Source: Donation by Nederlands Instituut voor Militaire Historie (NIMH, Netherlands Institute of Military History), 2017. Between 1920 and 1940.
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**Introduction**

**Hemburg military heritage**

During the Heritage and Architecture graduation studio the challenge is taken upon transforming a former Dutch military base and production zone by the name of Hembrug. Where time has stood still for years, this unique location within the Stelling van Amsterdam only recently has been opened for the public, now containing numerous historical military remnants to explore. The Hembrug district is characterised as a dense industrial area along the Noordzeekanaal, built with a high density of structures for logistic efficiency where initially ammunition and weaponry where produced. This industrial area is contrasted by the forest area around it, creating the ‘green enclave’ south of Zaandam.

I have chosen to develop the transformation of a former military test site and explosive storage zone within this green enclave, by the name of the Pavilions in the woods, or Plofbos. An area that contrasts tremendously to the surrounding industrial zone; under the trees, free standing structures, creating natural open spaces in between the buildings, small in scale, low-rise. Even the shape and location of the buildings were strategically designed and positioned and numerous practical military interventions where designed in order to reduce the risk of explosive accidents. Even the form of the buildings would steer an accidental explosion into the woods, and canals were laid out around the buildings acting as fire compartments. This former practical military design that acted as a strict risk management, now brought (a 100 years later) unintended qualities with it. Qualities of a natural environment, a restful ambience in the hearth of the Dutch’s 20th century military base, that is filled with historical evidence.

What interested me is that this unique setting is formed upon not just one single space, but the accumulation of many different types of space within this ensemble. It is the role of this experience of transition, together with the presence of historical evidence and natural qualities that makes the Plofbos so interesting and unique.
Research question

The Pavilions in the woods, characterised by its natural atmosphere offers an ideal environment for the aging elder. Living in a natural environment could improve the overall well-being of the individual, opposed to living in an urban environment. Yet, especially elderly, suffer from loneliness, fear or depression. These problems demand another solution from the transformation on a bigger scale of program that deal with the mental well-being of the individual. It can be contested by hosting communal activities for the elderly, as well as to stimulate them to exercise and to do communal activities such as gardening, bike rides or hikes through the forest. However, all these activities need to be organized and taken care of, so who is going to put in the effort? Another growing problem in the Netherlands is the huge housing shortage, especially in the Randstad. Mostly young starters are not able to afford an acceptable house. Within the two major cities Zaanstad and Amsterdam, Hembrug could offer an interesting alternative for those seeking a house. With the former mentioned elderly target group in mind, it is the idea to mix these young starters, families, and individuals together with the elderly. Together they will form a community, where people will focus on participation, hosting communal activities and help their elder neighbours. Whether it be small chores such as groceries or assistance with particular tasks, the younger generation will agree on participating in the community, having a slight responsibility for the elderly. As society brings more and more people in the world, we can only take care of less. This drives us into changing from an individual driven society to a community of solidarity, empathy, and compassion, where architecture can provide the basement for creating a bond between the individual.

This process has lead me to raise the following design research question, that aims on how to improve the current setting by architectural transformation.

“How can the existing buildings of the Plofbos be transformed sustainably, where elderly can live more independently and which stimulates the settlement of a self-supporting community?”
...TIMELESS
DECAY - RUINS - WILD NATURE

- WILD NATURE
The course of Hembrug

1900-2000
Age of military safety

Architecture
- Shell-roof structures
- Small scale
- Fragmented
- Rhythm of grid
- Formal or efficient

Nature
- Canals (fire compartments)
- Trees (camouflage, shock-waves and natural cooling)
- Earthen walls (protect storage from explosives)
- Open space (risk reduction)

Elements
- Lightning catchers
- Pipelines
- Water tank

What was...
INTENDED DESIGN
- Practical
- Military
- Efficiency

What is...
UNINTENDED QUALITIES
- Natural
- Scenic
- Experience
2020-2050

Age of Ecological and societal responsibility

Architecture
- Elderly-proof typologies
- Communal facilities
- Medical assistance
- Small-scale
- Ecological
- Sight on green
- Light
- Historical rhythm of orientation
- In-between space

Nature
- Diversity of spaces (transition)
- Scents of the Landscapes (memory stimulation)
- Trees
- Trail
- Benches
- BRIDGES
- Meeting points

Elements
- Pipeline energy network
- Re-use of grey water
- Solar gathering
- Heat storage
- Thermal comfort

What will be...

SUSTAINABLE INTERVENTIONS

Elderly proof
Self-supportive
Community
Ecological
My design focuses on the transformation of this former military test site and explosive storage zone, by the name of the Plofbos. A space that contrasts tremendously to the surrounding industrial zone; a site characterised by its natural spaces, with buildings under the trees, its restful ambiance, small-scale structures with many idyllic scenes created by open space in between the buildings. An atmosphere created by the stunning colour palettes of the changing seasons or the fallen leaves suddenly opening new sight lines towards the large structures of Hembrug. It is the role of this experience of transition, together with the presence of historical evidence that makes the Plofbos so interesting and unique. It is the objective to preserve and enhance that role of experience in future redesign. What intrigued me about this area is that it is not only the role of vision that defined the experience of the area, but also the elements that unlocked the other human senses that were at play.
My design focusses on the transformation of this former military test site and explosive storage zone, by the name of the Plofbos. A space that contrasts tremendously to the surrounding industrial zone; a site characterised by its natural spaces, with buildings under the trees; its restful ambiance, small-scale structures with many idyllic scenes created by open space in between the buildings. An atmosphere created by the stunning colour palettes of the changing seasons or the fallen leaves suddenly opening new sight lines towards the large structures of Hembrug. It is the role of this experience of transition, together with the presence of historical evidence that makes the Plofbos so interesting and unique. It is the objective to preserve and enhance that role of experience in future redesign. What intrigued me about this area is that it is not only the role of vision that defined the experience of the area, but also the elements that unlocked the other human senses that were at play.
Design approach Pavilions in the woods
Preserve Demolish Repair Infill
Strategy for the Plofbos between Taets

Heritage design Position
I am convinced that most of the existing structures can provide an excellent basis for adaptation. It is a good solution on a sustainable viewpoint; the redesign of existing built structures saves money on production costs, material usage, and CO2 emissions and waste. Why demolish and rebuild while much of the existing framework already allows space and structure for new facilities? During the course of Heritage and Architecture, my position on dealing with existing architecture has changed a lot. At the beginning of the course, I’ve had the tendency to add “wild” new volumes to the existing, attempting to achieve an impressive contrast between the old and the new. However, during a deeper analysis of the existing buildings, I realized that the extra qualities I’ve tried to achieve are already present in the existing. They only needed to be unlocked in a certain way. So why spend a lot of money, material, and effort attempting to achieve the same result? Buildings proved to be spacious and contain a lot of light within it already. Therefore, I am now trying to build from within the existing, by making minimal interventions but have a strong impact on defined space, quality and light, while sustaining the existing qualities such as form, material or space by letting them be or even amplifying them. Only when the required program demands so, expansions can be made through strong argumentation. The buildings on the Plofbos ensemble proved to be very large in space already and extending the volume did not seem to be the first priority, as qualities I attempted to achieve already existed within the existing buildings. It is more about finding and then enhancing or amplifying these qualities further, instead of trying to achieve the same result with new structures. This position on heritage made me take steps back from earlier designs I’ve had for the Plofbos buildings.

Design approach Pavilions in the woods
Strategy for the Plofbos between

<table>
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<tr>
<th>fill</th>
<th>Intervention</th>
<th>Re-interpretation</th>
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Level of transformation
01 THE KANGAROO RESIDENCE
1.1 Urban Kangaroo expansion

Fig. 3.1 Schematic of the self-supportive community
The first intervention is a multiple generation living concept called Kangaroo housing; a deviant form of living where the elder and its younger family live under the same roof, but have their own house. Through smart building organization the interaction and meeting between the two individuals is stimulated, as well as that the younger family has a sense of private control over the elder; making them notice a potential accident of the elder. This way the elder can live much more independently without the required need of medical assistance. The design assignment in which this results is if it is possible to adapt the existing building fabric into a modern residence. What this means for the design itself is the consideration between privacy and safety; resulting in various levels of relation between the two residences through playing with sight, sound and interaction.
1.2 Reference studies

Reference: Treebeek - Jo Janssen
1.3 Design interventions

Base foundation of the existing structure

Adding a split level

Voids to pass on light to the lower levels

Further height differences for visual relations and light
Analogue elderly care

In the example projects that were studied, visual connections between the elderly residents and the younger family residence (making them able to see each other between e.g. the kitchen/living room) initially provoked ethical doubts. Would you like to live in a house where you are constantly being watched? First, it was hard to imagine that it would be pleasant living in such a house. Would this concept only work between very good relations, such as families (so a small target group). However, it proved it to be effective to rely on analog visual relationships instead of digital home automated devices, as it increases the feeling of safety for the elder knowing that somebody is there for you, able to assist you with a small chore if necessary. Therefore, I’ve opted to make configurations where new inhabitants can determine themselves the sacrifice of privacy, in order to gain more private control over their aging elder. This level of adaptability provides this concept to be much more flexible and even work amongst a larger target group of unrelated elderly/younger generations. Secondly, the references displayed two single houses under the same roof, without any space for interaction. In this heritage project, it was considered to create spaces that provoked both young and old unite and interact with each other by generating places of occasional meeting in the residence, such as a shared hall-way, garden, and patio.

The final outcome of the Kangaroo house transformation has become sustainable as it offers a well-insulated residence, that performs according to the current building standards. It does not use gas and makes uses of solar energy to perform well on the required heating ventilation and electricity standards. Through analog control between young and old the elder will be assisted by its neighbours, allowing them to live much more independently than being put in a medical care centre. The urban program within the Plofbos should stimulate the elder to participate in communal activities, exercises, and day-time activities, thus keeping them more vital and healthier individuals.
Two houses under one roof

Upper floor apartment for younger generation
110m²

Ground bound residence for elder occupant
100m²

Public control between younger generation (upstairs) and elderly (ground floor) through openings around circulation spots or voids (mainly kitchen and living)

1.4 Digital versus Analogue control
LACK OF SOCIAL INTERACTION

PRIVATE INFORMATION

DIGITAL CARE

34
ACOUSTIC BARRIERS
VISUAL RELATIONSHIPS (MOVEMENT/LIGHT)
PROVOCATION OF INTERACTION

ANALOGUE CONTROL
1.5 Structure: Wooden Finnjoists
1.6 Roof opening

8000mm
Laminated timber beam bears the new load

Wooden column anchored into the existing foundation

Garden
1.7 Cutting open existing wall
Welded flange attached to an IPE180
LARGE GESTURE BY INTERVENTION, YET SMALL IN THE DETAILING
1.9 Future Adaptable configurations

1 - FULLY CLOSED

3 - FROM KANGAROO TO STANDARD RESIDENCES
2 - OPENABLE WHEN APPLICABLE

4 - FULLY OPEN; NO BORDER BETWEEN ZONING
02  THE CONTEMPLATION HALL
2.1 Ambiances

- Contemplation Hall along the Draaibank
- Lane of trees
- Compactness
- Transition zones “Border of trees”
Light; Scents/colour

Touch; tall grasses

Tall, wild, spacious woods. Undefined trail

“Lifted”; Umfassungs weg
The second design will become a Contemplation Hall within the heart of Hembrug. This is an activity that becomes more and more significant in this fast-paced modern age we’re living in right now. More and more we start to live a life where our mind is constantly disturbed, by the mobile telephone constantly demanding our attention. But also the increasing pressure from work, from school. Who does not find the time to contemplate and put things in perspective will remain with a busy mind. Something that could have potential negative health effects sooner or later, such as increased stress. I notice it amongst my fellow students as well, who speak about this new phenomenon called FOMO – “Fear of missing out”. With social applications such as Instagram, Facebook et cetera, people are constantly witnessing the “best moments” pictures shared by their friends online, meaning they start to (unconsciously) compare it with their own boring life, putting more pressure on themselves to “fit in”, but forgetting about what matters to themselves. What their own goals are. Contemplation could assist in such cases, for both young and old, to put your own life decisions into perspective and help to push forth striving for what matters to yourself. The design of the Contemplation activity will become an architectural challenge for me and is designed so that it will provide a space in the area where the visitor can rest the mind for a moment. After a long walk through the forest, the visitor can find intimate spaces created through light or dark or other architectural interventions. Here, the visitor is able to forget their daily struggles for a moment. To provoke the senses of the visitor, a number of architectural instruments will be used, such as light and dark, old and new, sequences between inside and outside, material, textures, the reflection of light, acoustics, all factors that affect the senses and the atmosphere within the building. Additionally, the vast space the existing structures provide allow communal gathering and collective events to be organized that will unite the community within Hembrug. This will stimulate the sense of unity amongst the community, helps to create a bond between each other but also battles loneliness in a way. With these two redesigns on a micro scale, together with the overall visions for the master plan on the meso and macro scale, it is aimed to prove that the existing architectural heritage provides an excellent basis to form a sustainable living environment, touching upon multiple societal problems we’re facing right now.
2.2 Design concept

Reflective roof coating
Ceiling Paint with a Granutale structure, reflecting more light particles
2.3 Impactful design interventions
2.4 \textbf{Configurations}

\textbf{Lectures}

\textbf{Dinner/communal}
The second building intervention provides a silent space for contemplation; providing an environment to mentally escape from the busy life and distractions. An activity that becomes more and more significant in this age of the mobile telephone constantly demanding your attention. It is about the approach towards this structure, where on the road, the individual is able to be distracted from their daily thoughts and worries for a moment and is carried away by nature. During the approach the mind is able to focus on the elements; the chirping of the birds, the scents created through different plants along the trail, the touch of tall grasses, through different spaces under the trees; open, light, or darker spaces, reaching the Contemplation Hall, finishing the walk inside. This way it is endeavoured to prevent mental instabilities of the community on the long-term. This design demands for specific acoustic qualities, light infill, use of space, structure and the integration of natural elements that contribute to the awareness of the elements that will have a restful impact on the visitor.
SPACE OF CONTEMPLATION
Directing accumulated rainwater within existing gutter. Height differences result in the sound of raindrops during cloudbursts. Rainwater is eventually distributed back to the existing canals.

Heighth differsents result in the sound of raindrops during cloudbursts.

FARGESIA ROBUSTA ‘PINGWU’
ACORUS GRAMINEUS ‘OGON’

Rain water principle/ shadow vegetation
Directing accumulated rainwater within existing gutter

Rain water distributes equally over the mounted green facade

Monnikskap (Aconitum)
Longkruid (Pulmonaria)
Elfenbloem (Epimedium)
Kruipend zenegroen (Ajuga reptans)
Gebroken hartje (Dicentra)
Kerstroos (Helleborus orientalis)
Varen (Polystichum)
Hartlelie (Hosta)
Kaukasisch vergeet-me-nietje (Brunnera)
Salomonszegel (Polygonatum)
2.7 Materialisation

REDUCED ACOUSTIC REVERBERATION

FLOOR HEATING

Stretch metal finishing
Floor heating/Stone tile finish
Room-dividing curtain
INCREASED ACOUSTIC REVERB

Rusted corten steel
Brown brickwork gray seam
Natural stone (antracite)
3.1 Program redefinition of the Farms

- DRAWING,
- PAINTING,
- TAILORING,
- KNITTING,
- POTTERY,
- WOODWORK,
- FABLAB
- CAFÉ/RESTAURANT
  - HORECA
  - MUSIC
  - YOGA/TAI-CHI
  - READING
  - ORGANISING EVENTS

- PHYSIQUE

- MUSIC
Warehouse transformation to café/restaurant
Farm program definition
Especially elderly suffer from loneliness, fear or depression. These problems demand another solution from the transformation in the form of program definition that deals with the mental well-being of the individual. It can be contested by hosting communal activities for the elderly and the community, as well as to stimulate them to exercise and to do communal activities such as communal gardening, bike rides or hikes through the forest. The final master plan has been designed with public facilities where the community is able to gather and meet, spend their day and additionally; find contemplation through nature and architecture. There will be an Artisans’ workshop, where people could come and craft objects from wood, tailor with cloth or craft things with clay. The other structure provides a café, restaurant, reading room and offers multifunctional space upstairs where people could do physical exercises together in order to improve their balance, fitness and overall vitality. Additionally, they can make music, which improves their cognitive functioning and coordination and has a positive influence on speech and hearing. All together the defined program should help to prevent inhabitants from developing negative health effects. Additionally, the space of contemplation will allow the inhabitants to find their inner rest again, improving their mental well-being, reducing fear and depression and making the inhabitant more healthy overall. Besides that, the large existing structure provides such a large space where occasionally, larger collective events could take place. Activities that could differ, such as funerals, weddings, celebrations, and parties. But also a place where lectures could be given, or collective dinners could take place. This multifunctional space touches upon bringing the community together.
Urban program redefinition

1. Program definition

- ELDER, 65+
- FAMILY
- SINGLE ADULTS

2. ARTISANS’ WORKSHOP
- DRAWING
- PAINTING
- TAILORING
- KNITTING
- POTTERY
- WOODWORK
- FABLAB

3. CONTEMPLATION HALL
- COMMUNAL GATHERING
- MENTAL REFLECTIONING
- LECTURES
- WEDDINGS
- MEMORIAL SERVICES
- ART EXHIBITIONS

4. MIXED RESIDENCES
- KANGAROO-HOUSING

4.1 Urban program redefinition

Program definition

- ELDER, 65+
- FAMILY
- SINGLE ADULTS

ARTISANS’ WORKSHOP
- DRAWING
- PAINTING
- TAILORING
- KNITTING
- POTTERY
- WOODWORK
- FABLAB

CONTEMPLATION HALL
- COMMUNAL GATHERING
- MENTAL REFLECTIONING
- LECTURES
- WEDDINGS
- MEMORIAL SERVICES
- ART EXHIBITIONS

MIXED RESIDENCES
- KANGAROO-HOUSING

4.1 Urban program redefinition
4.2 Space strategy

Open space
  Rhythm
  Scale
  Transition

Spatial plan

- Entrance of the Cathedral (transition zone)
- Clusters
- Wild trees
- Lane of trees
- Heart of the Plaza
- Into the Noordzeekanaal
- Into the Ladder/Waterfront

Open space
Rhythm
Scale
Transition
Living in a natural environment could improve the overall well-being of the individual, as opposed to living in an urban environment. It reduces stress, provokes physical activity (go for a stroll through the woods), breath cleaner air and thus making the inhabitant a healthier person overall. This is an offered quality that is already there. The challenge for the redesign was how this could be preserved while transforming the site to contemporary requirements. This has mainly been answered in the layout of the redesign of the ensemble. There have been masses added, sacrificing nature but only through very thorough consideration. Making sure the genius loci; the scale of the buildings, the rhythm, height, and in-between space character were preserved so nature could manifest accordingly, or even concluding to leave certain natural places untouched!
4.3 Urban structures

Legend:
- Taets Arts and Event Hall
- Lanes of trees
- Transition zone
- Dense woods
- Idyllic heart
- Fragments along the woods
- Hidden plot
- Ornamented facades
- Shell roofs
- Elements
- Generations
- Buildings

Ornamented facades
Shell roofs
Elements
Generations
4.4 Natural strategy/borders

Natural elements
- Forest
- Earthen walls
- Canals
- Trees
4.5 Reclamation of the Taets Art and Event Hall land
CLUSTERS OF FREE-STANDING STRUCTURES INTERTWINED WITH NATURE
(REFERENCE: MARC KOEHLER)
Reclamation of the Taets Art and Event Hall land

IMBALANCE OF SCALE, HEIGHT, PROPORTION, ARCHITECTURE AND MATERIALITY

Taets Art and Event Park, 6000m².
A site that initially acted as a production zone of explosive material and military test location, now houses a large Black box in the hearth of the Hembrug terrain. During the construction in 1991, earthen walls, canals and trees were replaced for a practical production hall. However, the activity in this building only operated until 2003, when the Hembrug terrain closed its operations. The building has not been in use until January 2014 when a variety of project developers transformed the former production hall into an Art and Event Hall. Up to today the building facilitates the most diverse events, from design fairs, multi-day company events, product presentations, car shows, conferences, fashion shows, and staff parties, to intimate get-togethers, atmospheric dinners, meetings, lunches, concerts and television recordings. Divided over three unique buildings that are connected through a glazed walkway, the Taets Art and Event park totally combine 10,000 square meters of floor space area. Combined with the open space in between the three units, Taets offers the opportunity to provide event space for up to 7,000 to 12,000 persons.
Observations Taets Black Box (building 1).
- Spacious interior, therefore highly practical for event based activities.
- Steel load bearing structure and metallic façades material potentially re-useable.
- The Black Box disturbs the structure of the northern part of Hembrug (free standing buildings at a distance from each other, surrounded by forest and sometimes earthen walls).
- Both scale and architecture do not fit in with the context.
- Architectural layering of the Black Box is incoherent with the surrounding ensembles.
- Low cultural historical significance.
DENSIFY MORPHOLOGY WHERE IT IS ALREADY DENSE IN ORDER TO MAINTAIN NATURE
DENSIFY MORPHOLOGY WHERE IT IS ALREADY DENSE IN ORDER TO MAINTAIN NATURE
Morphological density by 2050

URBAN

FOREST

VILLAGE

4.7
Proposed metro line tracks (long term)
Collective solar gathering
Central Heat pump installation (Ketelcentrale Hembrug)
Heat exchanging unit
Heat pump
Solar electricity collected through collective roof surfaces on Hembrug
Central Heat pump installation (Ketelcentrale Hembrug)

Kangaroo residence

Insulated water network through Hembrug Ø200mm

Heat exchanger

Electrical heating boiler

Collective Solar gathering

Hot water used by Floor heating + radiators
Heated water (40° C) from Hembrug collective solar gathering Ø200mm
Sewage under existing foundation Ø200mm
Radiator
Radiant warmth
Heat recovery unit (55x75x80)
Heat exchanger (60x30x60)
Electrical heating boiler (60x60x120)
Bathroom
Bedroom 1
Bedroom 0
Zone 1
Zone 2
Used air out (Ø200mm)
Fresh air in (Ø200mm)
Reheated fresh air
Shaft
Ground floor
Insulation from the inside. Target: Rc between 4/5 m²K/W
Heating and ventilation scheme Kangaroo Residences
Used water returns to the Ketelcentrale network Ø150mm
Electricity from collective solar gathering Ø10mm
Low temp. heating
Used air back to Heat recovery unit
Living room 0
21° C
Reheated fresh air
Fuse box
Living room 1
19° C
Electrical heating boiler (60x60x120)
First floor
Garden
Electricity from collective solar gathering Ø10mm
200mm
Used water returns to the Ketelcentrale network Ø150mm
4.11 Potential grey-water management

- Toilet
- Laundry
Pump
Settling tank
(first filter)
(used water)
Water storage
Rainwater collection
Helophytes
(second filter)
Canals
(back into the landscape)
Service block including:
- Heat recovery unit (air treatment unit) (600x800x800)
- Electronic heating boiler
Floor heating in combination with hot air heating

**Communal gathering (toevoer):**

- **Bezettingsgraad** 180m² / 3,3 = 54 personen
- **Ventilatieluchthoeveelheid:** 216 dm³/s
- **Toelaatbaar geluidsniveau:** 2 m/s
  - omzetten naar m³/s 0,216 m³/s

\[
\text{0,216} / 2 = 0,108 \text{ m}^2
\]

\[
\pi \times \text{straal}^2 = 1080
\]

\[
1080 / \pi = 344
\]

- **Straal luchtkanaal:** $\sqrt{344} = 18,5 \text{ cm}$
- **Diameter:** $= 37 \text{ cm}$
4.13 Potential city heating

Afval Energie Bedrijf (AEB)
HEIGHT ACCENTS, VERTICALITY TOOK AWAY
THE SENSE OF HUMAN SCALE
NEW POSITION

SMALL-SCALE, FREE STANDING MODULES
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