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Master of Architecture, Urbanism and Building Sciences

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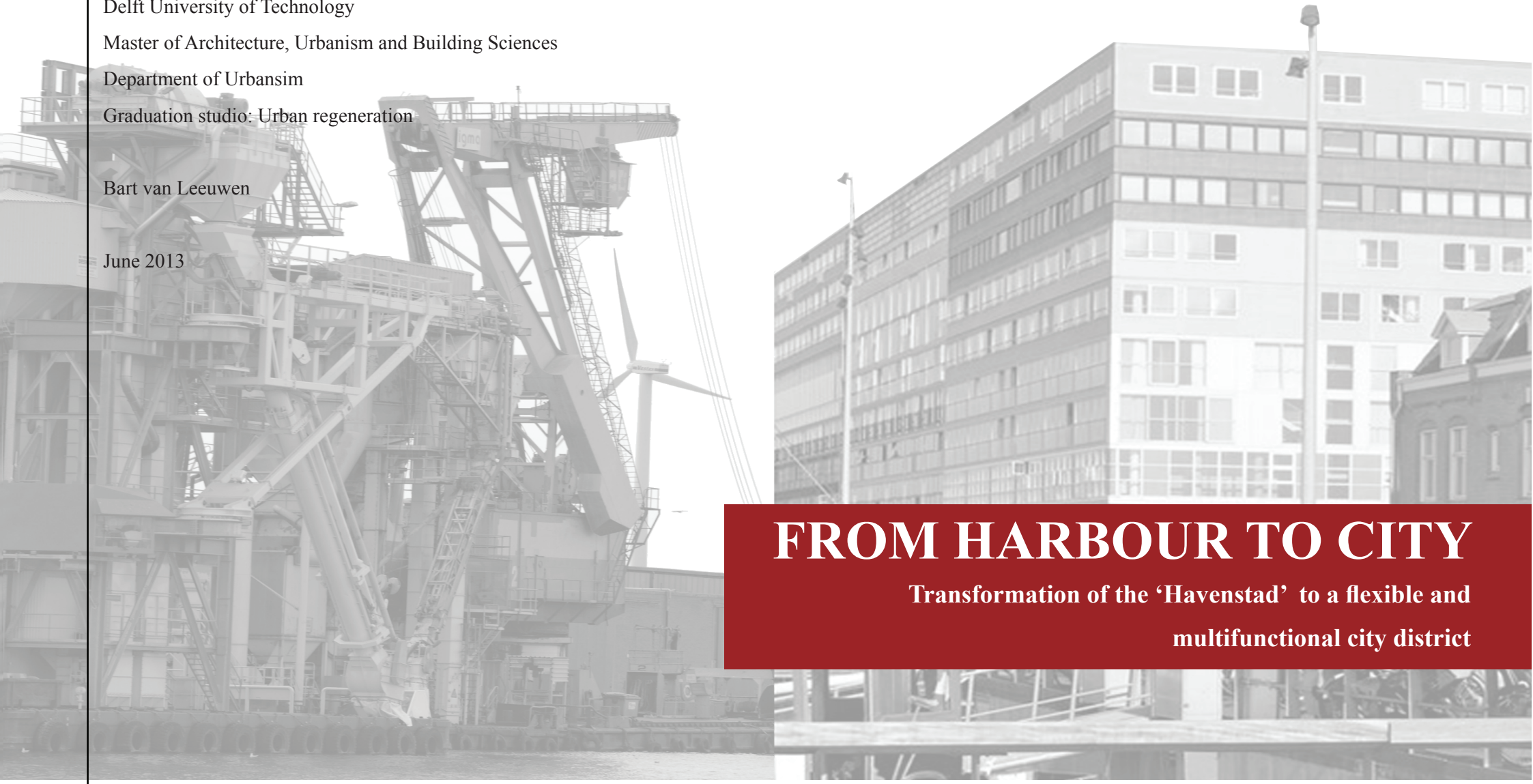

FROM HARBOUR TO CITY

Transformation of the 'Havenstad' to a flexible and multifunctional city district

Colophon

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Msc Thesis

Delft University of Technology
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Department of Urbanism
Studio: Urban Regeneration

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Cover:
Left image of the Coen- and Vlothaven in Amsterdam by Pimgmx (2009) and right image of the Houthaven in Amsterdam by Remi van Dijk (2009)

Preface

For the graduation track of the urbanism department at the Faculty of Architecture of the Technical University Delft this master thesis has been written, as part of the graduation studio: Urban Regeneration.

When looking for a subject for my graduation project I noticed a few issues that intrigued me. First is the fact that due to the current economic climate almost all planned city development projects are being put on hold. And second is the fact that there are huge amounts of vacant office space all over the country, some of this office space is even brand new and has never been used. Therefore I was questioning what kind of changes/developments would be needed in urban designs/development strategies to prevent these things from happening again in the future. The answer to this can be flexibility! By giving urban designs or the development strategies a certain degree of flexibility they could adapt to changes and these issues could possibly be prevented.

The location I have chosen to link with this graduation project is an harbour area just west of the centre of Amsterdam, named the Minerva City-harbour

This report will put forth the used research approach, along with some theoretical background on both flexible and mixed-use urban development. This theory has been the imput for an general development strategy. Furthermore has there been an analysis made of the project location, which has resulted into a masterplan for the larger region. And finally will the Urban design that has been made for the Minerva City-harbour be elaborated.

During this graduation process, I was supported by my mentors: Dr. Ir. Paul Stouten, chair of spatial planning & strategy and Ir. John Westrik, chair of urban compositions.

Bart van Leeuwen

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Image from Aerophoto-schiphol (2011)

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Project definition

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1.1 Problem statement

Large urban developments or urban renewal projects usually have a very long time span between initial design and final completions. During this time it is possible that there will be changes in the economic structure, in the labour and housing markets, in availability of technology and in lifestyle (Stouten, 2010: 224). These changes can potentially form the risk that there are totally different social, spatial and programmatic demands upon the completion of the project, resulting in a non-functional urban area. This means that a big issue for urban (re)development is the uncertainty of the future (Wigmans, 2003), and this uncertainty is even further enhanced by the current economic climate. Using todays form of urban planning it is only possible to make short-term plans and answer to the demands of a certain point in time (Tuttert, 2012: 28). This might mean that with the current economic climate the conventional form urban planning and design is out-dated. An urban design can no longer just be a rigid blueprint with some fancy impressions and sections, an urban plan has to be able to beware of the changing context and be able to anticipate on it. This means that an urban plan somehow has to be flexible, which in the case of urban design means being able to adapt to changes like the ones mentioned before (Voogd, 1995: 77). In other words, within the field of urbanism adaptability is a form of flexibility. This means that flexibility somehow has to be integrated into the development strategy or strategic development plan in order to make sure the urban design can be adaptable and will meet the required demands upon completion.

These changes in society and demands for certain functions are a continuous process (Stouten, 2010: 232); this means that after the completion the urban areas will still face the problem of having to facilitate these changes. To make sure that the urban fabric and the built environment can last through the time and remain a well-functioning area, it has to be flexible and thus able to adapt to these changes. This means that the urban fabric and buildings itself have to be able to accommodate different types functions without the need for major reconstructions

The location chosen for this project is a harbour area, close the centre of Amsterdam. The municipality of Amsterdam stated the ambition to transform this area into a mixed-use area for “living and working” (Gemeente Amsterdam, 2011: 64). Mixed-use in the field of urbanism means different functions will be combined within the same area, rather than clustering specific functions together as is done in for example office parks. It is important to note that the mixing of functions can appear on three different scale levels: firstly this can be on the scale of the neighbourhood where each block will have its own single functions. There can also be mixed-use on the scale of the building block where there are multiple functions accommodated within the same block. And thirdly there can be mixed-use on the scale of the building where different floor levels will have a different function. Example of this are buildings with shops on the ground floor and dwellings on the floors above. Further research will be done on mixed-use development in the next chapter.

1.2 Location

According to the office of Statistics Netherlands (*Dutch: Centraal Bureau voor de Statistiek*, CBS) the future demographic changes in the Netherlands will be characterized by a decrease in population and an aging population (De Jong and Van Duin, 2011). However this is certainly not the case for the big cities in the Randstad. The population of Amsterdam in particular is expected to grow, between 2010 and 2025 the estimated growth in population will be 110,000. This is more than 10 percent of the current population. This growth in population means that the amount of households in the city will increase with about 30,000 in the same period of time (De Jong and Van Duin, 2011). According to the different scenarios set up by the ministry of Housing, Spatial Planning and the Environment (*Dutch: Volkshuisvesting Ruimtelijke Ordening en Milieu*, VROM) (VROM 2008: 65-67) this increasing demand for space will continue up to 2040.

This growing demand for space will – according to the spatial development plans of Amsterdam – have to be satisfied by intensification of the land use in the city. To achieve the increased land use of especially industrial area's, intensification has to take place by increasing the mix in this area between working, living and facilities (Gemeente Amsterdam, 2011: 25).

The international trend of harbour activities moving out of the city has been going on ever since the 1960ies (Meyer, 1999: 13-14). The land close to the city centres simply has become too valuable to be used for industrial activities, even if these industries are still flourishing. In addition to this it is important to note that in times of economic recession like today the speed of these processes are generally increased (Harms, 2003). The municipality of Amsterdam has several brownfields that have been put up for urban (re)development. Most of these brownfields are harbours situated along the IJ. The Minerva City-harbour and the Coen- and Vlotharbour are a few of these harbours and are part of an area posed as 'Havenstad' by the municipality. The location within the municipality is shown on image 1.2.1.

Qualities and opportunities for the location

One of the most prominent qualities of the locations of Havenstad is the presence of the large body of water; the different docks provide very long quays and the harbours offer different impressive views over the

Image 1.2.1: *Municipality of Amsterdam with the Havenstad highlighted.*

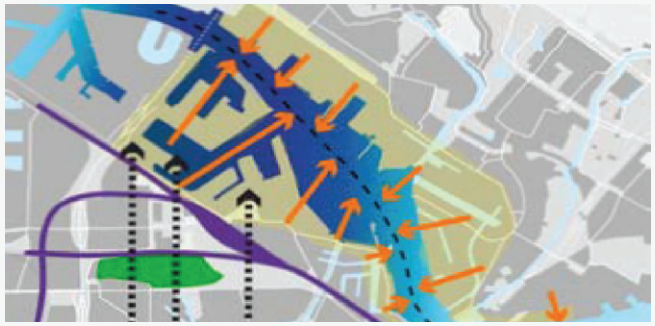


Image 1.2.2: *Orientation of the harbours and barriers (DRO and Haven Amsterdam, 2009: 36)*

Image 1.2.3: *Travel distances from Havenstad to important locations in Amsterdam; distance from Central Station to Havenstad: 3.75 km; distance to station Sloterdijk: 3.5 km; distance to the Dam: 4.1 km (DRO and Haven Amsterdam, 2009: 38)*

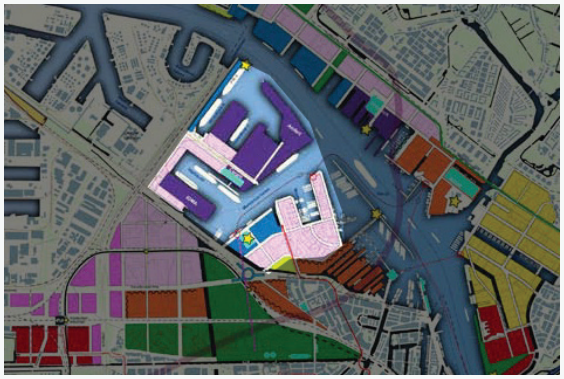


Image 1.2.4: *Layout plan for scenario 1: No changes in noise restriction (DRO and Haven Amsterdam, 2009: 64).*

Image 1.2.5: *Layout plan for scenario 2: Noise restrictions increased for the south-eastern part (DRO and Haven Amsterdam, 2009: 70).*

Image 1.2.6: *Layout plan for scenario 3: Noise restrictions increased for the entire area (DRO and Haven Amsterdam, 2009: 76).*

water. The connection with the other parts of the city however is a bit more problematic, the railways on the 'backside' of the harbours form a barrier between the harbour and the city (image 1.2.2).

The large history of harbour and industry activity offers the location several robust buildings, however the dominant image of these buildings is that they are set up in a pure functional way without a lot of architectural or cultural value. Due to the fact that a lot will have to be demolished, there is a lot of freedom for a new design. Besides the water, the close proximity to the centre of Amsterdam is potentially a very large quality for Havenstad. To illustrate: within a 10 to 15 minute bike ride from the Havenstad one can be at the Central station and station Sloterdijk and the Dam is only a little bit further away (image 1.2.3). The close proximity to the city centre of Amsterdam can be further exploited with a qualitative public transport connection, for example a tram connection with the two big railway Stations (transport nodes) nearby: Amsterdam Central station and Amsterdam Sloterdijk. Another option in expanding the subway network of the city towards this area. This however is a very expensive intervention. On the edge of Havenstad is the Westerpark. This is a qualitative urban park that offers a lot of catering and cultural facilities.

This combination of orientation towards the water, proximity to the city centre and the presence of amenities have prooved to be a formula for success with previous harbour redevelopment projects in Amsterdam (DRO and Haven Amsterdam, 2009: 36-41).

The Planning Service of Amsterdam (*Dutch: Dienst Ruimtelijke Ordening,* DRO) has set up three scenarios (image 1.2.4 – 1.2.6) for the redevelopment of the Havenstad in order to get a better view of the possibilities for a mix between dwellings, business activity (including harbour activity) and leisure along the IJ-quays. These scenarios differ from each other in the boundaries of the city. These boundaries are determined solely by noise restrictions. Increasing noise restrictions for the area will force the industry nearby to reduce their noise production and by doing so create a more pleasant living environment. This will give the opportunity to build dwellings in the area, but will also limit the possibilities for harbour activity.

Possibilities for the use of flexibility

The fact that different scenarios are made for the area shows that we are dealing with uncertainties. These uncertainties are caused by changes in the economic structure, in the labour and housing markets, in availability of technology and in lifestyle (Stouten, 2010: 224), and are further amplified by the current economic recession. This uncertainty gives the need for the development of a flexible (re)development strategy (Wigmans, 2003).

For this area flexibility could be used on the large scale in the form of a flexible development strategy/ strategic plan where decisions on the implementations and composition of the program will be made in a late stage of the development process.

On the smaller scale it could be more about adaptability, this means creating the opportunity for the functional programme to change and adapt to functional demand at a specific point in time. This however can be too liberal; a certain ratio between the different functions will have to be ensured. In order for it to remain a well-functioning area, a minimum and maximum for each type of function have to be determined. This will set some limits to the flexibility of the real estate and will ensure that the desired mixed character will be achieved.

Image 1.2.7: *Areal picture of the project site in Amsterdam showing the Minerva City-harbour and the Coen- and Vlothaven (DRO and Haven Amsterdam, 2009: 34).*

1.3 Aim and Research questions

1.3.1 Aim

The first goal of this project was to identify what ways or methods there are – according to the existing literature – for an urban design to be flexible in a spatial and functional way. This was followed by the consideration for which of these flexibility methods should be combined and how this should be done, in order to be able to create a generative approach – existing out of a set of rules or guidelines – for an urban design with a high degree of flexibility. The second goal was to apply this approach on an urban design for the Minerva City-harbour.

The municipality has stated the ambition for the area to be transformed into a mixed-use area. Therefore, the third goal was to combine mixed-use with a flexible/ adaptable urban design. This goal is very much bound to the context and is therefore secondary to the first two goals. In order to achieve this some research has been done on how flexibility can be applied on a mixed-use building block. An issue that this could bring is the fact that the block has to be flexible enough so that changes in function can take place. However, it should not be too flexible so that the block can become mono-functional as the demand for a specific function becomes very high. Therefore a balance will have to be found in the degree of flexibility.

1.3.2 Research questions

This project researches the possibilities for flexibility and adaptability in urban planning. Furthermore, the aim is to apply the results of this research on the Minerva City-harbour in the city of Amsterdam. Therefore the main research question – which is the backbone for this research throughout the project – for this project is: *What kind of **strategic plan** is needed for the **redevelopment** of brownfields into a **multifunctional** area that is **spatially and functionally flexible**?*

Main research question:

*What kind of **strategic plan** is needed for the **redevelopment** of brownfields into a **multifunctional** area that is **spatially and functionally flexible**?*

In order to answer this research question, the different elements that the question contains should be answered separately. To answer these different elements the following three sub research questions have been set up:

1) *What way(s) or method(s) are there for an urban design to be **flexible** and able to adapt to changes in functional and spatial demands and requirements?*
2) *What kind of **urban typology** enables a **changing urban programme**?*
3) *How can flexibility be combined with **mixed-use** in an **urban design** for the Minerva City-harbour?*

These questions also represent the steps that are taken during the research process. The methodology used to answer these questions and other aspects of the research will be further elaborated in the following chapter. In order to fully understand the research questions some terms will have to be further defined and operationalized (Bryman, 2008: 141). These terms have been highlighted in the research questions.

Urban design

Urban design can be defined by the arrangement and design of buildings, public spaces, transport systems, services and amenities, and by the process of giving form and shape to building blocks, neighbourhoods and cities. Urban design is a framework that orders the different elements into a network of streets,

public spaces. The practice of urban design operates on three scale levels, on the scale of the city block, city neighbourhood or district and on the scale of the city. Each scale comes with it's of kind of issues and challenges. The urban design for the Minerva City-harbour will be on the scale of the neighbourhood. Heeling et al (2006: 12) state that an urban design consist out of four elements:

1) the spatial-functional organisation of the land-use;
2) the design and composition of the urban plan;
3) the design and layout of the public space;
4) the rules and guidelines for building.

A complete urban design will contain all four of the elements. For the urban design for the Minerva City-harbour however the first point (the spatial-functional organisation of the land-use) will be more difficult to define since the aim is to create an urban design that is functionally and functionally flexible.

Urban redevelopment

Urban redevelopment or regeneration is an important method of spatial intervention and today is a well-established subject for design. There are various definitions of the term urban regenerations, Porter and Shaw (2009: 5) describe urban regeneration as reinvestment in a place, after a period of disinvestment. However one of the most comprehensive definition of urban regeneration is given by Roberts (2000: 17): *"Comprehensive and integrated vision and action aimed at the resolution of urban problems and seeking to bring about lasting improvements in the economic, physical, social and environmental conditions of an area that has been subject to change."* This means that "*one of the core activities from urban regeneration relates to finding solutions for the functional the obsolescence of buildings and changing requirements of its users"* (Stouten, 2010: 13).

Redundant land such as canals, docks, railway yards and industrial sites also known as brownfield sites have often been the focus of urban regeneration in the past. The Minerva City-harbour is such a site. So, for this area redevelopment means that an investment will be made to develop new build-up area, in order to gentrify the area. This will mean that the current use of the area will change from a working/industrial environment to a more liveable environment.

Urban programme

The urban programme can be defined as the programmatic infill of an urban area. According to Guyt and Hulsbergen (2002: 265-266) the urban programme consists out of two elements. The first element is the structure; this includes infrastructure, green and water. The second element is the functional use, like housing, amenities and workplaces.

There will be an attempt to make a flexible and adaptable urban design for the Minerva City-harbour. This means that there will be a dynamic urban programme, in other words the functional programme will change over time. This is something that happens in (almost) all urban areas. However, the speed of this process could be faster in this area, depanding on the demands, due to the flexible nature of the design.

Urban typology

Urban typology is the classification of (mostly) physical characteristics found in an urban area. Peterson (1979:76) describes these characteristics as: the streets, squares, building blocks and the grain of the urban fabric. However there are in my opinion some element missing from Peterson definition namely the

Open Space Ratio (OSR) and the Floor Space Idex (FSI). These index numbers show the amount of open space in an area and the floor space density of an area. These together are elements that form the structure of the urban area. This means that in other words an urban typology is a classification of the urban fabric.

Strategic plan

To achieve the expected results from a complex assignment like urban regeneration, something more is required than the traditional planning: a broader strategy that combines investments, with physical interventions and social measures. This strategy furthermore has to take account of the different scale levels and must involve different disciplines of urban development (Stouten, 2010: 59; Carter, 2000).

The term 'strategy' is known by a lot of different definitions. In the field of urban design/planning – the definitions that is used for this project – it can be defined as *a intended plan of action to accomplish a specific goal* (Oxford Dictionary, 2012). And this goal in this case would be flexible redevelopment of the Minerva City-harbour.

The process of urban (re)development is a long, expensive and above all complicated process. There are a large number of actors, instruments and assets involved (Urhahn and Bobic, 1996). A strategic plan helps with the "*organisation of mutual realations, positioning and division of participants, the spatial principles and the financing*" (Peterson, 1979: 78) of the development process. In line with this Urhahn and Bobic (1996) divine the most important aspects that should be determined in a development strategy as: organisation, communication, financing, legal relations, decision making and phasing of the process.

For this project a development strategy is created, with the emphasis on the, organisation, decision-making, spatial principles and phasing of the process. Elements that this strategy will contain are a phasing plan, which is integrated with the decision-making process and a spatial framework for the Minerva City-harbour, which structuralizes the area – with important structures, junctions and infrastructure – and can support a flexible fill-in of the area.

Mixed-use/multifunctionality

A mixed-use area can simply be defined as an area that facilitates multiple types of functions. In an urban area these functions usually are housing, working and amenities (Van den Hoek, 2010). In many policy documents nowadays, mixed-use is emerging as desirable aim for urban (re)development. One of the main goals for mixing multiple functions in an area is to create a lively streetscape, with activity throughout the entire day (Jacobs, 1961: 115-118).

There are three scale levels in which a mixture of functions can take place. Teppema (2004: 2) defines these as, scale of an area (neighbourhood or city), scale of the city block and scale of the individual building. Image 1.3.1 illustrates the different scale levels.

For the urban design of the Minerva City-harbour mixed use will most likely be applied on the scales of the building block and on the scale of the individual buildings. The mix of functions will consist of housing, working, amenities and some (light) harbour activities. (More extensive research will be done on mixed-use in the next chapter.)

Spatial and functional flexibility

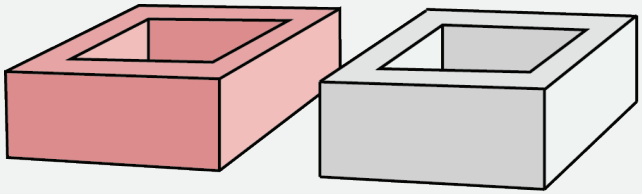
Flexibility can be described as the capability of a policy, process or organisation to adapt to changing circumstances and conditions (Voogd, 1995: 77).

De Jong et al. (2004: 636) make the distinction between two kinds of flexibility in urban designs, namely *structural* flexibility and *functional* flexibility. Structural flexibility involves a standardized (technical or structural) system that is able to facilitate all different demands. From this perspective the structure is considered flexible. Functional flexibility is described as the ability for a building or urban area to facilitate changes in its functional use. Stouten (2010: 156) makes the distinction between *passive* and *active* flexibility. Passive flexibility is the ability to facility changes without the need for adjustments or reconstructions. And active flexibility is when adjustments do have to be made to facilitate change, for example knocking down a wall to merge rooms.

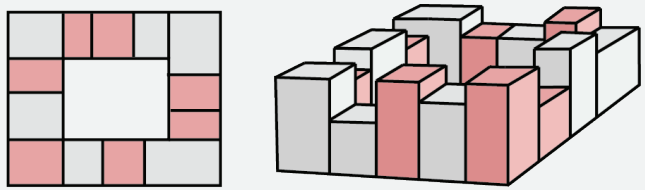
There are three important elements in urban development where flexibility can play a role:

- Flexibility in the development process. This can be described as the ability the implement changes in earlier made decisions during the process, for example making changes in the composition of the urban programme.
- Flexibility in the urban plan. The larger the scale is the less flexible it gets (PBL, 2012: 40), due to higher costs for making changes and the larger amount of actors involved The urban plan/structure is a large object, therefore the aim should be to create a plan that is structural flexible and in the form of passive flexibility in order to limit the costs.
- Flexibility in the built environment. This is flexibility on a lower scale. On the scale of the building the primary concern is functional flexibility. This flexibility can either be in a passive or active form.

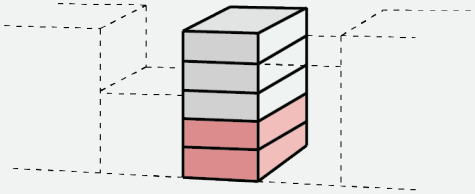
This is just a brief description of what flexibility could mean for urban development. In the next chapter this will be elaborated further.



Mixed use in scale of an area



Mixed use in scale of the city block



Mixed use in scale of the individual building

Image 1.3.1: *Conceptual image of the different scales in mixed-use.*

Vacant office space reaches record height - Algemeen Dagblad

The amount of vacant office space has increased by 7 percent in the last six months. At this moment there is the record amount of 7.62 million square meters of office space for sale or for rent. These numbers come forth out of a recent report by the realtor-association NVB Business. – *Translation of a Dutch new article form Algemeen Dagblad (2012).*

Municipalities lose millions on land speculation - Architectenweb

Many municipalities recorded a loss of millions on bought land. The municipalities bought large slaps of land that because of the crisis in the housing market have become unsalable. Of the 40 approached municipalities 33 recorded a loss greater than one million euro's, 11 of which recorded a loss of more than 20 miljion. – *Translation of Dutch news article from Architectenweb(2012a).*

Vacancy in retail sector increased – Architectenweb

There are more shops that are vacant. The retail space that is offered in the first half of this year increased to two million square meters. This means an increase of 8.7 percent relative to the beginning of the year. – *Translation of Dutch news article from Architectenweb (2012b).*

1.4 Relevance

This graduation project aims to contribute to both the scientific and societal perspectives. When it comes to the scientific relevance, the project intents to contribute to the knowledge and discussion on flexible urban planning/design. From the societal point of view, the application of this knowledge on the Minerva City-harbour in Amsterdam will be examined.

Societal relevance

The current economic climate has a major impact on the usage and demand of certain functions. An example of this is the massive amount of vacant office space. There are a lot of office parks almost completely vacant all over the country. On the left, some recent newspaper headings on this issue are shown.

If these office parks have been designed in a more flexible way they could have possibly been converted to accommodate other types of functions like for example student housing, and this way prevent the large scale vacancy that we see now.

Another issue caused by this economic climate is the fact that almost all new developments have been put on hold because of the uncertainty of what the future demand will be. Some consequences of this are for example that people that bought a new house – in an area that is to be (re)developed – see all planned developments in and around their neighbourhood cancelled and are as a result of this stuck with a home in an undeveloped area. These uncertainties will mean that the role of the urban plan and the urban planner/designer changes, an urban plan will no longer be just a blueprint with fancy impressions, a plan will have to be able to cope with these uncertainties and be able to adapt if the demands change. In other words: an urban plan has to be flexible!

Scientific relevance

This project is indebted to a large amount of urban studies on flexible planning and designing that have been done in the past. Many authors have written on certain methods and aspects of flexibility in the field of urbanism. The literature review in this thesis will go deeper into this. The goal of a master thesis however should be to contribute to the scientific community by adding to the body of knowledge. The aim is to do this by creating a generally applicable approach for flexible urban development strategies and adaptive urban design.

1.5 Methodology

This research project consists out of three important elements: the theoretical framework, the analytical framework and the application to the context. The input for these elements is the project definition. How the three elements relate to each other is illustrated by the scheme of image 1.5.2.

The theoretical framework is composed out of research methods such as literature review and data research. The analytical framework is composed out of the research methods data research and case reviews. And the application on the context will be achieved by the means of location analysis and scenario building. How these different research methods relate to the different research questions is shown in image 1.5.1.

In the following part of this chapter will be explained how the different methods that will be used for this research are applied.

Literature review

"A literature review is a systematic, explicit and reproducible method of identifying, evaluating, and interpreting the existing body of recorded work produced by researchers, scholars and practitioners" (Fink, 1998: 3). It is important to start a research with a literature review in order to know and understand what others have done before you, only then will you be able

	RESEARCH QUESTIONS	METHODS				
		LR	CR	DR	LA	SB
1	*What way(s) or method(s) are there for an urban design to be flexible and able to adapt to changes in functional and spatial demand?*	■	■			
2	*What kind of urban typology is best to facilitate a changing urban program?*	■	■	■		
3	*How can flexibility be combined with mixed-use in a urban design for the Minerva City-harbour?*			■	■	■

Abbreviations:
LR – Literature review
CR – Case review
DR – Data research
LA – Location Analysis
SB – Scenario building

Image 1.5.1: *Research questions with the methods used to answer them.*

to contribute to an on-going process. Besides this it is also important for the reader of the research to know the bigger picture and background of the research; a literature review will provide a context for the research (Ridley, 2008: 5). The literature review forms a big part of the theoretical framework and therefore has been an intensive focus on the literature review in the first months of the research project. The process of the literature review is a cyclical process consisting out of searching literature, reading literature and writing. These activities are interconnected with each other and will be performed parallel to each other (Ridley, 2008: 80). Image 1.5.3 illustrates how this process is managed.

For this research project a literature review has been done on flexibility in urban development, which is

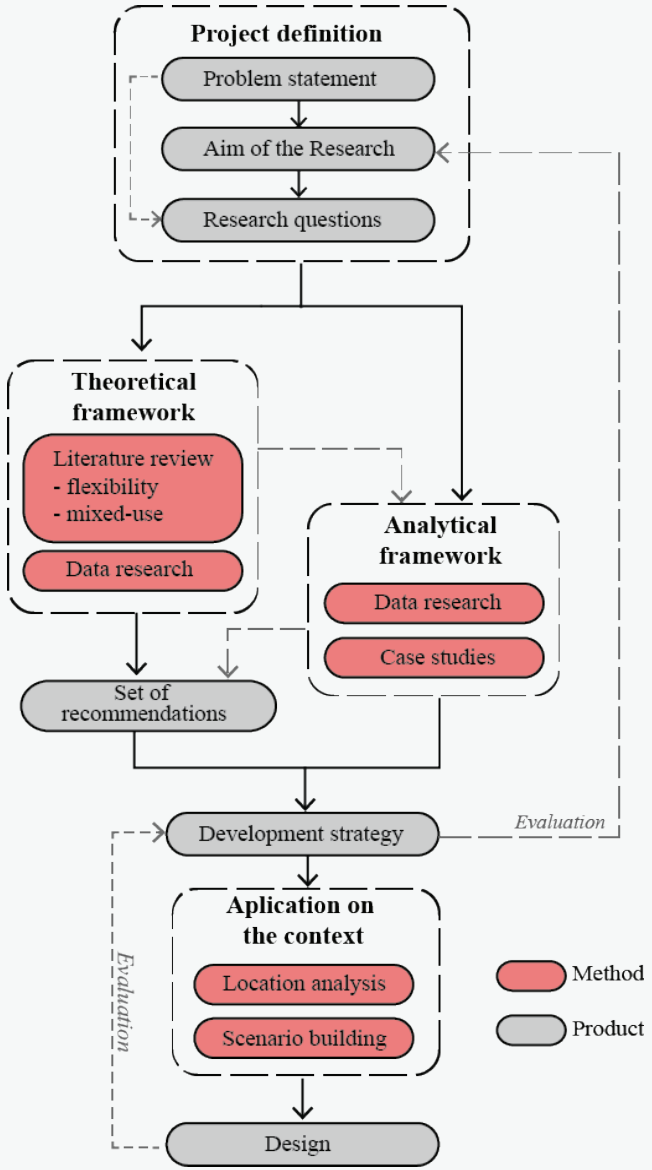


Image 1.5.2: *Conceptual scheme of the methodology for this research project.*

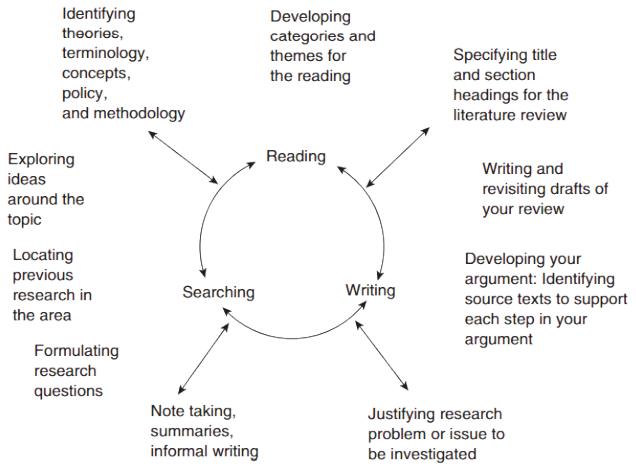


Image 1.5.3: *Cyclical process of creating a literature review (Ridley, 2008: 81)*

described in chapter 2.1.

Another literature review is done on mixed-use urban development. This study has been less extensive since this is an issue that is derived from the context of the design location and therefore is not the main issue of this research project. However, information on this topic is still needed. See chapter 2.2

Case review

A good way to support a theory is by performing case review. Cases will give an insight on how comparative issues have been solved in the past (Swanborn, 1994: 157-158). Yin (2003) distinguishes five different types of case studies. Two types can be used for the case reviews of this research projects:

- The critical case: This case is chosen to allow a better understanding of the developed theory on the subject in question. It could for example illustrate the circumstances in which the hypothesis will or will not hold (Bryman, 2008: 55);
- The representative case: These cases capture the circumstances and conditions of an exemplifying situation (Yin, 2003: 41)

The case reviews in this research project will mostly be used to support the developed theory - by the literature review on flexibility and mixed-use – by showing examples on how things have been done in practice. For this use study of the critical case and the representative case – or as Bryman (2008: 56) calls it the exemplifying case – are likely to prove most useful. Some of the cases that have been reviewed are; the grid of Manhattan, the grain size of amsterdam and the masterplan of Rijswijk.

Data research

Some data research has been done in order to know what kind of demand there is for the Minerva City-harbour and Amsterdam. This means data on for example expected changes in amount of inhabitants or the composition of households, or the expected demand for certain functions like office space and amenities.

Location Analysis

Making an analysis of the location is a way to get a good insight of the existing situation and possible futures, and can be in the form of a written text, drawings, models and computer models (Leupen et al., 2005: 20-21). In the field of urban planning and design the making of analytical drawings is the most common and useful method.

For the analysis of the Minerva City-harbour a number of aspects will be reviewed. These aspects are:

- The history of the location;
- The current use/occupation of the location;
- The reachability of the location;
- Unique qualities of the location.

Another aspect that was analysed is the meaning of the location for the city of Amsterdam or what the location could potentially contribute to the city. This means finding out what kind of needs there are in the city that can be accommodated at the Minerva City-harbour.

1.6 Reading guide

Now that the theme of this thesis and the project location have been clearly defined, a brief summary can be given on the content of this graduation report.

In chapter two will be started with the definition of the theoretical framework. Theoretical research has been done on the two important themes of this thesis flexibility and mixed-use. The theoretical framework of chapter 2 served as input for chapter 3, the development strategy. In this chapter the created strategy will be introduced and elaborated.

In chapter 4 there will be a summary of the analysis that was done on the Minerva City-harbour and its immediate surroundings; this will give some insights on the context and some of its problems.

In the next chapter there will be zoomed out to a larger scale. This scale will illustrate the effects of a new design for the Minerva City-harbour on the region/city and will also show that to achieve this new design, changes in for example the infrastructure will have to be made on the larger scale. These large-scale interventions will be shown in the masterplan that has been made for the region.

In chapter 6 we will look back into the project location with the actual design for the Minerva City-harbour. The chapter will start off with feedback to the theoretical framework and development strategy by explaining how the made development strategy has been applied to create a design for the Minerva City harbour. This will be followed by more detailed information on the made design.

At the back of the report there are a number of appendices that could help with some elaborations. First is the grain-size analysis that was made. Second is the building block catalogue, containing several building block compositions for the design of the Minerva city-harbour. And last is my literature review paper on flexibility.


Liza
Liza

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2.1 Flexibility

The term flexibility has been used quite a lot in the previous chapters, and has also been elaborated and defined into a certain extend. To fully understand the meaning and possibilities for flexibility in the field of urbanism, a literature review has been conducted. By doing this literature review different aspects and methods for flexibility will be identified and considered, and by doing so one of the subresearch questions will be answered, namely: What way(s) or method(s) are there for an urban design to be flexible and able to adapt to changes in functional and spatial demands and requirements? This chapter will explicate the results of this literature review.

Flexibility is a term with a very broad definition, it is used in different fields with different meanings. Bouten (2008: 18-23) gives a great overview of the meaning of the term definition in different disciplines and describes the reason for flexibility for these disciplines (image 2.1.1). The general defined by: The ability to bend without breaking, the ability to be easily modified and the to change and compromise (Oxford Dictionary, 2012). In the field of urban planning/designing the definition of flexibility is a bit more comprehensive and should in my opinion be defined as *the ability of an urban area to react and adapt to physical changes and changing circumstances with a low penalty in time efforts, costs and recourses*. There are three important reasons that make flexibility in the field of urbanism a relevant and important issue, these are: The uncertainty if the future, differentiated needs of the users and sustainability/durability.

Discipline	Meaning of flexibility	Reason for flexibility
Engineering	In engineering flexibility relates to physical technical installations, which perform activities and deliver value. Flexibility refers to the ability of the installation to change its internal working and keep delivering its output value.	Uncertainty about input, external influences and internal working.
Product design	In the discipline of product design, flexibility refers to the ability of a product to serve differentiated needs of users. The costs of the ability to perform different functions are thereby often not considered important.	Differentiated wishes and needs of users.
Physics	In physics in the case of materials, flexibility refers to deformation without breaking.	Differentiated demands/ conditions
Physiology	In physiology, flexibility means the ability to move, or the range of movement of a joint or muscle system.	Differentiated demands/ conditions
Management	Flexibility means the relation between total freedom and total determination in processes. So in this case flexibility is a degree.	Uncertainty about future developments and conditions
Public administration/ law	Freedom from restrictions.	Uncertainty about future needs of stakeholders
Labor market	In the labor market flexibility is used in distinctive ways. A regulative way: freedom for the employer (contracts). A way to facilitate supply and demand: differentiating the organization and ways of working and skills.	Uncertainty about future demand for labor. Differentiated wishes and needs on job conditions.
Didactics	In the cognitive flexibility theory, flexibility means a multi interpretable way of presenting the information, so everybody can explore the complex matter in its own way.	Differentiated ways of learning of people.
Software development	The meaning of flexibility in software development refers much to the way described in the introduction: the effort it costs to change the system.	Differentiated wishes and needs of software users.

Image 2.1.1: *Table showing different disciplines with the meaning of flexibility and the means of flexibility for each discipline (Bouten, 2008: 24).*

- *Uncertainty.* We life in a society that is continuously changing. Changes in the economic structure, in the labour and housing markets, in the availability of technology and in lifestyle, make the demands for an urban area change. The demand for office space for example is nowadays a lot lower than it was seven years earlier. The combination of a bad economic climate and uncertainties in future demands grind the urban development to a hold. Drewe (1993: 42) states that there are two ways to deal with uncertainty; reduce the uncertainty by doing more research, or accept the uncertainty and incorporate possibilities for adjustments; flexibility.

- *Differentiated need.* Our society is built-up out of many individuals, many different cultures, many different shops and many different types of businesses. The demands all of these set to their real estate can be very different. This means if the users of a building change – even if the function remains the same – the demands might be very different. This means flexibility in the building is needed to keep the building functioning well without the need for major reconstructions. How this can be achieved will again be elaborated in the following sections.
- *Sustainability.* In times where money is scares sustainability often disappears to the background, because this is usually very costly. However positive 'by-product' of flexible urban/real-estate development is sustainability. A building or urban fabric that is able to adapt needs less investments of money and recourses in order to keep functioning than a building or area that has to be demolished and rebuild. So this makes flexible development sustainable and durable (Maccreanor, 2005).

2.1.1 Flexibility in urban development

Discaplines in urban development

To better understand the meaning of flexibility for urbanism, an explanation will be made on what role the concept of flexibility can play for the different disciplines involved in urban development. These disciplines are:

- *Urban designer:* Flexibility is used by an urban designer as a reaction to the uncertainties of the future, this can be uncertainty about the future programme or uncertainty about the future use of functions. The urban designer will have to implement the theories on flexible development and translate them to practical solutions and principles for a actual design. Some of the methods on how an urban designer can do this will me elaborated further on in this chapter.
- *Urban planner:* The social-spatial issues in our society are getting increasingly complex, this makes is also more complex for the urban planner to produce theories or models on urban planning. Flexibility can be used within the development process models and by working with scenarios and strategies for development projects.
- *Development process manager:* The development of an urban project can take years for it to complete, for the development process manager this means that there will be changes in conditions and demands of stakeholders. So flexibility is required to adjust goals, means, budgets and methods.
- *Public administrator:* The public administrator set boundaries for the urban development in the form of regulations or policy in order to guide the development into the desired direction. Flexibility in these regulations can be realized so that the regulations can also be interpreted and adjusted to new unforeseen developments and the boundaries that are set prevent undesired developments, also leave enough room for initiatives of stakeholders.
- *Architect:* Flexibility will have to be used by the architect in such a way, that its buildings are able to adapt to the needs of the changing users and functions in such a way that there is no need for mayor remodelling.

2.1.2 Types of flexibility

There are many types of flexibility and many authors use different terms to describe them, the types and

terms that are most relevant for my projects will be described and explained in the paragraph.

Spatial and functional flexibility

De Jong et al (2004: 636) make the distinction between two kinds of flexibility in urban designs,, this is structural and functional flexibility. *Structural flexibility is described as the ability of a structure – this is often an urban fabric, but could also apply for the structure of a building – to facilitate different demands, without the need to make changes in the structure. Functional flexibility can be described as the ability for a building or urban area to facilitate changes in the functional use.* It is important to note that changes in functional use of a building should also has an impact on the urban area, because different functions set different requirements for its surroundings e.g. parking and amenities. This means that the functional flexibility of the buildings is strongly related to the functional flexibility of the urban area.

Active and Passive flexibility

Stouten (2010: 156) makes the distinction between passive and active flexibility. *Passive* flexibility can be defined as the ability of an urban area or building to facilitate changes in functional use without the need for adjustments or reconstructions, so this is very similar to the structural flexibility defined by De Jong et al. *Active* flexibility is as the term suggest the opposite of passive flexibility, so this is when adjustments do have to made to facilitate changes in functional use e.g. knocking down walls in the building or merging building blocks.

2.1.3 Flexibly aspects in urban development

When reading through the literature on flexible urban development basically three aspects on which flexibility can play a role for an urban area. First is the flexibility in the development process, second is flexibility within the created urban fabric and third is flexibility within the created buildings. These three aspects will be further elaborated.

Flexibility in the development process

Voogd (1995: 78) defines three types of flexibility within the urban development process, these are:

- *Flexibility in the content of the policy.* Policies are used to steer developments into a certain direction and set margins in which developments may vary. This is usually done by setting up regulations and zoning plans. These regulations however are always set up by an individual (law- or policy maker), which often has a subjective perspective on the matter. In order to be able to coop on changes that the policy did not anticipate on a certain amount of flexibility within the regulative system is needed. However the policy should not be too flexible, that it leaves the development free and does not give any direction to the development. To conclude, a policy should on one hand steer the development into the desired direction, and on the other hand have the flexibility to change at the moment the situation changes or opportunities arise (Bouten, 2008: 33-34). This also means that the goal of the development might change during the process.
- *Flexibility in methods and procedures.* The decision-making procedure is an aspect where flexibility can play an important role. In the ideal situation decisions are made on all the necessary information, this is however often not the case, due to uncertainties in future developments. When this is the case the decisions should either be made in such a way that they direct the developments at the moment but leave the possibility for change in the future, should the decision proof to be wrong (Bouten, 2008: 34). Or an other option is to

postpone the decision to the very last moment, however this can be risky, because it will leave many involved parties and potential investors in uncertainty (Voogd, 1995: 77). Therefore it is important that the moments on when the decisions will be made are determined very clearly in advance.

- *Flexibility of the organisation.* The organisation of a project determines what activities are executed when and by whom. An example for flexibility in the organisations is the possibility for responsibilities for certain activities to be transferred between parties, should it turn out that a certain party can do it cheaper, faster or better (Voogd, 1995: 78).

Flexibility in the urban fabric

The larger the scale of an object the costlier it gets and more actors are involved to make changes in the object, thus the less flexible it gets (illustrated on image 2.1.2) (PBL, 2012: 40). The Urban fabric is very large object, this however does not mean that an urban fabric cannot be flexible. The aim should be to create an urban fabric that is passively flexible. So this means that the urban fabric should be designed in such a way that it not only meets todays demand, but will also meet the future demands (structural flexibility). This also means that time-bound design principles and solutions should be avoided (Heeling and Westrik, 2001: 195). To know what kind of structures this are a lesson can be learned from the past by looking at urban fabrics that have been functioning well for long time. It has also shown that a small grain size in the urban fabric allows for diversity and gradual change on a small scale, this means that the grain size partly determines the ability of an area to adapt to changes. It is relevant to note that small grain size is relative to its environment (Bouten, 2008: 63); this means that a small grain size in one city might me not so small in another city.

It is also important to ensure that an area does not become too flexible, this will endanger the continuality of the area and my result into a dysfunctional area (Heeling and Westrik, 2001: 195). In order to prevent this a certain amount of fixed (non-flexible) programme is needed.

Flexibility in the built environment

The functional demand and use of buildings will change over time. The demand set for housing might for example change due to changes in household composition, or one type of shop will be replaced by another, which has other demands. Or the demand

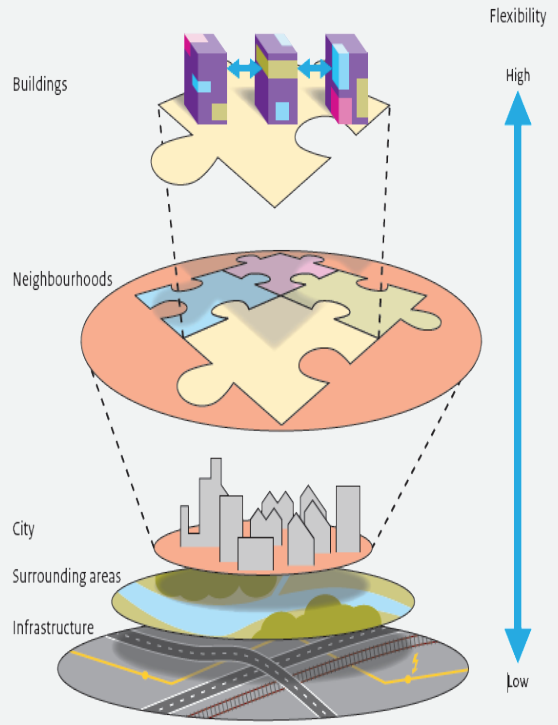


Image 2.1.2: *Various scales for flexibility in the urban environment (PBL, 2012: 40).*

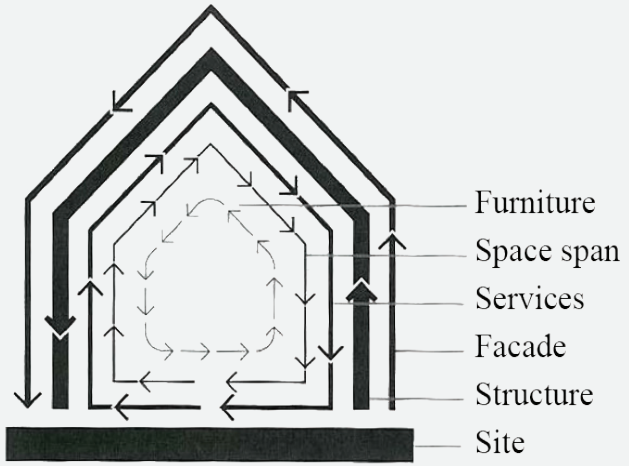


Image 2.1.3: *Diagram showing the system-based layers of a building (Heijne and Vink, 2005: 61).*

Example: Manhattan

The urban fabric of Manhattan is a good example of structure that is unchanged over the centuries. The grid size with islands of 61 by 250 meters has been able to facilitate changes in use of the urban area. The image above illustrates different possibilities for filling up the urban grid. So the buildings of the city and the use of the city have changed over time, but the structure of the city did not have to change (Heeling et al., 2006: 16, 122).

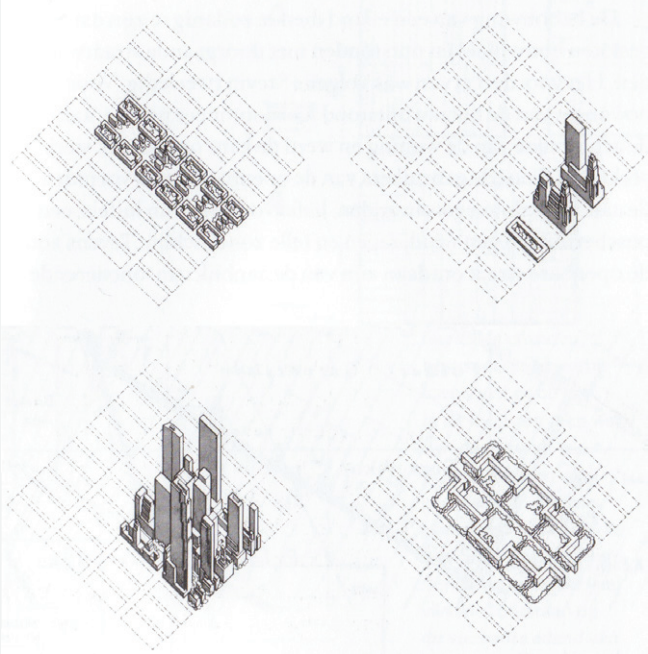


Image 2.1.4: *Different possible fillins for the grid of manhattan (Heeling et al., 2006: 123).*

for certain functions itself might change like we see now with the plummeting demand of office space. To prevent this from happening again in the future, buildings will have to be able to adept to different types of functional use (Van Zwol, 2005: 31). This is usually a form of active flexibility. More than forty percent of the activities housed in the building must be able to continue during the process of modifications, because this should not be large-scale renovations (Heijne and Vink, 2005: 58).

In order to ensure that these buildings will be flexible some regulations and policy must be made for these buildings. Van Zwol (2005: 31) and Maccreanor (2005: 101) give some elements that will help a building design is able to allow change in programme, these are; Extra floor to floor space, multiple access systems, over-dimensioning space and construction, loadbearing structures and facades suited for different programmes. For example, a building with a frame as loadbearing structures and non-loadbearing parting walls is more able to facilitate future change and is therefore flexible.

A building can be reduced to several layers e.g. the facade, structure etc. (illustrated on image 2.1.3), When combining different layers – for example embedding the installations in the structure of the building – the flexibility of a building is greatly reduced; in order to change one layer, the other has to change as well. This means that for optimal flexibility it is important to keep the layers separated from each other, so that can easily be changed individually (Heijne and Vink, 2005: 59).

"*Programmatic flexibility with an interchange ability between functions of living and working, are together with cultural durability, key to a building's useful life*" (Van Zwol, 2005: 40)

There are a lot of things that can be done by the architect to make a building flexible, however a few of them can to be taken into account by the urban planner/designer and be integrated into the urban plan to make the job of the architect a little easer, these are: Extra floor to floor space, multiple access systems (e.g. regular access and service access) and oversizing.

What we often see in current urban development that aims te be flexible, is that only one of these three aspects of flexibility is applied, this usually is a certain degree of flexibility in the development process or flexibility in the built environment. However to achieve urban plan that is integrally flexible all three of these aspects should be combined.

2.1.4 Methods of using flexibility in urbanism

Now the different aspects in which flexibility can play a role within urban development have been identified, we can have a look at a selection of different methods for each of the three aspects, that have been developed for achieving flexibility and determine which are best to use and combine.

Scenario building

In the field of urban design and planning scenarios can be defined as an image of a possible future. This image does not have to be desirable, nor probable, but possible. Scenarios often explore the unknown future and therefore cannot be falsified or proved (Salewski, 2010: 404). Van der Heijde (2005) gives three advantages of using scenarios in the planning process of a project.

- Scenarios can help an urban planner/designer in understanding the environment and the impact certain aspects can have on the projects. And will therefore allow the planner/designer to make better informed decisions.
- Scenarios are also a way to deal with the uncertainty that was mentioned earlier. By exploring many possible future scenarios there are no surprises in the future.
- Scenarios can help an urban plan to be more adaptable. The scenarios will have already researched the impact of changes and thus will the urban planner be able to react faster to these changes.

Scenario building is a method that has been used for decades to counter the problem of uncertainty in future developments (Salewski, 2010: 20). This makes scenario building a way to play into multiple future possibilities and makes it thus a method in flexible development. The ability to switch between scenarios during the development process can greatly increase its flexibility. This could for example be done in combination with a phasing plan where evaluation moments are used to decide if the current line of development is still in line with the current trends and if not decide to switch to another development scenario

An important aspect when making scenarios for complex situations like urban development – where lots of variables have influence on the development – is to limit the amount as variables used in making different scenarios. This makes is possible or easier to make a comparative analysis between the different scenarios and therefore a better augmented choice can be made between the scenario options (Salewski, 2010: 408).

Example: Amsterdam canal houses

The canal houses in Amsterdam is a very well-known example of a adaptable building typology, even though this building type was not designed with the this in mind, but the oversized loadbearing structure and large floor spaces. Nowadays they accommodate many different functions; large dwellings, offices, apartments hotels and shops (Van Zwol, 2005: 31).

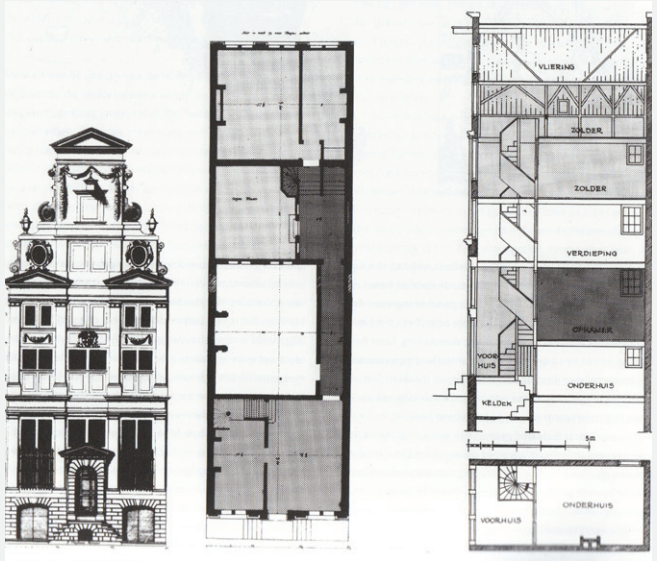


Image 2.1.5: *A design from 1629 for a canal house at the Keizersgracht in Amsterdam (Leupen et al., 2005: 80).*

Example: Amstel III, Amsterdam

The municipality of Amsterdam has set up a flexible zoning plan of the Amstel III area. They did this by not determining the functions on parcel level, but by determining the total amount of each function for the entire area. This means that certain functions are not bound to specific locations in the area. Furthermore is the amount of each function capped at a certain amount of squared meters, this means that certain functions can settle in the area or change until the maximum for this function is reached (Buitelaar et al., 2012: 97).

Image 2.1.6: *Birdseye view of the plan for the Amstel 3 area (Projectbureau Zuidoostlob, 2011).*

Phasing/gradual development

A phasing plan can be seen as flexibility in procedures. When developing a plan in phases – which will lead to a gradual development of the area – it is possible to integrate an evaluative moment at the end of each phase or at the beginning of a new phase. During these evaluations can be determined if the current plans still meet the current demands and if necessary the plans can be adjusted to meet the demands (Voogd, 1995: 78-82; Puylaert and Van Staalduine, 1984). This way a design can adapt to changes – in economic structure, in the labour and housing markets, in availability of technology and in lifestyle – and is therefore flexible.

When working with phases/gradual development it is important with investments in elements that will make the area attractive (infrastructure, public transport, green spaces and amenities, if these elements are not in place the developments are not likely to happen or will be confronted with vacancy (Urhahn Urban Design, 2010: 55).

Layered approach

The layered approach is a tool for the development process and relies on the concept that decisions are made by people who they are most relevant for or who have the most knowledge or experience about the subject. This means that for example decisions that affect a whole city or village are made by the municipality. However if the municipality also decides what the problems in a neighbourhood are or how for example the public space in that area should be designed, choices become bureaucratic and the people involved could end up being ignored. To be able to deal with problems and opportunities that emerge, the ability and responsibility to deal with them should be organized at the level that is most appropriate and effective in dealing with the problem or subject. In that way change can be addressed effectively and change doesn't become a problem. So with the layered approach making changes is done more efficient and faster, this is what makes this method flexible (Bouten, 2008: 68).

Flexible zoning plan

This is a method is a form of flexibility in policy (development process). A zoning plan is a policy document that determines what kinds of functions are allowed on what locations. These are usually very rigid documents and specifically identify functions, locations and spatial structure, however it is possible to create a flexible zoning plan. There are two clear elements in a zoning plan where flexibility can be integrated; these are the functional programme and the spatial structure

(Buitelaar et al., 2012: 96-97).

The functional programme can be made flexible by globally describing the desired functions a rather that giving the specifics, for example use 'working functions' rather than 'office space'. Another aspect that can be used is leaving the location of the functions flexible by determining the amount of each function for an entire area rather than determining the allowed functions for each individual parcel. The spatial structure of an area is another element that can be established in a zoning plan, this can again be made flexible by globally describing the structure, for example a fine grain urban fabric rather than a grid with islands of 50 meters by 50 meters (Buitelaar et al., 2012: 96-97). Because a flexible zoning plan leaves a lot open for interpretation, it is important that in order to prevent undesired developments it very clearly defined what kinds of developments are unwanted.

For a zoning plan to be qualify as a "flexible zoning plan" it is not necessary for both of the elements (Functional programme and spatial structure) to be flexible, I think it is important for large areas like the Minerva City-harbour that NOT both of the elements are flexible since this will give the development too much freedom, but for smaller area's this might work.

Flexible Masterplan

A masterplan can be a design method or tool to steer the gradual development of an area into a certain direction (Reitsma and Reijndorp, 2006). Such a masterplan should not give a literal and detailed plan for an area but set rules and guidelines for the development, for example building densities. Christiaanse defines the contemporary masterplan as: "It is a sustainable framework for a development that accommodates different programs at different time speed on different circumstances." (Bouten, 2008: 68)This means that a flexible masterplan should provide a strong framework in which different development at different speeds can take place. Such a flexible masterplan could be easily combined with the earlier described flexible zoning plan.

Temporary building

Two kinds of temporary building can be identified, first is the constructions of buildings that can easily be demolished or moved to other locations and the second is the temporary reuse of already exising buildings.

This first kind of temporary building involves the construction of new buildings, often consisting out of large premade elements. A good example of this kind of temporary building is the container houses for students.

Example: Masterplan, Rijswijk Zuid

Kuiper Compagnons created a flexible masterplan for the south of Rijswijk. The master plan consists out of a fixed structure for the area, but the infill of the structure is done by private developers and is more or less flexible. The visual quality plan that is set up for the infill is meant to steer the developments into a certain direction, but us not bounding. And the parcelling of the area is indicative and leaves room for changes in size should the need arise (Kuiper Compagnons, 2012).

Image 2.1.7: *Sketch of Rijswijk south showing the structural elements of the master plan (Kuiper Compagnons, 2012:14).*

Example: 'Het Sluishuis'

'Het Sluishuis' is a Solid in the new residential district of IJburg in Amsterdam. It uses loadbearing facades with a system of shafts and vertical circulation cores. This gives the building a free floor plan and allows a variety of programmes to be accommodated (Van Zwol, 2005: 33).

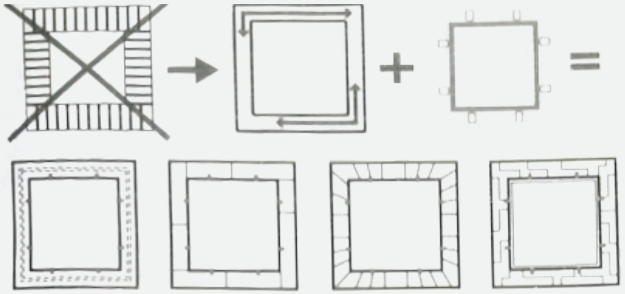


Image 2.1.8: *The principle of the flexible layout of 'Het Sluishuis' (Van Zwol, 2005: 35).*

Even though these buildings might be relatively cheap to construct, one has to take into account that there are also costs to demolish or move these buildings. This means that these 'temporary' buildings often need to stay in place for years in order to cover the costs, so in practice it means these temporary buildings are not so temporary and thus not very flexible.

The second kind of temporarily building uses already excising buildings to temporarily house new functions. These kinds of buildings are often used to set an ambition and identity for an area and buff up the value of the area (Hermans, 2012: 26-27). This kind of building often serves to give a impulse to new developments in an area. (Nijhof and Schultr, 1994: 13; Cerutti, 2011). This kind of temporary building is a lot cheaper, compared to the first kind but requires buildings that can accommodate them, in the past large warehouse where used for this with great success.

We can conclude that when it comes to with temporary building coasts have a big influence on how flexible this really is: The lower the coasts the greater the flexibility is.

Solids

Solids is a term introduced by 'De Architecten Cie' and is a term for a building typology that is designed in such a way that it can facilitate a changing programme and has emotional values (referred to as '*preciousness*') *so that the building will be able to last through time* (Bijendijk, 2005: 42).

A Solid can be divided into two elements, the base building (the façade and the loadbearing structure) and the fit-out (unit separating walls and interior).

To be able to facilitate the changing programme solids have: generous floor-to-floor heights, few vertical structural components, large open floor areas, over-dimensioned load bearing structure, generous vertical access (people, piping and cable). (Image shows example of a solid)

Creating a precious building is a more subjective matter and therefore a lot harder to achieve. Beijendijk (2005: 51) does give some suggestions – based on analysis of buildings that are known to poses emotional value – that might help achieving this: consider context of the building, large dimensioned and attractive entrance, use durable materials etc. Creating a building that is precious will require higher investments, however this should result into a longer lifespan of the building (Bijendijk, 2005: 48).

These are some of the most used and contemporary methods for dealing with flexibility in either the development process, urban design or built environment. It is very hard to determine if one method is better then the other, since the are many factors involved including factors derived from context of the area. This means that a set of methods can be good for one area but bad for another.

2.1.5 Drawbacks of flexibility

So far flexibility in urban development has only been seen as a something positive, but like most things, flexible development can have a negative side.

Even though flexibility can be used as a great tool to deal with the uncertainties of the future, however when not applied carefully flexibility could create even more uncertainty. When a plan or design becomes too flexible potential buyers/investors could become reticent due to uncertainties on what the exact developments will be in de surroundings (what kind of functions will come where?).

Voogd (1995: 80-81) describes in his book some other risks that can occur when dealing with flexible plans:

- The term flexibility is often used to hide or conceal underlying objectives and interests
- The preservation of a given situation could get lower priority because opportunities should be kept open to any potential new developments.
- The possibility exists that hard to define values or situations are perceived as flexible and are therefore faster changed, even if this was not the intention Flexibility can be used as a tool for policy makers or stakeholders to be able to act without the disturbance of rules and guidelines
- Flexibility can obstruct continuity in policy and can be contradictory to the natural human need to predictability and transparency

However these drawbacks and risks are not insurmountable, so when dealing with flexibility one must keep these in mind and deal with them and prevent occurrence of the described risks.

2.1.6 Conclusions and recommendations

Now that the meaning of flexibility for the field of urban planning and design has been defined and an thorough identification has been made on the aspects and methods of flexibility, we can sum up the conclusion we can draw for this and attempt to answer the question: *What way(s) or method(s) are there for an urban design to be flexible and able to adapt to changes in functional and spatial demands and requirements?*

The first important conclusion is that in order to achieve an urban plan or design that is integrally flexible it will have to be flexible in all three of the aspect of urban development: the urban development process, the urban design and the built environment. This means that there is flexibility both during the development (process) and after the completion (mainly the build enviroment). This also means that using only one of the flexibility methods described is not a option, at least three of the methods will have to be used, one for each of the three aspects.

Using more than three methods is of course also an option, but one has to keep in mind that a plan can also become too flexible and therefore dysfunctional, so it is recommended to limit the amount of methods used to four or five.

And now to answer the research question: There is a wide variety of methods to use. It is hard to say in advance if one method is better than the other, due to the fact that there are factors derived from the contexts – for example local legislation – that may have influence on this. So this means that the best combination of methods may differ for each location. Some methods are also easier to combine than others, for example a flexible masterplan can be easily combined with a flexible zoning plan since there is a lot of overlap between the two.

2.2 Mixed-use

An important aspect for redevelopment of the Minerva City-harbour is that it is to be developed into a mixed-use area. In this section literature research will be done on what exactly is the meaning of mixed-use development and what are the best ways to achieve this. In combination with the conclusions of the flexibility research the following research question will be able to be answered: *How can flexibility be combined with mixed-use in an urban design for the Minerva City-harbour?*

2.2.1 Definitions and scales of mixed-use

To start, the phenomenon of mixed-use development should be defined. In the past decades there have been several definitions made for mixed-use development, some of these definitions are given below:

- Jane Jacobs (1961) makes the distinction between primary and secondary uses. The primary uses create a potential for the existence of the secondary uses, and in turn the secondary uses are there to service the primary uses. A mixed-use area is defined as an area that combines these primary and secondary uses in one area. This means that according to Jacobs the different functions in an area will have to be beneficial to each other in order for it to qualify as mixed use.
- Schwanke (2003) is speaking of mixed-use development when at least three different revenue producing functions are integrated in an design or area. However, this definition does not take residential functions into account.
- The DRO in Amsterdam defines mixed-use as the presence of both living and working related functions in one area. In addition they recognize three aspects of mixed-use; concentration, dispersal and diversity of uses (Van den Hoek, 2008: 7; DRO, 2007)

The most contemporary definition for a mixed-use area is most likely a combination of the three: An area for living and working that has both primary and secondary functions. Van den Hoek categorises the different functions into three categories: housing, working and amenities (image 2.2.1). The amenities could be seen as the secondary function in an area that support the housing and the working functions.

What is still missing in this definition is the aspect of scale (building/block/neighbourhood etc.). If a mix of functions is achieved on a district level, this does not mean that this is the case on block level and of course visa versa (Van den Hoek, 2008: 8). Teppema (2004: 2) states that mixed-use can take place on three scales: the scale of an area (district or neighbourhood), the scale of a building block and finally the scale of an individual building. What this means in a spatial sense is illustrated in image 2.2.2

	Housing	Working	Amenities
Description (e.g.)	Appartments Condominium Row house Villa Etc.	Office Factory Laboratory Etc.	Commercial Retail Bars restaurants Hotel Societal Townhall University Hospital Cultural Church Museum Etc.

Image 2.2.1: *Catagorisation of different functions: Housing, working and amenities (Van den Hoek, 2010: 199)*

This means that when talking about mixed-use one must apart from the functions also define the scale on which the mixture of these functions is to take place.

2.2.2 Reasons for mixed-use

Business parks can offer many entrepreneurs an environment that provides companies in its needs. These business parks are often very well accessible

by car, provide plenty of space, and the land prices are relatively low. These spatial and financial advantages usually do not apply for mixed-use areas and on top of that can there be conflicting interests between the different users of the area. Despite of this the mixture of different functions in an area can have great advantages for the residents, companies and entrepreneurs in the area, provided it is done well.

Mixing functions in an area will attract people, such as the residents, employees and visitors (visiting for example recreational facilities) and when these people use the same amenities in the area, the public support for these amenities and services will likely increase (PBL, 2009b: 21).

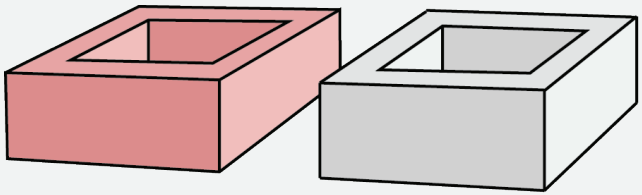
In addition the mixture of functions can contribute to a decrease in mobility, because this offers the opportunity for people to work close to their homes. This of course does not apply for everyone, but studies have shown that both high densities and the mixture of functions will decrease peoples travel distances (Louw, 2004: 7; Snellen, 2001: 21-24). And this will in turn decrease the carbon dioxide emissions produced by vehicles.

Another opportunity in mixed-use areas is the ability to combine the parking facilities for the different functions; this will be more space efficient. The residential functions will require the most parking spaces outside of the office hours whilst business and offices will require the most space during office hours. So when combining total parking need for both the living and the working related functions, this will result into a total parking need that is 25 to 35 percent lower than when this would be done separately (Lamens et al., 2008: 47). In addition the available finances for parking will be relatively higher (more money per parking space) when it is combined. This means that more expensive parking solutions like underground parking can be used and this will contribute to the spatial qualities of an area (PBL, 2009b: 11).

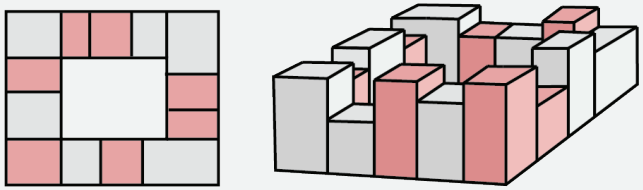
Jacobs (1961: 115-118) also state that in mixed-use areas there are more “eyes on the street”. This means that there is more activity on the street spread over the entire day, thereby increasing the supervision and social safety throughout the day.

And finally a mixed-use area will be less vulnerable to large-scale vacancy, since a multifunctional area is suitable for more types of functions. Vacant buildings will sooner be occupied by other types of functions and thus prevent vacancy.

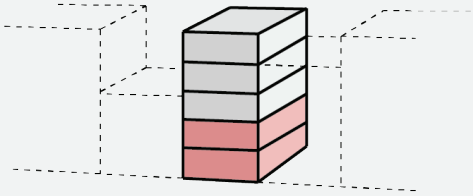
However, for a mixed-use area to function well, it is



Mixed use in scale of an area



Mixed use in scale of the city block



Mixed use in scale of the individual building

Image 2.2.2: *Conceptual image of the different scales in mixed-use.*

important that there is no or very little nuisance between the different users of the area. The most common form of nuisance in a multifunctional area is caused by traffic and parking. The nuisance is of course also depending on the type of business in the area. When a business produces a lot of sound or odour nuisance, it is best to separate it from residential functions (PBL, 2009b: 12). More on this will follow further on in this chapter.

2.2.3 Involved actors

When creating a mixed-use area it means that there will be more actors/users involved compared to a mono-functional area. These users have different demands and expectations of an area. PBL (2009b: 22) has identified four types of actors: entrepreneurs, residents, visitors and investors.

Entrepreneurs

Companies use several preconditions when it comes to choosing a location for their establishment, these are: good accessibility, proximity of amenities, sufficient parking, possibility for expansion, proximity to the sales market, availability of personnel and an appropriate location status (Pieters et al., 2006). Furthermore, it appears that the conditions of good accessibility and the presence of amenities are most important for the location choice (Weterings et al., 2009: 35-39). These conditions can be seen as the primary conditions, and the others as secondary conditions. This means that to attract companies/businesses to an area, the area will need to facilitate at least in the primary conditions plus some of the secondary conditions.

Residents

The quality of the living environment for a very large part determines the value of a house. This makes the value of a house a very good indicator for appreciated characteristics of a living environment A highly valued characteristic for example is the presence of water or green in the neighbourhood. Another important characteristic that will greatly improve the residents' appreciation of the area is the proximity of amenities; this again shows in the values of houses. Houses in close proximity of amenities are higher valued than house with a greater distance to the amenities (Visser and Van Dam, 2006: 27-30). This are just some general conditions that will increase the appeal of an area for residents, however it is important to note that, unlike the entrepreneurs, the demands residents set for an area are a lot more variable, since these are individuals rather than organisations.

Visitors

Visitors are temporary users of an area, visiting people, business or amenities in the area. Especially the visitors of the amenities are the ones that are influenced by the characteristics of an area, since they often have the ability to make use of similar amenities elsewhere. The most important conditions to attract these visitors are accessibility and parking facilities and to a smaller extent the aesthetics of an area (public space and architecture).

Investors

The most important thing for the investors is profit on their investments. The land prices for businesses will be higher in a mixed-use area compared to a mono-functional area. In addition are the aesthetic requirements higher. This means that required investment in a mixed-use area would be relatively high and this will increase the risk. This makes mixed-use development not very appealing for investors (PBL, 2009b: 20). To increase the profit and thus reduce the risk for the investor, the life span of the building will have to be increased. A way to do this is with flexible development (like described in the previous section).

2.2.4 Mixed use conditions

Creating a multifunctional area starts with making sure that the multiple functions do not experience nuisance from each other. Studies and practical examples have shown that this is definitely possible. Apart for nuisance, the PBL (2009b: 12-14) gives a few other spatial conditions that are important for a well-functioning mixed-use area. These conditions will be described in this section.

- The first important issue is the type of business that will be situated in the area. Obviously, some businesses are more suitable to be combined with other functions than others. Small businesses for example have proved to be better suited for a multifunctional area than large businesses. And the sectors of costumer and business services along with the government sector are better suited for mixing than the industrial and the logistical sector. What exactly are suitable businesses for a mixed-use area will be elaborated further on in this chapter;
- The second condition is the location. Not every redevelopment project is suitable to be a mixed-use area. There are certain conditions derived from the location that are needed to satisfy the demands of all the actors involved. One of the most important of this is the accessibility of the area, by both car and public transport. In addition to this there are some elements needed to make the area appealing for residents, like the presence of green or water closely or the proximity of the city centre (PBL, 2009a: 75-78);
- Third is the need of a good thought out urban fabric. The most important part of this is a good access structure. This needs to solve/prevent potential conflicts between the different types of functions. Ideally this structure can partially separate the traffic flows for the different types of functions;
- Finally there are some conditions for the parcelling. There is the need for variety in size of the available plots. Generally it is so that large plots are better suited for businesses and smaller plots better for residential functions. The larger plots give the businesses the opportunity for some expansions on the plots and this is a lot more difficult on smaller plots. Even though smaller plots are preferred for residential functions, it does not mean that residential functions cannot be placed on large plots. This will give the houses a larger garden, which is a rare good in many cities. So with the development of a multifunctional area it is important that there are some over-sized plots available.

	Business	Mixture possibilities
Category A	Service providers such as brokers, lawyers, architects, job agencies and retail sector.	Adjacent to homes
Category B	Mainly educational institutions, healthcare facilities, car dealers and garages, transport companies, financial services and construction firms.	Mixed environment, but spatially separated from housing and other functions
Category C	Usually, wholesale and commission trade, culture, sport & leisure and post & telecommunications	Mixed, but because of the relatively large traffic generation direct access to main infrastructure is needed
No Category	Companies with noise and/or odor nuisance	No mixture possible

Image 2.2.3: *Table with Bussiness categories with the types of bussineses that fall into these categoties (VNG, 2007)*

2.2.5 Defining mixable businesses

The Association of Dutch municipalities (Dutch: *Vereniging van Nederlandse Gemeenten, VNG) has done research on what sectors are suitable to be mixed with residential functions. The VNG* (2007) divided the businesses that are suitable for this into the categories A, B and C. What kind of businesses this are is illustrated on image 2.2.3. In order for a business to be mixable with residential functions (and thus fall into category A, B or C) it has to meet the following conditions (PBL, 2009b: 35):

- The production and/or loading and unloading takes place only during daytime;
- Activities mainly take place indoors;
- Businesses in category C are directly connected to the main infrastructure.

According to the VNG (2007) 86% of all the establishments in the Netherlands fall into one of these categories and are thus mixable with residential functions. This is equivalent to 72% of all the jobs. However, 43% of these jobs still take place in establishments located in mono-functional business parks. This means that there are plenty of potential businesses that can settle/move to mixed-use areas.

2.2.6 Mixed-use index

Now that mixed-use and the different functions have been defined. An important aspect when it comes to mixed-use is the ratio between the different functions in an area. This ratio will for a large part determine character of an area. A tool that has been developed to operationalize this ratio is the mixed-use index (MXI). The Mixed-use index illustrates the ratio between the FSI of different types of functions in an area, namely housing, working and amenities. The MXI is defined by calculating the percentage of FSI for each type of function in an area. For example the city of Amsterdam has 60 percent of the excising floor space occupied by housing, 25 percent by working and 15 percent by amenities. This will give a MXI of 60/25/15 for the city of Amsterdam (Van den Hoek, 2010: 201-202), whilst that of a mono-functional business park the MXI will be more in the range of 0/95/5.

Like said before, the MXI of an area for a large apart determines the character of an area and can therefore be used by policy makers to steer developments into a desired direction. However, it is still not clear what kind of MXI goes with what kind of living environment. Van den Hoek (2010) has made an analysis of different

	Historical city centre	Canal Zone	Post-war workin area	Post-war neighbourhood	Ring area	Contemporary harbour redevelopment
Example	Damrak, Redlight district	Canal Zone	Sloterdijk Telepoort	Amsterdam West, Buitenveldert	Ring West, Ring Zuid	Eastern harbour islands
Grain size	Small	Small	Large	Large	Large	Medium
Centrality	High	High	Low	Low	Medium	Medium
Desnisty	High	High	Low	Low	Medium / Low	Medium
MXI	29/20/51	50/29/21	89/3/8	0/85/16	29/53/18	80/11/9
MXI- P	**36**	**34**	112	104	40	94

Image 2.2.4: *Table with the results of the analysis done by Van den Hoek on the different urban typologies in Amsterdam (Van den Hoek, 2010: 206)*

urban typologies in Amsterdam, which will give some guidelines for this. The result of this analysis is show on image 2.2.4 This analysis also shows that there are certain spatial conditions or qualities needed to achieve a desired MXI. For example, it is no coincidence that the most mixed areas – historical centre and the canal zone – both have a small grain size of the urban fabric, a high centrality and a high urban density (Van den Hoek, 2010: 206). While an area where mixed-use was more or less propagated with the initial development (eastern harbour islands) does not have the same spatial qualities, and as a result there is a much lower degree of mixed-use. We can conclude that there is a close correlation between the districts characters: grain size, centrality, density and the functional mix (MXI).

The MXI gives a clear view of the divisions in FSI between the types of functions in an area. However, when looking at the MXI it is hard to determine the extent to which the area in question is mixed, and therefore it is hard to define if the area is a mixed-use area or not. The MXI somehow has to be reduced to a single number that can help define a mixed-use area. The theoretically highest possible mixture of functions (note: this is not the same as the ideal mixture of functions) would have an MXI of 33/33/33, the same amount of each function type. It is possible to simplify the MXI of an area by taking the difference between the percentages of each function with this 33 percent and adding them together (formula shown on image 2.3.5). This will give a number between 0 and 134, the MXI Product (MXI-P). The lower the MXI-P, the greater the mixture of functions; a MXI of 33/33/33 will have a MXI-P of 0 and a MXI of 100/0/0 will have a MXI-P of 134.

The PBL (2009b: 11) states that an area qualifies as a mixed-use area if the ratio between living and working is at least 20% to 80%. However, they leave out the amenities in this definition. Therefore it is assumed that this is only 2/3 of the total programme, so this means that an area qualifies as a mixed-use area if one of the tree function types is no more than 53% of the total FSI and in addition no function type can be under 13% of the total FSI. This means that the MXI-P cannot be higher than 40 for an area to qualify as a mixed-use area.

Calculating MXI-P

$$\frac{|\,33\% - \%\ Housing\,| + |\,33\% - \%\ Working\,| + |\,33\% - \%\ Amenities\,|}{\text{MXI-P}}$$

Calculating minimun and maximun % of functions

$$\frac{1}{2}\text{MXI-P} + 33 = \text{Max \% of Function}$$

$$\left|\frac{1}{2}\text{MXI-P} - 33\right| = \text{Min \% of Function}$$

Image 2.2.5: *Formulas for calculation the MXI-P, and minimum/maximum amount of functions with the MXI-P.*

2.2.7 Mixed-use and flexibility

A mixed-use area will in general be very well combined with functional flexibility. Functions in a mixed-use area can change relatively easy, since the conditions for multiple types of functions are present in the area (PBL, 2009b: 21).

Furthermore, the research has shown that an urban fabric with a small grain size is very suitable for mixed-use development and in the previous section is shown that a small grain size will contribute to the ability of an urban area to adapt to changes.

However, if the condition is for an area to be mixed-use, this also limits the flexibility in an area. Earlier is defined that a mixed-use area had an MXI-P of no higher than 40, so this means that that the area cannot change into a more mono-functional area should the demands arise for this and thus this will limit the flexibility.

This does not have to be a bad thing, since one of

the conclusions was that an area can also be too flexible and endanger the continuity of an area. The mixed-use conditions of an area can be used as a method to consciously limit the flexibility in order to prevent this from happening.

It can be concluded that mixed-use and flexible urban design can be easily combined, and if done right they can even mutually benefit from each other.

2.2.8 Conclusions

Creating a mixed-use area brings different kinds of users to an area who each set their own conditions for the use of the area. Some of these conditions are similar, like a good access system. The biggest challenge lies in preventing nuisances between the different users. Businesses are usually the main cause of nuisances for other users. To prevent these businesses in a mixed-use area, they have to meet the following conditions:

- The production and/or loading and unloading takes place only during daytime;
- Activities mainly take place indoors;
- Businesses in category C are directly connected to the main infrastructure.

Studies have shown that there currently are still plenty of mixable businesses located on mono-functional business-parks. This means that there are plenty of potential businesses that can settle/move to mixed-use areas.

The MXI-P can be used to determine the degree of functional mix in an area. For an urban area to qualify as a ‘mixed-use’ area, the MXI-P cannot be higher than 40.

The research has been done to answer the sub research question: How can flexibility be combined with mixed-use in an urban design for the Minerva City-harbour? Mixed-use and flexible urban design can be easily combined, and if done right can even mutually benefit from each other. A small grain size of the urban fabric for example is a spatial condition that will benefit both mixed-use and flexibility.

In addition, the MXI-P could be used in policy to set flexible mixed-use conditions for an area. If for example a MXI-P of maximum 40 for an area is a precondition, it means that each function type may differ no less than 13% of the total FSI and no more than 53%. This gives no set amount of programme, but sets some margins to work with.

2.3 Development strategy

With the results from the literature studies on flexibility and mixed-use in previous sections, a development strategy can be made that will eventually result into an urban design that is both multi-functional and flexible. The development strategy made should be a general strategy and be able to be applied on wide variety of locations. In order to illustrate this, the development strategy be applied in the design process for the Minerva City-harbour.

Flexibility and mixed-use are the backbones and main goals of this development strategy. In the literature study it was concluded that for an urban design/plan to be integrally flexible, at least one method of flexibility would have to be integrated in each of the three aspects of urban development: the development process, urban fabric and the built environment. A scheme illustrating the development strategy is shown on page the next page (image 2.3.1).

2.3.1 Development process

The first method that will be used to get flexibility in the development process is a flexible zoning plan. This is where mixed-use will play a role. The flexible zoning plan will set conditions for the percentage of FSI of each function type – living, working, and amenities – in a project area. This will be done by means of a term introduced in chapter two: the Mixed-use Index Product (MXI-P). The MXI-P for the area will be limited at 40, this means that for each function type in the area there is a limit of 53% of the total FSI and a minimum of 13% of the total FSI. It is likely that in later stages a different MXI-P will be determined for different subareas in order to guide the development more into a desired direction.

The second method that will integrate flexibility into the development process is gradual development. This is done by dividing the area into subareas. These areas will be developed in phases, one after the other, starting with the urban fabric. After the completion of each phase there can be an evaluative moment, to test if the planned developments are still in line with the desired goal or with the changes in societal and economical demands. And if this is not the case, adjustment can be made to the zoning plan and planned development.

2.3.2 Urban fabric

The urban fabric and built environment are the elements that will have to make sure the urban design/plan remains flexible after the completion. The urban fabric is something that is very costly to change and thus has the be flexible in a passive way, which means having to be able to facilitate changes – mainly in functional use – without the need for changes to the urban fabric itself.

The urban fabric is also what helps to make the area appealing for all the different types of functions that have to be attracted to the area. Therefore it is important that a good urban fabric is realized before starting with the development of real estate in order to prevent vacancy.

This means that the following elements - derived from the literature research - are important for the urban fabric in order for it to meet with the described conditions:

- *Access system:* A good access system is very important for a mixed-use area. This is the access structure within the project area, but also the accessibility of the area by both car and public transport. The location of the project site forms a very big influence on the accessibility of an area. This means this strategy will likely not work on every location, due to this .
- *Green and water network:* The presence of water and/or green in an area gives an enormous boost to the attractiveness of the area in question. And creating an attractive

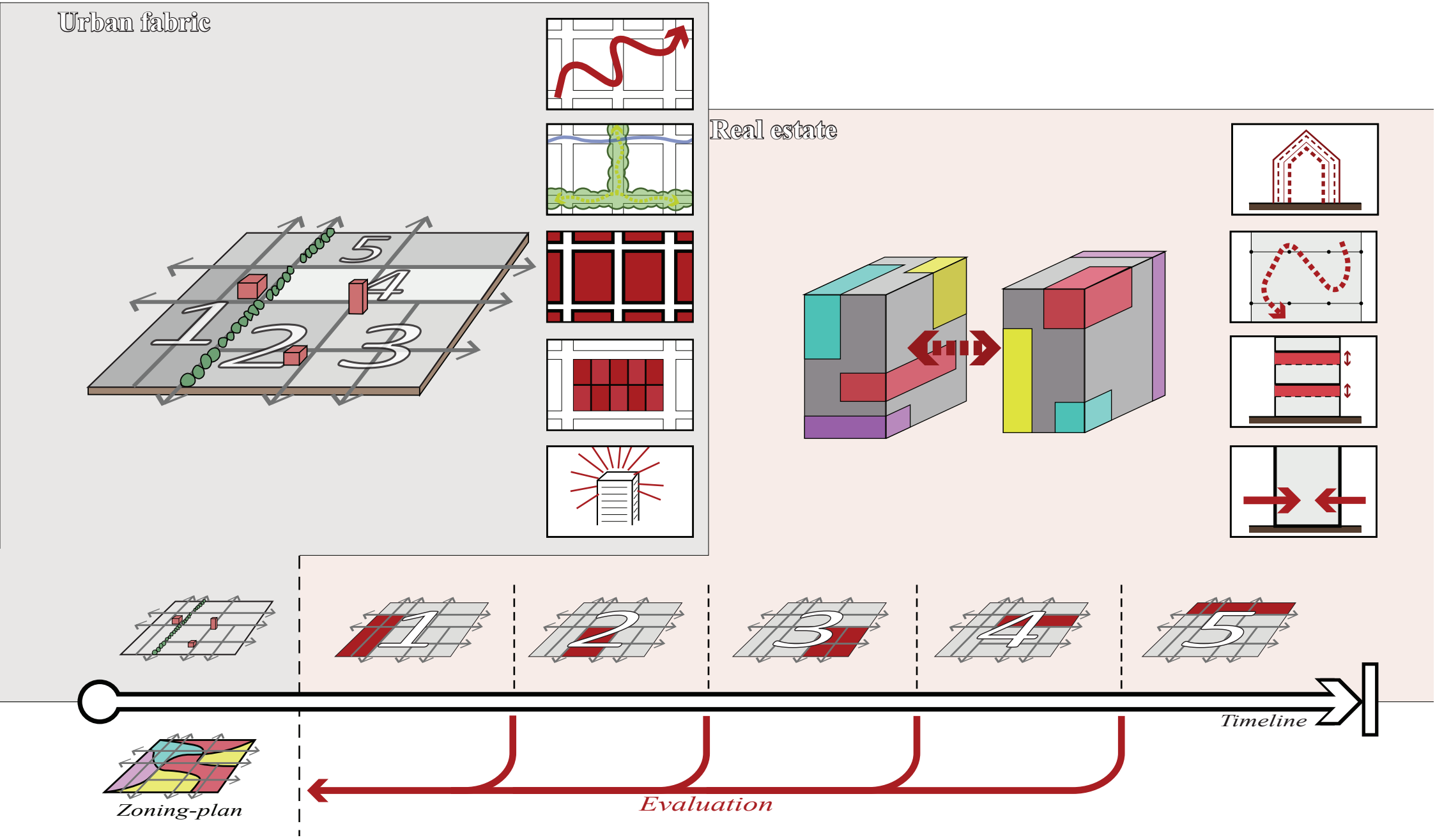


Image 2.3.1: *Scheme illustrating the set-up development strategy*

area is important to attract the different types of functions to the area, which in turn are needed for a mixed-use area. Therefore, it is important there is a presence of green and/or water.

- *Grain size:* The The theory in the previous sections have shown that the size of the urban islands has influence on the adaptability of an urban area. A urban area with a small grain size has proven to be more adaptable than urban areas with a large grain size. In addition there is concluded that mixed-use areas also thrive very well in a urban area with a small grain size. In the previous sections it was already mentioned that a small grain size is relative to its environment (Bouten, 2008: 63). So this means that a small grain size in one city might not be so small in another. To determine what a small grain size is for a specific location the grain of the city in question will first have to be analyzed.
- *Parcelling:* The size of a parcel for a large part determines what kind of functions can use the parcel. This means that to ensure a mixed environment a diversity in parcel sizes have to be available. However a the size of a parcel should never be dimensioned is such a way that it can only be used by one specific function, since this will greatly diminish the flexibility. A study by the PBL (2009b: 12, 14) has shown that parcels with a size of around 200 square meters – preferably 7,5 meter wide – can facilitate both large working functions like businesses and living related functions.
- *Landmarks:* Landmarks are elements that will add to the attractiveness of an area and in addition will help people navigate through an area. At the same time they can be used to house important facilities for an area to function well, e.g. a supermarket to provide for the daily needs.

2.3.3 Built environment

Flexibility within the built environment or real estate will make sure the urban area will remain flexible after its completion. The literature study has shown there are a number of aspects that, when combined, will greatly increase the functional flexibility of a building

- *Separated building systems:* keeping systems in a building, like the façade, load bearing structure and installations, separated from each other makes it possible to make changes in one without having to change an other.
- *Open floor plan:* Creating an open floor plan makes it easy to remove or place walls and thus easy to change the layout of a building.
- *Extra floor-to-floor space:* Offices and shops require more floor-to-floor space than housing. By using extra floor-to-floor space for housing, they can potentially be converted to office space or shops and visa versa.
- *Multiple access systems:* Different functions require different types of access. Housing for example only needs a front door, but shops need a service entrance for goods.

Since this is a graduation project for the field of urban design, the main focus will lie on the application of the flexibility aspects for the urban fabric. The methods to achieve flexibility in the other two aspects are now stated, but will not be elaborated into detail. The urban fabric however will have to take these aspects into account, since they all do have some influence on each other.

The first section of chapter 6 will illustrate how this development strategy can be interpreted and used to come to a design for an area. It is important to note there is room for other interpretations of the strategy, the methods chosen to use for this graduation project are not the only correct ones.

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4.1 Analysis

3.1.1 History

Image 3.1.1 illustrates the development over the years of the area that is now known as the Minerva City-harbour. We see that the area is subject to continuous changes, with an exception between 1906 and 1941; this can of course be explained by the poor economic climate at this time and the Second World War. Depending on the spatial needs and wishes of the users, quays are built, land is reclaimed, harbour basins are dug out and railway and road infrastructure is realised. Up to the sixties, the harbour activities in this area where only based on the lumber trade and transhipment. In the seventies the functional use of the area changed. Lumber was now mainly transported over the road rather than the water, so the large-scale water oriented harbour activity changed to smaller-scale land oriented businesses like hardware stores, wholesale stores and small machinery factories. These are still the kind of activities we see in the area today (Haven Amsterdam, 2007: 7).

3.1.2 IJ barrier

Like many big cities Amsterdam was built along the edge of the water. This allowed the city to grow due to its trade income. However, as the city grows, the water forms a barrier within the city (image 3.1.2). Many European cities face the same problem (such as London, Paris, Antwerp or Rotterdam). In cities like Paris and London this issue is largely solved by creating a lot of bridges, in Amsterdam however this is not the case. The only connection between the north and south banks of the IJ are three car tunnels and soon one metro line. For the connection for pedestrians Amsterdam relies on ferries. Additional connections across the IJ are needed to further improve this connectivity between Amsterdam North and the city centre (Gemeente Amsterdam, 2011: 61).

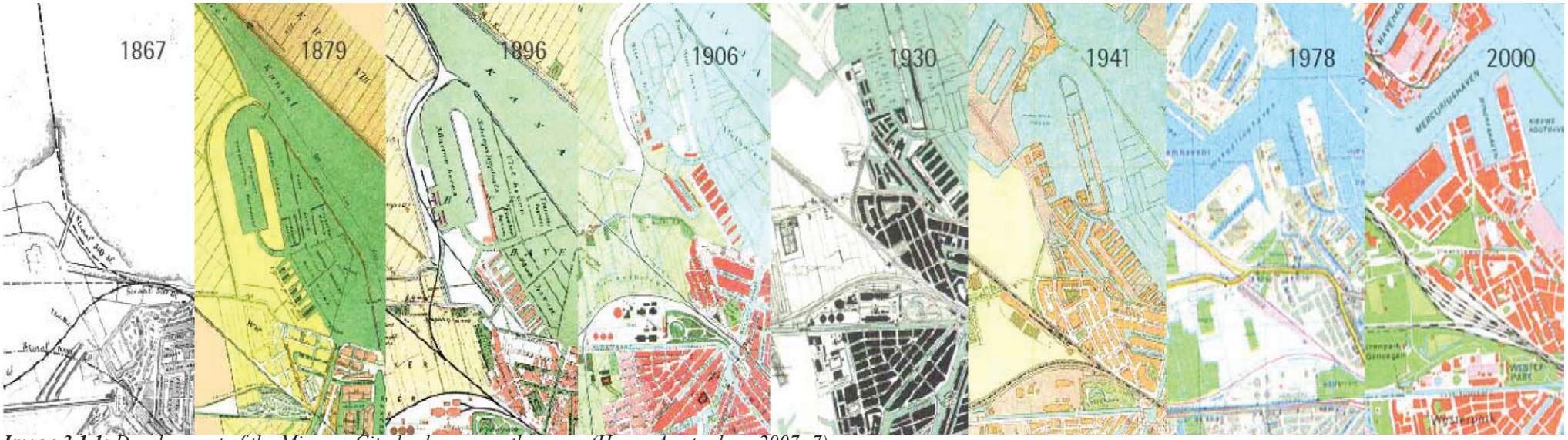

Image 3.1.1: *Development of the Minerva City-harbour over the years (Haven Amsterdam, 2007: 7).*

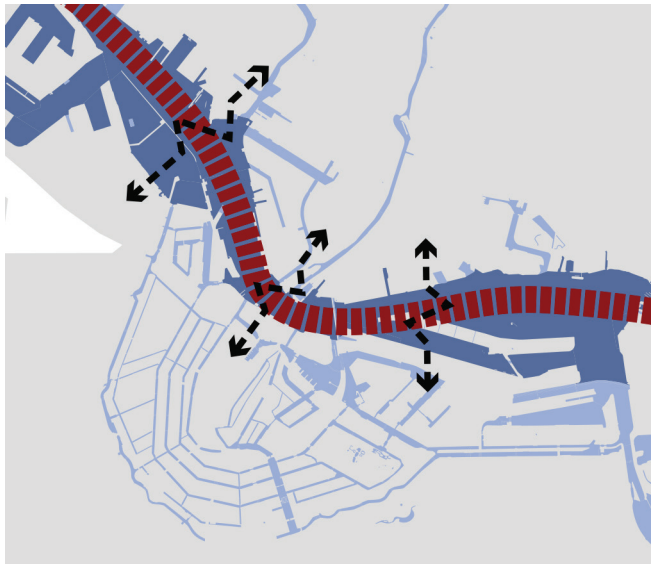

Image 3.1.2: *The IJ is a barrier between Amsterdam North and the centre of the city.*

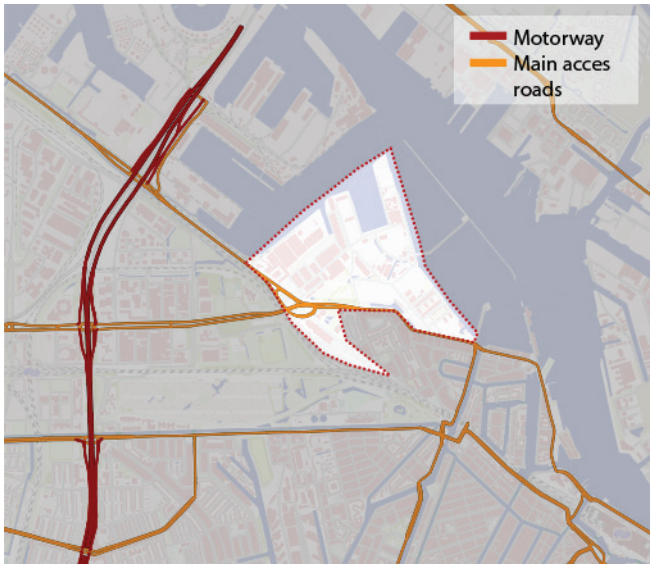

Image 3.1.3: *Orbital motorway A10 and the important access roads.*

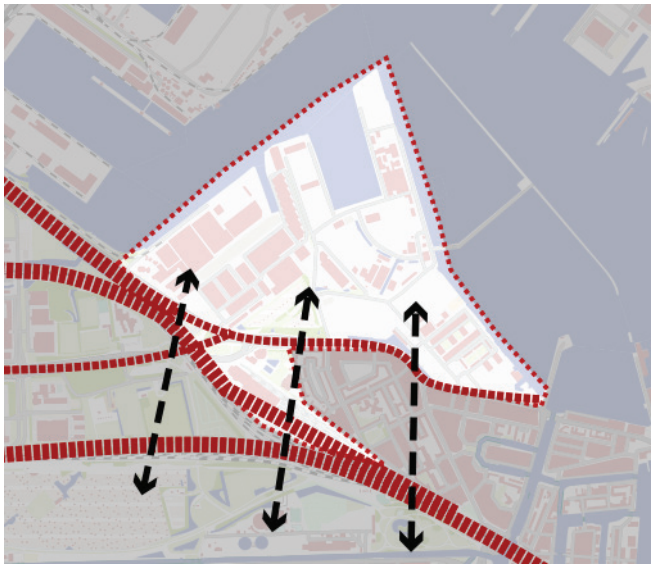

Image 3.1.4: *Major infrastructure is a barrier between the harbour and the city.*

3.1.3 Accessibility

The location of the Minerva City-harbour is very well accessible by car. It is very close to the orbital motorway around the city (A10) and is right next to major access roads for the city. These access roads however, in combination with a high concentration of railway tracks, really block off the Minerva City-harbour from the city, illustrated in image 3.1.4. For this new urban area to function well, this connection will have to be improved. To be able to do this the design location might have to be expanded towards the Houthavens on the east side and the NS railway yard on the south side (image 3.1.5).

3.1.4 Public transport

To improve the connection between the harbour area and the city a qualitative public transport connection is needed. This can be in the form of a tram or a subway connection. In the current situation this connection is still lacking. There is a subway stop relatively nearby at the Isolatorweg, however this is not sufficient. Furthermore, the location is situated between two large train stations (Amsterdam Central Station and Amsterdam Sloterdijk). There are two obvious solutions for connecting the area with public transport. The first would be a new tramline between the two railway stations, an added bonus for this option is the fact that the part of the line between the Westerpark and the Central Station already has the tram rails in place, but they are currently not being used. The other option is to extend the elevated subway line that currently stops at the Isolatorweg towards the Central Station, with an extra station at the Minerva City-harbour (image 3.1.6). One of the issues for the city of Amsterdam, like mentioned before, is the connection between the north of Amsterdam and the other parts south of the IJ (Gemeente Amsterdam, 2011: 61). In order to improve this connection the city of Amsterdam uses quite a few ferry connections across the IJ. A new additional ferry connection between the Minerva City-harbour and

Image 3.1.5: *Houthaven and the NS railway yard might be needed to improve to connection with the city.*

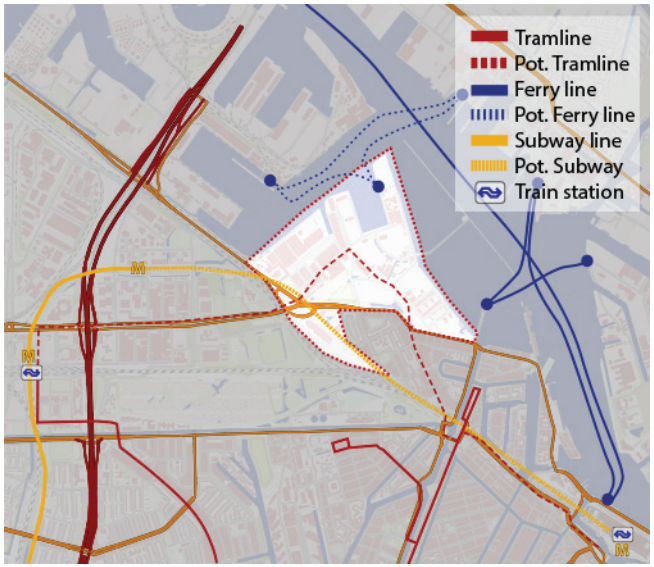

Image 3.1.6: *Current and possible additions of qualitative public transport.*

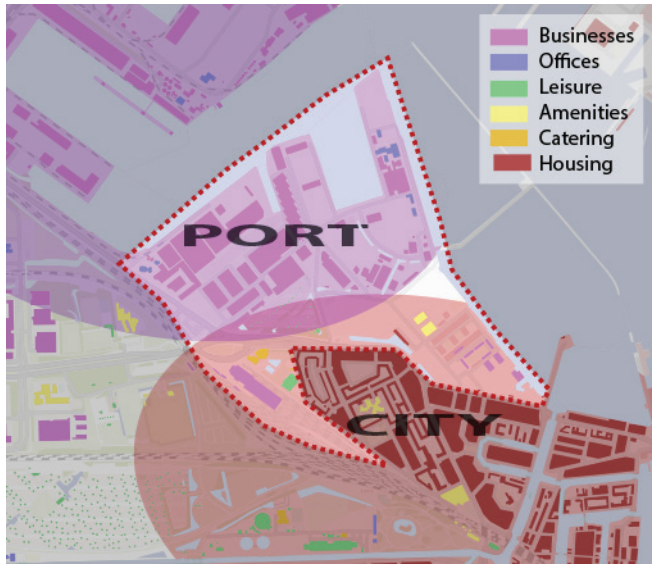

Image 3.1.7: *Current functional occupation of the Minerva City-harbour and its surroundings.*

the NDSM-wharf can further increase the connection between the north and south banks.

3.1.5 Functions

Image 3.1.7 illustrates the current functional occupation in and around the Minerva City-harbour. The Minerva City-harbour currently still functions as a harbour area, therefore it is obvious that most of the functions in the area are business functions combined with a few offices. This means that a large amount of the programme will have to change in order to create the desired multifunctional area. Just on the other side of the Spaarndammerdijk is the neighbourhood called the Spaarndammerbuurt. This is a mainly residential area. With the redevelopment of the Minerva City-harbour this will become an area where the port meets the city. It will have to function as a transition area between the two, with both port and city functions. In the development plans of Amsterdam the ambition is stated to realise a new cruise ship terminal in this area (Gemeente Amsterdam, 2011: 62). This could be one of the port related functions in the area that can be combined with city functions. Very close by is the Westerpark and Westergasfabriek. This is a city park with a lot of leisure and catering facilities, and very popular with the inhabitants of the city (DRO and Haven Amsterdam, 2009: 39).

3.1.6 Access structure

The current access structure of the Minerva City-harbour is illustrated on image 3.1.8. We can see that this currently is dramatic. The area is separated into three sections that are each accessed separately with no connections between the three sections. This will have to change in the new design for the area.

3.1.7 Environment

VNG (2007) divides businesses and industry into six different environmental categories, based on their amount of pollution. Category one has the lowest pollution and category six the highest. For the first two categories (one and two) the pollution is low enough

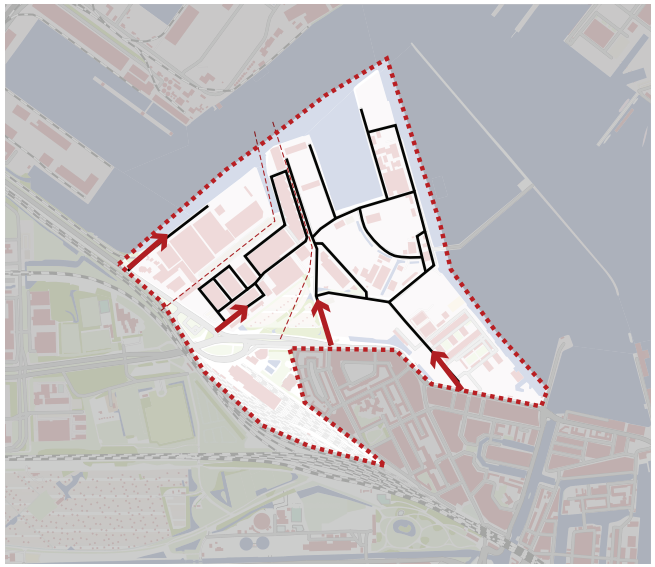

Image 3.1.8: *The current access-system for the Minerva City-harbour.*

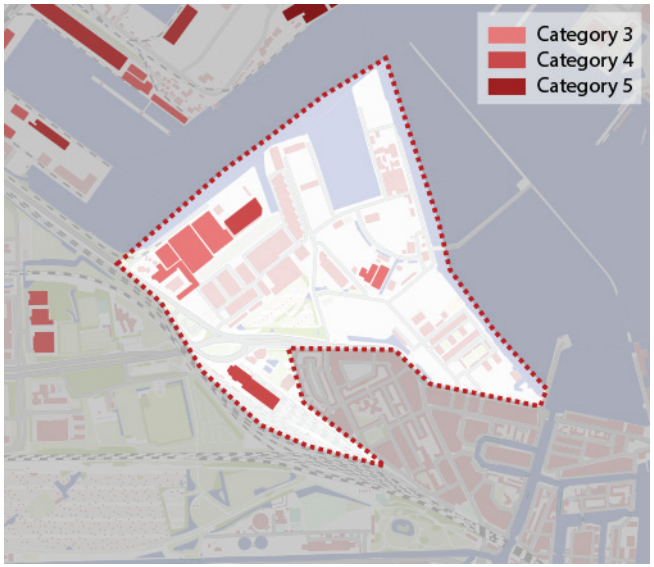

Image 3.1.9: *Polluting businesses that are not combinable with housing.*

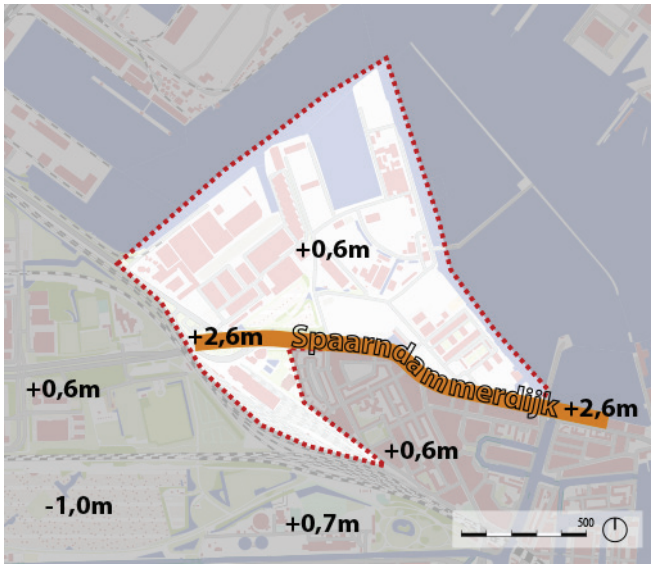

Image 3.1.10: *Height of the land in the area, with the remains of the old levee.*

for them to be combined with residential functions. Since the Minerva City-harbour is an industrial area, there are a number of businesses that fall in the categories three and four, shown on image 3.1.9. And on the nearby Vlot- and Coen harbours there are even some industries that fall in category five. These are businesses that make the area not suitable for a mixed-use area due to the produced pollution. This means that for the redevelopment of the area these businesses will have to be moved to other locations.

3.1.8 Water

When dealing with water locations it is important to know what threats there are from the water. The water in the IJ is regulated by Rijkswaterstaat and is kept at a fixed water level. This water level is 0.2 meter below NAP during the summer and 0.4 meter below NAP during the winter. This means there is only a fluctuation in water level of 20 centimetres (Rijkswaterstaat, s.d.). The land of the Minerva City-harbour currently stands at 0.6~0.7 meters above NAP. Currently, the threat of flooding in thProtection against water already played a role in former times. The city of Amsterdam used to be defended by the Spaarndammerdijk, location shown on image 3.1.10. Some remainders of this dike are beneath the current Spaarndammerweg. This dike has a height of 2.6 m above NAP; this is about two meters higher than the surrounding land.is outer dike area is relatively low, but in the light of future climate change and uncertainties regarding the locks near IJmuiden, this can change.

3.1.9 Current developments

There are quite a few developments currently happening in the area. Image 3.1.11 shows there are quite a few office buildings that have been constructed in the last few years, and some more of them are planned. These buildings however are quite large mono-functional units. Although the architecture of the buildings is appealing, the mono-functionality of these units does not fit with the aimed result for the area. But since

these are newly constructed buildings, they will not be demolished, since that would be very unsustainable. They will just have to be integrated into the new urban design for the area.

3.1.10 Available qualities

On the edge of the project site are some allotment gardens situated. These gardens are private property and are thus not publicly accessible. However, around and between these gardens there some open green spaces that can be used to integrate these gardens into a large public green space.

It is also important to note tat most of the quays currently are not publicly accessible, the presence of the water is a one of the largest qualities for this location, so the quays should be made publicly accessible to fully utilize this quality.

There are some unique dining locations in the area. The first is the REM-island. This is a restaurant in a former TV-studio on an artificial island (image 3.1.12). The second location is a restaurant in a remodeled ferry, which used to do service in Amsterdam (image 3.1.13). Since this restaurant is on a boat, it is easy to move, possibly to a more prominent location in the area.

Furthermore there is the Spaarndammerbuurt, a neighbourhood from 19th century with some beautiful architecture. Among this are some buildings form the Amsterdam school movement, an example of this is the building block known as the Ship, shown on image 3.1.14.

3.1.11 Houthaven developments

Soeters van Eldonk Architects made a design for the redevelopment of the Houthaven, this design is shown on image 3.1.15. This plan creates a wall of relatively high buildings that block off the Houthaven from the Minerva City-harbour. This is not desirable for the connection between the project area and the city, therefore this part of the design by Soeters van Eldonk Architects should be reconsidered. Another thing they propose is creating a tunnel for the road on the Spaarndammerdijk. This tunnel is good way to reduce the barrier – created by this road – between the harbour area and the Spaarndammerbuurt. However, the tunnel should be extended more towards the Minerva-City-

Image 3.1.11: *Current elements on the location that should be preserved, a number of newly built office buildings and allotment gardens.*

harbour, so that the connectivity between the Minerva-City-hour and the city can be increased. Creating a tunnel is a very costly solution, but will achieve the maximum effect: completely removing the barrier.

3.1.12 Conclusion

This analysis gave some insights on the current situation on the location. The most important conclusion from this analysis is that making changes in this area will greatly affect its immediate surroundings. If residential functions are brought into the Minerva City-harbour, it means that the industry on the nearby Vlot- and Coen harbours will have to move. This will most likely mean that this area will have to be redeveloped as well. In addition, interventions made in the infrastructure and public transport network will affect the functioning of this network for other locations as well.

This means that it is important to start with making a larger scale plan for the region. There are four important aspects with the redevelopment that will impact the whole area; infrastructure, public transport and green & leisure. So this will have to be the most important pillars of the masterplan.

Other more local issues like the hight differences and the fluctuating water level can be taken into account for the design for the Minerva city-harbour itself.

Image 3.1.12: *REM-island, restaurant on a former artificial island, which serviced as TV studio (Janssen, 2012).*

Image 3.1.13: *Pont 13, restaurant in a remodeled old ferry.*

Image 3.1.14: *Buildingblock the ship, designed by Michel de Klerk (Boorder, 2012)*

Image 3.1.15: *Design by Soeters Van Eldonk architects for the Houthaven (Soeters Van Eldonk, s.d.).*

Image from Aerophoto-schiphol (2011)

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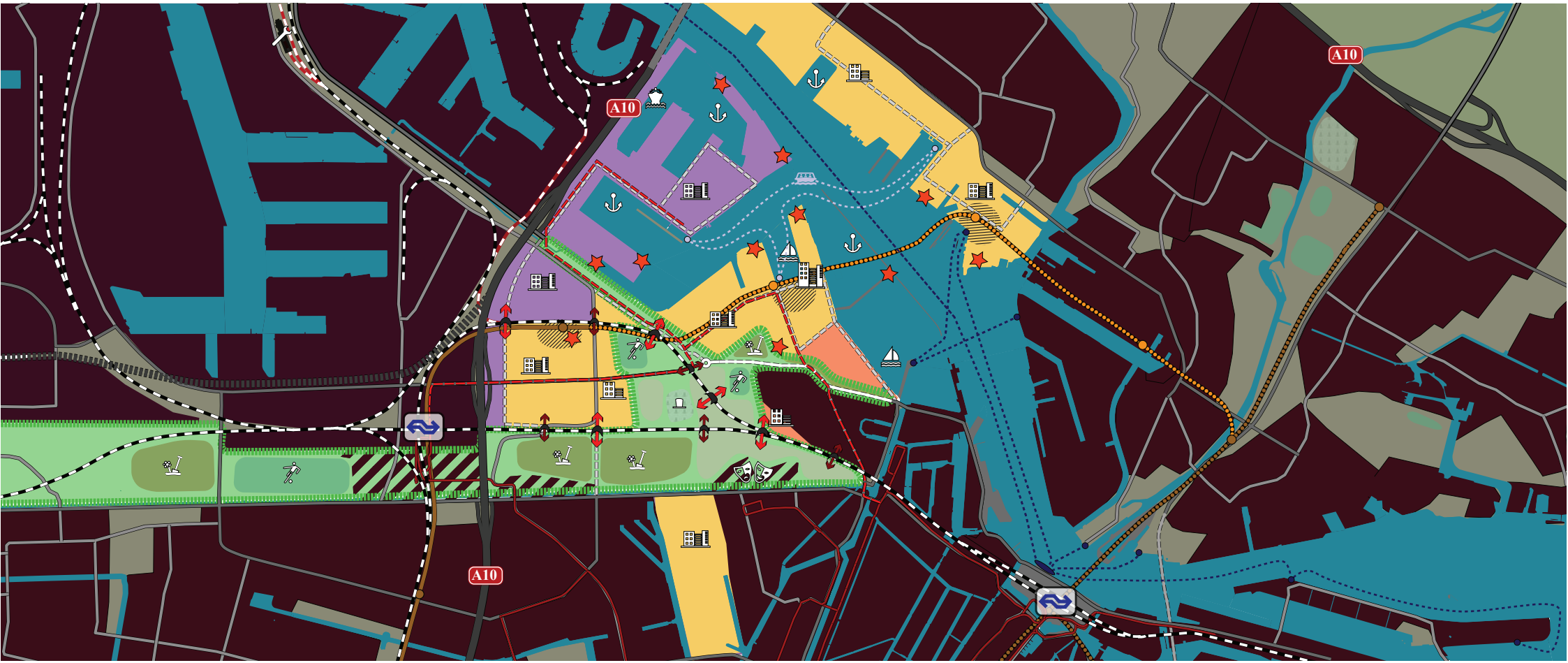
4.1 Vision 2050



Infrastructure

- Highway
- Highway under construction
- City acces road
- Proposed city access road
- Proposed city access road, *underground*
- Neighbourhood access road
- Proposed Neighbourhood access road
- Railway
- Proposed railway

- Railway crossings
- Proposed railway crossings

Public transport

- Subway lines, *above ground*
- Proposed subwayline, *underground*
- Tramlines
- Proposed tramline
- Ferry connections
- Proposed ferry connections
- Trainstation

Urban development

- Excisting urban area
- Proposed residential area
- Proposed bussiness park
- Proposed mixed-use area
- Centre locations
- High density
- Medium density
- Low density

Green and Leisure

- Urban green
- Green ”corridor”
- Recreational green
- Allotment gardens
- Sportsfields
- Graveyards
- Potential landmark location

N

0 1 km

Scale 1:35000

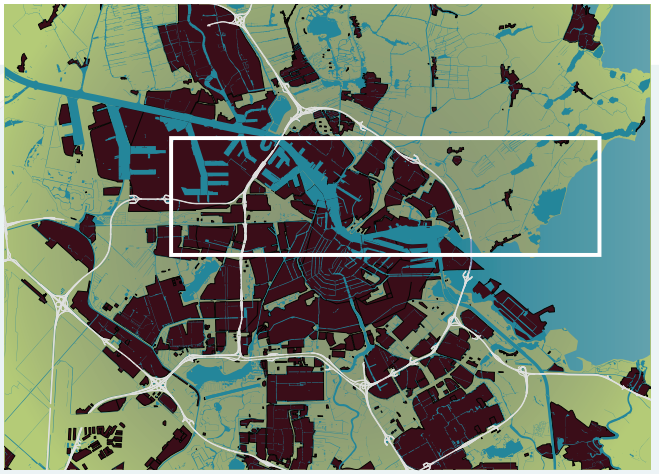
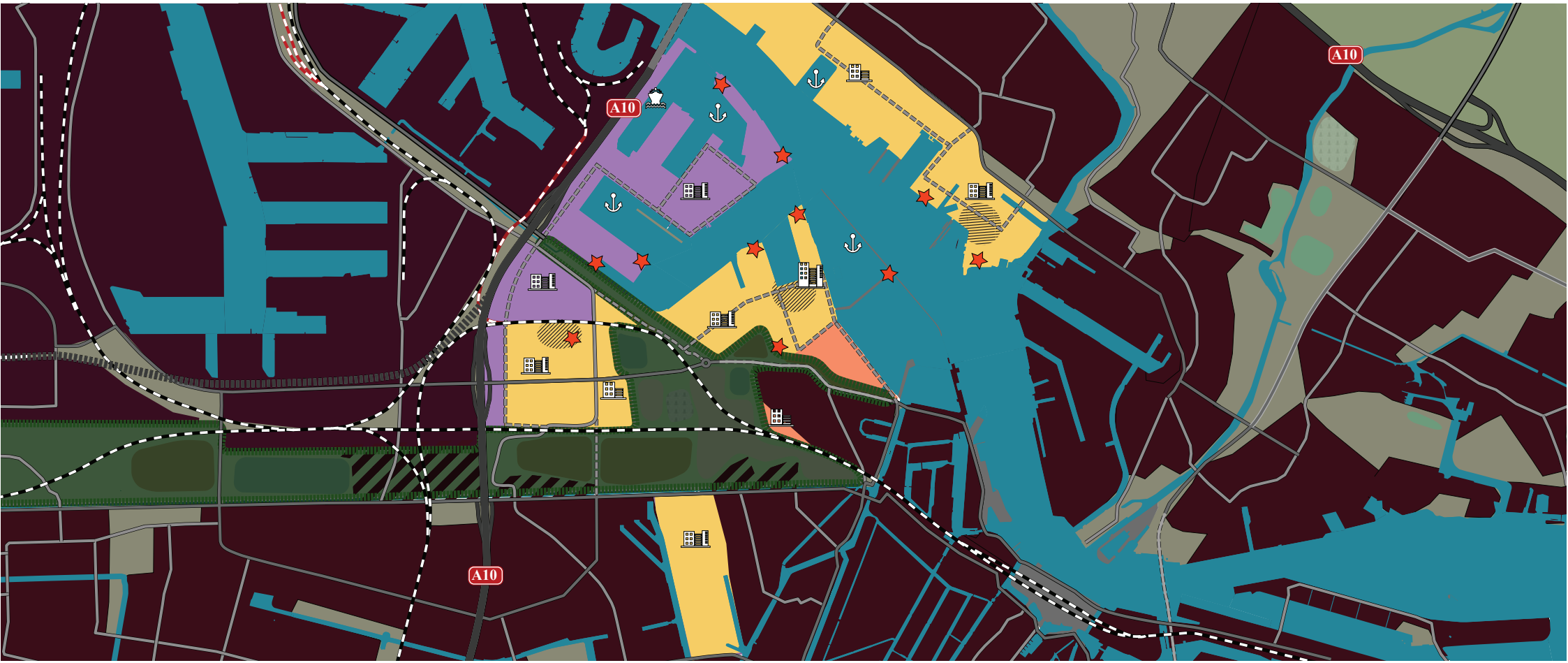


Image 4.1.1: *City of Amsterdam*

With the location analysis was concluded that larger scale interventions are needed to solve some of the problems - like the barriers, public transport and infrastructure - of the project location. Therfore a masterplan has been made for the entire western harbour area within the orbital motorway: the A10.

This map shows the proposed master plan for the Minerva City-harbour and its surroundings, The master plan is a result of made analysis and stated ambitions my the municipality of Amsterdam in various policy documents. The analysis has shown that there are few aspects that need to be designed at a bigger scale level: infrastructure, public transport and the green structure. In this chapter the proposed master plan shown on the left will be further elaborated, this will be done by showing and explaining interventions made on four different themes. These four themes are: Urban development, infrastructure, Public transport, Green and leisure.

4.2 Urban development



Urban development

- Existing urban area
- Proposed residential area
- Proposed bussiness park
- Proposed mixed-use area
- Centre locations
- High density
- Medium density
- Low density
- Second cuirse ship terminal
- Moorings for barges
- Potential landmark locations

N

0 1 km

Scale 1:35000

The areas that are to be redeveloped in this plan can be divided into two types of areas. First is the area around the IJ, the area that is currently occupied with harbour related industry and businesses. The second type contains the monofunctional business parks. This is the area between the harbour and the Sloterdijk station, known as the Alpha triangle and the area just south of the Brettenzone. These are all locations which are very close to the centre of the city and have therefore the opportunity to be redeveloped into attractive neighbourhoods.

The aim of the redevelopment is to create areas that combine living and working. This is however not possible everywhere. Due to the proximity of the industry on the other side of the A10 motorway and the pollution this produces, residential functions are not possible everywhere. Therefore, a transition zone is created that will function as a business/office park mainly, but not exclusively, for the creative industry.

Besides functions in the area, the aimed density in the area has also been indicated on the map. This concerns either a high, medium or low density. To illustrate what exactly is meant by this, references of high and low densities are shown on images 4.2.1 and 45.2.2

For an area to function well, some local centres are needed that can provide the users of the areas in their daily needs. These centres will be located at the current and new subway stations.

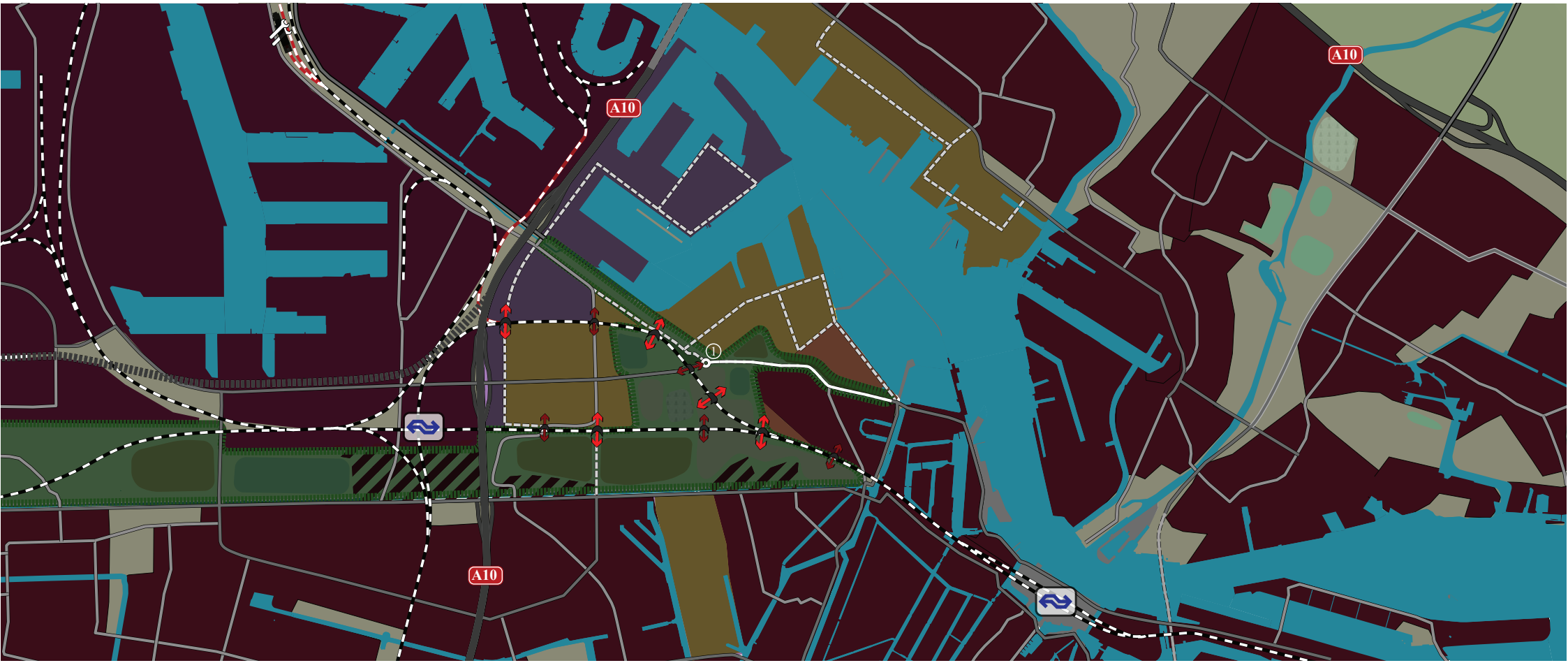
Every city needs landmarks. Landmarks are points of reference and help the users of the city to determine their location and can help with navigation through the city. Landmarks do not necessary have to be a tall building, but can be defined as anything that is unique and memorable in its context: statues, signs, shops etcetera (Lynch, 2003: 2). However, one can never be sure that placed elements will become the landmarks that they were intended to be. Studies have shown that placing elements at spatial prominent locations will sooner function as a landmark (Lynch, 2003: 6). Several potential landmark locations have been pinpointed on the map, most of these are spatially prominent locations and can be seen from a distance. This network of landmarks will help the user navigate through the newly developed area.

There is a shortage of mooring locations for barges in Amsterdam (Haven Amsterdam, 2007). The western harbour basins will give space for some new mooring locations for these barges. The municipality of Amsterdam has also stated the ambition for a second cruise ship terminal in the city (Gemeente Amsterdam, 2011). The Minerva City-harbour will be a very suitable location for this.

Image 4.2.1: *Example of low-density urban development: Borneo, Amsterdam (Honia urban design, 2009)*

Image 4.2.2: *Example of high-density urban development: Veemkade, Amsterdam (Rauw, 2012).*

4.3 Infrastructure



Infrastructure

- Highway
- Highway, *underground*
- Highway under construction
- City access road
- City access road, *underground*
- Proposed city access road
- Proposed city access road, *underground*
- Neighbourhood access road
- Proposed Neighbourhood access road
- Railway
- Proposed railway
- Railway crossings
- Proposed railway crossings
- New train-yard
- (1) Remodelled infrastructural node

N

0 1 km

Scale 1:35000

There are several interventions made on the infrastructural network of the area. Conclusion from the analysis in chapter two was that the infrastructure created many barriers between the harbour and the city, therefore the aim of these interventions was to reduce this barrier. This is firstly done by downgrading the S101 road (shown on image 4.3.1) and removing the railway that lay along this road. By doing this, one of the barriers will be removed and the Transformatorweg (S102) will become the main city access road in this area. For the railway system to remain functioning after the removal of this piece of track, two short new tracks will be constructed to reconnect everything.

In addition, a number of railway crossings will be added to the remaining barriers. This will not completely remove them, since this is impossible without creating large railway tunnels, but will make them a lot more permeable.

The last barrier between the harbour and city that is to be addressed is the road on the Spaardammerdijk. In the design for the Houthaven by Soeters this road is placed under the ground. In this plan it is proposed to elongate this tunnel and by doing so completely remove this barrier for the entire area rather than for solely the Houthaven.

Another issue was the railway yard located in the area. This railway yard will be moved towards the harbour, on the other side of the orbital motorway (A10). This will free up some more space for development along the railway.

The infrastructural node shown on image 4.3.1 will be remodelled. The current complex situation (image 4.3.2) with a fly-over uses a lot of unnecessary space. The new situation will make use of a turbo-roundabout (image 4.3.3); this has a faster flow than traffic lights and is a lot safer than a regular roundabout (Provincie Zuid Holland, s.d.). By using this construction the fly-over is no longer needed. This will free-up space for the addition of a tramline to the traffic node.

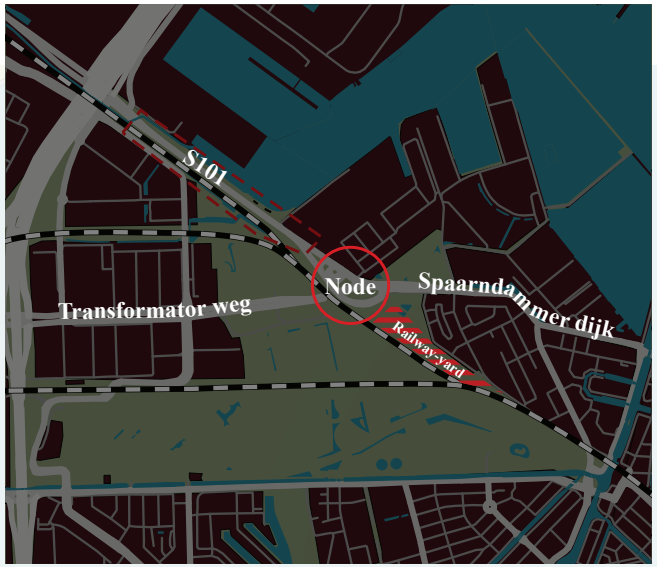


Image 4.3.1: *The current infrastructural network in the area.*

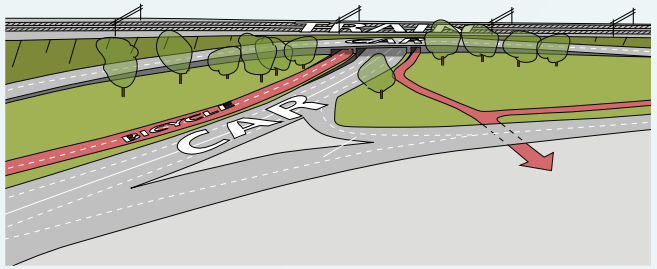


Image 4.3.2: *Current situation at the infrastructural node.*

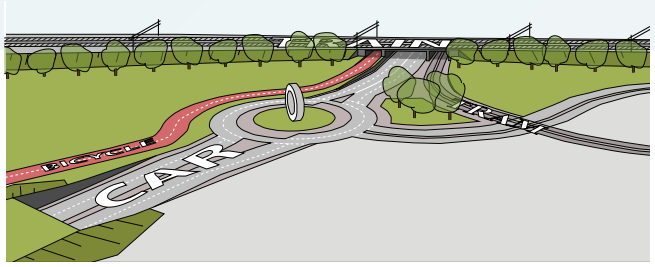
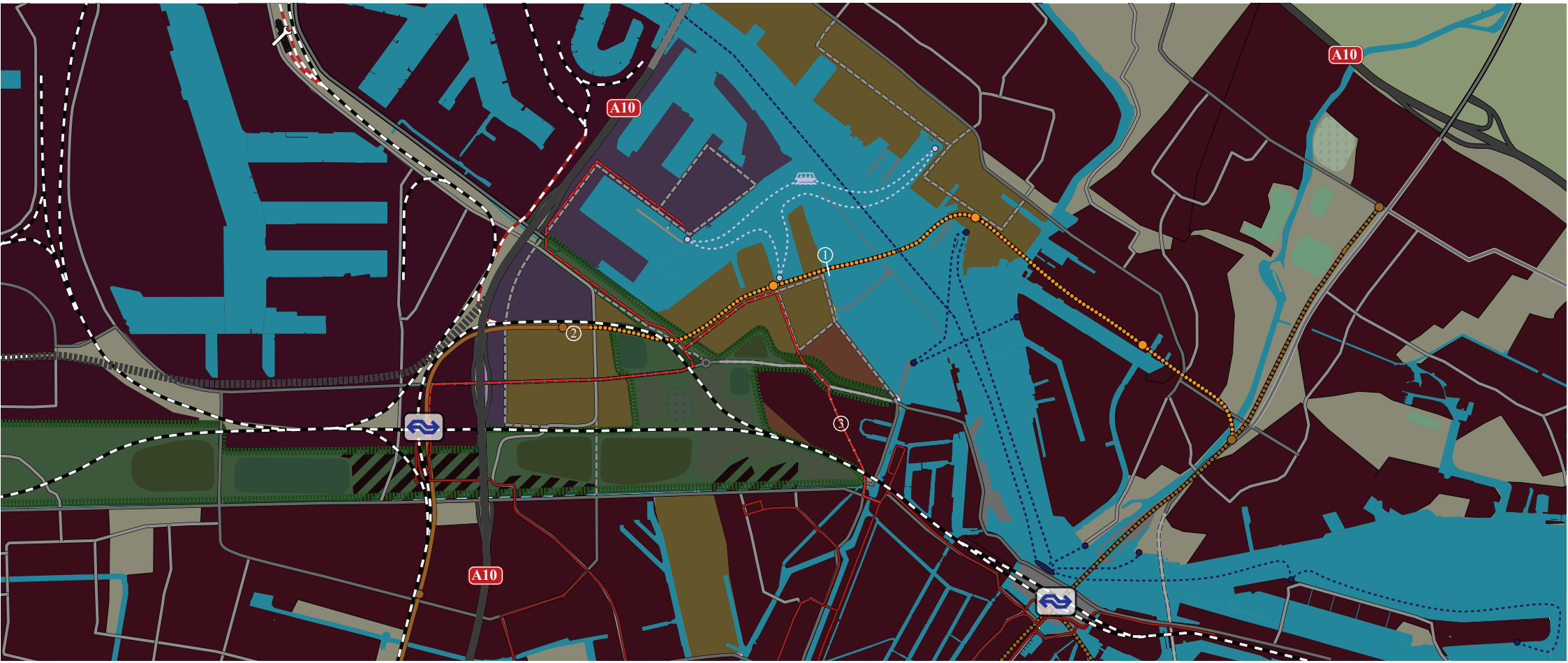


Image 4.3.3: *New situation at the infrastructural node.*

4.4 Public transport



Public transport

- Subway lines, *above ground*
- Subwaylines, *underground*
- Proposed subwayline, *underground*
- Subway stations
- Tramlines
- Proposed tramline
- Ferry connections
- Proposed ferry connections
- Trainstation

① First phase the subway line

② Isolatorweg

③ Spaarndammerstraat

N

0 1 km

Scale 1:35000

The area is conveniently situated between the two largest railway stations of Amsterdam (Central Station and Sloterdijk station). Creating a proper public transport connection towards these stations will provide huge opportunities for the area. For the area close to the Sloterdijk station this is already the case. However, the harbour area especially is lacking this connectivity.

The number 50 subway line currently has its final stop at the Isolatorweg. A very obvious intervention is extending this line towards the harbour. In this plan this will be done in two phases, since constructing a subway line can be very costly. To start, the subway line will be extended with just one stop. This will connect the harbour area with the Sloterdijk station. The line at the Isolatorweg is above ground and will go underground, since it has to cross underneath the railway. The line will be constructed up to the water's edge so that it can easily be extended in the second phase. The plan for the second phase is to extend the subway line further across the IJ, along other harbour redevelopment areas towards the North/South subway line that is currently under construction. This will contribute to the reduction of the barrier created by the water that was discussed in chapter two.

Another aspect which will contribute to the reduction of the barrier is a new ferry connection that will connect the north and south banks of the water in this area.

To connect the area with the Central Station, a new tramline will be created. This tramline will run between the two train stations and through the harbour area. The tramline will for about twenty-five percent use tracks that are already in place but are not used at this time. The tramline will run through the Spaarndammerstraat, a street that also used to have a tramline in the past (image 4.4.2).

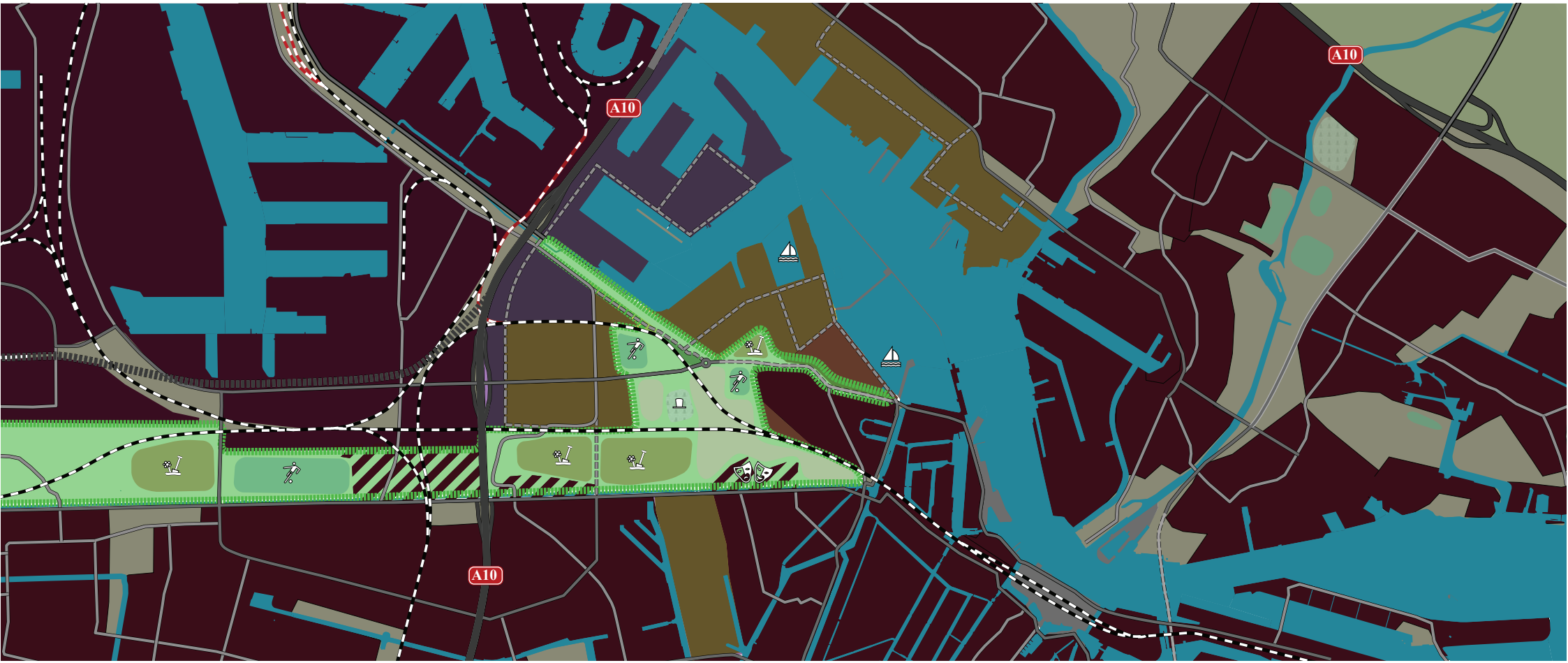
A small public transport hub will be created in the harbour area, where the metro, tram and ferry connections come together to create an integrated public transport network for the area.

All together these additions to the public transport network will ensure that this area is very well accessible by public transport. This will be a good stimulation for the urban development in this area.

Image 4.4.1: *The above ground subway station at the Isolatorweg (Nederland metro, 2008).*

Image 4.4.2: *Tramline 12 on the Spaarndammerstraat 1955 (Epema, 2009).*

4.5 Green and leisure



Green and Leisure

- Urban green
- Green “corridor”
- Recreational green
- Allotment gardens
- Sportsfields
- Graveyards
- Soccer field
- Cultural centre: Westergas verbriek
- Marinia

N

0 1 km

Scale 1:35000

The Brettenzone is an almost ten kilometres long ecological corridor. It connects the Haarlemmerpoort all the way to the nature area Spaarnwoude. This is illustrated on image 4.5.1 (Abrahamse et al., 2010). It comprises a zone of about 400 meters wide, with the exception of the area around the Sloterdijk train station; here the connection is limited to a small waterway.

In this plan, the green zone of the Brettenzone is extended past the railway. A large part of the current railway yard will be transformed into a green area and in this way connect to the allotment gardens at the Minerva City-harbour. Furthermore, there will be a park over the new tunnel at the Haarlemmerdijk. This will connect the green zone all the way to the waters of the IJ.

The current green zone is occupied for a large part by 'semi-green' functions, like sports fields and allotment gardens. The aim is to continue this tendency in the extension of the green zone. Therefore some additional sports fields will be placed here, together with some recreational green. In combination with the cultural centre at the Westergasfabriek and the old village centre of Sloterdijk – both also situated inside this green zone – the green zone will become the centre for recreation and culture for its surrounding areas

The extended green zone will also contribute to the reduction of the barriers created by the railways, with the extension parts of the railway will be hidden from view by the surrounding greenery, causing the barrier to be experienced less from the built environment.

The prominent location at the waterfront cannot be ignored, therefore marinas will be placed in the harbour to offer the possibility for water related leisure activities.

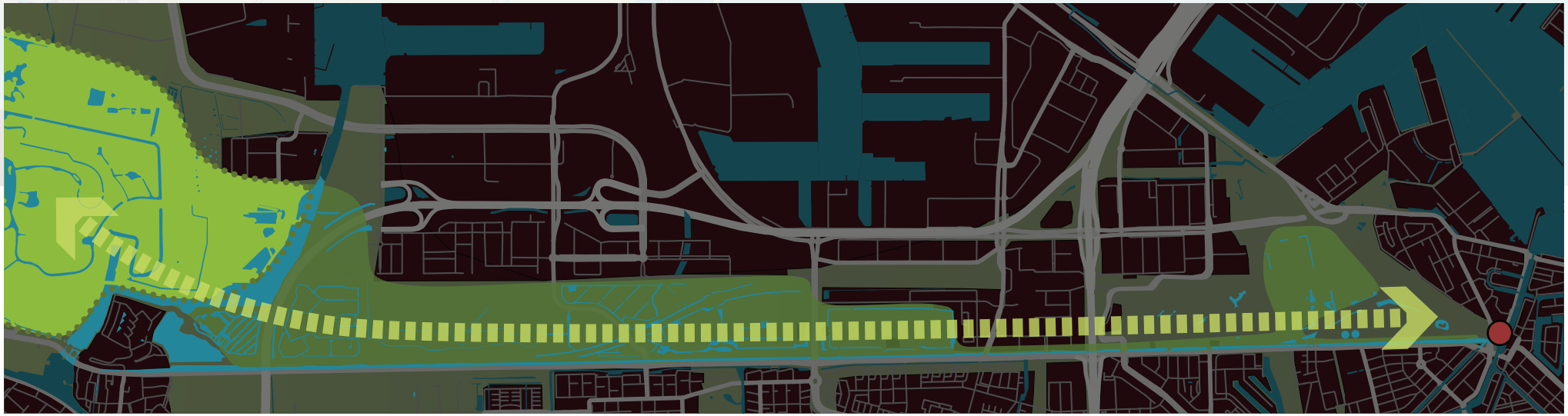


Image 4.5.1: *The ecological corridor between the Haarlemmerpoort (right) and nature area Spaarnwoude (left).*

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Urban design

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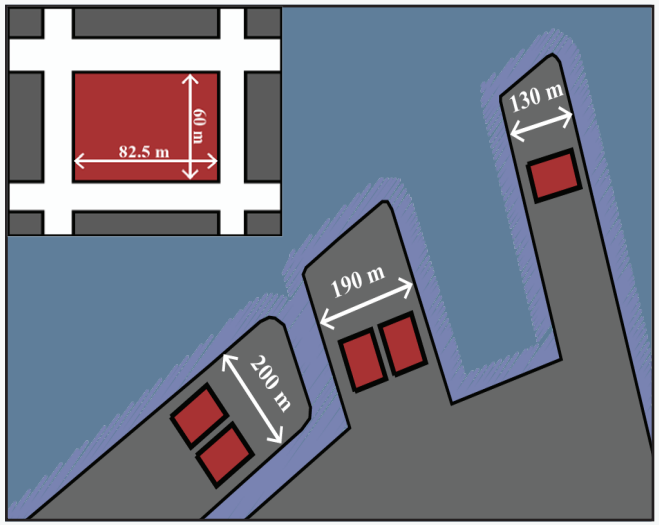


Image 5.1.1: *Bock dimensions, placed on the project location.*

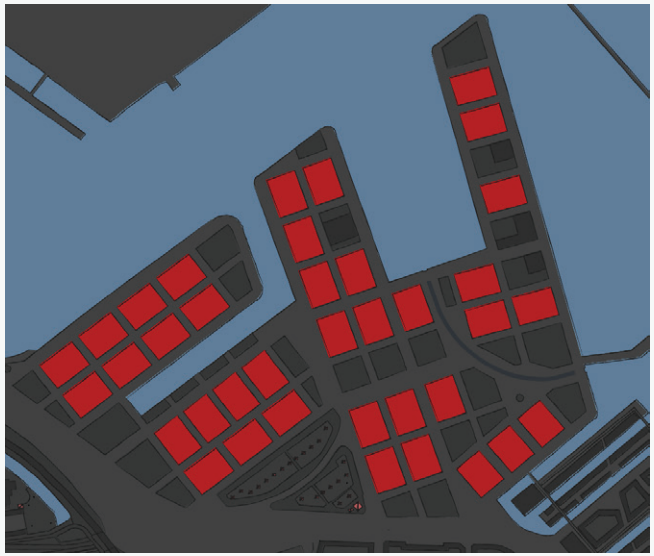


Image 5.1.2: *Blocks with the standard sizes in the new design for the Minerva city-harbour.*

5.1 Application development strategy

The application of the development strategy on the Minerva City-harbour will be explained by the means of the different aspects/conditions for the urban fabric: grain size, parcel size, access structure, green and water and finally landmarks.

5.1.1 Grain size

In the previous chapters was already stated that a small grain size of the urban fabric allows for diversity and gradual change. Furthermore it is noted that a small grain size is relevant to its environment. In order to determine what exactly is a small grain size for the city of Amsterdam an analysis has been made of the grain of several urban areas (see appendix 8.1). With this analysis was concluded that two aspects have influence on the perceived grain size: the surface area of the urban islands and the lengths of the urban islands. It is determined that an urban area in Amsterdam will qualify as a small grain size if: The surface area of the urban islands is ***less than 6000 m²*** and the edges of the urban islands are ***no longer than 100 meter.***

The aim for the design was to make an urban fabric that makes use of one standard island size. These islands are dimensioned is such a way that it allows for a flexible and multi-functional programme, which is with plurals of 7.5 meters (more on this in the next section 5.1.2 on the parcel sizes). Another decisive aspect in determining the island size was the size of the harbour piers. Together this lead to an standard island size of 60 meters wide and 82.5 meters long (Illustrated on image 5.1.1)

As mentioned before the design is made with the aim to use this standard island size as often as possible, Image 5.1.2 illustrates all the standard sized urban islands. A

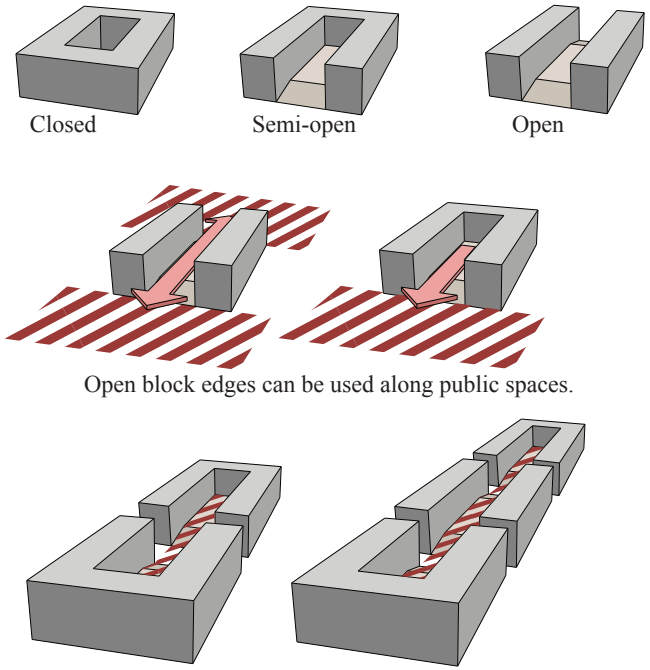
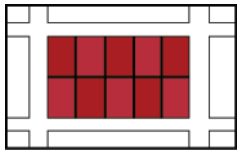


Image 5.1.3: *Possible changes of building blocks over time.*

catalogue has been made with a number of building block compositions that each can fit within these urban islands. This choice for what kind of building block should be build can be made in a later stage, e.g. at the start of a new phase in the development process.

The catalogue contains three kinds of building blocks: Closed, semi-open and open building blocks. The semi-open and open building blocks can be placed along public space in order to enhance the courtyards of the building blocks. Another option is to link the courtyards of some blocks together to create large(r) courtyards (illustrated on image 5.1.3)



5.1.2 Diverse parcelling

Different types of functions have different spatial requirements or demands. In order to be able to accommodate these different functions, diverse parcel sizes are needed. The diverse parcelling in this plan is achieved by making block composition consisting out of four different elements or "units". These units are dimensioned in such a way that each of them will be able to accommodate a few types of functions. Because each unit is not optimized for one specific function but for a few different functions it will make it relatively easy for functions to change within the units.

This means that by making a composition of these different units multi-functionality and flexibility will be achieved within these building blocks

All the units will have the same width, this makes it easy for them to be combined. This width has been set at 7.5 meter, This is a measure that is very suitable for all kinds of different functions (PBL, 2009: 14). The dept of the different units are plurals of 7.5, to ensure that the various units fit together within the block. Image 5.1.4 furthermore illustrates how the parking facilities can fit very well in to the dimensions with a plural of 7.5 meter: 15 meters will give room for six parking spaces and still leave enough space for the load-bearing structure (Neufert and Neufert, 2002: 439). The different units will be briefly explained and an overview of the specification of the different units is given in image 5.1.5.

Unit A:

This unit is suitable for residential and office functions, This unit is 15 meters deep. This will allow for enough daylight to enter the unit. According to the building act of 2012 office space requires a minimal ceiling height of 2.6 meter. However, a height of at least 3 meter is more desirable. Adding the required space for conduits leeds to a required floor-to-floor space of 3.5 meters.

The parking norm for this unit is based on the parking norm of the function with the highest parking demand, which in this case is office space (1.3 parking spaces per 100 m^2 (DRO, 2008: Bijlage V)). This means that for this unit there is a parking norm of 1.5 parking spaces per unit.

Unit B

Companies will also have a place in this plan, however companies require a lot of space. The PBL (2009: 67) state stat a parcel of at least 30 meters deep will give companies from the VNG (2007) categories A and B

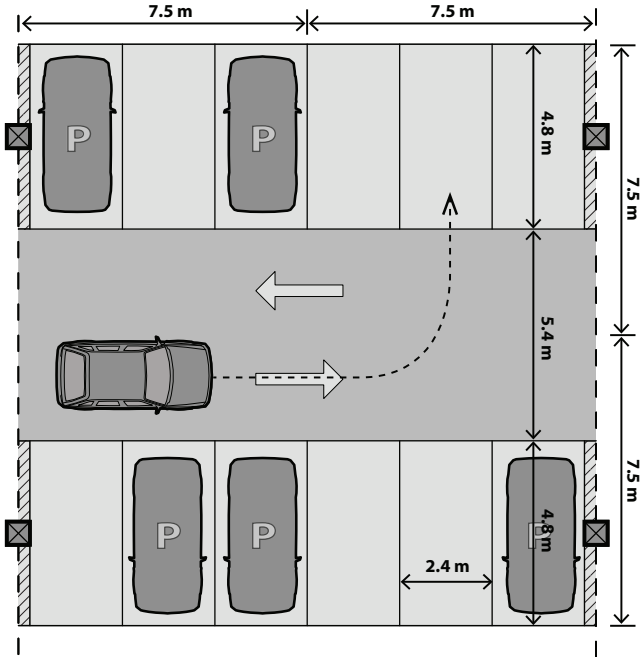


Image 5.1.4: *Example for parking plan.*

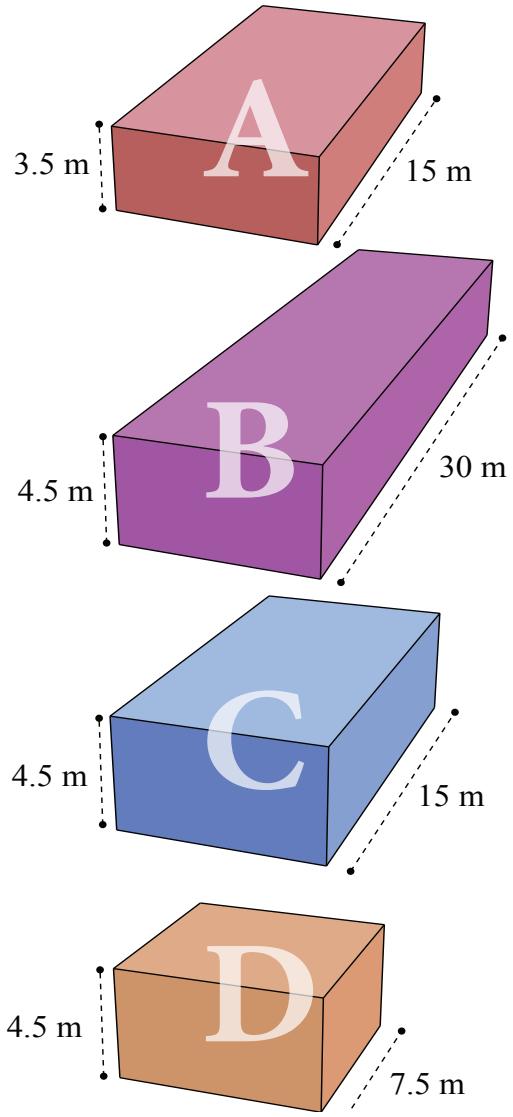
enough space. Companies and shops need to be supplied by trucks. To be able to do this from within the block (backside), an increased floor-to-floor space is needed. The average truck has a height of 4 meter (Neufert and Neufert, 2002: 433). Therefore, the floor-to-floor space has been to 4.5. These dimensions will make this unit also suitable for retail and catering functions. However, due to its dimensions this unit is not suitable for residential and office functions.

The parking norm for this unit has been determined at 7 parking spaces per unit and is based on a number set up by the municipality of Amsterdam (DRO, 2008: Bijlage V).

Unit C

This unit is suitable for retail, catering and office functions This unit is 15 meters deep, the same as unit A so that they are able to be combined. Like unit B it is preferred (but not necessary) that the unit can be supplied form within the block (backside). Therefore the height of this unit has also been set to 4.5 meters.

The parking norm for this unit has been determined at 3 parking spaces per unit and is based on a number set up by the municipality of Amsterdam (DRO, 2008: Bijlage V).



Unit A

Possible functions: Dwellings, Offices

Dimensions: 15 m deep, 3.5 m high, 7.5 m wide

Parking-norm: 1.5 parking spaces per unit

Unit B

Possible functions: Companies, Shops, Catering

Dimensions: 30 m deep,4.5 m high, 7.5 m wide

Parking-norm: 7 parking spaces per unit

Back entrance needed for supplies

Unit C

Possible functions: Shops, Catering, Offices, Dwellings

Dimensions:15 m deep, 4 m high, 7.5 m wide

Parking-norm: 3 parking spaces per unit

Unit D

Possible functions: Shops, Catering, Offices

Dimensions:7,5 m deep, 4 or 4,5 m high, 7.5 m wide

Parking-norm: 1.5 parking spaces per unit

Image 5.1.5: *The different units with their specifications.*

Unit D

This unit is suitable for small retail, catering and office functions. This unit is only 7.5 meters deep, which will give more space inside the block for parking facilities. The height of this Unit is the same as unit B and C, so that they can be combined on the same floor.

The parking norm for this unit is also the same as unit C, but with half the size; this means that 1.5 parking spaces per unit are needed.

Connecting units

To increase the flexibility and the variety in available accommodations, it is possible to connect different units together. Image 5.1.6 illustrates some examples of this. By allowing the connections between units it is for example possible to create multistory dwellings or large same level office space. These connections can be made during the initial development, but also in later stages. This can for example give offices or companies the possibility for expansion and will thus increase the flexibility in the building block. Furthermore, the variety that can be created with these connections will greatly contribute to the ability to attract different types of companies/residents into the area and therefore will contribute to creating a mixed-use area.

Note: the created block compositions can bee seen in the buildingblock catalogue (appendix 8.2)

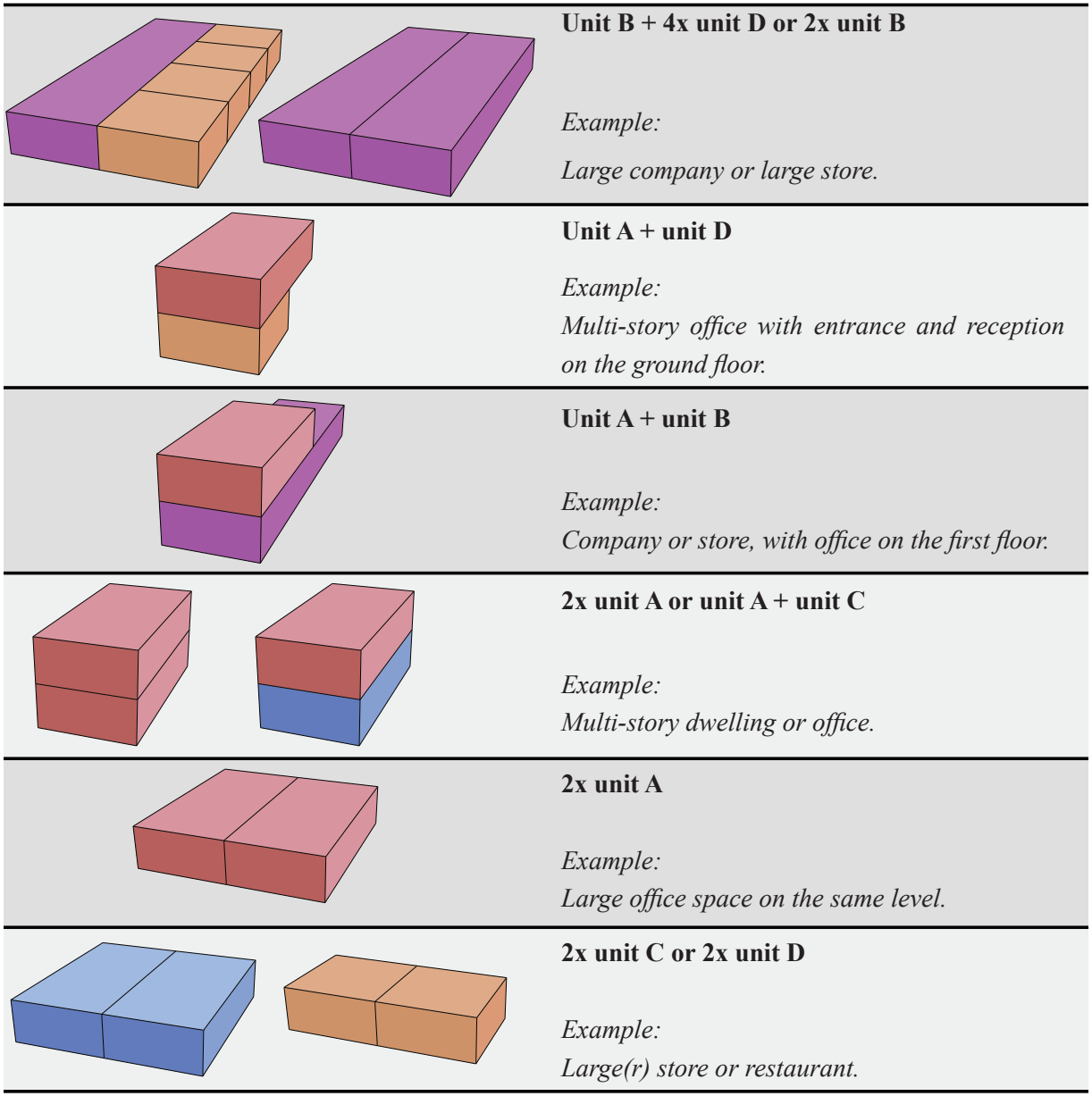


Image 5.1.6: *Some of the possible connections between different units.*

Standard profiles

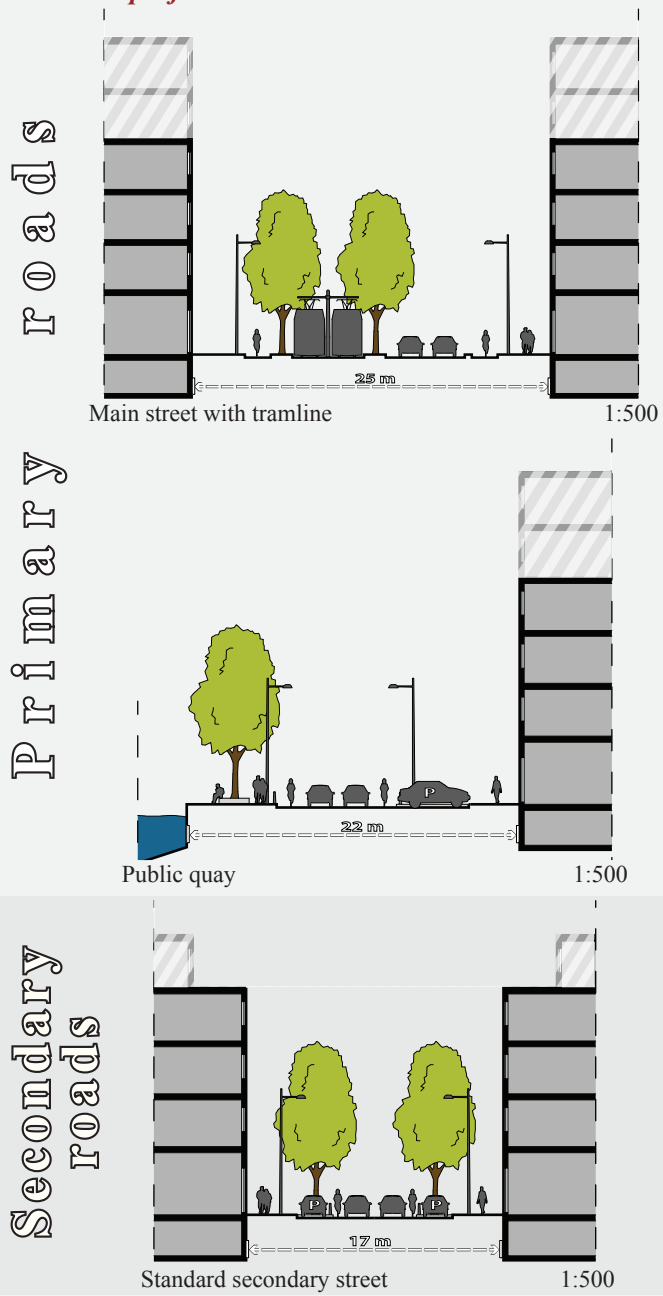
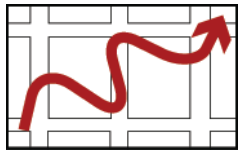


Image 5.1.7: *Standard street profiles for the new design.*



5.1.3 Access structure

To attract multiple functions to an area, a well functioning access structure is essential, both by car and public transport. Image 5.1.8 shows the primary car access structure of the new design for the Minerva City-harbour. These roads are placed is such a way that all the secondary roads in the plan can reach a primary access road with only making one turn or less. And from here one can easily access the main access roads of Amsterdam.

Image 5.1.7 shows the standard street profiles for this design, the primary and secondary roads. There are two types of primary roads: the public quays (22 meter wide) and the roads with the tram line (25 meter wide). Both have separated bicycle paths, and this is not the case for the secondary roads. The secondary roads are 17 meters wide. This sets limits to the building height along this street compared to the primary roads, the buildings can have a maximum of four floors, unless the fifth and sixth floor have a receded façade allowing for enough sunlight.

The new public transport connections have been elaborated in the previous chapter of the master plan. The access of the new public transport is illustrated in image 5.1.9. The image illustrates the routes of the

Image 5.1.8: *Main acces structure for cars in the new design for the Minerva city-harbour.*

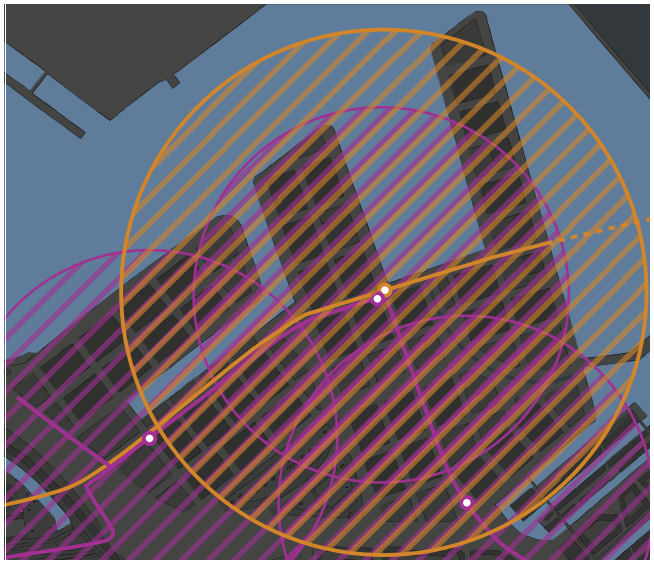
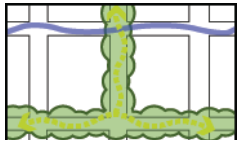


Image 5.1.9: *Access structure for public transport, with distance from the stops (Orange for the subway, purple for tram).*

tram line and subway line and their stops. The circles illustrate the walking distances (400 meter for the subway and 300 meter for the tram line (Gemeente Amserdam, 2005: 15)) and shows that the entire area is within walking distance of at least one public transport stop. And from these stops the large railway stations of Amsterdam Sloterdijk station and the Central Station can be reached quickly.



5.1.4 Water and green structure

In the development strategy it is stated that the presence of water and/or green will give a great boost to the attractiveness of an area, and that this attractiveness is needed to attract an variety of functions into the newly developed area. The fact that the project location is a former harbour area makes for an abundance of water in the close proximity. The presence of this water is utilized by making the quays publicly accessible (see the standard street profiles in image 5.1.7) and positioning several public spaces on the waters edge (two of these will be further elaborated in the next paragraphs), shown in image 5.1.10.

In addition image 5.1.10 also shows the green network for the new design of the Minerva City-harbour. In the previous chapters the larger-scale green network with the Brettenzone – which connects the nature area Spaarnwoude with the inner city of Amsterdam, illustrated in image 5.1.12 – has been elaborated. For the project location there will be a network of green routes that will run through the site and make a connection between the ecological zone in the south and the water. In addition will these routes provide pleasant traffic routes for slow traffic between the Minerva City-harbour and the inner city of Amsterdam.

These green routes will have a dimension of at least 40 meters wide. This will give enough space for separated bicycle and pedestrian and car routes, and will leave enough room for green and/or small sports/play fields for the children in the neighbourhood. Image 5.1.11 shows an example section of one of these green routes.

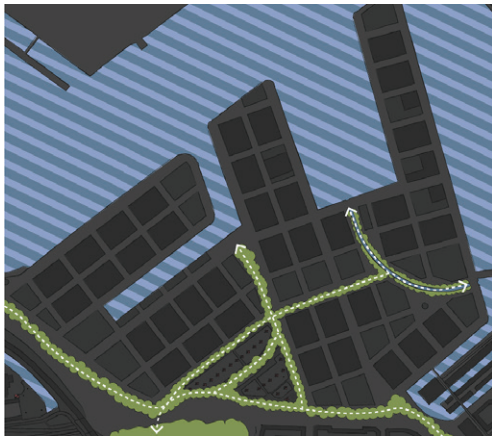


Image 5.1.10: *Water and green network for the new Minerva City-harbour.*

Image 5.1.11: *Example cross section of one of the green routes through the plan.*

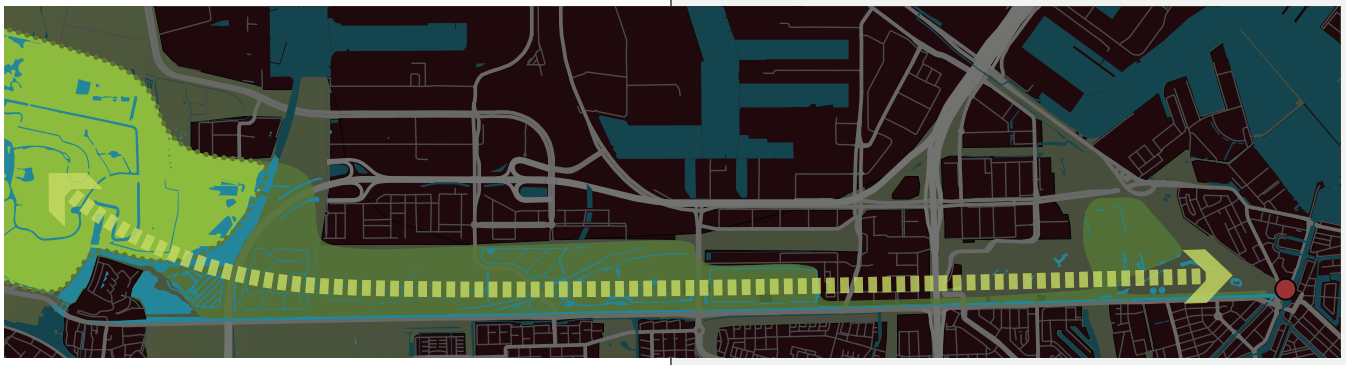


Image 5.1.12: *The ecological corridor between the Haarlemmerpoort (right) and nature area Spaarnwoude (left).*

Image 5.1.13: *Artwork as a landmark. (iamsterdam.com s.d.).*

Image 5.1.14: *Special function as a landmark, the Film Institute Netherlands in Amsterdam (Sica.nl, 2012).*

Image 5.1.15: *Tower as a landmark, the Shelltower allong the IJ in Amsterdam (Wojofoto, 2007).*

5.1.5 Landmarks

The landmarks are elements that will also elements that will boost the attractiveness of the area. The design for the Minerva-city harbour tries to make use of the standard sized block as often as possible. However, there are quite a few off-sized building blocks due to the shape and angular changes (llustrated on Image 5.1.16). These blocks can very well be used to construct special and potential landmark buildings. Of course there are too many of these blocks for them all be a landmark, so the large blocks and the ones at a special location like the end of a pier are the most obvious locations for a landmark.

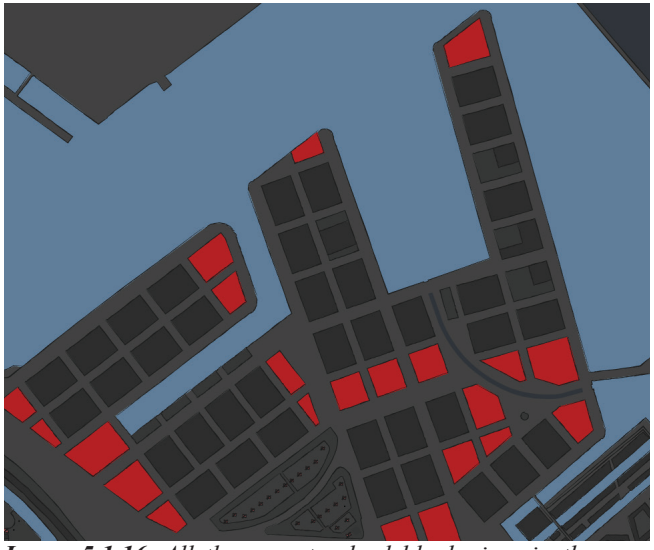


Image 5.1.16: *All the non-standard block sizes in the new design for the Minerva City-harbour.*

However, landmarks do not necessarily have to be tall buildings than can be seen from a large distance. It could for example also be an characteristic artwork or a building with a special function. Image 5.1.13-15 show different landmark types in the city of Amsterdam

With the REM-island (image 5.1.17) just offshore of the Minerva city harbour there of course already is a very notable landmark very close to the project location, and this landmark will remain on its current location.

Image 5.1.17: *REM-island, restaurant on a former artificial island, which serviced as TV studio (Janssen, 2012).*

5.1.6 Phasing

An important aspect in the development process of the set-up development strategy is the gradual development of the design. This means that the area will be developed piece by piece rather than the whole plan at once. To achieve this a phasing plan has been made.

Image 5.1.18 shows the division of the design into several development area's along with the important structural elements of the design. Next step is to determine the development order of the different development areas.

The development will start with the construction of all the structural elements (the infrastructure, public transport, public space and green). By doing this the different development areas will be able to function properly even though not all the areas have been developed. Image 5.1.20 shows what the possible situation could be if only the first development area is

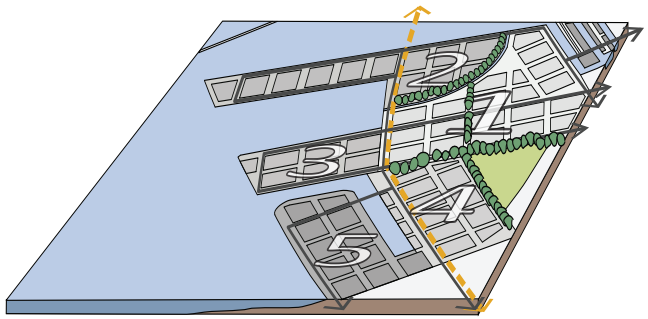


Image 5.1.18: *Overview of the division of the Minerva City-hour into different development areas: 1-5.*

developed, with all the structural elements and public transport in place this area can still function properly.

The development order of the different areas is based on the expansion of the urban fabric. This means that the development of the areas is started with area one, because this is the area that is adjacent to already existing urban areas and in this way a good connection between the old and the new can be made from the immediately (which would not be the case if the development was started with area three for example). The development of area one will be followed by area two. After this, area three and four will be developed.

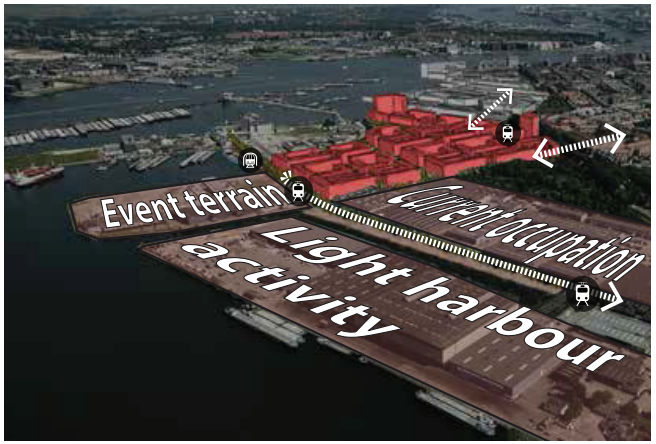


Image 5.1.19: *Possible situation if only phase one gets realized.*

The order between areas three and four does not really matter and is thus open for change. The development process will be ended with development area five since this area is the furthest away from the existing urban areas. A time-line of the development process is illustrated in image 5.1.20.

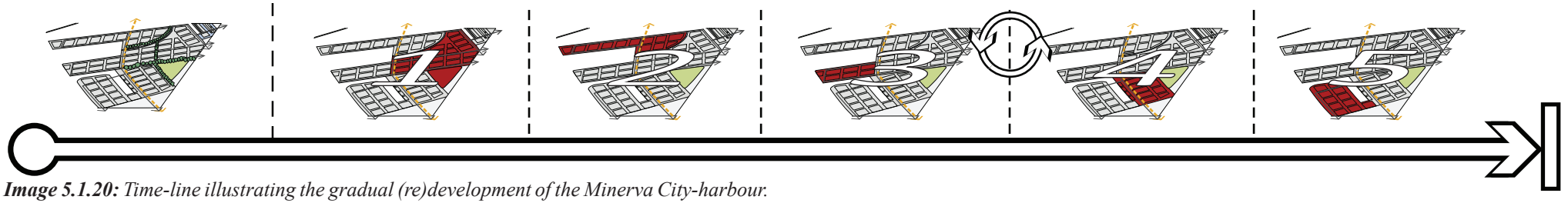


Image 5.1.20: *Time-line illustrating the gradual (re)development of the Minerva City-harbour.*

5.2 The design

The core of the design has already been elaborated in the previous section, with the application of the development strategy. This section will give some more detailed insight to the design. starting with the situation and design of the public spaces, followed by the furnishing of the public space, how the height difference between the Spaarndammerdijk and the harbour area is bridged and finally the functional programme. The plan of the design is shown on the fold-out of the next page.

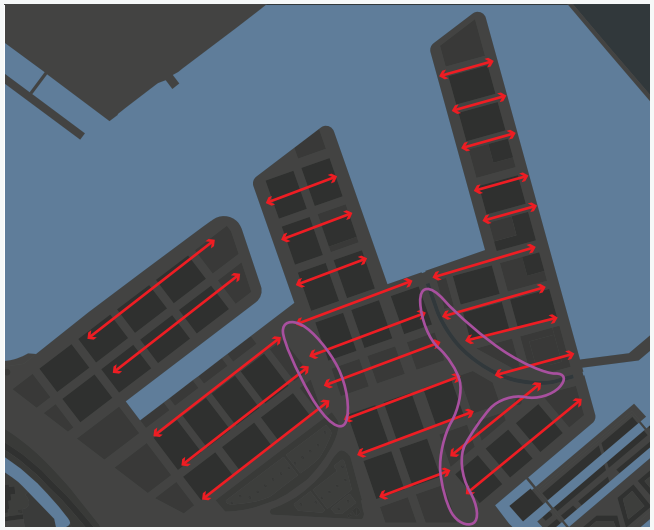


Image 5.2.1: *Different directions coming forth out of the project locations (red), and the locations where these angular changes meet (purple)*

5.2.1 Public spaces

The orientation of the building blocks is based on the directions of the project location. Four different directions can be derived from the site, illustrated in image 5.2.1. Where these different directions meet there is an angular rotation that can bring difficulties with the urban fabrics and building blocks. Creating public spaces where most of these different directions meet has solved these difficulties (image 5.2.2).

With the analysis in chapter four was shown that the presence of the IJ is a large quality for the project location. In order to fully utilise this quality the water has been made accessible by creating publicly accessible quays – large parts of the main access structure are along the quays – in addition with some larger public spaces on the waters edge. The public spaces in the plan are illustrated in image 5.2.2

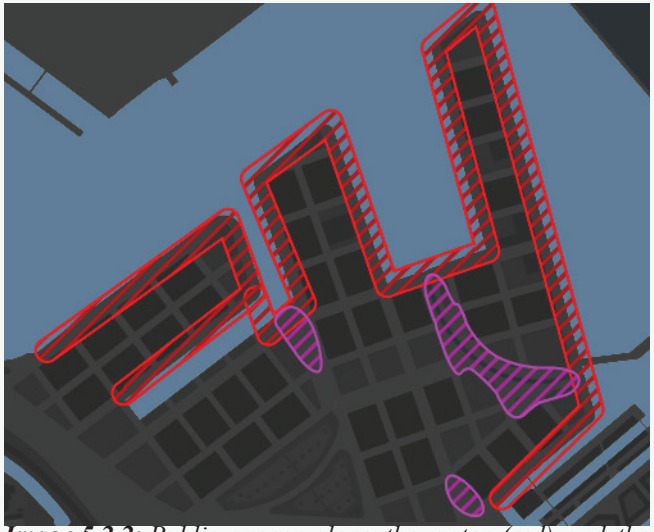


Image 5.2.2: *Public spaces along the water (red) and the public spaces created to solve the angular changes (purple)*

Image 5.2.3: *Birds eye impression of the design for the Minerva City-harbour, looking from the southeast.*


Water
Roads
Trace of the car tunnel
Pedestrian area
Existing buildings
Standard sized blocks
Off-sized blocks
New blocks outside the project area
Tram-line
Public green
Private green
Green slope
Trees
Outdoor swimming pool
Barges
Allotment gardens
Football pitches
Public swimming pool
Barge moorings
Marina
Graveyard
Adventure playground
Subway station
Tram stop
Ferry departure point
N
0
150 m
Scale 1:5000

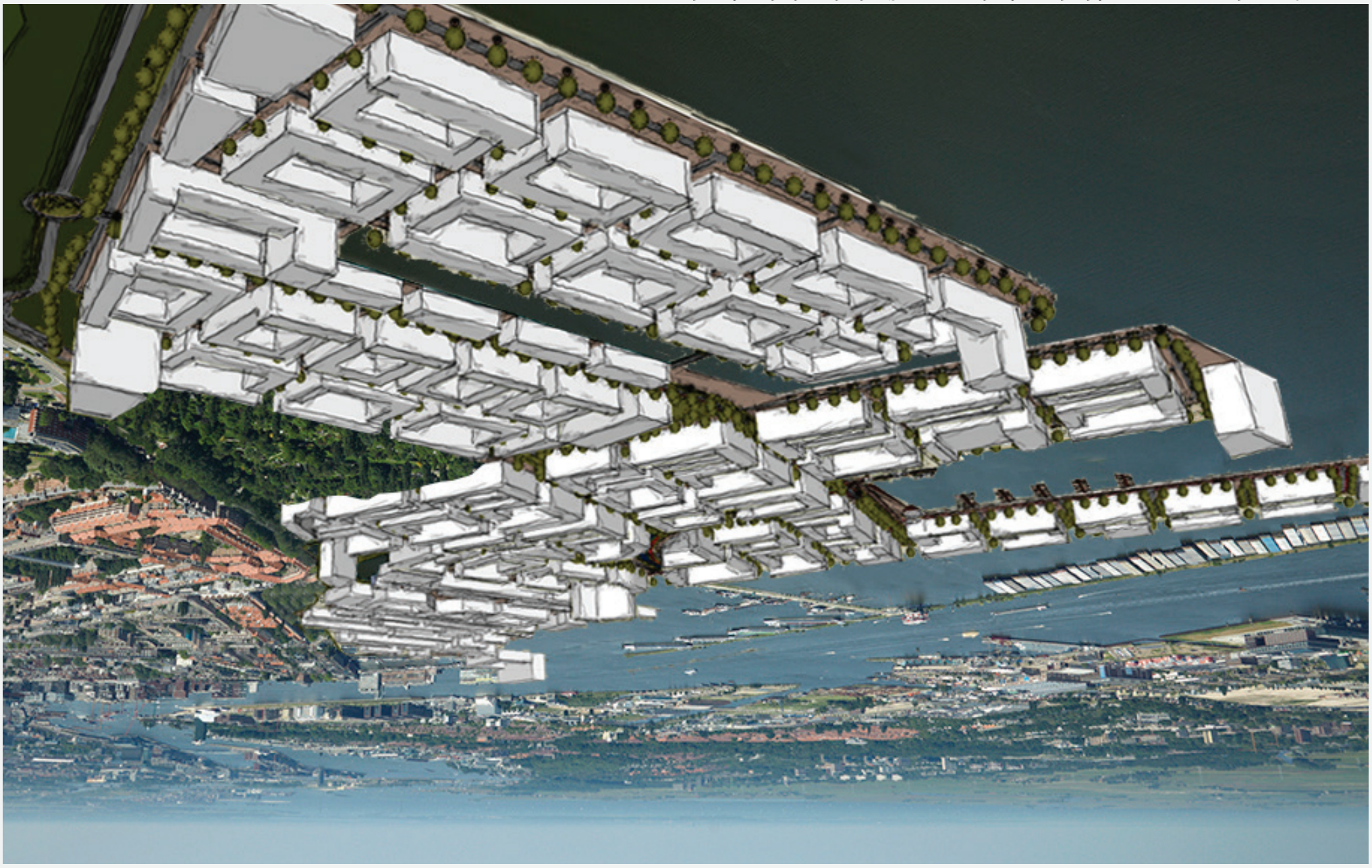


Image 5.2.4: *Birds eye impression of the design for the Minerva City-harbour, looking from the west*

References

Image 5.2.5: *Two types of street lights are used, along the car street (left) and along the pedestrian routes and public spaces (right).*

Image 5.2.6: *Benches that are used in the plan are the regular wooden bench (left) and on edges simple wooden sitting surfaces are created (right)*

Image 5.2.7: *The trees that are used are different kinds of Elm trees. A smaller kind (Ulmus Minor) left and a larger king (Ulmis Hollandica) right.*

Images from doelbeelden.nl (s.d.) unless mentioned otherwise

Two of these public spaces have been chosen to make a more detailed design, these are two types of public spaces a public space along the water (a head of one of the harbour basins) and public space that is part of the green structure (the "green" canal) in the area. These designs can be found in paragraphs 5.3 and 5.4.

5.2.2 Furnishing of the public domain

The materialisation of the public spaces will be further elaborated in the detailed designs of the public spaces that have been mentioned before. The furniture will now be briefly elaborated.

Two types of streetlights are used in the design. Along the car streets contemporary versions of the traditional streetlight are used, similar to the ones use in the newly developed IJ-burg district. To light the public spaces and pedestrian routes poles with a number of spotlights are used.

The image 5.2.6 illustrates the seating furniture that will be used in this design. These are contemporary wooden benches and in addition simple wooden surfaces will be placed on parts of the raised edges in the public spaces in order to create sitting surfaces.

Amsterdam has a tradition of using elm trees in the city, more than 75.000 elm trees in more than 40 different types are growing across the city (Gemeente Amserdam, s.d.). Therefore, (at least) two types of elm trees are used in the design, the Ulmus Minor – a relative small type – along the streets and the Ulmus Hollandica – an elm type with a wider crown – in and along the public spaces.

5.2.3 Height difference

Another point that came from the analysis is the height difference between the Spaarndammerdijk, 2.6 meter above NAP and the harbour area 0.6 meter above NAP. This is a height difference of only 2 meters. This is lower than half of the 4.5 meters which is the height of the ground floor in most of the standard building blocks out of the catalogue. Image 5.2.8 illustrates two options on how this height difference can be bridged with one of the standard building blocks using minor adjustments.

The first option has access to the ground floor on both the top and the bottom side. The block is elevated slightly so that there will still be a three-meters high façade of the ground floor on the topside of the levee. This elevation however, means that some steps will be needed to access the building on the lower side of the levee.

For the second option the block is slightly lowered. This will allow the first floor to have direct access from

the top of the levee and the ground floor can still be accessed on the lower side with some indoor stairs. The 'ground floor' on the topside will not have any daylight access and can therefore be used for parking and/or storage.

And there are of course some other ways thinkable on how this can be done with the few off-sized blocks that have to deal with this height difference.

5.2.4 Functional programme

The flexible character of this design means that no functional division of the design has been made, so there is no traditional map that shows all the functions in the design. However mixed-use is an important precondition. The spatial qualities of the urban design, which come forth out of the development strategy – explained in the previous section – should help make sure this happens.

In the theoretical framework a tool for the legislation has been introduced that can help guide a flexible development of a mixed-use area, the Mixed use Index Product (MXI-P). The MXI-P illustrates the degree of mixed-use. A low value means a high functional mix. In chapter two was concluded that a area can be defined as mixed-use if the MXI-P is 40 or below. To allow for the maximum amount of flexibility the maximum of MXI-P for this design should be set at this maximum of 40. This means that for each type of function (living, working and amenities) the minimum percentage of the total FSI is 13 percent and the maximum is 53 percent.

It however is to be expected that the residential related functions will be the dominant type of functions and that the percentage of amenities will be the lowest.

The pie charts of image 5.2.9 illustrate how some examples on how division of different types of functions can be with this MXI-P value.

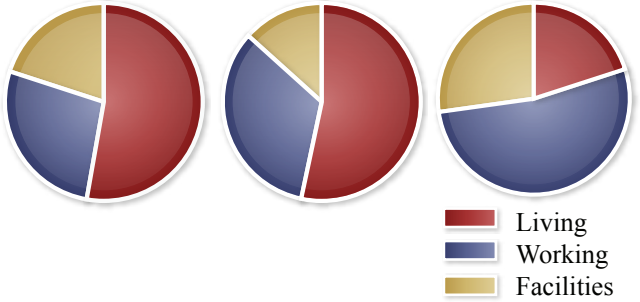


Image 5.2.9: *Possible function division between the different types of functions with an MXI-P of 40.*

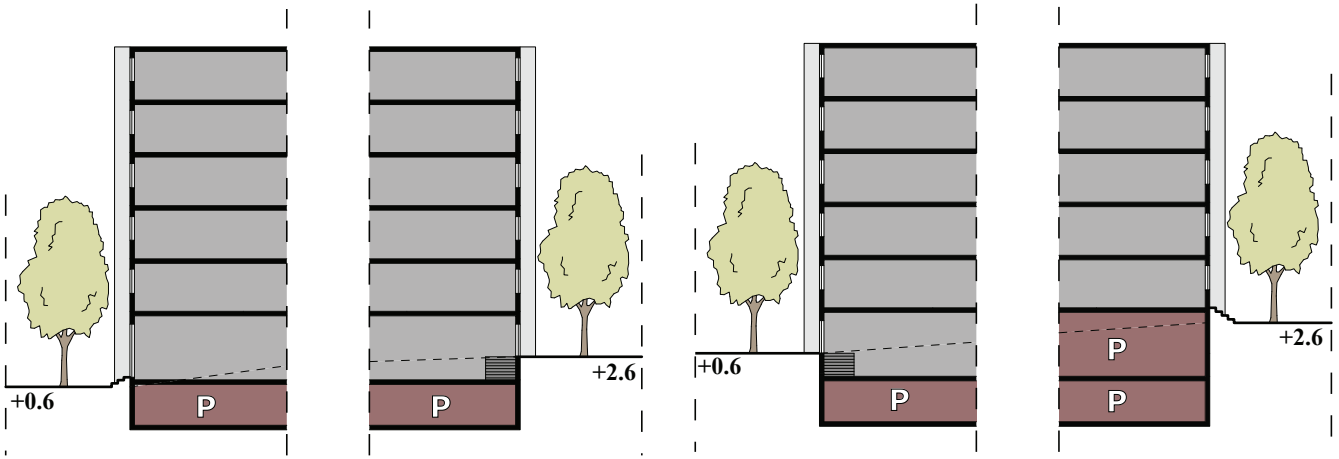
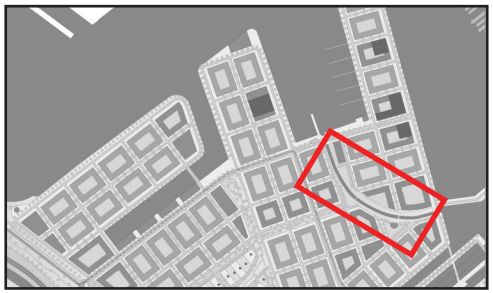


Image 5.2.8: *Two options for bridging the height difference between the levy and the harbour area: option one (left) and option two (right)*

5.3 Subarea: Green canal



Water
Public green
Green hill
Semi-public space
Building block
Roads
Bicycle path
Pedestrian path
Pedestrian area
Wooden deck
Parking space
Tram-line
Trees

N

0 50 m

Scale 1:1500

The location, shape and direction of the Canal is based on already existing water features on this location. These water features historically used to be part of a canal that was used to supply the wood industry on this location (this canal can be seen on the historical maps of the area in the analysis, 1930, 1941 and 1978). The design restores the connection between these water features and the IJ and furthermore makes this canal part of the green network of the area.

Images 6.3.1 illustrate the design concepts for the canal. One side of the canal will be used for bicycle routing while the other side is a pedestrian route.

Earlier was already mentioned that to deal with the angular changes in the urban fabric some public spaces have been created at the locations where these different directions meet. Two of these public spaces are along the canal. Framing them and creating “chambers” with rows of trees have accentuated these two public spaces. This way these public spaces will get their own identity and will not blur together into one large area with the canal. For this reason no trees have been placed on the green banks of the canal, since this will compromise the framing effect of the other trees

Image 5.3.1: *Concept images for the green canal: the routing separating bicycles and pedestrians (left) and the chambers along the canal (right)*

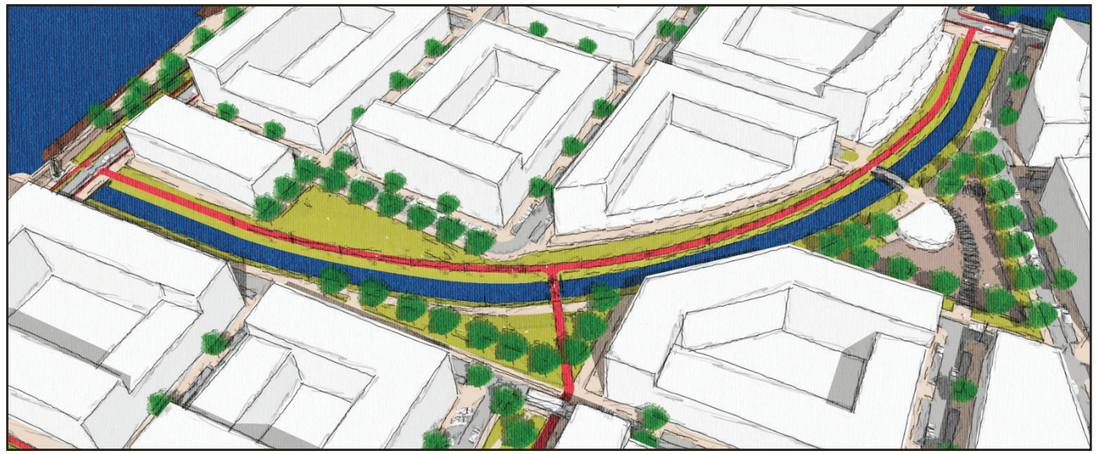


Image 5.3.2: *Birds-eye impression of tha canal and its surroundings*

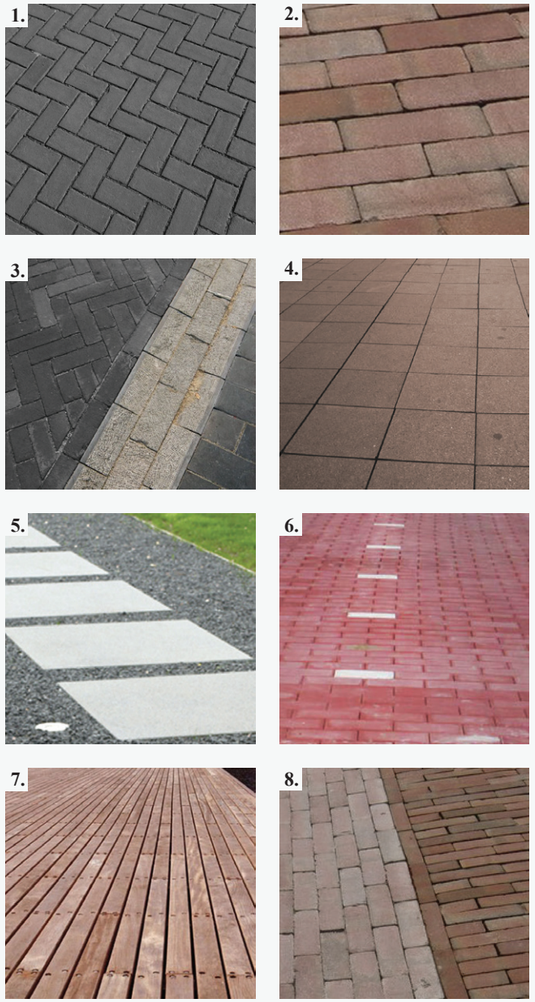
References

Image 5.3.3: *Provenierssingel in Rotterdam (Ducksingel, 2008)*

Image 5.3.4: *The Single in Utrecht (Knoop, 2011).*

References

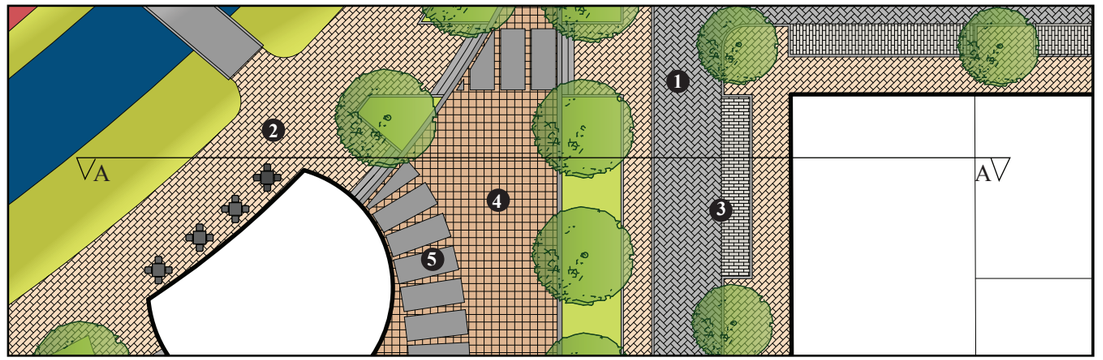
Materials



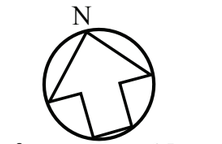
Images from doelbeelden.nl (s.d.)

Section A-A

Scale 1:500



Detailed plan of public space along the canal.



Scale 1:500

The first chamber is created by three directions in the urban fabric coming together and so creating a triangular open space. This first chamber along the canal will be characterised by terraces. The entire area is an elevated square. The elevation of the square is 1.2 meters. This height will further accent the framing of the area and will not too high, so that passing people can still view onto and over the elevated square (image 5.3.5). On the north edge of the square there will be a pavilion that will be able to house two or three bars and/or restaurants. These catering facilities will be able to have terraces on this elevated square with its orientation on the south, which is perfect in terms of sunlight access. By using different materials, the walking routes over the square are marked.

The numbers on the detailed map correspond with different materials shown on the foldout.

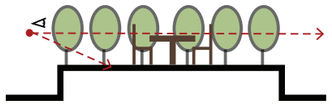


Image 5.3.5: *Concept image of the elevated square.*

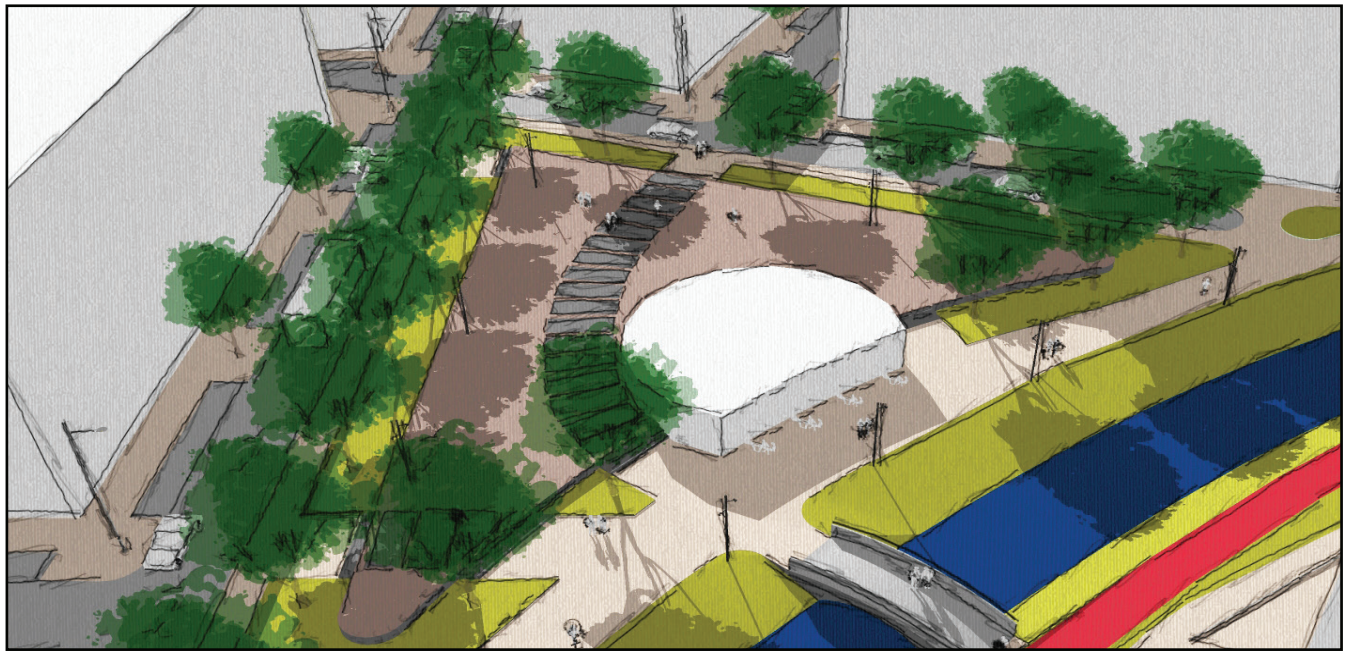


Image 5.3.6: *Birds-eye impression of the elevated public space.*

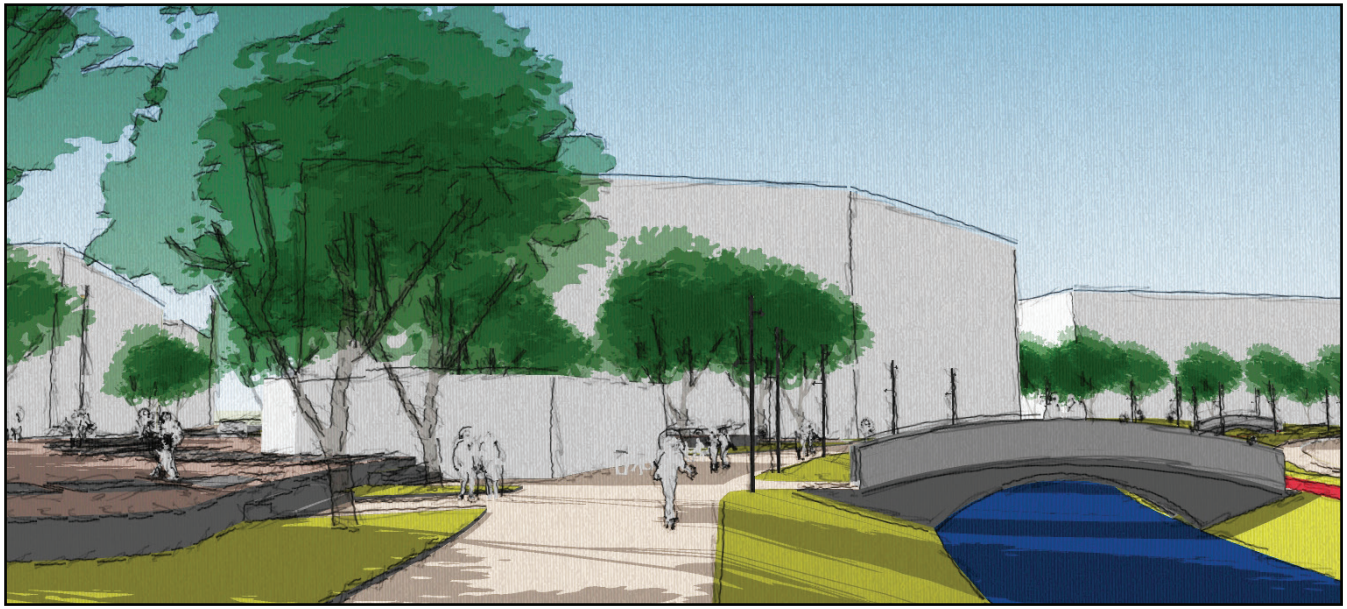


Image 5.3.7: *Eye-level impression allong the canal.*

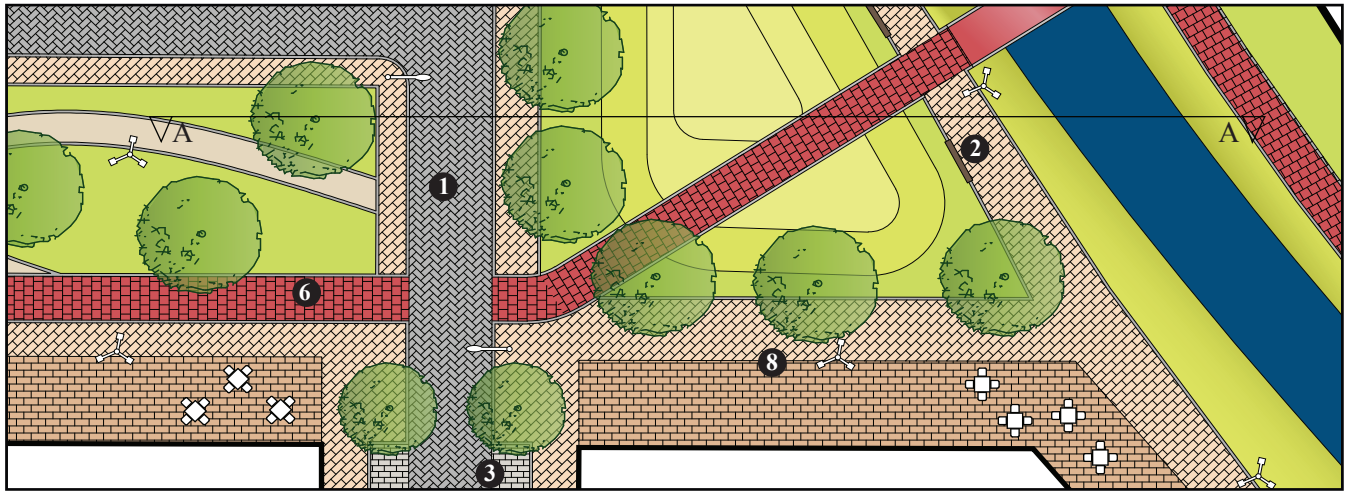
References

Image 5.3.8: *Elevated squares: Beestenmarkt in Delft by Dooozr (2011) and Schouwburgplein in Rotterdam by Topaas (2008).*

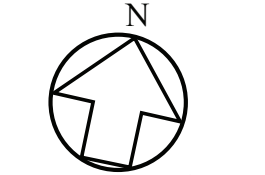
Image 5.3.9: *Round pavilion with bar/restaurant by Rijnbout (s.d.).*

Section A-A

Scale 1:500



Detailed plan of public space along the canal.



Scale 1:500

The second chamber is dissected in two by the canal. The framing of the area by the trees already helps a great deal for the area to be perceived as one. To further strengthen the unity of the area an hill landscape has been created on both sides of the canal. The similar landscape on both sides will help with the perception of the area and will furthermore offer nice vantage points across and over the canal.

Like the elevated square, the hills can not be too high so that they block out the view of the people passing by. Therefore, the maximum height of the hills has been set at 1.5 meter, so that the average person can still look over them.

The hill landscape is crossed by bicycle- and pedestrian paths, these paths are cut out of the hill landscape, This will create a number of raised edges that can be used as sitting surfaces.

This chamber will hopefully function as an area where people will come to relax in the grass and enjoy the sun.

Note: Detailed information on materialization is illustrated on the fold-out on page 78.

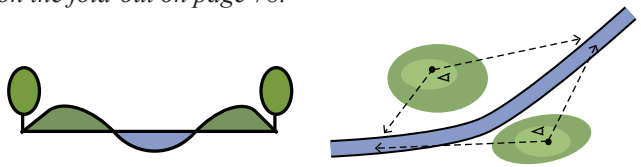


Image 5.3.10: *Concept images: hill landscape on both sides (left), vantage points across and over the canal (right).*

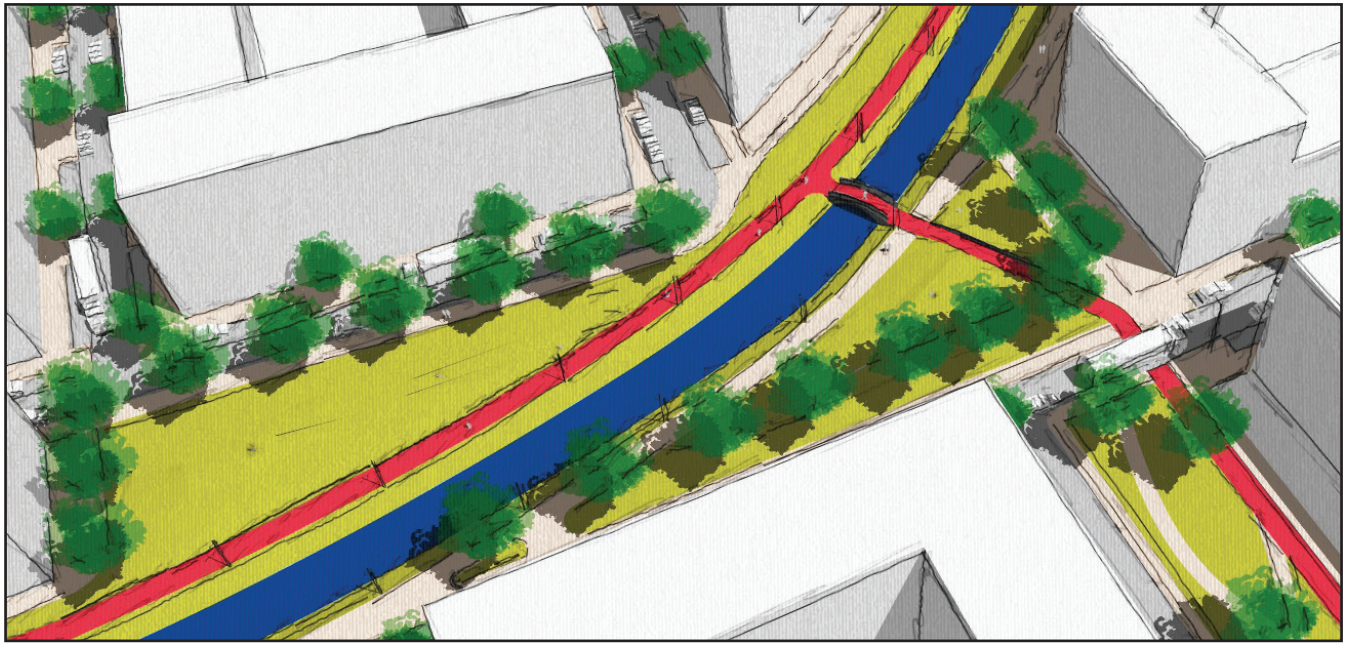


Image 5.3.11: *Birds-eye impression of the elevated public space.*

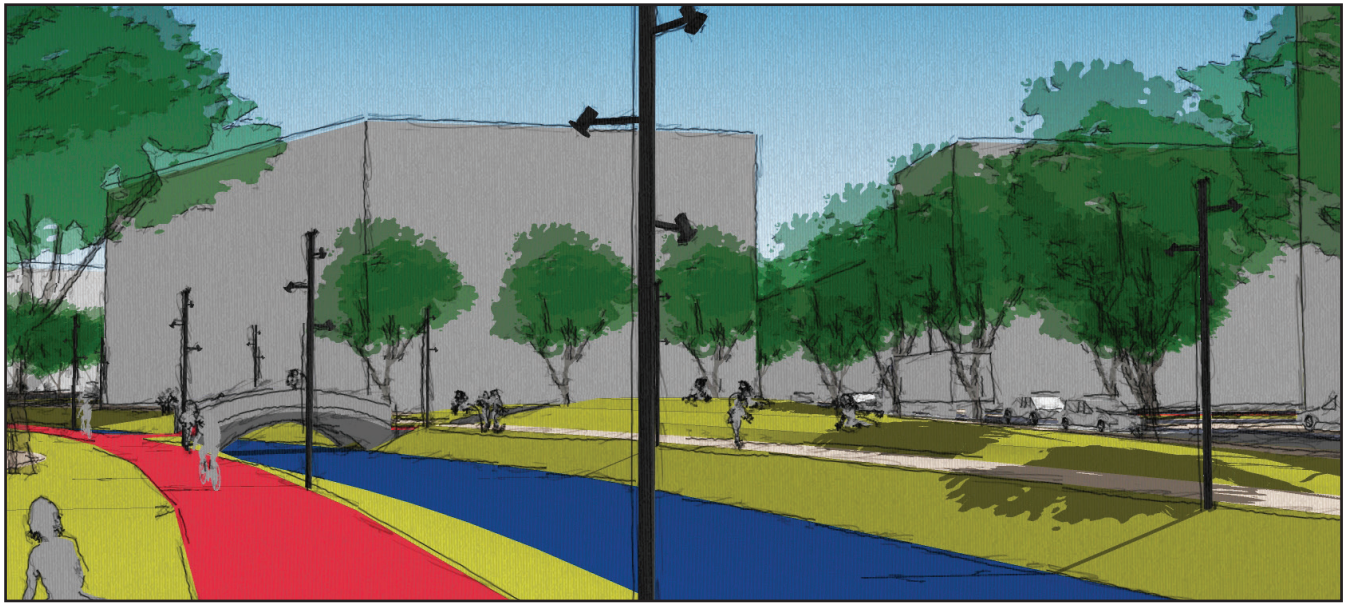


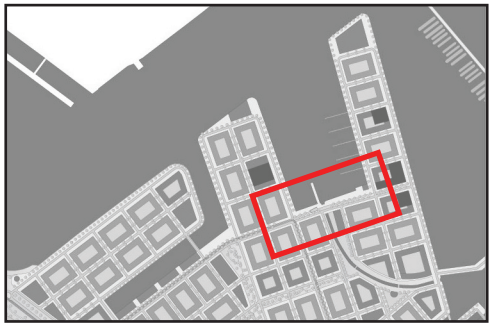
Image 5.3.12: *Eye-level impression allong the canal.*

References

Image 5.3.13: *Mekelpark in Delft: park with hilly landscape (TU noord, 2010).*

Image 5.3.14: *Hilly park with raised ledge, used to create a sitting surface in Ypenburg.(Doelbeelden.nl, s.d.).*

5.4 Subarea: Tip of the harbour basin



Water
Public green
Green hill
Semi-public space
Building block
Roads
Bicycle path
Pedestrian path
Pedestrian area
Wooden deck
Parking space
Tram-line
Trees

N

0 50 m

Scale 1:1500

The tip of this harbour basin is an important public space of the design. Firstly because this is where different public transport systems come together (ferry, subway and tram) and create a small transit hub, and secondly because this area will offer nice views over the water. These two qualities divide the area into two subareas with different characteristics. The southwest corner is the transit hub, so this area is characterized by movement, while the southeast corner an area with views over the water and a marina is a destination where people go to (illustrated in the concept of image 5.4.1).

Unity between the two areas with different characters is created firstly by the use of the same materials. And secondly by a double row of trees parallel to the water, which at the same time accentuates the main access roads in the urban fabric. There is a small gap in the rows of trees, where the quays of the harbour meets up with the canal. By interrupting the trees a clear field of view is created from the quay to the canal and vice versa. Where the canal and the quay meet an O-shaped "artwork" is placed; this is actually an electronic wind energy converter (Visscher, 2013), see references on the right.

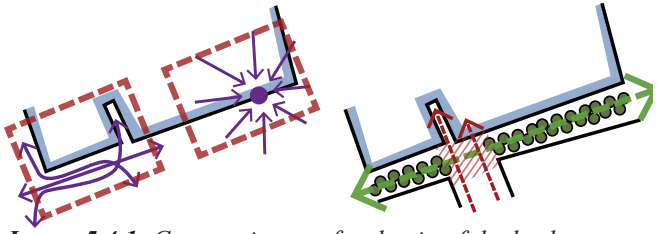


Image 5.4.1: *Concept images for the tip of the harbour: two areas with a different character (left) continuity with rows of threes, interrupted at the height of the canal (right)*

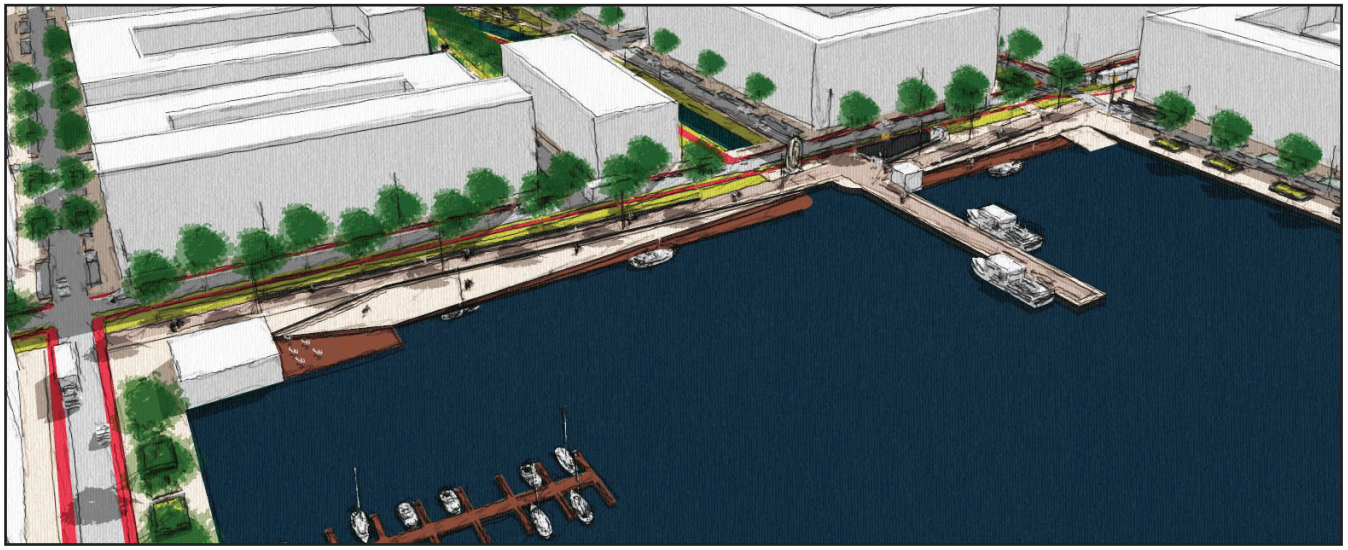


Image 5.4.2: *Birds-eye impression of the tip of the harbour basin*

References

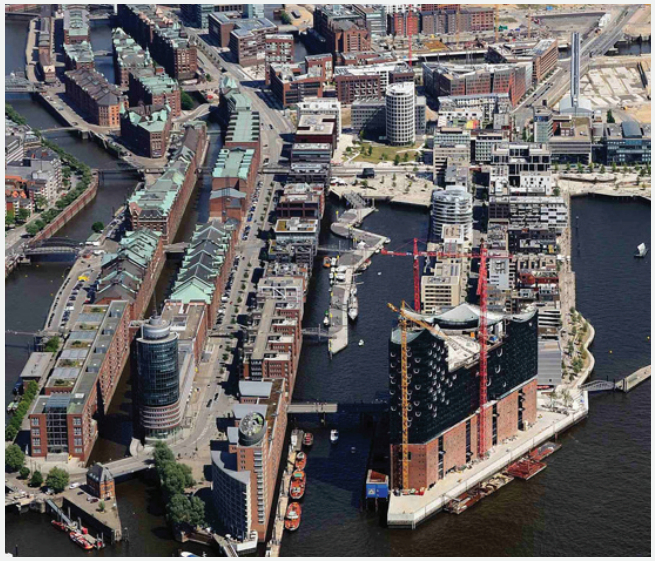


Image 5.4.4: *Harbour basin with pubic space at the tip, Hafencity in Hamburg (HafenCity Hamburg, s.d.).*

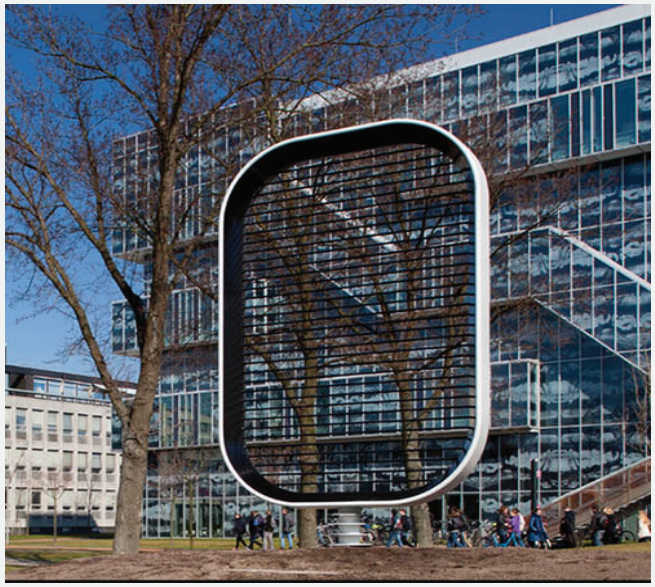
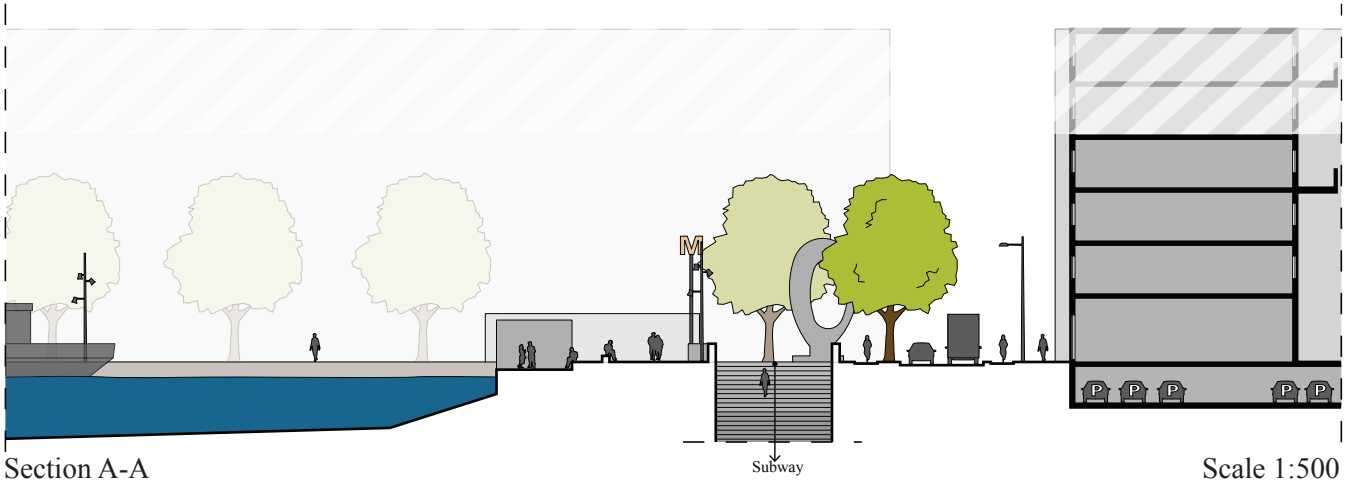
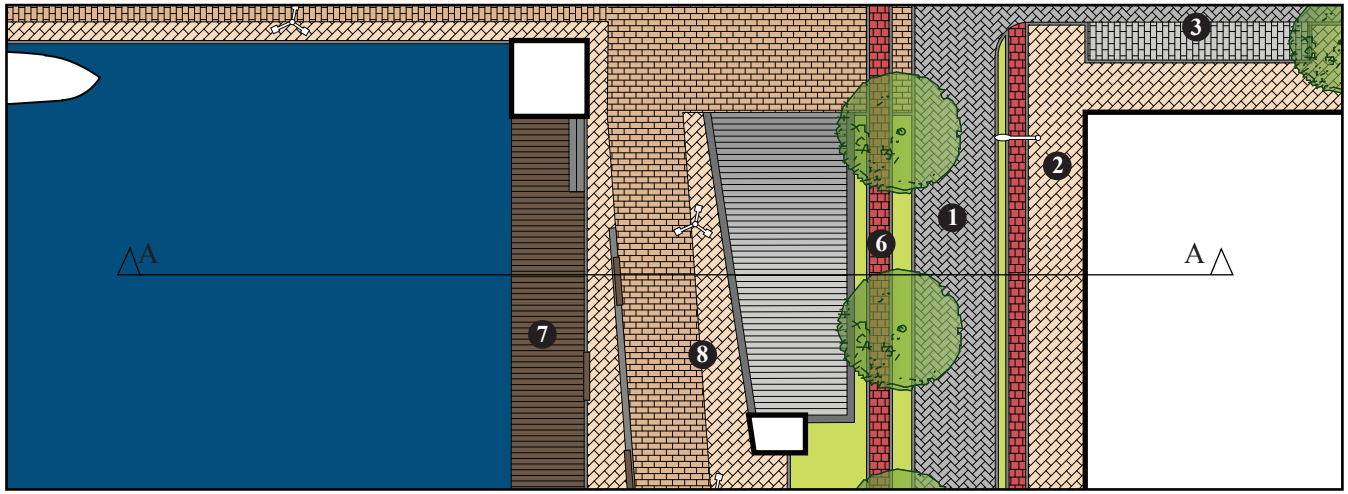


Image 5.4.3: *Electronic wind energy converter, does not need wicks to generate wind energy and is therfore very suitable for windy urban areas (Visscher, 2013)*

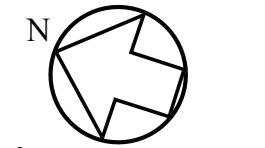


Section A-A

Scale 1:500



Detailed plan of public space on the south-west cornor of the harbour basin



Scale 1:500

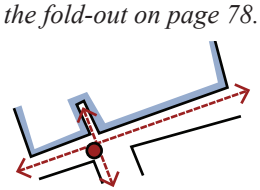
Like mentioned on the previous pages the southwest corner of the harbour basin is characterised by movement. It is a node where three public transport systems come together; Image 5.4.4 illustrates a schematic overview of the network.

The main entrance to the subway has been placed at the two routes, along the quay and along the canal. The second subway entrance is placed close to the tram-stop (not visible on the map on this page). At the main entrance/exit of the subway there is a small 'square' where the electronic wind energy converter is placed and a small kiosk where the people that are passing through can buy something to eat or drink.

The routes along the quay are marked by a difference in the pavement. Furthermore, there is a raised edge between the 'route' and the water that outs additional emphasis on the direction.

In addition, the quay also has a lower wooden platform that makes it easier for small boats to moor down and a ramp that can be used to get boats in and out of the water (not visible on the map on this page).

Note: Detailed information on materialization is illustrated on the fold-out on page 78.



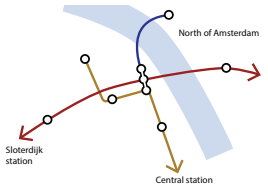


Image 5.4.5: *Overview of the new public transport network (right), crossing of two routes (left).*

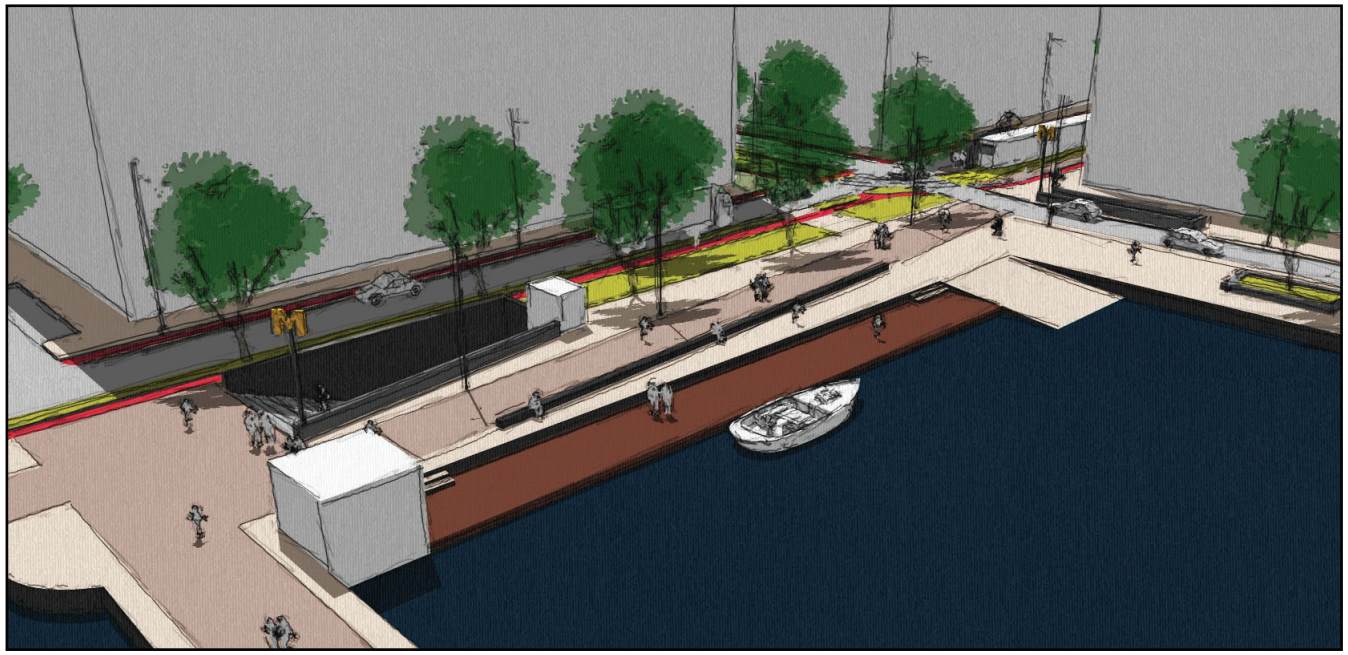


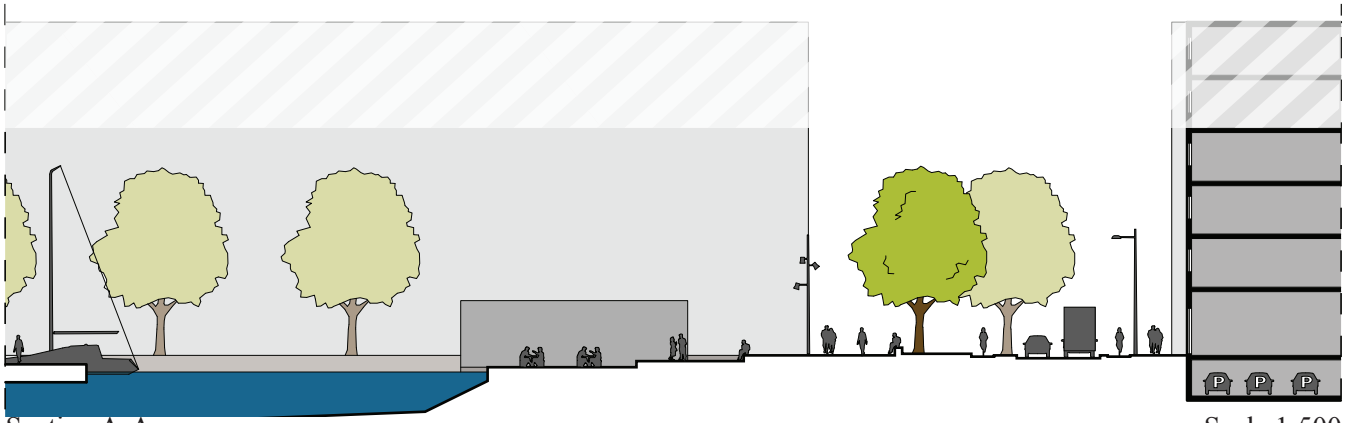
Image 5.4.6: *Birds-eye impression of the south-west corner of the harbour basin.*

Image 5.4.7: *Eye-level impression of the south-west corner of the harbour basin.*

References

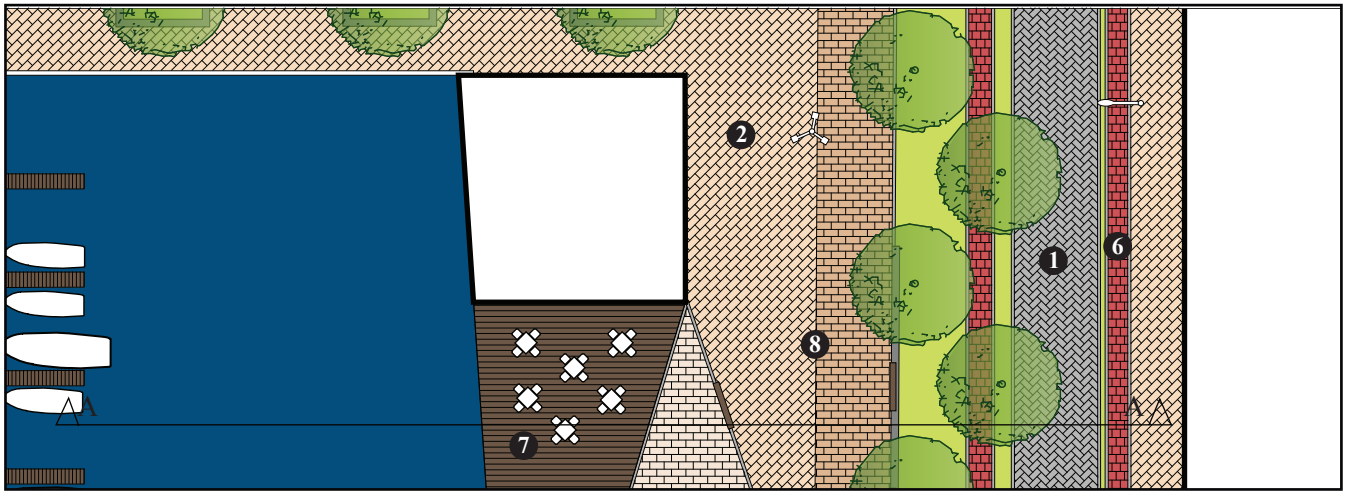
Image 5.4.8: *Lowered waterfront in Almere haven, Almere (Doelbeelden.nl, s.d.).*

Image 5.4.9: *Wide dimensioned subway entrance of the new subwaystop at the Rokin in Amsterdam (Gemeente Amsterdam, s.d.).*

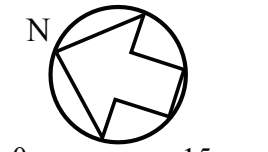


Section A-A

Scale 1:500



Detailed plan of public space on the south-east cornor of the harbour basin.



Scale 1:500

The southeast corner of the harbour basin is a destination for people who want to sit on the water's edge and enjoy the view over the water.

A pavilion has been placed on the edge of the water that will house a bar and/or restaurant for the visiting people to enjoy a drink or diner. The orientation of the quay is towards the north. This is not ideal when in comes to sunlight access, and therefore the quay has a wide dimension so that there is still enough sunlight access on the edge of the water (illustrated by concepts of image 5.4.9)

Eventhough the water is not in direct connection with the ocean, the water level still fluctuates (Rijkswaterstaat, s.d.) To keep close contact with the water – regardless of the water height – the quay has been layered into different levels.

Note: Detailed information on materialization is illustrated on the fold-out on page 78.

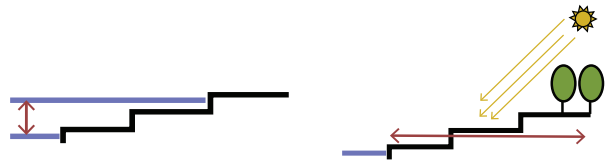


Image 5.4.10: *Concept images of the southeast corner: layered quay (left), wide quay to allow for enough sunlight access (right).*

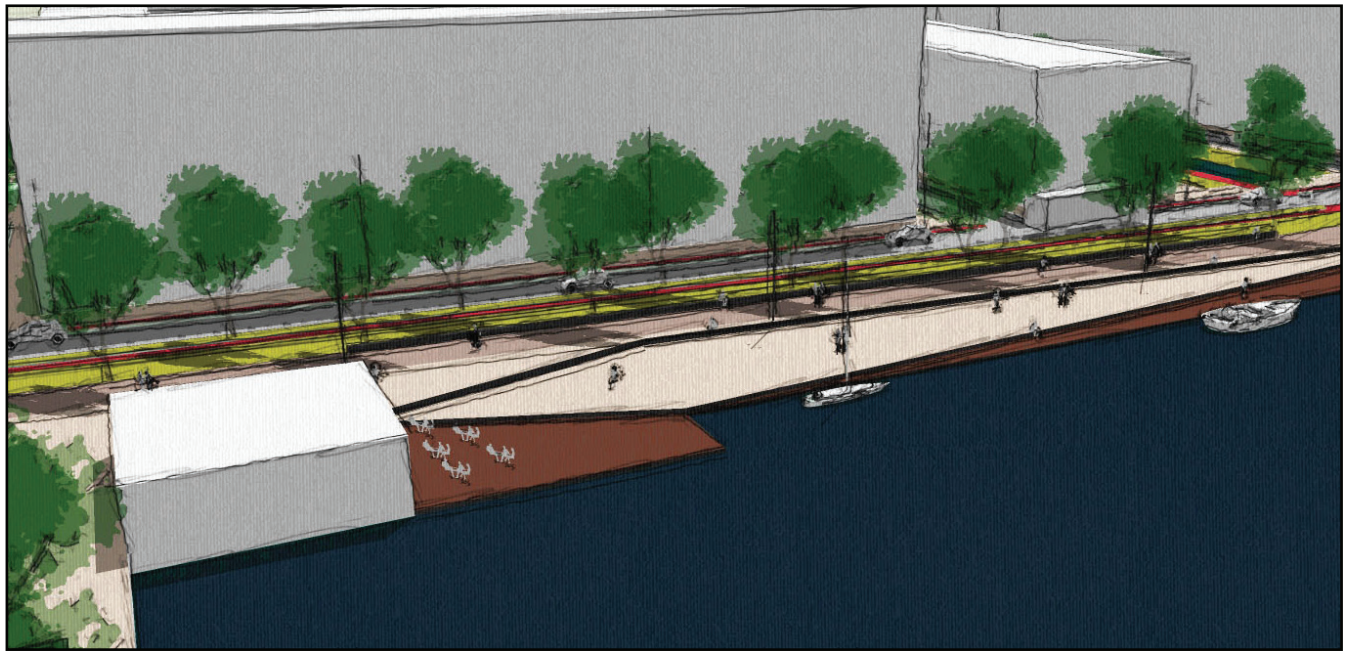


Image 5.4.11: *Birds-eye impression of the south-east corner of the harbour basin.*

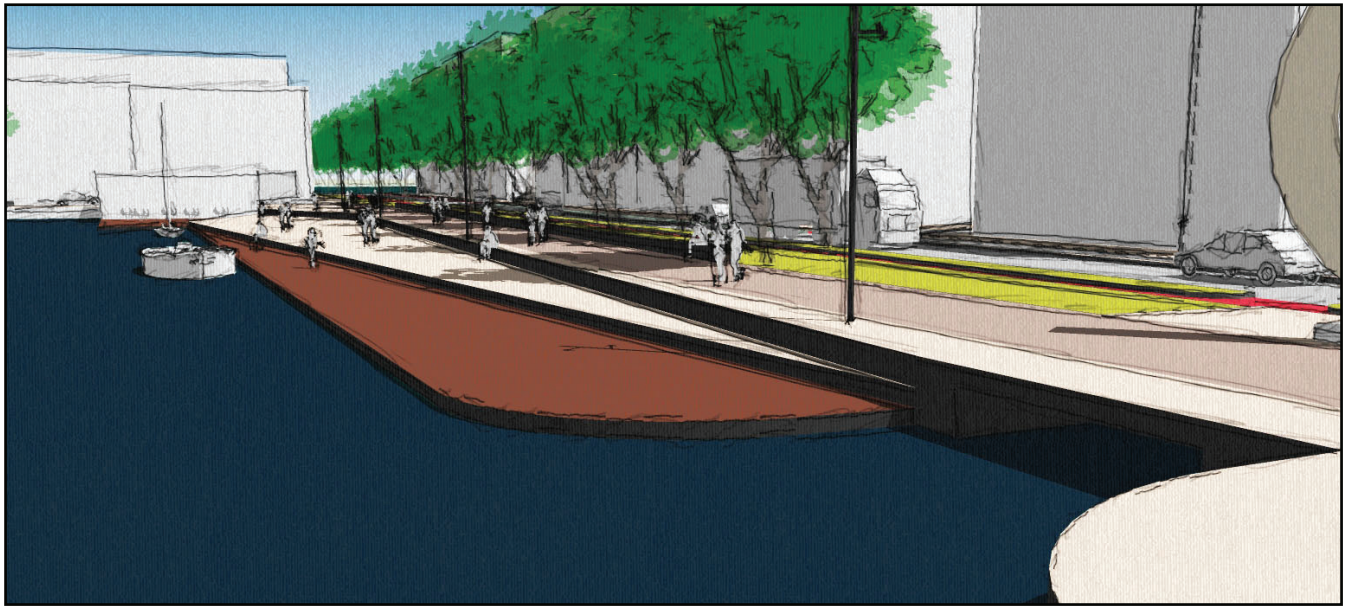


Image 5.4.12: *Eye-level impression of the south-east corner of the harbour basin*

References

Image 5.4.13: *Layered public space on the waters edge in Hafencity, Hamburg (Venusianer, 2008).*

Image 5.4.14: *Waterfront terrace at Dok 48 in IJburg, Amsterdam (Doucet, s.d.).*

5.5 Building rules

To steer the designs and the constructions of the real estate into the desired direction, a set of building rules has been set up. These rules will ensure the buildings are the correct size and that the aestatic value of the buildings are coherent and fit the desired aim.

To start, image 5.5.1 illustrates the minimum and maximum building heights for the various building blocks in the plan. This will make sure that the desired building density will be achieved and that the public spaces will have enough sunlight access during the day.

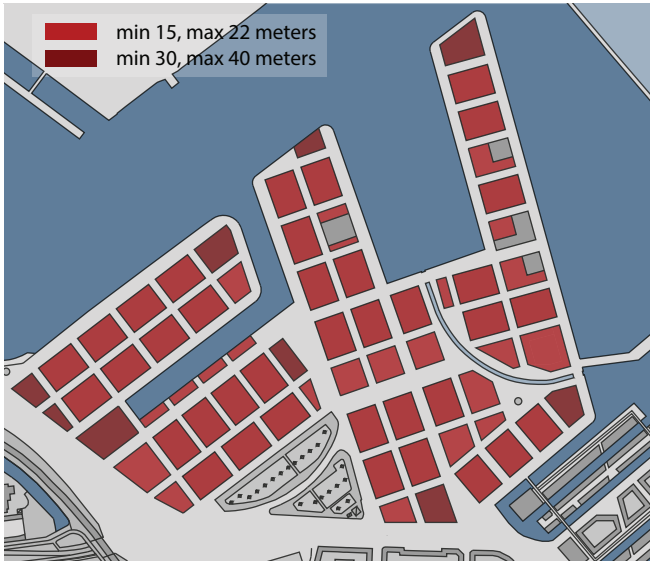
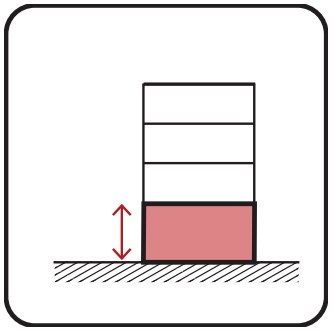
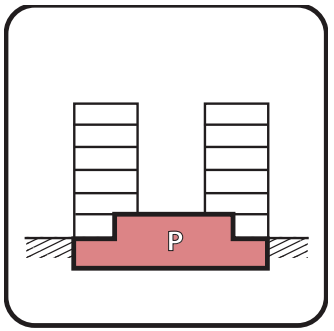


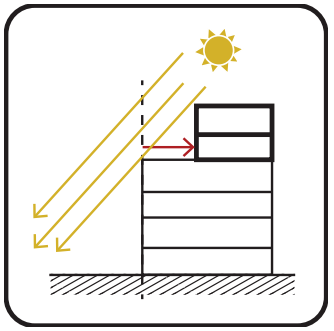
Image 5.5.1: *Maximum building heights for the new design of the Minerva City-harbour.*



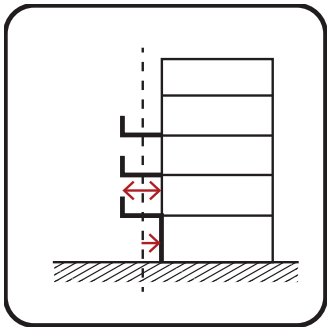
The ground floor level of buildings are most likely to be used for facilities. These usually require an higher larger floor-to-floor space than other functions. Therefore, the floor-to-floor space of all building should be over dimensioned to at least 3.5 meter.



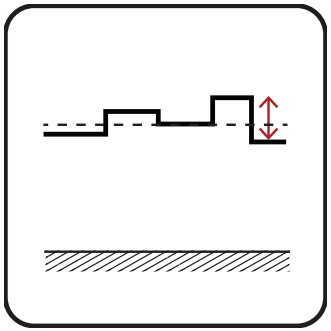
The majority of the parking must be solved inside the building blocks. This can be in a parking basement or beneath an elevated deck in the courtyard of the block. This parking will be supplemented with parking on the street.



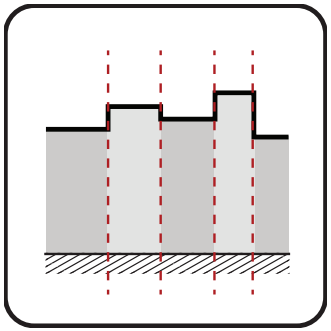
The narrow streets - 20 meters wide or less - have a maximum building height of four layers at the building line. Building higher is allowed.Provided that the floors will have an offset towards the parcel to allow for enough daylight access on the street.



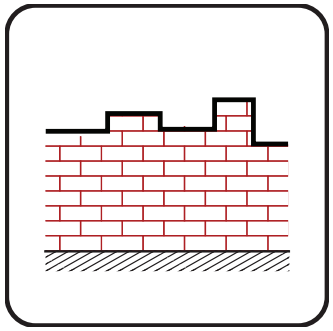
An offset from the building line is allowed. For the ground floor this can be a maximum of one meter and only towards the parcel. From the first floor and up this can be two meters (one meter towards the parcel and one meter towards the street).



There will have to be an offset in the roof-line of a building every 15 to 45 meters. This will make the side of the building to be perceived shorter.



In addition to further increase the vertical diversity, there will need to be diversity in the facade materials every 15 to 30 meters. This will give 2-4 different materials on the short edges and 3-6 on the long edges of the blocks



The building facades will have to be constructed in bricks or other stone materials. These are materials that are very typical in the Dutch cities and in addition these are very durable and low maintenance materials and will help make sure that the buildings last through time.

These rules are also considered in the block compisitions in the building block catalogue in appendix 8.2

Aimed densities

This plan does not use a set building height for the standard building blocks, this can vary between four and six layers. This means that there are no fixed FSI, and OSR data, but there is a minimum and a maximum for these values. These values are put forth on image 5.5.2.

	min	max
FSI	1.3	1.9
OSR	0.4	0.3
GSI	0.4	

Image 5.5.2: *Table with minimum and maximum density values.*

The space calculator from PERMETA Architects and the TU Delft (s.d.), gives a number of neighbourhood that have similar data as a reference. For the minimum value this are Vondelparkbuurt in Amsterdam (Image 5.5.3) and the Veste in Helmond (Image 5.5.4),. For the maximum value these are the Canalzone (Image 5.5.5) and the Pijp (Image 5.5.6), both in Amsterdam.

Image 5.5.3: *Vondelparkbuurt in Amsterdam.*

Image 5.5.5: *De Veste in Helmond.*

Minimum

Image 5.5.4: *The canal zone in Amsterdam.*

Image 5.5.6: *The Pijp in Amsterdam.*

Maximum

5.6 Conclusions

In order to test the made development strategy and bring any potential flaws to light is has been applied op the Minerva City-harbour, which has been extensively elaborated in the previous sections. I will now set forth some conclusions that have come to light during and after this process.

- The made development strategy should – according to the literature – provide a framework or perhaps more a checklist that – if followed correctly – will lead to a flexible and multi functional design. However this is all based on theory, this theory will have to be put into practice and than only after several years can be conformed if the desired effects of the strategy (flexibility and mixed-use) are achieved.
- The set up development strategy in this graduation project has been kept very broad, this will leave some room fore interpretation and will thus allow for different possibilities on how this strategy can be applied. The way I have chosen to fill in the strategy – parceling, island sizes, access structure etc. – is just one of the possibilities that works well for this location, but might not be the best possible possibility. It is furthermore important to note that the best way to fill in this strategy is likely to dependent on the context of the location.
- With further research some additional conditions can be set to the different aspects – for example the access structure or green/water structure – of the development strategy. However additional conditions will mean that the freedom in the design will be limited and might have the risk that every design will be very similar. However freedom is design will remain in the public spaces and differences can also me made in the architecture of the area. But nonetheless will a consideration will have to be made if this is desired.

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6.1 Conclusions

The uncertainties caused by the current economic climate demand for strategic plans when it comes to urban development. This means that in order to achieve the expected results from a complex assignment like urban regeneration, something more is required than the traditional planning: a broader strategy that combines investments, with physical interventions and social measures. This strategy furthermore has to take account of the different scale levels and must involve different disciplines of urban development

With the current economic climate it cannot be expected that large urban plans are developed all at ones, this will have to be done gradually, in phases. However, when developing in phases there is always a very real chance that eventually not all the phases will be realized, this means that the individual phases will have the be able to function properly with to others.

A way to deal with the uncertainties is to integrate flexibility into urban development. In the field of urban planning/designing flexibility should in my opinion be defined as *the ability of an urban area to react and adapt to physical changes and changing circumstances with a low penalty in time efforts, costs and recourses*. In this master thesis the possibilities to integrate flexibility into the urban development have been researched. The various conclusions from this master thesis will be summarized by giving answers to the different research questions. To start with the three sub-research questions

What way(s) or method(s) are there for an urban design to be flexible and able to adapt to changes in functional and spatial demands and requirements?

A wide variety of methods to achieve flexibility have been identified in chapter two. These methods can be categorized into three aspect of urban development: the urban development process, the urban design and the built environment.

This means that in order to achieve an urban plan or design that is integrally flexible, the plan will have to be flexible in all three of the aspects of urban development. This also means that using only one of the given flexibility methods is not a option, at least three of the methods will have to be used, one for each of three aspects.

Using more than three methods is of course also an option, but one has to keep in mind that a plan can also become too flexible and therefore dysfunctional. Therefore, it is recommended to limit the amount of methods used to four or five.

What kind of urban typology enables a changing urban programme?

There are a number of spatial conditions to an urban area that will greatly improve the ability of the functional urban programme to change:

- *Grain size:* The research in chapter two has shown that the size of the urban islands has influence on the adaptability of an urban area. A urban area with a small grain size has proven to be more adaptable than urban areas with a large grain size. The grain size is relative to its environment; this means that a small grain size in one city might not be so small in another.
- *Parcelling:* The size of a parcel for a large part determines what kind of functions can use the parcel. This means that a parcel should never be dimensioned is such a way that it can only be used by one specific function, since this will greatly diminish the flexibility. Parcels with a size of around 200 square meters – preferably 7,5 meter wide – can facilitate both large working functions like businesses and living related functions. Another aspect is this is the ceiling heights, different functions require different ceiling heights, therefore it is needed to over dimension the floor-to-floor space to allow a building to be

occupied by a wide variety of functions.

- *Accessibility:* A good connection to the infrastructural network is very important to meet the conditions for a wide variety of functions that can occupy the area. This is means access by car, bike, public transport and cargo (trucks).
- *Green and water network:* The presence of water and/or green in an area gives a enormous boost to the attractiveness of the area in question. And creating an attractive area is important to allow for the different types of functions to an area.
- *Parking:* different functions have different requirements for parking space. This means lack of parking space can greatly limit the diversity of functions that can or will. Therefore, having an abundance of parking space will increase the flexibility of an area.

How can flexibility be combined with mixed-use in an urban design for the Minerva City-harbour?

The research has shown that an urban fabric with a small grain size is very suitable for both mixed-use development and the ability of an urban area to adapt to changes.

However, the condition for an area to be mixed-use, also limits the flexibility in an area. Earlier is defined that a mixed-use area has an MXI-P (see page 37) of no higher than 40. This means that the area cannot transform into an mono-functional area and this will thus limit the flexibility.

However, this does not have to be a poor development, since one of the previous conclusions was that an area can also be too flexible and endanger the continuity of an area. The mixed-use conditions of an area can be used as a method to consciously limit the flexibility in order to prevent this from happening.

A mixed-use area will in general be very well combined with functional flexibility. Because functions in a mixed-use area can change relatively easy if the real estate allows it, since the conditions for multiple types of functions should present in the area.

What kind of strategic plan is needed for the redevelopment of brownfields into a multi-functional area that is spatially and functionally flexible?

The different sub-research questions already for a large part answer the main research question. These answers can be summarized as followed:

A strategic plan is needed that integrates flexibility in all three aspects of the urban development: the urban development process, the urban fabric and the built environment. The spatial flexibility will mainly be achieved in the aspect of the urban fabric by taking the criteria for: grain size, parceling, access systems, green and water networks and parking into account, while the functional flexibility will be achieved in the legislation and the build environment. Furthermore, the integrations with mixed-use development can be achieved relatively easy since there are many similar conditions like a small grain size and a good accessibility.

The strategic plan, made for this master thesis integrates flexibility into three scale levels of urban development/ planning; The development process, the urban fabric and the build environment or real estate. In the development process, flexibility has been achieved by making use of a flexible zoning-plan, in combination with gradual development with integrated evaluative moments. For the urban fabric, a number of spatial conditions have been formulated that can help create an adaptable urban area. And for the real-estate the principles of the so called “solids” (see page 30) have been used.

6.2 Recommendations for further research

Based on the application of the development strategy on the Minerva City-harbour a number of recommendations can be made for further research to test and improve the development strategy

- I have used the development strategy to create a design for the Minerva City-harbour. This could have been done without any major issues or flaws in the strategy. However, this is a design for a complete new area and there are hardly any buildings that have been preserved. This illustrates that this strategy can work when dealing with a blank 'canvas'. It is still unclear if this strategy can also be used when dealing with the redevelopment of an existing urban area where a lot of elements will have to be preserved. This strategy will have to be tested on such a location to be able to confirm or invalidate if this strategy works.
- It made strategy cannot be applied on every location, there are a number criteria – mainly derived from the context of the location – that determine if the strategy can be used. For example the accessibility of the area, but there might be other criteria as well, but more testing and research is needed to determine what they are. With these criteria a scheme can be made to easily determine if the strategy is applicable on a specific location, this could look something like image 6.2.1
- The current development strategy is still fairly basic at this point and only defines basic principles. With further research these principles can be further defined. Some key-data like required capacity of the access roads or basic design principles can for example be given bases on aimed urban density of the area. This can make the strategy easier to apply and possible increase the success chance. Image 6.2.2 illustrates what this could possibly look like.

Is the development strategy usable for my location?

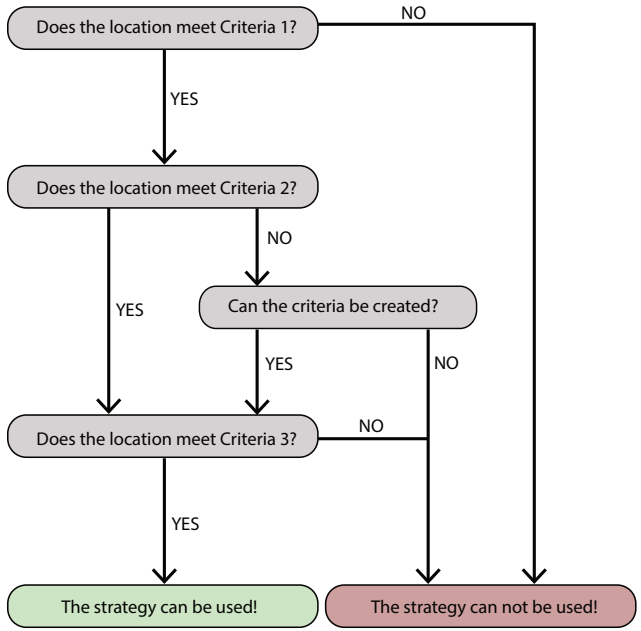
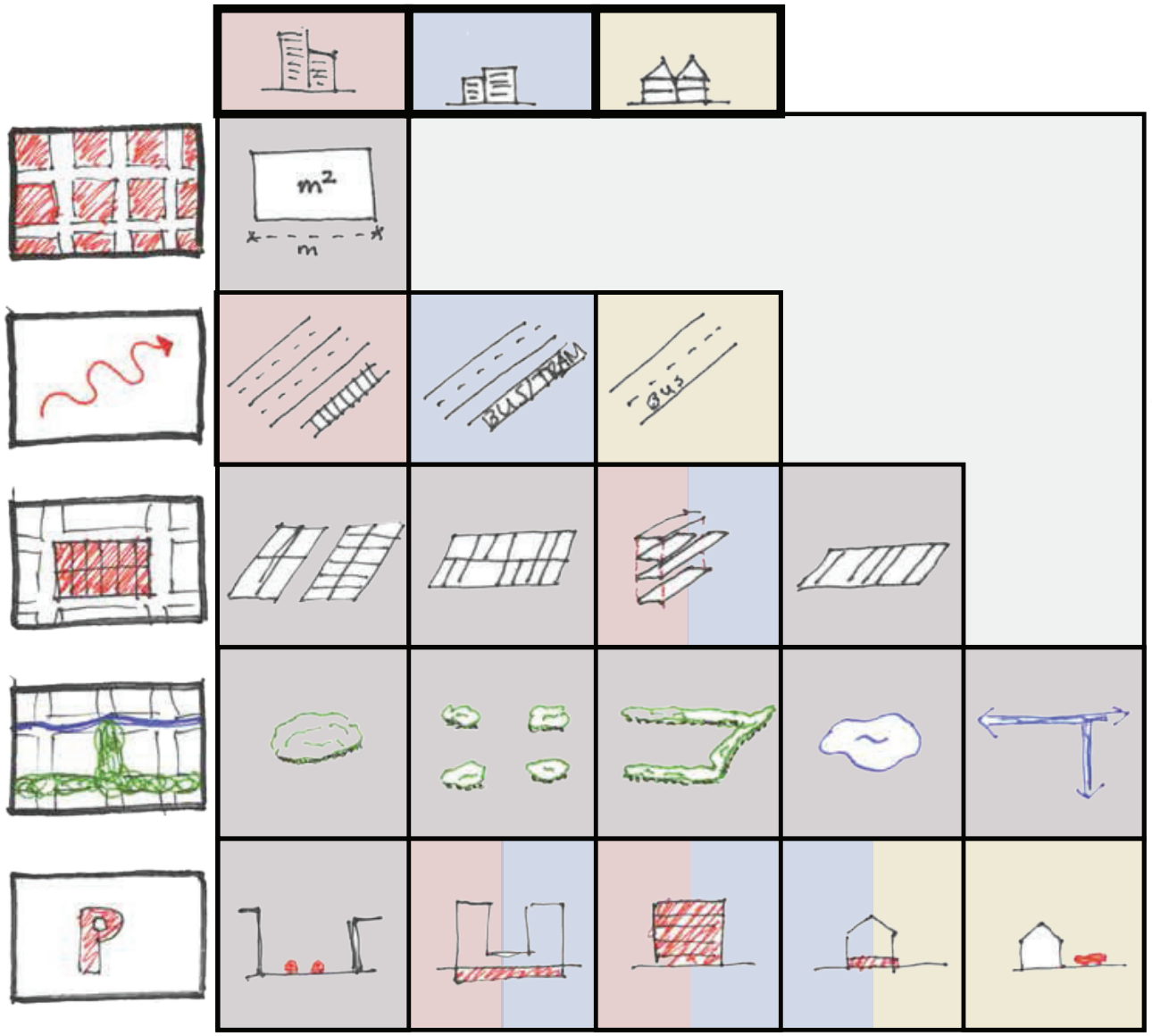


Image 6.2.1: *Example of what a scheme with selection criteria, which can be used to determine of the development strategy can be applied on s specific location*



- High, medium and low density, expressed in aimed FSI.

- Maximum block size, expressed in maximum surface area and maximum block length.
- Maximum size remains dependable of the context of the location.

- Number of lanes needed per hectare.
- Needed public transport capacity per hectare .
- Maximum travel time from major infrastructural node.

- Diversity between urban islands or within urban islands.
- Horizontal or vertical diversity in parcel size.
- More specific parcel dimensions.

- Min and max percentage of green, expressed in OSR
- Depended on aimed density.

- Number of required parking spaces per hectare.
- Depending on aimed density.

Solution suitable fir high densities
Solutions suitable for medium densities
Solutions suitable for low densities
Solutions suitable for All densities

Image 6.2.2: *Example on how the different aspects the urban fabric aspect of the development strategy could be further elaborated.*

Image from Suresh_Hegde (2012).

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Abrahamse, J. E., Kosian, M. & Schmitz, E. (2010). *Tussen Haarlemmerpoort en Halfweg: Historische atlas van de Brettenzone in Amsterdam.* Bussum: THOTH.

Algemeen Dagblad. (2012). *Leegstand kantoren bereikt nieuw record* [Online]. Retrieved 23-10-2012 from http://www.ad.nl/ad/nl/5597/Economie/article/detail/3298183/2012/08/08/Leegstand-kantoren-bereikt-nieuw-record.dhtml.

Architectenweb. (2012a). *Gemeenten verliezen vele miljoenen op grond* [Online]. Retrieved 10-12-2012 from http://www.architectenweb.nl/aweb/redactie/redactie_detail.asp?iNID=30091&s=1.

Architectenweb. (2012b). *Leegstand winkels verder opgelopen* [Online]. Retrieved 10-12-2012 from http://www.architectenweb.nl/aweb/redactie/redactie_detail.asp?iNID=29952&s=1.

Baumschlager Erbe. (s.d.). *Solids IJburg* [Online]. Retrieved 30-3-2013 from http://www.baumschlager-eberle.com/en/projects/chronological/details-of-project/project/solids-ijburg.html.

Bijendijk, F. (2005). *Solids*. In*:* Leupen, B., Heijne, R. & Van Zwol, J. (eds.) *Time based architecture.* Rotterdam: 010 Publishers, 42-51.

Bouten, M. (2008). *Flexibility in urbanism: Research on flexibility and transformation design for the Binckhorst.* Msc, Faculty of Architecture: Urbanism: Delft University of Technology.

Bryman, A. (2008). *Social Research Methods.* (3rd ed.) Oxford: Oxford University Press.

Buitelaar, E., Feenstra, S., Galle, M., Lekkerkerker, J., Sorel, N. & Tennekes, J. (2012). *Vormgeven aan de spontane stad, belemmeringen en kansen voor organische stedelijke herontwikkeling*. Den Haag/Bilthoven: Plan bureau voor de Leefomgeving & Urhahn Urban Design.

Carter, A. (2000). *Strategy and Partnership in Urban Regeneration*. In*:* Roberts, P. & Sykes, H. (eds.) *Urban Regeneration: A handbook.* London: Sage Publications, 9-37.

Cerutti, V. (2011). *reatieve fabrieken, Waardecreatie met herbestemming van industrieel erfgoed.* Utrecht: C2Publishers.

Cie Architecten. (2002). *Woongebouw Botania, Amsterdam* [Online]. Retrieved 30-3-2013 from http://www.cie.nl/projecten/projecten/wonen/botania,-amsterdam.aspx.

De Jong, A. & Van Duin, C. (2011). *Regionale bevolkings- en huishoudensprognose 2011–2040: sterke regionale contrasten.* . Den Haag/Bilthoven: PBL Netherlands Environmental Assessment Agency & CBS Statistics Netherlands.

De Jong, T. M., Moens, M. J., Van den Akker, C. & Steenbergen, C. M. (2004). *Sun wind water earth life and living, Legends for design.* Delft: Publicatiebureau Bouwkunde, Delft University of Technology.

Doelbeelden.nl. (s.d.). *Doelbeelden.nl, verbeeld je visie* [Online]. Retrieved 17-04-2013 from http://www.doelbeelden.nl.

Dooozr (2011) *Beestenmarkt - Delft* via: Flickr, Creative Commons [Online] Retrieved 2--4-2013, from http://www.flickr.com/photos/rikglass/6095852950/.

Drewe, P. (1993). *Werkwijzen van ruimtelijke planvorming: processen.* Technische Universiteit Delft, Faculteit der Bouwkunde.

DRO (2007). *Functiemenging in de Binnenstad*. Amsterdam: DRO Planning service of Amsterdam.

DRO (2008). *Locatiebeleid Amsterdam 2008, Een aanvullend toetsingskader van het Structuurplan 2003*. DRO Planning service of Amsterdam.

DRO & Haven Amsterdam (2009). *Haven-Stad, drie vergezichten voor de westelijke IJ-oevers*. Amsterdam: Municipality of Amsterdam.

Ducksingel (2008) *Rotterdam, Provenierssingel* via: Panoramio, Creative Commons [Online] Retrieved 19-04-2013, from http://www.panoramio.com/photo/8539334.

Epema, J. (2009). *Geheugen van de Amsterdamse tram* [Online]. Retrieved 28-12-12 from http://www.amsterdamsetrams.nl/epema/.

Fink, A. (1998). *Conducting Literature Reviews: From Paper to the Internet.* Thousand Oaks: SAGE Pubilcations Inc.

Gemeente Amserdam (2005). *Uitwerkingsplan Raamwerk Openbare Ruimte Overtoomse Veld*. Amsterdam.

Gemeente Amserdam. (s.d.). *Iepen in Amsterdam* [Online]. Retrieved 4-5-2013 from http://www.amsterdam.nl/toerisme-vrije-tijd/groen-natuur/bomen/iepen-amsterdam/.

Gemeente Amsterdam (2011). *Structuurvisie Amsterdam 2040: Economisch sterk en duurzaam*. Amsterdam.

Guyt, P. & Hulsbergen, E. (2002). *Urban programming research*. In*:* De Jong, T. M. & Van Der Voordt, D. J. M. (eds.) *Ways to study and research: Urban, architectural and technical design.* Delft: DUP Science, 265-270.

HafenCity Hamburg. (s.d.). *The HafenCity project* [Online]. Retrieved 5-5-2013 from http://www.hafencity.com/en/overview/the-hafencity-project.html.

Harms, H. (2003). *Long Term Economic Cucles and the Relation between Port and City*. In*:* Carmona, M. (ed.) *Globalization & City Ports: The Response Of City Ports In The Southern Hemisphere* Delft: Delft Univesity Press.

Haven Amsterdam (2007). *Stadhaven Minerva Herstructureringsplan*. Amsterdam

Heeling, J., Meyer, H. & Westrik, J. (2006). *Het ontwerp van de stadsplattegrond.* De kern van de stedenbouw in het perspectief van de eenentwintigste eeuw. Amsterdam: SUN.

Heeling, J. & Westrik, J. (2001). *De stad is al eeuwen duurzaam*. In*:* Heeling, J. (ed.) *Over stedenbouw, Eenzoektocht naar de grondslagen van de stedenbouwkundige ontwerpdiscipline.* Delft: Delft university press, 185-196.

Heijne, R. & Vink, J. (2005). *Flex-buildings, designed to respond to change*. In: Leupen, B., Heijne, R. & Van Zwol, J. (eds.) *Time based architecture.* Rotterdam: 010 Publishers, 58-67.

Hermans, A. (2012). *Tijdelijkheid voor de Eeuwigheid.* Social Geography and Planning: Universiteit Utrecht.

Honia urban design (2009) *Borneo, Amsterdam* via: Flickr, Creative Commons [Online] Retrieved 25-12-2012, from http://www.flickr.com/photos/honorata_grzesikowska/4585882773/.

HVDN Architecten. (s.d.-a). *blok 46a, ijburg amsterdam* [Online]. Retrieved 31-3-2013 from http://www.hvdn.nl/2111/projecten/0449wt.htm.

HVDN Architecten. (s.d.-b). *Het kasteel, Amsterdam* [Online]. Retrieved 31-3-2013 from http://www.hvdn.nl/2111/projecten/0444wt.htm.

INBO. (s.d.). *Amsterdam, Furore blok C* [Online]. Retrieved 30-3-2013 from http://www.inbo.com/NL/projecten/Pages/FuroreblokC.aspx -.UVb3Clsjq5I.

Jacobs, J. (1961). *The Death and Life of Great American Cities.* New York: Random House.

Janssen, D. (2012) *REM eiland* via: Flickr, Creative Commons [Online] Retrieved 10-10-2012, from http://www.flickr.com/photos/pimgmx/3763894588/in/photostream/.

JPMM (2011) *Botania* via: Flickr, Creative Commons [Online] Retrieved 30-03-2013, from http://www.flickr.com/photos/jpmm/5700701225/.

Knoop., J. (2011) *Single, Utrecht* via: Flickr, Creative Commons [Online] Retrieved 19-04-2013, from http://www.flickr.com/photos/joco_knoop/7646315714/.

Kuiper Compagnons (2012). *RijswijkBuiten: Beeldkwaliteitplan Sion,1e fase*. Rijswijk: Municipallity of Rijswijk.

Lamens, P., Jongen, E. & Van der Heijde, W. (2008). Dubbel parkeren mag. *Verkeerskunde,* 4.

Leupen, B., Grafe, C., Kornig, N., Lampe, M. & Zeeuw, P. (2005). *Ontwerp en analyse.* Rotterdam: Uitgeverij 010.

Louw, E. (2004). *Functiemenging wonen en werken.* Inspiratiepapers Woonwijken van de Toekomst nr 5. Rijswijk: Quantes.

Lynch, K. (2003). *The city image and its elements*. In: Watson, D., Pallatus, A. & Shibley, R. G. (eds.) *Time-Saver Standards for Urban Design.* New York: McGraw-Hill, 2.9.

Maccreanor (2005). *The sustainable city is the adaptable city*. In: Leupen, B., Heijne, R. & Van Zwol, J. (eds.) *Time based architecture.* Rotterdam: 010 Publishers, 98-109.

Meyer, H. (1999). *City and Port: urban planning as a cultural venture in London, Barcelona, New York, and Rotterdam.* Utrecht: International Books.

Nederland metro. (2008). *Het perron met 2 CAF'jes.* [Online]. Retrieved 29-12-12 from http://beeldbank.nederlandmetro.nl/gallery3/index.php/nederland/Amsterdam/ringlijn/Isolatorweg/Isolatorweg-002.

Neufert, E. & Neufert, P. (2002). *Neufert, Architects' Data.* Hoboken: Wiley-Blackwell.

Nijhof, P. & Schultr, E. (1994). *Herbestemming Industrieel Erfgoed in Nederland.* Zutphen: Walburg Pres.

Oxford Dictionary. (2012). *Oxford Dictionairies: The worlds most trusted dictionaries* [Online]. Retrieved 8-11-20112

from http://oxforddictionaries.com/.

PBL (2009a). *De toekomst van bedrijventerreinen: van uitbreiding naar herstructurering*. Den Haag/Bilthoven: PBL Netherlands Environmental Assessment Agency.

PBL (2009b). *Menging van wonen en werken*. Den Haag/Bilthoven: PBL Netherlands Environmental Assessment Agency.

PBL (2012). *Climate Adaptation in the Dutch Delta: Strategic options for a climate-proof development of the Netherlands*. Den Haag/Bilthoven: PBL Netherlands Environmental Assessment Agency.

PERMETA Architects & Tu Delft. (s.d.). *Spacemate Calculator* [Online]. Retrieved 03-04-2013 from http://www.spacemate.nl/calculator/spaceCalculator.html.

Peterson, S. (1979). Urban Design Tactics. *Achitectural Design Profile,* 20**,** 75-82.

Pimgmx (2009) *Igma K2 floating crane* via: Flickr, Creative Commons [Online] Retrieved 10-10-2012, from http://www.flickr.com/photos/pimgmx/3763894588/in/photostream/.

Porter, L. & Shaw, K. (2009). *Whose Urban Renaissance: An international comparison of urban regeneration stretegies.* Abingdon: Routledge.

Projectbureau Zuidoostlob (2011). *Strategiebesluit Amstel III: van monofunctioneel werkgebied naar multifunctionele stadswijk*. Amsterdam: Gemeente Amsterdam.

Provincie Zuid Holland. (s.d.). *Turbo rotonde* [Online]. Retrieved 29-12-12 from http://www.zuid-holland.nl/overzicht_alle_themas/c_e_thema_verkeer-vervoer/content_verkeersveiligheid/content_turborotonde.htm.

Puylaert, H. & Van Staalduine, J. (1984). *Ervaringen met planningsmethodiek.* 's Gravenhage: Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer.

Rauw, M. (2012) *Veemkade, Amsterdam* via: Flickr, Creative Commons [Online] Retrieved 25-12-2012, from http://www.flickr.com/photos/amstelbright/8258084166/.

Reitsma, M. & Reijndorp, A. (2006). De stad in kaart; Coolhaveneiland Rotterdam. *S&RO,* 4.

Ridley, D. (2008). *The Literature Review: A step-by-step Guide for Students.* Thousand Oaks: SAGE Publications Inc.

Rijkswaterstaat. (s.d.). *IJ* [Online]. Retrieved 21-11-2012 from http://www.rijkswaterstaat.nl/water/feiten_en_cijfers/vaarwegenoverzicht/ij/index.aspx.

Rijnbout (s.d.) *Nieuw verblijf in stadspark Amstelveen* Retrieved 17-04-2013, from http://rijnboutt.nl/articles/213.

Roberts, P. (2000). *The Evolution, Definition and Purpose of Urban Regeneration*. In*:* Roberts, P. & Sykes, H. (eds.) *Urban Regeneration: A handbook.* London: Sage Publications, 9-37.

Salewski, C. (2010). *Dutch New Worlds: Scenarios in the physical planning and design in the Netherlands 1970-2000.* Institure of Urban Design: ETH Zurich.

Salingaros, N. A. (2005). *Principles of urban structure.* Klaasen, I.T. Amsterdam: Techne Press.

Schwanke, D. (2003). *Mixed Use development Handbook.* (2nd ed.) Washington DC: Urban Land Institute.

Snellen, D. (2001). *Urban form and Activity-Travel Patterns: An activity-based approach to travel in a spatial context.* Fuculty of Architecture: Techincal University Eindhoven.

Soeters Van Eldonk. (s.d.). *Houthaven* [Online]. Amsterdam. Retrieved 25-11-2012 from http://www.soetersvaneldonk.nl/nl/stedebouw/supervisie/houthaven.html - afb1.

Stouten, P. (2010). *Changing Context in Urban Regeneration: 30 years of Modernisation in Rotterdam.* Design/Science/Planning. Amsterdam: Techne Press.

Suresh_Hegde (2012) *Westerdock* via: Flickr Creative Commons [Online] Retrieved 12-04-2013, from http://www.flickr.com/photos/suresh-hegde

Swanborn, P. G. (1994). *Methoden van sociaal-wetenschappelijk onderzoek.* (5th ed.) Mappel: Boompers drukkerijen bv.

Teppema, A. (2004). *Plan Amsterdam: Wonen tussen de bedrijven door*. Amsterdam: DRO.

Topaas. (2008). *Schouwburgplein* [Online]. Retrieved 19-4-2013 from http://foto-topaas.nl/.

TU Noord. (2010). *Relaxen op de campus* [Online]. Retrieved 5-5-2013 from http://tu-noord.blogspot.nl/2010_06_01_archive.html.

Tuttert, T. (2012). *Het moet anders...: Een nieuwe ruimtelijke planvorm en de rol van de stedenbouwer in gebiedsontwikkeling in Nederland.* Faculty of Architecture: Urbanism: Delft University of Technology.

Urhahn, G. B. & Bobic, M. (1996). *Strategie voor stedelijkheid: een studie over het thema stedebouwkundige kwaliteit en opdrachtgever.* Bussum: Thoth.

Urhahn Urban Design (2010). *Leefland*. In*:* Broekmans, T., Feenstra, S. & Urhahn, G. (eds.) *De spontane stad.* Amsterdam: BIS Publishers, 54-59.

Van den Hoek, J. (2008). The MXI (Mixed-use Index) as Tool for Urban Planning and Analysis *Corporations and Cities: Envsioning Corporate Real Estate in the Urban Futur.*

Van den Hoek, J. (2010). *The Mixed use index (MXI) as planning tool for (new) towns in the 21st century*. In*:* Provoost, M. (ed.) *New towns for the 21st century.* Amsterdam: SUN architecture.

Van der Heijde, K. (2005). *Scenarios.* (2nd ed.) Chichester: John Wiley & Sons Ltd.

Van Dijk, R. (2009) *Silodam Amsterdam* via: Flickr, Creative Commons [Online] Retrieved 10-10-2012, from http://www.flickr.com/photos/remivandijk/3954965731/in/photostream/.

Van Zwol, J. (2005). *The combination of living and working*. In*:* Leupen, B., Heijne, R. & Van Zwol, J. (eds.) *Time based architecture.* Rotterdam: 010 Publishers, 30-40.

Visscher, R. (2013). Ewicon voor de wind. Mooi opject wat stroom opwekt. *Trouw tijd*, 27-4-2013.

VNG (2007). *Bedrijven en milieuzonering: handreiking voor maatwerk in de gemeentelijke ruimtelijke ordeningspraktijk.* Den Haag: Sdu Uitgevers.

Voogd, H. (1995). *Methodologie van ruimtelijke planning.* Bussum: Dick coutinho.

VROM (2008). *Structuurvisie randstad 2040: Naar een duurzame en concurrerende europese topregio*. Den Haag: Ministry of Housing, Spatial Planning and the Environment

Wigmans, G. (2003). *Management van gebiedsontwikkeling.* Delft: Publikatieburo Bouwkunde.

Yin, R. K. (2003). *Case Study Research: Design and Methods.* (3rd ed.) Thausand Oaks: SAGE Publications Inc.


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8.1 Grain size analysis

This analysis will take a look at a number of neighbourhoods in Amsterdam in order to determine what conventional grain sizes there are in the city and eventually determine what a small grain size is in the context of Amsterdam.

Redlight district

The redlight district is one of the oldest parts of Amsterdam dating from the 14th century. The fine street pattern still dates from this period. This explains the fact that this area has a very fine grain size, with block size between 2,000 and 4,000 square meters (image 8.1.1).

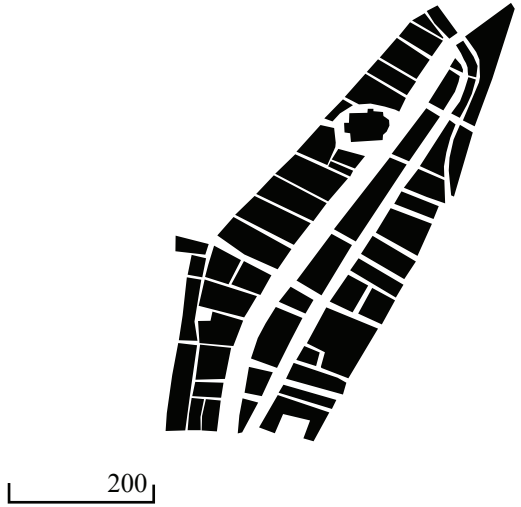


Image 8.1.1: *Urban grain of the redlight district.*

Block surface area: 2,000 - 4,000 m^2

Average block length: 80 m

Functional mix: 29/20/51

Canal zone

The canal zone is part of the city expansions of Amsterdam in the 17th and 18th century, which was a period of great wealth for Amsterdam and the Netherlands. This can still be seen in the architecture of the canal houses.

Van den Hoek (2010: 206) defines this part as having a small grain size, However the size and length of the urban islands are quite large especialy compared the grain of the redlight district. However, the functional mix in this area is still very high.

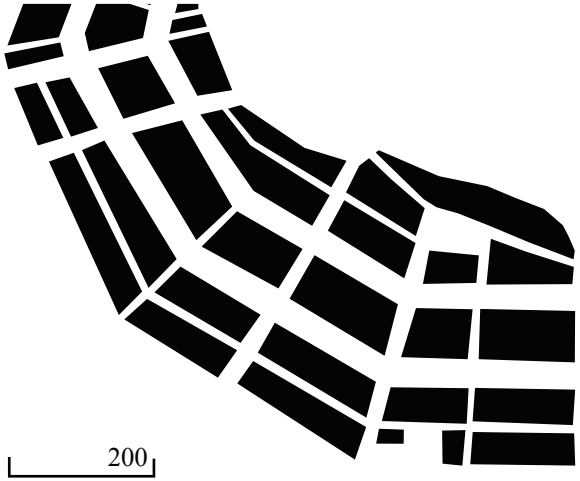


Image 8.1.2: *Urban grain of the Canal zone.*

Block surface area: 8,000 - 12,000 m^2

Average block length: 150 m

Functional mix: 50/29/21

The canalzone has urban islands between the 8,000 and 12,000 square meters with an average length of 150 meters.

The Pijp

The Pijp is regarded as an example of 19th century revolution-build, cheap construction. The bulk of the functional occupation in this area are residential functions. The surface area of the blocks in this neighbourhood lies between 6,000 and 10,000 square meters with an average block length of about 120

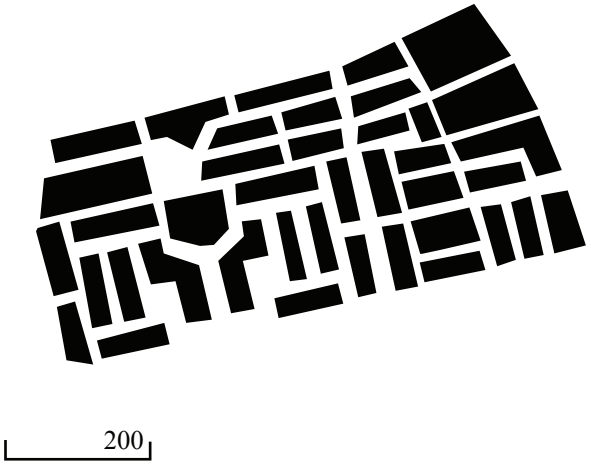


Image 8.1.3: *Urban grain of he Pijp.*

Block surface area: 6,500 - 10,000 m^2

Average block length: 120 m

Functional mix: 16/74/10

meters (image 8.1.3). This gives this neighbourhood a medium sized grain.

Eastern harbour area

This neighbourhood consists of contemporary harbor redevelopment form the 1990ies. The prominent function in the area are residential functions. This makes the functional mix here very low. The surface area of the building blocks is quite small; between 4,500 and 8,000 square meters. However, the buildingblocks are very narrow and long, which makes the average length of the blocks about 190 meters (image 8.1.4). This neighbourhood has a medium sized grain

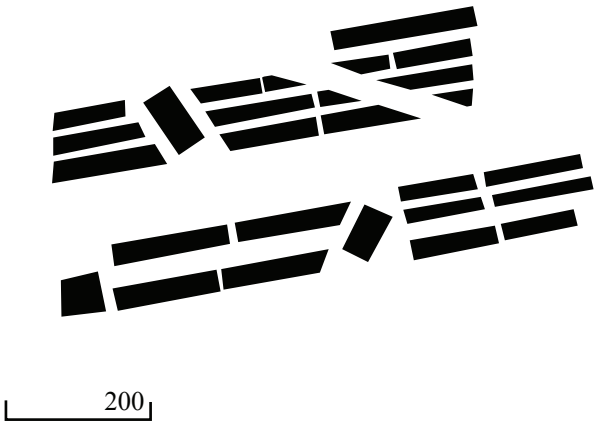


Image 8.1.4: *Urban grain of the Eastern harbour area.*

Block surface area: 4,500 - 8,000 m^2

Average block length: 190 m

Functional mix: 11/80/9

Westpoort

The Westpoort is a business park in the western parts of Amsterdam, which is a very mono-functional area where almost 90 percent of the occupation are working related functions. The grain size of this area is very large, between 12,000 and 20,000 square meters. This also makes it very hard to increase the functional mix.

Conclusions

The aim of the analysis was to determine what grain size is a small grain size in the context of Amsterdam.

There are two elements that affect the grain size. First is the actual surface area of the building blocks and second is the length of the building blocks. Thin, long blocks might have a small surface area, but due to the length they can still be perceived as very large. So the surface area and the length of the blocks together will determine the grain size.

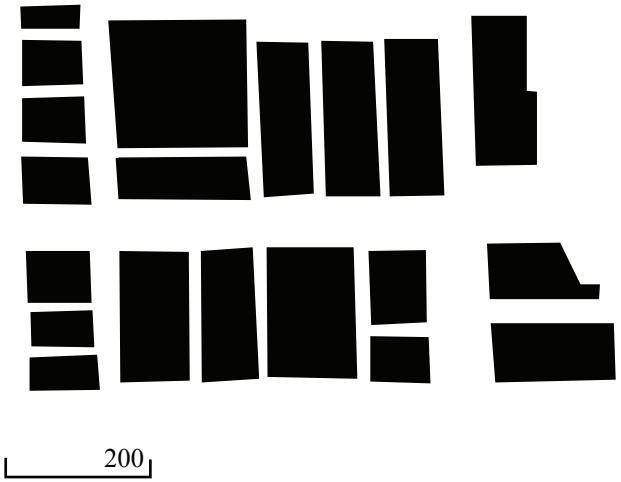


Image 8.1.5: *Urban grain of the Westpoort business park.*

Block surface area: 12.000 - 20.000 m^2

Average block length: 200 m

Functional mix: 89/3/8

There are two areas that qualify as a mixed-use area according to the definition set in chapter two (MXI-P lower than 40), namely the Canal zone and the redlight district.

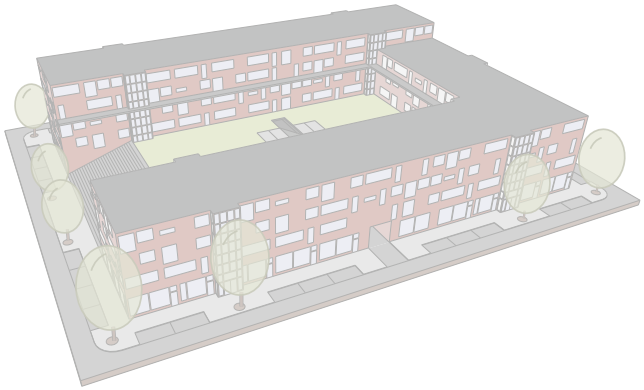
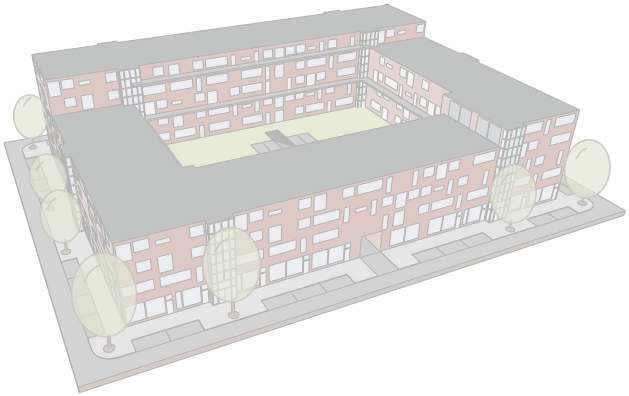
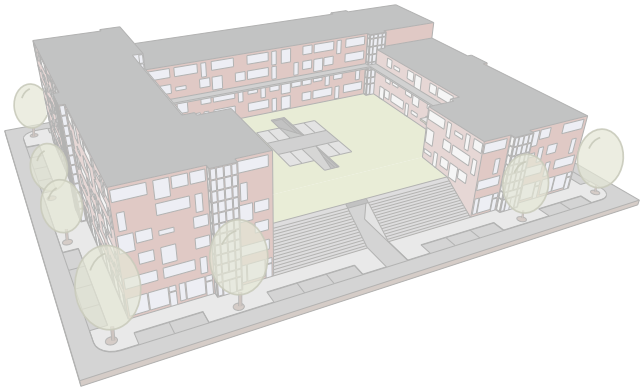
The red-light district of Amsterdam has a very fine grain size, which might even be a little bit too fine for the present day demands of an urban area and they should definitely not be any smaller. The Canal zone also has a high functional mix. However, the size and the length of the urban islands are too large.

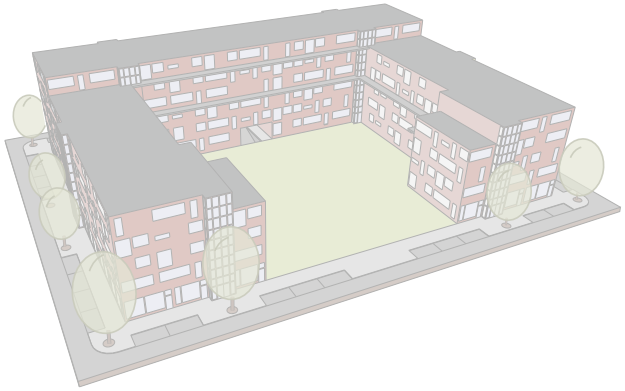
An in-between size between these two would be a very suitable dimension and would furthermore definitely qualify as a small grain size for the city of Amsterdam.

This would mean that the size of the urban islands has to be between 3,000 and 6,000 square meters and with a maximum length of the islands of 100 meters.

8.2 Building block catalog

BUILDING BLOCK CATALOG





FROM HARBOUR TO CITY

Transformation of the 'Havenstad' to a flexible and multifunctional city district

BUILDING BLOCK CATALOG

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1.1 Introduction

This catalog gives a number of pre-made block compositions that will fit in the urban islands of 82.5 meter by 60 meter. These blocks can be placed in any of the urban islands in the design that have these dimensions.

The building blocks in this catalog are composed out of four different units, which will be further elaborated in the next paragraph.

There are three categories of building blocks in this catalog: a closed building block, asemi-closed building block and an open building block. The blocks have been composed in such a way that they can be remodeled in later stages. This means that should for example the need arise to increase the density in the area due to very high demands, an open building block can be remodelled into a semi-closed or even closed building block (illustrated on image 1.1). This will in someway contribute to an increased flexibility in the area.

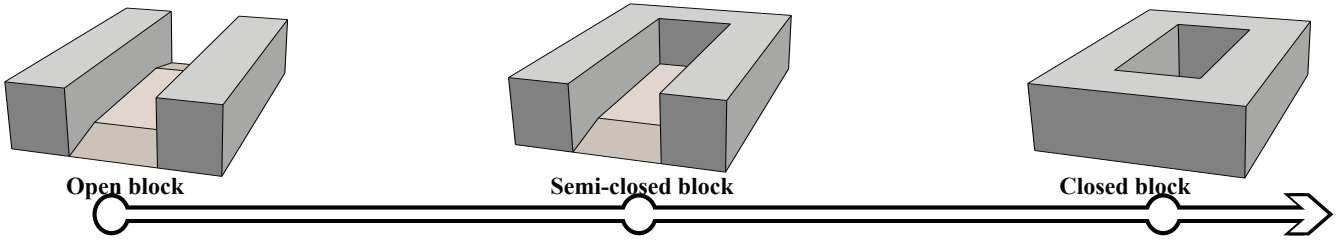


Image 1.1: *Possible changes of building blocks over time.*

Units

Different types of functions have different spatial requirements or demands. In order to be able to accommodate these different functions, the building blocks in this catalog will be composed out of four different elements, or "units". These units are dimensioned in such a way that each of them will be able to accommodate a few types of functions. Because each unit is not optimized for one specific function but for a few different functions it will make it relatively easy for functions to change within the units.

This means that by making a composition of these different units multi-functionality and flexibility will be achieved within these building blocks

All the units will have the same width, which makes is easy for them to be combined. This width has been set at 7.5 meters, which is a measure that is very suitable for all kinds of different functions (PBL, 2009: 14). The dept of the different units are plurals of this 7.5 in order to ensure that the various units fit together within the block. An overview of the specification of the different units is given on image 1.2.

Unit A:

This unit is suitable for residential and office functions. The unit is 15 meters deep, this will allow for enough daylight to enter the unit. According to the building act of 2012 office space requires a minimal ceiling height of 2.6 meter. However, a height of at least 3 meter is more desirable. Adding the required space for conduits leads to a required floor-to-floor space of 3.5 meters.

The parking norm for this unit is based on the parking norm of the function with the highest parking demand, which in this case is office space (1.3 parking spaces per 100 m^2 (DRO, 2008: Bijlage V)). This means that for this unit there is a parking norm of 1.5 parking spaces per unit.

Unit B

Companies will also have a place in this plan. However, companies require a lot of space. The PBL (2009: 67) state that a parcel of at least 30 meters deep will give companies enough space. Companies and shops need to be supplied by trucks. To be able to do this from within the block (backside) an increased floor-to-floor space

is needed. The average truck has a height of 4 meters (Neufert and Neufert, 2002: 433). Therefore, the floor-to-floor space has been set to 4.5. These dimensions will make this unit also suitable for retail and catering functions. However, due to its dimensions this unit is not suitable for residential and office functions.

The parking norm for this unit has been determined at 7 parking spaces per unit and is based on a number set up by the municipality of Amsterdam (DRO, 2008: Bijlage V).

Unit C

This unit is suitable for retail, catering and office functions This unit is 15 meters deep, the same as unit A so that they are able to be combined. Like unit B it is preferred (but not necessary) that the unit can be supplied from within the block (backside). Therefore, the height of this unit has also been set to 4.5 meters.

The parking norm for this unit has been determined at 3 parking spaces per unit and is based on a number set up by the municipality of Amsterdam (DRO, 2008: Bijlage V).

Unit D

This unit is suitable for small retail, catering and office functions. This unit is only 7.5 meter deep, which will give more space inside the block for parking facilities.

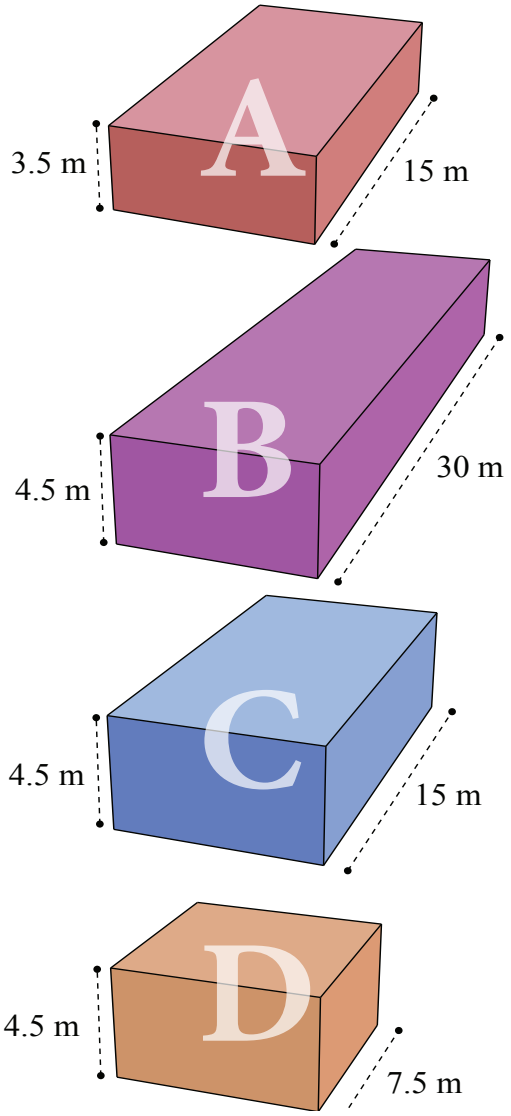


Image 1.2: *The different units with their specifications.*

Unit A

Possible functions: Dwellings, Offices

Dimensions: 15 m deep, 3.5 m high, 7.5 m wide

Parking-norm: 1.5 parking spaces per unit

Unit B

Possible functions: Companies, Shops, Catering

Dimensions: 30 m deep,4.5 m high, 7.5 m wide

Parking-norm: 7 parking spaces per unit

Back entrance needed for supplies

Unit C

Possible functions: Shops, Catering, Offices, Dwellings

Dimensions:15 m deep, 4 m high, 7.5 m wide

Parking-norm: 3 parking spaces per unit

Unit D

Possible functions: Shops, Catering, Offices

Dimensions:7,5 m deep, 4 or 4,5 m high, 7.5 m wide

Parking-norm: 1.5 parking spaces per unit

The height of this unit is the same as unit B and C so that they can be combined on the same floor.

The parking norm for this unit is also the same as unit C, but with half the size, so this means that 1.5 parking spaces per unit are needed.

Connecting units

To increase the flexibility and the variety in available accommodations it is possible to connect different units together. Image 1.2 illustrates some examples of this. By allowing the connections between units it is for example possible to create multistory dwellings or large same level office space. These connections can be made during the initial development but also in later stages. This can for example give offices or companies the possibility for expansion and will thus increase the flexibility in the building block. Furthermore will the variety that can be created with these connections greatly contribute to the ability to attract different types of companies/residents into the area and will therefore contribute to creating a mixed-use area.

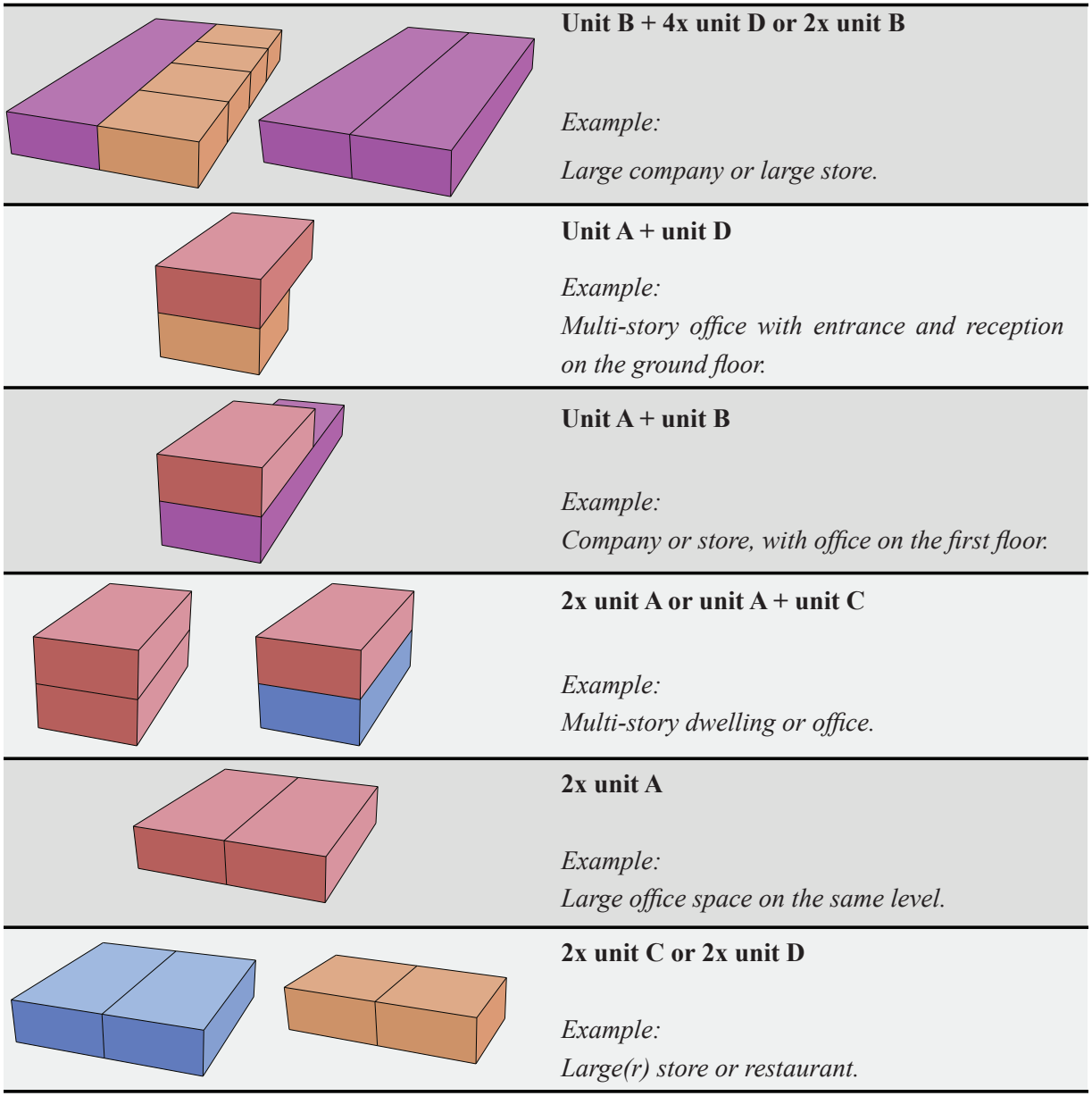


Image 1.3: *Some of the possible connections between different units.*

Building blocks

In the next sections a number of block compositions will be elaborated with sections, floor plans and three-dimensional impressions. The main difference between the blocks lies in the compositions of the ground floor (unit A, B or C) and the orientation of the block (closed, semi-closed or open). For each block the amount of each units is specified along with the expected parking needs.

Some of the blocks however will have a higher parking demand than the available parking spaces in the block. However, it is important to note that the blocks will house different types of functions, and these different functions will have different peak-hours for their parking need. This means that it is possible for the different functions to make use of each others parking facilities. This way less parking spaces will be needed. Image 1.3 furthermore illustrates how the parking facilities can fit in very well in the dimensions with a plural of 7.5 meter; 15 meters will give room for six parking spaces and still leave enough space for the load-bearing structure.

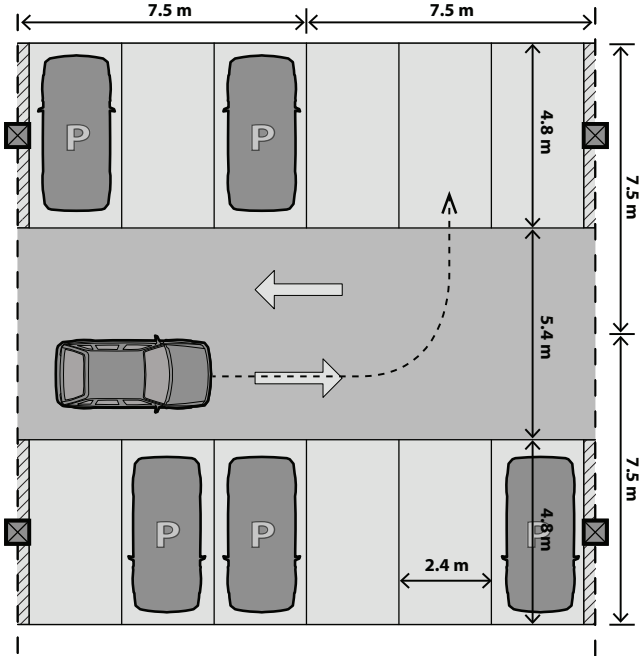


Image 1.4: *Eaxample for parking plan.*

For each block there are a number of FSI values given. First is the FSI of the block, this has a minimum and a maximum value since there is a margin for the number of floors for all the blocks. This value excludes the FSI from the infrastructure and parking. The last FSI value is the FSI that includes the public space surrounding the blocks. For this calculation it is assumed that the public space around the blocks are all streets of 17 meter wide on each side. This FSI value also has a minimum and a maximum value (image 1.3 also illustrates what the different FSI values mean).

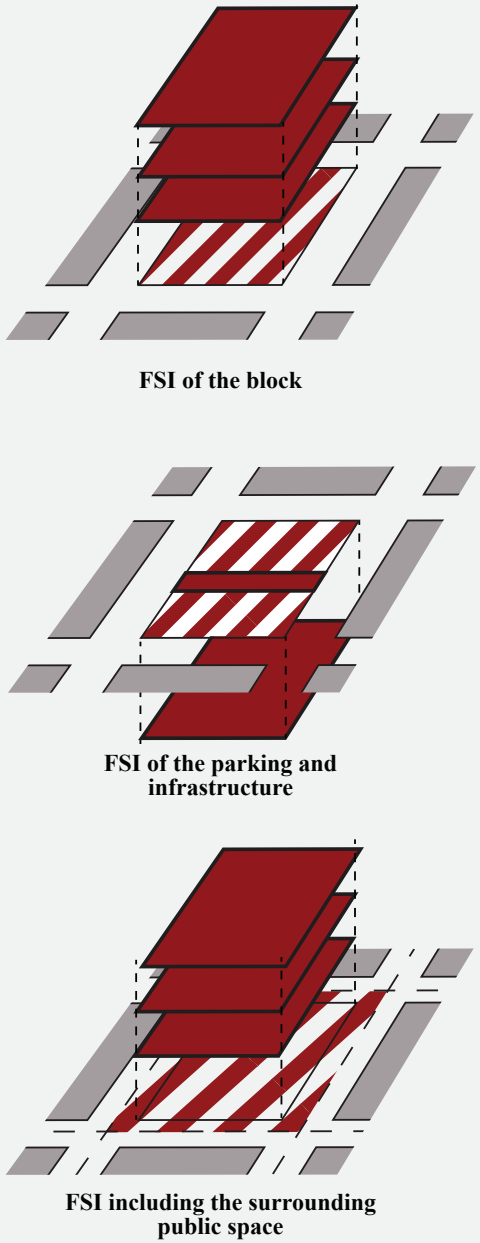
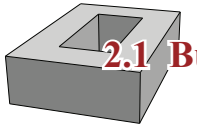


Image 1.5: *Scheme elaborating the dufferent FSI values.*



2.1 Building block 1A

It is very likely that the majority of the functions in the area will be residential functions since the demand for amenities usually is limited. Therefore, only unit A is used for this composition. That means that this block should only be used as dwellings and/or office space.

The courtyard of the block can be used either for private gardens or a large public or semi-public garden.

The parking facilities of the building block are accessed from the long sides of the block. According to the parking norms set for the different units there is a need for 268 parking spaces for this block. However, the offices and dwellings in the block have different peak hours for their parking need, therefore it is possible for the different functions to use each others parking facilities and less parking spaces are sufficient. This block offers parking space for 235 vehicles inside the parking basement. This in combination with some parking on the street should be more than sufficient.

To increase the flexibility different access systems are used (image 1.1.3); a combination of portico and gallery access and access directtly from the street.

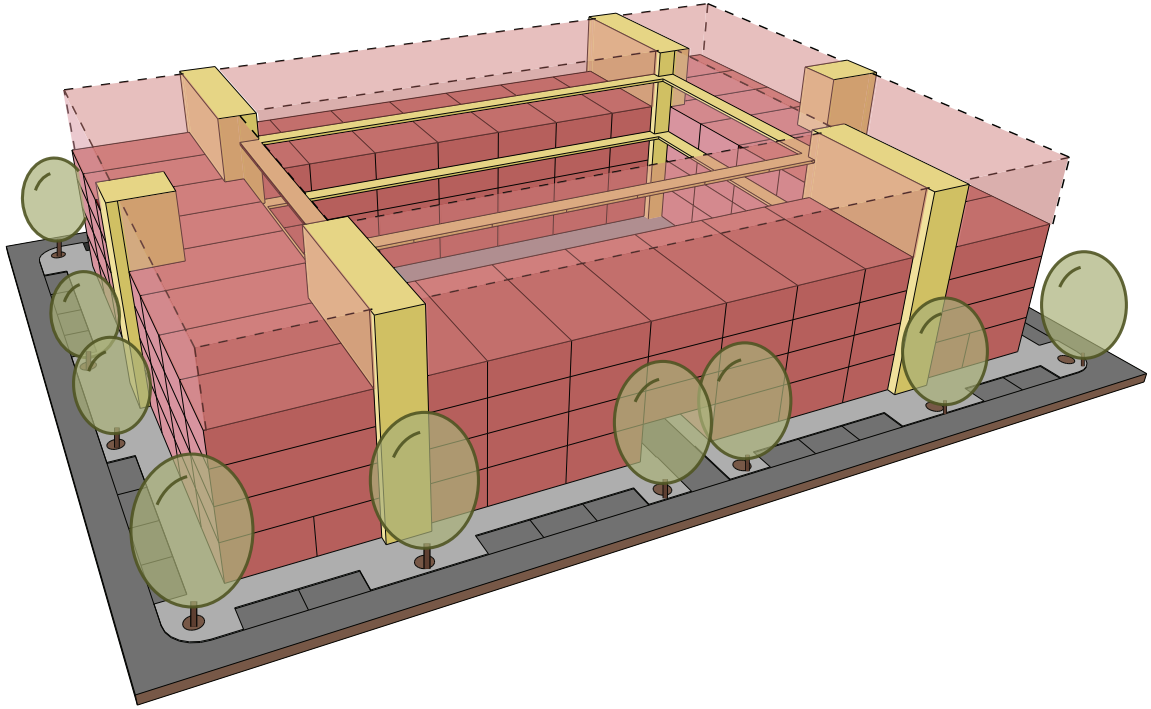


Image 2.1.1: *Overview of buildingblock 1A.*

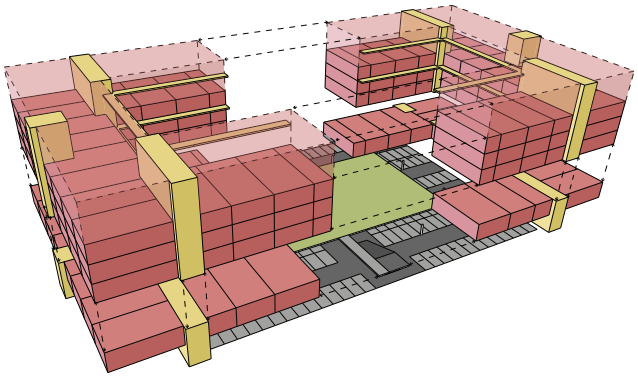


Image 2.1.2: *Exploded view of block 1A.*

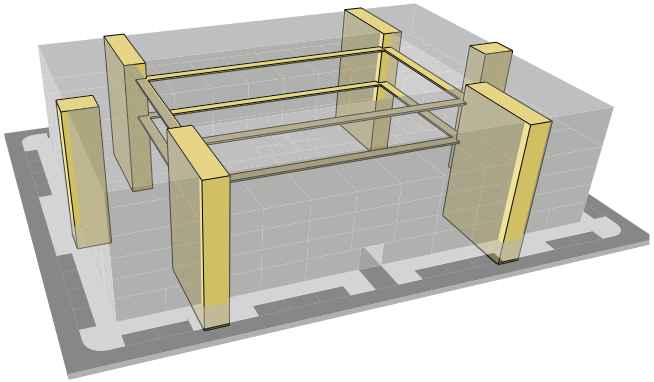


Image 2.1.3: *Access of the building: portico and gallery access.*

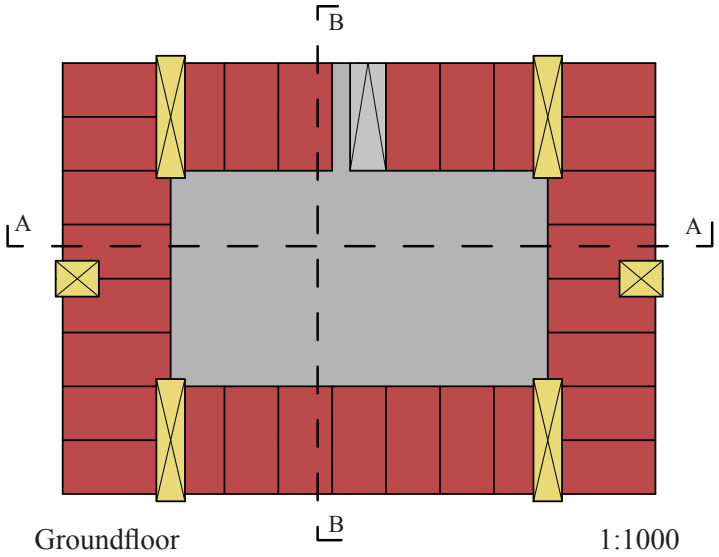


Image 2.1.4: *Floorplans and sections of buildingblock 1A.*

Block composition:

Unit A: 119-169

Unit B: -

Unit C: -

Unit D: -

Parking

Needed parking spaces: 268

Parking spaces inside the block: 235

Access systems:

Portico and gallery access, from the street and courtyard.

Densities:

FSI of the block:

min: 2.7 max: 4.0

FSI parking + infrastructure: 1.0

FSI including public space (streets):

min: 1.7 max: 2.3

Example of a possible elaboration.

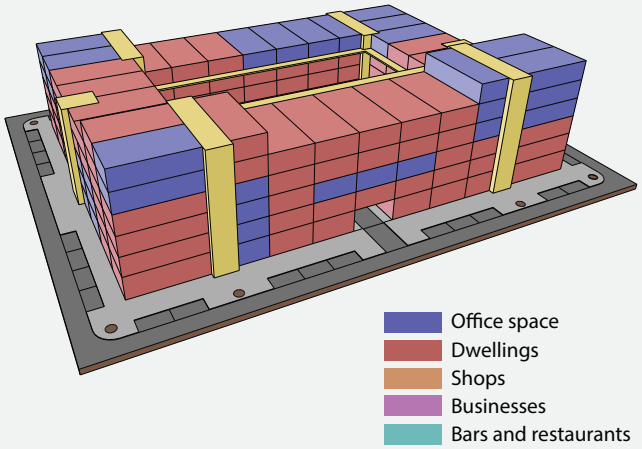


Image 2.1.5: *Possible distribution of function for block 1A.*

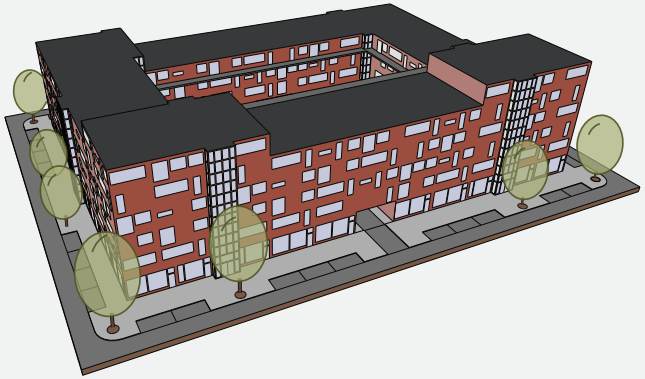
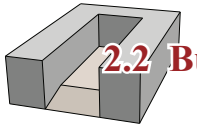


Image 2.1.6: *Impression of a possible scenario for block 1A.*



2.2 Building block 1B

It is very likely that the majority of the functions in the area will be residential functions since the demand for amenities usually is limited. Therefore, only unit A is used for this composition. That means that this block should only be used as dwellings and/or office space.

Bock 1B is a semi-closed building block with an open side on one of the long edges of the block

The courtyard of the block can be used either for some private gardens or a large public or semi-public garden.

The parking facilities of the building block are accessed from the long sides of the block. According to the parking norms set for the different units there is a need for 225 parking spaces for this block. However the offices and dwellings in the block have different peak hours for their parking need. Therefore, it is possible for the different functions to use each other's parking facilities and less parking spaces are sufficient. This block offers parking space for 235 vehicles inside the parking basement. This in combination with some parking on the street is more than sufficient.

To increase the flexibility different access systems are used (image 2.2.3); a combination of portico and gallery access and access directtly from the street.

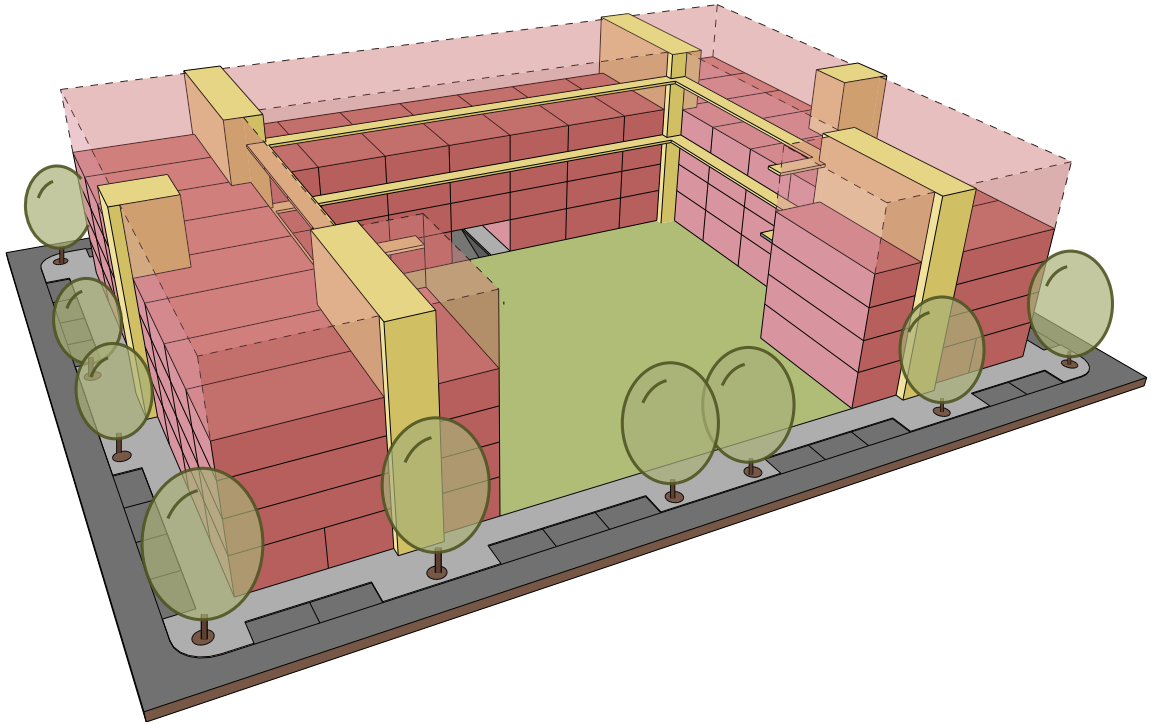


Image 2.2.1: *Overview of buildingblock 1B.*

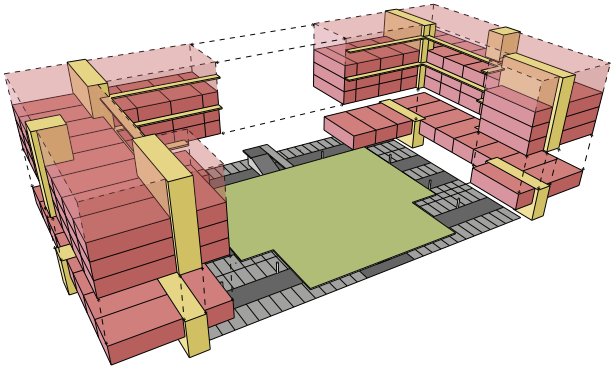


Image 2.2.2: *Exploded view of block 1B.*

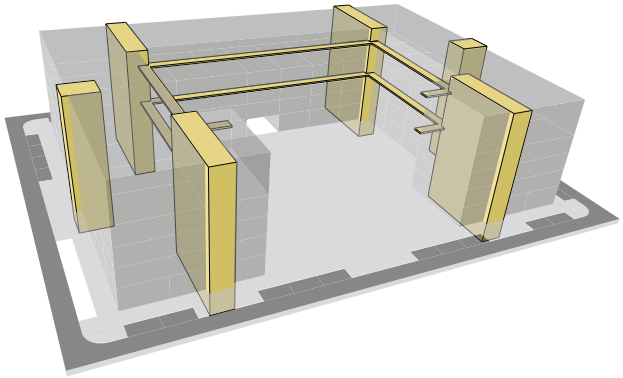


Image 2.2.3: *Access of the building: portico and gallery access.*

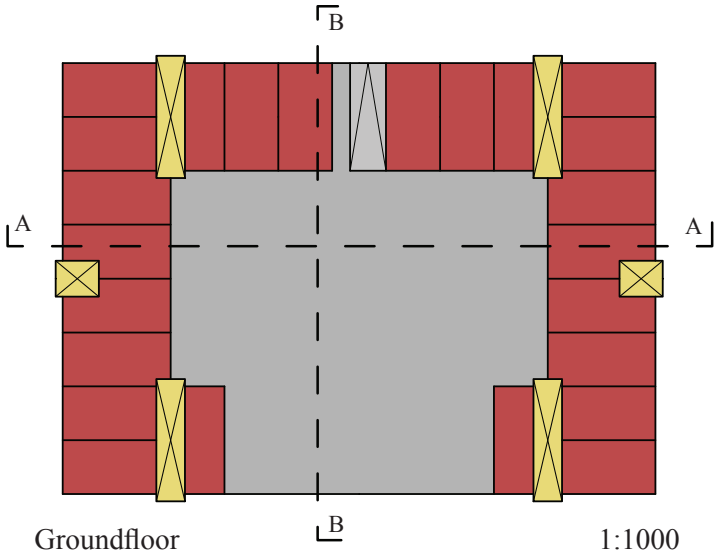


Image 2.2.4: *Floorplans and sections of buildingblock 1B.*

Block composition:

Unit A: 99 - 149

Unit B: -

Unit C: -

Unit D: -

Parking

Needed parking spaces: 225

Parking spaces inside the block: 235

Access systems:

Portico and gallery access, from the street and courtyard.

Densities:

FSI of the block:

min: 2.2 max: 2.3

FSI parking + infrastructure: 1.0

FSI including public space (streets):

min: 1.5 max: 2.0

Example of a possible elaboration.

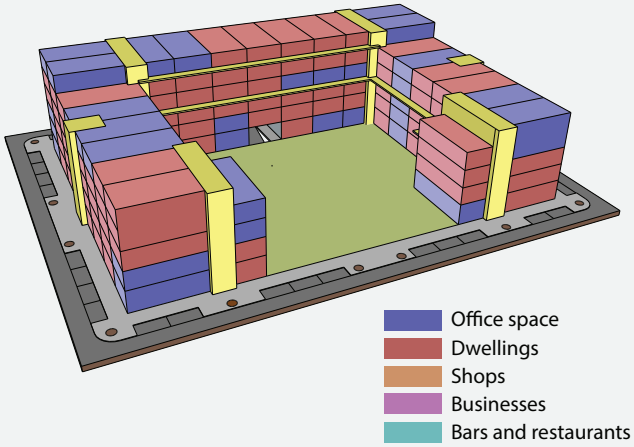


Image 2.2.5: *Possible distribution of functions for block 1B.*

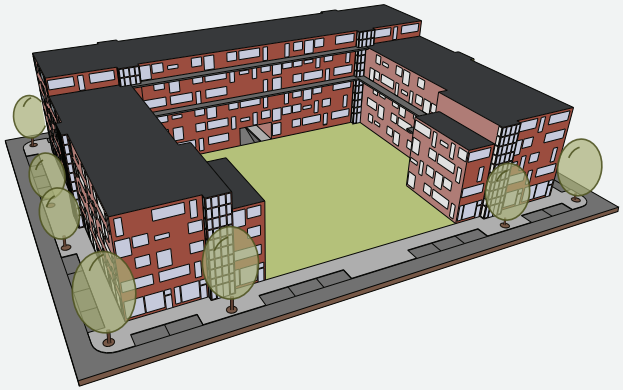
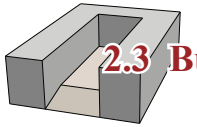


Image 2.2.6: *Impression of a possible scenario for block 1B.*



2.3 Building block 1C

It is very likely that the majority of the functions in the area will be residential functions since the demand for amenities usually is limited. Therefore, only unit A is used for this composition. That means that this block should only be used as dwellings and/or office space.

Bock 1C is variation of block 1A, and is a semi-closed building block with an open side on one of the short edges of the block

The courtyard of the block can be used either for some private gardens or a large public or semi-public garden.

The parking facilities of the building block are accessed from the long sides of the block. According to the parking norms set for the different units there is a need for 233 parking spaces for this block. However, the offices and dwellings in the block have different peak hours for their parking need. Therefore, it is possible for the different functions to use each others parking facilities and less parking spaces are sufficient. This block offers parking space for 235 vehicles inside the parking basement. This in combination with some parking on the street is more than sufficient.

To increase the flexibility different access systems are used (image 2.3.3); a combination of portico and gallery access and access directly from the street.

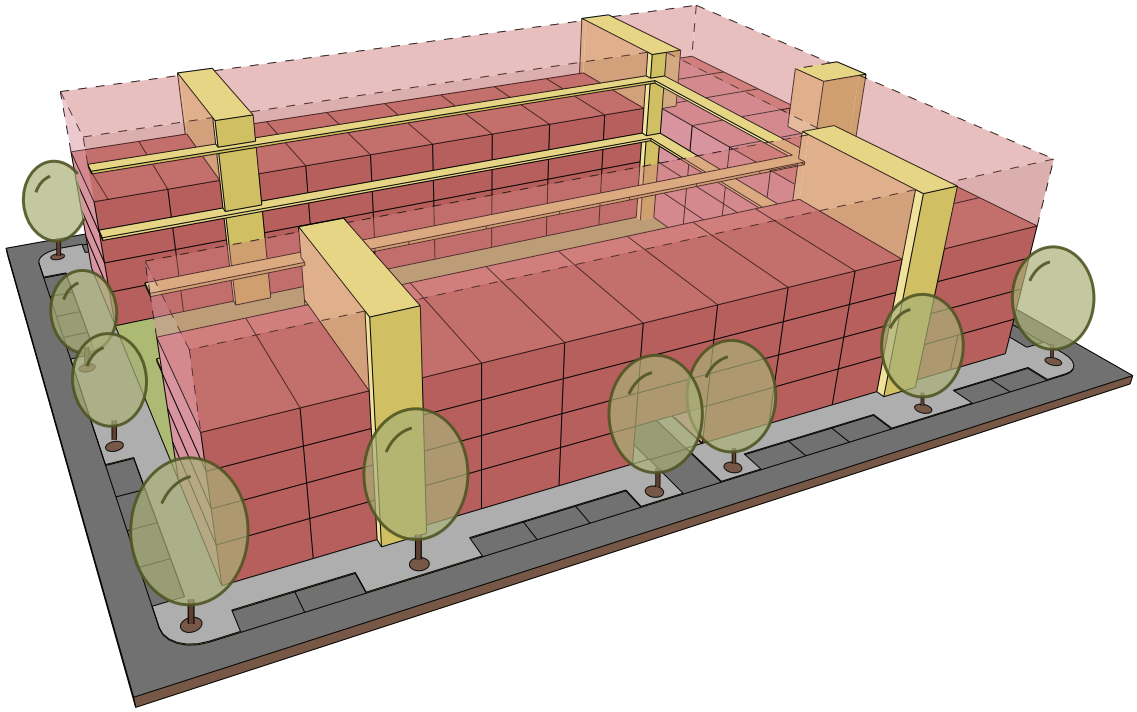


Image 2.3.1: *Overview of buildingblock 1C.*

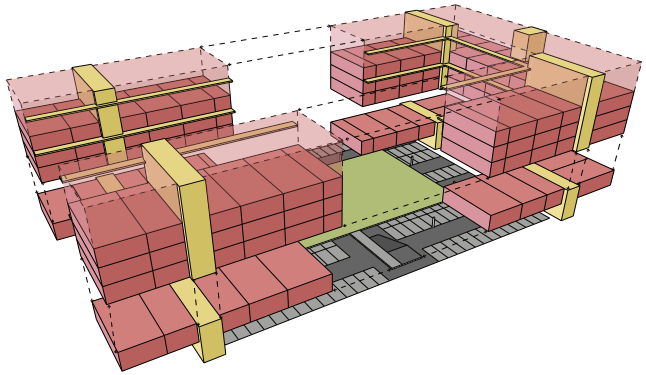


Image 2.3.2: *Exploded view of block 1C.*

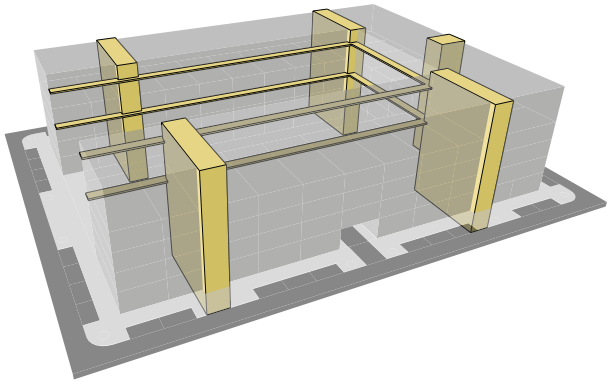


Image 2.3.3: *Access of the building: portico and gallery access.*

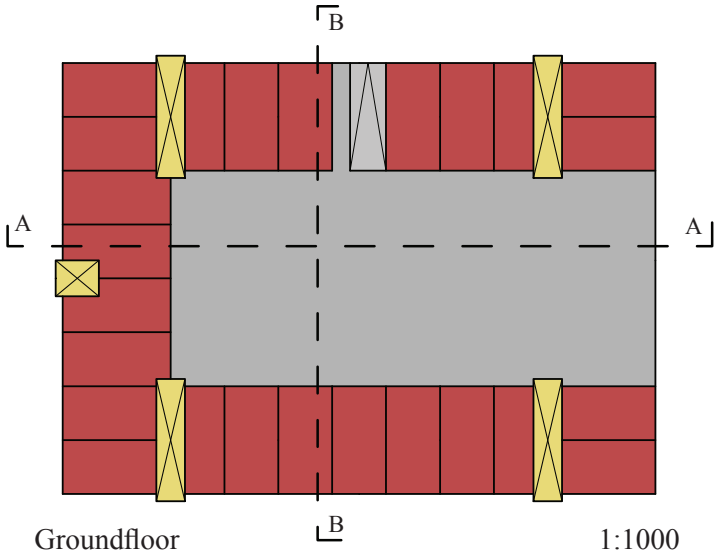


Image 2.3.4: *Floorplans and sections of buildingblock 1C.*

Block composition:

Unit A: 103 - 155

Unit B: -

Unit C: -

Unit D: -

Parking

Needed parking spaces: 233

Parking spaces inside the block: 235

Access systems:

Portico and gallery access, from the street and courtyard.

Densities:

FSI of the block:

min: 2.3 max: 2.5

FSI parking + infrastructure: 1.0

FSI including public space (streets):

min: 1.5 max: 2.0

Example of a possible elaboration.

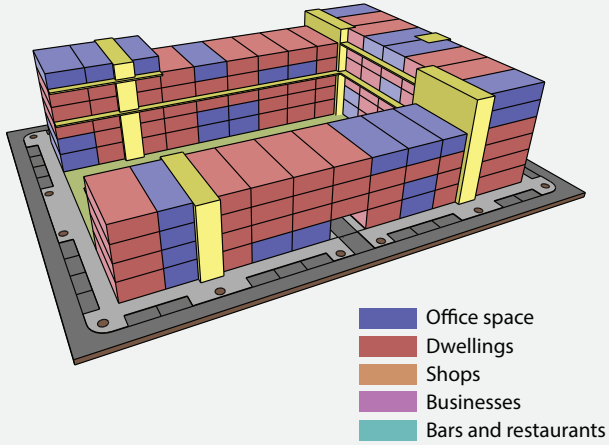
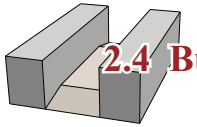


Image 2.3.5: *Possible distribution of functions for block 1C.*

Image 2.3.6: *Impression of a possible scenario for block 1C.*



2.4 Building block 1D

It is very likely that the majority of the functions in the area will be residential functions since the demand for amenities usually is limited. Therefore, only unit A is used for this composition. That means that this block should only be used as dwellings and/or office space.

Bock 1D is another variation of block 1A, and is a open building block where both short edges are open.

The courtyard of this block variant of the block can be used either for gardens or as a small backstreet.

The parking facilities of the building block are accessed from the long sides of the block. According to the parking norms set for the different units there is a need for 192 parking spaces for this block. However, the offices and dwellings in the block have different peak hours for their parking need. Therefore, it is possible for the different functions to use each others parking facilities and less parking spaces are sufficient. This block offers parking space for 235 vehicles inside the parking basement. This in combination with some parking on the street is more than sufficient.

To increase the flexibility different access systems are used (image 2.4.3); a combination of portico and gallery access and access directly from the street.

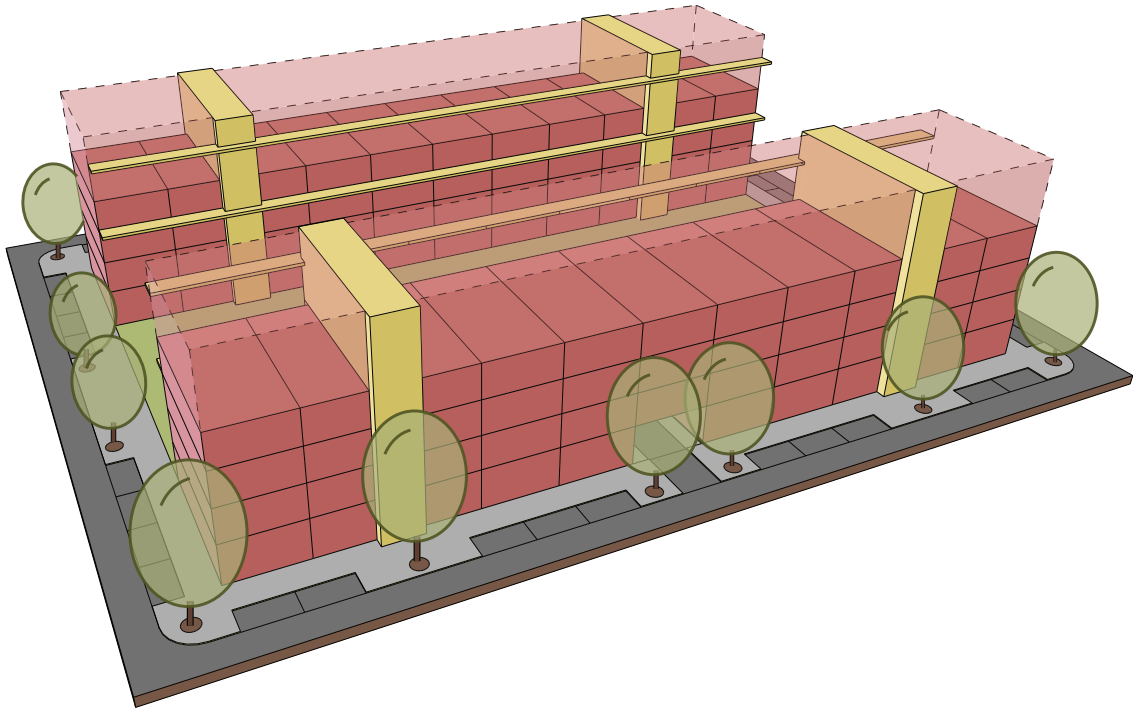


Image 2.4.1: *Overview of buildingblock 1D.*

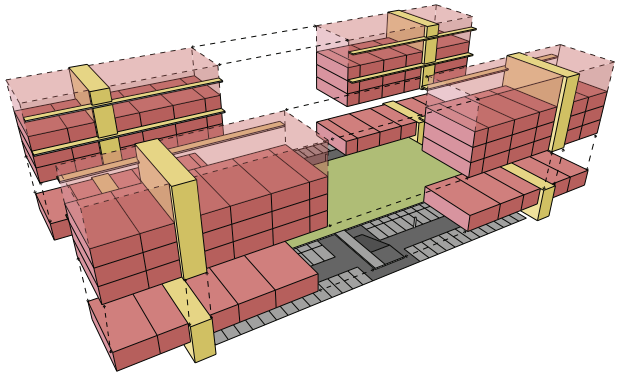


Image 2.4.2: *Exploded view of block 1D.*

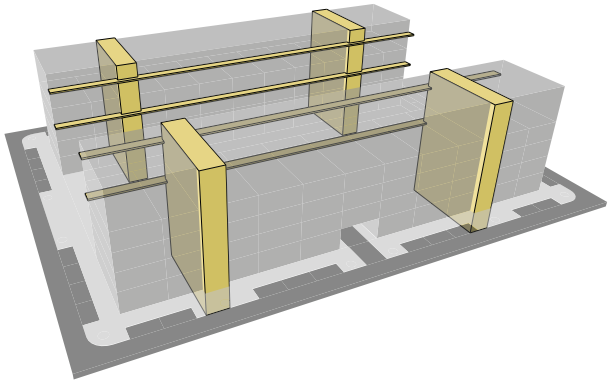


Image 2.4.3: *Access of the building: portico and gallery access.*

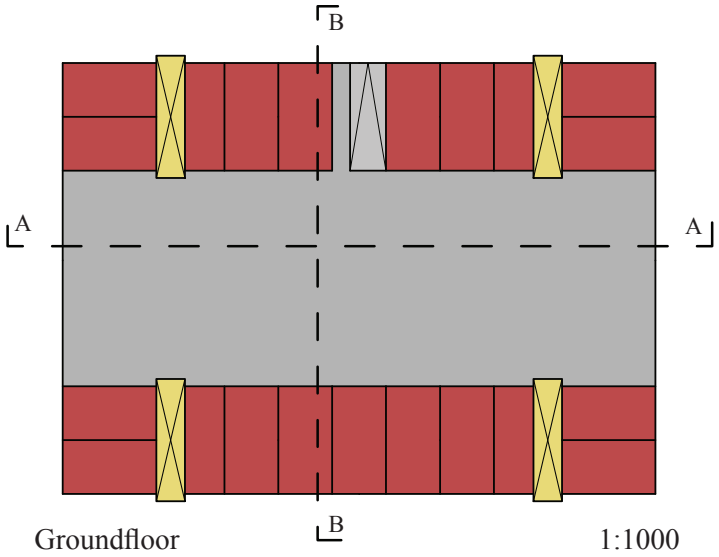


Image 2.4.4: *Floorplans and sections of buildingblock 1D.*

Block composition:

Unit A: 82 - 129

Unit B: -

Unit C: -

Unit D: -

Parking

Needed parking spaces: 192

Parking spaces inside the block: 235

Access systems:

Portico and gallery access, from the street and courtyard.

Densities:

FSI of the block:

min: 2.0 max: 2.9

FSI parking + infrastructure: 1.0

FSI including public space (streets):

min: 1.3 max: 1.8

Example of a possible elaboration.

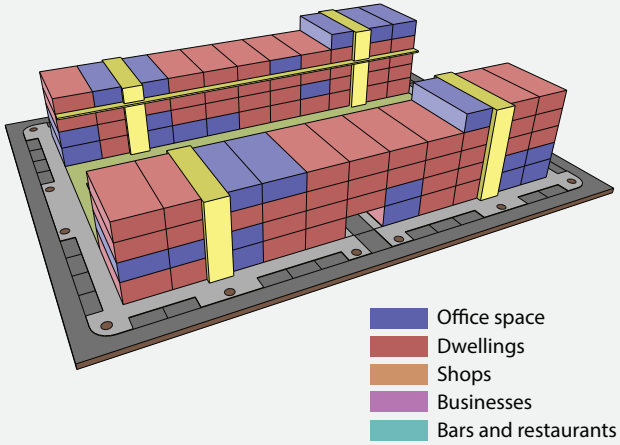
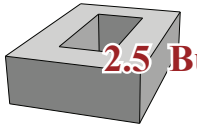


Image 2.4.5: *Possible distribution of functions for block 1D.*

Image 2.4.6: *Impression of a possible scenario for block 1D.*



2.5 Building block 2A

Building block 2A and 2B are the only blocks where unit B is used in the composition. These units are optimized for companies. Due to the depth of these units they can only be situated on the short edge of the building block. Inside the courtyard of the block is an elevated surface level. Beneath this surface level is space for trucks to supply the companies from inside the building block, This will make sure there is little sound nuisance from these companies.

The parking facilities of the building block are accessed from the long sides of the block (one side entrance, other side exit). According to the parking norms set for the different units there is a need for 339 parking spaces for this block. However, the different types of functions in the block have different peak hours for their parking need. Therefore, it is possible for the different functions to use eachother's parking facilities and less parking spaces might be sufficient. The block offers parking space for 286 vehicles (beneath the elevated surface level and inside the parking basement). This in combination with parking on the street should be sufficient.

To increase the flexibility different access systems are used (image 2.5.3); a combination of portico and gallery access and access directtly from the street.

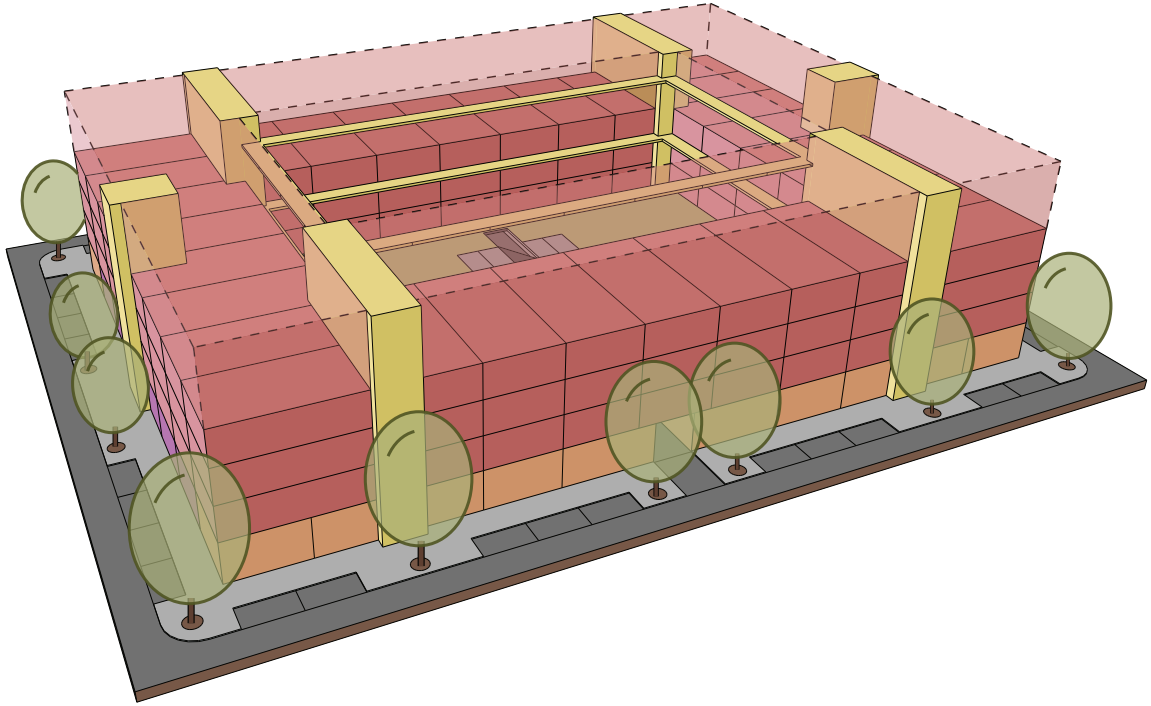


Image 2.5.1: *Overview of buildingblock 2A.*

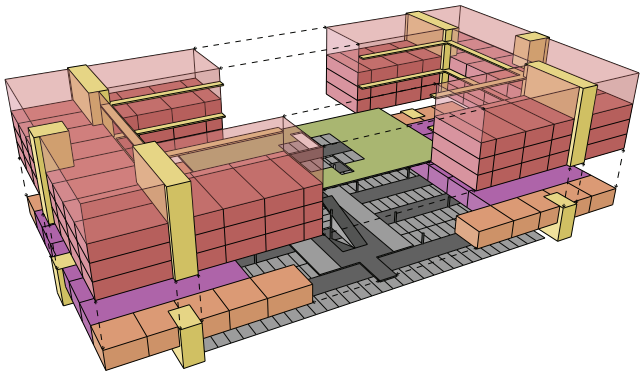


Image 2.5.2: *Exploded view of block 2A.*

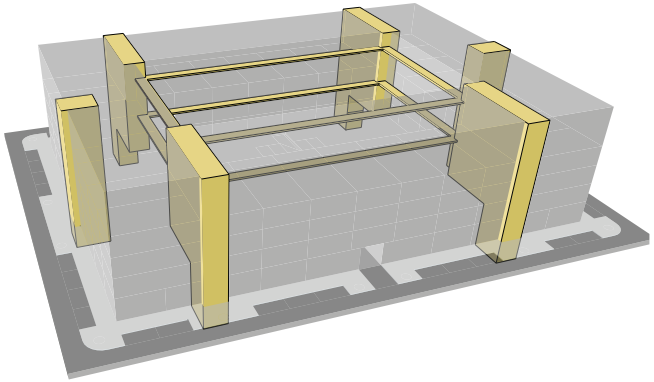
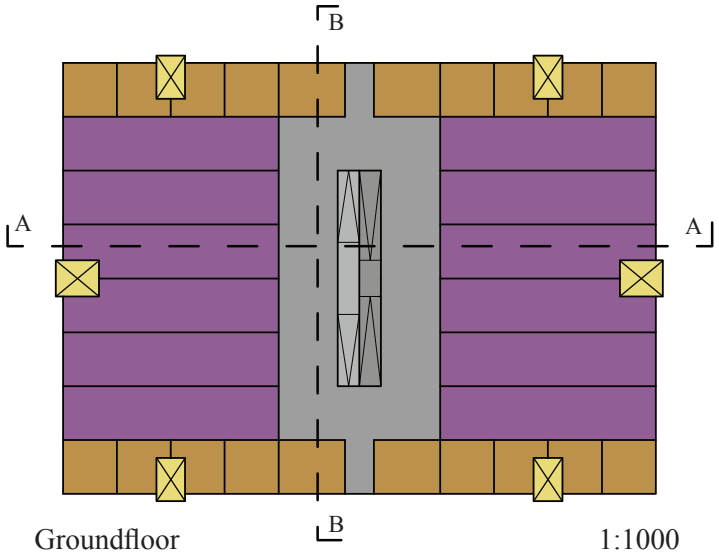
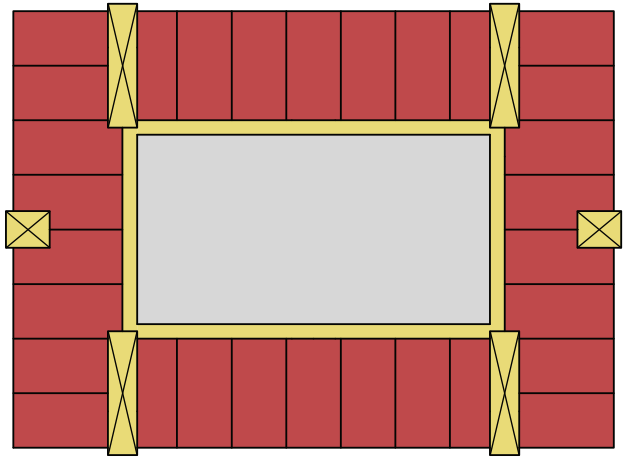


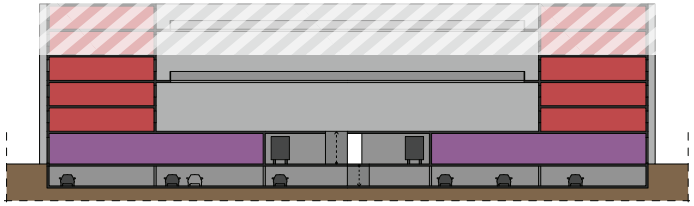
Image 2.5.3: *Access of the building: portico and gallery access.*



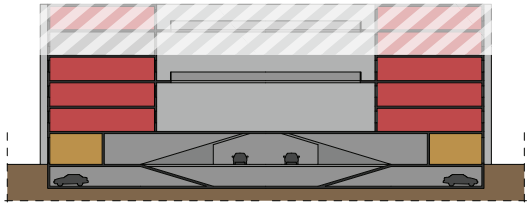
Groundfloor 1:1000



Other floors 1:1000



Section A-A 1:1000



Section B-B 1:1000

Image 2.5.4: *Floorplans and sections of buildingblock 2A.*

Block composition:

Unit A: 90-150

Unit B: 12

Unit C: -

Unit D: 20

Parking

Needed parking spaces: 339

Parking spaces inside the block: 286

Access systems:

Portico and gallery access, from the street and courtyard.

Densities:

FSI of the block:

min: 2.8 max: 4.2

FSI parking + infrastructure: 1.2

FSI including public space (streets):

min: 1.8 max: 2.4

Example of a possible elaboration.

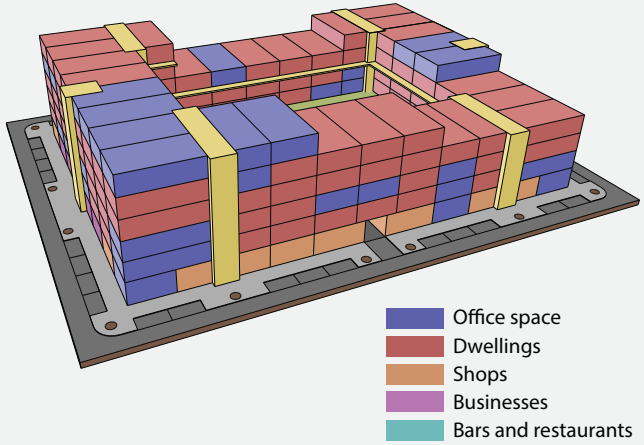
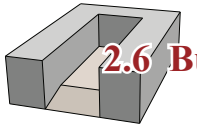


Image 2.5.5: *Possible distribution of functions for block 2A.*

Image 2.5.6: *Impression of a possible scenario for block 2A.*



2.6 Building block 2B

Building block 2A and 2B are the only blocks where unit B is used in the composition. These units are optimized for companies. Due to the depth of these units they can only be situated on the short edge of the building block.

Block 2B is a semi-closed building block with an open side on one of the long edges of the block. Inside the courtyard of the block is an elevated surface level. Beneath this surface level is space for trucks to supply the companies from inside the building block. This will make sure there is little sound nuisance from these companies.

The parking facilities of the building block are accessed from the long sides of the block (one side entrance, other side exit). According to the parking norms set for the different units there is a need for 296 parking spaces for this block. However, the different types of functions in the block have different peek hours for their parking need. Therefore, it is possible for the different functions to use each other's parking facilities and less parking spaces are sufficient. This block offers parking space for 286 vehicles (beneath the elevated surface level and inside the parking basement). This in combination with parking on the street should be more than sufficient.

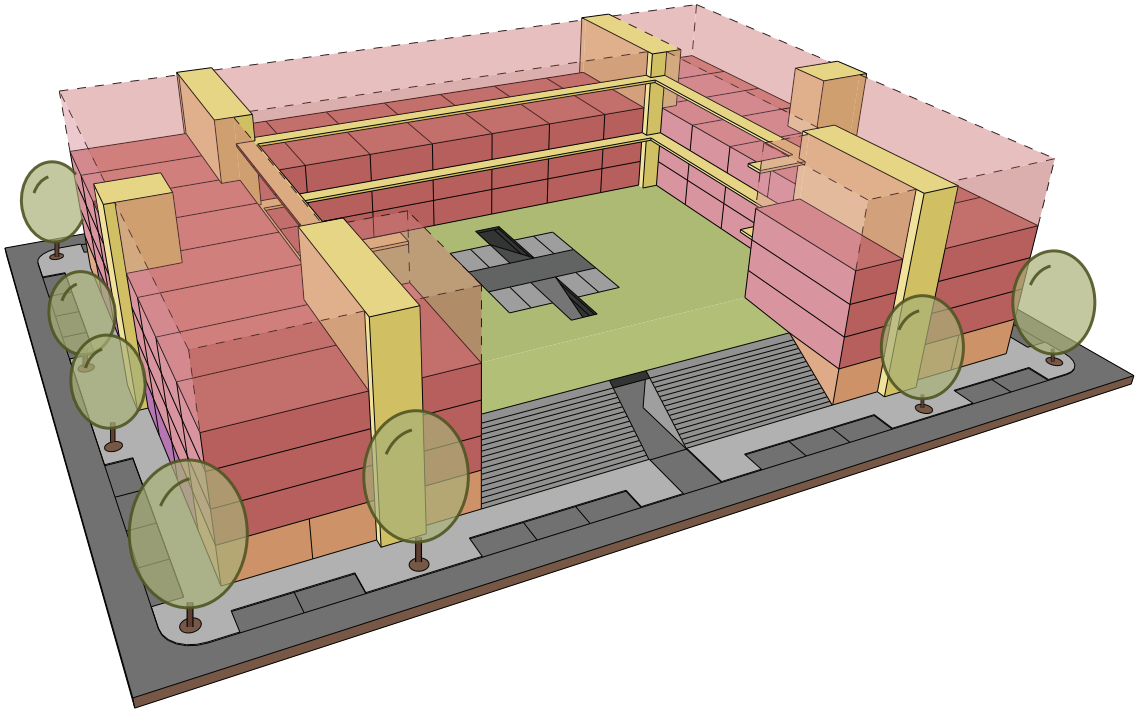


Image 2.6.1: *Overview of buildingblock 2B.*

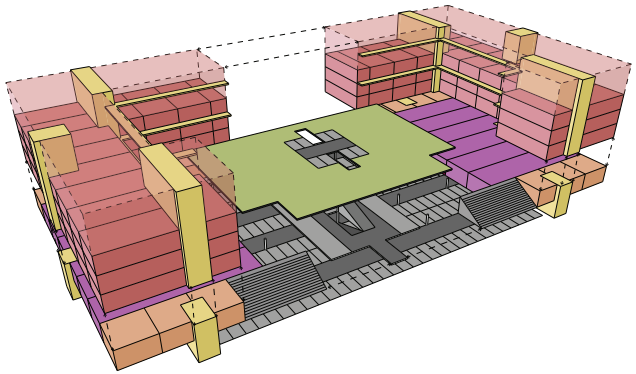


Image 2.6.2: *Exploded view of block 2B.*

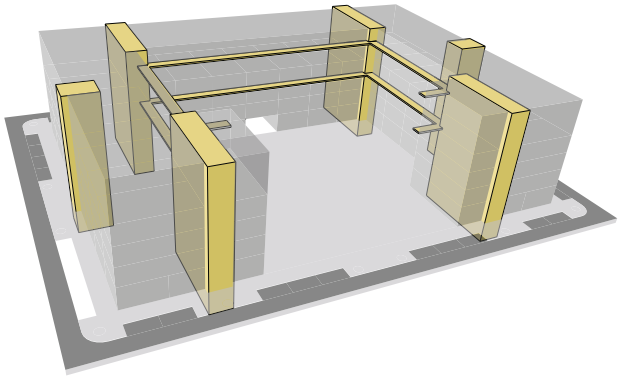


Image 2.6.3: *Access of the building: portico and gallery access.*

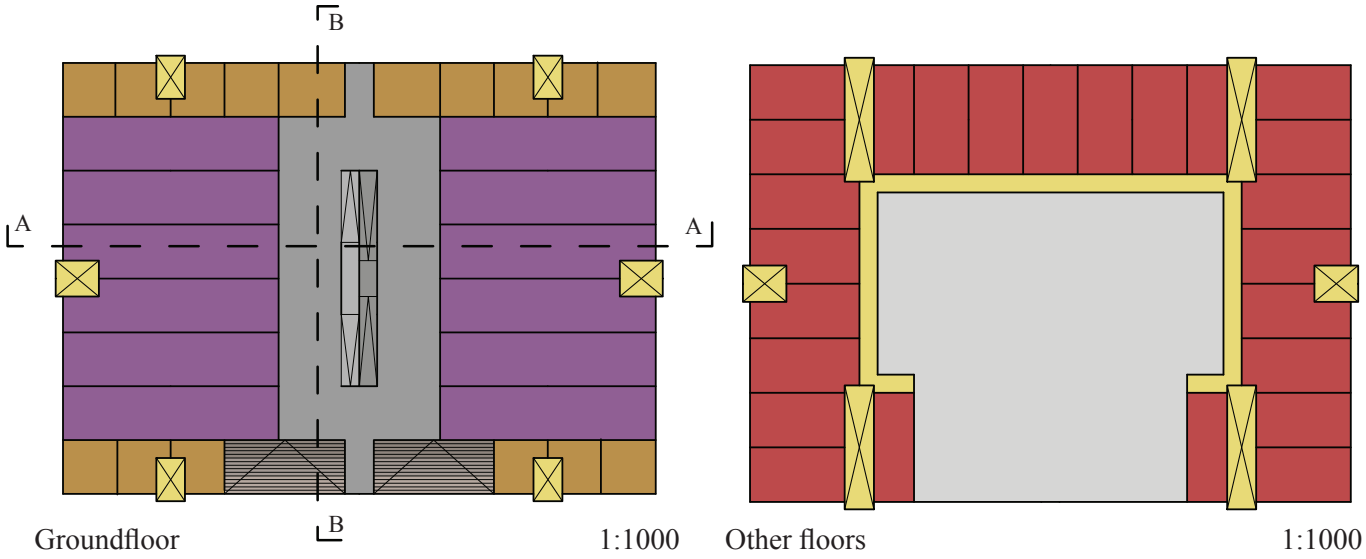


Image 2.6.4: *Floorplans and sections of buildingblock 2B.*

Block composition:

Unit A: 75-120

Unit B: 12

Unit C: -

Unit D: 16

Parking

Needed parking spaces: 296

Parking spaces inside the block: 286

Access systems:

Portico and gallery access, from the street and courtyard.

Densities:

FSI of the block:

min: 2.5 max: 3.6

FSI parking + infrastructure: 1.2

FSI including public space (streets):

min: 1.7 max: 2.2

Example of a possible elaboration.

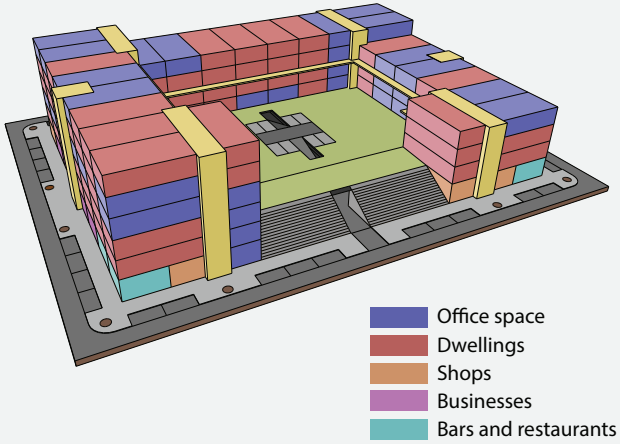


Image 2.6.5: *Possible distribution of functions for block 2B.*

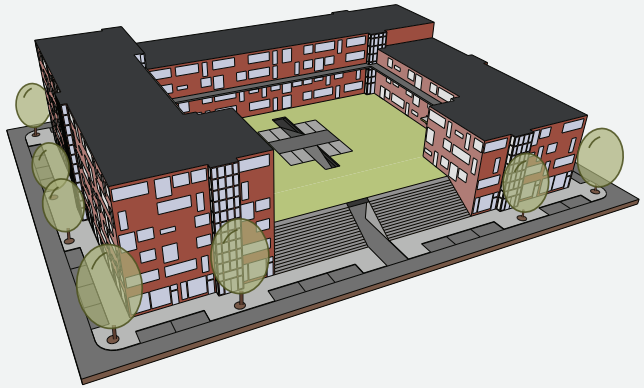


Image 2.6.6: *Impression of a possible scenario for block 2B.*

2.7 Building block 3A

Blok 3A is a composition that makes use of the units A, C and D. The ground floor consists out of units C and D and offers space to a wide variety of functions.

Inside the courtyard of the block is an elevated surface level. Beneath this surface level is space for trucks to supply the facilities on the ground floor from inside the building block.

The parking facilities of the building block are accessed from the long sides of the block (one side entrance, other side exit). According to the parking norms set for the different units there is a need for 303 parking spaces for this block. The block offers parking space for 329 vehicles (beneath the elevated surface level and inside the parking basement). This in combination with some parking on the street is more than sufficient.

To increase the flexibility different access systems are used (image 2.7.3); a combination of portico and gallery access and access directly from the street.

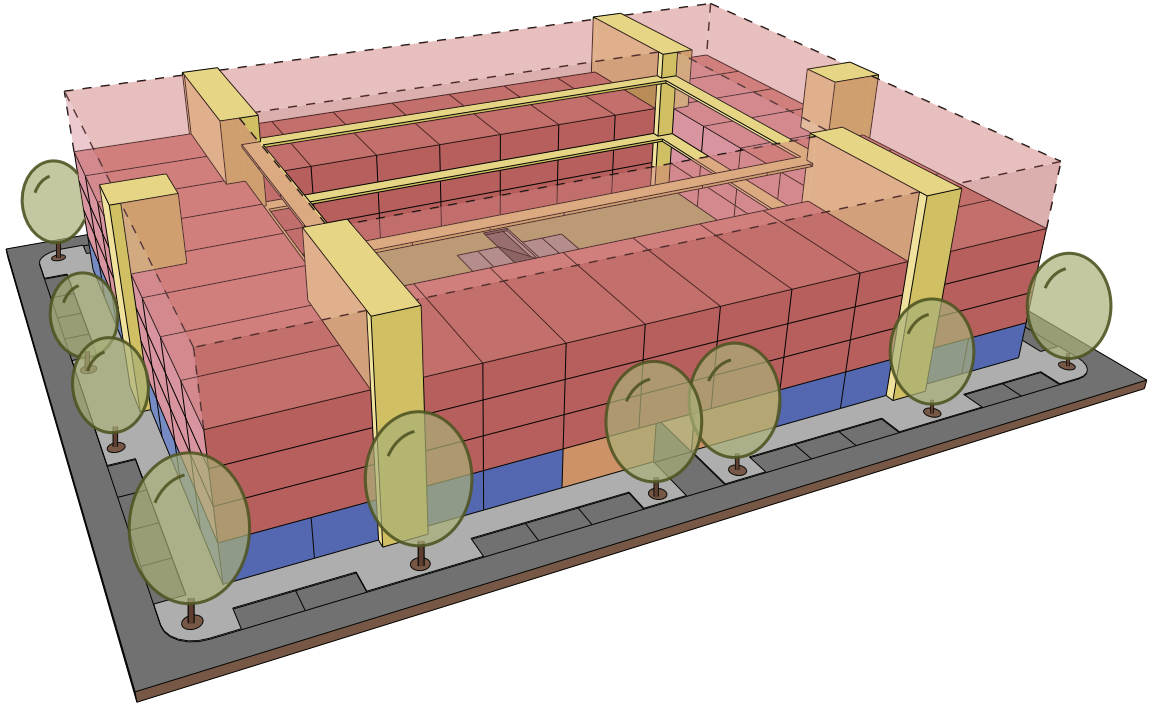


Image 2.7.1: *Overview of buildingblock 3A.*

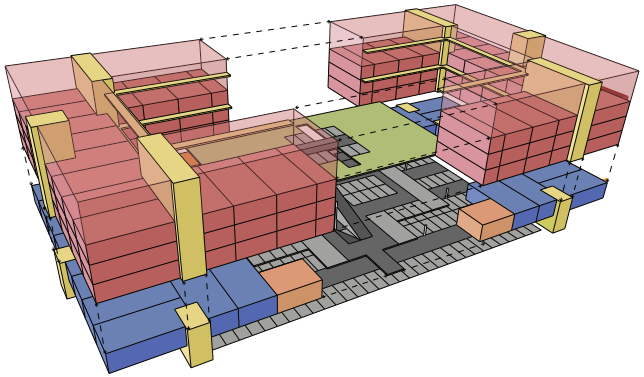


Image 2.7.2: *Exploded view of block 3A.*

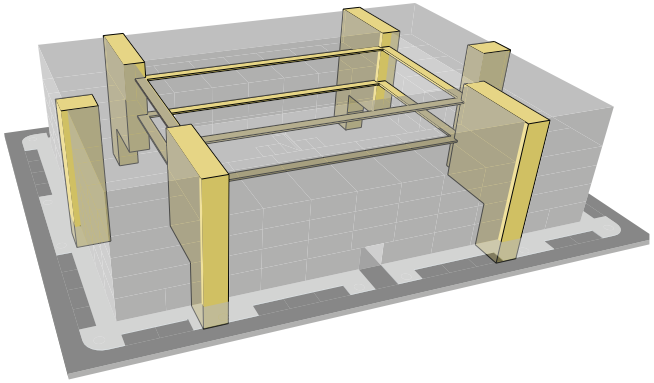


Image 2.7.3: *Access of the building: portico and gallery access.*

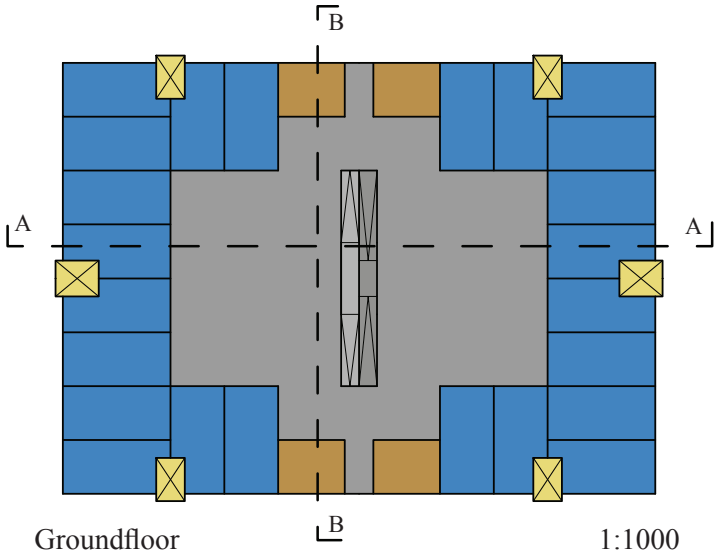


Image 2.7.4: *Floorplans and sections of buildingblock 3A.*

Block composition:

Unit A: 90-150

Unit B: -

Unit C: 24

Unit D: 4

Parking

Needed parking spaces: 303

Parking spaces inside the block: 329

Access systems:

Portico and gallery access, from the street and courtyard.

Densities:

FSI of the block:

min: 2.6 max: 4.0

FSI parking + infrastructure: 1.4

FSI including public space (streets):

min: 1.8 max: 2.4

Example of a possible elaboration.

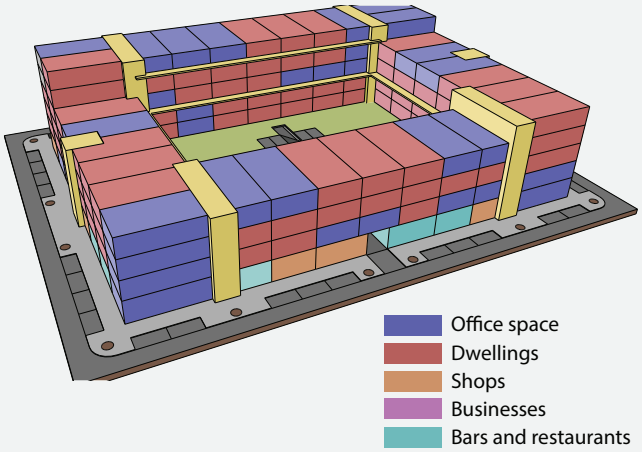
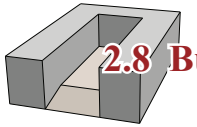


Image 2.7.5: *Possible distribution of functions for block 3A.*

Image 2.7.6: *Impression of a possible scenario for block 3A.*



2.8 Building block 3B

This block is a composition that makes use of the units A, C and D. The ground floor consists out of units C and D and offers space to a wide variety of functions. Bock 3B is a semi-closed building block with an open side on one of the long edges of the block

Inside the courtyard of the block is an elevated surface level. Beneath this surface level there is space for trucks to supply the facilities on the ground floor from inside the building block.

The parking facilities of the building block are accessed from the long sides of the block (one side entrance, other side exit). According to the parking norms set for the different units there is a need for 257 parking spaces for this block. The block offers parking space for 329 vehicles (beneath the elevated surface level and inside the parking basement). This in combination with some parking on the street is more than sufficient.

To increase the flexibility, different access systems are used (image 2.8.3); a combination of portico and gallery access and access directly from the street.

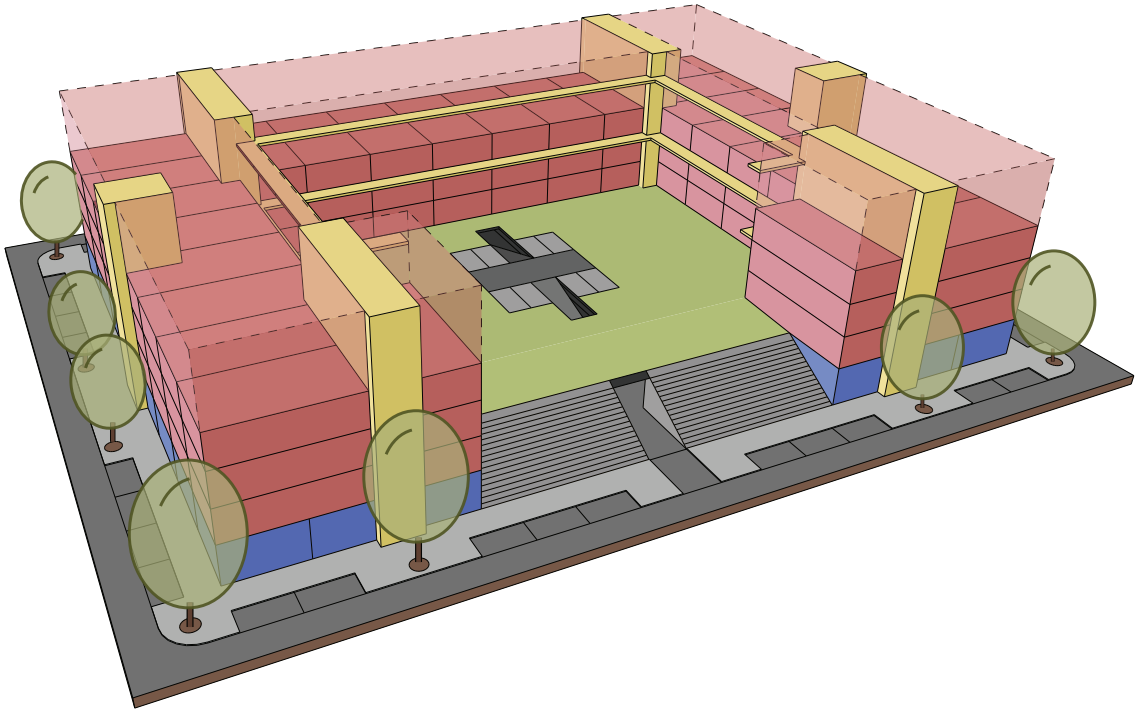


Image 2.8.1: *Overview of buildingblock 3B.*

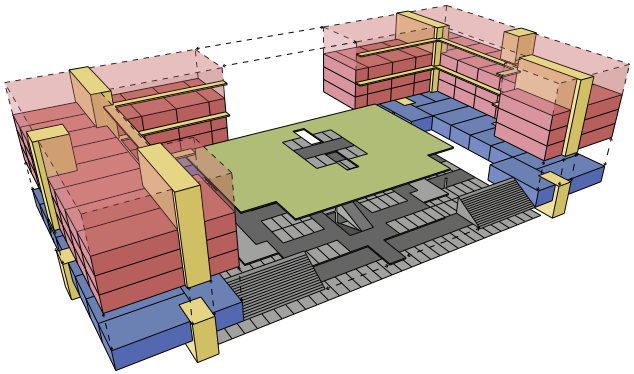


Image 2.8.2: *Exploded view of block 3B.*

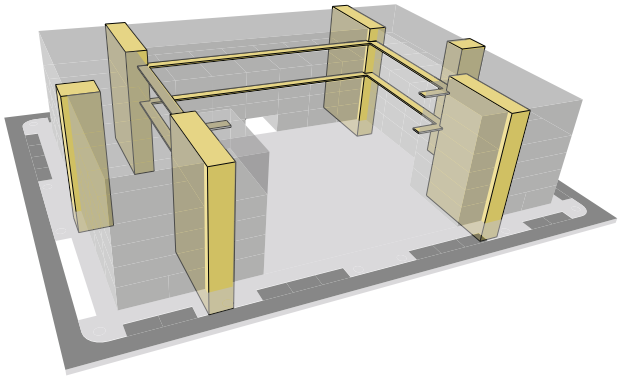
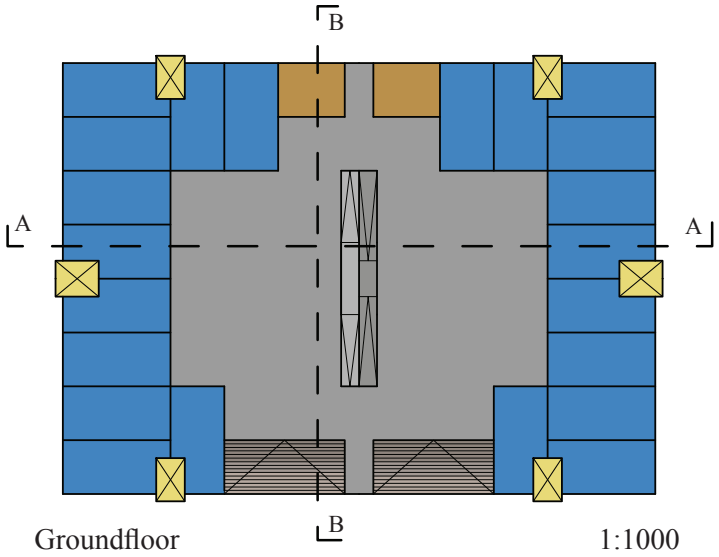
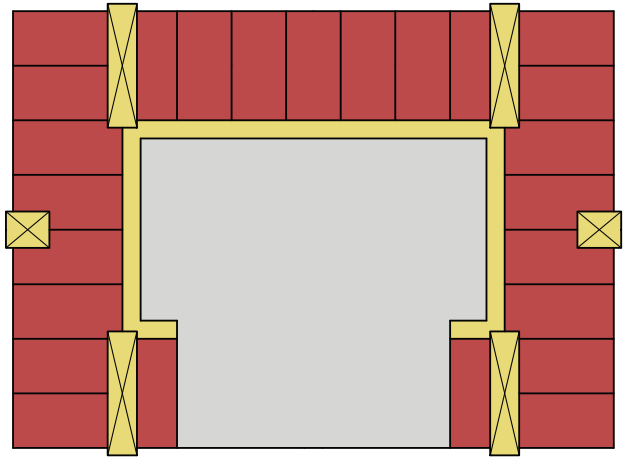


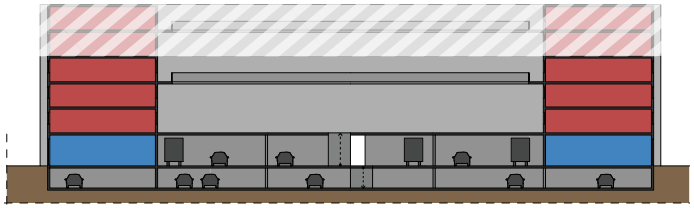
Image 2.8.3: *Access of the building: portico and gallery access.*



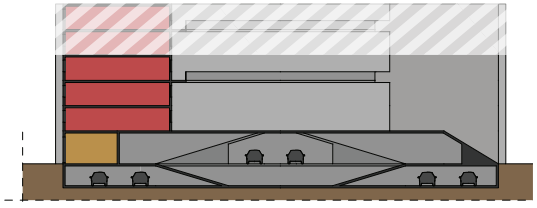
Groundfloor 1:1000



Other floors 1:1000



Section A-A 1:1000



Section B-B 1:1000

Image 2.8.4: *Floorplans and sections of buildingblock 3B.*

Block composition:

Unit A: 75 - 125

Unit B: -

Unit C: 22

Unit D: 2

Parking

Needed parking spaces: 257

Parking spaces inside the block: 329

Access systems:

Portico and gallery access, from the street and courtyard.

Densities:

FSI of the block:

min: 2.3 max: 3.4

FSI parking + infrastructure: 1.4

FSI including public space (streets):

min: 1.7 max: 2.2

Example of a possible elaboration.

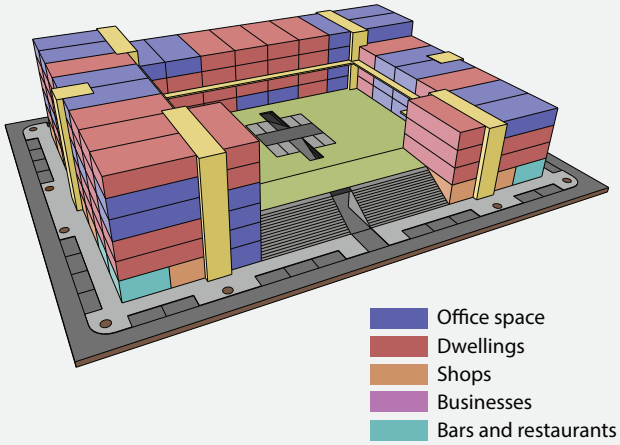


Image 2.8.5: *Possible distribution of functions for block 3B.*

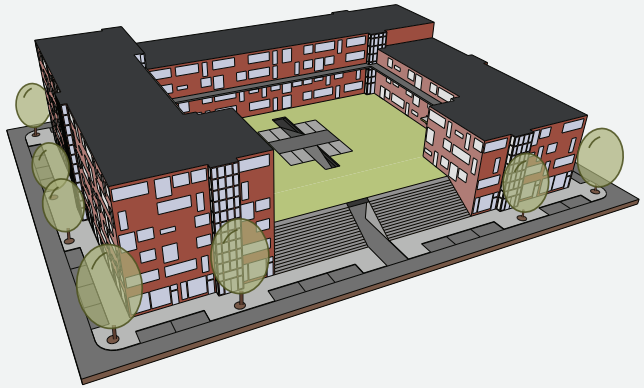
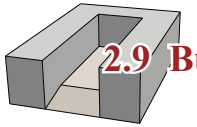


Image 2.8.6: *Impression of a possible scenario for block 3B.*



2.9 Building block 3C

This block is a composition that makes use of the units A, C and D. The ground floor consists out of units C and D and offers space to a wide variety of functions. Bock 3C is variation of block 3A, and is a semi-closed building block with an open side on one of the short edges of the block

Inside the courtyard of the block is an elevated surface level, Beneath this surface level there is space for trucks to supply the facilities on the ground floor from inside the building block.

The parking facilities of the building block are accessed from the long sides of the block (one side entrance, other side exit). According to the parking norms set for the different units there is a need for 261 parking spaces for this block. The block offers parking space for 329 vehicles (beneath the elevated surface level and inside the parking basement). This in combination with some parking on the street is more than sufficient.

To increase the flexibility, different access systems are used (image 2.9.3); a combination of portico and gallery access and access directly from the street.

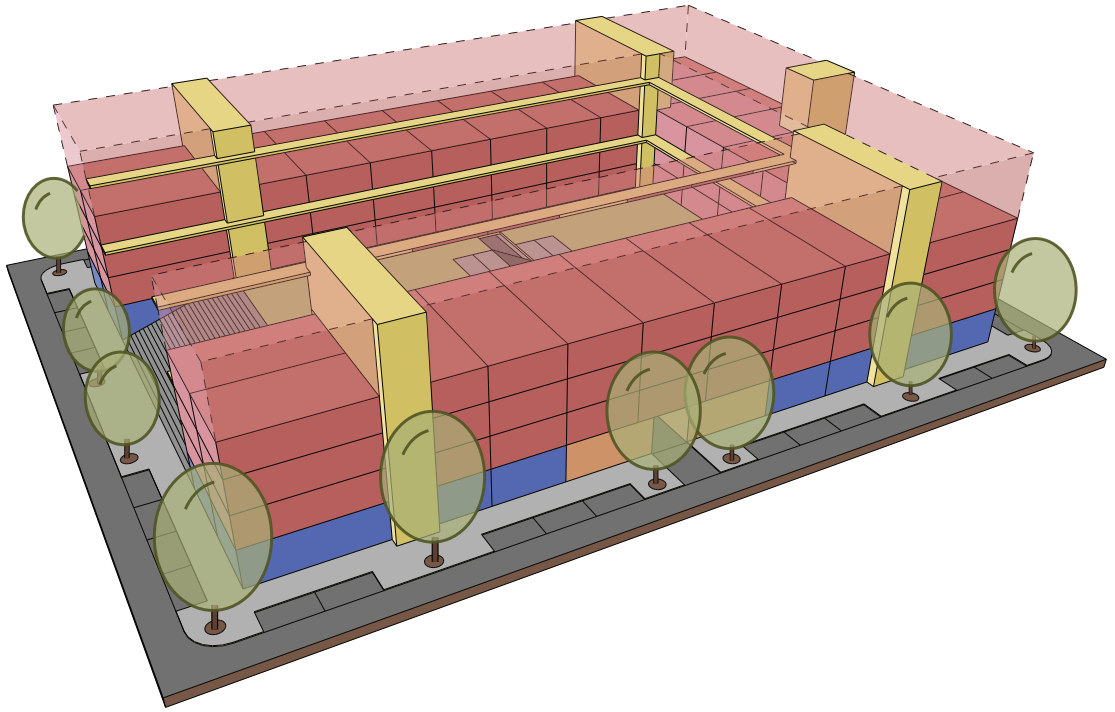


Image 2.9.1: *Overview of buildingblock 3C.*

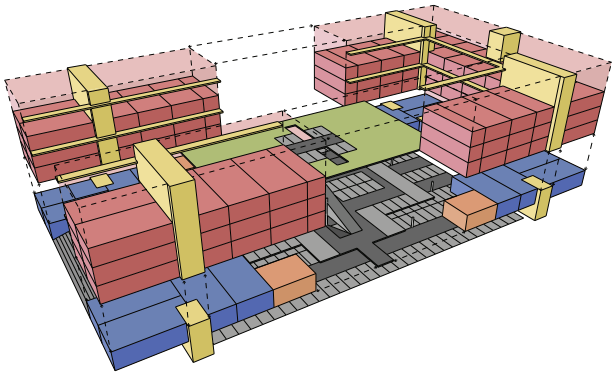


Image 2.9.2: *Exploded view of block 3C.*

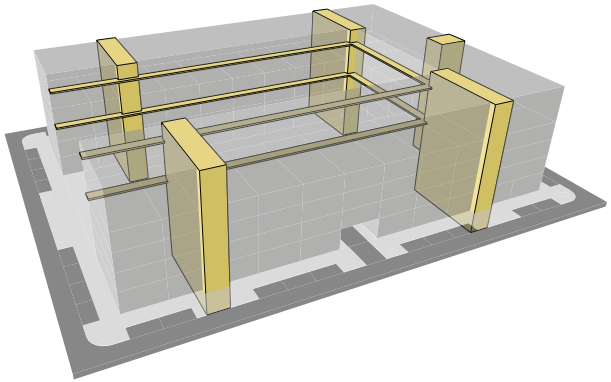


Image 2.9.3: *Access of the building: portico and gallery access.*

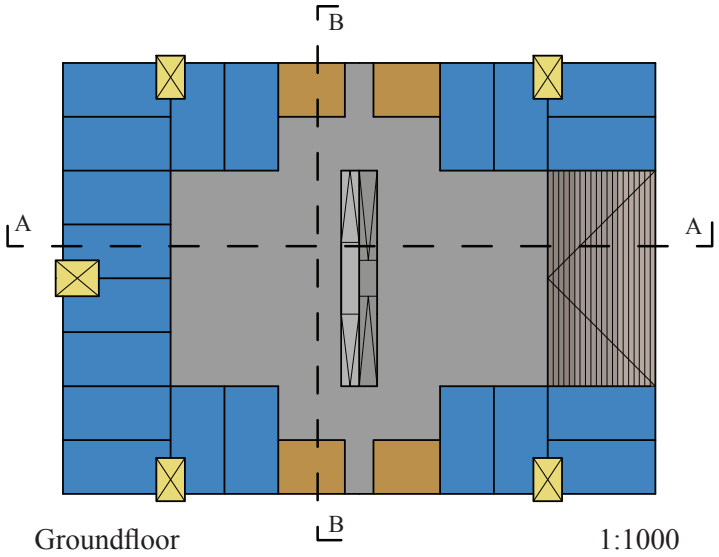


Image 2.9.4: *Floorplans and sections of buildingblock 3C.*

Block composition:

Unit A: 78 - 130

Unit B: -

Unit C: 20

Unit D: 4

Parking

Needed parking spaces: 261

Parking spaces inside the block: 329

Access systems:

Portico and gallery access, from the street and courtyard.

Densities:

FSI of the block:

min: 2.3 max: 3.5

FSI parking + infrastructure: 1.4

FSI including public space (streets):

min: 1.7 max: 2.2

Example of a possible elaboration.

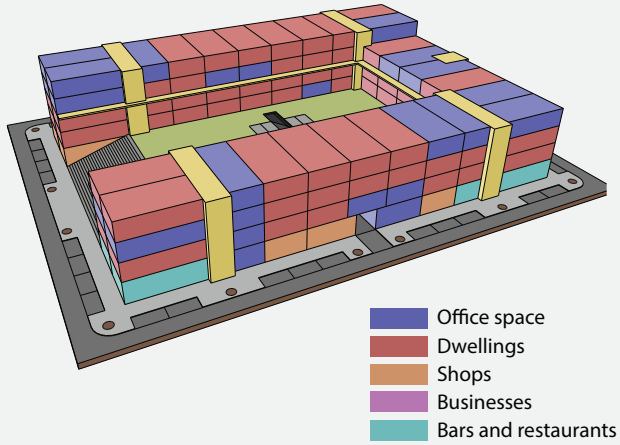
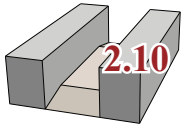


Image 2.9.5: *Possible distribution of functions for block 3C.*

Image 2.9.6: *Impression of a possible scenario for block 3C.*



2.10 Building block 3D

This block is a composition that makes use of the units A, C and D. The ground floor consists out of units C and D and offers space to a wide variety of functions. Bock 3D is another variation of block 3A, and is an open building block where both short edges are open.

Inside the courtyard of the block is an elevated surface level. Beneath this surface level there is space for trucks to supply the facilities on the ground floor from inside the building block.

The parking facilities of the building block are accessed from the long sides of the block (one side entrance, other side exit). According to the parking norms set for the different units there is a need for 219 parking spaces for this block. The block offers parking space for 329 vehicles (beneath the elevated surface level and inside the parking basement). This in combination with parking on the street is more than sufficient.

To increase the flexibility different access systems are used (image 1.10.3); a combination of portico and gallery access and access directly from the street.

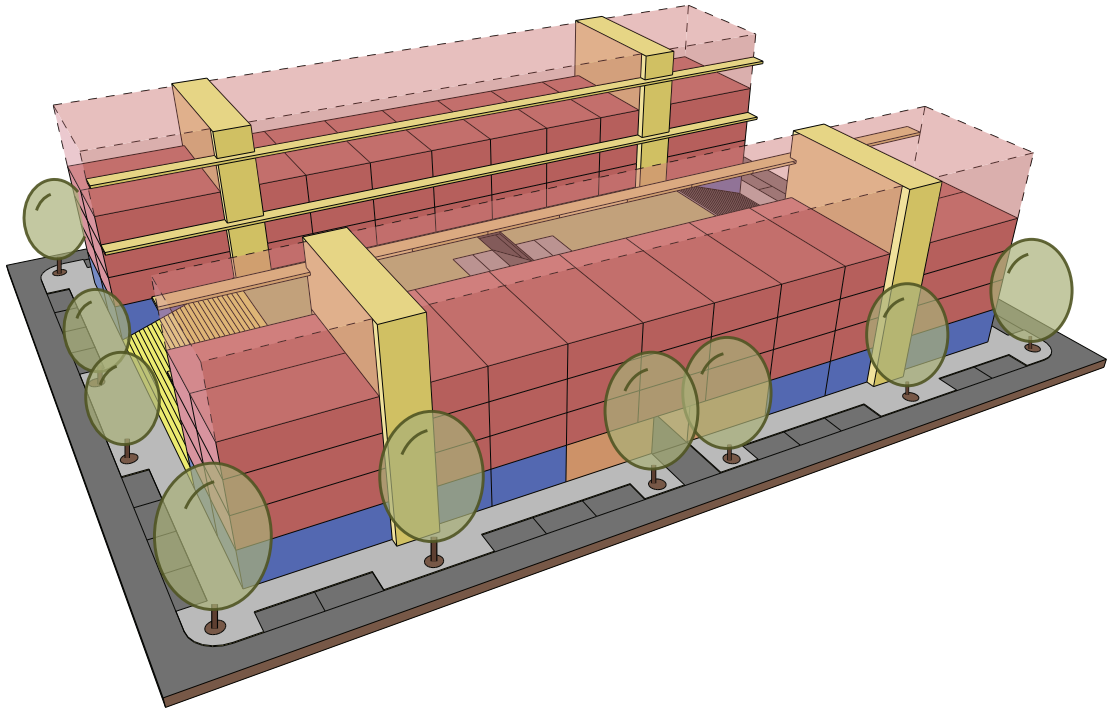


Image 2.10.1: *Overview of buildingblock 3D.*

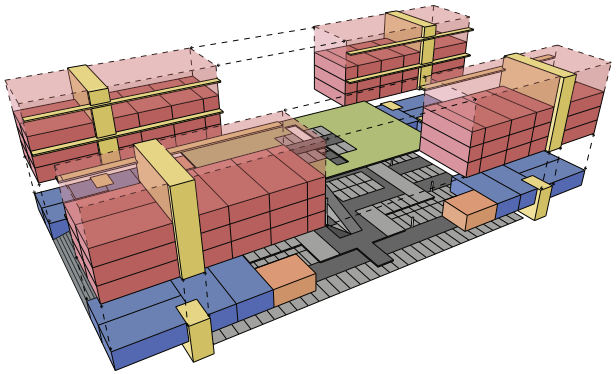


Image 2.10.2: *Exploded view of block 3D.*

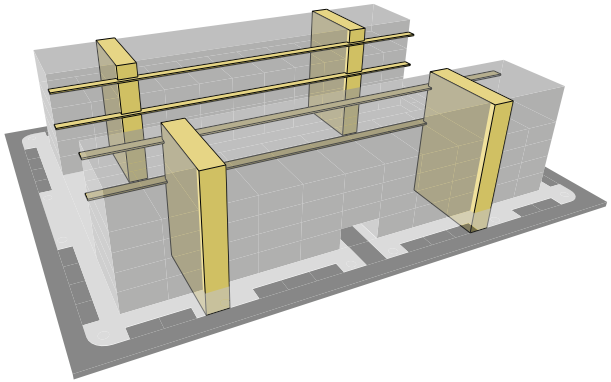
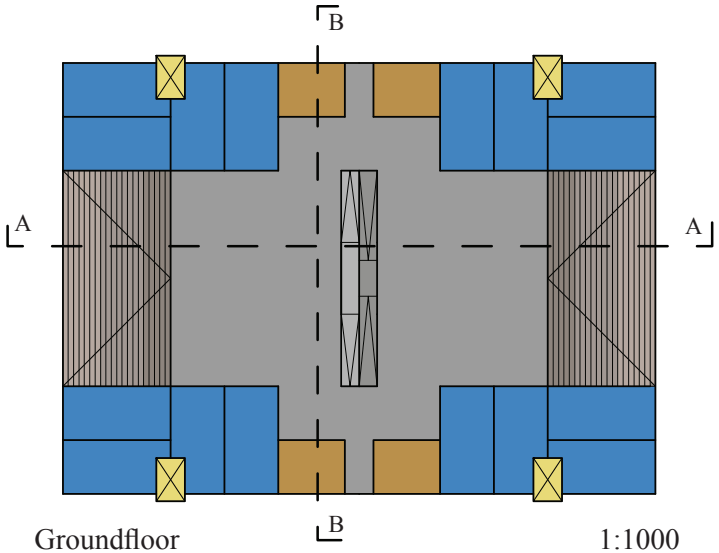
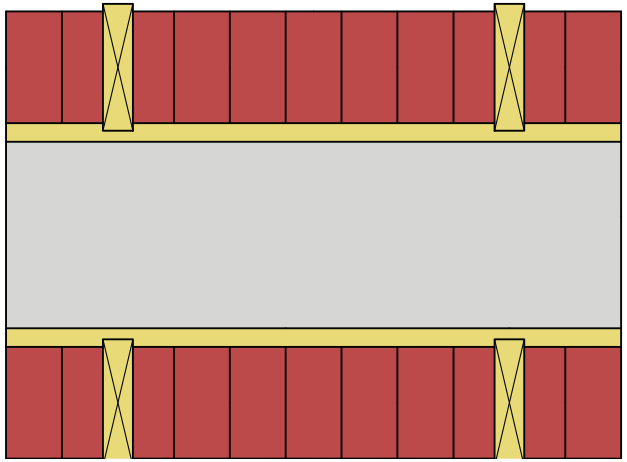


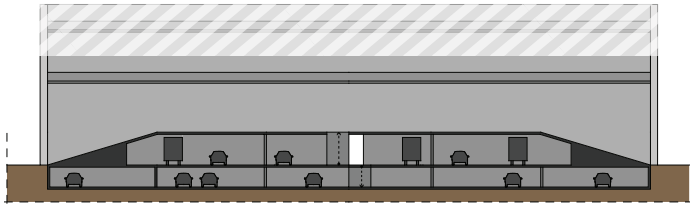
Image 2.10.3: *Access of the building: portico and gallery access.*



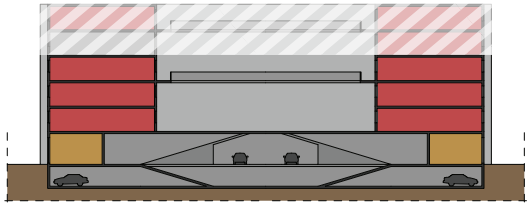
Groundfloor 1:1000



Other floors 1:1000



Section A-A 1:1000



Section B-B 1:1000

Image 2.10.4: *Floorplans and sections of buildingblock 3D.*

Block composition:

Unit A: 66 - 110

Unit B: -

Unit C: 16

Unit D: 4

Parking

Needed parking spaces: 219

Parking spaces inside the block: 329

Access systems:

Portico and gallery access, from the street and courtyard.

Densities:

FSI of the block:

min: 2.1 max: 3.0

FSI parking + infrastructure: 1.4

FSI including public space (streets):

min: 1.6 max: 2.0

Example of a possible elaboration.

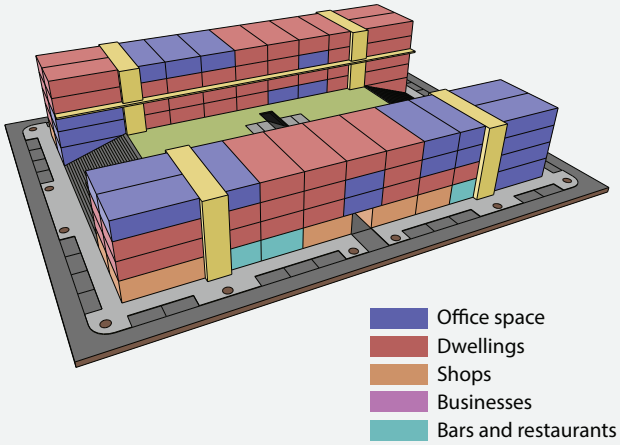


Image 2.10.5: *Possible distribution of functions for block 3D.*

Image 2.10.6: *Impression of a possible scenario for block 3D.*

3.1 Visual quality plan

In order to preserve buildings in time, emotional values have to be created. This means that buildings need to have certain qualities that make them visually appealing and thus 'precious' (Bijendijk, 2005: 42).

Creating an attractive building is a subjective matter. However, studies have shown that there are certain characteristics that can help in the creation of a building that poses emotional value. So to help steer the design of the building blocks into the correct direction, a visual qualities plan is created by a compilation of reference images.

Studying buildings that are known to have emotional value has shown that the materialization of the building is an aspect that will greatly add to the emotional value. The use of durable materials, like stone or bricks is a good example of this. And in addition largely dimensioned and attractive entrances to the block are very important when it comes to creating a 'precious' building (Bijendijk, 2005: 48).

Creating buildings with a high emotional value will however require a higher initial investment. However, using these durable materials will result in a much longer lifespan of the building.

Materialization

Image 3.10.1: *Building block "Botania" in Amsterdam (JPMM, 2011).*

Image 3.10.3: *New Façade of the former Wilhelmina Gasthuis in Amsterdam (INBO, s.d.).*

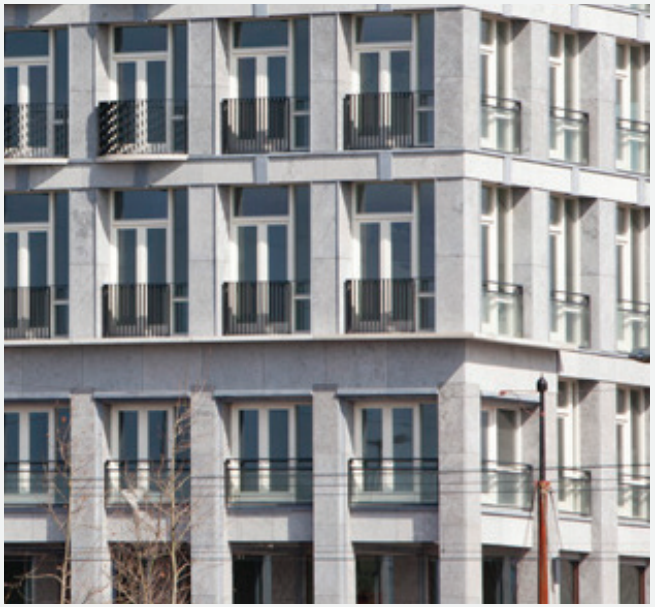


Image 3.10.2: *Façade of building block 1 in IJburg, Amsterdam (Baumschlager Erbe, s.d.).*

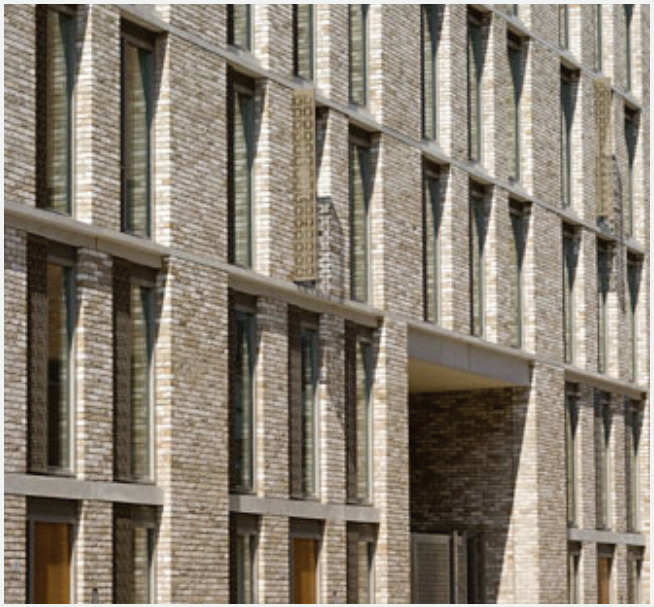


Image 3.10.4: *Façade of block 46a in IJburg, Amstardam (HVDN Architecten, s.d.-a).*

Image 4.1.1: *Entrance of the former Wilhelmina Gasthuis in Amsterdam (INBO, s.d.).*

Image 4.1.3: *Entrance hall of the building block "Botania" in Amsterdam by Cie Architects (Cie Architecten, 2002).*

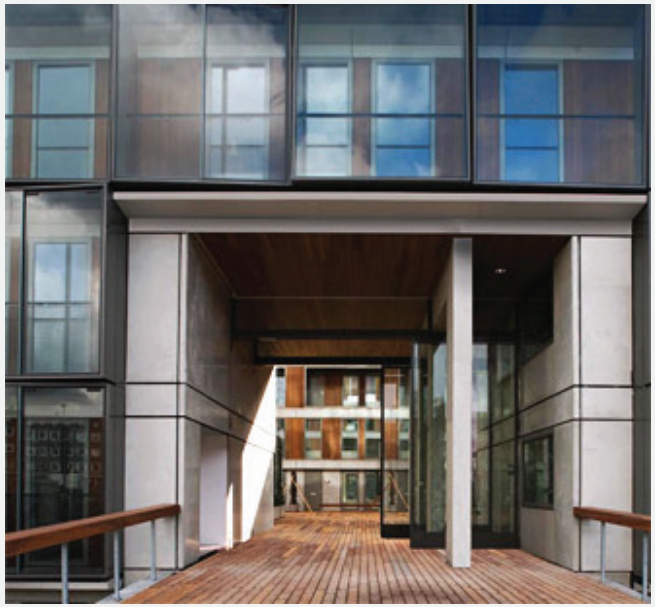


Image 4.1.2: *Entrance of the building block "Het kasteel" in Amsterdam (HVDN Architecten, s.d.).*

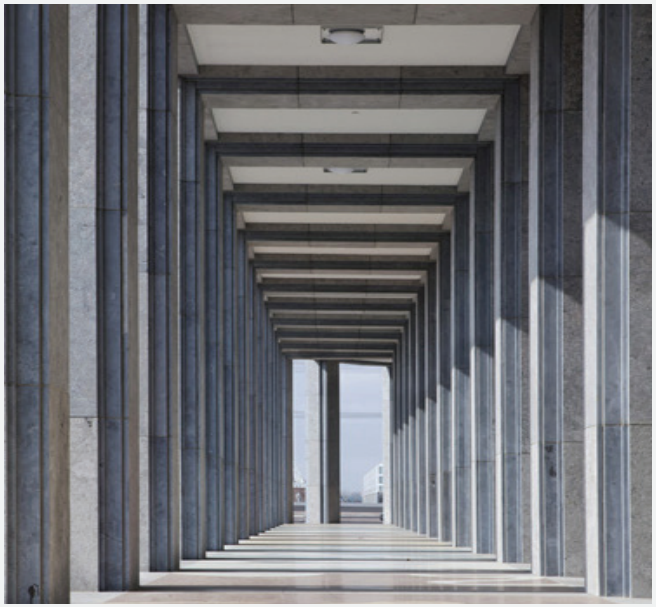


Image 4.1.4: *Arcade of building block 1 in IJburg, Amsterdam (Baumschlager Erbe, s.d.).*

4.1 References

Baumschlager Erbe. (s.d.). Solids IJburg [Online]. Retrieved 30-3-2013 from http://www.baumschlager-eberle.com/en/projects/chronological/details-of-project/project/solids-ijburg.html.

Bijendijk, F. (2005). Solids. In: Leupen, B., Heijne, R. & Van Zwol, J. (eds.) Time based architecture. Rotterdam: 010 Publishers, 42-51.

Cie Architecten. (2002). Woongebouw Botania, Amsterdam [Online]. Retrieved 30-3-2013 from http://www.cie.nl/projecten/projecten/wonen/botania,-amsterdam.aspx.

DRO (2008). Locatiebeleid Amsterdam 2008, Een aanvullend toetsingskader van het Structuurplan 2003. DRO Planning service of Amsterdam.

HVDN Architecten. (s.d.-a). blok 46a, ijburg amsterdam [Online]. Retrieved 31-3-2013 from http://www.hvdn.nl/2111/projecten/0449wt.htm.

HVDN Architecten. (s.d.-b). Het kasteel, Amsterdam [Online]. Retrieved 31-3-2013 from http://www.hvdn.nl/2111/projecten/0444wt.htm.

INBO. (s.d.). Amsterdam, Furore blok C [Online]. Retrieved 30-3-2013 from http://www.inbo.com/NL/projecten/Pages/FuroreblokC.aspx - .UVb3Cls-jq5I.

JPMM (2011) Botania via: Flickr, Creative Commons [Online] Retrieved 30-03-2013, from http://www.flickr.com/photos/jpmm/5700701225/.

Neufert, E. & Neufert, P. (2002). Neufert, Architects' Data. Hoboken: Wiley-Blackwell.

PBL (2009). Menging van wonen en werken. Den Haag/Bilthoven: PBL Netherlands Environmental Assessment Agency.

P5 REFLECTION

Bart van Leeuwen

Student id: #1309064

Master track: Urbanism

Graduation studio: Urban Regeneration

June 2013

Large urban developments or urban renewal projects usually have a very long time span between initial design and final completions. During this time it is possible that there will be changes in the economic structure, in the labour and housing markets, in availability of technology and in lifestyle (Stouten, 2010: 224). These changes can potentially form the risk that there are totally different social, spatial and programmatic demands upon the completion of the project, resulting in a non-functional urban area. This means that a big issue for urban (re)development is the uncertainty of the future (Wigmans, 2003), and this uncertainty is even further enhanced by the current economic climate. Using todays form of urban planning it is only possible to make short-term plans and answer to the demands of a set point in time (Tuttert, 2012: 28). This might mean that with the current economic climate the conventional form urban planning and design is out-dated. An urban design can no longer just be a rigid blueprint with some fancy impressions and sections, an urban plan has to be able to beware of the changing context and be able to anticipate on it. This means that an urban plan somehow has to be flexible, which in the case of urban design means being able to adapt to changes like the ones mentioned before (Voogd, 1995: 77). In other words, within the field of urbanism adaptability is a form of flexibility. This means that flexibility somehow has to be integrated into the development strategy or strategic development plan in order to make sure the urban design can be adaptable and will meet the required demands upon completion.

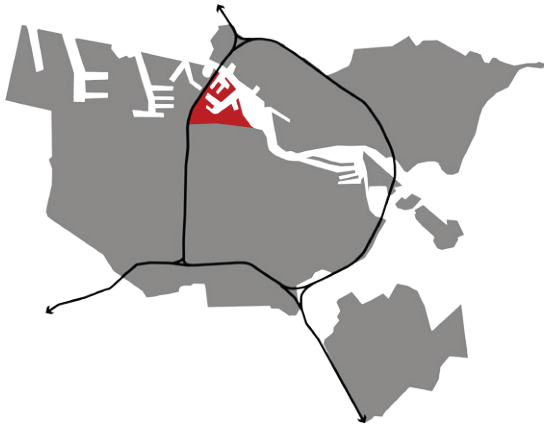


Image 1: The project location within the municipality of Amsterdam

These changes in society and demands for certain functions are a continuous process (Stouten, 2010: 232); this means that after the completion the urban areas will still face the problem of having to facilitate these changes. To make sure that the urban fabric and the built environment can last through the time and remain a well-functioning area, it has to be flexible and thus able to adapt to these changes. This means that the urban fabric and buildings itself have to be able to accommodate different types functions without the need for major reconstructions

The location chosen for this project is a harbour area, close the centre of Amsterdam, illustrated on image 1. The municipality of Amsterdam stated the ambition to transform this area into a mixed-use area for “living and working” (Gemeente Amsterdam, 2011:

64). Mixed-use in the field of urbanism, means different functions will be combined within the same area, rather than clustering specific functions together as is done in for example office parks.

"The research and design studio of urban regeneration is concentrated on methods of public intervention, urban design, sustainable development, heritage preservation, and strategic planning that contribute to urban regeneration strategies" (TU Delft, s.d.). With a former harbor area close to the centre of Amsterdam I have chosen a location that closely relates to the studio of urban regeneration. In combination with my chosen themes of flexibility and mixed-use is this graduation project in my opinion a very good example of an urban regeneration project

Relevance:

This graduation project aims to contribute to both the scientific and societal perspectives. When it comes to the scientific relevance, the project intents to contribute to the knowledge and discussion on flexible urban planning/design. From the societal point of view, the application of this knowledge on the Minerva City-harbour in Amsterdam will be examined.

Societal relevance

The current economic climate has a major impact on the usage and demand of certain functions. An example of this is the massive amount of vacant office space. There are a lot of office parks almost completely vacant all over the country. Image 8.1 shows a recent newspaper heading on this issue.

If these office parks have been designed in a more flexible way they could have possibly been converted to accommodate other types of functions like for example student housing, and this way prevent the large scale vacancy that we see now.

Another issue caused by this economic climate is the fact that almost all new developments have been put on hold because of the uncertainty of what the future demand will be. Some consequences of this are for example that people that bought a new house – in an area that is to be (re)developed – see all planned developments in and around their neighbourhood cancelled and are as a result of this stuck with a home in an undeveloped area. These uncertainties will mean that the role of the urban plan and the urban planner/designer changes, an urban plan will no longer be just a blueprint with fancy impressions, a plan will have to be able to cope with these uncertainties and be able to adapt if the demands change. In other words: an urban plan has to be flexible!

Scientific relevance

This project is indebted to a large amount of urban studies on flexible planning and designing that have been done in the past. Many authors have written on certain methods and aspects of flexibility in the field of urbanism. The literature review in this thesis will go deeper into this. The goal of a master thesis however should be to contribute to the scientific community by adding to the body of knowledge. The aim is to do this by creating a generally applicable approach for flexible urban development strategies and adaptive urban design.

Methodology

This research project consists out of three important elements: the theoretical framework, the analytical framework and the application on the context. The input for these elements is the project definition. How the three elements relate to each other is illustrated in the scheme on image 2. This scheme further illustrates very well the relation between research and design for this project: the research, especially the literature research has been an important input for the development strategy and the design.

The theoretical framework is composed out of the research methods literature review and some data research. The analytical framework is composed out of the research methods data research and case studies. And the application on the context will be achieved with the methods location analysis and scenario building.

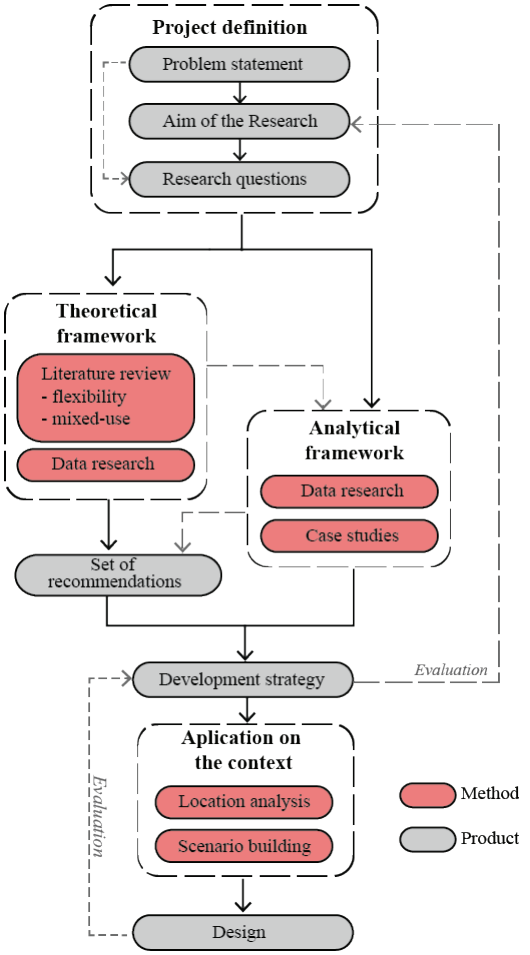


Image 2: Methodoly scheme, illustrating the relation between research and design.

References:

Gemeente Amsterdam (2011). *Structuurvisie Amsterdam 2040: Economisch sterk en duurzaam*. Amsterdam.

Stouten, P. (2010). *Changing Context in Urban Regeneration: 30 years of Modernisation in Rotterdam.* Design/Science/Planning. Amsterdam: Techne Press.

TU Delft. (s.d.). *Graduation Studio Urban Regeneration, Urban Regeneration in the European Context* [Online]. Retrieved 3-5-2013 from http://www.bk.tudelft.nl/over-faculteit/afdelingen/urbanism/organisatie/leerstoelen/ruimtelijke-planning-en-strategie/education/graduation-studio-urban-regeneration/.

Tuttert, T. (2012). *Het moet anders...: Een nieuwe ruimtelijke planvorm en de rol van de stedenbouwer in gebiedsontwikkeling in Nederland.* Faculty of Architecture: Urbanism: Delft University of Technology.

Voogd, H. (1995). *Methodologie van ruimtelijke planning.* Bussum: Dick coutinho.

Wigmans, G. (2003). *Management van gebiedsontwikkeling.* Delft: Publikatieburo Bouwkunde.

Building block data

Kavel opp	4950		
Area opp	10951	Block id	1A

		min	max
BVO BG	3315		
BV verdieping	3315		
Totaal BVO		13260	19890

parkeer plaatsen per m2	0.05	
BVO parkeren BG	0	Parkeerplaatsen: 0
BVO parkeren kelder	4950	248
Parkeerplaaten in het blok		235 *met correctie!*

		min	max	Parkeer norm
Unit A	30	90	150	1.5 225
Unit A BG		29		1.5 43.5
Unit C		0		3 0
Unit D		0		1.5 0
Parkeerplaatsen nodig				268.5

	min	max
FSI blok	2.7	4.0
FSI parkeren + infra		1.0
FSI met OR en infra	1.7	2.3

Kavel opp	4950	
Area opp	10951	Block id: 1B

		min	max
BVO BG	2753		
BV verdieping	2753		
Totaal BVO		11012	16518

parkeer plaatsen per m2	0.05	
BVO parkeren BG	0	Parkeerplaatsen: 0
BVO parkeren kelder	4950	248
Parkeerplaaten in het blok		235 *met correctie!*

		min	max	Parkeer norm
Unit A	25	75	125	1.5 187.5
Unit A BG		25		1.5 37.5
Unit C		0		3 0
Unit D		0		1.5 0
Parkeerplaatsen nodig				225

	min	max
FSI blok	2.2	3.3
FSI parkeren + infra		1.0
FSI met OR en infra	1.5	2.0

Kavel opp	4950	
Area opp	10951	Block id: 1C

		min	max
BVO BG	2865		
BV verdieping	2865		
Totaal BVO		11460	17190

parkeer plaatsen per m2	0.05	
BVO parkeren BG	0	Parkeerplaatsen: 0
BVO parkeren kelder	4950	248
Parkeerplaaten in het blok		235 *met correctie!*

		min	max	Parkeer norm
Unit A	26	78	130	1.5 195
Unit A BG		25		1.5 37.5
Unit C		0		3 0
Unit D		0		1.5 0
Parkeerplaatsen nodig				233

	min	max
FSI blok	2.3	3.5
FSI parkeren + infra		1.0
FSI met OR en infra	1.5	2.0

Kavel opp	4950	
Area opp	10951	Block id: 1C

		min	max
BVO BG	2865		
BV verdieping	2865		
Totaal BVO		11460	17190

parkeer plaatsen per m2	0.05	
BVO parkeren BG	0	Parkeerplaatsen: 0
BVO parkeren kelder	4950	248
Parkeerplaaten in het blok		235 *met correctie!*

		min	max	Parkeer norm
Unit A	26	78	130	1.5 195
Unit A BG		25		1.5 37.5
Unit C		0		3 0
Unit D		0		1.5 0
Parkeerplaatsen nodig				233

	min	max
FSI blok	2.3	3.5
FSI parkeren + infra		1.0
FSI met OR en infra	1.5	2.0

Kavel opp	4950		
Area opp	10951	Block id	2A

		min	max
BVO BG	3877.5		
BV verdieping	3315		
Totaal BVO		13822.5	20452.5

parkeer plaatsen per m2	0.05

		Parkeerplaatsen
BVO parkeren BG	1072.5	53.625
BVO parkeren kelder	4950	248
Parkeerplaaten in het blok		286

met correctie!

		min	max	Parkeer norm	
Unit A	30	90	150	1.5	225
Unit B		12		7	84
Unit C		0		3	0
Unit D		20		1.5	30
Parkeerplaatsen nodig					339

	min	max
FSI blok	2.8	4.1

FSI parkeren + infra		1.2
FSI met OR en infra	1.8	2.4

Kavel opp	4950	
Area opp	10951	Block id 2B

		min	max
BVO BG	3877.5		
BV verdieping	2753		
Totaal BVO		12136.5	17642.5

parkeer plaatsen per m2	0.05

		Parkeerplaatsen
BVO parkeren BG	1072.5	53.625
BVO parkeren kelder	4950	248
Parkeerplaaten in het blok		286

met correctie!

		min	max	Parkeer norm	
Unit A	25	75	125	1.5	187.5
Unit B		12		7	84
Unit C		0		3	0
Unit D		16		1.5	24
Parkeerplaatsen nodig					295.5

	min	max
FSI blok	2.5	3.6

FSI parkeren + infra		1.2
FSI met OR en infra	1.7	2.2

Kavel opp	4950	
Area opp	10951	Block id 3A

		min	max
BVO BG	2977.5		
BV verdieping	3315		
Totaal BVO		12922.5	19552.5

parkeer plaatsen per m2	0.05

		Parkeerplaatsen
BVO parkeren BG	1972.5	98.625
BVO parkeren kelder	4950	248
Parkeerplaaten in het blok		329

met correctie!

		min	max	Parkeer norm	
Unit A	30	90	150	1.5	225
Unit B		0		7	0
Unit C		24		3	72
Unit D		4		1.5	6
Parkeerplaatsen nodig					303

	min	max
FSI blok	2.6	4.0

FSI parkeren + infra		1.4
FSI met OR en infra	1.8	2.4

Kavel opp	4950	
Area opp	10951	Block id 3B

		min	max
BVO BG	2977.5		
BV verdieping	2753		
Totaal BVO		11236.5	16742.5

parkeer plaatsen per m2	0.05

		Parkeerplaatsen
BVO parkeren BG	1972.5	98.625
BVO parkeren kelder	4950	248
Parkeerplaaten in het blok		329

met correctie!

		min	max	Parkeer norm	
Unit A	25	75	125	1.5	187.5
Unit B		0		7	0
Unit C		22		3	66
Unit D		2		1.5	3
Parkeerplaatsen nodig					256.5

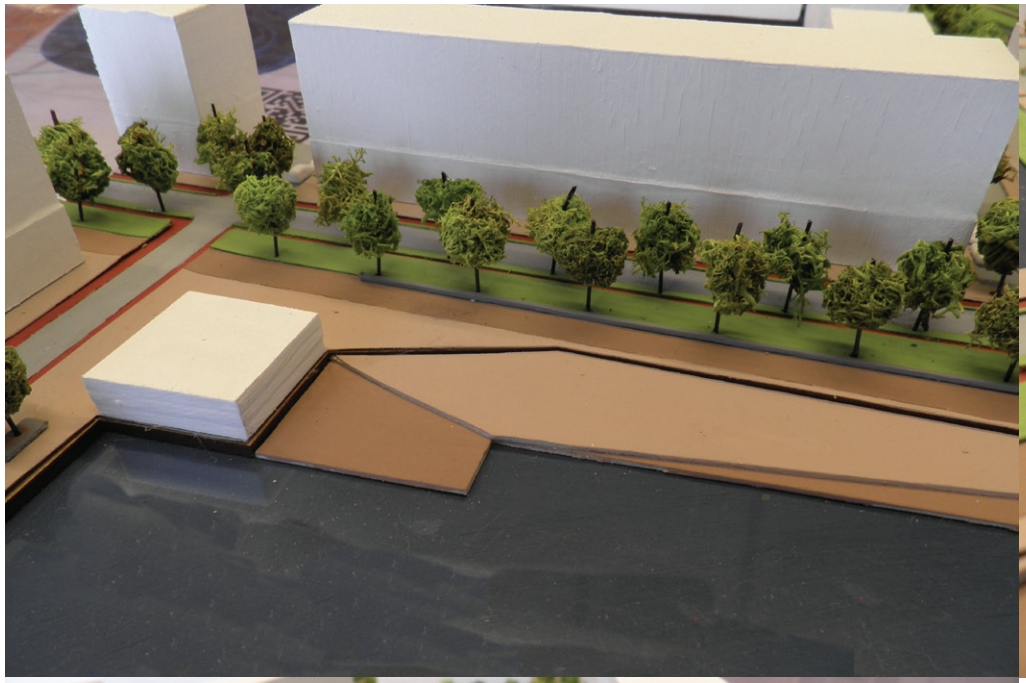
	min	max
FSI blok	2.3	3.4

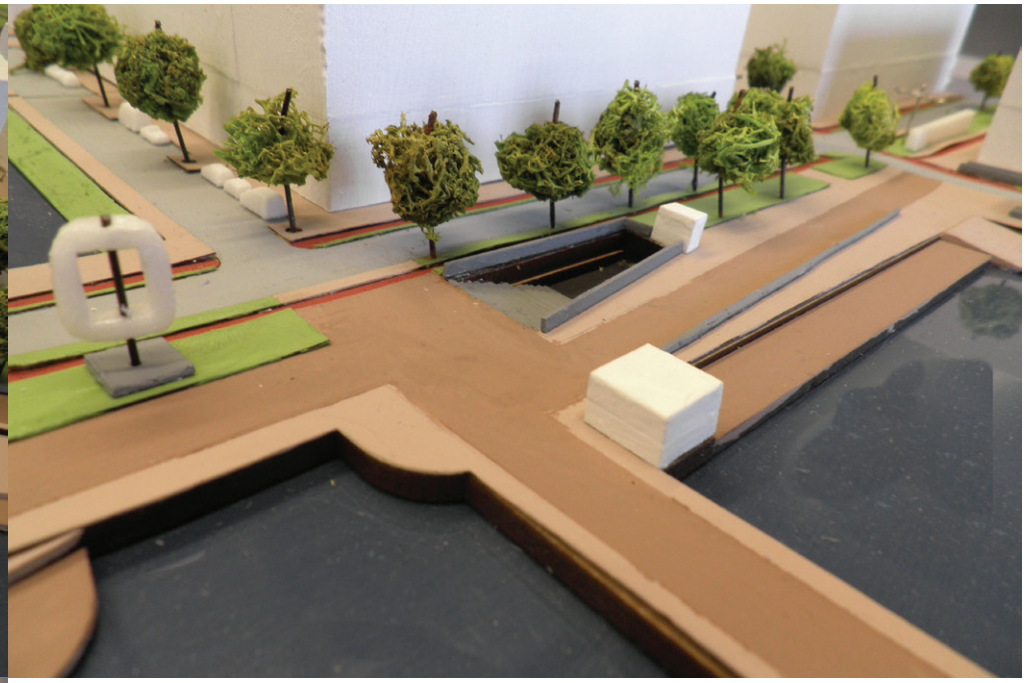
FSI parkeren + infra		1.4
FSI met OR en infra	1.7	2.2

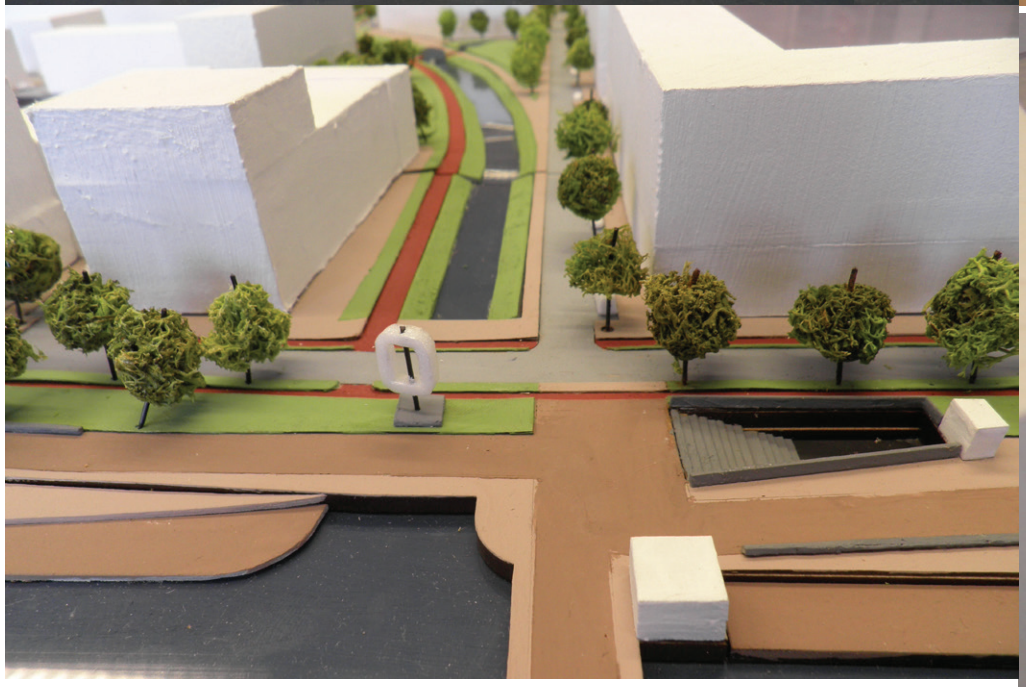
Kavel opp	4950				
Area opp	10951			Block id	3C
		min	max		
BVO BG	2977.5				
BV verdieping	2865				
Totaal BVO		11572.5	17302.5		
parkeer plaatsen per m2	0.05				
		Parkeerplaatsen			
BVO parkeren BG	1972.5	98.625			
BVO parkeren kelder	4950	248			
Parkeerplaaten in het blok		329	*met correctie!*		
		min	max	Parkeer norm	
Unit A	26	78	130	1.5	195
Unit B		0		7	0
Unit C		20		3	60
Unit D		4		1.5	6
Parkeerplaatsen nodig					261
		min	max		
FSI blok		2.3	3.5		
FSI parkeren + infra				1.4	
FSI met OR en infra		1.7	2.2		

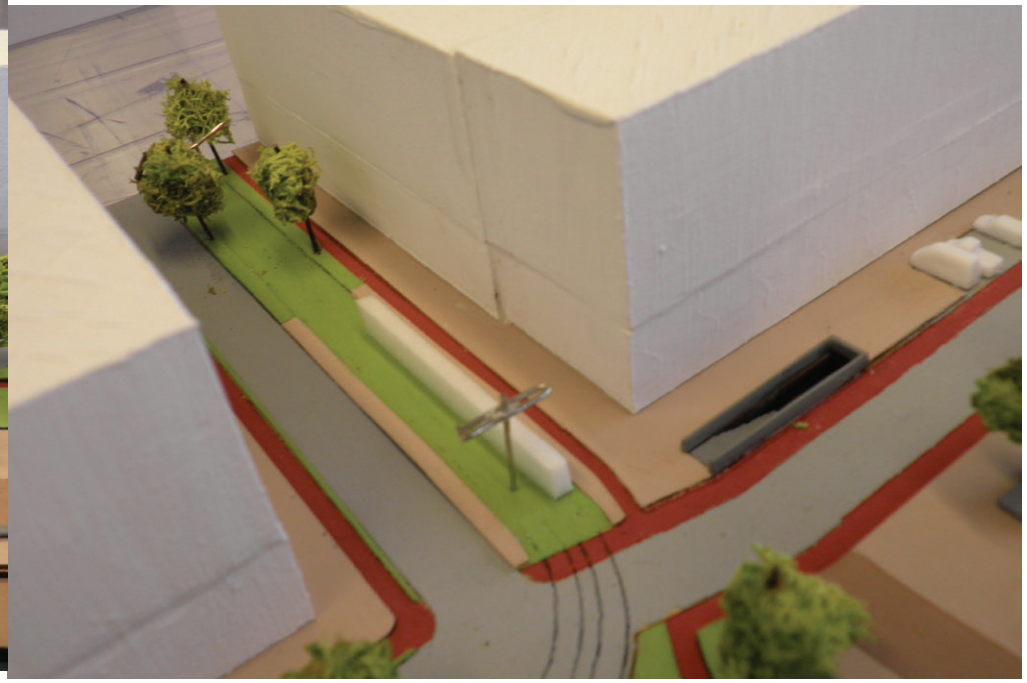
Kavel opp	4950				
Area opp	10951			Block id	3D
		min	max		
BVO BG	2977.5				
BV verdieping	2415				
Totaal BVO		10222.5	15052.5		
parkeer plaatsen per m2	0.05				
		Parkeerplaatsen			
BVO parkeren BG	1972.5	98.625			
BVO parkeren kelder	4950	248			
Parkeerplaaten in het blok		329	*met correctie!*		
		min	max	Parkeer norm	
Unit A	22	66	110	1.5	165
Unit B		0		7	0
Unit C		16		3	48
Unit D		4		1.5	6
Parkeerplaatsen nodig					219
		min	max		
FSI blok		2.1	3.0		
FSI parkeren + infra				1.4	
FSI met OR en infra		1.6	2.0		

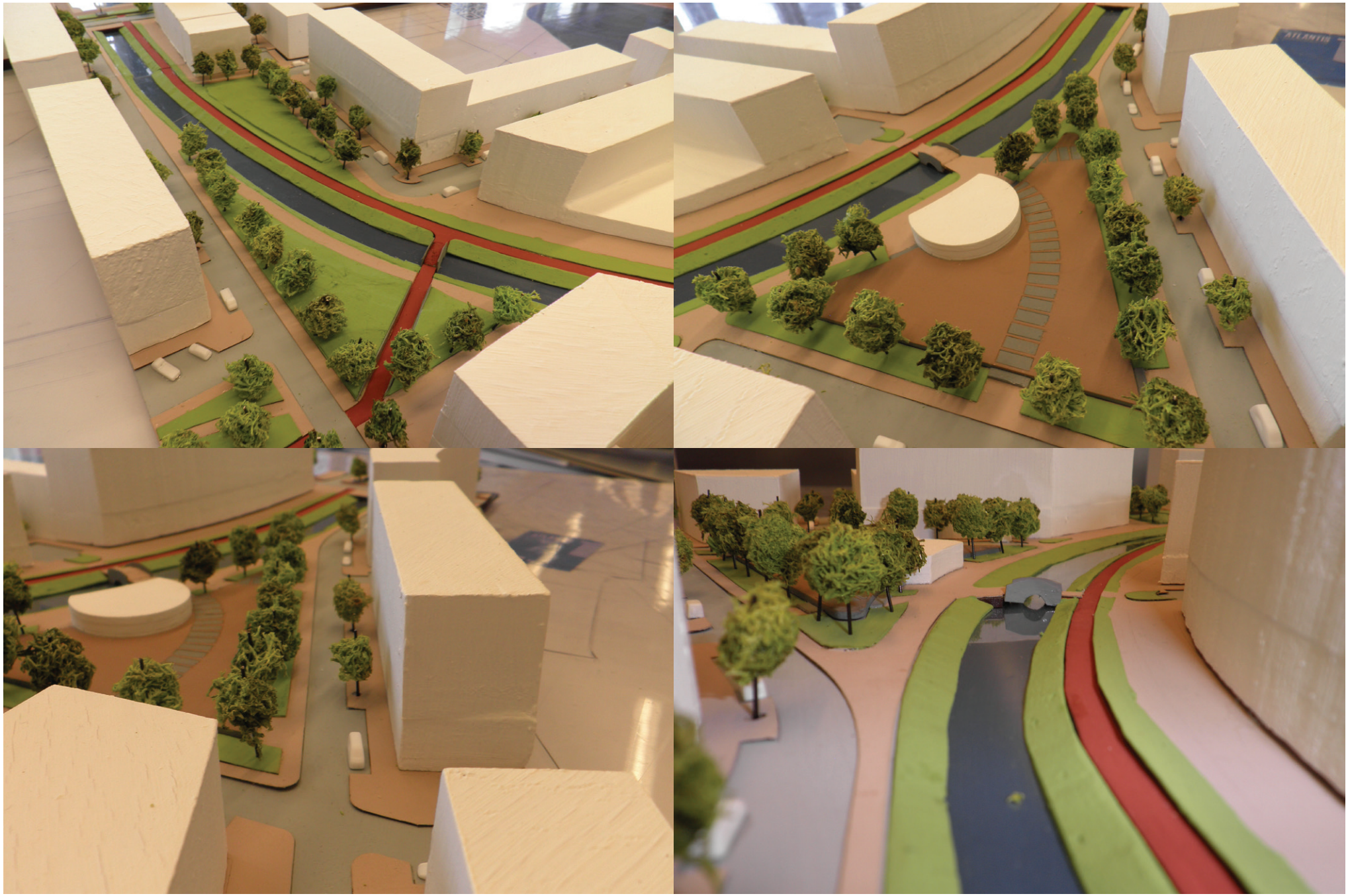
8.5 Model Photographs

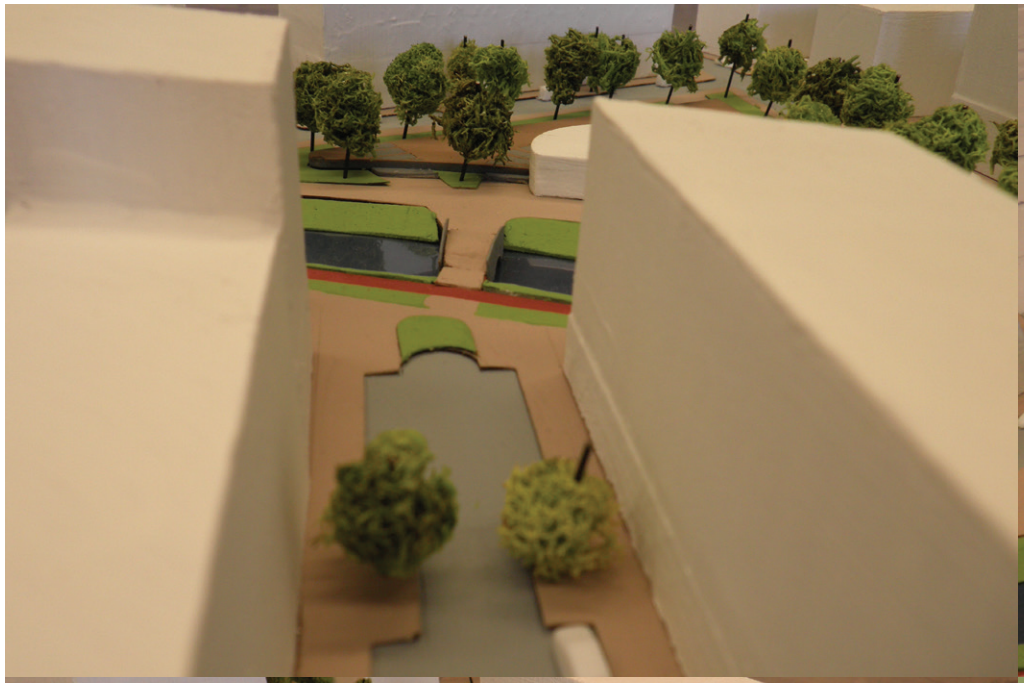


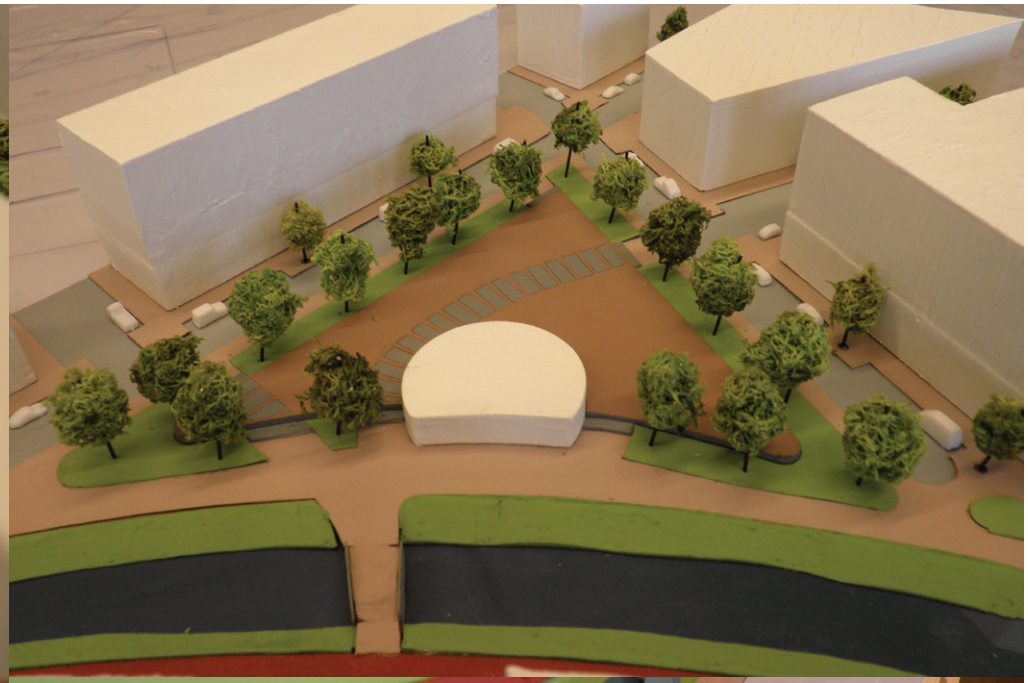


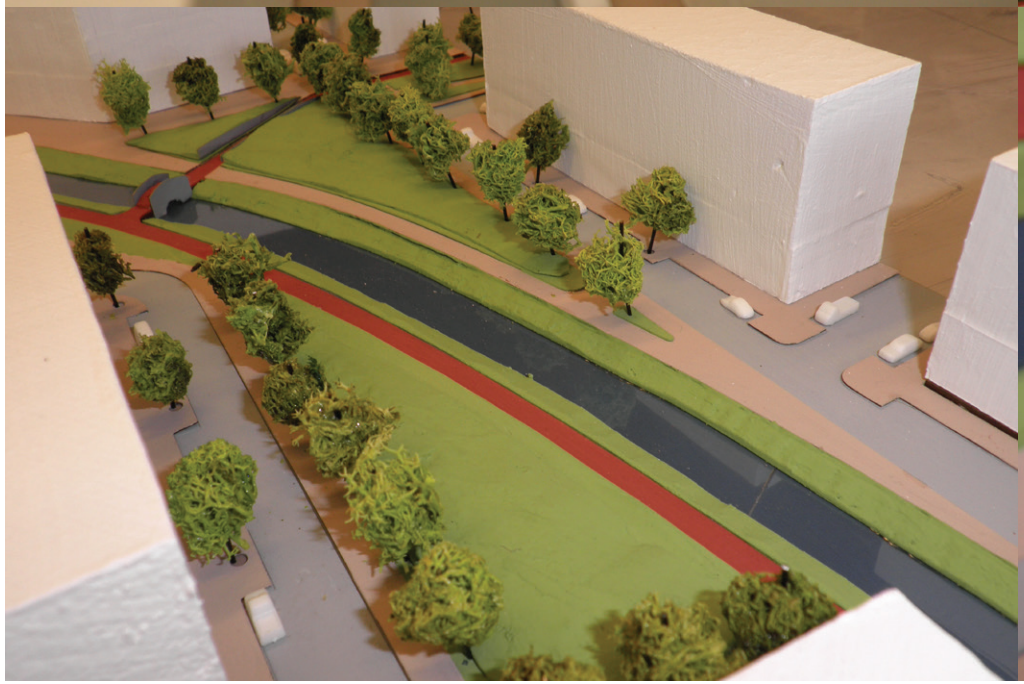












8.6 Literature review paper

Flexible Urbanism

Literature review on methods for flexible urban development

Course AR3U022, Theory of Urbanism

MSc Urbanism, Delft University of Technology

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Abstract – Large urban development projects usually have a very long time span between initial design and final completions. During this time it is possible that there will be changes in population, social structure and demand for functions like dwellings and office space (Wigmans, 2003). This can form the risk that there are totally different social and functional demands upon completion of the project, with the result of a non-functional urban area. In order to prevent this, an urban plan somehow has to be flexible; be able to accommodate these changes. These changes in society and demand for certain functions are a continuous process. This means that existing urban areas will face the problem of having to facilitate these changes. To make sure that the urban fabric and the built environment can last through the time and remain a well-functioning area, it has to be flexible and thus able to adapt to these changes. This means that the grain of the urban fabric and buildings itself have to be able to accommodate different types functions without the need for major reconstructions.

Functional and spatial flexibility can be key elements in solving these problems that are arising from a dynamic society. However, there are many ways thinkable in which an urban design can be flexible. For example, there is flexibility in design, planning and development process. The question that therefore will be addressed in this paper is: What are the best way(s) or method(s) for an urban design to be flexible and able to adapt to changes in functional and spatial demand? This question will be answered on the basis of a literature study. In order to answer this question a literature review will be conducted. There is a very wide scope of literature on this subject on all kinds of different scales, varying from design to development process/planning. Heeling (2001: 191-195) for example writes about the flexibility in the form of durability of the city plan, while Voogd (1995) places more emphasis on the planning process. Salingaros (2005: 221-235) explains flexibility as the ability to adept, in his books he concludes with adaptive design methods.

The main goal of this literature review study will be to identify what methods there are – according to the existing literature – for an urban plan or design to be flexible in a spatial and functional way. Secondly there will be a consideration made for which of these flexibility methods can and should be combined in order to create a generative approach for making flexible and adaptable urban designs.

Key words – functional flexibility, spatial flexibility, adaptability, urban development process, urban design

1 Introduction

We live in a dynamic society where change is a continuous process. This can be change in the economic structure, labour and housing markets, technology and lifestyle (Stouten, 2010: 224). These changes affect the functionality of the urban area and can result into large-scale vacancy and the demolishment of relatively new buildings. Large urban projects particularly have the risks that the demands have changed even before the project is completed, due to the long time span of these projects. To make sure that the urban fabric and the built environment can last through the time and remain well a functioning area, it has to be flexible and thus able to adapt to these changes. This means that the grain of the urban fabric and buildings itself have to be able to accommodate different types functions without the need for major reconstructions.

Functional and spatial flexibility can be key elements in solving these problems. This paper will make an overview of different methods that can be used in order to create an urban area that is flexible both spatial and functional, and attempt to answer the question: What are the best way(s) or method(s) for an urban design to be flexible and able to adapt to changes in functional and spatial demand?

In order to understand the methods one must first be fully aware of the meaning of flexibility. This paper will start with defining the term flexibility and what the term means for the field of urbanism, to be followed with a selection of methods to achieve flexibility in urban development.

2 Definition

Flexibility is a term with a very broad definition; it is used in different fields with different meanings. Bouten (2008: 18-23) gives a great overview of the meaning of the term flexibility in different disciplines and describes the reason for flexibility for these

Discipline	Meaning of flexibility	Reason for flexibility
Engineering	In engineering flexibility relates to physical technical installations, which perform activities and deliver value. Flexibility refers to the ability of the installation to change its internal working and keep delivering its output value.	Uncertainty about input, external influences and internal working.
Product design	In the discipline of product design, flexibility refers to the ability of a product to serve differentiated needs of users. The costs of the ability to perform different functions are thereby often not considered important.	Differentiated wishes and needs of users.
Physics	In physics in the case of materials, flexibility refers to deformation without breaking.	Differentiated demands/ conditions
Physiology	In physiology, flexibility means the ability to move, or the range of movement of a joint or muscle system.	Differentiated demands/ conditions
Management	Flexibility means the relation between total freedom and total determination in processes. So in this case flexibility is a degree.	Uncertainty about future developments and conditions
Public administration/ law	Freedom from restrictions.	Uncertainty about future needs of stakeholders
Labor market	In the labor market flexibility is used in distinctive ways. A regulative way: freedom for the employer (contracts). A way to facilitate supply and demand: differentiating the organization and ways of working and skills.	Uncertainty about future demand for labor. Differentiated wishes and needs on job conditions.
Didactics	In the cognitive flexibility theory, flexibility means a multi interpretable way of presenting the information, so everybody can explore the complex matter in its own way.	Differentiated ways of learning of people.
Software development	The meaning of flexibility in software development refers much to the way described in the introduction: the effort it costs to change the system.	Differentiated wishes and needs of software users.

Image 1: Table illustrating the different meanings of and reasons for flexibility in different disciplines (Bouten, 2008: 24)

disciplines (image 1). It is generally defined by: "the ability to bend without breaking, the ability to be easily modified and the willingness to change and compromise" (Oxford Dictionary, 2012). In the field of urban planning/designing the definition of flexibility is a bit more comprehensive and should in my opinion be defined *as the ability* of an urban area *to react and adapt to changing circumstances with a low penalty in time efforts, coasts and recourses.* There are three important reasons that make flexibility in the field of urbanism a relevant and important issue, these are: the uncertainty of the future, differentiated needs of the users and sustainability/ durability.

- *Uncertainty*. We live in a society that is continuously changing. Changes in the economic structure, in the labour and housing markets, in the availability of technology and in lifestyle, make the demands for an urban area change. The demand for office space for example is nowadays a lot lower than it was

seven years ago. The combination of a bad economic climate and uncertainties in future demands grind the urban development to a hold. Drewe (1993: 42) states that there are two ways to deal with uncertainty: reduce the uncertainty by doing more research, or accept the uncertainty and incorporate possibilities for adjustments. How this can be done in urban development, will be elaborated in the following sections.

- *Differentiated need*. Our society is built-up out of many individuals, many different cultures, many different shops and many different types of businesses. The demands all of these set to their real estate can be very different. This means if the users of a building change – even if the function remains the same – the demands might be very different. This means flexibility in the building is needed to keep the building functioning well without the need for major reconstructions. How this can be achieved will again be elaborated in the following sections.
- *Sustainability.* In times where money is scarce, sustainability often disappears to the background, because this is usually very costly. However, a very good 'by-product' of flexible urban/real-estate development is sustainability. A building or urban fabric that is able to adapt needs less investments of money and recourses compared with an area that has to be demolished and rebuilt. So this makes flexible development sustainable and durable (Maccreanor, 2005).

3 Flexibility in urban development

3.1 Types of flexibility

There are many types of flexibility and many authors use different terms to describe them. The types and terms which are most relevant for my project will be described and explained in the paragraph.

Spatial and functional flexibility

De Jong et al. (2004: 636) make the distinction between two kinds of flexibility in urban designs, this is structural and functional flexibility. *Structural flexibility* is described as the ability of a structure – this is often an urban fabric, but could also apply for the structure of a building – to facilitate different demands, without the need to make changes in the structure. This is often achieved by using standardised systems, e.g. standard dimensions.

Functional flexibility can be described as the ability of a building or urban area to facilitate changes in the functional use.

Active and Passive flexibility

Stouten (2010: 156) makes the distinction between passive and active flexibility. *Passive* flexibility can be defined as the ability of an urban area or building to facilitate changes in functional use without the need for adjustments or reconstructions, so this is very similar to the structural flexibility defined by De Jong et al. *Active* flexibility is, as the term suggests, the opposite of passive flexibility, so this is when adjustments do have to made to facilitate changes in functional use, e.g. knocking down walls in the building or merging building blocks.

3.2 Flexible aspects in urban development

When reading through the literature on flexible urban development basically three aspects come up on which flexibility can play a role for an urban area. First is the flexibility in the development process, second is flexibility within the created urban fabric and third is flexibility within the created buildings. These three aspects will be further elaborated.

Flexibility in the development process

Voogd (1995: 78) defines three types of flexibility within the urban development process:

- *Flexibility in the content of policy.* Policies are used to steer developments into a certain direction and set margins within which developments may vary. This is usually done by setting up regulations and zoning plans. These regulations however are always set up by an individual (law- or policy maker), which often has a subjective perspective on the matter. In order to be able to cope with changes that the policy did not anticipate on, a certain amount of flexibility within the regulative system is needed. However, the policy should not be so flexible, that it leaves the development free and does not give any direction to the development. To conclude, a policy should on one hand steer the development into the desired direction, and on the other hand have the flexibility to change at the moment the situation changes or opportunities arise (Bouten, 2008: 33-34).
- *Flexibility in methods and procedures*. The decision-making procedure is an aspect where flexibility can play an important role. In the ideal situation decisions are made on all the necessary information. This is however often not the case, due to uncertainties in future developments. When this is the case, the decisions should either be made in such a way that they direct the developments at the moment but leave the possibility for change in the future, should the decision proof to be wrong (Bouten, 2008: 34). Or another option is to postpone the decision to the very last moment. However, this can be risky, because it will leave many involved parties and potential investors in uncertainty (Voogd, 1995: 77). Therefore it is important that the moments when the decisions will be made are determined very clearly in advance.
- *Flexibility of the organisation.* The organisation of a project determines what activities are executed when and by whom. An example for flexibility in the organisations is the possibility for responsibilities for certain activities to be transferred between parties, should it turn out that a certain party can do it cheaper, faster or better (Voogd, 1995: 78).

Flexibility in the urban fabric

The larger the scale of an object, the costlier it gets and the more actors are involved to make changes in the object, thus the less flexible it gets (image 2) (PBL, 2012: 40). The urban fabric contains very large objects, this however does not mean that an urban fabric cannot be flexible. The aim should be to create an urban fabric that is passively flexible. So this means that the urban fabric should be designed in such a way that it not only meets todays demand, but will also meet the future demands (structural flexibility) (Heeling and Westrik, 2001: 195). To know what kind of structures these are, a lesson can be learned from the past by looking at urban fabrics that have been functioning well for a long time. It has also shown that a small grain size in the urban fabric allows for diversity and gradual change on a small scale. This means that the grain size partly determines the ability of an area to adapt to changes. It is relevant to note that small grain size is relative to its environment (Bouten, 2008: 63); this means that a small grain size in one city might be not so small in another city.

It is also important to ensure that an area does not become too flexible. This will endanger the continuality of the area and might result into a dysfunctional area (Heeling and Westrik, 2001: 195). In order to prevent this, a certain amount of fixed (non-flexible) programme is needed.

Flexibility in the built environment

The functional demand and use of buildings will change over time. The demand set for housing might for example change due to changes in household composition, or one type of shop will be replaced by another, which has other demands. Or the demand for certain functions itself might change, like we see now with the plummeting demand of office space. To prevent this from happening again in the future, buildings will have to be able to adapt to different types of functional use (Van Zwol, 2005: 31). This is usually a form of active flexibility. More than forty percent of the activities housed in the building must be able to continue during the process of modifications, because this should not be large-scale renovations (Heijne and Vink, 2005: 58).

In order to ensure that these buildings will be flexible, some regulations and policy must be made for these buildings. Van Zwol (2005: 31) and Maccreanor (2005: 101) give some elements that will help a building design to be able to allow change in programme, these are: extra floor to floor space, multiple access systems, over-dimensioning space and construction, loadbearing structures and facades suited for different programmes.

There are a lot of things that can be done by the architect to make a building flexible. However, only a few of them can be taken into account by the urban planner/designer and be integrated into the urban plan to make the job of the architect a little easier. These are: extra floor to floor space, multiple access systems and oversizing.

What we often see in current urban development that aims to be flexible, is that only one of these three aspects of flexibility is applied. This usually is a certain degree of flexibility in the development process or flexibility in the built environment. However, to achieve urban plan that is integrally flexible all three of these aspects should be combined.

4 Methods of using flexibility in urbanism

Now that the different aspects in which flexibility can play a role within urban development have been identified, we can have a look at a selection of different methods for each of the three aspects, which have been developed for achieving flexibility.

Scenario building

In the field of urban design and planning scenarios can be defined as an image of a possible future. This image does not have to be desirable, nor probable, but possible. Scenarios often explore the unknown future and therefore cannot be falsified or proved (Salewski, 2010: 404). Van der Heijde (2005) gives three advantages of using scenarios in the planning process of a project.

- Scenarios can help an urban planner/designer in understanding the environment and the impact certain aspects can have on the projects. And will therefore allow the planner/designer to make better informed decisions.
- Scenarios are also a way to deal with the uncertainty that was mentioned earlier. By exploring many possible future scenarios there are no surprises in the future.
- Scenarios can help an urban plan to be more adaptable. The scenarios will have already researched the impact of changes and thus will the urban planner be able to react faster to these changes.

Scenario building is a method that has been used for decades to counter the problem of uncertainty in future developments (Salewski, 2010: 20). This makes scenario building a way to anticipate on multiple future possibilities and makes it thus a method in flexible development. The ability to switch between scenarios within the development process will greatly increase its flexibility.

Phasing/gradual development

A phasing plan can be seen as flexibility in procedures. When developing a plan in phases it is possible to integrate an evaluative moment at the end of each phase or at the beginning of a new phase. During these evaluations can be determined whether the current plans still meet the current demands and if necessary the plans can be adjusted to meet the demands (Voogd, 1995: 78-82; Puylaert and Van Staalduine, 1984). This way a design can adapt to changes and is therefore flexible.

When working with phases/gradual development it is important to start with investments in elements that will make the area attractive (infrastructure, public transport, green spaces and amenities). If these elements are not in place, the developments are not likely to happen or will be confronted with vacancy (Urhahn Urban Design, 2010: 55).

Flexible zoning plan

A flexible zoning plan is a form of flexibility in policy (development process). A zoning plan is a policy document that determines what kinds of functions are allowed on which locations. These are usually very rigid documents and specifically identify functions, locations and spatial structure. However, it is possible to create a flexible zoning plan. There are two clear elements in a zoning plan where flexibility can be integrated; these are the functional programme and the spatial structure (Buitelaar et al., 2012: 96-97).

The functional programme can be made flexible by globally describing the desired functions rather than giving the specifics, for example use 'working functions' rather than 'office space'. Another aspect that can be used is leaving the location of the functions flexible by determining the amount of each function for an entire area rather than determining the allowed functions for each individual parcel. *The spatial structure* of an area is another element that can be established in a zoning plan. This can again be made flexible by globally describing the structure, for example a fine grain urban fabric rather than a grid with islands of 50 meters by 50 meters (Buitelaar et al., 2012: 96-97).

Masterplan development

A masterplan can be a design method or tool to steer the gradual development of an area into a certain direction (Reitsma and Reijndorp, 2006). Such a masterplan should not give a literal and detailed plan for an area, but set rules and guidelines for the development, for example building densities. Christiaanse describes the contemporary masterplan as: "It is a sustainable framework for a development that accommodates different programs at different time speed on different circumstances" (Bouten, 2008: 68). This means that a flexible masterplan should provide a strong framework in which different development at different speeds can take place. Such a flexible masterplan could be easily combined with the earlier described flexible zoning plan.

Temporary building

Two kinds of temporary building can be identified. First is the constructions of buildings that can easily be demolished or moved to other locations and the second is the temporary reuse of already existing buildings.

This first kind of temporary building involves the construction of new buildings, often consisting out of large pre-made elements. A good example of this kind of temporary building is the container houses for students. Even though these buildings might be relatively cheap to construct, one has to take into account that there are also costs to demolish or move these buildings. This means that these 'temporary'

buildings often need to stay in place for years in order to cover the costs, so in practice it means these temporary buildings are not so temporary and thus not very flexible.

The second kind of temporary building uses already excising buildings to temporarily house new functions. These kinds of buildings are often used to set an ambition and identity for an area and buff up the value of the area (Hermans, 2012: 26-27). This kind of building often serves to give an impulse to new developments in an area (Nijhof and Schultr, 1994: 13; Cerutti, 2011). This kind of temporary building is a lot cheaper compared to the first kind, but requires buildings that can accommodate them. In the past large warehouse where used for this with great success.

We can conclude that, when it comes to temporary building, costs have a big influence on how flexible this really is: The lower the coasts the greater the flexibility is.

Solids

Solids is a term introduced by 'De Architecten Cie' and is a term for a building typology that is designed in such a way that it can facilitate a changing programme and has emotional values (referred to as '*preciousness'*) so that the building will be able to last through time (Bijendijk, 2005: 42).

A Solid can be divided into two elements, the base building (the façade and the loadbearing structure) and the fit-out (unit separating walls and interior).

To be able to facilitate the changing programme, Solids have: generous floor-to-floor heights, few vertical structural components, large open floor areas, over-dimensioned load bearing structure ans generous vertical access (people, piping and cable).

Creating a precious building is a more subjective matter and therefore a lot harder to achieve. Beijendijk (2005: 51) does give some suggestions – based on analysis of buildings that are known to possess emotional value – that might help achieving this: consider context of the building, large dimensioned and attractive entrance, use durable materials etc. Creating a building that is precious will require higher investments, but this should result into a longer lifespan of the building (Bijendijk, 2005: 48).

These are some of the most used and contemporary methods for dealing with flexibility in either the development process, urban design or built environment. It is very hard to determine whether one method is better than the other, since there are many factors involved, including factors derived from the context of an area. This means that a set of methods can be good for one area but not suitable for another.

5 Conclusions and recommendations

Now that the meaning of flexibility for the field of urban planning and design has fully been defined and a thorough identification has been made on the aspects and methods of flexibility, the conclusion can be drawn from this and the research question can be answered: *What are the best way(s) or method(s) for an urban design to be flexible and able to adapt to changes in functional and spatial demand?*

The first important conclusion is that in order to achieve an urban plan or design that is integrally flexible, it will have to be flexible in all three of the aspects of urban development: the urban development process, the urban design and the built environment. This also means that using only one of the flexibility methods described is not an option, at least three of the methods will have to be used, one for each of the three aspects.

Using more than three methods is of course also an option, but one has to keep in mind that a plan can also become too flexible and therefore dysfunctional, so it is recommended to limit the amount of methods used to four or five.

Finally, regarding the research question, it is hard to say in advance if one method is better than the other, due to the fact that there are factors derived from the contexts – for example local legislation – that may have influence on this. So this means that the best combination of methods may differ for each location. Some methods are also easier to combine than others, for example a flexible masterplan can be easily combined with a flexible zoning plan since there is a lot of overlap between the two. The best ways and methods for a flexible urban design thus always partly depend on the context of the plan area.

6 References

Bijendijk, F. (2005). *Solids*. In*:* Leupen, B., Heijne, R. & Van Zwol, J. (eds.) *Time based architecture.* Rotterdam: 010 Publishers, 42-51.

Bouten, M. (2008). *Flexibility in urbanism: Research on flexibility and transformation design for the Binckhorst.* Msc, Faculty of Architecture: Urbanism: Delft University of Technology.

Buitelaar, E., Feenstra, S., Galle, M., Lekkerkerker, J., Sorel, N. & Tennekes, J. (2012). *Vormgeven aan de spontane stad, belemmeringen en kansen voor organische stedelijke herontwikkeling*. Den Haag/Bilthoven: Plan bureau voor de Leefomgeving & Urhahn Urban Design.

Cerutti, V. (2011). *reatieve fabrieken, Waardecreatie met herbestemming van industrieel erfgoed.* Utrecht: C2Publishers.

De Jong, T. M., Moens, M. J., Van den Akker, C. & Steenbergen, C. M. (2004). *Sun wind water earth life and living, Legends for design.* Delft: Publicatiebureau Bouwkunde, Delft University of Technology.

Drewe, P. (1993). *Werkwijzen van ruimtelijke planvorming: processen.* Technische Universiteit Delft, Faculteit der Bouwkunde.

Heeling, J. & Westrik, J. (2001). *De stad is al eeuwen duurzaam*. In*:* Heeling, J. (ed.) *Over stedenbouw, Eenzoektocht naar de grondslagen van de stedenbouwkundige ontwerpdiscipline.* Delft: Delft university press, 185-196.

Heijne, R. & Vink, J. (2005). *Flex-buildings, designed to respond to change*. In*:* Leupen, B., Heijne, R. & Van Zwol, J. (eds.) *Time based architecture.* Rotterdam: 010 Publishers, 58-67.

Hermans, A. (2012). *Tijdelijkheid voor de Eeuwigheid.* Social Geography and Planning: Universiteit Utrecht.

Maccreanor (2005). *The sustainable city is the adaptable city*. In*:* Leupen, B., Heijne, R. & Van Zwol, J. (eds.) *Time based architecture.* Rotterdam: 010 Publishers, 98-109.

Nijhof, P. & Schultr, E. (1994). *Herbestemming Industrieel Erfgoed in Nederland.* Zutphen: Walburg Pres.

Oxford Dictionary. (2012). *Oxford Dictionairies: The worlds most trusted dictionaries* [Online]. Retrieved 8-11-20112 from http://oxforddictionaries.com/.

PBL (2012). *Climate Adaptation in the Dutch Delta: Strategic options for a climate-proof development of the Netherlands*. Den Haag/Bilthoven: PBL Netherlands Environmental Assessment Agency.

Puylaert, H. & Van Staalduine, J. (1984). *Ervaringen met planningsmethodiek.* 's Gravenhage: Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer.

Reitsma, M. & Reijndorp, A. (2006). De stad in kaart; Coolhaveneiland Rotterdam. *S&RO,* 4.

Salewski, C. (2010). *Dutch New Worlds: Scenarios in the physical planning and design in the Netherlands 1970-2000.* Institure of Urban Design: ETH Zurich.

Salingaros, N. A. (2005). *Principles of urban fabric.* Klaasen, I.T. Amsterdam: Techne Press.

Stouten, P. (2010). *Changing Context in Urban Regeneration: 30 years of Modernisation in Rotterdam.* Design/Science/Planning. Amsterdam: Techne Press.

Urhahn Urban Design (2010). *Leefland*. In*:* Broekmans, T., Feenstra, S. & Urhahn, G. (eds.) *De spontane stad.* Amsterdam: BIS Publishers, 54-59.

Van der Heijde, K. (2005). *Scenarios.* (2nd ed.) Chichester: John Wiley & Sons Ltd.

Van Zwol, J. (2005). *The combination of living and working*. In*:* Leupen, B., Heijne, R. & Van Zwol, J. (eds.) *Time based architecture.* Rotterdam: 010 Publishers, 30-40.

Voogd, H. (1995). *Methodologie van ruimtelijke planning.* Bussum: Dick coutinho.

Wigmans, G. (2003). *Management van gebiedsontwikkeling.* Delft: Publikatieburo Bouwkunde.