TÉCNICO LISBOA

STRATEGY FOR TRANSFORMING AN INDUSTRIAL CANAL ZONE

Reusing the sources of Breda harbour

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Jury

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ABSTRACT

This report describes and justifies the project developed while doing the Erasmus mobility program at the Techich Universitat of Eindhoven, being submitted as the graduation report to the Integrated Master in Architecture at Instituto Superior Técnico. The project was developed in the design studio 'Industrial waterfronts_ transforming "the kanaalzone" of Breda'. The studio proposed to transform and renovate the industrial area in the north of Breda, being aware of the potential which a waterfront has in the renovation of the city.

The industrialization process transformed dramatically the urban landscape. Large structures implanted on harbor areas have been changing the morphology of cities, as well as their cultural, social and economic dynamics. After the Industrial Revolution and the period of glory, the industry had changed its productions systems, what consequently resulted in a relocation of the industry. As a result, all its built structures, were left behind, and have gradually been falling into decay. In recent years, some derelict industrial sites have been reclaimed, some of the new design strategies focused on the sustainability, quality and multi-functionality of the space, with attention to historic, socioeconomic and cultural aspects.

The investigations into theoretical and built sources became crucial in the design process, what is reflected in the report structure. The report is divided in three parts: the first one representing the research topics, the second one a propose of a strategy to implement an idea which is capable of regenerating the whole industrial area, and the last one represents the development of one specific building in order to prove the validity of the overall plan.

The main aim of this report is to present an strategy to renew the industrial area of Breda, integrating it into the city adding value to it, while taking into consideration its industrial heritage identity and the ecological concerns present in the rethinking of the city. At the same time, it means to demonstrate the versatility and potential of industrial waterfronts through the adaptation of new programs that are able to generate a new life in this areas.

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Breda | Industrial Heritage | Reuse | Urban Agriculture | Cooking school

RESUMO

O presente trabalho descreve e justifica o projecto desenvolvido durante o programa Erasmus na Techich Universitat of Eindhoven. O projecto foi desenvolvido na disciplina designada por " Zonas Industriais - transformação do "kanalzone" de Breda", cujo objectivo proposto seria a revitalização da area industrial localizada na zona norte da cidade de Breda, tendo em consideração o enorme potencial de frentes ribeirinhas como actor na renovação da cidade.

O processo de industrialização transformou dramaticamente a paisagem urbana. A implantação de estruturas em zonas portuárias alterou a morfologia das cidades, bem como a sua dinâmica cultural, social e económica. Após as Revoluções Industriais e o seu período de glória, a industria alterou os seus sistemas de produção, o que consequentemente resultou na deslocação da insdústria, deixando para trás todas as suas estruturas, as quais entraram gradualmente em decadência. Recentemente, zonas industriais obsulentas têm sido recuperadas, sendo, em alguns casos, orientados para a sustentabilidade, qualidade e multifuncionalidade espacial, dando especial atenção às caracteristicas históricas, socio-economicas e culturais.

As pesquisas teóricas e exemplos construidos foram cruciais no processo de desenvolvimento arquitectonico do projecto, o que se reflectiu na estrutura do trabalho. Este, é composto por três partes: a primeira, dedicada aos tópicos de pesquisa, a segunda propõe uma estratégia para revitalizar a zona industrial em declínio, e a última apresenta o desenvolvimento da proposta através da reabilitação de um edifício concreto, tendo como objectivo provar a viabilidade do plano na sua globalidade.

O objectivo principal deste trabalho é apresentar uma estratégia de recuperação desta zona industrial, integrado-a na cidade e acresentando-lhe valor, tendo em conta a sua identidade e herança industrial a par dos aspectos ecologicos na requalificação da cidade. Igualmente importante, é demonstrar a versatilidade e as potencialidades das zonas industriais mediante a adaptação de um programa gerador de uma rejuvenescedora vida urbana .

Breda | Património Industrial | Reutilizar | Agricultura Urbana | Escola de Culinária

INDEX

LIST OF ABREVIATIONS

BC	Breda Canal
IST	Instituto Superior Técnico
TU/e	Techich Universitat of Eindhoven
SA	Source: Author's
S	Source
UNESCO	United Nations Educational, Scientific, and Cultural Organizations
TICCIH	The International Committee for the Conservation of the Industrial Heritage
WHIM	World Heritage Industrial Monuments
OMA	Rem Koolhaas Office
UK	United Kingdom
ICOMOS	International Council on Monuments and Sites
FIEN	Federation Industrial Heritage of the Netherlands
vs.	Versus
et al	And others
MB	Municipality of Breda
AMB	Aquiver of the Municipality of Breda
WWI	World War I
WWII	World War II

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1.2_ Motivation

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1 INTRODUCTION

1.0_INTRODUCTION

This report describes and justifies the project developed during the year 2011/2012 while doing the Erasmus mobility program at the Technich Universitat of Eindhoven, in the Netherlands. The project was developed in the design studio 'Industrial waterfronts_ transforming "the kanaalzone" of Breda', supervised by Dr. Arch. Irene Curulli. This studio is included on a research of five industrial canal zones in Dutsch cities. The fundamental aspect of the studio is the transformation and renovation of industrial places and buildings being aware of the presence of water and its sensitive impression.

The project started with a research on industrial waterfronts projects and industrial reused buildings; this first step became important in order to develop the sensitivity and the criticism about the subject. The analyses of the place, as well as the understanding of Dutsch life style and the strong connection between the Netherlands and water, were vital to create an urban strategy. To be conscious about the qualities of Dutch cities and the impact of industrial areas, it was helpful to travel both in the Netherlands and Germany, which influenced the work process. The project culminates with the development of a reuse possibility in one of the industrial buildings at the studied area.

Readapting industrial sites to both present and future needs, has become an important subject in the last 25 years. Cities are dynamic, places of social and cultural interaction. With the rearrangement of the world industry polices, priorities and its migration of the industry. Large areas that used to have a busy life, have been converted into death areas. A transformation and gentrification of an industrial area is related to the reuse of the space that does not have an active life anymore. To improve the life quality of the inhabitants it is necessary to predict the future without forgetting the past. The identity and memory of the place must be reflected and respected considering the goals of the project and its physical conditions. The existent opportunities may be used as a motivation to create an active project which responds to the current needs.

Society is changing and sustainability is an important issue currently. The increasing of the population in urban areas multiplies the needs of inhabitants and consequently, urban conflicts. Every project is an opportunity to improve the urban environment and develop physical situations which contribute for a better society. Understanding the real situation, creating interactions between resources and territory; having special care about ecological, social and economic issues are preoccupations that meant to be developed in this project.

The practical work is one answer to the questions related to reuse of industrial heritage, which concerns the historical preservation. At the same time it presents a sustainable system and urban facilities.

1.1_OBJECTIVES

This report aims to present the architectural and theoretical thoughts during the design process and underline the most significant points of the project. Its aim is also to stimulate the debate about the covered subjects, to understand other possibilities of reuse and transformation of the city and provoke architectural thoughts reflecting its social and cultural implications.

The territory is a complex mixture of nodes and networks, places and flows, where multiple relations, activities and values co-exist. Consciousness on urban problems, physical barriers and the potential of the area are the main tools that will guide the work and help guiding the urban strategies.

In the studio, the importance of clarifying some definitions in order to develop the project was highlighted: Where does the intervention occur?; Why are we doing it?; For who?; How are we going to do it?

In combination with these questions four main preoccupations had been considered: re-thinking an Industrial Heritage area having the conscience of its value; maximizing the potential of a waterfront; finding one use that will revitalize this urban area; and having a sustainable proposal in which reuse is a global aspect. The subject of these main goals is developed indicating several possible ways and raising concerns:

- Industrial heritage is one part of the city and, to some extent, a part of the history and identity of a city. Respecting this legacy and conserving its memory is a part of the job of an Architect, in order to create a better environment in the city.
- The urban waterfront provides possibilities to create parts of the city that enrich life, offering public space, as well as functionality. The creation of public space raises questions concerning the lack of green spots in the city.
- Understanding the local community needs and combining that with the potential of the area, involving and inspiring whole communities. Those are the starting points to find a good program for a specific place. The program is one of the keys to a successful renewal area. However, investigation and demonstration about the versatility and potential of industrial buildings is also important.
- Talking about transformation has always raised the issue about reuse. The process of the work has started with the question: what are the opportunities of restructuring existing buildings within the context of the city? To propose an ecological system which will improve the biodiversity of the city, having sustainability in mind.

1.2_MOTIVATION

The theme of reusing industrial areas was presented during the design studio of 'Industrial waterfronts_ transforming "the kanaalzone" *of* Breda'. Since then this subject had been appealing to me, I saw it as a way to think about the changes of industrial buildings in their own lifetime, as well as the process of adaptation to the current reality and the necessary physical conservation. All this process generates urban problems and virtues, which directly enriches urban identity.

The historical past of Industrial areas is linked to production, which has been changing through the years. It is imperative to think about the new uses that these abandoned areas can support in combination with the needs of the surrounding communities. Discovering new uses reflecting the old programs and forecast how those places life will be in the future is exciting.

fig. 1_ Belcrum port_ the materiality and atmosphere of the place

Developing Industrial Areas that had become obsolete along the time is a topic extraordinarily rich both in space and time terms. Industrial buildings can provide a uniquely attractive atmosphere that is an indicative of an inherited beauty; its industrial shapes, the materiality of the buildings and the rough appearance bring to the user a journey through time. The circumstance of the area, being a waterfront, also provides a particular richness which has been another motivation.

Tackling this area has also been exciting, due to the transformation and reuse of industrial buildings that have a unique atmosphere and the creation of more livable urban environments.

1.3_STRUCTURE

To help understanding the process of this report, the structure is presented in three chapters, additional to the introduction and conclusion. The first two are related to a research that allows a better comprehension of the local situation and the subjects that will be covered on the project. The last chapter describes the whole Project progression.

1_Introduction_ It contains the overview of the report, its objectives and the author's motivation to select the subject.

2_Project framework_ It is the explanation of the circumstances in which the project has been developed, the objectives of the assignment, the methodology used during the process, the location and characterization of the area and the historical, cultural and political background.

3_Pré-Project research_ The project started with an investigation on different themes related to the transformation of industrial areas. The research followed the work and was crucial to justify the project decisions. The themes that more strongly influenced the work were mainly related to ways of reusing. This chapter is divided into two parts, the first one gives consciousness about industrial heritage features, what has been made in other projects, which are the possibilities of reinventing industrial places and how industrial buildings can be adapted to different uses without damaging its past.

The second part, focuses on studying the ecological sustainability of the city, the relation between nature, city and agriculture and how they can take advantage from each other. Sustainability is also seen as a reuse of natural resources. How the land and water can be intentionally adjusted to create a good urban environment. Typologies and benefits of urban farming were also studied; their importance in the improvement of life quality for populations and in the enrichment of urban biodiversity.

4_Project_ Describes the adopted decisions and presents the project. This section is organized in three parts: analysis of the area, explanation of the urban strategy, and development of the idea by reusing one of the industrial buildings in the area. The mental process is also described with graphic elements, which help in the full understanding of the proposal.

5_Conclusion_ Reflects the validity and sustainability of the proposal taking into account the academic process and the suggested goals. The reflection of the impact that this project can have in the future is the main feature of the conclusion.

2 PROJECT FRAMEWORK

2.0_PROJECT FRAMEWORK

To explain the process and the final product of this study-case it is necessary to clarify the context in which it was developed. This section is organized in three main chapters where the circumstances of the studio, the location, and the historical, social and political situation, will be explained.

Assignment framework _ In this sub-section the characteristics and objectives of the studio, its guidelines and restrictions will be explained. Being this an academic work it is also necessary to be aware of the pedagogical method and the learning process.

Physical framework _ Each place has its own individuality, the qualities and characteristics of the place are described here. The knowledge of the location, its insertion in the Netherlands and Europe will contribute to a better understanding of the geography and its influence. In this chapter the characterization of the area, the general urban characteristics and the specific features from each individual area are also presented.

Historical Framework _ The evolution of Society was never disconnected from the historical past; native memories and the identity of the place should be mentioned for a better comprehension of the Dutsch society. Summing up, this chapter explains the history of the Netherlands and Breda, its origins and how the industrial revolutions transformed the morphology of the city. It is also explained the current context of transformations proposed by the Municipality of Breda and its entailment.

2.1_ASSIGNMENT FRAMEWORK

The studio assignment is an exercise that takes into consideration the needs of the city and the urban problems, leading to rethink and reorganize one specific area. The confrontation with the complex real circumstances of the city brings to the architecture student one more conscious vision on urban reality. This reality must be seen as a guide to the project and not as a restriction.

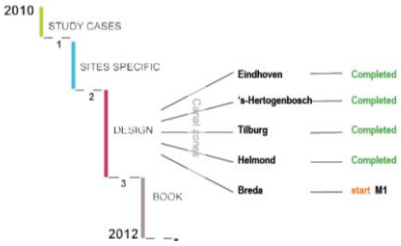

fig. 2_Planning of the research in waterfront industrial places

The “water front studio” is an investigation that started in 2010, divided into five semesters. The five cities, Helmond, Tilburg, Heindhoven, s’Hertogenbosch and Breda have an industrial past and all of them are linked by one water circuit. The studio was divided in two parts, the first one proposes the elaboration of a strategy to the waterfront site, focusing on the industrial area; in the second part, a limited area should be developed, selecting a portion of the design strategy.

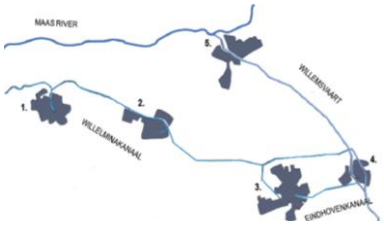

fig. 3_ Water circuit through the five cities of the

Without restrictions but always with coherence it was given to the student the freedom to take his own decisions: after analyzing the situation, he was asked to point out the urban problems, create a strategy to improve the urban quality of the area, compose a generic program for the intervention, choose one specific area or building to develop, create a detailed program for it and respond with an architectural solution. Total freedom was given in order to encourage a motivated student to develop his capacity of dealing with future roles and responsibilities of an Architect. However, it was asked by the responsible of the studio to prove the validity of the proposal by answering the following questions: why, where and how[1] the project would be developed; it was also asked to be coherent in the made decisions.

To propose a constructive urban transformation it is indispensable to read the site, understand what the population needs, explore the existent opportunities and have a critical approach to the current situation. The creation of a hierarchy with the issues, the primary needs, the actions and desires, is the basis to trace the objectives and requirements.

Creating a program that will correspond to the needs of the inhabitants is vital to the success of the intervention. The guidelines of the municipality are a complex set of circumstances that combine social, political and economical issues. Merging the real needs and the interpretative needs can be the key to find a right program to a right place, optimizing resources.

[1] Questions presented in the article Le Corbusier in FOCUS periodical, number 1 summer 1939, in which he approached the topic teaching architecture.

2.1.1_METHODOLOGY

Every architectural intervention has its own heart. However, the creation derives from a manifold knowledge, formed in a continuous research on life. The methodology of the studio is centered on the research and on an exchange of experiences. Seeking and interpreting what has been developed in similar examples and exploring spatial modeling are essential contributions to the design evolution and, at the same time, sustain the creation of new solutions.

The beginning of the assignment starts with a research focused on 9 topics:

1 _ Architecture and water
2 _ Industrial footprint vs. City gain
3 _ Industrial building: anonymous building
4 _ Strategies of Public Space
5 _ Relationship Old/New
6 _ Construction issue in transforming old into new
7 _ Material and recycling
8 _ Memory
9 _ The invisible layer

The research was not just important as a starting point but also as a permanent investigation. Becoming aware of similar designs and architectural thoughts was vital to develop sensitivity and criticism about the subject.

Making models was one tool to be used as method of the design process to refine judgments and decisions. Building the models would allow to understand the system being developed, it is the closest way of visualizing the transformation; it can be used as a motivation and communication of the design.

The participation of the class was fundamental to create healthy discussions between colleagues and teachers. This international studio gathered architecture students from six different countries, whose cultural and academic skills generated different backgrounds. The different points of view and the following discussions created a rich environment of architectural production.

The active involvement of the Municipality of Breda created a bridge between the academic world and the reality. On the first meeting urban problems, the inhabitant's needs and the urban strategies proposed by the Municipality were exposed. To culminate the studio, the students presented the ideas developed to the Municipality causing an active relevance in future progressions.

2.2_PHYSICAL FRAMEWORK

2.2.1_LOCATION

The Netherlands, located in the North-western Europe, has an exceptional geographic location, bordered by the North Sea, Germany and Belgium. It is the 10th most populated country in Europe. The project is located in the city of Breda, implanted in the region of North Brabant. This region, located in the south of the country and bordered by the Meuse River in the north, is mostly flat although nearly every part is above the sea level. Urban areas are the more populated ones; however, there are a lot of villages spread around the province. Together with the Rhine valley, North Brabant is the most densely industrialized region in Europe.

Breda lies near the Belgian frontier in western Nord-Brabant, at the junction of the rivers Mark and Aa. The confluence of the two rivers influenced the round shape of the inner city. The Industrial area is located in the north of the city center, nearby the central railway station.

fig. 4_ Netherlands in Europe

fig. 5_ North Brabant and Breda in Netherlands

fig. 7_Industrial area in Breda_ Studied area

fig. 6_ Plan of Breda

2.2.2_ CHARACTERIZATION OF THE AREA

fig. 8_Vinkstraat in Belcrum District

fig. 9_ Speelhuislaan Street

fig. 11_ Belcrum Haven_Backer en Rueb factory

fig. 12_ Belcrum Haven_ Manitowoc Company

The studied area has a favorable location; it raises the value of the land and increases speculation because it is situated near by the railway station. It is a mix of consolidated living neighborhoods and an extensive industrialized area where some industries are still in activity, others were abandoned and some of them have just been demolished. This fragmented area is a result of an industrial past where urban regeneration has been acting slowly over the years. The irregularity of the zone is expressly visible on the borders between the industrial and housing areas, creating tensions and conflict zones. These two different morphologies have strong opposing identities.

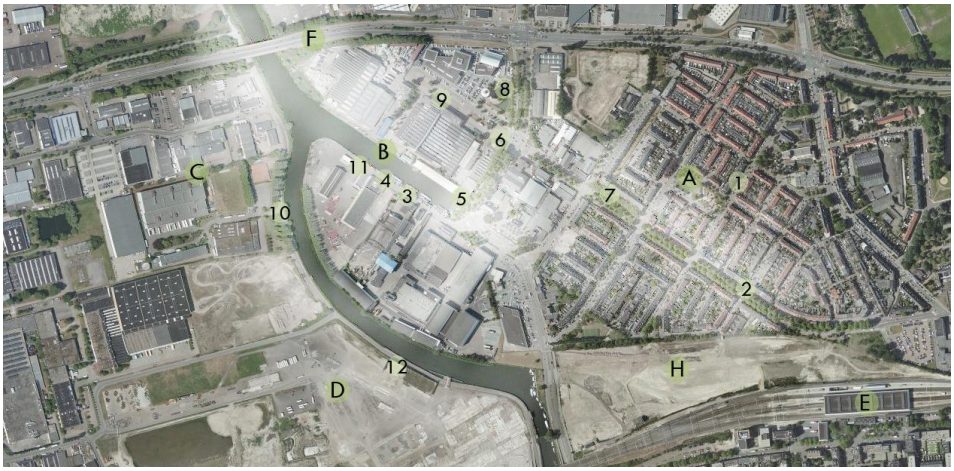

fig. 10_ Plan of the Industrial area

A – Belcrum Neigbourhood	1-fig.8_ Vinkstraat Street	7-fig.15_ Cross section
B - Belcrum Haven	2-fig.9_ Speelhuislaan Street	8-fig.16_ Water Tower
C - Industrial active area	3-fig.11_Backer en Rueb factory	9-fig.17_ Backer en Rueb factory
D – Indusdustrial demolish area	4-fig.12_ Manitowoc Company	10-fig.18_ Markkade Road
E – Train central station	5-fig.13_ Living boats	11-fig.19_ Canal
F – Backeren Ruebweg Road	6-fig.14_ Artiste studios	12-fig.20_ Demolish area
H – In construction (offices)		

The Belcrum district is a typical Dutsch housing neighbourhood where streets have a suitable size; the rows of trees and the green space in front of the houses create spatial quality providing the feeling of safety. In the same neighbourhood we find Speelhuislaan, an important street in the urban structure of this area. It connects the railway station to the industrial area next to the canal. In this street remains the old rail connection used to transport the locomotives made in the *Ketelmakerij NV Machinefabriek Breda Vh Backer en Rueb* factory. Most of the buildings in the neighborhood are two story high, made out of bricks and holding big windows. A great significance is given to the private backwards where each family has its own outdoors space. There is one small park in the

neighborhood where children often play and which is used by the community for social gatherings. This environment generates a familiar ambience where the inhabitants can stay together, engendering a quiet and peaceful feeling.

Contrary to the consolidated neighborhood, the "Belcrum Haven"[2] is mainly surrounded by industrial constructions with large dimensions; some of them are nineteenth century buildings with an important historical value and a characteristic industrial look. Others are prefabricated buildings which contrast with the old industrial structures. Next to the majority of industrial buildings, there is an un-built space that is being used for functional practices, such as trucks parking and circulation. Because those areas are private, the lack of urban public spaces is aggravated, being difficult for the public to reach the canal and get benefit of its qualities.

The configuration of this area is disordered, with different morphologies and non-resolved urban connections, where a clear lack of cohesion is visible. However, in some specific features the life on the port is still intensely lived. The housing boats, located at the end of the canal, the artists and designers that have reside in certain old industrial buildings, certain uses like small car workshops and second hand shops create a peculiar and unique identity.

fig. 16_ Cross section between the Speelhuislaan street and Minister Kanstraat

The Speelhuislaan is the street originated in the Belcrum district going towards the industrial area; its configuration has two different physiognomies since it passes the Minister Kanstraat. The part which is closest to the district has a familiar approach, whilst on the other part, the street is transformed in a big size road where there is intense traffic and pre-fabricated selling stands. There are a few buildings that give identity to the street, like the Water Tower, the old offices and a factory of the company Backer en Rueb.

fig. 13_ Living boats

fig. 14_ Artistic Studios

fig. 15_ Water Tower

fig. 17_ Old offices of the Backer en Rueb Factory

[2] Haven means port in Dutch.

fig. 18_ Markkade Road

fig. 19_ Canal with housing boats seeing the Veillingkade street

fig. 20_ Demolish area

Looking to the plan there is a visible different morphology between the river Mark and the artificial canal; the river comes from the inner city, where it has a smaller length, and goes towards the rural outskirts of Breda. The canal is a punctual extension of the river, built to give access to the industry by boat. Both have public access just on one side, the Markkade Road in the west side of the river and Veillingkade Street in the west side of the canal. It is detectable a differentiate public on both water front zones, which is influenced by the functions of its surroundings; next to the river, it is usual for the companies' trucks to pass, and in the canal, that who lives in the housing boats or work in the surroundings is the one taking usufruct of the canal.

In the Veillingkade Street there are a few small scale buildings which have their own size-adjusted functions, such as small shops or housing. This street does not have a vast affluence of public. However, the visual impact of the Backer en Rueb factory and its reflection on the canal creates a representative image to the harbor area[3].

Along the Markkade Road there are two conflict situations, several industries which are operational and one vast demolished area. The industries stimulate heavy truck traffic along the river, there is no bicycle path and the walkway does not have an appropriate dimension. All these features contribute to the lack of urbanity; this, with the unbuilt area provokes an atmosphere of insecurity and fearfulness. However, the Markkade Road has an enormous potential. There is a long way next the river with remnants of trees and vegetation, which assumes a charismatic atmosphere. The Municipality of Breda intends to construct a new housing area into that zone, through urban investigation studies, with the goal of unifying the area.[4]

The large roads with intense traffic create a strong visual and a physical barrier; in some occasions there are green buffer zones to protect the housing area. The Backer en Ruebweg road, located in the north area, is significant in the road network, it connects Breda with Dordrecht and Rotterdam; because of its large dimensions crossing it is difficult, though it is possible to pass underneath it, where it intersects the canal.

Along the development process of reusing this industrial area, the nuclear inspiration for the architect is the currently existing reality (the space and its uses) and needs, which gives suggestions to transform the area and develop the life quality of the inhabitants.

[3] Kevin lynch refers in his book "The image of the city", that it is important that a city creates images as symbols to structure a mental image in the mind of the citizens.

[4] The plans of the Municipality of Breda are explained in the section 2.3.2.2_Municipality directives.

2.3_HISTORICAL FRAMEWORK

2.3.1_NETHERLANDS CONTEXT

The Kingdom of Netherlands was born in the begining of the nineteenth century, though the ocupation of the area is remenence of the Roman Empire. Holland[5] and Belgium were together for long time; Belgium did not have a separate existence until 1831. The "Dutsch national identity emerged during the sixteenth and seventeenth centuries, especially in the struggle for independence from Catholic Spain during the Eighty Years War."[6]

In the WWI Holland's neutrality was respected by both parts. However, the country suffered through interference with its trade. After the war there was a great eindustrial xpansion, based on the coal fields of southern Limburg, and on agriculture; this subject will be developed in the next chapter. In the WWII, The Netherlands remained neutral; nevertheless, it was no avail when Hitler unleashed the invasion in Belgium and The Netherlands on the 10th May 1940. After the war both countries faced the task of reconstruction. Netherlands had suffered from land flooding and from the dismantling of industry, apart from this it had a major problem as a result of the war.

"For centuries the battle with the sea has been an offensive as well as a defensive campaign. As well as preventing further encroachment, reclamation of land by the draining of lakes started the 16th century."[7] The geography of the country will be further presented.

After the difficult years of reconstruction directly after the WWII, the Netherlands sustained in the second half of the 20th century a continuous and fast economical growth. Today the country is one of the most developed countries in the world. The Dutch focused their main energies on international trade, shipping, farming and manufacturing.

Period	Holland	Belgium
1st century B.C. – 5th century A.D.	Roman Empire	
5th century – 9th century A.D.	Empire of the Franks	
10th – 14th centuries	Feudal Period / Allegiance to the Holy Roman Emperor except for Flanders (to the French King)	
1384-1477	Burgundian Rule except for the northern provinces of Holland	
1482-1566	Habsburg Rule	
1566-1648	War of Independence against Spain	Spanish Rule
1648-1713	Independent – the United Provinces	Spanish Rule
1713-1795	Independent – the United Provinces	Austrian Rule
1795-1808	Batavin Republic	French Rule
1806-1810	Kingdom of Holland (under Napoleon's brother)	
1810-1815	In the French Empire	
1815-1830	Kingdom of the Netherlands	
1831	Kingdom of the Netherlands	Kingdom of Belgium

tab. 1 _ Chronological evolution of Netherlands

[5] Old designation of the Kingdom of Netherlands, nowadays it refers to two provinces: North and South Holland.

[6] www.everyculture.com/Ma-Ni/The-Netherlands.html

[7] Ministry of infrastructure and environment, 2011

2.3.1.1_EVOLUTION AND IMPORTANCE OF THE INDUSTRY

The industrialization in Europe had and still has an enormous impact on the society and the landscape. The *époque* of the industrial development and progress had been marked by the first and second industrial revolution in England, letting deep traces on the social, economic and cultural situation. In the first revolution large changes had happened within the fields of agriculture, manufacturing and transportation and these changes subsequently spread from England to the rest of Europe, North America, and finally to the whole world. The second industrial revolution[8] was based on the mass production and urbanization. All these facts were consequences of significant changes in Europe.[9]

The industrialization in the Netherlands did not occur at the same time as in England, Belgium and Germany, was just introduced after 1860. New textile mills were built in North Brabant and in the region of Twent. Around the late nineteenth century the heavy industry began to be implemented increasing slowly due to its high costs. Instead, farming goods were developed and exported and new distilleries and breweries were built. Small companies grew up developing specific products, as the known "Bataafsche Petroleum Maatschapij"[10] from Rotterdam, Akzo Nobel a chemical and pharmaceutical firm and Philips in Eindhoven, which was originally a light bulb factory. Nowadays big part of the industrialization has changed its processes and location, letting behind all the infrastructures, which have an historical value. The interest for industrial heritage arose in the seventies, in the same place where started the industrial revolution, in England, prompting the other countries to begin the industrial archeology.[11]

The demolition of the textile factory Pieter van Doorn[12] was considered a crucial and turning point moment to raise the industrial archeology in Netherlands; it provoked a national opposition to the demolition resulting in a wide spread concern for industrial heritage. Several private sponsors became interested on reuse industrial heritage buildings while several movements occupied vacant factories for living, and the municipalities started to have public initiatives with that propose[13]. In the early eighties it was created the FIEN[14], a corporation which promoted the study and investigation in preservation and management of Industrial Heritage; giving attention to the physical object

[8] In the later part of the XIX century.

[9] Yavuz, E.2012.

[10] Now called Royal Dutch/Shell.

[11] Woestenburg, M. & Bijl, R. 2004, p.27.

[12] In Tilburg, Netherlands, Demolished in 1975.

[13] Nijhof, P. 2004, p.18.

[14] Federatie Industrieel Erfgoed Nederland establish in 1984.

and its conservation, and also the cultural and historical features.[15] In the nineties, larger complexes turn out to be the point of departure of urban redevelopment plans such as the multifunctional projects: the Westergasfabriek in Amsterdam, addressed in the following chapters, and the Belvedera area in Maastricht.

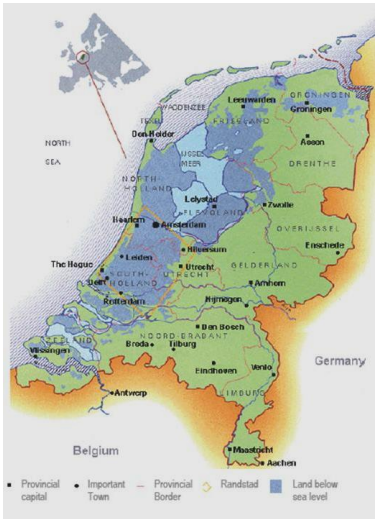

Fig. 21_Netherlands below water

2.3.1.2_GEOGRAPHY

Since very early Netherlands had to live with the presence of the water. The country lies below the sea level, from which it is protected partly by natural sand hills and partly by a vast group of artificial dykes or embankments which were constructed along the centuries.

Living on the edge of land and water offers many benefits. Netherlands had to optimize the potential of the water and control its destructive power. Canals were constructed with the primary purpose of drainage, however, they could also support an efficient transport network. The first form of regular public transport consisted of towed ships along canals, existing since the sixteenth century; canals were important for the industrial development as well. Waterfronts had historically been the staging points of the exportation and importation of goods. The location next to the water was a competitive advantage to many industrial operations. The edge between city and water, production site and its transporting base, represented the most intense area in the nineteenth-century city.

fig. 22_ Main Rivers (5 cities of the study in red)

On the 31st of January 1953 occurred a big flood disaster[16] caused by a heavy storm. Many dykes in the provinces of Zeeland, South Holland and Noord-Brabant proved to be unable to resist the combination of the spring tide[17] and a northwesterly storm. Again, in 1995, the Rhine flood created a tragic scenario. The disasters prompted public and international discussions concerning the preservation of the land and the protection of the population. The debates brought a new project, the Delta Plan, with a new approach giving more space for water.


fig.23_ 16th and 17th century images showing « trekschuiten » (literally translation: towed ships)

To have the right amount of water for water users (human direct consumption, agriculture, cleaning processes, etc.), at the right time, in the right place, and at socially acceptable costs is one of the key targets of the Ministry of Infrastructure and Environment[18]. Encouraging a closer relation with the water where the waterfronts are an important element for a healthy city is one global attitude that had been taken.

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[15] History of FIEN available at: www.industrieel-erfgoed.nl/

[16] Watersnoodramp in Dutch.

[17] Tides are the rise and fall of sea levels caused by the combined effects of the gravitational forces exerted by the Moon, the Sun and the rotation of the Earth.

[18] Dutch Ministry of Infrastructure and Environment, 2011.

2.3.2_BREDA CONTEXT

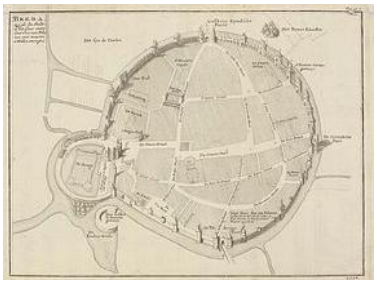

fig. 24_ Breda in 1350

fig. 25_ Breda en 1795

Fig. 26_ Spinuslland street in 1824

fig. 27_ Belcrum port in 1952

In 1252 the area which is now the city of Breda was granted certain privileges in a charter signed by Hendrik IV, Lord of Breda. Later a Brabant nobleman built there a castle attracting farmers, fishermen and sailors who gradually came to the area. Its origin at the confluence of the two rivers has influenced the medieval round shape of the inner city, surrounded by ramparts with only tree gates. The city had tree centers: the Castel[19] with the town hall, the Church and the Market, located on the highest point of the city; outside the gates Ginneken and Boschstraat economic activities took place, transforming the city into a trapezoidal shape.

The construction of a new system of ramparts which were flanked with salient, pentagonal bastions, permitted to offer resistance against the foreseeable military strike; Breda was the first Dutch city which had this type of walls. The city was in this period ravaged by two large fires[20], the first one destroyed especially the west side of the city and a number of houses at the market; the second one was much larger destroying the Town hall, tree Chapels and a large quantity of private houses; only about 160 houses were left. The construction materials were highly flammable, like wood, reeds and clay, which helped to the rapidly fire's spread. After this disaster Henry III studied and applied various schemes for construction of fire-safety houses.

The peace period was interrupted when the Spanish invasions started in 1568, returning to the Breda States' hands only in 1637 after the successful attacks of Frederick Henry. During the seventeenth and eightieth centuries the city was improved and reinforced, forts were built and the canals were widened being connected to the new Brabant Water Line[21] . The canals had not only a defensive function but they also had water management purposes. The military history of Breda and its fortifications around the city determinate the appearance and development of the city; nevertheless, nowadays the ramparts and bastions are no longer in the city, being the most notable feature of the past the canals around the old town.

[19] Dated from 1350 and owned by the rich Dutch nobleman John of Polanen, he constructed the castle after a long stay in Italy, introducing the Renaissance style in Breda.

[20] One in 1490 and the second in 1534.

[21] A connected network of fortifications (frontier cities) and defence lines, was built from Maastricht until Breda and 's-Hertogenbosch in the south, and Zeeland Delta and the Biesbosch in the west.

After the demolition of the fortifications the town had been growing progressively with the addition of new plots; the city was connected by railway in 1855 to Antwerp and Roosendaal, being after extended to Tilburg. Twenty years later the Engineer Frederick William van Gendt designed a plan of expansion with new roads, an urban park, various neighbourhoods and factories.

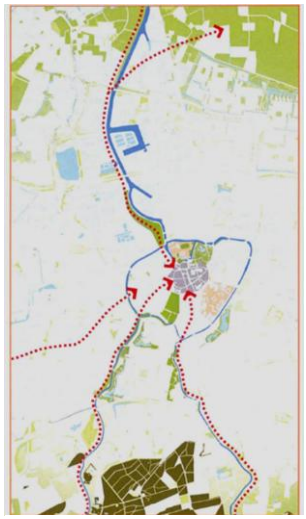

fig. 28_ Water connection to the inner city and to the mass river

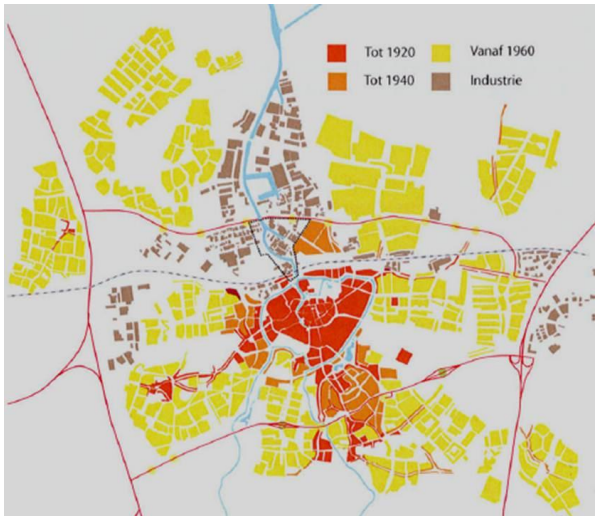

fig. 29_Urban Evolution

2.3.2.1_BELCRUM HARBOUR

In the same place where the Belcrum harbour is located today, there used to be the Playhouse of Nassau in the beginning of the XIX century. Surrounded by a forest it had an octagonal shape being the focus of a number of radial avenues. In 1824 it was sold and demolished.

In the beginning of the XX century the city of Breda started to make a transition from small-scale cottage industries to produce in large scale. However, there was no place destined to large industries in the city; they needed to move to the outskirts of the city, located although, close to water and / or track. In 1918 the city bought the area of Belcrum Polder to accommodate industry and construct social housing. [22] Attracting the companies was difficult, so the Municipality had to invest a lot until they settle in the area. In the thirties the Belcrum district was constructed. Designed by Schaap, the choice of the location to the residential area was deliberated by the usual south-western wind, thus the houses will be

[22] Geest, J. 2002, p.11.

Date	Breda	Belcrum Port
1350	Construction of the Castel	
1490	City fire	
1531-1538	Building ramparts around Breda	
1534	Large City fire	
1536	The Castel is transformed in a Renaissance palazzo.	
1568	Spanish Occupations	
1577	Prince William back to Breda	
1581	Spanish Occupations	
1637	Breda is back to the Dutch orders	
1824		Playhouse was sold and demolished
1855	Railroad to Roosendaal is complete	
1863-1864	Extension of the railroad until Tilburg	
1875	Plan of expansion by Engineer Frederick William van Gendt	
1918	Breda bought Belcrum Polder	The area was a polder of 60ha
1920		Plans to the Belcrum district
1923		Started the digging of the canal/ Auxion of fruit and vegetables
1927	Breda annexed the area of Belcrum	
1930		Architecture of the district designer: dh .Schaap
Until 1970		Heavy metal factories/ starts transformations/ less use
1975	Opening of the new train station	
1979		Closure

tab. 2_chronology of Breda and the Belcrum Port

less affected by the industry pollution. The plan was ambitious and spacious. However, its systematic expansion would promote the city to grow in different times.[23]

The port started to be excavated in 1923, which attracted, some years later, the R.K Barony Serbian Horticultural Society that bought a piece of land in the area and began to produce and sell vegetables and flowers, being the starting point of the industrialization in the Belcrum area. Other companies with related activities had settled down in the area, with a combination of slaughterhouse, fruit and vegetable, creating a market. The industrial character had changed progressively with the occupation of heavy metal factories, the study of the particular factory *Ketelmakerij NV Machinefabriek Breda Vh Backer en Rueb* will be further developed. The production continues to progress until the seventies, when the companies moved and the remaining buildings were demolished. In the nineties many spontaneous associations emerged in the area to present to the Municipality the neighbourhood' problems and share their preoccupations concerning the intentions of the Municipality to renew the area. The association Wijkraad Belcrum Committee is fighting against the gentrification proposed by the Municipality considering it an invasion. On the other hand, the Municipality believes that neighbourhood will not resist to the market and wants to study a balanced plan. [24]

The industrial heritage features have an important role in the identity of the place, with a special attention in the track running in the middle of the central axis of the area, the Speelhuislaan, characterized by rows of trees. This image is also endorsed as a special and rare cultural historical element. The contrast between the large factories and the offices' buildings marks a strong distinction between production and administration. The ambience of neighbourhood is active in one way, with spontaneous occupancy and temporary use of residual spaces; on the other way its large vacant areas provoke a sensation of insecurity. Nowadays, Belcrum is a mix of situations, it has a large-scale industrial area with several vacant buildings and empty demolished areas, juxtaposed with the consolidated residential district and a close-knit road system.

[23] Rijksdienst, P. 2011, p.18.

[24] Werff, H. 2008, p.23.

2.3.2.2_MUNICIPALITY DIRECTIVES

The Municipality of Breda pretends to renovate the industrial area studied in this project; the close railway station is being restructured, including facilities for urban and regional public transport; this transformation may change completely the economic development, being an enormous opportunity to create a better environment for inhabitants and businesses. The work projected to the railway station will have a relevant impact on its surroundings: "The development and exploitation of the Railway Zone will have a big impact on the adjacent neighbourhoods and this implicates that the sight of the neighbourhood will change drastically within ten years. Adding new functions and/or strengthening the existing functions should be seen as a "mega incident" for both neighborhoods"[25]

The industrial historical meaning of the area cannot be ignored; the historical buildings and urban structure herein are a valuable starting point to a renewal[26], the efforts to preserve the cultural heritage permit to emphasize the identity of the Havenkwartier (harbor district).[27] The Municipality plan in 2010 is based on small scale initiatives, public and private, inserted in a urban planning managed by the municipality; the stakeholders who want to invest in the area will corporate openly with the Municipality[28].

The city of Breda, together with five other cities in Brabant, will participate in the European Capital of Culturein in 2018; this event generates an economic opportunity to develop the Belcrum port. Furthermore, the release of the grant funds to reuse historical buildings will permit the factory of Backer & Rueb to have economic support to rehabilitation[29].

In 2009, the municipality of Breda instructed Charles Michel Grocery Loeff to study the Belcrum district, its historical and cultural heritage features and the urban infrastructures. This study was important to development the plan of the area in the context of large-scale development "Via Breda". The plan of Via Breda intends to combine private companies and provide public facilities to the city "having one eye on the market and another on the city"[30], creating a new modern city center. The program contains offices, hospitality and cultural centers, commercial recreational facilities, varied housing construction, space for

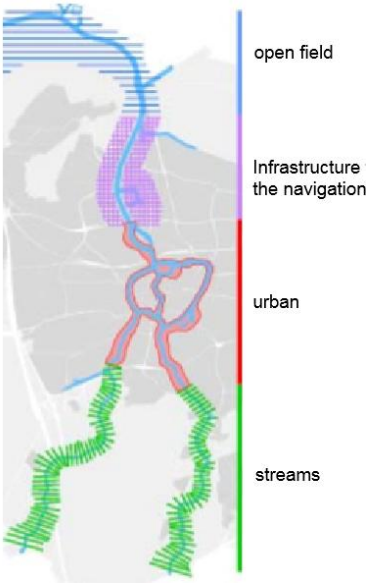

fig. 30_ Via Breda propose diagram

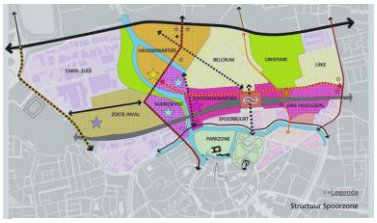
fig. 31_ Via Breda propose

Area	Size	Phasing
Stationskwartier	190,000 m² (homes, offices, facilities, commercial spaces in the station and hotel extensions) 100,000 m² parking (at offices, homes, park & ride)	2007 – 2018
Drie Hoefijzers	115,500 m² (60% residential, 15% work, 10% facilities and 15% flexible)	2007 – 2012
Havenkwartier	265,000 m²	> 2020
Liniepark	65,000 m²	> 2020
Markoevers	150,000 m²	> 2020
Zoete Inval	305,000 m²	> 2020

tab. 3_ Planning of the proposed to Belcrum area by Via Breda

[25] in "Participatory SWOT – analysis for the spatial impact study Railway Zone Breda: a case study" in the 45th ERSA Congress, Amsterdam, Netherlands, 2005.

[26] Municipality of Breda, 2005a, p.25.

[27] Municipality of Breda, 2010a, p.28.

[28] Municipality of Breda, 2010c.

[29] M. Berends, personal communication, July 27, 2010.

[30] Muntjewerff, H. 2008.

high-quality public transport, and a private transport and parking education, sport facilities, and medical aid and care for the elderly. It is also planned a sustainable environment, with green areas along the canal.[31] All these complex transformations seem to be based on marketing strategies, promoted by expressive communications campaigns. This attitude does not let space for reuse and highlight the industrial heritage existent in the area.

fig. 32_ Via Breda Urban proposal

[31] Muntjewerff,H. 2008.

3.1_Industrial Heritage – reusing the legacy

- 3.1.1_ Post – Industrial water front
- 3.1.2_ Industrial Atmosphere
- 3.1.3_ Compatibility of uses
- 3.1.4_ Converting industrial areas and buildings
  - 3.1.4.1_ Addiction of new elements
  - 3.1.4.2_ Transformation of the inner space
  - 3.1.4.3_ Green parks
- 3.1.5_ Learning's

3.2_ Ecological sustainability – reusing the sources

- 3.2.1_ Ecologic structure
  - 3.2.1.1_ Green Spaces in the city
  - 3.2.1.2_ Renovation and the cleaning the ground
- 3.2.2_ Water renew
- 3.2.3_ Urban Agriculture
- 3.2.4_ Learning's

3.0_ PRÉ-PROJECT RESEARCH

This chapter is dedicated to the research made before and during the design project process. The research is a combination of theory and built examples which influenced the work, it is organized in two main chapters, both related to reuse. The selection of the built examples has a, direct or indirect, relation with the design process and result.

Industrial Heritage – reusing the legacy_ It deals with features like how to reuse preserving the memory and identity of the place; how to obtain new possible functions and uses; and ways of transforming industrial areas and buildings, rethinking the contemporary needs. The architecture projects selected to present the reusing ideas, were not part of a restrict area; they were chosen for its capacity of renovating the structure of the city, its ability to preserve the industrial memory and to propose possible ways of constructing new systems. Most of the transformations took place in the beginning of the XXI century; nevertheless some of them are from the late XX century.

Ecological sustainability – reusing the sources_ Continuing the thought line of reusing, it raised issues of urban problems, such as the lack of green spaces inside the city and how to reuse land and water to improve public areas. Adding to these concerns the issue of food sustainability into the urban environment had revealed an important subject in the development of the project. The study of the typologies and benefits of the green spaces brings conscience about the urban landscape features, and the possibilities to make a fusion of urban and natural, with help of the ecological mantra. The original function of the industrial area, production and selling of fruits and legumes, when related with new ideas of how and where to produce the food products, brings the theme of urban agriculture as matters of food sustainability and urban planning. The subject had induced to research the possibilities of urban farming, its social benefits and importance to improve the life quality of the population.

3.1_INDUSTRIAL HERITAGE – REUSING THE LEGACY

Industrial sites are constantly becoming obsolete, the evolution of the manufacturing techniques and the new emergent technologies made the industry change physically and geographically, letting behind buildings and infrastructures.

Accepting industrial areas like a unique testimony of an industrial past epoch and face them as special areas that need to be protected and renewed is what makes, one more time, the industry an important vehicle to the city transformation[32]. UNESCO has an important role in the valorization of the Industrial Heritage recognizing the sites as "important milestones in the history of the humanity"[33].The concept of industrial heritage was defined by the TICCIH as: "remains of industrial culture which are of historical, technological, social, architectural or scientific value. These remains consist of buildings and machinery, workshops, mills and factories, mines and sites for processing and refining, warehouses and stores, places where energy is generated, transmitted and used, transport and all its infrastructure, as well as places used for social activities related to industry such as housing, religious worship or education" [34]. Industrial heritage presents unique challenges, the scale of the resources and the inherent conflicts allows the Architect to rethink how to preserve the heritage transforming a specific place as part of the urban life and the social network, providing the current community necessities.

"The industrial landscape is a wellspring of memory, and therefore a powerful force for learning and change. The heritage of such sites, and their associated architecture and infrastructure, can and has been utilized as a basis for revitalization, both in an economic and cultural sense, regaining valid meaning for contemporary society"[35]. "Besides the tangible heritage associated with industrial technology and processes, engineering, architecture and town planning, it includes many intangible dimensions embodied in the skills, memories and social life of workers and their communities."[36] The memory associated to industrial areas evokes feelings and atmospheres, which create a connection between the place and the memory, meanings and materiality, making the society remember it with a symbolism that exceeds the place and the respective function for which it was destined. Kevin Lynch says that "the external physical environment plays a role in building and supporting [a personal] image of time"[37] . However the memory has a

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[32] "Industry _ the source of every evil and every good _ becomes the true protagonist in the transformation of the city" Rossi, A.1982.

[33] UNESCO aim, available at: www. whc.unesco.org/sites/industrial.htm.

[34] TICCIH, 2003.

[35] Bodurow, C. 2003.

[36] ICOMOS & TICCIH, 2011.

[37] Lynch, K. 1972, p. 1.

fig. 33_ Zollverein renew building

fig. 34_ Zollverein landscape

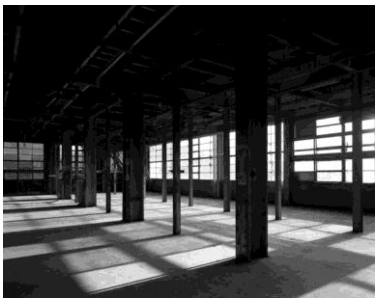

fig. 35_ Meelfabriek- existent structure

fig. 36_ Meelfabriek – Gym

fig. 37_ Meelfabriek – Hotel Meelfabriek

subjective inherent dimension and it requires different meanings in different communities and periods of time. “The individual and collective memory can be in accordance or not,”[38] becoming impossible to predict what should and should not be remembered[39]. Sola Morales argues that “the memory of the past seems to predominate over the present”[40], due to the creation of feelings and memories relatively to one specific place.

”Architecture is about images. Images of your memory and your experience.” [41] Each person creates their own images of the city relating those images with their own life. The perceptions of the city environment are related to the identity of the place. The industrial buildings provide an important sense of identity that might be deal with a conscious way in the design. The typology and quality of the buildings is so varied that each building has to be regarded under own circumstances, the group and individual memory to be developed.

The symbolism connected to the identity of the place and its memory is reflected in architecture by personal statements; where the architects and their multidisciplinary teams analyze the complexity of the pre-existing elements to transform the landscape generating new meanings. In Zollverein[42] it was attempted to maximize the authenticity of the pre-existent structures, the intention of the Architect was to respect the original identity, letting the old structures be undisturbed by the new buildings. A band was designed around the historic cluster of buildings. By doing so, ”visitors first have to cross a layer of modernity and enter an area where the scale, the function and the history of the buildings is completely different”. Old railways and conveyer belts that connected the buildings had been transformed into a public space, providing circulation and interesting routes across the site.[43]

Other approach which recognizes the identity of the place is the Meelfabriek,[44] a cluster of industrial buildings on a bastion of medieval fortifications in Leiden, Netherlands. The site has a variety of typical industrial buildings structures, like brick shell, concrete frame, steel frame, mushroom column, solid plate constructions and numerous honeycomb clusters of

[38] Storm, A., 2008, p.32.

[39] Nora, P. 1989, p. 14.

[40] Solà-Morales, I. 1995.

[41] Zumthor, P., 2005, p.9.

[42] Integrated in the Ruhr-area, Zeche Zollverein in Essen, Germany, it was a coal refinery since 1847 which was closed in 1988. In 2001 UNESCO add Zollverein to the list of WHIM and the master-plan was started to be develop by OMA with the collaboration of heritage specialists and conservationists. The works ended in 2010.

[43] www.oma.eu/projects/2002/zollverein-masterplan

[44] Integrated in an industrial belt developed in the 19th and 20th century, which most of the factories were demolish to create a green belt park, the Meelfabriek survived (close in 1988) and in 2007 Peter Zumpthor won a competition for the old factory site, where it was asked to bring new life to the complex.

silo shafts in various sizes from different periods. The architect decided to work with the beauty and strength of the physical elements, respecting the structural integrity of every building. Each building generates different images and atmospheres creating a strong identity. Most of the old façades are going to be replaced by transparent, translucent and elegant new skins making possible to see the old structures from outside. The memory of Meelfabriek will be visible through experiencing the old heavy-load structures. In some areas the structure is used as a tool to order the public space, furthermore in the buildings the structure provides memory where the industrial power is transformed in the background for a contemporary life.[45]


fig. 38_Tate Modern

A distinct case of renewal an industrial building is the Tate Modern[46], being "a significant place holder to link a number of notable changes to the role and practice of art galleries in the contemporary city"[47]. With a few interventions, most of the façade was kept transmitting its atmosphere and its memory to the surroundings, hence the population still recognized its image and the existence of the power station. The vertical chimney, the main icon of the power station, was not touched, but the turbine hall was transformed into a public space for works of art and social gatherings. The interior went through a total metamorphose[48], it was introduced a new horizontal element which feels like it had always belonged to the building. The sensibility of the Architect, respecting the identity of the building was combined with the intention to create a public accessible space being clear that "the Turbine Hall would have all the attributes of a street or public space. This is an explicitly and purposefully constructed public space which was conceived of both as a gallery, and to its location within a previously neglected post-industrial part of London."[49]

The conscience that the industrial elements play an important role in the identity of the site will reveal a fundamental aspect in the development of the project. The memory which can be visible through experiencing the old heavy-load structures, typically existent in industrial buildings, can be a vehicle to generate new meaning through the existing identity, when maximized their authenticity. The buildings image, being generally read by the community as a façade and volume, provides memory where the industrial power is transformed in the background for a contemporary life. Respecting the original design of the façade might transmit the industrial atmosphere and memory to the surroundings.

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45 www.demeelfabriek.nl/en/preservation/

46 Tate Modern is housed in the former Bankside Power Station, which closed in 1981, designed by Giles Gilbert Scott. Herzog & de Meuron won the competition of the renewal, The transformation was completed in 2000.

47 Dean, C. & Donnellan , C. p.10.

48 Moore,R. 2000 p.19.

49 Dean, C. & Donnellan, C. p.15.

3.1.1_POST- INDUSTRIAL WATERFRONT

An important element which contributes to the identity of the studied area is the canal. The symbology of a waterfront have been playing an important role in the urban morphology and identity. Important cities flourished next to the water in the 18th and 19th centuries because of advantageous shipping locations on rivers and harbors. These favorable locations attracted the Industry due to easily transport goods and raw materials. With the migration of these industries, which was a consequence of the shipping and manufacturing becoming less vital to the contemporary economy; the port areas had gradually lost its function. The leftover of the industries, buildings and infrastructures had become a barrier between the water and the city, resulting in several urban problems. Many cities around the world have lost the contact with water and their waterfronts. Richard Marshall says that "through historical circumstance, (urban waterfronts) are immediately adjacent to centers of older cities and, typically, are separated from the physical, cultural and psychological connections that exist in every city."[50] The necessity to integrate the harbor areas in the city raises the question what should be a waterfront place? Thus how the population can take advantage of the qualities of the water? Establish again the contact with the waterfronts and discover the new meaning of the relation between the water and the city is a challenge.

The function of transportation that the water used to have is no longer a necessity, being used, in most cases, as touristic and leisure activities. Nevertheless there are people who choose to live on the water in housing boats motivated by the possibility to move and change to other place with other atmospheres. Furthermore when those boats modify their location, the water scenery changes, what gives to the waterfronts a reality of permanent transformation. It will be visible in a further chapter that the Belcrum canal has a charismatic feature due to its housing boats.

The water is an element of nature that generates sensations influencing our perception of the environment; Richard Marshal identifies the new waterfronts as spaces of hope for urban vitality, where we can see "new city-making paradigms, partial visions for what our cities might be".[51] The water itself draws attention; moreover the potential that the waterfronts and the buildings offer to the inhabitants is enormous, bringing to the city creativity, space quality and identity. According to Pedro Brandão, waterfronts are associated with urban quality, having symbolic values to the community, such as " the

[50] Marshall, R. 2003.

[51] Marshal, R. 2001, p.3.

nature, the tourism, the nautical sports, the history and heritage, the construction of the city, the ensemble of cultures and emphasizes of the landscape." [52]

The complexity of the urban waterfronts creates not only opportunities but also challenges and difficulties to the designers. Due to the level of pollution remaining at the sites, redevelopment efforts are not easy or cheap. But its enormous potential to interact with the population can have a positive impact in the community life quality and engage its surroundings.

The diversity of relations between industrial buildings and the water is a result of the different specificities and needs of each industry. The transformations will be adaptable to the existent physical reality between the buildings and the water. The Wakefield waterfront in Yorkshire, UK, is a conservation area, which contains a number of significant industrial buildings, the "Grade II listed Navigation Warehouse"[53] was used as a catalyst for the regeneration of the entire waterfront area. The historic buildings are being restored and, together with a range of new buildings, will provide a mix of high quality riverside functions[54], "creating a new quarter which will suppose a heartbeat for the city"[55]. The master plan is designed to lead pedestrians through the development through a series of courtyards. The wharfs generate direct and open connections to the water. In order to work the spatial strategy, it was imperative that the visual link to the water was not blocked by flood protection measures. The adopted solution was to use a series of automatically activated, hydraulic rising dams.

In the buildings that are directly placed on the edge of the waterfront, with no public space in-between, privacy is provided to the functions adjoining the waterfront. In most of the waterfront's length it is not possible to reach the water directly from the public area, being necessary to go through the building to reach the water. The buildings can only be accessed from the waterside by boat. The new building that will host the gallery[56] is placed close to the water just as many of the old mills and warehouses along the river. The water

fig. 39_ Wakefield waterfront

fig. 40_ Navigation Warehouse

fig. 41__ Wakefield new building

fig. 42_ Wakefield new building

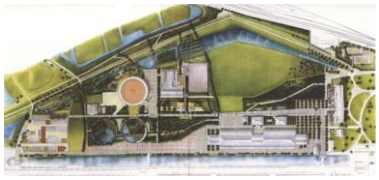

fig. 43_ Watergas Fabriek plan

fig. 44_ Watergas Fabriek

[52] Brandão, P. 2001, p.125, author's translation.

[53] It was built in 1790, fronts the River Calder at its junction with the Calder Hebble Navigation canal. There are other industrial buildings in the surroundings: the Grade II Listed Phoenix and Rutland Mills complex.

[54] The program of the area includes: apartments, office and leisure accommodation including restaurants, cafés, courtyards, landscaped gardens and public spaces.

[55] The project is divided in five phases, the first one was completed in 2008 and consists of two new office buildings, the refurbishment of a Grade II Listed warehouse for offices and a new residential building housing 52 units. Each phase is a mini mixed-use development, self-sufficient in terms of access, egress, servicing, flood protection and parking. www.rudi.net/node/22340

[56] The Hepworth Wakefield gallery, designed by David Chipperfield Architects, finished in 2011.

fig. 45_ Watergas Fabriek – gas holders transformation

can be visually experienced from the inside of the building, whose openings are placed relatively high above the water, because of the flooding.

There is a different relation between the industrial buildings and the water in the Watergas Fabriek in Amsterdam, Netherlands. In 1981, the factory stopped its functions of power generation and was reused as a recreation space, years later; the historic structure gave it potential for cultural re-use. In the project of Gustafson Porter the existent structures are reused and surrounded by a park with diverse spatial experiences where water is an important element of the design. The transformation creates different forms of relation with the water. The area in front of the already existing canal was maintained as a public space, where the promenade between the water and the industrial buildings is considered an attractive urban space. A closed water circulation system, which results in a sequence of ponds throughout the park, was also created. The scheme of aquatic gardens was also applied in old structures, some of the gas holders were transformed into a pond where the visitants can relax or enjoy theatre performances.

Waterfronts have an enormous potential to interact with the population having a positive impact in the community life's quality; these areas are associated with urban quality, having symbolic values to the community. In spite of this, waterfronts are potential areas for regeneration of urban landscape through the creation of public areas. These public areas can have different forms of relation with the water. The relation between industrial structures and water can be divided in two categories: one includes the buildings that are very close to the water letting no space to public areas and privileging the building’s users; the other one, is related to buildings with a considerable distance from the water, letting room to public areas in the in-between space. The visual link the city can have with water brings creativity and space quality to the area.

3.1.2_INDUSTRIAL ATMOSPHERE

Industrial complexes and buildings are impressive because of their size and imposing characteristic. They were built with practicality in mind – production, efficiency, effectiveness and sometimes security of the employees. Some factories were recognized as an architectural element because of their innovation or creativity, for example factories designed by Frank Lloyd Wright, Walter Gropius, and Albert Kahn. However, most of the industrial buildings are identified as anonymous, serving a functional purpose rather than a theoretical one. These buildings which were historically ignored are, since the last decades, recognized by their features[57]. The use of certain materials and solutions, the technology applied… the scale and shape of these buildings made them symbols of rational architecture which, emerging on a quite intense atmosphere, did generate curiosity and surprise.

fig. 46_ The Völklingen Ironworks

fig. 47_ Pump house on the write, Steam Blower House on the left

Depending on the specific industrial function, industrial sites have monumental structures that impose their presence causing an impressive landscape, changing the skyline and the built environment. The "dramatization" of these elements attracts new activities to the former industrial areas[58]. The Völklingen Ironworks[59] is an example of how this industrial presence can influence landscape and imagination.

fig. 48_ Steam Blower House interior

The "pump house" [60] and the "Steam Blower House"[61] in Bochum, Germany, are two buildings next to each other where "the architecture is designed to preserve as much as possible the original atmosphere, reflecting a harmonious ensemble of existing buildings and the new added construction"[62]. The steel-framework façade of the pump house was "enclose with an environmental mantle in compliance with climate control regulations, making possible to keep the atmosphere of the existing in the interior including its industrial rustic charm and its delicate roof trusses"[33]. The pipes and the steel works visible in the exterior of the pump house are preserved contrasting with the new envelope façade.

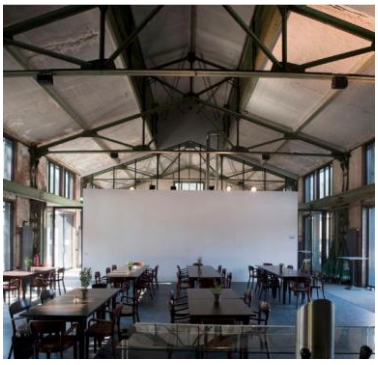

fig. 49_ Pump house interior

fig. 50_ Steam Blower House

[57] Cantell, Sophie F. 2005.

[58] Alzén, A. 1996.

[59] Founded in 1873, planed by Julius Buch, became the largest Ironwork in Germany being close in 1986. In 1994, it was declared by UNESCO as a World Heritage site being today a museum.

[60] Originally built as a pump house which was part of a huge steel works, it was transformed into a restaurant and visitor center. Designed by Heinrich Böll Architect, in 2012, the building is situated adjacent to the "Jahrhunderthalle", a huge industrial hall.

[61] Originally built as a steam blower house, designed by Heinrich Böll Architect in 2010. It serves the "Jahrhunderthalle" as a studio and provides storage room for the stage equipment.

[62] www.architektboell.de

fig. 51_ Mellfabriek hotel

fig. 52_ Mellfabriek offices

In the Steam Blower House only a few elements have been added such as a new staircase and a huge glass façade to highlight the big studio, the contrast between the old and the new materials makes a difference between the pieces built in different moments, creating a new atmosphere which respects the one of the past.

The beauty and strength in the physical structure of industrial buildings, which were designed to carry heavy loads, is one characteristic of the industrial atmosphere. In the Mellfabriek[63] this characteristic is the most relevant one taking it in account to preserve the industrial ambience. The structure is preserved and respected in all the industrial buildings types of the complex (variety of structures explained in the chapter 3.1). Zumthor redeveloped "the structural anatomy of each building from the elegant steel frames to the forest of concrete columns and the batteries of cathedral, like silo spaces will remain visible and play an important role in their new architectural expression." The structures will be visible from the exterior, through the transparent façades,[64] emphasizing their rhythm which provides flexibility. Each building will have an industrial atmosphere mixed with the background of contemporary life.

The ambiences in industrial places are recognized and appreciated by the public and there are many valid alternatives to preserve it. In the examples showed, the industrial atmosphere was transmitted by the preservation of industrial structures, the materials and the physical structure and the scale of buildings. It will be further referred the importance in emphasizing the industrial elements which are evaluated as important features in the characterization of the space, generating an atmosphere which relates the past with the present.

63 Complex of industrial buildings already exposed in the chapter 3.1_Industrial Heritage –reusing the legacy.

64 The facades had to be replaced, because the spaces were non-insulated and the old facades were delicate with single-pane windows which were extremely difficult to keep respecting the contemporary comfort level.

3.1.3_COMPATIBILITY OF USES

Due to the industrial building's characteristics and location, it is important to think about the adaptation of them into new uses. In New York, after the WWII, industrial buildings and warehouses were reused by artists transforming them in spaces where they could combine working and living paying a low price. The economic and social situation forced them to seek for new solutions, which sparked a starting point for industrial renovation. Adaptive reuse is the act of finding a new use for a building, a "process by which structurally sound older buildings are developed for economically viable new uses."[65] The recycling of buildings can provide new urban dynamics with the creation of attractive environments.

fig. 53_ Mellfabriek urban space

fig. 54_ The Urban Outfitters Corporate Campus

Industrial buildings are, in most cases, appropriate to reuse and adaptation due to their dimensions and –usually- open spaces, adaptable to public activities, private or both. Most usual current cases are conversions into museums, art studios, live-work units, offices, residential units, schools, retail or mix of uses; industrial buildings have the versatility of being able to be transformed into many programs, however some of them can hold certain uses better than others, depending on local situation. To decide the program it is necessary to take into account the needs of the population and the compatibility of the program with the building's physical characteristics. The program is an important tool to regenerate industrial areas that used to be abandoned.

fig. 55_ Dominican church

In the industrial complex of Meelfabriek,[66] the mix of uses is one of the reasons that allows to bring the area alive again. The area is open to the public offering a new urban energy not just for the complex but also for its surroundings. The master plan offers an attractive combination of living, working, learning, recreation, culture and shopping. "The street level of the complex is dedicated to public use and pedestrian circulation: places for rest and play, neighbourhood activities, daycare facilities, restaurants and cafés, some speciality shops and shops for everyday use." The adaptation of the unbuilt area to public purposes, generates urban situations that enrich the life of the place. The adaptive reuse of public layer is so important as the one of the building, being important to think in the program as a web which generates many possible connections. The mix of uses is even more important, when the industrial buildings are far away from the city center, where there are no facilities or public transports. It is the case of the Urban Outfitters Corporate Campus[67] in

fig. 56_ Landschaftspark Duisburg-Nord

fig. 57_ Ford Assembly building

65 Austin, Richard L. 1988, p.49.

66 Project spoken in the previous chapters.

67 Transformation of four historic buildings into offices and design studios of tree brands (Anthropology, Free People and Urban Outfitters retail). It was designed by Meyer Scherer & Rockcastle in 2006.

Philadelphia's Navy Yard[68]. When the company proposed to move to the location outside the city, the employees were worried with basic needs like: where to have lunch, and how to go to work. The company was looking for historic buildings where they could concentrate many functions and be inspired by the environment, giving the employees working-space quality. The creation of amenities such as a gym, a yoga studio, a dog park, a farmers' market and food shops was important to boost the employees' satisfaction, generating a lively and informal atmosphere.

When a new use is given to a building, unexpected situations may occur in unexpected places; like the case of the bookstore[69] placed in a Dominican church, in Maastricht, which surprises the visitors extending their imagination; or the climbing routes at Landschaftspark Duisburg-Nord[70] built on the walls of the former bunkers.

The general big scale in industrial buildings can allow diverse uses to take place in the same space. This flexibility happened in the Ford Assembly building[71] on the San Francisco Bay waterfront, whose project provides a large space for the community where the flexible spaces can be put to many uses, revitalizing the local economy. "The rebirth of the Ford Assembly Building serves as an extraordinary example of how historic preservation can be a catalyst for community revitalization, economic development and sustainability," says Richard Moe, president of the National Trust for Historic Preservation.

The studio gave freedom to choose an appropriate program for the area. The new functions are an important tool to regenerate the industrial area, working as a catalyst for the community revitalization and economic development. To recognize the population's needs and consider them when evaluating the physical capacities of space, is essential for the effective improvement of the local community's life quality. It is also important to reflect on the complementary needs of users, the mixed uses increase the web services and movement the population, optimizing supply. Flexible spaces increase positively the space's utilization raising its potential.

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[68] Used as ship buildings and repair facility from 1868 through 1996. In 2004 the area was master planned for redevelopment an evolution from public ownership to private use.

[69] Complete in 2007 and designed by Merkx + Girod, originally was a Dominican church built in 1294, being also a parish, warehouse, an archive and a bicycle store afterwards.

[70] Will be exposed in the next chapters

[71] It was a car factory, originally designed by Albert Kahn for Henry Ford, constructed in 1931, being converted into the World War II tank factory "manned" by Rosie-the-Riveters. The factory was closed in 1956 being purchased in 2004 to be transformed into a "green" businesses and a popular entertainment venue by Marcy Wong Donn Logan Architects.

3.1.4_CONVERTING INDUSTRIAL AREAS AND BUILDINGS

To understand the conversion of industrial buildings is important to introduce the concepts and the actions involved in interventions of existing buildings. “Interventions practically always involve some loss of a ‘value’ in cultural property, but are justified in order to preserve the objects for the future. Conservation involves making interventions at various scales and levels of intensity which are determined by the physical condition, causes of deterioration and anticipated future environment of the cultural property under treatment. Each case must be considered as a whole, and individually, taking all factors into account.”[72] Bernard Field considered that interventions in existing realities are important to conserve them, even if some of their “value” is lost. These interventions can be categorized by different actions, which could have a passive or an active attitude. Ana Roders[73] classifies the action of a conservation project in seven degrees: “(1) prevention of deterioration, (2) preservation of the existing state, (3) consolidation of the fabric, (4) restoration, (5) rehabilitation, (6) reproduction and (7) reconstruction”.[74] In the context of the project, whose aim is the renovation of the area, the action proposed is the rehabilitation. “There are many other different terms that are used to describe interventions to a building over and above maintenance. Words such as ‘refurbishment’ or ‘rehabilitation’ and ‘renovation’ or ‘restoration’ are occasionally taken as being synonyms with one another, even by some in the construction industry.” [75]

“Industrial heritage sites are very diversified in terms of their purpose, design and evolution”[76] resulting in different conversion approaches. The industrial object may be a single building, a complex of buildings or a landscape composed with structures and buildings.

The conversion of industrial buildings may have many different approaches, depending on the program, available spaces, and the physical conditions of the envelope and the structure of the building. “There are no uniform solutions or pre-established. It all depends on their environment, its needs and constraints.”[77] Adding to the physical reality, the intentions and imagination of the Architect and the desire of the client (private or public) will contribute to a successful conversion. “Buildings do vary greatly in the extent to which

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[72] Fielden, Bernard M. 1982, p.8.

[73] Roders, A. 2007, p.148.

[74] Other qualifications were also made, ICOSMOS, in 1992, classify seven different interventions: (1) non-intervention; (2) maintenance, (3) stabilization, (4) repair, (5) restoration, (6) reconstruction and (7) adaptation.

[75] Douglas, J. 2006, p.1.

[76] ICOMOS – TICCIH 2011.

[77] Mendes, José A. 2000 p.226.

they can accommodate change without losing their special interest. Some may be sensitive even to slight alterations; this is especially true regarding buildings with important interior and fittings, not just great houses, but also, for example, industrial structures with surviving machinery. Achieving a proper balance between the special interest of a listed building and proposals for alterations or extensions is demanding and should always be based on specialist expertise; but it is rarely impossible, if reasonable flexibility and imagination are shown by all the parts involved."[78] The proposal, developed with expertise, flexibility and imagination, should simultaneously search for "modernization and a general beneficiation of the building (...) – upgrading its installations, equipment and the spatial organization of the existing spaces - improving its functional performance and transformation these buildings apt for its complete and updated reuse."[79]

"Rehabilitation has been subdivided into two approaches; the passive approach, called reuse; and the active approach, called conversion. The difference between them lays in the chosen use for the new existence."[80] Rehabilitation is defined by Fielden as "the best way of preserving buildings as opposed to objects is to keep them in use"[81]; the suggestions conveyed by the proportions of the spaces and the detailed study of the program will indicate the space needs: if it is necessary to increase construction, or if there is enough space. The Interventions can be resolved in one of the three processes: addition, subtraction and maintenance of the elements. The addition is usually used in the active approach of an intervention; the conservation can add elements in the exterior of the existing building or in its interior, subdividing the existing space on a different way, which in many cases have large proportions. The addiction of elements and the subdivision of the interior space will be further explained in the following chapters.

The use of new materials and the addition of shapes or elements with a contemporary language do not necessarily imply a disconnection with the initial architecture options. "The conservation approach requires an assured touch with modern materials and sympathy with the subtleties of the original architecture"[82]

The large extension of some industrial structures generates an industrial landscape which is mixed with the urban network. To reactivate and restore these landscapes, which are usually abandoned, different innovative solutions have been applied. The industrial areas

[78] Department of the Environment, 1994, p.9.

[79] Aguiar, J et al. 2001, p. A.I-2.

[80] Roders, A. 2007, p.98.

[81] Fielden, Bernard M. 1982, p.10.

[82] Stratton, M. 2000, p.51.

are often located next to residential areas, being connected to them in many different ways. However, physical and visual barriers remain from the previous industrial use as walls, gates, etc., blocking the access to public use. It is important to create easy accessibility to landscapes and improve its quality provoking a dynamic urban life. [83]

In chapter 3.1.4.3_Green Parks, different interventions which generate a new cultural value reusing the industrial heritage to create public space will be studied. When these areas do not have any preservation or reuse, there is a chance they might be leaving to fall into decay, gradually turning it into a ruin. “The abandoned sites provide the best and most interactive museums of industrial archaeology and local history you’ll ever find. Those buildings that haven’t been stripped bare often house incredible old machines or technology we’ve all but forgotten today”[84]. The industrial ruins are not intellectual but sensual and intuitive, sites of fantasy and adventure which have been used as objects of art for photographers and others[85]. However, they did not “immediately evoke similar connotations of melancholic beauty, but instead represented a wasteland of dark urban nightscapes and abandoned parking lots that were loaded with meanings of ugliness and danger.”[86] Edensor establish four main categories: the industrial ruin as a backdrop for spectacular action, as a scene for science fiction, as a nostalgic landscape, and as a marginal place.[87] The ruins thus offer an open space for interpretation, an “incentive for restoration and for a return to origins”[88].

The conversion of industrial areas or buildings do not have uniformed solutions, it depends on the surroundings, their needs and constrains. It is important to create easily accessibility to these renewed industrial sites and improve its urban quality provoking a dynamic urban life. The need of floor space is one common concern when transforming industrial buildings. In the next two chapters different ways of resolving this issue will be demonstrated, the reflection about the design options of those examples will be important in the development of the project.

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[83] Keil, A. 2005, p. 117-130.

[84] Ninjalicious, A. 2005, p. 88.

[85] Edensor, F. 2005 p. 126–138.

[86] Ibid., p. 16.

[87] Ibid., p. 36.

[88] Jackson, J. 1980, p. 102.

3.1.4.1_ADDITION OF NEW ELEMENTS

fig. 58_ Butter factory

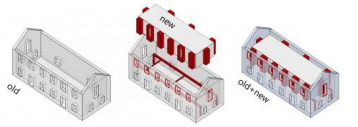


fig. 59_Butter factory-intervention

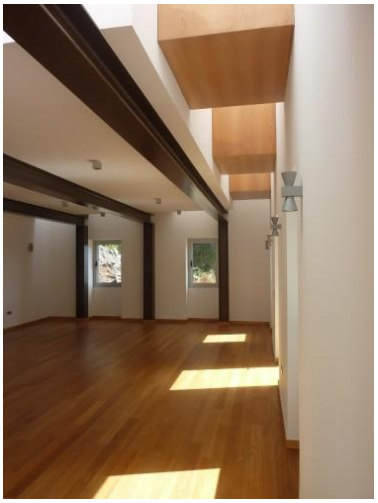


fig. 60_ Butter factory interior

The selection of the program is a consequence of diverse factors: social, political, economic, etc.; this choice is not always completely adaptable to the space available. Making additions is usually a consequence of the need of space, where programmatic requirements ask for an expansion of the floor area. Nevertheless, the addition of new elements is a result of the personal interpretation from who is transforming it, and his sensibility to read the existing situation and current necessities. The space requirement is not, in some cases, the main reason for the addition of new structures, representing essentially the architect's model of affirmation to the current transformation.

The alteration of the formal space can have different scales, since small addition until large expansions; those adjustments will change the spatial configuration and create new shapes. The relation between the new elements and the old ones can have different conceptual approaches. The new elements appear in a logical contrast with the original environment being recognizable different attitudes: inclusion, intersection and exclusion. These attitudes can be used simultaneously creating a strong or smooth contrast between the elements. Tree examples of addition will be talked in the following text illustrating different approaches.

In the rehabilitation of an old butter factory[89] converting to housing, two different approaches were taken for the two existing buildings which are next to each other. The advanced state of disrepair of the buildings did not allowed to conserve all parts of the constructions. In one of the buildings it was increased the floor space in its interior, while its image and volume were preserved as the original. The volume created to lodge the first floor had a physical separation with the envelope of the building. These two volumes are connected by elements with a different materiality, linking the interior with the original windows, leading the light to the inner space. The transition zone between the old and the new, in the first floor, also transformed the spatiality of the ground level. The other building was in an advanced degradation state which did permit to rehabilitate it. The intentions of the architects were to preserve its location, volume and morphological characteristics. Nevertheless, it is assumed the current time of construction creating a contemporary language using modern materials. This building introduces a strong independent identity still related to the preexisting. It is recognizable in these two moments two distinct ways of intervention, moreover the continuity created between each other creates a dynamic dialogue respecting the preexistent identity.

[89] Project of M.S.B Architects in Calheta, Madeira island, Portugal, 2010.

The rehabilitation of the old salt works, converted to the *Musée du sel de Salins les-Bains*[90] intends to create a monument to convey the local industrial heritage. The aim of the Municipality is to restore the original warehouses creating also an open-air museum. The project "links the goal of protecting the salt warehouses with the goal of revealing their symbolic importance for the city, which translates into a restoration to preserve the complex's original architecture with declaredly modern additions". The new element which intersects the original building, causing a visual impact to the visitant, is clearly visible. The new compact block contains room for temporary exhibitions being also used to distribute the museum routes; the material of the façade, steel sheeting, was used because of its particular resistance to corrosion by atmospheric agents. This new element, with its volume and materiality, makes a strong contrast with the original buildings, transforming the complex from an historic heritage building to a city monument. The affirmation of the new architecture allows the building to assume its new identity.


fig. 61_ Musée du sel de Salins les-Bains


fig. 62_ Musée du sel de Sales-Bains

The intervention in the old Barking Watermill[91] brings together two existing buildings, the Malthouse and the Granary, into a new use, combining them with a new piece. The goal was to retain the building's original industrial character while improving functionality, increasing day lighting and creating a new building which fully responds to the urban context. The original features of the Granary were restored, being the non-original extensions and partitions removed, where the blocked windows were opened to give the building its initial appearance. The new part combines the two older buildings by connecting them, following their shapes, the conventional roof shape is re-interpreted appearing in continuity with the existent skyline. By choosing the bronze-clad material in the new façades, which have the same chromatic line of the old buildings, the architect conveys a similarity between the new and the old; having, however, its own integrating identity. The windows are another prominent feature; the matching of small and big windows in the Granary is also applied in the new building but in a less strict way. As a whole, the new design is dynamic, creating a dialogue between the old and the new.


fig. 63_ Barking Watermill, new façade on the river side


fig. 64_ Barking Watermill, the old and new

Through these examples it is visible that addition of the new elements is a result of the personal interpretation from who is transforming it, and his sensibility to read the existing situation and current necessities. Two distinguishable attitudes are present, one of them creates a dynamic dialogue respecting the preexistent identity with a smooth contrast between the old and new. The other highlights the affirmation of the new architecture allowing the building to assume its new identity.

[90] Closed since 1962, the salt works in Salins-les-Bain, France, was restored by Malcotti-Roussey and Gheza, the works had finished in 2012.

[91] Built in 1870 in Barking, U.K. Rehabilitation by Schmidt Hammer Lasen in 2010.

3.1.4.2_TRANSFORMATION OF THE INNER SPACE

fig. 65_ Hinman Research Building

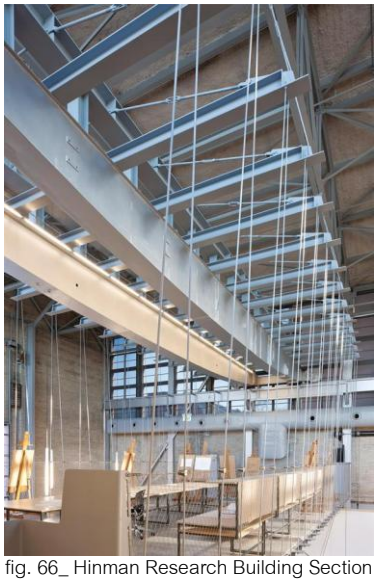


fig. 66_ Hinman Research Building Section - Suspention system

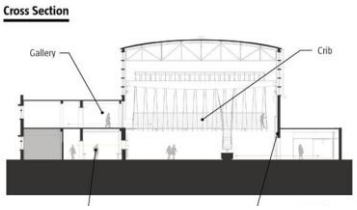


fig. 67_ Hinman Research Building - Hanging floor

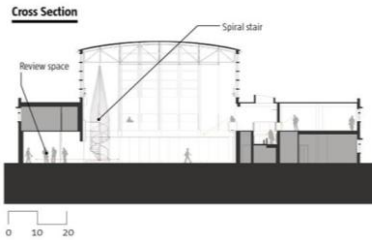


fig. 68_ Hinman Research Building- Section - Hanging stairs

When adapting the interior space of an industrial building to a new program, it is necessary, in most of the cases, to do some changes. Like it was already exposed in previous chapters, the distribution and design of programmatic demands has diverse influences, such as the building' scale and shape, the necessity for technical areas, fire security constraints, thermic requirements or social questions directly related with the function.

The different layers added in different ages, in the life time of the building, produce a composition which reflects many stories of the place and its production. Some things have been remembered, and others have been forgotten. The personal interpretation of the environment will present new alternatives to organize the space and has a rehabilitation philosophy, respecting its identity and spatiality. The typologies of industrial buildings have different features; the interventions that will be talked in this chapter are related to a specific type of industrial buildings, being characterized by large areas of open space with high ceilings, and generous lighting through large openings. Its construction system is prepared to receive large loads and its spatial configuration has an enormous flexibility. The following projects are three different approaches of large indoors spaces' partitions; however, all of them have one common characteristic: increasing the floor area.

The Hinman Research Building[92] on the Georgia Institute of Technology campus in Atlanta was readapted to the architecture school expansion. The building will be used for graduate studies including studio space, galleries, offices, classrooms, and research labs. Its high central bay illuminated by clerestory windows is the emblematic space of the building. The renovation maintained the ideals of a pedagogical building adding program space which was necessary. The "approach was to preserve the integrity of the high bay by literally hanging their interventions within it. The massive gantry crane that previously carried materials and assemblages through the space was reused to support a suspended "crib" that can now serve studio or student-lounge functions."[93] The crib floor is constructed of profiled out of suspended T-beams; the hanging is the project's theme: the way the new floor is constructed; the spiral staircase which connects the offices with the ground floor; a guillotine door, suspended from above, which provides a small area when closed and a large area when opened; and the suspended lights which can be adapted by winch

[92] It was open in 1939, designed by Paul M.Hefferman, director of the architecture school from 1956 to 1976. The building had served the schools of engineering and earth sciences as a space for full-scale research and prototyping. The rehabilitation was designed by Lord, Aeck & Sargent and Office dA's .

[93] Mays, V. 2011.

controls depending on the programmatic activities. The big flexibility of the space allows to adapt the bay to various functions: “design studios, lectures, movie screenings, parties, graduations and large-scale prototypes and installations”, this flexibility is possible because the static functions could be inserted up in the air. The transparency of the intervention and the use of light materials allowed to keep the feeling of a big scale space and the old structure. According to the designer Nader Tehrani “The relationship of the new elements within the high-bay and historic framework is calibrated carefully: neither in mere subservience, nor in disrespect, but rather in a productive tension, the new giving added meaning to the old.”

fig. 69_ Urban Outfitters Corporate - floor was partly removed to create diagonal visual lines , a boost to amplify the space

The project of the Urban Outfitters Corporate Campus[94] has a different approach in the concept of the inner space transformation. The campus is composed by five buildings whose rehabilitation strategy “centers on using the factory characteristics of the buildings industrial materiality, open volumes, and access to daylight to repurpose the buildings’ major function from production to creativity.”[95] The existing columns, walls, and ceilings were scraped to remove the paint and reveal a colorful patina in the materials. There are several actions which demonstrate the desire of showing the “interior of the materials”; walls added in the 50’s and 60’s to adapt the ship workshop to offices were removed to expose the metal roof truss system. The application of a new windows-system, due to the necessity to isolate the interior spaces, matches with the original windows, maintaining the old outline and bringing thermic and lightning comfort.

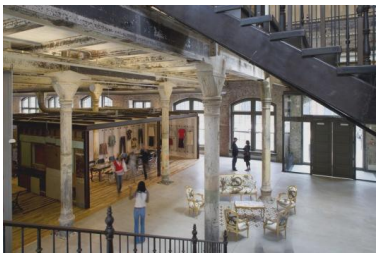


fig. 70_ Urban Outfitters Corporate - Space within the original volume, highlighting the structure

fig. 71_ Urban Outfitters Corporate - closed working rooms

Four of the buildings present similar characteristics, combining a mix of open workspaces and enclosed rooms, which reflect the industrial aesthetic of the Navy Yard. The new rooms inserted into the space are used for offices and meetings, being partially transparent and providing the necessary privacy to the working environment. The other building has different features and program, as dining facilities, fitness center and a variety of other related functions. The splendor of the interior, the big open volume, was maintained, leaving the steel structure and brick walls exposed which gives an industrial atmosphere.

fig. 72_ Urban Outfitters Corporate - Maintain the large volume of the inner space

In “the nefs de la Loire”[96], in Ilê de Nantes, France, the intervention in the building has a different urban dimension from the two projects already mentioned; the building is a vehicle for the city to rediscover the river. The warehouses have tree naves with large

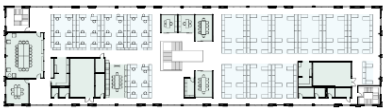


fig. 73_ Urban Outfitters Corporate plan 1st floor

[94] Introduced in the chapter 3.1.3.

[95] Scherer,J & Scherer, M, 2007.

[96] Built in 1902, housed the workshops of shipbuilding of the Loire, rehabilitation in 2007 designed by Alexandre Chemetoff et Atelier de l’île de Nantes. This project is part of a large intervention in Ilê de Nates which proposes open a public park letting the people take usufruct of the river. The generations of an economic impact in all territory permits combine public and private.

fig. 74_ The nefs de la Loire - Urban transformations which rediscover the river

fig. 75_ The nefs de la Loire - the inner building is used as a public area

dimensions, a metal structure and a translucent roof which needed to be repaired; the walls of the building were removed to create a permeable cover public space, opening two new streets contiguous with the outdoor public space. This renew construction accommodates diverse programs, some permanent others not combining an urban project which encounter cultural initiatives. [97]

The examples exposed in this chapter will have a particular correlation with the design of the project. The distribution and design of the programmatic demands has diverse influences, as it was previously referred. The evaluation of the dimensions and identity of the inner space are imperative to generate a design approach which reveals a rehabilitation philosophy that respects the building identity and spatiality. It is highlighting the capacity that these three examples have in common on the creation of flexible spaces, allowing to adapt them to various functions.

[97] In the article "Île de Nantes- Éco-Quartier de la Praire au Duc – Un quartier dans un parc" in www.iledenantes.com/files/documents/pdf/publications/nantes-ecoquartier.pdf

3.1.4.3_GREEN PARKS

The urban sprawl progressively occupied natural landscape, leading to a massive construction with an enormous lack of green space, where the sensation of breathing polluted air is higher. Industrial heritage sites are versatile and created an opportunity to renew these landscapes with a singular attention to the sustainable development, improving the life quality of the population. To insert vegetation in the urban context is, in some cases, a good prospect. Nevertheless, it is important to be aware of the industrial footprint and the problems that can be caused by the pollution of soil, water and air. Below, three distinct types of strategies with different scales which developed a significant amount of public open space will be clarified.

The Duisburg Nord Park[98] only represents a small portion of a large scale intervention, the *Internationale Bauausstellung* (IBA-1987), which has reused the old industrial areas in the Ruhr river basin with the aim of promoting urban development from a social, cultural and ecological perspective[99]. The heart of Duisburg Park is the Thyseen Steekworks, huge and solid machinery, a unique historic setting of industrial heritage which is emphasized by not transforming it. The growth of spontaneous vegetation plays a major role in parks design, creating a natural environment. The minimal intervention concerns both nature and building environment preserving the "secrets" and "mystery" of the place, which encourages the experience of discovery[100].

The park is divided into different areas, which borders were carefully developed by looking at existing conditions; the new uses of the area are related to outdoor activities in the natural environment, such as climbing in the concrete walls, biking, walking, diving in the old gas tanks or relaxing in the intimate gardens placed in the concrete bunkers. The use of existent elements for the new functions creates a bridge between the past and the present, nearly everything has been reused somehow, "playing with the distinctions between natural and artificial, while confusing our definition of park"[101]. Latz is quoted saying "landscape is culture"[102], linking in this project the memory with an awareness of presence where the attraction is linked to exploring physical remains of the past.[103] These remains become "awesome monumental sculptures as reminders of the site's history" [104]

fig. 76_ Duisburg Nord Park - Industrial park with large dimensions

fig. 77_ Duisburg Nord Park - The impact of the heavy structures

fig. 78_ Duisburg Nord Park - Assembling the nature and the industrial elements

[98] Transformation of a former steel complex designed by Latz + Partner, built from 1990 to 2002.

[99] Moreira De Marchi, P. 2001.

[100] Dettmar, J. 1999, p. 35.

[101] Latz, P. 1998.

[102] Lubow, A. 2004.

[103] Lowry, P. 2001.

[104] Reed, P. 2005.

fig. 79_ Westergas Fabriek Park - Green areas in a urban environment

fig. 80_ Westergas Fabriek Park - Relation with the water

fig. 81_ The High Line - A new urban space in a dense city

fig. 82_ The High Line - Input green in the city increasing the diversity of flora and fauna

The Westergas Fabriek Park, already mentioned in chapter "post-industrial waterfront", offers Amsterdam's inhabitants and visitors a green recreational park. Located in the proximity to the center of Amsterdam, its advantageous position and historic structures provided potential for cultural re-use. The concept suggested a delicate balance between society and landscape, city and nature. The creation of park zones related to the existing features and its contexts generates a diversity of situations and dynamics between them; the zones are connected with an axial promenade which links the eastern urban plaza to the western nature area. "Gustafson Porter's vision creates a robust landscape - a coherent expression of the synergy that can be created between industrial artifacts and a redefined natural and cultural context". The park offers a large diversity of cultural programs including areas to open-air events with large dimensions; the program responds to the needs of the local population, who was consulted during the design development process. This park, inserted in a dense urban context, to fill positively the population needs, generates new opportunities for public urban areas.

The last approach to be mentioned is inserted in a different context, being relevant the capacity of adaptation and reinvention of the city. The High Line[105] in Manhattan, USA, was an elevated railway where vegetation grew up spontaneously keeping 161 species of plants. By the end of the 80's the plan to recover the rail system was encouraged by the "friends of the highline"[106], becoming a successful project which changed the urban qualities of the area. Developed in three stages, the park was designed to offer to the residents the opportunity to walk through the city, having the possibility to sit and enjoy the view, being surrounded by grass and flowers. The passage through the buildings provides the owner an opportunity to begin a second layer of commercial area. "A derelict expanse of unused metal now is cohesive and welcoming public amenity"[107]

The three showed examples have different scales and relations with the urban environment. The High Line is located in the chaotic urban environment, the Westergas park is in the outskirts of the city but still with a close proximity from the city center, while the Duisburg park is far away from city, having a larger scale than the other ones. All of them have a distinguish design, function, social impact and integration into urban

[105] Opened in 1934, the elevated railway was providing higher safety by separating the train and street traffic; with the decrease of the use of train during the 60's and 70's the High Line was closed in 1980. The renew is designed by a collaboration between James Corner Field Operations (Project Lead), Diller Scofidio + Renfro, and planting designer Piet Oudolf; The first section opened in 2009, the second in 2011.

[106] Is a non-profit organization formed in 1999 by Joshua David and Robert Hammond.

[107] http://adaptivereuse.info/portfolio/the-high-line/

landscape. Even so, they are successful in implementing green areas into the city, what conveys the industrial heritage while regenerating the urban pattern. The High Line project reveals an interesting social entailment, its location and design makes it possible to give a privilege to those working or leaving nearby. This space can be used in small bits of the day while doing routine travels, being an achievement its concept of place to stay with place to pass. The creation of urban green spaces will become an important feature in the development of the urban strategy.

3.1.5_ LEARNINGS

The research on the topic reusing industrial areas was grouped by actions and results which influenced, directly or indirectly, my way of thinking about the subject and the conceptual and physical actions proposed in the project. The chapters must be seen not as separated subjects but as themes which are all related, creating connections between them and generating new understandings.

Being aware of the challenges in reusing industrial structures which have a historical character, it is important to understand the value of the identity of the place and the memory which is associated to it; having, though, conscience of its complexity. Identity can be preserved by working with the beauty and strength of the physical elements, respecting the structure and plans of the building, having the conscience that they were built with functionality in mind, being productivity and efficiency the main goals. The physical components create a valuable atmosphere; the preservation of some elements, such as the structure, raw materials or machinery, is one way to preserve part of that inherent atmosphere.

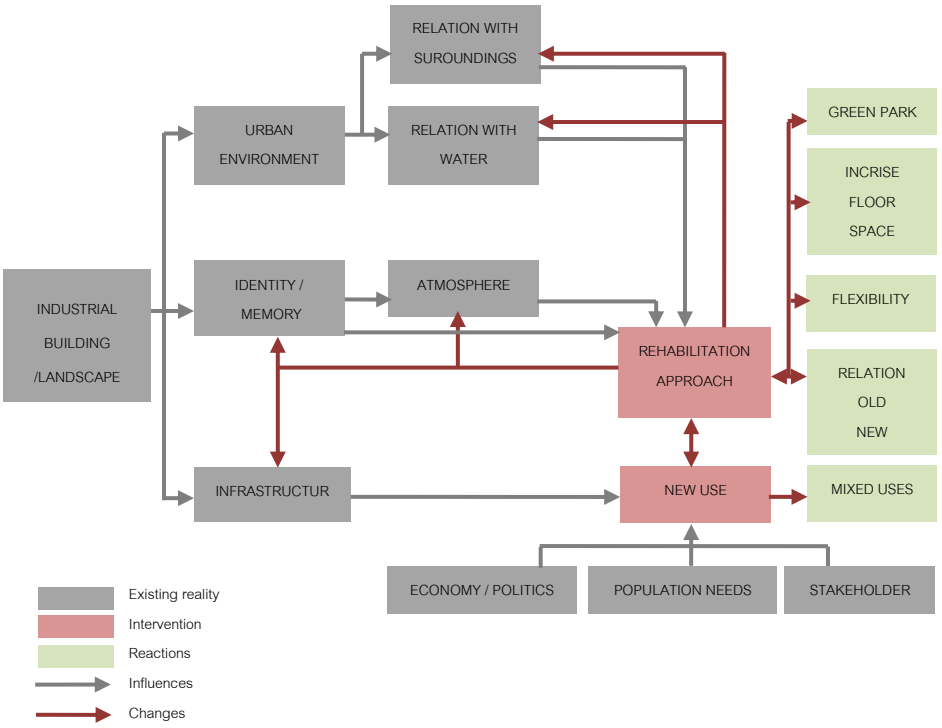
New uses related considerations must be weighed in each different feature, it is important to have in mind that the new functions are one important tool to regenerate the industrial area, working as a catalyst for the community revitalization and economic development. To recognize the population's needs and consider them when evaluating the physical capacities of the space, is essential for the effective improvement of the quality of local community's life. It is also important to reflect about the complementary needs of the users, mixed uses increase the web services and the movement of the population, optimizing supply. Flexible spaces increase positively the space's utilization raising its potential. It is important to be aware that the site should have a sustainable activity which should grow in time, giving the project a dynamic and somewhat unpredictable growth.

Concerning building interventions, there is no uniform solution which can be pointed; each case is a single reality, depending on the environment, its needs and constraints. The proposed project should be developed with expertise, flexibility and imagination, beneficiating the modernization of the buildings and their surroundings. Addition of elements which will complement the space needs can be justified in order to accomplish the programmatic demands; increasing the floor area can be applied by constructing complementary buildings, adding floor levels or working on the inner space of the existing building. These additions should respect the identity of the place, taking special care of the relation between the new and old.

The waterfront is an important item in this project due to its location; the harbour area needs to be integrated in the city, bringing city's creativity and space quality to the area. Relation between industrial structures and water can be divided into two categories: one includes the buildings that are very close to water, letting no space to public areas and privileging the building's users; the other one, related to the buildings with a considerable distance from the water, letting room to public areas in the space in-between. The reflection of these characterizations results in an intention to develop a design which enhances public space and does not forget to privilege the users of the waterfront buildings -due to their permanent characteristic-.

Ecological concerns are present in the contemporary world and they are meant to be part of the architect's inherent skills, being present in the gentrification process of industrial areas. Reflecting the lack of green spaces in the city, large industrial areas are an opportunity to insert vegetation in the urban context, creating ecological public urban areas. Observing the preexistent conditions, there might be remains of vegetation, which are important indicative clues for a transformation approach. It is necessary to have a special attention on the borders of the interventional area, to prevail a logical connexion between dense urban areas and a green landscape. Designing a landscape inside the city demonstrates the adaptability and renovation of the city, creating a delicate balance between society and landscape, where landscape becomes culture.

To conclude, the following diagram represents interactions between the existing industrial reality and the rehabilitation intervention, indicating the main points of reaction to the challenge.



3.2_ECOLOGICAL SUSTAINABILITY _ REUSING SOURCES

Environmental sustainability involves theory and practice actions which intend to protect the natural world, with particular emphasis on preserving the capability of the environment to support human life. The global idea of sustainability and its principles are not just about reducing the amount of waste produced or using less energy, but also about developing processes which can be applied locally reducing the global humanity's impact.

In the previous chapter different ways of preserving the industrial landscape were reflected. "We can only start to understand the contemporary landscape by knowing what we have rejected and what we have retained from the past."[108] Urban landscape is constantly changing, existing a number of opportunities to reuse the land with ecological aims. According to Thomas,[109] the term "land recycling" has been adopted by many urban planners. "The urban regeneration and the sustainable development emerged as parallel stands of modern urban policy"[110]. The landscape reclamation design interpreted by Punter should assimilate five fundamental principles: to protect and conserve quality landscapes; to develop a clear vision and strategy for an area; to apply collaborative design principles; to allow resources for long-term aftercare of new landscapes; to enhance biodiversity, social stability and economic development.[111]

Cities are places of high population density, where economic development has a higher effect, what consequently reflects in the high level of consumption of all kind of sources, namely space, water and food products. Massive production and consumption result on large level of pollution, which increases the ecological footprint[112]. In The Netherlands, no less than 65% of the population lives in urban areas, and this trend will continue over the coming years. The rapid increase of urban population has meant an increase in building density and, in turn, adverse consequences for urban green public space. Cities have several problems which need to be solved, as environmental, transportation and social/cultural ones[113]. In the last decades local authorities have been paying more attention to foster actions and urban designs which have a sustainable development improving the life quality of urban areas, discovering alternative forms of interrelationship

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[108] Swaffield, S. 2002, p.15.

[109] Thomas M.R. 2002, p. 10.

[110] Couch, C. & Dennemann, A. 2000, p.138.

[111] Punter, J. 2002.

[112] "The Ecological Footprint has emerged as the world's premier measure of humanity's demand on nature. This accounting system tracks, on the demand side, how much land and water area a human population uses to provide all it takes from nature." In Footprint Basics; the concept of "footprint" was initially defined by William Rees and Mathis Wackernagel in "Our Ecological Footprint" (1996).

[113] Herbert & Thomas 1997.

between people and places. Public spaces are the focus of these actions, being “a priority the architecture of the landscape and the public areas which connect the multiple urban centres”[114].

When building public green areas optimizing the management of economic resources is essential to. In The Netherlands, the method of “new estates” is responsible to generate sufficient founding for these areas. The idea is to let the private sector afford development, combining urban forest with housing and company buildings.[115]

The field of urban ecology combines the ideas of ecology, social sciences and planning to create an extensive understanding of urban systems functioning. The ecological concerns were present in the development of this project in the form of three main concerns: the lack of green spaces in urban areas and its impact in the environmental renew; the relation and utility of water, present in the canal; and the growing concern in some urban communities about how food production and its transport occurs, which engenders a new urban way of life with social positive issues.

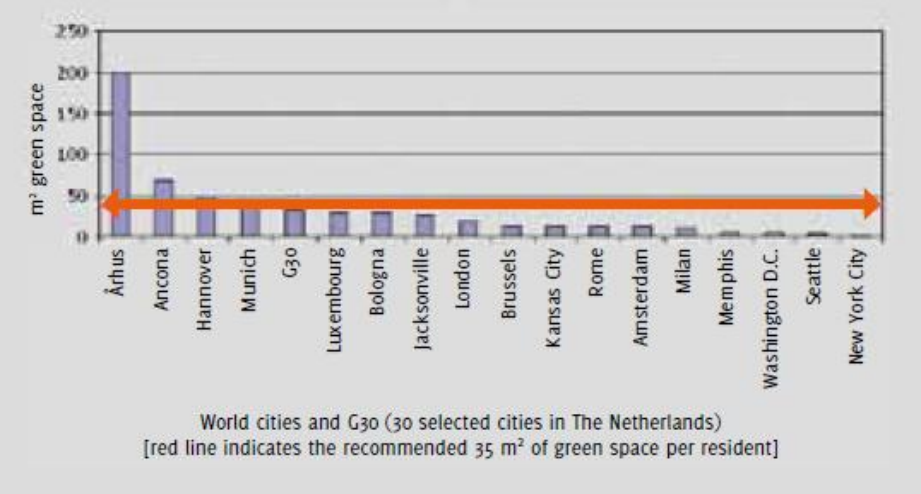

fig. 83_ Amount of green per resident in selected cities

[114] Portas, 2011, p.47. Author's translation.

[115] Dutch Ministry of Agriculture, 1995.

3.2.1_ECOLOGICAL STRUCTURE

Ecological structure in the city is represented by several green parcels inside the urban web; these green points can assume different functions and physiognomies with diverse scales: city, neighbourhood or private scales. The deficient quantity and quality of these points weaken the ecological structure; the implementation of a nature's-services approach, which will change the urban infrastructure, faces substantial obstacles requiring a deep change in the culture of urban management.

Green areas acquire important functions for peoples' needs in an urban landscape, providing them contact with nature thus its biodiversity, and a place for social interaction creating a sense of community identity[116]. Green areas' benefits are vast thus their effect in the people is large, improving their physical and mental well-being[117], which consequently reflects positively in the economy, increasing productivity and reducing absenteeism[118]. Moreover, indirectly the green spaces' benefits improve the urban environment: increasing the air quality by filtering its pollutants and dust, and preventing the soil erosion and absorbing rainwater; working as buffers, reducing the negatives effects of traffic and industry; providing a microclimate which reduces the greenhouse effect by absorbing CO_2 and regulating temperature through shade and wind, creating a cooler and more comfortable environment[119]. From an ecological point of view, green open spaces do also provide a natural habitat for animals increasing positively the urban fauna, preserving the ecosystem. The quality of the green infrastructure provides a more attractive environment for private investment and increases housing and offices values, being a good feature or not depending exclusively on social policies.

The introduction of vegetation into urban environment results in a positive contrast of shape and texture between construction and nature, stimulating senses through smell, sound and colour sight[120]. The progress of the relation between the city and nature is present in the contemporary urban issues with the aim of reducing the contrast between city and campaign.

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[116] Matsuoka, R. & Kaplan, R. 2008, p. 7-19.

[117] Maller, C. et al, 2006, p. 45-54.

[118] Constanza, R. 2008, p. 351.

[119] Givoni, B. 1991, p. 289-299.

[120] Dorward, S. 1990.

3.2.1.1_GREEN SPACES IN THE CITY

type of park	house's distance	size of park
pocket park	200m (4 min. walk)	0,01 ha - 1 ha
neighbourhood park	400m (6 min. walk)	1 ha - 6 ha
community park	800m (12 min. walk)	6 ha - 18 ha
large urban park	1600m (20 min. walk)	18 ha - 200 ha
city-wide park	3200m (up to 30 min. walk)	>200 ha

tab. 4_Typologies of urban parks

Green spaces in the city have different typologies, functions and scales, which will provoke in the inhabitants and visitors different reactions to the space. Green areas' different sizes will create different impacts on the city, the neighbourhood and the streets; providing a green network which offers movement into daily life, encouraging daily routine short trips on foot or bicycle, which is very usual in The Netherlands. Urban open space typology can be represented by public parks or gardens, outdoors sport facilities, allotments, private gardens, community gardens and urban farms, cemeteries and churchyards, green corridors, streets and squares, natural and semi-natural meadow and woodland; vegetation present in urban open spaces has aesthetics functions, creating a green and healthy image for the city. By creating a green network at the planning stage of a project, many urban conflicts and dangerous intersection could be solved.

The different typologies of urban parks are related with its size and usually they assume recreation functions, spaces to do exercise or enjoy the day[121]; its location inside the city creates the need to articulate the parks with its surroundings, ensuring accessibility and creating solutions where unavoidable infrastructural barriers block the access. The integration of semi-public and public buildings can be used as part of the continuous green network by creating atriums, galleries or other solutions. The green network must foresee public furniture and provide bicycle parking facilities at popular destinations. The parks are created to the population, offering a place to develop social contact and social cohesion. Urban squares and waterfronts also provoke this social interaction. The use of vegetation in these places makes them more attractive for people, when the trees are planted strategically; creating comfortable areas where people can sit, walk and play. The social contact is lived differently by each person; some people prefer quiet and peaceful spaces, while others choose playing and socializing busy areas. This conscience that the users change over the time should be visible in the design, offering flexibility and diversity of spaces for potential users.

When the street layout is composed by rows of trees, it is profitable to the inhabitants: providing structure and orientation in urban environment and creating a comfortable microclimate along streets. The trees in the street also have the function to protect from the

[121] Roseland, 1998, p. 15.

sun and control the wind, letting it remain above the tree canopy in narrow streets. They allow the sun reach the ground in winter and prevent the sun in summer. When the space is reduced, other solutions can be thought such as hedges, green roofs, green walls, etc.

Private gardens generate benefits to their owners, but also to the general public, by increasing biodiversity in the city, making the neighbourhoods more attractive and helping keep cooler streets and houses. Private gardens offer the freedom to choose their own plants and layout which increases the diversity of green in the neighbourhood, making it possible for the residents to experiment the four seasons. Land can be worked with different purposes: growing green for pleasure and visual effects or growing products and herbs for individual consuming[122]. Medina[123] building is a residential complex full of high quality private green areas interacting with public space providing the opportunity to experience the green biodiversity.

Indoor vegetation does also bring environmental, social and economic advantages. The use of plants improves indoor climate, regulating the temperature and improving the air quality. These features create a healthier atmosphere both in physical and psychological way. “Studies show that sick days from work are reduced by 3.5 days per employee in offices with plants”[124]. Moreover, there is a therapeutic impact just by looking at plants. In the Lumen building[125], the greenhouse construction provides the needed light for the plants to live and creates a connection between the outside and the inside.

An important function of green spots in the cities is to use them as a barrier; acting as a buffer to prevent local sources of pollution and noise such as heavy traffic roads, factories, etc. These barriers are also used in the private context, when continuous canopy of trees are placed in front of houses, backyards, or offices, creating a visual barrier between public and private.

fig. 84_ Private gardens in Medina, Eindhoven

fig. 85_ Lumen Building

[122] The urban farming theme will be developed in the chapter 3.2.3.

[123] In Eindhoven, Netherlands, designed by Neave Brown.

[124] Constanza, R. 2008.

[125] In Wageningen, Netherlands, designed by Luc van Dam (LIMES architecten), Copijn and Benisch Architekten.

3.2.1.2_RENOVATION AND CLEANING THE GROUND

The industrial process developed several changes in the ground of Physics. One of the major obstacles of brownfields renewing is to resolve the contamination problem of soil and water. There are different ways to deal with the problem, the choice of the solution must consider the different features and make a balance between them: the environmental impact, economic issues, project schedule and new use of the transformation.

One of the processes is to replace the soil with high concentration of contamination into certain depths below the surface and substitute it with a clean refill, using an impermeable barrier to separate the clean soil from the polluted one. This method is an immediate solution; however, its high costs do not provide a sustainable solution. A cheaper and long-term approach, the phytoremediation, eliminates contaminants through the use of certain plants which have the capability to mitigate environmental problem by breaking down the contaminants and obstructing their spreading through the ground water; this process is indicated for soils with low concentration of contaminants (organics, nutrients, or metals). Nevertheless, this process also has its limitations: plants are affected by the toxicity of the contaminated land, and the area that could be cleaned is limited in its extension and depth, depending on the size of the roots. The big advantage of this system is that it provides ecosystem restoration and "green areas that may be desired by the local community". [126]

The clean-up process being used in the Meelfabriek[127] is the isolation, the polluted ground would be covered by a layer of textile and on top of it a "living layer" of clean soil a meter deep.

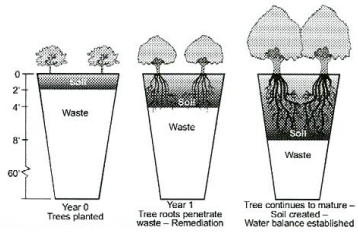


fig. 86_ Phytoremediation process

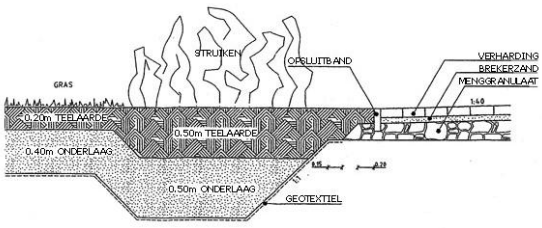


fig. 87_ Method used in Meelfabriek

[126] EPA, 2001.

[127] Project talked in previous chapters.

3.2.2_WATER RENEW

Water plays a particular role in urban areas. It is an important component which gives horizontality to the landscape. Integration of water in urban planning improves the quality of public spaces. The use of water as a green solution, by combining water with the need of nature and recreation brings social and ecological benefits. The use of trees to catch water runoff improves the infiltration capacity of the soil, which is important in the urban environment, due to the fact that most of the city's soil is water approve. The plants also help to purify the water by biofiltering.

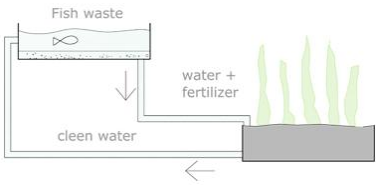


fig. 88_ Aquaponics system

The water can be reused for several purposes; for cleaning processes, human consumption and agriculture. Here we will talk about one of the methods of using the water in agriculture with ecological preoccupations, the aquaponics system.


fig. 89_ Plants on the water

Aquaponics system is an ecological system used to fertilize agriculture, it is a combination of aqua culture (raising fish) and hydroponics (growing plants without soil), where both vegetables and fishes grow together and the recycling of nutrients and filtration of the water is linked. There are three key roles in this system: fishes[128] produce their waste, a special bacteria turn that waste into nitrates, the water is pumped into the growing beds[129] and plants consume the nitrates, hence filtering the water, which is replaced in the fish's tanks providing a clean fauna. This system works as a cycle where the plants received the necessary nutrients and the water where the fishes swim, is constantly renewed. It can just be applied when the vegetation is plated on small stones, and not on the usually soil. This process is efficient, offering a good solution to renewing water constantly; its application brings others benefits: the fishes are proper to consume, there is no need of fertilizers and pesticides, and it is required less water than in the conventional gardens.

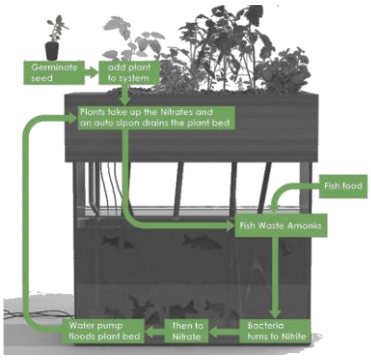


fig. 90_ Growing bed above the tank

It is important to consider the energy inputs and outputs of the system, such as the electricity necessary to the pumps, the fish food, and others. The tanks of water and fishes can have different positions in relation to the growing beds, such as: the tanks are under the plants without physical contact, the plants are on the water, or the plants can be on the side of the tanks. The location of the tanks and growing beds will depend on the available space, technical constrains, and the concept applied.

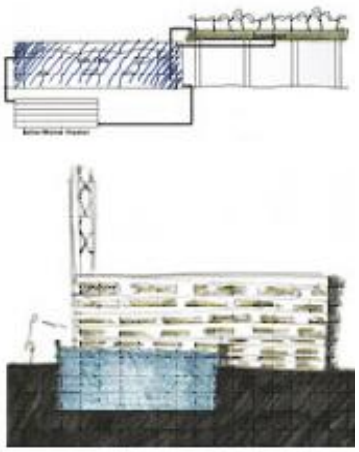


fig. 91_ Growing bed next to the water

Concerning water preservation, its benefits are several: ecological, social and economical. The aquaponic system is one of many systems to reuse water for growing food proposes. This concept will be developed in the current project, what will be explained in the chapter 4.3.4.1- Relation between the water and the building.

[128] The appropriate fishes to this system are: as tilapia, catfish and perch.

[129] Technical term which tells the place where plants grow.

3.2.3_URBAN AGRICULTURE

The practice of growing food inside a city is named urban agriculture; its insertion in the city can be seen as an aspect of food sustainability and urban planning, or as healthy leisure pursuit for the population. In the underdeveloped countries this practice has a significant role in the cities' food system, feeding especially the poor citizens or giving them an additional salary. The use of urban agriculture is mostly seen in Asia and Africa. However, recently it is becoming popular in cities across the United States and Europe, where several initiatives have been taken. Urban farming is becoming gradually popular in several cities from The Netherlands; especially community gardens have grown for the last years. Often articles about this subject are published in local newspapers, what shows this interest of the public[130].

Cultivation areas are related to the implantation of cities. Initially they were located in the outskirts, where soils were fertile. The proximity to the city permitted an easier organization of food's transportation. With the evolution and growing up of urban areas, cultivation was progressively replaced far away from urban centers. These changes made the production being more distant from the consumption focus, needing to travel long distances. Adding to this fact, nowadays, food products are not produced just locally; they travel long distances by boat, plain or truck, to provide a variety of products in the supermarket. Producing food locally provides a better way of sustaining the city's population and reduces the need of transportation. This feature improves the city's sustainability even more when the urban wastes are used as inputs, helping cities become more resource efficient and reducing the amount of waste[131].

The location of urban agriculture is defined in three different ways: the intra-urban, the peri-urban agriculture, and in urban buildings. The intra-urban is implemented in the densest urban areas, offering limited and dispersed areas; while the peri-urban agriculture is located in the edge of the city, being possible to have large areas for cultivation[132].

Initially local authorities, especially in developing countries, evaluated urban agriculture mainly as a source of problems, due to the apparent healthy and environmental risks. This practice was seen as a temporary use of the land[133]. However, the advantages of urban

[130] Lems, E. et al., 2011.

[131] Smit, J. et al., 2001.

[132] Mougeot, L.J.A. 2000, p.15.

[133] Bourque, M. 2000, p.119 - 145.

farming are higher when proper care is taken. Urban farming has numerous reasons to be used; it develops social cohesion in neighbourhoods and gives education about the origin of food, and fights against obesity; it is also important for climate regulation and the preservation of green spaces in the city. There are several advantages in the community gardens: they transform vacant areas in a productive use, providing food supply and recreational activities. In most of the cases the idea is to practice sustainable food production. Several gardens tried to input the principles of permaculture[134] to achieve this. Despite the qualities, there are some disadvantages that must be controlled. Many health risks in urban farming are similar to those in rural agriculture, being others specific for the urban context. The inappropriate use of contaminated irrigation water from rivers and canals contaminated by wastewater from industry, is one of the principal risks in food production[135].

Rural origin of the agriculture cannot be used with the same premises in the urban environment. In the city, the layout is different; the urban network has a specific structure and morphology; here the urban agriculture will be inserted and adjusted to the physical reality. Production systems can have different scales[136]. The small scale can involve one or more persons working a small portion of land for auto consumption; the large scale involves more people who develop a large farming area whose products can be commercialized. Maximizing the use of space is one of the goals of growing methods, due to the restricted space in urban areas[137]. Growing vertically offers diverse forms of maximizing the available space.

Urban agriculture can have different typologies and be differently adapted to the urban morphology; it can be implemented at urban parks, allotments, vacant lots, private gardens or at the water. The allotment gardens are parcels of land in the city " where ornamental plants and/or vegetables can be grown on which often a small house of defined proportions can be placed, in which it is allowed to stay overnight in the period of April till October"[138] . Wild vacant lots are parcels of land to build which are temporarily not used. The city's system of vacant spaces usually forget some potential areas, "surfaces

[134] Permaculture is a set of principles for designing human settlements and agricultural systems aimed at achieving sustainability. The term was introduced in the 1970s by Bill Mollison and David Holmgren.

[135] Brown, K. & Jameton, A. 2000, p.21.

[136] Smit, J. et al., 2001.

[137] Mougeot, L. J. A. 2000, p.17.

[138] Definition of allotment in Amsterdam. DRO, 2004a.

linked to roofs, terraces and balconies have certain typical characteristics that make them worth considering when it comes to introduction gardens."[139]

The concept of community garden can be used in different places where urban agriculture can be supported. It is an area shared by several members of a community; each community can manage differently the farming process. In some cases, each member of the community gives a number of working hours per week. They necessary work according to their availability and knowledge; afterwards they share the products.

The idea that growing food should perform locally, brings to the table where the centre points of food consuming are, such as restaurants, schools, hospitals, business parks, etc. These programs could support private gardens which provide quality food for their users; being adaptable, in some cases, recreational activities, for example in schools.

Innovation is an important feature in the role of urban agriculture; not necessarily just in technical discoveries and improvements, but also in the adaptation to the urban network and how it is organized in the society[140].

fig. 92_ Main policy perspectives on urban agriculture.

[139] Arosemena, G. 2012, p.75.

[140] Critchley, 2007.

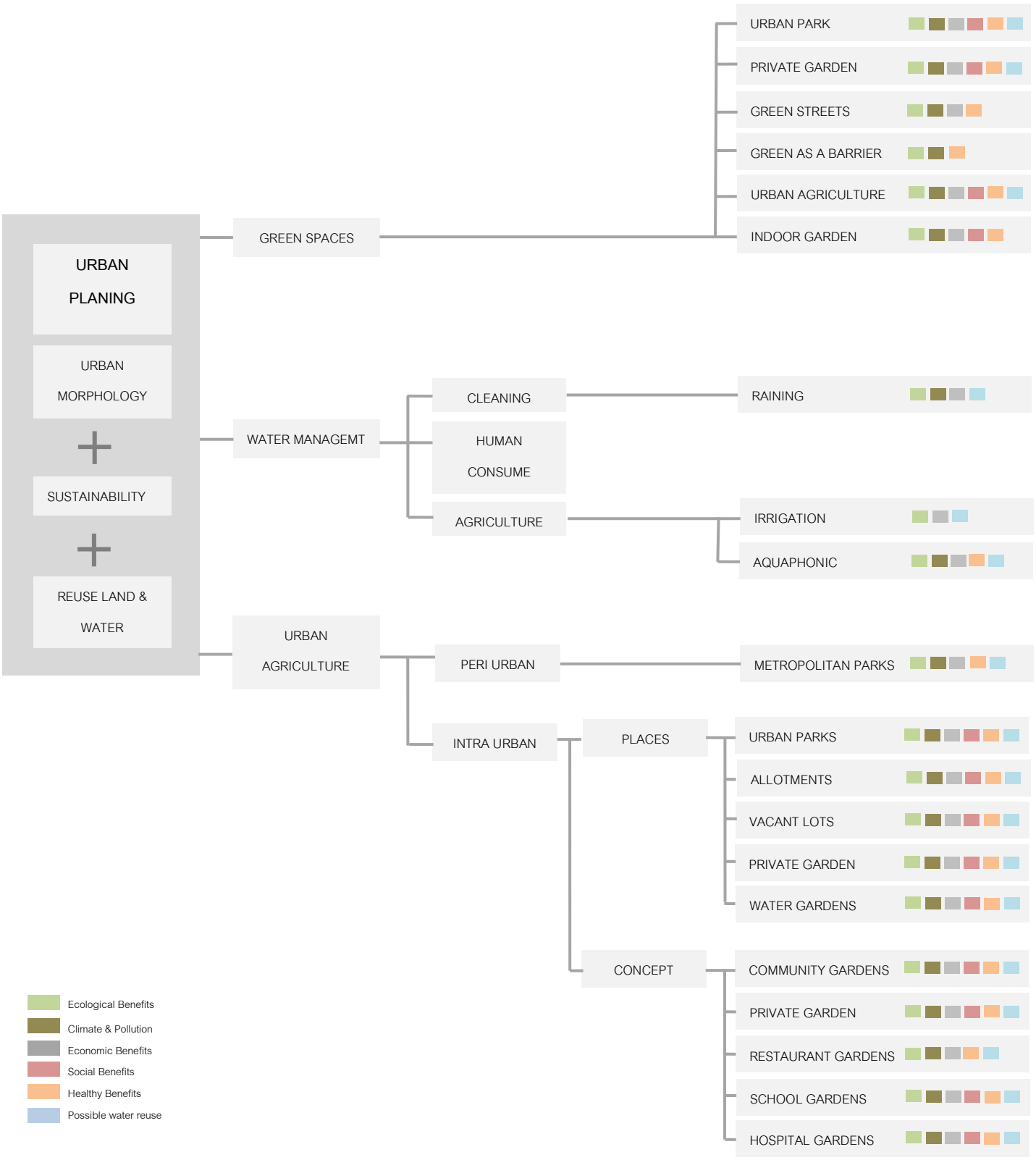
3.2.4_ LEARNINGS

Ecological concerns are present in the contemporary world and it is one of the architect's inherent skills, being present in the gentrification process of industrial areas. In this work, ecological concerns are associated to specific ways of reusing the resources, what can be a vehicle to improve the urban landscape and its inhabitants' life quality. Three main subjects were analyzed: the typologies and benefits of green spaces, food sustainability into the urban context and how to use the water as an element to improve the quality of the urban environment.

The set of green spaces constitutes the urban ecological structure of a city, the maintenance and improvement of this structure is very important for the city's inhabitant's life quality and for environmental issues. The benefits of green areas inserted in urban environment are numerous, related to benefits on the fields of: ecology, climate, pollution, economy, sociality, culture and health. The progress of the relation between the city and nature is present in contemporary urban issues with the aim of reducing the contrast between city and campaign. Different typologies and scale of green areas have different proposes and offer distinct functions, being all of them important in the creation of diversity urban elements.

The expectations of changing the life of the city's inhabitants and offering alternative ways of living, is the motivation to develop the work through the implementation of urban agriculture. An inclusion of rural activity in urban environment has been developed in several countries with different local conditions. Its ecological, economic and social benefits are seen as an aspect of food sustainability and urban planning. Due to the fact that the agriculture needs a large amount of water and nutrients, the research of possibilities which would create a sustainable system has led to the investigation of the aquaponics system. This method would influence the design decisions through functional proposes, what formerly was a predominant characteristic in the design process of industrial buildings.

The diagram in the next page resumes the benefits of the different typologies of green spaces, urban agriculture and ways of water management.


URBAN PLANING
URBAN MORPHOLOGY
+
SUSTAINABILITY
+
REUSE LAND & WATER
GREEN SPACES
URBAN PARK
PRIVATE GARDEN
GREEN STREETS
GREEN AS A BARRIER
URBAN AGRICULTURE
INDOOR GARDEN
WATER MANAGEMT
CLEANING
RAINING
HUMAN CONSUME
AGRICULTURE
IRRIGATION
AQUAPHONIC
URBAN AGRICULTURE
PERI URBAN
METROPOLITAN PARKS
INTRA URBAN
PLACES
URBAN PARKS
ALLOTMENTS
VACANT LOTS
PRIVATE GARDEN
WATER GARDENS
CONCEPT
COMMUNITY GARDENS
PRIVATE GARDEN
RESTAURANT GARDENS
SCHOOL GARDENS
HOSPITAL GARDENS
Ecological Benefits
Climate & Pollution
Economic Benefits
Social Benefits
Healthy Benefits
Possible water reuse

4.1_ Analyzes

4.1.1_ First Impression

4.1.2_ Characterization of areas

4.1.3_ Road networks and connections

4.1.4_ Typologies of Vegetation

4.1.5_ Barriers

4.1.6_ Services

4.2_ Strategy

4.2.1_ Objectives

4.2.2_ Urban concept

4.2.3_Program

4.2.4_ Area to develop

4.3_ Cooking school

4.3.1_ Characterization of the building

4.3.2_ Objectives

4.3.3_ Renovation strategy / conceptual transformation

4.3.3.1_ Functional system

4.3.4_ Architecture development

4.3.4.1_ Relation between the water and the building

4.3.4.2_ Structural concept

4.3.4.3_ Industrial & Green atmosphere

4.0_PROJECT DEVELOPMENT

“Reality is a yo-yo, change is the only constant.” [141] Nothing is static in nature; everything is an element of constant change, a relentless updating of the present condition. The exercise of designing has this motivation in changing and improving the human habitat. This chapter focuses on explaining the decisions and the thinking process of the project developed; establishing the relations between the project decisions and the learnings, presented on the previous chapters. During the creative process, graphical elements were essential to understand and communicate the ideas. They will also be exposed in this chapter, relating them with the written dialogue.

The organization of the chapter follows the studio structure; starting by analyzing the area, and proposing an initial strategy which will be developed and improved in a small portion of the entire project. This organization corresponds to the chapters 4.1_Analyses, 4.2_Strategy, and 4.3_Cooking school. The last chapter indicates a solution to the intervention in one of the buildings referred on the strategy. The features of the analysis and the goals of the strategy were not defined or suggested by the studio's supervisor; each student had to construct his own way, organizing his ideas and aims with hierarchy, to develop a project with coherence.

[141] Auster, P. 1989, p. 61

4.1_ANALYSIS

The analysis started with a first visit to the area and a representation of its first impression followed by a study of the site's morphology and characterization, understanding the urban constraints, qualities and problems. The analysis is focused on two different scales, one of them has to do with the limits of the city, and the other one, with the limits of the area defined by the studio. It was given more emphasis to the smaller area due to the time schedule of the studio. To study the area specific analytic tools were developed which could sustain and give clues to create a strategy.

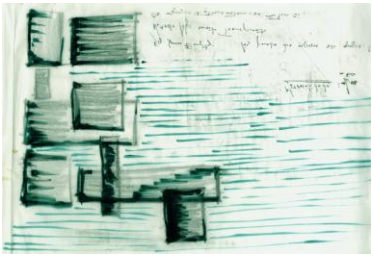


fig. 93_ 1st impression – Rhythm

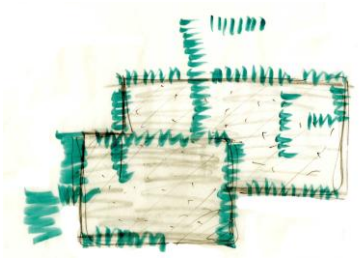


fig. 94_1st impression – Spaces' partition

fig. 95_The two scales of Analysis

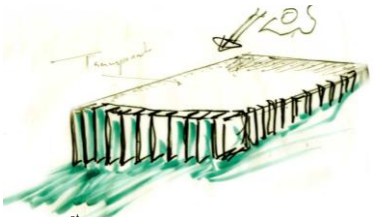


fig. 96_1st impression- roof lightening

4.1.1_FIRST IMPRESSION

The first contact with the site took place in the first group visit after the pre-project research. The visit had included a presentation guided by the Municipality, a walk through the Belcrum port and visits to some buildings, such as the water tower and the Backer and Rueb factory. It was requested to create an impression model which would represent the first impact on the individual thought, and would work as a reminder of the main features which provoked this first impression.

fig. 97_ 1st impression model - rhythm and big scale of the inner space

Personally, the Backer and Rueb factory was the element which provoked the main positive impact. The scale of the inner space created an impressive atmosphere, emphasized by the rhythm the steel structure and frames created, and the light entering in the building through big windows and openings in the roof. These two elements, light and the rhythmic structure, create a game of lights and shades which enrich the spatiality of the building. When visiting the cellar of one of the factory buildings the impression was the opposite: a space without natural light with many small partitions.

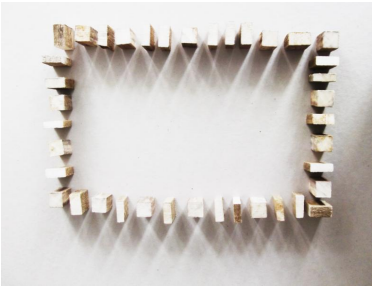


fig. 98_1st impression model - light creating shade through the rhythm of the elements

4.1.2_CHARACTERIZATION OF AREAS

fig. 99_Black and white diagram

fig. 100_ Black and white diagram

fig. 101_ Buildings High

fig. 102_ Interior of building next to the offices of the Backer and Rueb

The two distinguished urban morphologies, presented in the chapter 2.2.2_ Characterization of the area, have different characteristics and opposite identities influencing their connections with the surroundings. The main difference between Belcrum neighbourhood and the industrial zone is the quantity and hierarchy of public space[142], as well as the scale, typology and materiality of the buildings –related to their history and function. In the diagram of the building's height, it is notable that most of the constructions have from six to twelve meters, being the highest buildings the factory of Buck and Rueb and the water tower. This characteristic confers the space a horizontal image in the urban landscape.

Belcrum neighbourhood[143] plan is characterised by series of residential buildings, where there is a balance between public and private space, and outside/ inside space. Its structure brings together the private life with the neighbourhood experiences, combining this with the creation of a policy of urban vegetation, which will be exposed in the following chapters.

The industrial zone does not have the same features and identity through its large area. However, the lack of public space is something in common, like it was illustrated in chapter 2.2.2. The configuration of the area can be grouped in four main typologies: the area composed by heritage industrial buildings, the contemporary industrial buildings, the vast demolished area, and the small scale buildings.

The industrial area at the east of the canal has large heritage industrial buildings which confers a spatial atmosphere and increase the potential of transformation. These buildings' interiors are mainly composed by large halls where its dimension, the rhythm of its structure, the materiality of the elements, and the light that invades the space through the roof openings, generate an interesting atmosphere adding value to the inner space. Tadao Ando refers that a space which has a liveable environment has to provoke the user with the

142 The features of the public areas will be discuss in the chapter 4.1.5_Barriers.

143 Characterized in the chapter 2.2.2_Characterization of the area.

use of the senses[144]. The elements that were previously described contribute to activate the users' senses.

The contemporary industrial buildings at the west side of the studied area, contribute intensely to the lack of urban space, as it was explained in the chapter 2.2.2. This typology of pre-fabricated industrial buildings generates a loss of identity, creating an inconsistent and not coherent area. These features make the site unattractive and even transmitting the feeling of insecurity, what is increased with the vast demolished area, as it was described in the chapter 2.2.2.

The smaller buildings are vacant in some cases, used in others, with functions such as small shops or artistic studios. This social interaction with this small community generates a good dynamic, particularly next to the canal, a place appropriated to be used as public space. The canal itself is a calm and tranquil waterway where many houseboats reside, being happy with the circumstances of the surroundings, but not eliminating the possibility of changing. However, it is important that the transformation does not exclude the actual actors of the area.

fig. 103_ Private area of contemporary industrial building

fig. 104_ Informal furniture next to canal, used by the workers of the artistic studios

[144] Ando, T. 2003, p. 38.

4.1.3_ROAD NETWORKS AND CONNECTIONS

The road network of Breda has a main circulation made by two rings around the city. The ring in the city center stems from the medieval urban morphology, and the outside ring had followed the urban expansion impelled by the industry that developed its infrastructures along the old borders of the city. The train network has an important role in Netherlands. In Breda the train line crosses the north of the city, provoking a cut in the city between the north and the south, where the difficulties to cross create problems of accessibility and tension at the boundaries.

fig. 105_ Road network in Breda | red -primary roads | orange - secondary roads | yellow - train line

The intervention's zone, is characterized by three main elements: the principal road which crosses the north of the canal zone, the train line in the south, and two principal streets at the Belcrum neighbourhood that make the distribution to the local streets.

The main road in the north does not give access to the study area, it is a big artery of the city which connects it with a highway. Its contact with the harbour area is buffered by high vegetation. The two principal streets of the zone, the Speelhuislaan and the Belcrumweg, go towards the canal zone, having an endpoint which does not link the street with any public space. In the west side of the zone there is a lack of infrastructure due to its industrial character and big size of private areas.

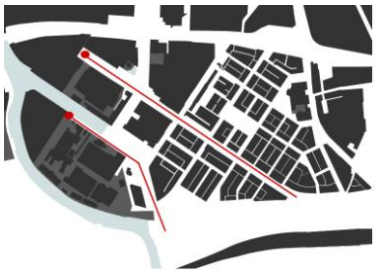


fig. 106_The end point of the, the Speelhuislaan and the Belcrumweg which does not lead to any public area

fig. 107_ Main roads of the study area

4.1.4_TYPOLOGYES OF VEGETATION

The green network of Breda is composed by several areas with different scales. At the outskirts of the city, four density green areas provide quality green spaces which can be reached by bike or walking easily. These areas are the Mastbos, Liesbos, Ulvenhoutsebos and Boswachterij dorst, liveable spaces which are used for sports and recreation. The Mastbos is one of the eldest pine's forest in Netherlands, being crossed by hiking and cycling trails, has several lakes which complete the landscape and fauna of the zone. This forest provides a rich nature creating peaceful areas which change along the seasons. The four dense green areas around Breda create a green corridor important to the city. However, this corridor is interrupted in the north part of the city due to the extensive industrial structures.

The plan of the city promotes the continuity of green spaces in urban context. The public gardens, the urban green parks, such as Valkenberg Park and Wilhelmina, and streets designed with rows of trees are part of the smaller scale into a larger green network. The trees in the urban landscape provide several benefits, such as culture, social, ecological and environmental. In the plan of the city is visible a lack of smaller scale green spaces in the north and east of the city.

fig. 112_ Green public areas in Breda and its surroundings

In the studied area it is visible that the Belcrum district has a political urban vegetation, while the industrialized area presents a lack of quality green spaces. The remains of trees in the industrial zones work like a barrier, to break the visual permeability towards some private areas. The buffer effect of the vegetation is also used to protect the area from the traffic noise of the north's road. The plan of the Belcrum neigbourhood foresee different types of vegetation: street vegetation, private gardens and public gardens. It was referred

fig. 108_Mastbos in the end of the summer

fig. 109_ Mastbos in the winter

fig. 110_ Private Garden in the Belcrum district improving the street environment

fig. 111_ Street of Belcrum district where the use of vegetation also improves the housing qualities

fig. 113_ Belcrum neighbourhood park

in the chapter 3.2.1.1, which are the qualities in use vegetation in the urban environment, and how it can increase the life quality of the area.

Based on the green structure existent in the city, the urban project will create a strategy to unify the green structure and fight against the lack of green spaces in the north of the city.

fig. 114_ Green Structure of the studied zone.

fig. 115_ Qualification of the green spaces in the studied area

4.1.5_BARRIERS

At the Breda canal zone, the users are confronted with many different barriers, either visual or physical. The barrier which provokes the main impact in the relation between the city and the canal is the large amount of private space in the mediations of the canal. The lack of public space makes that people do not usufruct the canal and its qualities, increasing the weakness of social and cultural environment.

fig. 116_Privite space (back) semi-public space (gray) public space (white)

Other barriers also contribute to a physical separation between the urban network and the canal. There are three distinguished barriers in different spots: a physical, a functional, and a visual barrier. The buildings in the end of the canal obstruct the passage to walk along the water which contributes to the lack of public spaces next to the canal. The road along the river Mark does not have a path or bicycle root, being intensively used by trucks, generating a non safe and pleasant area. This road is the largest area where the canal can be reached, withal its configuration and use does not permit to have a good livable area. The walls of the large industrial buildings, due to its opacity, do not permit to have punctual visual lines.

fig. 117_ Buildings as a physical barrier

The interpretation of the existing barriers will motivate the creation of public areas, enriching the urban design and promoting a better environment.

fig. 118_ Road as a functional barrier

4.1.6_SERVICES

The functions of the area are related to its history and industrial past. It is visible a clear functional separation between the neighbourhood and the industrial buildings. The uses of the neighbourhood are mainly housing and educational facilities; in the industrial side the functions are not uniform, mixing shops, offices, cultural organizations, factories and storages.

fig. 119_ Walls as a visual barrier

The functions using the facilities of the old factories had chosen this area partly, due to its large spaces which allowed to manage their functions. Some of the companies intent to move in the following years, such as the paper factory installed in the “Baker and Buer”. The cultural organizations bring to the zone a dynamic and creative approach. The active poles must be used as an incentive, involving them in the new urban design.

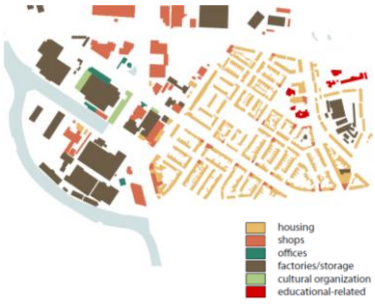


fig. 120_ Functional Map

4.2_STRATEGY

fig. 121_ Diagram of existing green

It is important to settle priorities and identify the principal problems to create an urban strategy. In the previous analysis the lack of public areas and green spaces was identified as a priority; being the Belcrum neighbourhood a good example of management of public / private space and urban vegetation, being a possible catalyst. The dead end of the principal streets of the zone, and the three barriers which do not permit a closer relation with the canal and the river Mark were also identified. The demolished area is interpreted as an opportunity to bring new life into the area with ecologic concerns.

fig. 122_Dead end of the two streets

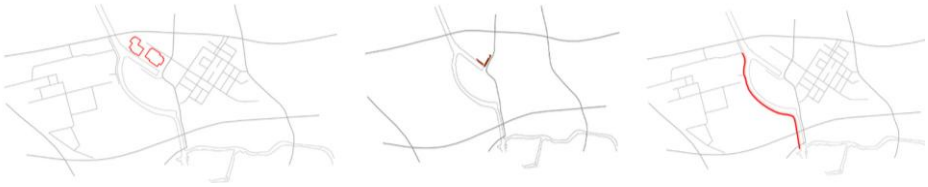


fig. 123_Diagram with Barriers- Visual (walls), physical (buildings) and functional (road)

The urban strategy is presented like the natural order of the design process: the definition of the objectives outlines the urban concept and the wishes of transformation, while presenting a coherent program which may revitalize the study area. This chapter will culminate by presenting the area which will be further developed. The nomination of the area which will be developed may have in mind the purpose of the studio: to renew the canal zone and its industrial heritage.

4.2.1_ OBJECTIVES

The main goal of the project is the revitalization of the industrial area and the canal, integrating them into the city and adding value to them, respecting its industrial heritage. The creation of other specific objectives is important to achieve the main goal, and give solutions to the current problems. The following objectives are grouped into three subjects: related to the overall of the project, the atmosphere and identity, and the programmatic concerns.

Relative to the overall project:

_To implement a strategy that promotes public and green spaces into the area, improving the landscape, qualifying and activating the canal.

_To improve the overall visual quality of the area.

_To improve the overall environmental quality of the area, understanding site contamination issues and identify and applying appropriate remediation techniques.

_To promote a more fluid space, where the people can easily reach the canal.

Associated with the programmatic demands:

_To implement a program which reflects social, economic, and cultural features.

_To create a mixed program where several age groups and different publics interact, taking advantages of the urban qualities.

_To involve the local community, improving the public facilities to the actual functions, while bringing new actors to the canal zone.

Concerning the area's atmosphere and identity:

_To preserve specific industrial features with a high visual and social impact.

4.2.2_URBAN CONCEPT

fig. 124_ Belcrum district being a catalyst to the industrial zone, due its political urban vegetarion

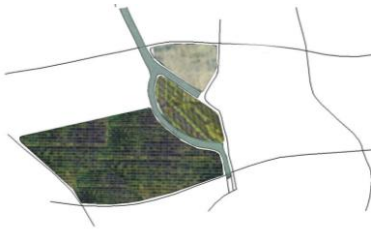


fig. 125_ Green Atmosphere concept to the three areas

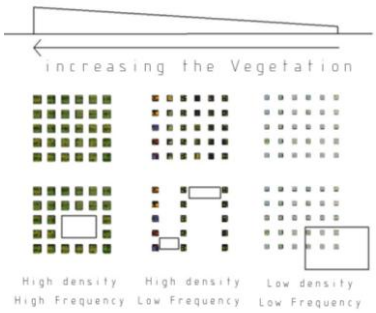


fig. 126_ Increasing the vefetation through the tree areas. The density represents the scale of the vagetarion, and the frequency represents the amount of it

fig. 128_ Conceptual model representing the constructuction and the feelings of the fist impression of the industrial buildings, cobining with the use of nature

The urban concept was born from three existing realities: the lack of urban space, the non existence of green areas at the industrial zone, and the sharp division between Belcum neighbourhood and the industrial zone. Furthermore, Belcrum district can have an enormous influence because of its policy on urban vegetation[145]. The idea of this neighbourhood working as a catalyst will generate a new policy of urban vegetation through the industrialized area. The desire of using the vegetation as an element to unify the area, assuming its opposite morphologies, will make this unlivable area to become a part of the city, while helping to maximize the potential of the waterfront[146].

The aim of this project is to create a new green pole in the city, which is not necessarily a park, but a mix of functions with an urban design which pretends to reduce the ecological and economic issues[147]. This new pole will increase the urban green network, and create a reach and diverse contact with nature, generating a sense of community identity[148].

fig. 127_ Map of the city with the new green pole and the infranstructures already existent

Due to the existing morphology of the area, the amount of vegetation will not be used regularly, being increased progressively through the three different areas: one at the east of the canal, the other ones between the canal and the river Mark and the demolished

[145] What was previously presented in the chapter 4.1.4_typologies of vegetation.

[146] Was referred as one of the objectives in the chapter 1.1_Objectives.

[147] The ones presented in the chapter 3.2_Ecological sustainability_ Reusing resources, when talking about the ecological concerns presented in the project.

[148] Matsuoka & Kaplan refereed this idea of the green spaces quality into the urban environment, exposed in the chapter 3.2.1_Ecological structure.

industrial area. This increasing will be transmitted through the quantity, scale and typology of vegetation used. Urban green areas may aggregate elements which are not articulated, and permit to create urban green areas of permanence and passage. A quality which was referred in the chapter 3.1.4.3_Green Parks. This new area will combine different ways of using green elements to improve its urbanity, such as green streets, green plazas, urban agriculture, private gardens, indoor gardens and a dense green area. The concept of these green spaces being insert in the urban environment was elucidated in the chapter 3.2.1.1_Green spaces in the city.

fig. 129_ Conceptual model in the nature

Associated to this project, the industrial heritage is an important element which should be respected[149], while at the same time embracing contemporary modernity in the transformation, creating a dialog between the old and the new elements. To revitalize the area it is created a program which pretends to bring new population to the area, involving the existent community. This program will be presented in the next chapter.

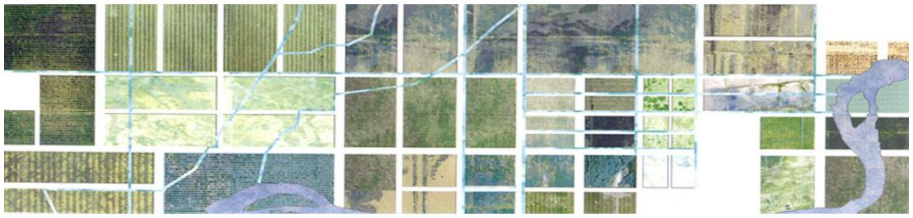


fig. 130_ Conceptual draw, matching the materiality of natural elements, the rugness of the industrial materials and the representation of the water

[149] Bodurow refers that the "the industrial landscape is a wellspring of memory, and therefore a powerful force for learning and change".

4.2.3_ PROGRAM

The task of creating a program that regenerates the urban layout, has to propose new uses, or revitalize the existing ones, intending to attract stakeholders and users, generating an economic development with a sustainable system that aims to improve the canal zone life's quality[150].

The reflection of the program had partly involved the research of what used to be before. Like it was described in the chapter 2.3.2.1, the first industry to work at the Belcrum Harbour was the R.K Barony Serbian Horticultural Society. This company was a producer and seller of vegetables and flowers. The legacy of those functions is still present in some of the actual uses, even if reduced and adapted to the urban reality and customs. This can be found at the company of vegetables conservation.

The theme of production is inherent to the area. It is through this subject that the program pretends to regenerate this urban landscape, respecting its memory[151] while reinterpreting the theme of production. This reinterpretation is associated to the insertion of agriculture into the city, which is a vehicle for food sustainability, urban planning and a healthy leisure

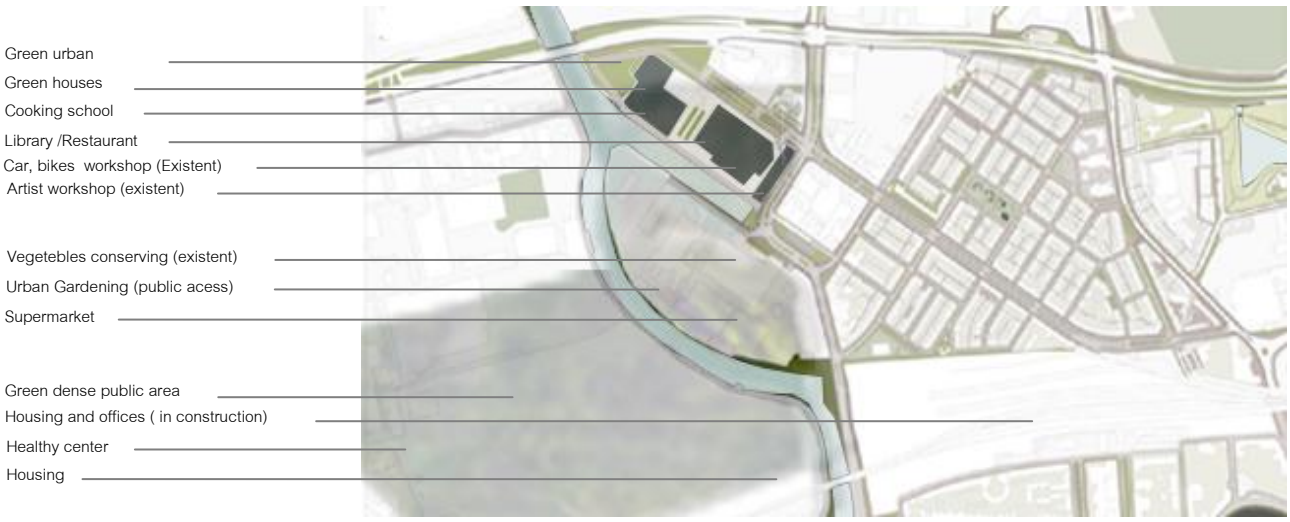


fig. 131_Program of the intervention

[150] The importance of creating a sustainable system and managing the private and public space with the available resources is explained in the chapter 3.2_Ecological sustainability_ Reusing resources.

[151] The importance of interpreting the memory of the place was exposed in the chapter 3.1_Industrial Heritage_ Reusing the legacy. Sola Morales refers that the "the memory of the past seems to predominate over the present".

pursuit for the population[152]. The production of food will be the main feature of the programmatic demands, whose insertion in the landscape is part of the urban design.

The impact that a mixed program has in the revitalization of areas which are, or will become in a short time, obsolete, was exposed in chapter 3.1.3. Due to the importance of a multifunctional program to generate an alive area, it is proposed a mixed program where different age groups interact, creating a social cohesion. The program pretends to respect and involve the existing functions in the area, what also increases the variety of uses, improving the network of necessary dislocations and enhance the daily life of the inhabitants.

[152] The benefits and to the city and its population of urban agriculture is elucidated in the chapter 3.2.3_Urban Agriculture.

4.2.4_ AREA TO DEVELOP

fig. 132_ Waterfront intervention

fig. 133_ Indication of a continous path along the canal

fig. 134_ Building which will be developed

fig. 135_Indication of a parcel of the urban design propose

After having created a program which fulfills the whole intervention, the studio proposed to develop the project through a closer approach to the industrial area, electing a building or a zone where the principles previously referred could be proved.

The previously presented analysis revealed the lack of public spaces and the disconnection between the existent infrastructures and the canal. The two principal streets of the neighbourhood lead to the industrial area and the canal; however, their end point does not involve that area due to the almost inexistence of public areas. Thus this, the restricted areas will be opened, being proposed to create a continuous path connecting the current infrastructures with the industrial area and the canal. This path will cross several public spaces next to the canal, which will be integrated in the current urban morphology.

The creation of public areas at the waterfront would qualify and activate the canal, generating a better life quality through public spaces. It was referred in chapter 3.1.1_Post industrial waterfront, the potential of waterfronts and its symbolic qualities in the perspective of the community.

This strategy was developed and it will be presented in the next chapter the proposal of transformation of the old factory Backer and Rueb. The architectonic characteristics of the building, its location and mixed program proposed previously, are the motivation to have chosen this building, generating a challenge which could be seen as a starting point of the canal zone regeneration.

4.3 – COOKING SCHOOL

This chapter will present a specific solution based on the previously presented strategy ideas. The validation of the strategy is focused on the factory building of the old Backer and Rueb company. This zoom requires a change of scale between the strategy and the architecture development of this specific building.

The organization of the chapter follows a structure that's been adapted to the projects' development and its decisions. Starting by the characterization of the building, in order to better define the objectives and goals; tracing, afterwards, the renovation strategy and the conceptual transformation of the building. Each point of the renovation strategy is further demonstrated through specific tools which were created during the project process. These tools were developed simultaneously. The project options are correlated with the learning's presented in the chapter 3.

The program to the current building has different functions, some are public, others private. The main function of the building is a cooking school, which is complemented with other programs, such as a restaurant, a biological market and a green house where food can be grown. The creation of a mixed program pretends to seek the goal of open the school to the community, where different activities could be developed, creating a social web which will increase the frequency that the population will attend the area, and consequently create a more livable area.

The school's surroundings are characterized by the canal; the water is a crucial element at the landscape and will have an important role in the development of the project. The design of the landscape and the renovation of this industrial area seek to emphasize the current heritage and its qualities.

4.3.1 _ CHARACTERIZATION OF THE BUILDING

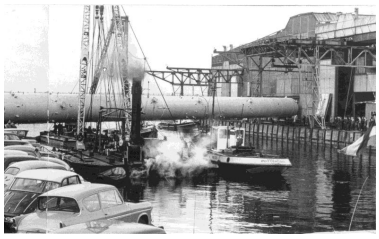


fig. 136_ Structure going out of the building at the canal side _1987

fig. 137_ Structure going out of the building at the road side- 1996

fig. 138_ Expantion of the building (with), 1950

fig. 139_ Interior of the factory-1983

fig. 140_ Interior of the factory,2012

The building chosen to be developed has a favourable location, in front of the canal and at the end of the Speelhuislaan Street, which gives to the spot lots of potential. The building was implanted in 1928 at the Belcrum Port, when it was still an empty area, being originally the Machinefabriek Breda f. Backer and Rueb. The company's function was related to metal works, producing large boilers, heavy steam engines and steam locomotives. The connection of the building with the railway station had permitted to transport the large and heavy products easier.

The company meant to have a functional building, with a considerable height to have the possibility of getting large pieces of material and machines into it, a lightweight construction, and a length which could be extended. Its volumetry gives a horizontal character to the building and its surroundings. When entering the building this volumetry is felt as a large empty space where the steel structure has an important role in the identity of the inner space. The structure is prepared to carry heavy load, having a system of runways in the structure, which goes out of the building to the canal and road side. Those runways were ensuring that all products could be removed. The part of the structure which goes out of the building was cut and removed, when it was no longer necessary. There was an expansion of the building providing more floor area; the expansion had the same logic of the original building, it was constructed one more row of columns with a larger length.

The building is intensely marked with a rhythm created by several features of the building. The structure provides a strong metrical position; moreover, the frames of the windows and the openings at the ceiling also contribute to the presence of this rhythm. Those openings provide daylight and confer the space a stimulating atmosphere, where the game of light and shades interact with the structure. Nowadays most of the ceiling openings are closed.

Façades are constituted by steel frame and brick, where the dimensions of the frame emphasize the horizontal characteristic of the building. The brick is substituted at some places by large openings or big sliding doors. The doors are placed at the canal and road sides, generating a circulation towards the canal. The large openings at the canal side permit to create a closer relation between the canal and the building. Currently, some parts

of the façade were replaced by other materials; this is visible particularly at the canal side's façade, where the variety of materials creates a non-uniformed façade.


fig. 141_ Façade with a variety of materials

Since 1997 the building has been used as paper storage by the company Puijfelik which recycles paper. The surroundings of the building are closed to the public, because the factory logistic does not permit public entrance for safety reasons. The owners want to expand the factory to a big site where they have a container terminal. The move of the company may bring new solutions to the area[153].

4.3.2_OBJECTIVES

The aim of this work is the revitalization of Breda's Canal zone. Taking in account the strategy proposed previously, the building renewal is based on three main goals which are developed under specific objectives.

Concerning the urbanity of the place and social impact:
_Provides a rich outdoor amenity for the students and general public, creating a symbiosis of public areas with the ludic and pedagogic function, and an academic environment.
_Provides a design solution that fulfills the program requirements creating new solutions to promote the social interaction.
_Creates a school open to the public, which generate spaces that emphasize the industrial impact of the building, while diversifying and qualifying the communal space.

Relative to the preservation of the industrial heritage:
_Respects the industrial heritage of the building and its relation with the canal and the buildings in its surroundings.
_Provides a design solution that reveals the site-specific elements, such as its volumetry and structure

Concerning ecological and sustainable issues:
_Integrates a sustainable system for which the school can be self-sufficient.

153 http://www.youtube.com/watch?v=eQl7WN8mHiU

4.3.3_RENOVATION STRATAGY / CONCEPTUAL TRANSFORMATION

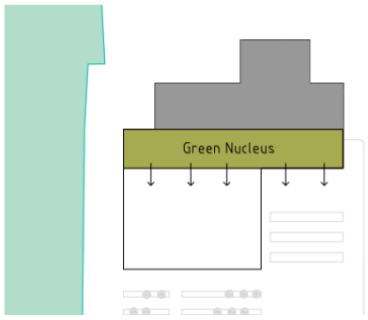


fig. 142_ Green Nucleus, visual connection with the building and the outside. The building in gray will contemplate a community garden managed by the cooking school.

fig. 143_ Low construction permit maintain the feeling of the big empty space.

The renovation strategy has three main goals: to maintain the image and volume of the existing building to be possible to the population still recognize the place; to respect the interior features which give identity to the building, letting its history being recognized; and to involve the school and its surroundings in the growing food's theme. The architecture and conceptual options are directly or indirectly, related to one of these goals.

The preoccupation of maintaining the image of the building or an icon that makes it being recognized as an existent value makes a progressive evolution of the city's perception possible, and not a dramatic change. This necessity of being attentive to the transformation is explained in chapter 3.1_Industrial Heritage-Reusing the Legacy. To preserve the image of the building, its volumetry will not have alterations and the concept of the façades will be maintained. As it was mentioned in chapter 3.1, the building Tate Modern had a few interventions on the façades to transmit its atmosphere and memory to the surroundings. This process of maintaining the façades as much as possible will be explained in chapter 4.3.4_Architecture development.

When entering the building, the main features that characterize the space are the steel structure and the big empty space. Preserving these features by the creation of connections between the old and the new, will add value to the space respecting the qualities of the existent. It will also allow to adapt the industrial atmosphere to the contemporary approaches, the reorganization of these elements like important characteristics of the industrial ambiences was demonstrated in the chapter 3.1.2_Industrial Atmosphere. Maintaining the buildings' character while improving its functionality to respond fully to the program, is reached by creating a balance between the program and the physical space. The floor space available is enough for the proposed program, so large additions to building, as mentioned in the chapter 3.1.4.1_Addition of Elements, are not necessary. However, the inner space has to be compartmented because all the functions cannot cohabit at the same space.

To maintain the perception of the hall's dimensions the new construction will assume a low size construction, coming from the ground and matching the structure. The space contains a mix of open working spaces and enclosed rooms, used for specific functions which need

more privacy. These options of preserving the open volume and create two different typologies of working space, are represented in project of Urban Outfitters Corporate[154]. It is important that the new elements do not extinguish the visual connection between the building and the canal. The organization and the way of construction of these new elements will be explained in chapter 4.3.4.

The steel structure has an enormous presence in the space. The project of Meelfabrick[155] helped to recognize the importance of the structure and how to experience the heavy-load structures. The solution to maximize the authenticity of the structure in this project was to create contrast between the structure and the new elements, by using a different materiality and do not touch each other.

It was clarified in chapter 4.3.1 that the building had an extension; this area of the building will be used as a green nucleus, where products will grow. The choice of this position is due to the fact that this volume can contact with the outside and the inside of the building, being important to communicate the process of growing food and transmit its atmosphere. This area is seen as a private garden, where not just the owner has its benefits, but also the users of the public space at the surroundings.[156]

In order to grow food, it is important to have some considerations in mind, such as the light, the water, the space to grow and how to maximize the space to obtain the maximum variety and quantity of products. To maximize the green space, the type of construction is different from the one mentioned previously. Because the structure was prepared to carry heavy loads[157], it was possible to had floor area to create more room to plant more products. The development of this structural issue will be further presented in chapter 4.3.4.2.

The water has an important role in the conception of the project, not just because of its urban qualities but also because of its irrigating function. A special system will be applied, what will have a functional purpose and create a new meaning in the relation between the water and the building. The explanation of this new relation with the water and its system will be presented in chapter 4.3.4.1.

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[154] Explained in chapter 3.1.4.2_Transformation of the inner space.

[155] Explained in chapter 3.1_Industrial Heritage – Reusing the legacy.

[156] Explained in chapter 3.2.1.1- green spaces in the city.

[157] Explained in chapter 4.3.1_Characterization of the Building.

The cooking school is open to the community, sharing the space with other possible users. The integration of the different functions, such as the restaurant, the biological market or the community garden, creates new dynamics, attracting people which generate a strong and active urban life. However, when different publics cohabite the same area, the organization of functions and circulation are crucial[158]. In educational spaces, flexibility is one of the most important challenges. Pedagogical and didactic activities are continuously changing. Furthermore, the use of spaces can change during the day, having different activities, such as learning processes with the children from the schools nearby, gardening activities to seniors, small workshops of cooking and other activities which can be organized by local organisms and use the school facilities. This flexibility will be implemented in several spaces.

The building next to the cooking school will be a community garden, the design of this building was not developed, but it is important to clarify that this community garden will be managed by the cooking school to better organize the community, like it was explained in chapter 3.2.3 when talking about community gardens.

After defining the conceptual transformation, the proposed approach development followed the creation of a system of circulation and the organization of the functions, which will be exposed in the next chapter.

[158] Will be explained in the chapter 4.3.4_Funtional system.

4.3.3.1_FUNCTIONAL SYSTEM

The development of a functional system started by thinking about the interactions between the three main functions: food production, cooking school, and public facilities. A mixed program has qualities which were elucidated in chapter 3.1.3_Compability of uses. In this project it was taken the option of crossing the different circulations correspondent to each function group. Thus each group can interact with the others, generating curiosity and interest for the work of each other; the public and the private are not separated and involve the public in the process and ambiences of the cooking school. This method aims to reach the goal of creating a school open to the public.

The cooking school works as an agglomerate, while the other functions are disposed on its side. The production and the public functions are divided in the opposite sides, making its connections to cross the cooking school, which can be seen in the graphic "organization Concept".

The main circulation is made by three axes that cross each other. The principal circulation goes through the building from the street side to the canal side, creating a continuous visual line towards the canal. This option allows to emphasize the visual relation with the canal, breaking, punctually, the barrier created by the building, what was explained in the chapter 4.1.4. This break in the building is materialized by a large door and window, making it possible to see the water through the building, creating a public visual connection with the canal. The concept of creating connections with the water in canal zones where the construction is dense, was illustrated in the Wakefield waterfront, talked in the chapter 3.1.1.

The organization of the public facilities is based on the position of the different functions at opposite sides. In the canal side, the restaurant and the market have a direct entrance from the promenade next to the canal. The restaurant is placed at a profitable area, where the large windows provoke the feeling of proximity with the water. On the other side of the building, next to the entrance, it is situated the main hall, used for lectures and other events which can occur. When necessary, this plan permits that the public of the auditorium can go to the restaurant or market passing through the school and vice versa.

Production areas have two different places due to their function. Within the building the production works as a green house; in the outside, fruit trees can grow, because the

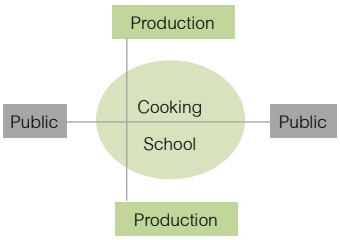

fig. 144_ Organization Concept

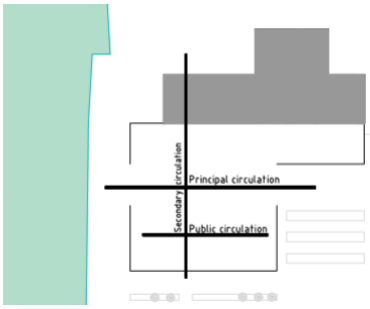

fig. 145_ Principal, public and secondary circulation

fig. 146_ Functional organization

fig. 147_ Functional organization - Public areas and connection

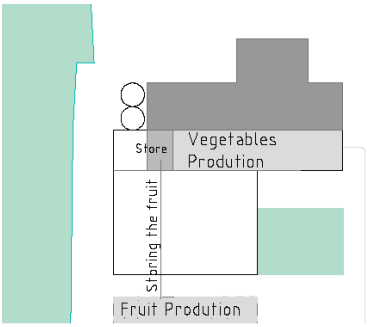

fig148_ Functional Organization - Food production

fig. 149_ Functional Organization -Cooking School

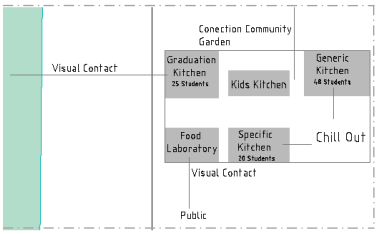

fig. 150_ Functional Organization- Kitchens

fig. 151_ Functional Organization- Reception

available space is larger. The fruit production area needs to have easy access to storage, even if it will be used sporadically. The creation of direct access to the storage promotes social interactions between workers and users.

The cooking school is zoned into four functional areas, withal this division is not observable. The cafeteria is the central meeting point, its area was extended to a double floor, which process will be illustrated in the next chapter. Reception has an important detail in the organization of the space which influences the perception of the program and its complexity. When entering the building, the first visual contact is the room reserved to cleaning food products. This vision of the cleaning process involves the users in an initial approximation to the space. The kitchen zone has different types of kitchen, in each case it is important to relate these spaces with other elements creating a visual and/or physical link with them.

Generally, the design proposes a clear circulation with generous dimensions, and orientated towards the canal. Interaction between the different social groups will promote the creation of a cooking school open to the community.

4.3.4_ ARCHITECTURE DEVELOPMENT

The process of materialization of the concepts and renovation strategy, proposed in the chapter 4.3.3 was developed, essentially, by drawing organizational diagrams presented in the previous chapter, and modelling research, occurring both in the meantime.

As it was explained in chapter 4.3.3, programmatic demands entail a division of the space into small areas, where each function can have an appropriate privacy. These divisions are developed in two different approaches: one, where the food products are grown, and the other reserved to the rest of the program. These different architecture solutions promote the understanding of the original building[159], creating different meanings in the relation between the old and the new elements.

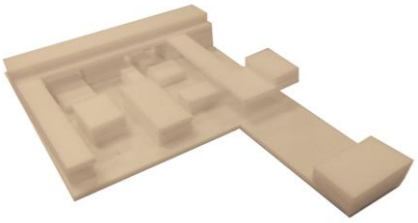

fig. 152_ 1st model research - appropriation of the space still with too much construction, However, is visible the desire of create spaces in-between

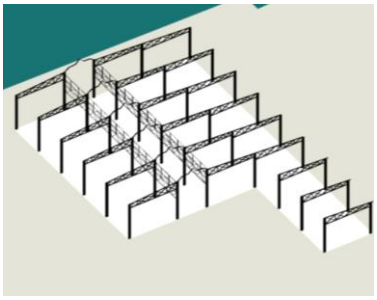

fig. 153_ Digital Model - Current structure

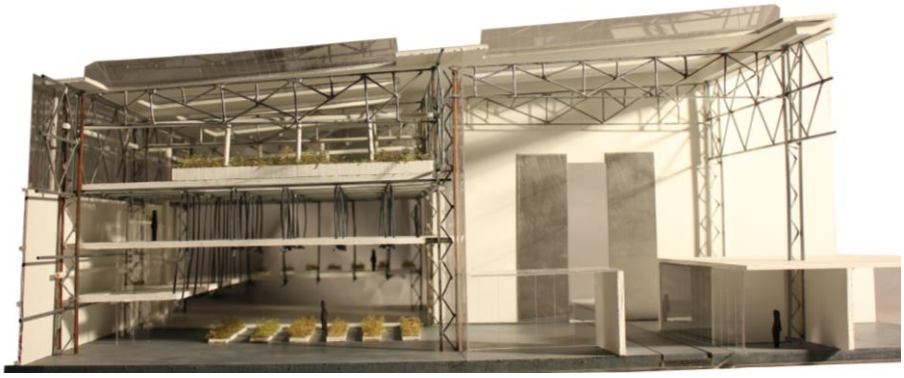

fig. 154_ Final model where can be seen the two different approaches of construction and their relation with the current structure

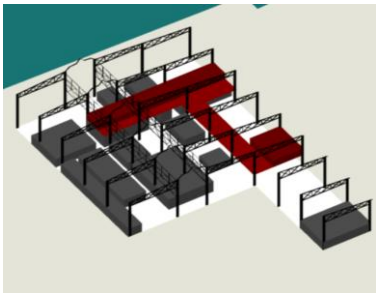

fig. 155_ Digital Model - Working process of the inner space, mixing the closed spaces with the spaces in-between

The boost of the project research in the chapter 3.1, when mentioning that transformations are connected and emerging from the past, highlight the need of maintain some of the building features. Preserving the structure and the emptiness of the space are the mains goals relatively to the main hall. The terrain constructions are lower proportionally to the dimensions of the hall, letting a free volume between the new construction and the structure, what emphasizes and gives prominence to the original structure.

fig. 156_ The low construction permit to create visual lines towards the canal

It is proposed to create two different typologies of spaces: enclosed rooms for specific functions and flexible areas. These flexible working spaces are in-between the shell of the original building and the closed rooms, generating different spatiality's. The intention to use these spaces, which work together, was prompted when studding the case of the Urban Outfitters Corporate expounded in the chapter 3.1.4.2. A particular space which has an

[159] Like it was explained in the chapter 4.3.3., the building had an extension.

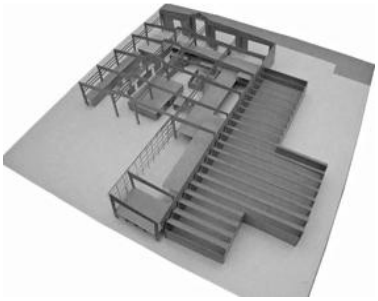

fig. 157_ Working the inner space

fig. 158_ Opening in the roof will permit to have a better lightning in the interior.

fig. 159_ Studding the openings of the boxes / closed spaces

fig. 160_ Green nucleus with hanging platforms fixed in the original structure

fig. 161_ In the ground floor the green production more heavy and above the platform of the Cafeteria

interesting social interaction is the area where functions the market and the eating place of the restaurant[160]. This open area, or in-between area, proposes a solution which puts together two functions with different characteristics. They share these activities of the daily life and a physical space which has a higher atmosphere value, due to its visual link with the canal and the presence of the structure.

The closed rooms have several functions, such as classrooms, kitchens, auditorium, teachers' offices and cleaning room of edible products, among other smaller functions. Because the functions are so diverse, each box is designed according to its functions and location. Nevertheless, an important characteristic is applicable to all of them: light matters. The larger amount of light comes from the roof due to its openings. The original openings, currently closed, will be reopened due to their importance in the illumination of the inner space. Studies were made to understand how the opening of the boxes could work, having in mind a creation of a rhythm which could dialogue with the existing structure. However, this dialogue did not work because it imposed its design, letting no space to have a clear vision of the original structure. The final proposal was to open the façades fully and when possible, the boxes' roofs.[161]

The approach of the green area intents to maximize the available space, to produce enough products for the school's consumption and selling at the market. Therefore, it is necessary to increase floor area. Influenced by the solutions of the Hinman Research Building, presented in chapter 3.1.4.2, where the structure of the first floor is hanging, it is proposed to create a structure which comes from the ceiling. The original structure is prepared to carry heavy loads due to its previous function, as it was demonstrated in chapter 4.3.1.This characteristic of the building in combination with the aim of increasing the floor space, generated a system of hanging new platforms, which are fixed in the original structure. The constructive system will be further explained.

It was mentioned in the previous chapter that the cafeteria would be expanded to a first floor. This expansion is developed in combination with the green area, providing a space which embraces the food production and conveys different sensations. Accessibility is

[160] Can be visible in the flour plan in the attachment C.

[161] This solution is also visible in one of the Urban Outfitters Corporat's pictures presented in the chapter 3.1.4.2.

made from different points, making the two functions not to cross each other physically, sharing only the visual dimension.

To generate spaces that emphasize the industrial impact of the building, while diversifying and qualifying the communal space, is one goal of this project. Hence, respecting the identity of the façades is important to preserve the image of the building. The horizontal[162] character of the original façade, is maintained by renewing the steel frame. The preservation of the dimensions of the doors and windows, reminds the building memory through the industrial elements. The façade that has direct contact with the green nucleus, the steel frame is maintained and the opaque material is substituted for a translucent material, which becomes visible from the exterior the food production and the original steel structure. This link of the green nucleus with the exterior is prolonged to the interior.

The green nucleus of this building would work in partnership with the community garden at the adjacent building. The design of this building is not developed in this face of the project. However, it is important to clarify that part of a public space will be next to the canal. The water is part of this urban environment, playing an important role in the project, in the next chapter the relation between the building and the water and its impact in the urban environment will be illustrated.

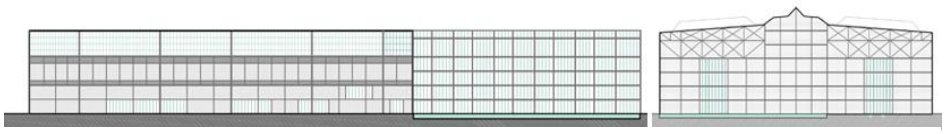

fig. 162_ South (left) and east (right) façades

fig. 163_ Transparency of the facade which connects with the green nucleus

[162] Tadao Ando refers in his book *Conversas com Michael Auping*, the importance of the horizontal feature of the architecture, which connects the constructuctions with the landscape.

4.3.4.1_ RELATION BETWEEN WATER AND BUILDING

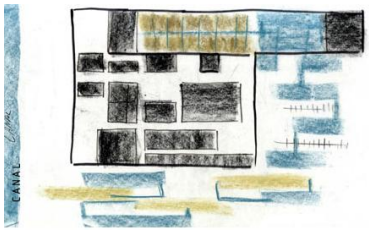

fig. 164_ Drawing research, the water fragmentation would not give the reflection impact, generating technical problems

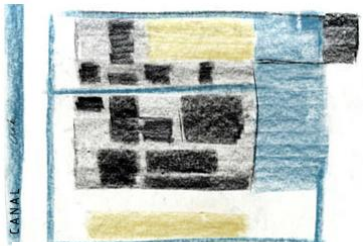

fig. 165_ System of water and how to do the refill of water into the ponds / tanks

fig. 166_ Drawing of the landscape

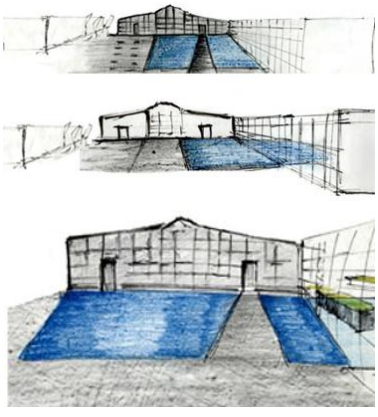

fig. 167_ Drawing research - relation between the water and the façade

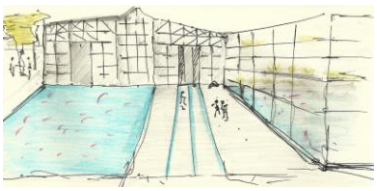

fig. 168_ Drawing of the propose

The artificial canal has an important expression in the characterization of the site. The studied building is placed parallel with the canal, creating a space between these two elements, the canal and the building. It was illustrated in chapter 3.1.1 that the creation of public space near by the water improves the urbanity and life's quality of the area. Thus this, next to the canal, was created a promenade which culminates into the green plaza, where the community garden works, such as it was illustrated previously.

The fact that the program contemplates food production, leads to research sustainable ways of gardening. One sustainable way of growing food is using the aquaponics system, which was presented in the chapter 3.2.2. This system introduces water in the process providing the necessary nutrients to the plants through the waste of the fishes. The interpretation of tanks, which have to contain water and fishes, can bring together design and functionality.

The introduction of a new element -water- in the landscape led to research which kind of relation between the water and the building already exists, and how this new element can coexist with the existing structure, adding value to the landscape. In chapter 3.1.1, when talking about the new gallery of the Wakefield waterfront, water touches the building creating reflections which emphasize it and its shape. The choice of using this solution, which creates a close relation with water attributes a new image to the building and the public space, generating, also, new dynamics with the water in the outer and inner space.

The design proposes to create a contiguous pond at the opposite site of the canal, suggesting a new relationship between the water and the building, which respects the presence and identity of the canal, due to its strategic position. The necessity of creating two different ponds, or tanks, is due to the regulation of the temperature because of growing matters. Nevertheless, the desire to create a single water element, leads to generate an illusion of the two ponds seeming to be the same element. Whereby, in the platform that leads the public to the entrance of the building there are some small water lines, which make part of the refill system of the pound.

The water tank inside the building (1) keeps the water on a specific temperature good for the production in the building (A). The water tank outside does not need a special

temperature because it is used to fertilize the outside vegetation (B). This process of fertilization contemplates a refill of the water in the tanks. The circuit which provides the distribution of the water is materialized in pipes and elements in the ground floor. Pipes are used when needed to reach the growing beds in higher levels, whereas when the circuit is made in the ground floor, the system is embodied in the ground and visible through a transparency. The guarantee that water has enough pressure to reach the higher points of the system, a pump is assembled in the technical area.

The intervention of reusing the water resource will create a new dynamic into urban landscape. Furthermore, it will also promote the ecological concerns about wasting water, generating knowledge to the society.

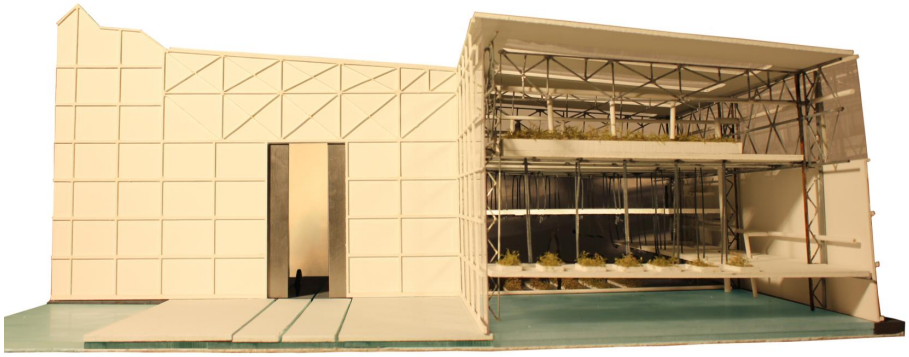

fig. 171_ Model of the proposal where is visible the water tanks and the system of pipes (white)

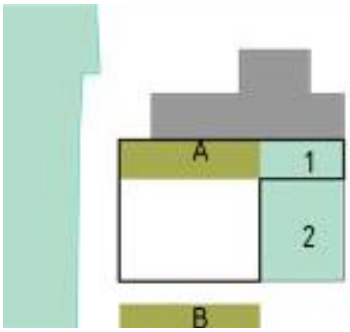

fig. 169_ The two tanks (1,2)

correspondent to the growing areas (A,B)

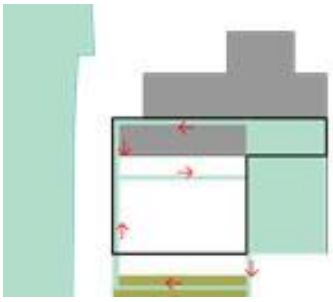

fig. 170_ Water circuit

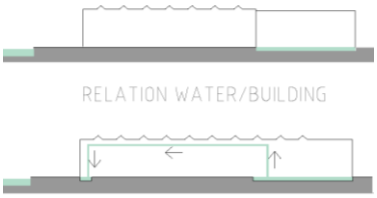

fig. 172_Curcuit of water by pipes

4.3.4.2_STRUCTURAL CONCEPT

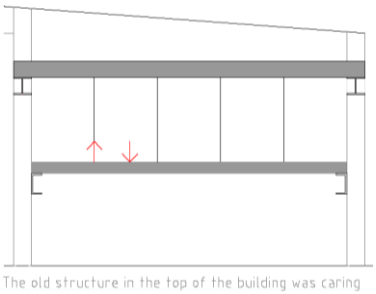

fig. 173_ Structural concept with cables in tension

fig. 175_ System of beams and cables

The new elements of the proposal have two typologies of constructions: one which comes from the ground and the other which is supported by the pre-existent structure. The first one will be demonstrated in the next chapter due to the importance of the materiality rather than the structural issues.

The structure of the green nucleus is possible due to the characteristics and functions of the existent structure, as explained before. The last floor is held by the pre-existent beams and others smaller beams which help to stabilize the structure. The levels below are supported by cables in tension, which are attached to the steel structure of the last floor.

The hanging structure presents a new alternative to organize the space, being visible the layers added in different times. The use of cables permits to have a permeability through the space[163], maintaining the same goal of preserving the spatiality.

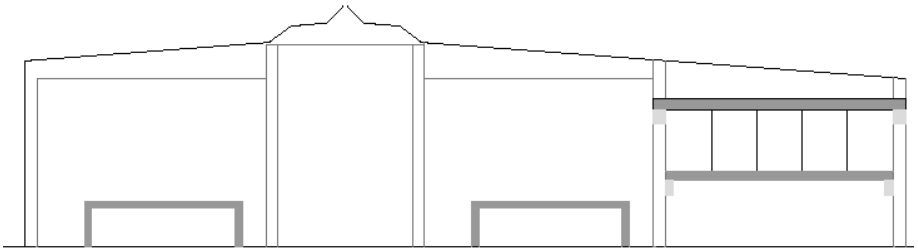

fig. 174_The two typologies of structure and construction

[163] A solution which was presented in the chapter 3.1.4.2, when taking about the Hinnan Research Building.

4.3.4.3_INDUSTRIAL & GREEN ATMOSPHERE

The intention of the design is to preserve as much as possible of the industrial characteristics, recreating the original atmosphere while generating a harmonious ensemble of the existent and the new added constructions. The dialog between the old and the new meant to generate spaces which involve the users in the theme of the cooking school, transmitting all the steps since the food's production until serving the meal. Tadao Ando refers that "a building is not just shape. It is necessary to offer the users an experience of space." [164]

Space's experiences are created in the project through four approaches: the relation with the original steel structure, the contact with the water, the organization of the functions and its social relations and lastly the vegetation elements and its diverse relations with the user.

The contact with the structure through diverse spaces, where some are more open and others more closed, creates different relations and visual frames of the structure. This relation with the structure is emphasised when the users occupy the second floor at the green nucleus, where they have a global visualization of the building, being closer to the imposing top steel structure.

Water embodies a significant symbolism which identifies the area. It was demonstrated in the chapter 4.3.4.1 the new architectural meanings of the water in the design approach. The organization of the functions and its interactions were presented in the chapter 4.3.3.1, it is highlighting the entrance which has a direct contact with the room of cleaning the food, while emphasized with the large dimension of the door.

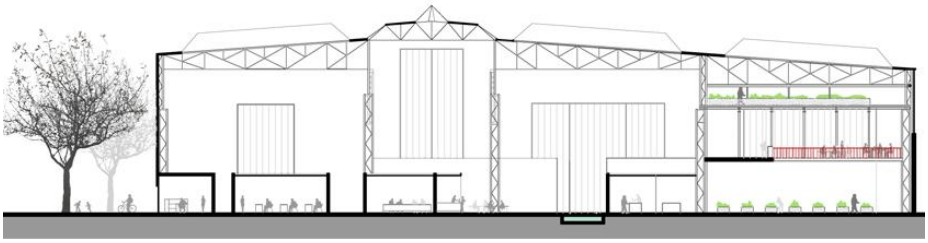

fig. 176_ Section of the building- it is visible the two different construction an philosophy approaches and the water circuited through the building

[164] Ando, T. 2003, p.21. Author's translation

fig. 177_ Concrete blocks which can serve to produce small vegetation

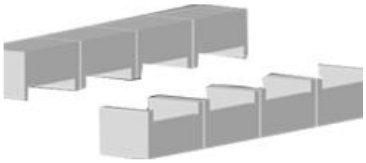

fig. 178_Set of concrete blocks which form a wall

fig. 179_ Location of the green walls and relation with the in-between spaces

The insertion of vegetation in the building generates a new architectural language. These vegetation elements have two ways of transforming the space: the green nucleus is composed by several layers, as it was explained previously, and the green walls which are located in specific areas of the intervention. These green walls are built with pre-fabricated concrete boxes where can be inserted small quantities of vegetation. These green walls are adjacent to the flexible spaces, which create a space in-between the original shell of the building and the new constructions which lodge specific functions. These flexible spaces increase positively the space's utilization raising its potential.

5.1_ Concerning the theoretical work

5.2_ Concerning the project developed

5 CONCLUSION

5.0_CONCLUSION

The aim of this report was to describe and justify the project developed in the master design studio at the TU/e, while doing the Erasmus mobility program. The studio goal was to renew the industrial canal's zone of Breda, in The Netherlands, and also to integrate this area into the city adding value to it, being important to take into consideration its industrial heritage structures.

This report has achieved the objective of communicating and clarifying the ideas developed during the studio. It has also created a balance between the creation of a final academic graduation paper for IST and the flexibility of the Dutch master teaching method. The support and openness of all participants, who embraced the exchange of cultures and knowledge, was important for structuring the process of doing the project and the report, seeking solutions for a better urban landscape through the shared knowledge.

To justify the project it was firstly clarified its framework: the assignment demands, the physical, cultural and historical features of The Netherlands, as well as the evolution of the city and its industrial area. Furthermore, taking into account the academic context, there were presented two main research subjects which were, directly or indirectly, related to the project decisions, being a fundamental base for the project development.

The first investigation subject concerns the renewing of industrial landscapes and buildings, understanding their historical value. The second, is associated with ecological and sustainable concerns, being presented specific ways of reusing the resources, what can be a vehicle to improve the urban landscape and the life quality of the inhabitants. These two subjects are both related to the theme of reusing: how to reuse and adapt the legacy of the industrial structures, and how to reuse the urban resources. They were presented through theoretical and practical examples for specific places. The association between the project circumstances and the projects that others had already developed led to organize the research chapter (3) by joining compilations of different projects into diverse subjects which had been important in the designing process.

In the chapter of the objectives (1.1), there were presented four main guide-lines that have been developed and discussed along this report:

1_ Respect the industrial heritage buildings existent in the area, analyzing which elements are important to preserve its memory and identity, while transmitting a continuation from the past which is adapted to the current reality.

2_ Maximize the potential of the waterfront, improving its public space, while reflecting the lack of green spaces in the area.

3_ Revitalize the area through the program, whilst understanding the needs of local community. Combine these two realities involving and inspiring the whole communities.

4_ Propose an ecologic system which will improve the biodiversity in the city, having sustainability in mind.

The conclusion of this report focuses on diverse matters due its complexity and vastness of overall subjects. A first conclusion is that these objectives cannot be generally answered, being important the contextualization of a concrete reality. The project proposed, is one contextualized contribution for a possible solution of how to revitalize a canal waterfront through its industrial heritage.

5.1 CONCERNING THE THEORETICAL WORK

The research topics have the aim of contributing to a richer understanding of a canal zone transformation; looking at differentiated planning solutions suitable for the specific situation of the given territory. It is important to underline that there are no "model solutions" which can be applicable anywhere to all kind of population. But, there are references which can be adopted as inspiration aiming the creation of a strategy and solving specific problems.

The examples exposed in chapter 3.1, demonstrate how apparently redundant industrial places can be reinterpreted and reused. Preserving the marks of industry on the landscape is a way of valuing and retaining the industrial past. It was important to understand in the examples studied, what kind of industrial structures were preserved or demolished, and which meanings and material features were hidden or emphasized. The value of the identity of the place and its memory is a complex subject whose interpretation would depend on individual backgrounds; as Zumthor refers, "architecture is about images. Images of your memory and your experience." [165] Each person has different memories and consequently different influences on the interpretation of the identity. The

[165] Zumthor, P., 2005, p.9

reinterpretation of materiality can take many different shapes and involve a wide range of actors. "The identity can be preserved working with the beauty and strength of the physical elements, respecting the structure"[166] or significant elements which would contribute for an industrial atmosphere.

The duality of the industrial buildings like the factory which transmits bright and dark aspects, was a rich source for those who had started to reinterpret those places. In the context of the assignment, the study of physical transformations in industrial building is focused on the different ways of adding floor space, with the aim of responding their programmatic demands. Manly, there were grouped three different ways of complement the need of space: "constructing complementary buildings, adding floor levels or work the inner space of the existing building."[167] The decision of how to add floor space has several conditionings, such as the surrounding landscape, the interpretation of the industrial features and preservation of its identity, local governmental rules and the quantity and quality spaces which are necessary. This investigation was very important, having directed consequences in the design proposed.

To revitalize the area it was important to have in mind that the new functions are one important tool of regeneration. Concluding that new appropriated uses would work as a catalyst for the existent community and its economic, cultural and social development. "It is also important to reflect about the complementary needs of the users, the mixed uses increase the web services and the population's movement, optimizing their supply."[168] When implementing mixed uses the area achieve a more active urban life, increasing the potential of the waterfront. Furthermore, some areas of the intervention, public or private, would get benefits if their uses are flexible, having a "sustainable activity which can grow in time, giving to the project dynamic"[169].

The fact that the location of the industrial complex is close to a canal, caused a reflection about the relation between industrial buildings and water. This physical position of the buildings, relatively to the water, can have different configurations, what will consequently create different meanings of waterfront public spaces. It is crucial for the revitalization of

166 In the chapter 3.1.2_Lernings.

167 Ibid.

168 Ibid.

169 Ibid.

this zone, to create a public infrastructure next to the canal. Concerning public areas, an enormous lack of green spaces was identified in industrial areas. The ecological structure is a vehicle for generate important functions in the urban environment.

The set of green spaces constitutes the urban ecological structure of a city, the maintenance and improvement of this structure is very important for the life's quality of the city's inhabitants and environmental issues. The benefits of green areas inserted in the urban environment are numerous: ecological, climate and pollution, economic, social, cultural, and healthy benefits. "The progress of the relation between the city and the nature is present in the contemporary urban issues with the aim of reducing the contrast between city and campaign."[170] The different typologies and scale of the green areas have different proposes and offer distinct functions, being all of them important in the creation of diversity urban elements. There were studied the qualities and benefits of urban parks, private gardens, green streets, green as a barrier, urban agriculture and indoor garden.

The expectations of changing the life of the city's inhabitants and offer alternative ways of living, is the motivation to develop the work through the implementation of urban agriculture. Although it is a recent concept: including a rural activity in the urban environment, the introduction of agriculture in the city has been used in several countries with different local conditions. Its ecological, economic and social benefits are seen as an aspect of food sustainability and urban planning. In the exposed project the implementation of this use is worked locally. While in the urban strategy the areas to a future development of the work are indicated.

Due to the fact that agriculture needs a large amount of water and nutrients, the research of possibilities which would create a sustainable system, led to the investigation of the aquaponics system. This method influenced the design decisions through functional proposes, what formerly was a predominant characteristic in the design process of industrial buildings.

Having the conscience that industrial areas have to resolve the contamination problem of the soil and water, it is important to think which are the positive remarks in the relation between industry and nature. Are industry and nature two sharply distinct concepts? In chapter 3.1.4.3_Green parks, there were exposed examples of how the industrial structures and the nature can have blurred boundaries, and even generated a harmonious combination between heritage cultural and natural landscape. The project presents a

[170] In the chapter 3.2.1_Ecological Structure.

possible solution where the identity of industrial heritage embodies natural elements: water and food production, which aim to create a sustainable system to the community.

5.2 CONCERNING THE PROJECT DEVELOPED

Concerning the developed project, it is believed that its ambition of being as realistic as possible, without loosing its stimulating concept was achieved. Generally, the design responds to the formulated guidelines and the constraints of the local circumstances, while, reflecting the theoretical knowledge, concerning the transformation of industrial sites and ecological attitudes aiming to improve the urban environment.

The analysis and observation of the place had contributed for a better understanding of the local reality and needs. It ware studied the place's morphologies and characterization, understanding the urban constraints, qualities and problems. Concluding, as a priority the wish of resolving the lack of public areas and green spaces into the studied area while creating a closer relation with the canal and giving to the industrial heritage a protagonist role.

Considering the challenge, it was indicated the creation of a green web composed by different typologies and scales of green spaces, what will increase and improve the ecological structure of Breda. The density of the green mass, would depend on the percentage of built-area and the function associated to it. This had a direct relation when studying the program, associating the available resources and characteristics of the place, with functions which could work as a tool for the revitalization process. The implementation of a mixed program where different age groups could interact, creates a social cohesion while offering a variety of uses. It was previously referred the chosen option, concerning the insertion of urban agriculture into the urban landscape.

The development of a certain solution which could prove the validation of the urban strategy, went through the creation of a cooking school at one of the waterfront industrial buildings. The combination of the school with the production of food, developed a new unconventional active reality, which motivates and offers a school open to the community through its program and its design. The most positive strength of the project is the creation of a different reality which is believed to be enable of captivating several publics, what, consequently, would bring a new life into this industrial zone. The respect for the industrial memory and the identity of the elements which were considered the most significant in the characterization of the place, the volumetry of the building and its steel structure, was an achievement to enrich urban identity. The relation between the old and new and the way how the new emphasizes the old is an important achievement of the project.

Concluding, the project showed the capability industrial sites and buildings have to improve the cities and the quality of the urban landscapes; situating the efforts to recognise the industrial past in relation to an understanding of the current needs and opportunities to implement changes in the city, thus in the society. Proposing a project where the implementation of urban agriculture makes part of the urban design and not the simply left-over spaces of the city, aims also to make aware the MB about the food sustainability issues and the importance to implement local incentives. Taking advantage of MB being present at the project's final presentation, it was aimed to achieve future expectations on the implementation of urban farming in Breda.

It is hoped that the present study have contributed to increase the expectations and the possibilities of the Breda canal zone's transformation through one specific point of view. This report is seen as a document and process accessible for future projects and further investigations.

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A-List of consulted projects

B- Documentation of the Backer en Rueb factory

C- Graphic elements of the project

ATTACHMENTS

A- LIST OF CONSULTED PROJECTS

Project	Location	Author (Intervention)	Date of construction	Date of Intervention	Chapter mentioned:
ZOLLVEREIN	Essen, Germany	OMA	1932 1988 (closed)	2002-2010	3.1_ Industrial Heritage
TATE MODERN	London, UK	Herzog & De Meuron	1947(1st stage) 1963 (2nd stage) 1981 (it closed)	Museum Completion :1994/95 Project:95/97 Contruction:98/00	3.1_ Industrial Heritage
WATERFRONT WAKEFIELD	Wakefield, Yorkshire's, U.K.	David Chipperfield Architects (Gallery)	1790	2005 – Navigation wherehouse (complete 2008) 2011 – Gallery	3.1.1_Post-Industrial Waterfront
WASTERGAS FABRIEK	Amsterdam, Netherlands	Kathryn Gustafson (with Mecanoo Architects)	1885 1902 (Gasholder)	2003	3.1.1_Post-Industrial Waterfront 3.1.4.3_Green Parks
VOLKLINGEN IRONWORKS	Saarland, Germany	(*)	1873	1994	3.1.2_ Industrial Atmosphere
PUMP HOUSE	Bochum, Germany	Heinrich Böll Architect	(*)	2012	3.1.2_ Industrial Atmosphere
STEAM BLOWER HOUSE	Bochum, Germany	Heinrich Böll Architect	(*)	2010	3.1.2_ Industrial Atmosphere
MELLFABRIEK	Leiden, Netherlands	Atelier Peter Zumthor & Partner	1883 until 1988	2007 the Masterplan was approved.	3.1_ Industrial Heritage 3.1.2_ Industrial Atmosphere 3.1.3_Compatibility of uses 3.2.1.3_ Renovation and cleaning the ground
NEFT DE LA LOIRE	Nantes, France	Alexandre chemetoff	1902	2007	3.1.4.2_Transformation of the inner space
DOMINICAN CHURCH	Maastrich, Netherlands	Merkx + Girod	1294	2007	3.1.3_Compatibility of uses
FORD ASSEMBLY BUILDING	Richmond, California, USA	Marcy Wong Donn Logan Architects	1931	2009	3.1.3_Compatibility of uses
DUISBURG NORD PARK	Duisburg, Germany	Latz + Partner	(*)	1990-2002	3.1.3_Compatibility of uses 3.1.4.3_Green Parks
HIGH LINE	New York City, USA	James Corner Field Operations & Diller Scofidio + Renfro	1934	2009 (1st section) 2011 (2nd section)	3.1.4.3_Green Parks
MUSÉE DU SEL DE SALINS-LES-BAINS	Salins-les-Bains, France	Malcotti-Roussey and Gheza	1940(*2) 1962 (closing)	2012	3.1.4.1_Addiction new Elements
BUTTER FACTORY	Calheta, Madeira, Portugal	M.S.B Architects	(*)	2010	3.1.4.1_Addiction new Elements
GRANARY	Barking,U.K	Schmidt Hammer Lasen	1870	2010	3.1.4.1_Addiction new Elements
URBAN OUTFITTERS CORPORATE CAMPUS	Philadelphia, Pennsylvania, USA	Meyer, Scherer & Rockcastle, Ltd.	(*)	2006	3.1.3_Compatibility of uses 3.1.4.2_Transformation of the inner space
HINMAN RESEARCH BUILDING	Atlanta, USA	Lord, Aeck & Sargent and Office dA's	1939	(*)	3.1.4.2_Transformation of the inner space
LUMEN BUILDING	Wageningen, Netherlands	Luc van Dam (LIMES architecten)	2000		3.2.1.1_ Green spaces in the city
MEDINA COMPLEX	Eindhoven, Netherlands	Neave Brown	2002		3.2.1.1_ Green spaces in the city

(*) Information not found (*2) Before that date

B- DOCUMENTATION OF BACKER EN RUEB FACTORY

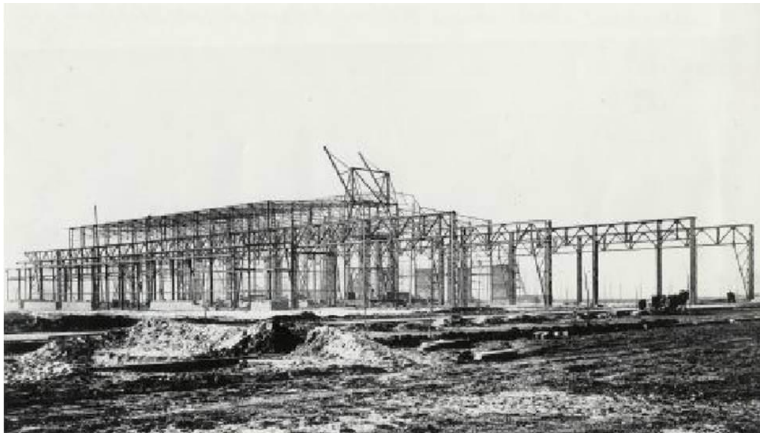


fig. 180_ Steel Skeleton metal works of Machinefabriek Breda (under construction) in 1928

fig. 181_ Machinefabriek Breda in 1950

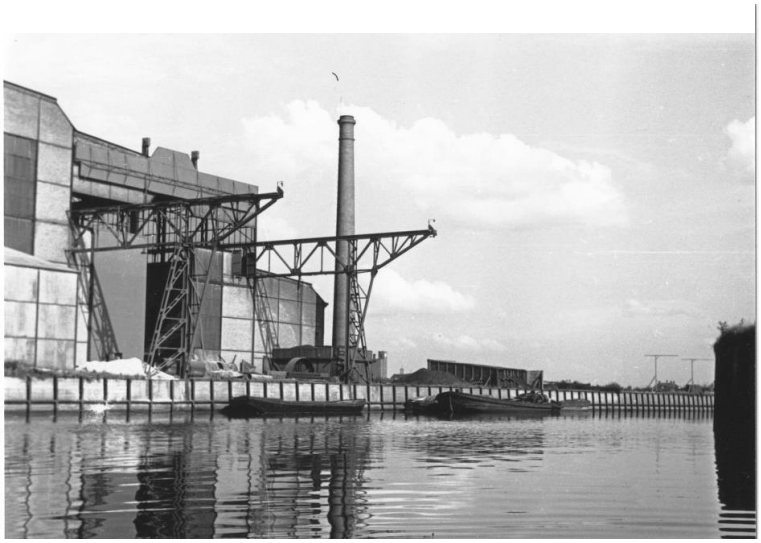


fig. 182_ factory building of Backer and Rueb in 1935

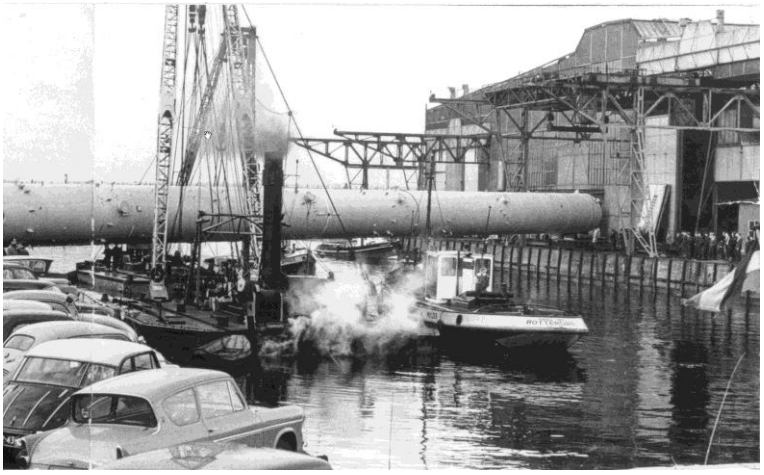


fig. 183_ Heavy transport from the factory Backer and Rueb; 1987

fig. 184_ Strike at Machinefabriek Breda, formerly Backer and Rueb in 1973

fig. 185_The factory in 1985

fig. 186_Interior of the factory in 1983 - Looking to the canal side

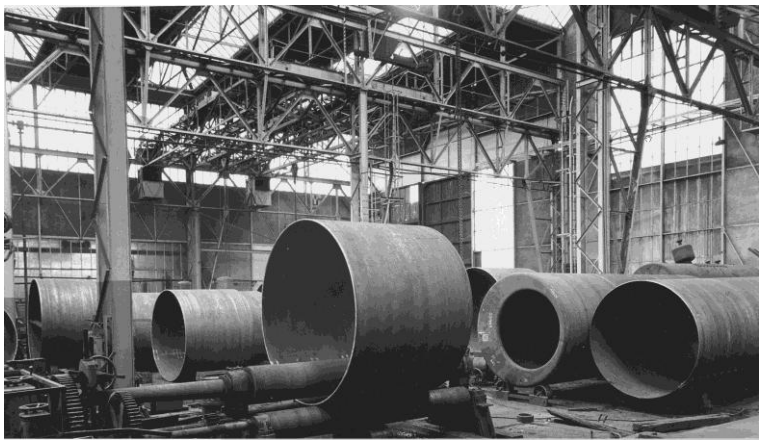
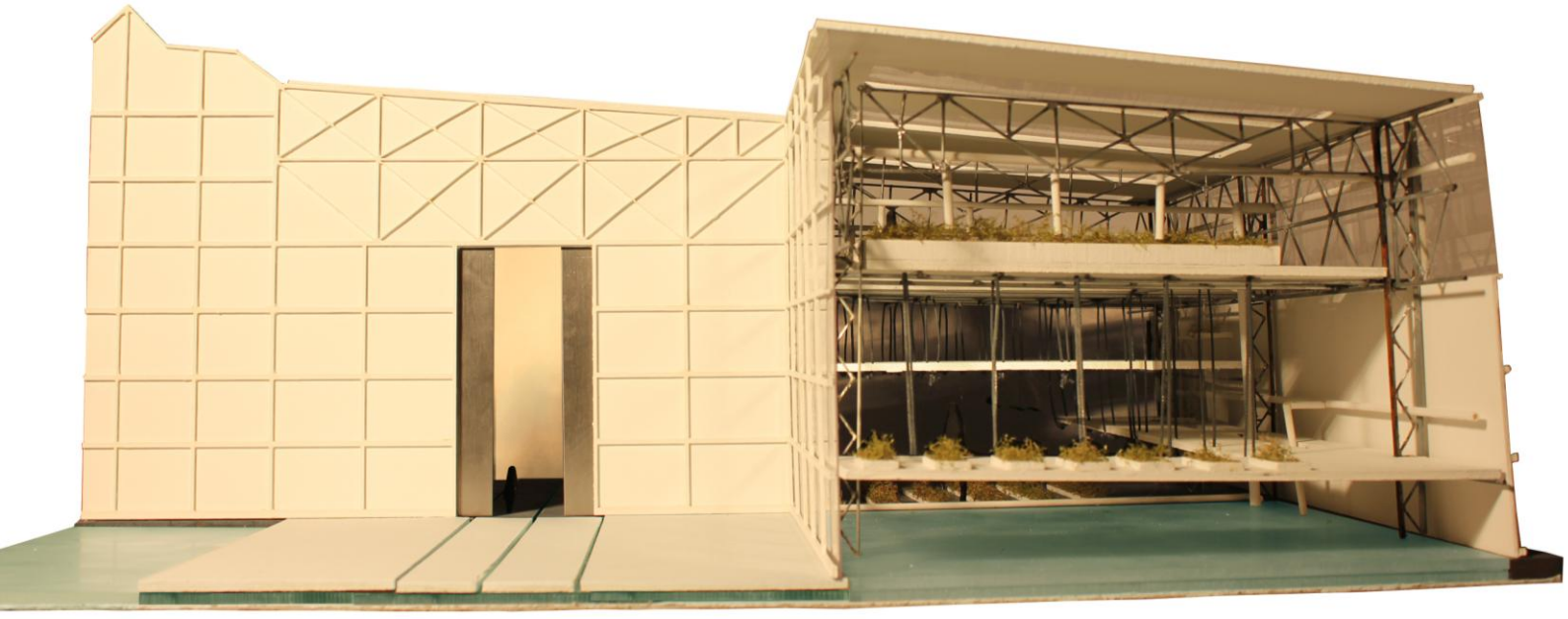


fig. 187_ Interior od the factory in 1983 – Looking to the road side

C- GRAPHIC ELEMENTS OF THE PROJECT



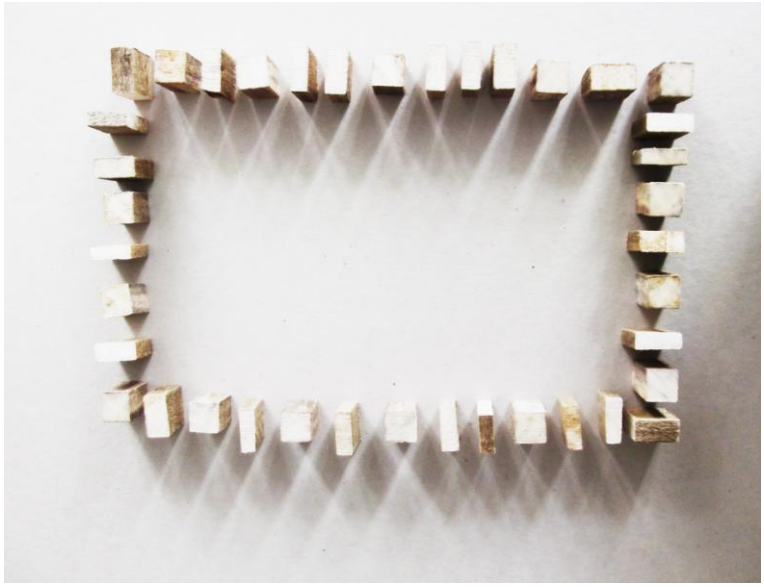


fig. 188_1st Impression model - The rytmic of the structures

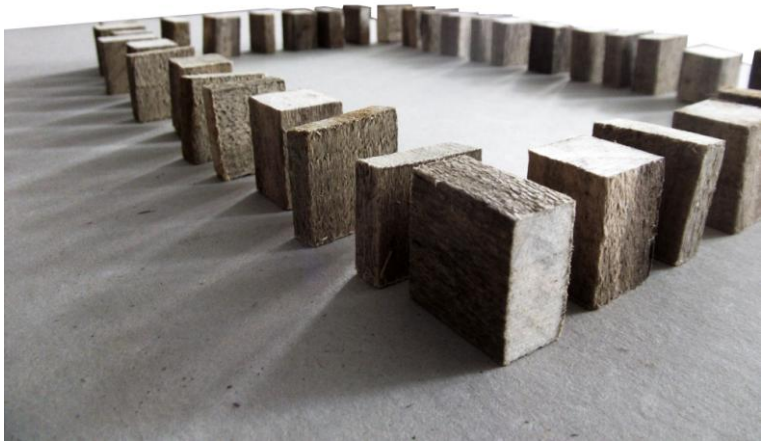


fig. 189_1st. Impression model - The ligthning through the material

fig. 190_ Conceptual model -Dialogue between the 1st impression model with natural

source: the earth

fig. 191_Conceptual model - The dialog between rhytmc of the construction and of the nature

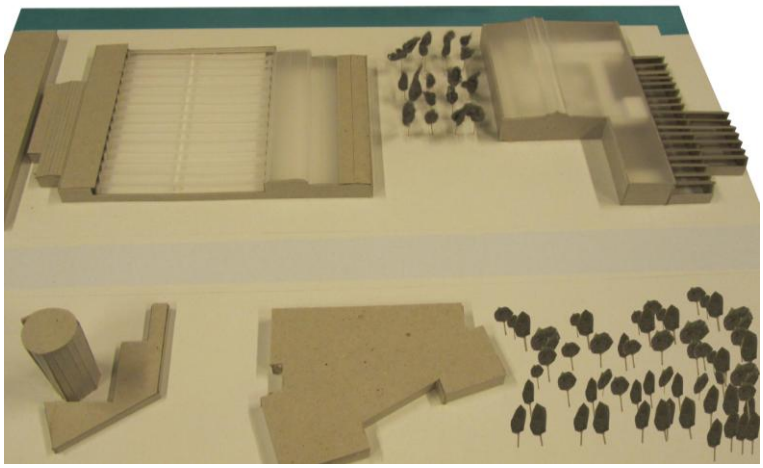


fig. 192_Model of the urban intervention

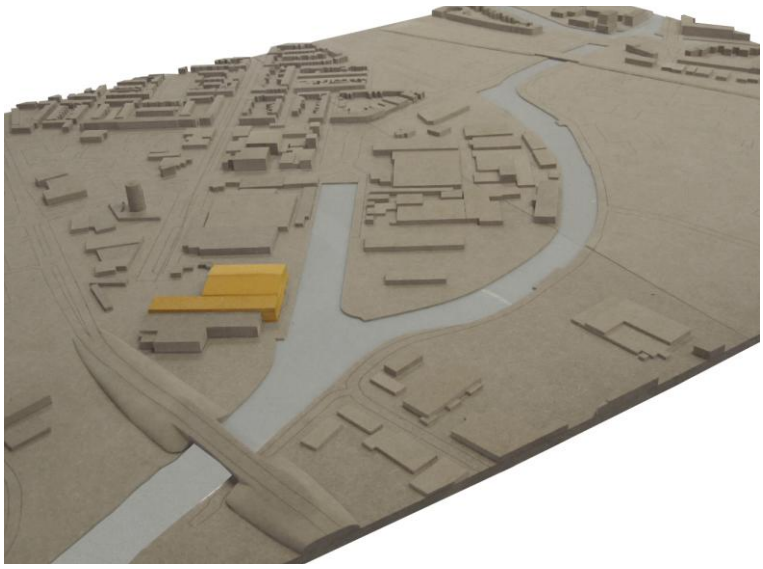


fig. 193_ Model of the zone's intervenssion _Building to develope the propose

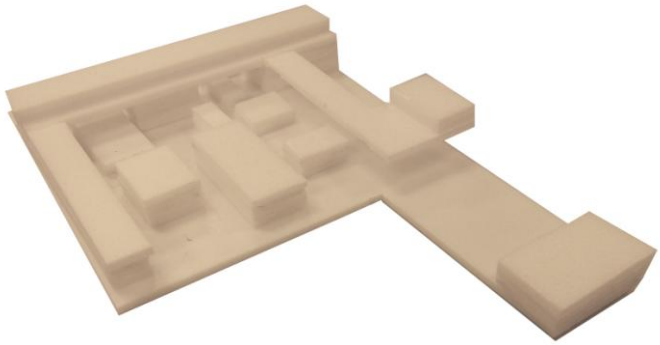


fig. 194_ Working the volumetry and organization of the inner space

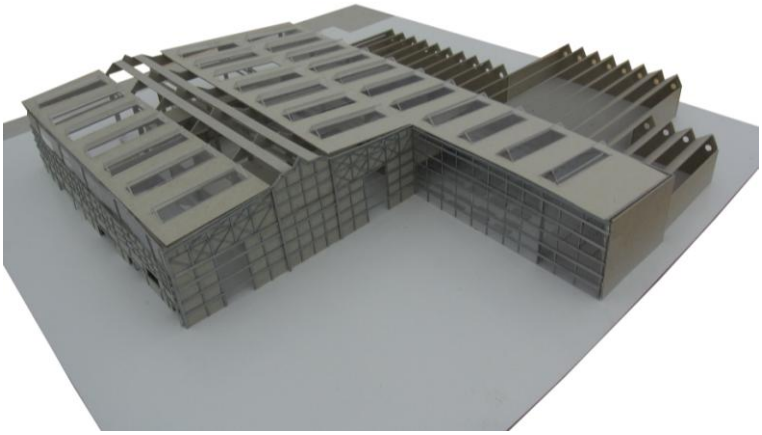


fig. 195_ Model of the cooking school (mid review)

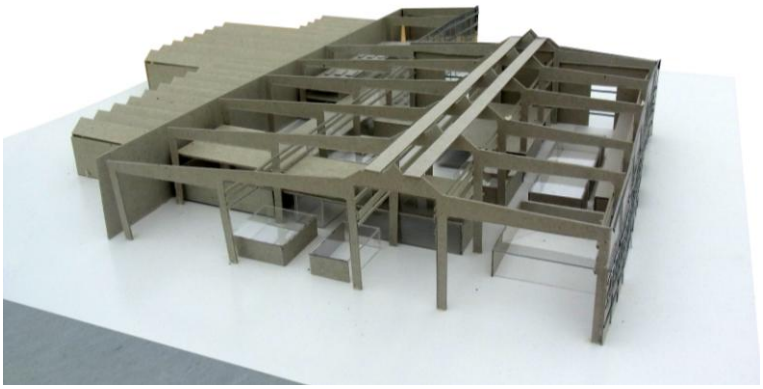


fig. 196_ Model of cooking school (mid review)_ Mantain visually the volumetry of the hall

fig. 197_ Model of cooking school (mid review)_permeability through the building towerds the canal

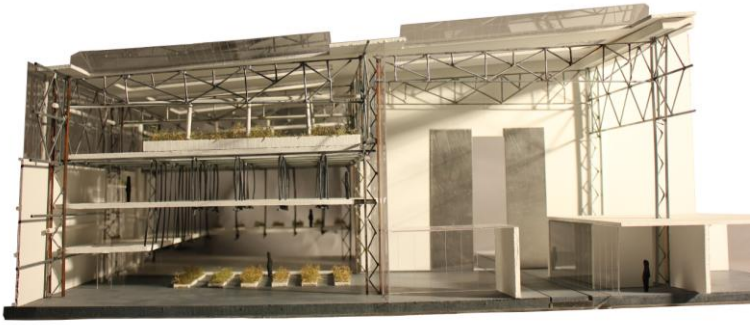


fig. 198_ Cooking school- The two typologies of strucure and the dialog between then and the original stell structure of the building.

fig. 199_Entrance of the cooking school - the green nucleus transmite its atmosphere to the outside

fig. 200_Green nucleos of the cooking school

fig. 201_Interior of the cooking school- Scale of the building

fig. 202_Green nucleos - Structure suspended with cabels

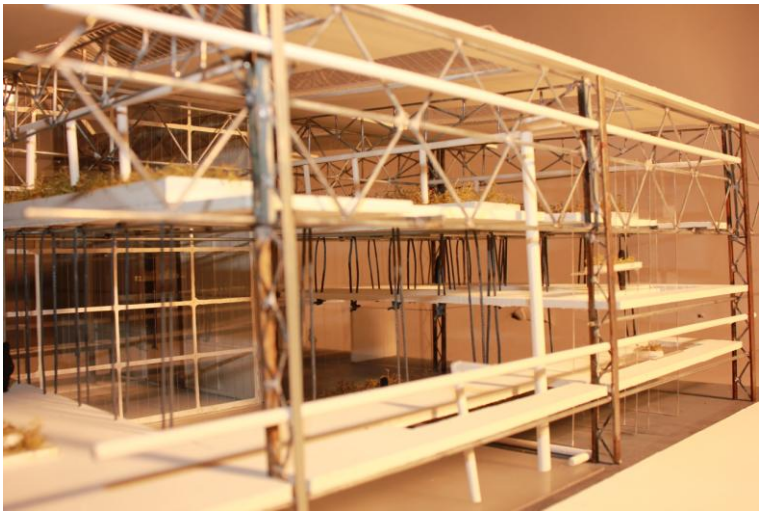
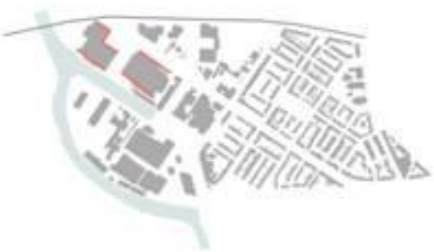


fig. 203_ Green nucleus with the pipes system to provide water and nutrients to the plants

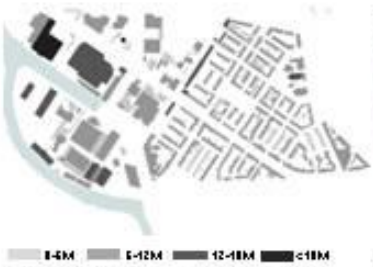
URBAN ANALYSIS

Physical Barrier - The existing building close the circulation next to the canal

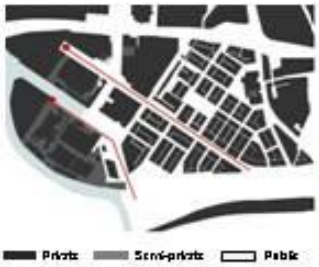
Social Barrier – The road traffiic and the non existence walking path makes the population do not go to that area and enjoy the canal



Visual Barrier – The large industrial buildings provoke a visual barrier against the canal because of its opacity

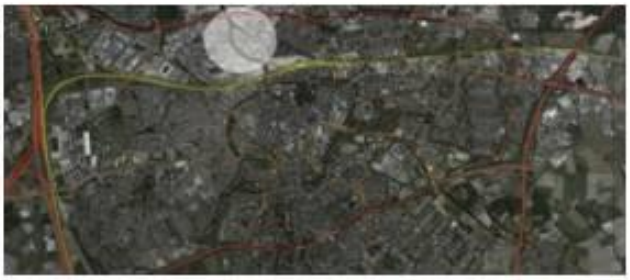


Construction high – it is visible a character of horizontality in the area, where mort of the buildings have three levels



Private and public area – it is visible an enormous lack of public spaces

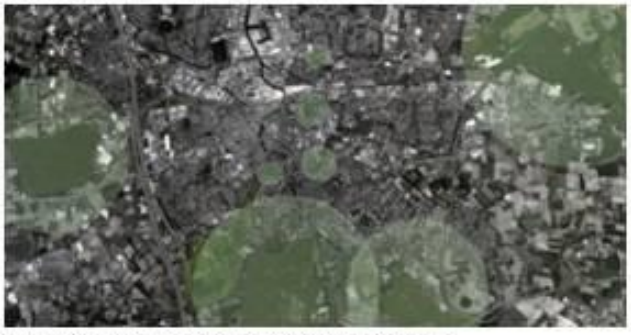
End Point – Two roads which lead to the canal to a close space



Main road structure in Breda

Main road structure in Belcrum

Green typology – It is visible that the Belcrum district has a political urban vegetation and the rest of the area presents a lack of green quality areas



Green Structure and area of influence in Breda

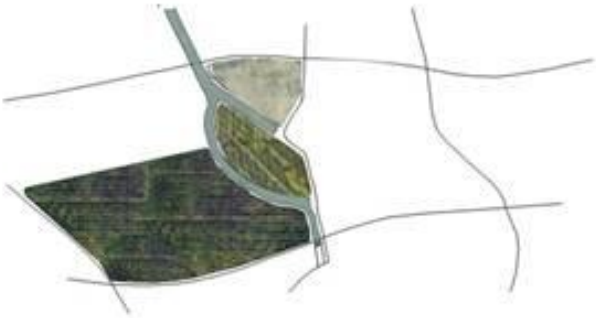
Functions - The Belcrum district is mainly composed by housing while the other part is a mix of functions

Green Structure in the studied area –Belcrum port

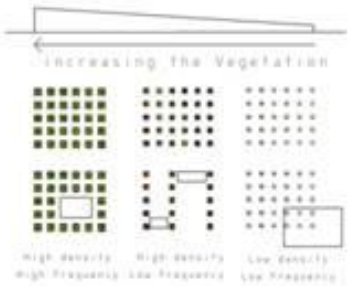
URBAN STRATEGY

The main goal of the strategy is to re-introduce nature into this area, creating a green web through generating several public spaces

The water has an important role in the urban design, the creation of a new materiality that generates different relations with the water conveying different sensations is an achievement.

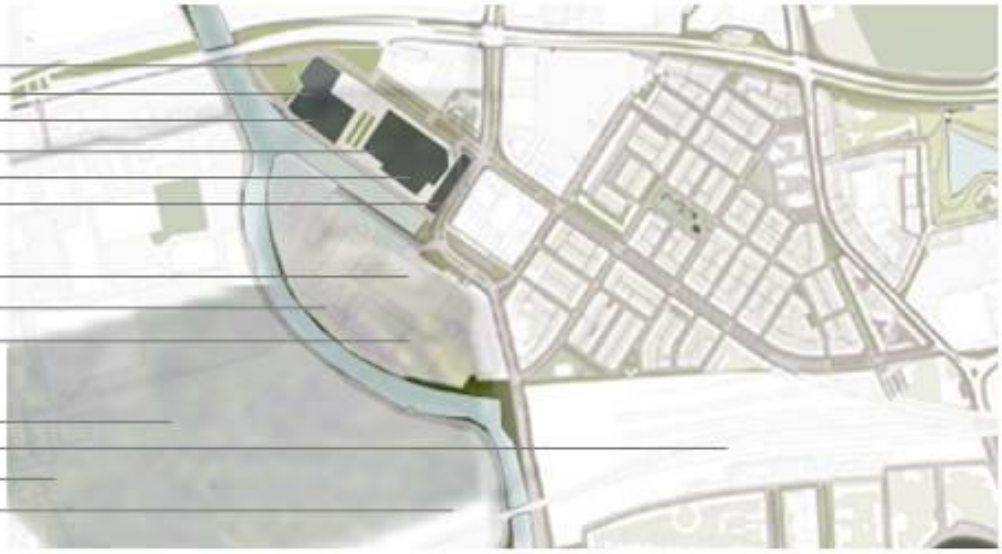


Spread the green already existent in the Belcrum district, increasing the vegetation progressively



Public space next to the canal _To qualify and activate the canal the restrict areas will be opened, creating a new path next to the canal involved by public areas which generates an active urban life

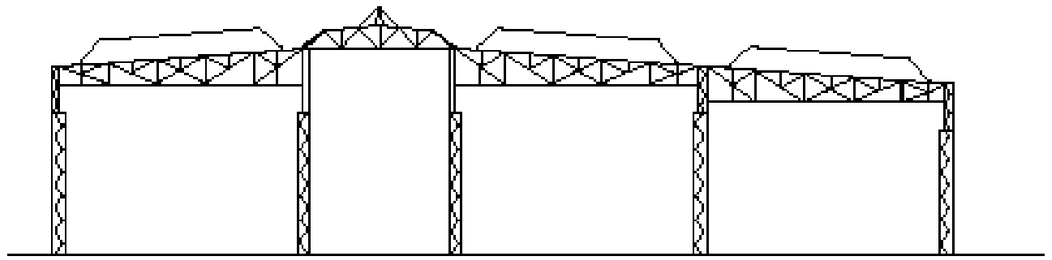
The Industrial Heritage Buildings give identity to the site. The renovation of these buildings must respect its own identity adding value through the transformation.



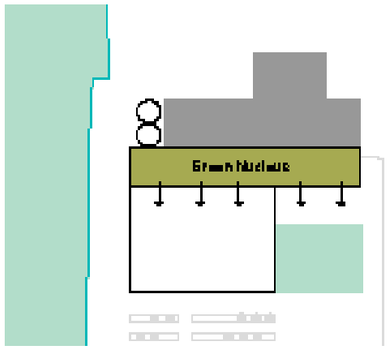
The programme pretends to involve the existent functions in the area and creating a mixed program, where different age groups interact, creating a social cohesion.

COOKING SCHOOL

LOW CONSTRUCTIONS
permit maintain the
feeling of the
EMPTY SPACE

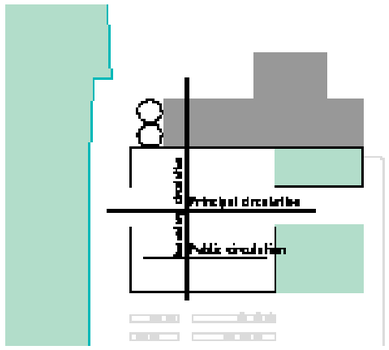


INDUSTRIAL IDENTITY
Dialog with the steel
STRUCTURE

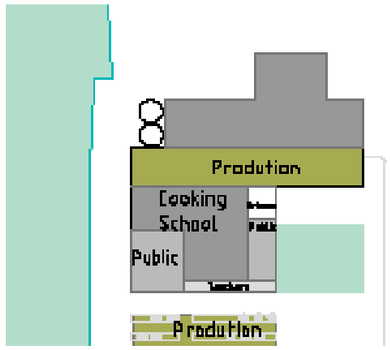


GREEN NUCLEOS

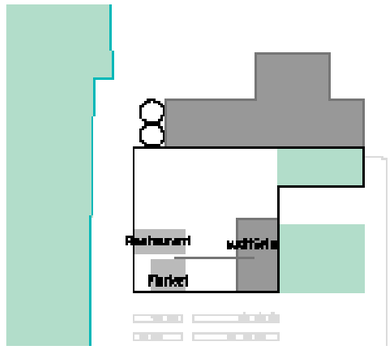
VISUAL CONECTION WITH THE BUILDING



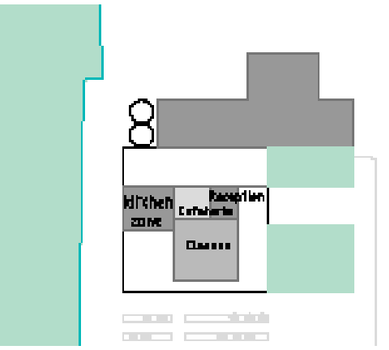
PRINCIPAL CIRCULATION



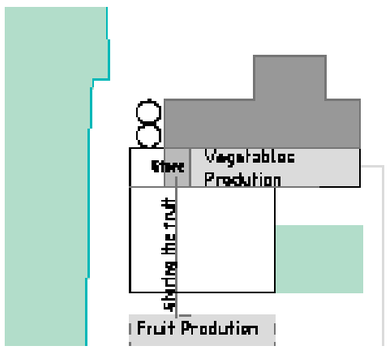
FUNCTIONAL ORGANIZATION



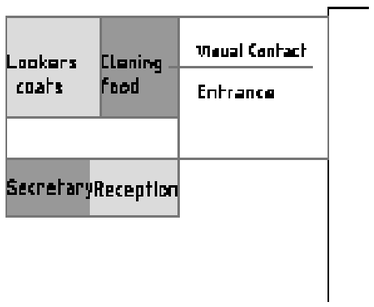
FUNCTIONAL ORGANIZATION_ PUBLIC



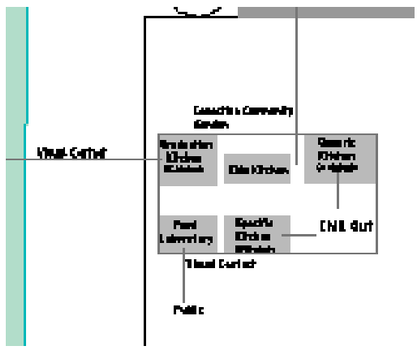
FUNCTIONAL ORGANIZATION
COOKING SCHOOL



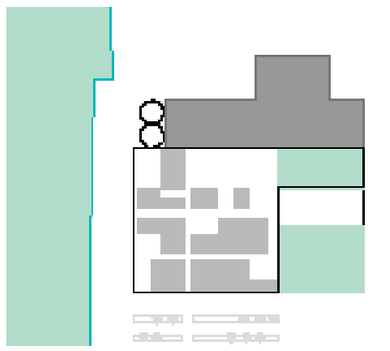
FUNCTIONAL ORGANIZATION_ PRODUCTION



FUNCTIONAL ORGANIZATION_ ENTRANCE



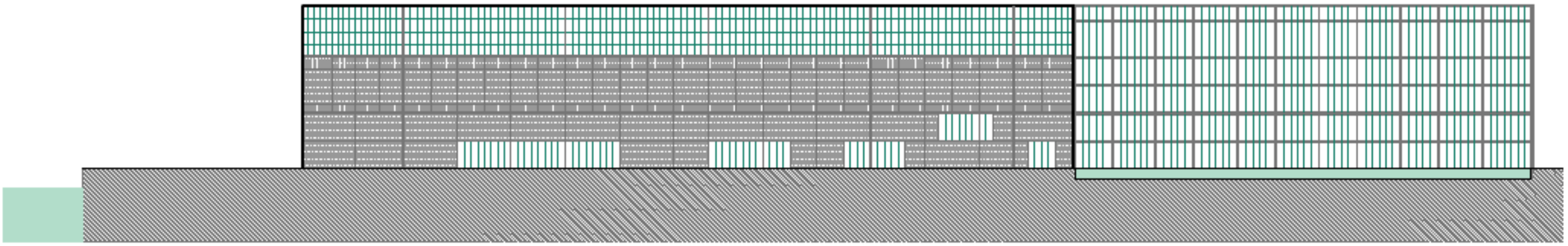
FUNCTIONAL ORGANIZATION_ KITCHEN



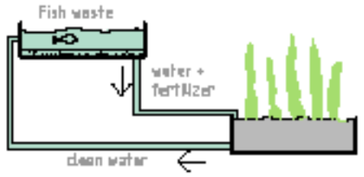
VOLUMETRY

The design proposes a clear circulation with generous dimensions, and orientated towards the canal.

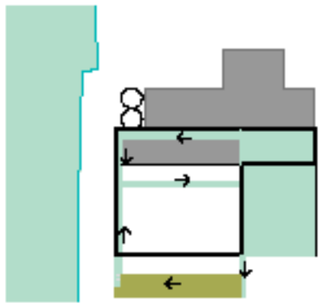
The interactions between the different social groups promote the creation of a cooking school open to the community.



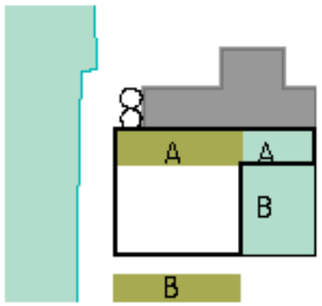
WEST FAÇADE 1/400



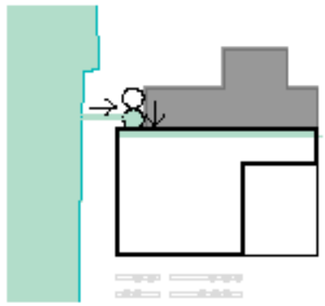
AQUAPONIC SYSTEM ecological fertilizer. The system need to have tanks with fishes where their waste fixed with the water is a good fertilizer to the plants. When the plants are growing they produce an enzyme that clean the water. The water is placed in the tanks again to provide a good fauna to the fishes.



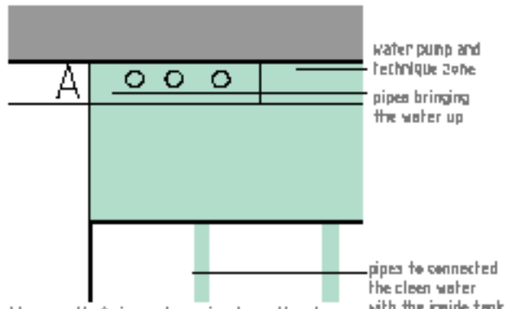
CLOSE SYSTEM – after the water be pomp to the vegetables production it is insert again in the system.



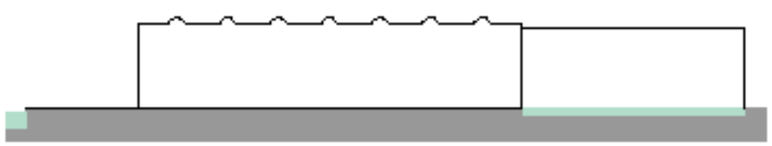
TWO TANKES – one in the exterior provide water to the exterior vegetation. Other one in the interior (temperature controlled) feed the inside plants



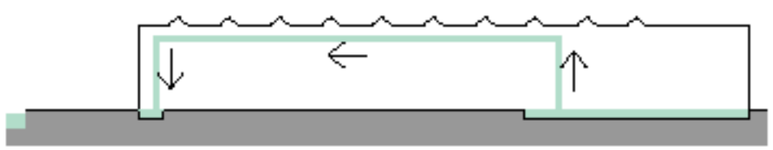
Treatment and refill the water in the system



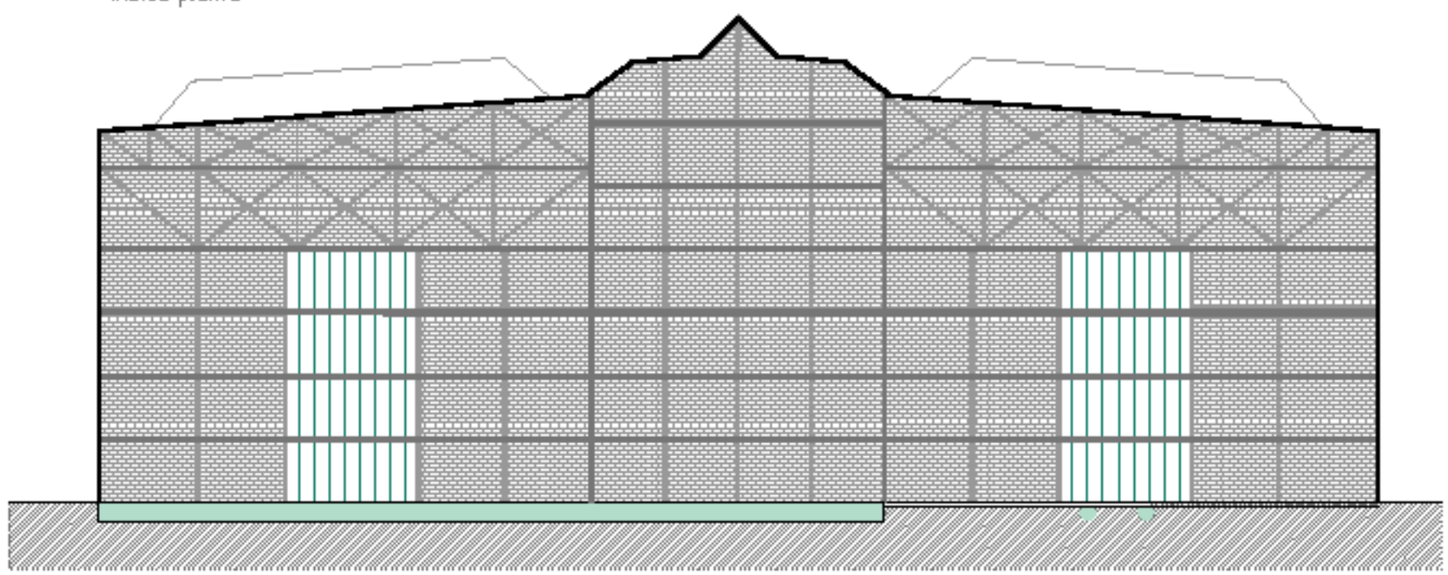
the wall A is a tecnical wall where all the pipes go up and down.



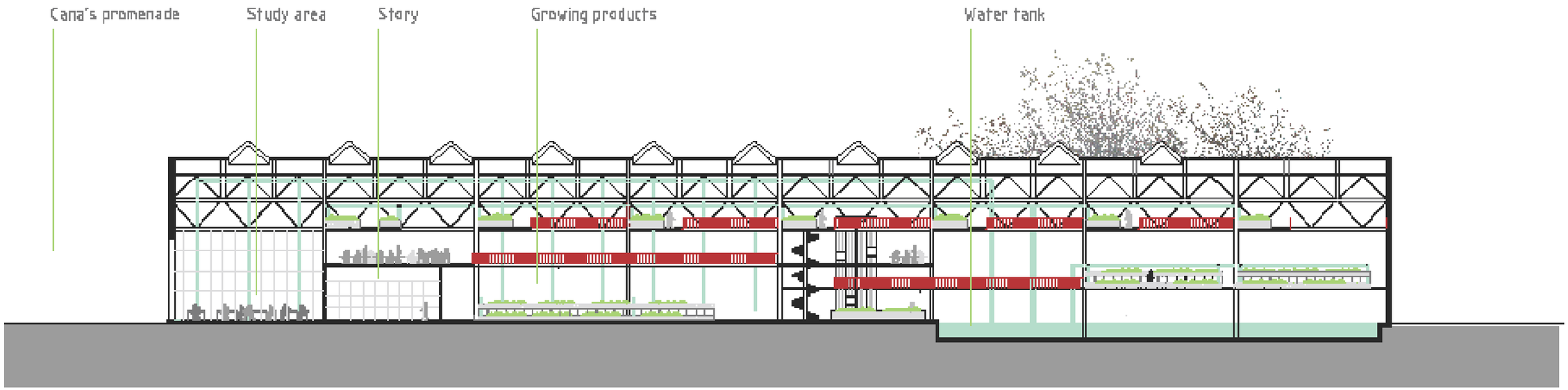
RELATION WATER/BUILDING



PIPES WALL - WATER FLOW

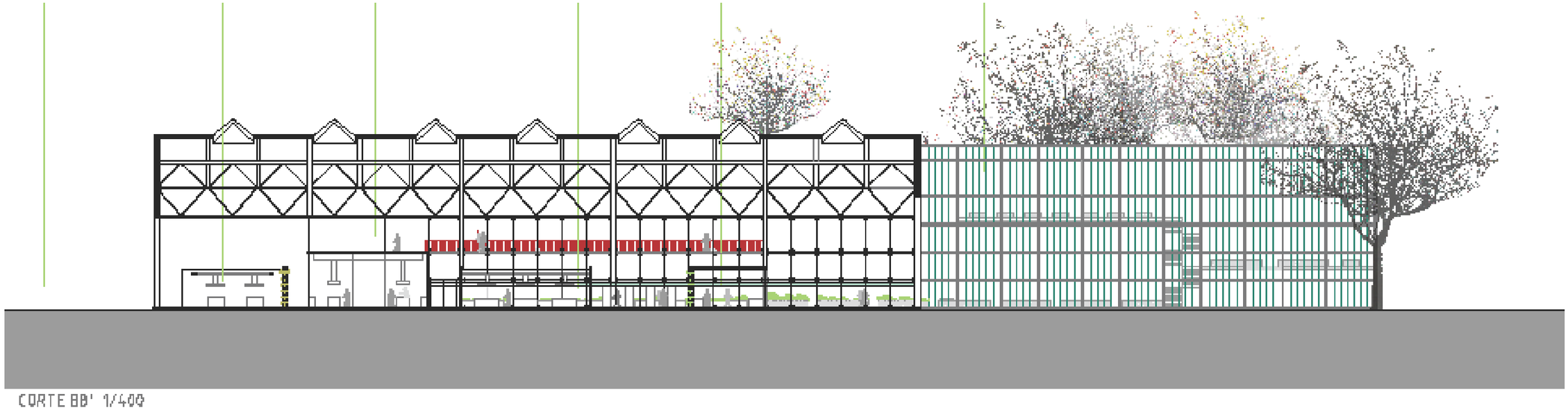


NORTH FAÇADE 1/250

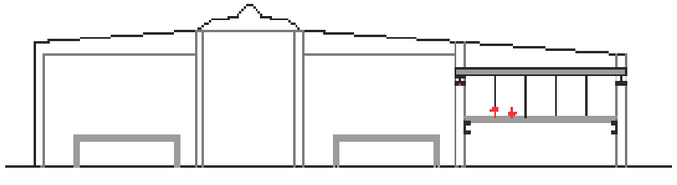


CORTE AA' 1/400

Cana's promenade | Graduation Kitchen | Class Room | Generic kitchen | Cleaning the products | Growing food

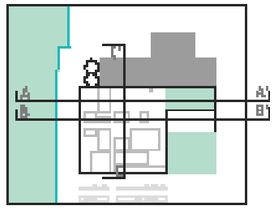


CORTE BB' 1/400



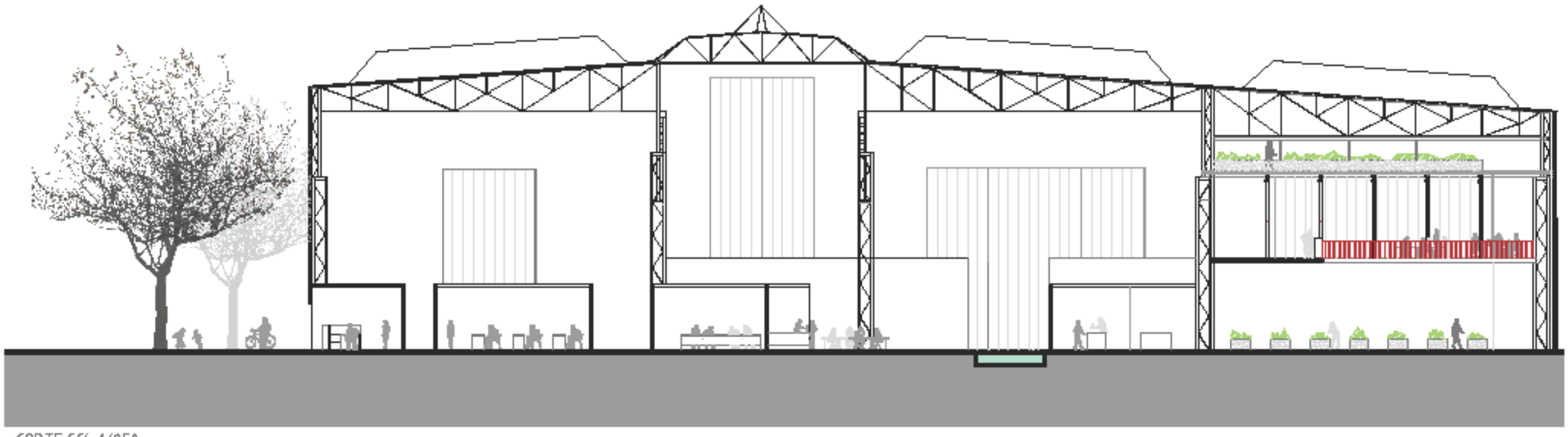
There are two types of construction, one is build from the ground and do not depend on the old structure. In the other typologie the knew structure is support by the old one.

The old structure in the top of the building was caring heavy loads. A knew steel structure will be placed in the old one the cary the last floor. The first floor willbe suport by cabels in tension.

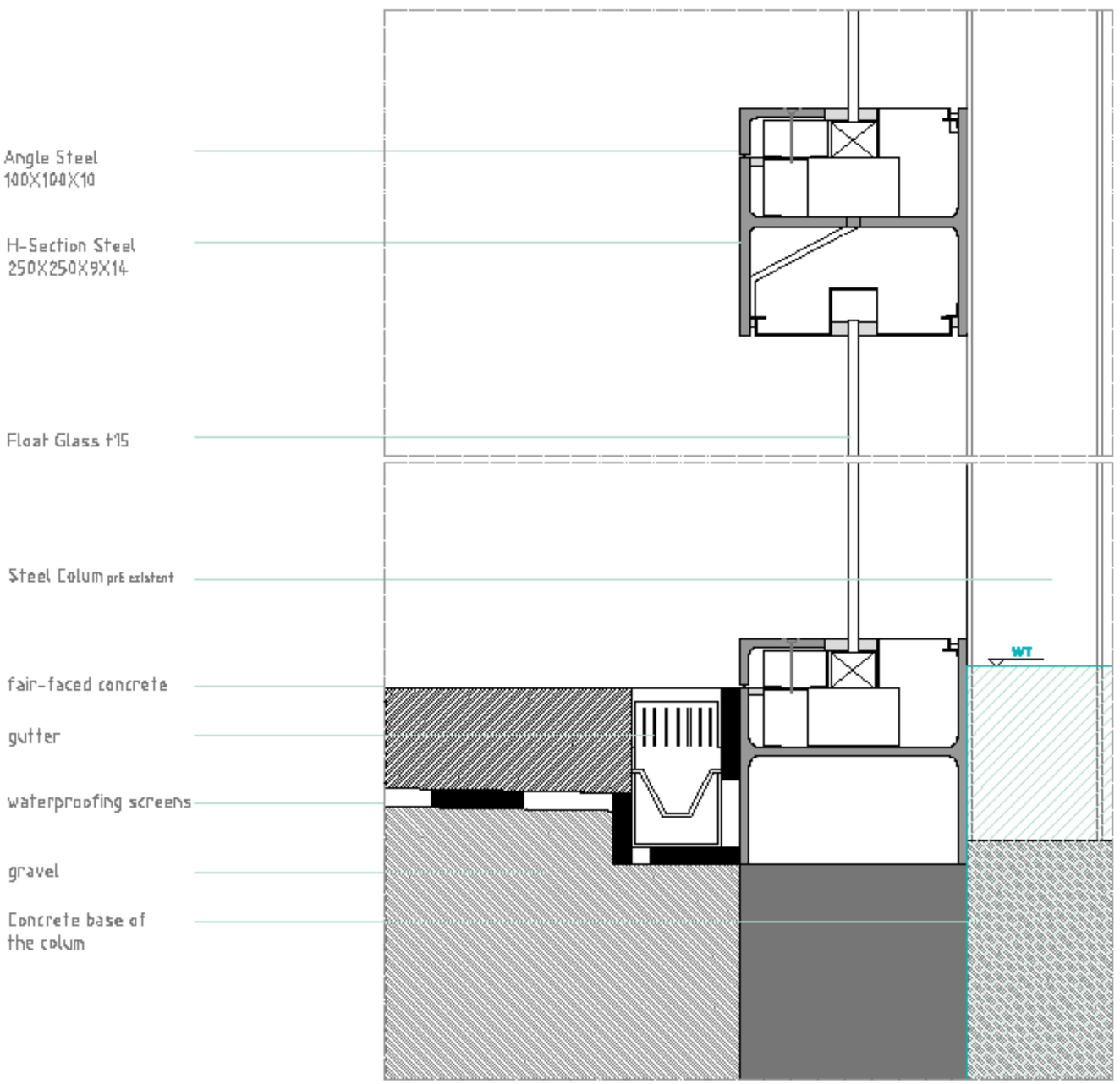


PLAN - LEVEL 0

1/400



CORTE CC' 1/250


Angle Steel
100X100X10
H-Section Steel
250X250X9X14
Float Glass t15
Steel Colum pré existent
fair-faced concrete
gutter
waterproofing screens
gravel
Concrete base of
the colum
WT

Detail D __ 1/5

1 -Steel Colum pré assistant

2-Steel water pipe 320dim paint in ligth blue

3- metel plate

4-safety glass 10 mm thick sandblasted inside

5-Illumination

6-stainless steel 120 mm dia 2mm thinck

7- metel plate around the colum

8 -reinforced concrete made in sito

9 - metel plate 4mm (protect the concrete)

10- UPE 245 (pré welded in the beam in fabric)

11- Metel plate pré-fabricated

12 - suport to the cabel

13-tension tie 40mm dia paited to fier securety

14-HEB 250

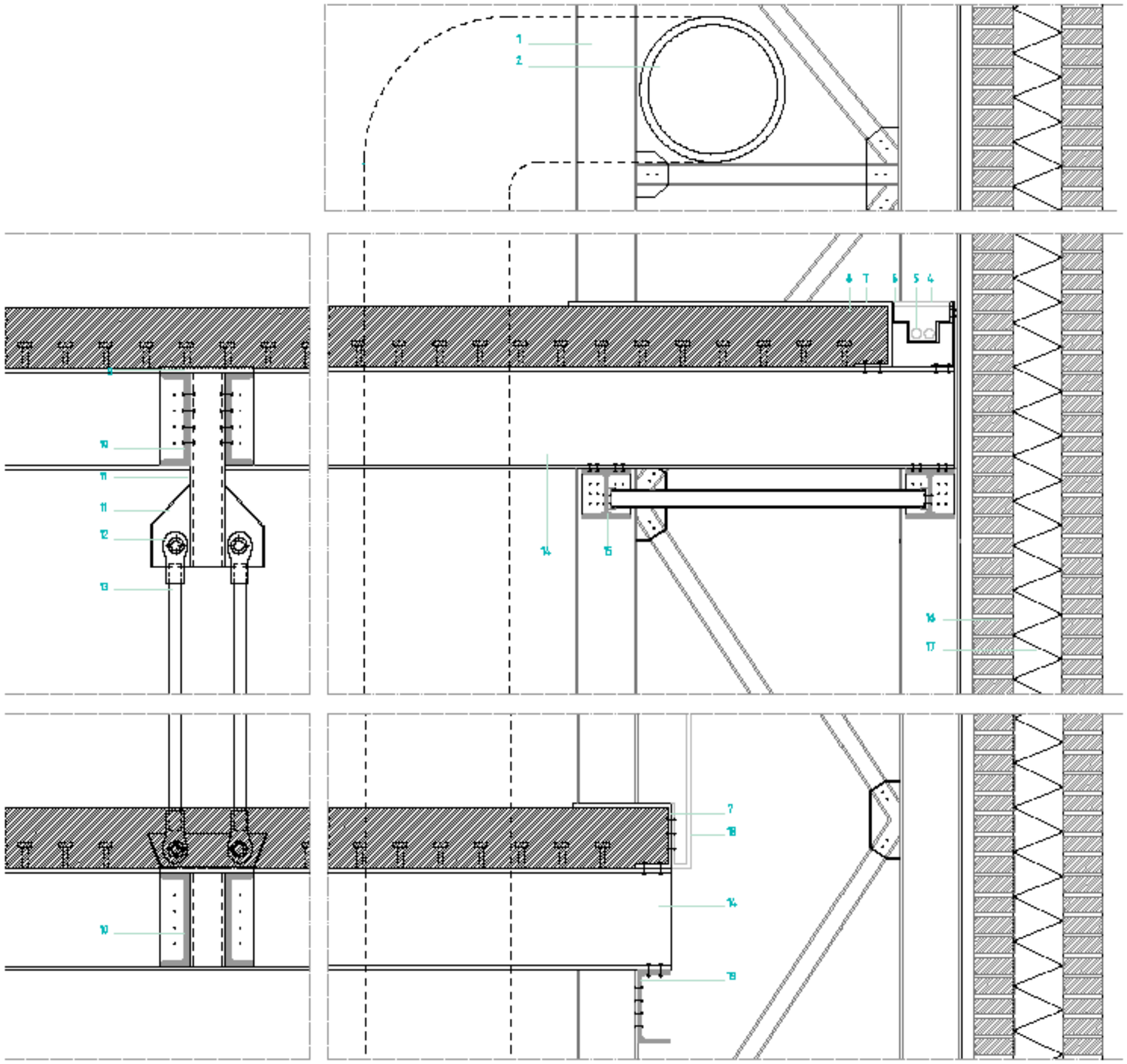
15 - HEB 120 (pré-existent)

16-Brick Amherst blend

17-Rigid isolation

18 - Railing in zinc plate

19- UPE 180



Detail E __ 1/10