ANTHROPOCENE
HOLOCENE
PLEISTOCENE
PLIOCENE
The proposed current geological epoch in which humans are the primary cause of permanent planetary change.
ANTHROPOCENE

Capitalism at the basis of the adaption of nature by humans and especially the consuming of Earth’s resources

Jason Moore:

CAPITALOCENE

CHEAP NATURE

The “unpaid work” in capitalism
ANTHROPOCENE

DESIGNERS OF THE FUTURE:
REDUCE HUMAN IMPACT

HERITAGE AND ARCHITECTURE:
MAKE USABLE FOR THE FUTURE
& KEEP THE PAST READABLE
PRODUCTION OF WEAPONS IN THE NETHERLANDS

1889
Increased production of new types of weaponry. Need for larger production site.

1900
Moving the Atillerie Inrichting from Delft to Zaandam.
In the centre of the Fortification line Stelling van Amsterdam

Hembrug
A polder area named after a rotating bridge across the North Sea Canal
EXPANTION OF CITIES

ZAANDAM

Hembrug

industrial harbor area

NOORDELUKE ZAAN-OEVERS

AMSTERDAM
THE LADDER  
a world within a world

P5 presentation
MSc 4 Graduation studio, Heritage and Architecture
Project Hembrug, Zaandam

Abel van Unen  4523113
THE LADDER  a world within a world

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CONTENT

PART 1
ANALYSIS

PART 2
MASTERPLAN + PROGRAM

PART 3
TRANSFORMATION STRATEGIES

PART 4
DESIGN
BUILDING DEVELOPMENT OF THE HEMBRUG

Early period of the Hembrug
Demolishing of long Marine shed
Looting of machines by Germans WWII
Eurometaal takes over production
The Hembrug today
HISTORY OF THE THE LADDER

Historical view on the Ladder 1956, photo from collection Hembrug Museum, Zaandam
HISTORY OF THE THE LADDER

1901
HISTORY OF THE THE LADDER

1931

Current building boundary Ladder
HISTORY OF THE LADDER

1953

Current building boundary Ladder
HISTORY OF THE THE LADDER

1996

Current building boundary Ladder
ANALYSIS OF THE EXISTING
INTERIOR WORLD
DAYLIGHT FROM ABOVE

RELATION INSIDE/OUTSIDE
GENERAL CONCLUSIONS OF THE BUILDING ANALYSES

ARCHITECTURAL VALUES

BUILDING TECHNICAL VALUES

CULTURAL HISTORICAL VALUES

SEQUENCE OF ATMOSPHERES AND DAYLIGHT

DEVELOPMENT AND EXPERIMENTATION IN BUILDING TECHNIQUES IN A SPAN OF 50 YEARS

LAYERS IN TIME AND EVIDENCE OF HISTORICAL USE
PART 2: CONTEXT, MASTERPLAN & PROGRAM RESEARCH

Zaadam 77,000 inhabitants (2017)

idea for new infrastructure from Amsterdam to Zaandam

existing ferry connection between Amsterdam and Zaandam

existing train track to Amsterdam

existing living / working areas

proposed transformation from industrial areas to living / working areas

Hembrug + ca. 1,000 inhabitants

Achtersluispolder + ca. 5,000 inhabitants

Cornelis Douwes + ca. 5,000 inhabitants

industrial harbor area
PUBLIC VERSUS PRIVATE

Hembrug
+ ca.1,000 inhabitants
MAIN DESIGN QUESTION

HOW CAN THE LADDER BE TRANSFORMED TO A NEIGHBOURHOOD REINFORCING COMPLEX, BUT KEEP ITS CULTURAL HISTORIC AND ATMOSPHERIC VALUES?
PART 3: TRANSFORMATION STRATEGIES

1. REACTION ON THE ANTHROPOCENE
2. INFILL & GESTALTRECYCLING
3. REDESIGN SKIN & APPLYING ZONES

CULTURAL + SOCIETAL
ARCHITECTURE + CULTURAL VALUES
BUILDING TECHNOLOGY + USE
1. REACTION ON THE ANTHROPOCENE

- consciousness of human impact
- the former function of the area
- contrast between nature and industrial landscape
1. REACTION ON THE ANTHROPOCENE

REDUCE HUMAN IMPACT
- reuse existing structure and skin
- reuse energy between functions

RESTORE CONTACT WITH NATURE
- extention of the plofbos into and on top of the building
2. INFILL & GESTALT RECYCLING

SHEARING LAYERS OF CHANGE. Because of the different rates of change of its components, a building is always tearing itself apart.

SCHEME BY STEWART BRAND
2. INFILL & GESTALTRECYCLING

1a. new function/proces/machine needed

1b. form fits function

space plan

site

2a. current state of the building

2b. function fits form

no infill (space plan)
services (some still visible)
skin (not in an optimal state)

services --> added

skin --> adapted

structure --> reused

site
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1a. new function/process/machine needed

1b. form fits function

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2b. function fits form

- space plan
- site

- space plan
- services
- skin
- structure
- site

- no infill (space plan)
- services (some still visible)
- skin (not in an optimal state)

- space plan -> new infill
- services --> added
- skin --> adapted
- structure --> reused
- site
3. REDESIGN & APPLYING ZONES

- different climate zones with different impact on the existing
- shearing energy between functions during the day
- saving energy during the year
SHEARING ENERGY: DURING A DAY

need for energy on a winter day

- Swimming pool
- Houses
- Offices/meeting
- Fitness
- Sport rooms

Amount of people:

<table>
<thead>
<tr>
<th>Time</th>
<th>6.00 12.00 18.00 24.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.00</td>
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- Heating needed: add energy
- Cooling needed: extract energy
SHEARING ENERGY: DURING A YEAR

- **COOLING SEASON**
  - Warmth from the air
  - Rest warmth
  - Low temperature heating

- **HEATING SEASON**
  - Warmth from the sun
  - Rest warmth
  - Extra heat of crystallization

- **SUMMER**
  - Summer
  - Warmth from the air

- **WINTER**
  - Winter
  - Extra heat of crystallization

- **AUTUMN**
  - Autumn
  - High temperature cooling
  - Ca. 20°C

- **SPRING**
  - Spring
  - Inside building
  - Climate system

- **WARM WATER**
  - SolarEis-Buffer
  - 0°C
SOLAR EIS BUFFERS 3 x 300 m³

180 SOLAR HEAT COLLECTORS 490 m²

SOLAR CELLS IN GLASS 600 m² (60% OF GLASS SURFACE)

ZINC ROOF STANDING SEAM

2500 m² GREEN ROOF SLIGHTLY INTENSIVE
PART 4: TOUR THROUGH THE BUILDING
ENTRANCE

PROBLEMS
- no clear entrance for the Ladder
- large open space, without human scale
- no clear entrance towards the museum
SOLUTIONS
- sawtooth roof must be kept visible
- place housing block backwards
- use rest for entrance square for the museum
CONNECTIONS OF THE LADDER
EXISTING BRICK FACADE

NEW BRICK: STONECYCLING
EXISTING BRICK: NEW JOINTS

NEW BRICK: STONECYCLING
21 studios 70 m²
resception 35 m²
office 160 m²
health specialists 3 x 70 m²
toilets 70 m²
kitchen 80 m²
THE CHURCH

- Canteen 550 m²
- Meeting and working space 360 m²
- Outside terras 110 m²

South side 1940-1969
historical use

structure

rhythm

light and scale
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<td>min.</td>
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IMPROVEMENT IN PRODUCTION PROCESS
REUSE THE PIT
THE PRESS HALL
BEHIND THE PRESS
Press Hall

Changing room for swimming pool 250 m²
Large sport room 110 m²
Small sport room 60 m²
Technical space 60 m²
CHANGING ROOMS AND HOUSING

7 x studio 50m²
2 x changing/lockerrooms 95m²
swimming pool 25 x 10 m
teaching pool  16 x 8 m
space for supervisors 50m²
technical space 300 m²
PRESTRESSED CONCRETE HYPERBOLIC PARABOLOID SHELL
Cultural historical value

1. only example of HP-shells we found in the Netherlands
2. it shows the phase in time of using concrete for large spans
3. relevant structure type today
SET OF SOLUTIONS FOR SWIMMINGPOOL

**PRESERVING THE CONCRETE SHELLS**
- Condensation affecting structure (carbonation)
  - New roof above existing
- Chlorine affecting structure (carbonation)
  - Filter with UV light

**INDOOR CLIMATE**
- Reuse heat and drainage of moisture
  - Exhaust of air above shell structure
- Acoustics and thermal insulation
  - Vapor-repellent layer on 1/3

**FOUNDATION**
- Placement of pool
  - On place of wellrings
  - Reuse foundation poles
- Prevent floating when the pool is empty
  - Extra thick foundation slab
SET OF SOLUTIONS FOR SWIMMINGPOOL

PRESERVING THE CONCRETE SHELLS

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FOUNDATION

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- reuse foundation poles

prevent floating when the pool is empty
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ETFE ROOF
HEATING

23-32 ºC

25-28 ºC

heat loss
VENTILATION
HWA Ø 100 insulated
W2

air supply swimming pool
ATTACHMENTS
HOUSING

24 rooms of 14 m² with shared living and kitchen of 6 x 80 m²

1 studio of 109 m²
GYM

fitness 1200 m²
winter garden 150m²
SCENARIO FOR USE

the Ladder

now - 2025
DESIGN AND
BUILDING PHASE

2025 - 2035
TRANSITION PERIOD

after 2035
LONG USE PERIOD

surrounding
DEMOLITION DRAWING

ROOF
USE DURING THE DAY

use of functions in one day

amount of people

6.00 12.00 18.00 24.00

swimming pool
fitness
houses
sport rooms
offices/meeting

heating needed
add energy
cooling needed
extract energy

6.00 12.00 18.00 24.00

fitness
swimming pool
sport rooms

houses

offices/meeting
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Solar Eis tank in basement of new addition
local technical space
supply and exhaust of low temperature heating

LOW TEMPERATURE HEATING SUPPLY
LOCAL HEATING

local technical space
schematic field of low temperature
floor heating zone
local technical space

fresh air supply (from shady south side)

ventilation zone

air exhaust (via roof)
insulated space inside bigger space (box in box)
small adaptations of the existing (semi climated spaces)
insulation of space on the exterior side
insulation of space on the interior side
new insulated space, independent from existing building
SUMMER DAY SCHEME

- Passive ventilation
- Wind chimney
- Heat pump
- Solar ice tank
- Local installation unit
- Heat recovery ventilation
- Heat pump
- Bypass
- Rest heat between functions / climate zones
- Low temperature heating supply
- Precooled ventilation supply
- Fresh air input from shadow (south) side
- Air exhaust with CO2 measurement
- Shading
- Floor cooling
- Rest heat by overheating
- Passive ventilation by overheating
- Precooled ventilation supply
- Precooled ventilation supply
- Local installation unit
- Local installation unit
- Local installation unit
FLOORPLAN 02 - 1:500

Sport room
Yoga/meditation
60 m²

Studio
Second floor
22 m²

Housing unit
Second floor
24 m²

p+ 6900