ENVIRONmetroMIX

Strategic Design Proposals for Amsterdam Zuid-Oost
Metro station environments and their Neighbourhoods
in order to stimulate Urban Interdependence and Coherence in the District

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Summary

This Master thesis deals with metro station environments in the district Amsterdam Zuid-Oost. The metro is one of the main public transport modes in the district, however these station environments are not well integrated in the neighbourhoods. Often these areas are neglected and seem forgotten, while travellers need to face these environments daily.

On top of this the district does not have a very good image, this is due to both urban morphological and social issues. The district was designed according modernistic ideals, functions were separated which allows minimal interaction. Roads are elevated and have hierarchical network characteristics, causing even less interaction between urban elements and public space users. A lot of undefined public space is created due to elevated infrastructure, these dark and unpleasant environments are associated with illegal businesses. And these businesses do exists, because the district is dealing with a high rate of crime and drugs dealing. And at the same time the district has a lot of unemployed inhabitants. In this Master thesis I have tried to find design guidelines or design concepts which can be used to integrate a metro station with its surrounding neighbourhood in order to create a lively, attractive and useful metro station environment. The strategy follows: redevelopments around metro stations can function as hubs to structuralize the urban environment. This stimulates the urban coherence and interdependence of the district.

Design recommendations for the district were taken from practical research and theoretical principles of Salingaros (2005), while on the neighbourhood scale guidelines were analyzed of Transit Oriented Development (TOD) (Calthorpe, 1993) also case studies were done to find design references.

Next key-projects were chosen to develop design proposals for and four design concepts were concluded: the pedestrian defined grid city, mix of functions, higher densities around station and smaller plot sizes which are the fundaments of integrating a metro station with its surrounding neighbourhood.

Figure Summary-1: Venserpolder station environment.
source: by author, 2009.

Figure Summary-2: Kraaiennest station environment.
source: by author, 2009.

[1]

Introduction to the project

[1] Introduction to the project

This Master thesis has been written in the framework of my graduation project in the field of Urbanism. The studio that I joined is "Mobility Environments in the Networked City Region" which is part of the chair of "Spatial planning and Strategy". The studio has given me a theme and direction for the choice of my subject of my graduation project.

Within the system of graduating at the TU Delft, students are honored to have three mentors from various disciplines for assistance during the graduation process. I have chosen for three mentors from the disciplines of "Spatial planning and Strategy" - Remon Rooij, "Metropolitan and Regional Design" - Maurits de Hoog and "Urban Design" - Willem Hermans.

CHAPTERS

Chapter 1

In the first chapter the graduation project is thoroughly introduced: including the problem field of the research, the objective of the whole project, the methodology that is used to execute the research, the main and sub research questions that have been asked, the relevance of the subject, and the time planning of the whole project.

Chapter 2

The second chapter contains a comprehensive site analysis concerning the metro system of Amsterdam and its role on the scale of the city, the district Amsterdam Zuid-Oost and the neighbourhoods around the metro stations.

Chapter 3

The third chapter elaborates the theorethical framework that has been used. Two theories are combined to tackle two scales of the project: the district scale and the neighbourhood scale. The theories for urban coherence by Salingaros (2005) are used in order to succeed an urban coherence in the district. While transit oriented development guidelines by Calthorpe (1993) are used to create pedestrian friendly, attractive and lively metro station environments.

Chapter 4

In the fourth chapter the conclusions from the practical site analysis and the theoretical analysis for urban coherence are combined in order to make a vision for the district. The vision consists of a certain amount of key projects, which stimulated urban coherence in Amsterdam Zuid-Oost. Most of them deal with redevelopment of

metro station environments, as this is the main subject of this project.

Chapter 5

In the fifth chapter, case studies are analysed using the transit oriented development guidelines gathered from the theoretical analysis in Chapter 3. Not only are the metro station environments of Amsterdam Zuid-Oost analysed, but also 5 metro station environments in Stockholm, Sweden. A specific district was chosen, Vällingby - Hässelby, to compare with the district Amsterdam Zuid-Oost. While Amsterdam Zuid-Oost was born from a spread out functional concept, the district Vällingby - Hässelby was formed by a compact neighbourhood concept.

Chapter 6

The sixth chapter contains design proposals for selected keyprojects: Holendrecht and Strandvliet. All the relevant research comes together in this chapter.

Chapter 7

I end this thesis with conclusions, a discussion and recommendations for the district Amsterdam Zuid-Oost and for further research.

Chapter 8

In my final chapter I will evaluate my design proposals and my design process.

1.1 Motivation

FIRST GLANCE OF THE BIJLMER

Born and living in Amsterdam Oost for more than 20 years, created a strong and bounding relation between me and the city. The picturesque Herenhuizen flanking the canals in the inner city centre have always inspired me. Loving to visit many parts of the city to find something new every other day.

I still remember the day I visited Bijlmermeer in Amsterdam Zuid-Oost, it was during my first high school years. We had to finish an assignment and we decided to do it at the house of a classmate.

I took the metro because it was the quickest mode of travel. I recorded the fast views outside the window from my seat. The metro line was elevated so I could see quite far away. The view was, however, not the prettiest. Slabs of housing blocks repeated many times in an over-organized and dull way, or a long interval with just office buildings that stand out and are trying to hide what is behind them.

When I finally arrived, I felt completely lost. The huge honeycomb flats in the middle of the park-like environment made me wonder in which of one of the flats my friend would live. At the end I could not find it

and had to ask her to pick me up, the right path to the entrance of the flat was not easy to find nor was it easy to remember. The visit that followed, my classmate showed me another route to enter, the next visit yet another path. It made me wonder, it was somehow exciting that she knew multiple routes, though it took me more than ten visits to understand which route was the easiest and most comfortable to walk.

THE TRUTH OF AMSTERDAM ZUID-OOST

When I started a bachelor at the Faculty of Architecture at the TU Delft the more I came to notice that the scale of the city interested me most. I was highly fascinated about social cohesion and relations in the different scales of urban units. In one of our courses we got a lecture about the history of Amsterdam Zuid-Oost and the conclusions of the lecture, kind of proved the atmosphere I felt there.

The district was an enclave and in the beginning very dependent on the city centre for work and facilities. The concepts of the functional city from the modernist point of view, where housing, work, recreation and infrastructure are functionally separated, were used to

Figure 1.1.1 Vision for the Bijlmermeer.
source: Mentzel, 1989.

form the structure of the district (intro-figure 1.1). The district also has a low density land use and the road network is not very dense causing auto-dependency. These functional suburban neighbourhoods are nowadays known as suburban sprawl. Sprawl is associated with many disadvantages and has proven to be unsustainable. (Morris, 2005; Duany et al., 2000; Calthorpe, 1993). Even though Amsterdam Zuid-Oost is not depicted as a suburban sprawl neighbourhood, it has very strong chracteristics of it: functional city concept & hierarchical road networks.

AMSTERDAM ZUID-OOST CAN BECOME MORE SUCCESSFUL

A lot of has been written about sprawl patterns and how to renew these suburbia. One of the first movements is formed by 'New Urbanism' and 'Smart growth'. These movements are trying to put an end to suburban sprawl by advocating the comeback of traditional neighbourhood design characteristics (Soule, 2005).

Salingaros (2005) states that a "high degree of organized complexity" is needed to create urban coherence and make a city successful. Unfortunately "contemporary rules for urban form, which reduce both complexity and connectivity are not capable of generating urban coherence". The morphology that is needed to create this urban coherence "closely resembles that of traditional cities and towns". To create this urban coherence Salingaros (2005) proposes 8 principles, however, he states that "the smaller scales need to be defined before the larger scales: their elements must couple in a stable manner before the higher-order modules can even begin to form and interact".

Therefore, my master research tackles the district scale via the neighbourhood scale. The intervention points are the metro stations and their direct environments

Figure 1.1.2 Photo of the Kraaiennest metro station environment.
source: by author, 2009.

(figure 1.1.2) : including the commercial area (if present) and the closeby residential neighbourhood.

I have derived design guidelines from transit oriented development theories (Calthorpe, 1993; Bernick and Cervero, 1997) for integrating the metro, as a sustainable mode of transport into the small scale urban neighbourhood, through design interventions in selected metro environment key projects, in order to create urban coherence on a bigger scale.

1.2 Problem field

PROBLEM STATEMENT

In the middle of the 20th century, the increased employment in the centre of Amsterdam caused a need for more space to accommodate inhabitants (figure 1.2.1). The 'Structuurplan Amsterdam Zuid en Zuid-Oost' (1965) was developed to meet this spatial necessity, housing and several urban services were planned in this region with (figure 1.2.2). (Jolles et al., 2003)

The district was built on the grounds of the formerly municipality Weesper-Karspel. When the municipality was removed and surrounding municipalities were arguing about the governance of the lands. Amsterdam was already making plans for the Bijlmermeer in 1957. Finally on the 1st of August 1966 the formerly municipality was split up and given to Weesp, 's-Graveland and Naarden. The grounds of the Bijlmermeer and surroundings were added to Amsterdam, formerly known as the district Amsterdam Zuid-Oost. The district It now lays as an enclave, distanced from the rest of the city. Separated by the municipalities Ouder-Amstel and Diemen. (Hootsen, 2006; Mentzel, 1989)

The Amsterdam Zuid-Oost expansion was supposed to be the city of the future, it was designed by the rules of the functional city. Living, work and recreation were separated. Also different transport modes were isolated from each other. Fast modes (e.g. car, metro) did not meet the slow ones (i.e. cyclist and pedestrian). This was realised in the form of elevated roads and tracks, so that the pedestrian and cyclist would have a safe and plentiful space to enjoy. (figure 1.2.3). (Mentzel, 1989; Jolles et al., 2003; Bruijne et al., 2002)

A metro line was planned and built between the district and the city centre, with stops that would be within 400m reach of the surrounding neighbourhoods. The metro line was to provide rapid transport for

Figure 1.2.1 Increasing amount of people and employment in the middle of the 20th century.
source: by author, 2009.

Figure 1.2.2 Stuctuurplan Amsterdam Zuid en Zuid-Oost (1965).
source: Jolles et al., 2003; by author, 2009.

employees who lived in the district to the city where they worked. (Bruijne et al., 2002)

Soon the metro system was extended to four lines and has become a prominent mode of public transport (for commuters) nowadays. (Manenschijn et al., 2007)

PROBLEMS ON DISTRICT SCALE

However this city concept has proven to be a failure in the Amsterdam Zuid-Oost context (figure 1.2.4), see Section 2.3 for more information on this.

(i) **Separatiopn of functions:** Separating functions caused lack of vitality and interaction. By making areas monotonous and for one use only, these areas are only temporal specialised. (Bertolini and Dijst, 2003)

(ii) **Infrastructural networks:** Road network and paths for cyc**list** are set up very broad compared to other city districts and lacks spatial cohesion. Green is fragmented by wide infrastructure.

(iii) **Monotonous housing stock:** Because the district was rapidly built, a large amount of the housing stock comes from the same period (which means they all decay in the same period too), housing density is also not diverse, with approximately 30 dwellings per hectare in every combined neighbourhood.

(iv) **Lack of daily destinations:** The district was very oriented towards the city centre in the beginning, facilities and work came much later and are not well integrated or are lacking. Work and facilities are not adjusted with the inhabitants of the district. (Jolles et al., 2003)

PROBLEMS ON NEIGHBOURHOOD SCALE

As mentioned before, metro station were designed within 400m of reach of the neighbourhoods, see Section 2.4.

(v) **Elevated metro stations:** But there is a lack of integration with the surrounding neighbourhoods which is strengthened by the elevation of the tracks and the fact that these neighbourhoods were not oriented towards it.

(vi) **Undefined space:** The lack of integrating the transportation modes into the urban environment, caused spaces under and around these modes to be dark, undefined and of poor quality. (Bruijne et al., 2002)

(vii) **Functional zones:** Functions are separated and zoned due to the concepts of the functional city, which created mono-functional areas around the metro stations.

(viii) **Hierarchical road networks:** The neighbourhoods have typical characteristics of suburban sprawl road networks : hierarchical road structure and cul-de-sacs. The district is automobile oriented and do not encourage use of transit even though the metro station are within 400m of reach.

Figure 1.2.3 Impression for Amsterdam Zuid-Oost. source: Mentzel, 1989; by author, 2009.

Figure 1.2.4 Amsterdam Zuid-Oost current situation (2009). source: Google Street View, 2009.

1.3 Objective & Strategy

AIM OF THE PROJECT

The aim for my master research is to create and/or strengthen urban coherence in the district Amsterdam Zuid-Oost by introducing design guidelines for urban coherence of Salingaros (2005) and transit oriented design concepts of Calthorpe (1993) around metro station environments.

As my strategy for the scale of Amsterdam is more theoretical, I focused my more detailed design proposals on the smaller scale as I prefered a more practice based result.

PROPOSED STRATEGY FOR THE PROJECT

The strategy of my project is to strengthen the internal coherence of Amsterdam Zuid-Oost by redeveloping metro stations and their direct surroundings into small hubs to structuralize the urban environment.

The method is to take on the small scale and create elements that also affect the higher scale. According to Salingaros (2005) I need to define the small scale first to create a basis for the larger scale. In his own words: "elements on the small scale must couple in a stable manner before the higher order modules can even begin to form and interact. Elements on the smallest scale, along with their couplings thus provide the foundations for the entire structure."

To create coherence Salingaros (2005) introduces eight critical rules that are relevant for urban design: couplings, diversity, boundaries, forces, organization, hierarchy, interdependence, decomposition. These are main rules that I will use to establish coherence in the district. I have proposed to use these rules on the Amsterdam Zuid-Oost in order to create urba coherence in the district.

On the scale of the metro station surroundings, I have introduced transit oriented design concepts (Calthorpe, 1993 to establish the proposed hubs. Here

I have taken the importance of pedestrian friendliness on the scale of the neighbourhood as leader for the design.

Phase 0:

Weak coherence and strong dependence

In the fexisitng situation we find that the district is quite oriented towards and dependent on services of the city centre, from the point of view of the inhabitants of the district. On the other hand the district offers a lot of employment, unfortunately the jobs that are offered do not match with the education level of the people who are searching for work in the district. So there is a lot of commuting to and from the district (figure 1.3.1).

Figure 1.3.1 Phase 0: Existing situation.
source: by author, 2009.

Phase 1:

Urban coherence and interdependence

To even out this imbalance and the large amount of commuting. I have tried to establish urban coherence by redeveloping metro stations and their direct surroundings into small hubs to structuralize the urban environment. Towards interdependence on a higher scale (figure 1.3.2). These hubs provide a mix of functions and a variety of work for all kinds of education levels.

Final Phase:

Urban coherence and balanced dependency

In the final phase I aim for that the urban coherence is so strong on the smaller scale that it radiates on a higher scale so that there is room for larger scale interaction and balanced dependency between the city centre and the district (figure 1.3.3).

Figure 1.3.2 Phase 1: Urban coherence.
source: by author, 2009.

Figure 1.3.3 Phase 2: Urban coherence and interdependence.
source: by author, 2009.

1.4 Research Questions

On the neighbourhood scale, metro station are not always very well integrated. My intentions is to find design criteria or design guidelines for good mixed use metro station environments, therefore my main research question is:

MAIN RESEARCH QUESTION:
What kind of design criteria can be used to integrate a metro station with its surrounding neighbourhood?

To be able to answer my main research question, I have set up sub-research questions, which are answered in the mentioned chapters.

SUB RESEARCH QUESTIONS

Chapter 1: Introduction to the project
No research question, this chapter gives a general introduction of the graduation project.

Chapter 2: Context analysis
What is the role of the metro system on the scale of the city Amsterdam, district Amsterdam Zuid-Oost and on the neighbourhoods of this district?

Chapter 3: Theoretical Framework
What kind of design guidelines or principles can improve the urban coherence on the scale of the district of Amsterdam Zuid-Oost?

What has been written about the walkability of neighbourhood typologies?

and

What kind of design guidelines are suggested by transit oriented development (TOD) (Calthorpe, 2003) to integrate a metro station with its surrounding neighbourhood?

Chapter 4: Vision for Amsterdam Zuid-Oost
How can the district of Amsterdam Zuid-Oost be improved using metro stations as hubs to structuralize the urban environment?

and

Which key-projects are necessary to accomplish the vision?

Chapter 5: Case studies
What can be learned from metro systems and metro environments of other cities and countries?

Chapter 6: Design proposal
What are possible design proposals for lively and inviting metro station environments using the case study design references and TOD design guidelines?

Chapter 7: Conclusions and recommendations
What are the conclusions of my graduation project and what can I recommend for further research?

Chapter 8: Reflection
What can be improved in the design process and the design proposals?

1.5 Methodology

1. First I started orientating to decide about the subject for my graduation project.
2. Then I defined a problem statement.
3. Next I developed a main research question and sub-research questions.
4. I have used two types of tools and methods for my research. The one is more practical oriented, which includes:
   - context analysis;
   - facts, statistics and trends;
   - Amsterdam metro study;
   - site analysis;

   The other is more academic oriented, which includes:
   - literature review;
   - case studies;
   - theories study;

District level

5. Now from the practical line, I have derived a SWOT analysis that will determine the priorities and goals for the vision of the project location.
6. From the academic line, I have derived guidelines for urban coherence.
7. Combining step 5 & 6 has resulted in a vision for the scale of the district. The vision includes strategic key-projects, which subsequently is used for a in-depth analysis for the design proposals.

Neighbourhood scale

8. For the neighbourhood scale, I have derived transit oriented design guidelines which are used to analyse the case studies. From this I have developed design references that can be used in the design proposals.
9. Using the design references and the transit oriented development guidelines I have made design proposals for the selected key-projects.
10. I finished my thesis with conclusions and recommendations of my design process and products.

Figure 1.5.1 Methodology scheme.
source: by author, 2010.

[2]

The metro system of Amsterdam
and its role on the scale of the city,
district and neighbourhood

[2] The metro system of Amsterdam and its role on the scale of the city, district and neighbourhood

INTRODUCTION

> **WHAT** This chapter elaborates the role of the metro system through different urban scales and gives an answer to my first sub research question:

"What is the role of the metro system on the scale of the city Amsterdam, district Amsterdam Zuid-Oost and on the neighbourhoods of this district?"

> **WHY** To be able to make conclusions about the metro station environments in Amsterdam Zuid-Oost it is necessary to understand the current situation of the location. Therefore, it was inevitable to do an in-depth research on the role of the metro system on the scale of the district and the neighbourhoods. Because a metro system does not only play a role on the neighbourhood scale nor only on the scale of the district, it was also significant to find out what its role was on the scale of the city and what kind of influence this role on the city scale has in the context of my project.

> **HOW** In order to tackle this research question I have done research using context and site analysis tools.

SECTION 2.1: AMSTERDAM METRO SYSTEM

In the first section a comprehensive historical analysis has been made on the initiative and developments around the metro system of Amsterdam.

The developments include a time interval of approximately 30 years. In 1968 the first draft was made for the metro system, it showed radial lines going through the extensions of the city. One of these lines was going to a new part of the city, to the district Amsterdam Zuid-Oost. The first part of the metro system was built in this district in order to enable fast accessibility by public transport to and from the city centre. Many extensions followed soon after, the current extension is the notorious Noord-Zuidlijn.

SECTION 2.2: AMSTERDAM CITY SCALE

The length and shape of the metro system is related to the composition of the city. Amsterdam is known as a Lobbenstad (in English: finger city), even though it was not planned as one it has strong characteristics of it. The metro system follows the radial 'fingers' of the city, two lines go to the district Amsterdam Zuid-Oost and one line goes to Amstelveen. But when the finger city concept could no longer be used as a planning instrument, another model was developed and this model was applicable to not only the city of Amsterdam but also Amsterdam and its metropolitan area.

This section elaborates the different city models that are used as a planning instrument for the city. It also mentions the potential for a larger metro system to support the metropolitan area.

SECTION 2.3: AMSTERDAM ZUID-OOST DISTRICT SCALE

In order to understand the current situation of Amsterdam Zuid-Oost, the district is extensively analyzed. The metro system was an important design

element in the district, it was already drawn up in the initial plans. Due to various circumstances this metro system isn't well integrated in the urban environment and unfortunately this is not the only problem of Amsterdam Zuid-Oost.

In the third section an analysis has been made on various topics which explains the incoherence of the district, including the history of the neighbourhoods Bijlmermeer, Holendrecht and Venserpolder, the existing road network, the green and water network, the finite housing stock, the lack of daily destinations, the work clash and data on the current population.

SECTION 2.4: AMSTERDAM ZUID-OOST METRO STATION ENVIRONMENTS NEIGHBOURHOOD SCALE

In the final section the actual metro station environments are analyzed. I have categorized the metro stations hierarchically: district centre, neighbourhood centre, work/residential. For each of these metro stations I have written a short text, which explains the direct environment around the station, the shopping centre (if present) and the residential neighbourhood(s).

Next to this I also made a small diagram for each of these station to show the mix of functions that surround these nodes, in order to show whether there is high or low interaction around the stop.

2.1 The metro system of Amsterdam

THE FIRST METRO LINE IN AMSTERDAM

The first planning ideas for the Amsterdam metro line comes from the nota Binnenstad (1955). In this nota an important perspective decision was made: the inner city should lay centrally in the city of Amsterdam and should maintain its central functions in the future. Mobility attracting elements should be dispersed to other areas to maintain the function of the centre.

According to this nota the need for public transport would increase, whereby it would be necessary to replace some tramlines by busses - trams take up a lot of space. Since there would be a need for this precious space the question came up whether Amsterdam should create an underground rail. Many other cities were doing it at that moment or had done, to create a mass and rapid transport for the city (e.g. Paris metro system (1900), London underground system (1863)) (Rohde, 2004-2009).

Soon a commission for traffic and transport was founded, to research the measures which needed to be taken for a fast transport system for the growing city.

Based on the need for shorter travelling distances and capacity growth, the commission concluded that the public transport should have its own track, which doesn't conflict with other traffic and enclosed three options, of which they already concluded beforehand that the first two would be too expensive:

• Broader roads with one track for public transport.
• Horizontal division: own streets for public transport
• Vertical division: a) elevated tracks
                              b) tunnels

Hereby the decision for the metro service was made, whether it was a grounded decision can be questioned. Nevertheless a concept was developed with radial main lines in the city. The need for good

Figure 2.1.1 Metro system concept, 1968.
source: de Hoog & Vermeulen, 2009.

accessibility between the city centre and the 'new' Bijlmermeer was decisive to built the Oostlijn (east line) first (Jintes, 1976). A more detailed concept map was made in 1968 (figure 2.1.1) (Jolles et al., 2003; de Hoog & Vermeulen, 2009).

In 1977 two metro lines were completed starting from station Weesperplein; one going to Gaasperplas and the other one to Holendrecht. In 1980 the line was extended from Weesperplein to Amsterdam Central Station (GVB, 2009).

METRO LINES DEVELOPMENTS 1977-2004

This paragraph will elaborate the developments of the metro lines throughout 1977 to 2004.

Two lines were built in 1977 starting from station Weesperplein; one going to Gaasperplas and the other one to Holendrecht (figure 2.1.2a). In 1980 the Oostlijn was finished with two lines (on the same

METRO LINES DEVELOPMENTS 1977-2004

track) extending from Amsterdam Central Station to Gaasperplas - line 53, and the second from Amsterdam CS to Holendrecht - line 54 (figure 2.1.2b). In 1982 an extension was completed from Holendrecht to Gein (figure 2.1.2c) (Jintes, 1976).

The next line which was built was the Amstelveenlijn, it was a detraction from station Spaklerweg of the existing Oostlijn. On the 1st of December 1990 the line 51 was officially opened, going from Amsterdam CS to Amstelveen Poortwachter via Amsterdam Zuid.

Due to political reasons this line was partially a light rail service; from Amsterdam CS to Amsterdam Zuid it is a heavy metro, from Amsterdam Zuid to Amstelveen Poortwachter it is a light rail on ground level (figure 2.1.2d).

The third line was completed in 1997, it was the Ringlijn going from Gein to Isolatorweg - line 50. At first it was like the Amstelveenlijn implemented as a light rail, though immediately the service was heavily used.

Figure 2.1.2 Metro lines developments throughout 1977 to 2004.

a. In 1977 the Oostlijn was finished from Weesperplein to Gaasperplas and Weesperplein to Holendrecht.

b. In 1980 the two branches of the Oostlijn are completed.

c. In 1982 an extension was made from Holendrecht to Gein.

d. In 1990 the Amstelveenlijn was finished, a side-branch from the Oostlijn to Amstelveen Poortwachter.

e. In 1997 the Ringlijn was completed, going from Gein to Isolatorweg.

f. In 2004 an extension was made on the Amstelveenlijn. The terminal was extended from Amstelveen Poortwachter to Amstelveen Westwijk.

source: GVB.nl; by author, 2009.

The trams could not cope with the amount of travellers, so the company decided to turn the light rail service into a heavy rail metro service, for this the platforms were shortened so that the same carriages like the ones of the Oostlijn could be used (figure 2.1.2e) (Wikipedia: Amsterdamse metro, 2009).
In 2004 an extension was added from Amstelveen Poortwachter to Amstelveen Westwijk (figure 2.1.2f) (GVB, 2009).

THE "NOORD-ZUIDLIJN"

After the last extension in 2004 the construction of more lines remained silent for a while. But in order to create better and faster public transport accessibility to the north, the construction for the North-South line was initiated (figure 2.1.3).

Many complaints were raised during the construction, it was even put to a hold, when dwellings and shops started to sink in around the station Vijzelgracht.
Claims for damage and compensation were piling up and so did the costs. The line should have been completed in 2009, but questions were raised whether the line should be finished or not.

From a recent survey by the commission under the leader Veerman, it was decided that the line should be completed, even though there are a lot of obstacles. A new budget calculation was made and a new deadline is set for 2017 (Noord/Zuidlijn editorial staff, 2009).

The North-South connection will be the fifth metro line addition to the metro system of Amsterdam. The line will go from Station Zuid to Buikslotermeerplein, both terminal stations are important transit location. The type will be a heavy rail metro, the stations will be partially underground and on ground level (Fellows Communicatie Amsterdam, 2005).

Figure 2.1.3 Planned for 2017: the north-soutih line going from station Zuid to Buikslotermeerplein.
source: noordzuidlijn.amsterdam.nl; by author, 2009.

METRO STATION TYPOLOGIES

The metro system of Amsterdam is a combination of a heavy rail metro and so-called rapid trams/light rail (in Dutch: sneltrams).

The total length of the system is approximately 33km. The system is mainly running on the surface, only 3,5 km of the system is underground. This results into various types of stations and tracks: underground, ground level and elevated.

Underground

The underground part of the system, goes from the Central Station to Wibautstraat (lines 51, 53 and 54).

The characteristics of an underground stop is that it has limited interaction with the urban environment. The only interaction is the entrance to the actual underground stop. The entrance to the stop can be defined using coherent architecture in the existing urban environment or extravagant architecture to emphasize it. The underground environment is isolated, usually some convenience stores are placed in the corridors (figure 2.1.4).

Ground level

The ground level part of the metro system is mostly in Amstelveen. From the station Zuid, the metro 51 will continue as a light rail to the final stop Amstelveen Westwijk.

The stops can easily be integrated in the urban environment, it is part of the view of the street. But because the metro is a hybrid vehicle, the stops need to be elevated slightly in order to compensate the height of the vehicle doors, which result into small stairs and slopes (figure 2.1.5).

Elevated

The largest part of the metro system is elevated. From the station Amstel, line 53 and 54 continue respectively to the final destinations Gaasperplas and Gein. Also line 50 is elevated and goes from Gein to Isolatorweg Elevated tracks and station stops are very prominently present in the urban environment. It can easily form a visual barrier. Elevated stops and tracks create dark and undefined environments due to its permanent shadows. The stops are easy to spot, and can be either designed to fit with the surrounding neighbourhood or deisgned with extravagant architecture to stand out (figure 2.1.6).

Figure 2.1.4 Pictures of station Waterlooplein, Amsterdam.
a. Underground stop.
b. Underground environment, people do not stay here for a long period.
c. One of the entrances/exits. The entrance is very noticeable, it is a free standing element in the urban environment.
source: by author, 2009.

Figure 2.1.5 Pictures of station A.J. Ernststraat, Amstelveen.
a. Ground level stop.
b. The stop is slightly elevated, which result into small stairs or slopes.
c. Ground level stops can easily be integrated in the urban environment.
source: by author, 2009.

Figure 2.1.6 Pictures of station Kraaiennest, Amsterdam.
a. Elevated stop.
b. Elevated metro tracks are clearly visible.
c. Elevated stops creates dark environments.
source: by author, 2009.

METRO SYSTEM IN 2030+

Figure 2.1.7 Vision regional public transport 2030+.
source: Dienst Ruimtelijke Ordening, 2009.

The 'Physical Planning Department of the city of Amsterdam (DRO)' is currently focused on the metropolitan area around Amsterdam. They have made a structural vision for the year 2030+. A structural vision is a statutory planning instrument, a long-term blueprint for the city's spatial and physical development in which choices are made regarding the functions of living, working, recreation, accessibility, social amenities and sustainability.

Within the subject of accessibility a structural vision map with the regional public transport network has been made, showing the new connections and extensions of the current train and metro system.
 In the metro system the lines are split whenever a place requires more capacity. Extensions of metro lines give opportunity for urban growth (figure 2.1.7).

The current metro lines are still recognizable:

- The yellow line is line 53 Amsterdam CS - Gaasperplas.
- The light blue line is line 54 Amsterdam CS - Gein.
- The green line is line 51 Gein - Isolatorweg, with an extension to the north of Amsterdam.
- The current Amstelveen line is split up in the olive green line, going from Amstel - Zuid, and the purple line going from Zuid - Amstelveen Westwijk.

The north-south line will be extended to Amstelveen (see purple line). Other extension go to Purmerend and Edam (green lines), through Zaanstad (pink line), IJmuiden (blue line), IJburg (red line), Almere-Schiphol (orange line), Haarlem and Hoofddorp (turquoise line), Alkmaar and Uithoorn (brown lines).

There are a few more lines which are sidetracks and create more connections within the city (Dienst Ruimtelijke Ordening, 2009).

2.2 The metro system of Amsterdamand its role on the scale of the city

THREE MAJOR EXTENSIONS FORM THE COMPOSITION THE CITY AMSTERDAM

In the second half of the nineteenth century so called partial plans in Amsterdam caused a fragmented growth in the city. The desire for a better and more integral development was the motive to make the Algemeen Uitbreidingsplan (AUP) 1935 (in English: general extension plan). This general extension plan by C. Van Eesteren formed the basis for future plans (figure 2.2.1).

The AUP had a clear structure and division of land use for a western (Westelijke Tuinsteden) and southern extension (Buitenveldert) of Amsterdam, though soon it became clear that the residential program of the AUP was far from satisfying the current and future housing needs, as Amsterdam had grown larger than they had imagined.

In 1958 an additional plan was made for the north bank of Amsterdam, the Structuurplan Noord (figure 2.2.2).

Although developing along the north of the IJ was disapproved due to lack of accessibility in the first place, the need for more dwellings was more decisive in the end. Low density developments acquiring more space and also the decreasing number of people per household were two important factors to develop above the river 't IJ anyway.

However, the addition of Amsterdam Noord was as well not enough to fulfil the housing needs. (Jolles et al., 2003)

A few years later the Structuurplan Amsterdam Zuid en Zuid-Oost (1965) was added (figure 2.2.3). Designed by a team of urban designers, it was the second big addition to the AUP and spread over several municipalities.

The plan would accommodate 100.000 inhabitants in the Bijlmermeer and was completely different from the other plans of the AUP to concede the previous critique on the garden cities in the west of Amsterdam.

In 1965 the design for the first 18.000 dwellings were presented in the Grondslagen voor de Zuid-

Figure 2.2.1 General extension plan concept, 1935.

source: Jolles et al., 2003.

Figure 2.2.2 Structuurplan Noord concept, 1958.

source: Jolles et al., 2003.

Figure 2.2.3 Structuurplan Zuid en Zuid-Oost concept, 1965.
source: Jolles et al., 2003.

Oostelijke stadsuitbreiding (Foundations for the South-eastern city expansion) of which 13.000 dwellings would be situated in honeycomb complexes. (Jolles et al., 2003; Gemeente Amsterdam Zuid-Oost, 2005)

AMSTERDAM A LOBBENSTAD

Amsterdam is known as a successful model of the Lobbenstad (In English: finger city) (figure 2.2.4). A radial city composition, with a direct relation among the green. The model was introduced by Möhring, Eberstadt and Petersen (de Hoog, 2005) and has been used in many cities besides Amsterdam, such as Hamburg, Köln, Copenhagen and Stockholm (figure 2.2.5).

The model is famous because of its accessibility advantages: the city centre is easily accessible from all the city parts (the fingers), it is more compactly situated around the city centre. Cities with one sided growth have city parts which are further away from the city centre.

However, the model was not implemented on purpose in the beginning. The AUP of 1935 was not

designed according to the lobbenstad model, but it did have the characteristics of it. So Amsterdam developed itself according to the lobbenstad model, but was not very aware of it till the 60's (Gieling, 2006).

In the case of Amsterdam the Lobbenstad model is spread over 4 municipalities (figure 2.2.6):
- Amsterdam
- Diemen
- Ouder Amstel
- Amstelveen

Figure 2.2.4 Concept of the Lobbenstad. Figurative.
source: by author, 2009.

Figure 2.2.5 Lobbenstad scheme for Köln 1923-1927.
source: de Hoog, 2005.

built environment
municipality border Amsterdam
other municipalities

built environment
green areas

Figure 2.2.6 The Lobbenstad model of Amsterdam includes other municipalities as well.
source: by author, 2009.

Figure 2.2.7 Green areas are entangled with the built environment.
source: by author, 2009.

There are three parts in the city, where the Lobbenstad model is clearly visible (figure 2.2.7):

• Amsterdam West contains two built environment extensions, and with the green area Sloterpark and the lake Sloterpark in the middle.

• Amstelveen is flanked by Amsterdamse Bos and Nieuwe Meer on the left and the Amstel area on the right.

• Amsterdam Zuid-Oost is inserted by the green area Bijlmerpark and the lake Gaasperplas. And also flanked by the Amstel area and Diemerbos

The surrounding green landscape was not the basis for the development of the urban structure, unlike other lobbenstad cities. Though it did result into an increasing importance to the green and resulted in a "main green structure plan" in 1996 (Gieling, 2006).

Because the finger city model was discovered later, the city differs from cities where the model had been implemented from the beginning. Other lobbenstad cities have a fast public transport mode

(heavy rail or light rail) going to their extensions (the fingers), and in Amsterdam the public transport differs in every city part.

INFRASTRUCTURAL NETWORKS

The infrastructural networks more or less follow the finger city structure, they have a radial structure.

Road network

The road network consist of a ring road with a radial structure. The most important directions are: Zaanstad (A8), Almere (A1), Utrecht (A2), Schiphol (A4) and Haarlem (A200) (figure 2.2.8)

Train network

Same as in the road network the radial structure can be found in the train network. With the most important directions going to: Zaanstad, Almere, Utrecht, Schiphol and Haarlem (figure 2.2.9).

The train network is a fast service and is more

externally oriented, because it only has several stops in the city: Central Station, Sloterdijk, Lelylaan, Amstel, Muiderpoort, Bijlmer Arena, Holendrecht, RAI, Zuid WTC, Schiphol. There is no track going to or through Amstelveen.

The train network is managed by the Dutch Railway Company, 'Nederlandse Spoorwegen' (NS).

Metro system

The metro system shows an incomplete radial structure, with missing links to the north, west and east of the city. This network is unlike the rail network more internally oriented. The system continues through Amstelveen complementing the tram and/or train (figure 2.2.10).

The Metro system is managed by the Municipality public transport services, 'Gemeente Vervoersbedrijf' (GVB).

The missing links of the metro system are covered by other modes of public transport in the city (figure 2.2.11).

Tram system

The tram network shows a more radial structure than the metro system, though it has missing links for the north and south-east part.

The trams are managed by the Municipality public transport services, 'Gemeente Vervoersbedrijf' (GVB).

Bus network

The bus network shows a more complex system. It is the main public transport for the north of Amsterdam.

The busses are partially managed by GVB and two other private companies: Connexxion and Arriva.

Figure 2.2.8 Road network of Amsterdam.
source: by author., 2009

Figure 2.2.10 Metro system of Amsterdam, 2004.
source: GVB, 2009; by author, 2009

Figure 2.2.9 Train network of Amsterdam.
source: NS, 2009; by author, 2009.

Figure 2.2.11 Internal public transport networks in Amsterdam.
source: GVB, 2009; by author, 2009.

FROM FINGER CITY TO NETWORKED CITY

Mobility and wealth increased after the Second World War. Due to increased ease of accessibility the regional scale plays a role in daily life. The inner city centre is no longer the biggest provider of work, leisure and other activities: these have been shifted and concentrated in other parts of the city. In the case of Amsterdam a shift of employment went to the edge of the district south-east (Amstel III and Bullewijk area) and also in the south axis.

Many years Amsterdam presented itself as a compact finger city. Though it had limitation to urbanization. An additional 150,000 dwellings must be built in the period to 2030, including 50,000 within Amsterdam's city boundaries. This was according to the North Wing 2030 plan.

But the finger city concept could no longer be a governance instrument for the development of the city. What did not fit in the finger city concept, needed to be placed elsewhere.

It resulted into the form of a regional network city and the finger city had become a mere principle or term to describe the shape of the city and its relationship with its surrounding green. (Hanou et al., 2008)

The network city or 'Netzstadt' (Oswald and Baccini, 2003) deals with the interrelations and accessibility of nodes, these nodes are non-hierarchical and the physical shape of the city is only a consequence of it. (Gieling, 2006)

The Network city describes an urban system consisting of three element: nodes, connections and borders. These elements are defined as follows (figure 2.2.12):

- Nodes are locations marked by a high density of people, goods and information.
- Connections represent flows of people, goods and information between nodes.
- Borders are the spatial, temporal or organizational

Figure 2.2.12 Netzstadt model.
a. Estimation of area densities in the observation perimeter for the identification of nodes.
b. Trans-boundary network of nodes and connections.
c. nodes and connections on three scale levels.
source: Oswald and Baccini, 2003.

demarcations of the network. They are also called the perimeter or the scale of the network.

Amsterdam is polycentric (figure 2.2.13). The old city centre acts as nucleus and shows a more or less radial structure. The finger city wedges have their own commercial sub centre. Office and business centres are concentrated in several places in the city.

The commercial centres are (figure 2.2.14):
1. City centre;
2. Osdorpplein;
3. Winkelcentrum Boven 't IJ;
4. Amsterdamse Poort and Arena Boulevard;
5. Amstelveen Centrum;
6. Diemen shopping centre.

Office and Business centres are (figure 2.2.15):
1. City centre;
2. Sloterdijk area;
3. Amstel area;
4. South Axis;
5. Amstel III and Bullewijk area;
6. International airport Schiphol.

GOVERNANCE AND PLANNING
Within the borders of the municipality of Amsterdam there are 15 districts, 97 combined neighbourhoods and 470 neighbourhoods (Beijer et al., 2005).

The district Amsterdam Zuid-Oost is one of these 15 district and is not directly connected to the rest of the city.

Figure 2.2.13 City parts.
source: by author, 2009.

Figure 2.2.14 Centres of the city parts.
source: by author, 2009.

Figure 2.2.15 Business centres of the city parts.
source: by author, 2009.

Figure 2.2.14 Division of districts and neighbourhoods.
source: Beijer et al., 2005; by author, 2009.

FROM NETWORKED CITY TO METROPOLITAN AREA

The polycentric network city has dominated ideas about urban development, not only in and around Amsterdam, but in the whole of The Netherlands, e.g. the Randstad as a polycentric network region. In the Randstad, in the Amsterdam region and also in the North Wing, Amsterdam is one of these nodes and is showing that is (becoming) the most important one. The international position of Amsterdam is unique within the North wing, Randstad, and also in The Netherlands.

The Institute for Spatial Research (RPB) notes that "the Amsterdam metropolitan area is the undisputed economic heart of the Netherlands in every respect. This is where investment is needed most urgently and where it yields the highest returns (Vreeswijk, 2008).

However, to play a role in the European competition, the regional scale should be stimulated. The region as a whole can offer harmonized housing environments, clusters of work, diverse landscapes, and other facilities.

The spatial strategy for Amsterdam in the coming years is therefore focused on the metropolitan region (fig. 2.2.16).

The national policy of orchestrating complementarities and equality within the Randstad, namely on the scale of the urban mega region, has proven fairly ineffective. An international analysis of metropolitan regions by the Institute for Spatial Research (RPB) also demonstrates that the top-level functions associated with metropolises are often consolidated in a single city.

The formation of one dominant centre is the norm, whether for Amsterdam within the Randstad or for San Francisco in the Bay Area, Düsseldorf in the Ruhrgebiet and Brussels within the Flemish Diamond.

The metropolitan region of Amsterdam has a lot

Figure 2.2.16 Regional development strategy, 2004.
source: de Hoog, 2009.

to offer and has many opportunities to develop as such a region. The region has an important international airport, counts more than 2 million inhabitants, is developing itself as a creative industry and is a hotspot for international companies to settle. (Vreeswijk, 2008; Hanou et al., 2008)

According to the Spatial Planning Department of Amsterdam (Dienst Ruimtelijke Ordening, DRO), Metropolisation of Amsterdam is not a choice, but a development that simply happens. And that we can grab this chance to develop it as best as possible.

It is a complex assignment, the scale of the project is much bigger and more parties are involved. (van Poelgeest, 2007)

REGIONAL PUBLIC TRANSPORT NETWORK FOR AN ACCESSIBLE METROPOLITAN AREA

Several reports are encouraging the metropolitan growth of Amsterdam, with more jobs and visitors as a goal, together with this also adding high quality environments, work and facilities. Due to this, mobility will increase, and the pressure on the roads as well (figure 2.2.17) (Gemeente Amsterdam, 2007).

An alternative for the car could be public transport, but a good regional public transport network is currently lacking. An upgrade of the current metro system network to a high quality one is a desirable option. Considerations are made for connections to Amstelveen, Schiphol, Almere, Zaanstad and Purmerend in the Vision 2030+ by the Physical Planning Department of Amsterdam (DRO) (Dienst Ruimtelijke Ordening, 2009). Another consideration is to close the so-called 'Ring-line'.

To realize the network, an important factor is to split up the current metro lines, which ride on the same tracks to create a more frequent and safe system (Gemeente Amsterdam, 2007).

Figure 2.2.17 Congestion prediction during evening rush hour in Amsterdam region for 2010.
source: (Gemeente.Amsterdam, 2007)

2.3 The metro system of Amsterdam and its role the scale of the district Amsterdam Zuid-Oost

THE COMPOSITION OF THE DISTRICT AMSTERDAM ZUID-OOST

In the Structuurplan Zuid en Zuid-Oost (1965) (structure plan) the designers have chosen to concentrate the traffic and to limit an extensive road network in the residential area, that is why district and neighbourhood accessibility is lacking in the plan. As a compensation a network of parking garages in combination with secondary roads has been made. A buffer zone (for noise and direct air pollution) between the residential area and infrastructure were taken into account (Jolles et al., 2003).

Along the important water structure, trade and industry is planned. In the west a stadium has been planned, where years later the Arena was build. Around

some metro stations so called centre functions are visible. The main recreational program in the district is the lake Gaasperplas (figure 2.3.1).

THE FIRST PROJECT: BIJLMERMEER

Bijlmermeer was one of the first project in the Structuurplan and was suppose to become the city of the future, built by the rules of the functional city. A city where living, working, traffic and recreation are spatially separated. Large open spaces would be situated between the high rise honeycomb complexes. The apartments were to fulfil the complete privacy of the inhabitants, while the open spaces could be used for recreational purpose and other collective activities

residential area
centre functions
trade and industry
area for special facilities
green
water

Figure 2.3.1 Structuurplan Zuid en Zuid-Oost, 1965.
source: Jolles et al., 2003; by author, 2009.

(figure 2.3.2), a completely car-free space.

After the neighbourhood was completed in 1975 it faced a difficult start: the place was not implemented as originally planned, corridors were situated on the first floor, while on the ground floor storage space created a closed facade. Facilities under the elevated roads and parking spaces came much later than planned by which the space became neglected in the first place. Furthermore the fast metro service was constructed much later than planned (Gemeente Amsterdam Zuid-Oost, 2005).

Also social issues started to rise. The high complexes were meant for middleclass families from Amsterdam, however they never came and instead moved to the suburbs with single family houses, which were developed during the construction of Bijlmermeer. In the 70s there was a period of vacancy, soon singles, families without kids and single parent families inhabited the place. And after the independence of Suriname a lot of Surinam people and also Antilleans came to the Bijlmermeer (1970-1975), because other districts were too expensive for them to settle (fig. 1.3.3) (Mentzel, 1989; Gemeente Amsterdam Zuid-Oost, 2005).

Later, unemployment, lack of security, criminality, drugs dealing, tensions between ethnic groups, and high turnover created a negative image of the Bijlmermeer. In 1983 almost a quarter of the high-rise dwellings was vacant. Immediate action was required. Several housing corporations were combined into one new corporation: 'Nieuw Amsterdam'.

Several problems were tackled by this new corporation. The rents were reduced, the flats were repainted, a portion of the dwellings were split in order to meet the current demand for single and two-person households.

Also a project group was set up: Projectgroep Hoogbouw Bijlmermeer (Project group High-rise Bijlmermeer). They were responsible to take care

Figure 2.3.2 Impression of ground level Bijlmermeer. source: Mentzel, 1989; by author, 2009.

for the drugs problems, and giving directions on the bicycle routes. On some places parking on ground level was allowed, so that the distance between car and house was shortened drastically. Some garages were demolished, because they were often half empty and increased the feeling of insecurity many residents already had. This was due to a miscalculation in the 60's, they thought that the average car per household would be 1.5 (in reality this was only 0.5 at the end of the 90's).

A great stimulation for the district was the delivery of the shopping and business centre, Amsterdamse Poort in 1987. This made the district less dependent on the historical city centre of Amsterdam. It even became an important sub centre for the surrounding area.

Though the large scale, the type of functions; big furniture mall (villa arena), and massive entertainment venues (arena boulevard) and soccer games (arena stadium), and level of ambition (a 24h economy through mixed functions), is perhaps just as extreme as the ideas of the construction of the Bijlmermeer itself. A certain coherence with the 'old' Bijlmer and the Centre area is missing. (Bruijne et al., 2002)

NEIGHBOURHOODS AFTER THE FAILURE OF BIJLMERMEER

After the failure of the Bijlmermeer other neighbourhoods were designed according to less extreme ideals.

In a few of the neighbourhoods we see some remains of these ideals, such as in Holendrecht West. The construction of this neighbourhood started in 1974. In this neighbourhood collectivism played an important role still, we can see that by looking at the large collective green areas in the so-called 'soft courtyards'. While in other neighbourhoods an adversion was made against all the ideals modernists seem to have, such as in Venserpolder - constructed between 1981 - 1984. Here an attempt was made to return to the more traditional streets and building blocks. Unfortunately these blocks were of enormous sizes and all of them looked the same, creating once again an inverted neighbourhood.

These attempts of adversion against the modernistic ideals were not very successful. The district seems like a patchwork of all kinds of neighbourhoods which 'stand-alone' and are not integrated with each other.

COMPARING THE STRUCTUURPLAN WITH REALITY

The original Structuurplan Zuid en Zuid-Oost and the reality are different from each other. (figures 2.3.3 & 2.3.4) The missing links could be essential for the aim of the district as it was planned. If some parts were not implemented in the past, perhaps they have new potential to be implemented now.

Water structure

(see figure 2.3.5)

The current water structure is completely different from the Structuurplan. The harbour industry declined and goods were transported over roads. The water structure, now called Duivendrechtse vaart stops at Amstel I and Amstel II, it is not connected to the Amsterdam Rijnkanaal. The plots which were meant for harbour industry are now occupied by offices and other industries.

The implementation for other industries than harbour industry has been a correct choice, nowadays a lot of harbours are being redeveloped due to less need of harbour industries.

Figure 2.3.3 Structuurplan Zuid en Zuid-Oost, 1965. source: Jolles et al., 2003.

Figure 2.3.4 Satellite picture from Google earth of Amsterdam Zuid-Oost, 2006.
source: Google Earth.

Infrastructure

(see figure 2.3.6)

The current infrastructure is also different from the Structuurplan. Some connections were not implemented: the Gooiseweg and the A9 are not extended to the west, the metro line is also not extended to the west.

There is potential to create a better accessibility to Amsterdam Zuid-Oost. A metro connection to the east (in the direction of Weesp) would be interesting, since the Physical Planning Department of Amsterdam (DRO), is considering a metro system of the metropolitan area.

Special facilities

(see figure 2.3.7)

The area reserved for 'special facilities' are occupied by dwellings and does not contain any special facilities.

One could think about adding special facilities in order to make the district more attractive.

Centre Facilities

(see figure 2.3.8)

Facilities are planned around four of the metro stations, but these came much later.

- Reigersbos centre (also known as Gaasperdam): completed in 1984, contains shops, social-cultural and medical facilities and it's spread over 11 blocks. The architect was Cees Dam (Lootsma, 1986).
- Gein centre (also known as Wisseloord): completed in 1987, contains 16 shops, within an area of 2.330m^2 (Stichting CBW, 2009)
- Kraaiennest centre: facilities are concentrated in a small shopping centre. Renovation plans have been made by NL architects in October 2008 (NL

Figure 2.3.5 Water structure comparison.
source: Google Earth; by author, 2009.

Figure 2.3.6 Infrastructure comparison.
source: Google Earth; by author, 2009.

Figure 2.3.4 Special facilities comparison.
source: Google Earth; by author, 2009.

Figure 2.3.8 Special facilities comparison.
source: Google Earth; by author, 2009.

architects, 2009).

- Ganzenhoef centre (also known as Ganzenpoort): this centre was hidden under the large roads, parking lots and metro line. But it has recently been renovated in 2005, its facilities cover the E- en G-neighbourhood. The shopping centre contains 5.800 m² shops, 32 dwellings social rent, 102 houses (sale) en 5.500 m² offices space. (Gemeente Amsterdam Zuid-Oost, 2005)

AREAS, "COMBINED NEIGHBOURHOODS" AND NEIGHBOURHOODS

The district is set up in zoned areas, a typical example of a modern functional city. Work, housing, green are separated from each other (figure 2.3.9). Even the infrastructure is separated by elevating it from the ground.

Within the city district four subareas can be defined, which have more or less the same characteristics: the venserpolder area, the Bijlmermeer where the notorious honeycombs flats are situated, the Amstel III area where a lot of offices are situated and Gaasperdam. These areas have their own internal road structure and morphological uniformity (Kuipers et al., 2009) (figure 2.3.10).

The borders set up by the governance are slightly different. There are 7 combined neighbourhoods including, Amstel III & Bullewijk, Bijlmer Centrum, Bijlmer Oost, Nellestein, Holendrecht & Reigersbos, Gein and Driemond.

Research and survey are often done in this combined neighbourhoods division (Beijer et al., 2005) (figure 2.3.11).

Within these combined neighbourhoods there is a further division of smaller neighbourhoods (Beijer et al., 2005) (figure 2.3.12).

Figure 2.3.9 Urban functions are separated from each other.
source: by author, 2009.

Figure 2.3.10 District subareas.
source: Kuipers et al., 2009; by author, 2009.

1. Amstel III & Bullewijk
2. Bijlmer-Centrum D, F & H
3. Bijlmer-Oost E, G & K
4. Nellestein
5. Holendrecht & Reigersbos
6. Gein
7. Driemond

Figure 2.3.11 Combined Neighbourhoods.
source: CBS, 2006; by author, 2009..

Figure 2.3.12 Neighbourhoods division of Amsterdam Zuid-Oost.
source: Beijer et al., 2005; by author, 2009.

GREEN NETWORK

The Amsterdam Zuid-Oost district is completely surrounded by green area, with one green wedge entering the district in the south-east corner (figure 2.3.13). However this green is quite fragmented due to the infrastructure: A2, train track, Gaasperdammerweg/A9, and the avenues. But there is potential to (re) connect these green areas (figure 2.3.14).

The typologies of the green landscape in and around Amsterdam Zuid-Oost, vary from parks in the city, forests in the north-east (Diemerbos), nature in the

south and north-east side and typical Dutch peat meadow lands around the whole district (figure 2.3.15). There is a rich differentiation and potential to intensify it.

Typologies in this district vary with park fields, green lanes, courtyards, green belts and the typical avenues (figure 2.3.16). There is opportunity to introduce new urban greenery (de Vree et al., 2009).

Figure 2.3.13 Green structure in Amsterdam Zuid-Oost.
source: de Vree et al., 2009.

Figure 2.3.14 Infrastructure form barriers in the green structure of Amsterdam Zuid-Oost.
source: de Vree et al., 2009.

Figure 2.3.15 Typologies of green landscape in and around Amsterdam Zuid-Oost.
source: de Vree et al., 2009.

Figure 2.3.16 Typologies of urban green in Amsterdam Zuid-Oost.
source: de Vree et al., 2009.

WATER STRUCTURE

Figure 2.3.17 Maps of Amsterdam Zuid-Oost.
a. Bijlmermeerpolder, 1850.
b. Amsterdam Zuid-Oost, 2009.
source: de Vree et al., 2009.

Just like many lands in The Netherlands, Amsterdam Zuid-Oost was a polder area. The Bijlmermeer used to be a lake, and was reclaimed in the 17th century (figure 2.3.17a). The polder structure has remained the same in the surrounding area of the district. While the Bijlmermeer was reclaimed, new lakes were dug: Gaasperplas and Ouderkerkerplas (figure 2.3.17b).

These lakes can be intensified for recreational purpose.

The types of waters are linked to its historical landscape: different soil types will sprout different plantation.
In the district many types of water can be found, recreation lakes, urban recreation waters, urban waters and infrastructural routes. There is room for strengthening the various types or adding new types of water (figure 2.3.18).

The soil of the district, which consist of a thin peat clay layer makes it impossible to add deep waters. Height differences may cause water seepage and inundation. Water seepage takes place in the lower areas, such as the Bijlmermeer. Inundation takes place in the higher areas (fig. 2.3.19) (van der Kooij and Hartog, 2009).

Figure 2.3.18 Water types in Amsterdam Zuid-Oost.
source: de Vree et al., 2009.

Figure 2.3.19 Water seepage and inundation in Amsterdam Zuid-Oost.
source: de Vree et al., 2009.

DISTRICT ROAD NETWORK: A SYSTEM OF AVENUES

The road network is very determining for Amsterdam Zuid-Oost, spatially as well as functionally. It is a system of (sometimes) elevated 'dreven' (in English: avenues, lanes). Together with the train track and the highway A2 and A9, they border and divide the district (figure 2.3.20).

Recent redevelopments include lowering the avenues, which could solve problems that these elevated avenues cause, such as barrier forming, lack of social safety, undefined public space. This has started in the Bijlmermeer area, but there is no clear logic of avenues which are elevated or on ground floor level (figure 2.3.21).

The profile and width of the avenues vary, but are relatively broad compared to other roads in Amsterdam. This is determining for the atmosphere (figures 2.3.22 & 2.3.23). The extent of the accessibility of functions along the avenues are defined by the presence of parallel roads and exits.

The atmosphere around these avenues are not always pleasant. It may cause anonymous spaces, it can give a lack of social control and safety (figure 2.3.24) (Kuipers et al., 2009).

Figure 2.3.20 Avenues names.
source: Kuipers et al., 2009.

Figure 2.3.21 High and low avenues.
source: Kuipers et al., 2009.

Figure 2.3.22 Profile of avenues.
source: Kuipers et al., 2009.

Figure 2.3.23 Capacity of avenues.
source: Kuipers et al., 2009.

Figure 2.3.24 Atmosphere of the avenues
a. Anonymous space.
b. For cars only, no space for cyclist or pedestrians.
c. Lack of social control and safety.
d. Green slopes, barrier.
e. Broad profiles.
f. Tunnels.
source: (Kuipers et al., 2009).

NEIGHBOURHOOD ROAD NETWORK: HIERARCHICAL

From the avenues we get off into the neighbourhoods. The road network of the neighbourhoods have a lot of sprawl patterns (hierarchical road networks) and cul-de-sacs. They are unlike traditional neighbourhoods (figure 2.3.25).

These sprawl patterns set up by modernist are less pedestrian friendly than the traditional patterns. While traditional patterns fit the buildings, modern patterns follow their own dedicated forms (figure 2.3.26) (Marshall, 2004; Calthorpe, 2003).

Road networks in other districts are much more dense and have a more grid-like structure (figure 2.3.27).

- - - municipality border
— main roads
— secundary roads

Figure 2.3.25 Hierarchical road networks on the neighbourhood scale.
source: by author, 2009.

Figure 2.3.26 Traditional versus modern layouts.
a. Fit of roads and buildings.
b. Roads and buildings follow their own dedicated forms.
source: Marshall, 2004.

Figure 2.3.27 Traditional versus modern layouts (same scale).
a. Road network in Amsterdam Oud-Zuid.
b. Road network in Amsterdam Zuid-Oost.
source: Google Earth.

PUBLIC TRANSPORT

	Stop spacing [m]	Maximum access distance [m]
Urban Bus	300 – 500	400
Urban Tram	300 – 500	400
Light rail tram	400 – 700	600
Metro	700 – 1400	800
Urban rail	1500 – 2000	1000

Figure 2.3.28 Guidelines for urban public transport networks. source: van Nes, 2002.

Guidelines for urban public transport networks (van Nes, 2002) are used to test the user friendliness of the public transport in Amsterdam Zuid-Oost in this project.

The following table (figure 2.3.28) gives guidelines for the spacing between stops per transport mode and the maximum access distance, also known as the catchment area per transport mode.

The transport modes available in Amsterdam Zuid-Oost are the bus, the metro and the urban rail (figure 2.3.19).

Train network

(see figure 2.3.29)

The train rail going through the Amsterdam Zuid-Oost district belongs to the larger scale and has directions going to Amsterdam Central Station, Almere, Schiphol and Utrecht. The train service has a stop at the Bijlmer Arena and one at Holendrecht in Amsterdam Zuid-Oost.

The stop at Bijlmer Arena serves the Arena Boulevard area and the sub centre functions in Amsterdamse Poort. It has 4 trains per hour going in the direction of Utrecht and also 4 trains per hour in the direction of Duivendrecht, where passengers can change for other directions.

Metro
50 Isolatorweg - Station Sloterdijk - Station Zuid - Station Bijlmer ArenA - Gein
53 Centraal Station - Van der Madeweg - Gaasperplas
54 Centraal Station - Van der Madeweg - Station Bijlmer ArenA - Gein

Bus
GVB
44 Station Bijlmer ArenA - Station Diemen Zuid -Diemen Noord
45 HolendrechtAMC - 's-Gravendijkdreef - Station Bijlmer ArenA
46*Buikslotermeerplein - Station Diemen Zuid - Station Duivendrecht - Station Bijlmer ArenA -Holendrecht AMC
47 HolendrechtAMC - Gaasperdam - Station Bijlmer ArenA
49 Station Bijlmer ArenA - Gaasperplas - Driemond -Station Weesp

SPECIAL RUSH HOUR SERVICE
249 Duivendrecht Weesp
No service during school holidays

CONNEXXION / ARRIVA
102 [Blaricum] - Zuidoost- Station Bijlmer ArenA
120 [Utrecht/Abcoude}- Station Bijlmer ArenA
126 [Mijdrecht] - Station Bijlmer ArenA
158 [Almere Haven/Muiden}- Zuidoost -Holendrechtstation

Figure 2.3.28 Public transport in Amsterdam Zuid-Oost. source: GVB, 2009.

The stop at Holendrecht is a stop that is added quite recently and is located near the AMC Hospital and the Faculty of Medical Science of the University of Amsterdam. It has 2 to 4 trains per hour going in the direction of Utrecht and 4 trains per hour in the direction of Duivendrecht, where passengers can change for other directions.

Both stops can be considered as transit stops as it gives possibilities to transfer to the city metro system and bus network.

The distance between the two stops is approximately 2km, which is good according to the guidelines for urban rail.

The catchment area, with a radius of 1000m covers less than half of the district. The combined neighbourhoods Bijlmer Oost, Nellestein, Gein and Driemond are not covered.

Metro network

(see figure 2.3.30)

The metros in Amsterdam Zuid-Oost (50, 53, 54), go every 7 to 8 minutes during rush hours (7-8 metros per hour). During regular hours and in the evening there is a metro every 10 minutes (6 metro's per hour). The metro service is available from 6:00 – 1:00.

There are 10 metro stops in the district, the distances between the stops vary from 600 – 1000 meters, which are within the margins of the guidelines for urban public transport network. The catchment area leaves out some parts of the city using 800m as a maximum radius from the stops.

The Bijlmerpark in the middle is not easily accessible by metro. Also the outer edges are not very good accessible, including the edges of the Amstel III area, the combined neighbourhood Driemond and part of Nellestein.

Bus network

(see figure 2.3.31)

Even though the bus network looks very dense, the bus is not a very reliable mode of transport as it often uses the same space as the automobiles, which causes uncertainties in departure and arrival times. However the transport mode is also flexible.

The list below shows the bus service.

- Bus 44: every 15 minutes.
- Bus 45: every 15 minutes.
- Bus 46: every 10 minutes, no service during school

Figure 2.3.29 Rail network in the district Amsterdam Zuid-Oost. source: NS, 2009; by author, 2009.

Figure 2.3.30 Metro network in the district Amsterdam Zuid-Oost. source: GVB, 2009; by author, 2009.

holidays.

- Bus 47: every 10 minutes.
- Bus 49: every 30 minutes.
- Bus 249: 1 bus to Weesp only between 7:00 and 8:00. 1 bus to Duivendrecht only between 14:00 and 15:00.
- Bus 102: every 30 minutes.
- Bus 120: every 30 minutes.
- Bus 126: every 30 minutes.
- Bus 158: every 30 minutes.

The distances between the stops have are average 400m in the urbanized areas, which are within the margins of the guidelines.

The catchment area with a 400m radius around the stops is quite large, still there are a few parts which are not covered, i.e. the bottom left and bottom right corner of the district.

BICYCLE NETWORK

Main bicycle network

(see figure 2.3.32)

Paths for cyclist are set up very broad compared to other districts of Amsterdam. It lacks spatial cohesion, a finer network is desirable.

In Amsterdam Noord we find an average width of 0,51 km between the parallel roads. In Amsterdam West we find an average of 0,65 km width, in Amsterdam Zuid an average of 0,6 km width, and in Amsterdam Zuid-Oost an average of 1,57 km width.

The bicycle network average width in Amsterdam Zuid-Oost is almost twice as big as in the other districts.

Recreational bicycle network

(see figure 2.3.33)

There are bicycle routes for recreation in Amsterdam Zuid-Oost. The experiences for the cyclist through the landscape can vary a lot. That is due to the avenues, which creates tunnels and bridges, giving the cyclist different point of view over the landscape.

On the edges of the district, entrances can be found to enter the surrounding polder landscapes or nature area.

In the map there are several places noted, which are places that have either an unclear route connection or have obstacles (fig. 2.3.34). These images also show the variety of the views on the bicycle network.

Figure 2.3.32 Main bicycle network.
source: Dienst Infrastructuur Verkeer en Vervoer, 2005; by author, 2009.

Figure 2.3.33 Recreation bicycle routes.
source: de Vree et al., 2009.

Figure 2.3.34 Pictures corresponding to the numbers on figure 2.3.33.
source: de Vree et al., 2009.

HOUSING

Housing density

(see figure 2.3.35)

This is a rough calculation of gross densities of the combined neighbourhoods in Amsterdam Zuid-Oost. Four types of densities can be found in this district.

Firstly the high density high rise flats in the Bijlmermeer area with large public spaces in between. Secondly the middle high density in Holendrecht, Reigersbos and Gein area. Often with big collective green public space. Thirdly the low densities, single family housing spread in the district. And fourth, another density is remarkable in this district of less than 10 dwellings per hectare, that is of the combined neighbourhood Amstel III & Bullewijk and of Nellestein. The low density in the Amstel II area is due to the big amount of offices situated there. Lower density in Nellestein are due to the lake Gaasperplas.

Densification could be an option for more variety of housing. The big public/collective spaces have a bad reputation due to lack of maintenance and unclear ownership.

Housing stock

(see figure 2.3.36)

In Amsterdam Zuid-Oost we see that the combined neighbourhood Bijlmer-Oost has a large housing stock. In this neighbourhood a lot of the old honeycomb 'Bijlmerflats' can be found. Other combined neighbourhoods have an average housing stock comparable to the rest of the city.

The housing stock in Amsterdam Zuid-Oost is comparable to the housing stock in Amsterdam West.

Figure 2.3.35 Housing density of Amsterdam, Diemen, Amstelveen and Ouder Amstel.
source: CBS, 2006; by author, 2009.

Figure 2.3.36 Housing stock of Amsterdam, Diemen, Amstelveen and Ouder Amstel.
source: CBS, 2006; by author, 2009.

		voor 1906	1906- 1918	1919- 1930	1931- 1945	1946- 1960	1961- 1970	1971- 1980	1981- 1990	1991- 2000	2001- 2007	totaal
T92	Amstel III/Bullewijk	4	3	–	–	–	–	1	2	–	1	11
T93	Bijlmer Centrum (D,F,H)	2	–	–	–	–	1199	1708	5354	402	951	9616
T94	Bijlmer Oost (E,G,K)	1	–	1	2	–	1602	5486	1265	1111	1554	11022
T95	Nellestein	2	1	5	9	4	4	1522	112	–	1	1660
T96	Holendrecht/Reigersbos	1	–	–	–	–	–	3126	4687	198	139	8151
T97	Gein	–	–	–	–	–	–	–	4877	2	–	4879
T98	Driemond	16	40	75	14	97	98	64	178	21	14	617
T	Zuidoost	26	44	81	25	101	2903	11907	16475	1734	2660	35956

Figure 2.3.37 Age of housing stock in Amsterdam Zuid-Oost.
source: van Zee and Hylkema, 2008.

Age of housing stock

(see figure 2.3.37)

Because the district was rapidly built, a large amount of the housing stock comes from the same period (which means they all decay in the same period too).

In the figure we find that about 79% of the housing stock comes '70's and '80's.

If large scale demolishment is needed, it may cause a new peek in housing stock age again. It is therefore necessary to look at other solutions, such as restoration and/or replacement for less demanding functions in the same building.

POPULATION

Population density

(see figure 2.3.38)

The following map shows the population density of Amsterdam, Diemen, Amstelveen and Ouder Amstel in inhabitants per km².

The highest density can be found in the city centre of Amsterdam. Amsterdam Zuid-Oost has an average population density and is comparable to Amstelveen and Amsterdam Noord.

There is opportunity to create a higher variety of densities in the district.

Age distribution and amount of inhabitants

(see figures 2.3.39 & 2.3.40)

The following map shows the age distribution and amount of inhabitants of Amsterdam, Diemen, Amstelveen and Ouder Amstel in inhabitants per km².

The amount of inhabitants in Amsterdam Zuid-Oost is comparable to Amsterdam Oost. In figure 2.3.40, we can see that the amount of inhabitants declines especially in the combined neighbourhood Bijlmer-Oost. One of the reasons is because some of the large honeycomb 'Bijlmerflats' have been

Figure 2.3.38 Population density of Amsterdam, Diemen, Amstelveen and Ouder Amstel.
source: CBS, 2006; by author, 2009.

demolished and replaced by single family housing.

Compared to other districts, Amsterdam Zuid-Oost has a quite a big amount of young inhabitants. The average in Amsterdam in 2006 is 28%, while in Amsterdam Zuid-Oost it is 35%.

There is opportunity to introduce more primary schools, high schools and dwellings for starters.

Non-native non-western inhabitants

(see figures 2.3.41 & 2.3.42)

The following map shows the percentage of non-western non-native foreigners in Amsterdam, Diemen, Amstelveen and Ouder Amstel.

We can find high peaks of non-native non-western inhabitants in Amsterdam West and in Amsterdam Zuid-Oost. While in Amsterdam West there are a lot of Moroccan and Turkish people, in Amsterdam Zuid-Oost we find a lot of Surinam and Ghanaians. The big amount of Surinam is due to the independence of Surinam in the '70s. A lot of Surinam

Figure 2.3.39 Age distribution and amount of inhabitants of Amsterdam, Diemen, Amstelveen and Ouder Amstel.
source: CBS, 2006; by author, 2009.

Figure 2.3.40 Age distribution and amount of inhabitants of Amsterdam Zuid-Oost in 1999, 2002, 2004 and 2006.
source: CBS, 1999; CBS, 2002; CBS 2004; CBS, 2006; by author, 2009.

people immigrated to The Netherlands, people who wanted to live in Amsterdam found cheap housing in Amsterdam Zuid-Oost.

In figure 2.3.42 we find that the non-native non-western inhabitants in Amsterdam Zuid-Oost has grown since 1999. Compared to the average in whole Amsterdam. The Zuid-Oost extension has almost double the amount of non-native non-western inhabitants.

There is an opportunity to attract native inhabitants in the district, to create a better balance.

Figure 2.3.41 Percentage of non-western non-native foreigners in Amsterdam, Diemen, Amstelveen and Ouder Amstel.
source: CBS, 2006; by author, 2009.

Figure 2.3.42 Non-native, non-western inhabitants of Amsterdam Zuid-Oost in 1999, 2002, 2004 and 2006.
source: CBS, 1999; CBS, 2002; CBS 2004; CBS, 2006; by author, 2009.

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LACK OF DAILY DESTINATIONS

The presence of daily facilities are an indicator for the liveability for neighbourhoods (Ruimtemonitor, 2003). For the project an analysis has been made to indicate the liveliness of the district. Because the district was very oriented towards the city centre in the beginning, facilities and work came much later and are not well integrated or even lacking.

Daily activities include: (a) school, (b) work and (3) visits to daily facilities, e.g. supermarkets and drugstores.

Comparison areas

(see figures 2.3.43 & 2.3.44)

For this analysis I have compared four areas: Amsterdam Zuid-Oost, Amsterdam West*, Amsterdam Noord and Amstelveen.

Location	Urbanized area (ha)	Inhabitants
Amsterdam Z-O	2 008	77 435
Amsterdam West*	2 646	182 575
Amsterdam Noord	2 276	84 823
Amstelveen	1 622	76 610

Figure 2.3.44 Comparable areas in Amsterdam.
source: van Zee and Hylkema, 2008; CBS, 2006; by author, 2009.

Relative calculations

It is necessary to understand that the calculations made in this research are relative, assuming that the destinations are evenly distributed over the area (figure 2.3.45). This is of course not realistic, but it does give a rough indication of the current situation.

Figure 2.3.43 Comparison areas.
source: by author, 2009.

Figure 2.3.45 Daily destinations are relatively calculated by assuming that they are evenly distributed over the area.
source: by author, 2009.

* Amsterdam West includes the 'combined neighbourhoods': Bos en Lommer, Geuzenveld-Slotermeer, Osdorp, Slotervaart and De Baarsjes, in this comparison.

Schools

(see figure 2.3.46)

The number of primary schools and high schools are relatively put against the amount per area and the amount per child. These calculations are relative, assuming that the schools are evenly distributed over the area. This is of course not realistic, but the calculation gives an idea about the distance to the school and the choice for schools.

Distance

(see figure 2.3.47)

The distance is calculated by dividing the complete area (ha) by the amount of primary schools and high schools.

When we look at the primary schools Amsterdam Zuid-Oost scores mediocre in the distance analysis: with 1 school per 251 ha, Amstelveen scores lowest with 1 school per 324 ha.

In the high school analysis Amsterdam Zuid-Oost scores bad with 1 school per 669 ha, and Amsterdam Noord also scores low with 1 school per 379 ha.

Choice

(see figure 2.3.48)

The choice is calculated by dividing the amount of children (of 0-19 years old) in the area by the amount of schools prmary and high schools together.

Amsterdam Zuid-Oost scores bad with the amount of children per school: 1911 children per school , compared to Amsterdam West and Amsterdam Noord: consequently 1538 children and 1074 children per school. No data was found about Amstelveen.

municipality border
high school
primary school

1 Augustinus College : vmbo & mbo niveau 1 & 2
2 Open Schoolgemeenschap Bijlmer : vwo, havo, vmbo
3 Reigersbos Scholengemeenschap : vwo, havo, vmbo-t en vmbo-k (sector economie, richting handel & administratie)

Figure 2.3.46 Number of primary schools (orange), and number of high schools (purple).
source: Google maps, 2009; by author, 2009.

Location	Primary School Per area (ha)	High School Per area (ha)
A'dam Z-O	2 008 / 8 = 251	2 008 / 3 = 669
A'dam West*	2 646 / 19= 139	2 646 / 12 = 220
A'dam Noord	2 276 / 14 = 162	2 276 / 6 = 379
Amstelveen	1 622 / 5 = 324	1 622 / 8 = 203

Figure 2.3.47 Primary school and high school per area.
source: CBS, 2006; Google maps, 2009; by author, 2009.

Location	Amount of children 0 – 19 years	Children per school
A'dam Z-O	21 025	21 025 / 11 = 1911
A'dam West*	47 681	47 681/ 31 = 1538
A'dam Noord	21 483	21 483 / 20 = 1074
Amstelveen	?	?

Figure 2.3.48 Amount of children and children per school.
source: CBS, 2006; Google maps, 2009; by author, 2009.

Work

(see figures 2.3.49 & 2.3.50)

There is a clash of work offered and the education level of the inhabitants of the district.

The district offers the second most jobs in Amsterdam next to the city centre. However, these jobs require a HBO or University degree. This is in contrast with the education of the persons in search for employment in the district.

In a survey among 2.020 employees in Amsterdam Zuid-Oost, only 9% of the respondents lives in the district. The respondents have a high education: 81% has a HBO or University degree. (Oude Ophuis et al., 2009)

Amsterdam Zuid-Oost is one of the districts that has the most number of unemployed: 6,4%, i.e. 5020 persons. Average in Amsterdam is 4,8% (van Zee and Hylkema, 2008).

The district also has the highest rate for social security (CBS, 2006).

Figure 2.3.49 Persons in search for employment according to education in Amsterdam Zuid-Oost.
source: van Zee and Hylkema, 2008; by author, 2009.

Figure 2.3.41 Social security in Amsterdam: ABW and WWB social security per 1000 households.
source: CBS, 2006; by author, 2009.

Daily facilities

(see figure 2.3.51)

The number of supermarkets and drugstores are relatively put against the amount per area. These calculations are relative, assuming that the supermarkets and drugstores are evenly distributed over the area. This is of course not realistic, but the calculation gives an idea about the distance to these daily facilities.

Distance

(see figure 2.3.52)

The distance is calculated by dividing the complete area (ha) by the amount of supermarkets and drugstores.

When we look at the supermarket analysis Amsterdam Zuid-Oost scores low: 1 supermarket per 251 ha. Amsterdam Noord scores lower with: 1 supermarket per 228 ha.

In the drugstore analysis Amsterdam Zuid-Oost scores mediocre with: 1 drugstore per 251 ha. Amsterdam Noord scores lowest with: 1 drugstore per 285 ha.

In the comparison Amsterdam Noord scores lower than Amsterdam Zuid-Oost.

Choice

It did not make sense to do a calculation on choice, because some supermarket brands are all the same in a district.

municipality border
supermarkets   : albert heijn, aldi, bas, c1000, dekamarkt, digros, dirk, edah, lidl, plus, spar,
                  super de boer, vomar
drugstores   : private drugstores, etos, kruitvat, etc.

Figure 2.3.51 Supermarkets (green) and drugstores (turquoise) in Amsterdam.
source: Google maps, 2009; by author, 2009.

Location	Supermarket Per area (ha)	Drugstore Per area (ha)
A'dam Z-O	2 008 / 8 = 251	2 008 / 8 = 251
A'dam West*	2 646 / 17 = 156	2 646 / 19 = 139
A'dam Noord	2 276 / 10 = 228	2 276 / 8 = 285
Amstelveen	1 622 / 13 = 125	1 622 / 11 = 148

Figure 2.3.51 Supermarket per area and drugstore per area.
source: CBS, 2006; Google maps, 2009; by author, 2009.

2.4   Amsterdam Zuid-Oost metro station environments

10 STATIONS, 3 CATEGORIES

Figure 2.4.1 Metro station environment typologies.
source: by author, 2009.

(see figures 2.4.1 & 2.4.2)

There are 10 stations in the district, the station environments can be roughly categorized into three types: District services centre, neighbourhood services centre and residential/work. Each of these types have different characteristics.

Of course each metro station environment also has its individual characteristics.

District services centre

The district services centre serves as the nucleus of the district. It is easily accessible by car, train, metro and bus. It has facilities that can be used by many people, such as a cinema, shopping centre, swimming pool and soccer stadium.

Neighbourhood services centre

The neighbourhood services centre has facilities for daily use, such as supermarkets, drugstores, bakeries, butchers, hair dressers and bookshops. Other less daily services can be found in the district centre.

Residential / Work

These metro station environments are less defined. The metro serves mainly for the residents and employees. The environments of these station do not have any special facilities.

District services centre	Neighbourhood services centre	Residential / Work
I. Bijlmer	II. Reigersbos III. Gein IV. Ganzenhoef V. Kraaiennest	VI. Strandvliet VII. Bullewijk VIII. Holendrecht IX. Vernserpolder X. Gaasperplas

Figure 2.4.2 Metro station environments categorized.
source: by author.

I.   STATION BIJLMER

Figure 2.4.3 Station Bijlmer, Gein line [54] stop.
source: by author, 2009.

Station Bijlmer Arena (figure 2.4.3) leads us to the centre of the district Amsterdam Zuid-Oost.

EnvironMETRO Mix

(see figure 2.4.4)

There is quite a mix of functions. The immediate surroundings consists of a lot of office and industrial area, the industrial area should be positioned elsewhere.

Station area

The station is a transit station it is recently renovated (figure 2.4.5a). and has transfer possibilities for the train, metro and bus.

The train directions are towards Amsterdam CS or Utrecht. The metro gives options to the directions of Amsterdam CS, Gein and Isolatorweg (figure 2.4.5b). The bus terminal is large, but also dark. Busses go to Diemen Noord, Holendrecht AMC, Weesp, Utrecht,

Mijdrecht, Almere Haven, Schiphol and Haarlem (figure 2.4.5c).

Shopping area

The shopping area 'Amsterdamse Poort' is close to the station in a walkable distance. Unfortunately the route towards the commercial shopping area is not so clear, one has to cross under a large office building to reach it (figure 2.4.5d&e).

On the other side of the station we find the Arena Boulevard, which presents itself as large scale entertainment area.

Places such as the Arena stadium, movie theatre Pathé Arena and the Heineken Music Hall are an example of this. The Arena Boulevard also contain some megastores of Decathlon and Perry Sport, where one can find all requisites for outdoor activities. Other big stores are the Mediamarkt Arena Woonboulevard Villa Arena, for respectively electronic devices and furniture. The boulevard also has some small cafés and restaurants (figure 2.4.5f).

Even though the Arena boulevard is such large scale, shops open in regular working hours and the cafes and restaurants close at 10pm when there are no events. The only attraction that remains in the evening

Figure 2.4.4 Station Bijlmer, distribution of functions.
source: by author, 2009.

Figure 2.4.5 Pictures of the station, shopping area Amsterdamse Poort and the Arena Boulevard.

a. Big new transit station building, Amsterdam Bijlmer Arena.

b. Interior of the bright station Bijlmer Arena. Transit for metro and train.

c. Bus terminal, big but dark, inadequate lighting.

d. Route toward the shopping area is unclear, pedestrian has to cross through the office building.

e. Amsterdamse Poort shopping centre, the shopping route is sheltered.

f. The Arena boulevard with large movie theatre and shops.

source: by author, 2009.

Figure 2.4.6 Pictures of station offices and residential areas around Station Bijlmer Arena
a. Offices above and next to shopping centre.
b. Residential neighbourhood on the shopping centre side, H-buurt.
c. View from bus terminal toward De corridor business area.
d. Offices near Arena Boulevard, De corridor.
source: by author, 2009.

is the movie theatre. So in the evening the place is not as lively as one would imagine.

Residential / Work area

Around the shopping centre there are some office buildings and residential areas (figure 2.4.6a, b).

Surrounding the Arena Boulevard are large office buildings and many parking garages. Behind the stadium Arena lies the border between Amsterdam and Ouder-Amstel (figure 2.4.6c &d).

II.   STATION REIGERSBOS

Figure 2.4.7 Station Reigersbos, Gein line [54] stop.
source: by author, 2009.

Station Reigersbos (figure 2.4.7) has a small neighbourhood centre attached to the metro station.

EnvironMETRO Mix

(see figure 2.4.8)

There is not a high mix of functions, however, the station environment is quite pedestrian friendly on both sides. Cyclists are able to cross under the metro tracks, but the street materials and furniture could use some maintenance.

Station area

The station is a small transit station with bus transfer possibilities, towards the direction of Holendrecht, Duivendrecht and Weesp. And metro transfer possibilities to Amsterdam CS, Gein and Isolatorweg. The station platform is unfortunately surrounded by a lot of parking lots (figure 2.4.9a). The station tracks casts big shadows underneath, which is not so good. There are two exits at this station, with two completely

different environments.

Shopping area

One exit leads one directly to the commercial area Reigersbos. This exit it recently renovated with more light and transparent material (figure 2.4.9b). The commercial centre is pedestrian friendly, accessible by bicycle but not with car. It slowly fades out into the residential areas surrounding it (figures 2.4.9c&d).

Residential area

The other exit leads to two residential areas: the Randwijkhof (figure 2.4.9e), or T-buurt (T-neighbourhood) (figure 2.4.9f).

Figure 2.4.8 Station Reigersbos, distribution of functions.
source: by author, 2009.

Figure 2.4.9 Pictures of the station environment of Reigersbos.

a. Parking lots, view from station platform.

b. Station Reigersbos is recently renovated with more light and transparent material.

c. Reigersbos commercial centre.

d. Shopping street slowly fading out into residential area.

e. Randwijkhof residential neighbourhood.

f. Residential area T-Neighbourhood.

source: by author, 2009.

III. STATION GEIN

Figure 2.4.10 Station Gein, Gein line [54] stop.
source: by author, 2009.

Station Gein (figure 2.4.10) has a small neighbourhood centre attached to the metro station.

EnvironMETRO Mix
(see figure 2.4.11)
There is not a high mix of functions. The commercial area exit is pedestrian friendly.
The other exit leads to residential areas.

Station area
The station is a small transit station with bus transfer possibilities, towards the direction of Holendrecht, Duivendrecht and Weesp. And metro transfer possibilities to Amsterdam CS and Isolatorweg.

Shopping area
The exit that leads to the core commercial area has a pedestrian friendly environment, the cyclist has possibilities to cross under the station's metro tracks.

Unfortunately the metro tracks cast big shadows under the direct metro station environment, there are some shops under the tracks as well (figure 2.4.12a).

The commercial area itself is slightly deteriorated, and looks dark due to the setbacks of the building. It slowly fades into the residential area (figures 2.4.12b&c).

Residential areas
The residential area at the other direction of the exit is well integrated in the route towards the metro station. There is a small daycare right next to the station (figure 2.4.12d).

The other exit directions lead to residential areas (wethouder neighbourhood and neighbourhood near valburgdreef), there is less interaction with the station. Instead the pedestrian has to cross either parking lots or an infrastructure zone. There is also one small old kiosk (figure 2.4.12e&f).

Figure 2.4.11 Station Gein, distribution of functions.
source: by author, 2009.

Labels in image a: W.C.'T GEIN, BICYCLE PATH, SMALL SHOPS

Labels in image b: RESIDENTIAL AREA, LARGE SETBACKS, LARGE SETBACKS, BICYCLE PATH, PEDESTRIAN SIDEWALK

Labels in image d: DAYCARE

Labels in image e: METRO, RESIDENTIAL AREA, PARKING LOTS, PEDESTRIAN UNFRIENDLY CROSSING, KIOSK

Labels in image f: PARKING LOTS, LARGE UNDEFINED SPACE

Figure 2.4.12 Pictures of the station environment of Gein.

a. Environment under the metro tracks.

b. Gein commercial centre.

c. Gein commercial centre, the shops have setback entrances.

d. Pedestrian friendly residential area.

e. Residential exit of Wethouder neighbourhood, not so pedestrian friendly environment.

f. Residential exit, not so pedestrian friendly environment near Valburdreef.

source: by author, 2009.

IV.   STATION GANZENHOEF

Figure 2.4.13 Station Ganzenhoef, Gaasperplas line [53] stop. source: by author, 2009.

Station Ganzenhoef (figure 2.4.13) has a small neighbourhood centre attached to the metro station.

EnvironMETRO Mix

(see figure 2.4.14)

There is quite a mix of functions in the direct station environment (50m). Also in the secondary circle there is a mix of commercial area, residential area and offices area.

Station area

The station is a small transit station with bus transfer possibilities, towards the direction of Gaasperplas, KNMS island, Holendrecht, Bijlmer Arena. The metro goes to Amsterdam CS and Gaasperplas.

The station Ganzenhoef is recently renovated, with light and transparent material. It has one exit that leads to a square and a roundabout. Visitors have to decide from there which direction they want to go

(figures 2.4.15a &b).

Because the station ends up at a square it is very easy to orientate yourself, however the square is bordered with roads, which makes it sure that you will need to cross the road (figures 2.4.15c, d).

Shopping area

The commercial centre is popular and crowded (figures 2.4.15e & f).

Residential area

The residential area is quite new, with buildings up to 4 floors.

Figure 2.4.14 Station Reigersbos, distribution of functions. source: by author, 2009.

Figure 2.4.15 Pictures of the station environment of Ganzenhoef.
a. Recently renovated station building for Ganzenhoef.
b. Station square.
c. Station square and roundabout.
d. Station square and core commercial area.
e. Core commercial main shopping street.
f. Core commercial area.
source: by author, 2009.

V.   STATION KRAAIENNEST

Figure 2.4.16 Station Kraaiennest, Gaasperplas line [53] stop. source: by author, 2009.

Station Kraaiennest (figure 2.4.16) has a small neighbourhood shopping mall attached to the metro station.

EnvironMETRO Mix

(see figure 2.4.17)

There is a low mix of functions: mostly residential area. There is a commercial area, but it is concentrated in a mall, which has no interaction with the surrounding area.

Station area

The station is a small transit station with bus transfer possibilities, towards the direction of Gaasperplas, KNMS island, Holendrecht, Bijlmer Arena and Weesp. The metro goes to Amsterdam CS and Gaasperplas.

The metro station is very prominently present in the area of Kraaiennest, the exit leads us to a dark and

empty square which is used for the weekly market and a parking lot (figures 2.4.18a&b). Further away we see a warehouse-like shopping mall (figure 2.4.18c).

Shopping area

The shopping mall looks deteriorated, the façade is recently renovated, but it still doesn't look attractive at all. The shopping mall has low interaction with the surroundings (figure 2.4.18d).

Residential area

The other side of the exit has a view over a big road, a mosque (figure 2.4.18e) and an empty plot.

The old honeycomb flats are visible and form one of the main residential areas for this metro station.

Figure 2.4.17 Station Kraaiennest, distribution of functions. source: by author, 2009.

Figure 2.4.18 Pictures of the station environment of Kraaiennest.

a. Dark station environment of Kraaiennest.

b. Prominently present metro station and tracks.

c. Market space and shopping mall.

d. Shopping mall and the surrounding environment.

e. Kraaiennest Mosque.

f. Honeycomb flats.

source: by author, 2009.

VI.   STATION STRANDVLIET

Figure 2.4.19 Station Strandvliet, Gein line [54] stop.
source: by author, 2009.

Station Strandvliet (figure 2.4.19) is a station near the Arena stadium and near the Amsterdamse Poort commercial area

EnvironMETRO Mix

(see figure 2.4.20)

There is a medium mix of functions around this stationOn one side there is a residential area and on the other side it is rather chaotic, because it is bordering the municipality Ouder-Amstel.

Station area

The station is work/residential station with metro transfer possibilities, towards the direction of Amsterdam CS, Gein and Isolatorweg.

There are two exits at Strandvliet, one of them is more heavily used than the other. Both exits have sufficient lighting, but the space is large which makes it feel

eerie (figure 2.4.21a). Both exits end up at an unclear situation, it is rather difficult to orientate (fitgure 2.4.21b).

Also there is a strong distinction between both sides of the metro line, one is residential (figure 2.4.21c) the other is undefined area (infrastructure & not so clear route to Arena stadium) (figure 2.4.21d).

Shopping area

The commercial area is not located near the metro station.

Residential area

The residential area is very monotonous. The blocks are closed, with internal courtyards. Some blocks have unarticulated walls on the ground floor, due to space for sheds (figure 2.4.21e).

It is possible to enter some of the collective courtyards, the courtyards are well maintained, it is, however, not very lively (figure 2.4.21f).

Figure 2.4.20 Station Strandvliet, distribution of functions.
source: by author, 2009.

Figure 2.4.21 Pictures of the station environment of Strandvliet.

a. Lighting under station tracks at the station.

b. Station environment towards residential area is not very clear.

c. Residential area of Strandvliet.

d. Undefined public space, infrastructure.

e. Unarticulated walls.

f. Inner courtyard.

source: by author, 2010.

VII. STATION BULLEWIJK

Figure 2.4.22 Station Bullewijk, Gein line [54] stop.
source: by author, 2009.

Station Bullewijk (figure 2.4.22) is a work/residential station.

EnvironMETRO Mix
(see figure 2.4.23)
There is an extremely low mix of functions at this station. One side is residential and the other side is office/business area.

Station area
The station is work/residential station with metro transfer possibilities, towards the direction of Amsterdam CS, Gein and Isolatorweg.

There are two exits at this station. Both exits are very unclear and it is difficult to orientate (figures 2.4.24a&b).

Shopping area
The commercial area is not located near the metro station.

Residential area
The residential area includes Hoptille (figure 2.4.24c) and Haardstee and the flats: Hogevecht, Haag en Veld, Hofgeest and Hoogoord dwellings (figure 2.4.24d).

On the other side of the metro tracks, there are a lot of offices (figure 2.4.24e). One of the main attractors at this station is the Ikea (figure 2.4.24f).

Figure 2.4.23 Station Bullewijk, distribution of functions.
source: by author, 2009.

Figure 2.4.24 Pictures of the station environment of Bullewijk.

a. Hoptille residential area

b. Hogevecht flats.

c. Offices area of Bullewijk.

d. Direct station exit environment to offices area of Bullewijk.

e. Business and offices area of Bullewijk

f. Attractor: Ikea.

source: Google Streetview; by author, 2009&2010.

VIII. STATION HOLENDRECHT

Figure 2.4.25 Station Holendrecht, Gein line [54] stop. source: by author, 2009.

Station Holendrecht (figure 2.4.25) is a work/residential station. It is an important stop for the AMC Hospital.

EnvironMETRO Mix

(see figure 2.4.26)

There is a very low mix of functions around this stop. One side is for business/offices purpose and the other side for residential purpose. The commercial area is not close to the metro station.

Station area

The station is a becoming a large transit station due to the new train station. There are bus transfer possibilities, towards the direction of Bijlmer Arena, Buikslotermeerplein, Utrecht CS, Mijdrecht, Almere Haven and Almere Oostvaarders. The metro goes to Amsterdam CS and Gein. The train goes to Alkmaar, Uitgeest, Amsterdam CS, Rotterdam CS and Rhenen.

The station platform is recently renovated, but the station area on the ground floor looks deteriorated (figure 2.4.27a&b). The station has 2 exits, with 4 directions, two of them lead to a residential area, one to AMC Hospital (figure 2.4.27c) and the other one to a business/office area (figure 2.4.27d).

Shopping area

The commercial area is not located near the metro station.

Residential area

The residential area consists of meander shaped building blocks, which has two sides. One is a soft, pedestrian side, and the other is a hard car side (figure 2.4.27e). The backsides of the building blocks are facing the pedestrian sides, it has large areas of (collective) green space (figure 2.4.27f). The front sides are meant for the cars to drop off passengers, the pedestrian sidewalk is very small, some contain a small playground. Cars are not allowed to park here though.

Figure 2.4.26 Station Holendrecht, distribution of functions. source: by author, 2009.

Figure 2.4.27 Pictures of the station environment of Holendrecht.

a. Deteriorated art(?) at Holendrecht station.

b. Ground floor station area, not inviting nor lively.

c. Exit towards to AMS Hospital, with a sheltered route.

d. Exit to business and offices area.

e. Hard side of housing type for cars.

f. Soft side of housing type for pedstrian and cyclist.

source: by author, 2009.

IX. STATION VENSERPOLDER

Figure 2.4.28 Station Venserpolder, Gaasperplas line [53] stop. source: by author, 2009.

Station Venserpolder (figure 2.4.28) is work/residential station and is on the border of two municipalities: Amsterdam Z-O and Diemen.

EnvironMETRO Mix

(see figure 2.4.29)

There is a low mix of functions: mostly residential area. One quarter is occupied by business/office area and lays in the municipality of Diemen.

Station area

The station is a residential/work station and offers no transfer possibilities. The metro [53] goes from Amsterdam CS to Gaasperplas.

There is one exit at this station which has two direction. The metro station looks completely deteriorated. It is a very dark environment and it is not well maintained (figure 2.4.30a). On the side of the residential area of

Diemen, there is no interaction with the metro station at all. At the other side the exit leads to a parking lot in front of the residential area.

Shopping area

The commercial area is not located near the metro station.

Residential area

On the Amsterdam side, the station exit leads to an empty station square with one small kiosk (figure 2.4.30b). The residential area, Dalsteindreef has closed blocks (figure 2.4.30c). The route towards the residential area is not so pleasant, there are a lot of parking lots and you need to cross a road (figure 2.4.30d).

On the Diemen side, there is a small bridge that leads to the residential area (figure 2.4.30e). It is a clear route, but the area is not so well maintained, it is not inviting nor pleasant. The bridge leads to the residential area Weerribben. The surroundings are very not lively (figure 2.4.30f).

Figure 2.4.29 Station Kraaiennest, distribution of functions. source: by author, 2009.

Figure 2.4.30 Pictures of the station environment of Venserpolder.
a. Deteriorated station.
b. Empty station square.
c. Residential area of Amsterdam.
d. Route towards residential area.
e. Bridge to Diemen.
f. Unpleasant and not lively environment.
source: by author, 2009.

X.   STATION GAASPERPLAS

Figure 2.4.31 Station Gaasperplas, Gaasperplas line [53] stop. source: by author, 2009.

Station Gaasperplas (figure 2.4.31) is a work/residential station and is very close to Gaasperplas (lake & park).

EnvironMETRO Mix
(see figure 2.4.32)
There is a low mix of functions, basically one side is green (Gaasperplas), and the other side is residential area (K-neighbourhood & Kouwenoord).

Station area
The station is work/residential station with metro transfer possibilities, towards the direction of Amsterdam CS. Bus transfer directions go to: Muiderpoortstation, Holendrecht AMC, Bijlmer Arena, Weesp. Special rush hour busses go to: Duivendrecht dorp, Weesp, Aalsmeer, Bijlmer Arena and Haarlem.

The station looks deteriorated, there are containers just outside the station (figures 2.4.33a&b). It is difficult to orientate. There is also a bus station

next to the metro station (figure 2.4.33c).

Shopping area
The commercial area is not located near the metro station.

Residential area
The residential area basically includes Nellestein (figure 2.4.33d). Even though the K-neighbourhood and Kouwenoord is quite close to the station, the route to those neighbourhoods is not very clear.

The Gaasperplas cannot be seen from the direct station environment. The environment is very green but there is no clear route (figure 2.4.33e). The Gaasperplas is a large green park with a lake in the middle (figure 2.4.33f).

Figure 2.4.32 Station Gaasperplas, distribution of functions. source: by author, 2009.

Figure 2.4.33 Pictures of the station environment of Gaasperplas.

a. Deteriorated station.

b. Lot of containers in front of the station.

c. Bus station.

d. Nellestein.

e. Unclear route to Gaasperplas.

f. Gaasperplas.

source: by author, 2009.

[2] Conclusions

THE ROLE OF THE METRO SYSTEM ON THE THREE SCALES

The role of the metro system plays very different roles on the three scales. On the scale of the city it is a fast public transport mode which goes to the centre, the west and south-east of the city (and the municipality of Amstelveen). This mode of public transport is in use next to the tram, bus and train. It has separated tracks and is therefore not interacting with other modes of transport apart from the transit locations.

On the scale of the district Amsterdam Zuid-Oost, the metro system plays a more important role than on the city scale. The metro is the main public transport mode, next to the bus and train. Its catchment area covers about 80% of the district.

On the scale of the neighbourhoods in Amsterdam Zuid-Oost, the metro stations play a more important role than the system itself. The metro stations are not always very well integrated with the surrounding urban environment.

The following paragraphs includes conclusions from each section of this chapter.

THE METRO SYSTEM OF AMSTERDAM IS YOUNG AND UNFINISHED

The developments of the metro system of Amsterdam includes a time interval of approximately 30 years. In 1968 the first drafts were made for this metro system, while other cities were way ahead: in Paris the metro system was opened in 1900 and in London the underground system opened in 1863.

The reasons why the municipality chose for a metro system were a bit unjust and unclear. The system was built anyway, with the first line going to the newly built south-east extension of the city. Soon the metro system gained new lines which went to the Central Station, the western part of the city and to the municipality of Amstelveen. Looking at the complete metro system of Amsterdam today (year 2009), it is yet a rather unfinished system. Even including the north-south connection the system still remains incomplete.

The city has a radial form with urban wedges as extensions like the shape of a hand: palm = city centre and fingers = urban extensions, but the metro lines are not covering all these city wedges, thus only a certain part of the city is covered. Here is where the city tram system comes in, because looking at the complete public transport network and the city shape we see that both metro and tram system are incomplete, but together they complement each other.

Current plans by the Physical Planning Department (DRO) of Amsterdam are focusing on the metropolitan area of Amsterdam. Here the metro system plays an important role, in their perspective this system can be the main public transport to the cities around Amsterdam. To accomplish this system it is inevitable to complete the system in the city first.

AMSTERDAM ZUID OOST LACKS ... IT SIMPLY LACKS A LOT

Amsterdam Zuid-Oost was planned by modernist, with a functional point of view. Which means that functions

were separated from each other. In the Amsterdam Zuid-Oost context this concept failed. This is not only due to urban planning problems, but also social issues.

Urban planning wise the concept of separating functions caused a lot of problems: (i) there is a lack of liveliness in the district due to monotonous functions in the same area. (ii) A lot of housing deteriorates at the same time (because it is built during the same period), which gives the district an overall deteriorated look. (iii) Infrastructural networks are separated and are very broad, it lacks fineness and extent of accessibility.

But urban morphological planning also stimulated social issues: (i) there is a lot of undefined public space in the district, due to elevated infrastructure, and a lot of 'collective' green. These undefined spaces lack social control. (ii) There is a 'work clash' in the district, the work provided asks for a higher degree than the people have who are searching for work. The education level in the district is lower than average in Amsterdam. (iii) Because there is lack of social control and, the district deals with a lot of criminality and drugs problems.

So the district lacks a certain balance and coherence. A more fine (urban morphological and infrstructural wise) and mixed environment could improve the district, to provide a variety of work, housing and facilities in a more compact area.

METRO STATION ENVIRONMENTS AS ENTRY POINTS FOR COMPACT MIXED DEVELOPMENTS

The first metro line was constructed in Amsterdam Zuid-Oost. Even though each neighbourhood was in 400 meters proximity of a metro station. The metro stations were not very well integrated in the neighbourhoods and the neighbourhoods were not always oriented towards the stations. The elevated stations created a sense of an unsafe environment, due to neglect and permanent darkness (Bruijne et al.,

2002). And monotonous functions surround the metro stations.

Metro stations are nowadays not only seen as a mode of transport to arrive at their destination. But metro stations are transits, entry and exit points for people. More specifically, pedestrians, that need a friendly and useful environment. A better integration with the surrounding neighbourhoods is hereby necessary.

>> NEXT CHAPTER: THEORETICAL FRAMEWORK

In the next chapter I have elaborated theories related to urban coherence (Salingaros, 2005) and Transit Oriented Development (TOD) (Calthorpe, 1993). Both theories suggests principles or guidelines to create a better urban environment.

Stimulating urban coherence & Design guidelines for metro station environments

[3]   Urban coherence in the district & Pedestrian friendly design guidelines for metro station environments

INTRODUCTION

➢ **WHAT** This chapter elaborates the theoretical framework that has been used in order to support the practical analysis. It gives an answer to the following sub research question:

"What kind of design guidelines or principles can improve the urban coherence on the scale of the district of Amsterdam Zuid-Oost?"

"What has been written about the walkability of neighbourhood typologies?"

and

What kind of design guidelines are suggested by transit oriented development (TOD) (Calthorpe, 2003) to integrate a metro station with its surrounding neighbourhood?

➢ **WHY** The strategy of my project is to strengthen the internal coherence of Amsterdam Zuid-Oost by redeveloping metro stations and their direct surroundings into small hubs to structuralize the urban environment

➢ **HOW** For this I have selected two guiding principles to tackle the two scales of the project.

The first principle is related to the scale of the district. Because the district is unbalanced I have selected principles from the book 'Principles of Urban Structure' by mathematician Nikos Salingaros in order to create urban coherence.

Nikos A. Salingaros is professor of mathematics at the University of Texas in San Antonio, in addition he is a consultant for various American New Urbanist projects and/or government planners in other countries such as Mexico, Greece and Spain.

The principles from this book are very abstract because they are taken from mathematics and science. It was therefore necessary to translated them for the

case of the district Amsterdam Zuid-Oost.

The second principle that I have chosen is to promote walkable neighbourhoods to end functional suburbia using the 'transit oriented development' principles of Calthorpe (1993). Promoting walkable neighbourhoods is one of the principles of transit oriented development. I believe it is the fundamental element for creating environments that support uses of transits.

In this chapter I have elaborated why we should advocate pedestrian friendly design for neighbourhoods, in order to end outdated and unsustainable suburban sprawl patterns. Even though Amsterdam Zuid-Oost is not seen as a suburban sprawl development, it definitely has the characteristics of it.

Because we are dealing with a transit stop, I have not only studied the principles in order to create a walkable neighbourhood, but studied all of the proposed principles of TOD. And elaborated the principles that are applicable for the case in Amsterdam.

These two principles for respectively the scale of the district and the scale of the neighbourhood complement each other.

Transit oriented development can be used for redevelopment on the scale of the district or region, however in this case I think it is not feasible to implement a large scale redevelopment concept based on TOD. The district has a strict separation of functions, this fact cannot easily be changed without large scale redevelopments.

Instead I have studied the principles of Salingaros (2005) and found out that these principles are more abstract and therefore more flexible to interpret. The way I interpreted these principles are more subtle and more feasible to implement.

SECTION 3.1

There is an increasing awareness that a city needs to be understood as a complex interacting system. Different types of urban systems overlap to build up urban complexity in a living city. This raises the need for using concepts such as coherence, emergence, information, self-organization and adaptivity (Salingaros, 2005).

The district Amsterdam Zuid-Oost is design according to functional means, it is decomposable is separate elements and is therefore unsuccessful according to Salingaros. This writer describes certain urban phenomena using understandings from science and mathematics. Because these principles are derived from more abstract fields, they cannot directly be used on urban design. Therefore I have translated these principles, using my own interpretation on the situation of Amsterdam Zuid-Oost. This translation can be found after each principle in the 'For my project'-paragraph. Whereupon I have elaborated the 'Approach' from this translation.

The original guiding principles can be found in the book: *"Principles of urban structure"* by Nikos Salingaros (2005), Techne Press.

The conclusions of this paragraph are used to form a theoretical base for the vision of the district and are elaborated in chapter 4.

SECTION 3.2

This section s dedicated to a theory paper I have written for a master course during my graduation semester. It can be seen as a literature analysis that gives a general idea on how the perception of neighbourhoods has changed during the years, how suburban sprawl neighbourhoods were developed, and why we no longer admire these sprawl patterns. The paper urges the comeback of traditional neighbourhoods which are more pedestrian friendly.

Pedestrian friendly design is recommended by Transit Oriented Development (TOD) and is my main focus while using these principles for implementation. The paper bridges the two scales of the project: the district scale and the neighbourhood scale. Separation of functions might have been an ideal concept on the scale of the district, but it has many consequences on the neighbourhood scale which perhaps were not foreseen. The paper describes these consequences and elaborates the contrary solutions, which are suggested by authors from several literature references.

SECTION 3.3

American suburbs which have been developed soon after the WWII, also known as sprawl suburbia have been proved to be an unsustainable type of growth (Duany et al., 2000). Transit Oriented development or TOD for short, is a movement that was developed to map out a new direction for growth in the American Metropolis and end this type of unsustainable urban sprawl formations (Calthorpe, 1993).

Calthorpe (1993) gives in his book guidelines for compact regional urban growth which is transit supportive. He also suggests guiding principles on how to organize urban elements around the transit stops. The structure of the guidelines consists of various topics.

For this project I have carefully read and translated the elements in these topics to fit it to the context of the district Amsterdam Zuid-Oost. Deriving guiding principles that can be implemented around the metro stations of my project. The original guidelines can be found in the book: *"The Next American Metropolis: ecology, community and the American Dream"* by Peter Calthorpe (1993), Princeton Architectural Press.

The principles from TOD are used to do an in-depth analysis of the case studies in Stockholm and selected key-projects from the vision of Amsterdam Zuid-Oost. On top these principles are used as guiding principles during the design process.

3.1 Stimulating urban coherence

PRINCIPLES OF URBAN STRUCTURE

Figure 3.1.1 Book cover of 'Principles of urban structure', by Nikos Salingaros.
source: Salingaros, 2005.

The eight principles (or rules) by Salingaros (2005) (figure 3.1.1) are given to create a successful urban environment. The principles are based on scientific insights.

This section can be seen as a summary and thorough explanation of these principles and what these principles would mean for my graduation project.

The principles:

A.   COUPLINGS: Strongly-coupled elements on the same scale form a module. There should be no unconnected elements inside a module.

B.   DIVERSITY: Similar elements do not couple. A critical diversity of different elements is needed because some will catalyze couplings between others.

C.   BOUNDARIES: Different modules couple via their boundary elements. Connections form between modules, and not between their internal elements.

D.   FORCES: Interactions are naturally strongest on the smallest scale, and weakest on the largest scale. Reversing them generates pathologies.

E.   ORGANIZATION: Long-range forces create the large scale from well-defined structure on the smallest scales. Alignment does not establish, but can destroy short-range couplings.

F.   HIERARCHY: A system's components assemble progressively from small to large. This process generates linked units defined on many distinct scales.

G.   INTERDEPENDENCE: Elements and modules on different scales do not depend on each other in a symmetric manner: a higher scale requires all lower scales, but not vice versa.

H.   DECOMPOSITION: A coherent system cannot be completely decomposed into constituent parts. There exists many in-equivalent decompositions based on different types of units.

A. COUPLINGS

"Strongly-coupled elements on the same scale form a module. There should be no unconnected elements inside a module."

According to Salingaros (2005) two urban elements can link strongly in many ways. However, two elements that are simply juxtaposed, but which do not interact in any way, do not couple. They remain unaffected by each other and fail to weave the urban fabric.

A coupling is strong whenever one element needs its complement for greater coherence. The units that couple must be of similar size.

The first two coupling examples are perchance suitable for the architectural scale (figure 3.1.2a&b), but certainly not on the scale of the district therefore I will not use them. The remaining three coupling principles are proper to use on the scale of the district (figure 3.1.2c, d & e).

For my project

In the district of Amsterdam Zuid-Oost, urban elements do not couple strongly. There are mainly four functions separated from each other in the district: work, dwellings, green and infrastructure (figure 3.1.3).

Approach

In order to see what the interaction between these elements are, I have put them into a matrix (figure 3.1.4). And for every group of two elements, I have analysed in what way they couple or not.

Whenever a group does not couple (strongly), I have suggested solution type(s) from the proposed geometric coupling examples of Salingaros (2005).

Figure 3.1.2 Salingaros' coupling examples, type 1-5.
a. Type 1 Geometric coupling hrough contrast in texture.
b. Type 2 Geometric coupling through contrast in colour.
c. Type 3 Geometric coupling through interpenetration.
d. Type 4 Geometric coupling through permeability.
e. Type 5 Inductive coupling via a common third element.
source: Salingaros, 2005.

Figure 3.1.3 Separated functions in the district.
source: by author, 2009.

TYPE	work	housing	green	infrastructure
work				
housing	1			
green	2	4		
infrastructure	3	5	6	

Figure 3.1.4 Matrix of urban elements.
source: by author, 2009.

GROUP 1

work	housing

Figure 3.1.5 Work and housing do not form a couple, they slide against each other.
source: by author, 2009.

Work is positioned on the left side of the district, bordered by infrastructure. Housing is purely positioned on the right. These elements "slide" against each other, there is low interaction, which means they are not coupled (figure 3.1.5).

Solution types

(see figure 3.1.6)

- Solution type 3:
  Let work and housing mix by constructing big areas of work in the housing area and the other way around.

- Solution type 4:
  Allow work and housing mix slightly through each

other's areas on the border between them.

- Solution type 5:
  The stops of the metro system can function as a common third element, users of both urban elements need transport to move around.

Figure 3.1.6 Solution types 3, 4 & 5 for group 1.
source: by author, 2009.

work	green

Figure 3.1.7 Work and green do not couple, there is no interaction.
source: by author, 2009.

There is absolutely no direct physical connection between work and green in the district (figure 3.1.7).

Solution types

• Solution type 3:
  Allow work and green mix by dissolving the harsh borders of both urban elements and built up areas of work in the green zone and the other way around (figure 3.1.8).

Figure 3.1.8 Solution type 3 for group 2.
source: by author, 2009.

work	infrastructure

Figure 3.1.9 Work and infrastructure form a couple through permeability.
source: by author, 2009.

Work is easily accessible by car and public transport (via metro system). The infrastructure can be seen as a common third element, that couples work and dwellings. With work, the infrastructure forms a couple through permeability (figure 3.1.9).

housing	green

Figure 3.1.10 Housing and green are coupled through interpenetration.
source: by author, 2009.

In the district, there is a wedge of green penetrating the housing area. According to the proposed coupling examples. These two urban elements do couple (figure 3.1.10).

GROUP 5

housing	infrastructure

Figure 3.1.11 Work and housing form a couple through permeability.
source: by author, 2009.

The housing area is easily accessible by car and public transport (via metro system). The infrastructure can be seen as a common third element, that couples work and dwellings. With the housing area, the infrastructure forms a couple through permeability (figure 3.1.11).

GROUP 6

green	infrastructure

Figure 3.1.12 Green and infrastructure do not form a couple, because they slide against each other.
source: by author, 2009.

Green and infrastructure do not form a couple in the district. Infrastructure is dividing the green in parts; the green and infrastructure slide against each other (figure 3.1.12).

Solution types

(see figure 3.1.13)

- Solution type 4:
  Make sure that the green is uninterrupted area, this can be made possible by using wildlife friendly under and over passages (figure 3.2.14a&b). Infrastructure and green should couple through permeability.

Figure 3.1.13 Solution type 4 for group 6.
source: by author, 2009.

Figure 3.1.14 Wildlife passes.
a. Wildlife overpass
b. Wildlife underpass.
source: K. Gunson & K. Foresman from Bissonette et al., 2009.

B. DIVERSITY

"Similar elements do not couple. A critical diversity of different elements is needed because some will catalyze couplings between others."

According to Salingaros (2005) diversity becomes only a problem when elements have a disproportionate size. Size imbalance among urban units can create desolation by preventing small-scale couplings although exactly the same kind of contrast in uses at small scale becomes an asset because it enables couplings among adjoining elements.

Elements in a mixture of different type can function as an unsuspected catalyst. Urban coherence emerges in an analogous fashion. The formation of a complex interacting whole requires the availability of many different types of urban element.

For my project

Since functions are strictly separated, diversity is not very strong on the large scale (figure 3.1.15). On the smaller scale, we see on some places intentions to introduce diversity. These places are around the metro stations: Bijlmer Arena, Reigersbos, Gein, Ganzenhoef and Kraaiennest. Around these metro stations, some sub-centre facilities are implemented.

Approach

This is a great step towards more diversity on the neighbourhood scale, however, it is not implemented successfully at every station mentioned above. So there is room for improvement.

There is also potential to introduce this type of diversity around other metro stations, which are frequently used by not only inhabitants of the district, but also visitors. For example around Venserpolder, Strandvliet, Bullewijk or Holendrecht.

Figure 3.1.15 Minimum diversity on large scale.
source: Google Earth; by author, 2009.

C. BOUNDARIES

"Different modules couple via their boundary elements. Connections form between modules, and not between their internal elements."

For my project

Functions are strictly separated in the district (figure 3.1.16), the boundaries between work and housing is a train rail and the metro rail. The boundaries of the elements housing and green are not special in particular.

Approach

A closer look should be taken at the boundaries of the elements. The place where the elements reach and should interact with each other in order to couple.

Figure 3.1.16 Separated functions in the district.
source: by author, 2009.

D. FORCES

"Interactions are naturally strongest on the smallest scale, and weakest on the largest scale. Reversing them generates pathologies."

Pathology is the study of diseases. Salingaros (2005) mentions that urban couplings begin on the smallest possible scale, and are needed to bind contrasting or complementary components together into one unit.

There exist different types of forces that act on different scales. Every force is inversely proportional to the spatial dimension, which means that a very strong force acts over short distances, whereas a weak force acts over long distances.

For my project

By the smallest scale, Salingaros gives examples of: footpath with boundary wall (figure 3.1.17a), parking place with a piece of pedestrian canopy, wall with tree, bricks with mortar, paving stones of contrasting colours (figure 3.1.17b), entry-way with arcade, column with roof, local street with parking spaces (figure 3.1.17c), etc.

Approach

For a vision on the scale of the district this rule cannot be used, because this rule should be implemented on the neighbourhood scale or even architectural scale.

However these small scale elements can be considered in the design proposals for the metro station environments.

Figure 3.1.17
a. Footpath with boundary wall, location: Stockholm.
b. Paving stones of contrasting colours.
c. Local street with parking space, location: Stockholm.
source: by author, 2009.

E. ORGANISATION

"Long-range forces create the large scale from well-defined structure on the smallest scales. Alignment does not establish, but can destroy short-range couplings."

Figures 3.1.18a, b &c illustrate three distinct cases of ordering. In figure 3.2.18a, non-interacting elements are aligned, just as in a contemporary city. The opposite case, where interacting elements show no overall alignment, has a decidedly organic form (figure 3.1.18b). Figure 3.1.18c has both coupling and alignment.

For my project

In the district (figure 3.1.19), one can find types of figure 3.1.18a and also of figure 3.1.18c.

Approach

The grid structure should be reviewed: a more complex coupling can be implemented to align it on a bigger scale.

F. INTERDEPENDENCE

"Elements and modules on different scales do not depend on each other in a symmetric manner: a higher scale requires all lower scales, but not vice versa."

For my project

There is a strict separation of functions on the scale of the district, causing the lower scale to depend on the higher scale. There is no interdependence.

Approach

On both low scale as on the higher scale a diverse environment is needed. I will treat every metro station environment as a unique situation with its unique needs. When diversity is reached on a lower

Figure 3.1.18 Organization of elements.
a. Elements aligned but not coupled.
b. Elements coupled but not aligned.
c. Coupled elements aligned.
source: Salingaros, 2005.

Figure 3.1.19 Elements aligned but not coupled and coupled elements aligned in the district of Amsterdam Zuid-Oost.
source: Google Earth.

LOWER SCALE

Figure 3.1.20 Diversity on a lower scale can create diversity on a higher scale.
source: by author, 2009.

HOUSING

GREEN

WORK

Figure 3.1.21 Amsterdam Zuid-Oost can be decomposed into constituent parts.
source: by author, 2009.

scale it will also be available for the higher scale (figure 3.1.20).

G. DECOMPOSITION
"A coherent system cannot be completely decomposed into constituent parts. There exists many in-equivalent decompositions based on different types of units."

For my project
The district of Amsterdam Zuid-Oost can easily be decomposed into constituent parts: i.e. work, housing and green (figure 3.1.21). So it is not a coherent system.

Approach
A mix of functions and more complex interrelations can create an environment that can be decomposed based on different types of units.

3.2 The Walkable Neighbourhood

THE WALKABLE NEIGHBOURHOOD
Advocating pedestrian friendly design for neighbourhoods to end suburban sprawl

Neighbourhoods are formed by networks of people
The neighbourhood is no longer essential for social relations. The classical idea of the neighbourhood of being a proper territorial base, where people would have many personal contacts has been debunked. Nevertheless the neighbourhood still exists, but is created by networks of people. People connect with each other because they share something in common; they go to the same sports club, bring their children to the same school, do their shopping in the same centre or help each other out in emergencies. Jacobs (1961), Lynch (1981), Barnett (2003) and (Boarnet and Crane, 2001) all agree on this.

According to Lynch (1981) these networks of people result into physical networks that are often an important part of the mental structure for people. Instead of being an ideal unit of social organization (a space where people know each other because they live next to each other), the neighbourhood has become "a concept of control and a concept of sensibility". Lynch states that that "these communities exist in the minds of city dwellers." In this local organization "there is often an agreement about their boundaries and their stereotyped characteristics. That agreement is enforced by word of mouth and by the media." So he thinks that even though the neighbourhood is formed by relations, it still has some sort of local organization and boundaries that is accepted by and agreed on by people and media.

On the contrary Jacobs (1961) believes that neighbourhoods are physical, social and economic continuities. And "once a good, strong network of links gets going, the network can enlarge relatively swiftly and weave all kinds of new patterns." She states that

"we should drop any ideal of neighbourhoods as self-contained or introvert units". And that the only way to tell whether a neighbourhood is a success is if it succeeds in localized self-government. Jacobs also believes that the first relationships to form in city areas that give any neighbourhood stability, are those in street neighbourhoods (among the people who have something in common, as mentioned earlier).

Barnett (2003) does not say whether a neighbourhood does or does not have any boundaries. But he does believe that it is not the designers and builders that create neighbourhoods, but that it is the people who make a neighbourhood out of different kind of places. However, "the design and physical condition of the community do have a big effect on whether people create neighbourhoods or not".

Boarnet and Crane (2001) also agree with Barnett (2003) that quality of life is influenced by the environment in which one lives, though they do think that "human behaviour is more complex than a simply a reflection of the neighbourhood".

Planners can be seen as writers, while people are both the producers and actors of a neighbourhood.
I agree with Barnett that the design and physical condition of a spatial unit can give a certain effect on people, as it creates a mental structure for people, as Lynch would say. Planners 'write' a certain neighbourhood pattern. People interpret these neighbourhoods in their own way, they are the 'producers' of their own environment. As actors people create certain networks, by making certain choices in their lives.

As to whether a neighbourhood has boundaries, I dare not say if that it is true or not. Mental maps can grow continuously like Jacobs states, however, I think that for certain networks these mental maps lay within a certain unit. And this unit is accepted by and agreed on by people and media, like Lynch states. Especially daily activities are done within a local community, such

as grocery shopping or bringing children to school for instance. Other networks that can be more spread are travelling, recreation, visiting a friend etc.

Nevertheless to create neighbourhoods and networks, people and relations are essential. And the base for this network can be interpreted as either weak or strong, interesting or uninspiring, memorable or disorientating depending on the urban design.

Development of neighbourhood types

After the Second World War, population and work grew steadily in the United States and western Europe. Cities became more dense, sanitary conditions deteriorated and green spaces were difficult to find. Modernists invented a form of urban growth to contrast the overcrowded city, where the "functionalist view of the city, requiring the strict separation of uses, persisted as a particularly powerful ideological motivation for urban renewal projects in the 1950s, as well as for suburban sprawl developments" (Soule, 2005).

The concepts of the functional city were set up by the CIAM. Each urban agglomeration was separated into four categories: dwelling, working, recreation and circulation. For each of these items, requirements were proposed for implementation: "(1) residential areas, designed for maximum light and air in each unit, must be sited in the most favourable parts of the city topographically and climatologically, with no housing sited along arterial roads; (2) Workplaces should be located so as to allow the shortest possible commuting distances, yet should remain separated from residences by greenbelts; (3) Parks should be distributed throughout the city, and high-rise buildings could be used to free more ground area for recreation; and (4) Pedestrian, local and high-speed traffic channels should be separated, with pedestrian-vehicular crossings minimized or eliminated through the use of superblocks and multiple-level crossings" (Mumford, 1992).

But many already recognized the problems in this ideology of what pure separation of functions may cause, such as Jacobs (1961), who stated that a district "must serve more than one primary function; preferably more than two" as a generator for diversity and that the absence of it could "frustrate a district's potential".

Soon the suburban sprawl developments driven by the ideology of the functional city had proven to be unsustainable. According to Duany et al. (2000) "sprawl tends not to pay for itself financially and consumes land at an alarming rate, while producing insurmountable traffic problems and exacerbating social inequity and isolation". It is "not healthy growth" and "it is essentially self-destructive". Nechyba and Walsh (2004) state that sprawl is "disadvantageous socially", it weakens or even destroys local community.

The failure of the functionalist city was even recognized by CIAM's own membership. Team X, led by the couple Smithsons, recognized that "the separation that CIAM fostered was untenable, giving way to an inorganic form of urbanism". But they retained the objection against the traditional urban form and analyzed neighbourhood life in distinguishable associational hierarchical elements. Only it still was "another form of abstraction, another system of separation, another rejection of historical context and the traditional forms and patterns of urbanism" (Talen, 2005).

Others who believed that we should bring the pre-automobile traditional urban patterns of the city back, were the followers of 'new urbanism'. The new urbanism paradigm was a primary response to sprawl, along with the visions of 'smart growth' from the 80s, who advocated "mix of uses, with residential, commercial, and civic activities more tightly interspersed. Such higher densities and mixed uses are intended to foster a wider range of transportation choices, including public-transport, ride sharing, bicycling, and walking" (Soule, 2005).

In the following part of this paper several views by different authors are put next to each other to elaborate so called traditional neighbourhoods against neighbourhoods that were developed by suburban sprawl.

Strong versus weak urban design for neighbourhoods

Suburban sprawl has been depicted as weak urban design for neighbourhoods due to the separation of functions and high dependency on automobile. It has created a loss sense of community and besides they are unsustainable (Duany et al., 2000; Squires et al., 2002; Calthorpe, 1993; Morris, 2005; Frumkin et al., 2004; Nijkamp and Rienstra, 1996; Smith et al., 1987; Nechyba and Walsh, 2004). It is "a consequence of various broad changes in society, such as income increase, smaller households, more leisure time, and changing housing preferences" (Nijkamp and Rienstra, 1996).

Traditional neighbourhoods on the other hand can form strong neighbourhoods and have proven to be sustainable (Katz, 1993; Duany et al., 2000; Hall and Porterfield, 2001). Due to mixed-use of land development and walkable communities. While some advocate the comeback of these traditional neighbourhoods (Duany et al., 2000) or some components from traditional neighbourhoods (Calthorpe, 1993; Morris, 2005), others believe that sprawl has always occurred and that we should give the dispersed urban regions some respect before we decide to transform them all (Bruegmann, 2006).

Duany et al. (2000) can be seen as one of the frontrunners to promote the traditional neighbourhood networks against suburban sprawl developments.

They state that suburban sprawl "ignores the historical precedent and human experience". It consists of five components, which are very similar to concepts

Figure 3.2.1 Sprawl (top) versus the traditional neighbourhood (bottom): in contrast to the traditional network of many walkable streets, the sprawl model not only eliminates pedestrian connections but focuses all traffic onto a single road.
source: Duany et al., 2000.

of the functional city: (1) Housing subdivision, which only serves for housing; (2) Shopping centres, which is exclusively for shopping; (3) Office parks, which is only for work; (4) Civic institutions, a cluster of public buildings; and (5) Roadways, the most important of them all "to connect the other four disassociated components".

Suburban sprawl creates traffic congestions, everybody is forced to drive because functions are apart from each other. On top of that, the road network is set up hierarchically: the driver always ends up on the so-called "collector" road and if some accident occurs here the whole system collapses (see figure 3.2.1: top).

Duany et al. (2000) think that another problem is that things that seem nearby are still far apart. Developers have built a barrier between functions (roads, parking lots, undefined green, no designated place for walking

etc.), "discouraging even the most intrepid citizen from walking".

Also curving roads and cul-de-sacs "do not make memorable places". Curves are not per se the problem; "the problem is driving along on a street that heads north and finding oneself heading east, then south, then west", which makes them "utterly disorienting". And so called Cul-de-sacs, better known as dead-end roads do not "allow streets to connect across them" .

They think that the only proven alternative to sprawl is the traditional neighbourhood, which represents "mixed-use, pedestrian friendly communities of varied population, either standing free as villages or grouped into towns and cities".

When some accident happens in a traditional street network, the driver can always choose another path, because the system gives more alternatives (see figure 3.2.1: bottom). These neighbourhoods have functions which are relatively in proximity to each other due to mixed-use and are easily accessible by walking. So Duany et al. (2000) pleads to put an end to suburban automobile-dependent sprawl patterns with a return to more traditional planning principles.

Bruegmann (2006) does not agree with this view, as historian, he sees sprawl as something that has always occurred. Suburbs existed as long as cities do, giving space for wealthy families who built their villas and second houses outside the congested, noisy, and dense city. Accessibility was not a problem as they had enough money for horses and carriages.

A lot of things that critics of sprawl appear to agree on nowadays are based on "out-of-date or insufficient evidence" according to Bruegmann (2006). In his book, Bruegmann (2006) views sprawl as a cultural issue, and does not think that objective issues such as the cost of low-density developments or the effect of sprawl on commuting and global warming are the drivers behind the "anti-sprawl crusade".

Instead he focuses on questions about "planning and democracy, aesthetics and metaphysics, and differing class-based assumptions about what makes a good urban life".

On the other hand Calthorpe (1993) does not ignore the mobility problems sprawl has brought nor does he think that returning the traditional form of neighbourhoods and town is the solution. According to Calthorpe (1993) not only recent suburban developments separated many uses, but also classic towns did so. "Residential neighbourhoods, commercial areas, school sites, and civic centres. But the connections between uses were internal and walkable, close and direct". The population of these towns was diverse and they all shared an "identifiable commercial centre and civic focus". This town centre integrated commercial, recreational and civic life, but current suburbia does not reflect this.

While some characteristics of the traditional neighbourhoods and town are suitable for implementing on current sites for improvement, such as a mixed-use centre or pedestrian friendly streets, others are less adaptable, such as its fine grain and scale. So "integrating more finely walkable communities with a strong local identity and convivial public spaces are possible" according to Calthorpe (1993) and these forms emerged by his proposed design principles can be both timeless and contemporary.

The guidelines of Calthorpe (1993) promote transit oriented development which takes a further step to get the pedestrian to use transit instead of cars for longer trips. The guidelines consists of compact and transit-supportive growth, placing facilities within walking distance of transit stops, creating pedestrian friendly street networks, mix of housing, preserving high quality open space, making public spaces the focus for neighbourhood activity and encouraging infill along transit corridors within existing neighbourhoods.

Morris (2005) is also a supporter for walkable communities and thinks that "modern suburbs are built to accommodate cars and commerce only and not people or public transit." It has eliminated possibilities for social interaction, due to lack of sidewalks and pedestrian areas, while sidewalks are the most important thing that holds society together and create contact (Morris, 2005; Jacobs, 1961).

Besides advocating pedestrian friendliness Morris (2005) also supports higher density, mixed-use, traditional gridded road networks and mass transportation.

It seems to me that Bruegmann shoves the objective automobile-dependency problems away, by saying that these are not the drivers behind the anti-sprawl movement, while many authors (Duany et al., 2000; Squires et al., 2002) who are against sprawl, think that dealing with the sprawl network pattern is one of the most important things.

Duany et al. (2000) set up a strong comparison between traditional and modern neighbourhoods road networks and pinpoint what kind of serious problems sprawl patterns might bring – automobile-dependency, lack of orientation and lack of interconnected roads due to cul-de-sacs. Though I agree with Calthorpe (1993) that simply bringing back the traditional neighbourhood is not the solution. Implementing certain guidelines, that have proven to be necessary for a neighbourhood to work, such as walkable communities, can be implemented to improve social interaction at all times.

Advantages of pedestrian oriented neighbourhoods
According to Bradbury et al. (2007) "walkable neighbourhoods are typically characterized by having a range of facilities within 10 minutes (up to about 800m) walking distance of residential area which residents may access comfortably on foot". There are many advantages of pedestrian friendly neighbourhoods.

First of all they make pedestrian travel easier and make them travel more often (Lee and Moudon, 2008; Cervero, 1995) and it also offers the potential to replace short car trips (Cervero, 1995), particularly under a quarter mile (Boarnet and Crane, 2001; Untermann, 1984) but not more than 2km (Bradbury et al., 2007). Untermann (1984) states that "people tend to walk where it is easier, faster or cheaper than to drive". In high density districts, congestions and lack of parking are reasons for people to walk instead of ride. In medium density neighbourhoods "sidewalks, destinations and continuous changes of view" seduce people to walk also. "Walkers are attracted to mixed-use urban districts where there is activity involving people-people watching, socializing, being seen, and just being around other people." In single-used districts and suburbs, "where destinations are distant and the unfolding view is monotonous" people are less willing to walk.

Second, it encourages the conservation of energy resources, creates less fragmented open space and reduces pollution. Conservation of energy resources is achieved by the decrease of public infrastructure requirements and development costs (Smith et al., 1987). It declines automobile congestions, which lessens noise and air pollution (Nechyba and Walsh, 2004).

Third, pedestrian friendly designs often have high densities, which promotes a reduced amount loss of open space (Boarnet and Crane, 2001; Calthorpe, 1993) and also reduces vehicular trip frequency (Levinson and Wynn, 1963).

Fourth, pedestrian friendly designs are more easily served by transit (Smith et al., 1987; Calthorpe, 1993; Bernick and Cervero, 1997). "Walking is one of the most important mode to access public transport terminals" (Wibowo and Olszewski, 2005), advocating walkable communities can stimulate the use of public transport.

Fifth, walking is healthy physical activity. Physical

activity is associated with decreased risks of developing many chronic diseases, such as obesity, cardiovascular diseases, type II diabetes, certain cancers, depression, and anxiety (Lee and Moudon, 2008).

CONCLUSION

The physical form of a neighbourhood can create a base for social networks to evolve (Barnett, 2003; Boarnet and Crane, 2001). Social networks are nowadays the strongest component to form a neighbourhood (Lynch, 1981; Jacobs, 1961; Barnett, 2003). For social networks to form in a neighbourhood pedestrians on sidewalks are essential (Morris, 2005; Jacobs, 1961).

However, suburban sprawl neighbourhoods created by Modernists are not pedestrian-friendly: sidewalks are lacking and the road networks are mobile-oriented, whereby the sense of community is rather lost (Duany et al., 2000; Squires et al., 2002; Calthorpe, 1993; Morris, 2005; Frumkin et al., 2004; Nijkamp and Rienstra, 1996; Smith et al., 1987; Nechyba and Walsh, 2004).

A primary response against these pedestrian unfriendly neighbourhoods was from the New Urbanism movement along with the Smarth Growth followers, who advocate to bring the traditional neighbourhood back (Duany et al., 2000) or at least some components of it (Calthorpe, 1993; Morris, 2005), to make the neighbourhood walkable again.

Walkable neighbourhoods have many advantages. Firstly pedestrians can travel easier (Lee and Moudon, 2008; Cervero, 1995) and it offers the potential to reduce or replace vehicular trips (Boarnet and Crane, 2001; Untermann, 1984; Cervero, 1995). Secondly it encourages conservation of energy resources, by means of decrease development costs, infrastructural requirements, less noise and air pollution. Thirdly, it promotes high density, which can reduce vehicular trip frequency (Levinson and Wynn, 1963) and reduces loss of open space (Boarnet and Crane, 2001; Calthorpe, 1993). Fourth, pedestrian friendly neighbourhoods can stimulate use of public transport, because it easier served by public transport (Smith et al., 1987; Calthorpe, 1993; Bernick and Cervero, 1997). And fifth walking is a healthy physical activity that is associated with decreased risks of developing many chronic diseases (Lee and Moudon, 2008).

3.3 Metro station design guidelines derived from Transit oriented development (TOD)guidelines

TRANSIT ORIENTED DEVELOPMENT (TOD)

A transit oriented development (TOD) is a mixed-use community community within an average 2000-foot (0,6 km) 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.

TODs offer an alternative to traditional development patterns by providing housing, services, and employment opportunities for a diverse population in a configuration that facilitates pedestrian and transit access.

They can be developed throughout a metropolitan region on undeveloped sites in urbanizing areas, sites with the potential for redevelopment or reuse, and in new urban growth areas. Their uses and configuration must relate to existing surrounding neighbourhoods. They must be located on or near existing or planned segments of a trunk transit line or feeder bus network. Adequate auto accessibility is also important. (Definition from: Calthorpe, 1993)

Calthorpe (1993) describes two types of TODs in his book (figure 3.3.1): the Urban TOD and the Neighbourhood TOD.

Urban TODs are located directly on the trunk line transit network: at light rail, heavy rail, or express bus stops. They should be developed with high commercial intensities, job clusters, and moderate to high residentiai densities.

While Neighborhood TODs are located on a local or feeder bus line within 10 minutes transit travel time (no more than 3 miles) from a trunk line transit stop. They should place an emphasis on moderate density residential, service, retail, entertainment, civic, and recreational uses.

Figure 3.3.1 Book cover of 'The Next American Metropolis', by Peter Calthorpe.
source: Calthorpe, 1993.

Figure 3.3.2 Urban TOD.
source: Calthorpe, 1993.

In my research I'm dealing with Urban TODs, Calthorpe (1993) suggests the following for Urban TODs.

Urban TODs

(see figure 3.3.2)
Each TOD may assume a different character and mix of uses depending on its location within the region, market demands, and the surrounding land uses. Urban TODS are suitable for job-generating and high

intensity uses such as offices, community-serving retail centers, and moderate- to high-density housing because they allow direct access to the transit system without requiring passengers to transfer. Similarly, the intensity of development along the trunk line network should reflect the significant investment necessary to construct the transit system and should generate the greatest number of transit-bound trips.

When Urban TODS are located in existing developed neighborhoods, it may be appropriate to apply the densities and mix of uses recommended by a local planning effort. Urban TODS are typically sited approximately Ih to I mile apart to meet station spacing guidelines, although they could be sited doser together, as transit planning and market demand perrnit.

TRANSIT ORIENTED DESIGN GUIDELINES FOR THE CASE OF AMSTERDAM ZUID-OOST

The following list summarizes the principles of transit oriented development.

- Organize growth area 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 to 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;
- And encourage infill and redevelopment along transit corridors within existing neighbourhoods.

Calthorpe (1993) elaborated a variety of topics that are essential for a good implementation of these basic principles.

For my thesis I have re-ordered these topics according to the sequence of environments one will encounter starting from a metro station. That is the 'transit system', the 'core commercial area' (if present), the 'residential area' and the 'secondary area'.

Further I explored the other topics and decided to merge a few topics together. Because I am using walkable neighbourhoods as a main interest for redeveloping the metro station environments, I have created a topic called 'the pedestrian and bicycle system and the street', which is a combination of the three topics: 'streets and circulation system', 'pedestrian and bicycle system' and 'parking requirements'.

I maintained the topic 'parks, plazas, and civic buildings', because it was already a combination of several urban elements. I left out the topic 'ecology and habitat' because these elements are more related to landscaping and technical environmental issues (figure 3.3.3).

Figure 3.3.3 Transit oriented development topics.
A. Transit system
B. Core commercial area
C. Residential area
D. Secondary area
E. Pedestrian, bicycle system and the street
F. Parks, Plazas and civic buildings.
source: Calthorpe, 1993; by author, 2009.

A. TRANSIT SYSTEM

Transit line location

Transit must help define the density, location, and quality of growth in a region. They should be located to allow maximum area for new TODs, to access prime redevelopment sites or infill sites, and serve to existing dense residential and employment centres.

Therefore The transit line should be located in high density, pedestrian friendly places, which have the opportunity for redevelopment. And a mix of station qualities is important to a successful transit line.

Transit stop location

Accessibility is the key to successful transit ridership. That is why stops should be located and adjacent to the core commercial area. While the commercial uses should be directly visible and accessible from the transit stop.

And the feeder bus stops may be located in secondary areas along connector streets and adjacent to parks and public facilities.

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Transit stop facilities

The following facilities should be available around transit stops:

1. **Comfortable waiting areas**, should be appropriate for year-round weather conditions, they should provide shelter for pedestrians. The shelters should be designed with passenger safety and comfort in mind. They should be easily recognizable, yet blend with the architecture of the transit station and/or surrounding buildings.

2. **Passenger drop-off zone**, should be placed convenient i.e. close to the stop, but should not interfere with pedestrian access.

3. **Adequate lighting** is needed to orientate and can increase the sense of safety.

4. Secure and safe **Bicycle storage areas**, such as bike lockers, bike racks, or monitored 'bike checks' should also e provided.

5. **A lively, inviting and useful environment** at the station can reduce the frustration caused by the wait for transit. Such activities help populate the station area, increasing safety.

Access to transit stops

Accessibility to transit stops must be given high priority in the design of streets in order to promote transit ridership. Therefore the following two principles are important:

6. **Pedestrian crossings**, streets must be designed to facilitate safe and comfortable pedestrian crossings to the transit stops.

7. **Isolation**, Park-and-ride lots, "kiss-and-ride" and major bus drop-off areas should not isolate the station from local pedestrians.

B. CORE COMMERCIAL AREA

Core commercial areas size and location

Mixed use core commercial areas are the primary link between transit and land use. New competing retail uses should be strictly limited within one mile of the core commercial area.

Type of commercial centres include:

Type	m²
Convenience shopping and service	929 – 2.323
Neighbourhood centres with a supermarket, drugstore, and supporting uses	7.432 – 13.006
Specialty retail centres	5.574 – 11.148
Community centres with convenience shopping and department stored	11.148 or greater

1. **Mix of functions**, the core commercial area may mix ground floor retail, office, and commercial space. It must occupy at least 10% of the total TOD site area.

2. **Pedestrian-oriented circulation system**, street-level retail, office, and service commercial space should form a pedestrian-oriented circulation system that is accessible from the surrounding neighbourhood without requiring use of an arterial street.

3. **Location of industrial uses**, office and employee-intensive light industrial uses should be located adjacent to the core commercial area.

Core commercial configuration

The configuration of shops in the core area must balance pedestrian and auto comfort, visibility, and accessibility (figure 3.3.4).

4. **Orientation of shops**, Anchor stores may need to orient to an arterial and parking lots, small shops should orient to pedestrian main streets and plazas.

5. **Local access,** direct local street access from the local neighbourhood is required.

Commercial building setbacks

The street and sidewalk is the main pedestrian activity centre.

6. **Building setbacks** from public streets should be minimized.

Commercial building facades

7. **Building facades** should be varied and articulated to provide visual interest to pedestrians and street level windows and numerous building entries are required in the core commercial area. While arcades, porches, bays, and balconies are encouraged.

8. **Unarticulated walls**, in no case shall the street side façade of a building consist of an unarticulated blank wall or an unbroken series of garage doors.

Figure 3.3.4 Example of a TOD Core commercial area configuration.
source: Calthorpe, 1993.

C. RESIDENTIAL AREAS

Residential densities

Urban TODs can have a variety of densities.

Ancillary units are encouraged to increase affordability and diversity, these units should be located in the single-family portion of residential areas. Ancillery units and single-family homes can have densities varying from 30 - 40 units dwellings per hectare.

Townhouses can have densities between 45 - 70 dwellings per hectare.

Apartments can have densities between 85 - 125 dwellings per hectare.

Residential building setbacks

1. **Residential building setbacks** from public streets should be minimized, while maintaining privacy.

Residential building façade

2. **Building facades** should be varied and articulated to provide visual interest to pedestrians.

3. **Unarticulated walls**, in no case shall a façade of a building consist of an unarticulated blank wall or an unbroken series of garage doors.

Residential building entries

4. **Orientation of entries**, primary ground floor residential entries to multi-family buildings must orient to streets, not to interior blocks or parking lots.

5. **Visibility of entries**, front doors of single-family homes, duplexes, and townhouses must be visible from the street.

Residential garages

6. **Residential garages** should be positioned to reduce their visual impact on the street.

D. SECONDARY AREAS

Types and proximity of secondary areas

Three types of secondary areas are:

Type
I.   Those separated by an arterial but close to the transit stop (suited for large scale employment).
II.   Those separated by the arterial but further from the transit stop (area should provide low-density residential housing, public schools, and community parks).
III.   Those of greater distance but without arterial separation (area should provide low-density residential housing).

Residential quantities and densities in secondary areas

Secondary areas provide opportunities for low-density housing types that should not be accommodated in TODs but are essential to ensure diversity and choice.

1. **Variety**, a variety of low-density housing types and densities should be provided in secondary areas. The minimum average should be 15 units per net hectare.

Non-residential uses in secondary areas

Daycare, neighbourhood parks, schools, small convenience stores, and public recreation facilities may also be combined to create neighbourhood sub centres in secondary areas.

2. **Supporting role**, secondary areas should contain uses that support the TOD, but not compete with major retail, professional office, service commercial, and public uses in the core commercial area.

Streets and bikeways in secondary areas

3. **Direct connections**, the primary roadway system in secondary areas must provide strong direct connections to the TOD core commercial area and transit stop.

E. THE PEDESTRIAN AND BICYCLE SYSTEM AND THE STREET

Pedestrian routes

Too often pedestrian paths have been separated from streets, giving a confusing message to pedestrians. This can be dangerous because these routes lack adequate surveillance and auto access.

Routes through parking lots or at the rear of residential developments should be avoided at all times.

1. **Visible**, clear, comfortable and direct, pedestrian routes should be located along or visible from all streets. They should provide clear, comfortable, and direct access to the core commercial area and transit stop.

2. **Bordered**, primary pedestrian routes and bikeways should be bordered by residential fronts, public parks, plazas, or commercial uses.

Arterial crossings and pedestrian bridges

3. Crosswalks should be provided at all signalized arterial intersections. They should provide easy and safe movement across arterials.

4. **Under-crossings or bridges** for pedestrian and bicyclists are discouraged.

Bikeways

Biking can be a major alternative to the auto for local trips. That is why important destinations should be linked with bicycle routes. The bikeways should be well-identified by signs.

5. **Marked lanes**, separated or marked bike lanes on primary routes, along greenways and arterials will support usage of the bike.

6. **Traffic interaction**, on smaller streets, bikes sharing the travel lane will help slow down cars to speeds more appropriate for residential streets.

Bike parking

Bicycle parking facilities must be provided throughout core commercial areas, in office developments, and at transit stops, schools, and parks.

7. **Location of bike parking,** bike parking may be shared between uses, but should be centrally located, easily accessible to building entries. However it should not block any pedestrian routes.

Streets

Streets should be recognizable, formalized, and inter-connected (figure 3.3.5). Streets should be designed for 30 km per hour. While travel lanes should be 2,4 m – 3 m wide.

Shade trees are required along all streets Sidewalks are required on all streets as well they must provide an unobstructed path at least 1,5 m wide. But larger sidewalk dimensions are desirable in core commercial areas where pedestrian activity will be greatest and where outdoor seating is encouraged.

Figure 3.3.5 Street systems.
a. Preferred street system.
b. Discouraged street system.
source: Calthorpe, 1993.

On-street parking is encouraged on all streets, except arterials.

Parking configuration

(see figures 3.3.6 & 3.3.7)

Parking lots should not dominate the frontage of pedestrian-oriented streets, interrupt pedestrian routes, or negatively impact surrounding neighbourhoods. Lots should be located behind buildings or in the interior of a block whenever possible.

Figure 3.3.6 Retail in structure parking lots.
a. Preferred situation.
b. Discouraged situation.
source: Calthorpe, 1993.

Figure 3.3.7 Surface parking redevelopment.
a. Existing surface parking lot.
b. Future intensification.
source: Calthorpe, 1993.

F. PARKS, PLAZAS, AND CIVIC BUILDINGS

Location of parks and plazas

Parks and plazas should provide a public focus for each neighbourhood. They should be located next to public streets, residential areas, and retail uses. TOD recommends a park area of 5 – 10% of the site area.

Parks should be recognized as spaces designed for both active and passive uses, they should not be formed from residual areas, used as buffers to surrounding developments, or used to separate buildings from streets.

Community buildings

Civic services such as community buildings, government offices, recreation centres, post offices, libraries, and daycare, should be placed in central locations as highly visible focal points (figure 3.3.8).

Schools and community parks

School sites and community parks should be located at the edges of TODs within the secondary areas. Strong pedestrian and bike links should connect these sites with the commercial and transit core.

Figure 3.3.8 Positioning of civic services.
source: Calthorpe, 1993.

[3] Conclusions

DESIGN GUIDELINES TO IMPROVE THE URBAN COHERENCE ON THE SCALE OF THE DISTRICT

The translated principles for urban coherence has led to the following guidelines for the district:

- Create permeability between the work and dwellings. A strict division of functions is not desirable these days, it encourages commuting.
- Metro station are special nodes in the urban environment, and can be used to couple two or more functions.
- In the neighbourhood Amstel III and Bullewijk there is no green, green can be introduced to create a better mix of functions.
- Infrastructure is often a common third element that can couple other functions, however it can also act as a barrier. Special attention is needed for this element. The elevated roads (dreven) should be lowered, to create more interaction.
- Diversity on a lower scale is desirable, this can be done around the metro stations.
- Because the district has a strict division of functions, it is necessary to have a closer look on the boundaries between it. A focus will be given to the metro stations between the work and dwellings. But also where the dwellings and green meet, it is necessary to try to make them fit with each other.
- The organisation of the housing should be reviewed. Structures on the small scale can create a confusing orientation in the neighbourhood.

DESIGN GUIDELINES TO INTEGRATE A METRO STATION WITH ITS SURROUNDING NEIGHBOURHOOD

The Transit Oriented Development guidelines by Calthorpe (1993) suggest many design guiding principles to create pleasant and useful station environments which have a clear connection with their surrounding neighbourhood. The neighbourhoods are oriented towards the core area where all a lot of activities take place and most public facilities are situated. The core area is situated right next to the station.

Lot of interaction takes place on the street, because the street is available for all users, parking takes place on the street as well.

The interaction is intensified by creating high densities around the core area around the station. Urban residential areas must have a minimum average of 38 units per hectare.

From the Transit Oriented Development (TOD) guidelines of Calthorpe (1993) I have summarized the most relevant topics for my research and design process. These topics are:

A. Transit system
B. Core commercial area
C. Residential area
D. Secondary area
E. Pedestrian, bicycle system and the street
F. Parks, Plazas and civic buildings.

These topics each have sub-items which are clearly outlined. The sub-items can be used to analyse a specific topic for a location to see whether it is or isn't sufficient. But the main use of these guidelines is to guide me through and help me make decisions during the design process .

PRINCIPLES FOR URBAN COHERENCE IN USE

Salingaros (2005) gives 8 principles to stimulate urban coherence, these principles are abstract and taken from mathematics and other sciences.

In my research I have tried to translate these principles to the situation in Amsterdam Zuid-Oost. I have found out that some of these examples are not applicable to the scale of the district.

For example in the *Couplings* principle: both "Type 1 Geometric coupling through contrast in texture" and "Type 2 Geometric coupling through contrast in colour" are not applicable to the scale of the district, these type of couplings can be used during the materialization of a facade or pavement.

Other principles are roughly translatable but need intervention on an architectural scale. Such as the principle of *Forces*. Salingaros (2005) already mentions here that "Interactions are naturally strongest on the smallest scale, and weakest on the largest scale...", which means that I should look for forces on a smaller scale, than I am analyzing.

Also for the principle of *Organisation,* Salingaros (2005) suggest that "long-range forces create the large scale from well-defined structure on the smallest scales...", so once again he repeats the essence of defining a smaller scale first.

TRANSIT ORIENTED DEVELOPMENT (TOD) GUIDELINES IN USE

The Transit Oriented Development (TOD) guidelines of Calthorpe (1993) are very comprehensive and are very useful as a reference for my research. However in his book he mainly mentions how to deal with new development areas where all these guidelines should be implemented.

In my case I am dealing with a more complicated existing plan, where all station core areas and most of the secondary areas are already filled in and situated. And where the functions are separated in its extreme.

Implementing all these guidelines would need massive redevelopments everywhere.

Therefore I have decided not to use these guiding principles on the scale of the district. But instead have chosen to implement them on the key-projects. The key-projects are defined using the practical analysis of Chapter 2 and the urban coherence principles of Salingaros (2005) in this chapter.

URBAN COHERENCE VS TOD

While TOD asks for massive developments around transits and therefore massive changes in the whole district, the urban coherence principles are more subtle and can be interpreted in a less extreme way.

>> NEXT CHAPTER: A VISION FOR THE DISTRICT

In the next chapter I have combined the practical analysis with the theoretical analysis for urban coherence of this chapter to create a vision for the district.

WALKABLE NEIGHBOURHOODS

NEW TRANSIT STOPS

PERMEABILITY

ORIENTATION

[4]

A Vision to stimulate urban interdependence and coherence in the district Amsterdam Zuid-Oost

[4] A Vision to stimulate urban interdependence and coherence in the district Amsterdam Zuid-Oost

INTRODUCTION

➤ **WHAT** In this chapter I have suggested a vision for the district which could stimulate the urban coherence and it gives an answer to following research question:

"How can the district of Amsterdam Zuid-Oost be improved using metro stations as hubs to structuralize the urban environment?"

and

"Which key-projects are necessary to accomplish the vision?"

➤ **WHY** From the practical and theoretical analysis I have concluded that the district is imbalanced and is lacking urban coherence. These are reasons that prevent the district to become successful.

➤ **HOW** To conclude the issues in a comprehensive table. In this chapter I have combined the practical and theoretical conclusions from my context analysis of Amsterdam Zuid-Oost and the translated guiding principles for urban coherence in order to create a so-called vision or perspective for the district.

SECTION 4.1: VISION FROM PRACTICAL RESEARCH

The conclusions from the practical analysis from Chapter 2 are summarized in a SWOT analysis (figure 4a). The SWOT analysis shows the strengths, weaknesses, opportunities and threats of Amsterdam Zuid-Ost. In this particular case I have ordered the items in the SWOT analysis and placed it within one of the following three

S	W
O	T

Figure 4a A SWOT analysis consists of strengths, weaknesses, opportunities and threats of a project.

topics: Mobility & Infrastructure, City Green & Water and Urban Life.

Consequently I made three strategy maps for each of these topics, elaborating the most important interventions based on the SWOT analysis. These strategic interventions are recommended to improve the urban interdependence of the district.

SECTION 4.2: VISION FROM THEORETICAL RESEARCH

The conclusions from the theoretical analysis for urban coherence (Salingaros, 2005) are summarized in a recommendation-list, which is used to create an urban coherence strategy map.

In this urban coherence strategy map, several interventions are mentioned which are to stimulate the urban coherence in the district Amsterdam Zuid-Oost.

SECTION 4.3: A VISION FOR AMSTERDAM ZUID-OOST TO STIMULATE URBAN INTERDEPENDENCE AND COHERENT

The maps from both the practical and theoretical

analysis are then recombined into one vision for the project.

Within this vision I have selected certain key-projects, which are essential for the vision to be realised.

Key-projects are an important part of the strategy it prioritizes the 'things-to-do', with number 1 being the most important to implement. The duration of key-projects may vary, but they all add up into reaching the goal, which is of course the completion of the vision (figure 4b).

Figure 4b An example of a vision or perspective with its key projects.
source: by author, 2009.

4.1 Input for the Vision from the SWOT analysis

THREE TOPICS

I has subdivided the SWOT analysis (figure 4.1.1) into three topics: Mobility & Infrastructure, City Green & Water and Urban Life.

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Mobility & Infrastructure
- The district has fast accessibility to other parts of the city by car and public transport.

City Green & Water
- Lot of open space/greenery compared to other city districts.
- Broad differentiation of urban green and waters.

Urban Life
- Redevelopments are improving the quality of the districts (mixed housing & lowering avenues)

S

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Mobility & Infrastructure
- The functional city concept is a failure in the district, it encourages commuting and discourages integration.
- Car and bicycle network lack spatial cohesion.
- Pedestrian unfriendly neighbourhood street patterns.
- The avenues are dividing the neighbourhoods quite strictly which discourages internal interaction it also gives an impression of insufficient social control and social safety.

City Green & Water
- Fragmented urban green in the district.
- Bijlmerpark is not easily accessible by fast public transport.
- There is not so much interaction with the green.

Urban Life
- District has a bad image, due to drugs problems, unemployment and low quality of public space.
- Monotonous housing stock (in sense of year and gross housing density).
- There is a lack of daily destinations in the district.

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Mobility & Infrastructure
- Connect the district with the radial public transport of the city, in order to create equal accessibility.
- Extend the A9 to the west and create better accessibility with Weesp-Almere.
- Extend metro system for metropolitan area.
- Promote use of public transport, instead of car using design interventions.

City Green & Water
- Strengthen and (re)connect variety of urban green and water.

Urban Life
- Densification for more variety in housing, open space and urban morphology.
- Development along lowered avenues.
- Development around Holendrecht station, because of the new train stop.
- Redevelopment around station Venserpolder for a better integration between Diemen and Amsterdam.
- Redevelopment around station Kraaiennest, Bullewijk & Strandvliet there is lack of vitality.

O

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Mobility & Infrastructure
- Increasing commuting creates more congestions.

City Green & Water
- Water seepage and inundation.
- Further deterioration and neglect of avenues and big open public spaces.
- Urban green has no long life due to soil circumstances.

Urban Life
- Bad image continues.
- Monotonous housing stock (in sense of year), due to many reconstructions recently.

T

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Figure 4.1.1 SWOT analysis of the district Amsterdam Zuid-Oost.
source: by author, 2009.

Figure 4.1.1 Mobility & Infrastructure map.

» Avenues should be lowered in order to create more interaction.
» Extend tram [9] to Holendrecht, new transit stops at Diemen Zuid and Holendrecht.
» Extend metro to Weesp.
» Remove Karspeldreef to reconnect Bijlmerpark.

source: by author, 2009.

Figure 4.1.2 City Green & Water Map.

» Create a green link between the Arena Boulevard and Bijlmerpark.
» Reconnect the Bijlmerpark.
» Create clear connection with Gaasperplas at the stations Gaasperplas and Gein.

source: by author, 2009.

Mobility & Infrastructure

This is an important issue as it is one of the main elements of the functional city. Elevated roads and thereby separating users are causing low interaction between these users, therefore it is very important to consider to lower these avenues.

Due to hierarchical road networks some neighbourhoods are considered to be pedestrian unfriendly, because these are more car oriented.

Furthermore the road networks and main bicycle network are very broad compared to other districts in the city, it lacks spatial cohesion.

There is great opportunity to focus on the public transport network. It is now only the bus, metro and train. One can consider to extend the tram to the district in order to create a better accessibility.

City Green & Water

Talking about this topic we should look at two scales: the district scale and the neighbourhood scale.

On the higher scale we find fragmentation of the green 'finger city'-concept wedge. The elevated infrastructure is cutting the green wedge in pieces. One can consider to divert some of these roads, lower these roads and/or adding wildlife under and over passes.

On the lower scale there is a lot of variety of greens. The fragmentation of the green wedge plays a minor role on this scale.

Threats on this topic are quite general and are more or less the same as in other polder areas in The Netherlands, such as water seepage and inundation.

Figure 4.1.3 Urban Life Map.
» Lower avenues for more interaction and develop along the borders.
» Mixed redevelopment around Kraaiennest, Bullewijk and Holendrecht.
» Reconnect neighbourhoods in flanking municipality.
source: by author, 2009.

Urban Life

This topic deals with urban developments and societal issues. The district has a bad image, which is not only caused by the urban fabric but also the inhabitants. Redevelopments are improving the image of the district as well as adding a bigger variety of households.

Another problem of the district is the housing stock age, the district was rapidly built causing most of the housing stock to be built in the '70s and '80s period. That is why even though redevelopments are good, it is necessary to consider that they shouldn't all take place at the same period as the housing stock age might turn monotonous again.

The elevated avenues take up a lot of space, lowering them will create a lot of left over space which can be used for urban development and densification.

There is plenty of opportunity to create better metro station environments, as stations are sources and attractors of people. At this moment many metro stations in the district are not that well integrated.

4.2 Input for the Vision from the urban coherence principles

VISUAL STRATEGY FOR URBAN COHERENCE IN AMSTERDAM ZUID-OOST

The theoretical analysis of the principles of Salingaros have led to the following conclusions. These conclusions are summarized in a visual strategy (figure 4.2.1).

- Create permeability between the work and dwellings. A strict division of functions is not desirable these days, it encourages commuting.

- Metro station are special nodes in the urban environment, and can be used to couple two or more functions.

- In the neighbourhood Amstel III and Bullewijk there is no green, green can be introduced to create a better mix of functions.

- Infrastructure is often a common third element that can couple other functions, however it can also act as a barrier. Special attention is needed for this element. The elevated roads (dreven) should be lowered, to create more interaction.

- Diversity on a lower scale is desirable, this can be done around the metro stations.

- Because the district has a strict division of functions, it is necessary to have a closer look on the boundaries between it. A focus will be given to the metro stations between the work and dwellings. But also where the dwellings and green meet, it is necessary to try to make them fit with each other.

- The organisation of the housing should be reviewed. Structures on the small scale can create a confusing orientation in the neighbourhood.

Figure 4.2.1 Strategy using urban coherence principles.
» A green wedge has been added to the work area.
» Permeability should be implemented between work and housing.
» Housing should orient towards the green, to create a better interaction between these two urban elements.
» The Bijlmerpark can be reconnected as a whole, roads can be diverted.
» Mixed redevelopment around metro stations are desirable for more diversity. It can also be used to couple on or more elements.

source: by author, 2009.

KEYPROJECTS

1. Extent tram [9] to Holendrecht station
2. Extent metro [54] to Weesp station
3. Lower dreven for more permability and new mixed developement

4. Redirect Karspeldreef to reconnect Bijlmerpark
5. Redevelopment around Holendrecht station
6. Redevelopment around Kraaiennest station

7. Redevelopment around Bullewijk station
8. Create green connections to Gaasperplas
9. Stimulate interaction between municipalities around metro stations

LEGEND

Water	Metro line	Green connection
Urbanized area	New Metro line	New development
Green	Metro station	Neighbourhood

Main road	Tram line	Interaction between neighbourhoods
Secondary road	New Tram line	Permeability between functions
Removed road	New Transit	

4.3 Key projects in the Vision for urban interdependence and coherence in Amsterdam Zuid-Oost

VISION

(see figure 4.3.1)
The vision focusses on the stimulation of urban interdependence and coherence in Amsterdam Zuid-Oost. It contains 9 keyprojects of which 5 considers redevelopment around metro stations.

Because my research sees potential to improve the district via the metro station environments, most of the keyprojects are related to this.

Accessibility
The first two keyprojects relate to accessibility of the district. Both projects are focussing on extending an existing line: tram line 9 to Holendrecht and metro 54 to Weesp.

Subtle interaction between monotonous functions
The third and eighth project is directly referring to the strategy map for urban coherence. This map introduces subtle changes such as permeability (keyproject 3) and change of orientation (keyproject 8) to lift up the strict separation of functions.

Reconnecting Green
Bijlmerpark is very much fragmented by infrastructure, keyproject 4 introduces a minor intervention to reunite the 'pieces of Bijlmerpark'

Metro station environment redevelopments
Keyproject 5, 6, 7, 8 & 9 deal with redevelopments around metro station environments.

Interacting with other municipalities
Another interesting issue is keyproject 9, until now no plans are made to integrate the urban environment with the flanking municipalities Ouder Amstel and Diemen.

KEYPROJECTS

1. Start with extending tram line 9, the tram will be the internal mode of public transport in the city. Station Diemen Zuid and Station Holendrecht will become new transits.

2. Extend the Gein metro line [54] to Weesp. The metro will become the main public transport for the metropolitan region of Amsterdam.

3. Lower the avenues to create more interaction in the district. Develop around the now available space. Create more permeability between the separated functions.

4. This is a minor intervention: Karspeldreef should be removed to reconnect Bijlmerpark. Traffic can be diverted over the Gaasperdammerweg.

5. Holendrecht is a new transit station for the train, metro and tram. It needs a mixed redevelopment.

6. Station Kraaiennest has potential to be redeveloped as well. The honeycomb complexes should be replaced by mixed housing.

7. Station Bullewijk has a very mix of functions and has potential to be redeveloped as well.

8. Create clear green connections at the stations Gaasperplas and Gein with the Gaasperplas.

9. The neighbourhoods Venserpolder, Strandvliet and Bijlmer-Centrum can have a better interaction. They should also interact with the flanking municipality Ouder Amstel and Diemen.

Figure 4.3.1 Vision for the district (see left), source: by author, 2009.

[4] Conclusions

REMARKS ON THE VISION

The answer to the sub-research question for this chapter has been answered in Section 4.3.

The vision focuses on the stimulation of urban interdependence and coherence in Amsterdam Zuid-Oost. It contains 9 key-projects of which 5 considers redevelopment around metro stations. These metro stations can be seen as hubs to structuralize the urban environment.

REMARKS ON KEYPROJECTS

The answer to the sub-research question for this chapter has been answered in Section 4.3.

In the vision there are 9 key-projects which are essential to stimulate the urban interdependence and urban coherence in the district.

These key-projects deal with accessibility and infrastructure, interaction between monotonous functions, reconnecting green, metro station environments redevelopments, and interaction with other municipalities.

>> NEXT CHAPTER: CASE STUDIES

In the next chapter I have analysed the metro system of the city Stockholm. In the city I have found a district which has a similar size and amount of population as Amsterdam Zuid-Oost. However this district was design according different concepts than the functional city, whereby the metro station environments have a complete different atmosphere.

GREEN CONNECTIONS

NEW STATION ???

T STOP?

CAFÉ & KONDITORI

SKO- & NYCKELSERVICE
KEMTVÄTT SKRÄDDERI

[5]

Case studies of Amsterdam Zuid-Oost and Stockholm Vällingby - Hässelby metro station environments

[5] Case studies of Amsterdam Zuid-Oost and Stockholm Hässelby - Vällingby metro station environments

INTRODUCTION

➤ **WHAT** In this chapter I have done some case studies on metro station environments in Amsterdam Zuid-Oost and in the district Hässelby - Vällingby in Stockholm. It relates to the following research question:

"What can be learned from metro systems and metro environments of other cities and countries?"

➤ **WHY** The metro system of Amsterdam is quite young compared to other cities and perhaps not the best implemented. I can learn from metro station environments which are well integrated and save references as objects for design.

➤ **HOW** The metro station environments in the district Hässelby - Vällingby has been elaborated. I also did a TOD analysis on both Stockholm and Amsterdam, the best results are used as references for my design process.

SECTION 5.1: STOCKHOLM CITY SCALE

In this section I have elaborated the city Stockholm as case studiy location for my project. Not only is the urban form and the size comparable to Amsterdam, but also culture and historical background (de Hoog, 2005).

At first glance we can see that the metro system in Stockholm is bigger and more heavily used than the system in Amsterdam. But it is not as extensive as the systems we find in London or in Paris, so it can be used as a case study reference (Rohde, 2004-2009) (figure 5a).

Also one can imagine that the Stockholm system could be the size to which the system in Amsterdam can grow to, while its Metropolitan growth expectations are emerging. Even though the system is not quite comparable (yet), the size of the municipality and its metropolitan region are.

SECTION 5.2: HÄSSELBY - VÄLLINGBY DISTRICT SCALE

In this section I elaborate a more specific case study location which is comparable to the district Amsterdam Zuid-Oost.

The district (stadsdelsområde): Hässelby – Vällingby in Stockholm. It is a district in the west of the city Stockholm, distanced from the city centre. The area and population is quite comparable to Amsterdam Zuid-Oost. The district has five metro stations of which 4 are elavated just like in Amsterdam.

SECTION 5.3: HÄSSELBY - VÄLLINGBY NEIGHBOURHOOD SCALE

The actual metro station environments are analyzed in this section. I have categorized the metro stations hierarchically: district centre, neighbourhood centre, work/residential. For each of these metro stations I have written a short text, which explains the direct

environment around the station, the shopping centre (if present) and the residential neighbourhood(s).

Next to this I also made a small diagram for each of these station to show the mix of functions that surround these nodes, in order to show whether there is high or low interaction around the stop.

SECTION 5.4: TOD REFERENCES OF AMSTERDAM ZUID-OOST AND HÄSSELBY - VÄLLINGBY

In this final section I have used the guidelines of transit oriented development as a testing tool for the metro station environments of Amsterdam Zuid-Oost and Stockholm Hässelby - Vällingby.

I picked the topics: transit system, core commercial area and residential area as subjects to test the metro station environments. The best results are used as references for my design process.

	Opening Year	Network length	Stations	Lines	Stations per line	Average station distance	Average line length	Annual ridership
Amsterdam	1977	32,7 km	33	4	8,25	0,99 km	8,18 km	91 million
Rotterdam	1968	47,0 km	38	2	19,00	1,27 km	23,50 km	85 million
Stockholm	1950	105,7 km	104	3	34,67	1,06 km	35,23 km	297 million
Paris	1900	213,0 km	380	16	23,75	0,71 km	13,31 km	1410 million
London	1863	408,0 km	268	11	24,36	1,52 km	37,09 km	1014 million
Brussel	1976	32,2 km	61	3	20,33	0,55 km	10,73 km	113 million

Figure 5a Comparison of several metro systems.
source: Rohde, 2004-2009; by author, 2009.

5.1 Stockholm City

STOCKHOLM VS AMSTERDAM

The urban form of Stockholm follows the finger city concept, the green wedges are naturally formed by water (Gieling, 2006).

The choice for Stockholm as case study location is not only because its urban form and size is comparable to Amsterdam, but also for its comparable culture and historical background (de Hoog, 2005).

The municipality of Stockholm has an area of 188 km2 and consists of 18 districts (figure 5.1.1). It's metropolitan area has about 2 million inhabitants like the Metropolitan area of Amsterdam.The city is built on 14 islands, connected by 57 bridges. The archipelago consist of 30.000 islands, islets and skerries (figure 5.1.2).

Stockholm is considered to have one of the cleanest environments amongcapital cities of Europe, it is a home for 38 parks. The land use of the city is divided in three approximately even components: green, water and urban area.

INFRASTRUCTURAL NETWORKS

Road network

(see figure 5.1.3)

The road network of shows a radial structure. There are many destinations along the main roads: Enköping, Uppsala, Täby, Norrtälje, Värmdö, Fisksätra, Tyresö,

municipality border
district border

Figure 5.1.1 Districts of the municipality of Stockholm.
1. Kista;
2. Rinkeby;
3. Spånga – Tensta;
4. Hässelby – Vällingby;
5. Bromma;
6. Östermalm;
7. Norrmalm;
8. Kungsholmen;
9. Maria – Gamla Stan;
10. Liljeholmen;
11. Hägersten;
12. Skärholmen;
13. Katarina – Sofia;
14. Enskede – Årsta;
15. Älvsjö;
16. Vantör;
17. Farsta;
18. Skarpnäck.
source: by author, 2009.

Metropolitan area	Metropoolregio Amsterdam	Stockholm County
Area	2.583 km²	6.488 km²
Population	2,2 million	1,98 million

Metropolitan area	Amsterdam	Stockholm
Area	220 km²	188 km²
Population	755.269	810.120
Population Density	3.442 inhabitants/km²	3.614 inhabitants/km²

Figure 5.1.2 Metropolitan area and city comparison between Amsterdam and Stockholm.
source: SVB, 2009; CBS, 2006; van Susteren, 2007; National Atlas of Sweden, 2000; Stockholms Stad, 2009; by author, 2009.

Haninge, Botkyrka, Söderälje.

The secondary roads show a less dense structure than the secondary roads in Amsterdam.

Train network

(see figure 5.1.4)

The train network also has a more or less radial structure. The big difference between the Amsterdam train network is that the network of Stockholm has a lot more destinations in the municipality itself and shows a lot of side-branches.

There are two types of train transport in the city. There is a so-called suburban rail, which includes the 'commuter rail' (Stockholms pendeltåg), Saltsjöbanen and Roslagbanen. These give accessibility within the city and are comparable to the so-called 'stop trains, sprinters or randstad rail' in The Netherlands.

The regional destinations are not per se the same as the main road network, while in Amsterdam it is. Regional rail or intercity trains create connections between Stockholm and cities outside the municipality.

Noticeable is that the north-east and the west side of the city do not have train connections. The reason for this is that these areas are not heavily urbanized.

Metro system

(see figure 5.1.5)

The metro system has a radial structure. It is an extensive system with many side branches and destinations. The construction is a combination of heavy rail metro and light rail.

The metro system is also known as the Tunnelbana or T-Bana in short. The first line was completed in 1950, it was a small part of the green line replacing a rapid tram line, in the following years the system extended massively, till in 1994 the last addition was added.

Figure 5.1.3 Road network of Stockholm.
source: by author, 2009.

Figure 5.1.4 Train network of Stockholm.
source: by author, 2009.

The Tunnelbana of Stockholm is referred to as the longest art gallery in the world. Artwork is integrated in most stations.

Light rail

The light rail network is connected with the metro lines, it is comparable with the situation in Amstelveen, where the metro continues on as light rail (figure 5.1.6).

Tram network

There is one tram line in Stockholm, the Djurgården line. Other tram lines are replaced by the metro and light rail system (figure 5.1.6).

Bus network

There are three types of bus lines, the inner-city line (figure 5.1.6) , suburban line and service line.

--- municipality border ········ metro ········· light rail

Figure 5.1.5 Metro system of Stockholm, T-Bana.
source: by author, 2009.

--- municipality border —— metro ········· tram
········· light rail ········· bus

Figure 5.2.6 Other public transport of Stockholm.
source: by author, 2009.

5.2 The Stockholm district Hässelby - Vällingby

ABC-CITY

An ideal 'functional city' concept was implemented in Amsterdam Zuid-Oost, which consisted of four separated urban components: dwelling, working, recreation and circulation (Mumford, 1992; Jolles et al., 2003). The district plan (1947-1950) for Hässelby – Vällingby contained a different concept: the ABC-city, which stands for Arbete, Bostad, Centrum (work, living, centre). The district lays distanced from the city centre on the west of Stockholm city (figures 5.2.1 & 5.2.2). One of the green metro lines ends in this ditrict at Hässelby Strand.

Vällingby was the first suburb, where this concept was implemented, the creation of this suburb was the result of progressive politics and city planning in post-war Stockholm. The concept basically meant that people should be able to live, work and have access to important social and cultural facilities on a short walking distance, stressing the fact that the district should be a self-sufficient unit (Case Scheer and Stanilov, 2004).

Vällingby was also the first large-scale project in which the principle of traffic separation was realised. Residents could access the city centre without having to cross any arterial street (Desjardins, 2003).

The local commercial centre was accessible by subway, high density areas surrounded these centres, with a bit further away lower density single-family houses and terrace houses (also known as Friluftsstaden) (Stockholms Stad, 2009; Waern, 2001).

Figure 5.2.1 Location of the district Hässelby – Vällingby in the city of Stockholm.
source: by author, 2009.

The small scale housing estates in Vällingby designed for social interaction, with schools, day care, community centres and green areas, were developed by Sven Backström and Leif Reinius.

The concept was inspired by the neighbourhood ideas as expressed by the American socialist Arthur Perry in 1929 and English 'new towns' in Lewis Mumford's 'The culture of Cities'. It became very famous and successful, whereas it was widespread in other suburbs in Sweden: Farsta, Solberga, Gubbängen, Fruängen, Kärrtorp, Hässelby, Kortedala (Wikipedia, visited on: 04-09-2009; Pass, 1973; Gullberg and Kaijser, 2004; Waern, 2001; Desjardins, 2003).

District	Amsterdam Zuid-Oost	Stockholm Vällingby - Hässelby
Area	22,08 km²	19,60 km²
Population	84.811	58.795
Population Density	3.841 inhabitants/km²	3.000 inhabitants/km²
Metro stations	10	5
District concept	Functional City	ABC-city

Figure 5.2.2 District comparison between Amsterdam Zuid-Oost and Stockholm Vällingby - Hässelby.
source: Case Scheer and Stanilov, 2004; by author, 2009.

THE NEIGHBOURHOOD UNIT

The neighbourhood unit was first introduced and defined by Clarence Arthur Perry in 1929. It represented the ideal residential neighbourhood as a physical defined unit, with school, churches, and recreational areas at its centre.

Perry organized the neighbourhood unit around several physically oriented ideals (figure 5.2.3) (Lawhon, 2009):

- Centre the school in the neighbourhood so that a child's walk to school was only about one-quarter of a mile and no more than one-half mile and could be achieved without crossing a major arterial street.

  Size the neighbourhood to sufficiently support a school, between 5,000 to 9,000 residents, approximately 160 acres at a density of ten units per acre.

  Implement a wider use of the school facilities for neighbourhood meetings and activities, constructing a large play area around the building for use by the entire community.

- Place arterial streets along the perimeter so that they define and distinguish the "place" of the neighbourhood and by design eliminate unwanted through-traffic from the neighbourhood.

  In this way, major arterials define the neighbourhood, rather than divide it through its heart.

- Design internal streets using a hierarchy that easily distinguishes local streets from arterial streets, using curvilinear street design for both safety and aesthetic purposes. Streets, by design, would discourage unwanted through traffic and enhance the safety of pedestrians.

Figure 5.2.3 Clarence Perry Neighbourhood unit.
source: C. A. Perry, "The neighbourhood Unit, a Scheme of Arrangement for the Family-Life Community." Monograph one, Neighbourhood Community Planning, Regional Plan of New York and Its Environs, 1929 in Lawhon, 2009.

- Restrict local shopping areas to the perimeter or perhaps to the main entrance of the neighbourhood, thus excluding nonlocal traffic destined for these commercial uses that might intrude on the neighbourhood.

- Dedicate at least 10 percent of the neighbourhood land area to parks and open space, creating places for play and community interaction.

PHYSICAL PLANNING IDEAS FOR VÄLLINGBY

During the 1930s and 1940s suburban development was often carried out at the neighbourhood level. Development was concentrated primarily on residences and local shops. Five basic physical planning ideas were used (Pass, 1973):

1. The communities are, like pearls on a string, linked downtown by a rapid transport line (figures 5.2.4 & 5.2.5).
2. They are partly self-sufficient, with community centres and employment opportunities near housing areas.
3. Each group of suburban communities has a large area centre providing retail, commercial, social, and cultural services (figures 5.2.6).
4. Dwellings are arranged in small neighbourhood units, often around a common green.
5. Different kinds of traffic are intentionally separated. People can walk to the neighbourhood centre and children to school without crossing roads.

On the scale of the district the ideas for Vällingby are closely related to transit oriented development.

Figure 5.2.4 Diagram of suburban development. source: Pass, 1973.

Figure 5.2.5 Schematic diagram of suburban community development.
  Left: Two fully developed city districts with a common industrial area and grouped around a radial suburban railway. About 1.800 meters between the stations. About 33.000 inhabitants.
  Right: two city districts developed solely with multi-storey rental apartments and located partly around the radial suburban railway and partly close to the ring road with bus service. About 1.100 meters between stations. About 24.000 inhabitants
source: Stockholms stads stadsplanekontor, Generalplan för Stockholm 1952 in Pass, 1973.

Figure 5.2.6 Schematic diagram of a suburban community served by rapid transit.

This model for Stockholm's post–World War II suburban communities shows development taking place along the transit line and the community centre at the station. Multi-storey housing is immediately adjacent to the centre, with single-family housing farther away. The centre includes facilities for social activities in the community hall and premises for cultural activities for the community. However, in contrast to the English model, there was no provision for local self-government.

source: Stockholms stads stadsplanekontor, Generalplan för Stockholm 1952 in Pass, 1973.

Type of dwelling	Number of inhabitants (approximate)	Percent
Multistory apartments	10,200	62
Row and detached single-family housing	6,300	38
Total	16,500	

Land use areas (approximate)	Hectares	Acres
Multistory apartments	46.0	113.66
Row and detached single-family housing	80.0	197.68
District center	1.0	2.47
Neighborhood center (three)	1.0	2.47
Schools (two)	5.0	12.35
Sports and festivals	7.0	17.29
Industry	16.5	40.77
Allotment gardens	11.0	27.18
Total	167.5	413.87

Population density	Inhabitants per hectare	Inhabitants per acre
Multistory apartments	220	89
Row and detached single-family housing	80	32

Distance from district center	Meters	Yards
To perimeter of multistory apartments	450	492
To perimeter of row and detached single-family housing	900	984
To perimeter of industrial area	600	656
To perimeter of allotment garden	600	656

Distance from neighborhood center	Meters	Yards
To perimeter of detached single-family housing	300	328
To district center	600	656

Symbols

- ⊖ multistory apartments
- ☺ row and detached single-family housing
- ⓦ larger shopping center
- ♨ smaller shopping center
- ⓒⓓ cultural center
- ⊙ post office
- ⊗ handicraft
- ⊍ industry
- ⊛ larger laundry
- ⊛ smaller laundry
- ⓘ auto service station
- ♠ nursery
- (hⓣ) secondary school
- athletic field
- exercise field
- tennis court
- ⊚ larger playground
- ⊙ smaller playground
- allotment gardens

NEIGHBOURHOOD BORDERS

The district contains 9 neighbourhoods (figures 5.2.7 & 5.2.8) of which Hässelby Villastad is the biggest one.

The population densities are relatively high in the neighbourhoods: Hässelby Gard, Hässelby Strand and Vällingby.

	Area (ha)	Popula-tion	Popula-tion density (p/ha)	Dwellings
1 Villastad	1.127	17.329	23	6.297
2 Strand	167	6.566	70	3.971
3 Gard	134	9.494	71	5.391
4 Vinsta	167	3.228	19	1.165
5 Kälvesta	117	4.458	38	1.469
6 Nälsta	138	4.663	34	1.667
7 Vällingby	137	7.071	52	3.969
8 Grimsta	333	4.146	16	2.041
9 Råcksta	142	4.733	33	3.086

Figure 5.2.7 Area, population and population density of the neighbourhoods of the district Hässelby – Vällingby.
source: USK, 2007-2009; by author, 2009.

— district border
— neighbourhood border

Figure 5.2.8 Neighbourhoods of the district Hässelby – Vällingby: 1. Hässelby Villastad; 2. Hässelby Strand; 3. Hässelby Gard; 4. Vinsta; 5. Kälvesta; 6. Nälsta; 7. Vällingby; 8. Grimsta; 9. Råcksta.
source: by author, 2009.

municipality border
metro
metro stop

Figure 5.2.9 Metro stations in the district Hässelby – Vällingby. source: by author, 2009.

Figure 5.2.10 Catchment area of the metro stations in the district Hässelby - Vällingby. source: by author, 2009.

METRO STATIONS

Five metro stations can be found in the district, they are part of the green metro line: Råcksta, Vällingby, Johannelund, Hässelby Gård and Hässelby Strand (figure 5.2.9).

Most stations are elevated and are relative for the case study as the stations in Amsterdam Zuid-Oost are also elevated. One of the stations has a commercial centre built over the metro station, which is the centre of the district, station Vällingby.

The catchment area of the metro is not very big in the district. Big parts in the north-west do not have easy access to the metro (figure 5.2.10).

LOCAL BUS NETWORK

Figure 5.2.11 shows a rough scheme of the available bus network in the district.

municipality border
metro
busses

Figure 5.2.11 Bus network in the district Hässelby - Vällingby. source: by author, 2009.

5.3 Vällingby - Hässelby metro station environments

5 STATIONS, 3 CATEGORIES

Figure 5.3.1 Metro station environment typologies.
source: by author, 2009.

(see figures 5.3.1 & 5.3.2)

There are 5 stations in the district, the station environments can be roughly categorized into three types: District services centre, neighbourhood services centre and residential/work. Each of these types have different characteristics.

Of course each metro station environment also has its individual characteristics.

District services centre

The district services centre serves as the nucleus of the district. It is easily accessible by car, train, metro and bus. It has facilities that can be used by many people, such as a cinema, shopping centre, swimming pool and soccer stadium.

Neighbourhood services centre

The neighbourhood services centre has facilities for daily use, such as supermarkets, drugstores, bakeries, butchers, hair dressers and bookshops. Other less daily services can be found in the district centre.

Residential / Work

These metro station environments are less defined. The metro serves mainly for the residents and employees. The environments of these station do not have any special facilities.

District services centre	Neighbourhood services centre	Residential / Work
I. Vällingby	II. Hässelby Gård III. Hässelby Strand	IV. Råcksta V. Johannelund

Figure 5.3.2 Metro station environments categorized.
source: by author, 2009.

5.4 TOD Design references

TOD CASE STUDIES DESIGN REFERENCES

Using the first three items of the Transit oriented development guidelines (TOD) I have analysed the station environments of the districts Amsterdam Zuid-Oost and Vällingby - Hässelby.

These three items are, A. the transit system, B. the core commercial area and C. the residential area.

Consequently I have rated them with a --, - , , + or ++. Then, I elaborated the items that got the highest score (++), with a picture of the item and a short description.

Collecting all these items creates a small database of references from the two case studies, which I have used furing my design process.

A. TRANSIT SYSTEM

Amsterdam Zuid-Oost

Type	District centre	Neighbourhood centre				Residential / Work				
Station	Bijlmer	Reigersbos	Gein	Ganzenhoef	Kraaiennest	Strandvliet	Bullewijk	Holendrecht	Venserpolder	Gaasperplas
1 Comfortable waiting area	++	+	+	++	+	+	+	+	+	+
2 Convenient passenger drop-off zone	++	-	±	++	+	+	+	+	+	±
3 Adequate lighting	+	+	±	++	–	±	±	±	––	±
4 Secure biking storage	+	+	+	+	+	+	+	++	+	+
5 Lively, inviting activities	++	++	+	––	––	––	––	––	––	––
6 Pedestrian crossings	+	++	++	±	+	±	–	±	–	+
7 Isolation	+	+	±	+	±	±	±	±	±	±

Figure 5.4.1 Amsterdam Zuid-Oost transit system scoring table.
source: by author, 2009.

Stockholm Hässelby - Vällingby

Type	District centre	Neighbourhood centre		Residential / Work	
Station	Vällingby	Hässelby Gård	Hasselby Strand	Råcksta	Johannelund
1 Comfortable waiting area	-	±	±	±	±
2 Convenient passenger drop-off zone	±	+	++	++	++
3 Adequate lighting	––	+	+	+	+
4 Secure biking storage	+	+	+	±	+
5 Lively, inviting environment	++	+	+	–	––
6 Pedestrian crossings	++	++	+	±	±
7 Isolation	+	++	+	+	–

Legend

++	very good
+	good
±	ok
–	bad
––	very bad

Figure 5.4.2 Stockholm Hässelby - Vällingby transit system scoring table.
source: by author, 2009.

1. Comfortable waiting area

1. Bijlmer

The station is renovated, it is bigger and more light. There is plenty of space even when it's crowded during rush hour. There are some seats, and some bars to lean on.

The place is sheltered from heavy weather circumstances.

The platform is overall clean and maintained. The view from the station is not boring, it is not isolated.

1. Ganzenhoef

The station is renovated with light and transparent material. There are seats to sit on and the platform is spacious.

The place is sheltered from heavy weather circumstances.

The platform is overall clean and maintained. The view from the station is not boring, it is not isolated.

2. Convenient drop-off zone

2. Bijlmer

The passenger drop-off zone is right next to the bus terminal. It is close to the station and it doesn't disturb any other pedestrian access.

2. Ganzenhoef

The passenger drop-off zone is next to the station. It does not interfere with the pedestrian route.

2. Hässelby Strand

The station ends up on a street which is not very busy. Cars are allowed through this street, it is also where the bus stops.

2. Råcksta

There is a road next to the station, which is not so busy. Passengers can be dropped-off here. There is also a bus station here.

2. Johannelund
The station is quite isolated, there is plenty of space to drop-off passengers.

However they need to cross the big parking lot. It is not a pedestrian friendly station.

3. Ganzenhoef
There is a lot of height under the metro tracks, which makes it less dark. The transparent wall of the front of the metro station also gives an open and light appearance.

4. Holendrecht
There are bicycle lockers at Holendrecht station. These are more secure than regular bicycle stands.

5. Lively environment

5. Bijlmer
The Bijlmer Arena transit stop is the access point of the district centre. There are quite a few facilities in the station itself.

And around the station there is the movie theatre and cafes and restaurants.

5. Reigersbos
One of the exits lead directly to the commercial area of the neighbourhood. The station blends into the building facades. There are many services available and it is very lively with lots of people. In the station building there is a small flower shop.

5. Vällingby
The station has a variety of fast food kiosks. A small supermarket and small book shop.

6. Pedestrian crossing

6. Reigersbos
The exit to the commercial area is very pedestrian friendly. No cars can enter, there is a cycle path in the middle and sidewalks on both sides.

6. Gein
The exit to the commercial area and also to the residential area is pedestrian friendly. No cars can enter, there is a cycle path in the middle and sidewalks on both sides.

6. Vällingby
The exits of this station leads to the commercial area. No cars can enter.

7. Isolation

6. Hasselby Gård
The station is part of the main shopping street, it blends into the commercial area. The station has a small kiosk and post office.

7. Hasselby Gård
The station is part of the shopping street and is not isolated with parking lots or infrastructure.

B. CORE COMMERCAIL AREA

Amsterdam Zuid-Oost

Type	District centre	Neighbourhood centre				Residential / Work				
Station	Bijlmer	Reigersbos	Gein	Ganzenhoef	Kraaiennest	Strandvliet	Bullewijk	Holendrecht	Venserpolder	Gaasperplas
1 Mix of functions	+ +	+ +	+	+ +	+					
2 Pedestrian oriented	±	+ +	+ +	+ +	±					
3 Location of industrial areas	–	+	+	+	±					
4 Orientation of shops	+	+ +	+ +	+ +	– –					
5 Local access	±	+ +	+ +	+ +	±					
6 Building setbacks	+ +	+ +	– –	+ +	– –					
7 Building facades	±	– –	– –	– –	– –					
8 Unarticulated walls	+ +	+ +	+	+ +	– –					

Figure 5.4.3 Amsterdam Zuid-Oost core commercial area scoring table.
source: by author, 2009.

Stockholm Hässelby - Vällingby

Type	District centre	Neighbourhood centre		Residential / Work	
Station	Vällingby	Hässelby Gård	Hasselby Strand	Råcksta	Johannelund
1 Mix of functions	+ +	+ +	+		
2 Pedestrian oriented	+ +	+ +	+		
3 Location of industrial areas	+	+ +	+		
4 Orientation of shops	+ +	+ +	+		
5 Local access	+	+ +	+		
6 Building setbacks	+ +	+ +	+		
7 Building facades	+ +	+	–		
8 Unarticulated walls	+ +	+	–		

Figure 5.4.4 Stockholm Hässelby - Vällingby core commercial area scoring table.
source: by author, 2009.

Legend

+ + very good

+ good

± ok

– bad

– – very bad

1. Mix of functions

1. Bijlmer

The commercial area around Bijlmer has a mix of functions, on the one side there is the Arena Boulevard with a theatre, music stage, stadium and some mega stores. On the other side there is Amsterdamse Poort the commercial centre of the district. With many types of shops.

1. Reigersbos

There is a mix of functions in the core commercial area around Reigersbos station.

1. Ganzenhoef

The core commercial area is recently renovated, it is very lively and there is a mix of functions.

2. Pedestrian oriented

1. Vällingby

At this station there is a high mix of functions. In the station there are several kiosk selling a variety of food. Outside the station is the core commercial area.

1. Hässelby Gård

There is a high mix of functions in the core commercial area.

2. Reigersbos

The core commercial area is pedestrian oriented. It is directly reachable by public transport and mingles in well with the surrounding residential neighbourhood.

Cars cannot enter the area, it is meant for slow traffic (pedestrian & cyclist). The pedestrian sidewalk is quite broad.

2. Gein
The core commercial area is pedestrian oriented. It is meant for slow traffic (pedestrian & cyclist), cars cannot enter.

2. Ganzenhoef
The core commercial area is pedestrian oriented. The sidewalk is broad and the buildings have a human scale it is a pleasant environment for the pedestrian.

2. Vällingby
The core commercial area is pedestrian oriented. Some streets provide shelter from bad weather conditions. No cars can enter there is plenty of space for the pedestrian.

3. **Location of industrial areas**

4. **Orientation of shops**

2. Hässelby Gård
The core commercial area is pedestrian oriented. The buildings provide shelter in bad weather conditions. No cars can enter.

3. Hässelby Gård
Offices are positioned just along side the core commercial area. It is close to the station and centre, but doesn't influence the atmosphere of the core commercial area.

4. Reigersbos
The shops are oriented on the main street. The pedestrian sidewalk is broad and pleasant.

4. Gein
The shops are oriented to the main street. Unfortunately due to the building setbacks the shops are not very visible.

4. Ganzenhoef
The shops are oriented to the main street.

4. Vällingby
Shops are oriented toward the main pedestrian routes.

5. **Local access**

4. Hässelby Gård
The shops are oriented to the main street.

5. Reigersbos
The core commercial area blends in well with the residential area. It is easy to reach by foot and by bicycle.

5. Gein
The core commercial area blends in well with the residential neighbourhood and is easy accessible by public transport.

5. Ganzenhoef
The core commercial area is easy accessible by public transport and it blends in well with the residential area. The residential area is being renovated into 3-4 floors housing.

5. Hässelby Gård
The core commercial are blends well into the residential area. It is easily accessible.

6. Bijlmer
The buildings along the route in Amsterdamse Poort along the shops are sheltered from rain.

6. Reigersbos
There is no building setbacks, there is enough space for the pedestrian and cyclist.

6. Ganzenhoef
The buildings are not setback.

6. Vällingby
The buildings are not setback.

7. Varied facades

6. Hässelby Gård
The buildings are not setback.

7. Vällingby
The facades are varied in the Vällingby commercial area. Though they have the same greyish style.

8. Unarticulated walls

8. Bijlmer
There are no unarticulated walls in the commercial area in Amsterdamse Poort.

But the Arena Boulevard has less of a human scale. The theatre and music podium, which requires darkness and so are less articulated. However the use of material in the architectural scale compensates it.

8. Reigersbos
There are no unarticulated walls in the core commercial area.

8. Ganzenhoef
There are no unarticulated walls. The shops front are light and open.

8. Vällingby
There are no unarticulated walls in the core commercial area.

[5] Conclusions

LEARNING FROM OTHER CITIES AND COUNTRIES

A lot can be learned from metro systems of other countries as the metro system in Amsterdam is still quite short compared to other cities and also quite young.

In this case I have looked at the metro system in Stockholm, a city with similar cultural and historical background. Its metro system opened about twenty-five years earlier than in Amsterdam, and has triple the amount of network length and stations (figure 5a - see introduction).

THE EXTENSIVE PUBLIC TRANSPORT NETWORK OF STOCKHOLM COMPARED TO AMSTERDAM

Stockholm has a big variety of public transport, however this is not surprising looking at the archipelago nature of the city.

There are two types of train transport within the city: one is a suburban rail which is comparable to the stoptrain in The Netherlands. The other service brings passengers to regional desitinations, comparable to an intercity train.

It is noticeable that the suburban rail plays a more important transport mode than the stoptrain service does in The Netherlands.

Another big public transport mode in the city is of course the metro system and the lightrails. Compared to the system in Amsterdam, the Stockholm system is a lots bigger and shows a lot of sidebranches. However there is no tram system in the city.

THE NEIGHBOURHOOD UNIT IN THE DISTRICT OF HÄSSELBY - VÄLLINGBY

There are only five stations in the district Hässelby - Vällingby, compared to ten in Amsterdam Zuid-Oost. A lot of area is not covered within the catchment area of the metro system, probably due to the fact that the urban extensions were built later than the metro system in the district.

However The most interesting difference with Amsterdam Zuid-Oost is the design concept for the district. In Amsterdam Zuid-Oost the modern functional city plays the largest role, while in Hässelby - Vállingby the neighbourhood unit concept was used. The neighbourhood unit concept suggests a compact mixed use environment around the metro stations. Within a district there is a nucleus, a larger centre for the whole district. Every other station environment can function as a small neighbourhood centre with facilities for daily use.

This concept is interesting in a way that the

Transit Oriented Development (TOD) guidelines suggests more or less the same.

However this concept is not fully executed in the district Hässelby - Vällingby, the stations Råcksta and Johannelund do not have a neighbourhood centre, maybe it is because these two stations are very close to the nucleus of the whole district.

If we look at Amsterdam Zuid-Oost, we can find this principle back, but in a less coherent way. Bijlmer Station is the nucleus of the whole district. There are four stations with neighbourhood centres near the station: Reigersbos, Gein, Ganzenhoef and Kraaiennest. The remaining stations: Strandvliet, Bullewijk, Holendrecht, Venserpolder and Gaasperplas either don't have a neighbourhood centre or the centre is not close to the station.

Strandvliet and Bullewijk are very close to the nucleus, and perhaps don't need an extra neighbourhood centre, like Råcksta and Johannelund - if we would like to compare this to the case in Hässelby - Vällingby. But the remaining stations Holendrecht, venserpolder and Gaasperplas have no excuse.

It is a different concept, the locations with a centre attached to the station in Amsterdam Zuid-Oost seem more coincidental rather than planned.

Overal we can find a higher mix of housing densities and housing types in Hässelby - Vällingby than in Amsterdam Zuid-Oost. In Amsterdam Zuid-Oost a neighbourhood often consists of the same typology of housing with the same facade and height.

While in Vällingby - Hässelby we can find high apartment flats next to one-family housing and 3-4 floors apartments.

>> NEXT CHAPTER: DESIGN PROPOSALS

In the next chapter two key-projects are further elaborated for a design proposal. The two locations are Holendrecht station and Strandvliet station.

[6]

Strategic design proposals for selected Key Projects

[6] Strategic design proposals for selected Key-projects

INTRODUCTION

➢ **WHAT** In this chapter I have developed a few design proposals for two of the key-projects. This chapter gives an answer to following research question:

"What are possible design proposals for lively and inviting metro station environments using the case study design references and TOD design guidelines?"

➢ **WHY**   The main research question is to find design guidelines to integrate a metro station with its surrounding neighbourhood. Now that I found a set of guidelines (from TOD), I want to test them and see if they are useful.

➢ **HOW**   From the TOD analysis of the key-project I have derived design concepts. The design concepts are implemented in the design proposal.

The design proposal is elaborated with maps, drawings and references.

SECTION 6.1: TOD ANALYSIS OF HOLENDRECHT

In the first section the Holendrecht station is analysed using the Transit Oriented Development (TOD) guidelines to find the good and bad elements of the neighbourhood.

The outcomes are reviewed and considered during the design process.

SECTION 6.2: DESIGN PROPOSAL FOR HOLENDRECHT

In section 6.2 a comprehensive design proposal is made for the metro station environment of Holendrecht. It contains maps of the current situation, the methodology for design, sections and impressions of the design proposal.

SECTION 6.3: DESIGN PROPOSAL FOR STRANDVLIET

In the third section a conceptual design proposal has been made for the station of Strandvliet. Three scenarios are suggested to improve the current situation.

6.1   TOD Analysis of Holendrecht

Figure 6.1.1 Holendrecht station.
source: by author, 2009.

TRANSIT SYSTEM

(see figure 6.1.1)

Holendrecht is a transit with connections to the sub centre of Amsterdam Zuid-Oost (Bijlmer Arena), Amsterdam Central Station and also Utrecht and Almere. It is recently renovated to have a stoptrain station here, this gives the opportunity and stimulus to improve the station environment and the surrounding neighbourhood.

Train

Amsterdam Central Station - Utrecht Central Station

Bus (GVB)

45   : Holendrecht AMC - Station Bijlmer Arena

46   : Holendrecht AMC - Buikslotermeerplein

47   : Holendrecht AMC - Station Bijlmer Arena

355   : Amsterdam CS - Amsterdam CS (ring line, night bus)

Bus (Connexxion)

120   : Station Bijlmer Arena - Utrecht Central Station

126   : Station Bijlmer Arena - Mijdrecht

158   : Holendrecht AMC - Almere-Haven

  extra rush hour bus services:

260   : Holendrecht AMC - Buiten NS

262   : Holendrecht AMC - Regenboogbuurt

264   : Holendrecht AMC - Parkwijk NS

Metro

50   : Gein - Isolatorweg

54   : Gein - Amsterdam Central Station

EXITS AND DIRECTIONS

(see figures 6.1.2 & 6.1.3)

This station has 2 exits and leads to 4 quarters.

Panorama views of the environments around the station exits show the visitors of the quarters. There are four quarters, two are for residents and two are directed to the business and offices area. Exit D is heavily used by visitors from and to the AMC Hospital and also used by students due to a University of Amsterdam Faculty building.

CURRENT SITUATION

On the 29th of November 1974 the construction of Holendrecht was started. The urban plan for Holendrecht was developed by W. G. Quist, F.J. van Gool and N. Schippers in collaboration with six housing associations. The elevated roads were already realised. According to Verhagen (1987) The plan was a combination of 'Bijlmer-infrastructure' and an aversion to Bijlmer-flats.

Figure 6.1.2 Holendrecht station map.
source: GVB, 2009; by author, 2009.

Figure 6.1.3 Holendrecht station exit environments.
source: by author, 2009.

TRANSIT STOP FACILITIES

1. **Comfortable waiting area**

(see figures 6.1.4a, b, c, d & e)

The waiting area is sheltered, there are seats, garbage cans and it is overal clean. The architecture of the transit station stands out against the surrounding buildings, it does not blend in well. Besides it is not very well maintianed, there is graffiti above the stations, along the tracks.

The platform is recently renovated, dark grey and white are the main colors.

Figure 6.1.4 Holendrecht station waiting area.
a. Holendrecht metro station building.
b. Holendrecht metro station entrance.
c. Holendrecht metro station platform.
d. Holendrecht metro station entrance.
e. Holendrecht metro station escalator, stairs and elevator.
source: by author, 2009.

Figure 6.1.5 Holendrecht passenger drop-off zone at AMC Hospital quarter.
source: by author, 2009.

Figure 6.1.6 Holendrecht passenger drop-off zone at AMC Hospital quarter is being renewed.
source: by author, 2009.

2. **Passenger drop-off zone**

(see figures 6.1.5 & 6.1.6)

The passenger drop-off zone was situated correctly. It does not interfere with the passenger flow to and from the station. However it has been removed (see picture).

3. **Adequate Lighting**

(see figure 6.1.7)

The lighting is sufficient, but the ceiling is quite low which creates an eerie atmosphere. Under EXIT C and D there is a bicycle path.

EXIT A

EXIT B

EXIT C

EXIT D

Figure 6.1.7 Holendrecht metro station lighting
source: by author, 2009.

Figure 6.1.8 Holendrecht metro station bicycle storages.
source: by author, 2009.

4. **Bicycle storage**

(see figure 6.1.8)

There are bicycle storages available at all exits. The ones at EXIT B are recently added. At EXIT D there are secured bicycle storages.

5. **Lively environment**

(see figure 6.1.9)

The station is not inviting, there is lack of maintanance. And there is a lot of construction work going on. At EXIT D, there is a fish kiosk, a flower kiosk and a small restaurant. At other exits no services are provided.

Figure 6.1.9 Holendrecht metro station environment.
source: Google Earth, 2009; by author, 2009.

EXIT A

EXIT B

EXIT C

EXIT D

Figure 6.1.10 Crossings at entrances of Holendrecht Station.
source: by author, 2009.

ACCESS TO TRANSIT STOPS

6. Crossings

(see figure 6.1.10)

The pedestrian access at ENTRANCE A and C is safe and comfortable, there is no need to cross any arterial or other road. However it is not very lively, the backs of the dwellings are facing the entrance.

The road to ENTRANCE B is safe because there is no need to cross any road, however it looks very eerie. The shrubs and bushes are not taken care of and the road is very narrow.

The road to ENTRANCE D from the hospital is nice. It is sheltered from the rain, the station is clearly present. Unfortunately there is graffiti on the track sides.

7. Isolation

(see figure 6.1.11)
Parking lots are isolating the station building. And

forms a border between the residential area and station. It also forms a border between the offices and the station.

The elevated road Meibergdreef-Holendrechtdreef is dividing the neighbourhoods.

Figure 6.1.11 Parking lots are isolating the station of Holendrecht.
source: Google Earth, 2009; by author, 2009.

RESIDENTIAL AREA

1 Holendrechtdreef area

2 AMC Hospital area

3 Meibergdreef primary area

4 Malden-, Mije-, and Mijndenhof

5 Meibergdreef secondary area

6 Tafelbergweg area

Figure 6.1.12 Area typologies around the Holendrecht station.
source: Google Earth, 2009; by author, 2009.

In this section I have mainly analyzed residential area 1 is, because this is the residential neighbourhood closest to the station. The residential area 4 can be seen as secondary area.

RESIDENTIAL DENSITIES

(see figures 6.1.13 & 6.1.14)

The dwellings formation creates inner and outer courtyards.

The outer courtyards (front of buildings) these are so-called "hard-courtyards", cars are allowed to ride through it with low speed, parking takes place outside these courtyards. In some of these courtyards we can find small playfields for children, on the ground floor there are many unarticulated walls due to storage room.

All the inner courtyards are large green open spaces, it sometimes contains private backyards. Most of it is public space, these are so-called "soft-courtyards".

This area has a density of 55 dwellings per hectare. This typology of housing has an Floor Space Index of 0,59, a Ground Space Index of 0,14 and a Open Space Ratio of 1,69.

Figure 6.1.13 Meander housing typology in Holendrecht West.
source: by author, 2009.

Figure 6.1.14 Sections of housing typology at Holendrecht West.
source: by author, 2009.

RESIDENTIAL BUILDING SETBACKS

1. Setbacks

Entries of the housing is a little bit setback. Storage rooms are blocking the view to the entries.

RESIDENTIAL BUILDING FACADES

2. Varied facades

There are two types of facades in two areas within Holendrecht West.

Figures 6.1.15a&B show a light red brick facade of 4 floors high dwellings with small sheds in front of it.

Figures 6.1.15c&d show 4 floors high, medium brown brick facades, with colored balconies.

Figure 6.1.15 Facades of housing in Holendrecht West.
source: by author, 2009.

3. Unarticulated walls

(see figure 6.1.16a, b&c)

Many places with unarticulated walls can be found in the residential neighbourhood.

RESIDENTIAL BUILDING ENTRIES

4. Orientation

The main pedestrian route will only see the back sides of the dwellings. This is not prefered for the liveliness of the route (figure 6.1.17).

Figure 6.1.16 Unarticulated walls in Holendrecht West.
a. Building block corners; b. Commercial area; c. Front sides of housing have storage rooms in front of it.
source: by author, 2009.

Legend
— Front
--- Back
⋯⋯ Main Pedestrian route
■ Commercial
■ Ancillery

Figure 6.1.17 Front and back sides of the residential area Holendrecht West.
source: by author, 2009.

5. **Visibility**

(see figure 6.1.18)

Entries are not very visible due to the storage sheds next to the entries.

Figure 6.1.18 Visibility of entries.
source: by author, 2009.

RESIDENTIAL GARAGES

6. Garages

(see figure 6.1.19)

Parking is not allowed in the courtyards, parking is done outside the residential area.

Figure 6.1.19 Parking lots.
source: by author, 2009.

CONCLUDING REMARKS

kk

6.2 Design Proposal for Holendrecht

DESIGN CONCEPTS

A. The pedestrian defined grid city

(see figure 6.2.1)

In Holendrecht we can find two types of urban morphology: firstly is the the object city in the business area, with free-standing blocks and an arbitrary rectangular road network. The pedestrian space in this typology is big and rather undefined.

Secondly is the modern city big blocks with large green public (collective) spaces and hierarchical roadnetworks. The pedestrian space is in the large collective areas and everywhere but the car roads, because slow and fast road users are separated.

The concept I am introducing here is deduced from the theoretical paper about the walkability of neighbourhoods in Chapter 3.

In this paper I have concluded that the traditional city is more pedestrian friendly. Pedestrian main routes were the fundaments of the urban fabric. However, I do not want to re-implement a 17th century city, instead I am introducing a new type of city, which I have called the 'pedestrian defined grid city'.

In this typology pedestrian attractors are placed in a grid city. A grid city can organize the urban fabric in an equitable distribution of property and street access for all. The pedestrian attractors should be easily accessible, hence pedestrian routes can subdivide the grid network and create a diversity of urban forms and giving pedestrians easy access.

	OBJECT CITY	MODERN CITY	GRID CITY	TRADITIONAL CITY	PEDESTRIAN DEFINED GRID CITY
plan	Amstel III	Holendrecht West	Venserpolder	Diemen	Pedestrian attractors will define urban spaces in the grid city, these spaces should be easily accessible, hence pedestrian routes can subdivide the grid network and create a diversity of urban forms.
road network					
pedestrian space					

Figure 6.2.1 City typologies.
source: by author, 2009.

Figure 6.2.2 Functional program, existing situation.
source: by author, 2009.

Figure 6.2.3 Functional program, new mixed functional program for design proposal.
source: by author, 2009.

B. Mixed Functions

Current situation

(see figure 6.2.2)

In the current situation there is an extreme low mix of functions. On one side of the metro tracks there is the business and offices area, on the other side there is housing.

The deteriorating neighbourhood centre facilites are situated on the far east of the neighbourhood and has no connection with the station.

Both neighbourhoods are not very lively nor inviting. There is no clear connection with the station.

Proposed situation

(see figure 6.2.3)

According to the TOD guidelines a mixed environment is suggested around the transit. In my case study of Stockholm the concept was to create a compact mixed environment around the transit as well.

Therefore I am proposing to move the centre functions near the station, and allow permeability between the business area and residential area. There is also room to implement other public facilities near the station area to create a variety of functions for diverse users.

C. Higher density around the station area

Current situation

(see figure 6.2.4)

Currently the densities are the same everywhere. On the eastern residential side there is a density of 55 dwellings per hectare and a FSI of 0,59. On the western business area there is even a lower density.

The low densities do not encourage liveliness in the neighbourhoods.

Proposed situation

(see figure 6.2.5)

In the new situation I propose to create higher densities around the station area to empower the liveliness of the neighbourhood.

Densities can be lower further away from the station. And even more lower in the secondary areas. TOD guidelines suggests that ancillery units and single-family homes can have densities varying from 30 - 40 units dwellings per hectare.

Townhouses can have densities between 45 - 70 dwellings per hectare.

And apartments can have densities between 85 - 125 dwellings per hectare.

Figure 6.2.4 Densities, existing situation.
source: by author, 2009.

Figure 6.2.5 Densities, new higher densities around station area for design proposal.
source: by author, 2009.

Figure 6.2.6 Plot sizes, existing situation.
source: by author, 2009.

Figure 6.2.7 Plot sizes, new smaller and denser plot sizes for design proposal.
source: by author, 2009.

D. Smaller plot sizes

Current situation

(see figure 6.2.6)

In the current situation the plot sizes are rather large. Road networks do not have so many parallel roads or side branches, which is not so good for the accessibility of the neighbourhood.

Proposed situation

(see figure 6.2.7)

In order to create a good accessible and compact neighbourhood, it is necessary to divide the plots into smaller sizes.

GRID ROAD NETWORK & PEDESTRIAN ATTRACTORS AND MAIN ROUTES

First I make a conceptual grid layout over the existing situation of the road network (figures 6.2.8 & 6.2.9).

Then I place the pedestrian attractors on the existing situation (figure 6.2.10) and define more or less the redevelopment area, which is in this case about 112 hectares (figure 6.2.11).

Figure 6.2.8 Road network, existing situation.
source: by author, 2009.

Figure 6.2.9 Road network, new grid pattern and smaller plot sizes for design proposal.
source: by author, 2009.

Figure 6.2.10 Pedestrian attractors.
source: by author, 2009.

Next I redefine the pedestrian main routes on the conceptual road network (figure 6.2.12).

By turning the road network layer of I get the main pedestrian routes of the design proposal, which is also a concept for the public space network.

Figure 6.2.11 Roughly calculated redevelopment area.
source: by author, 2009.

Figure 6.2.12 Pedestrian main routes defined on conceptual road network.
source: by author, 2009.

Figure 6.2.13 Pedestrian main routes, a concept for the public space network.
source: by author, 2009.

Current situation

Figure 6.2.14 Existing situation of Holendrecht.
source: by author, 2009.

Design proposal for Holendrecht

Legend

- green existing
- courtyards
- park
- water
- existing buildings
- core area centre functions
- core area offices
- core area public facilities
- public square
- main bicycle route
- intervention area

0 50 100 meters

Figure 6.2.15 Design proposal for Holendrecht.
source: by author, 2009.

Figure 6.2.16 Design proposal in phases.
source: by author, 2009.

DESIGN PROPOSAL IN PHASES

Figure 6.2.14 shows the current situation of Holendrecht, the next figure 6.2.15 shows my design proposal. This design proposal should be implemented in phases, I suggest 6 phases of redevelopment (figure 6.2.16).

Phase 1
Develop core commercial area, to create a mix of functions, more liveliness and atractiveness. Create a green lane through the collective green space of housing typology.

Phase 2
Bring the AMC Hospital closer to the station. Develop the tram & bus station stop near the hospital and metro station for easy transfer and short walking distances. Attract investors into the area by developing offices near the station.

Phase 3
Develop offices along the other metro station exit to attract more investors.

Phase 4
Insert a school in the area with a clear connection from the metro station. Create a green lane through the collective green space of housing typology.

Phase 5
Create housing in the business area to create a higher mix of functions.

Phase 6
Finalize design proposal by demolishing current core commercial area and adding new functions on that location, such as sports centre or other community buildings and offices.

Next possible steps
• Extent the green lane through the collective green space of housing typology.
• Close off meander type residential building blocks or demolish them.

MORPHOLOGY AND DENSITIES

In the current situation the density in the business area is (figure 5.2.17_1) :

FSI	0,63
GSI	0,15
OSR	1,34

The density of the meander type of building blocks is (figure 6.2.17_2) :

FSI	0,59
GSI	0,14
OSR	1,69

dwellings p/ha
55

Figure 6.2.17 Densities, existing situation.
source: by author, 2009.

Figure 6.2.18 Urban morphology of the design proposal.
source: by author, 2009.

Demolished housing

In figure 6.2.19 area 1 will be demolished, it is about 4,5 hectares and it contains about 300 dwellings.

Newly added housing

In figure 6.2.20 area 1 will be added as housing. The area size is about 14 hectares.

layers	area (m2)	total area (m2)
4	34.521	138.084
8	3.646	29.168
		167.252

The total built up area is about 15 hectares. Calculating an access area of 10% and dwellings of 150m², about 1.004 dwellings will be added.

access	total area (m2)	150m2 dwellings	dwellings p/ha
-10%	150.527	1.004	71

FSI	1,12
GSI	0,26
OSR	0,66

The densities will be about 71 dwellings per hectare and an FSI of 1,12.

In area 2 of figure 6.2.20 there will be newly added housing as well. The area size is about 25 hectares.

layers	area (m²)	total area (m²)
4	60.950	243.800
2	2.980	5.960
6	3.412	20.472
		270.232

The total built up area is about 27 hectares. Calculating an access area of 10% and dwellings of 150m², about 1.621 dwellings will be added.

access	total area (m2)	150m2 dwellings	dwellings p/ha
-10%	243.209	1.621	65

FSI	1,08
GSI	0,27
OSR	0,67

The densities will be about 65 dwellings per hectare with an FSI of 1,08.

In total an approximate amount of (2625 - 300 =) 2325 dwellings will be added in the area.

Figure 6.2.19 Demolished housing for design proposal. source: by author, 2009.

Figure 6.2.20 Newly added housing in design proposal. source: by author, 2009.

PEDESTRIAN MAIN ROUTES

Design concept 1
pedestrian network

Figure 6.2.21 shows the pedestrian main routes of the design proposal.

An important factor is that the metro station is part of the main pedestrian routes.

The pedestrian attractors are the metro stations, the public squares and public facilities.

MIX OF FUNCTIONS

Design concept 2
mixed functions

Figure 6.2.22 shows the current functional program of the Holendrecth station area. There is a very low mix of functions, basically there is business and offices space on the west side of the station tracks and residential area on the east side of the tracks.

In my proposal I suggest a high mix of function aorund the direct station area. I also suggest to add housing in the business area and some offices in the housing area (figure 6.2.23).

Figure 6.2.21 Pedestrian main routes of the design proposal.
source: by author, 2010.

Functional Program
current situation

Legend

green / park
water
existing buildings
intervention area
housing
centre functions
work
community buildings
housing / centre functions
housing / work
work

0   50   100 meters

Figure 6.2.22 Functional program, current situation.
source: by author, 2010.

Functional Program
design proposal

Legend

green / park
water
existing buildings
intervention area
housing
centre functions
work
community buildings
housing / centre functions
housing / work
work

0   50   100 meters

Figure 6.2.23 Functional program of design proposal.
source: by author, 2010.

CONCENTRATED DENSITY

Design concept 3
concentrated
density

Figures 6.2.24 & 6.2.25 show the buildings densities and heights of the buildings blocks of the design proposal.

My design proposal suggest higher building blocks near the station area to create a more liveliness and interaction.

Figure 6.2.24 Area building densities.
source: by author, 2010.

Figure 6.2.25 Area building heights.
source: by author, 2010.

SMALLER PLOT SIZES

Design concept 4
smaller plotsizes

Figure 6.2.26 shows the current division of plot sizes. In the current situation the plot sizes are quite broad.

My design proposal suggest a finer and denser structure of plot sizes division (figure 6.2.26). Smaller plot sizes create a better accessibility in the area.

Figure 6.2.26 Plot sises in current situation
source: by author, 2010.

Legend
- green existing
- courtyards
- park
- water
- existing buildings
- new buildings
- intervention area

Figure 6.2.27 Plot sizes of design proposal.
source: by author, 2010.

FRONT & BACK SIDES

It was a difficult task to deal with the meander shaped building typology, because the front and back sides were not coherent.

In my proposal I close off two of the meander blocks to deal with the front and back sides (figure 6.2.28_1 & 2)

PARKING SOLUTION

With an addition of about 2325 dwellings, parking solutions are needed to provide enough parking lots for the inhabitants and visitors.

I suggest two parking solutions: one for private parking and the other for visitors.

Private parking

Private parking should be done underneath building blocks, it could be half deepened parking lots under the inner courtyards (figure 6.2.29a) or underground parking lots (figure 6.2.29b).

Figure 6.2.28 Front and back sides of building blocks in design proposal.
source: by author, 2010.

Visitors parking

Visitors are allowed to park on streets, except on arterials. Arterials need to be parking lots free due to ensure the flow of cars (figure 6.2.29c).

Figure 6.2.30 shows the parking entries of the design proposal. Some open parking lots remain from the current situation, these open parking lots are situated just outside the 'hard-courtyards'.

Figure 6.2.29 Parking solutions.
source: by author, 2010.

Figure 6.2.30 Parking solution in design proposal.
source: by author, 2010.

Figure 6.2.31 Sections in, current situation.
source: by author, 2010.

Figure 6.2.32 Sections in design proposal.
source: by author, 2010.

Legend
green existing
courtyards
park
water
existing buildings
new buildings
intervention area

SECTIONS

Section UU'

This section is taken at the core commercial area of the current situation. I am proposing to add a green lane through the neighbourhood, which is accessible by car. My reference is the Jericholaan in Rotterdam (figure 6.2.33).

This green lane can be extended through the neighbourhood in the future.

Figure 6.2.33 Reference: Jericholaan, Rotterdam. source: Google Streetview, 2009.

Figure 6.2.34 a. Section UU', current situation; b. Section UU', design proposal. source: by author, 2010.

Figure 6.2.35 Render of the green lane. source: by author, 2009.

Section VV'

Section VV' in the transit area of the design proposal. I took a reference of the Muiderpoortstation in Amsterdam (figure 6.2.36).

Currently there is a lot of construction work going on at section VV'. Therefore I couldn't make a true section.

Figure 6.2.36 Reference: Muiderpoortstation, Amsterdam. source: Google Earth, 2009.

Figure 6.2.37 Section VV', design proposal.
source:by author, 2010.

Figure 6.2.38 Render of the station area.
source: by author, 2009.

SECTIONS

Section WW'

This section emphasizes the residents along the water slope. As a reference I have taken a project from Oegstgeest (figure 6.2.39).

Figure 6.2.39 Reference: Poelgeest, Oegstgeest. source: Google Streetview, 2009.

Figure 6.2.40 a. Section WW', current situation; b. Section WW', design proposal. source: by author, 2010.

Figure 6.2.41 Reference of Poelgeest, Oegstgeest. source: Google Streetview, 2009.

EXIT A

Figure 6.2.42 Exit A, current situation.
source: by author, 2009.

Figure 6.2.43 Exit A, collage.
source: by author, 2010.

a. Gein: daycare along route   b. Holendrecht: clear route to destination   c. Hässelby Gard: small shops near station

Figure 6.2.44 Case study References
source: by author, 2009.

EXIT B

Figure 6.2.45 Exit B, current situation.
source: by author, 2009.

Figure 6.2.46 Exit B, collage.
source: by author, 2010.

a. Gein: shops under station

b. Gein: sidewalk from the station

c. Hässelby Gard: cafe along station exit

Figure 6.2.47 Case study References
source: by author, 2009.

EXIT C

Figure 6.2.48 Exit C, current situation.
source: by author, 2009.

Figure 6.2.49 Exit C, render collage.
source: by author, 2010.

a. Hässelby Gard: core commercial area

b. Hässelby Strand: core commercial area

c. Reigersbos: core commercial area

Figure 6.2.50 Case study References
source: by author, 2009.

EXIT D

Figure 6.2.51 Exit D, current situation.
source: by author, 2009.

Figure 6.2.52 Exit D, render collage.
source: by author, 2010.

a. Hässelby Gard: bus near station exit

b. Ganzenhoef: combination of work / housing

c. Ganzenhoef: pedestrian friendly crossing

Figure 6.2.53 Case study References
source: by author, 2009.

6.3 Design proposal for Station Strandvliet

NEW LOCATION

Strandvliet is a very different location than Holendrecht. I have tried to maintain the same design concepts and methodology to create a design proposal for this metro station environment.

DESIGN CONCEPTS

A. The pedestrian defined grid city

(see figure 6.3.1)

In Strandvliet we have two city typolgies on the two sides of the metro tracks. On one side we have a grid city typology. However the grid is quite broad compared to other grid patterns in other parts of the city of Amsterdam.

Since this is already a grid structure, I do not need to introduce it. I can follow my methodology by placing pedestrian attractors on the existing situation to see if there should be any big changes in the current grid structure.

On the other side there is quite a lot of undefined area, large infrastructural columns of the train tracks fill up the space. There are shrubs and other plantation, which is not very well maintained. At one of the station exit there is no clear route. At the other station exit there is a route going to the soccer training fields and the Arena stadium.

This side has characteristics of the object city but it is not so dense and is less defined.

B. Mixed Functions

Current situation

(see figure 6.3.2)

In the current situation there is a low mix of functions. On one side of the metro tracks there is the residential area of Strandvliet.

On the other side there is a strip of undefined area, with large infrastructural columns of the elevated train tracks.Consequently there are some private golf terrains and some training soccer fields.

	OBJECT CITY	MODERN CITY	GRID CITY	TRADITIONAL CITY	PEDESTRIAN DEFINED GRID CITY
plan	Amstel III	Holendrecht West	Venserpolder	Diemen	Pedestrian attractors will define urban spaces in the grid city, these spaces should be easily accessible, hence pedestrian routes can subdivide the grid network and create a diversity of urban forms.
road network					
pedestrian space					

Figure 6.3.1 City typologies.
source: by author, 2009.

Figure 6.3.2 Functional program, existing situation.
source: by author, 2009.

Proposed situation

For my proposal I made three scenarios of functions.

The first scenario is linked to the Arena Boulevard, I suggest to extent the large scale entertaintment into this area. The Strandvliet station will also serve as main station for the entertaintment area. The area is meant for a large amount of users (figure 6.3.3a).

In the second scenario I propose a cultural themed urban park, which fits with the Arena Boulevard, but can also be used by residents of the Strandvliet and Duivendrecht (figure 6.3.3b).

The final scenario deals with a more soft landscape park with lakes. It suggests interesting interaction with the infrastructural columns. It is possible to connect it with the Amstelscheg on the west side of the location. This landscape can be used by the residents and nature lovers (figure 6.3.3c).

On the following pages I have elaborated the three scanarios a bit more.

Figure 6.3.3 Functional program, new mixed functional program for design proposal.
source: by author, 2009.

SCENARIO 1: ENTERTAINTMENT AREA

The first scenario is an entertaintment area, one can think of adding large entertaintment facilities such as space for a pop-podium, a big skiing slope or maybe an outdoor kart circuit.

The Arena Boulevard is a large scale entertaintment area already. There are already a lot of parking facilties in the area, which can be used in times for big events.

To give an impression of the size of the facilities which could be added, I have copied and pasted the actual location of Pinkpop and a skiing slope (Snowworld) and a kart circuit into the Strandvliet plot.

Pinkpop (Megaland), Limburg
(see figures 6.3.4 & 6.3.5)
Pinkpop is a large yearly music festival which attracts many people. The podium fits on the location, but the camping places (soccer fields) do not fit. However, there are also soccer fields in the current situation in the west. The space was previously used a horse race track, but now it is only an entertainment area.

Snowworld, Limburg
(see figures 6.3.6 & 6.3.7)
Snowworld is a large skiing and snowboarding slope, it needs to be build on a hill, which takes quite a lot of space. Snowworld has about 1,4 million visitors per year.

Kart Circuit, Berghem
(see figures 6.3.8 & 6.3.9)
Kart circuits have various sizes, it could fit into the location, there is space left for other facilities.

Figure 6.3.4 Pinkpop, Limburg.
source: angel.regioportals.nl.

Figure 6.3.6 Snowworld, Limburg.
source: pwpeics.se.

Figure 6.3.8 Kart cicuit, Berghem.
source: xander-racing.nl.

Figure 6.3.5 a. Pinkpop terrain; b. Pinkpop terrain pasted on Strandvliet.
source: Google Earth, 2009; by author, 2010.

Figure 6.3.7 a. Snowworld; b. Snowworld pasted on Strandvliet.
source: Google Earth, 2009, by author, 2010.

Figure 6.3.9 a. Museumpark, Rotterdam; b. Museumpark, Rotterdam pasted on Strandvliet.
source: Google Earth, 2009, by author, 2010.

SCENARIO 2: URBAN THEME PARK

The second scenario could be a theme park, such as the culture park: Westergasfabriek terrain in Amsterdam, the pavilions park: Parc de la Vilette in Paris or the Museumpark in Rotterdam.

The district lacks cultural facilities such as museums and theaters. A big mediacentre of van de Ende is being built next to the Arena stadium. There is potential to continue this theme into the north around the Strandvliet station.

To give an impression of the size of the facilities, I have copied and pasted the actual location of the Westergasfabriek terrain, the Parc de la Vilette and the Museumpark into the Strandvliet plot.

Westergasfabriek terrain, Amsterdam

(see figures 6.3.10 & 6.3.11)

The Westergasfabriek terrain is used as a culture park its size is about 14 hectares. The park has in and outside activities, such as pop podiums, movies and theater workshops and there are some art galleries.

Parc de la Vilette, Paris

(see figures 6.3.12 & 6.3.13)

Parc de la Vilette is a big city park its size is about 55 hectares and is the largest park in Paris. Designed by Bernard Tschumi, there are 26 follies spread in the park with all different functions and program. The cité des sciences at de l'industrie is also situated in this park.

Museumpark, Rotterdam

(see figures 6.3.14 & 6.3.15)

The Museumpark has a few museum clustered together around a park. The museums have different themes: the Boijmans van Beuningen museum, surrealism; the Kunsthal has modern art and the Nederlandse Architectuur Instituut (NAI) is focused on architecture.

Figure 6.3.10 Westergasfabriek terrain.
source: amsterdam.nl.

Figure 6.3.12 Parc de la Vilette.
source: pwpeics.se.

Figure 6.3.14 Museumpark, Rotterdam.
source: commons.wikimedia.org.

Figure 6.3.11 a. Westergasfabriek terrain; b. Westergasfabriek terrain pasted on Strandvliet.
source: Google Earth, 2009; by author, 2010.

Figure 6.3.13 a. Parc de la Vilette; b. Parc de la Vilette pasted on Strandvliet.
source: Google Earth, 2009, by author, 2010.

Figure 6.3.15 a. Museumpark, Rotterdam; b. Museumpark, Rotterdam pasted on Strandvliet.
source: Google Earth, 2009, by author, 2010.

SCENARIO 3: NATURE IN THE CITY

The third scenario could be a green scenario, it could be water park or an extension of the Amstelscheg.

In the work area of the district there is no defined green public space. Adding a park could add up to the mix of functions in this area.

To give an impression of the size of the facilities, I have copied and pasted the following locations into the Strandvliet plot: lakes along Hammaröleden road in Karlstad, Sweden, a piece of the Naardermeer and a corner of the Weerwater in Almere.

It is noticable at first glance that many of the suggested locations do not fit into the Strandvliet plot. I suggest to take a look at the Amstelscheg as well. Or create a smaller scale wetland.

Lakes along Hammaröleden road, Karlstad
(see figures 6.3.16 & 6.3.17)
Karlstad is a city of lakes, and many lakes can be found along large infrastructural roads such as the lakes along the Hammaröleden road.

Naardermeer
(see figures 6.3.18 & 6.3.19)
Naardermeer is a large lake with smaller lakes around it. The scale is much bigger than in Strandvliet.

Weerwater, Almere
(see figures 6.3.20 & 6.3.21)
The Weerwater in Almere is a urban lake, in lays near the centre of the city. The scale is much bigger than in Strandvliet.

Figure 6.3.16 Wetlands along Hammaröleden road in Karlstad. source: by author, 2009.

Figure 6.3.18 Naardermeer. source: www.martijndejonge.nl

Figure 6.3.20 Weerwater, Almere. source: picasa.com.

Figure 6.3.17 a. Lakes along Hammaröleden road, Karlstad; b. Lakes along Hammaröleden road, Karlstad pasted on Strandvliet.
source: Google Earth, 2009; by author, 2010.

Figure 6.3.19 a. Piece of Naardermeer; b. Piece of Naardermeer pasted on Strandvliet.
source: Google Earth, 2009, by author, 2010.

Figure 6.3.21 a. Piece of Weerwater, Almere; b. Piece of Weerwater, Almere pasted on Strandvliet.
source: Google Earth, 2009, by author, 2010.

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C. Higher density around the station area

Current situation

(see figure 6.3.22)

The current densities of the residential neighboourhood of Strandvliet are:

FSI	0,63
GSI	0,14
OSR	1,35

This residential area already has a grid structure, but it is a very broad grid structure.

Proposed situation

The choice of the functional program will determine the densities of the location.

D. Smaller plot sizes

Current situation

Even though the building block typology is of grid structure, the road network is only grid-like in the internal neighbourhood. The accessibility to the neighbourhood is rather poor, the hieracrchical road network is also present in this location.

Proposed situation

In the proposed situation I suggest to add more entrance and exit points to and from the neighbourhood to increase its accessibility.

Figure 6.3.22 Density of `Strandvliet residential area, existing situation.
source: by author, 2010.

GRID ROAD NETWORK & PEDESTRIAN ATTRACTORS AND MAIN ROUTES

First I extent the grid layout to stimulate more accessibility (figures 6.3.23 & 6.3.24).

Then I place the pedestrian attractors on the existing situation (figure 6.3.25) and define more or less the redevelopment area, which is in this case about 55 hectares (figure 6.3.26).

Figure 6.3.23 Road network, existing situation.
source: by author, 2010.

Figure 6.3.24 Road network, extended grid structure.
source: by author, 2010.

Figure 6.3.25 Pedestrian attractors.
source: by author, 2010.

Figure 6.3.26 Roughly calculated redevelopment area.
source: by author, 2009.

SNOWWORLD SCENARIO

I have picked Snowworld as scenario to elaborate. The plot was too small to implement a Pinkpop terrain and the snowworld slope (figure 6.2.27).

However it was possible to combine a race track with a Snowwold slope (figures 6.2.28 & 6.2.29). There is space left, to densify the facilities, we can think of adding other functions such as a climbing hall (figure 6.2.30).

Figure 6.3.31 suggest the atmosphere of the snowworld scanerio.

Figure 6.2.28 Climbing hall.
source: Google Image search.

Figure 6.2.27 Snowworld scenario.
source: by author, 2010.

Figure 6.2.29 Zoetermeer Snowworld
source: Google Image search.

Figure 6.2.30 Climbing hall.
source: Google Image search.

Figure 6.2.31 a. Current situation; b. Collage new situation.
source: by author, 2010.

[6] Conclusions

LIVELY AND INVITING METRO STATIONS

For both of the stations four main design concepts were used, which are: the pedestrian defined grid city, mix of functions, higher densities around station and smaller plot sizes. These four design concepts are generically usable for metro station environments to integrate a metro station with its surrounding neighbourhood.

HOLENDRECHT STATION

Holendrecht station is a station with potential to have new functions to be developed around the station. The latest addition of a train station stop has upgraded the station to a transit stop. My design proposals upgrades the station further with a mixed program of functions, higher density, smaller plot sizes and a defined pedestrian route with a system of public squares.

One main issue that should be done is the lowering of the car avenue. Lowering the avenue will create extra space along the roads, these left-over spaces can be used to densify the area. Also more interaction between public space users is stimulated when everybody uses the same street.

Interaction between functions is also stimulated by placing a residential area in the business area and offices in the residential area. A core commercial area is positioned near the station which gives it easy access. The AMC Hospital is brought closer to the station so that visitors have to walk less. Other public facilities are added as well such as a sports centre and a high school. These functions will be used by the new inhabitants, because the design proposal consists of adding about 2300 dwellings (400 are demolished).

This means an increase of liveliness, but also an increase of need for parking spaces. Parking solutions are necessary to deal with these amounts, my suggestion is to create private parking space under the building blocks, while visitors can park on the street except for arterials to maintain the flow.

The Holendrecht station design proposal is comprehensive: with calculations, sections and impressions of the created spaces.

STRANDVLIET STATION

The Strandvliet station is on the other hand less defined, while it was clear what should be done at the location of Holendrecht there are more options possible for the Strandvliet station. The four design concepts remain, but the positioning of functions is in this case the leader for the other three concepts. Depending on the program one places in the area, the pedestrian main routes, plot sizes and density follows.

Three scenarios are suggested for the area 'behind' Strandvliet: a large scale entertainment area, a cultural park and a landscape park.

The large scale entertainment buildings will need a clear route from the station, the entrances of the entertainment buildings should be situated along the main route.

When placing a cultural park with pavilions, there are multiple routes possible to maintain maximum accessibility to all the pavilions.

A landscape park can have multiple routes as well.

1 Pedestrian defined
public space network in
a grid city layout
(from theory paper)

2 Mixed functions
(from TOD)

3 Higher density around
station area
(from TOD)

4 Smaller plot sizes
(from practical research)

Conclusions & Recommendations

[7] Conclusions & Recommendations

CONCLUSIONS

The metro system

The role of the metro system plays very different roles on the scale of the city, district and neighbourhood. On the scale of the city it is a fast public transport mode which goes to the centre, the west and south-east of the city (and the municipality of Amstelveen). This mode of public transport is in use next to the tram, bus and train. It has separated tracks and is therefore not interacting with other modes of transport apart from the transit locations. On the scale of the district Amsterdam Zuid-Oost, the metro system plays a more important role than on the city scale. The metro is the main public transport mode, next to the bus and train. Its catchment area covers about 80% of the district.

On the scale of the neighbourhoods in Amsterdam Zuid-Oost, the metro stations play a more important role than the system itself. The metro stations are not always very well integrated with the surrounding urban environment.

The focus of my research has been on the district Amsterdam Zuid-Oost and the individual metro station environments in the neighbourhoods. Amsterdam Zuid-Oost is a district of the city Amsterdam which lies distanced from the city. The district has never been very popular in a positive way, both urban morphological and social problems created a negative image of the district. Amsterdam Zuid-Oost lacks a certain coherence, due to broad urban structures, low interaction via separated functions and social imbalances.

The district is now in its redevelopment era and I believe that the metro station environments should not be forgotten in this process. In contrary these metro stations could be acting as the doors to the district. Metro stations are nowadays not only seen as a mode of transport to arrive at their destination. But metro stations are transits, entry and exit points for people. More specifically, pedestrians, that need a friendly and useful environment. A better integration with the surrounding neighbourhoods is hereby necessary.

Urban coherence and transit oriented development guidelines

Via principles for urban coherence by Salingaros (2005) I have tried to map out a strategic proposal to improve the urban coherence of the district. Recommendations from this proposals are to create permeability between the work and dwellings, using metro stations as a common third element to couple two or more functions, create a mix of functions and more diversity and to allow interaction by lowering the avenues.

While for the smaller scale I have analyzed Transit oriented Development (TOD) guidelines which are developed to encourage use of transit. The Transit Oriented Development (TOD) guidelines of Calthorpe (1993) are very comprehensive and is dealing with the topics of: the transit system, the core commercial area, the residential area, secondary area and a the pedestrian, bicycle system and the street, Parks, Plazas and civic buildings. The guidelines are very useful as a reference for my research.

A vision for the district Amsterdam Zuid-Oost

From the practical and theoretical analysis I have created a vision for the district. The vision focuses on the stimulation of urban interdependence and coherence in Amsterdam Zuid-Oost. It contains 9 key-projects of which 5 considers redevelopment around metro stations. These metro stations can be seen as hubs to structuralize the urban environment. The key-projects deal with accessibility and infrastructure, interaction between monotonous functions, reconnecting green, metro station environments redevelopments, and interaction with other municipalities.

Using case studies as a reference for design

To broaden my knowledge on metro station

environment I have done a case study on the district Hässelby – Vällingby in Stockholm. Stockholm is a city with similar cultural and historical background as Amsterdam. The district Hässelby – Vällingby has elevated station like in Amsterdam Zuid-Oost and has a comparable area size and amount of population.

The interesting difference with Amsterdam Zuid-Oost is the design concept for the district. In Amsterdam Zuid-Oost the modern functional city plays the largest role, while in Hässelby - Vällingby the neighbourhood unit concept was used. The neighbourhood unit concept suggests a compact mixed use environment around the metro stations. Within a district there is a nucleus, a larger centre for the whole district. Every other station environment can function as a small neighbourhood centre with facilities for daily use. The neighbourhood concept is very relatable to the Transit Oriented Development (TOD) guidelines of Calthorpe (1993). Design references were taken from the case study for use during the design process.

Design proposals for good metro station environments

With all the data and knowledge assembled I Elaborated two key-projects: Holendrecht station and Strandvliet station. The two key-project are different in size and theme. The Holendrecht station required a large intervention, but it was clear what type of station it could be (station with a neighbourhood centre attached to it). With the Strandvliet station it was less clear what should be done, for this station I created scenarios which would possibly fit with the current situation, the solutions for this station stayed conceptual.

At Holendrecht station I added a lot of functions and raised the density in order to create more liveliness in the area. About 2300 dwellings are added to the current situation, the increased amount of inhabitants also asks for parking solutions, parking should be done in the building blocks, while visitors can park on the

streets except on arterials. Phasing the design proposal can attract investors.

Generic design guidelines to integrate a metro station with its surrounding neighbourhood

For both of the station four main design concepts were used, which are: the pedestrian defined grid city, mix of functions, higher densities around station and smaller plot sizes. These four design concepts are generically usable for metro station environments to integrate a metro station with its surrounding neighbourhood.

Pedestrian defined grid city

From my theoretical research paper I have concluded that traditional city patterns are more pedestrian friendly. Pedestrian main routes were the fundaments of the urban fabric. However, re-implement a 17th century city is not desirable, instead I am introducing a new type of city, which I have called the 'pedestrian defined grid city'.

In this typology pedestrian attractors are placed in a grid city. A grid city can organize the urban fabric in an equitable distribution of property and street access for all. The pedestrian attractors should be easily accessible, hence pedestrian routes can subdivide the grid network and create a diversity of urban forms and giving pedestrians easy access. Both car access and pedestrian access are covered within this city pattern concept.

Mix of functions

Both TOD and the neighbourhood unit (derived from case study) find that a mix of functions is desirable to create a lively and useful environment. A mix of function attracts a variety of users at different hours of the day, this can increase the liveliness of an area.

Higher densities around the station

Higher densities can empower the liveliness of a neighbourhood, because high densities generate a bigger amount of people. Densities can be lower

further away from the station. And even more lower in the secondary areas. TOD guidelines suggests that ancillery units and single-family homes can have densities varying from 30 - 40 units dwellings per hectare. Townhouses can have densities between 45 - 70 dwellings per hectare. And apartments can have densities between 85 - 125 dwellings per hectare.

Smaller plot sizes
The accessibility of an area is measurable by the amount of parallel roads and corners. Creating smaller plot sizes increases the accessibility of an area.

Transit oriented development guidelines can be used as a reference guide during the design process.

RECOMMENDATIONS
Recommendations for the city Amsterdam
Lower avenues
The avenues are dividing neighbourhoods in a negative way, they do not allow interaction between other neighbourhoods. They take up a lot of unnecessary space which can be used for densification of areas. The space around the elevated roads are unpleasant, under and overpasses for pedestrians re complicated and unclear for orientation and are therefore not recommended. Separating road users discourages interaction and it doesn't fit with the idea of a lively city. The street should be available for all users in order to stimulate maximum interaction.

No more hierarchical road structures
Hierarchical road structures stimulates car usage and are proven to be unsustainable. The accessibility of the neighbourhoods is minimalistic and doesn't stimulate interaction between neighbourhoods. A pedestrian defined grid city pattern provides both car user as well as the pedestrian an optimal accessibility.

Metro station environments are the keys to the district
The metro is one of the main public transport modes of the district, but the metro station environments are not well maintained, unpleasant and are not part of the surrounding neighbourhoods. Metro stations are a source of people coming and going from and to their destinations, a clear, lively and pleasant environment and route is needed. The metro station should be integrated in the main pedestrian routes of the area.

Metropolitan stations
If the metro system will be part of the main public transport of the metropolitan area, it is necessary to create good station environments unlike the ones in Amsterdam Zuid-Oost. There is an opportunity to learn from this district. My recommendation is to improve test stations to create a generic code for metro station environments. Transit oriented development guidelines can be useful for the test stations.

Recommendations for further research
Other case studies
In my graduation project I did a case study on the district Hässelby – Välingby in Stockholm. The findings from this case study were very similar to transit oriented development (TOD) guidelines I had analyzed. The district was designed according to a neighbourhood concept, a compact urban development with mixed functions around the metro stations. Each metro station had their own commercial centre with daily facilities.

These characteristics are very in line with the TOD guidelines, and emphasized the guidelines even more. Analyzing a different case study could have given other solutions for metro station environment developments. Suggested locations are the Rotterdam metro system or the Berlin metro system.

Other metro station typologies

The TOD guidelines are generic to use for transits, however I think that there is a significant difference between elevated station, ground floor stations and underground stations. And that different metro station typologies require other interventions. Ground floor stations are very much like tram station stops, these are already interacting with the urban environment. Underground stations can be blended into building blocks, while elevated stations are very visible and can divide neighbourhoods in a negative way. In my research I have tried to make the elevated station part of the main pedestrian route of the research locations to integrate it with the surrounding neighbourhoods. Further research could be done for underground stations and ground-floor stations.

Elaborate another key-project

In my design proposals I have elaborated two types of metro stations, they required different solutions. The Holendrecht station required a large intervention, but it was clear what type of station it could be (station with a neighbourhood centre attached to it). With the Strandvliet station it was less clear what should be done, for this station I created scenarios which would possibly fit with the current situation, the solutions stayed conceptual. Each station could generate different solutions, it was possible to conclude some generic concepts that are applicable for metro station environments. My recommendations are to elaborate one or more key-projects.

Recommendations on using the theoretical principles and guidelines in this project

The principles of Salingaros (2005)

Salingaros (2005) gives 8 principles to stimulate urban coherence, these principles are abstract and taken from mathematics and other sciences. In my research I have tried to translate these principles to the situation in Amsterdam Zuid-Oost. I have found out that some of these examples are not applicable to the scale of the district. Other principles are roughly translatable but need intervention on an architectural scale. These principles can be interpreted is a subtle way and can be very vague sometimes. It is necessary do define the principles in a clear way, before using them.

Transit oriented development guidelines

The Transit Oriented Development (TOD) guidelines of Calthorpe (1993) are very comprehensive and are very useful as a reference for my research. However in his book he mainly mentions how to deal with new development areas where all these guidelines should be implemented.

In my case I am dealing with a more complicated existing plan, where all station core areas and most of the secondary areas are already filled in and situated. And where the functions are separated in its extreme. Implementing all these guidelines would need massive redevelopments everywhere. It is recommended to use these guidelines as a reference and not as the absolute solution.

Reflection on the design products and the design process

EVALUATION OF THE DESIGN PRODUCTS

Holendrecht Station

Holendrecht station is a station with potential to have new functions to be developed around the station. The latest addition of a train station stop has upgraded the station to a transit stop. My design proposals upgrades the station further with a mixed program of functions, higher density, smaller plot sizes and a defined pedestrian route with a system of public squares.

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The Holendrecht station design proposal is comprehensive: with calculations, sections and impressions of the created spaces.

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The large scale entertainment buildings will need a clear route from the station, the entrances of the entertainment buildings should be situated along the main route.

When placing a cultural park with pavilions, there are multiple routes possible to maintain maximum accessibility to all the pavilions.

A landscape park can have multiple routes as well.

EVALUATION OF THE DESIGN PROCESS

In the thesis plan we were asked to make a time planning for the project, which has been very helpful to stay within the topic of my research field. I have more or less followed the flowchart (figure 8.1).

However I found difficulties in the time planning after each presentation moment. After each presentation moment there is a lot of feedback from the mentors and there is little time to change the current products, because one needs to continue working on the rest. These evaluation moments took longer than expected, causing all the work to shift forward.

When I finished the design guidelines and case study design references, there was little time left to produce a design proposal. Making the design proposal for Holendrecht was a lot of trial and error, first I took a very large redevelopment area, where after many comments were made about the feasibility of such a large project. But during my evaluation process I found out that the area could be smaller by replacing some of the current buildings back in place (figures 8.2 & 8.3). It has been very valuable to gain experience for designing by evaluating my own design proposal.

Figure 8.1 Time planning flow chart.
source: by author, 2009.

Design proposal for Holendrecht

Legend
- green / park
- water
- existing buildings
- new buildings
- intervention area

0   50   100 meters

Figure 8.2 Design for Holendrecht, version 1.
source: by author, 2009.

Design proposal for Holendrecht

Legend
- green existing
- courtyards
- park
- water
- existing buildings
- core area centre functions
- core area offices
- core area public facilites
- public square
- main bicycle route
- intervention area

0   50   100 meters

Figure 8.3 Design for Holendrecht, final version.
source: by author, 2010.

During the P4 questions were raised whether every station would need such a large intervention, and suggestions were made to elaborated another metro station environment to see its interventions needed. I elaborated Strandvliet station in a conceptual way using scenarios for the location. While on the one side (residential side) minimum interventions are needed, the other side needs a bigger intervention and has more options.

The most important thing that I have learned from this research project is that after each presentation moment there should be a week of pause to evaluate the products made so far. It is also necessary to see if one is still in line with the suggested time planning.

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