

An architectural rendering of a modern building named FENIX II. The building is a two-story structure with a light-colored, textured facade. It features large, multi-paned glass windows on the upper floor, some of which are open, revealing interior spaces with plants. The ground floor has large glass doors and windows, showing people inside. In front of the building is a paved courtyard with a low concrete wall and a planter bed containing green plants. Several people are depicted in the scene: a man sitting on the ground reading a newspaper, a woman walking, a child, and a man riding a bicycle. The sky is blue with a few birds flying.

FENIX II

An energizing warehouse for the inhabitants of
Katendrecht and the city of Rotterdam

RESEARCH REPORT

Studio Heritage & Architecture | Rotterdam Harbour

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FENIX II

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creo

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20 | 30 | 40 ZWANGERSCHAPSECHO'S

PREFACE

This research report has been conducted as part of the Graduation Studio Heritage & Architecture, MSc Architecture, Urbanism & Building Sciences at the Delft University of Technology. The project concerns the Fenix II warehouse in Katendrecht, Rotterdam. During the first period of the graduation project a research and analysis of the existing building, its urban context and historic context has been made. By translating this into a value assessment and taking a position in transformation architecture, a first step towards the design is made. The findings from the research phase led to the guiding theme of the design. The design itself will be explained in the second part of this report. The last part will reflect on the results of the research and design in this graduation project, considering the process, planning and product.



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0. INTRODUCTION

Where once arose the largest warehouse of the world, in the vibrant heart of the port of Rotterdam, is now located an old building in the shadow of modern society. Today, the need for sustainability in architecture is relevant and shifting to the domain of architecture and transformation. The fierce history of Fenix II, together with current issue of sustainability, are the start of this graduation project that will be described in the report in front of you.

0.1 PROBLEM STATEMENT

Nowadays the urge of building sustainable is obvious. It is necessary to come up with new solutions in order to give the planet to next generations. It is also known that buildings play a crucial role in this. This will be substantiated in the first chapter of this report.

On the other hand, transformation of cities and buildings is one of the main emergent themes in contemporary architecture. Finding an appropriate balance between the old and the new is of fundamental interest for contemporary architectural design (Studio Heritage & Architecture, 2016).

Looking at these trends, it could be expected that also a flourishing integration of both takes place. But the opposite is true (Stuivenberg, 2016). When new buildings can be built sustainable but the demand is in the existing stock, the world will be left empty handed. That is the reason the problem statement in this project is:

Transformation and sustainability are rarely being combined in contemporary architecture.

0.2 RESEARCH OBJECT

The studio Heritage & Architecture Rotterdam Harbour is concerned with the actual question of a new phase of development of some specific harbour areas, through intervention. The theme for research is the significance and essence of the building complex and the water and within this, the tolerance for change (Studio Heritage & Architecture, 2016).

It is exactly dealing with existing architecture and the question of a new phase of development that resulted in the object of this graduation project. By taking these existing building complexes to the future, also the question of sustainability needs to be considered. Even more when involving the location of the subject, an old port area in development in a city with a fierce history and where innovation is celebrated.

Fenix II is one of the existing building complexes and located at the south side of the Rijnhaven. This in origin port warehouse and its nearby environment are in the middle of the redevelopment of the city harbours of Rotterdam (Programmabureau Stadshavens Rotterdam, 2011). After a long period of vacancy the building is now partly in use again. Temporary functions created on the short term a new life for the Fenix II. Now a plan is needed for the further development of the old warehouse.

Fenix II is on the edge between history and future and thereby an interesting object for this graduation project.

0.3 DESIGN QUESTION

Considering the problem statement and object of this project, the aim of this design project is to transform the building into a sustainable building while maintaining the identity and underscore its characteristics. So the design question dealt with in this report is:

How to transform the Fenix II into a sustainable building while conserving its characteristics?

0.4 RESEARCH QUESTION

To be able to answer this question the two different aspects in the question are researched. The first aspect is the term 'sustainable building'. Therefore the research question is:

What is the approach for designing a sustainable building?

The second aspect is the 'character' of the Fenix II. Therefore the research question is:

What have been and are the characteristics of the Fenix II and its surroundings?

To be able to answer this second question secondary questions are:

How can Fenix II be placed in its urban context?

What are the developments of Fenix II and its environment?

What are the current conditions of the building?

What are the values of Fenix II with its history and where is room for adaptation and improvement?

By answering these research questions a basis can be created for the design for the Fenix II.

0.5 METHOD AND STRUCTURE

Design by research | This report starts with handling the research questions. First the sustainability question is research by a literature study in the form of a position paper.

Second the question of the characteristics is researched by making an *analysis* of the Fenix. In this comprehensive part of this report first the urban environment is explored, the building analysis will follow and thereafter the building technology will be examined. Next, a more profound study will elaborate on an important aspect of this project, public space. Eventually a value assessment is made. Here the historical value, the matrix of aspects and a personal value map shall be discussed.

Research by design | The second part in this report is *the design*. It will start with translating the results from the research into the starting points for the design. Here a guiding theme is developed that in the followed part of the report will be translated into the design for the Fenix II. This will be done by explaining the urban structure, the appearance of the building, its function and the technique.

To come up with solutions, reference projects

were studied and excursions were undertaken.

Variants were tested in sketches, 2D drawings and virtual as well as physical 3D models. They were examined and the best solution resulted in the purposed design.

NOTE | photo's and illustrations without source are made by the author.

POSITION

1. TRANSFORMATION & SUSTAINABILITY

Two trends in contemporary architecture

Nowadays the urge of building sustainable is obvious. In order to give the planet to next generations it is necessary to come up with energy reduction and Co2 saving solutions. It is also known that buildings play a crucial role in this. A view on architecture magazines and websites shows that sustainability is nowadays everywhere in architecture. Terms like zero-energy, geothermal heating and zero-waste became common language. Altogether, sustainability seems not that special anymore. Like Teeuw (2014, pp.5) phrases it: "if you are a competent architect, your buildings are by definition sustainable". With this in mind, it is the goal already achieved?

On the other hand transformation of buildings is one of the main emergent topics in contemporary architecture. It's about finding 'an appropriate balance between the old and the new' (Studio Heritage & Architecture, 2016 pp.4). Van den Dobbelsteen (2015) emphasizes that most of the built environment in the future shall be the same as now. Transformation therefore will be the theme in architecture of the coming years. Moreover, this trend is already going on. The jury of the Gulden Feniks, the award for the existing build environment, notes a large upward trend in the number of registrations (Stichting NPR, 2015). And the yearbook *Architectuur in Nederland* (literally: Architecture in the Netherlands) of 2014/15 contained for the first time in history more transformation and renovation projects than new builds (Architectenweb, 2015). Additionally, in

some cases it even becomes a hype in society. People associate an industrial character or former industrial function with a more personal and more careful approach (Pol, 2016). It is familiar and at the same time innovative which makes people feel comfortable.

Looking at these trends, it could be expected that also a flourishing integration of both takes place. But the opposite is true. Where in the latest yearbook *Architectuur in Nederland* almost every new built is 'sustainable', there is no general focus on this subject in the renovation of old buildings as described in the yearbook of the Gulden Feniks (Avermaete, Van der Heijden, Hannema & Oostmeijer, 2016; Stichting NPR, 2015). Jury chairman of the Gulden Feniks 2015, Karin Laglas (2015) confirms this by noting the select attempts, which were moreover mainly done on the scale of area development, to price them and mainly to emphasize that there is still a lot of work to be done in the field of sustainability and renovation. When new buildings can be built sustainable but the demand is in the existing stock, the world will be left empty handed. The position defended in this paper is that sustainability and transformation must be combined in contemporary architecture. Also according to Van den Dobbelsteen (2015) this is the real challenge for the coming years.

Of course, there are more ways in which this can be achieved. The research question is: What method can be developed to create architecture in which sustainability and transformation are combined and with this, towards what goal can be worked?

Integrated sustainable design

First things first. Before something can be said about combining, it is important to elucidate

sustainability in architecture nowadays. It appears that the current trend, as described in the introduction, does in many cases not achieve the goal of becoming sustainable architecture at all. These projects are often composed of separated elements added in one of the last phases of the design process. According to Van Timmeren (2014) it often leads to limited solutions for singular problems with static forces. While sustainable architecture asks a more dynamic approach.

Not all sustainability questions in architecture can be solved with the same solutions. It is about finding the ones suitable for the project and integrating them in the design. In this way it is about combining sustainability and architecture in an integral sustainable design (Rudy Uytenhaak, 2014). Here the building is not an isolated object but needs to be part of a total concept with its environment (Van Timmeren, 2014). This will lead to a higher quality result. Although that higher quality is difficult to make specific. Kristinsson (2012) phrases it as a hidden, invisible added value. It will be the difference between separate additions and an holistic solution. The process of developing such an integral sustainable design appeals to a kind of competence, or what Teeuw

(2014) calls the skills of the architect.

According to Dahl (2010) it's not only the integration that is missing in contemporary sustainable architecture but also the interaction with the environment. He explains that traditional architecture is adapted to climate and the available materials. Also Kristinsson (2012) describes this historical architecture as inspiration for today's challenges of integrating sustainability. But that is not what is happening right now. Both agree that in the current trend a lack is perceptible of basing the design on an analysis of the conditions of the local climate. These modern examples are nonetheless a wonderful protection against the outside world, but do not use it. They could have been built anywhere on the planet in every climate. Kristinsson (2012) adds that integrated sustainable design needs to form a bridge between architecture and nature. Therefore it is necessary to use the great potential of paying more attention to the local climate and adopt it

Steps in smart bioclimatic retrofit. (1) First research is needed to understand the starting point. (2) Then the specific conditions of the project need to be analyzed. (3) Next this has to be translated in a set of preconditions. (4) Finally a toolbox of preconditions is available to develop an architectural design.



RESEARCH



ANALYSIS



BOUNDARIES



TOOLBOX

in the design.

Smart bioclimatic design and transformation

In order to create a design that integrates sustainability and therefore interact with its environment, different methods are developed. This article is not the place to explore all different kinds, but to find one that can be used in transformation projects. A possible one can be 'smart bioclimatic design'. Van den Dobbelsteen (2015) explains it as an approach that combines making full use of the available opportunities on site with smart use of technology in architecture. This complement is based on the term 'bioclimatic design' that was introduced by Victor Olgyay in the 50s and later used by Ken Yeang for his skyscrapers. Actually, for centuries bioclimatic design was the only option for those with limited resources using the consisting conditions.

In the smart variant, will be worked stepwise towards a situation where a toolbox of preconditions is available to develop an architectural design. To create this toolbox, first a starting point can be formulated by making an inventory of the desired conditions of the user that relate to comfort. Next, it is important to analyse the characteristics of the local environment that have impact on the climate design or energy use of a building. This step can be extended by adding local material sources. Finally, a set of boundaries for the design can be formed out of the information gathered in the second step (Van den Dobbelsteen, 2015).

This approach is developed for and can be used in designing new buildings. In contrast, a transformation design requires its own working

method. The major difference is, of course, that the starting point contains an already existing building. In this case it is necessary to do historic research and find out the story of the building; its origin and the interventions through time. In addition to the current state must be analyzed to know what is left from the past and what are the new circumstances. With this it is possible to create a value assessment in which the value of the building is visualized and justified (Hendriks & Van der Hoeve, 2009).

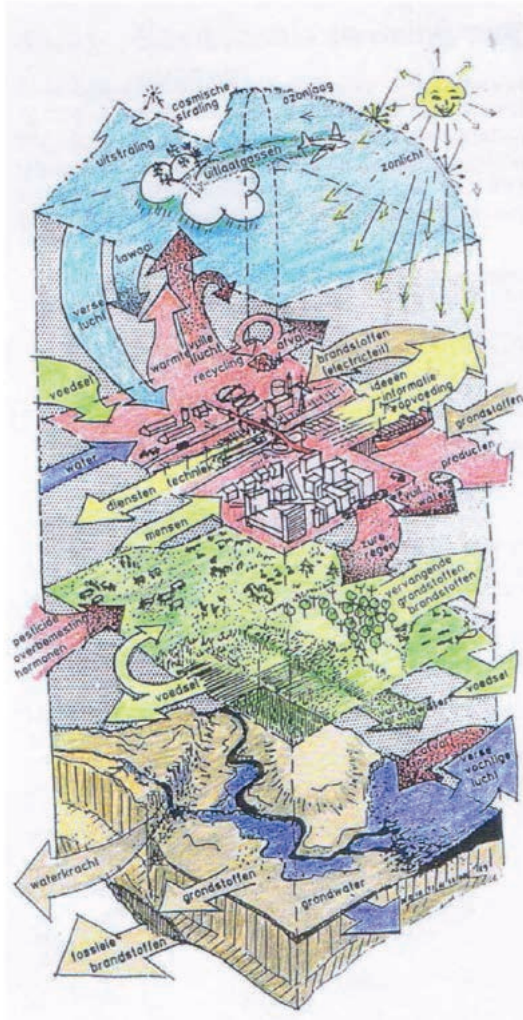
Smart bioclimatic retrofit

By looking at these two approaches, one for creating a design for integrated sustainable architecture and one for creating a design for transformation architecture, similar phases are used. First research is needed to understand the starting point. This is based on facts, general used measurements or already gathered information. Then the specific conditions of the project need to be analyzed. Here already a skill of observation and combining information is needed in order to understand what the project is about. Next this has to be translated in a set of preconditions. When going to an approach where both sustainability and transformation will be combined in architecture, these processes can run next to each other. This new approach can be called 'smart bioclimatic retrofit' and will pay attention to both elements that will be parts of architecture. Here, in the final situation the architect has to use two toolboxes, one that shows the chances and limitations of the existing building and one that offers the direction and sources for developing an integrated sustainable design. The challenge is to use these in the right way to create great architecture. This assignment will ask something extra from the architect and is

more complicated because from both directions not all interventions are possible or desirable (Van den Dobbelsteen, 2015).

Closing cycles in our existing backyard

The approach is a way of forming the process that can lead to the right result. In terms of sustainability it often remains with theories like this instead of adding the specific aim. While it is important to look towards which can be worked. In order to do that, it is best to start with a way of understanding the world as an environmental system which consists of four different layers that interact with each other. Kristinsson (2012) explains in his book how one of these four layers is composed by people but is not independent and does need the others. This system of interaction should ideally work in two ways but right now we primarily use the other layers as a source or space to store waste. So the system is not in balance. Then looking at the role of the building in this whole, it appears that human accommodation, as construction, maintenance and operation, is after food the second largest impact of our way of living on the worlds environmental system (Wackernagel & Rees, 1996). It is responsible for 50% of the used materials, 50% of the total amount of waste produced and 40% of all energy consumption (Kristinsson, 2012). So improving buildings can have a huge influence on bringing the layers of the environmental system in balance.



Kristinsson, J. (2012). Interactions in Kristinsson's system. (pp. 20) Integrated Sustainable Design. Delft, The Netherlands: Delftdigitalpress.

A solution for this is used by Paul de Ruiter Architects (2016), a Dutch architectural firm that is working on and profiling in sustainability issues. They considered the four cycles of energy, water, waste and use of material and try to close them in their design for a building. The energy use for their recent build Amstel Hotel is for example reduced

with 65%. The rest can be produced locally. In this way is tried to solve as much as possible in our own backyard what really fits to the approach of smart bioclimatic design (Van den Dobbelsteen, 2015).

The transformation issue can be seen from this perspective as part of the cycle of material and waste. The existing building is already there and (partly) useable. On the other hand, when demolishing and removing it, it will become waste. So by transforming buildings, there is being contributed to reduce the input of materials and the output of waste. Van den Dobbelsteen (2004) confirms this in his research but also shows another side. With new buildings it is possible to achieve a better environmental performance. This plays a role not only in the cycle of waste and material but also in the water and energy cycle. By calculating the impact it appears that in some cases, when the buildings becomes very old, it is more sustainable to demolish and rebuild than to reuse (Van den Dobbelsteen, 2004). This illustrates that just reuse by itself is not always sustainable. Noticeable is that this is seen from the technical perspective. By combining transformation and sustainability also the historical and cultural value of the building becomes important. Moreover, these values can be decisive for the decision to preserve the building although it is not the sustainable solution. This balance between sustainability and transformation will be a new challenge in contemporary architecture.

CONCLUSION

Altogether it can be stated that sustainability and transformation are two distinctive trends. In contrast to what is happening now, it is necessary to combine them in contemporary architecture. The reason for this is that the world will be left empty handed when new buildings can be built sustainable but the demand is in the existing stock. In this sense, sustainability must lead to an integrated design that interacts with its environment. Developing two toolboxes of preconditions, one for creating a design for integrated sustainable architecture and one for creating a design for transformation architecture is an approach to be able to reach this ambition. The challenge is to use these in the right way to create great architecture, a process that appeals to the skill of the architect. With this a design can be developed that closes the four cycles within the scope of the project. In the end, by using this approach and working towards this aim, a design can be developed that combines integrated sustainability and transformation in contemporary architecture.

URBAN ANALYSIS

NOTE | This report includes the information needed to elaborate on for this design project. The complete analysis with more extensive information and large illustrations can be found in *'Research and Analysis, Fenix II Rotterdam'*

2 HISTORY AND DEVELOPMENT

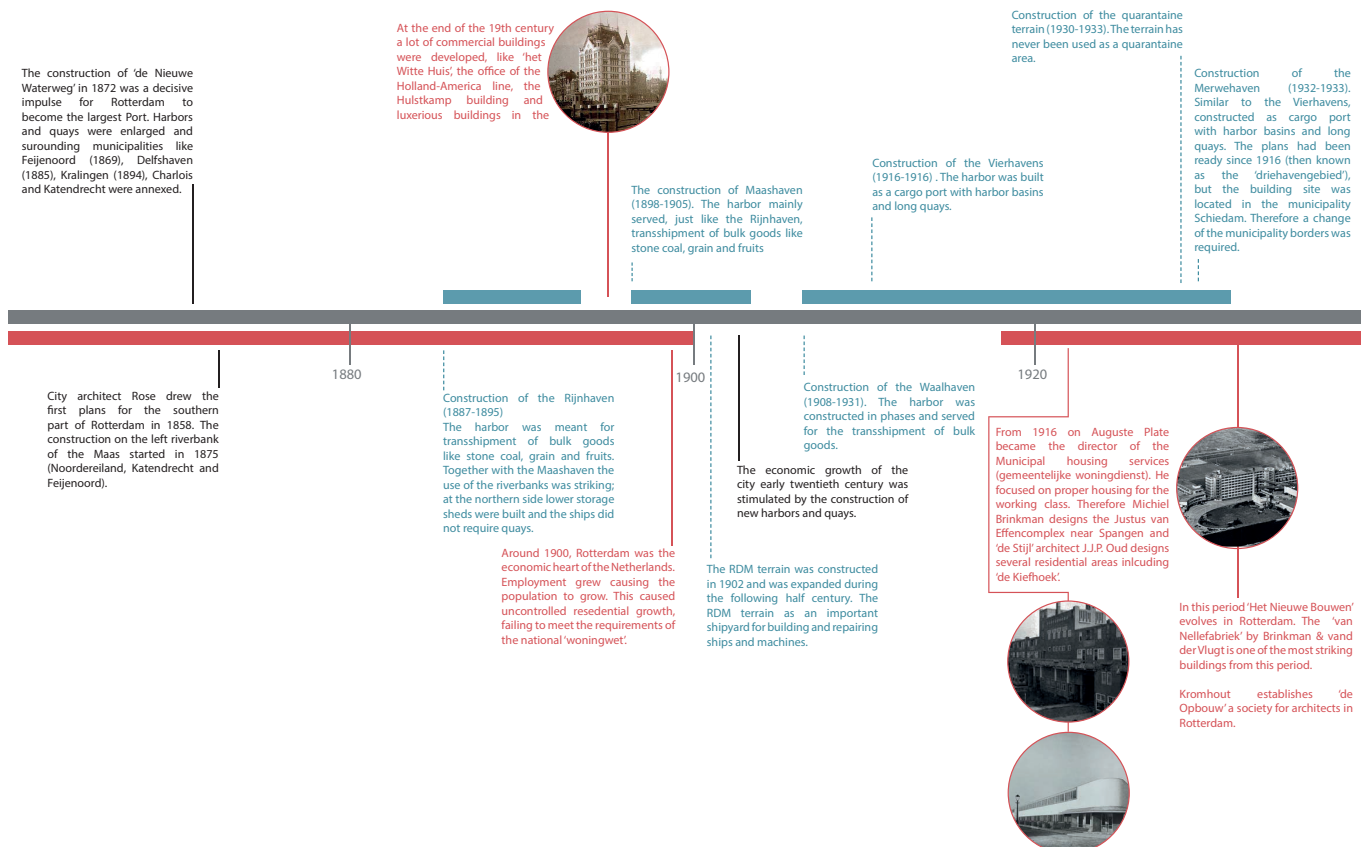
2.1 SHORT HISTORY OF ROTTERDAM

Rotterdam received city rights in 1340 and twenty years later a city wall was built.

WORLD PORT | Until 1825 the growth of Rotterdam limited itself to the town triangle within the city walls. From that moment the town expanded very fast outside the city limits. As gateway to Europe Rotterdam benefited from the booming German economy. In this period, Rotterdam surpassed Amsterdam as a port city. New harbours brought plenty of

jobs: tens of thousands of cheap labour from Brabant and Zeeland moved to Rotterdam. New neighbourhoods arose, such as Crooswijk and Spangenberg. The city also grew by annexing neighbouring communities, such as Delfshaven Overschie. The First World War brought stagnation, which was not conquered until 1926. After the global economic recession of 1929 also affected the city of Rotterdam.

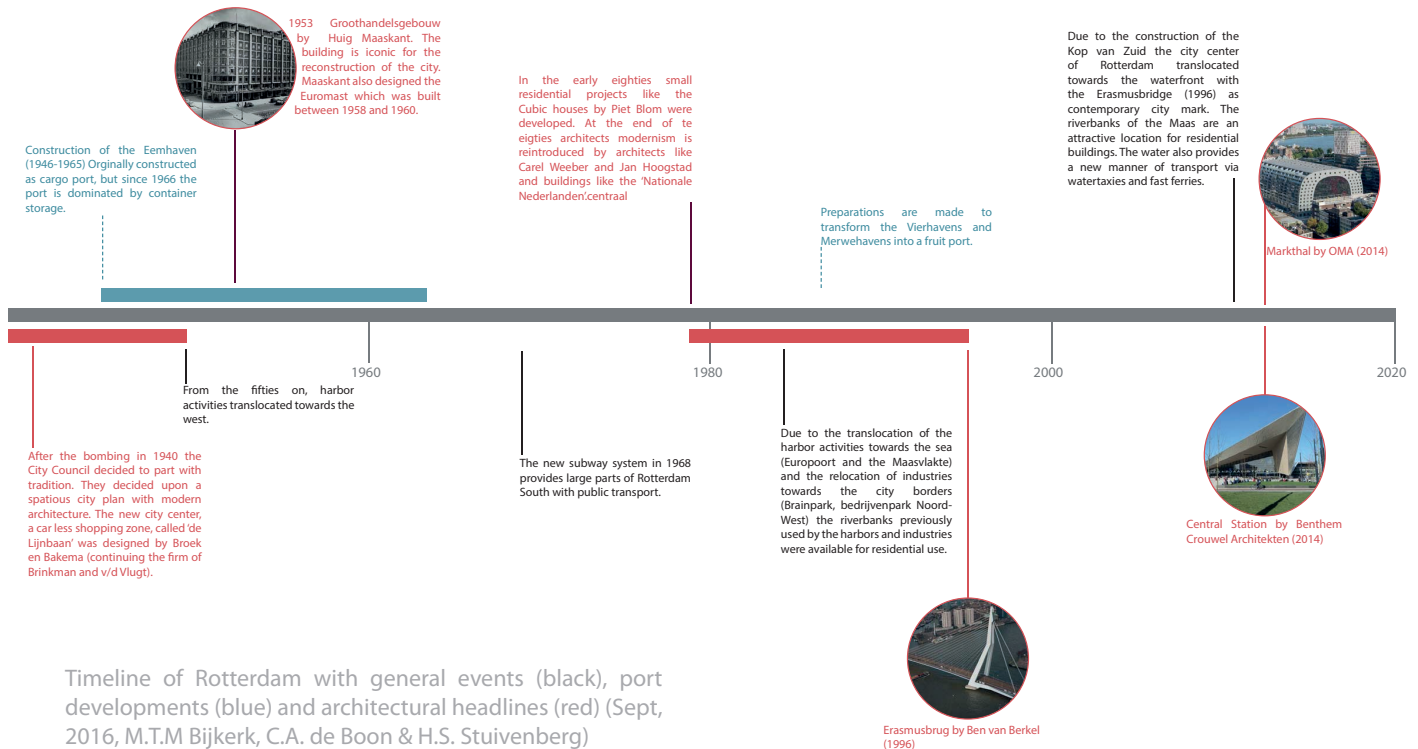
BOMBING AND RECONSTRUCTION | During the Second World War and the bombing of May 1940, Rotterdam was destroyed. Although this was a huge blow to the city, they immediately started rebuilding. The center became accessible by wide roads and urban functions were grouped. In the



centre half of the dwelling capacity disappears. These changes are still visible in the current image of the city. From the 50s on the port activities moved to the west where the petrochemical industry developed. The port of Rotterdam became the largest in the world. Extensive new housing and a modern subway were symbolic for the Rotterdam momentum. From the seventies new flows of immigrants from all over the world made Rotterdam a multicultural city.

CULTURE | Rotterdam got a number of leading cultural events within the city borders and in 2001 it became European Capital of Culture. Despite the economic recession that started in 2008, a number of notable buildings was built.

The new Central Station was opened in 2014, the same year The Rotterdam was completed and the end of 2014 the Markthal followed. This architectural additions put the city nationally and internationally on the map.



2.2 KATENDRECHT: FROM HARBOR TO HOTSPOT

HISTORY | Katendrecht is located in the south of Rotterdam, surrounded by the Maashaven, Nieuwe Maas and the Rijnhaven. On the east side, the district is connected to Afrikaanderwijk. It has a unique mix of historic buildings and new modern buildings. In recent years Katendrecht has undergone a huge metamorphosis. It was a notorious problem district where most people would rather not come. Nowadays, it is one of the most popular and safe neighbourhoods of Rotterdam (Wijkprofiel Rotterdam, 2016).

The origin of Katendrecht goes back to the year



Atjehstraat, J. Noest, 1927, Coll. Historisch Katendrecht

1199. At that time it was a green diked polder landscape. Since 1895 Katendrecht is part of Rotterdam. In the same period the Katendrechtse havens, the Rijnhaven and Maashaven were dug. Katendrecht turned into a bustling port area and at the start of the 20th century transshipment determined the character of the quays (Historisch Katendrecht, 2016).



Maashaven, 1912, kunijdekaapaan.nl

Katendrecht had many characteristics in the past century. To start with, in early 30s the district was an early Chinatown and entertainment quarter for sailors. The atmosphere was cosy and accordion music was played in the countless cafés. During the war the forbidden jazz music was played here and it was a safe haven for everyone. In the following period Katendrecht was flooded by dockworkers during daytime and in the evening a “world city” with cheerful bars, partying sailors and prostitutes. Unfortunately it became a grim neighbourhood with violence and crime in the 80s and in the 90s it was a rather dismal area (Historisch Katendrecht, 2016). From



Deliplein, 2012, NRP Gulden Feniks

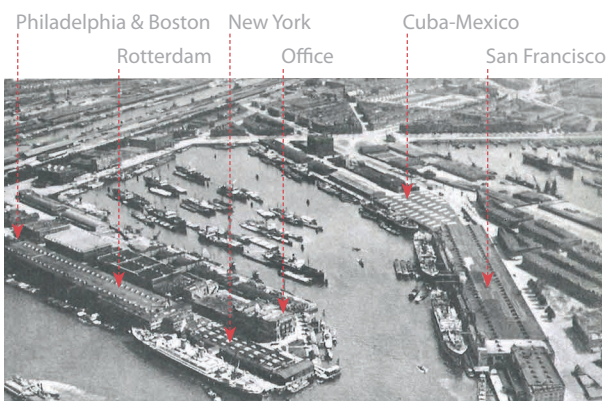


Katendrecht, 1903 (coll. Stadsarchief Rotterdam)

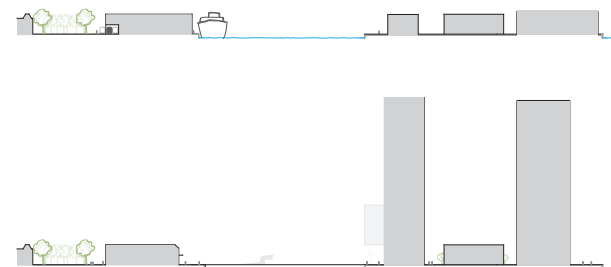


Katendrecht, 2016

the beginning of this century, however, this was about to change. By extensive renovation and rebuilding, the character of the neighbourhood quickly changed. Nowadays Katendrecht is hip and trendy (Wijkprofiel Rotterdam, 2016).



Overview large warehouses Kop van Zuid and Rijnhaven 1930 (Havenarchitectuur, 1982)



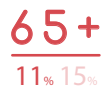
Section of Katendrecht and Kop van Zuid. Top: ca.1920 with the San Francisco, Rijnhaven with ships and warehouses at the Wilhelminapier. Bottom: current situation with Fenix II, Rijnhaven bridge and high rise.

3. PRESENT CONTEXT

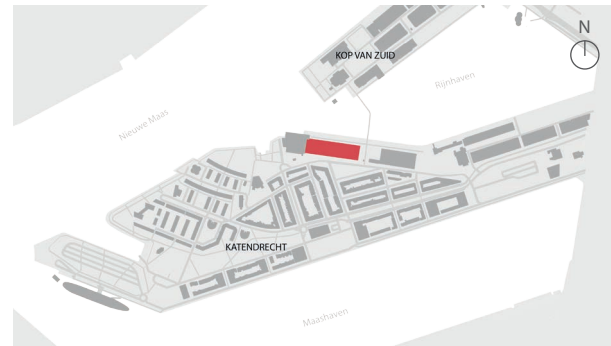
3.1 KATENDRECHT TODAY

TPOLOGY | The harbours Rijnhaven and Maasthaven were the first of there type and designed by G.J. de Jongh. These harbour basins provided place for transshipment of bulk cargo 'op stroom' that took place at the water and disjointed from the quay. Situated between these harbours, Katendrecht turns out to be peninsula, connected with a small wrist to the district Afrikaanderwijk and with a long quay length.

PEOPLE | Katendrecht is compared to Rotterdam just a small district but growing. It houses relatively many families and so a lot of children. The group of inhabitants of Katendrecht is an interesting mix of yuppen, young families and oldies from the first hour. In addition, the results of research of the municipality of Rotterdam (2016) shows that living experience in Katendrecht is very high and that it has risen strongly in the last two years. Moreover, residents do feel strongly connected with the district as



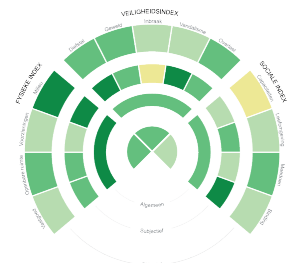
Inhabitants, houses, age & households of Katendrecht (numbers: Wijkprofiel Rotterdam, 2016)



Lactation warehouse Fenx II at peninsula Katendrecht.

well as with Rotterdam. Besides, it appears that certain facilities, for example shops for everyday groceries, are missing.

During the day most people are leaving Katendrecht to go to work. In contrast, Kop van Zuid is flooded by people in the morning and empty in the evening. Also the flow of children going to school is present on Katendrecht. The subway station is a central point of arriving and leaving passengers. It can be concluded that Fenix II is at a nice calm spot very near all this movement without being intersected by it.

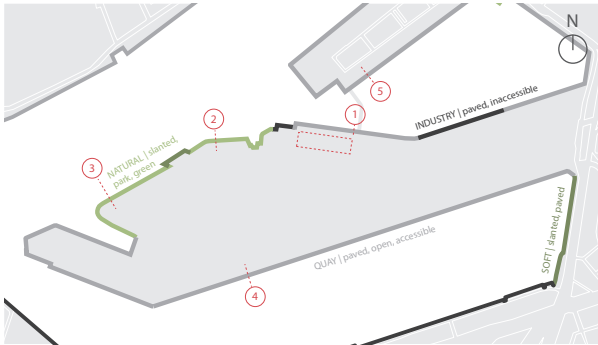


Positive **living** experience

High **neighborhood** commitment

Lack of certain **facilities**

Conclusions of the neighborhood profile (Wijkprofiel Rotterdam, 2016)



Different quay types at Katendrecht

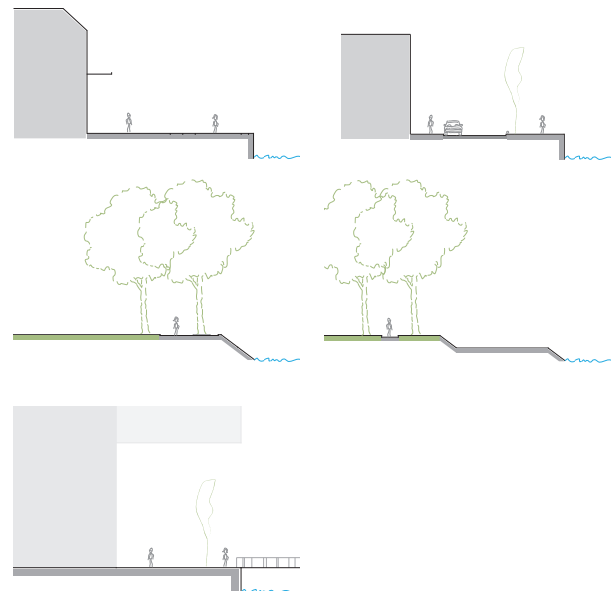


Plan of the green structure of Katendrecht

GREEN STRUCTURE | In the 19th century, prominent families of Rotterdam had their summer residence at the green idyllic spot that Katendrecht was. At the time the Maas- and Rijnhaven were completed, the pretty riverside village was turned into an isolated neighbourhood on a narrow peninsula surrounded by ports, warehouses, storage and shipping. There was not much green to be found. Today the district is again a quite green place in the city of Rotterdam. The Kaappark is located in the center surrounded by houses. The Tweede Katendrechtse Hoofd and Derde Katendrechtse Haven have gotten a natural character and next to the Veerdam a park with high trees is situated.

The Deliplein dates from later period. As it is now called the new hotspot of Rotterdam, Deliplein used to be a place where sailors, prostitutes and drunken pub customers dominated the scene. In the 90s it became a ghost square with boarded-up buildings. Thanks to renovations and investments Deliplein nowadays is extremely hip. Overhanging trees, restaurants, cafés, shops and the Fenix Food Factory together create a unique square that brings many people to Katendrecht.

WATER AND QUAY | Katendrecht is surrounded with water: the Maas, the Rijnhaven and the Maashaven. That also means that it has a very long quay length. Through time these edges changed and developed. Today a variety of shapes and atmospheres of can be found, from wide and green to enclosed and completely paved.



Different sections of the quay showing the connection with the water.



Rijnhaven bridge | rijnhavenbrug.nl

INFRASTRUCTURE | That Katendrecht is a peninsula, can also be seen in the structure of the roads. A main road runs into the district and branches off in a finer structure of streets. Around the edges, Katendrecht is mainly accessible for pedestrians. An exception in this structure is the Veerlaan which still has a speed of 50 km/h instead of 30 km/h.

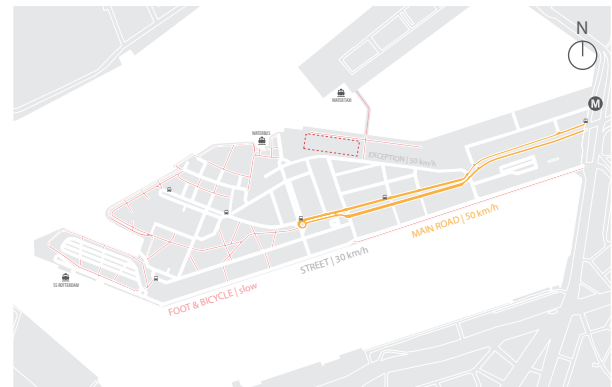
Unfortunately, this also means that the end of the neighbourhood is not easily accessible by public transport. The subway stops on the wrist in the east. Only one bus line runs through the middle of Katendrecht. In contrast, the Rijnhaven bridge offers a nice route for cyclists and pedestrians. It lands exactly between the two Fenix warehouses at the peninsula.

A new type of public transport, the water bus and water taxi, both have stops located on Katendrecht. Where a ferry was located in the period Katendrecht was a hamlet, now stops the water bus. This right around the corner from the Fenix warehouses.

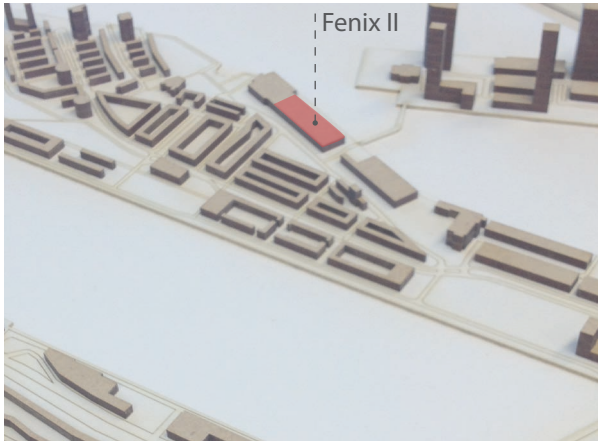
PROGRAM | The majority of the buildings at Katendrecht is housing or has a mixed use function. Also a number of social functions are assigned. Remains of the port industry are still present along the quay of the Rijnhaven. For Kop van Zuid the municipality assigned 'urban functions' in the zoning plan. Which apparently can be stretched from housing till hospitality and leisure. Interesting is the tremendous difference in density between the on average four story housing blocks at Katendrecht and the high rise of Kop van Zuid.



Program of housing and mixed use in the core and some remaining industry at the Rijnhaven quay



Infrastructure with main road, finer street structure en pedestrian accessible quay length.

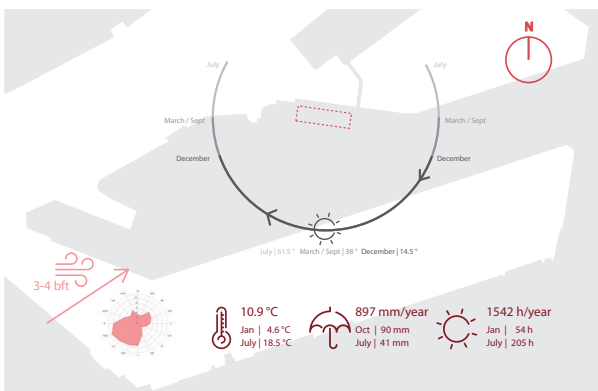


Model showing morphology and building height

A couple of monuments can be found at Katendrecht but more on Kop van Zuid. The most important are Hotel New York, former headquarter of the Holland-Amerika Line, across the Rijnhaven and Meelfabriek Latenstein next to the Fenix warehouses along the Rijnhaven. More warehouses and rests of the Holland-America Line are located at Kop van Zuid and at the wrist of Katendrecht.



Hotel New York (1901, Architect: C. B. van der Tak) between two skyscrapers at Kop van Zuid.



Climate of the location

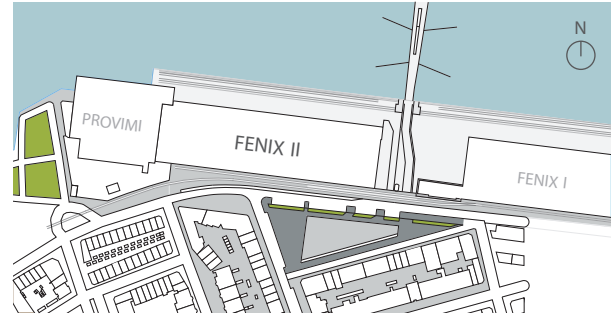
CLIMATE | The climate of the location is characterized by an average temperature of 10.9 degrees Celsius, a predominant southwest wind with an average force of 3-4 btf and relatively high rainfall of 897 mm per year. The water side of Fenix II is directed to the north-northeast.

The place has a high potential for geothermal, thermal storage and solar energy (Atlas Natuurlijk Kapitaal, N.D). In addition, there is the possibility to be connected to the waste heat network.

3.2 SITE

PROGRAM | The Fenix II is located at the Veerlaan. At the west side the building of Provimi, a company operating in the international animal nutrition industry, is located. The place has an industrial character and is characterized by transport and closed off by gates. On the east side of Fenix II, the Fenix I is situated. Between the two buildings a wide space forms the connection between the quay and the Veerlaan. Here the Rijnhaven bridge lands at Katendrecht. On the other side of the Veerlaan the Deliplein is situated surrounded by housing.

TPOLOGY | In the direct environment of Fenix II, the original structure of Katendrecht is leading. Housing blocks in the core are separated from the water by a stroke of industry. Fenix II is a remaining part of a former warehouse building with a box shape and a strong horizontal direction parallel to the quay. It can be seen as a landscrapper. Fenix I is the other remaining part of the same former

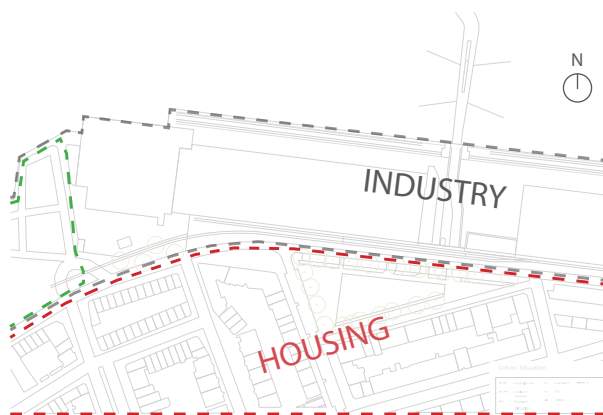


Ground plan with site and buildings

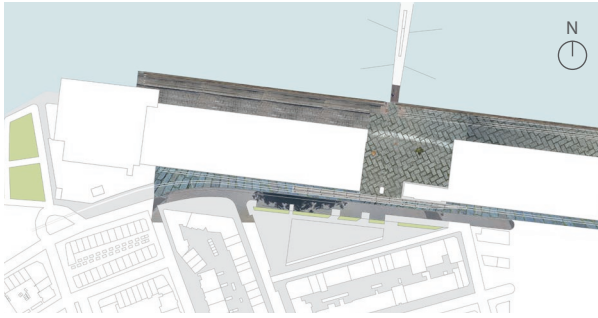
warehouse but then smaller. The Provimi building on the other hand, is a combination of the old four story storehouse with an added silo and other added building parts.

TRAFFIC | The site is easily accessible by the Rijnhaven bridge or via the Veerlaan. The water taxi stops around the corner at the Linker Veerdam. The traffic at the site itself is however hardly structured. Along the street trucks are stalled in front of the building and parked cars are blocking the access to the building. On the water side, cars and cyclists are driving along the quay between the pedestrians. Parking spots are found wherever is space.

MATERIALS | A mix of materials can be found in the pavement of the site. On the street side, old cobble stones are alternated with Stelcon plates. The interspace is paved with pavers and the the quay with a variety of pavers and Stelcon plates. Port activities of the past have resulted in a wavy effect in the surface. On both long sides of the building old train or crane tracks are found.

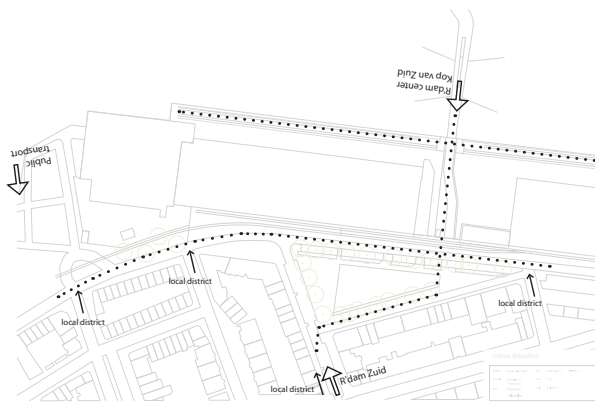


Ground plan of the original structure of Katendrecht



Ground plan of the site with different materials in the pavement.

ORGANIZATION | The flow of walking and biking visitors is intertwined with driving and parked cars at the Veerlaan and on the quay. The space between the building and the street is not really used. In contrast, the quay is used extensively. The large disorganised terrace of the Food Factory is situated here and people are relaxing in front of the circus or working out in front of the crossfit. Arriving by bike, people take the route via the quay.



Flows in the direct environment of Fenix II

4. FUTURE PLANS

4.1 ROTTERDAM

The municipality of Rotterdam has composed the city vision for 2030. In this document they describe the character of the city in about fifteen years from now and point out some key subjects. In the following sections, the main elements of this vision will be explained.

OVERVIEW | In 2030, Rotterdam is a clean, colourful port city at the mouth of the river Maas. The city, with its distinctive skyline exudes an entrepreneurial spirit and an open and international character. More than 600,000 people live and work in the city and have plenty of contact with each other and with the rest of the world.

ECONOMY | Besides the multinationals, there are many small and medium sized businesses that operate internationally. The city has a relatively young working population and a unique combination of highly skilled people and craftsmen.

CULTURE | The city has an innovative cultural climate and is nationally and internationally known for its events. Most cultural facilities are located in the downtown area, but also at other places is space for temporary cultural initiatives. The historic buildings in the old city harbors hosts a variety of cultural experimentation. Attracted to the bold and playful of the city, cultural figureheads have settled here.

LIVING | Rotterdam has really become a place to live. Living in the city center is very popular

with starters and seniors. The neighbourhoods surrounding the centre all have their own character, thanks to their (historical) location and function. They provide a quiet, high-quality and diverse living and working environment for all population groups.

SPORTS AND WORK | An important reason to live in this city are the cultural and sports facilities, which can also be found in the neighbourhoods. In all districts are sufficient indoor and outdoor sports facilities, which are attractively designed near other neighbourhood facilities. Small businesses, including home workers, have spread across the districts.

RESIDENTS | The residents are strongly involved in the fortunes of their town. They are above all proud of their tough city: the port, the business climate, cultural events, sports climate, the illustrious history, the immigrant population and the healthy climate.

INFRASTRUCTURE | Traveling for work, study or leisure is easy because of the high-quality public transport. A dense road network, cycle track structure and water transport network districts are mutually well connected to areas around the city.

GREEN AND WATER | In the inner city attractive pedestrian routes are everywhere. It offers residents and visitors the opportunity for meeting and relaxation. In addition, there is sufficient, surprisingly green and the water is never far away. The port city offers plenty of places possibilities for living on and near the water.

(Source: Gemeente Rotterdam, 2007)



Structural plan city harbors 2025 (Gemeente Rotterdam, 2011)

4.2 KATENDRECHT

The Rijnhaven it's on its way to become an example for the old city harbours of Rotterdam. The municipality's vision is to create an urban environment where living, working and leisure are combined. Chances for building energy efficient and water safe will be visible here and attract Rotterdam citizens and tourists. Along the quay a dense area will arise that is called the 'Show City'. Here, the water with its quays provides in the middle of the 'arena', space for recreation. Examples mentioned are a floating swimming pool and walking route along the quays and the banks of the Maas.

In other words, this vision purposes a coherent strip around the Rijnhaven. The set ambition and term 'Show City', suggest an impressive and iconic character. The municipality speaks of a dense and high quality urban environment with the focal points smart energy and climate resistant.

At Katendrecht this concerns the (former) industrial strip between residential Katendrecht and the water of the Rijnhaven. But the position of the heritage in this area is not named.

The restructuring of Katendrecht started already with the Rijnhaven bridge. This will be prosecuted by a second bridge over the Maashaven that connects Katendrecht with Tarwewijk.

The assigned program for the core of Katendrecht is clearly living. In 'the wrist' also mixed use is assigned. The small amount of industry which is still located on the north side of Katendrecht, will gradually have to relocate itself (Programmabureau Stadshavens Rotterdam, 2011).

4.3 SITE

In the coming years the industry of Provimi will disappear. This will offer a challenging development project where the situation of the old storehouse can be brought back and the industry additions can be removed.



Provimi with former storehouse (Provimi, 2016)

One of the already planned projects on Katendrecht is located right next to Fenix II and consist a radically transformation of its little brother: Fenix I. The design by Mei Architecten will transform the warehouse into a ten story building for living, working and recreation. On top of the existing will be built more than 200 new loft apartments. This will be complemented by 8.500 m² commercial space and 225 parking spots. At the moment the project started by completely stripping the Fenix II.

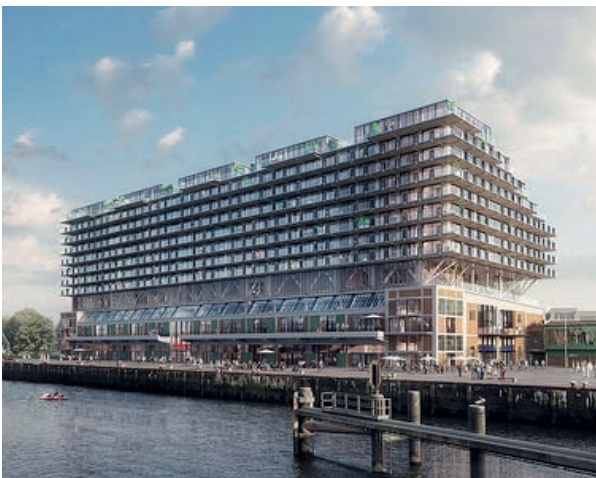
Looking critically to this design, it is hard to recognise the former warehouse in the suggested new building. The landscrapper will change in a skyscraper and with it the old building disappears under the new volume of the apartments.

Moreover, by zooming into the details, it appears that the structure of the warehouses will be pierced by a totally new steel structure. It seems



Current situation of the stripped Fenix I building (Mei Architects, 2016)

that a lot of effort has to be made to transform this building in order to make it suitable for its new function. It can be questioned if this project builds upon the values and capabilities of the heritage building.



Design of Fenix I by Mei Architects (Mei Architects, 2016)

CONCLUSION

HISTORY | The history of Rotterdam is characterized by the development of the port into one of world's largest, the destruction of the war and the multicultural city that it became today. The cultural climate and architectural additions of the last years put the city nationally and internationally on the map.

Katendrecht, as southern district and one of the old city harbours holds a history as centre of port activity. With the port moving towards the west, Katendrecht became a problem district where most people would rather not come. In recent years the district was redeveloped into a peaceful living neighbourhood with hip and trendy areas as the Deliplein.

CURRENT | The peninsula Katendrecht is today characterized by a group of residents mainly consisting of young families, a very positive living experience that grew extensively in recent years and a lack of facilities for daily groceries. It has a green environment is surrounded by water and owns a long quay length with different atmospheres and dimensions.

Fenix II warehouse is located between the industry of Provimi and its little brother Fenix I. The site includes a variety of pavement materials.

Future | The vision for Rotterdam in 2030 of the municipality of Rotterdam focus on a healthy economy, innovative culture climate, pleasant living experience, possibilities to sports and work everywhere, committed residents, a dense transport network and high quality green

structures and waterfronts.

The future plan for Katendrecht and Kop van Zuid contains an increase of housing and introvert high rise buildings. The direct environment of the Fenix II will be influenced by the new design for the Fenix I. The design by Mei Architecten will transform the warehouse into a ten story building for living, working and recreation.

ARCHITECTURAL ANALYSIS

NOTE | This report includes the information needed to elaborate on for this design project. The complete analysis with more extensive information and large illustrations can be found in *'Research and Analysis, Fenix II Rotterdam'*

5 HISTORY AND DEVELOPMENT FENIX II

5.1 SAN FRANCISCO

After completing the Rijnhaven, in 1895 the municipality placed two wooden warehouses on the end of the south side of the Rijnhaven: Warehouses A and B. On an early map these old warehouses are clearly visible and a photograph from 1911 gives an impression of what these buildings looked like. In 1915, these warehouses



Wooden warehouses A & B after a storm in 1911 (coll. Stadsarchief Rotterdam)

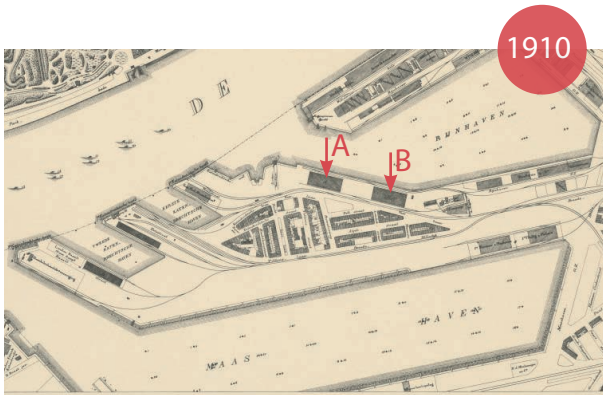
became property of the Holland-America Line, which already had the plan to replace them for a bigger one (Fischer, 2014). In 1922 two new warehouses were situated at the south side of the Rijnhaven: San Francisco and Cuba-Mexico of which San Francisco is the largest. A storehouse of four floors was situated on the west side. The municipal city map from 1923 shows this new situation. Het Vaderland (1923) describes how they together cover the 520 m quay length and give room for three large steamships. It really was a special project. Besides Het Vaderland, also Maasbode (1922) and Haagse Courant (1923) published about the new warehouses.



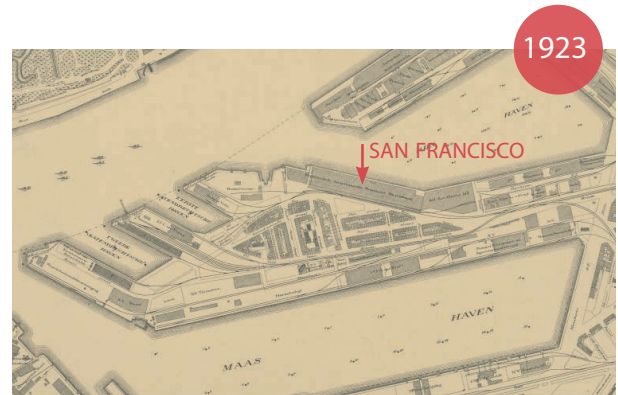
Newspaper article, Haagse Courant March 17, 1923
In the following years, San Francisco was center and part of all kind of port activities. This was till World War II which seriously damaged the city of Rotterdam. After the bombing of 1940, which destroyed much of the downtown area, the damage to the San Francisco warehouse wasn't that bad. However, at the end of the war in February 1945, they also bombed the port buildings at the Rijnhaven. Especially the part at the quay was really damaged, the Veerlaan seemed more or less unharmed (Fischer, 2014). After the war, the warehouse was restored and the quay of the Rijnhaven was widened as is clearly shown on the picture from 1947. Tragically, at the end of that year the building was hit by a fire that completely destroyed its middle part (Van Schagen Architects, 2012).



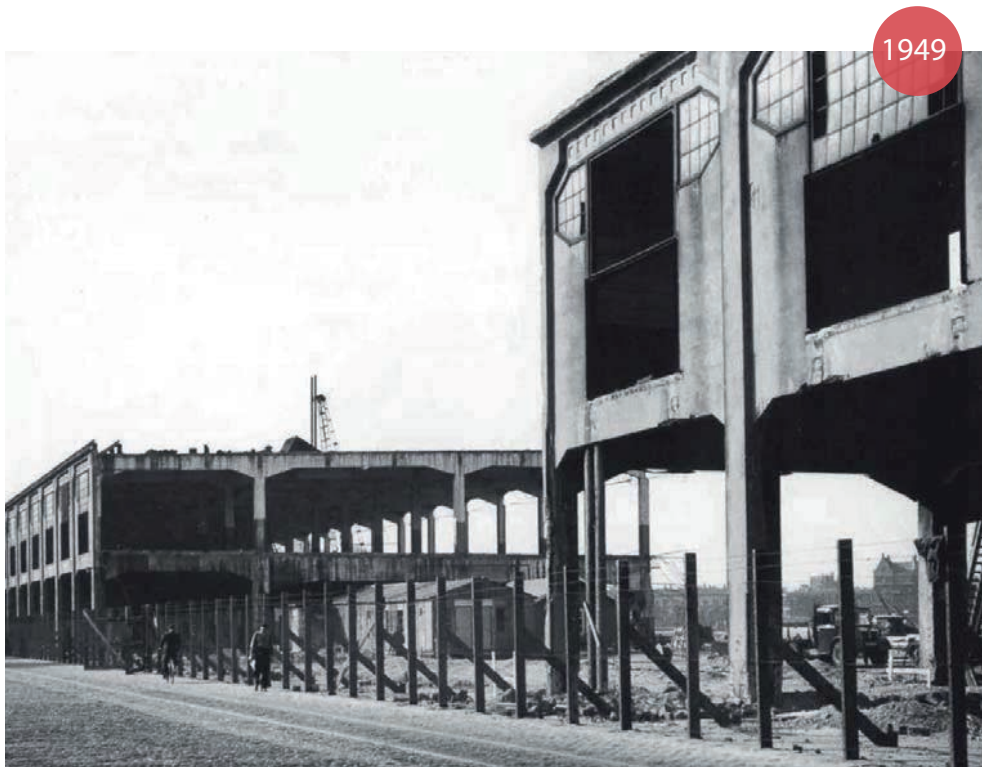
Damage of the water side after the war (Katendrechtse Bewonersorganisatie, 1945, Feijernoordse Meesters)



Katendrecht en het Nieuwe Werk, 1910, with the old warehouses A and B (coll. Stadsarchief Rotterdam)



Katendrecht en het Nieuwe Werk, 1923, with the new San Francisco warehouse (coll. Stadsarchief Rotterdam)



Ca. 1949, situation after the fire, coll. Stadsarchief Rotterdam)



E.A. Hof, coll. Spaarnestad Archief, September 1947

5.2 FENIX I & FENIX II

A tremendous renovation was needed to restore the building. Het Vrije Volk (1951) describes that till 1948 the warehouse was very dilapidated. In that year the renovation started which would last two and a half years and cost half a million guilder. From that moment the huge San Francisco wasn't one building but split into two smaller warehouses that were from that moment on called: Fenix I and Fenix II. During the renovation the buildings were made less deep. Moreover, a canteen was built together with offices, bicycle sheds and



1980, Katendrechtse Bewonersorganisatie, coll. Historisch Katendrecht

garages. In addition, new rail tracks on the quay were constructed where three quay cranes were placed (Het Vrije Volk, 1951). Altogether the situation at the Rijnhaven changed dramatically in those years.

5.3 FENIX NOW

Till the '90s there has been activity around the Fenix warehouses. This also brought along a lot of hustle and bustle for the surroundings. From the early morning until the late afternoon the



2012, coll. Historsch Katendrecht

Veerlaan was filled with trucks, other traffic had difficulty with getting through. Thereby also the train with loaded wagons arrived around 10 am (De Rijke, 2016).

The business was finite. With the movement of port activities towards the west, also the activities in the Rijnhaven disappeared. Katendrecht became part of the city centre and the Fenix warehouse had lost its function and vigour. On photographs from 2002, the building looks closed and vacant. Since 2012, the building is cautiously back in use again thanks to small creative initiatives. Now, in



Ca. 1950 situation just after the renovation (coll. Stadsarchief Rotterdam)

also provides temporary space for meetings, presentations, dinners and cocktail parties. Until the completion of Fenix 1, this remains the same, then the companies are welcome to make the transition to Fenix 1. Then we can also shape the development of Fenix 2.)

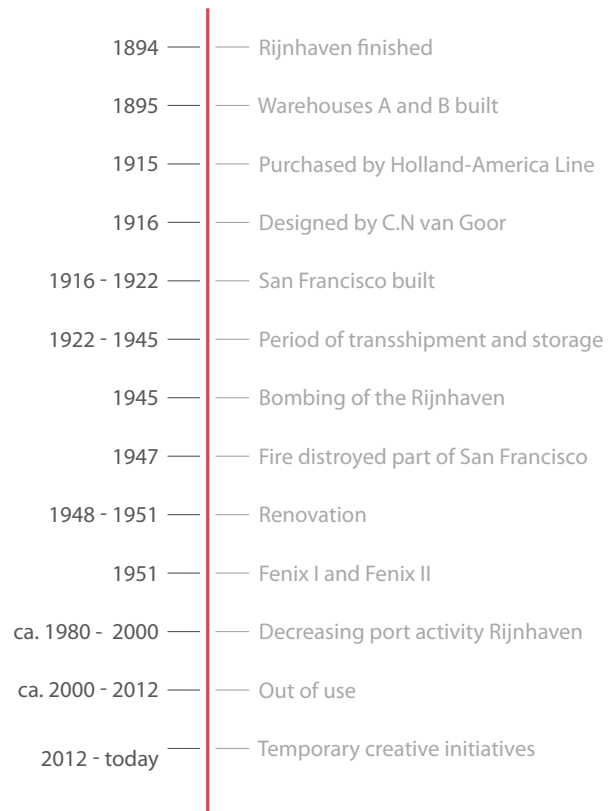
2016, Fenix II is still just partially used and only by temporary function but it really became a place loved by people from in- and outside Rotterdam.

5.4 FUTURE PLANS

The plans for the Fenix II are in line with the development of Fenix I. Heijmans, developer of Fenix I, stated:

"In Fenix 2 zit nu Fenix Food Factory, waar diverse kleine bedrijven zitten op het gebied van eten en drinken. Deze loods biedt daarnaast tijdelijk ruimte voor vergaderingen, presentaties, diners en borrels. Tot de oplevering van Fenix 1 blijft dat zo, daarna zijn de ondernemers welkom de overstap naar Fenix 1 te maken. Dan kunnen we de ontwikkeling van Fenix 2 ook vormgeven." (Heijmans, 2015)

(Translation: Now, Fenix Food Factory with several small companies in the field of food and drink, is located in Fenix 2. This warehouse



6 BUILDING COMPOSITION

6.1 TYPOLOGY

The San Francisco building was a harbour warehouse. This type was developed in Rotterdam when the ports kept growing and there was need for quick processing of goods (Gerrits, 1982). Previously, storehouses, the oldest business buildings in the harbour, were mainly used.

The warehouse characteristics of a low number of floors, a rational structure and high sliding doors on both sides, are also applied to the San Francisco. But the distinguishing width with a free span of 25-40m and load bearing structure of steel with wooden façades and roofing are different from the concrete structure and 10 to 13,5m span of San Francisco.

San Francisco is an early example of the building type harbour warehouse. It can be seen as show piece of the collection of warehouses of the Holland America Line (De Boer, 1923) and is related to the former warehouses New York and Rotterdam. Interesting is, that San Francisco is not only is the largest of this collection, it is also the only building from which currently something has been preserved.

6.2 USERS

Today, the large warehouse is divided into several spaces where a variety of creative businesses is settled. The most famous is probably the Fenix food factory, a small roofed market hall that focusses on fresh and local food. Also Circus Codart, part of the School of Arts and

circus Rotjeknor are located in the warehouse. Furthermore, companies like a bike shop, interior design firm and a crossfitt centre are situated in the building. Flexible temporarily workspaces are created on a part of the first floor. Another part of the building is empty or rented out for events like the International Architecture Biennale Rotterdam.

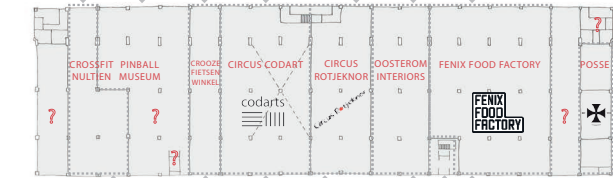
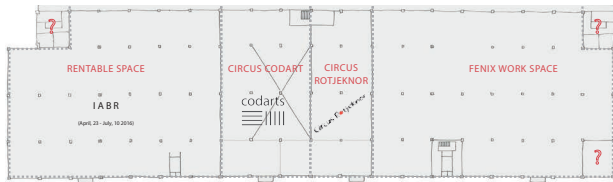
6.3 ORGANIZATION

The program of the building is determined by the creative companies. Some are retail, others leisure and quite a lot of space is occupied by small offices. Different entrances on both sides of the Fenix II make the possibility to walk and see through it. Together this creates a movement from the Veerlaan to the water and vice versa. Even for the office space on the first floor this connection takes place. Although the front door is situated at the Veerlaan, the balcony provides the connection with the waterside.

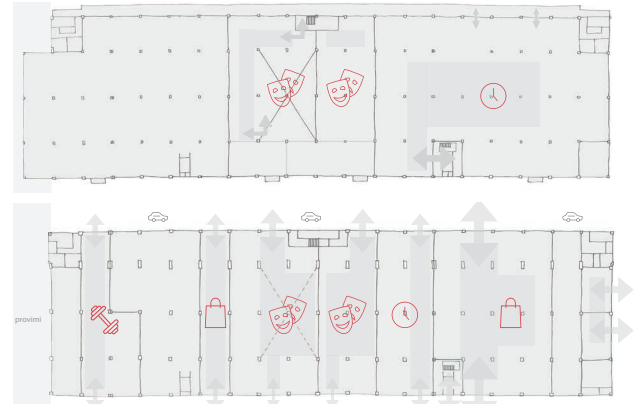
6.4 FAÇADE

De façades today are a mix of elements from different time episodes. The walls and form language from the windows and sliding doors at the Veerlaan is from the San Francisco, the whole side and waterside façades are made during the renovation in the 50s and new colours were applied in the 80s. Also in the last years new modern doors, windows and windows were placed in the existing openings. The new windows are compliant to the old form language and have the slanted corners. The doors on the other hand, are more modern.

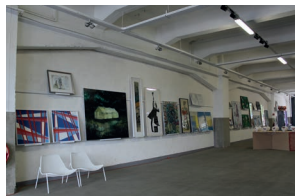
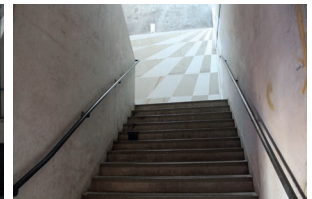
What definitely has changed is the way to enter the building. In the current situation the entrance



Divided spaces and different users.



Current program.



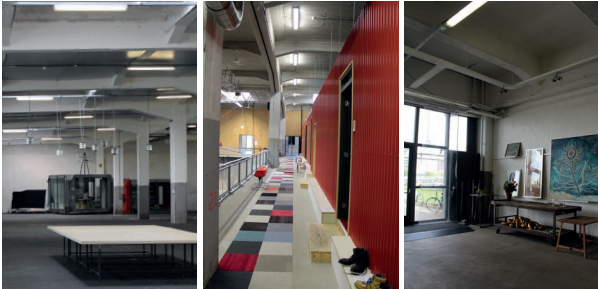
Users: Fenix Food Factory (photo: guerrillatasting.nl), Circus Codarts (photo: codartv), Van Oosterom Interieur & Rentable Space - IABR (photo: Hans Tak)

Old window frames, concrete stairs, circus Rotjeknor (photo: circusrotjeknor.nl) & Van Oosterom Interieur.



Facades: streetside, waterside, eastside

depends. All companies have their own front door at each side of the building. So it is possible to enter at the street side as well as at the waterside. It can be concluded that the building has no front or back anymore and it became a two sided



Use of lighting at the first floor, in the middle and below the balcony.

building.

6.5 INTERIOR

The main part of the interior is still original from the renovation in the 50s. The construction is present in interior. The finish with white and grey paint gives a calm and subdued impression. In addition, the users all have adapted their space in a different way. The circus school, for example,

has given the interior very bright colours. The interior design firm, in contrast made it very clean and modern.

6.6 LIGHT AND AIR

The relatively small windows cannot bring much sunlight to the centre of the building. For the purpose of storage this is a good thing. Nowadays, while Fenix II has another function, it can be found quite dark. In the length of the building only sunlight from the street side can enter the building. The other side is given the sloped roof window and although it is oriented towards the north, it brings a lot of indirect light inside. The balcony on the other hand really blocks the light which results in a darker ground floor. By analysing the pictures from inside it is remarkable that in most rooms extra lighting was used.

CONCLUSION

HISTORY | The current Fenix II is a remnant of the San Francisco building. This huge concrete port warehouse arose between 1916 and 1922 at the south side of the new Rijnhaven and was built by the Holland-America Line. The damages of the WW II and a fire asked for a tremendous renovation that resulted in a separation into two warehouses: Fenix I and Fenix II.

After a long period of functioning as a storage building, the port moved towards the west and the building became vacant. Just in recent years the Fenix II became partly back in use by creative initiatives.

CURRENT | The Fenix II is a remaining part of an early port warehouse. It can be seen as show piece of the collection of warehouses of the Holland America Line. Today, the large warehouse is divided into several spaces where a variety of creative businesses is settled. The program of the building is determined by the companies. The possibility to enter the building from both sides and walk or see through it, creates a movement from the Veerlaan to the water and vice versa. De façades today are a mix of elements from different time episodes and the main part of the interior is a remnant of the renovation in the 50s. In addition, the current users all have adapted their space in a different way. This all results in a building with a extraordinary rich history that is used in a creative way but which current state is quite disorganized and incoherent.

BUILDING TECHNOLOGY ANALYSIS

NOTE | This report includes the information needed to elaborate on for this design project. The complete analysis with more extensive information and large illustrations can be found in *'Research and Analysis, Fenix II Rotterdam'*

7. HISTORY & DEVELOPMENT STRUCTURE

7.1 STRUCTURE THROUGH TIME

SAN FRANCISCO | The development of the load bearing structure of the Fenix II starts with the large San Francisco warehouse. Its concrete construction with a monolithic character is divided into forty-two grid lines with a distance of 8,60 m. On grid lines 15 and 29, the construction is interrupted by an expansion joint. Here, on both sides of the structure over the entire depth concrete walls are placed between the columns.

On the grid line 4, the construction is for unknown reasons also interrupted without placing a wall. A possible consideration could have been to connect the warehouse and the storehouse and so replace the join from grid line 1 to the east.

In the depth of 65 m the warehouse is divided into six grid lines. The grid section on the waterfront is 14 m and the one on the street side 10.5 m. The middle three are 13.5 m.

The roof is part of the construction and is slanted to both sides and the rainwater drainage is solved at the inside of the facade. This is shown in the detail at page 48.

The foundation consists of concrete footings on wooden poles. It turns out that the foundation of the old wooden warehouses A and B is still between San Francisco's. The front part of the warehouse on the water side rests on the foundation of the quay of the Rijnhaven. Concrete façades are also part of the monolithic structure but do not have a function in the load bearing system.

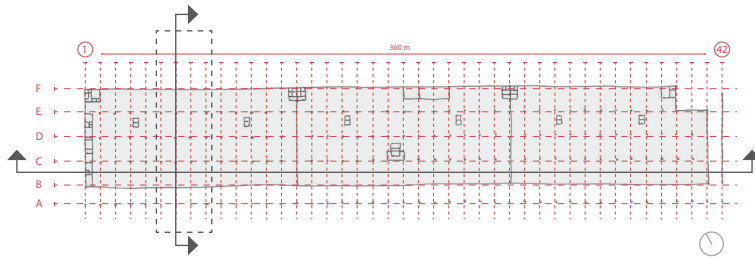
FENIX I & II | The war and the fire have had an important impact on the load bearing structure of the building. After the fire, the two spans between grid line F and D were gone. The columns on grid line D are still there (see picture of E.A. Hof on pp. 28). A new span was replaced but with a different grid size of 8.5 m. Where this new size is related to is unknown.

The middle of the San Francisco warehouse, a width of 60 m between grid line 21 and 29 was vanished by the fire. Therefore Fenix I is 120 m and Fenix II 180 m. The left new warehouse, Fenix II now consists of 21 grid lines in length and 5 grid lines in depth. The disappearance of the arcade made that the warehouse is now both on the ground as on the first floor 46 m deep.

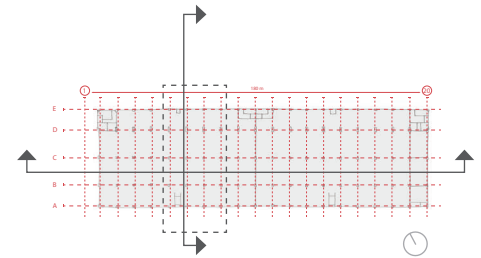
The expansion joints can of course be found at the same place as before: grid line 4 and 15. However, the concrete separation wall is removed. A new 'fire wall' is placed on grid line 11.

Noticeable is the extra-wide column on grid line D of 2.1 m. The drawings from 1948 show a double column with space in between but the current situation seems to be a solid concrete column. Nothing indicates that this column had more weight to bear. The reason for this solution may be the addition of the new part of the structure. After all, this is point where the old and new part of the building had to be connected.

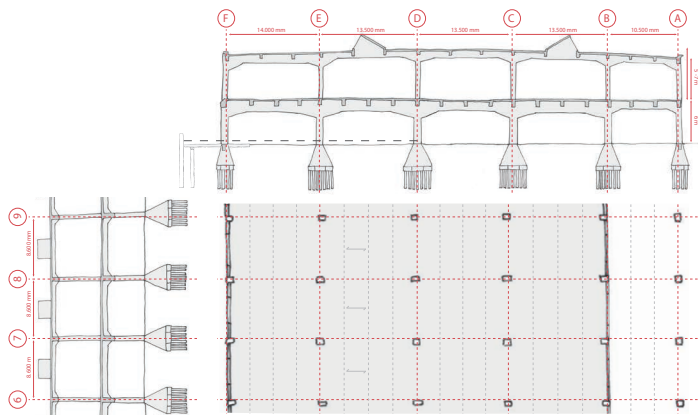
For the Fenix II warehouse the ramp of the roof from the street side was extended. The rainwater drainage is only located on street side and is still solved at the inside of the facade. The drainage for sloped roof window is solved on the water side, also on the inside of the exterior wall.



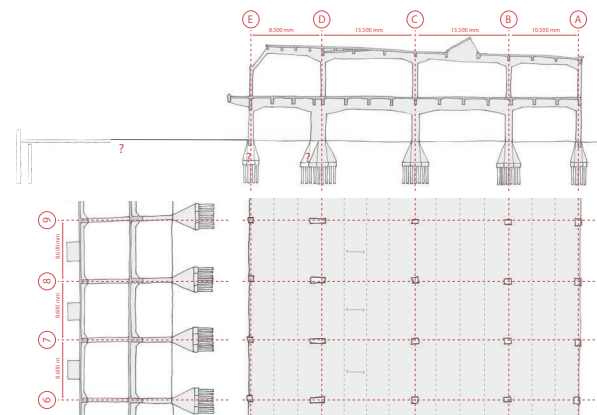
BEFORE | Grid of the San Francisco building in which the below standing fragment is indicated.



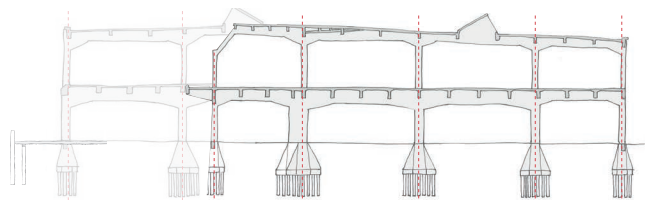
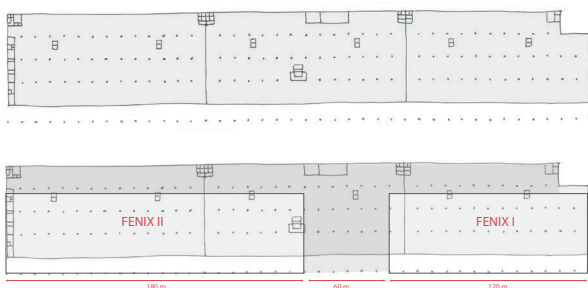
After | Grid of the Fenix II building in which the below standing fragment is indicated.



BEFORE | Principle of the load bearing structure of the San Francisco in plan, longitudinal & cross section with grids & dimensions



AFTER | Principle of the load bearing structure of the Fenix II in plan, long & cross section with grids & dimensions



Impact of fire of 1947 on the load bearing structure, San Francisco in the background and Fenix II in the front.

In which way the foundation of the new part of the warehouse is built is unknown. Probably new foundation parts are an extension of the existing. New façades and façade are made in brick, in contrast to the concrete façades of San Francisco.

The fire has exposed the reinforcement of the structure to high temperatures. This could mean a lower carrying capacity. In recent years no problems revealed despite rigorous use. Additional research could provide more certainty about this.

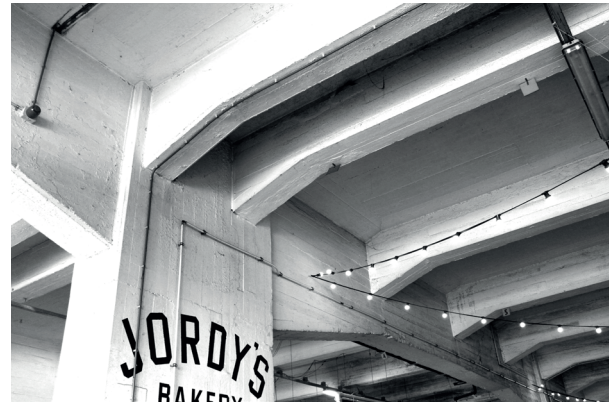
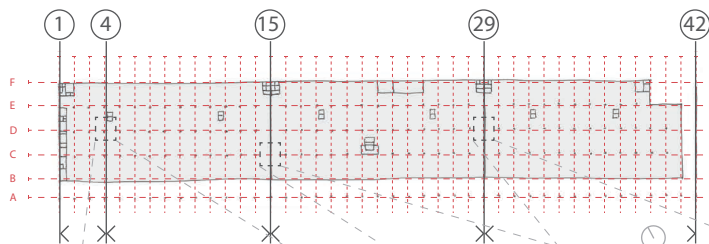
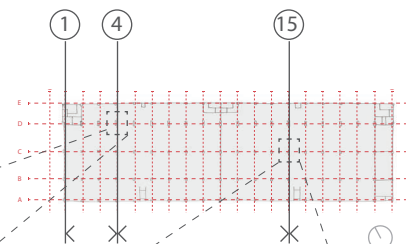


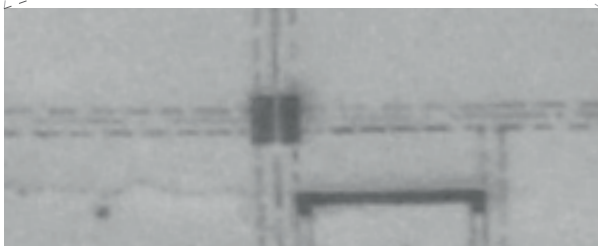
Photo of the wide column on the ground floor making it likely that is it made as one column.



BEFORE | Plan of San Francisco with expansion joints grid lines



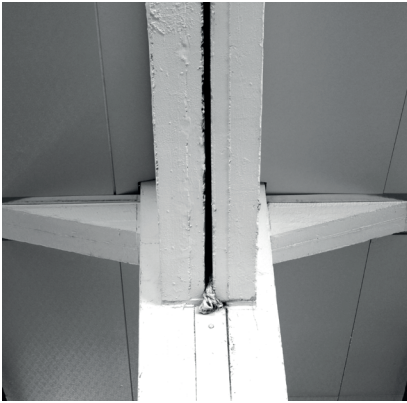
After | Plan of Fenix II with expansion joints grid lines



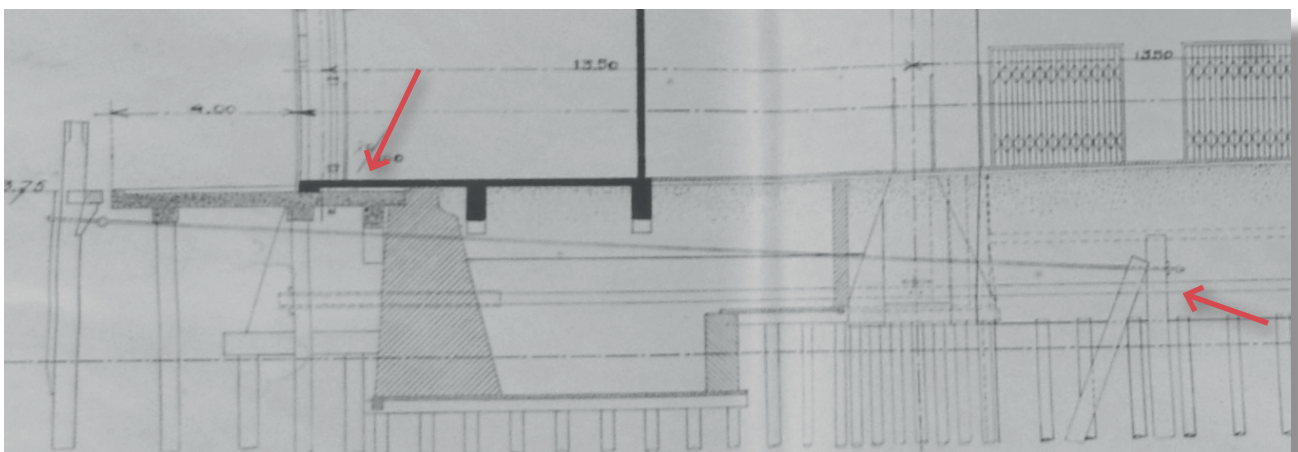
Expansion joint at grid line 4



Expansion joint at grid line 15 and 29



Expansion joint at the first floor where beams, columns and floors are separated. The space between the columns and floors is/is was covered.



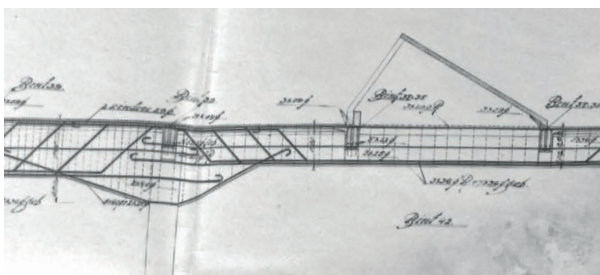
The front part of the warehouse resting on the foundation of the quay of the Rijnhaven (Oct 1916, coll. Stadsarchief Rotterdam - archief Holland-Amerika Lijn 318-01)

7.2 BUILDING METHODE

It is interesting to put the concrete structure of the building in its historical context in order to understand its nature and quality. The use of reinforced concrete emerged in the 19th century.

HENNEBIQUE | Francois Hennebique can, according to Heinemann (2013) be regarded as one of the main figures in the overall development of reinforced concrete. He introduced in 1892, a monolithic reinforced concrete structure in which the different constructional elements were connected to each other. The construction of San Francisco looks due to its monolithic character strongly like this Hennebique system. Companies as Hennebique kept secret the knowledge of how to calculate on reinforced concrete (Heinemann, 2013).

G.B.V. | In 1912, the first Gewapend Betonvoorschriften (G.B.V., Netherlands Code of Practice for Reinforced Concrete) were published. From then on, methods for designing and calculating became accessible (Heinemann, 2013). San Francisco is one of the early examples



Fragment of the construction drawings, color modified for the purpose of legibility (Oct 1916, coll. Stadsarchief Rotterdam - archief Holland-Amerika Lijn 318-01)



Interior drawings of San Francisco (G. van Duffelen in Holland-Amerika Lijn 1873 - 1923)

of reinforced concrete structures. During the 20s the use of reinforced concrete grew and became a common construction material in the 30s (Heinemann, 2013).

H.B.M. | The construction of the San Francisco was designed by the *Hollandsche Maatschappij tot het uitvoeren van werken in gewapend beton* (Fischer, 2014). Van Hemert was owner of this company and played an important role in the development of theories and guidelines of concrete. According to H.A. Heinemann (personal communication, October 11, 2016) Hemert was among those who felt resistance for the non-transparent and unverifiable system of Hennebique.

Altogether, the construction of the San Francisco warehouse is an early example of reinforced concrete. The monolithic system seems inspired by the Hennebique system but it is unlikely that it is actually calculated by this company. It seems logical that the calculations are made by Hemert's company and meet the prescription of the G.V.B.

NOTE | A remark on this historic reinforced concrete, according to H. A. Heinemann (personal communication, October 11, 2016), is that the quality really varies and depends on of course the calculations during the design, but also of the concrete mix and the way it is poured. Therefore it will be necessary to do further research on site in order to say more about the quality of the concrete itself.



Junction where primary and secondary beam meet with the new roof element



Cross section of a concrete beam and floor with reinforcement

8. CONSTRUCTION PRICIPLES

8.1 STRUCTURE

The structure has not changed much since the renovation of the 50s. Only in Circus Codart and Circus Rotjeknor serious adjustments have been made to the structure. Here, large parts of the beams and floors are removed. In this way it was possible to create a high circushal. In addition, a light steel construction was made on the first floor. This has created a split level where office space and smaller studios are situated.

When looking more closely to the working of the construction, the stability also becomes important. The monolithic structure has rigid connections between the columns and beams and between the columns themselves. Also, the floor surfaces are a part of the concrete whole, and contribute to the stiffness. In this way, the forces can be directed to the foundation and the construction is stable.

8.2 BUILDING DETAILS

WINDOWS | According to F.W.A Koopman (personal communication, October 25, 2016), the window frames in the street side facade are made according the Fenestra system. This system distinguishes itself by the crucifixion of the steel glass muntins. The Fenestra system was mainly applied in the beginning of the nineteenth century. This argues that the window frames are original from the San Francisco.

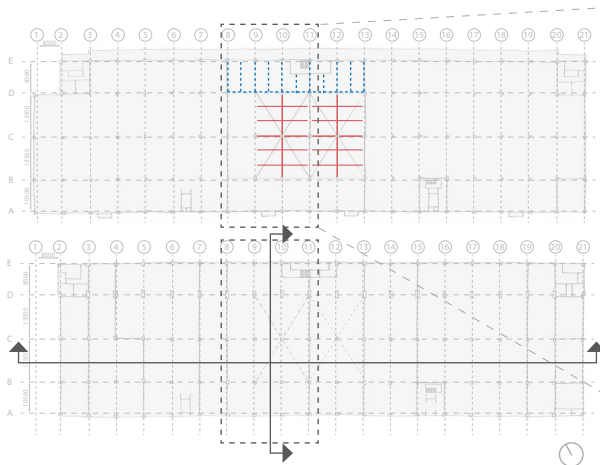
ROOF | The concrete roof at the street side is part of the whole structure. The edge consists of remaining of the San Francisco warehouse with

the old ornaments and a layer of plaster that was placed in the 80s.

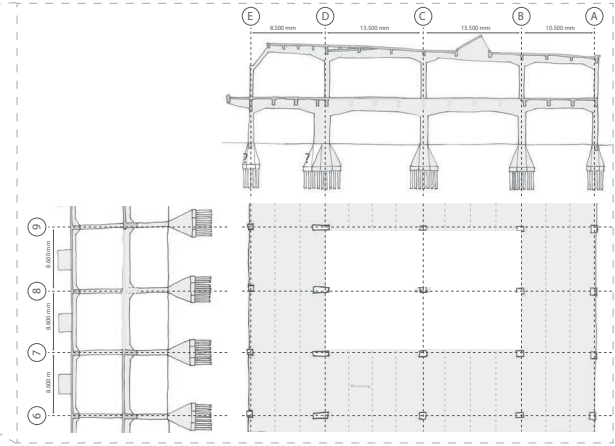
FLOOR | Looking more closely to the system of the ground floor, it appears that stelcon plates of 2x2m and 2x1m are used. They are placed between the collumns and interior walls are placed on top. The plates are probably placed during the renovation in 1950.

8.3 DAMAGES

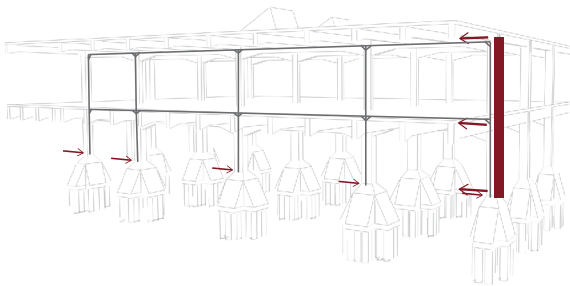
Damages are mainly located at the facade at the Veerlaan. This is the oldest facade and moreover, situated towards the south-southwest. This can be the reason of the spalling of the concrete and cracking of the plaster. The old steel sliding doors and window frames are rusty. Also at the side facade some parts of the reinforcement is exposed. The columns of this facade were not designed to function as an exterior wall. Inside at some columns the concrete is spalling and at the plaster of the brick walls occurs exfoliation. This stays with the concrete cover and has no direct influence on the load-bearing capacity. However, like what happened with the exterior, the reinforcement is exposed, which it can cause damage in time.



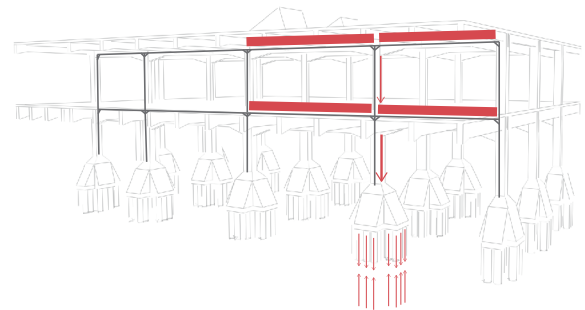
Adjustments in the structure of the Fenix II in plan with removed beams in red.



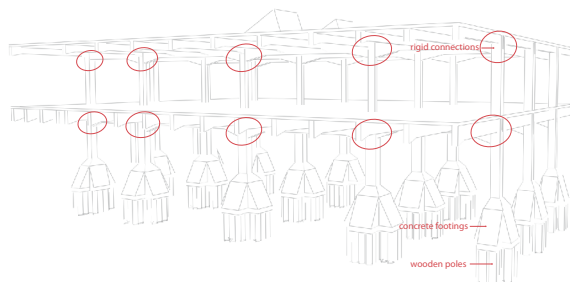
Principle of the load bearing structure of the Fenix II in plan, long & cross section with grids & dimensions



Static scheme horizontal forces



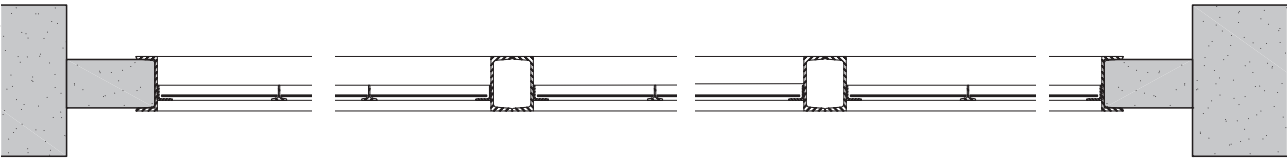
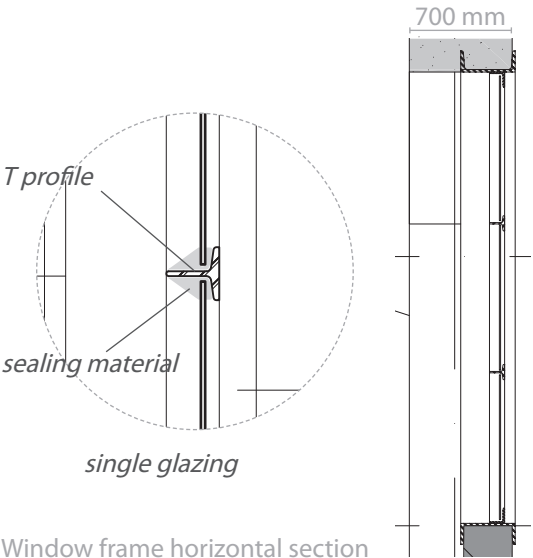
Static scheme vertical forces for a column



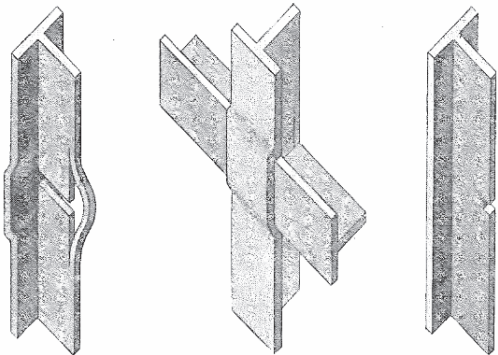
Stability of the load bearing structure by rigid connection in two directions



Stelcon plates (boundaries indicated with red), dimensions of 2x2m and 2x1.5m, placed between columns, space filled with pavers, walls built on top.



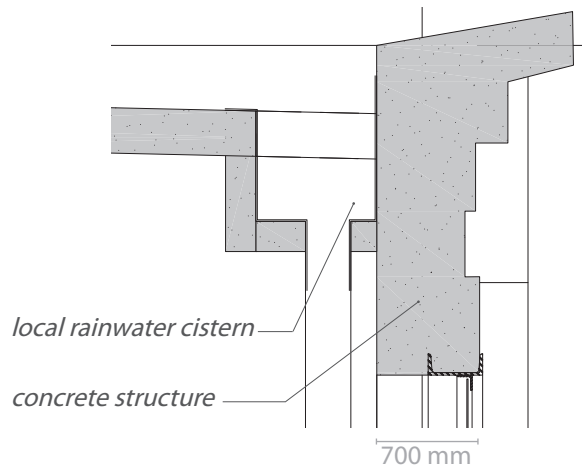
Window frame detail in horizontal section



Principle of the Fenestra system



Window frame interior



Roof edge detail in horizontal section



Roof edge exterior



Spalling of columns, exfoliation of plaster and rust



Rainwater drainage at water side (l) and street side (r)

CONCLUSION

The remains of the large monolithic structure of the San Francisco, one of the first of its kind, is still present in the current structure. The method used is inspired by Hennibique but made by the *Hollandsche Maatschappij tot het uitvoeren van werken in gewapend beton*. It was damaged by the WW II and the fire of 1947. Thereafter it became smaller and was partly replaced during the renovation for the Fenix I & II. The structure is stable due to rigid connections. Details remind of the past and damages can mainly be found at the street side facade. Altogether the structure is in a good condition and is after hundred years still in use. Moreover it is likely that the structure will also function for the next period of use.

DEPTH ANALYSIS: PUBLIC SPACE

9. THEORETICAL FRAMEWORK

Standing on the Rijnhaven bridge with the high rise of Kop van Zuid left behind, the old port warehouse Fenix II is standing in the center of a variety of public space. This place seems to be a magnet for new initiatives, creative startups and hip Rotterdam. Moreover the building from the past seems intertwined with this modern movement at redeveloped Katendrecht.

The rich history of the place, the changes in use and interventions in the urban environment have resulted in a variety of public spaces in and outside the building. When developing a design for Fenix II there are opportunities to use these spaces, to adapt them or to introduce new ones. For this, first it is necessary to understand and interpret the these various urban spaces. That will be done in an in depth study in this part of the report.

The main question dealt with in this report is the following:

What are the conditions of public space in and outside the Fenix II?

To be able to answer this main question some secondary questions are:

What is public space and how can it be structured?

What is the development of the space around the Fenix II?

What kinds of public spaces are present in

and around the Fenix II and what determines them?

9.1 DEFINITION

What is public space and how can it be structured?

When thinking of public space, people often relate this to parks and squares. But the city is made up of much more space that is publicly accessible. According to Meyer (2006), this space is essential for the city to function and must not been seen as residual space. It is necessary for the networks of traffic, greenery and water, but also for the accessibility of buildings and for utilities. This space is, however, not used and experienced all in the same way by the public. Meyer (2009) also speaks of a degree to which people feel comfortable in a public space. It is therefore interesting to define what public space exactly is and moreover, what it is not.

Space and public

Strictly speaking, public space is territory and civil works that are owned and managed by the government (Meyer, 2006). This can be called formal public space. The boundaries are clear and can be found in the cadaster. In this way the owner defines whether a space is, or is not public space. The opposite is private space, not owned by the government.

When looking at the definition of the two words, a similar conclusion can be drawn. *Public* can be defined as 'for everyone accessible' (Van Dale, 2016). And *space* is described in Van Dale (2016) as 'a place determined by borders' and by the Cambridge Dictionary (2016) as 'an empty area that is available to be used'. So in this way public

space is a 'place or area defined by borders that is available to use for everyone'.

This does not mean that it actually is used, it is only available. When looking at the space that is used by the public, also informal public space needs to be included. This is what Meyer (2016) calls the space that is not owned by the government but in everyday life is used as a public space. The word realm may fit better here than space. Realm is according to the Cambridge Dictionary (2016) 'an area of interest or activity'. So then, it is not about where the space is but more about where the public is; the space that is really used as public space. Borders of these spaces are not officially set but are determined by people. What is not public realm, is the space not *used* as public space.

By doing research at conditions of public space not only the space but even more the use of it is important. So in this report the public space is '*space that is public available and used by the public*'.

9.2 METHOD

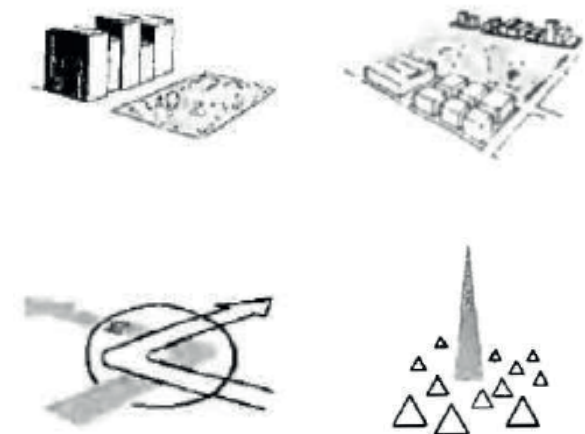
The term public space and its definition are very comprehensive while cities are composed of areas with diverse characters. According to Meyer (2011), there is an increasing differentiation and specialization of the use of public space. In each city different types of public space are established and unique relationships are organized.

To be able to analyse the public space, a way of structuring is needed. From the point of view that it is about the public of the city, Lynch (1960) gives an interesting perspective. He sees the public or the people of the city not just as

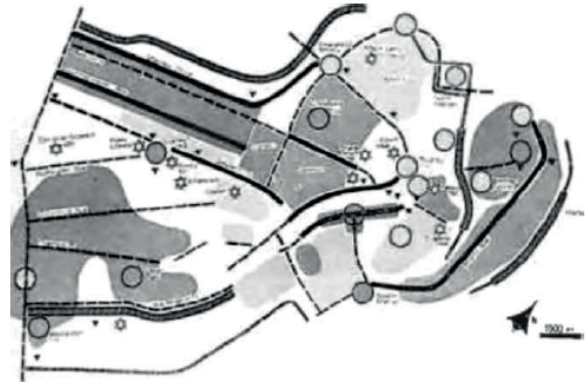
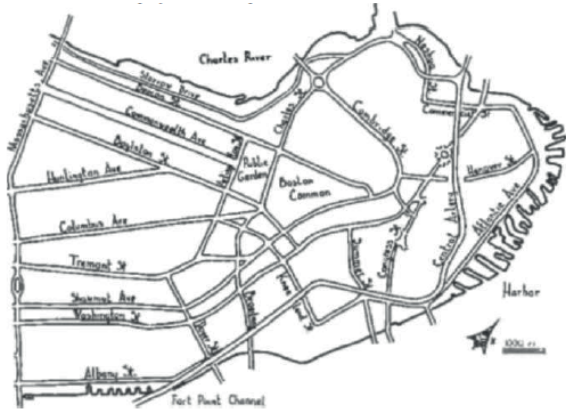
observers but as part of the city. Their perception of the city is composed of different fragments and influenced by different senses. Out of many individual images, a public image of the city is formed (Lynch, 1960).

From this the physical, perceptible objects can be analysed. According to Lynch the content of city images is composed of five types of elements: Paths, Edges, Districts, Nodes and Landmarks.

Paths are the channels along which people move. Edges can be explained as linear elements that are not used as paths but more boundaries or breaks. Districts are sections of the city that can be entered and with a specific character. Nodes are seen as points or strategic spots to and from which is travelled. Finally a landmarks is an object or point reference that cannot be entered but is external.



Lynch, K. (1960). Edges, districts, nodes and landmarks. (pp. 41-42) *The image of the city*. London, England: The M.I.T. Press.



Left: The outlines of Boston. Right: A map of the image of the city with paths, edges, districts, nodes and landmarks. Lynch, K. (1960). Outlines and visual form of Boston. (pp. 41-42) *The image of the city*. London, England: The M.I.T. Press.

These elements can be used to analyse whole cities, metropolitan regions or smaller areas of the city. The elements will shift in the image when looking at different scales (Lynch, 1960).

10. PUBLIC SPACE ANALYSIS

10.1 HISTORY & DEVELOPMENT

What is the development of the space around the Fenix II?

To understand how the public spaces around the Fenix II developed, it is necessary to involve the history of the building and its surroundings.

historic events. refer on findings from the first part of this research



Deliplein with San Francisco (left) and houses (right) 1939 (coll. Historisch Katendrecht)

It turns out that there are three distinctive periods to be distinguished: San Francisco, Fenix II and Fenix now. In this chapter, for each period be considered shortly what the historical context is, how public space looked like at that time and how it was used.

SAN FRANCISCO | By the time the huge concrete warehouse San Francisco was built by the Holland-America Line between 1916 and 1922, the environment was relatively new. With the construction of the urban environment of the new Katendrecht, also the Deliplein was formed.



Deliplein with San Francisco at the right, ca. 1940

The large triangle space had houses on two sides and the Veerlaan on the third. Here, San Francisco formed a huge contrast with the housing blocks that had a much finer structure and a more varied street scape. Moreover, the building completely blocked the connection with the water of the Rijnhaven.

The warehouse and the quay were determined by port activities, sailors and stevedores. Ships were laying very close to the facade of the building with very little space in between.

The Deliplein was defined by curbs and had furnishing elements as trees and street lights. The pavement of the street was extended and people were walking and cycling across the square.



Waterfront with San Francisco (Bouwkundig Weekblad 1931)



Ca. 1950 situation just after the renovation (Van Schagen Architecten, 2012)

Altogether, during this time only the Deliplein was part of the public space. The whole building and the quay were used by the company.

FENIX I & II | After the renovation of the, by war and fire damaged building, the place was again used for storage and dominated by port activities.

Meanwhile, things were definitely changed in the building as well as in the surroundings. First of all, because of the less deep building and a wider quay, there was more space between the warehouses and the water. Here the activities increased by the presence of the wall cranes and the train. The quay was also in this period not accessible and dominated by port activities.



1980, Katendrechtse Bewonersorganisatie, coll. Historisch Katendrecht

Second, by closing the ground floor at the street side, all transport activities took place at the street. Third, a new space was created between the two buildings. This was actually still part of the companies territory and closed by a gate.

Although the circumstances really did change, the size of the public space stayed about the same. It was partly deprived by port activities of the company at the street. In contrast, with the interruption in the volume of the buildings the view from the Deliplein changed and a visual connection with the water was possible.



Empty Fenix II at the Veerlaan, 2012, coll. Historisch Katendrecht

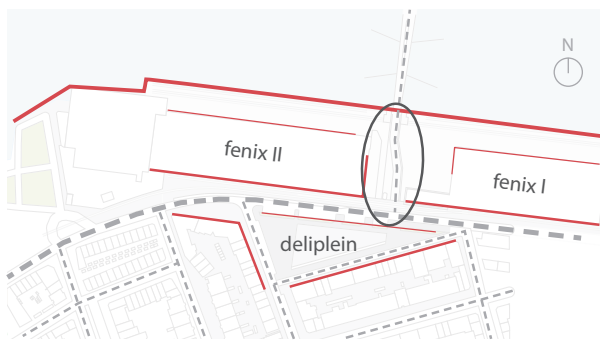
CURRENT SITUATION | In the period of Fenix II standing empty along the water and Katendrecht being a problem area, the municipality put a lot of effort to redevelop this district. For example the Rijnhaven bridge was built that turned out to be a very important connection, but also the Deliplein was renovated. The situation changed from a space not used by the public at all to a variety of public space today. Now, people are at the square, between the buildings, at the quay and even parts of the building are more or less used by the public.

10.2 FENIX' PUBLIC SPACE

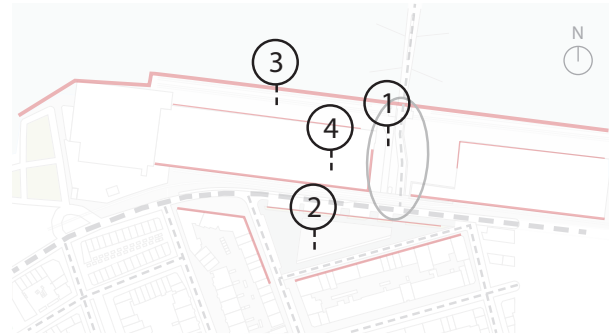
What kinds of public spaces are present in and around the Fenix II and what determines them?

When analysing the direct environment of the Fenix II according to the method of Lynch, different elements can be discovered. Paths can be found in the Veerlaan, other streets and the way from the bridge through the space between Fenix I & II. The warehouses themselves, building blocks at the Deliplein, row of trees along the Veerlaan and most of all the waterfront, form clear edges. Finally, the space from the bridge to the Veerlaan adjoined by the side façades of the buildings can be seen as a node. It connects flows from the Rijnhaven bridge, the quay, the Veerlaan and the Deliplein.

Between these different described elements, little spaces can be found that contain their own specific characteristics. This analysis is done on a very small scale so these small spaces can be seen as districts. In this way can be pointed out four of these spaces that all adjoin the Fenix buildings and are used by the public: the interspace,



Map of the image of the city for the direct environment of Fenix II. Paths are dotted grey, edges are solid red and nodes are black circles.



The public spaces of Fenix II: 1) The interspace 2) The Deliplein 3) The Quay 4) The inside

between the Fenix I & II (1); the Deliplein (2); the quay, between the facade and the waterfront (3); and the inside, specific parts of the building (4).

These spaces can be analyzed by its boundaries, connection with Fenix II, use and function as an element of the image of the city. Some contain conflicts.

INTERSPACE | The interspace is situated between the quay and the Veerlaan and is defined by the buildings on both sides.

Fenix II is the western buildings and its facade forms at this side the boundary of the space. Nowadays cafe Posse is located behind the high sliding doors. An old guard house provides together with concrete curb block on the pavement direction and dimension.

Most people use the interspace to pass through and bike or walk from the Kop van Zuid to the square on the other side or they come from the Veerlaan and go to the quay or bridge. Besides it is also used as terrace in front of Posse.

Connecting all these different directions and places makes this place functioning as a node.

The conflict here is lack of direction. It is not clear where to go and space can be used more efficiently. Moreover, the history of the building parts being connected as San Francisco cannot be experienced nowadays.

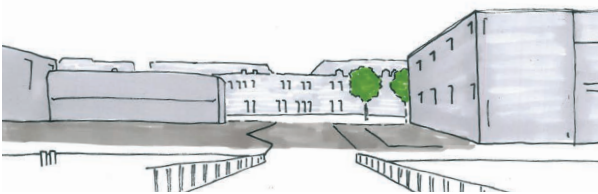
DELIPLEIN | The square across the street is the Deliplein. Recently, this square was given a new design by Van Schagen Architecten and program with culinary and cultural functions. The renovated street walls and the trees form the boundaries of the space.

In the summer people are sitting on the square under the trees and also events like festivals and Koningsdag are celebrated here.

On the other side of the road the square is connected with the facade of the Fenix II. This facade is with its highly contrasting colours and big scale elements, very different from the houses at the Deliplein.

The square functions as a district with a cosy and enclosed character.

The conflict in this space is that the square is not really connected with the Fenix II. The road forms a boundary that is not pleasant to cross.



Interspace: sketch of the form and impression of its use (photo left: Tripadvisor)



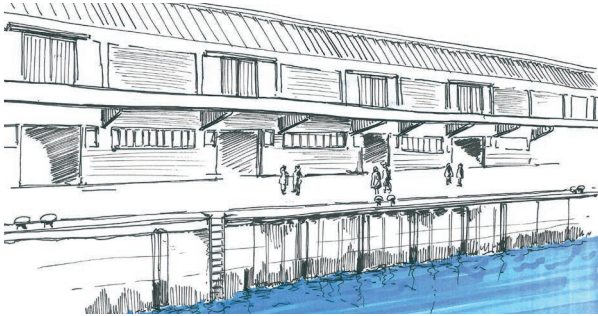
Deliplein: sketch of the form and impression of its use (photo left: WTFS, right: uitagendarotterdam)

Quay | On the other side of the building the quay is situated between the facade and the water. These elements also define the boundaries and dimension of the space. The end is closed by the Provimi building.

The façade on one side is functioning as solid background and the balcony provides an enclosed space next to the building. Also here many of the old openings are filled with new entrances.

The quay is a place to relax, drink a cup of coffee and sit next to the water. But there is also activity of bikers and cars driving over the quay to their destination beyond.

The quay is a *district* with a particular character. The wide view over the water of the Rijnhaven and on the skyline of Rotterdam gives the quay a spacious character. In the pavement old railway and crane tracks are still visible. Together with the loose stones and bumpy road this reminds of the time of port activities and transshipment.

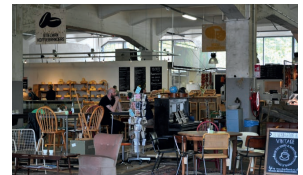
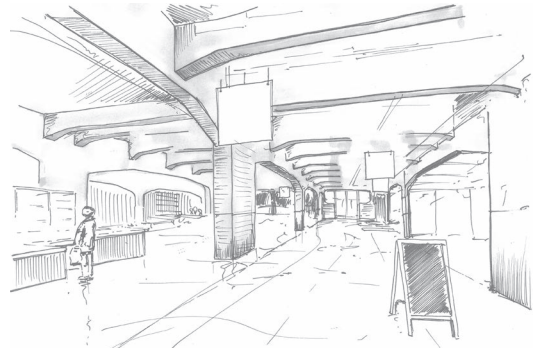


Quay: sketch of the form and impression of its use (photo left: Guerrilatasting, right: S. Kienhuis)

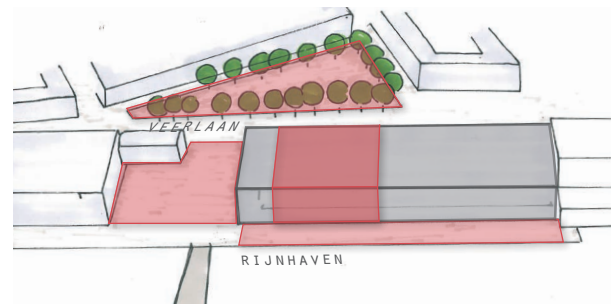
INSIDE | When going inside, the buildings provides space for a small food market, or public accessible event area. Different small businesses have their own space in the large room. It is enclosed by the walls of the building that form the boundaries including the roof. The old monolithic construction defines the dimensions and the atmosphere of this space. The people who use and visit this space are very diverse. Locals regularly do their groceries, citizens of Rotterdam often drink a coffee or beer on the terrace and national and international tourists like to visit the place for its unique ambiance. Also this space functions as a district with its own characteristics. Fresh and local is the focus and shared space is furnished as a retro living room. It is on the border between inside and outside. The way it is enclosed by walls, the absence of heat and refrigeration systems and the often opened doors that bring influences from the outside climate make that the space is just slightly

detached from the outside.

The lack of light and air in this space form a conflict with the temporary function on the edge between inside and outside.



Inside: sketch of the form and impression of its use (photo: S. Kienhuis)

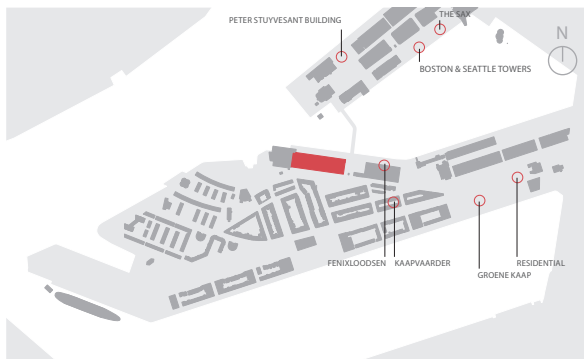


The public space in and outside the Fenix II

10.3 FUTURE PLANS

What is the development of the space around the Fenix II?

When we look to the future it appears that Fenix II holds a very interesting position. At this moment Fenix already is in the surrounding area of Katendrecht and Kop van Zuid, the only place where is such a variety of public space and interaction between the public space and the building. Combining this with the planned building projects in these districts, is striking that in the coming years mostly residential functions



Planned projects on Katendrecht and Kop van Zuid

and introvert buildings will be added. So the only project that can do something with the public space is the Fenix II.

Looking at the smaller scale of the site, the project of Fenix I will really impact the public space. First of all the building will be much higher. It will change the dimensions of the space and will change the boundaries of the interspace from the two facades of equal height to unequal. Moreover, the height will deprives the quay in front of the



Design of Fenix I by Mei Architects (Mei Architects, 2016)

building from sunlight. On the other hand, the function of the building will result in an increase of inhabitants and users of the public space.

Another impact on the public space is the plan of the municipality to get rid of the industry on Katendrecht. The neighbor building of Provimi can be renovated. That will rise the possibility to increase the quality of the space surrounding this building.

CONCLUSION

THEORY | In this depth analysis is attempted to make the variety of public spaces in and around the Fenix II understandable and interpretable. The research question therefor was:

'What are the conditions of public space in and outside the Fenix II?'

In this, public space can be seen as space that is public available and used by the public.

Looking from the perspective of the image of the city composed of several elements, public space can be analyzed. The elements can be described as paths, edges, districts, vs and landmarks.

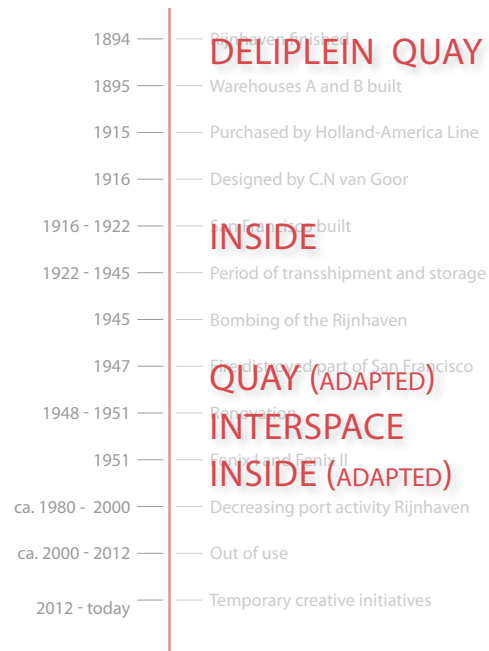
HISTORY | Interventions through time formed and developed the public space around the Fenix II. The most influencing are the fire and renovation that created the interspace that by the construction of the bridge became a connection. On the other hand the public space made possible the current function of the Fenix II; The redevelopment of the Deliplein and revival of Katendrecht provided the opportunity for creative initiatives as the Fenix Food Factory to become a great success.

ANALYSIS | It is clear that there is a variety of public spaces in and around the Fenix II. Creating an image of the city of the direct environment of the Fenix II, does points out four different public spaces that are adjoined with the building. These are the Interspace, Deliplein, Quay and Inside. They function as node or district within the image an appear to have their own boundaries,

connection to the Fenix II, way of use and character. Also conflict arise within these areas. Analyzing these public spaces brought up the strengths and problems of the area.

FUTURE | It appears that the building holds a unique position with being surrounded by such a variety of public space and moreover, with being part of it. With the future building projects planned for Katendrecht and Kop van Zuid, this uniqueness will even grow.

To conclude, because of this rich and unique situation of the public space in and around the Fenix II, the public space will be essential for the further development of the Fenix II.



Timeline of the public space placed over the timeline of Fenix II

CULTURAL VALUE

11. VALUES ASSESMENT

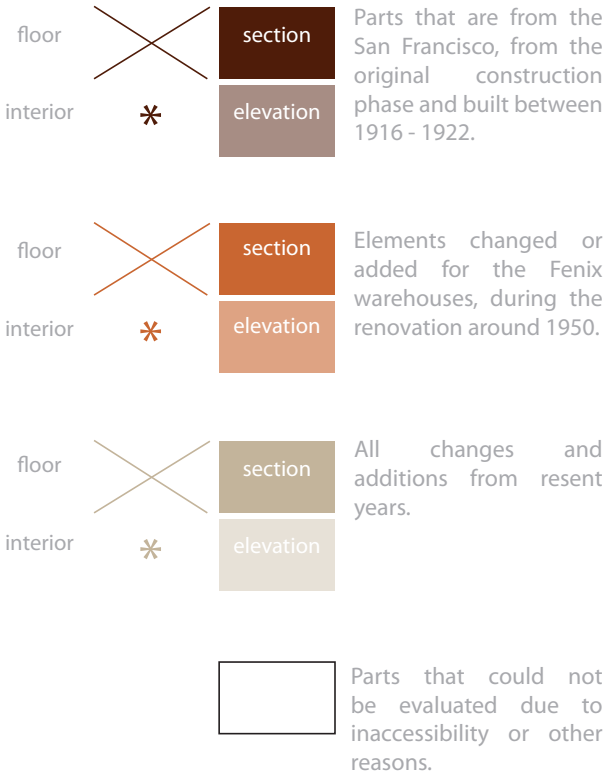
11.1 HISTORICAL VALUE: NEUTRAL VALUE MAP

With all the information collected in the analysis, a map can be drawn that indicates which elements of the building are from which period. In this way the different layers of time become visible and show what is left from the past. Although it has been drawn with care, the conclusions are based on the information available, as described in this report. Upon further research, information may be revealed which can make valuations irrelevant or incorrect.

On drawings of the Public Works Department from 1951 is indicated:

- San Francisco parts (BROWN = oldest)
- Fenix II parts (ORANGE)
- Parts from recent years (BEIGE = new)

(The drawings from 1950 are used as underlay for this value assesment. These are from the period in which the biggest architectural changes were made. Subsequently, interior walls are placed and interiors were adapted but no significant changes have been made in the building as a whole. Drawings of the current situation are missing, hence these drawings, which are still be representative, have been used.)

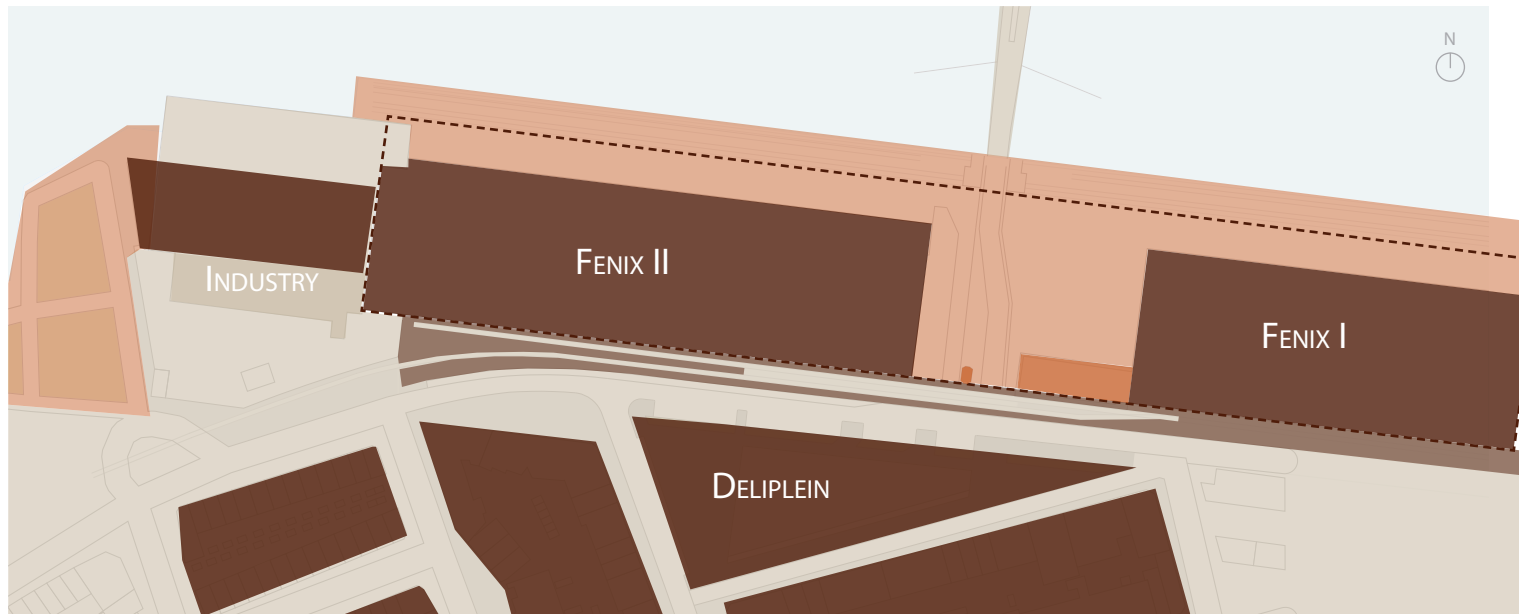




The quay is renewed and extended just after WW II. The pavement at the water side and between the Fenix warehouses, a combination of pavers and Stelcon, is probably from the renovation.



The bridge is very new.



The train tracks and crane tracks on the quay are from the Fenix period

The buildings are together part of the old San Francisco. The storehouse is probably hidden in the new industry building next to Fenix II

The position of the train tracks at the street side is from the San Francisco period. The tracks are probably moved and renewed during the renovation.



The structure of the housing blocks and the Deliplein dates from the time of the San Francisco. In the meantime the houses are renovated.



Parts of the pavement at the street side of Fenix I & II look the same as the street cobblestones at the old pictures and probably are from the San Francisco period.

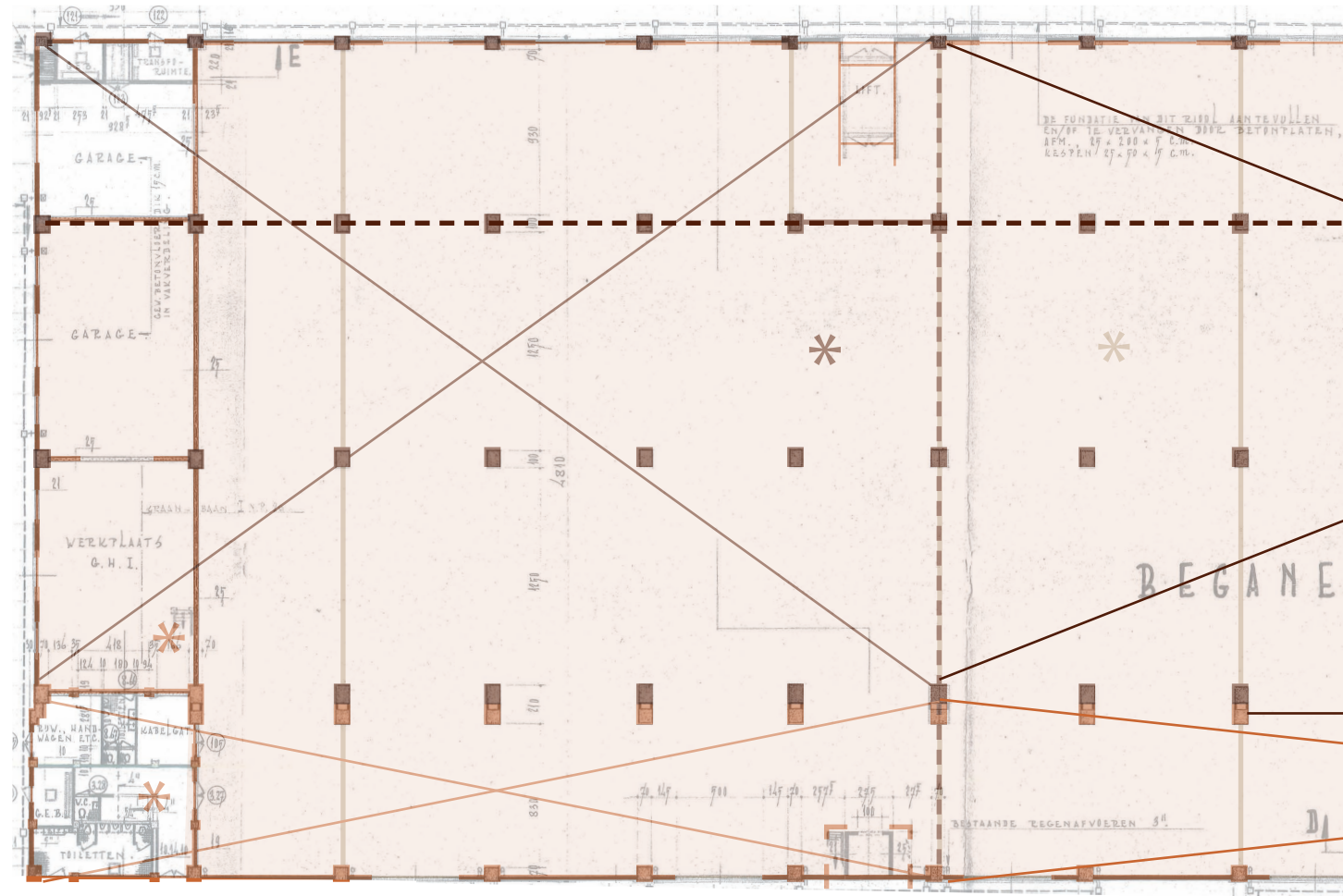
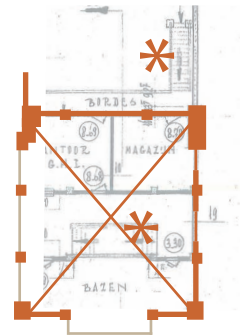
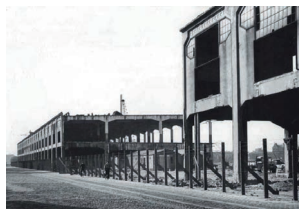


The current ground floor exterior walls on the streetside are an addition from the Fenix period. The original ground floor facade line of the San Francisco is located behind the current facade.



The whole concrete load bearing structure is originally from the San Francisco period. Only the part on the water side is an addition from the Fenix renovation.

The side facade is build during the renovation of 1950 after the fire destroyed the middel part of the San Francisco.



* The staircases and interior in the corners is original



Customs, built in the Fenix period, does not exist anymore and is not visible in the facade.

* The separation wall is a resent built one but is situated on the location of the separation wall of the San Francisco Warehouse



Most windows and doors are addition of the last years and have been placed in the existing openings. Others are from the Fenix period

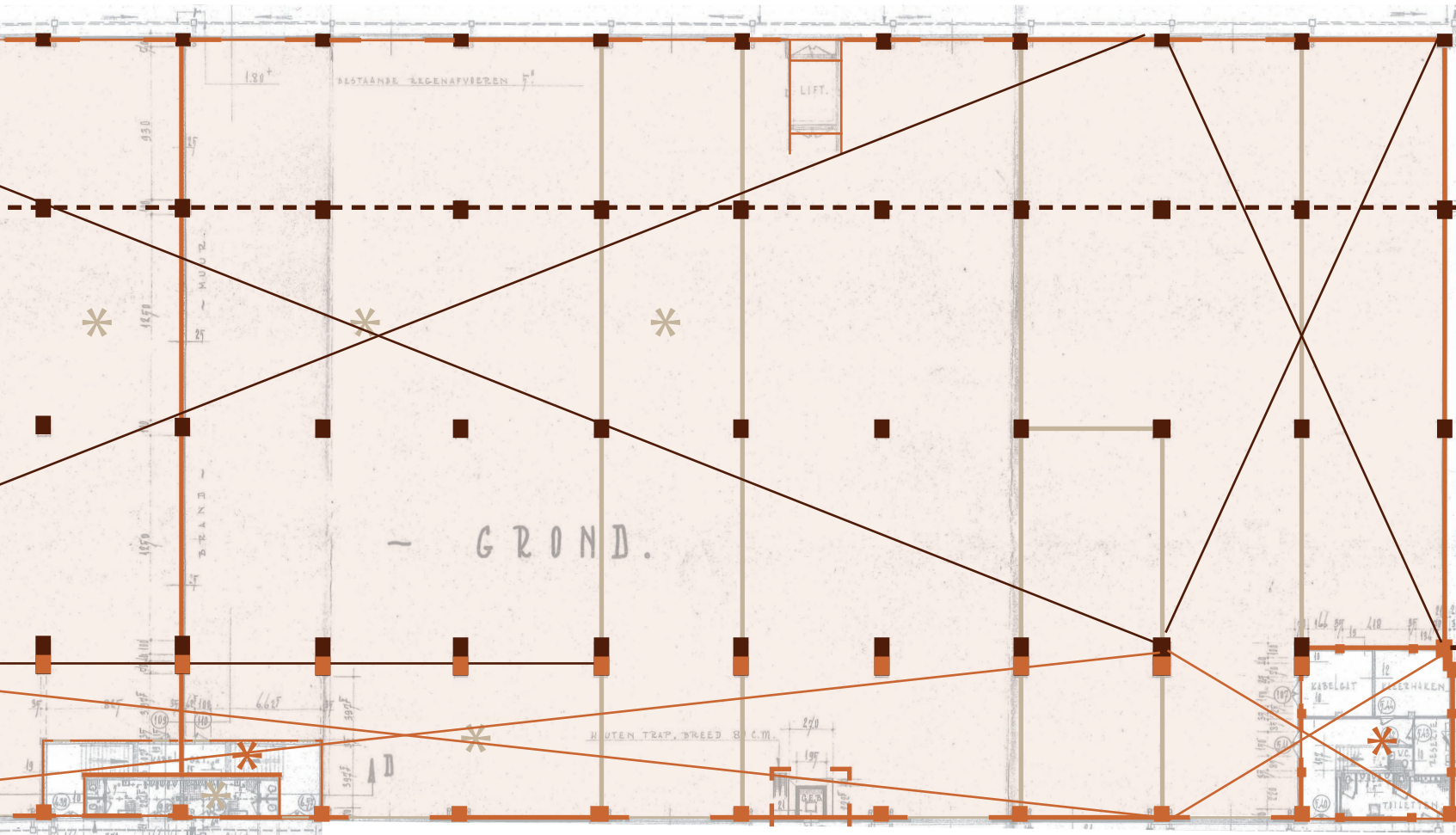


The elevators were built during the renovation of 1950.

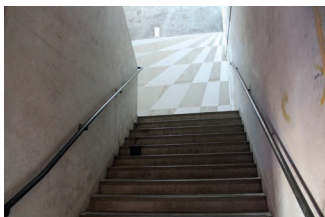


Potential remaining parts of the Holland-America Line storehouse are located in the new industry building.

The side wall is not at the original place of the separation wall between the warehouse and the storehouse but is a later adjustment, probably from the Fenix period.



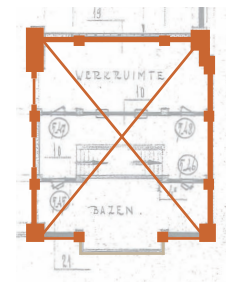
* The staircases are still original but the toilets are replaced.



* The interior of the circus school changed recently.



Customs, built in the Fenix period, does not exist anymore.

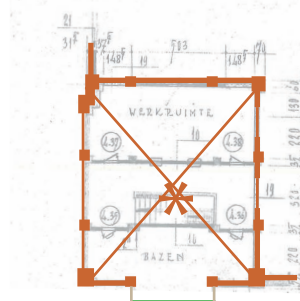


This facade is original from the San Francisco. In the Fenix period some parts are closed with masonry. These are seen as additions to the original

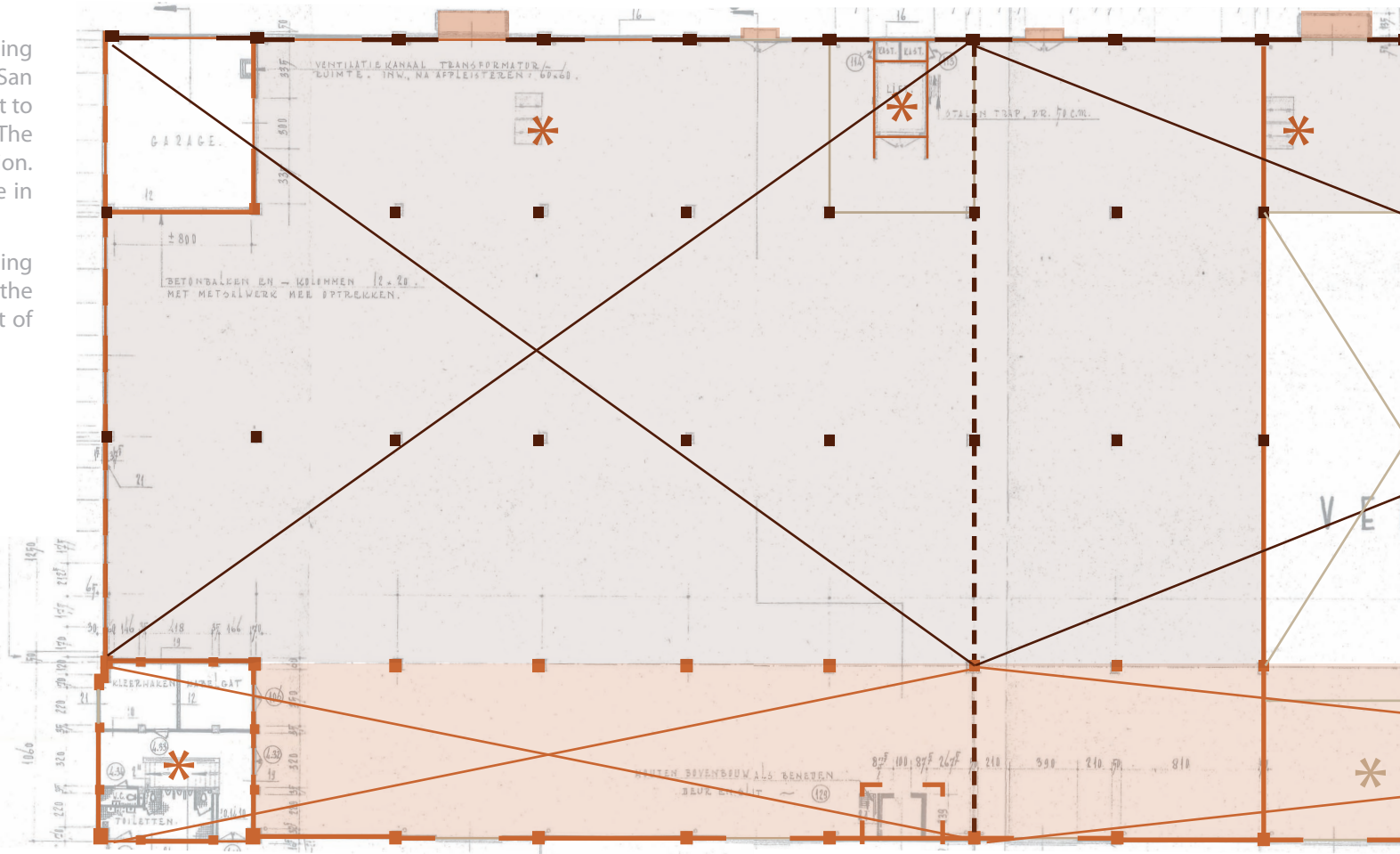


The whole concrete load bearing structure is originally from the San Francisco period. Only the part to the water side is an addition. The floor is part of the construction. In recent years a vide is made in the circus school.

The side facade is build during the renovation of 1950 after the fire destroyed the middel part of the San Francisco.



The corners are new elements from the renovation around 1950.



The location of the separation wall of the San Francisco Warehouse

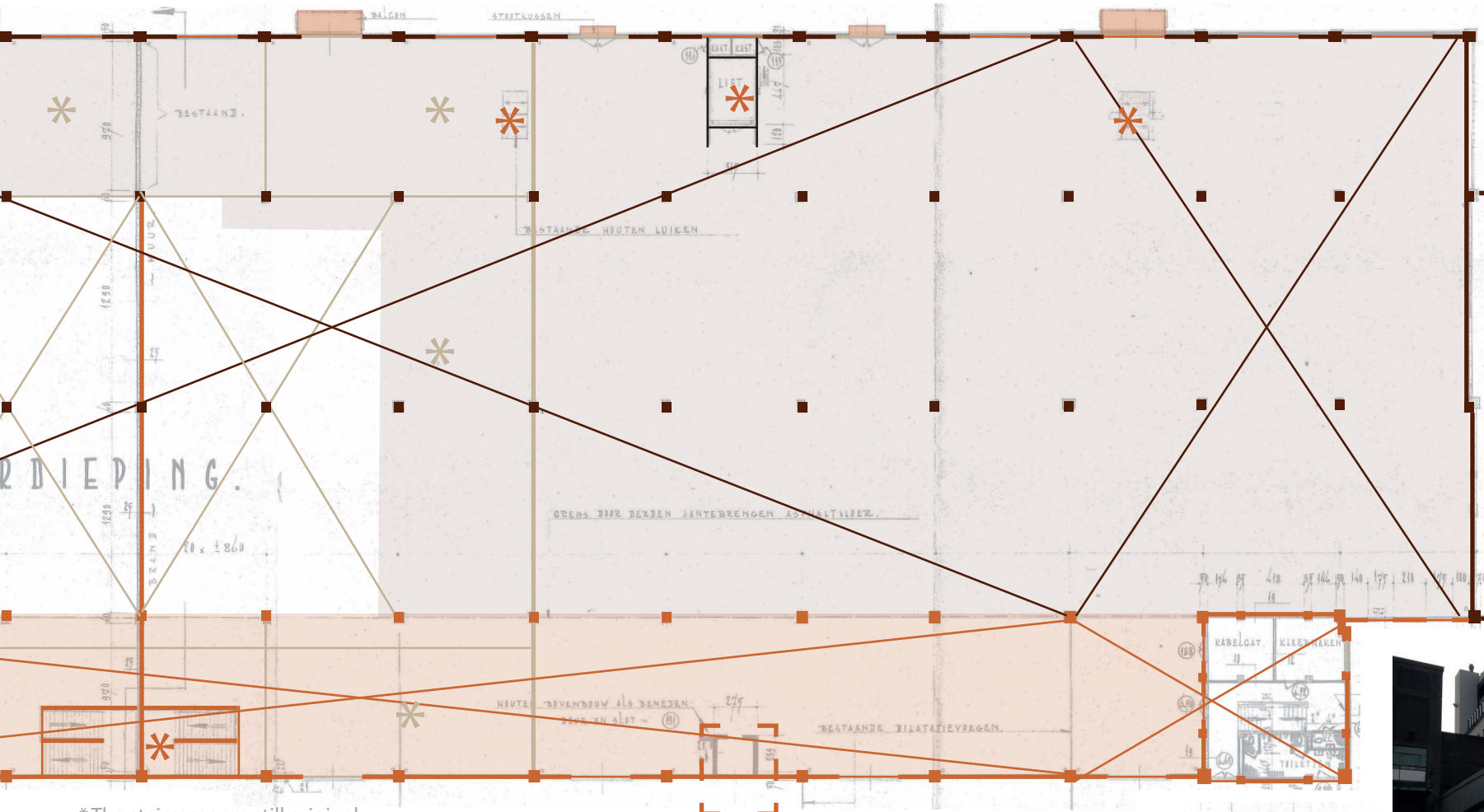
Most interiors are from the fenix warehouse. Painted concrete, steel doors and windows and concrete floors are the main aspects



The balconies and fenders are addition from the Fenix period to this streetside facade of the San Francisco.

* The wooden panels in the floor are from before the Fenix period but not shown on the drawings of the San Francisco warehouse. Moreover, it is not clear for which they are used. Now they are closed with concrete.

The side wall is at the original place of the separation wall between the warehouse and the storehouse. It probably is the original wall.

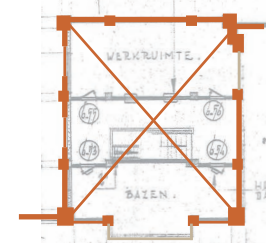


*The staircases are still original and are built for the Fenix warehouse

Most interior walls are recently built.

The vides are an intervention of recent years

Customs, built in the Fenix period, does not exist anymore and is not visible in the facade.



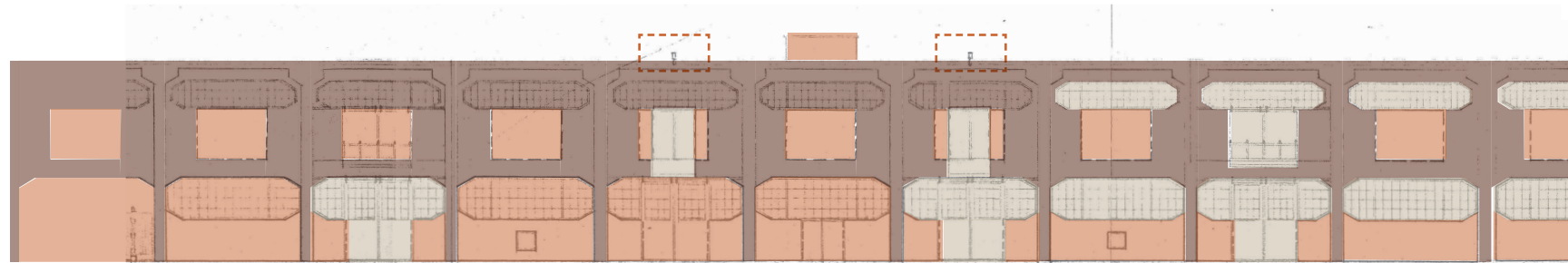
This facade is original built for the Fenix warehouse during the renovation in 1950. In recent years new windows and doors were placed.



Corners are essential for waterside facade from the Fenix period, including the spilt levels. The division is less characteristic.

Most windows and doors are additions of the last years and have been placed in the existing openings. Others are from the Fenix period like the sliding doors.

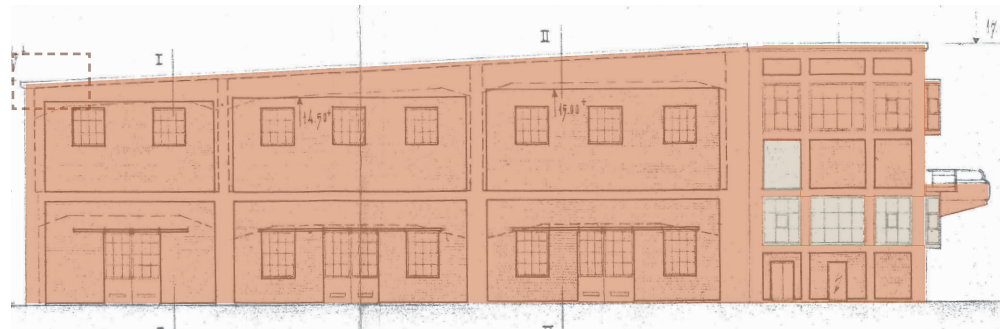
This facade is original from the San Francisco 1922. In the Fenix period some parts are closed with masonry and new windows and doors were placed. In the 80s a new layer of plaster was applied with the colors red and white over all the closed parts. This layer is not showed in the drawing. The original color was grayish. Also in recent years new windows and doors were placed.



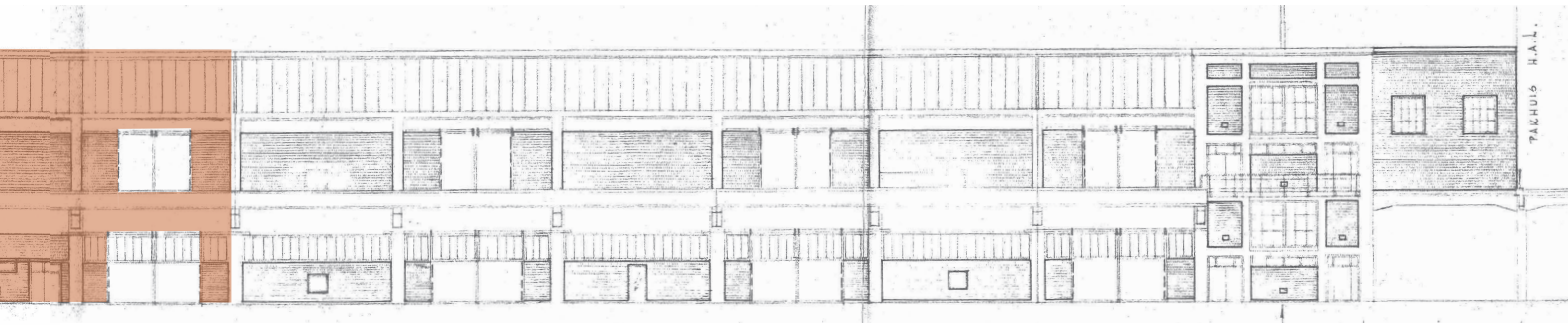
The current ground floor facade at the streetside is an addition from the Fenix period. The original ground floor facade line of the San Francisco is located behind the current facade.

Most windows and doors are additions of the last years and have been placed in the existing openings. Others are from the San Francisco period like the windowframes of the first floor or from the Fenix period like the sliding doors.

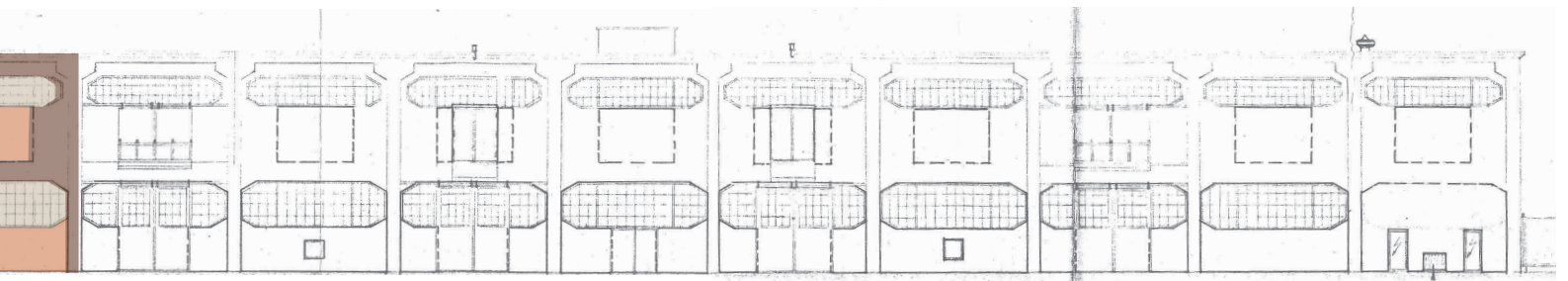
This facade is originally built for the Fenix warehouse during the renovation in 1950. In recent years some new windows and doors were placed.



At the streetside on the roof are still remnants of the crane rails present.




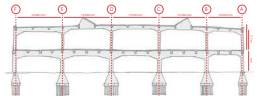



Potential remaining parts of the Holland-America Line storehouse of very high architectural and historical value.




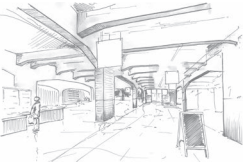





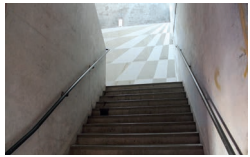





The balconies and fenders are addition from the Fenix period to this streetside facade of the San Francisco.

The lifting beams are addition from the Fenix period as well as the boxes on the roof for the elevators

11.2 MATRIX OF ASPECTS

	HISTORICAL	
SITE		
STRUCTURE		
SKIN		
SPACE PLAN		
SERVICES		
STUFF		
STORY		

	ARTISTIC	COMMEMORATIVE	USE	NEWNESS	CONFLICT
			connected to city center, bike easy access		The building that once was there blocked the possibility of the connections that are now used a lot.
					
					
					Large open spaces divided for use
					Absence of services leads to or at a unpleasant indoor climate for the current functions.
					
					

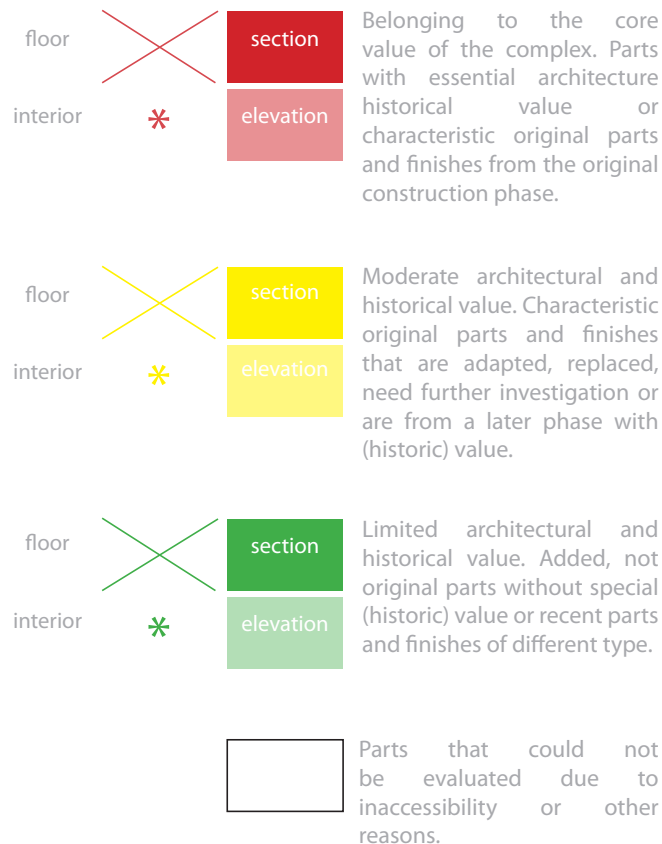
11.3 HISTORICAL VALUE: PERSONAL VALUE MAP

On the following pages a the value assesment of Fenx II ispresented. For this the objective value map is used in combination with the analysis. In this way becomes visible which parts must be treated with absolute care and which can easily be changed or adapted. Although it has been drawn with care, the conclusions are based on the information available, as described in this report. Upon further research, information may be revealed which can make valuations irrelevant or incorrect.

On drawings of the Public Works Department from 1951 is indicated:

- Original parts (RED = great historical value)
- Parts that might be/ are partly original (YELLOW)
- Parts that are not original (GREEN = little value)

(The drawings from 1950 are used as underlay for this value assesment. These are from the period in which the biggest architectural changes were made. Subsequently, interior walls are placed and interiors were adapted but no significant changes have been made in the building as a whole. Drawings of the current situation are missing, hence these drawings, which are still be representative, have been used.)

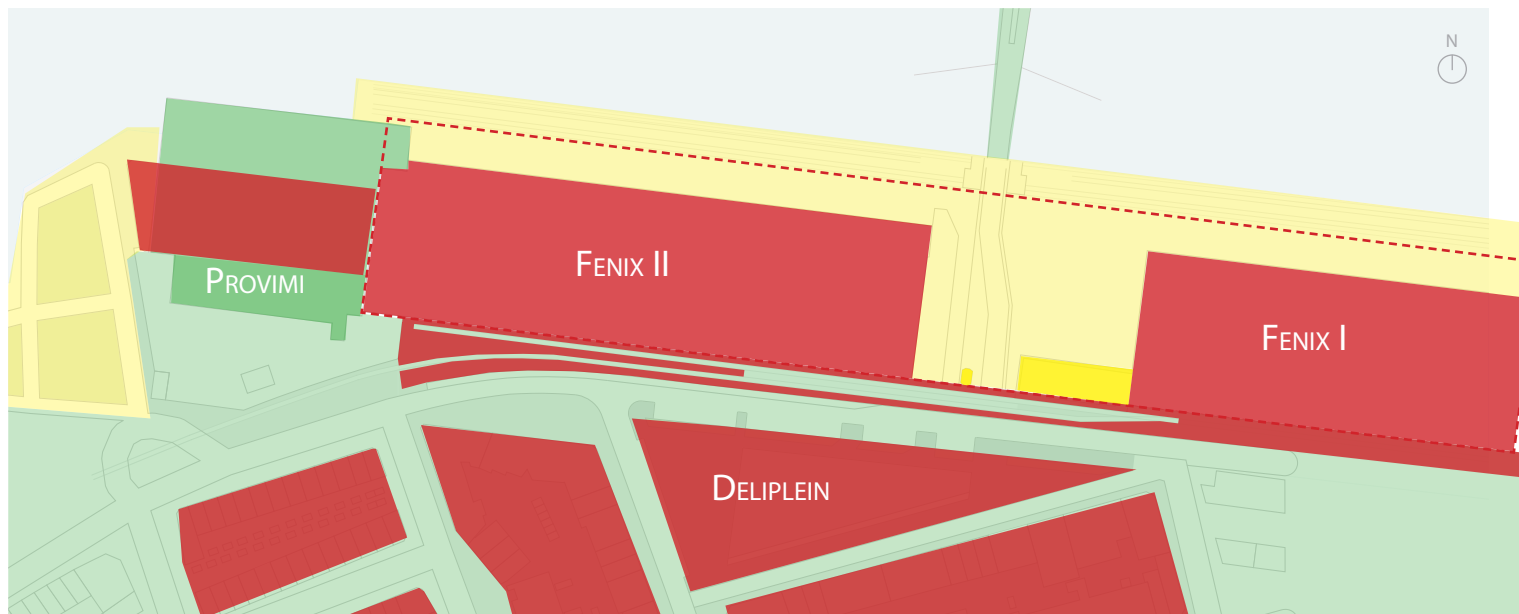




The pavement at the quay reminds with its wavy surface at the time of port activities and transshipment.



The new bridge is an addition of recent years



The train tracks and crane tracks on the quay are very tangible elements reminding to the past.

The buildings, probably hidden storehouse and the outline of the San Francisco, together show the past as well as the intervention of the past and all have a high value.

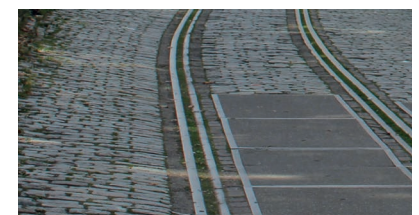
The train tracks at the street side of the building are very tangible elements reminding to the past.



The old structure of the housing blocks and Deliplein, remnants of the old Katendrecht have a high value.

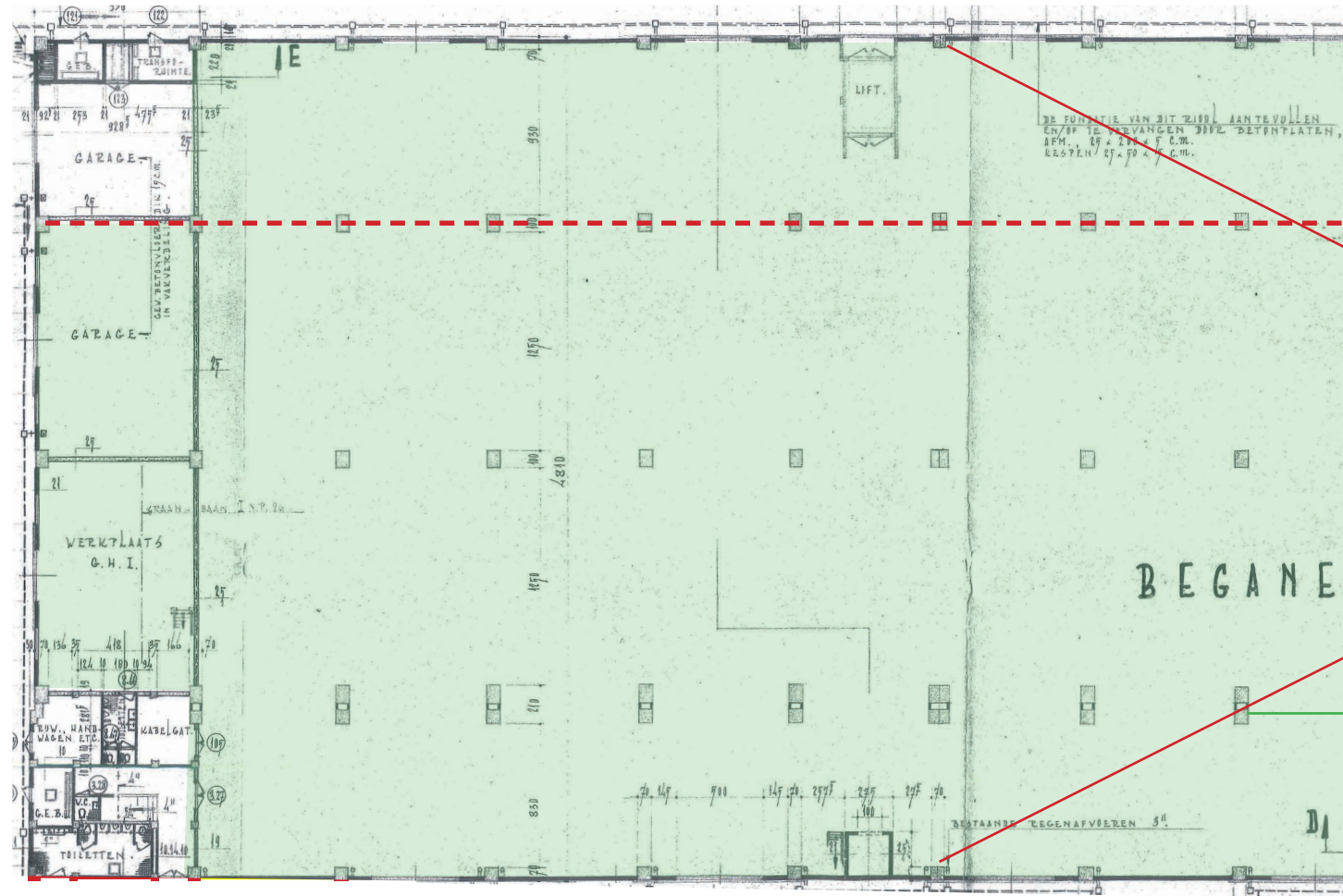
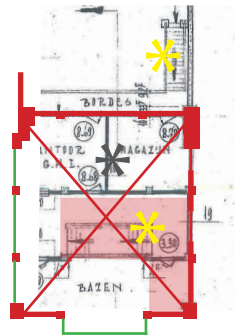


The probably from the San Francisco period remaining cobblestones have, as material a very high value.



The whole concrete load bearing structure is originally from the San Francisco period. Only the part to the water side is an addition. They are both really characteristic for the building. The floor is part of the construction.

New interiors are created by painting that is mainly applied on the new interior walls. Furniture and decoration are the basis for the most interiors. Except for the circus schools - they got a totally renewed interior with a new floor, interior walls and rooms - and the Crooze shop that added an interior element with office space.



The current ground floor facade at the streetside is an addition from the Fenix period. The original ground floor facade line of the San Francisco is located behind the current facade.

* The separation wall is a resent built one but is situated on the location of the separation wall of the San Francisco Warehouse

Corners are essential for waterside facade from the Fenix period, including the spilt levels. The division is less characteristic

Most interior walls are recently built.

Customs, built in the Fenix period, does not exist anymore and is not visible in the facade.



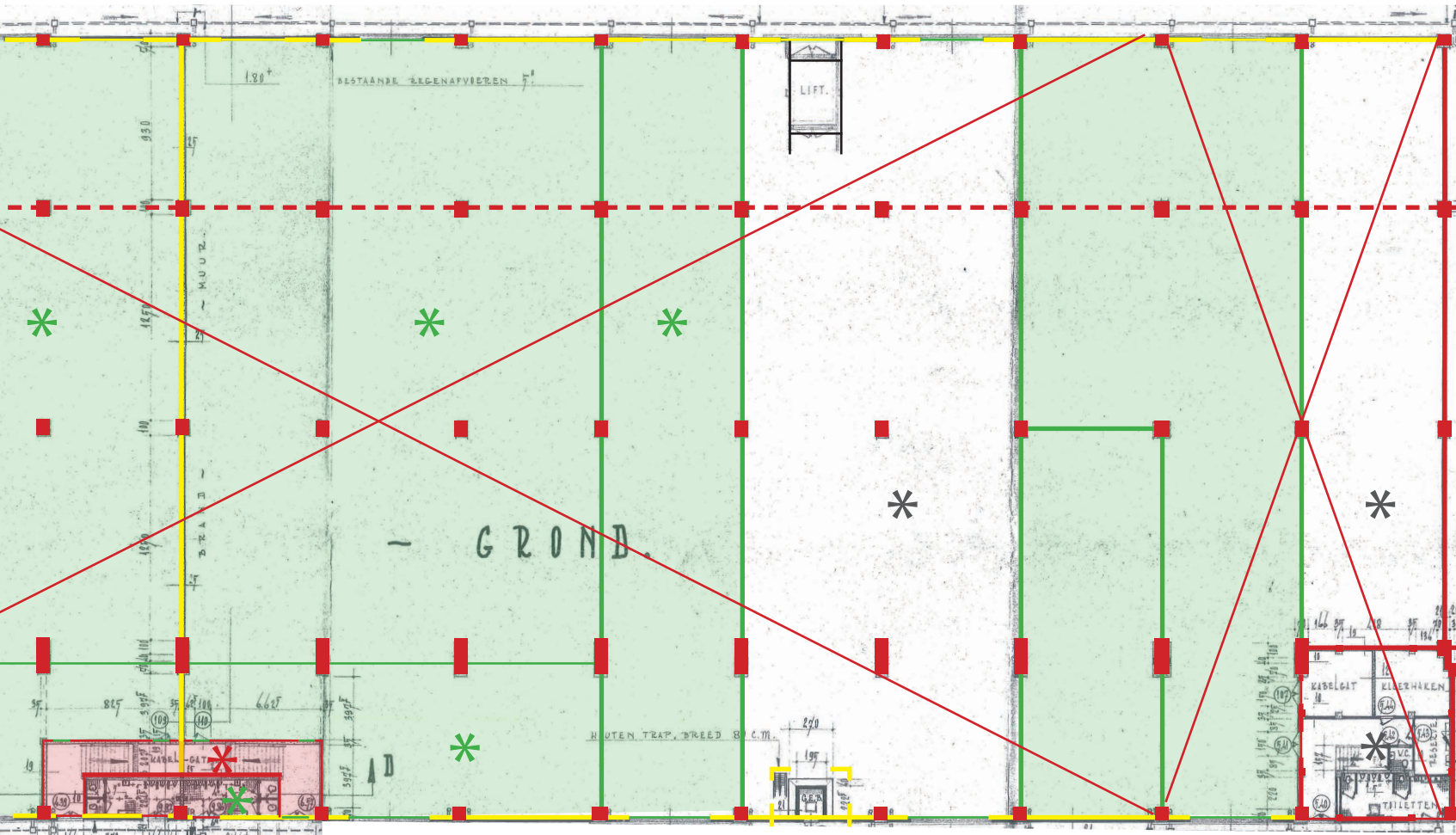


Most windows and doors are addition of the last years and have been placed in the existing openings. Others are from the Fenix period

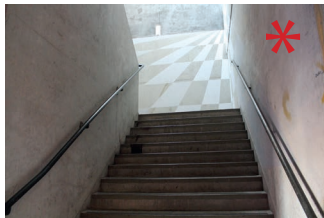
The elevators can be seen as an addition behind this facade of the San Francisco period.

The side wall is at the original place of the separation wall between the warehouse and the storehouse. It probably is the original wall.

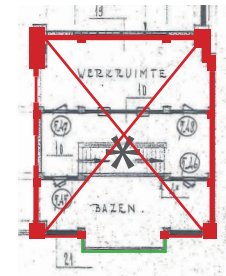
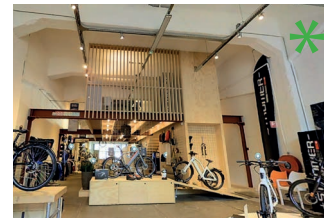
Potential remaining parts of the Holland-America Line storehouse of very high architectural and historical value.



* The room is part of the Fenix time layer of the waterside facade. The staircases are still original but the toilets are replaced.



Customs, built in the Fenix period, does not exist anymore and is not visible in the facade.



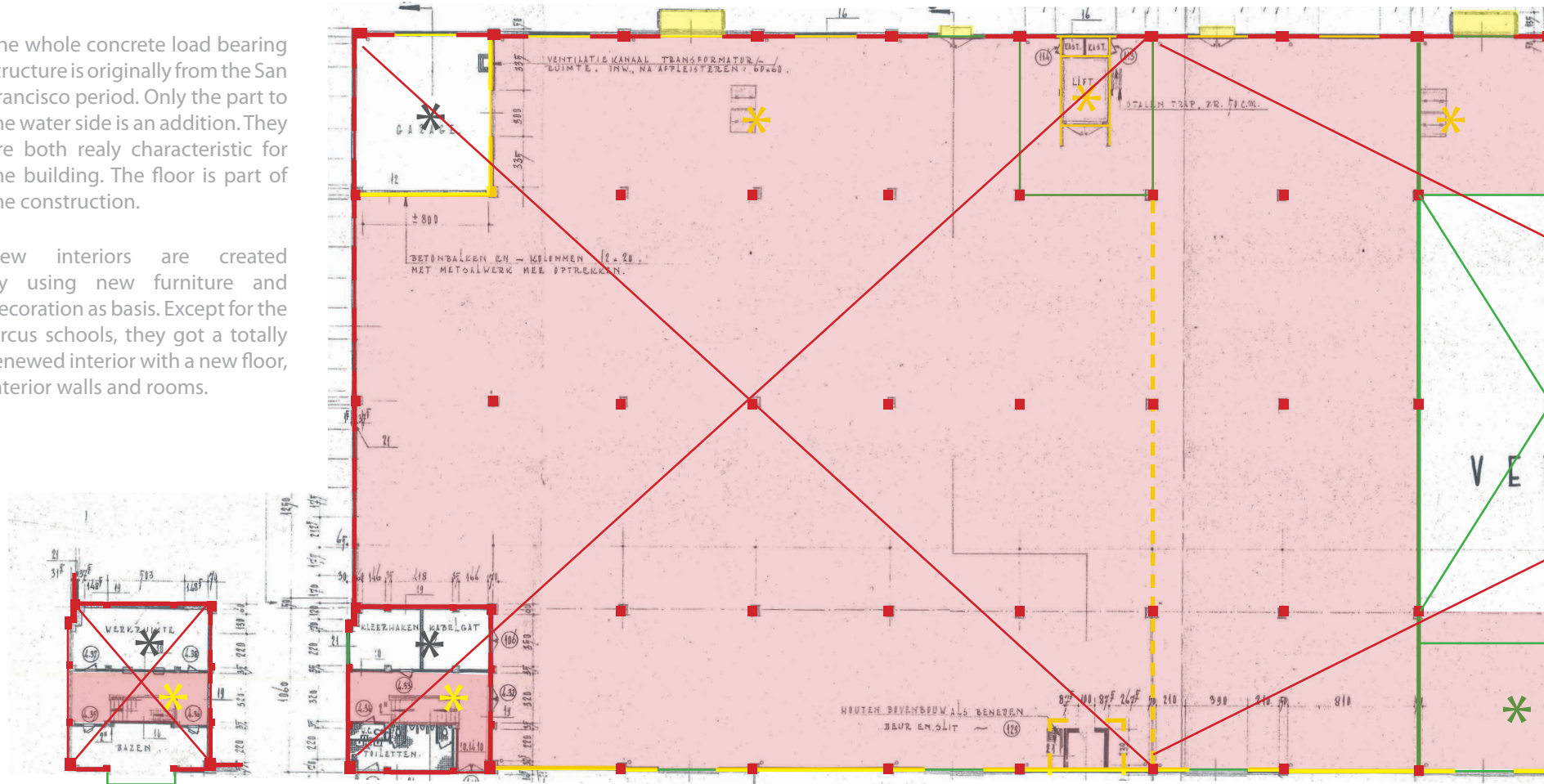
Corners are essential for waterside facade from the Fenix period, including the split levels. The division is less characteristic

This facade is original from the San Francisco. In the Fenix period parts are closed with masonry. These are seen as additions to the original

* The elevators can be seen as an addition behind this facade of the San Francisco period.

The whole concrete load bearing structure is originally from the San Francisco period. Only the part to the water side is an addition. They are both really characteristic for the building. The floor is part of the construction.

New interiors are created by using new furniture and decoration as basis. Except for the circus schools, they got a totally renewed interior with a new floor, interior walls and rooms.



Corners are essential for waterside facade from the Fenix period, including the spilt levels. The division is less characteristic



Customs, built in the Fenix period, does not exist anymore and is not visible in the facade.

The location of the separation wall of the San Francisco Warehouse



The vides are an intervention of recent years

The balconies and fenders are addition from the Fenix period to this streetside facade of the San Francisco.

* The wooden panels in the floor are from before the Fenix period but not shown on the drawings of the San Francisco warehouse. Moreover, it is not clear for which they are used. Now they are closed with concrete.

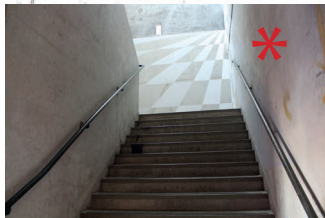
The side wall is at the original place of the separation wall between the warehouse and the storehouse. Whether it is the original wall, is unknown.

Potential remaining parts of the Holland-America Line storehouse of very high architectural and historical value.

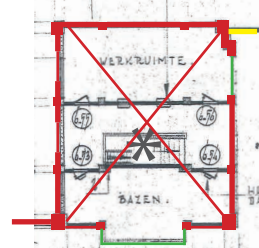
This wall part is not at the original place of the San Francisco or characteristic for the Fenix warehouse.

* The staircases are still original and are part of the Fenix time layer.

Most interior walls are recently built.

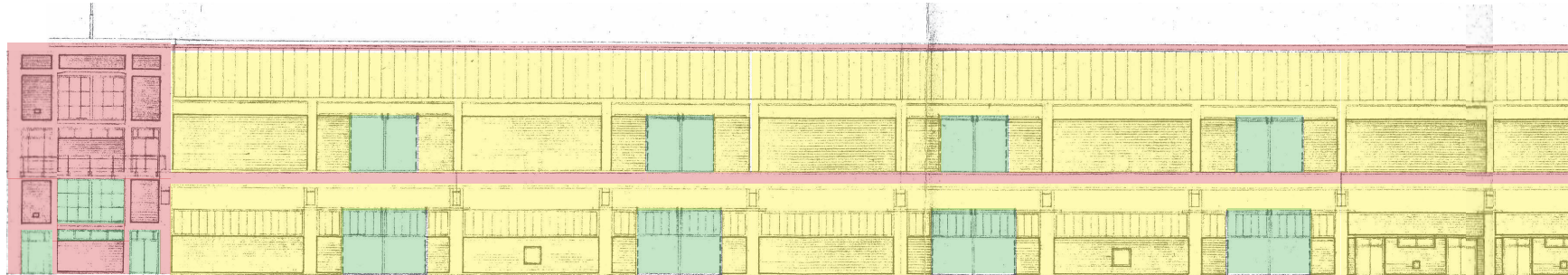


Customs, built in the Fenix period, does not exist anymore and is not visible in the facade.



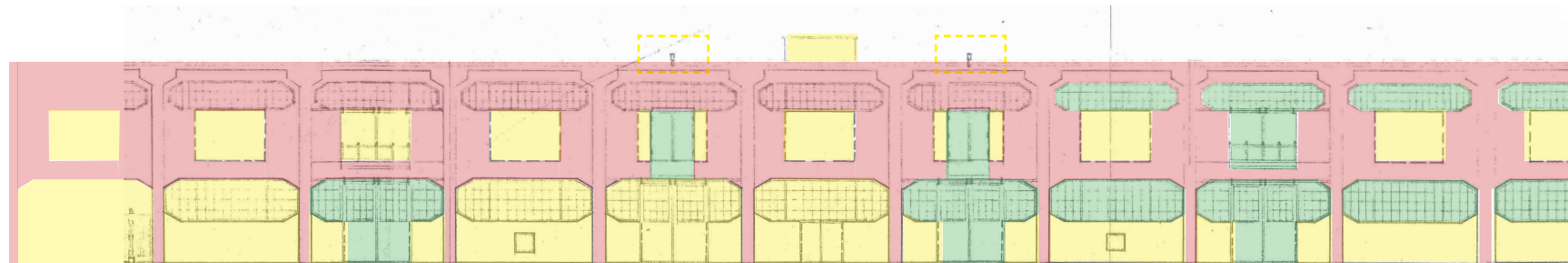
Corners are essential for waterside facade from the Fenix period, including the spilt levels. The division is less characteristic

The characteristics of this facade are the corners, the balcony and the roof edge. The in recent years placed windows and doors are seen as additions and have no value.



Most windows and doors are additions of the last years and have been placed in the existing openings. Others are from the Fenix period like the sliding doors.

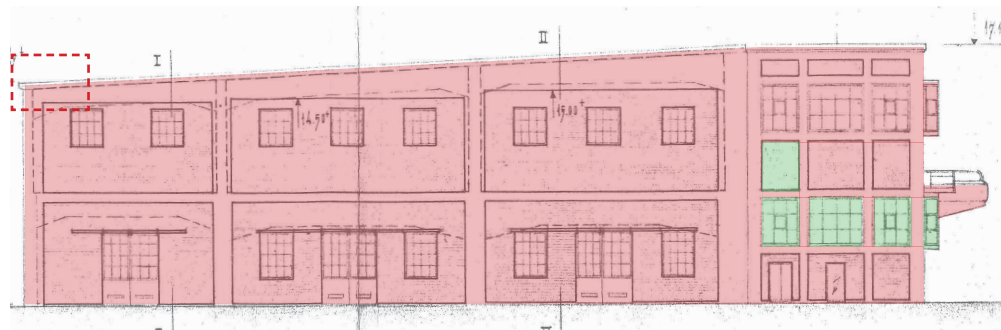
The characteristics of this facade are the structure and wall parts remaining from the San Francisco. The masonry parts are seen as additions from the Fenix period even as the windows and doors from that moment. The in the 80s applied layer has no value but the original grayish color has. The in recent years placed windows and doors are seen as additions and have no value.



The current ground floor facade at the streetside is an addition from the Fenix period. The original ground floor facade line of the San Francisco is located behind the current facade.

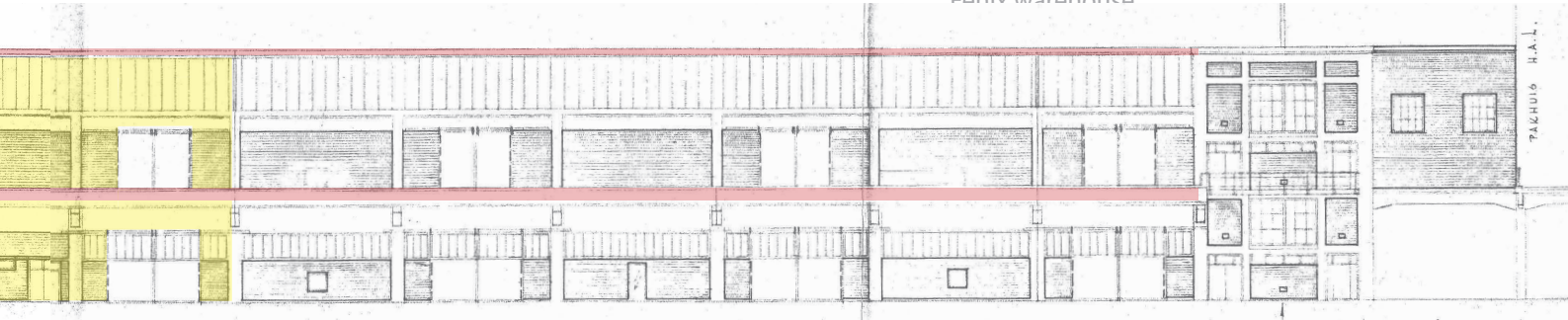
The balconies and fenders are addition from the Fenix period and have a medium value

As a whole this facade marks the demolished middle part of the San Francisco and defines the current public space. For that reason it has a high value. The in recent years placed windows and doors are seen as additions and have no value.

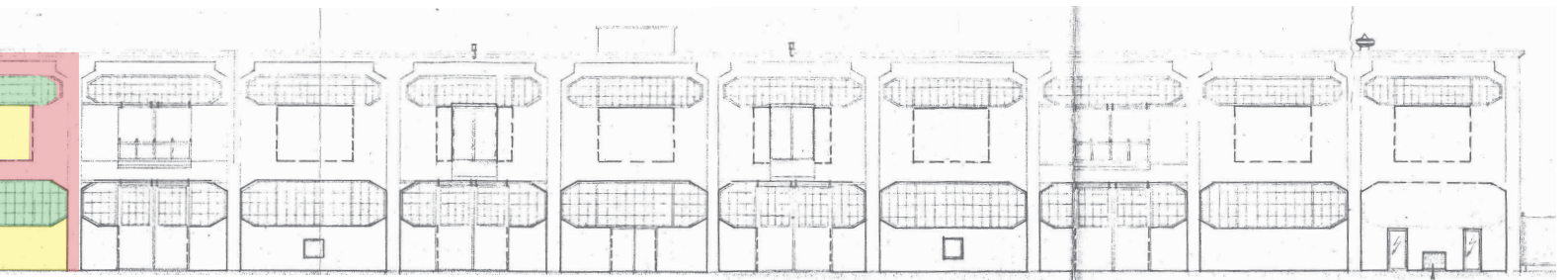


At the streetside on the roof are still remnants of the crane rails present.

This wall part is not at the original place of the San Francisco or characteristic for the Fenix warehouse



Potential remaining parts of the Holland-America Line storehouse of very high architectural and historical value.



Most windows and doors are additions of the last years and have been placed in the existing openings. Others are from the San Francisco priod like the windowframes of the first floor or from the Fenix period like the sliding doors.

The lifting beams are addition from the Fenix period as well as the boxes on the roof for the elevators

CONCLUSION

CULTURAL HISTORY | To conclude, Fenix II has general value as part of the port history of the Rijnhaven; It has urban value as part of the original structure of Katendrecht; Architectural value because of the functional character of the port building; Building history value has the monolithic concrete structure; And the use value is about the storage warehouse function.

CURRENT SITUATION | Besides the described values in the current situation, the port activities are gone, the facades are closed and the building is in the shadow of all kind of new projects. What is left is a grey line a the quay of Katendrecht.



DESIGN



12. STARTING POINTS

Looking at the research question and the flourishing days of the Fenix II, Energy became the guiding theme of this design. The intention is to give back and create energy in the appearance of the building, in its function and operation. First, this brief chapter explains what energy is in relation to this project.

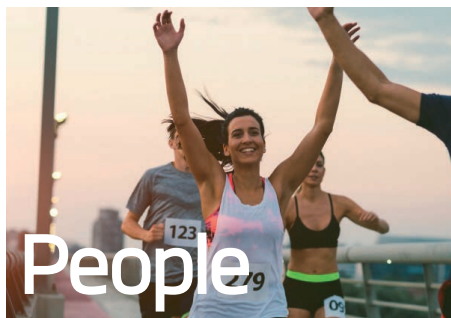
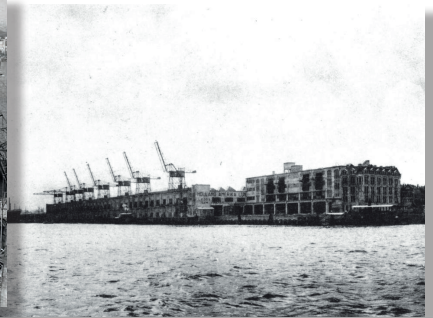
Energy can be seen in the history of the Fenix II: large steamships, moving cranes, people moving in and around the building.

And there also is energy in the location in the heart of port city Rotterdam, connected to Kop van Zuid with its high rise and hotspot Katendrecht at the other side.

Of course energy is also about sustainability. It has to do with the use of electricity, water, food and material.

And last, energy is about people, about what people do in buildings and how they use them.

In the next part of this report will be explained how energy is translated in the design. In succession, the urban context of the building, its appearance and the building technique will be discussed.



13. DESIGN

13.1 URBAN CONTEXT

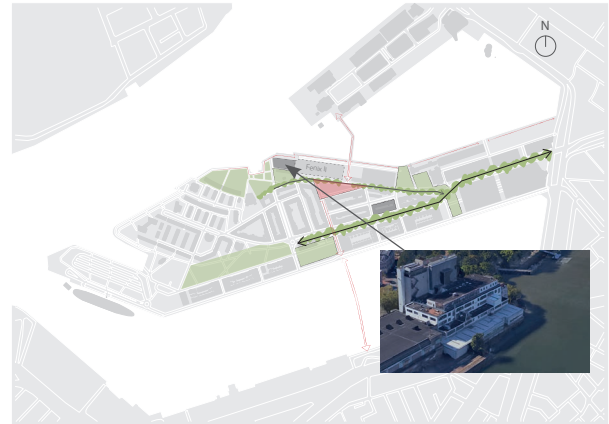
On the urban scale the intention is to make the location bursting and lively again. A place for the inhabitants of Katendrecht and the city of Rotterdam. Therefore, four interventions are important.

The first is the second bridge, a plan of the municipality, that will improve the accessibility of the site and the flow from the centre to the south of Rotterdam.



Structure plan Katendrecht with new bridges.

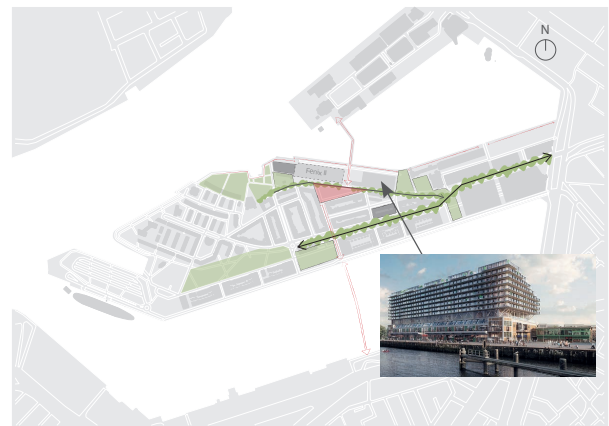
Second is an intervention in the urban structure. By restoring the original structure of Katendrecht, the site of Fenix II will be more accessible and attractive. The industry of Provimi doesn't fit in a living environment and therefore, the suggestion is to remove the industry additions and bring out the storehouse that is hidden between the added building elements. This plan is withal in line with the policy of the municipality to gradually remove the industry at the north side of Katendrecht. At the other side of Fenix II, restoring the original structure means making a connection with the other Fenix building. As described in the analysis,



Structure plan Katendrecht with removal of Provimi

Fenix I is at the moment changing into a ten story building that in its design doesn't really suit with the approach used in this project. A connection will not be made in approach but in function on which will be returned later in this report.

Third is an intervention in public space. By introducing a new space in the water of the Rijnhaven a connection with the water can be restored. This Fenix Boardwalk provides space for recreation near the water. The shape, derived from movement of people, creates several



Structure plan Katendrecht with new design for Fenix I

spaces within this new element. The flat terraces of The Pier provide views of vibrant life on the water, including passing barges, water taxis, and sightseeing boats. The staircase in the centre links the quay directly to the edge of an urban swimming pool that will change in a skating rink during wintertime. This has everything to do with the energy supply for the building that will be explained later on in this report. The layered paths of the Water Plaza offer the opportunity for people to engage with water at the river's edge. In its whole this boardwalk sets the scene for future development in this Rijnhaven area.



Urban plan with new public space: Fenix Boardwalk

Last is the most important intervention, an intervention in how the public approaches and moves in and the around the Fenix II. In the current situation the building is closed and forms a blockade. The intention is, that in the new situation people from different directions can walk through the building. The important directions in this context are: the centre over the Rijnhaven bridge, the south of Rotterdam over the new planned bridge, the public transport and the district. The new situation is that people from all directions can walk inside and outside the building in a logical way.



Urban plan with people from different directions

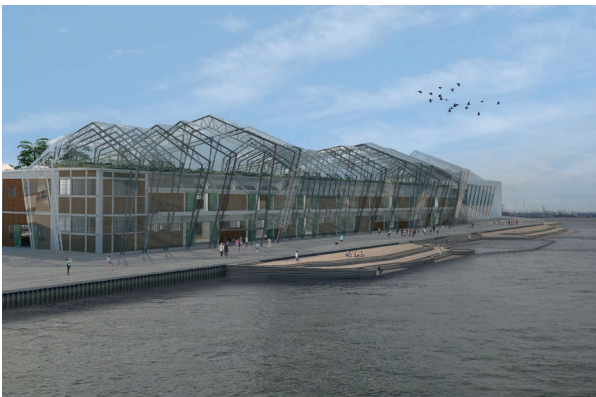
The used materials will also contribute to this. The cobblestones, partly still present in front of the building, will remark the contours of the San Francisco building. Inside these edges is reintroduced the rectangular shaped pavement with natural stone tiles. The result is that the contour of material is not the same as that of the Fenix II. This emphasizes the movement of people through the building and inside and outside are more overlapping each other.



Urban plan with new situation

13.2 BUILDING

The new water side of the Fenix II is about wideness and large scale. At this side, the intention was to make a connection with the water. That is why the new facade is designed like a wave, rolling over the building. The question was how to respond on Kop van Zuid. Does the Fenix II need to compete with all the high rise in the environment? No, the horizontal appearance is its value and that is what is emphasized in the design.



Impression of the new water side facade of Fenix II.

This architectural design results in new spaces at the quay and in the building. These vary in direction and dimension and thereby underscore the movement of the new design in and around the building.

The transparent and bright character of a wave is translated into the new elevation of the Fenix II. Transparency is not only the external appearance but also means that the building needs to be accessible. The way people walk through the



Impression of the new street side facade of Fenix II.

building is connected to the entrances in the heights of the wave. Behind these peaks, large voids play a role in the comfort and sustainability of the building.

Waves break and end on a quay or shore. At the east side of Fenix II the wave facade ends in a dome shape. The connected glass canopy offers an entrance to the passage at the water side and is as well the east entrance of the building. At the west side the wave rolls against the storehouse.



Impression of the roof garden of Fenix II.

In this design it is a canopy end of the passage and the entrance to the wave from the park and storehouse passage. But at the same time it can be the start of the further development of the elevation of the Rijnhaven.

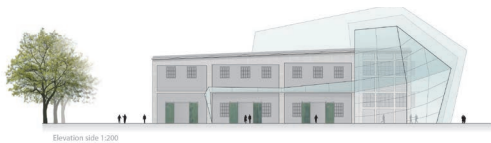
The other, street side is small scale and connected to the Deliplein and residential function of Katendrecht. That is why the facade at this side is designed open and inviting. This, high valued original facade of the San Francisco from 1916, has a beautiful rhythm that is emphasized in the design. The open ground floor is restored by removing the added walls and the moving

platforms are reintroduced by oriels. Also the main entrances are situated at the places where people walk in and outside the building. This is emphasized by the organisation of the public spaces.

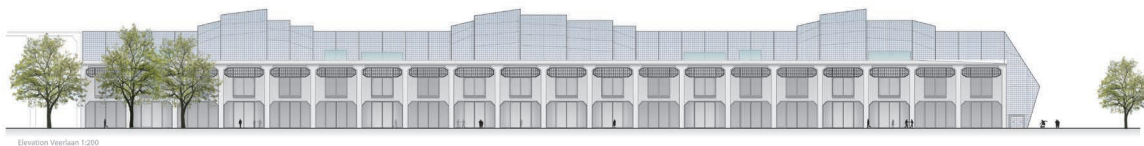
A huge opportunity of this building is the roof. By its flatness, it is accessible and nearby. At the roof a roof garden is created. This garden is situated partly under the glass of the new water side facade so it can function as a greenhouse and partly in the open air where it is a wild garden. More about the function of the building will follow later on in this chapter.



Rijnhaven elevation (north)



Side elevation (east)



Veerlaan elevation (south)

After explaining the exterior of the design, now can be looked at the interior. Inside, energy is translated in high open spaces alternated with more enclosed areas. In the core of the building large voids bring a lot of light inside. But energy is also translated in the functions of the building. Fenix II will be an Art & Sport centre with a local food market. A connection with the other Fenix building is made by creating a culture cluster. In the lower warehouse part of Fenix I is placed a performing art centre that can co-act with the visual art centre in the Fenix II.



Impression of the large open space at the first floor.



Impression of the entrance of the food market.

For the appearance the wave of people through the building was determining. The result is three organic shaped pavilions. At the east side the market, central situated an exhibition space and at the west side the gym. Between these pavilions is room for circulation and places to meet. People will meet each other on their way to work or home, when they go to the gym or while visiting an exposition.



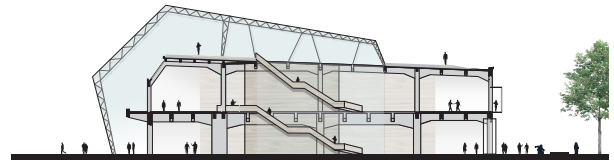
Impression of an atelier, inside the new pavilion.



Cross section 1.



Cross section 2.



Cross section 3.



Longitudinal section

In the high open spaces around, the original material of in situ concrete is preserved and visible. In these spaces the strong orthogonal structure and its rough history of the building can be experienced.

Although spaces are located in the core of this relatively deep building, enough light is coming in. This is due to the vides in this new design. In the length of the building corridors of light go through the building till the ground floor. At the roof the vides are connected to the new facade at the waterside. These vides also have a function in



Impression of the open space in relation to the ateliers.

the climate of the building that will be explained in the next paragraph.

The shape of the wave at the roof is translated in the facade of the greenhouse. The footbridges are at the same place as the circulation space inside. These paths end in small garden terraces that offers a view over the public space at both sides of the building. As described, the roof houses the greenhouse as well as the vegetable



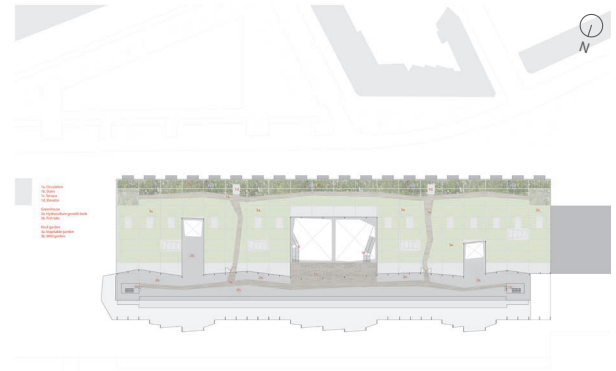
Scheme explaining the building management.

and wild garden that will collaborate with the stands and kitchen in the market downstairs.

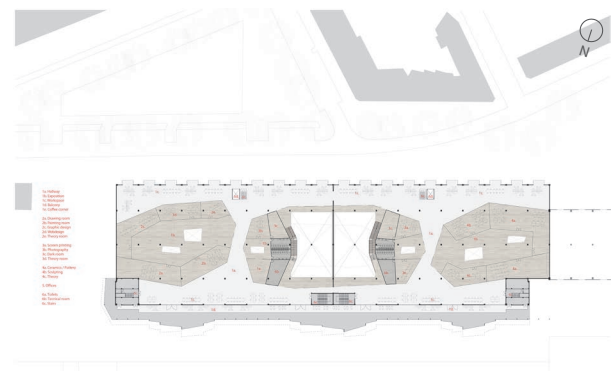
Both, the building as a whole and the separate functions can function well with a thoughtful management plan. In general, this means that the building has a public area in which other users can operate separately. This is based on the strength of current use, close cooperation between local entrepreneurs.



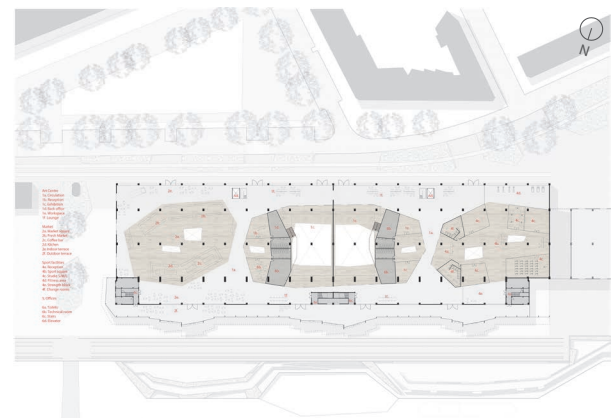
Reference project of volunteers working in the roof garden (De Luchtsingel, N.D.)



Ground floor



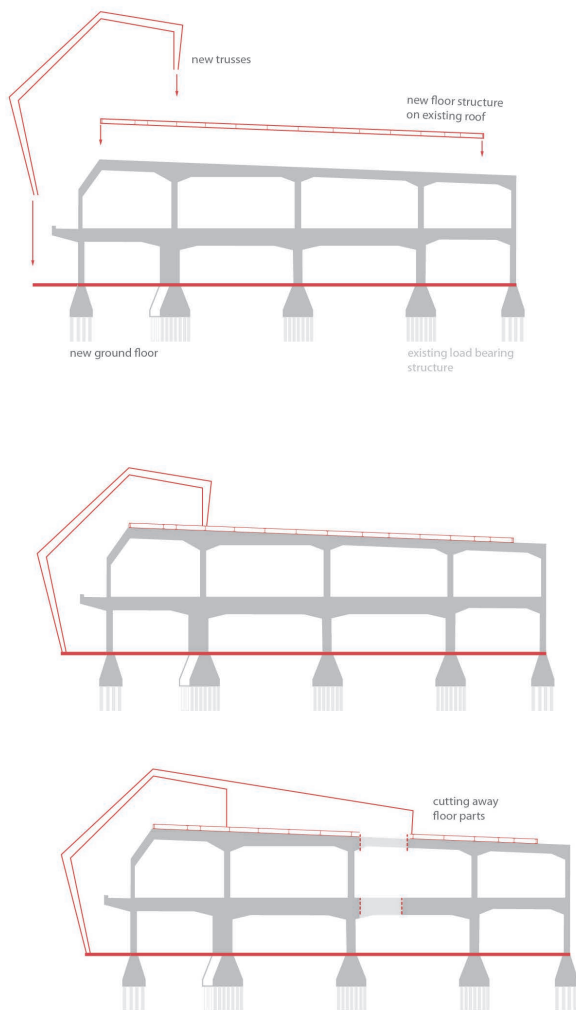
First floor



Ground floor

13.3 BUILDING TECHNOLOGY

By explaining the building technology, the design can be explored further. In the new design the structure principle is to use the existing load bearing structure, add a roof structure to help to carry the roof garden and add a new structure for the waterside facade.



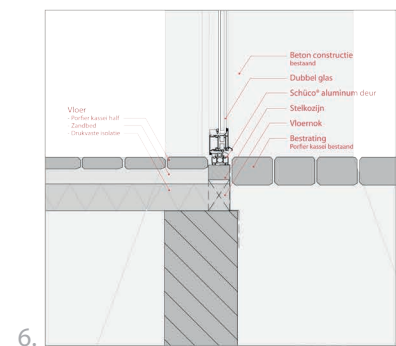
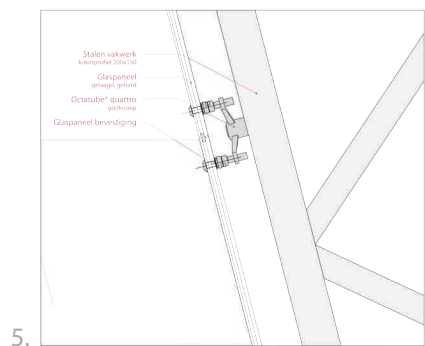
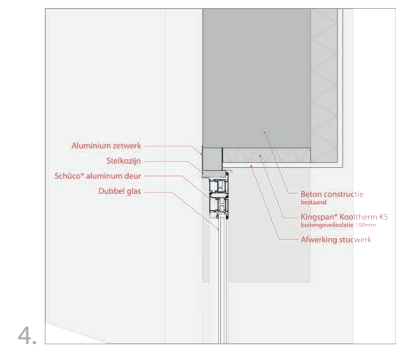
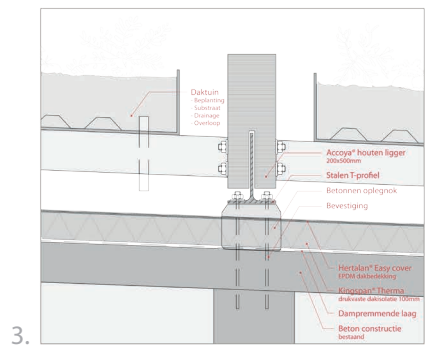
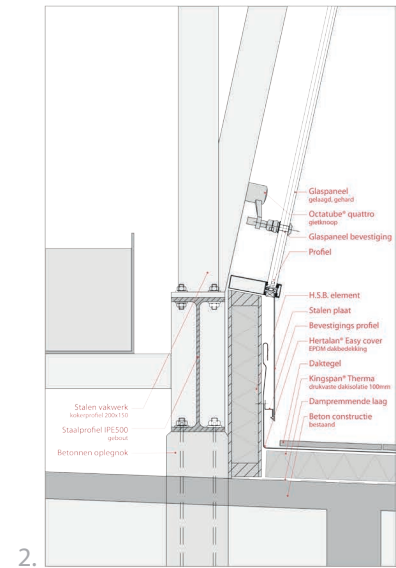
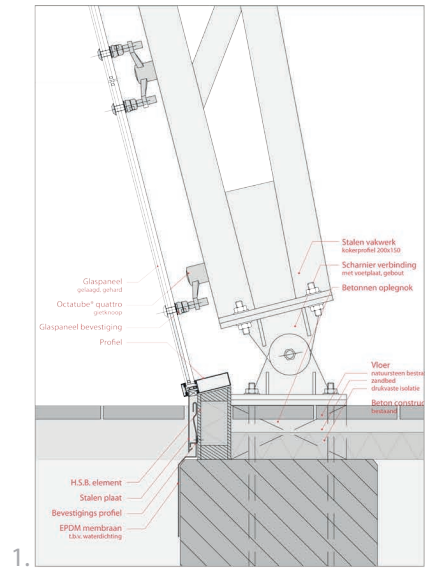
Scheme principle load bearing structure

The new facade is build out of steel trusses and spider glass. As can be seen in the details, this system creates space between column and glass, an effect that will emphasize the brightness and transparency in appearance.

The trusses land with one feet on the quay and one on the roof. Both connections are made out of steel joints. Also for the finishing is chosen for steel plates and aluminium profiles.

At the roof a more natural material of wood is used for the construction. By lifting the beams the material, as well as their structure, can be experienced in the garden. Moreover, the existing roof can be used to collect the rainwater.

Interventions in the existing façades have the same character as the new facade but are subordinate to the old. With slim dimensions and a position placed back in the facade, the high doors at the ground floor contribute to the open and inviting character of this facade. Although the original character of the facade is emphasized in the architectural design, it is still possible to insulate the facade on the outside. The San Francisco facade had a cement plaster finish. The current facade will be stripped of the, not original, current finish layer and will be repaired and restored where necessary. Then a foam insulation plate is applied that can be finished with a plaster layer. This results in a slightly thicker package on the concrete structure. However, this does not cause any problems with the existing openings and does not negatively affect the appearance of the façade. In addition, insulating the facade has advantages in terms of preserving the original facade.



Details, original scale 1:5
connection of new facade (1&2),
new roof structure (3), attachment
of the facade (5) and intervention
existing facade (4&6).

The current floor made of concrete slabs in a sand bed. This can be removed relatively easily. Thereafter, the application of an underground utility, placing a new foundation for the water side facade, and the application of insulation under the floor will be done. Next, the floor will be re-coated as described in the previous paragraph. In the new situation the street and floor are at the same level as can be seen in the details.

The enclosed interior space is created by a raised floor and a dropped ceiling. Ease and inspiration are important in these spaces. Therefore, installations and piping is hidden in the ceiling. Light fixtures are also recessed in the ceiling. The lighting is not only functional but, as described in the previous paragraph, also has an architectural aspect and therefore included in the technical design of the ceiling. In the open spaces near the facade, the character of the existing building and its original construction is important. This should not be disturbed by installations and wiring. Therefore, this is also mainly hidden in the dropped ceiling in the core of the building. Only electricity will be guided through grooves in the rough concrete floor to the different workspaces.

Last in this paragraph, the issue with regard to fire will be considered. Accessibility, transparency and movement are very important in the design. The result is wide open spaces. That makes it undesirable to subdivide the building into fire compartments. To prevent this, a number of precautions have been taken. The interior spaces can be compartmentalized by maintaining the operation of the current firewall and closing the pavilions. The open spaces are considered as escape route. The vides can be used to extract smoke out of the building. On the ground floor,

doors can be opened over the entire width of the façade and from the first floor and the roof, the capacity and amount of stairs will be sufficient to evacuate every person in the building. This takes into account a maximum occupancy of 480 people inside the building. Eventually, in consultation with the fire department, it must be ensured that the building is fireproof.

Section original scale 1:50

Section original scale 1:50

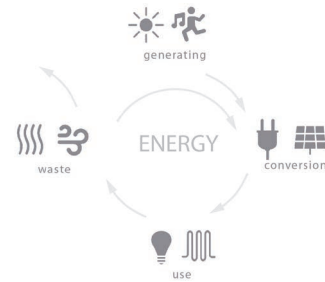
13.4 SUSTAINABILITY

As described in the first paragraph of this chapter, energy has to do with sustainability. Combined with the ambition to close the cycles of energy, water, material and food this is elaborated in the design. In this paragraph is explored in what way and to which extend the goal can be achieved.



ENERGY | Starting with the cycle of energy, the challenge is to minimize the need and try to generate the remaining part. This means that in wintertime the water of the Rijnhaven and the heat produced in the greenhouse are used to heat the building. Tubes with water heated in the greenhouse will fill a barrel. This water will, when needed, be heated to the right temperature by the heat pump that runs on Rijnhaven water and heat the building by a low temperature system, floor heating. By running the heat pump on Rijnhaven water, a side effect is that the water of the Rijnhaven will be cooled. In this way the urban skating rink will be created. Furthermore, heat produced in the kitchens and gym is used to heat tap water by a heat pump boiler.

During summertime the greenhouse will be opened to prevent overheating. By using the heat pump, the Rijnhaven water will now cool the



1. Cycle of energy



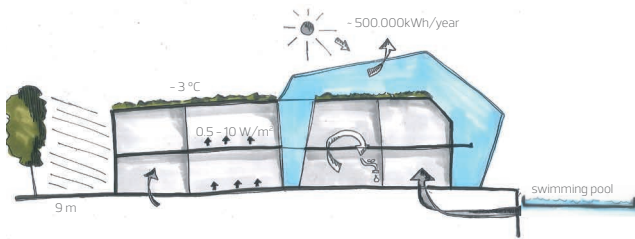
2. Cycle of water



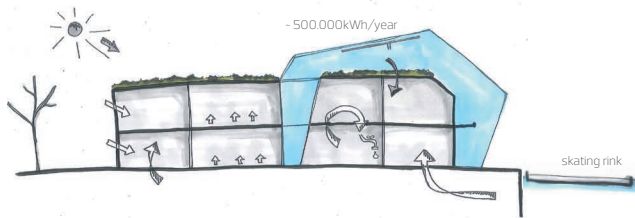
3. Cycle of material



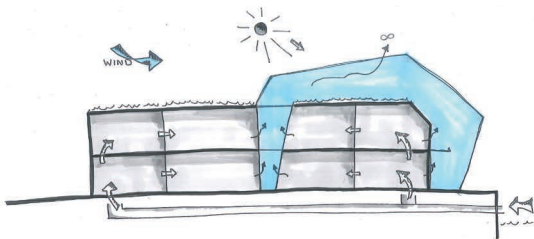
4. Cycle of food



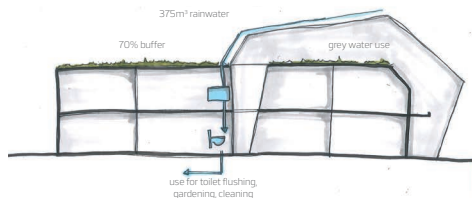
Summer situation



Winter situation



Ventilation system



Water system

building by a high temperature system through floor cooling. The reverse benefit of the heat pump in summer, is a warm water swimming pool. Heat produced in the kitchens and gym is still being used used to heat tap water.

In spring and fall the greenhouse will on average be enough to heat the building. When needed ,and depending on the weather conditions, the system can switch to winter mode to heat or summer mode to cool.

In addition, also ventilation is important considering the energy cycle of the building. Air will be pre heated or cooled with ground tubes. The vides and greenhouse are used to extract the air from the building. In this way, air is mainly naturally extracted by thermal differences and height. Some of the vides are used to blow extracted air into the greenhouse. Polluted air is mechanically extracted by other vides and blown out at the roof.

Then, after minimizing the need, energy is generated by building integrated PV on the south side of the new facade. And also fitness equipment in the gym contributes to the energy supply.

In the end, it is presumable that 100% of the energy required for Fenix II can be generated by the building itself. Of course, this is an average annual energy calculation. Overproduction in summer can be used for various purposes, like loading e-bikes near the terrace or Deliplein. More about the energy calculations and in depth information and drawings of the climate system can be found in *Appendix 2* and *Appendix 3*.



Building integrated photovoltaic (PV) modules reference (AGC Glass Europe, 2017)

WATER | The second cycle is the cycle of water. The challenge is to use rainwater and reuse grey water from the building.

The rainwater can be collected by using the existing drainage that is located at the street side of the Fenix II. It will end in a collecting tank in the ground. This rainwater mainly comes from the roof surface of the new facade with a ramp to the street side. Also the outside roof area without roof garden contributes to this. Last, the rainwater from the roof garden that is not absorbed by plants will also be collected by this system.

Also, the grey water from the kitchens in the market, the showers in the gym and the sinks and pantries in the art centre will be purified and reused. After purifying grey water can be used in the same system as the rainwater. This water can be used for toilet flushing, gardening and cleaning.

The roof garden has more advantages in the cycle of water. It only will need extra water in times of drought and the buffer capacity helps to prevent overload of drainage and sewage in times of heavy rainfall. More about the water calculations can be found in *Appendix 3*.

MATERIAL | Next is the cycle of material. The challenge is to use the existing materials as much as possible and to consider the life cycle of the materials added. Attention has been paid to selecting the new materials. By doing this, for example the C2C certificate can help. In this way, accoya wood is used for the roof structure, and rubber wood for the interior. Also, more innovative materials are available, such as a 100% recyclable casting floor. Finally, the cycle of material is taken into consideration by choosing a reversible assembly. Most construction elements are mounted and in the design is chosen for roofing that is not glued. This can be seen in the details in the previous paragraph.



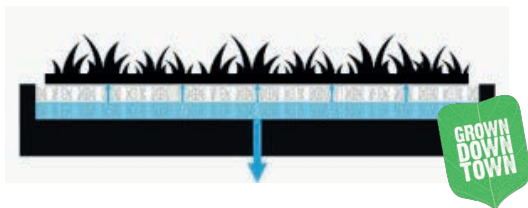
Cradle to cradle certification logo (Cradle to Cradle Products Innovation Institute, 2017)

FOOD | The last cycle is that of food. This whole cycle takes place in or at the building. In the greenhouse the system of urban farmers is used, and in the garden the system of grown down town. With the greenhouse and vegetable garden it is possible to produce about 25% of the vegetable need of Katendrecht.

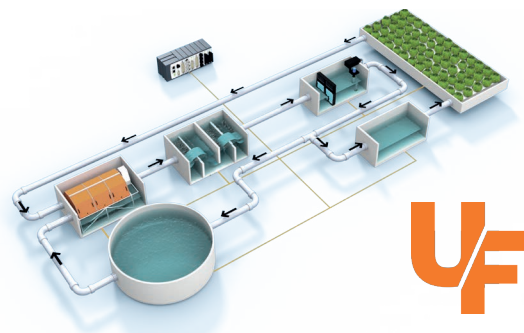
The aquaponics system, that combines the production of vegetable and fish, of Urban Farmers can be used in the greenhouse. Urban Farmers as company 'enables efficient and sustainable food production that can seamlessly be integrated in existing infrastructure (on rooftops or at existing production facilities) within or nearby cities, close to or at the point of sale' (Urbanfarmers, 2013). Together with the fact a lot of information about crop yield, preconditions and reference projects is known for this system, made this system suitable for this design project.

At the roof garden, another system is used. By choosing a specific system, not only the production is interesting. Important was that the garden will also be used as a garden with qualitative space for educational purposes and where volunteers can garden. *Rooffood*

is a growing system that offers an easy way of growing vegetables on the roof in cities (Grown down town, 2017). It consists of a layer of crates in which vegetables are grown and that can easily be changed and removed. The crop yield of the Rooffood system is depending on the vegetable species that are grown and the available square meters. There must be chosen for high yields per m² and species that are suitable for the meditating climate that is present on the roof (Luchtsingel, ND). More about the food calculations can be found in *Appendix 3*.



Rooffood system use for the roof garden (top) and the aquaponics system used in the greenhouse (right).



CONCLUSION

The goal of all that is researched and designed during this graduation project, is to be able to answer my research question. The conclusion is that this design shows that it is possible to transform the Fenix II into a sustainable building and conserving its characteristics. Al together, Fenix II will be an energizing warehouse for the inhabitants of Katendrecht and the city of Rotterdam.



REFLECTION

14. PRODUCT PROCESS & PLANNING

In this chapter will be reflected on the results of the research and design in this graduation project, considering the process, planning and product. The aim is to see to what extent the used approach worked, understand the 'how and why' and to learn from this.

14.1 STUDIO & SUBJECT

The first aspect to consider is the relationship between the theme of the graduation studio and the subject chosen within this framework.

Heritage & Architecture is concerned with preservation and renewal in existing architecture. The studio approaches research and design on all levels of scale ranging from the use of materials and technology, through the reuse and redesign of a building complex, to the development of landscape and urban structure. In which will be focused to translate cultural historic and technological information into a design.

In the Studio Heritage & Architecture Rotterdam Harbour Heritage, the ambition is to reach for a smart design for adaptive re-use of existing building complexes in the harbour areas of Rotterdam.

The studio is concerned with the actual question of a new phase of development of some specific harbour areas, through intervention. These harbour areas will change considerably, because of the vacant and new contextual identities that will be repositioned in the urban infra-structure. They have changed already by the departure of

several industries. The theme for research is the significance and essence of the building complex and the water and within this, the tolerance for change.

It is exactly dealing with existing architecture and the question of a new phase of development that resulted in the object of this graduation project. By taking these existing building complexes to the future, also the question of sustainability needs to be considered. Even more when involving the location of the subject, an old port area in development in a city with a fierce history and where innovation is celebrated.

The building Fenix II is one of the existing building complexes and is located on Katendrecht. This in origin port warehouse and its nearby environment are subject of this graduation studio between history and future.

14.2 METHOD

The method chosen in this graduation project is similar to the approach of the studio Heritage and Architecture. Architectural reuse of buildings is a design by research and research by design.

During this graduation project specific research is done on the development of an approach to combine transformation and sustainability in architecture. This can be done by developing two toolboxes during the first phase: one for transformation architecture and one for integrated sustainability. In the next phase (research by design) the two need to be combined in the design.

This process of developing a toolbox for transformation architecture is in line with the by the studio purposed approach. Here will be started with research into the history and an analysis of the past, present and future on different scale levels. Both will form the basis for the value assessment.

Usually the essential qualities of the selected building and the individual starting points for the design dictate the program of demands and the outlines for the following research by design. But in this project also the toolbox for integrated sustainability was made and used to dictate the outlines of the next phase. This was done by researching the goal that could be worked towards and analysing the characteristics of the local environment that have impact on the climate design or energy use of the building. Together this formed a set of boundaries to work within the design.

The research by design phase starts with identifying the essence of the ambition for the subject. This forms the research questions for which a solution has to be developed in the design.

To come up with solutions, reference projects were studied and excursions were undertaken. The two toolboxes developed in the first part functioned as set of preconditions.

Variants were tested in sketches, 2D drawings and virtual as well as physical 3D models. They were examined and the best solution resulted in the purposed design.

Remarkable is that, as in any design process, the design in this project is a purposed solution and will not be the only way of answering the design question. It is the outcome of the research process walked through during this graduation project. It is at this moment and within this time frame a worth knowing answer.

Note: By choosing a route other than usual, combining heritage with sustainability as an ambition from the start of the project, also the path to follow had to be considered. Therefore, the process was not self-evident and went with trial and error. Looking back, the toolbox for integrated sustainability that was developed in the first phase of the project, has become significantly less comprehensive than that for transformation. This may be due to the influence of the running process in the studio heritage and architecture. In a subsequent research project, a more convenient balance should be found.

14.3 RELATION TO WIDER SOCIAL CONTEXT

The theme of this graduation project responds to one of the current issues in society. Nowadays the urge of building sustainable is obvious. In order to give the planet to next generations it is necessary to come up with new solutions. On the other hand transformation of buildings is one of the main emergent topics in contemporary architecture. It's about finding 'an appropriate balance between the old and the new.' Most of the built environment in the future shall be the same as now. Transformation therefore will be the theme in architecture of the coming years.

So it can be stated that sustainability and transformation are two distinctive trends in contemporary architecture. In contrast to what is happening now, it is necessary to combine them. The reason for this is that the world will be left empty handed when new buildings can be built sustainable but the demand is in the existing stock. In this way this graduation project is an example solution for the theme in architecture of the coming years.

Moreover, the project is contributing to the development of an approach for combining architecture and sustainability. This can be used and further developed in the future.

Last, interesting in this project is that at the site two total different solutions are purposed for two comparable buildings with the same history. The design of Mei Architects is totally different from the design purposed in this project.

This not only shows that designing is a process that can have multiple solutions. Especially it

illustrates the importance of good research and a value assessment. In order to investigated the tolerance for change as basis for the design.

14.4 RESEARCH AND DESIGN

The strong predetermined direction of research resulted in a research question. From there multiple sub questions were formulated. This made possible to better understand the main question and to frame it. The research has had a strong influence on the whole approach of the design. The formulated ambition can be found in the result on all scale levels.

Research

The research question stated was: *How to transform a heritage building into a sustainable building while conserving its characteristics?*

The sub questions asked are:

What is a sustainable building and related to that, what is transformation?

How to combine sustainability and transformation in architecture?

What have been and are the characteristics of the existing building complex and its surroundings?

Before these questions could be answered, a subject was chosen. As described in section 12.1, Fenix II is one of the existing building complexes within the theme of the studio and moreover positioned at the centre between history and future. Therefore this building is an interesting subject for this research.

Altogether could be concluded that Fenix II is a remnant of a quite impressive, and for the time it was build, distinctive building for the environment as well as for the port of Rotterdam.

The changes during time are strongly related to another important occurrence in the city's memory, WWII. This building has always been surrounded by movement and activity during its whole period of use. But, it became vacant when the port moved towards the west.

Besides the history, also the future for Fenix II was researched by investigating the meaning of a sustainable building. The goal was phrased to try to close the cycles of energy, water, material and food within the scope of the project.

Translation into design | Looking at the research question, the history of the building and the current situation, the guiding theme 'energy' was chosen. At this phase in the process all the outcomes of the research together formed the basis for the direction of the design. While different aspects of energy were strongly present in the past and appear to be important and relevant in the future, it is absent in the current situation. So the new design for Fenix II needs to give this building energy again.

Design | In the design phase was researched what aspects of energy were related to this project and relevant for the design and building. At the same time, an attempt to find a balance between the cultural value of the existing and the new that needs to be added.

Energy in appearance means that in the exterior the old is emphasized at the small scale street side by opening concrete façade again, bringing back the strong rhythm and provide space for movement and interaction around this facade. While at the large scale water side, a strong gesture is made by adding a rolling shape over

the building. Hereby a connection is made with the movement of the water as well as a reaction on the force of the high rise around the Rijnhaven. Going inside, wide open spaces are filled with horizontal light, and characterized by the heavy and rough concrete structure which offers space for interaction. In the core of the building the new water side facade dives into vides that bring skylight from above and change the darkest areas of the building in oasis of light and green. Around these vides more softer and enclosed areas are placed which provide a platform for creativity. At the roof the transparent rolling structure of the new facade as well as the structure of the existing building are combined into a green landscape.

Energy also has to do with the function of the building. Here is tried to create a place for the residents of Katendrecht again as well as reintroduce a connection between the two Fenix buildings. Fenix II will be a place where people get energy from sports, making or enjoying visual art and the production and consumption of food.

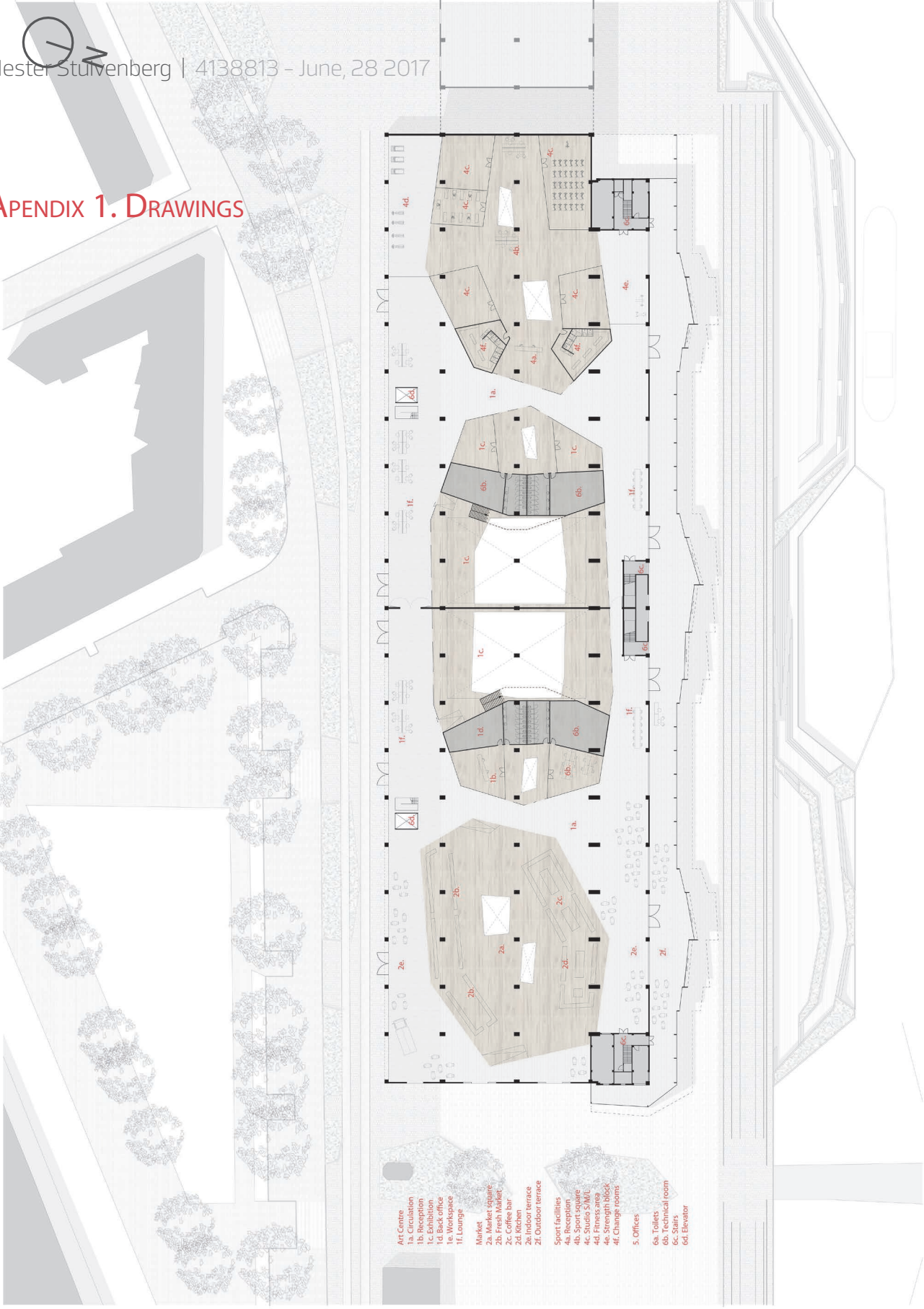
Energy is also a technical story. The added facade also functions as a greenhouse, shaft and buffer zone and contains building integrated PV so the required energy can be generated in the building. The roof garden will play a role in the water buffer capacity and rainwater collection so less tap water is needed and or waste is going to the sewage. Energy in building material is considered by using reused, recyclable or renewable materials as much as possible. And last, the production and consumption of food are integrated in the architectural design and the way the building is used. This makes that Fenix II can contribute about 30% of the vegetable need of Katendrecht.

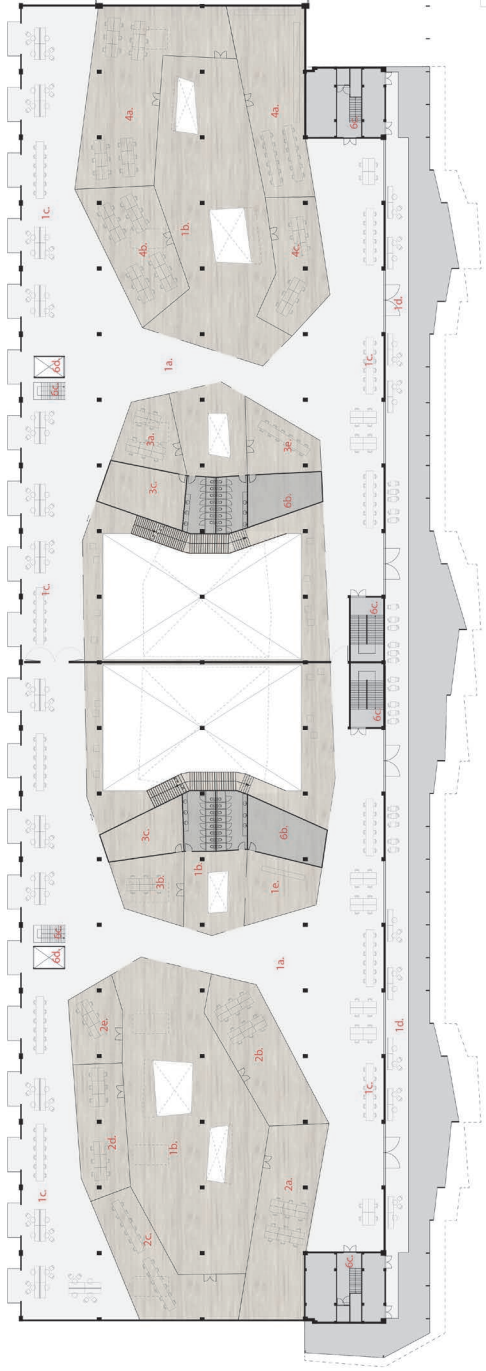
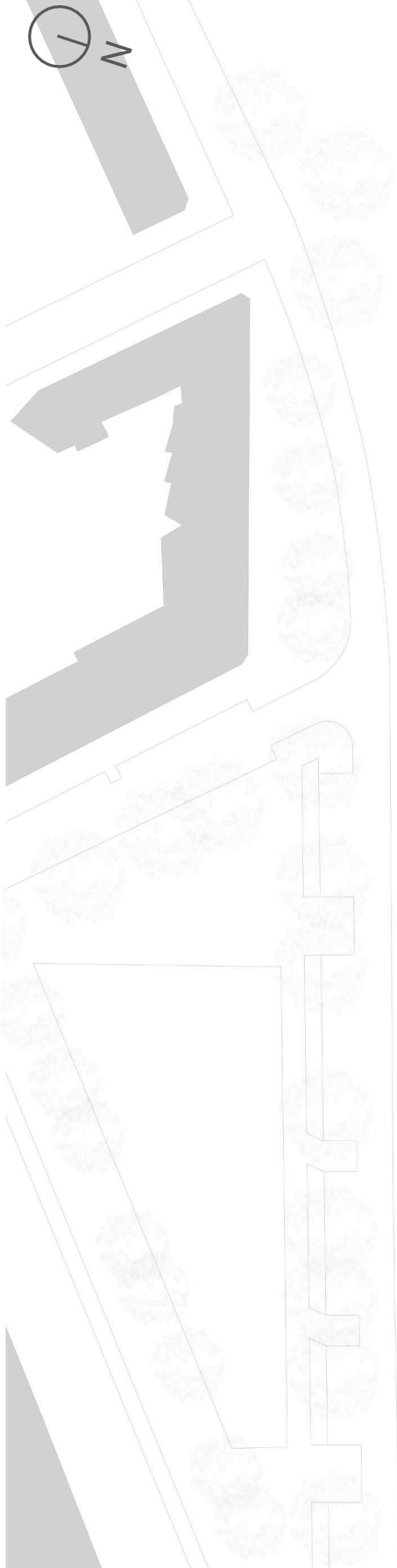
The goal of all that is designed and researched, is to be able to answer my research question. By developing this design with energy as guiding theme, at the same time an answer is given to the research questions. It conserves and elaborates on the character of the building and succeeds to close a the main part of the four cycles. In the end, heritage and sustainability are integrated in the design that transforms Fenix II into an energizing warehouse for the inhabitants of Katendrecht and the city of Rotterdam.

Note: Where during the first phase of this project the heritage aspect prevailed during the research, the design focused more on the sustainability aspect of this project. Finding a balance between both is one of the challenges during a research like this. The value assessment and the framework of transformation function as foundation for the heritage design. In this project, sometimes not enough attention has been paid to this important tool.

APENDIX 1. DRAWINGS

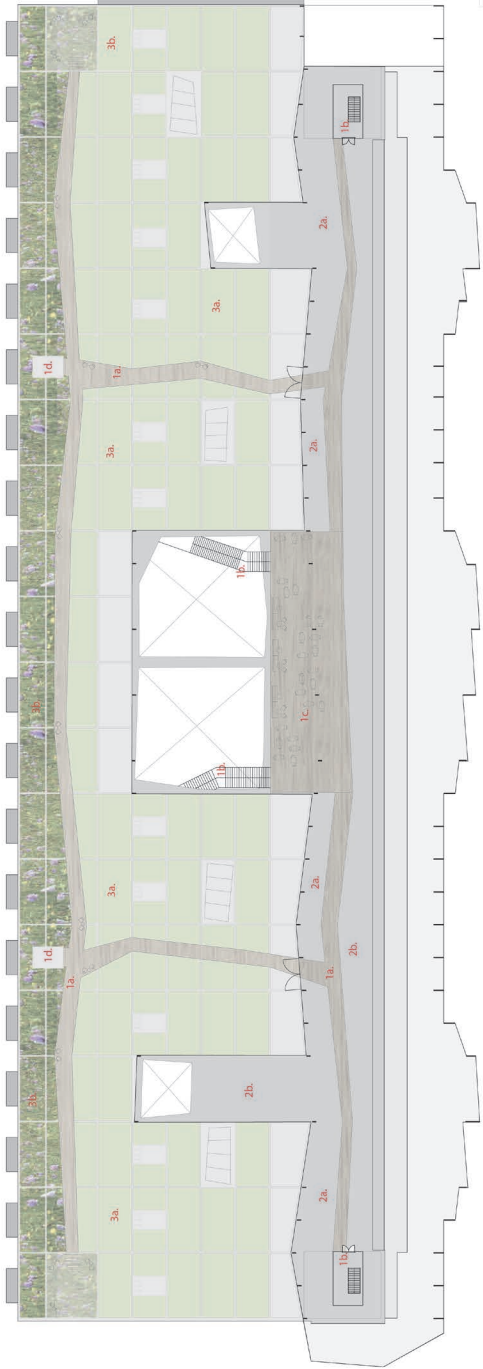
Ground floor



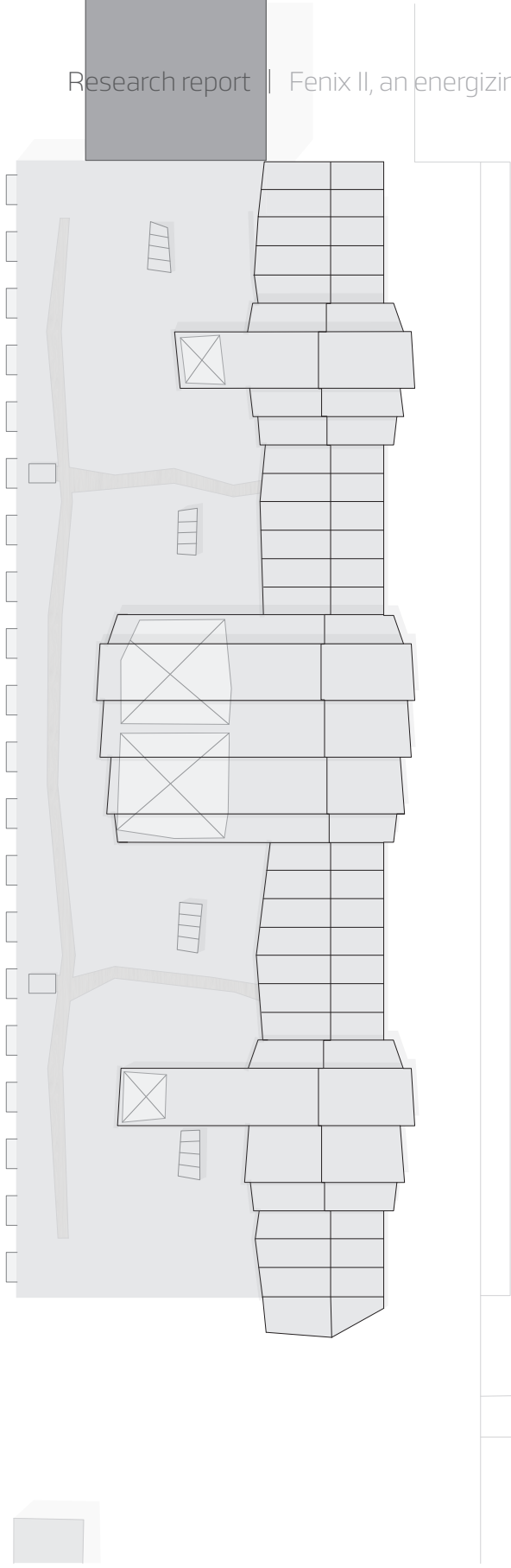


- 1a. Hallway
- 1b. Exposition
- 1c. Workplace
- 1d. Balcony
- 1e. Office corner
- 2a. Drawing room
- 2b. Painting room
- 2c. Graphic design
- 2d. Webdesign
- 2e. Theory room
- 3a. Screen printing
- 3b. Photography
- 3c. Dark room
- 3d. Theory room
- 4a. Ceramics / Pottery
- 4b. Sculpting
- 4c. Theory
- 5. Offices
- 6a. Toilets
- 6b. Theoretical room
- 6c. Stairs

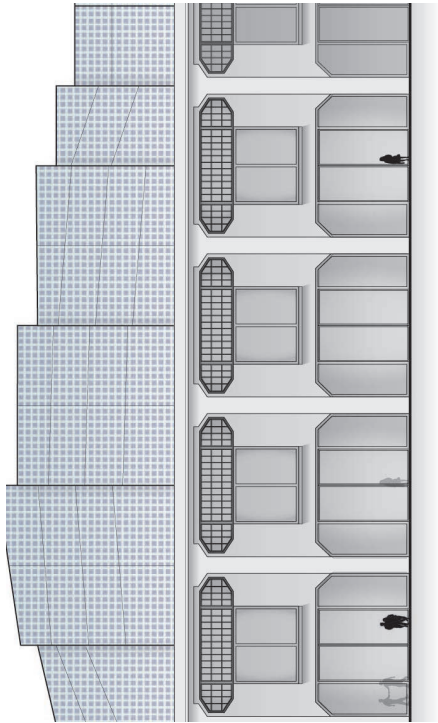
Roof plan



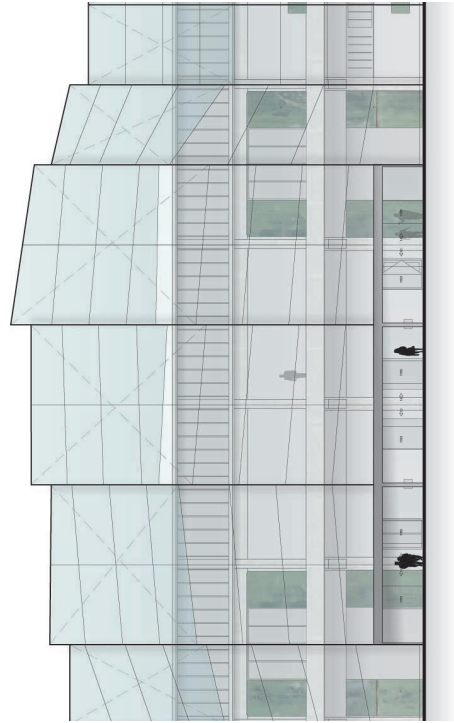
- 1a. Circulation
- 1b. Stairs
- 1c. Terrace
- 1d. Elevator
- 2a. Greenhouse
- 2b. Hydroculture growth beds
- 2c. Fish tanks
- 2d. Roof garden
- 3a. Vegetable garden
- 3b. Wild garden



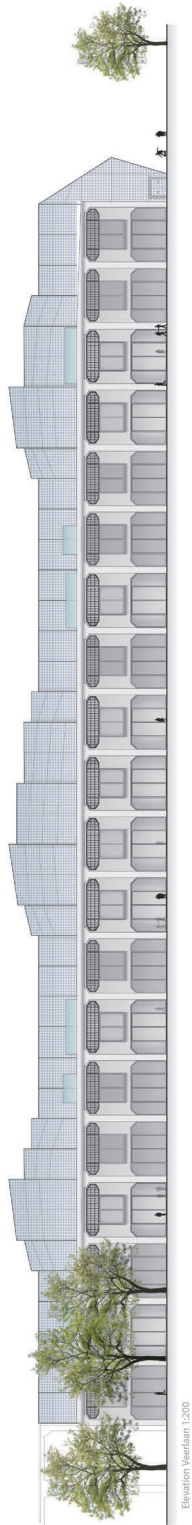
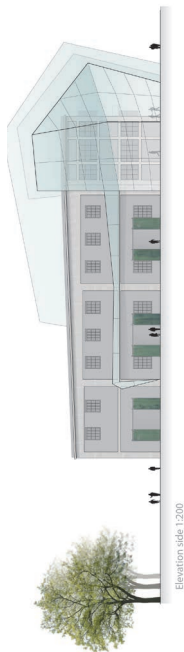
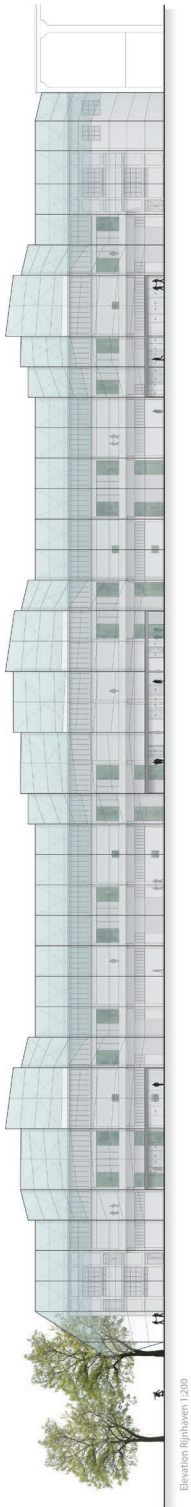
Roof elevation



Detail Veerlaan elevation (south)



Detail Rijnhaven elevation (north)



Building management plan



Information desk occupied
central point of contact



Entrepreneurs jointly responsible
for building management



Main part of the building
open for the public



Gym

22.00
18.00

3. Open for fitness
and group classes



Art centre

8.00
9.00

1. Receptionist
present at central
information desk

2. Workspace and
exposition public
accessible

3. Ateliers separately
accessible and open for
classes and workshops

17.00
17.00



Garden

9.00
10.00

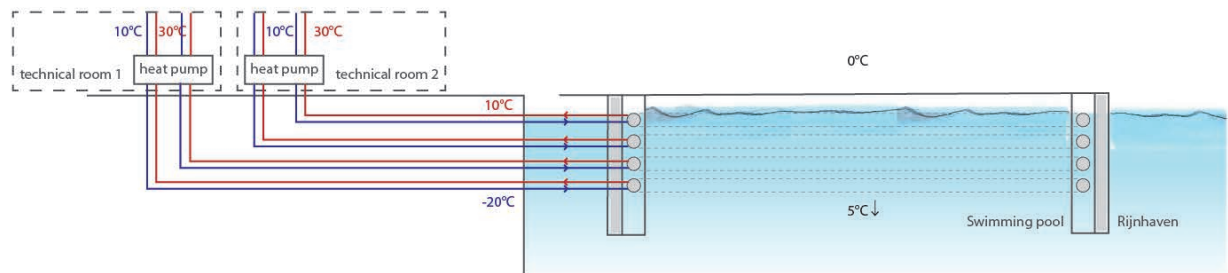
1. The roof farmer
takes care of the
garden's manage-
ment and main-
tenance

2. Roof terrace
open for public

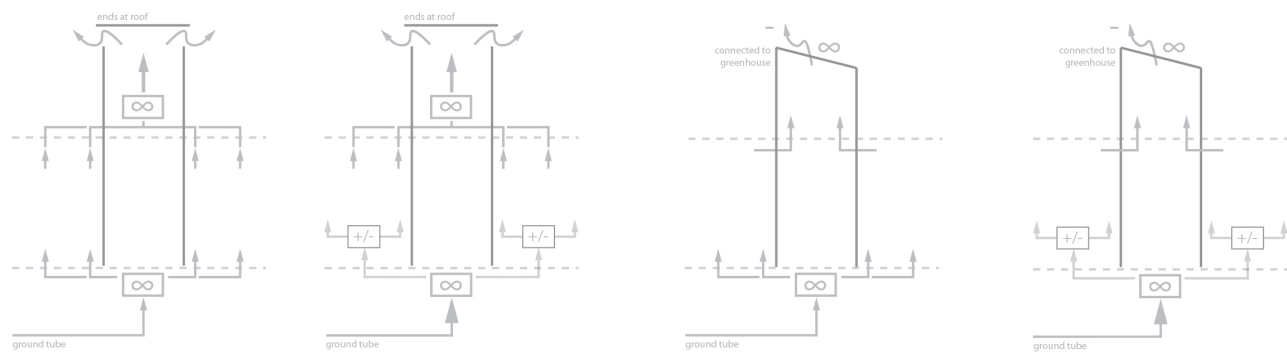
3. Ateliers are separately
accessible and open for clas-
ses and workshops

17.00
17.00

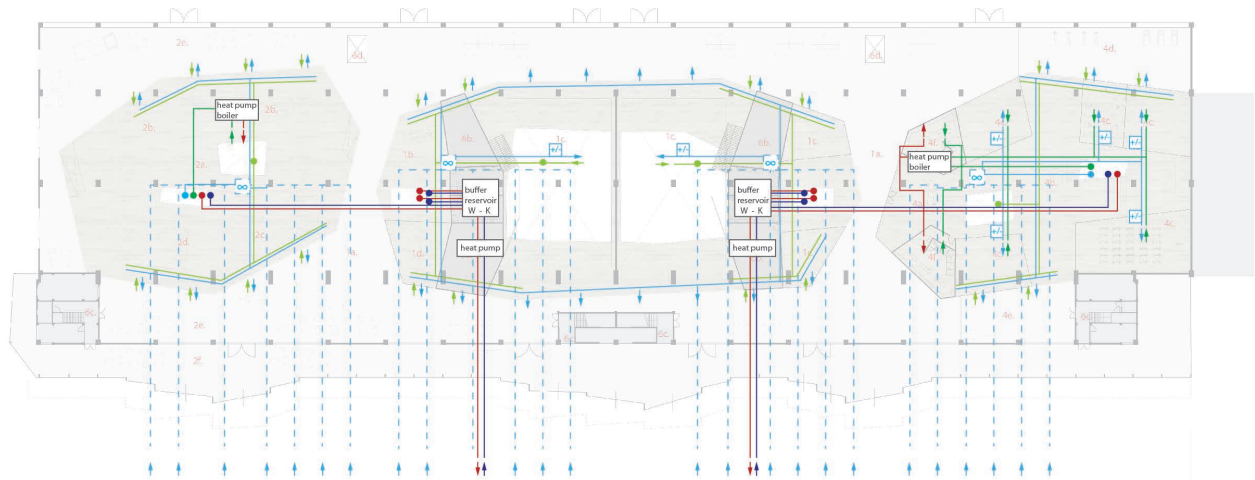




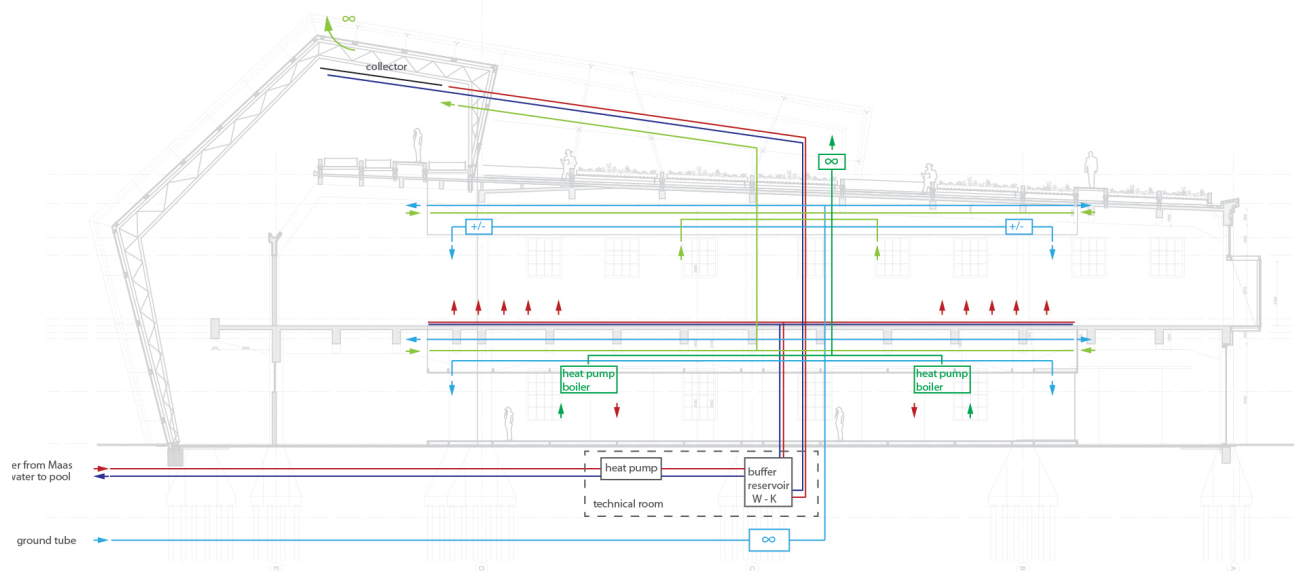
Scheme urban swimming pool/ skating rink



Scheme ventilation



Climate scheme in plan



Climate scheme in cross section

APENDIX 3. CALCULATIONS

ENERGY | To explore whether it is realistic to say that the building can generate the power it needs, calculations are made. First the required energy of the building is estimated and thereafter the amount of energy that can be generated by the building is calculated.

The number of square meters and average consumption per function leads to an estimate of the total energy consumption of Fenix II. Key figures of similar functions as described in a recent benchmark (Sipma, 2016) are used for the specific functions in the building. For example, the culture centre will largely be similar to an educational function. Furthermore, the market's kitchens are comparable with hospitality while the surrounding market place doesn't really use a lot of energy. Therefore also the activities and occupation of the various spaces are taken into account. In addition to the electricity consumption, the required energy for heating is included in the calculation. For this, a heat pump with a COP of 4 was taken and the average required heat of 15 kWh / m² (Van den Dobbelaars, Huijbers, & Yanovshtchinsky, 2012). The adjacent table shows what the energy consumption of Fenix II will be.

The solar panels on the new facade provide the energy. In addition, choices in the use of the building can also play a role in the energy supply. For example, SportsArt fitness equipment will provide energy instead of using it.

The roof of 3,500 m² and oriented to the south/southeast and at an angle of 20 degrees, has

building integrated pv cells. It is assumed that the glass panels are for 60% covered with PV. This will convert the, in the Netherlands present 1000 kWh solar radiation to electricity with a efficiency of 18%. The vertical part of the new facade with a surface area of 720m² also has BIPV that, due to the angle, will generate 30% less energy (dezonnepaneelexpert, 2017). However, in winter, due to the low sun, these will be more advantageous.

The gym can have about 40 generating machines that generate energy. This can be based on 160W per user and an average of 6 hours a day (SportsArt, 2017). The adjacent table shows the energy generated by the Fenix II.

NOTE | In these calculation, average figures are used to calculate the energy use. Because Fenix II is a transformation project, it is uncertain whether equivalent performance could be achieved with regard to insulation and infiltration. On the other hand, energy savings due to the solar collector and pre heating or cooling of ventilation air, are also not been included. Altogether, the calculation can be seen as a good approximation of Fenix' II energy potential.

Energy use

	kWh/m2	m2	kWh
Food market	25	2000	50.000
Market kitchen	100	300	30.000
Culture	35	6400	224.000
Ateliers	40	1500	60.000
Sport	35	1500	52.500
Heating	3,75	6000	22.500
Total kWh			439.000

Energy generation

	kWh/m2	m2	kWh
Solar panels roof	108	3.500	378.000
Solar panels roof vertical	76	720	54.432
Eco power fitness series			14.000
Total kWh			446.432

Energy calculations for Fenix II

WATER | To investigate what the savings of Fenix II can be on tap water, the amount of rainwater is calculated. Next, there will be investigated if this is enough for toilet flushing. The grey water cycle could within the scope of this project not been calculated due to missing figures, here only the qualitative contribution is described.

In the Netherlands, the average rainfall is 0.065 m^3 of water per square meter a month (Pötz & Bleuze, 2012). The rainwater to be collected, can be calculated by taking the roof surface of the new facade with a ramp to the street side, that is 3500 m^2 . After all, the rainwater drainage is located at this side. Next the outside roof area without roof garden is added. That makes the rainwater collecting surface about 4300 m^2 . With this a drainage coefficient of 0.95 is valid (Pötz & Bleuze, 2012). Obviously, rain will fall on the roof garden. With the application of a garden that is similar to a light-intensive green roof, 70% of the rainwater will be buffered. Partly this will be taken by the plants. The remaining part, about 40% will gradually be drained (Pötz & Bleuze, 2012). So the roof garden will only need extra water in times of drought. Buffer capacity helps to prevent overload of drainage and sewage in times of heavy rainfall. Together 375 m^3 of rainwater a month can be collected.

To make an estimation of the use of water for toilet flushing, different assumptions were made for the functions in Fenix II. For the art center, an average occupation of 200 fte's is taken. One person uses an average of 16 L for toilet flushing a day (Pötz & Bleuze, 2012). It is assumed that the building is being used in this way 6 days a week. However, for the market and the sports centre, it is better to take the visitors figures to calculate

with. The food market can get half a million visits a year. That's an eighth of the Markthal in the centre of Rotterdam and a quarter of De Hallen in Amsterdam, two large and well-known examples of a market hall. Not every visitor will use the toilet. Therefore, the number is reduced by 50%. A visitor uses 5.7 L of water for toilet flushing a use (Vitens, N.D.). The gym will have about 2000 members of which will sport on average once a week. The adjacent table shows the toilet water consumption of Fenix II. So, in Fenix II, 100% of the usual used drinking water for toilet flushing, can be replaced by rainwater. Even 130L a month will remain.

Then the grey water contribution. In Fenix II, water from the kitchens in the market, the showers in the gym and the sinks and pantries in the art centre will be purified and reused. This can be connected to urban greenhouse water purification system (Urbanfarmers, 2016). After purification the water can be used for gardening and cleaning.

Water use

	visitor/month	fte	L / user	m3
Market	40000		5,7	114
Culture		200	16	80
Sport	9000		5,7	51

Total m3 / month 245

Rainwater collected

	m2	%	m3
Glass roof surface	3500	0,95	216
Uncovered roof surface	800	0,95	49
Roof garden	4200	0,4	109

Total m3 / month 375

Toilet water use calculations for Fenix II

FOOD PRODUCTION | In order to investigate what Fenix's contribution may be regarding the production of food, calculations have been made. To do this, reference systems, suitable for the created spaces in the design, are used. First of all, the possible yield of these systems is calculated. Thereafter is explored what this means in relation to the need of Katendrecht.

Starting with the calculation of the food yield of Fenix II, the aquaponic system in the greenhouse and the Rooffood system in the roof garden are examined. According to Urbanfarmers, at least 1000 m² of greenhouse space is needed for a well-running greenhouse with sales opportunities (Urbanfarmers, 2013). The greenhouse on the roof of Fenix II is about 2500 m² including space for terrace, circulation and qualitative space. In the end, there will be net 1600 m² for hydroponics and aquaculture in food production. This is just a bit more than the production space of the UF reference project, De Schilde in The Hague, known as Europe's largest city farmhouse (Urbanfarmers, 2016). De Schilde has a crop yield of 45 tons of vegetable and a production of 19 tons of fish a year. Thus, the maximum yield of the Fenix II greenhouse can be the same. But, because of sustainability and social considerations no light is added to the greenhouse during the night. That will result in a lower yield production than a production greenhouse. Therefore the figures are reduced by one third.

To estimate the contribution of Fenix II on the vegetable need of Katendrecht, is calculated with average values. The actual yield will depend on specific choice of species and intensity of production. On average can be count on a yield of 4 kg per m² and three till six harvests a year

(Mensink, 2015). The roof garden of Fenix II is 5500 m² including space for circulation, the wild garden and recreation. In the end, there will be net 3000 m² available for vegetable production. This results in a vegetable production of about 48 tons of vegetable a year.

Next, the vegetable needs of the residents of Katendrecht needs to be explored. For this purpose, a daily consumption of 150g for children, 200g for adults and 150g for the elderly is taken (Mensink, 2015). The next table shows how the total need for the 4601 inhabitants of Katendrecht is calculated.

In the end the 78 tons of vegetable produced at the Fenix II, will cover about 25% of the vegetable need of Katendrecht.

Food production

	kg/m2	m2	kg
UF system vegetable		1200	30.000
UF system fish		400	12.667
Rooffood system	3 x 4	3000	36.000
Total kg			78.667

Vegetable need Katendecht

	number of people	kg/day	kg/year
Children	1012	152	55.480
Adults	3083	617	225.205
Elderly	506	76	27.740
Total kg			308.425

Food production calculations for Fenix II

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