “Old Line”), the oldest of the Netherlands. In most cases including Leiden the railway track was built just outside the historic city centre, but nowadays the built environment now surrounds almost 7 kilometres of the line. In the near future, the line will partly be used to host the Stedenbaan system. In previous explorations on the spatial potentials of the Stedenbaan product two or three extra stops have been mentioned, next to two existing stations in this area. (Atelier Zuidvleugel 2006; Urban Unlimited 2005)

As a spatial object, the railway track causes functional and psychological barriers in the city, strengthened by other (infra) structure very close to the line like the Old Rhine River. Besides this, the complete inner city route is situated on a dike at a higher level compared to the ground level.

**Strategic design location: Leiden De Mors**

In previous studies, Leiden De Mors has been mentioned as potential new Stedenbaan station in the period after 2020. Its location on a crossing of roads, waterways and railroads...
already provide enough complexity for a single design case. The Stedenbaan conditions will only add more complexity to this. Two adjacent city districts that are already facing some urban renewal programmes and an industrial site next to the tracks provide enough dynamics and input for an urban regeneration project.

Relevance of the study

Scientific relevance
The role of mobility in the city is one of the major strategic design and planning tasks for urbanism as a whole. Although it is widely agreed among experts that new urban transport technologies are playing an important role in the development and transformation of the present socio-spatial environment, it is still unclear how these new technologies should be interpreted in planning and designing the network city. (Rooij 2005:341) This project adds to the discussion concerning the relationship between mobility and urbanisation on the interface between the disciplines of urban planning and traffic engineering. This study could provide a better understanding of the potentials of a spatial interplay between urban transport and the city by making the link with the issue of urban regeneration. It also adds to the growing importance of station areas as collective spaces at different scale levels and the way these spaces are able to function as a new public domain. (Hajer & Reijndorp 2001)

Societal relevance
An often-quoted definition of the sustainable development is: “Meeting the needs of the present without compromising the ability of future generations to meet their needs.” (Brundlant 1987)

The continuing debate on sustainability shows the growing awareness of today’s society concerning future developments. Concepts as Transit-Oriented Development and Stedenbaan are trying to deal with present needs as growing mobility and urban development space in a way that is generally recognized as being sustainable. One of the consequences is the increase of pressure on existing neighbourhoods as a result of densification. Creating good living environments is one of the greatest challenges within this framework.

1.5 Structure of this report
This report is divided into six parts, which represent the approach during this study. This introduction chapter forms Part I of the report. Part II consists of the theoretical framework of the study in which theories on Transit-Oriented Development, Stedenbaan and station area (re)development have been reflected and analysed. An overview and analysis of the Leiden case on the scales of the city and specific station area are the main contents of Part III. In Part IV contains supporting design studies that were needed to bridge the gap between theory and design. This part ends with urban design and planning principles as a conclusion of the Body of Knowledge. The implementations of the outcomes of these previous parts are made visible in the design part, Part V. The final part, Part VI, contains the evaluation and overall conclusions of the study and the design.
Theoretical framework

Part II.
2 Transit-Oriented Development: a regional perspective for local communities

The changing use of large rail infrastructure through urban areas

2.1 Introduction

In brief, Transit-Oriented Development (TOD) refers to a regional network of higher density, mixed-use, human-scaled living environments centred around public transport stops in which development and exploitation of public transportation and urban uses are combined. TOD environments can be developed relatively easy in urban expansion areas or in areas such as brownfields (vacant, derelict or underused land) that could be restructured entirely, because of the lack of physical and societal context. But what happens if a programme based on TOD principles is applied to urban environments with a fixed structure, areas that have been working according to their own systems for some considerable time and are instantly confronted with new perspectives?

In this chapter, the main question is:

What are qualifying aspects for the approach of existing neighbourhoods in the vicinity of railway infrastructure that will be confronted with the regional scale due to the use of a TOD related strategy?

First the concept Transit-Oriented Development is being explained together with its background, key aspects and implementations. After this, the problem of large infrastructure through the city and its influence on surrounding environments is being discussed, followed by a reflection on the complex nature of station area (re)developments. Finally social and community issues concerning urban regeneration programmes have been considered. At the end the main conclusions are given together with recommendations and starting points for further study.

Fig. 2-1: Del Mar Transit city, Pasadena, California USA (Christian Ventura)
2.2 Transit-Oriented Development

Transport-Oriented Development is the name of a concept or strategy that can be used as tool to manage urban growth on the regional scale level. Within this framework the public transport system acts as backbone for spatial developments.

The concept started as a possible answer to the notorious urban sprawl that had ‘infected’ the American cities after the Second World War. According to architect and urban designer Peter Calthorpe, an influential expert in this field, “The alternative to sprawl is simple and timely: neighbourhoods of housing, parks, and schools placed within walking distance of shops, civic services, jobs, and transit – a modern version of the traditional town.” (Calthorpe 1993:16)

A solid definition of TOD is given in Calthorpe’s The Next American Metropolis: “A Transit-Oriented Development (TOD) is a mixed-use community within an average 2,000-foot walking distance of a transit stop and core commercial area. TODs mix residential, retail, office, open space, and public uses in a walkable environment, making it convenient for residents and employees to travel by transit, bicycle, foot, or car.” (Calthorpe 1993:56)

Calthorpe indicates that TOD is primary about creating ‘walkable’ communities, because they “can help relieving our dependence on the auto in many ways than just transit”. (ibid::42)

The most revealing statement strengthens this: “A healthy walking environment can succeed without transit, but a transit system cannot exist without the pedestrian.” (ibid)

From a strategic point-of-view the community development must precede not just follow the development of the public transport networks. (ibid)

If applied at a regional scale, a network of such communities can “accommodate regional growth with minimal environmental impacts; less land consumed; less traffic generated; less pollution produced.” (ibid)

In The Next American Metropolis (Calthorpe 1993:43) a set of principles of TOD are summarized (see Fig. 2-2)

- Organize growth on a regional level to be compact and transit-supportive.
- Place commercial, housing, jobs, parks, and civic uses within walking distance of transit stops.
- Create pedestrian-friendly street networks which directly connect local destinations.
- Provide a mix of housing types, densities and costs.
- Preserve sensitive habitat, riparian zones, and high-quality open space.
- Make public spaces the focus of building orientation and neighbourhood activity.
- Encourage infill and redevelopment along transit corridors within existing neighbourhoods.

Fig. 2-2: Principles of TOD (Calthorpe 1993:43)

Fig. 2-3: Preferred structure of a TOD (Calthorpe 1993)
Especially the Calthorpe’s plea for infill and redevelopment along transit corridors is telling a lot about the aspirations of TOD, because it emphasizes the fact that TOD could play an important role in urban regeneration programmes.

**Reflection on TOD practices**

In the book *The New Transit Town* (Dittmar & Ohland 2004) an evaluation of 10 years of TOD practice has been described.

In the foreword, Peter Calthorpe states that the practice has not exploited TOD’s capacity to its maximum potential, especially in case of inner-suburban renewal (the first ring of suburbanisation around the city). In case of the inner city projects Calthorpe noticed that TOD is applied in a better way, but that practices show that balancing “the need for affordable housing with the need to diversify the city into economically integrated communities” appeared to be not easy at all. Negative effects of gentrification processes, as the displacement of whole communities, came up to the surface, as an appropriate mix of affordable housing was not incorporated. (ibid::xii-xiv)

According to Dittmar, Belzer and Autler “successful TOD needs mixed-use, walkable, location-efficient development that balances the need for sufficient density to support convenient transit service with the scale of the adjacent community” (Dittmar et al. 2004:4) and “TOD can realize its full potential only if it is seen as a new paradigm of development rather than a series of marginal improvements.” (ibid:9)

This combination of these statements shows that the theory is been sharpened through the years. Calthorpe’s principles are still recognizable, but after a decade of practice it apparently was necessary to emphasize that the principles cannot be applied instantly at any location and that the wider context became more important.

Dittmar and Poticha came to the conclusion that a decent definition of TOD and a set of aims are missing till that time, which caused operational misunderstandings and uncertainties. As an answer a ‘performance-based definition’ of TOD is given based on five main goals. (see Fig. 2-4)

With the expression “The Regional Building Block” they were able to reflect the ambition

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**Fig. 2-4: Performance based definition of TOD** (Dittmar & Poticha 2004:23)

<table>
<thead>
<tr>
<th>Location efficiency</th>
<th>Sufficient density near stop/station, central located and convenient stop/stations, pedestrian friendliness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rich mix of choices</td>
<td>Many activities within walking distance</td>
</tr>
<tr>
<td>Value capture</td>
<td>Benefits for all stakeholders: economic, social, environmental value</td>
</tr>
<tr>
<td>Place making</td>
<td></td>
</tr>
<tr>
<td>Resolution of the tension between node and place</td>
<td></td>
</tr>
</tbody>
</table>
and perspective of a TOD environment and provide a clear picture on the complex task of integrating different scale levels at one spot as well. (Dittmar & Poticha 2004)

They also make clear that TOD is not about forcing people to live in a particular way, but that it is rather offering a wider range of choices and opportunities compared to conventional (sub)urban development. (Ibid:26)

2.3 Position of large (heavy) rail infrastructure in the city

Rail infrastructure exists in various sorts and types, most of the time directly related to the function and reach of the transport mode that makes use of it. The term heavy rail is often used for regular railways, to distinguish from systems such as trams, light rail and metro. Most means of transport have certain characteristics that are better suited to particular circumstances and they will function relatively badly under other spatial circumstances. (Rooij 2005:343)

The spatial character of the infrastructure is very much tuned to its function. Major (inter) national or interregional rail connections need solid grounds to carry the heavy rail traffic and grade separated junctions to avoid confrontations with other traffic. Because of the expansion of the urban area large parts of these infrastructures became exceptional elements in the urban fabric. A good example is the railway embankment that used to be developed to provide the heavy traffic with a sound base in areas with weak soil conditions. In order to keep the increasing traffic flowing, these landscape elements were evolved into massive structures that do not correspond with the view and structure of their present urban surroundings.

Large infrastructures through urban areas consume excessive amount of space while only serving a relatively small area. The indirect claims on space are often several times larger than the direct. (Van der Hoeven 2001:165) As a connection they are able to bring distant spaces together, ‘to compress space’ while at the same time spaces in between are excluded. (Hajer & Reijndorp 2001:60)

Because of this, large infrastructures like these are often considered as physical and psychological barriers between areas on the local scale. The barrier effect is experienced even more because of the spatial developments alongside these linear structures like industries and other activities that were considered unwanted near residential areas. The clustering and the nature of these activities have led to impenetrable islands, or ‘enclaves’ (Hajer & Reijndorp 2001:56) in today’s urban tissue. As functional separation continued, new residential areas turned away from these infrastructure lines, orientating themselves in the opposite direction, ignoring the presence of the infrastructure just like infrastructure did to the ‘in between spaces’. Those neighbourhoods might already have social or economical centres. In this case, it is not very likely that they are situated in the direct surroundings of a proposed TOD area.

The continuing of this functional separation led to a further increase of what Hajer and Reijndorp (2001:56) called ‘archipelago of enclaves’, to express the subdivision of the urban field into multiple ‘islands’. What remained were the meaningless spaces along the infrastructure that add to the perception of these areas as backside of the city.

2.4 Station area (re)development

The fact that at railway station areas several scales come together makes the reconstruction of areas around existing and new stations both complex
and interesting. “Their capacity to link physically and symbolically distant domains is the source of both their potentials, their constraints, and their contradictions” (Bertolini & Spit 1998:219)

The dual identity of stations as being both nodes and places as described by Bertolini and Spit (1998) defines the unique challenge of these locations: “Basically, the unique challenge of the development of node-places is to deal, at the same time, with both transport and urban development issues.” (ibid:17) The complex node-place interactions have to be considered as the core issues of railway station developments. (ibid:9) “Station areas could be seen as potential ‘centres of centres’ within the region as links between the region and the (inter)national space: that is, between the local and the global” (ibid:220) Recognition of the network and its multi-centred dynamics is the first step, followed by a focus on relationships of competition and complementarity between the different locations in the network. (ibid 219-220)

Stations play an important role in the functioning of specific locations and activities. As transportation nodes they have a network value; because of a certain amount of destinations and origins in the vicinity of the station, they have a certain location value and finally they have a certain value as being a place (the location itself has its own target groups). (Bertolini & Dijst 2000)

Bertolini and Spit also recognized a number of dilemmas characteristic for station development areas that all can be reduced to the place-node identity of station areas and the diversity of interests of the actors involved. The economical driving forces tend to dominate environmental (promoting public transport use) and urban planning and design (healing the city, relation station and neighbourhood, removing barriers etc.) arguments. Crucial is the physical and organizational coordination between transport and property development, but because of its complexity, place-development and node-development processes each tend to follow autonomous tracks. Privatization of national railway companies and distinction between commercial transport companies and governmental infrastructure management
Because local conditions vary as well as local aspirations and expectations about what is required, a single blueprint for success of urban regeneration programmes does not exist, but it is proved that initiatives are implemented most successfully when programmes sensitively respond to the needs of local people. (Jacobs & Dutton 2000:126-127)

Especially policy-makers and programme managers have to be flexible in relation to the local people. (ibid; Houterman & Hulsbergen 2005:338-339)

Stimulating local initiatives have to be considered as investment because it stimulates commitment, which might lead to social cohesion, awareness and innovative ideas. An early involvement of local people can also add to the definition or sharpening of the task. (ibid)

### 2.5 Social and community issues

Connection to the regional scale together with TOD related environments could help to upgrade the former ‘in-between areas’ but it could also bring negative effects as class conflict or segregation of close communities. (Musterd & De Pater 1992:91-95)

Neighbourhoods that did not receive lots of attention earlier, could become interesting residence places or business location for a larger group of people. It is not very hard to imagine that a direct connection to the region is able to increase the location’s market value. Gentrification is a well-known phenomenon in the course of which neighbourhood upgrading and increasing land prices go hand in hand. (ibid)

Negative effects of such developments mainly have influence on the local inhabitants and shopkeepers. Increasing land prices could lead to higher property values and rents, which could cause people to leave to other neighbourhoods or districts. (ibid)
2.6 Conclusions

The main question linked to the subject of this chapter was:

“What are qualifying aspects for the approach of existing neighbourhoods in the vicinity of railway infrastructure that will be confronted with the regional scale due to the use of a TOD related strategy?”

Transit-Oriented Development is a community-based strategy for accommodating most of the regional urban growth within the boundaries of the existing built environment by concentrating housing, civic and commercial activities around public transport stops. As TOD has the ambition to play an important role in the community, place making is one of the most important conditions. The review on this concept showed that urban regeneration should be one of the qualifying aspects of TOD, but that according to its advocates, previous practices have not fully reached its potentials so far. TOD is above all a concept that has to be seen in the wider context of a region, as a sum of all parts. The strength of TOD, the integral vision, is therefore at same time its greatest weakness. If one of the many components fails to reach its goals, the whole concept might collapse.

The reflection on the position of large infrastructure in the city showed that the physical presence of the infrastructure itself and the way it gave direction to surrounding developments could be seen as the main problem and challenge to deal with. The issue of station area (re)development gave insight in the potentials of these areas as being both nodes and places, that potentials can be exploited the most if these areas are seen in the framework of a complementary network, and that station area developments are influenced by a great diversity of interests. The dominance of economic driving forces at station development processes, strengthened by the commercialization of the transport companies, could be a serious threat for the success of TOD. A broad public a private support, awareness and understanding of each other’s interests is essential for the parties involved. This conclusion is supported by the look into the community issues at urban regeneration programmes, which showed that the involvement of local people has to be seen as an investment in the success of the programme.

The possible effects of the upgrading of the neighbourhoods demonstrated the complexity of diversifying the community structure and the weak boundary between positive and negative effects.

Qualifying aspects for the approach of this kind of issue that have been recognized are:

- The interplay between the overall ambition and aims for the developments on the regional level and the potential and desirable results on the local level based on the local conditions.
- The design and role of the area as a local and regional place and the transition to the regional node.
- The way of organization and coordination between transport and property development, based on the node-place characteristics of railway stations.
- The relationship between the regional aspirations and the local vulnerabilities.
- The position of the large infrastructure in this framework.
- The functional relationship of the TOD with existing local centres in the neighbourhood.
2.7 Recommendations & Discussion

By naming concrete subjects in the research question, an attempt was made to limit the research field. After the research the conclusion can be drawn that the field is still too wide. Especially concerning the societal consequences of such interventions the research can be elaborated in further studies.

Because urban planning and design is limited to the functional-spatial and physical spatial translation of the given conditions, a certain position concerning the indicated qualifying issues has to be taken for setting design guidelines.

The question how to deal with a local community that is very close is a very complex issue for example. A total devotion to the Transit-Oriented Development with the desired diversification will automatically lead to the breaking up of these fixed structures. On the other hand a more preservative strategy can be an obstacle for the success of the TOD because it sets limitations to the sphere of influence it could have. Because it has very much to do with the connection of different worlds, and the creation of place, enhancing different ‘enclaves’ (Hajer & Reijndorp 2001) could be a possible strategy. The spaces in between the enclaves, the ‘liminal spaces’ will then be the most challenging spaces to design. (ibid:128-129)

On this, and other designated issues, a clear position that is based on specific knowledge concerning the regional ambitions and the location specific context should provide direction.

Fig. 2-6: Strategies to connect different domains
3 Stedenbaan

3.1 Introduction

This chapter provides an overview of the Stedenbaan project, what it is and what it represents, to determine conditions for the general approach of the Stedenbaan assignment.

The chapter starts with a brief introduction to the project, its motivation and backgrounds, its concrete aims and the way all of this is planned to be accomplished. In addition, an overview is given of the concrete agreements on the realisation of the project that have been made until now. After this, previous studies on Stedenbaan are being reflected, after which Stedenbaan is being compared to the theories behind in relation to Transit-Oriented Development. From the outcomes, conclusions and recommendations are made with a view to further study on the integration of the Stedenbaan programme on the local scale.

3.2 A brief overview of Stedenbaan

Stedenbaan is a public transportation and urbanisation concept initiated by the Bestuurlijk Platform Zuidvleugel (South Wing Administrative Platform), a cooperation of eight administrative partners in the Zuidvleugel, the southern part of the Randstad.

Stedenbaan consists of:

- The creation of a high-frequency public transport system on the existing national rail network
- A regionally coordinated urban development programme based around the stations on the rail network

This combination is also referred to as the ‘dual-purpose strategy’ (Atelier Zuidvleugel 2006)

So basically, Stedenbaan is a rapid transit system (Dutch: Hoogwaardig openbaar vervoer systeem) as well as a regional urbanisation strategy.
3.3 Goals and strategy

Stedenbaan is meant to:

- Improve the accessibility and mobility in the Zuidvleugel and distribute this more equally
- Increase the variation in residential and working environments
- Limit the environmental load and a further attack on rural areas

To accomplish these goals, the focus will be on three main tasks:

- Improving the train product: faster, more frequent and more comfortable
- Improving the transportation from and to the stations
- Improving and intensifying the land use in the station surroundings

(Bestuurlijk Platform Zuidvleugel 2007)

Planning

In the first studies Stedenbaan was estimated to start in 2007, after the international trains would use the new high speed railway line. This has been delayed until 2009 at earliest, because of which the current ambitions of the Stedenbaan project presume a starting period from 2010 to 2020. (Bestuurlijk Platform Zuidvleugel 2007)

3.4 Motivation and backgrounds

In the Netherlands, especially in the densely populated Randstad, the country’s largest and economically most important urban network, the use and efficiency of the infrastructure network has been the subject for debate for the last years. The rising mobility and urbanisation problems are considered a major threat to the international competitive position of the Randstad.

In the perspective of Zuidvleugel, the series of separate urban regions have to be transformed into a single cohesive metropolitan area with a heightened level of interaction between functions. The regional road network and public transport system have not kept pace with these changes and are unable to meet the growing demand for transport. (Atelier Zuidvleugel 2006)

Zuidvleugel: Motor in the Delta

As part of a strategy to strengthen the Randstad’s international competitive position, the South Wing Administrative Platform (BPZ) and the Ministry...
of Housing, Spatial Planning and Environment (MVROM) have developed a joint strategy for the Zuidvleugel, with the following goals:

- Finding a balance between economic/infrastructure needs and the ‘quality of life’.
- Strengthening of the economic clusters
- Good international access
- Spacious dwelling environments and hence quality of life
- Attractive cities
- Pleasant landscapes

(Bestuurlijk Platform Zuidvleugel 2006)

**Zuidvleugel Urbanisation Strategy 2040**

As the elaboration of these goals and ambitions, the very recent (July 2008) publication ‘Verstedelijkingsstrategie Zuidvleugel’ (Urbanisation strategy) is very ambitious:

At least 80% of the total housing programme until 2020 should be realized within the existing urban area, which is a huge difference with for example the ambition of the National Spatial Strategy (40%).

This ambition is partly based on a market demands study by ABF Research, which indicated a potential growth in the demands for _high-quality urban living._

(Bestuurlijk Platform Zuidvleugel 2008)

According to the strategy the existing urban areas are facing substantial densification, which could preserve the surrounding open landscapes. As a result of this, the public accessibility of these open landscapes has to increase, by which they can function as very large metropolitan park areas. This perspective has clearly influenced the new spatial vision Randstad 2040, published in September 2008.

**The role of Stedenbaan**

Stedenbaan is considered one of the important instruments that will be used to develop the Zuidvleugel area.

The move of the international train traffic to the new high-speed line (HSL) will provide extra capacity to the existing main railway network and made it possible to reconsider the use and efficiency of this network. This extra capacity will be used to expand regional transport with the introduction of Stedenbaan. Together with other existent or planned (light) rail connections in the Zuidvleugel as the
Although previous documents and studies on Stedenbaan also considered the period after 2020, the current ambition document (Bestuurlijk Platform Zuidvlugel 2007) only focuses on the starting period from 2010 to 2020. The earlier mentioned spatial visions for the Zuidvleugel and the entire Randstad consider a period until 2040. The previous documents and studies have also been considering the realisation of potential new stations of 2020 (Atelier Zuidvleugel 2006; Urban Unlimited 2005), which shows that the true ambition of Stedenbaan indeed is reaching further than the official ambit document is suggesting.

3.5 Ambitions versus concrete agreements

Next to the previous goals a spatial development ambition is formulated for the period between 2010 and 2020, which consists of the realisation of 25,000 to 40,000 dwellings and 0.7 to 1.2 million square metres of office space in the estimated radius of 1200 metres around the Stedenbaan stations. This comprises 1/3 of the total amount of extra dwellings that have to be built in the Zuidvleugel and up to 2/3 of the needed amount of office space.

In this period 4 new stations have to be built next to the 32 already existing stations in the network. The new stations are all projected outside the current urban area, on strategic locations near nodes of motorways and public transport (BleiZo, Sassenheim, Gouweknoop) or near an urban extension area (Schiedam Kethel/Spaland). The main transformation tasks have to take place around the 32 existing stations.

Metro and TramPlus in the Rotterdam region, RandstadRail in the agglomerations of The Hague and Rotterdam and the Rijn-Gouwelijn in the Leiden region this could form an integral network of high-quality public transport in the southern Randstad. (Van der Hoeven 2005)

Execution agreement Stedenbaan Zuidvleugel

In the execution agreement for the realisation of the Stedenbaan programme between the initiators of Stedenbaan (Zuidvleugel partners) and Nederlandse Spoorwegen (NS, Dutch Railways) of December 2007, some concrete arrangements were made:

• The frequency of the Sprinter trains on the section between Leiden and Dordrecht will be increased from 4 to 6 per hour in the period between 2010 and 2020, depending on the urban developments around the stations.
and ended with some possible spatial translations of the findings on the scale of the station area.

**Atelier Zuidvleugel: network qualities**

After an inventory of potential development sites in existing and potential station areas and the review of the potentialities, three scenarios have been drawn up to explore the way designated potentialities could be exploited to achieve the goals at the supraregional level: the densification scenario, the network scenario and the sustainability scenario.

**Densification scenario**

“Maximum densification around public transport hubs”

This scenario is in line with the National Spatial Strategy (Nota Ruimte), which states that from a traffic/transport perspective it is important to make maximum use of the potential for densification around public transport hubs in order to create attractive cities and towns.

**Network scenario**

“Maximum diversity of services and locations in a coherent programmatic whole”

The agreement emphasizes the transportation aspect of Stedenbaan as well as the general development programme. Supporting sub-studies have to deal with the desirable qualities of the station surroundings.

The current agreement also reveals the limitations of the project: the planning and realisation will involve many sides because of which the process will turn out to be very complex.

The influence of the project will especially have to become visible on the local scale, where the local authorities have been made responsible for the planning and realisation. The rejection of the potential Gouweknoop station already showed that the success of Stedenbaan is very much depending on large actors as the NS.

**3.6 Stedenbaan studies**

On initiative of provincial and regional governments and institutions a couple of studies/surveys were made that were meant to explore the potentials and character of the Stedenbaan station areas.

The study of Atelier Zuidvleugel focussed on the network qualities of the stations (Atelier Zuidvleugel 2006), while Urban Unlimited explored the mobility types or traveller’s profiles in relation to station profiles (Urban Unlimited 2005). Both of the studies started at the regional scale level.

For certain important themes, sharing agreements had to be formulated:

- The quality of stations, station surroundings and transfer points
- Transportation to and from the stations, by bicycle
- Information and communication services
- Park and Ride facilities
- Social safety

The spatial development programme as written in the ambition document is accepted.

The Zuidvleugel partners will determine, organise and guide the development programme, the province of South Holland will be responsible for the direction and the local municipalities will be responsible for the execution of the programme around the stations.

The NS disagrees on the realisation for a new Gouweknoop station, but agrees on the potential realisation of the other station before 2012.
In this scenario the metropolis is not defined as a single urban planning concept, but as a coherent programmatic whole. The scenario offers maximum diversity of services and locations within given temporal and spatial constraints. The quality of the location is based on accessibility and on the sites designated for housing, recreation and employment. The main goal within this scenario is the formation of networks.

The Sustainability scenario
“Maximum sustainability: aiming for mixed-use environments, sustainable mobility, preserving authentic landscape”

This scenario aims at sustainable development. Potentialities that aim for mixed-use environments and densification of existing urban areas and which preserve the open landscape, are valued highly in this scenario.

Reflection and conclusions
All three scenarios contain essential aspects of Transit-Oriented Development: densification around public transport stops, the creation of a diverse network and prevention of further damage to the open landscape. This raises the questions how these scenarios are different from each other and how effective they really are.

Densification is considered as an independent scenario, but also as method to preserve the open landscape, a prime aspect of the Sustainability scenario. Also was suggested that the Network scenario is not sustainable (enough), because it will increase traffic movements, which, at the same time is considered desirable for the functioning of Stedenbaan. Together these scenarios provide a clear overview of the different characteristics and

Fig. 2-9: Scenario’s Stedenbaan: a) Densification, b) Network, c) Sustainability (Atelier Zuidvleugel 2006)
ambitions of Stedenbaan, although it is clear that they cannot be considered as completely independent development perspectives. For this, they are too interwoven.

In their study, Atelier Zuidvleugel already came to the conclusion that the ‘South Wing Network Scenario’ could make the largest contribution towards the development of an emerging regional transport network. A quality that is essential if the aim is to transform the Zuidvleugel into a single cohesive metropolitan area with a heightened level of interaction between functions.

If the Zuidvleugel has to become an attractive working and living environment, just building denser will not be the answer. Creating mixed-use areas everywhere, without a decent overview of their interrelations could result in diversity and heterogeneity on a local scale, but also in homogeneity and monotony on the larger scale. (De Jong & van der Voordt 2002:37)

For this it is important to know what scale is guiding, what scale is the most important? In this case it is the regional scale. On the regional scale a network has to emerge that will be attractive and diverse, which is main competitive quality of Zuidvleugel/Randstad. After all, the main goal is to increase the competiveness of the Zuidvleugel and Randstad as a whole.

**Urban Unlimited: mobility types**

Urban Unlimited has been using the method of thematisation of station areas based on specific ‘mobility types’ to create environmental differentiation along the Stedenbaan. The desired differentiation is primarily applied to the (supra) regional scale level and although it can be a handy tool to define the local design task, it is questionable whether this organisation principle will be effective on the scale of the local station areas. There will be much chance of homogeneity on this level, which is undesirable if the aim is to create vital living environments on these locations.

**Conclusions**

After studying the backgrounds and theories of Transit Oriented Development and the Stedenbaan project the Network scenario used by the Atelier Zuidvleugel reflects most of the original ambitions of TOD and Stedenbaan.
The aim to differentiate the Zuidvleugel was clearly the starting point for this scenario and for the Urban Unlimited thematisation method, which have many similarities.

There is a clear gap between the regional ambitions and the local ambitions and possibilities. Both of the studies made an attempt to say something about this diffuse area, but their limitations appeared at the moment the local level required a more concrete perspective.

There is clearly a need for an approach from a local perspective. On this scale level, spatial, functional and social starting points can be found that could provide the local station area with an own distinctive identity that could give the area opportunities to place itself in the total image of the Zuidvleugel/Randstad. This can give an answer to the question what Stedenbaan really is about.

### 3.7 Stedenbaan as Transit-Oriented Development strategy

The Stedenbaan concept is strongly related to the principles of Transit-Oriented Development (TOD), with similar aspects as densification/intensification of land use around stations, creating mixed-use environments and the regional network as focal point.

On certain, important aspects the theories on TOD are taking it a step further. Especially on the functioning and design of station areas, the theories on TOD are more concrete: the station area has to be an integral part of the centre of a ‘walkable’ community.

According to Calthorpe, from a strategic point-of-view, the community development must precede not just follow the development of the public transport networks. The realisation of ‘walkable’ communities is the first priority. (Calthorpe 1993)

A previous conclusion already made clear that the desired central role of the station area within a surrounding community will not be feasible in many cases, especially in areas with already fixed
communities without any orientation towards new or existing station areas. For these cases the focus have to be on creating a certain balance. For Stedenbaan, the precondition of a walkable, human-scaled station area has not been determined (yet). Stedenbaan is currently reasoning from the perspective of the public transportation product and the supporting transportation modes. Towards the regional mobility network this might be a good thing, but for the local scale it is lacking.

The earlier discussed Atelier Zuidvleugel network scenario, which is considered the perspective that represents most of the Stedenbaan concept, is also the closest to the goals of Transit-Oriented Development, especially considering the inter-relationships between the independent local station areas within the framework of the regional city.

3.8 Conclusions and recommendations

As a transportation and urbanisation strategy, Stedenbaan is part of a larger strategy that aims for the improvement of the international competitive position of the Randstad. This aim is the most important message that should be taken in account through all of the different design scales. It places decisions in a wider perspective, which asks for high quality standards.

The greatest strength of the Randstad is the diverse character, which have to be increased with the strategy of creating more diverse and high-quality urban living environments. Stedenbaan will have to play an important role in this.

Stedenbaan will have to become an essential part of a cohesive metropolitan area with a heightened level of interaction between functions. The studies of Atelier Zuidvleugel and Urban Regeneration that concentrated on network qualities and ‘mobility types’, made a first attempt to think of the Zuidvleugel in terms of networks and relationships. Stedenbaan will primarily be getting shaped on the local level, because local authorities have been given the responsibility for planning and realising the spatial part of Stedenbaan.

Although the official ambitions run until 2020, the main changes will be taken place after this period. Because of this, it is recommended that future developments should be considered in a larger time span, especially future developments that involve new to be realized station areas.

Stedenbaan has many similarities with TOD, but it is too much oriented on the transportation aspects at the moment. If Stedenbaan wants to become more than just a transportation product with some additional urban developments, it should make clear what exactly is expected from a Stedenbaan station area, because this is where the different layers and qualities of the Randstad/Zuidvleugel will meet and become visible.
Recommendations for the analysis at city scale

From the regional point-of-view, the analysis on the scale of the city or agglomeration has to focus on:

- Defining the research area
  - A clearly defined research area based on the expected catchment area of Stedebaan is needed to connect the activities within this area to the Stedebaan programme.

- Position and quality transportation networks
  - What is the current status and which possibilities are there to place Stedebaan within these networks?

- Local qualities with regional allure
  - What kind of local ingredients (certain uses, economic activity, cultural history, landscape structures etc.) are available that are able to ‘colour’ Zuidvleugel?
  - Could Stedebaan strengthen their position and vice versa?

- Local dynamics
  - Is there any spatial-functional dynamics in the urban area? Are there possibilities for Stedebaan to connect to this?
  - What spatial developments / plans is the city facing? Is there much movement?

- Which locations provide possibilities for transformation, restructuring, land use intensification and in which period of time? (also after 2020!)

- Local limitations
  - Are there any local conditions that could hinder the planning and realisation of Stedebaan or prevent Stedebaan for reaching its goals one way or another? (Spatial-functional, operational, urban/landscape structure etc.)

To be able to make a statement on the current and potential characteristics of future Stedebaan station areas in the city, it is also important to get insight in:

- Living environments
  - What types of living environments are in the Stedebaan area at city scale (quality, diversity, density, mix of uses, urban structure)

- Position in relation to existing centralities

- Is Stedebaan able to fulfil a central role at district scale (like a TOD)? Will there be conflicts with other centralities? What is the nature of these centralities and in what way could Stedebaan gain a place in these local systems?

Recommendations for the urban planning at district scale

- Stedebaan = Networks
  - Stedebaan refers to networks, as transportation product first in transportation networks, but network thinking is also about considering other spatial-functional relationships Stedebaan could have with its surroundings.

- Stedebaan/Zuidvleugel = diversity of high-quality living environments

- Stedebaan = dense, diverse living environments around stations in urban areas

- Stedebaan = regional link of local qualities
  - Stedebaan is dependent on local ingredients that could provide distinct identity. Local qualities with at least regional allure also represent the Randstad/Zuidvleugel and will be connected by Stedebaan.
4 Towards a Stedenbaan station area

4.1 Introduction

In this chapter is about the question of what could be expected from a Stedenbaan station area.

There are different theories about what characteristics a good station area should have, which aspects are determining the dimensions and service area and what kind of relationship the station area should have with its surroundings.

The aim of this chapter is to define conditions and principles that could be used for the approach of the Stedenbaan station area design task.

4.2 Stedenbaan

As been concluded previously, the Stedenbaan programme is lacking a concrete overview of the actual approach of its station areas. The different actors have mainly been focusing on the transportation aspects, which has led to concrete agreements on chain mobility, frequency increase of the train product and the realisation of new stations.

Stedenbaan only reports that land use in station areas should be intensified and improved by spatial and programmatic densification and increasing the spatial quality, environmental differentiation, mix of uses and liveliness. (Bestuurlijk Platform Zuidvleugel 2007)

Apart from an estimated ‘sphere of influence’ of a 1200 metres radius little is known about the scale and form of the future developments.

The Stedenbaan ‘Sphere of influence’

The previous Stedenbaan studies assume a primary ‘sphere of influence’ or catchment area within a radius of 1200 metres around the stations, based on the assumption that the large number of cyclists in the Netherlands makes it likely that the sphere of influence will be larger than the usual 1000 or 800 metres used in international planning analyses. (Atelier Zuidvleugel 2006)

Another assumption used to determine the sphere of influence is the theory that individual spheres cannot overlap each other, because people will use the nearest station. The study is also using the theory that existing stations will be dominating the future stations, limiting the sphere of influence of these stations furthermore.

Fig. 2-10: ‘Railkids’ child day care at Gouda Goverwelle station (Bestuurlijk Platform Zuidvleugel 2007)
The Stedenbaan planners acknowledge that this influence is relative and very much dependent on local aspects such as the condition of the underlying (public) transport network or the presence of spatial or psychological barriers. (Atelier Zuidvleugel 2006)

4.3 Transit-Oriented Development

According to Calthorpe (1993:56), a Transit-Oriented Development is a mixed-use community within a 2000 feet (=600 metres) or 10 minute walking distance from a public transport stop. He also acknowledges that this size is an average, cases will have different surrounding features which influence the size. This theory distinguishes different areas within this radius. In the core, directly next to the transport stop, a commercial area has to be located as a centre of the community added with community services, higher density housing and offices. Mixed-use core commercial areas are the primary link between public transport and land uses. (Calthorpe 1993:77)

Further from the core, the area will get a more residential character. This all depends on the location within the region, market demands, surrounding land uses and the type of TOD.

Urban TOD’s are located directly on the “trunk line” of the public transport network. The focus should be on high commercial intensities, job clusters, and moderate to high residential densities. Neighbourhood TOD’s are located on local or “feeder” public transport lines within a 10 minute travel time from a stop on the “trunk line”. The focus should be on moderate density residential, service, retail, entertainment, civic, and recreational uses. (Calthorpe 1993:57)

In Randstad Holland, the intercity (express train) network will in this case be the main trunk line. Stedenbaan will function as feeder to this network. Because Stedenbaan is aiming to be the backbone of the public transport in the Zuidvleugel and shares its infrastructure with the intercity system, Stedenbaan can also be considered as part of this trunk line. The location in relation to other transportation modes, the intercity stations and features of the surroundings are ingredients to define the type of TOD needed for the specific location.

An important aspect of TOD is the pedestrian quality of the direct station surroundings. The
10-minute walking distance from the station entrance determines the spatial dimensions of the station area together with concentrations of amenities that are strongly related with the station but may be located on a larger distance. This is called the ‘micro-environment’. In the development phase, the area that is to be redeveloped determines the dimensions of the station area. Peek recommends that this area should equal the ‘micro-environment’ in order to employ the ‘synergic’ possibilities. (ibid:145)

Peek also concluded that “There is no certain relationship between real estate prices and the vicinity of a station” (Peek 2006:137)

From this real estate point-of-view the calculations of the Stedenbaan studies using the 1200 metre sphere of influence could lead to conclusions that might be too rosy. The 1200 metre radius comprises an area that is simply too large to dedicate all the developments within this radius to the rail station area developments. The focus has to be on a smaller area of about 600 metres radius.

4.4 Other theories

According to Bertolini and Spit (1998:12), ‘the influence of a railway station may go far beyond its immediate surroundings.’ But ‘(...) entities right next to a railway station may not show any apparent relationship with it.’

Peek (2006:144) distinguishes the phase of use of the location and the development phase in order to determine the spatial dimensions of the station area. In the phase of use, the actual spatial-functional structure of the station area has to stimulate people to use functions and amenities on the way to or from the station or stop. It is about thinking in networks and relationships. The direct station surroundings have to be able to offer a wide range of choices within a compact setting, by which they could be used as efficient as possible. Multiple trips could then be combined along one specific route. (Dittmar & Poticha 2004:25)

An example is dropping off children at day care before getting a quick breakfast at the coffee corner and taking the train to work within walking distance. Because of this, the design and layout of the routes from and towards the station is essential.
4.5 Generic design principles for station areas

Previous studies on station areas have been providing a wide range of generic urban design and planning instruments which already have proved themselves in practices. The instruments serve recurring themes that should add to a lively, safe and comfortable station environment, which also provide conditions for a better and more efficient use of the public transportation system.

According to Bach (Bach et al. 2006), a healthy operation of a public transport system requires an urban structure that has:

- A high FSI and PSI within the primary stop service area (primaire haltebereik)
- A functional mix within a service area (of approximately 300 m) of living, working and amenities (because of the operating requirement that public transport attracts passengers in both directions evenly as possible)
- An excellent walking/cycling quality within three minutes (approximately 300 m) from the stop or station.

Spatial quality

“(…), the urban structure along public transport routes inside a 300 m radius (R=300) should offer primarily public safety, shelter, from the elements, person friendly lighting and a large measure of radiality. In this zone, barriers such as distributor roads, pedestrian lighting and stairs/inclines should be avoided.” (Bach et al. 2006)

From the perspective of placemaking, the direct station surroundings have to meet some basic conditions on climate shelter, traffic safety and social security. (Bach et al. 2006; Van der Hoeven et al. 1996)

It is also important that suitable uses and services are being realised in the direct station surroundings that focus on supporting transport modes: bicycles and pedestrians, buses and trams, taxis and car passengers. (Van der Hoeven et al. 1996)

Routes

The routes from and to the station (area) are very important.

From the a transport point-of view, logical, time-saving routes for especially walking
Box 2.1  Amsterdam Bijlmer ArenA station
The design of the Amsterdam Bijlmer ArenA station, which reopened in 2007, is a good example of an integral approach of different disciplines.

A 70 metres wide pedestrian boulevard aligned diagonally to the railway tracks provides a turnstile-free route between the two districts on both sides of the station. An increase of the available height above this boulevard with almost 2 metres meant a further decrease the barrier effects of the track.

With the architectural intervention to make use of the space in between the tracks, making use of natural daylight entrance and spatial effects, the sense of safety was improved through visual contact and transparency between platforms and ground level areas. Conveniently arranged escalators and elevators provide also more vulnerable people with easy and safe access to the platforms.

Fig. 2-11: Amsterdam Bijlmer ArenA: viaduct as ‘urban interior’

Fig. 2-12: Bijlmer ArenA: 70 metres wide pedestrian boulevard underneath the tracks (Grimshaw architects)

or cycling are needed (node-quality), which have a pedestrian/cyclist-friendly layout and which offer a convenient atmosphere (place-quality). (Bach et al. 2006)

The building frontages (stedebouwkundige plint) have to serve the public, support the liveliness of the area and provide “Eyes on the Street” (Jacobs 1961). From this point-of view it is important that, next to retail and civic uses, also residential uses should be planned along these routes. (Bach et al. 2006; Calthorpe 1993; Van der Hoeven et al. 1996)

Density
The question is what kind of densification programme is appropriate for a specific situation.

Along routes to a suburban or VINEX station Bach and De Jong (1997) suggest a minimum Floor Space Index (FSI) of 1,5 and a minimum PSI of 250 within a 300 metre radius of the station. Inside a wider service area of 900 metres the FSI in this case should at least be 0,7 and the PSI of at least 150. At urban stations or high quality public transport stations in dense urban areas these values have to be much higher.
Public safety and comfort
To increase the public safety, platforms and complete stations are being closed off with turnstiles (Dutch: tourniquets) that ensure that only passengers have access to the station domain. At many locations the station is also an important connection in the urban structure as link between two districts on both sides of the railway line. The closing off of this routes will lead to a new or renewed spatial barrier in the city, which is a serious threat the public safety and liveliness of the areas. (Bach et al. 2006)

Elevations
For the design of stations, station surroundings and public amenities the focus has to be on the ground level, because that is where most people feel at ease. Overcoming height differences requires extra effort and could pose a threat to the public safety, particularly for vulnerable groups. (Asmussen 1996)

Desirable uses
From a study on densification potentials around Amsterdam metro stations (Van der Hoeven et al. 1996) a conclusion was that retail, (higher) education and public oriented offices (offices with public counters) are the most desirable uses for the spatial-functional intensification of station areas, before residential uses, health care and public buildings.

The study also emphasized that intensification of uses cannot be realized without an increase of car movements, which makes a careful planning of car accessibility and parking facilities needed. (ibid:13)

Because of their positive effects on the social security and the liveliness of the station surroundings, residential uses in mixed urban environments have to be stimulated, on condition that are placed properly. (in the direct surroundings of the station, along the main pedestrian and bicycle routes)

4.6 Conclusions and recommendations
If it comes to the design and planning of the station area, Stedenbaan is not much explicit in comparison with theories on Transit-Oriented Development. The focus is very much on the transportation aspects. (node-aspect)

There are different opinions on the actual catchment area of the station and the station area dimensions.

The 1200 metre radius as been used in Stedenbaan studies is relevant considering the Dutch bicycle culture, but to link all developments within a perfect circle around the station to the Stedenbaan station area developments seems too easy. The 1200 metre radius does can be used as starting point to get grip on the urban structure around the stations, but the actual reach should be based on the possibilities and limitations of the urban tissue.

It is important to acknowledge that possibilities to restructure or transform areas in the direct station surroundings will be critical. A location with more possibilities for restructuring within walking distance shall eventually provide better conditions for a well-functioning station area.

It can be concluded that a core area of a 250 to 300 metre radius around the station entrances could be used as primary stop service area. From this core area most of the profits can be made. The guiding 300 metre radius (R=300) (Bach et al. 2006) represents a 5 minute walk which can also be related to the average size of Calthorpe’s ‘core commercial area’. It is also comparable with criteria of the Amsterdam metro stations study (250 m)(Van der Hoeven et al. 1996)
Very important in station area is the place quality aspect, which consists of providing a convenient place and giving priority to the slow-traffic modes, especially to the pedestrian. Recurring themes are social and traffic safety, place quality and comfort. Other important themes are:
Routing from and to the station and the first impression people get when they leave the station. Finally, the design of the station itself will be influencing the functioning of the station environment.

Recommendations for the analysis of the station area
The question whether the spatial-functional characteristics of the station environments fit in the perspective of Stedenbaan / TOD is guiding for the analysis of existing station areas. The aspects that have been defined for the city scale are of course also important for the station area scale, but a station area requires also more specific insight in:

- Position in relation to the surroundings
  - (urban structure, in relation to other centralities)
- Barrier effects structures
  - (spatial-functional, psychological: urban structures, landscape structures, infrastructure)
- Density and densification potentials
- Determining primary service area: core area 250-300 from station entrances

Aspects primarily for the analysis of existing station areas:

- Identity/legibility of station and surroundings
- Place quality
- Routes from and to the station.

Recommendations for the urban planning and design of the station area

- Stedenbaan= networks
  - Relationships that exist/could exist between station area and other uses and areas.
- Pedestrian priority
  - The pedestrian has to be considered most important. This requires a focus on safety, comfort, place quality etc.
- Stedenbaan = quality living environments
  - Densification needs compensations
- Core area has priority
  - The first few metres are essential for the success
  - Considering the service area as large as possible. What are the opportunities/limitations? Are there obstacles, barriers that have to be broken?
Case: Oude Lijn & Leiden

Part IV.
5 Oude Lijn and Leiden region

5.1 Introduction

This chapter is the first part of the case study to the integration of the Stedenbaan project at the local scale. The chapter is about the Leiden region and the Oude Lijn railway ("Old Line") that runs through its urban area and which in the near future will be hosting the Stedenbaan system. It starts with a brief overview of the area, its position in the Randstad conurbation, its main qualities and ambitions. After this, the context of the rail transportation in the area and its historic relationship with urban development is explained, followed by a further analysis of the different structures within the area, with special attention to the local qualities that could be connected to Stedenbaan, local urban dynamics and the position of the local transportation network. Because of the importance of networks in this project, an independent analysis of the networks and nodes in this area is made, focused on the network quality of the existing en possible future Stedenbaan stations and with relation to the method used by Stedenbaan.

To further explore the development possibilities, this chapter also provides an overview of the probable actors that would be involved.

The conclusion of this chapter is integrated in the overall conclusion of the Leiden case analysis in the final chapter of this part of the report.

5.2 Leiden in the Randstad/Zuidvleugel

The city of Leiden and its agglomeration are strategically situated in the centre of Randstad Holland. The region is part of the South Wing but due to its vicinity to Schiphol Airport, which is part of the North Wing, it can be seen as an important link between these two parts of the Randstad.

The municipalities in the Leiden region are all member of the administrative cooperation of Holland Rijnland, a region with almost 400,000 inhabitants, more than a half of which live in the Leiden agglomeration.

Besides two motorways on the edges, two railway lines through the urban area provide the city with quick and direct connections to Schiphol Airport and the four main cities of the Netherlands.
5.3 Local and regional ambitions

Leiden likes to present itself with the motto “Key to Discovery”, because of the presence of many knowledge institutions as the Leiden University, a booming bioscience business, important museums and its rich history.

In its perspective for 2030, the municipality emphasizes the importance of the ‘knowledge economy’ and wants to develop itself as a high quality knowledge-based city. To accomplish this, the city wants to attract more people by offering attractive living and working environments by, improving the accessibility by improving the infrastructure and recreational facilities. According to the perspective, the main threat is the lack of available development space within the municipal borders. The city acknowledges that it should benefit more from the qualities that are crossing the municipal borders in and outside the urban area.

(Gemeente Leiden 2007)

The area west of Leiden Centraal is the leading cluster of life science activities in the Netherlands. The municipality and the Leiden University are the most active promoters of this ‘Leiden Bio Science Park’ (LBSP), but the provincial and national governments already recognized its (economical) importance as shown in their plans and strategies.
5.4 Leiden and rails: a brief history

Although today only heavy railway lines are running through the city, other forms of railway transport have been playing an important role in the history and development of the urban structure of the Leiden area. Because of Stedenbaan and the RijnGouweLijn light rail project, rail transportation is coming back into the picture.

Heavy rail

‘De Oude Lijn’

‘De Oude Lijn’ (The Old Line) was the first railway section in the Netherlands and the first form of railway transportation that was realized in the Leiden region. The line was realised in several stages starting in Amsterdam, completed in 1847, intended to connect the larger cities in Holland. The Leiden station was established in 1842. In most cases including Leiden the railway track was built just outside the historic city centre.

After the realisation of the railway line the surroundings of the stations started being urbanized. Especially in Oegstgeest and Warmond (which also had a station from 1842 to 1960), the earliest forms of suburbanisation emerged: the earliest forms of transit oriented development.

Because of the expansion of the urban area the built environment now surrounds almost 7 kilometres of railway track in four different municipalities: Voorschoten, Leiden, Oegstgeest and Teylingen.

As a spatial object, the railway track also causes functional and psychological barriers in the city, strengthened by other (infra) structure very close to the line like the Oude Rijn River. Besides this, the complete inner city route is situated on a dike at a higher level compared to the ground level.

Stedenbaan

Between Leiden and Dordrecht ‘De Oude Lijn’ will be used to host the Stedenbaan system. Nowadays Leiden has two stations along the line: De Vink and Leiden Centraal.

In previous explorations on the spatial potentials of the Stedenbaan product two or three extra stops have been mentioned in the Leiden region.

Leiden-Woerden

Leiden-Woerden railway line (1878) provided a direct connection with the city of Utrecht. Before the development of Zuidwest in the...
1950’s this line marked the border of Leiden’s urban area. In 1961 the second station of Leiden, Lammenschans, was opened along this line. In the near future, the part of this line between Alphen and Leiden Lammenschans will be used by the regional light rail project RijnGouweLijn (RGL), which will share the tracks with the heavy rail trains.

**Haarlemmermeer railway line**

As part of a series of railway lines in and around the Haarlemmermeer polder, a railway connection between Leiden Heerensingel (Leiden North) and Hoofddorp was operational in the short period of time between 1912 to 1935. In comparison with the other lines around Leiden, this line had a more interlocal character. After the 1935 most of its infrastructure was being removed, besides a section between the Leiden Heerensingel station and the Leiden main station that remained in use by freight traffic until 1972. Today its remains are hardly recognisable in the urban structure, only a part of the route that was transformed into a regional road.

**Light rail**

After the realisation of the heavy railway lines, an extensive network of tramlines was built from the 1880’s that connected Leiden with surrounding villages. Along these routes ribbon developments started to grow. Because rail transport was mainly accessible to the more prosperous people the tramlines were responsible for increase of suburban villa districts, especially on the higher sand ridges of for example Oegstgeest, Voorschoten and Wassenaar. (Wiersinga 1995:63-67)

After the war all the lines were abolished and replaced by bus lines. Some of the old routes are still visible in the landscape, because their embankments were used for bicycle paths.

**RijnGouweLijn**

After almost 50 years, trams will make a revival in the area with the RijnGouweLijn (‘Rhine-Gouwe-Line’) (RGL). This provincial light rail project will connect the city of Gouda with coast villages Katwijk and Noordwijk, via Alphen aan den Rijn and the centre of Leiden. From Gouda to Leiden Lammenschans its hybride ‘tram-train’ vehicles will use the existing heavy rail tracks, sharing the infrastructure with regular heavy rail trains. From Leiden Lammenschans the vehicles will proceed as a city tram on new tracks through the city centre, via Leiden Centraal and the bioscience cluster towards the coast.
Fig. 3-5: Leiden research area, based on 1200 m reach related to the urban structure
5.5 Structure overview

Figure 3.5 provides an overview of the research area, based on the indication of the Stedenbaan’s sphere of influence (1200 metre radius), but adjusted to the urban structure of Leiden.

Urban structure

The urban structure of Leiden is very much influenced by the course of the Oude Rijn river. Because of their continuity the old dike roads are still very important roads in the urban tissue. In the centre, the old dike roads Breestraat and Haarlemmerstraat are still the most important shopping streets of the city.

Until the 20th century the urban area remained limited to the size of the historic city between its 17th century borders. Only after the 1950’s the city really started to grow, and lost touch to its historic relationship with the Oude Rijn.

Urban dynamics

The most important developments are currently taken place west of the central train station with the booming life sciences cluster in the Leeuwenhoek area, but also the realisation of new residential districts in Oegstgeest/Valkenburg (Knoop Leiden-West) and the future urban developments on the former Valkenburg airfield.

Inside the city large post-war city districts in the north (Leiden-Noord) and south of the city (Zuidwest) are being regenerated at the moment.

Infrastructure

Road network

The Leiden region has a good connection to the national road network with two parallel motorways on the edges that directly connect the region with Amsterdam/Schiphol in the north and The Hague/Rotterdam in the south. A decent connection between these roads is lacking, which causes many problems inside the urban area. Leiden’s local road network is in most cases still depending on historic routes to and from the city centre.

Because of the lack of a ring structure, the main car traffic goes right through the city. An undesirable situation that causes many problems.

Rijnlandroute (N11-west)

The first plans to connect the two motorways on both side of the city were already made decades ago. Nowadays the route is generally considered as urgent, because the main connection between these motorways, the Doctor Lelylaan-Churchilllaan corridor (N206), is going straight through the city, causing mobility, accessibility and livability problems. The most probable route is projected just west of the urban area, but other possible routes are still being studied.

A new connection will create possibilities for a restructuring of the Lelylaan-Churchilllaan corridor. Local authorities already made studies to transform the city’s main roads into ‘stadsboulevards’ (city boulevards) (Gemeente Leiden 1995), which is already made concrete for the Willem de Zwijgerlaan, another main through road. With decreasing the barrier effects, the road has to become a more integrated part of the urban structure.

Ring studies

On the local level authorities are currently studying on the creation of a ring structure to decrease the through traffic in the city centre. The need for at least an eastern part (a north-south connection) is already recognized and a western part is once mentioned as being an option for the future. This road has then to be realized.
somewhere parallel to the Oude Lijn railway line, which therefore could have consequences for the development of the Stedenbaan zone.

Public transportation
In the Leiden region, Leiden Centraal is the main public transport hub with a main railway station for intercity and regional trains and the main bus station for regional and local buses. Except for some express bus services from and to The Hague using the A44/N44 (with Park & Ride facilities and connections with local bus lines), nearly every bus stops at Leiden Centraal. From the other train stations, only Leiden Lammenschans acts as a public transport node with connections to the regional and local bus network. De Vink’s role in the public transportation system is marginal with only one stop at the end of a local bus line.

Plans & ambitions
The Rijngouwelijn light rail project is a hot topic in the Leiden region, especially in Leiden, but the role of Stedenbaan in local plans or ambition documents is very marginal. The two projects are considered independently to each other and not as parts of an integral public transport network in the Zuidvleugel.

Landscape
The urban area of Leiden is mainly built on the higher grounds along the Oude Rijn (‘Old Rhine’) River. Today, the area between Katwijk and Leiden is completely urbanized. From both sides the Oude Lijn railway enters the urban area of Leiden from different landscapes: in the north, the route connects to the open peatmeadow landscape with the Kagerplassen lake area, part of the Randstad’s main green space: the Groene Hart (Green Heart), while in the south the route is part of the green bufferzone between The Hague and Leiden, currently often referred to as ‘Landgoederenzone’ (‘country estates area’).

Leiden & water
Water plays an important role in the urban structure of Leiden as main open space in a compact city. The city is famous for its historic centre with its extensive canal network formed around the Oude Rijn River. The extensive network of waterways reaches far into the surroundings where it connects to the Groene Hart with recreational hotspots as the lake areas of Vlietlanden and Kagerplassen. Because of this, water recreation and water sports are very popular in the Leiden region.

Oude Rijn
The Oude Rijn is nothing like the Vecht River between Amsterdam and Utrecht with its beautiful country houses and estates facing the water. Industrial activities along the waterway have been dominating the appearance of the river for centuries, characterizing the Oude Rijn as typical ‘working river’.

Nowadays, many industrial activities which used to be located outside the city borders have been overtaken by the expanding city. Looking at the experience of the water there is a clear distinction between the water inside and outside the historic centre. In the centre the almost all public life takes place alongside and on the water, outside the centre the city is turning its back to it. In these areas public space adjacent to the water is very rare; most of the water is not even visible from the public streets. With new developments facing and using the water (residential developments, bar/restaurants with water access etc.), the city is orienting itself to the water again in the last decades.
Green structure

The green structure inside the urban area of Leiden is characterised by the canals (Singels) around the historic centre and some parks in the latest residential areas. Especially in the older neighbourhoods around the centre, the available green space is very scarce. The largest green space is located outside the urban area.

In comparison with the standard of 75 m² of available green space per dwelling as been used in the National Spatial Policy Document (Nota Ruimte), the availability of green space in Leiden is relatively poor. This rate is actually even lower considering the fact that most of this green space is not publicly accessible (sports grounds, allotment gardens, agricultural land). (Bezemer & Visschedijk 2003:58-59)
5.6 Networks and nodes in the Leiden case

**Leiden Centraal: Public transportation hub**
As already been said, Leiden Centraal is the main public transport hub in the Leiden region. From the other train stations, only Leiden Lammenschans acts as a public transport node with connections to the regional and local bus network. De Vink’s role in the public transportation system is marginal with only one stop at the end of a local bus line. The areas where the potential new stations are projected are currently only being served by some local bus lines.

**Leiden’s bicycle network**
Leiden is a bicycle city. The use of bicycle as a means of transportation is relatively high compared to other Dutch cities. According to estimations, almost half of the trips within 7.5 kilometres are made by bicycle. This is mainly because of the compact and dense urban structure with many long continuous lines. (Ligtermoet 2007)

**Stedenbaan: 1200 metre radius**
Because Stedenbaan uses the 1200 metre radius around the station to determine the “sphere of influence” or catchment area, based on the assumption that these 1200 metres are relatively easy to cycle on the flat Dutch roads, an analysis of save and commonly used bicycle routes was made to explore the actual 1200 metre reach of the existing and potential new stations.

So: What does this distance of 1200 metres really mean if we relate this to the Leiden case?

**An overview of the 1200 metres analysis**
De Vink station has very good bicycle connections to the adjacent districts, especially on the Leiden side (Stevenshof district). It is very clear to see that the location of the station was included in the planning of the structure of the urban district. On the Voorschoten side this is less visible, but long continuous cycle paths still provide good connections to several neighbourhoods in Voorschoten and Leiden Zuidwest.

The Oude Rijn River forms a very clear spatial barrier that limits the sphere of influence of De Vink station.

The current bicycle structure in the Mors subarea is primarily based on the grid structure of the road network. There are good connections to the Zuidwest area, but the network is depending on only one bridge over de Oude Rijn River. Based on the current cycle networks it can be stated that Leiden Centraal forms a larger threat to a possible new station in the Mors district than De Vink station does.

The area of Leiden Centraal has a very dense cycle structure that benefits from the continuity of the historic lines in the urban tissue. The actual 1200 metre reach almost equals the theoretical Stedenbaan sphere of influence.

The Merenwijk area also has some long continuous cycle paths that penetrate deep into the adjacent urban districts. These paths also provide good connections with the historic centre and the central station, which is considered to be a possible threat to the establishment of a new station at this location.

**Conclusions**
Leiden Centraal is connected to a very dense bicycle network that can be considered a threat to the potential service area of new stations in Merenwijk and De Mors. It is very likely that, for a trip to Schiphol airport, an individual who lives
at 5 minutes cycling distance from Leiden De Mors and at 10 minutes cycling from Leiden Centraal, will choose to cycle directly to the main station. The bicycle network strengthens the position of Leiden Centraal as the region’s most important node.

Because of the current structure of the bicycle network and spatial and psychological barriers of the Oude Rijn zone, a new Leiden De Mors station would probably not be harmed by the vicinity of the existing De Vink station. Opportunities are mainly in the realisation of strong relationships with adjacent districts as well as the nearby city centre and Bioscience Park knowledge cluster.

De Vink and Leiden/Noord areas have good bicycle connection to the adjacent suburban districts and green outside areas, which provide opportunities for becoming local recreational and suburban nodes.

Other networks

Next to the public transport and bicycle access, Leiden Centraal’s position as link in the routes between the historic centre and the ‘new town’ makes the hub even more diverse. Important
social and cultural amenities (hospital, education/university, historic centre, museums) and business activities in and around the station area add to the importance of the area as a hub in, and in between different networks.

The many links and the favourable geographic location provide high accessibility to the area, which attracts spatial developments and people, those in return generate new traffic flows. This capability is the main strength and quality of the Leiden Centraal area, but also its most important weakness. The pressure on the physical space will only be increasing.

The reliability on a couple of important hubs is clear and efficient, but vulnerable at the same time. A failure or calamity in the Leiden Centraal area could interrupt the entire train traffic between The Hague/Rotterdam and Schiphol/Amsterdam. From this point-of-view, the new high-speed rail connection on a new corridor between Rotterdam and Schiphol/Amsterdam will therefore already be an important improvement. Besides this, a failure at Leiden Centraal could interrupt the entire public transport network in the region as well as the supply of users and/or employees of the amenities and businesses in the area. The recent discussion on the placement of turnstiles that will block non-train passengers for using the station’s pedestrian passage shows the vulnerability of this location on the lowest scale level.

**Conclusions and recommendations**
Extra nodes in the Leiden region could strengthen the regional networks. Because of the strong relationship with the Zuidvleugel or Randstad networks, strong, reliable regional networks eventually will add to the capacity of these higher networks. Because of the dominant position of the Leiden Centraal area in the local and regional public transportation networks, it is not desirable to develop a new public transportation hub in its vicinity. An existing or new station will not even be able to develop itself like that.

![Fig. 3-10: Urban centralities in relation to the Steidenbaan area](image-url)
The node-quality is the main strength of the Leiden Centraal area, but also its most important weakness. The pressure on the available physical space will only be increasing.

The vicinity of Leiden Centraal and the centre and the connection to Stedenbaan could be used to release some pressure on the Leiden Centraal area, by replacing certain functions to these locations, but in order to add value to the regional network, stations as Merenwijk or De Mors also need to express an own distinctive identity and specific attractions. Because of the lacking opportunities for becoming transportation nodes, it is recommended to position these stations as accessible places.

5.7 Towards a new station area: Actors & policy

Actors

National government, Nederlandse Spoorwegen and Prorail
Without the participation of Nederlandse Spoorwegen (Dutch Railways), the main railway operator, and ProRail, the government task organisation responsible for the entire national railway network infrastructure, the Stedenbaan project is not achievable.

Nederlandse Spoorwegen (NS) is a commercial railway operator, but completely owned by the Dutch state as the only stockholder. The railway infrastructure including the station buildings is owned by the national government. As a government task organisation, Prorail is responsible for the maintenance of the railway infrastructure, but the NS manages the station buildings. The NS are still owner of 4700 hectares of land in the vicinity of railway infrastructure, mostly former railway yards or business grounds. Along the Oude Lijn in Leiden NS owns no large plots of land.

At least till 2015 the NS hold the concessions for main railway lines, including the lines that are part of the Stedenbaan project.

Provincial government
The provincial government is managing some infrastructure works. In the project location this is applied to bridges over inland waterway transportation routes, including the railway bridge over the Oude Rijn River.

Local authorities
The local municipality owns land that is being used for the local road infrastructure, public spaces and green spaces.

Local real estate owners
Different public and private parties own the land and buildings along the line. In the direct surroundings of the potential station Leiden de Mors, non-governmental housing corporations own much of the real estate. Other real estate is owner-occupied or in the possession of local enterprises and local authorities.

Policy new stations vs. new Leiden stations
A new station requires bringing in at least 1000 new train passengers a day (that have not used the train before via other stations) before
the development is even being considered.
(Ministerie van Verkeer en Waterstaat 2004)

The strong position of Leiden Centraal is
the main threat of an eventual realisation
of new stations within its current range.
Realistically, this means for a new station at
Leiden de Mors or Leiden Merenwijk that a firm
densification programme is needed not only to
meet the needs of Stedenbaan but also to even
consider the realisation of a station on this location.

Conclusions and recommendations
The most important actors that are responsible
for the rail product and new and existing rail
infrastructure, NS and ProRail, do not own
large plots of land or real estate property
along the Oude Lijn railway in Leiden,
which means that the leading transportation
company is not able to develop or exploit
future station areas by their own.
Local authorities and private real estate owners
own most of the land and buildings. In the Mors
area, non-governmental housing corporations
own a large amount of real estate, which provides
possibilities for urban transformations. It can be
concluded that the planning of new stations in
the Leiden region are very much dependent on
the ambitions and goals of these local actors.
If the realisation of new stations in the Leiden
area is really desired from a local point-of-view,
developments in the area have to be at such
quality that would ‘seduce’ the transportation
actors to join the development process.
It also means that a firm densification
programme is needed, also because of
the needs and goals of Stedenbaan.
6  Leiden De Mors area

6.1  Structure overview

The area in brief

Until the 1950’s most of the area used to be rural land outside the city, with industrial activities along the riverbanks, some small-scaled ribbon developments along the dike and a small 1930’s ‘garden village’ neighbourhood surrounded by the open landscape.

Nowadays the old Heesterboom wood mill and the Wernink concrete factory are the only reminders of the former industrial character of the river at this location. Besides the concrete factory, most of the current activities on the Wernink site have nothing to do with the water and also the concrete factory is now very much depending on transportation over land.

At this location, the railway line is located just north of the river in the primarily residential Mors district, but also very close to the Zuidwest (Southwest) district on the other side of the river. In both districts, but mainly in Zuidwest, neighbourhoods are being regenerated at the moment or planned to be regenerated in the near future.

North of the river: Mors district

The Mors district is the area which would be most influenced by the realisation of the new Stedenbaan stop and the attached urban developments.

Spatial structure

The natural path of the river determines the urban structure of the oldest parts of the Mors district. The ribbon development follows the light curves of the river. The dense character of the ribbons makes the spatial relationship of the Rhine and the neighbourhoods behind quite weak, as a result of which the Rhine has not been a structuring element for the rest of the district.

The ancient dike road (Morsweg/Hoge Morsweg) was divided into different parts after the realisation of the regional road N206 (Dr. Lelylaan/Churchilllaan) and the elevation and doubling of the railway line (2 to 4 tracks), resulting in an isolated site along the water.
Fig. 3-12: Overview of Leiden De Mors area
From the district the water can hardly be accessed or experienced. This is strengthened by the barrier effect of the railway embankment. The structure of the neighbourhoods was based on the rural structure of the former polder, but this is hardly recognisable anymore due to the great variety of parcelling forms. The Lage Morsweg is the only original landscape component that has clearly been used to structure the neighbourhoods.

**Neighbourhoods**

The busy regional arterial road of the Doctor Lelylaan divides the area northeast of the railway line in two main parts: ‘Hoge Mors’ and ‘Lage Mors’.

The Lage Mors is a primarily a low-rise residential district built in the 1930’s and 1950’s along the Lage Morsweg (former country road) with a neighbourhood park in the northeast separating the low-rise from some mid-rise (7-8 storey) apartment buildings from the 1970’s. The low-rise residential neighbourhood of Bockhorst in the 1980’s was the latest expansion of the district, but because of the introvert design according to the ‘woonerf’ (home zone) principle it is not much related with its surroundings.

The Hoge Mors is mainly an apparently loose collection of neighbourhoods of all different characteristics within a regular grid structure. It consists of several building typologies that have been realised by means of small-scaled projects, resulting in a great variety of urban blocks, both in mass as in architectural appearance.

Man started to build medium and high-rise social housing apartment buildings and some single-family houses in the 1950’s, using a grid based on the former rural land division. From the 1960’s the focus was on single-family houses in the owner-occupied sector to balance the neighbourhood. Today former agricultural plots in the area are still being transformed into residential blocks, using the same base grid. On the riverside, several residential buildings in a more open setting, typologically different from the old ribbon developments, were realized in the last decade to differentiate this environment and to improve the relationship between the city and the river.

As a result of this, the characteristic of the Hoge Mors is not very explicit, but because of its variety rather unique, which could be considered as a special quality. The network of straight streets and roads and the old dike road are the only continuities in this area.

**Functional structure**

Apart from some local street shops in the Lage Mors and along the Morsweg (old dike road), most of the neighbourhood facilities are clustered at the Diamantplein district shopping centre in the Hoge Mors. Because of the vicinity of the city centre and larger shopping areas in the Stevenshof district and the Zuidwest district, Diamantplein mainly attracts people from the Mors district for their daily needs. Besides two supermarkets of larger chains, all of the shops are owned by local retailers, which could be seen as the main quality of this shopping centre.

**South of the river: Leiden Zuidwest**

Zuidwest (Southwest) is an autonomous city district, located on the south side of the river, southwest of the historic city centre. Because of its close vicinity to the new station area it is very likely that this area would be influenced as well. The districts was listed as one of 56 ‘problem districts’ of the Ministry of Housing, Spatial Planning and the Environment (VROM) that should get priorities in urban
regeneration programmes, but the district is not in current list that has been shortened to 40 districts. Currently many neighbourhoods in Zuidwest are being regenerated by the housing associations and local government, which makes it a very dynamic district at the moment.

Spatial structure
Just like on the opposite side of the river, the river’s natural path determines the urban structure of the oldest parts of the Zuidwest district and the same as in the Mors district, ribbon developments along the river have been obstructing the relationship between the river and the areas behind the ribbons.

The largest part of Zuidwest is built in the 1960’s according to functional, modernist ideologies most visible in the regular street pattern, dominated by the cross-axis of the two main roads (Churchilllaan and Vijf Meilaan). The latest extension of the district was the Coebel neighbourhood just behind the ribbon developments along the river in the 1990’s.

Functional structure
Almost all of the shopping facilities and community services are clustered at the Luifelbaan shopping centre, the second largest retail area of Leiden, at the crossing of the two main roads of the district. Very recent investments in commercial floor areas and parking facilities caused a substantial increase of the centre’s capacity. The centre, with a combination of local retail shops and large chain stores, now has a catchment area that goes far beyond the district borders. The establishment of a ‘XL’ hypermarket with a large parking garage emphasizes the main quality of the shopping centre: the good accessibility by car.

Oude Rijn zone: southern riverbank
Haagweg
The narrow strip on the along the old dike road can be divided in two parts which are separated by the Churchilllaan. The eastern part has a typical ‘Oude Rijn’ characteristics with houses facing the road, with their backs towards the water and remains of the industrial past with the Heesterboom wood mill. The wood mill site is currently being redeveloped into a mixed-use area with offices, residential buildings, a restaurant and (semi-) public spaces on the waterside, which fits into the strategy to improve the relationship between the city and the river.

The area west of the Churchilllaan is completely different with residential ribbon developments along the Haagweg facing the Oude Rijn, which makes the Haagweg road the only linear public space in the surroundings that is adjacent to the water. Unfortunately the view on the water is obstructed by a continuing ribbon of house boats attached with high fences and hedgerows on the riverbank.

De Groote Vink
In the outside river bend the landscape is currently dominated by an over dimensioned road junction, a leftover of an (unrealised) 1970’s traffic route to The Hague. Because of the construction of the grade-separated junction the landscape was elevated, disconnecting the riverbanks with the area behind it and resulting in an inaccessible waterfront at this location as well. Nowadays this fragmented wasteland is ready for redevelopment, as is shown in initial studies made by the municipality (Gemeente Leiden, 2005 #25)

Before this, at the important crossing of river, railway, tramway and roads, a popular inn and playground were located here, where travellers could rest and people from Leiden could spend their Sundays on a nice location away from the hectic city life. In the beginning of the
railway era the trains would even stop at this spot (on request). This informal connection of different networks, scales and systems is a good example of what a new station nearby, sharing some important location characteristics could mean in both regional and local contexts.

Ter Wadding

On the other side of the current junction, probably on the end of an old sand-ridge, lies a country estate that is partly used as public park. The name of the estate, ‘Ter Wadding’ (Dutch: ‘doorwaadbare plaats’, ‘ford’ in English), refers to a place where the river could be crossed. It emphasises the importance of the location from a landscape point-of-view as meeting point of the Oude Rijn river landscape and the sand-ridge landscape.

6.2 Stedenbaan Leiden De Mors

Projected station area

The new Stedenbaan station is projected just halfway the existing stations Leiden Centraal and De Vink.

In the Atelier Zuidvleugel study the station was projected on the crossing with the Lage Morsweg, while the Urban Unlimited study used the crossing with the Doctor Lelylaan as station location. The last location will be the most realistic because it is better integrated in the urban structure, with the bridge connection to the other side of the river and it has more development possibilities than the Lage Morsweg location, which is pretty isolated. Because of these aspects this study has been using the Doctor Lelylaan location.

De Mors in previous studies

The Atelier Zuidvleugel study saw potentials for this station in their ‘Network scenario’ as ‘Outskirt of many cities’, based on its medium density, its orientation on the central city and its low score when it comes to potential node quality in the public transportation network. A connection to Stedenbaan would mean that this area could also be considered as outskirt of other cities, most likely The Hague. According to this study these centres have little potential to become mixed city-centre developments and should focus on their ‘spacious, green and peaceful surroundings’.

In the ‘Densification scenario’ the station is said to become a ‘Creative city’, which are remarkably said to be good accessible by every mode of transport (car, Stedenbaan, Intercity and other types of high quality public transport). Although this is a rather contradictory with the ‘Outskirt of many cities’ potentiality, this conclusion is probably based on the vicinity of Leiden Centraal (also a ‘Creative city’), the city centre and the booming bioscience knowledge cluster. Because the ‘Sustainability scenario’ focused on the existing stations, De Mors was not considered a future station in this scenario. (Atelier Zuidvleugel 2006)

In the Urban Unlimited study that focused on the environmental differentiation of the Stedenbaan network, Leiden De Mors has been considered very potential because of the densification possibilities in the adjacent regeneration areas on both sides of the river. (Urban Unlimited 2004)
Fig. 3-13: Structure & uses Leiden de Mors
The Mors and Zuidwest districts are both subject of large and small scaled urban regeneration projects. Large areas are owned by housing companies which provides opportunity for change. Also the 7 hectares of industrial land along the river, a function type that does not match the requirements of a Stedenbaan station area, provide redevelopment opportunities. The vicinity of the bioscience knowledge cluster has also to be taken in account in this framework. Another dynamic area is located just north of the projected station area: the current Mors’ sports grounds, which is subject of redevelopment discussions.

Urban Unlimited saw potentials for De Mors to be clustered with Leiden Centraal and together focus on the ‘knowledge profile’ and ‘health care and wellness’. It is also considered an ‘urban stop’ (stedelijke halte), because of its relatively high percentage of young people, students and young urban professionals and a possible destination for higher education. In the study the area, especially the ‘Rijnfront’ (river banks), is projected to be developed for double-income couples, singles and higher incomes. (Urban Unlimited 2005)

**Conclusions**

The studies of Urban Unlimited and Atelier Zuidvleugel show some different, but also comparable results. According to both studies the vicinity of Leiden Centraal, the historic centre and the knowledge cluster can be considered as major opportunities for the development of the area. It should therefore be clustered with the Leiden Centraal area. The location along the Oude Rijn River is in both studies considered as great potential to create a distinctive living environment for people that would like to live near local qualities, with a direct connection to other regional qualities.

**Urban dynamics and densities**

The densities in De Mors area can be defined as suburban. It is remarkable to see that the mid-/high-rise areas have almost the same densities as the single-family house areas. The only area that with a rather high density is the Diamantplein neighbourhood centre, because of large retail surface and the apartment buildings above.
Local initiative with regional quality: “Huis van de Sport”

Huis van de Sport (‘Home of Sports’) is a private initiative of several amateur sports clubs in the Mors district in reaction to municipal plans to build on (parts of) the Mors’ sports grounds. The initiative is based on the assumption that the area can be intensified with a large urban program without losing sports grounds surface. The sports accommodation would even be increased and added with sport-related facilities and services to create a regional sports cluster.

Program

The Huis van de Sport initiative is based on the realisation of:

- At least 400 apartment houses, 2 or 3 secondary schools, offices, a sports hall with room for 5000 spectators, gyms, an athletics track, 9 artificial turf sports fields, parking spaces and possibly an enclosed 400-meter ice rink.

Stedenbaan

From the Stedenbaan point-of-view this initiative has to be encouraged because:

- It creates an area of regional allure that will attract people from the region to this location.
- A Stedenbaan stop within 600 meters (5 to 10 minutes walking) can increase the accessibility of this area.
- A private initiative with a wide social support like this can lead to active involvement of local communities that could be positive for the support of Stedenbaan.
- The initiative is compatible with the theory of sustainable development (and Transit-Oriented Development) in the way it provides a mix of functions: living, working and leisure activities within the framework of multiple land use and public involvement.
- It fits in the densification strategy of Stedenbaan.

Existing vs. new centralities

A new Stedenbaan station will add a new centrality to the area. Besides Leiden Centraal, De Mors is the only area in the Leiden region where this centrality can be connected directly to an existing centrality: the Diamantplein neighbourhood centre. This centre is located within 150 metres of the projected station. The small scaled functional characteristics of the neighbourhood centre around the Diamantplein has to be considered as distinctive quality.

Fig. 3-14: “Huis van de Sport” redevelopment plan
compared to nearby larger scaled centralities as Leiden Centraal area and the car-oriented Luifelbaan shopping centre in Zuidwest.

**Barrier effects**
As been described in the structure overview, the area contains three important structures that cause barrier effects:

- Doctor Lelylaan arterial road
- Oude Rijn river zone
- Railway embankment

From the point of view of Stedenbaan a massive barrier adjacent to the primary station area is a very undesirable situation. A closer look to these structures is been made to find starting points for the design task.

**Doctor Lelylaan**
The Doctor Lelylaan is a 1200 meters long two-lane principal arterial road.

The crossings with bicycle and pedestrian routes are made grade separated via two half-deepened bicycle/pedestrian underpasses and one bicycle/pedestrian bridge. The crossing with the railway line is made with a viaduct underpass. Because of all these grade separated crossings the road has an uneven profile and is largely situated on an embankment. Both of the residential districts have only one car entrance to the arterial. To prevent car traffic between the two parts there is no continuing route possible. Instead, car traffic from one side to the other should always use a part of the arterial road, adding more (unwanted) traffic to the already busy road.

The Doctor Lelylaan is also responsible for cutting off the historical dike road (Hoge) Morsweg, making it a dead-end street, which together with the barrier of the railway embankment shaped conditions for the separate industrial site along the riverside. In the frameworks of the regional bicycle network and the Oude Rijn zone it is desirable to reconstruct the continuous route along the river.

**Future opportunities & starting points**
The realisation of the new connection between the A4 and A44 motorways on the edge of the city (RijnlandRoute/N11-west) could be the starting point for the transformation of the road into a distinct ‘City boulevard’ (Stadsboulevard), which already exists in visions of other main roads in Leiden as the Willem de Zwijgerlaan (Noord) and the Churchillaan in Zuidwest.

**Oude Rijn river zone**
As been described in the previous chapter, the Oude Rijn forms a clear physical and psychological barrier between the districts on both sides. This mainly because of the adjacent ribbon developments, housing boats and industrial site.

**Future opportunities & starting points**
New developments facing and using the water (residential developments, bar/restaurants with water access etc.), the city is orienting itself to the water again in the last decades. In this area, the old Heesterboom wood mill site is already regenerated in this framework with the establishment of a restaurant on the waterside. This process can be taken as starting point to integrate the river back in the city and decrease its barrier effects.

**Railway embankment**
The railway embankment separates the Mors area from the Oude Rijn zone. Within the area only two viaducts provide access to the other
side: at the Doctor Lelylaan and at the Lage Morsweg (in between distance: 350 metres).

**Future opportunities & starting points**
In the framework of a future Stedenbaan station a redevelopment of the industrial site (concrete factory) is very probable, which makes an improvement of the accessibility of this site an important starting point.
A further analysis on redevelopment and transformation of the railway infrastructure itself has to provide more insight in the possibilities to decrease its barrier effects.

Fig. 3-15: Road structure and district/neighbourhood accessibility
7 Line as an object in the urban structure

7.1 Introduction

The Oude Lijn is not only an important connection; it is also a physical, spatial object in the urban structure. Being part of the urban structure, the object relates somehow to the city and to the operations within the city. As an elevated construction, it also has to with the way the city is experienced from the outside.

Further on, the line as an object has a mutual relationship with the organization of the (underlying) landscape and the development and organization of the surrounding urban tissue.

At the time of realization, the city was not an issue because the line ran outside the city borders through the open landscape. After this, the city has grown around the track, which means that it is very likely that the line as an object has had influence on the developments in its vicinity.

Because of the strong historical relationship between landscape conditions and the development and organization of the urban tissue, especially in Dutch cities, it is very likely that the railway line has played a role in this too.

This chapter contains an analysis of the spatial relationship between the railway and the urban structure and an overview of alternatives to the current situation. From this conclusions and recommendations have been made for the approach and possibilities of the line in the framework of Stedenbaan.

7.2 Overview relationship railwayline - urban structure

Starting from the direction of Voorschoten/The Hague, the line enters the city on an embankment. Except for a bicycle and bus underpass at De Vink station, the districts on both sides of the line (also two different municipalities) have little relation with each other. The elevated location of the tracks combined with the low surrounding building heights provide the train passengers with a wide view over the adjacent areas. While the building fronts on the Leiden side are oriented to the line, the other side is turning its back. A green park area strip with an overhead power line is separating the railway from the built environment. After crossing the railway bridge over the Oude Rijn River the
line enters the Mors area. On both sides of the river the railway has been separating old urban and landscape structures as historic dike routes with adjacent ribbon developments. Because of this, the area across the bridge has two different faces: on one side there is a residential district with some relationship to the railway line, on the other side the industrial area along the river turns its back to it. The elevated position provides also at this location a wide view over the area.

As the line proceeds, it runs almost unnoticed parallel to the Oude Rijn River, because of dense ribbon developments that obstruct the view on the water. After passing the viaduct over the Lage Morsweg, a former rural road, the buildings come closer to the line. On the centre/riverside the pattern of a small-scaled 19th century residential district ends abruptly at the railway embankment. On the other side large scaled detached building complexes provide a buffer between the railway and the adjacent residential district. Further on in the direction of Leiden Centraal, the busy Plesmanlaan access road is being crossed. This road is slightly been curved to provide a perpendicular crossing with the railway, which is a sign that the railway was there before the road was realised.

Leiden Central Station (Leiden Centraal) is located on the crossing of the railway and the historic road between Leiden and its neighbouring villages of Oegstgeest and Rijnsburg, which separated this road into two parts: the current Stationsweg (Station road) and Rijnsburgerweg (Rijnsburg road).

In the current urban structure the Stationsweg ends at the station. In the Leiden Centraal area the embankment is been replaced by a retaining wall construction and viaducts, of which the pedestrian passage underneath the station provides the most important pedestrian connection between the old city and the ‘new city’ with the development area, knowledge cluster and medical facilities on the other side.

On the side of the old city, a main city road is located parallel to the railway line (Schipholweg) that is brought underground in front of the station entrance. The road is aligned with business units and office spaces built very close to the railway tracks, which represents the economic value
of this highly accessible location. The railway separates this large scaled business area from the smaller scaled residential area on the other side.

After the Leiden Centraal area the railroad is quickly ‘outside the city’ again: The line is located on a green embankment with low buildings turned away from it. The backside of the city presents itself again: industrial areas and a wastewater treatment complex are located along the line. At the other side the front of the relatively small VINEX residential area of Poelgeest are indeed oriented to the railway, but on a considerable distance because of noise and environmental standards. It has no relation whatsoever with the other side (Merenwijk), a traditional introvert planned 70’s residential district (Dutch: ‘Bloemkoolwijk’), which’ buildings are also on a reasonable distance of the tracks. The distance between the railway and the closest buildings provided space for a green strip park area along the railway, with as main quality the recreational bicycle route that provides a continuous connection between the Leiden Centraal area and the large green areas outside the city (Kaag lakes/Warmond).

From Poelgeest/Merenwijk the line quickly bends away, leaving the urban area, towards Warmond and the Bollenstreek (Bulb area).

**Stedenbaan Oude Lijn vs. A4 motorway**

The existing infrastructure network in the South Wing largely consists of parallel motorways and railway lines. The A4 motorway is one of the busiest road in the Netherlands. Except for Haarlem, the same cities are being connected to each other as with the Oude Lijn railroad.

The most striking difference is that the A4 is connecting the edges of the cities, while the Old Line is connecting the centres with each other. The fact that the A4 is ‘passing by’ and the Old Line is ‘going in’ shapes different conditions for the (visual) experience of the urban areas from both routes.

From this perspective there is an opportunity for Stedenbaan zone to distinguish itself from the A4 zone.

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**Fig. 3-17:** Overview Oude Lijn in Leiden: Landscape line enters the city
7.3 Alternatives to the embankment

There are of course alternatives to the current embankment, but is it realistic to reconsider the physical appearance of the construction?

From a city point-of-view a transformation of the current embankment could be considered if there is an urgent lack of development space or guarantee that existing barrier effects would be decreased/removed.

From a transportation point-of-view transformation could be considered if the current situation is inefficient or an obstacle to the functioning of the train service.

Is Stedenbaan as a driving force able to change the physical appearance of the infrastructure and what if so, will it be technically, economically and socially responsible?

To explore this, a brief overview of recent dynamics on Dutch rail infrastructure is made, after which the possible alternatives are related to Stedenbaan and the Leiden case.
Recent dynamics on the Dutch rail infrastructure

An overview
In the framework of ‘Rail 21’ the ambitious plan for the future of the Dutch railways in 1988, the Old Line between Leiden and The Hague and between Rotterdam and Dordrecht was expanded from two to four tracks. To break the increased barriers Rotterdam (1993) and Rijswijk (1996) got underground tracks and stations and Leiden got a larger station with pedestrian-friendly route underneath the tracks connecting the historic centre with the new development areas on the other side. Due to the realisation of the high-speed rail connection to Brussels and Paris and the Betuweroute freight railway to Germany, Barendrecht (between Rotterdam and Dordrecht) got a new station (2001) in an at-grade tunnel covered under a layer of ground with a park on top.

In Delft, a new two kilometres long four-track tunnel with underground station is planned to replace the present two-track railway viaduct, the last bottleneck in the four-track system.

Also in other parts of the country rail infrastructure has been taken up recently.

Schiphol Airport
With the connection of the national airport to the railway network in by the ‘Schiphollijn’ in 1978, the decision was made to include a 6 kilometres long tunnel with an underground station underneath the airport and its runways. In the mid 90’s the station became an integral part of the airport terminal to improve the interchange between the different transport modes.

Amsterdam Bijlmer ArenA
In Amsterdam, the Bijlmer station was rebuilt in 2007 to provide space for doubling the Amsterdam-Utrecht connection from two to four tracks and the realisation of the ‘Utrechtboog’ flyover (2006) that directly connects Utrecht to Schiphol Airport. The needed interventions were made use of to realise a 70 metres wide pedestrian boulevard aligned diagonally to the railway tracks to connect the districts on both sides. Increasing the available height above this boulevard with almost 2 metres and the use of further decreased the barrier effects of the tracks. With the architectural intervention to make use of the space in between the tracks, making use of natural daylight entrance and spatial effects, the sense of safety (social security) was improved through visual contact and transparency between platforms and ground level areas. (E-architect 2007)

‘World-class stations’
In the Wereldstation (‘world-class station’) concept of the Nederlandse Spoorwegen (Dutch Railways, NS), six railway stations (Amsterdam C., Rotterdam C, Utrecht C., Den Haag C, Breda and Arnhem) will be transformed into “dynamic city portals of international allure” between 2009 and 2013. The main reason for these transformations are the connections to the European high-speed train network that should be operational in that period. In the concept the stations will be comparable with international airports, especially when it comes to the quality of comfort, services and types of amenities within these buildings. (NS Poort 2007)

The concept is going to be tested at Leiden Centraal (no future Wereldstation). Plans are made to upgrade the station building to a multifunctional location with a focus on lifestyle and entertainment. In this concept different ‘worlds’ are created with English names as ‘Food’, ‘Health and Beauty’, ‘Events’, ‘Media’ and ‘To
Go’. For example, a fitness centre is planned to be located in the building. (NS Poort 2007)

**Review of the alternative infrastructures**

A short review of the available alternatives teaches us that the many crossings with the local road network and waterways make it technically impossible to place the infrastructure partially underground without creating new spatial barriers in the urban structure. Tunnels need to come back to surface once, which could lead to new barriers at these locations. An example is the Willemsspoortunnel in Rotterdam.

For the same reason, a half deepened variant or the ‘hollow dike’ principle as in Barendrecht are no serious options. Because of this, only a complete deepened track (roofed over or not) of at least 5 kilometres could be an alternative for the current elevated construction.

A complete deepened or underground construction provides opportunities to densify the urban structure and to strengthen the relationship between different districts. This will require huge investments, especially for a medium sized city as Leiden. It will also cause serious hindrance to the train traffic on one of the country’s busiest tracks, which probably will lead to a delay of projects like Stedenbaan.

From the Stedenbaan point-of-view (half-deepened) tunnels or ‘hollow dikes’ will maybe provide a more efficient train service, but will decrease the spatial experience and relationship of the line and its surroundings.

**Conclusions**

In all of the cases, projects on the local urban scale were driven by needs on a larger scale: urgent needs to adjust the infrastructure to new requirements of the railway network.

Without the need to increase the capacity of the Old Line, Rijswijk would not have an underground railway station and Rotterdam would probably still have an elevated railway running through its centre (almost certainly without the future HST connection). The same counts for the transformation of Amsterdam Bijlmer station, which probably would not even be considered, if there were no need to improve the connection between Amsterdam/Schiphol and Utrecht.

Considering this knowledge, the question whether the Stedenbaan project could be
this kind of driving force that leads to the (partial) transformation of the spatial-physical form of railways through urban areas, could only be answered positively if Stedenbaan is generally accepted as being essential for the Randstad mobility network and only if the current capacity of the network is lacking.

Stedenbaan is projected on the current infrastructure, which will have a larger capacity from the moment the international trains start to run on the new HST track. This means that, besides the Delft bottleneck, it is very unlikely that the physical appearance of the Old Line railway is able to change dramatically with the realisation of Stedenbaan.

Besides this, the review of the possible alternatives made clear that there are many technical and economical limitations to such significant interventions, which makes a complete transformation not very realistic.

### 7.4 Conclusions and recommendations

Because the line was realised outside the historic city borders, the railway has been considered as ‘natural’ border of the later districts, which resulted in weak relationships across the line. Despite of this, there are not many conflicts, because the urban structure has been adapting itself to the railway through the years. At some locations, landscape and urban structures have been separated, resulting in little islands in the city.

Besides the Leiden Centraal area, the line seems to run above the city instead of going through it. The neglection of the railway line has provide a special quality too: the green park area strips at Voorschoten and Leiden-Noord with the recreational bicycle routes to the outside areas.

For the design task a certain balance have to be found between this green quality in a compact city and the need for development space in the vicinity of Stedenbaan.

If Stedenbaan wants to gain a permanent place in the city, also in areas outside the centre, the task has to consider the experience of the city by train. In addition, the separation between city districts on both sides of the line provides opportunities for Stedenbaan station areas to position itself as links between them.

The many crossings with the local road network and waterways make it technically impossible to place the infrastructure partially underground without creating new spatial barriers in the urban structure. These technical and economical limitations together with the lacking driving force, make an (partially) underground railway construction not very realistic in this case, which means that a study on other possibilities based on the current elevated position of the track is recommended.
8 Starting points and goals for the Leiden case

8.1 Introduction
This chapter is the conclusion of the analysis of the Leiden case.

The results of previous chapters are combined and related to the goals of Stedenbaan with the use of a SWOT analysis (Strengths, Weaknesses, Opportunities and Threats). The SWOT conclusions provide the starting points for the design task for the Leiden case, in which the recommendations from theory are combined with location specific ambitions and goals.

8.2 SWOT
The conclusion of the SWOT mark the goals for the design task:
Positive components as strengths should be used and extended, while opportunities should be exploited. Weaknesses should be decreased and threats should be resisted.

The SWOT analysis is not only a comparison of aspects, it is also meant to add value to the outcomes. Most important are the relationships between the components:
After defining a strength that relates to a certain opportunity the focus should be on finding an answer on how this strength could be used to take advantage of this opportunity (Fig. 3.20).
Stedenbaan with station
Historic centre
Dynamic areas
Flexible urban structure
Open green area
Urban park area
Good accessibility through regional roads
Connection to large green areas outside urban area
Direct & save bicycle connections to adjacent districts
Connection to long continuous lines in urban structure

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Stedenbaan with station
Historic centre
Dynamic Leeuwenhoek area (knowledge/bioscience)
Central position between 2 districts
Urban core area: Link between regional qualities
Connecting to the open landscape (recreation etc.)
Connecting green areas
Rijnlandroute/N11-west = extra development space
Strengthening the recreational/green routes
Waterways
Node in surrounding green areas
Fig. 3-23: Weaknesses

- Stedenbaan with station
- Weak relationship both sides of the railway
- Railway line = administrative border
- Green border restricts catchment area
- Barrier effects railways
- Barrier effects waterways
- Barrier effects main roads
- New station close and good connected to Leiden Centraal

Fig. 3-24: Threats

- Stedenbaan with station
- Weak relationship both sides of the railway
- Administrative constraints
- Domination and competition of existing stations
- Rijnlandroute/N11 with new access road adjacent to the railway (extra barrier effects)
### Conclusions and recommendations SWOT

#### City scale (Fig. 3.25)

Distinctive quality environments as the bioscience park / knowledge cluster, the historic city centre and the Oude Rijn River are local strengths which should be used to take advantage of the opportunity of Stedenbaan. Stedenbaan would get a larger meaning at the local scale when it connects to this local qualities.

The long continuous (landscape) lines along the waterways and railway embankment are considered important strengths that should be used to provide access to the (recreational) opportunities of the outside landscape and to provide Stedenbaan stations with a large catchment area.

At the same time long continuous lines, especially the railway, the river and arterial roads, form the main barriers in the city.

Improving the integration of these lines in the city would decrease their barrier effects and will increase the possibility to take full advantage of the Stedenbaan opportunities.

Backsides of the city form increase the barrier effects of the railway line. A integration of the

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#### SWOT conclusions city scale

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<td><strong>STRENGTHS</strong></td>
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| • Local qualities with regional allure:  
  - Strengthen triangle dynamic knowledge cluster - historic city - Oude Rijn river  
• Long continious lines:  
  - City - landscape connectors  
• Local urban dynamics/transformation potentials connect to Stedenbaan programme  
• Strenghten central position stations as node between districts  
• Green-blue areas as special living environments  |
| • Long lines = main barriers  
  - Integration of long lines to break their barriers  
• Stedenbaan vs. railway city’s back side  
  - urban structure towards the railway zone  
• De Vink/Merenwijk: little development space vs. good connections outside green areas:  
  - Nodes city-landscape  |

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| • De Vink / Merenwijk: good (bicycle) acces both sides to/from station vs. barrier railway/municipalities/introvert districts:  
  - Station area as node between districts  
• Use of local urban dynamics/quality/ transformation potentials to develop own distinctive quality/identity new stations against threat existing station areas  |
| • Competitive station areas, dominance Leiden Centraal  
• De Vink / Merenwijk: railway barrier between municipalities and introvert districts  
  - integral cross-border approach needed  
• De Vink / De Mors:  
  - avoid extra barrier N11 access road along railway  |

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Fig. 3-25: SWOT conclusions city scale
railway line in the city will only be possible if the urban structure orients itself towards the line.

Stedenbaan is dependent on development possibilities around the stations. Especially at the Mors and Leiden Centraal areas, present urban dynamics and transformation potentials are considered strengths that should be exploited to connect to Stedenbaan. On the other hand, the opportunity of Stedenbaan provides conditions to develop the potentials of these areas.

The barrier effects of the railway embankment are experienced the most at De Vink and Merenwijk, where the effects are strengthened by the different municipalities and the introvert districts on both sides of the line, which is a threat to the exploitation of Stedenbaan. The good bicycle accessibility in both areas should be used to provide the station areas with a central position (node-quality) between the districts. These barrier operational, functional, spatial and psychological barriers are not only weaknesses, but form also threats to the realisation, exploitation and integration of Stedenbaan at these locations.

To prevent this threat to become concrete, an integral cross-border approach is needed. The lack of development space is also a weak point in these sections. On the other hand they have good (bicycle) connections with green areas outside the city. This strength could be used to position these areas as nodes between city and landscape.

An important threat to new stations are the existing stations that are already having a share in the transportation networks. The local qualities of the new station areas should be used to develop their own distinctive quality and identity, by which they could add value to the existing network. Besides being the main threat to the new stations, the hub function of Leiden Centraal is both its own main quality and weakness. The hub provides many possibilities for Stedenbaan to connect to other networks, but its independent position makes it vulnerable. This weakness could be decreased by improving the functional relations and cooperation with the other stations, which at the same time would take away its threats towards the realisation of new stations.
At district scale, the local qualities of the Oude Rijn river, the bioscience park / knowledge cluster and the historic city centre provide good conditions to connect Stedenbaan to the local scale. A strengthening of their interrelationships would provide even more quality to the Stedenbaan network. The waterside location provides possibilities to create a special living condition (high-quality living environment) near the station. The “Huis van de Sport” private development initiative also provides many opportunities to Stedenbaan to connect to a local quality with regional characteristics.

Because of the lack of potential transportation node qualities, these location qualities should be applied to emphasize the place quality of the area. The area has many existing and potential qualities (waterside/sports area) to develop its own distinctive identity that could add value to the Stedenbaan network and which could be used to distinguish itself from existing stations (threats).

As from the city scale SWOT was concluded, the continuous lines have to be considered as important strengths that could be used to extend

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**Fig. 3-26: SWOT conclusions district scale**

BSP = Bioscience park / knowledge cluster

HvS = Huis van de Sport / mixed-use sports area
the reach of the Stedenbaan station area. The continuous routes in De Mors area are the old dike roads along the river and the provincial arterial road (Doctor Lelylaan), which at the same time limit the potential service area of the new station with their barrier effects. Together with the railway embankment, the arterial road and the Oude Rijn River zone form the main barriers in this area. A better integration in the urban structure would decrease these negative effects.

The small-scaled neighbourhood centre (Diamantplein) close to the projected station provides conditions for Stedenbaan to gain a central place in the local community. For this area, Stedenbaan itself will be a threat because of the expected scale differences. A careful approach is needed to balance the scales.

A very important threat to the realisation of a Stedenbaan station area at this location is the lack of a driving force to make physical interventions in the infrastructure possible and the fact that the main actors, the railway companies, do not have development opportunities (land) in the area.

To attract actors to involve and invest, providing a development perspective of the surroundings with a certain attractive (high-quality) value of its own is needed, from which the need and purpose of a new station could be proved.
8.3 Conclusions and recommendations for design

Scale Leiden

Relation railway line – urban structure
To emphasize the renewed relationship with between city and railway line, the orientation of the urban structure towards the railway line has to be improved. The railway line has currently a too independent position within the city.

Guiding structures
The area has to be viewed from in the context of three structuring subareas.

- Oude Lijn railway / Stedenbaan zone
- Oude Rijn river / waterways
- Main road network

Local qualities with regional allure
The Bioscience park knowledge cluster, the historic city centre and the Oude Rijn River are local-regional qualities that could add value to the Stedenbaan and Zuidvleugel network. It is recommended to strengthen their interrelationship in order to create a strong entity. Leiden Centraal is already an important link between the old and new centre. The area around Leiden de Mors could connect the Oude Rijn to this network.

High quality living environments
From the framework of Zuidvleugel / Randstad 2040 there is a need for high quality urban living environments. Especially green-blue areas have much potential to become such metropolitan areas. The presence of such areas in the Stedenbaan zone is an important quality which should be enforced. The Leiden De Mors area which could be connected to the Oude Rijn River has the greatest opportunity to become a high quality Randstad living environment.

Scale De Mors
The new Stedenbaan station which places the area in the context of the Zuidvleugel/Randstad networks, the vicinity of the dynamic bioscience knowledge cluster and the historic city centre, and its location along the Oude Rijn River provide the main ingredients for the area.

Node vs. Place
Because of the limited share in local and regional public transportation network, also with the new station, and the vicinity of the Leiden Centraal hub, Leiden De Mors would not become an important interchange/transfer spot. The regional road connection does provide opportunities for intermodal interchange (Park and Ride), but is undesirable because of the inner city location.

The node quality has to be obtained by an efficient service of the direct surroundings (R=1200 m), in which more sustainable transportation modes as cycling, walking, and possibly by water, have to be supported.

To optimize the service area of the station and the station area it means finding a solution for the existing physical-spatial and psychological barrier effects caused by the Doctor Lelylaan/Churchilllaan corridor (regional road), the railway embankment itself and the Oude Rijn River zone.

The station area has to get a central function in the more local networks, in which it has to benefit more from existing qualities and has to start using the area’s currently underutilized potentials. The Oude Rijn River and the long lines along the waterways for example, provide possibilities for strengthening the recreational use in the area.
The design has to express a careful balance between the new regional scale and this local quality. Because of this, the station should be positioned as “Neighbourhood station with a regional accent”]

**Programme**

Besides the relatively small industrial area, the area mainly has a residential character. The conditions provided by the vicinity of the centre, the dynamics of the knowledge-based economy, and the waterside make the area attractive to extend and differentiate this residential use. These conditions are independent from the realisation of a Stedenbaan station. From the perspective of Stedenbaan and Transit-Oriented Development a more mixed-use programme is desired, especially uses that could have a sustainable relationship with both station as the local community.

**Guiding structures**

In the area 4 guiding structures have to acknowledged:

- Main road networks
- Oude Lijn railway / Stedenbaan zone
- Oude Rijn / riverbank zone

**8.4 Recommendations**

Further design studies to local station areas have to provide a better insight in the instruments that could be used by designing and planning the station area. It is also important to further explore the possibilities for the intensification of the area.

**Place quality**

As TOD has the ambition to play an important role in the community, place making is one of the most important conditions.

The lack of possibilities to develop itself as transportation node and the many ‘place quality’ opportunities (residential character, waterside, neighbourhood centre, recreational use etc.) provide the main conditions for positioning the area as a place quality node that is oriented on sustainable transport modes.

**Scale differences**

The small-scaled functional characteristics of the neighbourhood centre around the Diamantplein has to be considered as a distinctive quality compared to nearby larger scaled centralities as Leiden Centraal area and the Luifelbaan shopping centre in Zuidwest. This quality should be applied to emphasize the differences with those centres. It provides conditions for a human scaled community around the new station which perfectly fits in the theory of Transit-Oriented Development.
Urban core area: local qualities regional allure

Oude Lijn railway development zone

Connecting outside green areas

Rijnlandroute N11 + urban development

Waterways: regional connectors

Connecting urban green network

Regional road network

Redevelopment areas

Long continuous lines: city-landscape connectors

Strengthen bicycle connections adjacent districts

Fig. 3-27: Design task city scale
Stedenbaan + station + service area
Urban core area: local qualities regional allure
Connecting to local-regional sports area
Redevelopment areas
Redevelopment railway zone De Mors/Centraal
Connection local and regional centralities
Quality living environment to water
Decreasing barrier effects
Connecting centralities
Waterways: regional connectors
Connecting urban green network

Fig. 3-28: Design task district scale
Design study: practices and design instruments

Part IV.
9 The Berlin City Rail (Stadtbahn)

9.1 Introduction

The Stadtbahn is an 11 kilometres long railway line through the centre of Berlin, built as an elevated line, mostly on viaducts, and realized in 1882 to connect former terminus stations on the city’s edge with each other. The route was not only influenced by the location of the already existing stations the line was supposed to connect, but also by land availability in the city centre. Because of this, the line is snaking its way through the urban fabric, apparently independent from the rather linear urban structure, just like the river Spree does. The line hosts long distance, regional, suburban, and local urban services (S-Bahn) on four railway tracks.

Leiden is not Berlin

Of course, in general, the provincial town of Leiden is incomparable with the global city of Berlin. Besides these scale differences, other contextual differences are important to acknowledge: In the Leiden situation the city was not an issue because the railway line was constructed outside the city’s borders of that time. In Berlin, the city was already there which explains the choice to build an elevated track with numerous viaduct arches and bridges to avoid crossings with existing traffic flows. Because of the minimal availability of space the total width of the structure is made as limited as possible. The structure made it possible to place all service and technical spaces underneath. Further vaulted spaces along the line could be rented for shops, businesses, storage or pubs, restaurants etc. in order to (partially) earn back the invested capital.

This resulted in a railway line which importance goes beyond its transportation function. The strong interrelationship between the line and the urban fabric is the main reason why the Berlin city rail is subject of a reference study for this project, because it is an important aim of Stedenbaan and Transit-Oriented Development.
Besides this, there are also some important similarities between the two corridors in Leiden and Berlin:

- Both corridors are running elevated through an urban fabric.
- Both corridors have four tracks, two for intercity, two for (sub)urban services.
- Freight traffic with dangerous goods is minimized on both corridors.

**Scale levels**

On the city scale, the position of the line in the city has been explored, before zooming in on a specific station that is comparable in scale with the potential new Stedenbaan stop at Leiden De Mors. The main focus was on the position in different networks, on the relationship with the direct surroundings, in which specifically on the relationship with other public spaces.

In this area three levels of scale have been explored:

The scale of the walkable area around the station, the scale of the direct surroundings of the station and that of the station itself.

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Fig. 4-2: Overview of the Berlin Stadtbahn with stations and connections

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9.2 The city line

The line finds its way through the urban structure apparently apart from everything else. It directly connects places in the city in a way the straight road pattern cannot, which explains the special position of the line in the city. The fact that the line had to adjust to an already existing urban structure resulted in a great variety of appearances and experiences of the structure itself and in relationship to its surroundings.

In the most western part, the line is still caught in a regular city grid in a dense urban environment, from which it proceeds alongside the green Tiergarten park towards the course of the river Spree. Via the newly developed central station area the line snakes its way through the dense urban structure of the older districts. Due to this, the structure has different sorts of relationships with the city. Sometimes the line apparently cuts through urban blocks or even a building, alongside backsides and inner courtyards and then it is suddenly part of an open park environment before flowing parallel to the river course. The same river is being crossed several times and on certain locations the line just follows the street pattern.

It is striking that in all of these situations the line accommodates to the specific circumstances. Sometimes it is a very present element in the urban structure and sometimes it just stands back, subordinating itself to its surroundings.

Little barrier effects

The historic relationship of the city with the line (city was there first) is the main reason that the four-track railway line causes so little barrier effect. The construction had to be extremely flexible to avoid being an obstacle to the city. The street pattern remains continuous without strange deviations at the railway crossings. The buildings are often built very close to the railway (also new buildings), which simply denies the line to attract much attention in a visual sense. The line is far from being a guiding element in the total urban structure; a principle that is maintained in new development and restructuring plans. On the other hand, the structure is getting more involved in the city as planners and developers recognize its distinct qualities.
Besides this, most of the spaces underneath the arches are used by urban amenities that give the structure a certain meaning on ground level.

All of these aspects add to the perception that the areas at both sides of the tracks are equal to each other and that there is no ‘other side of the railway’. The Stadtbahn is part of the urban interior of Berlin.

9.3 Hackescher Markt station

The Hackescher Markt S-Bahn station is the oldest and most beautiful of the stations along the Stadtbahn. Apart from its distinct architecture, the station is famous for the several bars, restaurants and retail stores underneath the building’s arch viaduct construction.

The station is a good example of a ‘regular’ station (only local S-Bahn service) along the city railway that is firmly rooted in the local urban tissue, which is why it is considered to be a useful reference to the Leiden De Mors project area and comparable project areas.

Relationship interior-exterior

The station’s architecture with its decorative and very detailed finishing represents the important position of the railways in the late 19th century. The masonry facade appears to be fully enclosed from the outside, but because of smart use of (semi-) transparent faces in both façades and roof, the platform space inside is very light. From the platform, people can catch a glimpse of the outside world by looking through nicely formed rounded windows. At night, platform lights shining through the transparent parts of the façade together with façade illumination add to the entourage of the public spaces outside.

The island platform and the adjacent S-Bahn tracks are covered for about 100 metres and completely separated from the regional train traffic (express service), which is diverted around. This situation offers comfort for the passengers, protecting them against miserable weather conditions and loud passing through trains. It also emphasizes the separate domains and gives a certain distinction and identity to the S-Bahn service.
Two pedestrian passages underneath the tracks provide access to the island platform as well as a connection between both sides of the station.

9.4 Hackescher Markt area

In the station area two separate parts can be identified: an urban place area on the north side and a traffic and transportation area on the south side.

The northern entrances lead to a triangular public square enclosed by the station building and the buildings facing it. This space is primarily pedestrian area with many bars, restaurants, and retail shops on the ground floors of the buildings including the station building. The south side can be identified as the transportation side, with bus/tram stops and (kiss-and-ride) parking facilities close to the station entrances for a smooth passenger interchange between the different modes. Despite of all this traffic, pedestrians have priority on this side too. The pedestrian area on this side is only crossed by one-way tramlines, which affect the pedestrian quality as little as possible. The motorized traffic is being diverted on a proper distance of this area. Like on the other side, the spaces underneath

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**Fig. 4-5:** Hackescher Markt analysis: Pedestrian Priority

- Stadtbahn viaduct
- Pedestrian area: public
- Pedestrian area: Sem-public
- Semi-public pedestrian passage
- Distance from the station entrance in metres

**Fig. 4-6:** Hackescher Markt analysis: Public space network

- Stadtbahn viaduct
- Public plaza / square
- Station square: Transportation space
- Urban park area
- Semi-public park area
- Public plaza / square
- River promenade
- Hackesche Höfe courtyards
- Sidewalks/pedestrian street
- Main pedestrian routes

**Fig. 4-7:** Hackescher Markt analysis: Direct station surroundings

- Tram + stop
- Pedestrian priority area
- Main road
- One-way traffic street
- Park & Ride
the arches are being used by people oriented uses as bars, restaurants and small retail shops.

The two semi-public station passages and two public underpasses at the edges provide a relatively transparent connection between the two areas on both sides of the station. Because of this, the Hackescher Markt station has a very central position in the centre of a pedestrian only/priority island within a 100-150 meter radius around the station. Because of the fact that the one-way single-lane streets that bound most part of this ‘island’ are relatively easy to cross by foot, the total area that can be defined as pedestrian friendly is in fact much larger and includes large public spaces like the Monbijoupark, the Spree river promenade and the Hackesche Höfe courtyards complex.

**Attractions**

Important Berlin places and attractions as the Museum Island, Alexanderplatz and the Hackesche Höfe are within easy reach of the station area, which increases the importance of the station.

**Places and routes**

The Neue Promenade alongside the northern façades of the square crosses the railway viaduct diagonally and connects the triangular square with another triangular space, a little park between the railway and the river Spree. Also on this location, cafés and restaurants occupy the spaces underneath the arches, added with terraces in summer, which increase the social safety and vitality of the public space.

The route along the Neue Promenade is extended with a route through the little park that leads towards an open arch underneath the railway line, through which the park is connected with the larger Monbijoupark on the other side. By making use of the flexibility of the arches construction this passage way was relatively

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**Fig. 4-8: Projection Hackescher Markt area on Leiden De Mors area**
easy to construct. Because of this, the little park could be considered as entrance space of a larger park space, making the railway line at this spot to be experienced as part of this whole. In this case, the railway viaduct, the park and the river can be looked upon as interrelated components of a single place instead of individual elements in space.

Because of the wide pedestrian promenade that runs along a large part of the river, the little park can also be considered as important link in the larger network of public places in the area.

Hackesche Höfe
Hackesche Höfe is a complex of eight interconnected courtyards with residential, commercial and cultural spaces. Because of its location in the vicinity of the Hackesche Markt public area and the fact that this semi-public complex is only accessible by pedestrians adds another dimension to the pedestrian friendly environment around the station.

9.5 Conclusions

City scale: the line as urban interior
At city scale the Stadtbahn case showed that an elevated railway indeed can be an integral part of the urban structure. It is part of the urban structure by being ‘absent’. Its flexible construction is its main quality, which enables the line to adjust to its surroundings, but its coherent architecture (both line and stations) emphasizes its special status as the city’s backbone.

Spatially, the viaduct construction limits physical barrier effects in the urban structure. Functionally, the available space underneath the arches enables efficient land use and conditions to contribute to local street level networks. Apart from street level, the line provides different and variable perspectives to the city. From the train, passengers get an outside view of what the city is all about, with the possibility to stop at interesting places; a quality that emphasizes the importance of the visual appearance of the areas adjacent to the line.

Station area: Node as place, place as node
The most striking aspect of the Hackescher Markt case is the fact that the station area is not only a transportation node, but also an important node in the network of public spaces and cultural life. Taking the S-Bahn or transferring between (public) transportation systems does not have to be the goal for going to this area. People are given the opportunity to go there without having a particular trip in mind, because of the presence of public services or just for fun, because of the quality of the surroundings.

Identity / recognisability
The distinguishing character of the area is mainly because of the rather organic structure of the urban tissue at this location. The typical morphology together with the linear element of the Stadtbahn resulted in an apparently fragmented series of public spaces with unusual shapes, like the triangular park and square. This composition makes the place identifiable and recognizable.

Wide variety of (semi-) public spaces
All of these public spaces are multi-layered:

- The station square as centre of cultural, social activities and nightlife, as central starting and meeting point or market square.
People-oriented uses as bars, restaurants, retail shops and community services generate activity among people and provide possibilities for interactions.

The design of the station shows some basic aspects that support the S-Bahn product: light, transparency and overview improve the feeling of safety among the public. The overall roof and the separation from express trains provide a comfortable waiting area and make the system legible and recognizable. The architecture makes the building itself a recognizable attraction and advertisement for the S-Bahn service as well as for the total Hackescher Markt area.

Station scale:
The Hackescher Markt case showed that with the right layout and design, the station itself is able to attract people to use the train product. Therefore, the focus have to be on making a comfortable, socially safe building that can be used in a legible, efficient way.

Its design represents the ambition and character of the transportation product.

The fact that the station is opening itself up to its surroundings, in a functional as well as in a spatial-visual sense, decreases the transition between the different domains and sets the station, as well as the product it represents, in the centre of the local environment.

The method of physically separating the domains of the different train services that make use of the tracks emphasises the special status of S-bahn within the Berlin transportation networks and makes the station legible and comfortable.
10 Local station area (re)developments

10.1 Introduction

To get a better understanding of how in practice has been dealt with local station area (re) developments, two Rotterdam metro stations and their surroundings have been explored: Spijkenisse De Akkers and Capelle Centrum. Both are smaller, local station with elevated tracks outside the main city centre, which makes them comparable with Leiden De Mors case. The analysis is been made based on the basic conditions for station areas from the theoretic framework. In the conclusions of this analysis a feedback is given in relation to Stedenbaan and the design location Leiden De Mors.

10.2 Spijkenisse De Akkers (1985)

Spijkenisse De Akkers is a metro station on a viaduct at the end of both Rotterdam metro lines. The station is located in the heart of an extension district of Rotterdam satellite town Spijkenisse and is developed and built simultaneously with the surrounding neighbourhoods as central place in the community.

Centre area

The station is located in the middle of the central, car free neighbourhood centre that comprises a covered indoor area (shopping passage) and an outdoor area around a small neighbourhood square. Most of the shops are situated inside, while the outside area is mixed-use. (shops and community services) The retail stock consists of a mix of local and regional/national shops, which shows the dual (local/regional) character of the area.

Transportation: reach and chain mobility

The station has an island platform because of which only one platform entrance is needed. The entrance space below the platform entrance has two exists: one leads to the little
neighbourhood square, the other leads to the clear backside with guarded and unguarded bicycle parkings and a kiss-and-ride location. A short walk provides a connection to local bus lines. There is a clear separation between the ‘Alpha’ (front: place) en ‘Beta’ (back: transport/node) of the station.

An extensive bicycle path network connects the station area to the surrounding neighbourhoods. There are also sufficient parking spaces (Park-and-Ride) available that are shared with the shopping centre. Considering the urban structure and the distance to the next metro stop (1000 m) the reach or service area is estimated to be 500 to 1000 metres from the station. In the direct station surroundings most neighbourhood/community services can be reached within 100 to 150 metres from the station entrance.

**Place quality: domain of pedestrian and cyclists**
The central part is the domain of the slow-paced traffic; car traffic is being diverted around. The pedestrian dominates the mixed-use core area with the little square and the shopping passage. With dragging the distinct pavement underneath the viaduct, the domain is extended and emphasized. Further from the core, the residential streets are made pedestrian/bicycle only with safe (eyes on the street) and direct bicycle paths leading to adjacent neighbourhoods.

**Shelter**
The small dimensions of the pedestrian square provide shelter to the wind. Along the sides arcades in front of the facades also provide shelter. The shopping passage and the metro station are fully enclosed and having a indoor climate, with very little relationship with the outside.

**Social (un)safety**
The uses along the square have their front entrances at this public space. The apartments above these ground floor uses are also overlooking the square. The Alpha side is therefore being watched during day and night. The inside oriented shopping area has important negative effects when it comes to social safety at the streets at the backsides of the shops that are primarily meant for retail supply. Outside loading hours the lack of surveillance prevents people for using these parts of the station area. It is remarkable that the Beta side of the station is adjacent to such an area, what
especially at night decreases the attractiveness of the station area and neighbourhood centre.

**Density**
The narrow street pattern with primarily mid-rise apartment buildings in the core emphasizes the difference between the station area and its surroundings, which mainly consist of single-family houses. The residential tower next to the station’s entrance provided an instant density increase for the area. It also represents the scale difference and can be seen as landmark for the metro station and centre area.

**Legibility/identity**

The rather modest design keeps the station on the background and merges it into its surroundings. It presents itself as being part of the centre area, as one of the choices and opportunities this area provides. The transportation function seems to be less important. Nevertheless, the station cannot be missed because of its visible location above the main bicycle access route and the entrances along this.

**Barrier effects viaduct**
The barrier effects are minimized due to the design of the elevated track as a viaduct construction that at the core is being merged into its surroundings. Dense building underneath and adjacent to the viaduct prevent the viaduct for being too visibly present. The space underneath the viaduct is being used efficiently with the location of one part of the shopping passage on one side and a large supermarket and parking spaces on the other side. The station entrances and the entrance of the large supermarket are located at the underpass, which makes this location full of activity during the day. (at least until the supermarket closes)
10.3 Capelle Centrum (1994)

Metro station Capelle Centrum is one stop before the last stop on the Rotterdam Calandlijn metro line. Same as Spijkenisse De Akkers, this station is located on a viaduct.

**Centre area**

This station is also located in a centre area, in this case the centre of the Capelle municipality, because of which several municipal and cultural institutions are located in the vicinity, for example the town hall and a theatre.

The centre is actually still in development, because the metro station was realized through an existing neighbourhood at the time. The metro made it possible to develop the existing neighbourhood centre into a town centre with regional qualities.

*(Gemeente Capelle aan den IJssel 2006)*

**Transportation**

The station has two platforms, one for each direction that can be accessed on both ends of the platforms. One side leads to a central car free square, the other to a district access road with connection possibilities to local and regional bus lines. This side also provides parking spaces for cars and bicycles. From this location several bicycle paths lead to adjacent neighbourhoods, but the regular urban grid structure does not provide direct routes to and from the station. Compared to Spijkenisse the routes are not located through or along residential streets.
**Place quality**

Car traffic is diverted around the car free centre area and parking and retail loading spaces are situated along this route. At these locations cars and backside of shops determine the character of the streetscape. The central square is a pedestrian domain. Although the square is crossed by an access road on one side, materialization and traffic restrictions (narrowed lanes, speed humps, no parking along the road) make the road be experienced as part of the square space.

The relationship with the shopping centre is not clear. The most important shopping area is located in a indoor passage which partly runs underneath the viaduct. This is a result of the fact that shopping centre and station were not developed simultaneously as in Spijkenisse. Plans exist to improve this relationship.

**Shelter**

Compared to the Spijkenisse case and the Berlin Hackescher Markt station the platforms are barely covered, but the entrances and staircases are. There are also covered waiting spaces provided at the platforms. The shopping centre is completely covered, but inaccessible at night. Arcades in front of the facades at one side of the square provide the possibility to shelter as well as the viaduct construction itself.

**Social (un)safety**

Along the square are public oriented uses located (theatre, bars/restaurants) that provide liveliness and surveillance during day and evening hours. Above these functions residential apartments are overlooking the square. The metro viaduct dominates the opposite side with no activity underneath. The shopping centre is closed at night, which causes one long side of the square

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**Fig. 4-17:** Projection Capelle station area on Leiden De Mars area
to be left without any surveillance during these hours, which is strengthened by the presence of the viaduct. The area on the edge of the core is the real backside of the area with backsides of shops, parking and loading spaces. Also at this location the public surveillance is lacking at night, which add negative effects to the safety of the metro entrances and bicycle parkings on this side.

**Density**
A neighbourhood with mid-rise buildings and a lot of retail space surrounds the station. Just outside the core area (=200 metres from the entrances) areas are characterised by low buildings and single-family houses, which shows a certain difference in scale. The vicinity of large open traffic spaces (main access roads within 10 metres of the station entrance at the transportation side) give the area nevertheless a not very dense impression. There are plans to change this situation and organize a much higher density in the core area. (ibid)

**Legibility/identity**
The station building itself has not much identity. The main aspect that attracts attention is the massiveness of the viaduct construction. From outside the core area there is not much attraction because of the closed backsides of the shops.

**Barrier effects viaduct**
The viaduct has sufficient height to provide a barrier free passage, but it does not fit on a main public space as the central square. The concrete construction seems massive and heavy and attracts too much attention. These aspects make the viaduct to be experienced as visible and psychological barrier between the shopping passage and the central square. Plans have been made in which the space underneath the viaduct will become part of the shopping centre, with front entrances to the square. (ibid)
10.4 Conclusions and recommendations

Recurring elements

In the cases recurring elements can be identified that have been applied.

District scale (R=1000 m)
- Central place in area because of:
  - Cluster uses and services in core area
  - Higher densities and mixed-use in core area
  - Radial bicycle routes to central area
- Chain mobility services due to:
  - Direct bicycle routes and bicycle parking
  - Easy connection to local bus lines
  - Sufficient parking space

Scale core area (R=300 m)
- Mixed-use in core area
- Higher densities in core area
- Pedestrian/bicycle priority in core area
  - Car free / car restricted core area
  - Social safety “eyes on the street”
  - Climate shelter
- Identity/legibility station area
- Station as integral part of the surroundings

Scale station (R=100 m)
- Attractiveness station and transportation product
  - Identity/legibility station building
  - Social safety around station entrances

- Efficient transitions to other transport modes
- Climate shelter within and around the station

Important lessons

The centre function around the stops is important for the integration of public transportation in the city. In Spijkenisse this has been pushed pretty far, while in Capelle its is still in process. Important are the uses and amenities that stimulate surveillance through the day and which are supportive to the transportation product. The theatre next to the station in Capelle is a good example of such an amenity. Another important aspect is the visual and functional appearance of the retail area. The cases show that the first 50 to 100 metres from the station entrances are crucial to the experience and use of the station area. In addition, the following metres are also important because they determine the potential reach of the area. The indoor shopping areas provide a sheltered and safe passage during daily hours, which is a huge difference with the closed backside routes that have to be taken at night. The case of Spijkenisse showed the importance of safe bicycle routes from and to the station.
Considering the identity/legibility aspect the modest position of De Akkers is remarkable. The station building is levelled to its surroundings, which shows resemblance with theories on Transit-Oriented Development in which the community plays a central role and the transportation is more supporting.

In both station areas there is a separation between a place side and a transportation (node) side. It is remarkable that in both cases this separation emphasises the presence of two complete different worlds. A rather safe, comfortable, sheltered place opposed to a traffic side with lacking surveillance on the backside of the core area. There might be more balanced compositions possible.

Relations to Stedenbaan/Leiden De Mors

The Rotterdam cases show resemblances with the Leiden De Mors case in the fact that all of the cases are located outside the main urban centres. The main difference is that Leiden De Mors in both directions would be connected to the larger regional network, while the metro stations are located at the end of local metro lines.

The Spijkenisse and Capelle case both involve introvert shopping centres, just like the Diamantplein shopping centre in the Leiden De Mors area. The backsides are the main problems of this shopping centre typology. Indoors they are safe, secure and comfortable, but on the outside there are many ‘dead spaces’ that, especially at night, do not fit in the desirable streetscape of a safe and attractive station area. It is recommended that the difference between front and backsides should be avoided in the design of a Stedenbaan station area.
Fig. 4-18: Overview Urban design principles and instrument for the approach of Stedenbaan at local scale levels
11 Urban design and planning instruments

11.1 Introduction

This chapter contains the overview of the urban design and planning instruments for the approach of Stedenbaan/transit-oriented development at local scale that have been identified during the process. It can be read as a generic conclusion of what Stedenbaan means for the urban design and planning task at multiple local scale levels:

- Scale of the city (agglomeration),
- Scale of the city district/Stedenbaan service area (R=1200 m) and
- Scale of the station area (R=300 m)

The instruments and themes are summarized in the scheme in Figure 4.18.

First an overview is provided on the themes and conditions that apply to the approach the different scale levels, after which the tools/instruments that could be used are explained briefly.

Certain themes and instruments apply to more than one scale level.

11.2 Themes and conditions

General themes and conditions

Network quality

Randstad/Zuidvleugel and Stedenbaan is about thinking in terms of networks. First in terms of the transportation networks, but also thinking in which other spatial-functional relationships Stedenbaan could be having with its surroundings. This means a continuous focus on the way places interrelate and what ways they provide additional value to the quality of the total network.

Efficient land use

Stedenbaan aims at intensified land use around the stations. At city and district scale this means getting an overview of existing land use patterns in the Stedenbaan service area and the way they relate and should relate to the Stedenbaan product.

At district and station area scale it more concretely relates to the question of what kind of intensification is needed for the specific area to be able to meet the goals of Stedenbaan. In urban areas a higher density in building and functional programme is preferred in the direct station surroundings.

Diversity of special living environments

Stedenbaan is part of the strategy of increasing the competitive position of the Randstad. The strength of Randstad/Zuidvleugel is characterized by its diversity. Increasing the diversity and amount of attractive high quality living environments is therefore an important goal. The diversity has to be expressed on different scales, not only on the Randstad/Zuidvleugel scale, but also within the specific agglomeration and further on within districts and station areas.

Experience of the city

Stedenbaan has to gain a permanent position in the structure and activity networks of the Zuidvleugel. Stedenbaan symbolizes a change in the use of the existing railway network and its relationship with its surroundings. It therefore needs a distinct character, focused on its central location in the urban areas, which should be different from the character of the parallel motorway networks along the edges of the urban areas. It is important to experience going through the city instead of passing along.
Themes/conditions at city scale
To express the quality of the local diversity of the Zuidvleugel and Stedenbaan networks, the focus has to be on finding local ingredients with at least regional allure that can be connected to the Stedenbaan network. It is concretely about defining local aspects with at least regional quality that could represent the identity of the Zuidvleugel, of which Stedenbaan is a part.

Because Stedenbaan consist of intensifying existing urban areas, an overview is required of the urban dynamics at city scale:
What spatial issues take place at local scale? What are development possibilities and which areas and land uses within the reach of Stedenbaan should be considered for transformation/restructuring?

Also the experience / perception of Stedenbaan and the urban area has to be noticed: a renewed view on the spatial-functional relationship between city and rail is desired. Conditions have to be shaped that could add to the experience of going through the city and which could attract Stedenbaan passengers to make use of the diverse qualities of the local station areas. What aspects form bottlenecks/obstacles / barriers in the relationship between city and the railway and what possibilities are available to strengthen this relationship?
Stedenbaan has to be considered in the framework of the total accessibility of the Zuidvleugel, which also involves local accessibility. At city scale it means getting comprehension of the quality of the local transportation networks and the possibility for Stedenbaan to connect to this. It also requires a view on the interrelationship between different nodes in these networks, especially the relationship between the individual Stedenbaan stations.

Themes/conditions at district scale
At district scale the focus has to be on shaping conditions that strengthen the reach and position of the station area, which, in its turn, should strengthen the Stedenbaan product. From the transportation point of view, it means giving special attention to sustainable transport modes as walking and cycling. At this scale, the focus has to be on creating direct bicycle routes to the station area.

It also means defining the limitations of the urban structure, especially barriers, that are threats to the efficient use and accessibility of the station area.

For Stedenbaan/TOD the core (R=300m) around the station is essential. At district scale it is important to mark this core area and to outline the spatial-functional conditions this area should have and in what way it should relate to its surroundings. At this scale the local networks have to be determined that could be connected to the regional networks provided by Stedenbaan.

Themes/conditions for station areas
At station area scale, the quality of the station surroundings is essential. The focus has to be on its quality as being as node in transportation networks as well as its place quality (place-making).

It is about creating an attractive, walkable, people-oriented mixed-use environment, in which the station itself forms an integral part. Next to the basic conditions for a good station area like comfort, safety, efficiency and legibility, Stedenbaan/TOD require an active role for the core station area within the local community networks and the connection to the regional scale. This requires a view how to deal with
scale differences and side effects that would occur with the realisation of the station.

11.3 Tools and instruments

**Tools/instruments at city scale**

*Local qualities with regional allure*

To express the quality of the local diversity of the Zuidvleugel and Stedenbaan networks, the focus has to be on finding local ingredients with at least regional allure that can be connected to the Stedenbaan network. These qualities could be related to special living environments, functional zones, cultural history, economic core areas etc.

*Local dynamics*

An overview of the local dynamics is needed to define starting points for developments that could relate Stedenbaan to the local scale.

*Thematisation of the network*

With thematisation the different elements of the network could be provided with a distinct character/identity in relation to others, which adds to environmental differentiation of the network. Special attention is required on creating diversity on different scales to prevent homogenous environments on the lower scales.

**Tools/instruments at district scale**

*Densification-living quality*

Intensification of land use will increase the pressure on the open spaces within the urban areas. Especially in already compact and densely built urban areas, it is essential to directly compensate the further densification of these areas in terms of living quality.

Next to the quality of the built environment (architecture, typology) the emphasis has to be on the quality of the adjacent public spaces, the accessibility of the outside areas and the connection to recreational networks.

*Distinct network of public spaces*

Creating a distinct network of public spaces within a compact area is a place-making tool that emphasises the place quality of an area. The network itself should be attractive and diverse enough to be able to function on its own. Integrating the station area in such a network emphasizes its position as being a place and node between places. It can be used to express the identity and recognisability of an area.

**Direct and save bicycle/pedestrian routes**

Direct radial slow-traffic routes, make the station area attractive and efficient for the use of these sustainable transport modes and involves the orientation of uses and building fronts to the routes. It represents the priority of these modes over especially car use. It therefore goes hand-in-hand with means to reduce car-use in these areas (e.g. diverting motor traffic).

**Domains**

A division in domains is a tool that can be applied to deal with complexities of station areas as scale differences and different users, transport modes and their demands. It can also be used to create multiple distinct identities of places within a compact area (diversity) and to make complex areas as this legible for its users.

**Tools/instruments for station areas**

*Central position station in a people oriented area*

A central position of the station in an area which layout is focused on people activity is a basic instrument for place-making. It is based on:

*Pedestrian priority*

The station exits lead directly to pedestrian friendly areas, where pedestrians have
Spatial buffers can be used to design transitions between areas that need to be approached carefully. It is different from a barrier, because interaction is still possible. In Stedenbaan station areas this mainly relates to scale differences between the regional oriented station area and local neighbourhoods.

Spatial buffers can be formed by buildings, landscape features, but also infrastructure.

**Climate shelter**
Shelter against the elements is needed to provide comfort to the users of the station area, which adds to the attractiveness of the area and the transportation product. It particularly applies to routes to/from the station, the transition between transport modes and the station itself.

**Compact station area**
Multiple uses and experiences within walking distance from the station result in efficient land use and the possibility to combine multiple trips.

**People oriented uses facing the public spaces**
Ground floors of buildings are filled with people-oriented uses as that make the public spaces attractive in terms of social safety, efficient land use and liveliness.

**Central position station area in network of public spaces**
A wide variety of (semi-) public spaces in walking distance of the station entrances is a great quality that makes the area attractive for different users. A central position of the station area in this network provide opportunities for both transport and neighbourhood to attract uses from different scales.

**Multiple land use**
Multiple land use can be applied as tool to create efficient land use within the station area. Especially in areas where infrastructure is claiming lots of valuable space, this instrument can add to the integration of these structures within the city as well as the transportation modes they serve.

**Eyes on the streets**
Having public spaces watched over during the day and night provides the area with social safety, an important condition for an station area. The focus should be on orientating building fronts with people-oriented uses and residential uses with their front entrances to the public spaces.

**All sides are front sides**
Designing all building sides adjacent to public spaces as front sides is related to “eyes on the streets”, with the difference that it also represents the hierarchy within the urban structure where place quality is not only needed for specific uses.

**Flexibility in urban blocks**
A flexible urban structure provides conditions for future changes and mixed-used environments. Flexibility within urban blocks is an instrument to facilitate diversity also at the lower urban scales.
Design: Stedenbaan in Leiden

Part V.
12 Structure Vision Leiden
Oude Lijn zone

12.1 Urban networks

Green-blue recreational network
The largest green areas are located outside the urban area. Densely built urban areas require more from these green areas than just their ecological qualities. Current policies already contain strategies to improve the accessibility of these green areas to increase the recreational value of these areas. The Randstad residents then could be using these areas as urban park areas.

Stedenbaan could form an important link in this.

Within the Leiden area the green areas on both sides are been dragged into the city by the Oude Lijn railway and its adjacent green strips. The other way around, improving the recreational bicycle routes in the railway zone could add to the accessibility of the green outside areas. The extensive network of waterways should also be playing a large role in these recreational networks.

Urban structure
Within the Leiden region there are little possibilities for urban extension. The green borders on both side of the Oude Lijn railway limit the potential service area of Stedenbaan. The discussion on the A4-A44 connection (Rijnlandroute/N11-West) could be used to create extra development space within the service area of Stedenbaan stop De Vink. This is only possible if the route is planned along the edge of the urban area.

The main task is to transform or restructure industrial areas, business parks, sports grounds and other sites within the service area that are being used extensively at the moment and/or just do not fit in the perspective of Stedenbaan.

The Oude Lijn railway line has to become a more integral part of the urban structure, by decreasing barrier effects. Location of the new stations on the crossings of existing routes provide better conditions for a quick connection of Stedenbaan to the local urban networks.
High quality living environments

A goal was set to create several high quality (mixed-use) living environments along the line. At city scale, existing quality environments as the historic centre, the prewar districts and the Oude Rijnzone have to be added with other types of quality living environments. Especially areas within or along the green and blue structures deserve consideration. Because of the accessibility provided by Stedenbaan, the vicinity of the historic centre and the economic knowledge cluster, The Oude Rijn riverbanks at Leiden De Mors are designated as high quality urban waterfront living environment. At Leiden Centraal the urban character and the great accessibility are the main qualities that have to be used to further develop the area as high quality urban area with a wide range of urban uses, services and dwelling types. The areas around Leiden Noord/ Merenwijk and De Vink have a rather suburban character. These locations provide conditions for living environments that focus on the green character of the surroundings.
The western part of the ring is been made part of the overall vision to increase the accessibility of the railwayzone as well as the city itself. It also provides development potentials in the area between Leiden Centraal and Leiden De Mors, making this area one of the most accessible locations in the region.

12.2 Spatial-functional zones at city scale

At city scale, there are three important urban and landscape structures within that could provide a distinct spatial-functional identity to the Stedenbaan area.

- Oude Lijn railway / Stedenbaan zone
- Oude Rijn river / waterways
- Main road network

For these zones independent visions have been developed that together form an important part of the overall vision at city scale. Apart from this, the Stedenbaan assignment asked for a general vision on station and station area development.
**Vision Oude Lijn railway / Stedenbaan zone**

The Oude Lijn / Stedenbaan has a dual character: it can be considered as line through the city as well as line in the city. The analysis made clear that the line through the city is in fact a line that is running above the city. Within the city the line itself is not considered as quality.

The main qualities are the green strips with the recreational bicycle routes and little park areas along the embankment that the Oude Lijn railway is dragging along. This value has to be strengthened, but at the same time the land use has to be intensified. The line above the city has to become a line in the city.

Particularly at the station an experience of ‘landing’ in the city has to be created. The buildings have to react on the railwayline, which results in a larger scale of uses and building typology in relation to the surroundings. From the city the importance of the line would be emphasized because of this.

The public transportation node and intercity station Leiden Centraal is at the highest level of local transportation hierarchy which has to be emphasized. The building density has to be larger than at other areas, there will be more and higher high rises possible and the buildings have to be built very close to the tracks. (Gemeente Leiden 2005)

At other locations the buildings have to situated detached to the embankment to ensure the green strip would stay visible. A typology that fits in this vision is the ‘box on stilts’. (See figure 5.5) By sharpening the edges, the green strip has to become a more distinct domain instead of the current fragmented wasteland.

**Vision Oude Rijn zone**

Outside the centre the Oude Rijn is often a rather ‘forgotten’ river, the backside of the city. In current policies and studies developments along the waterfront that orient themselves and/or make use of the water are being stimulated. This is not enough: The Oude Rijn River needs to fulfill a larger role in the urban networks again. The recreational function of the water is a quality that has to be maintained and extended.
The river banks are currently too little accessible. The focus has to be on those locations where future accessible riverbanks are possible to establish routes along the water that strengthen the total recreational network in the region.

Especially the area around the new Stedenbaan station Leiden De Mors has to adapt to this. It is important that networks play an essential role in the planning of Stedenbaan areas. It is imaginable that Leiden De Mors would be the starting location of a Oude Rijn or Groene Hart cruise for example. A (students’) water sports club that is located in the area could attract members, public and contestants from outside the region due to the Stedenbaan connection. This kind of function could also be combined with (student) housing. Also in the field of transportation the water could benefit the network quality of the Stedenbaan station if it would be used for water-based transportation as water taxis or buses that could improve the accessibility of residential environments along the water or could provide a nice and easy transport to the city centre.

The Oude Rijn zone is characterized by small-scaled residential ribbon developments with gardens along the water, alternated by larger scaled industrial complexes. The development area at Leiden De Mors should find an balance between these typologies. Related to Stedenbaan the densities of the current river banks would not be sufficient.

**Vision main road network**

The Leiden main road structure is not unambiguous. In the municipal plans the main roads have to develop into ‘city boulevards’. The traffic function have to be connected to the city, with buildings and programme oriented to the streets, which will decrease the barrier effects of these structures. Along these accessible city roads there is space for larger scaled building typologies and programme.

**Vision stations and station areas**

The current tendency towards stations is that the station buildings itself are considered more than just train stops. Stations have become products that have to be developed into ‘dynamic city portals’ with (international) allure. They have to become experiences of their own due to a service supply that goes beyond the train product. (NS Poort 2007)
Box 5.1  Network of possible activity patterns

HOME

WORK

on to go
It is not about the station itself, it is about the area and the networks of which the station is part. In case of Stedenbaan being a gateway to the train product that serves the region should be station’s priority. The direct surroundings have to support the product and vice versa. The station should function as link between scales that meet over there. The multifunctional station building as NS is advocating is a threat for the legibility of the station itself. Multifunctionality or mixed-use should better be applied to the direct surrounding instead of only the station building.

Berlin Hackescher Markt, Amsterdam Bijlmer ArenA, but the small metrostation of De Akkers have been good examples of locations at which the station building effaces itself from its surroundings. The Bijlmer ArenA viaduct is part of the urban interior, which is a quality that suits a station that first has to gain a place in an existing urban structure and urban networks. Besides this, recognisability remains important: the station’s presence should be experienced because it is important for identity of the area. Further on, basic conditions of a good station area as social security, traffic safety, comfort and legibility have to be taken in account as well as an integral approach towards the relation of different transport modes (chain mobility) and users in the area.
13 De Mors

13.1 Spatial-functional main structure

To reach Stedenbaan’s goal to intensify land use around the stations, the direct station surroundings have to be developed in a high programme and building density. The primary densification is planned in the core area of about 300 metres (=5 minute walking distance) around the station entrances. On the edges the dense and compact core will be compensated with the creation of new public green spaces or with upgrading the existing. The water of the Oude Rijn River is designated to be the most important open space in the area. With improving the accessibility of the waterfront and with the organization of activities along and on the water, the river should get an important function in surrounding networks.

13.2 Nodes and routes

Nodes and routes serving different levels of scale will together form the network of De Mors. The direct station area is the location at which every routes and scales come together, making it a central place in the district. In this case, the nodes are primarily places: spaces and uses that...
serve their own type of users, which allows them to generate movement by their selves.

The function as node in transportation networks makes it important to create direct and formal routes to the station. At the same time the place aspect asks for ‘slower’ indirect, more informal routes that stimulate people to stay and enjoy the area. This requires different qualities.

The station is the most important node because it serves the transportation network. It connects to the larger regional scale that allows people to transport to other regional places but on the other hand it also brings people from outside into the local networks. An important direct connection is to the “Huis van de Sport” mixed-use sports area, a node on local-regional scale.

The programme along especially the formal routes has to be oriented on the slow-traffic that will be its main user. The ground floors need to be flexible for small-scaled businesses and people oriented functions which generate activity along the routes which could be connected to the transportation function. An example of these activity patterns is explained in box 5.1.

**Central district axis**

The connection is made by a central district axis: a route for cycling and walking that connects the nodes on higher scale (station and sports area) directly and at the same time will function as ‘heart line’ of the neighbourhood. To accomplish this, it also connects to several ‘neighbourhood nodes’ such as the neighbourhood shopping centre, a community centre and the neighbourhood park, which gets a qualitative upgrade. (Densification=compensation aspect)

**New bridge and routes: Green-blue connector**

A new slow-traffic bridge increases the service area of the station area and the functions on both
The distinct location makes this node act on the scale of the city, as link between city districts. A new green route on the river bank links this node to the green-blue recreational network.

sides of the river (e.g. Sports area) and connects to the green-blue recreational network. The bridge in the extension of the neighbourhood grid structure has a direct route (pedestrian/bicycle) to the station node and the existing neighbourhoods on the other side of the railway line. These routes also meet each other at this location, which also requires place quality to the node. The green-blue recreational character of the location influences the spatial-functional composition of this node.

**Node opposite bank: District connector**
Another important node is located on the opposite river side near the current bridge. This node on the interface of water, green and main roads, has to drag the station’s service area over the psychological barrier of the river.
13.3 Subareas

Within the main structure four spatial-functional subareas have been identified:

- Main road networks
- Oude Lijn railway / Stedenbaan zone
- Oude Rijn / riverbank zone
- Mors / neighbourhood zone

The first 3 are part of the regional structure, which has been described in the previous chapter. (Structure vision) The Mors subarea is related to the structure of the current Hoge Mors neighbourhood.

A study to the relationship between these zones made clear that a separation into different enclaves or domains could provide the subareas with their own distinct identity, which makes it possible to create a diversity of living environments within a limited area. This separation increases the importance of the intermediate zones and public spaces (‘liminal spaces’ (Hajer & Reijndorp 2001:128-129)) that now have to function as links.

Main road networks

The Vondellaan is extended and connected to the Doctor Lelylaan to finish the ring structure. To prevent an increase of the barriers effects, the traffic speed of the through traffic has to be reduced. A solution was found by interrupting the continuous route of the Doctor Lelylaan at the new ring road. With a curve the ring road is led underneath a new railway viaduct onto a new river bridge. This firm intervention creates development opportunities at locations that are currently cut off by existing infrastructure. From the perspective of Stedenbaan obtaining more and better usable development locations can be justified.

The road curve slows down the traffic, which emphasizes the presence of the station area.
Because of the legibility of the area the station is projected above the new route, providing a visual ‘gate’ that helps reducing the traffic speed. In addition, the road section between the curve and the bridge is considered to be part of the surrounding station area with pedestrian priority, which influences the materialization and width of the road profile. The buildings and uses along the main roads join the scale of these roads according to the ‘city boulevard’ concept. The building fronts and its ground floor uses will be oriented to the streets. Due to the accessibility by car and the location just outside the station core area, the zone is able to attract larger scale uses than the core.

**Oude Lijn railway / Stedenbaan zone**

The Oude Lijn – Stedenbaan zone is the strip adjacent to the railway embankment. The buildings react to the scale of the railway, what can be perceived by the scale differences with the buildings in the adjacent zones. The buildings are detached from the embankment. To further emphasize the domain, current ditches adjacent to the railway will be widened, new ditches will be created and water will be let in from the river. Because of this, the ‘head’ of the area will be detached from its surroundings to express its special location on the intersection of waterways and railways. The height difference is being overcome with the realisation of a park hill with a distinct building form, like a castle, on top of it. Because of its location just outside the core area, the building will mainly include residential uses, with possibilities for other ground floor uses (grand cafes, restaurants) that can take advantage of the green park hill. The hill provides space for underground parking space.

In the area to 200 dwellings (in the park hill building, reference De Whale, Amsterdam) and up to 30000 m² of office space/educational space is possible.
Fig. 5-21: Sections “Place-Node” & Subareas/domains
Box 5.2  Relationship existing centre  
– new station area

From the theory was learned that the relationship between old and new centralities is a qualifying aspect. In the case of Leiden de Mors, the main neighbourhood facilities are located within 150 metres of the projected Stedenbaan station. As TOD has the ambition to play an important role in the community, this could lead to several variants:

Merging. The current neighbourhood centre moves towards the new station area, forming one strong centrality in both local and supralocal networks.

Separating. Because of its connection to the larger scale, the new station area is considered as independent space that mainly relates and reacts to the regional scale level. The current neighbourhood keeps located at the same spot, serving the local community.

Buffering. The current neighbourhood centre keeps located at the same spot, still serving the local community, and will function in harmony next to a centre around the station that also relates to the regional scale.

In the first variant the neighbourhood centre will be absorbed in the larger whole. Several scale levels will be skipped.

In the second variant the local and regional centres are working apart from each other. The current barrier effect of the railway embankment could be maintained or even increased to emphasise the different ‘enclaves’. Because of their disconnection, they probably will not harm each other nor strengthen each other.

In the third variant the in between spaces are critical as they connect the different scales.

The third variant is applied in the design for the Mors area. The images at the right show the design of the buffers with the use of mass and spatial domains.
**Oude Rijn / riverbank zone**

The building in the riverbank zone connects to existing programmes that want to make the Oude Rijn River an integral part of the urban life in the region again. The location has also much potential to add a distinct local identity to the Stedenbaan network.

The concept is about forming a contrast between both sides of the river. A large part of the northern bank will become part of the direct station area and will therefore get a rather urban character, while the other side will become its green opposite.

**North bank**

The northern bank is according to the structure vision designated as high quality living environment. In this area a rather high building density with relatively low building heights is aimed for, to meet the needs of Stedenbaan and to fit in the structure and visual quality of the Oude Rijn zone.

Within this context the aim is a public space structure that would primarily be a pedestrian domain in which the place aspect would be the key element.

**Typology**

The organization principle is inspired by the spatial composition of the areas along the Oude Rijn, at which the dike road provides the main access of continuous small-scaled ribbon developments facing the road, and its industrial variant that provides more flexibility and space to integrate larger scaled solutions and to create diverse spaces in between the urban blocks. The flexible typology makes a high building density possible. Because of this, and the fact that a pedestrian environment has to be shaped, car parking has to be solved within or under the urban blocks.

**Public spaces**

The dike road is the only continuous line in this zone, but opposed to the original principle space is left between the building plots to create an alley structure perpendicular to the dike road that connects the public spaces of the dike and the station square with the river. There is no continuous route along the water, but there will be some public places along the water which are connected by a informal network of alleys and inner squares.

**Programme**

The node on the intersection of the riverbank and the Stedenbaan zones, bicycle routes and water, on the transition to the green-recreational networks requires a programme that connects to these specific aspects. Because of this, a small harbour area along a quay is projected at this location that provides space for river cruise boats (‘Groene Hart cruises’), recreational boating and connected facilities like stores and restaurants. The building typology in the riverbank zone makes it possible to built in a very high density (FSI=3) with an estimated programme of 700-800 dwellings and 9000-18000 m² of mixed-used programme.

**Southbank**

As compensation for the intense land use on the opposite side the south bank will be oriented on increasing the environmental and recreational value of the area. The hard-edged urban side will therefore get a greener and more natural counterpart.

At the south bank the view of the Rhine is obstructed by a wall of houseboats and high hedges.

Due to the busy Haagweg it is hardly possible for slower traffic to get to the Rijnoever.
Fig. 5-22: Line through the city

Fig. 5-23: City axis ends in lowered station square

Fig. 5-24: City axis: slow-traffic domain
New pedestrian/bicycle bridge and quay with link to water transport

Direct route to the station

Legible station area: domains, recognisable station building
Fig. 5-28: Diike road as intermediate space
Fig. 5-29: Overview flexible blocks riverbank area
Fig. 5-30: Overview station area
The green river bank increases the importance of the Oude Rijn as ecological connection within Leiden.

Along the waterside a slow-traffic route is projected, with respect to the natural banks, which enhances the perception of the surroundings. The route ends by the node near the new Churchill bridge. This node will have to be made as a prominent building, with a form and materialisation that takes advantage of this striking location. At least the ground floor of the building must have a public function, preferably a socio-cultural city scale function.

**Morszone**
Distortion of the district grid is used to create recognizable places and new, more direct routes. For this, a single urban block, designed as unity, divides the space and will function as a natural spatial buffer between the district scale and the regional scale of the station. It also brings in a rather high density (FSI=3, ±200 dwellings, 1100 m² retail). The Diamantplein shopping centre will need a transformation from the current introvert situation.

The covered part will be removed, which will have the advantage of placing the shops at a new square. Part of the stores will get a place in the new block alongside the central district axis.

The redevelopment of this part also includes new residential blocks which composition follows from the district grid. The streets between these blocks are pedestrian area, parking has to take place underneath/within the blocks.

In the Morszone an estimated programme of 600 dwellings and 8000 m² mixed-use is possible.

### 13.4 The direct station area

The direct station area is the most important part of the core around the station, the node-place aspect being the most prominent.

**Node vs. place: Two squares**

The choice has been made against a strict division between alpha and beta sides: both parts must have some place quality, with the difference that the main focus of the district road side is towards traffic and transportation (node-aspect), while on the other square the place aspect dominates.
The public place/square connects to the central district axis and the dike route and is lowered compared to ground level which accentuates its own domain and as well as the surrounding domains, while reducing the visual and psychological barrier effect of the viaduct. The viaduct becomes a structural part of the square (urban interior), and provides shelter to users of the area. Because of this, all of the supporting transport modes facilities (bus stops, bicycle parkings) are located underneath the viaduct, next to the station entrances.

**The station**

The squares are connected by the station building, which will be placed as a light construction under a new viaduct. The station will have two entrances, one at each side of the main road. In this way the range of the station is increased and unsafe situations with cyclists crossing the road in a hurry are avoided.

As been mentioned earlier, the station is projected above the main road, in which it is able to attract attention, slow down the traffic and emphasize the transition between zones and districts.

The platforms and entrances have to be completely covered to provide the users with a comfortable setting. In the design is been chosen for the Hackescher Markt concept with an enclosed island platform, which also emphasizes the Stedenbaan domain. This concept is also been used in the Leidschenveen RandstadRail station (Figure 5.33).

13.5 Programme overview

Most of the programme is mentioned before per subarea. Figure 5.34 provides an overview. To summarize this:

The direct station surroundings have to be focus on efficient use of the transport network. Uses that can be located here are people and transport oriented. The viaduct provides efficiency and shelter for the transfer between transport modes, like bicycle parkings and bus stop close to the station entrances.

Along the routes to and from the station, especially the slow-traffic routes the ground floors have to provide space for small scaled, people oriented uses; uses that could provide opportunities to combine multiple trips in one:
people can leave their child at day care, before having some breakfast at the coffee corner and taking the Stedenbaan to their work area. Along these routes there also have to be residential uses oriented on the public spaces (eyes on the street).

The Oude Lijn/Stedenbaan zone provides space for larger scaled uses like offices (people oriented) and (higher) education. The larger scaled buildings work as buffers between the railway track and the more vulnerable zones. The riverbank zone is a high density mixed-use zone, and is defined as high quality urban living environment oriented on the water, with a wide variety of building and residential typologies. The Mors/neighborhood zone focus mainly on the relation with the existing neighborhood. Next to residential uses, the area functions a community centre, with the focus on the daily needs of the inhabitants.

![Diagram of programme types in different subareas](image-url)
Conclusions & Evaluations

Part VI.
14 Evaluation

14.1 Design task and implementation

Reflection city scale
The city scale vision concentrated on defining and connecting local qualities to Stedenbaan, the experience of the railway zone as new urban centrality and front side of the city and the search for a large meaning for Stedenbaan in regional and local networks. The most important reason to consider the line as an entity was the idea that another view on the use of the railway infrastructure should involve a different relationship between line and city that goes further than just interventions in the direct station surroundings. The design task has made it clear that an integral approach of the railway zone can indeed be of value to the spatial-functional relationship between city and railway line. An approach focused on one complete partial section provides opportunities for an urban area to present and position itself as being coherent under a Zuidvleugel/Randstad umbrella. After the study the conclusion was that this specific situation, in which the railway line was realized prior to most of the urban area, did not result in major problems on local scale, because the entity of the line has always been taken for granted. In the beginning of the project there was this belief that the urban area as a whole should get a stronger relationship with the railway line, but due to a better overview of the spatial-functional differences between areas along the line a direction was chosen that provided opportunity for different types of relationships between city and line. Another belief in which the railway embankment was considered a rural leftover that did not match its present urban surroundings, was followed by the perception of the special status and quality of the embankment as a green entity in an densely built urban environment, which was then taken as a guiding element for the design. In this way it could have a more distinct quality and function for the city and its local networks.

An evaluation of the design and process is making it clear that the station areas are obviously the key elements of Stedenbaan, but that a decreased distance between stops provide less possibilities for former intermediate zones to be neglected.
The vision at city scale was mainly focused obtaining limiting conditions for the design at district scale, which resulted in the fact that the other stations have been discussed too generally, which caused their mutual relationship within the Stedenbaan network to be a bit under-exposed. This can be regarded as a recommendation for further study or elaboration of the design.

Reflection district/station area
For the design of the Stedenbaan station area at Leiden De Mors the focus was primarily on the balance between place and node, the relationship between old and new centralities and the realization of compact and diverse urban living conditions in a higher building density.

Also without a Stedenbaan station the location offered more than enough starting points for a spatial design task, which provided it with more body, but also more complexity. The final result differs rather radically from the current situation, especially in relation to the spatial and programmatic intensification of land use that has been established, which resulted in the transformation of a rather ordinary residential neighbourhood and a little attractive industrial site into a district with Randstad quality with a distinguishing local identity.

It is not as if a Stedenbaan station area would not be possible if the transformation would be limited to the current industrial site. This little island in the city would set perfect conditions to create a regional enclave within the city, but the influence of Stedenbaan would then limited as well. It is an answer to the self-created task based on the premise that Stedenbaan needs a statement to emphasize the importance of the spatial scale it connects to. The competitive location between two existing stations also added to this. A blueprint for the ultimate station area simply does not exist, nor does it for a Stedenbaan station area. It all depends on the location specific characteristics, which should be employed to provide this station area type with identity to distinguish itself from other station areas in the network. The typologies applied in the design are derived from the inspiration of the location and followed the structure vision in which the location was designated to develop into a high quality urban environment based on the vicinity of the city centre, the knowledge cluster, the accessibility and the waterside. It has been a creative act on the given situation that could have had a more traditional design as well, but which was chosen from the partially personal need to create an unique living environment.

The functioning of a station area is very much dependant on the quality of the details. Because of the different scale levels that were subject of this project, the project was not able to finish with a very detailed station area plan. The design is been made on such level that conditions are set to make a further elaboration possible. It is flexible towards the future architectural design, programme and design of the public spaces. This is needed because areas like these are very susceptible for social and economical changes. It is recommended for an elaboration to focus on a more detailed view on the transitions between public and private spaces and the consequences of the increased density, activity and movements within the area for the relation between the street profiles, building programme and typologies.

Physical interventions
The division in different environments appeared to be a tool to deal with the complexity of different scales and structures and to
guarantee identity and quality per subarea. It is a relatively safe way to give shape to a complex node like this, but it is legible and emphasizes the diversity within the area. The choice to maintain the structure of the existing embankment with the addition of new and extended viaducts is made because a complete transformation is technically and economically unrealistic. Multiple land use of the elevated tracks like in Berlin could be a future possibility when the pressure on the available space becomes higher, but in the current situation this will be too complicated and in fact unnecessary to reach the goals. The structure is not causing major problems in the city and the continuity of the transportation system has the main priority. The location simply does not lend itself for a application of this method, which has probably to be considered on a larger (city) scale to make it feasible. Just a smaller underpass or no intervention at all by using the existing viaduct over the Doctor Lelylaan would be a possible affordable alternative, but will limit the allure of Stedenbaan and development potentials in the station area by maintaining the barriers. Eventually, the pressure on this underpass will increase which would lead to new undesirable conflicts. The proposed interventions for the ring road, the new bridge and the extended railway viaduct are not necessary conditions for a Stedenbaan station area, but have been applied to provide a more integral solution to current and future conflicts at this location. This is derived from the need to provide Stedenbaan with a larger meaning in the entire local transportation network. The design also contains the demolition of existing dwellings, a decision which is based on their relatively low density, the limited typologies, the building quality and lifespan and the fact that they are primarily owned by housing corporations. Most important was the fact the situation after 2020 has been considered. Maintaining these dwellings and integrate them in the plan of a station area at this location will still be possible, although it limits the development possibilities because most of these dwellings are located within the station’s primary service area (R=300m). Keeping this dwellings will therefore need to involve restructuring to create a more diverse living environment. The perspective and ambitions of the station area should then also be adjusted to the more suburban residential qualities of the surroundings.

14.2 Stedenbaan design and planning instruments

The main objectives of this study as been written in the introduction (Chapter 1) were:

... to provide guidelines and recommendations for the approach of Transit-Oriented Development programmes as Stedenbaan in existing urban fabric and the way existing railway infrastructure can be used.

And:

...to add to the overall knowledge of the implementation of these regional programmes on the local scales and what this means for urban regeneration programmes and urbanism in general.

The principles as been described in Chapter 11 provide an overview of what Stedenbaan means for urban design and planning on different local scales. It can be seen a spatial translation of the theories on Transit-Oriented Development, Stedenbaan and station area (re)development as well as the input for the design task.
These principles focus primarily on the spatial aspects, while urban regeneration also involves social aspects. As a spatial development programme, Stedenbaan cannot meet local social demands in general, but planners have to be aware for the consequences of their interventions.

The tools/instruments have been derived from the theories and cases that have been analyzed and reflected upon during this study. Because the study was focused on just a part of content of Stedenbaan / Transit-Oriented Development, new station areas in urban regeneration areas with the use of existing infrastructure, and oriented on the specific Leiden design case, there are probably other conditions and especially instruments that can be applied to this kind of projects.

In this study, the principles were helpful to get grip on Stedenbaan and its backgrounds, to give direction to the design study, to define the design task and to the design itself. Compared to the urban design principles for Transit-Oriented Development as been described by Peter Calthorpe (Calthorpe 1993), this study’s principles are less concrete. Besides the fact that research to Transit-Oriented Development is far more advanced, the Stedenbaan specific situation of building within existing urban areas, using existing infrastructure, in the framework of a polycentric Randstad, is very much dependent on location-specific characteristics, which makes it hard to express the desired Stedenbaan quality in general terms. Despite the fact that these instruments were helpful for this study, they are not ready to be handed over to the local actors that will have to deal with Stedenbaan in practice. For this purpose the instruments have to be elaborated and extended with results of other type of Stedenbaan cases.
In this context, local neighbourhoods in the vicinity of railway infrastructure are going to be confronted with the regional scale if a new station will be realised together with a Transit-Oriented Development related strategy. In addition, the perspective of the large infrastructure within the city, often considered as physical and psychological barriers between city districts and exceptional elements in the urban tissue, will change.

In this study the research questions were:
- Can a regional programme as Stedenbaan, based on the principles of Transit-Oriented Development, be deployed for local urban regeneration?
- How should we treat infrastructure barriers within this context?

A brief answer to the main research question will be:
Yes, under certain conditions, Stedenbaan can be deployed for local urban regeneration.

Stedenbaan is a project of which the spatial programme mainly consists of transformation and restructuring of existing urban areas. Its related
theory of Transit-Oriented Development also acknowledges the great potential of intensified and changed land use in inner city areas. As a primarily spatial development programme, Stedenbaan itself cannot be used to solve local social problems and issues. Stedenbaan does provide opportunities for regeneration programmes to adapt to the future changes, but local actors have to ensure that social needs are being taken in account.

An active interaction between the regional overall ambitions and possible and desirable implications at the local scale is important to gain a balanced end result. The dominance of economic driving forces at station development processes could be a serious threat for existing social structures and the success of TOD/ Stedenbaan. A broad public and private support, awareness and understanding of each other’s interests is essential for the parties involved.

A new view on the existing railway infrastructure also means a new view on the relationship between the city and the railway zone. It is not realistic to expect an existing urban area to completely adjust its structure and systems to the theories of Stedenbaan or Transit-Oriented Development and move towards the railway zone, but at locations where it is possible, a new orientation towards the public transportation network could be used to provide the urban structure with new dimensions. Areas that are to be regenerated in this way could obtain a new position within local and regional networks.

At the city scale, Stedenbaan is about defining and connecting to local qualities with regional allure, the experience of the railway zone as new urban centrality and front side of the city and gaining a place in regional and local networks. At the district/station area scale the Stedenbaan task focuses on the balance between place and node, the relationship between old and new centralities and the realisation of compact and diverse urban living conditions in a higher building density. The goal is to gain a permanent place in the activity patterns of people in its surroundings.

In cases where a Stedenbaan station area is able to really fulfil a central role within its surroundings, it can be a starting point for local urban regeneration, but the direct station surroundings have to offer sufficient development opportunities, especially within a radius of 300 metres around the station. Designing and planning a Stedenbaan station area as being a place is essential to attract people and to create a centre of activities.

There are a certain conditions that should be acknowledged:

First, Stedenbaan has to take a clear position in what should be accomplished with the local station area (re) developments. Should they just be planned to add to a more efficient use of the transportation network or should Stedenbaan station areas be more? In its current policy Stedenbaan is too much focused on the transportation networks, while its motivation and underlying ambitions go further than that.

The dual character of station areas as being nodes and places, provide these areas with great potential for playing an important role within and in between networks on different scales levels. These potentials can be exploited the most if these areas are seen in the framework of a complementary network.
Stedenbaan does not clearly acknowledge the importance of the place-aspect as basic condition for its station areas, while transit-oriented development principally does. It is a condition that clarifies what is expected from such areas. The lack of such a vision keeps a clear gap between what is regionally expected and locally possible or desirable. Because the responsibility for the planning and realisation is designated to the local authorities there is need for a clear position-taking in the way Stedenbaan should be implemented on the local scale.

As a transportation project, Stedenbaan would first be associated with accessibility and mobility issues. Stedenbaan could mean more if it also would be involved in local accessibility and mobility issues. An integral approach like this would have positive effects for a larger area, also for local urban regeneration programmes that are not directly influenced by the station area (re)developments.

Local authorities, inhabitants and the private business sector should be made aware of the fact that Stedenbaan is not just an independent provincial project, but that it is part of a more extensive strategy to increase the international competitive position of the Randstad as a whole. It should be emphasized that local qualities are the main ingredients for Stedenbaan and an active participation of local actors is therefore very important.

Possible future regeneration areas (past 2020) should be part of planning process in an early stage. The ambition of Stedenbaan exceeds the current concrete agreements that were made for the period until 2020. The largest transformation tasks will have to take place after this. To make sure Stedenbaan will be able to add value to the local urban regeneration programmes of tomorrow, these areas should already be defined and explored.

Stedenbaan refers to a different view on the existing transportation network and the urban development policy. As it aims to gain a permanent place in existing urban networks and to become the backbone of the Zuidvleugel the change it stands for and the importance of the spatial scale it connects to have to be emphasized. The future changes along the corridors and especially around the stations have to be thorough to express its intentions. For existing neighborhoods the transition from a local to a regional neighborhood and from back side to front side of the city means a complete different orientation and position. A spatial attention is required to the spatial-functional transitions and relationships between existing local centralities and the new local-regional centrality around the station.

15.1 Barrier effects

(Infrastructure) barriers could limit the service area of a station area, which is negative for the accessibility and use of the transportation product. To increase the reach of the area it is important to decrease the spatial-functional and psychological limitations of barriers. Barriers are not considered unwanted at all locations. In some cases a separation of environments is desirable, for example as border between industrial areas and residential areas, large-scaled and small-scaled environments. Reference studies to local station areas showed the importance of place-making as a strategy to integrate station areas, the transportation systems they connect including its infrastructure,
in the city. By considering a station area as a qualitative place with sufficient choices in activities and living environments, initial problems as scale differences and spatial-functional barrier effects could be overcome. The Leiden De Mors case showed that on the one hand there was a need to break the many barriers within the area, but on the other hand to (partially) maintain them to emphasize the scale differences and the diversity in living environments. In the design the barriers have been decreased, but not entirely removed, which makes them function as buffers. To which level barriers are being maintained depends on the location specific situation, but it remains a fact that a Transit-Oriented Development or a Stedenbaan station area will benefit most from a situation where areas on both sides of the transportation line are being considered equally and are able to complete each other.

15.2 Relationship Product, Area and Networks

As a final acknowledgement, the study made clear that the success of Stedenbaan depends on the relationship between three components: The public transport product, the area around the stops and the quality of the networks that are connected to this area. If the product fails to attract people, because of an unsafe station, an inconsistent time schedule or uncomfortable trains or platforms, the possibilities for the development of the networks and the station surroundings will be reduced. unsafe, monofunctional surroundings of the station will have consequences for the attractiveness of the product and the quality of the network. A good product and well designed station area cannot function without good supporting networks.


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