HERITAGE & ARCHITECTURE
Rotterdam Industrial Harbour

P5 Presentation
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Index

Background

Research Question

Cultural Values

Design Question

Design Process
  Starting Points
  Programs
  Intervention
  Demolishment
  Space arrangement
  Space Quality
Fenix II
The witness of Rotterdam active industrial harbour transformation
1951
Research Question

Who is Fenix II?

What is the hierarchy of existing values? During the intervention, which elements should be preserved, transformed or demolished?

What is the relation with the context?
History background
Rotterdam Harbor Development over Time

Rijnhaven as the second early developed industrial harbor
History background
Katendrecht-warehouses
Holland Amerika Lijn

Active industrial harbor
Reached out to America
History background
San Francisco warehouse
The longest warehouse in Europe at the time
Early stage of using reinforced concrete
History Background
Transformation of the building
Once an entirety

Phase I
1916-1922
San Francisco Warehouse

Phase II
1944-1951
Fenix I and Fenix II

Phase III
2012-2014
Fenix I- New programs
Fenix 2- Dwellings
Chronomapping

North-Waterfront

South-Deliplein

1916
1951
2014
History Background
Transformation of the accessibility and axis

San Francisco warehouse

North side (waterfront) | South side (Deliplein)

Phase I
Fenix II
Fenix I

Phase II

Phase III

Fenix II
Fenix I
Surroundings
Character of Fenix II
First thing to notice on facade

On the south façade
The repetitive rhythm
The shape of the columns
The shape of the window

On the north façade
The consistent side window on the first floor
Character of Fenix II
Repetitive Open space
Similar space experience
Character of Fenix II
Natural day light introduce
Character of Fenix II
Reinforced concrete
Trance of concrete casting
Aesthetic aspects

Monolithic reinforced concrete-casted on site 1916

Pre-fabricated concrete 1951

New and Old Joint

New addition Structure System  Original Structure System
Monolithic  Monolithic
Cultural Valuation
History layers
Façades
Structure
Rhythm
Repetition
Openness
Cultural Valuation

North-Waterfront

South-Deliplein

High values  Original element- façade, structure
Medium values  Flooring and partial south facade
Low values
Current Neighbors

Provimi Factory
One last trace of industrial activities in Katendrecht
Possible to relocate

Fenix I
New dwelling complex
Expected to be completed in 2018.
130 units, from 81 to 186 m²
Fenix II, she is the witness of Rotterdam industrial harbor transformation over time.

She represents the growth of Rotterdam industrial harbor. 
She was once the longest warehouse in Europe. 
She shows the modernity of applying cutting edge building technology by using reinforced concrete. 
She is a strong survivor from both WWII and on-site fire damage.

Fenix II states important valuable layers: historical, cultural, technical, non-intentional commemorative, and rarity aspects. Even though Fenix II is not yet listed on Rotterdam municipality monuments, the characters and facts found in the building prove the importance of Fenix II.

Fenix II, she continues her journey to the new phase of Rotterdam industrial harbor.
Design Question

How can Fenix II act as a driver to revitalize the glory history layers of liveliness from previous industrial harbor?

Sub Questions

What will be the new identity of Fenix II?

How to reconnect the entirety of San Francisco warehouse? How to show the continuity within the aspects of forms and functions?

With urban transformation, in which forms of natural elements can provide better relation and integration to the city context.

How can these natural integrations influence public health and surrounding quality?
Circular Economy
Existing current programs- Tropicana and RTM Campus
Turning phase of industrial nature

Concept

Raw Material A → Product A → Waste

Raw Material B → Product B → Waste

Research Lab Example

DYCLE
Procedure

Spread the concept of DYCLE

Distribute diapers

Recycle diapers with baby bio waste

Biodegradation Vermicompost

Super soil Black humus Terra preta

Food harvest Family Market

Planting Farmers/family Trees Vegetable

Knowledge Exchange
Small working space

Open Working space
Involved & Share
Local Community
Innovation Cluster
Cultural and educational gathering point from the south of Maas River

- **RTM Campus**
  - Education
    - Large machinery space (Innovation Dock)
    - Medium research office
  - Workshops
  - Events
  - Lectures
  - Canteen

- **Fenix II**
  - Leisure
    - Exhibition
    - Large research office
    - Research Labs
  - Workshops
  - Events
  - Lectures
  - Café

- **Tropicana**
  - Commercial
    - Small research office
    - Small research labs
  - Workshops
  - Events
  - Lectures
  - Café
Starting Points
Continuity
 Entirety
 Public programs required

Residential  Commercial  Factory
Office  Hospital  Leisure (museum, theater)

Landmark
Public  Semi-Public  Private
Starting Points
Continuity
Entirety

Greenery
Water front

Trees 25-15m
Trees 15-8m
Trees 8-3m
Grass

public square
semi-public square
Starting Points
Continuity
Entirety
Starting Points
Continuity
Entirety

Visual continuity

FENIX II
Inspiration
Integration with different natural elements
Increase public health
Circulation
Continuity
Entirety
Pedestrian
Traffic
Leading visitors with water and trees

Access to both water and trees

Residential area

Temporary Car Access

Kop van Zuid
Intervention
Façades
Entrance

Existing Facade

Intervention Facade
Circulation

North façade
Waterfront entrance
Main pedestrian flow
Visible entire façade
Intervention
Light Plaza/ Temporary exhibitions events
Waterfront
Trace of the past
Intervention
Waterfront
Trace of the past
Rhythm of structure
Balcony
Side window
Rail
Light poles
Circulation
North façade
Waterfront entrance
Circulation
South Façade
Deliplein Entrance
Original Façade Elements
Rhythm of structure
Rhythm of openings
Intervention
South Entrance
Original Elements
Guided by light
Programs

Fexix II- Innovation Cluster of circular economy
**Intervention**

Ground Floor

Leading visitors with water and the trace of the past

Natural elements embrace Fenix II

Central Green as the main gathering point

Axial space arrangement
Intervention

1F
Natural elements embrace Fenix II
Open space arrangement
Intervention
Demolishment
Retreat with caution
Preservation

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Demolish
Treat with caution
Remained
Intervention
Central Green
New spatial experience
Where the existing and the new meet
**Intervention**

Central Green

Main Axis/ gathering point

Natural light introduce
Intervention
Central Green
New spatial experience
Natural light introduce
Large Events
Resting point
Intervention
Central Green
New layer-raised floor
Trace of the past-existing floor
**Intervention**

Central Green

New spatial experience

Visual connection

Visual continuity
Intervention
Central Green
Structure demolition

Original situation

Double height space - option 1
Extra columns
Carbon fiber reinforcement

Double height space - option 2
Extra reinforced concrete

The new bending moment acts on contrary with the original situation.
A new reinforcement is required.

The new bending moment acts on contrary with the original situation.
A new reinforcement is required.
**Intervention**

Exhibition Experience

GF-Fenix II, Rotterdam Industrial Harbor History

GF- WOrld Urban Issue and Rotterdam Urban Issue
**Intervention**

Exhibition
GF
Axial experience
Surrounded by natural elements
Light Plaza
Temporary Exhibition/ Events
**Intervention**

Exhibition experience

GF

Axial routing
Intervention
Exhibition experience
1F
Open Space
Intervention
Existing structure entirely visible
Raised Floor
Visual connection
**Intervention**
Pass by Research Lab
Central Green as ending point
**Intervention**

Climate Principles

Position of existing elements

South facade (Deliplein) 1916
**Intervention**  
Climate Principles  
Buffer Zone/Green way

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**Buffer Zone**  
Using water and plants to control intake air temperature and humidity  
Traditional insulation layer

- Suitable existing structure  
  - Heavy load  
  - Higher ceiling  
  - Better ventilation

- 1/3 water surface  
  - 15-23 °C

- 18 °C  
  - -10 to 30 °C

- Plants to increase evaporation

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**Climate condition**

Outdoor temperature = Needed temperature

Natural cross ventilation

Outdoor temperature > Needed temperature

- Cool side (North)
- Warm side (South)
- Intake air becomes cool and wet
- Active buffer zone
- Solution
- Dehumidification
- Ventilation
- Evaporation

Outdoor temperature < Needed temperature

- Cool side (North)
- Warm side (South)
- Intake air becomes warm and dry
- Active buffer zone
- Solution
- Humidification
- Ventilation
- Evaporation
## Intervention

**Climate Principles**

**Buffer Zone/Green way**

<table>
<thead>
<tr>
<th></th>
<th>Summer</th>
<th>Winter</th>
<th>Suitable temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Outdoor temperature &gt; Needed temperature</td>
<td>Outdoor temperature &lt; Needed temperature</td>
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<tr>
<td>Sunny</td>
<td>![Diagram]</td>
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<tr>
<td>Windy</td>
<td>![Diagram]</td>
<td>![Diagram]</td>
<td>![Diagram]</td>
</tr>
<tr>
<td>Cloudy</td>
<td>![Diagram]</td>
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<tr>
<td>Night with people</td>
<td>![Diagram]</td>
<td>![Diagram]</td>
<td>![Diagram]</td>
</tr>
<tr>
<td>Night without people Cool down building</td>
<td>![Diagram]</td>
<td>![Diagram]</td>
<td>![Diagram]</td>
</tr>
</tbody>
</table>
Outdoor temperature = Needed temperature

Intervention
Climate Principles
Buffer Zone
Ventilation
Intervention
Climate Principles
Buffer Zone
Ventilation

Outdoor temperature > Needed temperature

Cool side (North)
Warm side (South)
Active buffer zone

Technical room
Air intake
Air outtake
**Intervention**

**Climate Principles**

**Buffer Zone**

**Ventilation**

Outdoor temperature < Needed temperature

Active buffer zone

Cool side (North)

Warm side (South)

Heated Top

Heat Exchange

Technical room

Air intake

Air outtake
Intervention
Climate Principles
Floor heating/Cooling

Winter
Aquifer thermal energy storage
- Steady water temperature around 10°C in all seasons
- Reduces heating/cooling temperature difference
- Replacing fossil fuel needs and reduces CO2 emission

Summer
Aquifer thermal energy storage
- Steady water temperature around 10°C in all seasons
- Reduces heating/cooling temperature difference
- Replacing fossil fuel needs and reduces CO2 emission
Intervention
Climate Principles
Green roof/ Water collection
buffer Zone

Good roof insulation
- Increases the efficiency of buffer zones
- Creates the critical point to increases ventilation
**Intervention**

Buffer zone green way - Semi outdoor experience
Temporary Exhibition or events/ Resting point
Intervention
Materialization

Phase I-1916

Phase II-1954

Intervention-2018

concrete

brick

white concrete

light brown oak wood
**Intervention**

South Facade Expression

Bring back original character
Intervention
Green way
Intervention
Green way/ extension of central main space
Ventilation system
Raised floor/ existing structure
**Intervention**

**Detailing**

**Detail 1**
1. Heat exchange (air to water)
2. Existing structure-reinforced concrete
3. Air outtake 1F
4. Air outtake GF
5. Insulation XPS 100mm
6. Cement board 12 mm
7. C-shaped aluminum
8. Clean and apply cement if stain unremovable
9. Double glazing

**Detail 2**
1. Double glazing
2. Insulation XPS 100mm
3. C-shaped aluminum
4. Wooden flooring
5. Floor heating
6. Sound insulation
7. Existing structure-reinforced concrete
8. Clean and apply cement if stain unremovable
9. Air outtake GF

**Detail 3**
1. Polymer mortars for larger damage
2. Existing foundation-reinforced concrete

**Detail 4**
1. Aluminum double glazing window frame with existing 2° roof slope
2. HSS. 150mm 50 mm 7mm
3. L-shaped steel. Equal angle 100mm
4. Leveling cement if needed
5. Insulation XPS 100mm
6. Foam sealant
7. Aluminum flushing
8. Existing structure-reinforced concrete
9. Original steel window frame. Needed to be retrofitted and reinstalled

**Detail 5**
1. Single glazing
2. Water tank (The water is used for controlling incoming air temperature and humidity. Water temperature range is from 15°C - 23°C, year round.)
3. Existing structure-reinforced concrete

**Detail 6**
1. Prefabricated concrete base
2. Leveling cement if needed
3. Existing structure-reinforced concrete
Fenix II, she continues her journey to the new phase of Rotterdam industrial harbor.

Thank you