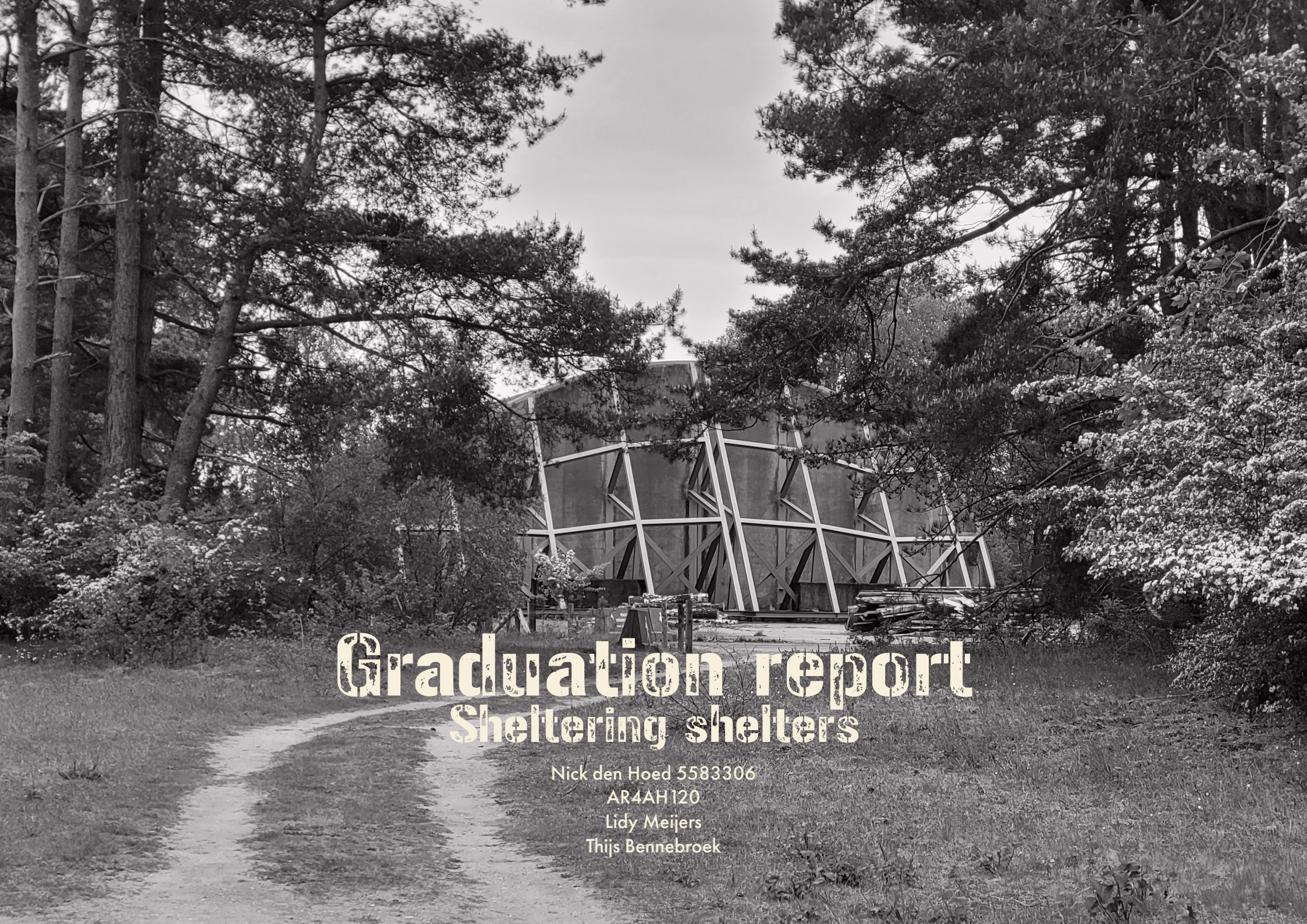

Graduation report
Sheltering shelters

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AR4AH120
Lidy Meijers
Thijs Bennebroek

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Reading guide

This research exist of 4 chapters. Chapter 1 explains why this research matters and explains the relevance. It also states the research question, ambitions and scope.

Chapter 2 explains which methods are used an what theoretical framework forms the basis of the design. Six criteria are established and a way to evaluate the design scenarios.

Chapter 3 contains all the results existing of six ensemble scenarios, twelve shelter scenarios and one further developed scenario. All these scenarios are evaluated at the end of the chapter.

Chapter 4 shows the conclusion of the research, its implications and contains a reflection.

Abstract

During the Cold War, thousands of military buildings and infrastructures were built across Europe, many of which have since been abandoned following the end of the Cold War. An example are the Hardened Aircraft Shelters (HAS). At Soesterberg Air Base there are 17 HAS within a nature reserve which is managed by Utrechts Landschap. A tension exists between ecological preservation and the safeguarding of Cold War heritage, caused by a lack of architectural precedents and transformation strategies for this typology.

This research investigates to what extent a design-based toolbox can guide the transformation possibilities of HAS at Soesterberg Air Base. The methodology combines a theoretical framework derived from the specific values of the site with research by design. Six criteria are established for the evaluation: level of intervention, public-private use, occupancy, heritage values, alignment with Utrechts Landschap's vision, and sustainability.

The results include six ensemble scenarios and twelve shelter scenarios exploring different functions, intervention strategies, and spatial approaches. One scenario, a natural cemetery, is developed into a detailed architectural design, testing the toolbox in practice.

The research concludes that a design-based toolbox can effectively structure and compare transformation possibilities while functioning as a conversation starter for stakeholders. The scenarios that perform best balance heritage preservation with ecological values. Rather than leading to a single solution, the toolbox shows opportunities, limitations, and conflicts, allowing multiple future scenarios to be explored while keeping the specific values of the site central.

Keywords: Cold War heritage, Hardened Aircraft Shelters, adaptive reuse, transformation toolbox, Soesterberg Air Base

Part 1. Introduction

What is the problem statement? How is it relevant? What are the objective and motivation? What is the research and design question & scope?

Part 1. Introduction

1.1 Problem statement

During the Cold War, thousands of structures and facilities were built in the Netherlands alone (Koude Oorlog Verhalen, 2024). These facilities primarily consist of military infrastructure, buildings and emergency shelters. When the Cold War ended along with the fear of war, many countries scaled down their military forces (Bodovitz, n.d.). This resulted in the demolition, sale and abandonment of these military sites.

Nowadays, however, the military is expanding again (Coolman et al., 2025). But the old locations no longer align with current demands. Some of the sites are now listed as nature reserves or are located within urban areas. The large number of vacant Cold War buildings, coupled with a lack of information and guidelines on how to proceed, has resulted in the deterioration of these buildings, along with their associated stories and values.

At the same time, there is growing interest in sustainable reuse of existing buildings and in the preservation of Cold War heritage. To prevent further loss of this period while responding to current spatial needs, it is important to explore new adaptive strategies that connect these sites to social, ecological, and spatial demands.



Figure 1: Sites containing HAS(hardened aircraft shelters)

1.2 Relevance

At present there is a lack of architectural precedents, scientific documentation and transformation strategies for the adaptive reuse of Cold War heritage. In 2020 the Minister for Education, Culture and Science stated that there was a lack of representation of Cold War heritage within the National Monuments Database (RCE, 2025). This heritage category remains underdeveloped in both academic and professional practice.

Existing approaches often rely on strategies developed for other typologies, such as maritime or industrial heritage. However, these frameworks do not fully address the specific spatial, material, and intangible values of Cold War architecture. Consequently, key aspects of this typology risk being overlooked. This highlights the need to generate new knowledge, methods, and design approaches tailored specifically to Cold War heritage

The proposed toolbox responds to this gap by exploring transformation strategies that are rooted in site-specific values. In doing so, it not only provides insight into the potential of Soesterberg Air Base, but also makes Cold War heritage more attractive for stakeholders for future investment and decisions.

Next to the relevance to the Soesterberg airbase, the methodology of deriving a framework from specific site values, can also be transferred to other contexts. This makes the research relevant to the architectural profession.

Lastly it has relevance to the society for it helps preserving the stories and lessons from the cold war period. This is a time period that a whole generation have experienced especially through conscription, protest and fear. At the same time most of the cold war buildings surrounding these memories were secret or hidden. Revitalizing these buildings ensures the safekeeping of these memories as well as creating a place for dialogue and conversation.

1.3 Objective and motivation

When I chose the 'Adaptive Reuse of Heritage' graduation studio, I was unfamiliar with Cold War heritage. However, through lectures and research, I discovered that it had many interesting aspects. Many Cold war structures remain relatively unknown partly because they were originally secret, hidden within landscapes or deliberately demolished after losing their military function.

During the site visits of the studio we visited the Soesterberg Airbase. The airbase is partially owned by Utrechts Landschap. They are very passionate about the cultural heritage of the site as well as the ecology. Their vision towards the shelters is conservation through abstinence. However, this approach raised questions regarding the future potential of the shelters. While the ecology forms an important quality of the site, the gradual decay of the shelters also risks losing its significant values. For the shelters that they did reuse they struggled with their strategy because there is little information about the reuse of such shelters. This creates a tension between ecological preservation and the preservation of Cold War Heritage.

Therefore I would like to inspire stakeholders like Utrecht Landschap of all the possibilities of such sites and how the ecology as well as society can benefit from certain interventions. Next to that I like tackling the challenge these military purely functional buildings bring. For in a lot of cases the stories are almost more important than the buildings themselves. And I want to explore different transformation strategies to help position myself in the architectural debate.

The goal of the toolbox is to demonstrate how a transformation framework can be developed from the specific values and characteristics of a site, while also providing a method for comparing scenarios and evaluating their impact. In this way, the toolbox functions as both a design instrument and a conversation starter for stakeholders, designers, and policymakers. Ultimately, the project seeks to contribute to greater awareness of Cold War heritage and its potential significance.

1.4 Research and design questions

Main research question

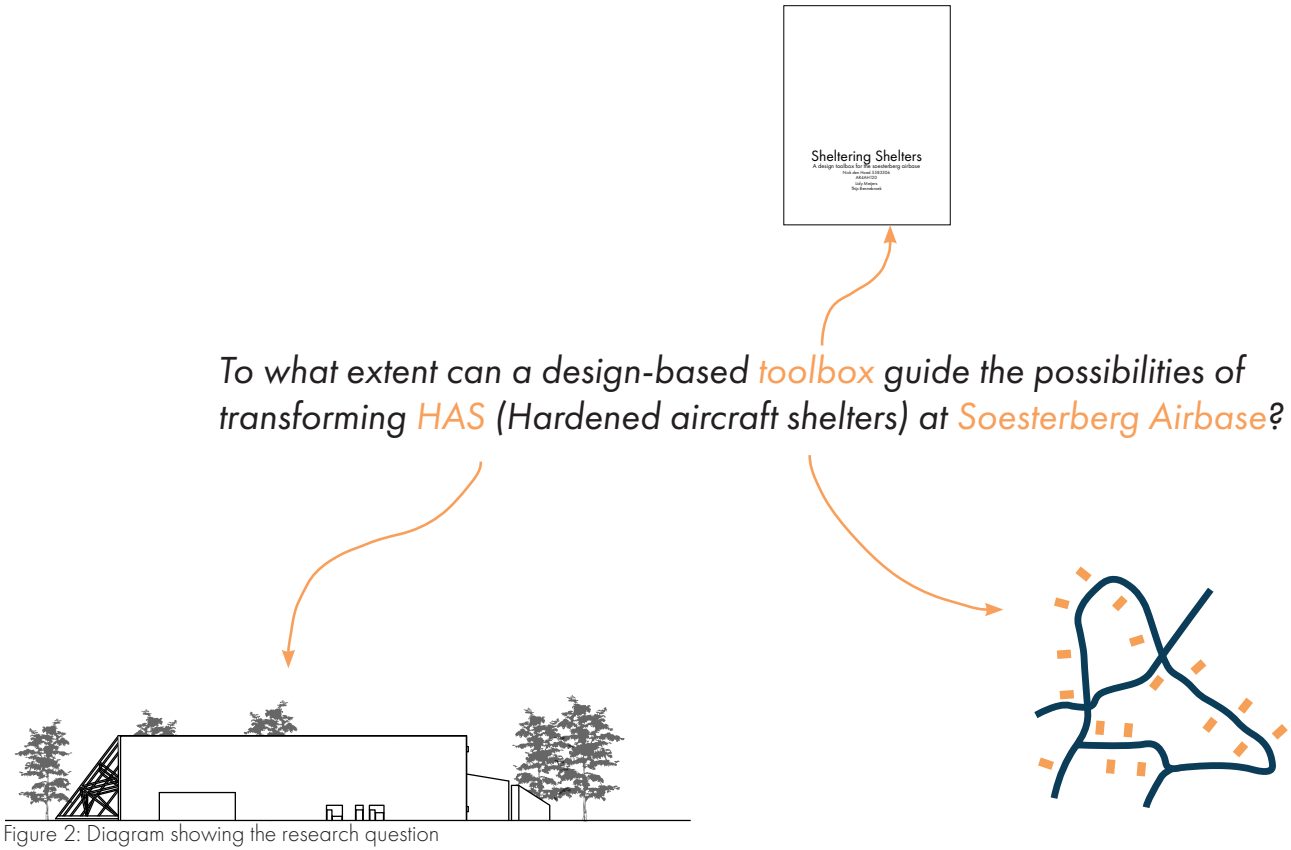


Figure 2: Diagram showing the research question

Sub questions

1) Which heritage values, spatial qualities, and architectural characteristics define the HAS at Soesterberg airbase?

2) Which criteria, strategies and evaluation methods can form the basis of a design-based toolbox for the HAS?

3) Which transformation scenarios and future functions are compatible within the context?

4) How do the proposed interventions and design scenarios affect the heritage values and transformation potential of the HAS?

5) How can a selected transformation scenario be developed into an architectural design?

1.5 Scope

The limitations of the research must be clearly defined. The research will focus on hardened aircraft shelters built during the Cold War (1947–1991) by American and/or NATO forces. The Soesterberg airbase is a perfect example of this and will therefore form the focus of the project, specifically the shelter area located between the two runways.

The site is owned by Utrechts Landschap and used as a nature reserve. They state that the ecological values cannot be affected. At the same time, they wish to safeguard the site's unique atmosphere and open it to the public ('Vliegbasis Soesterberg', 2018). The toolbox will start from these values and will also form an important criteria.

The research will not dive into the financial aspects or logistics. Furthermore the toolbox will exist of six scenarios for the ensemble and twelve scenarios for the shelters. One of these scenarios is further developed.

Part 2. Approach

What is the methodology? What is the theoretical framework?

Part 2. Approach

2.1 Methodology

The project is divided into two main parts, corresponding to chapters 2 and 3: a theoretical framework and a research-by-design phase.

The first part establishes the theoretical framework through literature research, site analysis, spatial analysis, historical analysis, and value assessment. A wide range of research methods and sources is used, including precedent studies, maps, fieldwork, archival photographs, drawings, and historical documents.

The second part consists of research by design, resulting in the development of a transformation toolbox. This toolbox is structured through parameters coming from the theoretical framework and evaluated using the predefined criteria. Within the toolbox, different intervention strategies, functions, and transformation scenarios are explored across multiple scales, ranging from the ensemble to the individual shelter.

One of the scenarios is further developed into an architectural design, to test the applicability of the toolbox in practice. The expected outcome of the project is a design-based toolbox for the HAS at Soesterberg Air Base, providing insight, inspiration, opportunities and limitations.

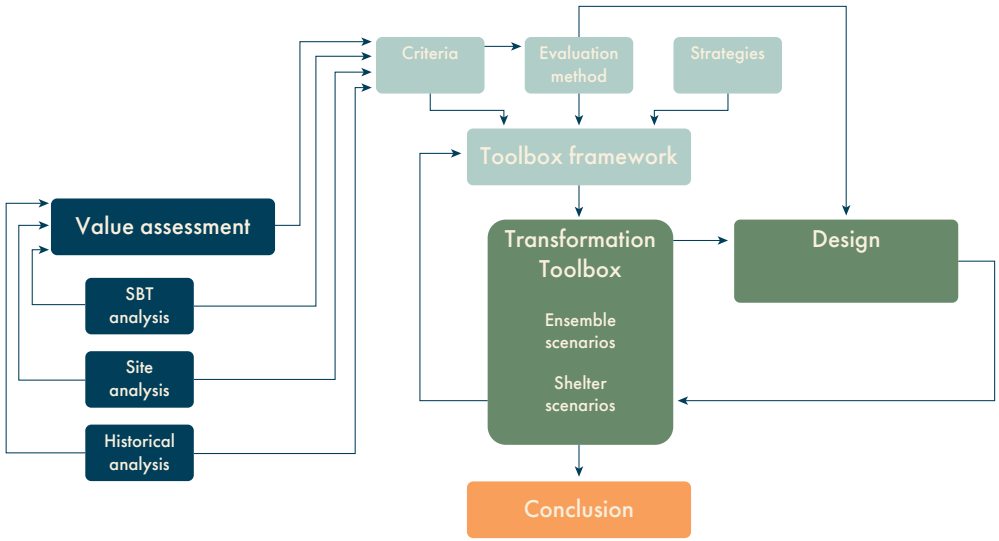


Figure 3: Research scheme

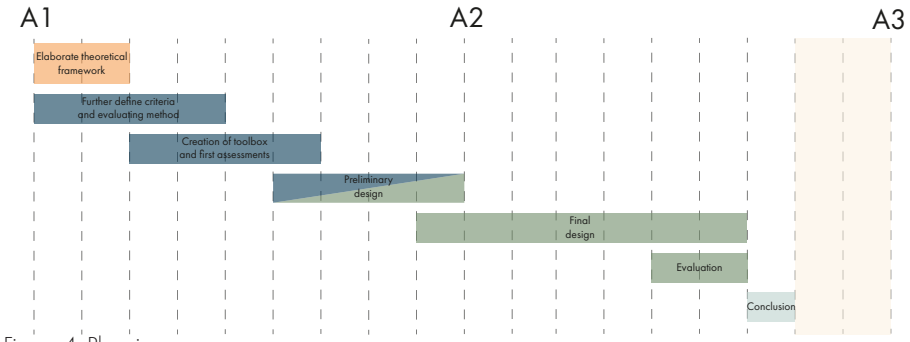


Figure 4: Planning

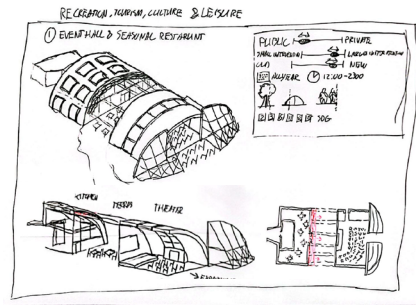


Figure 5: Sketch of expected output

2.2 Theoretical framework

The theoretical framework addresses sub-questions 1 and 2, beginning with: Which heritage values, spatial qualities, and architectural characteristics define the HAS at Soesterberg Air Base? To answer this question, the framework examines the history of the site and the shelters, followed by a site analysis, value assessment, and typological analysis.

2.2.1 History of the site

Soesterberg Air Base has a long military history dating back to the Napoleon. During the 19th century it became a Dutch military training ground, and in 1910 it was transformed into a Vliegerheide for public airshows. The site was taken over by the Dutch Air Force in 1913. During the Second World War the airbase was occupied by German forces, after which part of the site was assigned to the United States Air Force (USAF) in 1954.

During the Cold War period, the Hardened Aircraft Shelter (HAS) area was constructed between the two runways, partly on the location of the former German runway. Following the departure of the USAF in 1994, the area became vacant. Since 2017, parts of the site have been owned by Utrechts Landschap, which transformed the area into a nature reserve.

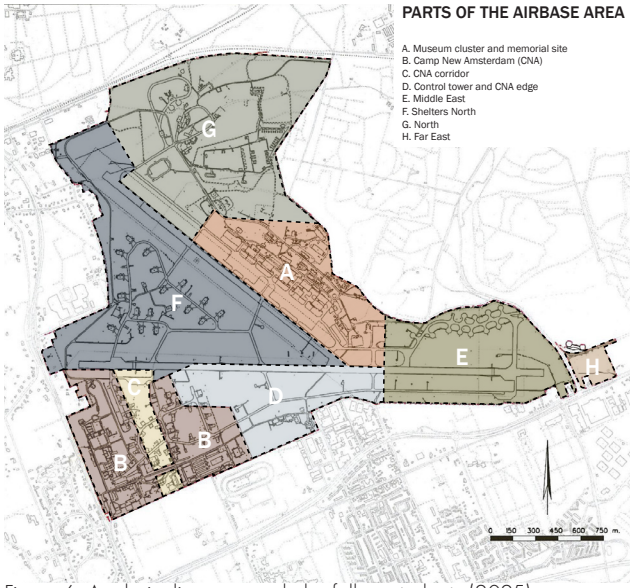


Figure 6: Analysis diagram made by fellow students (2025)

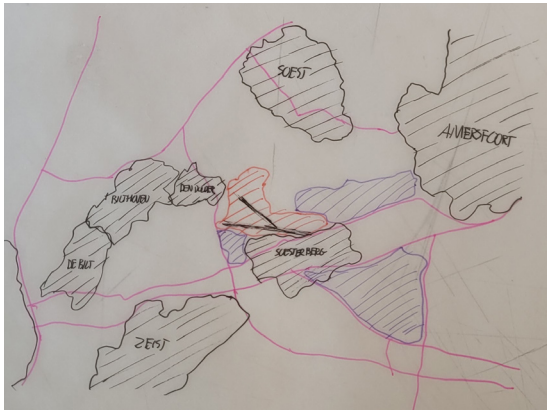


Figure 7: Sketch showing the connection of the Airbase with surrounding cities

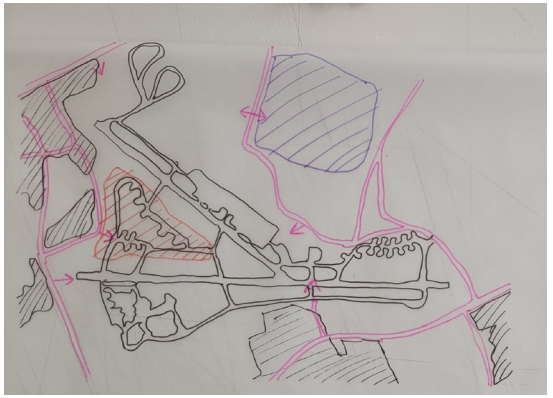


Figure 8: Sketch of the location of the shelters within the airbase

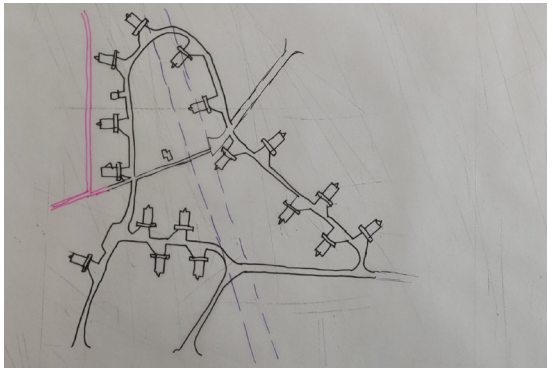


Figure 9: Sketch of the ensemble of the shelters

2.2 Theoretical framework

2.2.2 History of the shelters

The development of Hardened Aircraft Shelters was strongly influenced by the Israeli attack on Egypt in 1967, during which many aircraft were destroyed on the ground. This demonstrated the vulnerability of airbases and led to the widespread implementation of HAS typologies. At the same time, the USAF expanded its military infrastructure in Europe in response to Cold War tensions.

This resulted in four standardized shelter types: first generation, modified first generation, second generation, and third generation shelters. Although differing in size and detailing, all shelters shared the same structural principle of steel arches covered with reinforced concrete.

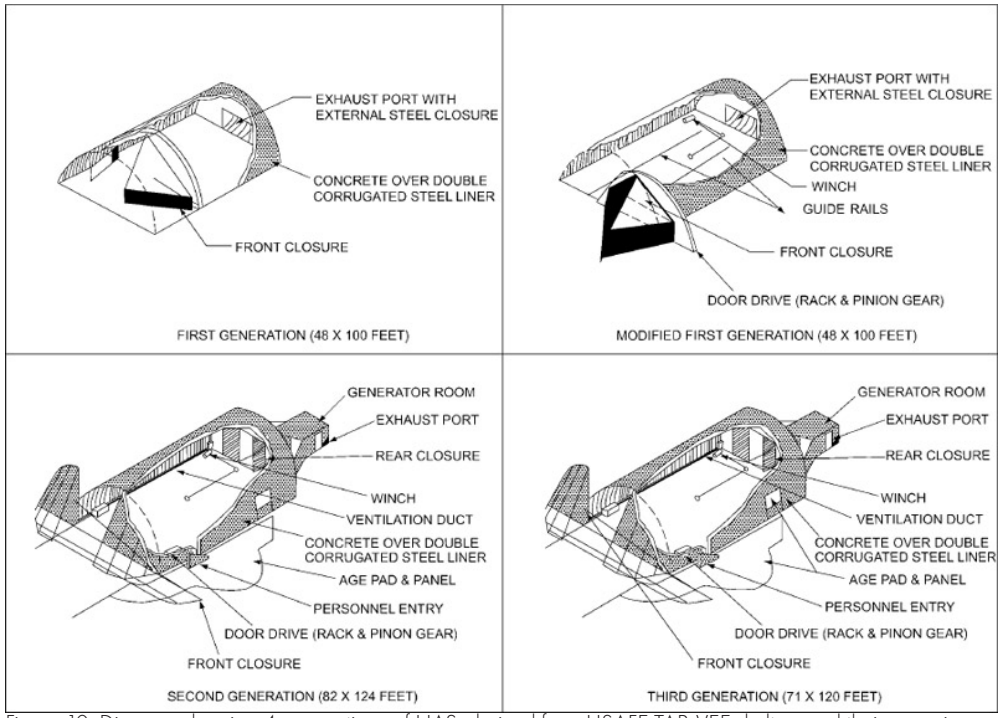


Figure 10: Diagram showing 4 generations of HAS, derived from USAFE TAB-VEE shelters and their genesis. (n.d)

2.2 Theoretical framework

2.2.3 Site analysis

The airbase lies between Zeist and Amersfoort and is bordered by the A28, N237, and N238. Today, the site functions as an ecological corridor. Other parts of the airbase are occupied by the National Military Museum, while Camp New Amsterdam remains in military use.

Despite its proximity to surrounding urban areas, the site remains relatively disconnected due to its former military function and limited accessibility. A strong contrast exists between the planted camouflage vegetation and the concrete military structures, creating a unique relationship between architecture and nature.

The sunlight analysis shows variation in the orientation of the shelters, while many are partially covered by trees, resulting in significant shadow conditions. These environmental characteristics can influence the suitability of future functions and interventions.



Figure 12: Diagram showing the connection of the airbase with the surrounding cities

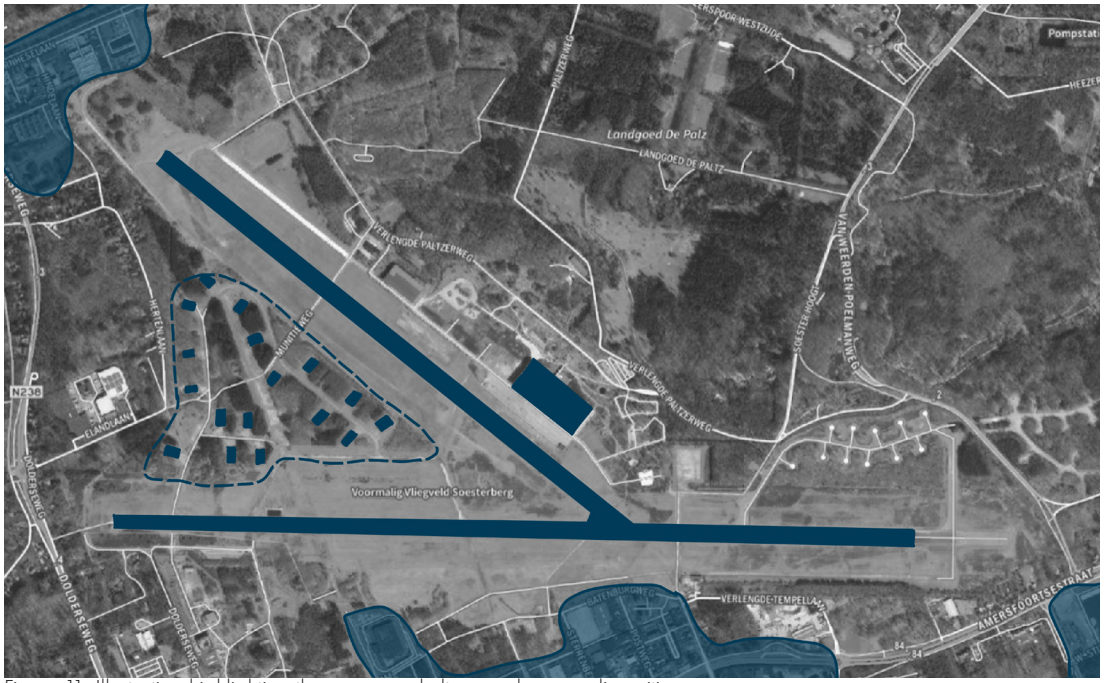


Figure 11: Illustration highlighting the runways, shelters, and surrounding cities



Figure 13: Photos giving an impression of the airbase

2.2 Theoretical framework

2.2.3 Site analysis

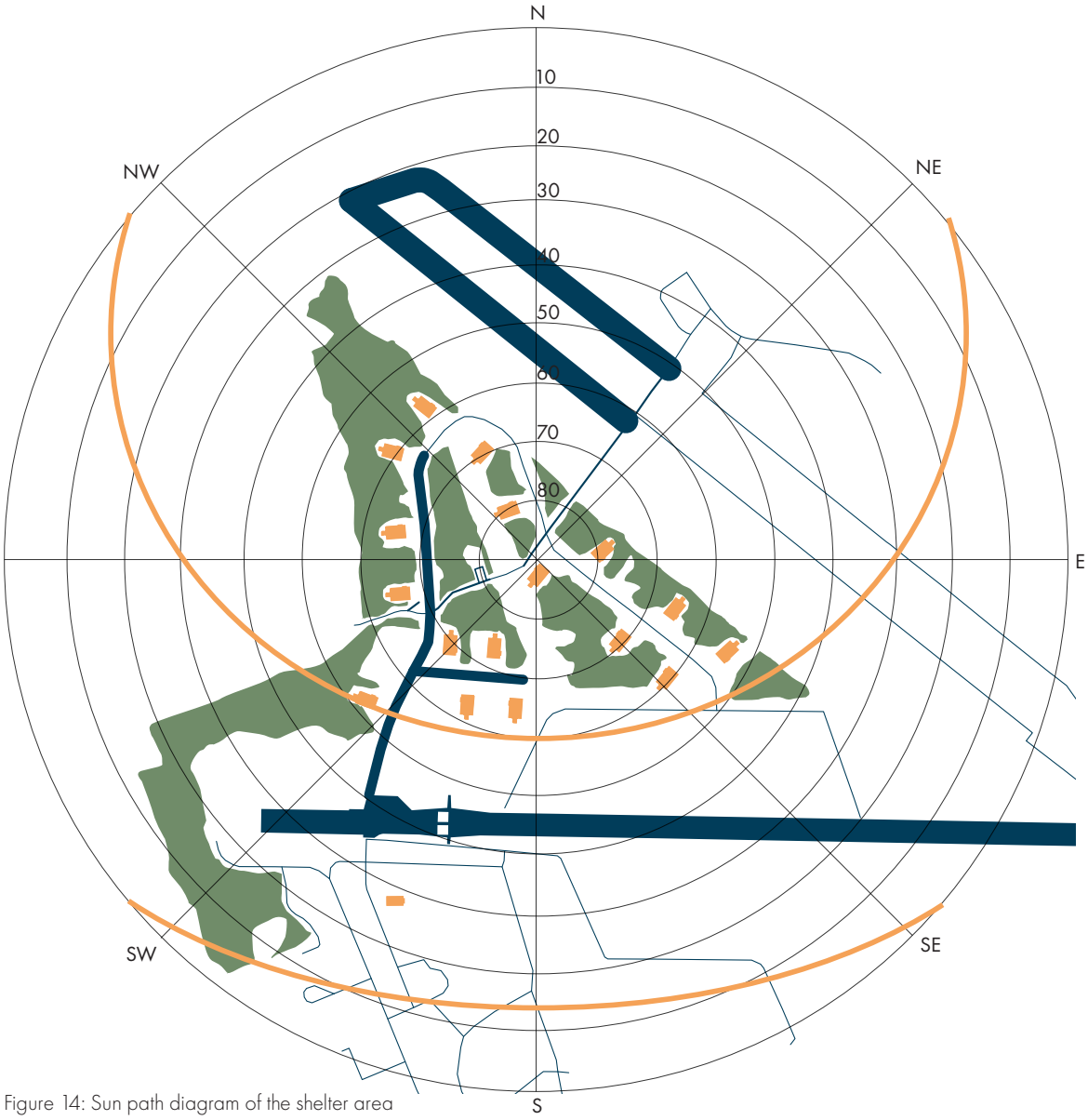


Figure 14: Sun path diagram of the shelter area



Figure 15: Overview of the orientation of the shelters

2.2 Theoretical framework

2.2.4 Value assessment

The value assessment combines existing studies with additional analyses based on multiple valuation methods. Van Emstede (2015) states that the purpose of a value assessment should be stated. The purpose of this value assessment is to define the criteria and parameters through which the transformation toolbox will be structured and evaluated.

The shelters are first analyzed using the ERM methodology, identifying elements of high, positive, and indifferent value. Because this approach insufficiently addresses intangible values and the overall ensemble, a second method based on Kuipers & De Jonge (2017) is used.

Ecological significance of the site, the rarity of the shelter ensemble, and the spatial qualities created through camouflage within the landscape. In addition, the site possesses strong intangible values related to memory, atmosphere, weathering, and the perception of Cold War heritage. These findings raise questions regarding the extent to which original materials and architectural characteristics should be preserved.

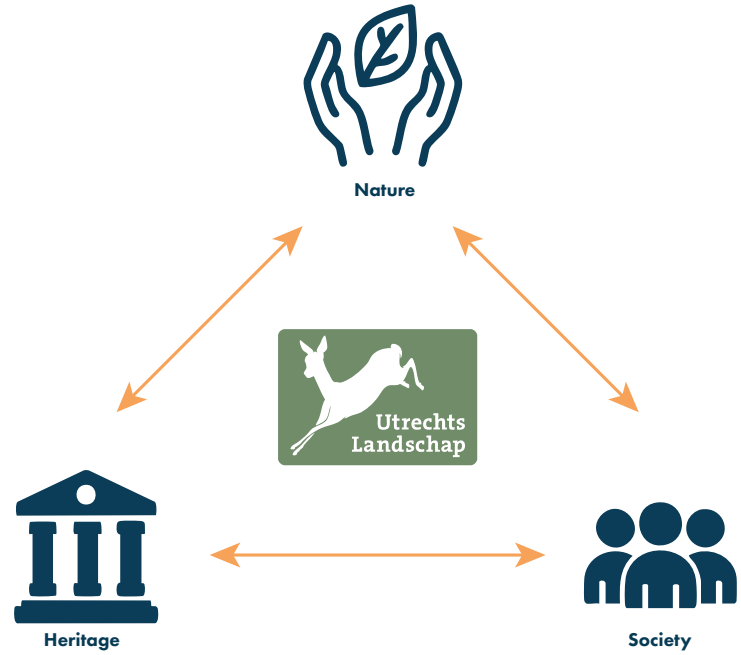
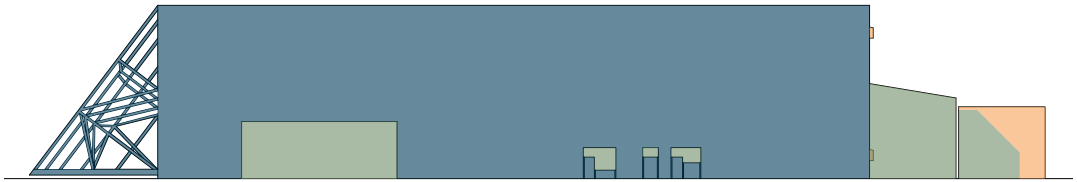


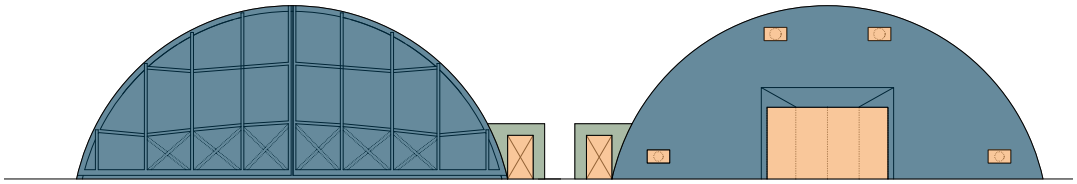
Figure 16: Diagram illustrating the main values of Utrechts Landschap

2.2 Theoretical framework

2.2.4 Value assessment

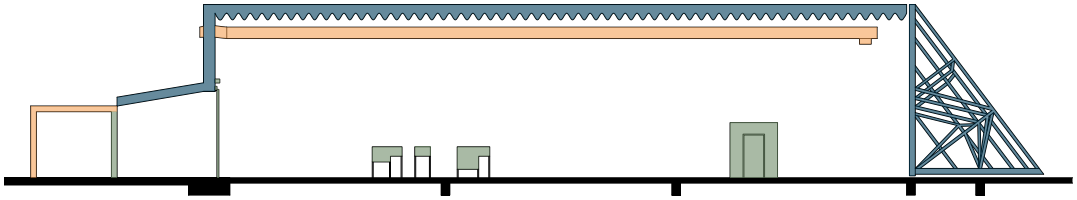


Sites containing HAS

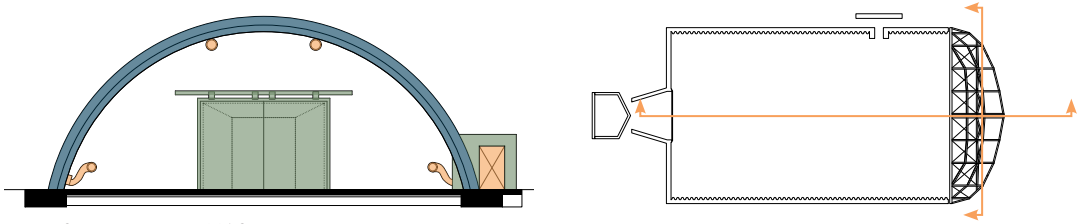


Sites containing HAS

Sites containing HAS



Sites containing HAS



Sites containing HAS

Figure 17: Value assessment according to the ERM method

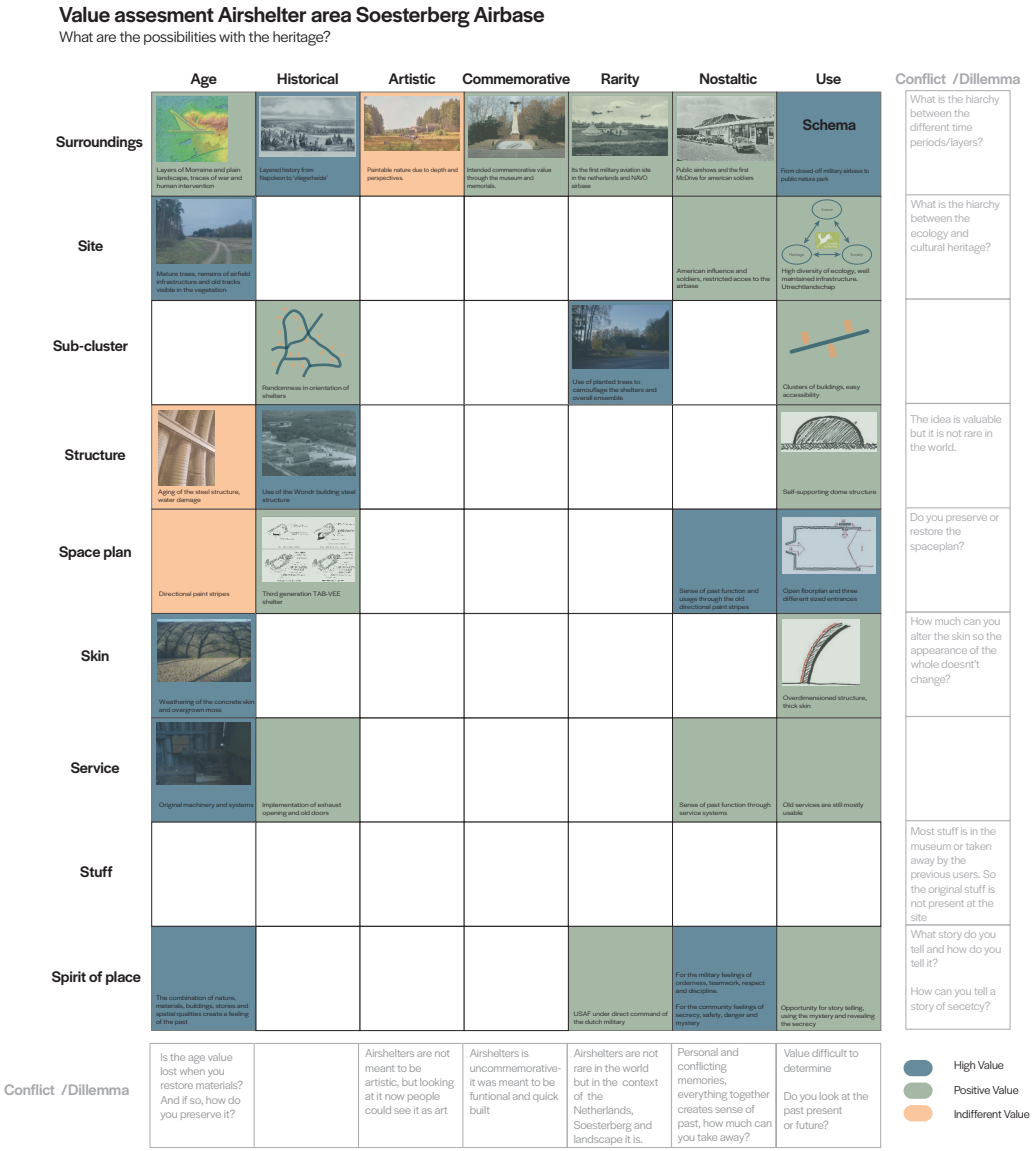


Figure 18: Value matrix of the soesterberg airbase

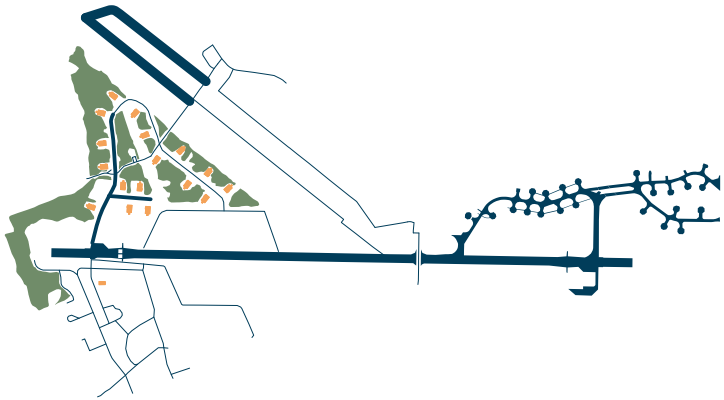
2.2 Theoretical framework

2.2.5 Spatial building typology

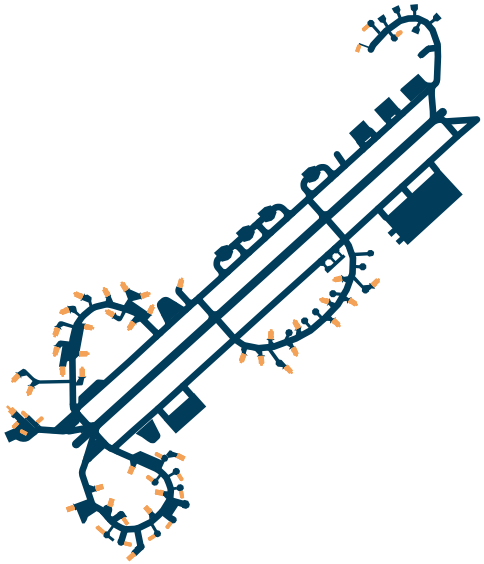
The shelters were designed for a highly specific military function that is difficult to directly adapt. Therefore, the research focuses on the spatial and architectural qualities of the shelters rather than their original function.
The typological analysis is conducted across six scales derived from the Richtlijnen Bouwhistorisch Onderzoek (Hendriks et al., 2009): the site, ensemble, building, spaces, elements, and components. This approach defines the characteristics that can guide future transformation strategies and functions for the HAS.

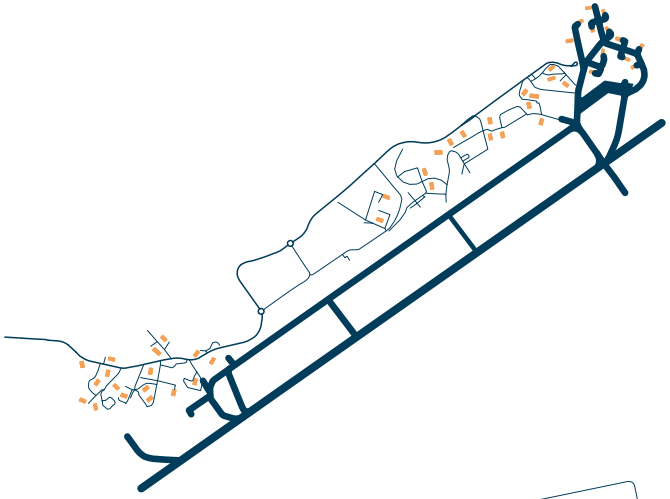
Site

Soesterberg
Country: Netherlands
Status: Nature reserve

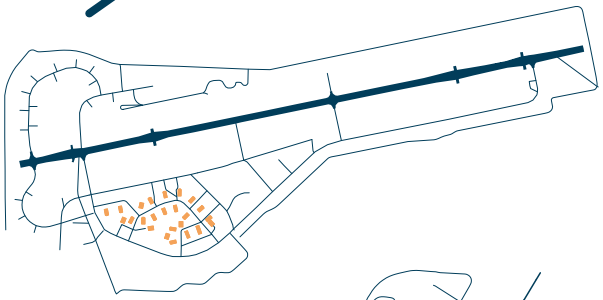


Aviano
Country: Italy
Status: Operational





Bitburg
Country: Germany
Status: Commercial airport



Erding
Country: Germany
Status: Under development

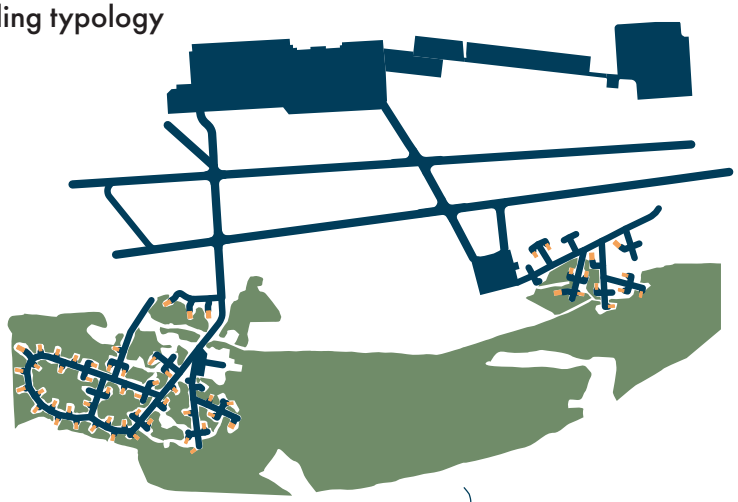


Hahn
Country: Germany
Status: Commercial airfield

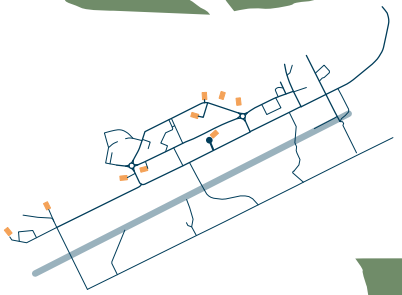
2.2 Theoretical framework

2.2.5 Spatial building typology

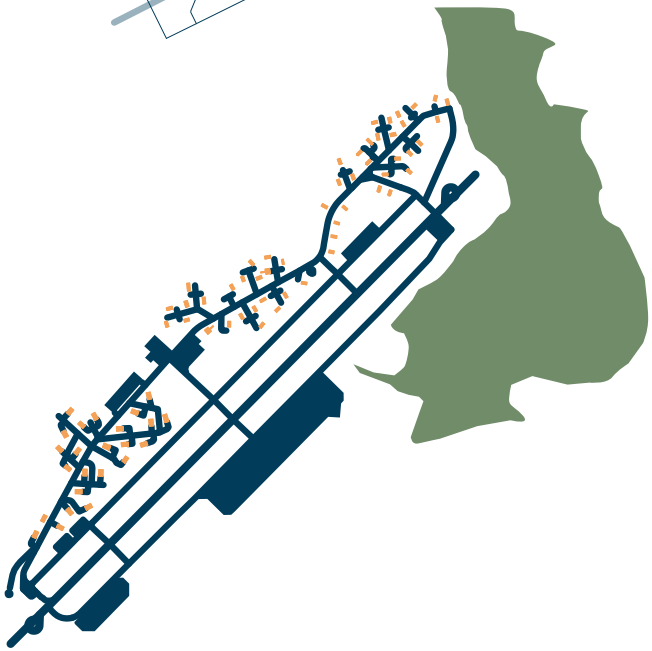
Ramstein
Country: Germany
Status: Active USAF



Sembach
Country: Germany
Status: Active US Army



Spangdahlen
Country: Germany
Status: Active USAF



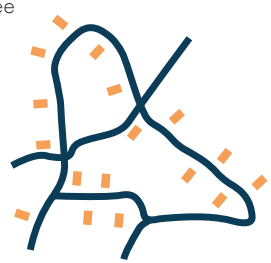


Zweibrücken
Country: Germany
Status: Commercial and Civil use

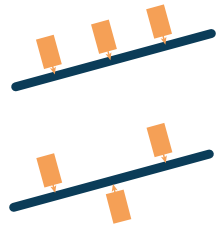
Ensemble



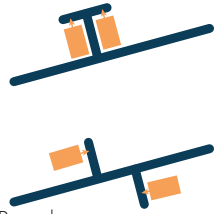
Tree



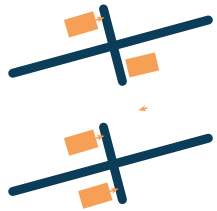
Organic



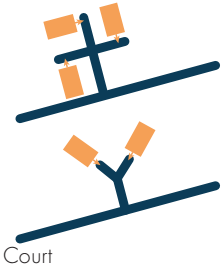
Street



Branch



Perpendicular

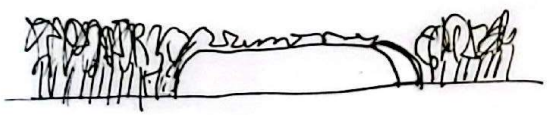


Court

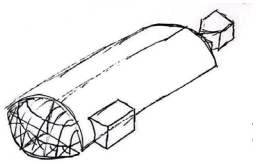
2.2 Theoretical framework

2.2.5 Spatial building typology

The building



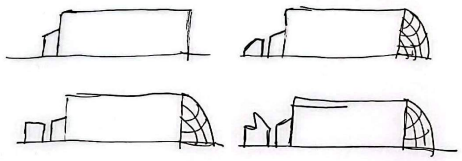
Hidden
- Camouflaged with threes and paint



Halfpipe
- Long tubular half pipe shape

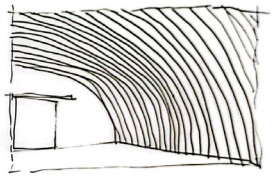


Hierarchy of volumes
- Large main volume, small side volume, stepped backside and sloped front

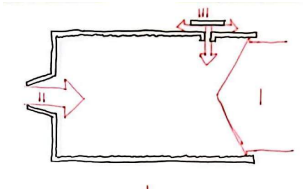


Anomalies
- Local adaptations and differences

The space



Ribbed dome
- Large tubular open volume covered by a ribbed dome structure



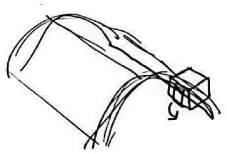
Entrances
- Hierarchy of three entrances, front, back and side



Curved walls
- Two straight walls and one large curved roof

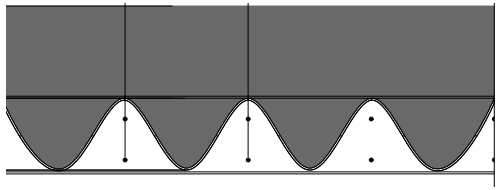
Elements







Doors
- Sliding and pivoting doors
- Different constructions

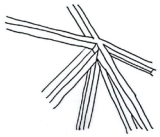


Walls
- Double corrugated steel panel, poured over with concrete, overgrown with moss

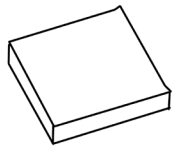
Components



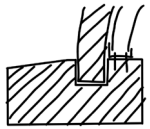
Wonder building steel
- Double corrugated
- Galvanized steel



Steel door structure
- HE 180 B



Concrete floor
- Concrete floor slab 28mm thick



Foundation beam
- Beam running around the edge ~ 200x100mm

2.2 Theoretical framework

2.2.6 Criteria

Bases on the theoretical framework, six criteria are established to evaluate the scenarios. The criteria are:

- Level & Method of intervention
- Public or private use?
- Occupancy
- Heritage & values
- Utrechts landschap vision
- Sustainability

Each criteria is further explained below



A) Level & method of intervention

The first criteria is about the level and method of intervention. This can be important to understand the scale of the scenario, the impact on the building and how much will be changed.



B) Public or private

The second criteria is about if the site and its program is public, semi-public, semi-private or private. This is interesting for the soesterberg started with a public function, turned into private and now public again.



C) Occupancy

The third criteria is occupancy. This is specifically important due to the fact that the site is a nature reserve. Furthermore its important for it will differ when people will be coming.



D) Heritage & values

The fourth criteria will be about how the various heritage values are changed. This is based on the 8 values proposed by Pereira Roders (Spoormans, et al., 2023)



E) Utrechts landschap

The fifth criteria is based on the three main pillars of Utrecht Landschap; Nature, Heritage and Society. The scenario will be evaluated on how much it aligns with those values.



F) Sustainability

The sixth criteria is sustainability. This revers to the broad definition of sustainability; environmental, social and economic.

Figure 19: Overview of the six selected criteria

2.2 Theoretical framework

2.2.7 Evaluation

The scenarios within the toolbox are evaluated using different methods based on the six criteria. Because the ensemble scenarios are less detailed, their evaluation stays more approximate

Intervention

The level of intervention is evaluated in two ways: by evaluating how much of the shelter is removed or added, and by identifying the method of intervention applied. These methods are derived from a study on church transformations by the Vlaams Bouwmeester (Ardui et al., 2023). Shelters share several spatial characteristics with churches, such as large open interiors, limited facilities, and the need for subdivision and climate control.
The ten intervention methods are:

- I Open up (openen)
- II Divide (opdelen)
- III Isolate (afzonderen)
- IV Add (toevoegen)
- V Remove (wegnemen)
- VI Integrate (integreren)
- VII Facilitate (faciliteren)
- VIII Access (ontsluiten)
- IX Activate (activeren)
- X Connect (verbinden)

Each method is illustrated through an example.

Public or private use

The scenarios are evaluated according to their level of accessibility and categorized as public, semi-public, semi-private, or private.

Occupancy

Occupancy is assessed through both frequency and duration of use. This includes how often a scenario is used, such as weekly, monthly, or seasonally, as well as the moments of occupation throughout the day.

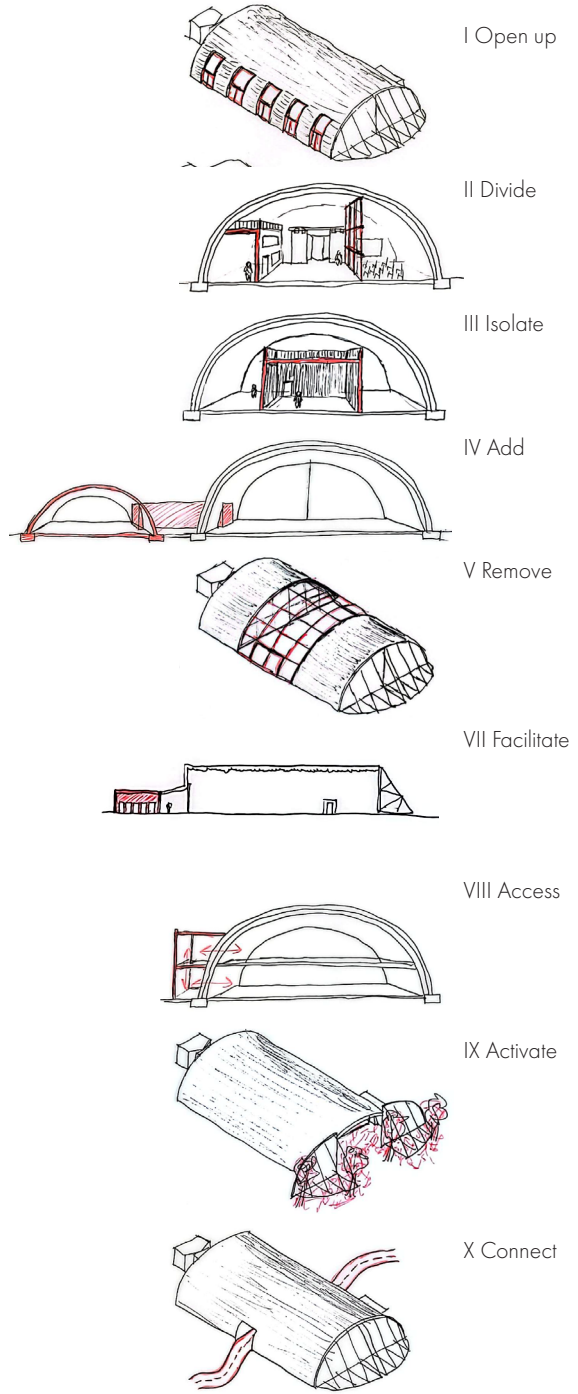


Figure 20: Overview of the ten levels of intervention applied on shelters

2.2 Theoretical framework

2.2.7 Evaluation

Heritage & Values

The impact on heritage values is evaluated using a rubric based on the eight values proposed by Pereira (Spoormans et al., 2023). The results are visualized through radar diagrams, allowing different scenarios to be compared.

Utrechts Landschap's values

The scenarios are additionally evaluated against the main ambitions of Utrechts Landschap. These evaluations are also represented in radar diagrams. The complete rubrics are included in the appendix.

Sustainability

Sustainability is evaluated using the wilderness-based checklist by Malcolm Wells from Daylighting for Sustainable Design (Guzowski, 2000). Because this assessment depends strongly on detailed design decisions, it is only applied to the developed architectural proposal.

Wilderness-based checklist:

- ☐ 1. Create pure air
- ☐ 2. Creates pure water
- ☐ 3. Stores rainwater
- ☐ 4. Produces its own food
- ☐ 5. Creates rich soil
- ☐ 6. Uses solar energy
- ☐ 7. Stores solar energy
- ☐ 8. Creates silence
- ☐ 9. Consumes its own wastes
- ☐ 10. Maintains itself
- ☐ 11. Matches nature's pace
- ☐ 12. Provides wildlife habitat
- ☐ 13. Provides human habitat
- ☐ 14. Moderates climate and weather
- ☐ 15. ... And is beautiful

Figure 21: Wilderness-based checklist derived from Daylighting for Sustainable Design (Guzowski, 2000)

Values:

Nature:	
1.	Animals (1 = decrease; 2 = no change; 3 = small increase; 4 = large increase)
2.	Plants (1 = decrease; 2 = no change; 3 = small increase; 4 = large increase)
3.	Attention (1 = decrease; 2 = no change; 3 = small increase; 4 = large increase)
Society:	
1.	Quality of life (1 = decrease; 2 = no change; 3 = small increase; 4 = large increase)
2.	Densification (1 = decrease; 2 = no change; 3 = small increase; 4 = large increase)
3.	Social and active (1 = decrease; 2 = no change; 3 = small increase; 4 = large increase)
4.	Climate & energy (1 = decrease; 2 = no change; 3 = small increase; 4 = large increase)
Heritage:	
1.	Average of Heritage (1 = decrease; 2 = no change; 3 = small increase; 4 = large increase)
2.	Scientific (1 = decrease; 2 = no change; 3 = small increase; 4 = large increase)
3.	Historic (1 = decrease; 2 = no change; 3 = small increase; 4 = large increase)
4.	Political (1 = decrease; 2 = no change; 3 = small increase; 4 = large increase)
5.	Economic (1 = decrease; 2 = no change; 3 = small increase; 4 = large increase)
6.	Social (1 = decrease; 2 = no change; 3 = small increase; 4 = large increase)
7.	Age (1 = decrease; 2 = no change; 3 = small increase; 4 = large increase)
8.	Aesthetical (1 = decrease; 2 = no change; 3 = small increase; 4 = large increase)

Figure 22: Rubric showing the evaluation method Utrechts Landschap's values

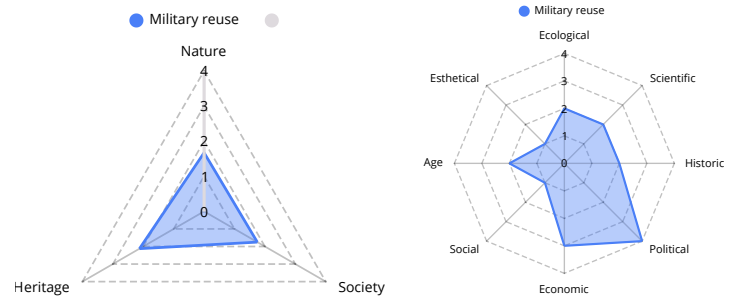


Figure 23: Radar graphs representing the results of the evaluation of heritage values and Utrechts Landschap's values

2.2 Theoretical framework

2.2.7 Strategies

There are several approaches to the adaptive reuse of existing buildings. Utrechts Landschap currently applies two strategies at Soesterberg Air Base: conservation through abstinence and conservation through development.

To further define these approaches and generate a broader range of transformation scenarios, additional literature is used, including the ten strategies proposed by Petzet in ´Reduce, Reuse, Recycle: Architecture as Resource´ (Petzet & Heilmeyer, 2012) which are shown on the right. These strategies provide a framework for categorizing different forms of intervention and reuse.

The conservation through abstinence approach of Utrechts Landschap aligns with the Reduce category, especially the strategy of changing perception and behavior. However, the proposed design scenarios do not necessarily correspond to a single strategy. Multiple strategies can align with one intervention. For example, curated decay may combine a change in perception with subtraction when selective demolition is applied.

Reduce

Perception: perceive, recognize, represent, document, analyze, explore, compare, collect, discuss, inform, publish, sensitive, reevaluate

Maintenance: clean, care, improve, patch, seal, cure, prepare, repair

Behavior: challange, standards, alter conduct, adapt for comfort, flexible use, zone creation

Reuse

Renovation: renew, replace, exchange, restore, rebuild

Conversion: reprogram, convert, reorganize, rededicate, adapt, transform, remodel

Infill: fill, insert, fit, embed, install, connect, close, implant

Redesign: reformulate, reshape, rewrite, interpret, tune, tweak

Subtraction: reduce, downsize, dismantle, remove, differentiate, lower, shear, demolish

Additions: raise, lengthen, complement, attach, expand, continue, enlarge, append

Recycle

Material recycling: transform, use of spolia, recycle, reprocess, transplant, reassemble

Gestalt Recycling: Adapt, cast, imitate, reproduce/copy, emulate, adopt, reuse vocabulary, carry over / transfer, reproduce, reconstruct

Figure 24: Overview of transformation strategies derived from Reduce, Reuse, Recycle: Architecture as Resource (Petzet & Heilmeyer, 2012)

Part 3. Results

What scenarios fit the context? How can such a scenario be evaluated? What are the effects and consequences of the scenarios?

Part 3. Results

3.1 Research results

This chapter presents the results of the research and addresses sub-questions 3, 4, and 5. The chapter begins by exploring which functions are compatible with the context of Soesterberg Air Base. Based on this exploration, six ensemble scenarios are developed.

Following this, twelve shelter scenarios are proposed, forming the basis of the transformation toolbox. These scenarios investigate different intervention strategies, functions, and spatial approaches at the scale of the individual HAS.

One of the shelter scenarios is then further developed into a detailed architectural design proposal. This design, functions as a test case through which the usability and effectiveness of the toolbox is explored and evaluated. Several aspects, including atmosphere, construction, climate concept, and materiality, are further researched and integrated into the final proposal.

Lastly, the ensemble scenarios, shelter scenarios, and architectural design are evaluated in order to assess their impact, opportunities, and consequences for the heritage values, ecological qualities, and transformation potential of the

3.2 Functions

First of all the function should align with one of the three values of Utrechts Landschap: Nature, Heritage & Society. Starting with an exploration of these directions, a selection of possibilities is created.

Another important consideration is the accessibility of the site. Soesterberg Air Base is relatively difficult to access on foot and is currently oriented more towards bicycles and vehicles. Therefore, the proposed functions must respond to the existing infrastructure and accessibility conditions of the area.

In addition, the current uses of shelters are analyzed alongside examples from other airbases. Based on this research, six ensemble scenarios are developed:

- Ruin park
- Military reuse
- Cemetery
- Residential district
- Cultural area
- Olympic village

Each scenario occupies a certain part of the site enabling the possibility to combine the scenarios. Next to that 12 shelter scenarios are designed inspired by the ensemble scenarios and the transformation strategies.

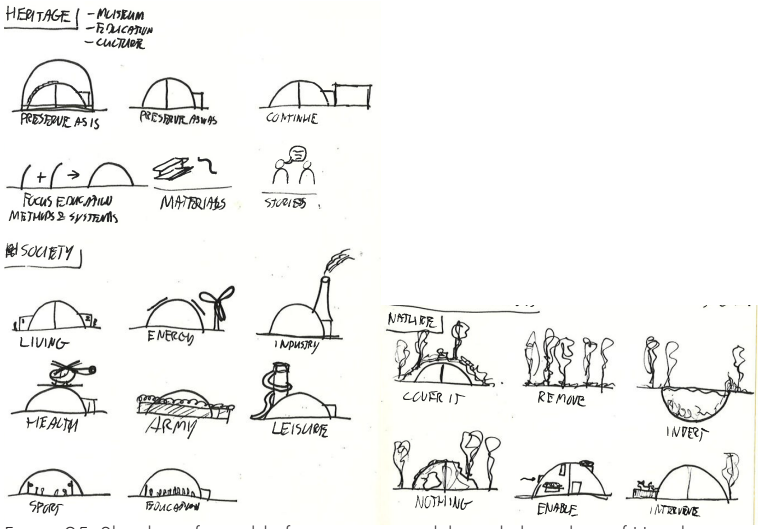
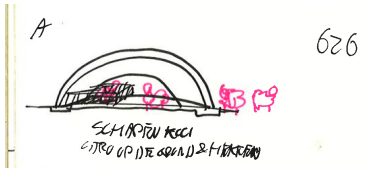
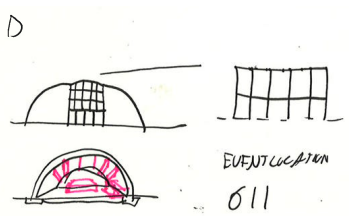


Figure 25: Sketches of possible functions inspired through the values of Utrechts Landschap

Sheepfold



Event space



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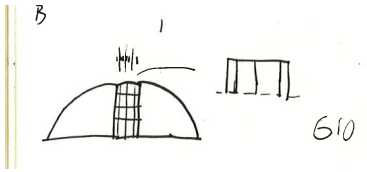
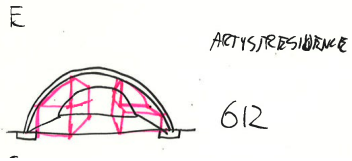
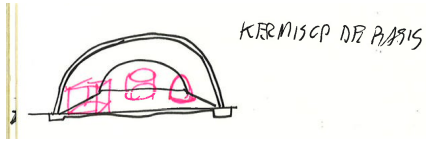


Artist residence



Funfair at the basis



Storage



Art exhibition



Office

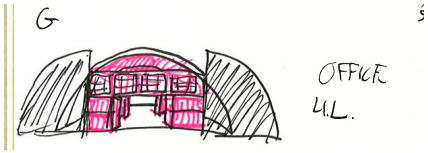


Figure 26: Overview of existing functions at the Soesterberg airbase



Figure 28: Image of refugee housing within an HAS derived from Süddeutsche.de (Fischer, 2016)

3.3 Ensemble scenarios

3.3.1 Ruins park | Perception & behavior

This scenario is centered on the aging and decay of the shelters. The shelters slowly turn into ruins showing the power of nature. The site will be a public park and have some additional functions like a petting zoo



Figure 29: Sketches of a ruined shelter



Figure 30: Image showing the atmosphere of a ruin (Moon, 2023)



Figure 31: Image of St Dunstan in the East Church Garden

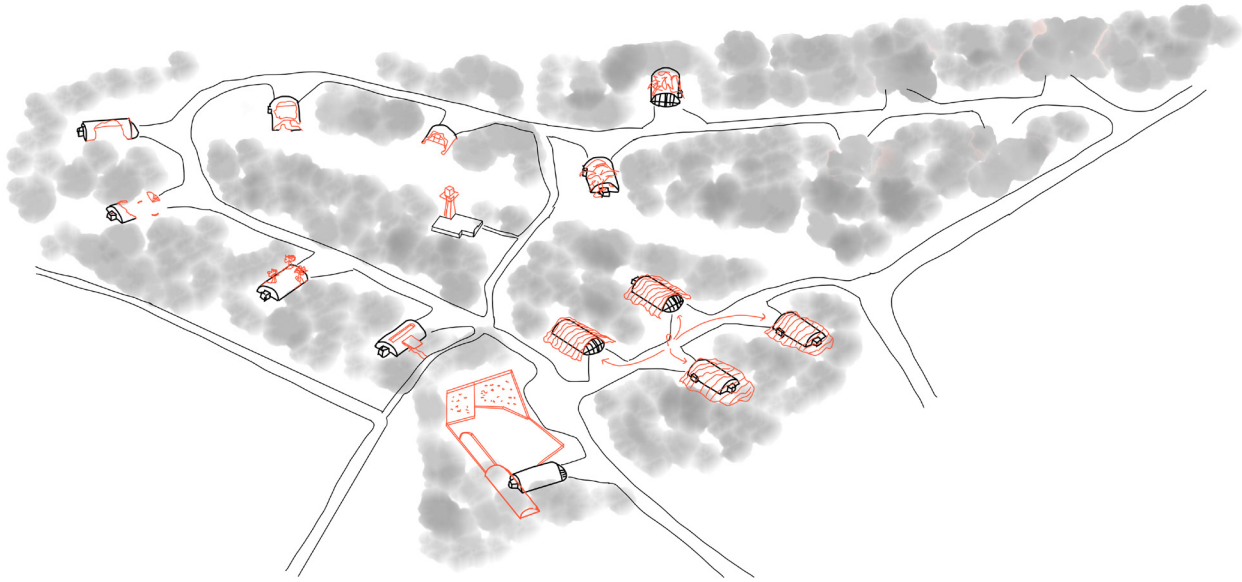


Figure 32: Site plan of the curated decay scenario

3.3 Ensemble scenarios

3.3.2 Military reuse | Maintenance & renovation

This scenario reuses the shelters in their original way, restoring the old runway. It could even be further developed with housing and or training facilities



Figure 33: Aerial view of Spangdahlem Airbase



Figure 34: Shelter in use at Spangdahlem airbase (Airplane Spangdahlem Airbase, 2025)

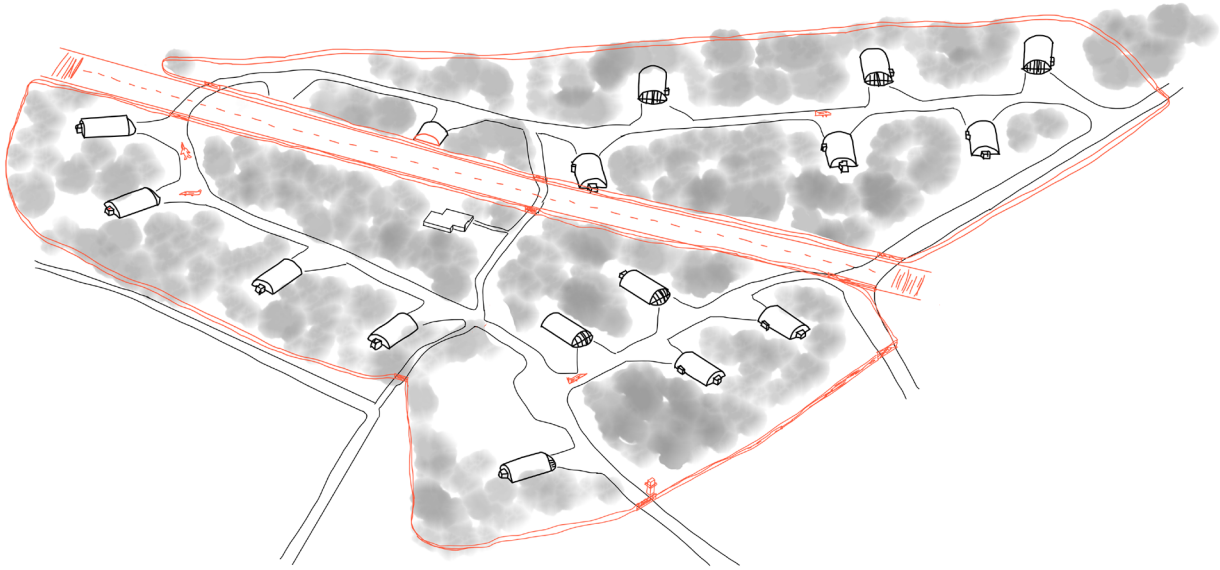


Figure 35: Site plan for the military reuse scenario

3.3 Ensemble scenarios

3.3.3 Cemetery | Perception & infill

The area is used as a natural burial cemetery using the shelters for ceremonies, as a columbarium or as storage. This can perfectly be combined with a ruined park creating a transcendental atmosphere.



Figure 36: Ceremonial room Koningsakker (Begraafplaatsen in Nederland | LOB, n.d.)

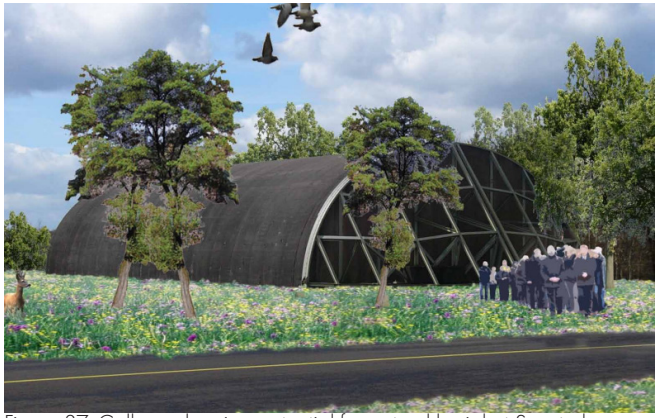


Figure 37: Collage showing potential for natural burial at Soesterberg (Vollmers & Partners et al., 2011)

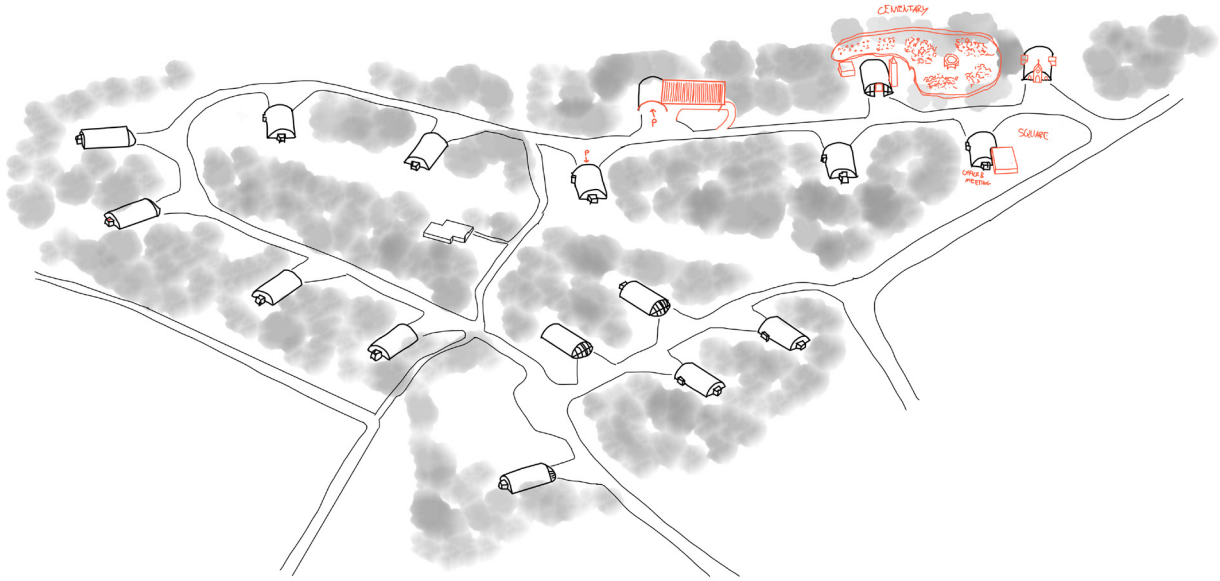


Figure 38: Site plan for the natural cemetery scenario

3.3 Ensemble scenarios

3.3.4 Residential district | Conversion

The shelters are turned into studios, urban villas and terraced houses. It can also be combined with the planned housing project on the airbase combining public services like a supermarket and or school.



Figure 39: Proposed housing project 'Wonen op de Vliegbasis' (De Vliegbasis, 2026)



Figure 40: Example of quonset house (Admin & Admin, 2024)

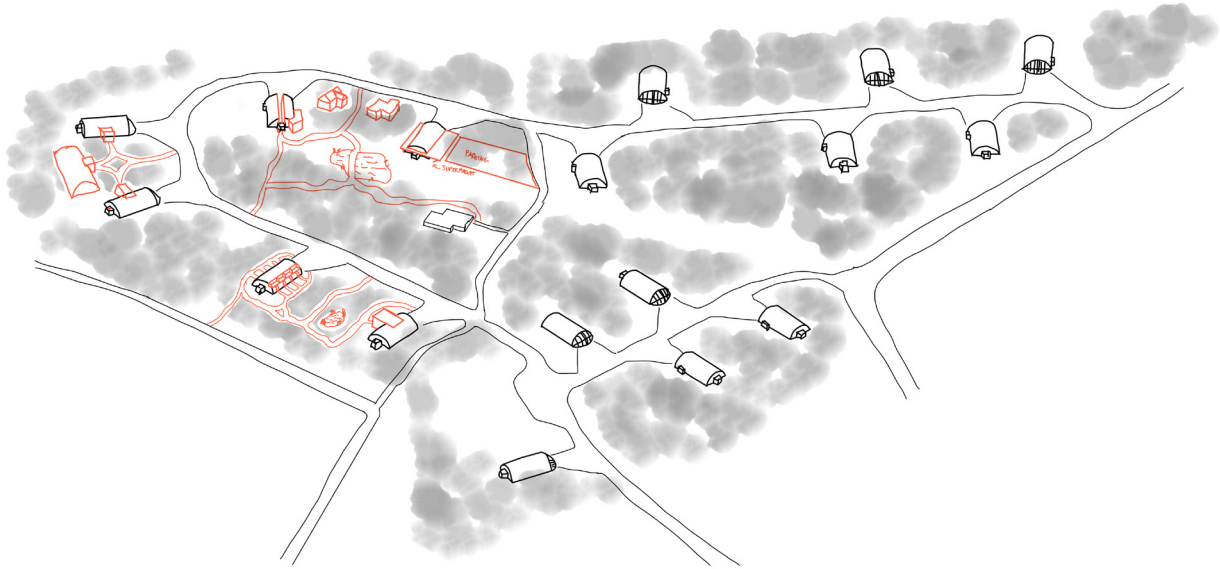


Figure 41: Site plan of the residential district scenario

3.3 Ensemble scenarios

3.3.5 Cultural area | Conversion & Addition

This scenario creates a festival area next to the shelters and turns other shelters in exhibition areas and museums. Enabling a connection with the existing museum and thematic events.



Figure 42: Event at the airbase (Event inspiration, 2024)



Figure 43: Event in a shelter (Verhuurmogelijkheden - Utrechts Landschap, n.d.)

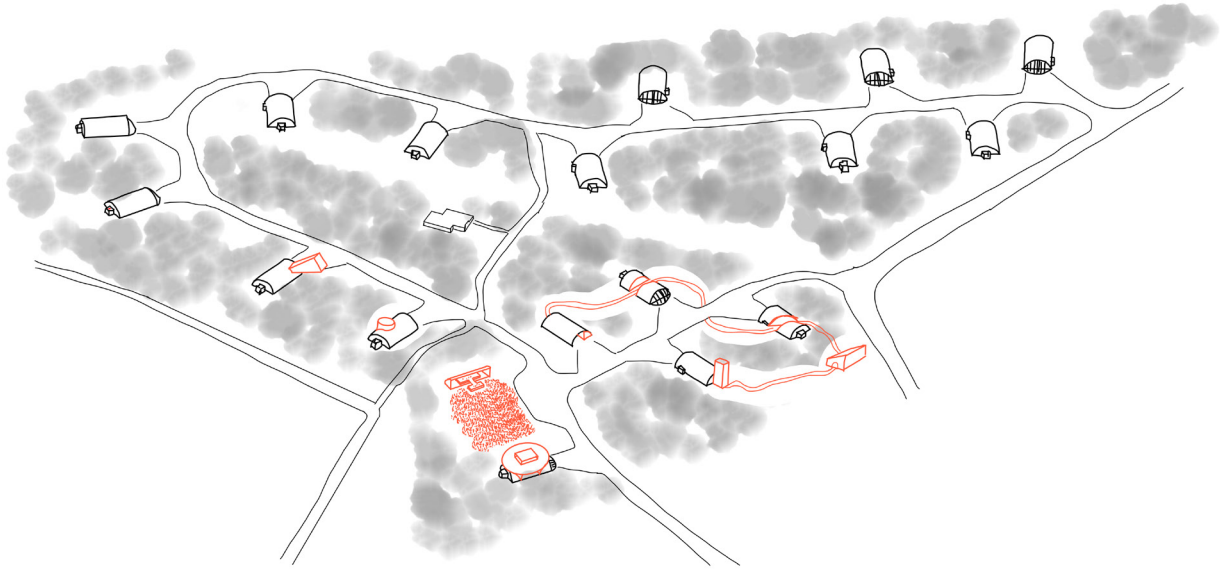


Figure 44: Site plan for the cultural area scenario

3.3 Ensemble scenarios

3.3.6 Olympic village| Conversion & Redesign

The shelters are turned into sport facilities and in the forest other sport facilities are realized. The secluded site is a pro and it could also function as a sport hub for the surrounding villages.



Figure 45: Sketch KNVB Campus (Verheij, 2017)



Figure 46: Reference image sport facility (Ventosa, 2026)

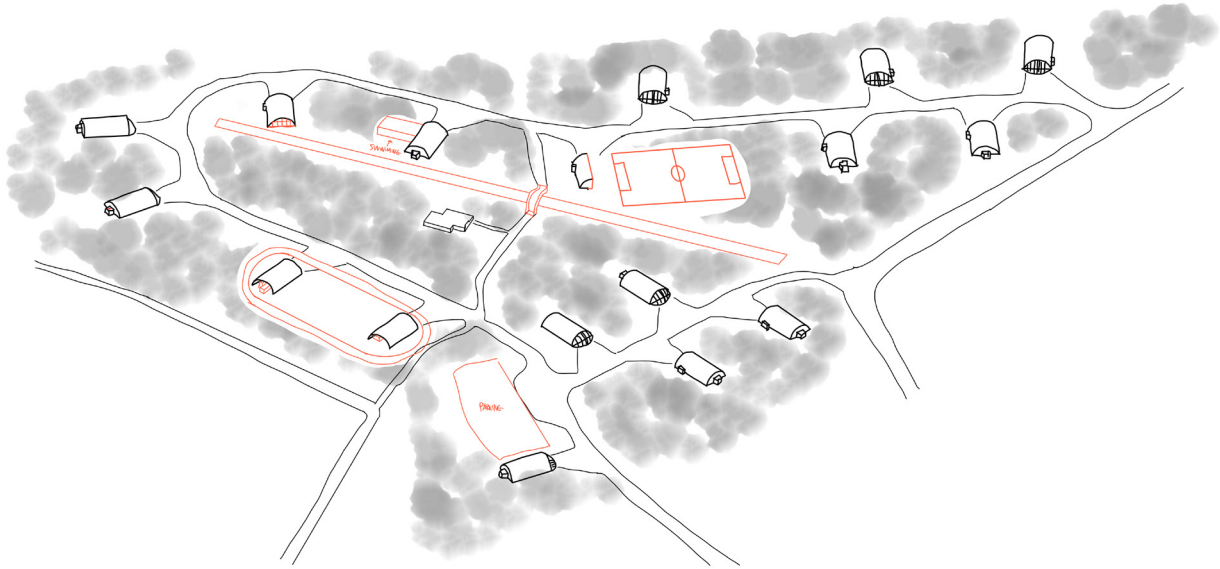


Figure 47: Site plan of the olympic village scenario

3.4 Shelter scenarios

3.4.1 Memorial | Perception & Subtraction

This scenario creates a memorial by removing the whole shelter and only keeping its footprint. Resulting in an open space for gathering and memorials.

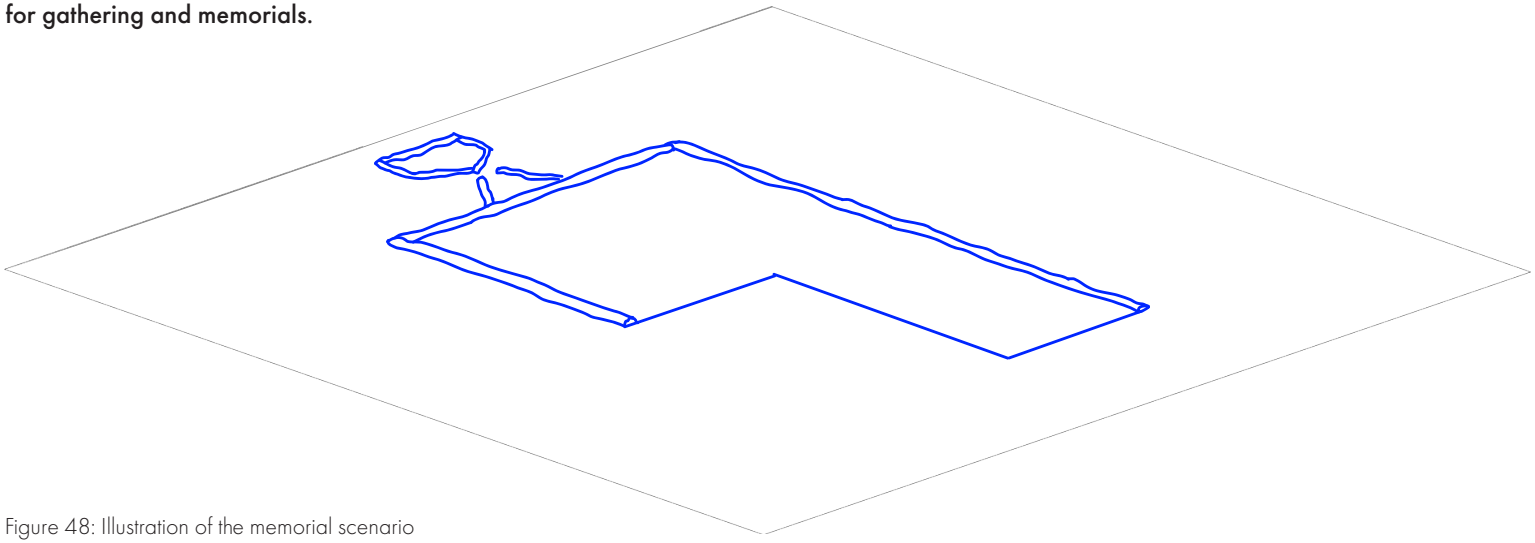


Figure 48: Illustration of the memorial scenario

3.4.2 Military | Maintenance & Renovation

This scenario reuses the shelters in its original function by sheltering airplanes.

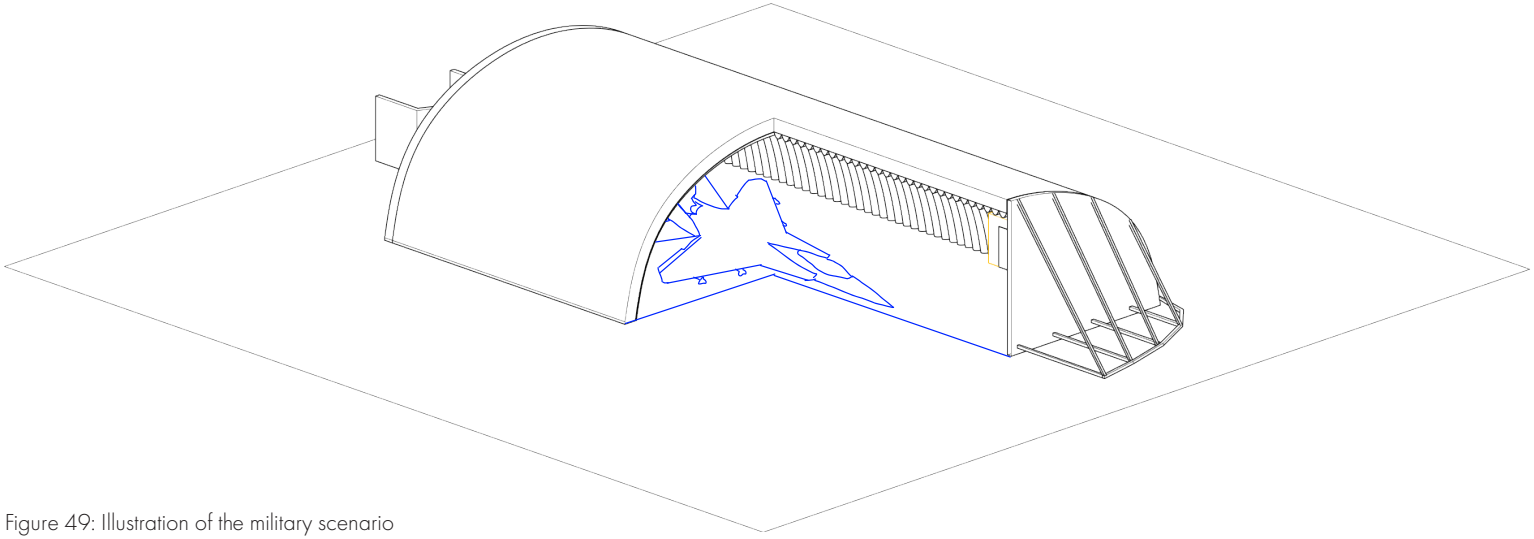


Figure 49: Illustration of the military scenario

3.4 Shelter scenarios

3.4.3 Animal shelter | Behavior & Subtraction

This scenario closes the shelters and creates space for animals as well as an adjusted shell to enable plant growth.

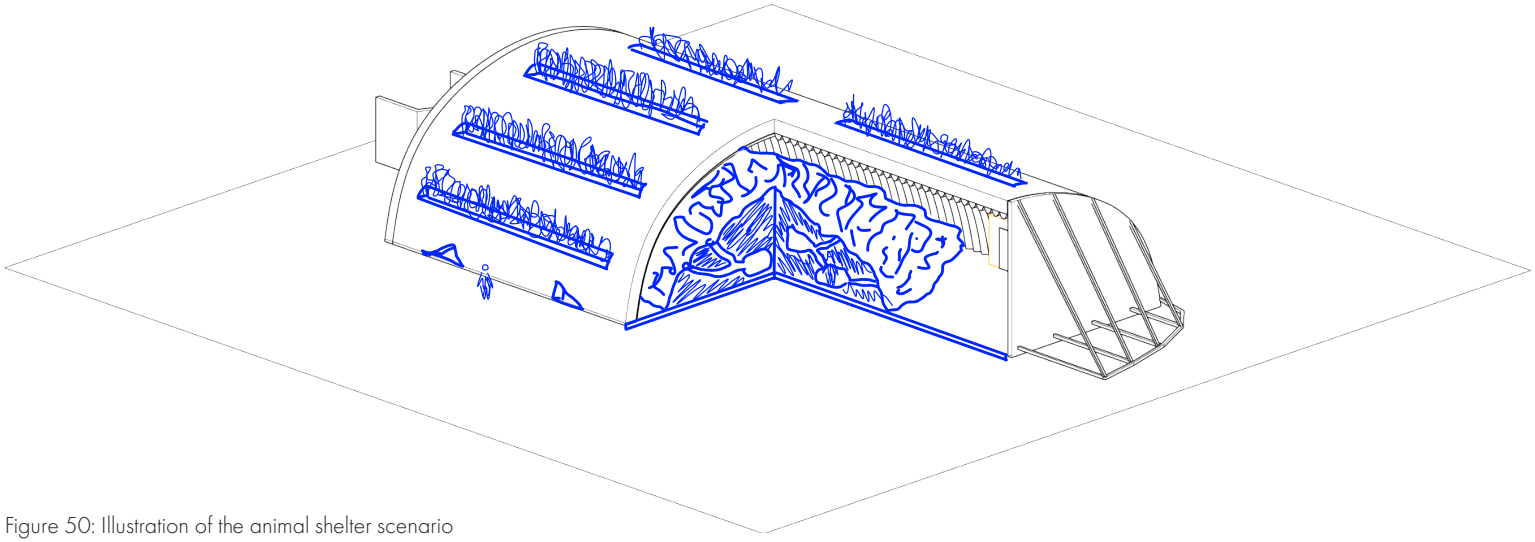


Figure 50: Illustration of the animal shelter scenario

3.4.4 Shroom farm | Behavior & conversion

For this scenario the shelter has been converted into a mushroom farm. The darkness and inside atmosphere of the shelter is ideal for mushroom agriculture.

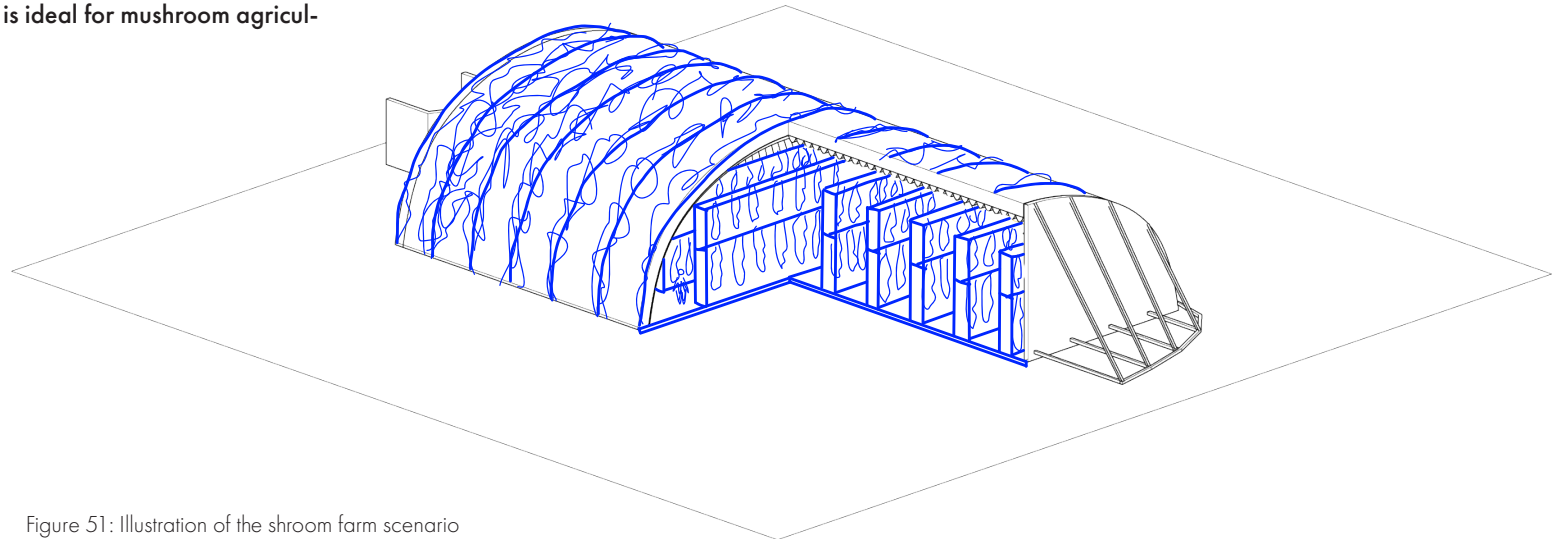


Figure 51: Illustration of the shroom farm scenario

3.4 Shelter scenarios

3.4.5 Chapel | Behavior & conversion

This scenario enhances the special spatial qualities inside of the shelter creating a sacral ceremonial space

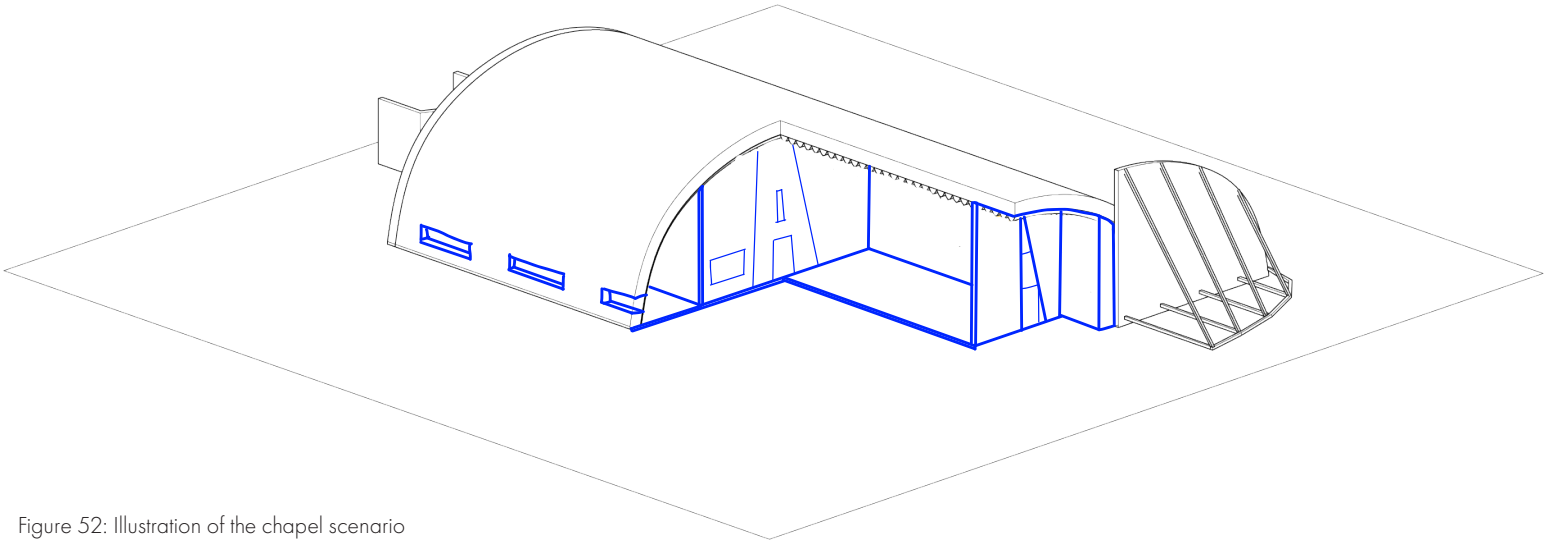


Figure 52: Illustration of the chapel scenario

3.4.6 Columbarium| Conversion & Subtraction

This scenarios opens the sides of the shelter and turns it into a canopy. Creating a covered area connected to the nature around it ideal for a columbarium

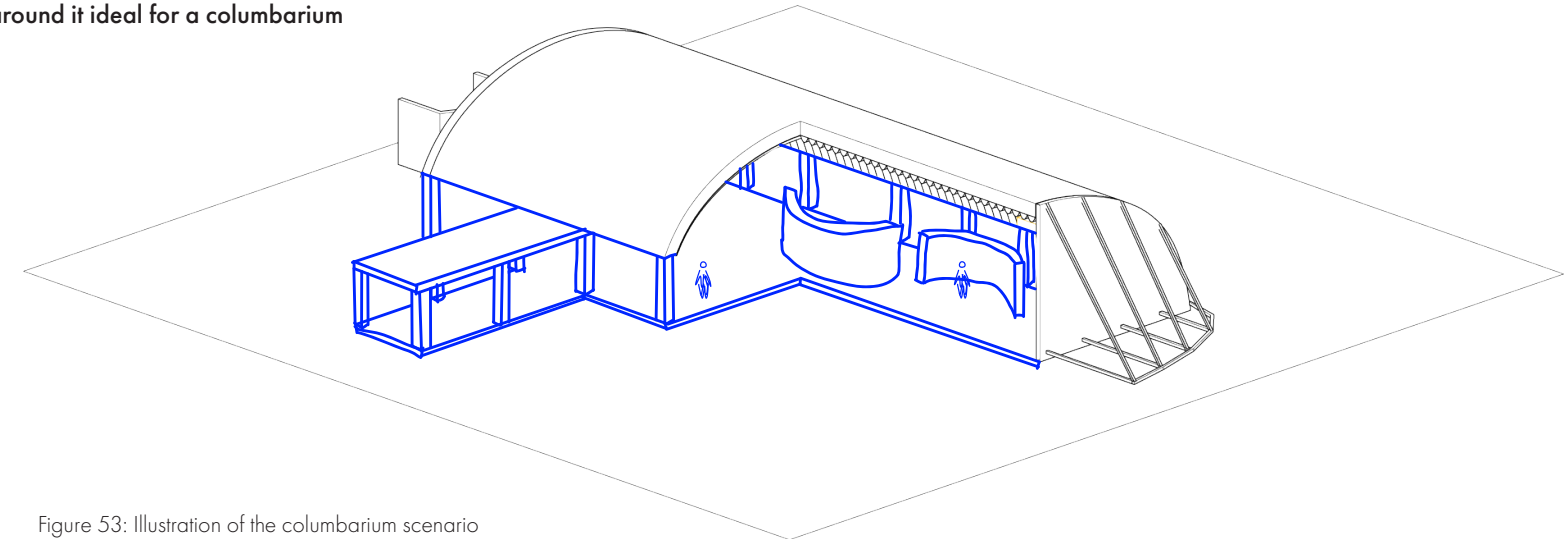


Figure 53: Illustration of the columbarium scenario

3.4 Shelter scenarios

3.4.7 Food hall | Conversion & Subtraction

By opening the roof and placing street like food stalls a food hall can be created in the shelter.

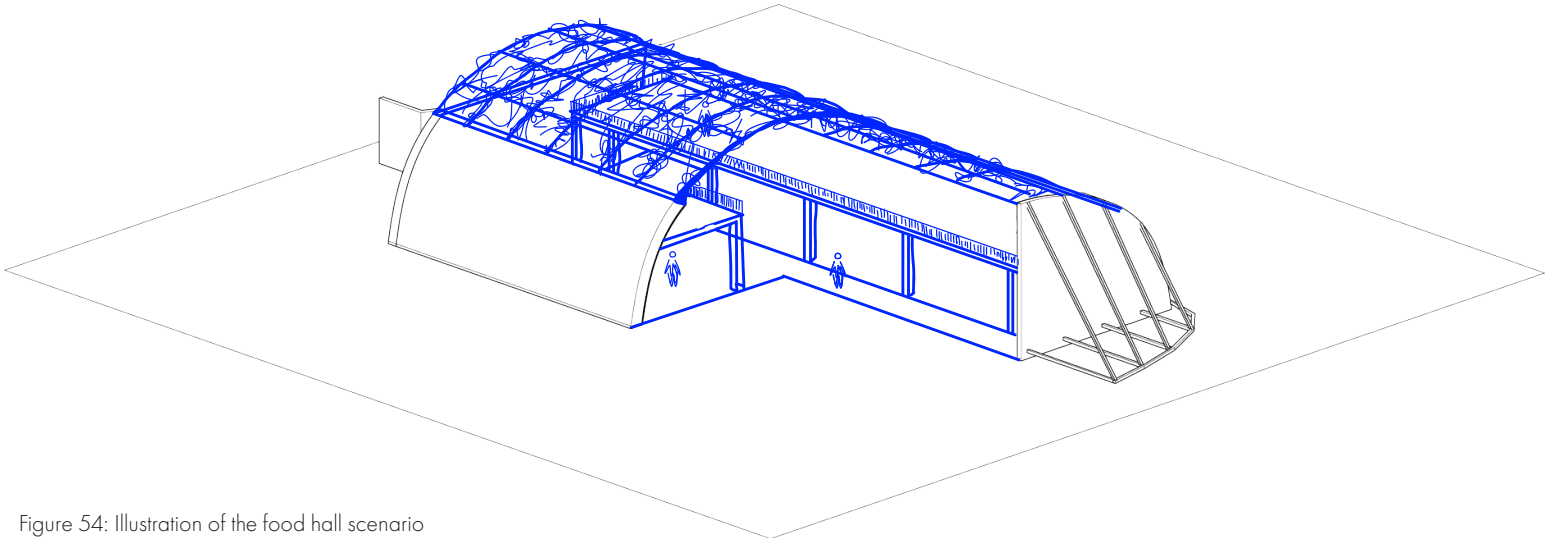


Figure 54: Illustration of the food hall scenario

3.4.8 Swimming pool| Conversion & Addition

The original Wonder Building structure was often used for swimming halls.
This scenarios converts the shelter into an Olympic swimming pool.

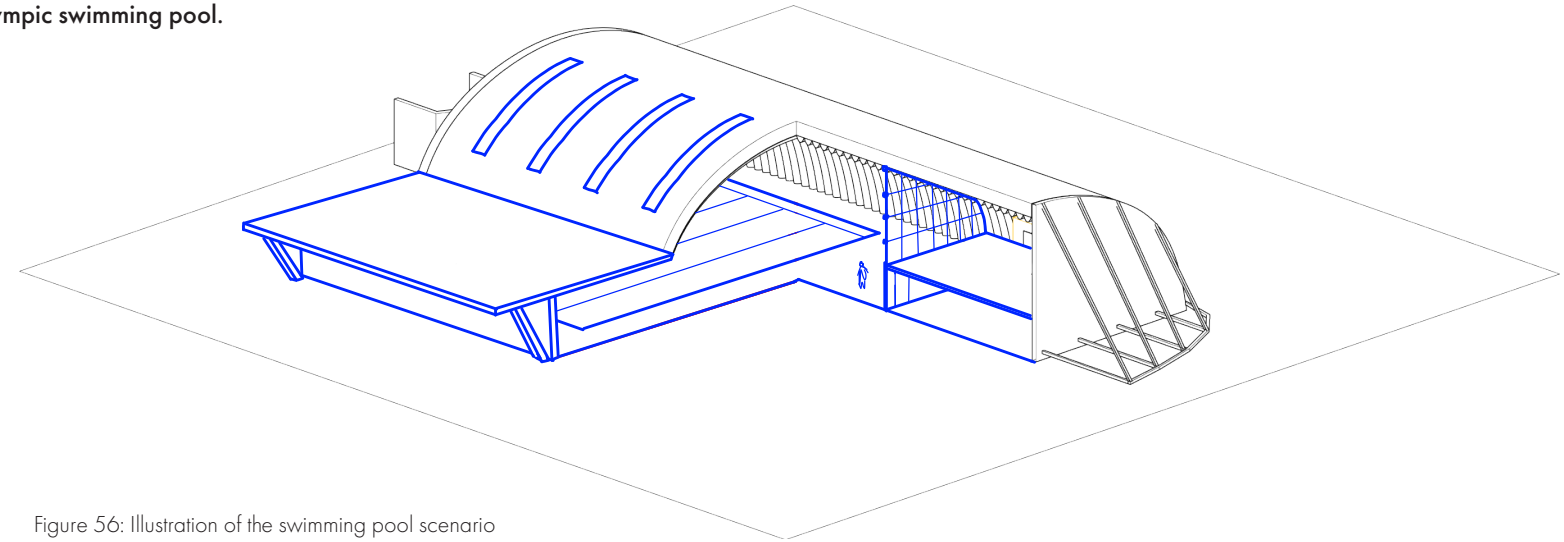


Figure 56: Illustration of the swimming pool scenario

3.4 Shelter scenarios

3.4.9 School| Redesign & subtraction

This scenario puts a school within this shelter and removes slices from the shelter creating a good connection with the nature as well as some flexible covered outside space.

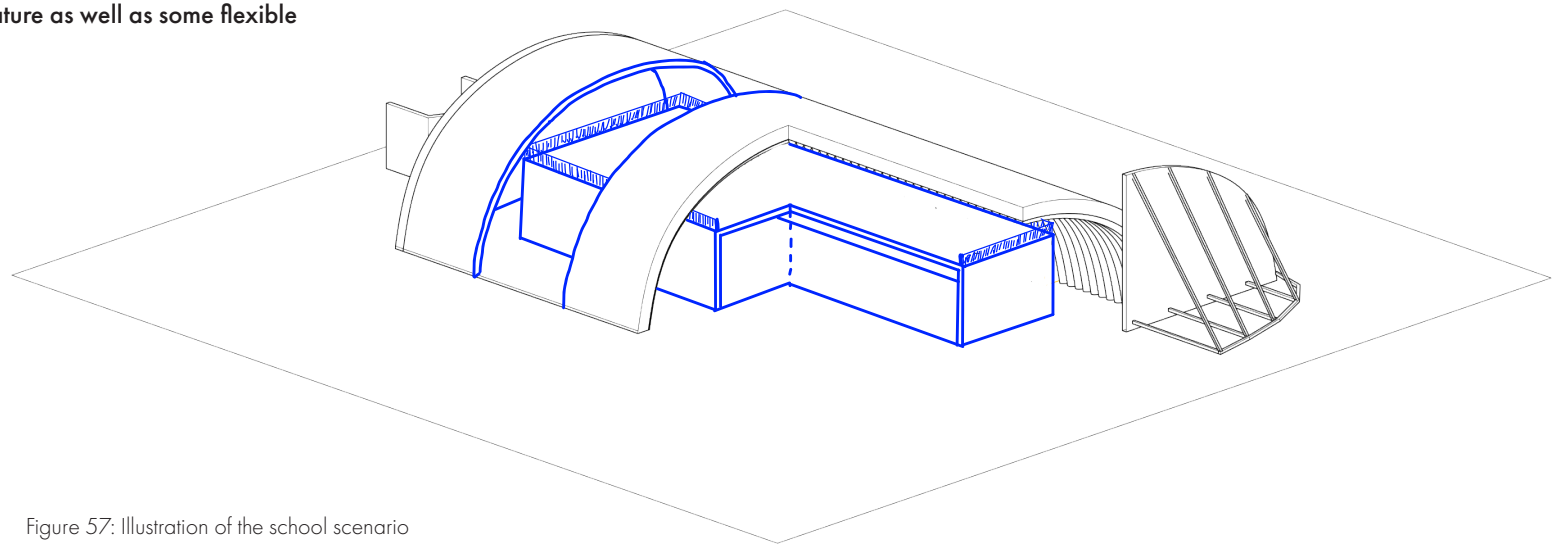


Figure 57: Illustration of the school scenario

3.4.10 Housing| Redesign & subtraction

This scenario creates 8 houses with a floor area of 120m2. Due to the sloped roof enough light and air can get into the homes.

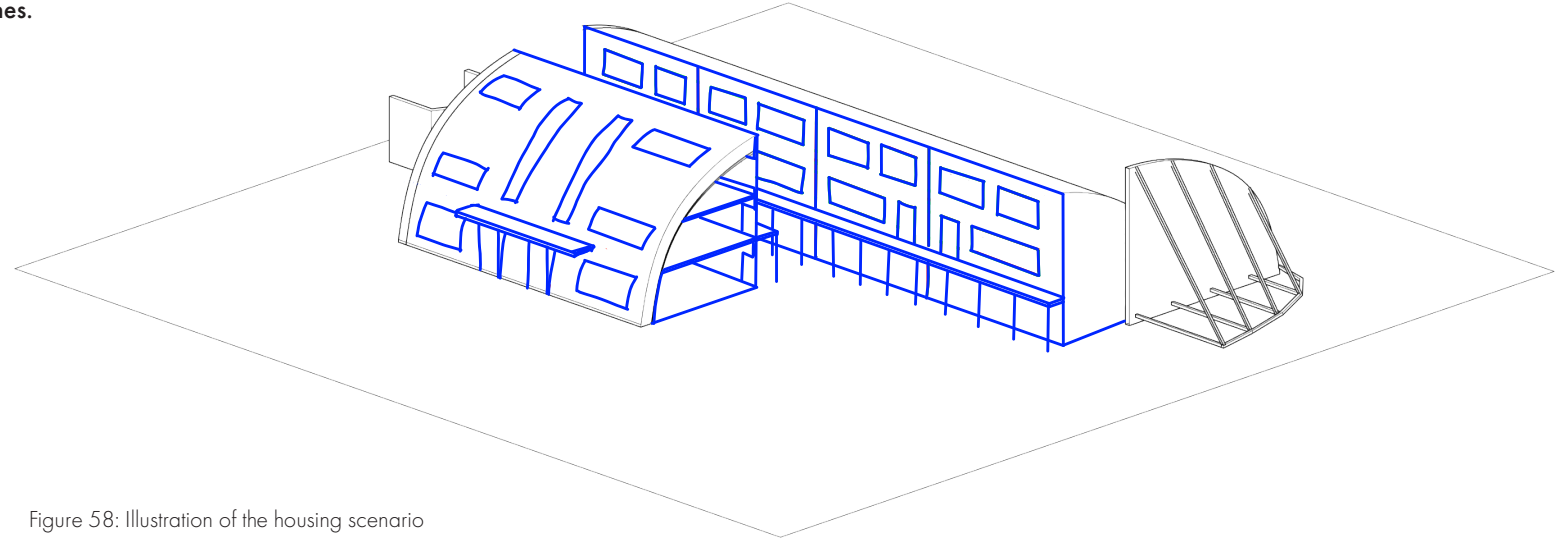


Figure 58: Illustration of the housing scenario

3.4 Shelter scenarios

XI

3.4.11 Event ruin| Infill & subtraction

This scenario begins with the creation of a ruin after which the remaining ruin will be filled in with a separate structure.

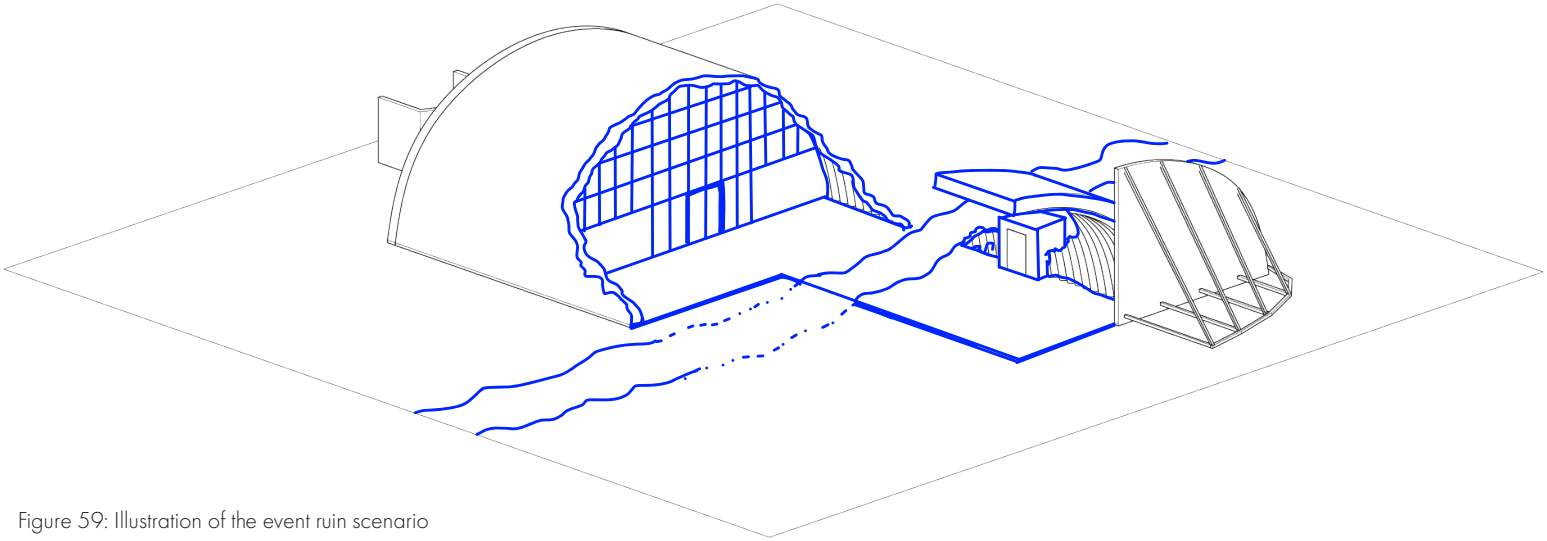


Figure 59: Illustration of the event ruin scenario

XII

3.4.12 Restaurant| Gestalt recycling

In this scenario a large part of the shelter is removed and replaced with a contemporary redesign in glass.

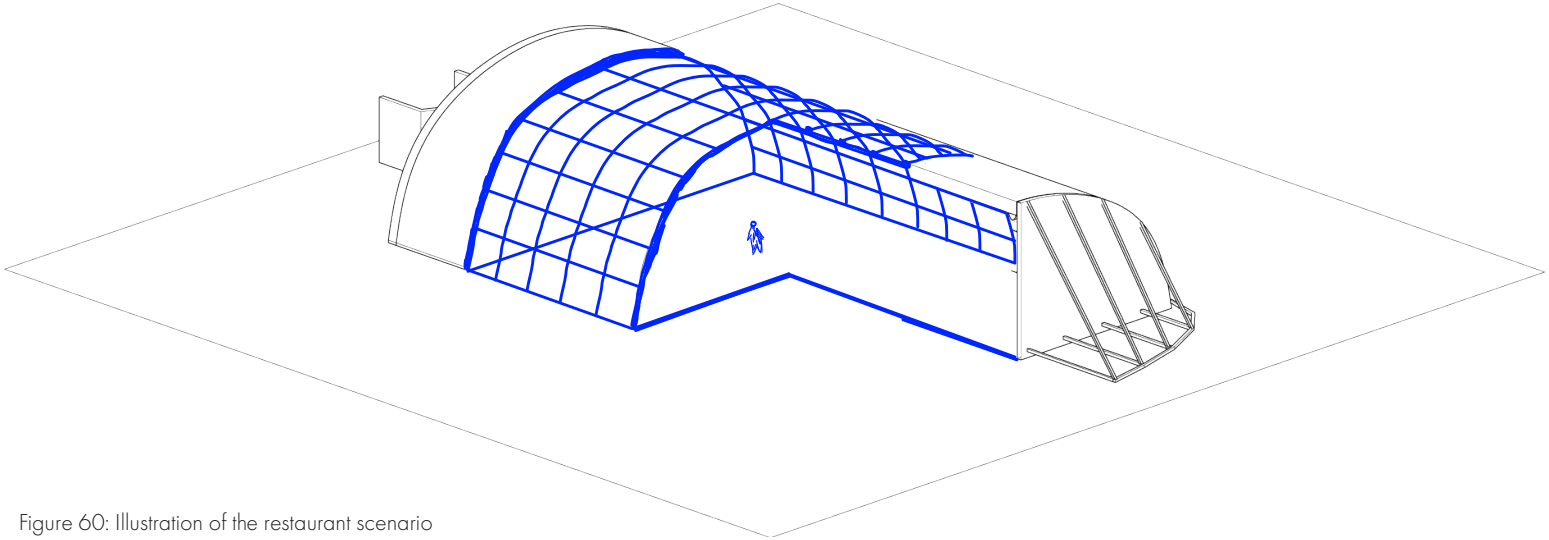


Figure 60: Illustration of the restaurant scenario

3.5 Developed scenario

3.5.1 Choice of scenario

When evaluating the scenarios it becomes apparent how some scenarios only strengthen one specific value and that others have a overall positive influence like the ruined park and the natural cemetery. Because the ruined park is already in some way the vision of Utrechts Landschap the natural cemetery is further developed. Also because it is more challenging in how to develop this scenario



Figure 61: Collage of the chapel shelter

3.5 Developed scenario

3.5.2 Natural burial cemetery

When looking at other natural cemeteries and their event spaces a few important aspects become apparent. Most of the designs have a ceremonial room, a café area, consultation room, family room and a place for maintenance.

An other important aspect is the routing and entrance, sometimes even having a separate entrance for close relatives. And lastly a strong connection with the nature surrounding it. This can be realized through large windows or by creating the ability to perform the ceremony outside as well.



Figure 62: Example of a natural burial landscape (Natuurbegraafplaats De Utrecht, n.d.)

De hoevens		De utrecht	
Mooi & Slecht weer entree		Ontmoeting	
Garderobe		Woonkeuken	
Toilet	4 a 5	Spreekkamer	
Koffie ruimte			
keuken		Onderhoud	
Ceremonie		Kast	
Toilet		werkbank	
spreekkamer		golfcar	
Terras		kistwagen	
		Toiletgebouw	
		3 toilet	
		1 invalide	
		1 instalatie & douche	

Maashorst		Schoorsveld	
Ceremonieruimte		Ceremonieruimte	
koffieruimte		Koffieruimte	
keuken		keuken	
toiletgroep groot	~4 a 5	Terras	
garderobe		Toilet groep	4 man 4 vrouw 1 gehandicapt
spreekkamer	3x	Garderobe	
toiletgroep klein	~ 2	Tochtsluis	
entree/ontvangst		Extra kamer + toilet	
zijkamer		Kleine ceremonie ruimte	
prive kamer	2x	spreekkamer	2x
		kleine garderobe	
		wachtruimte	
		onderhouds gebouw	

Figure 63: Inventarisation of the program of natural burial cemeteries

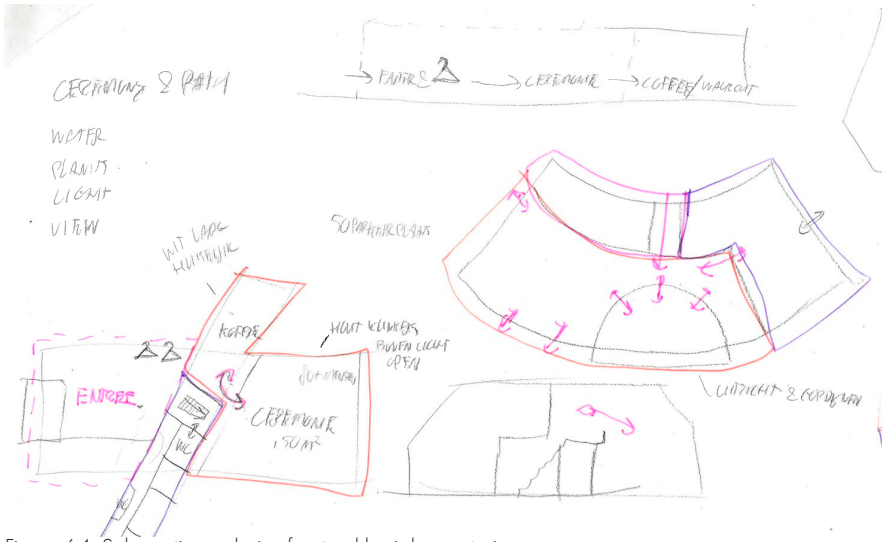


Figure 64: Schematic analysis of natural burial cemeteries

3.5 Developed scenario

3.5.3 Lighting

"Regardless of the architectural style or period, daylight has always been an essential medium for transforming architecture into sacred space" (Guzowski, 2000)

Lighting can help transform a ordinary space in a sacred space. Therefore it is also something useful for the design. Multiple books are used as a form of inspiration what lighting principles can be applied resulting in the design that different rooms will have a different lighting principle fitting the atmosphere of the room. And to use the day light to its full potential a shelter has been chosen with the front orientated to the North east and with trees on its south east side.

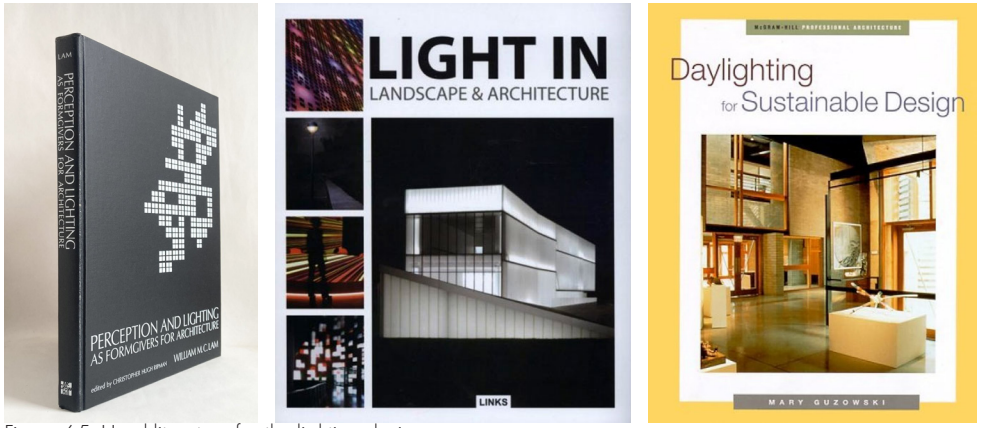


Figure 65: Used literature for the lighting design

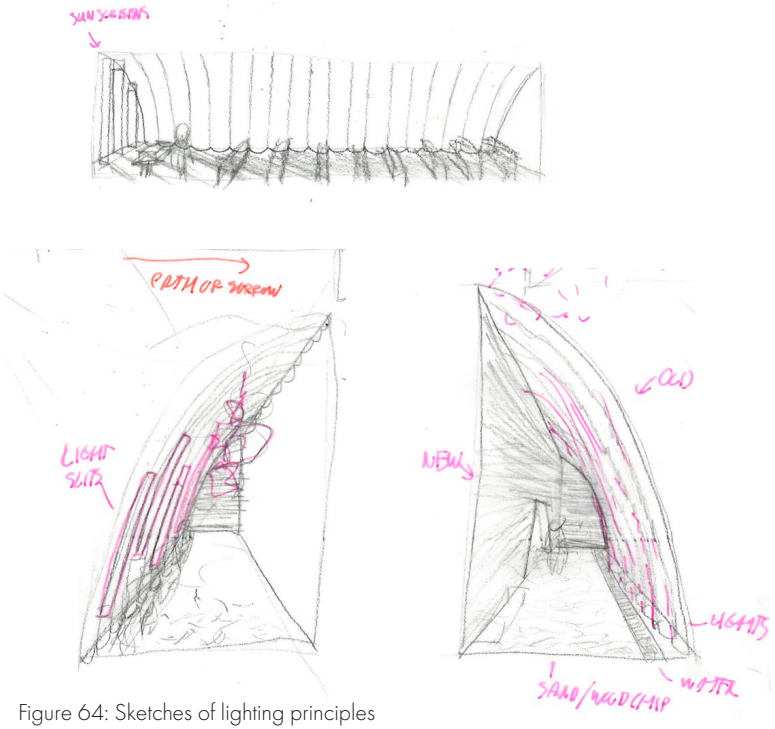


Figure 64: Sketches of lighting principles

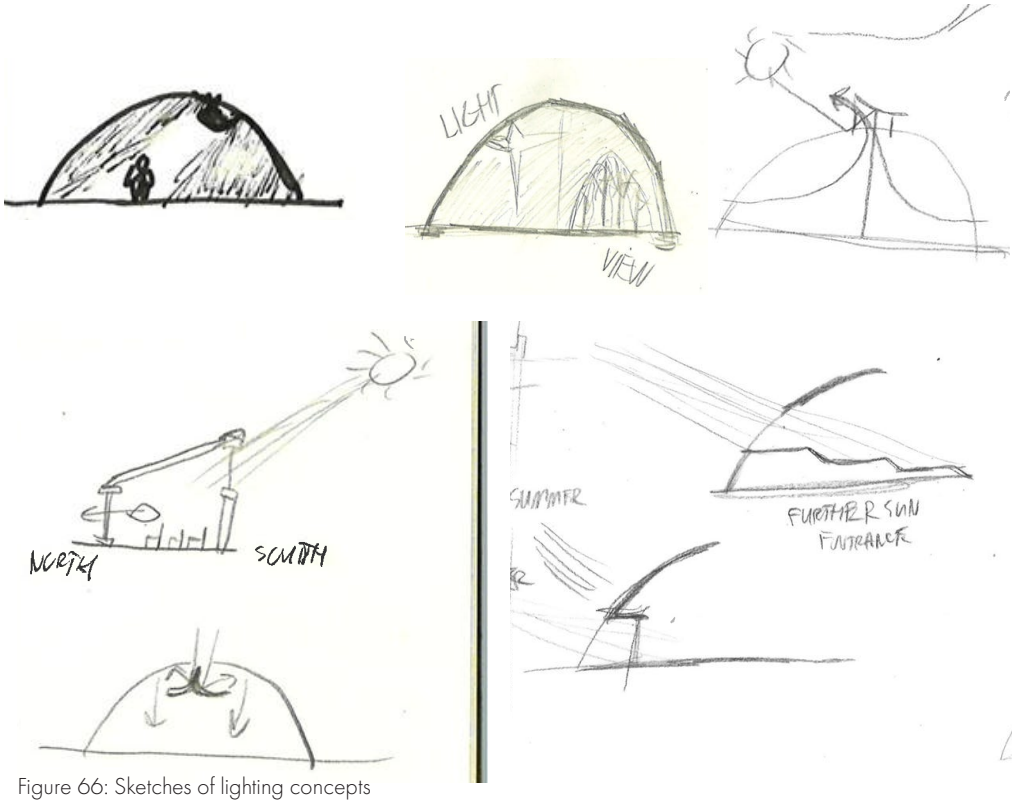


Figure 66: Sketches of lighting concepts

3.5 Developed scenario

3.5.4 Routing

While analyzing the natural cemeteries it became apparent how the routing of the design is important and can be used to guide people during their final goodbye. This led to the following principle of having two different entrance routes one for the close relatives and another for the general visitors each with their own characteristics and goals.

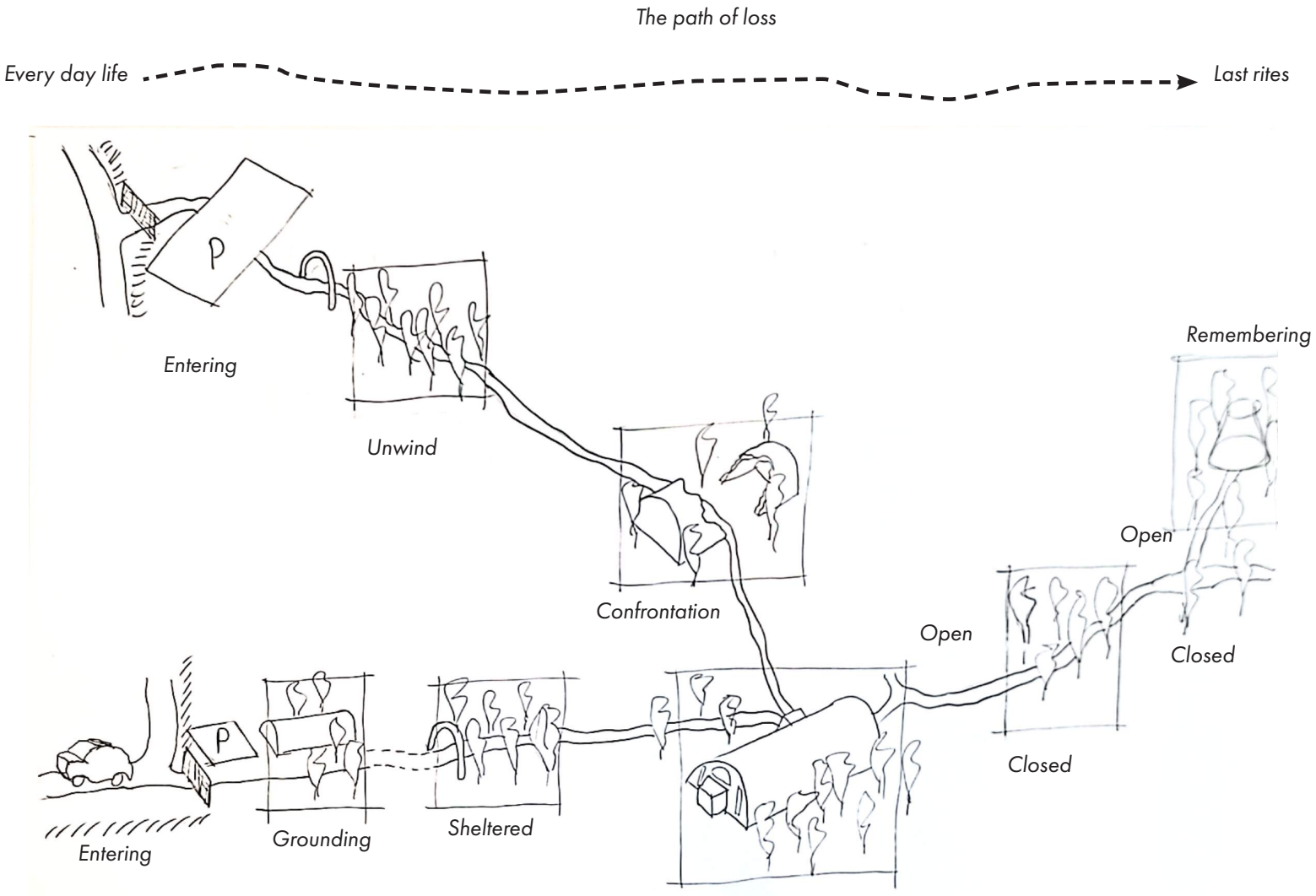


Figure 66: Schematic sketch of the routing of the design

3.5 Developed scenario

3.5.4 Routing



Figure 67: Schematic overview of connection with other cities



Figure 68: Illustration of main entrance routes of the design



Figure 69: Illustration of the area of the natural cemetery



Figure 70: Illustration of the two zones created in the cemetery

3.5 Developed scenario

3.5.4 Routing

When translating the routing to the site a master plan is created existing of different paths distinguished through their accessibility enabling visitors to choose their own experience.



Figure 71: Map of the design

3.5 Developed scenario

3.5.5 Atmosphere

To define the atmosphere of the spaces several references are analyzed being primarily brutalist churches or crematoria. These references play with the contrast of light, materials and also views to the outside.



Figure 72: Analysis sketches of the wanted atmosphere



Figure 73: Reverence of brutalistic church (Bartolacci, 2022)



Figure 74: Reverence integrated view (Wade, 2019)

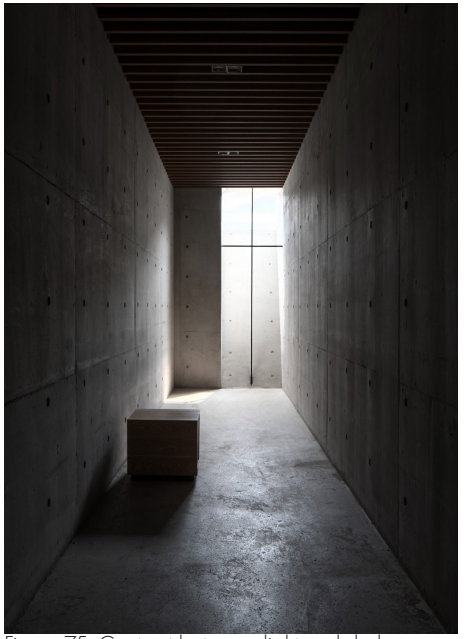
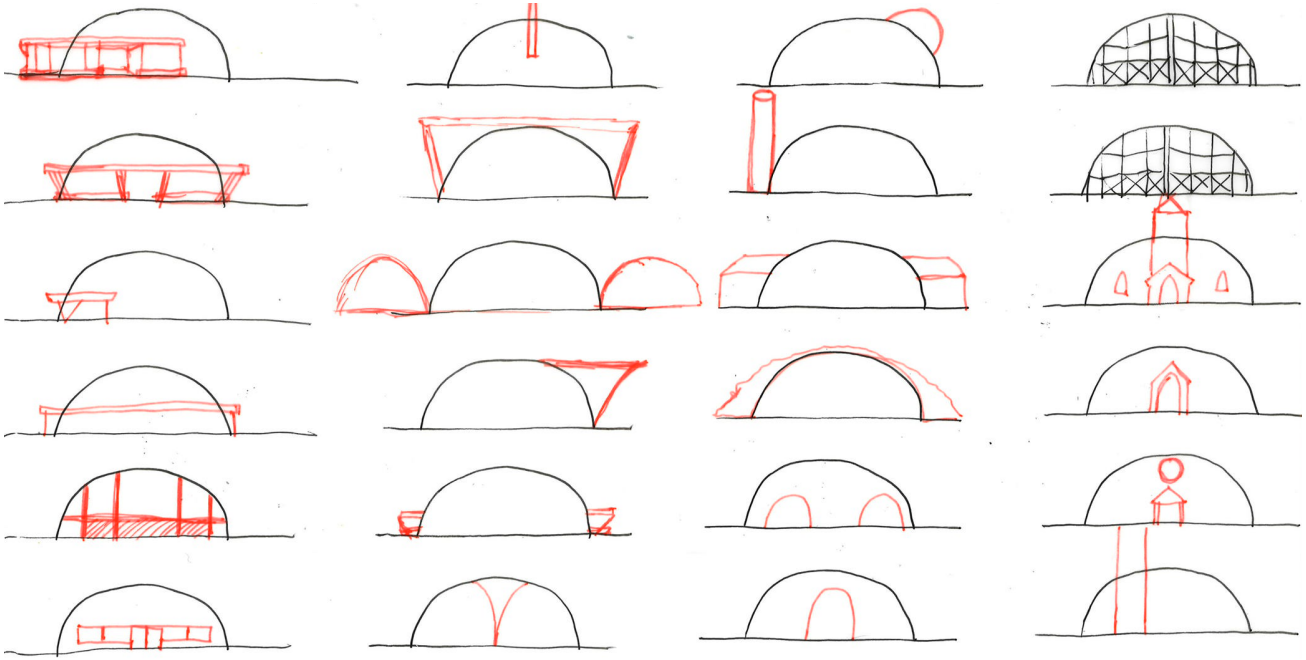


Figure 75: Contrast between light and dark (Atelier Koma Meditation Chapel, 2025)

3.5 Developed scenario

3.5.6 Spatial exploration

First the overall shape and composition of the chapel was explored. A small intervention showing the changed function while maintaining the overall impression fitted the design brief best. After this the interior spatial experience was explored leading to the idea of dividing the shelter with two large walls into two hallways and a large open space in between. The rooms itself where also further explored.



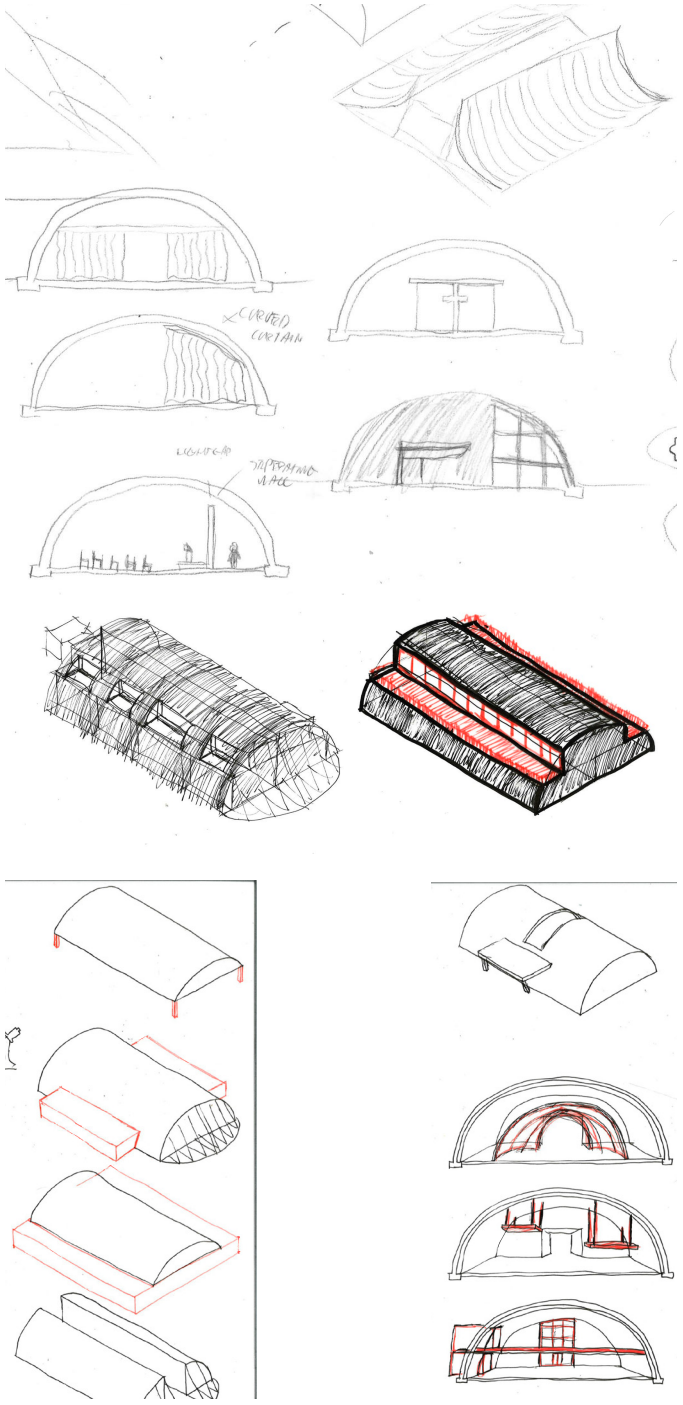


Figure 76: Schematic sketch exploration of interventions

3.5 Developed scenario

3.5.6 Spatial exploration

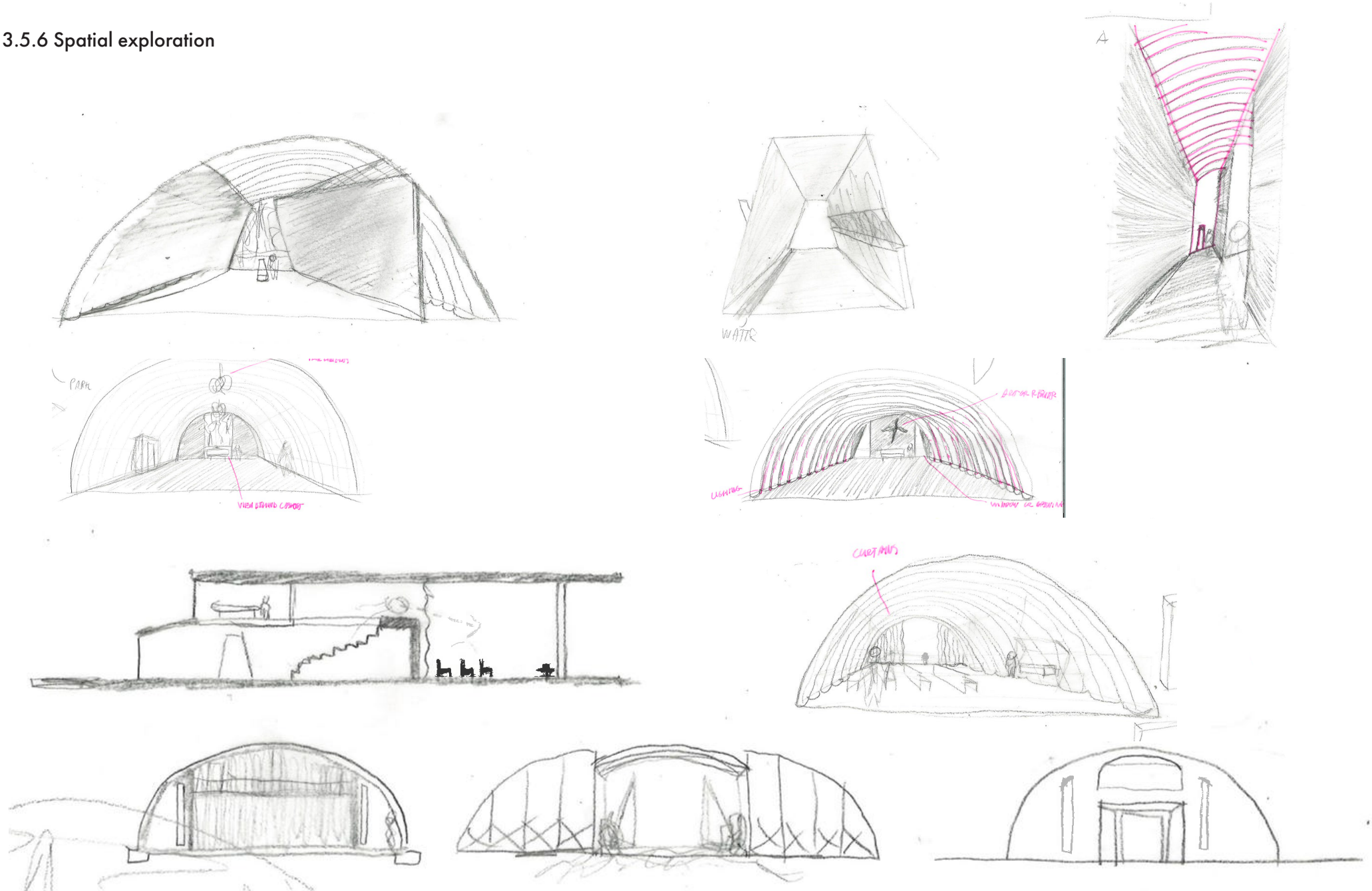


Figure 77: Sketches exploring the interior spatial atmosphere

3.5 Developed scenario

3.5.6 Spatial exploration

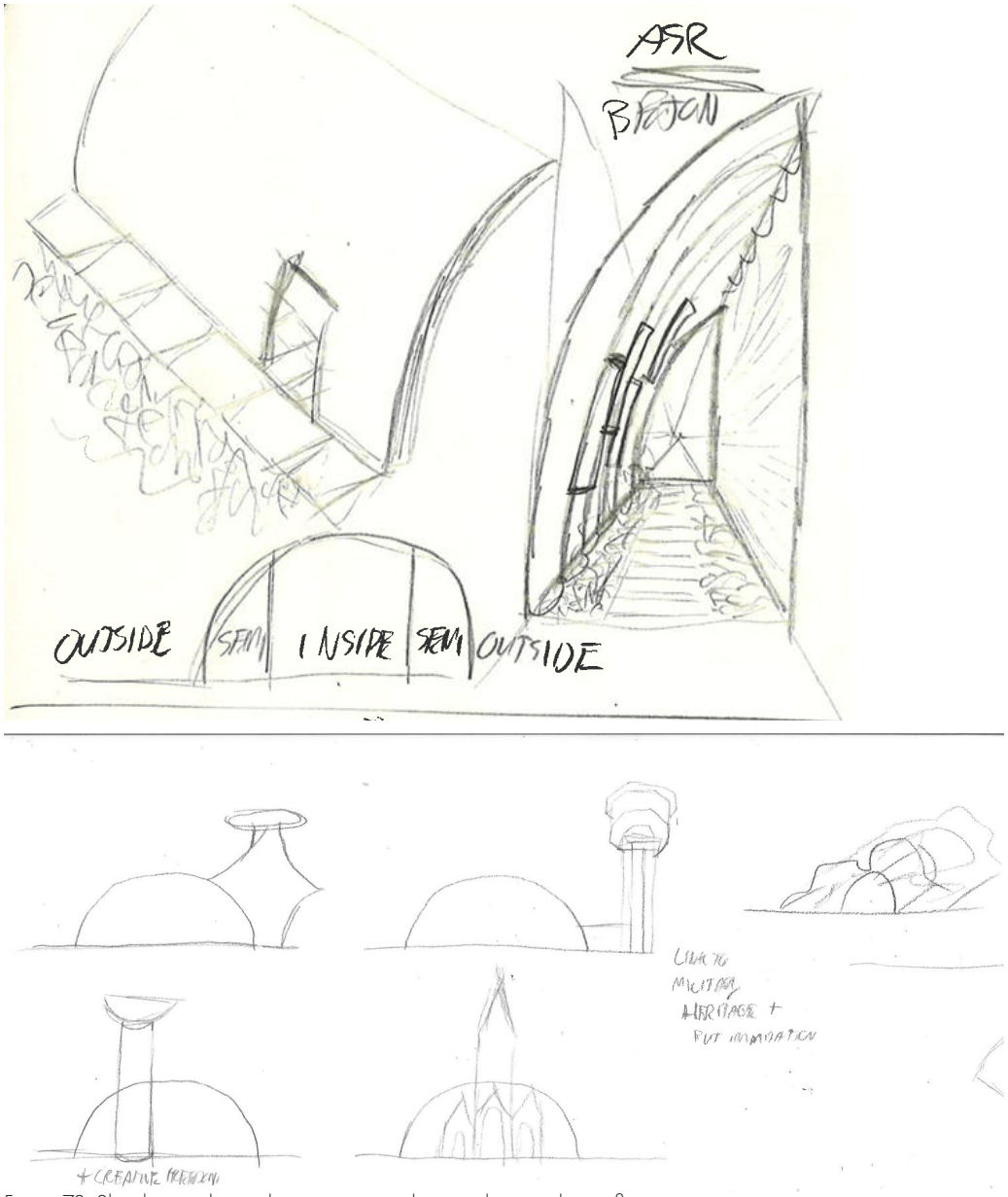
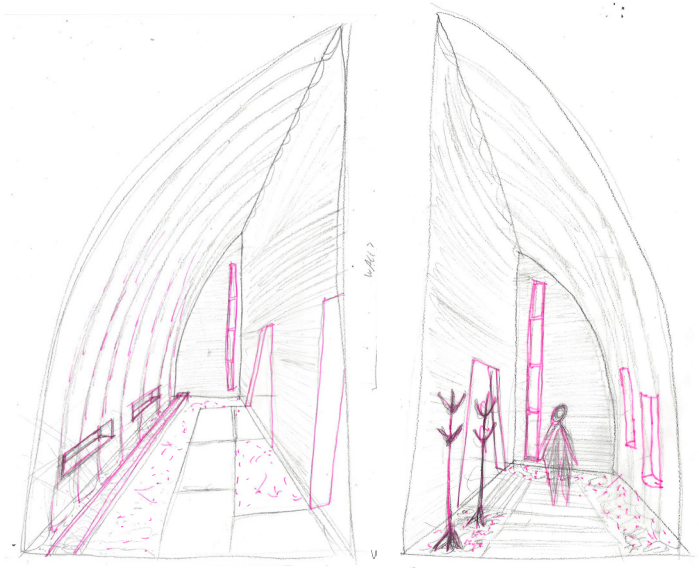
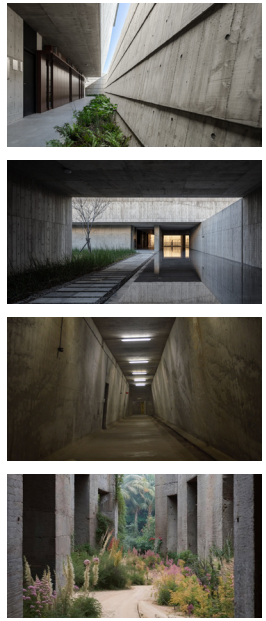


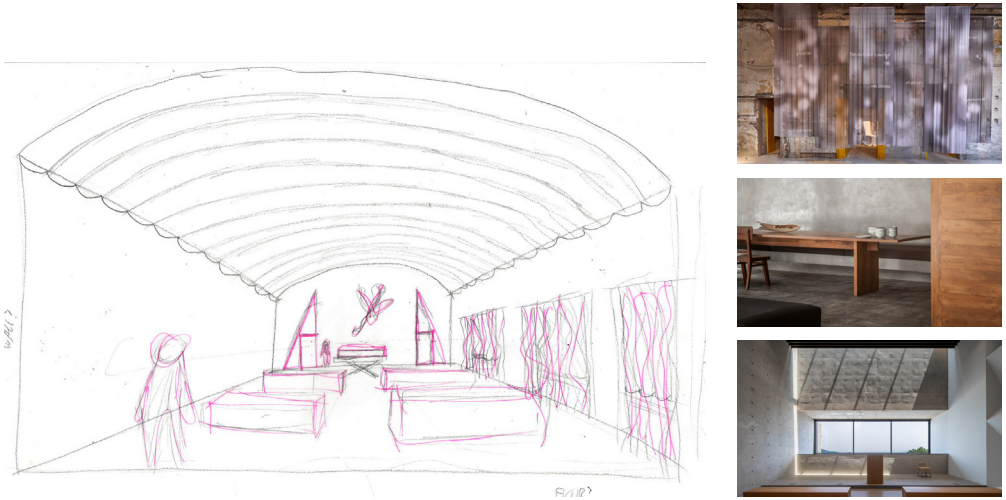
Figure 78: Sketches exploring the interior spatial atmosphere and specific elements like the door

3.5 Developed scenario

3.5.6 Spatial exploration









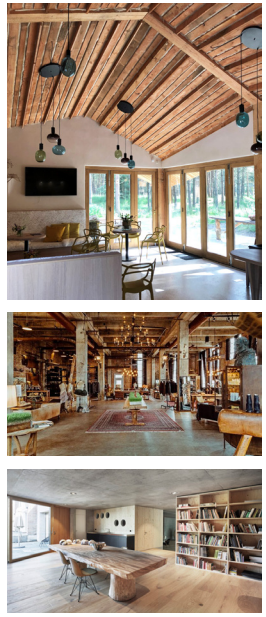


Figure 79: Sketches exploring the experience of the main spaces

3.5 Developed scenario

3.5.6 Spatial exploration

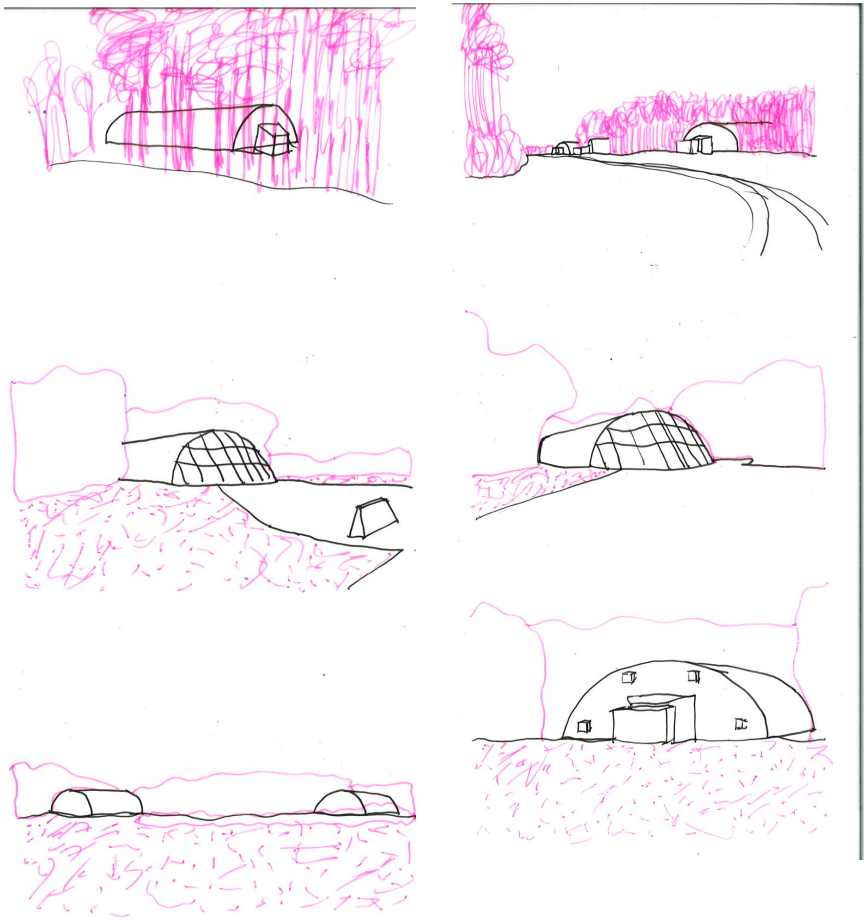




Figure 80: Sketches exploring the experience of outdoor area surrounding the shelters

3.5 Developed scenario

3.5.7 Architectural concept

First different floor plan possibilities where researched eventually ending up with the creating of a large central body which is divided into three parts, which are flanked and connected by two hallways. The central body exist of a large open ceremonial room, a café area with a smaller ceremonial room on top and a central three storied body containing the facilities, vertical connection and family room.

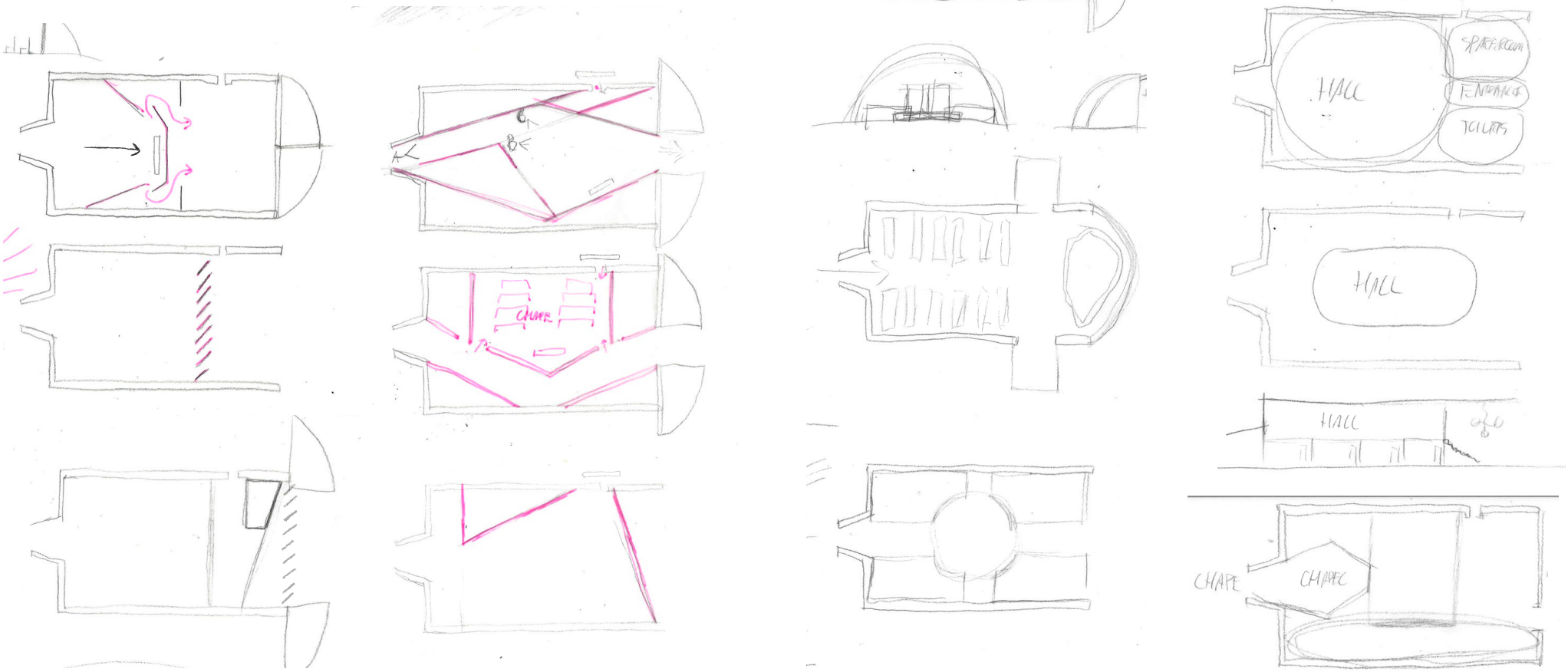
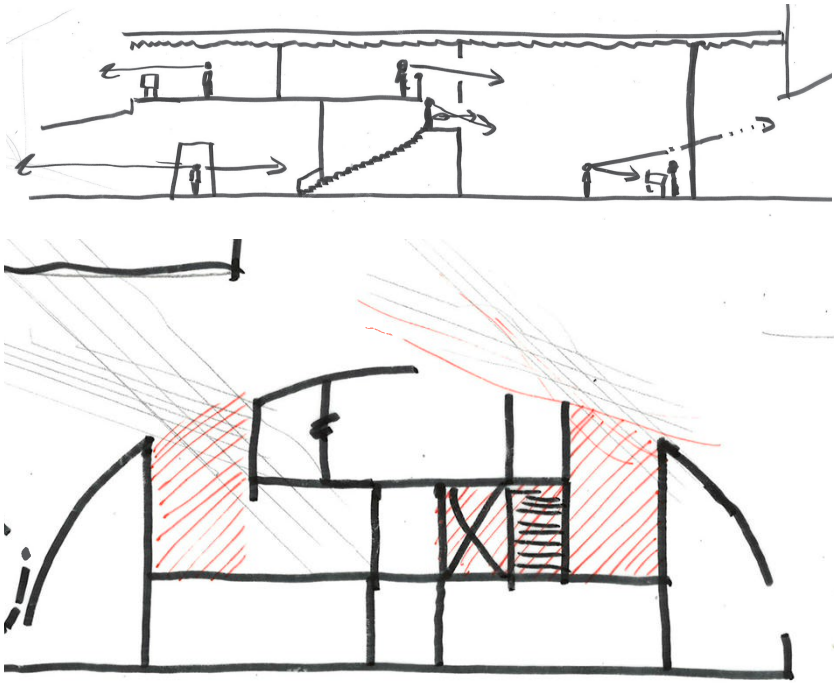


Figure 81: Sketches exploring the layout of the floor plan and its program

3.5 Developed scenario

3.5.7 Architectural concept

This is translated to the vertical organization of the shelter resulting in the concept shown below



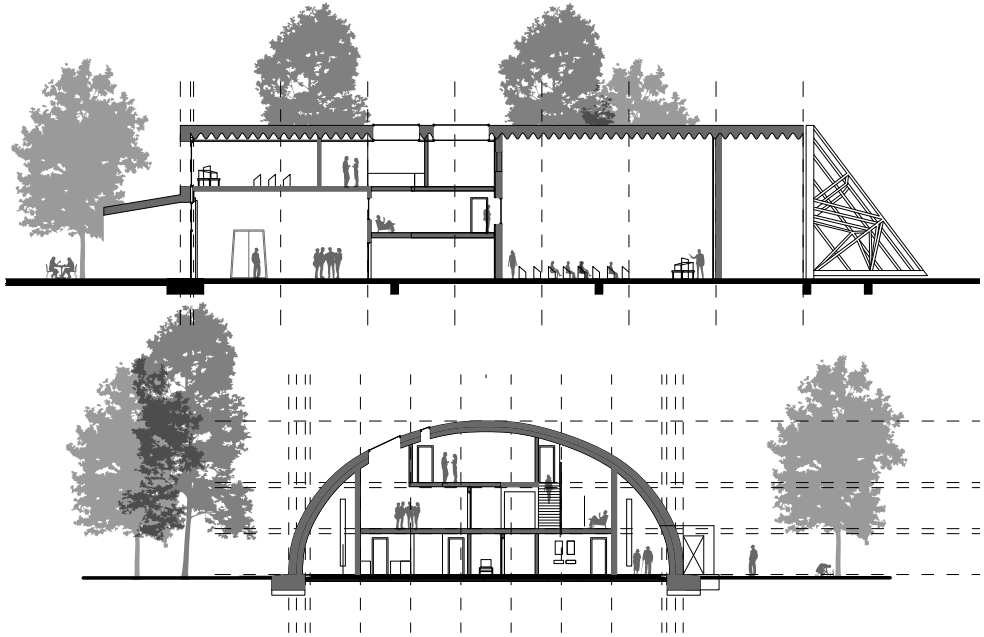


Figure 82: Sketches and illustrations illustrating the main concept of the vertical connection of spaces

3.5 Developed scenario

3.5.7 Architectural concept

The facades below show the interaction of the shelter with the outside. The south west facades shows how wooden panels are used as sun shading and the new entrance is visible. The north west facades shows the openings of the hallway of life with wooden slats.

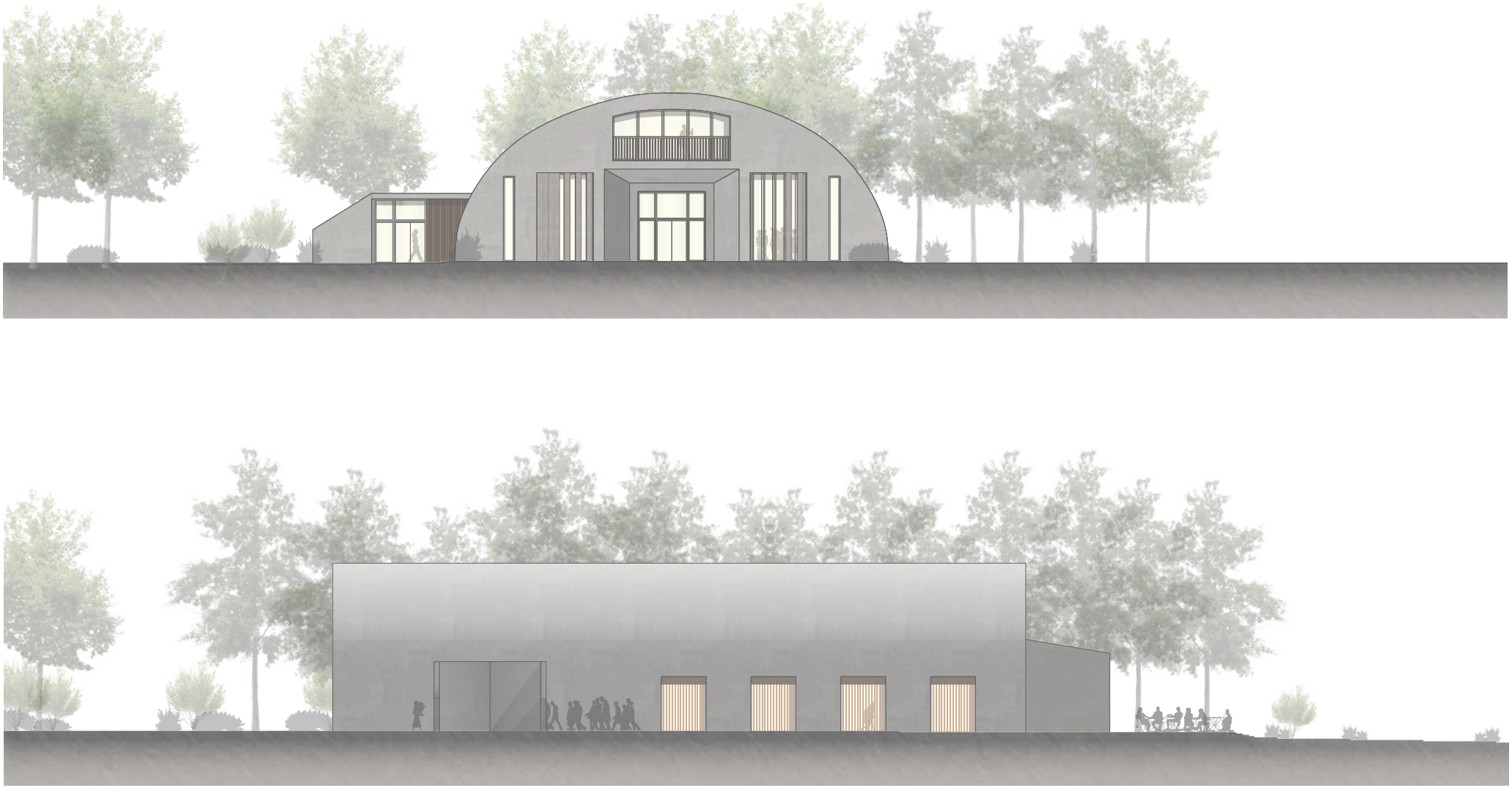


Figure 83: Facade elevations of the south west & north west facades

3.5 Developed scenario

3.5.7 Architectural concept

These facades show how the front of the shelter can be used in several ways. The doors can be opened and a funeral ceremony can be held outside.

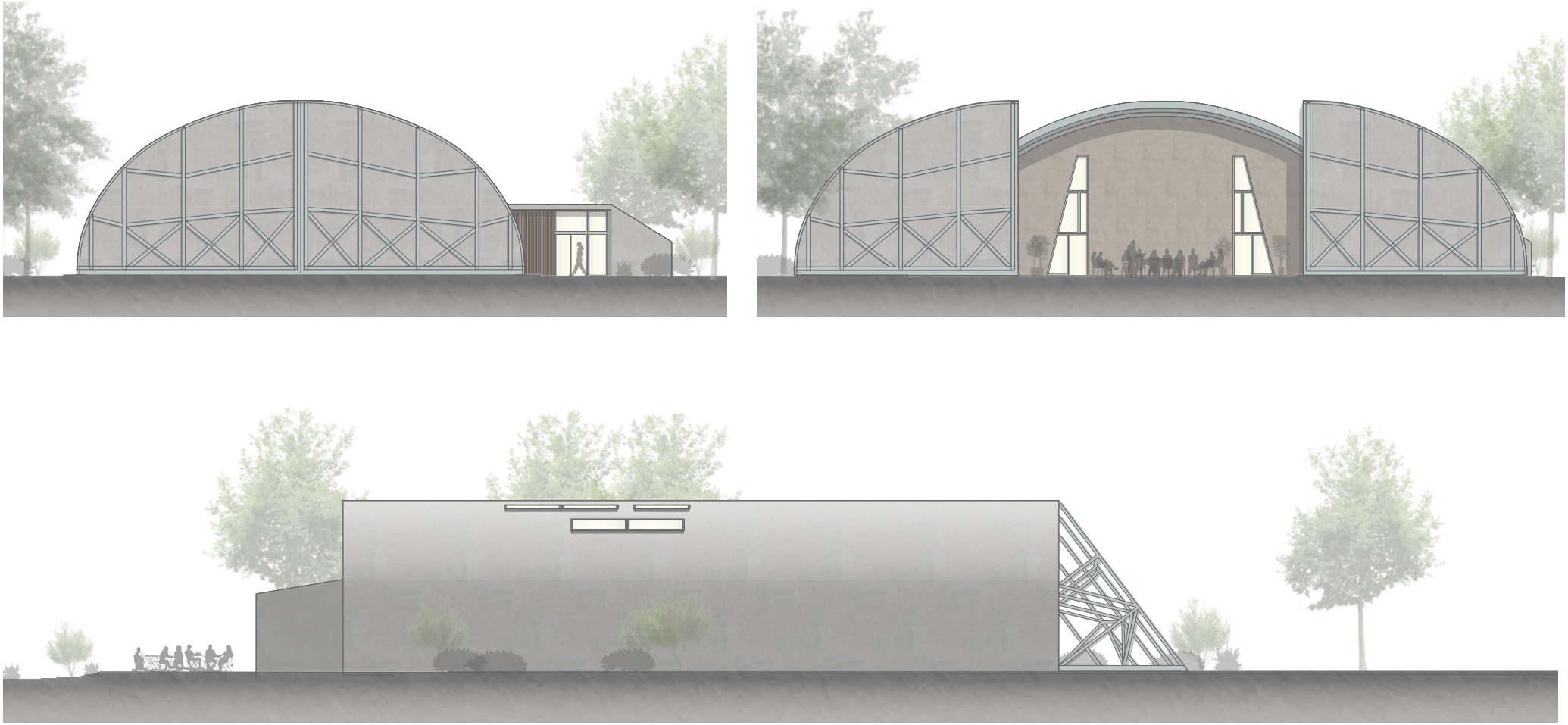


Figure 83: Facade elevations of the north east facade with closed and open doors and the south east facade

3.5 Developed scenario

3.5.7 Architectural concept

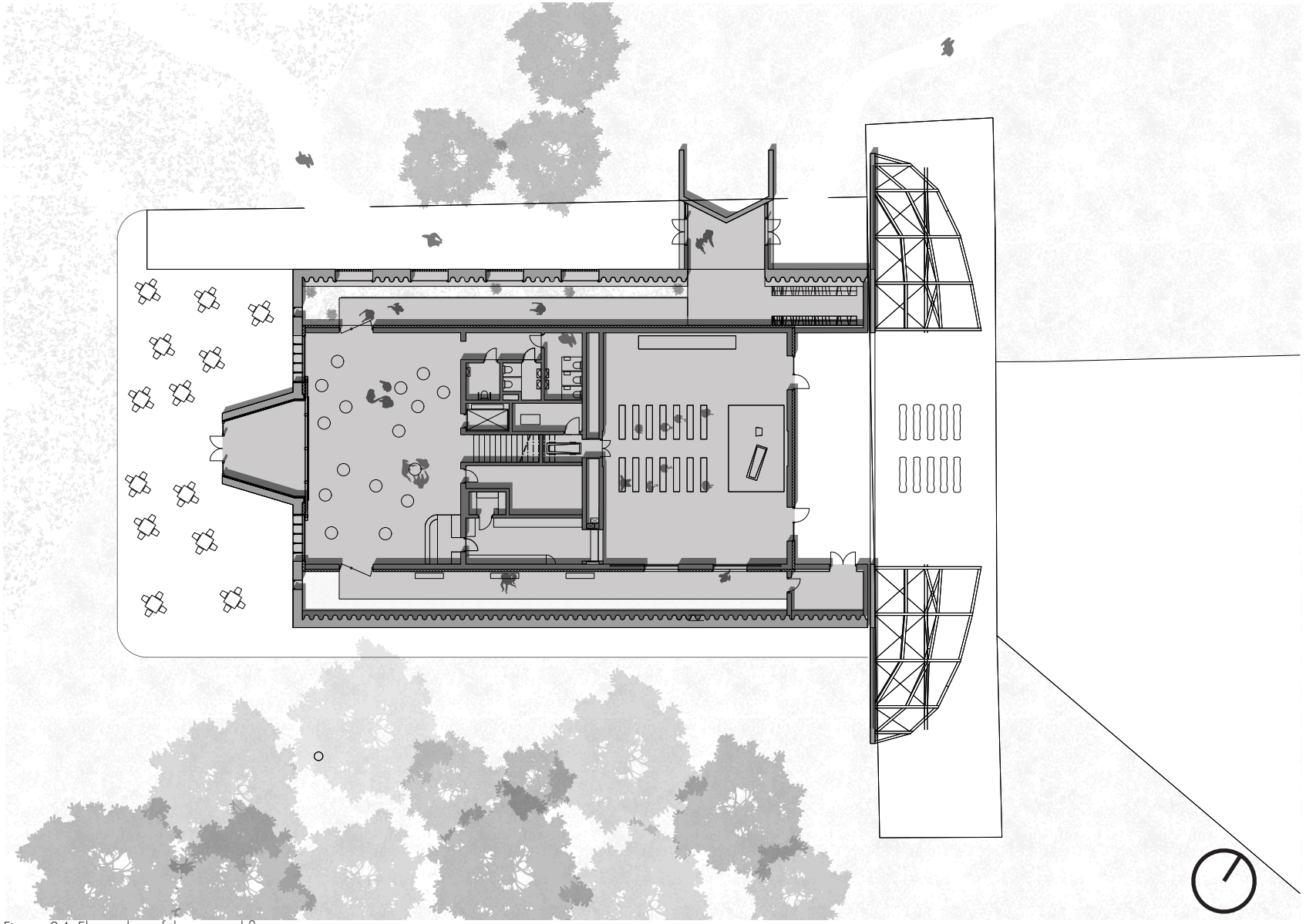
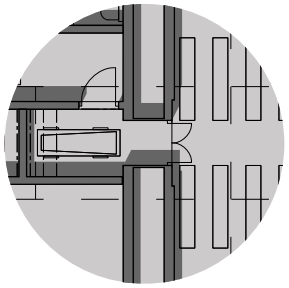
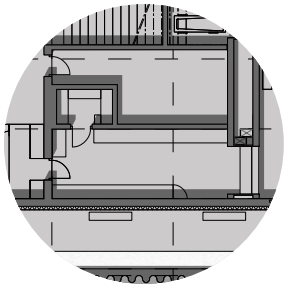


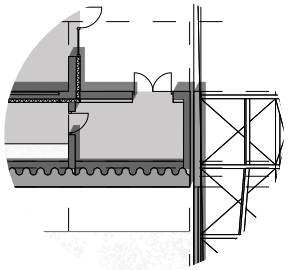
Figure 84: Floor plan of the ground floor



Side room under the stairs from which the casket can be brought into the ceremonial room



The kitchen is connected to the cafe area as well as the ceremonial room through a serving hatch



Small maintenance room hidden at the end of the hallway forming a direct connection to the outside

3.5 Developed scenario

3.5.7 Architectural concept

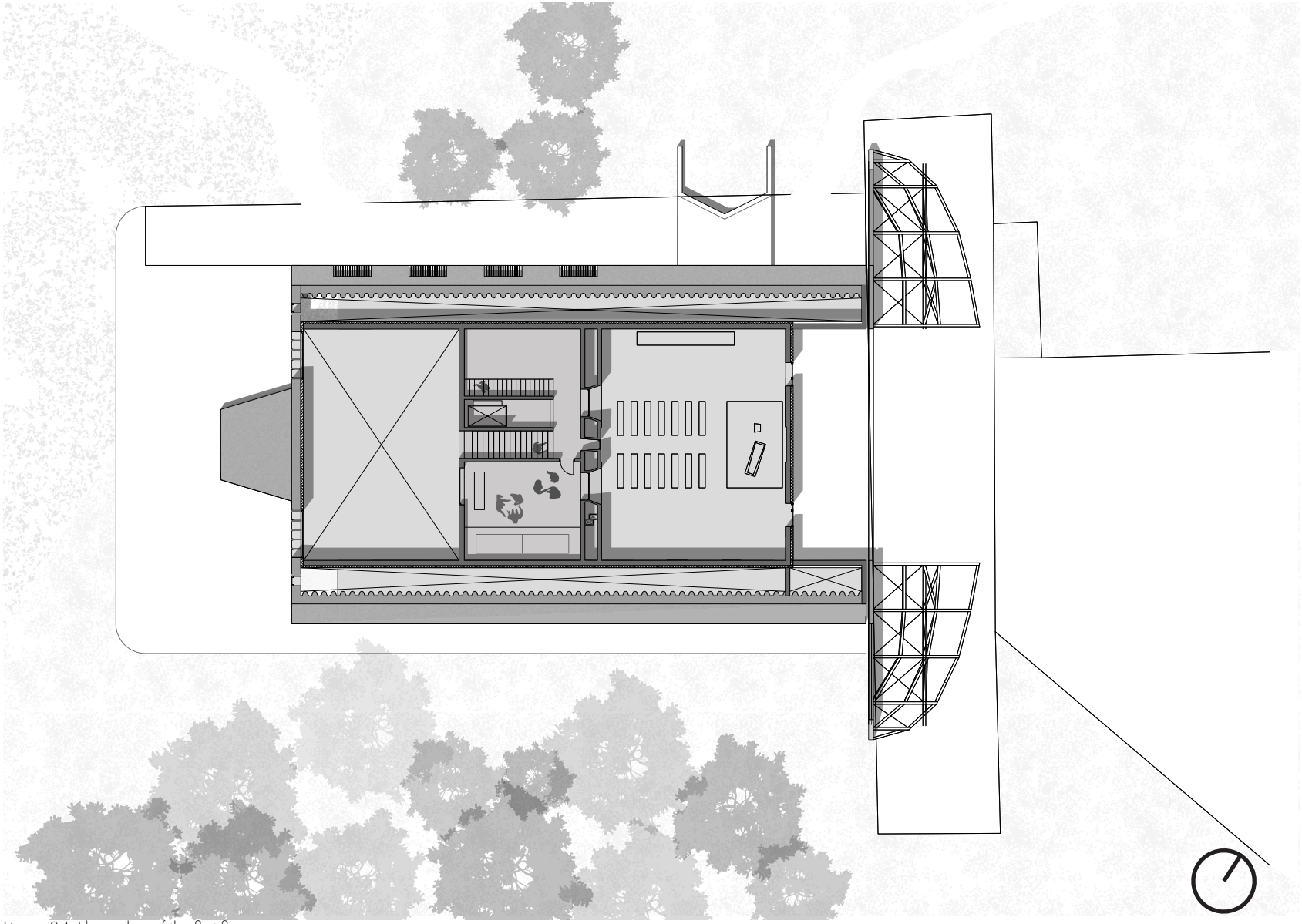
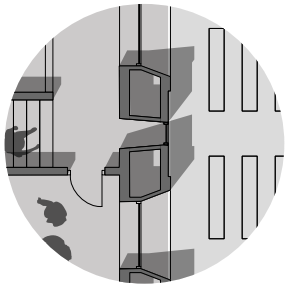


Figure 84: Floor plan of the first floor



Window creating a see through from the foyer to the ceremonial room



Family room with a view on both the foyer and the ceremonial room

3.5 Developed scenario

3.5.7 Architectural concept

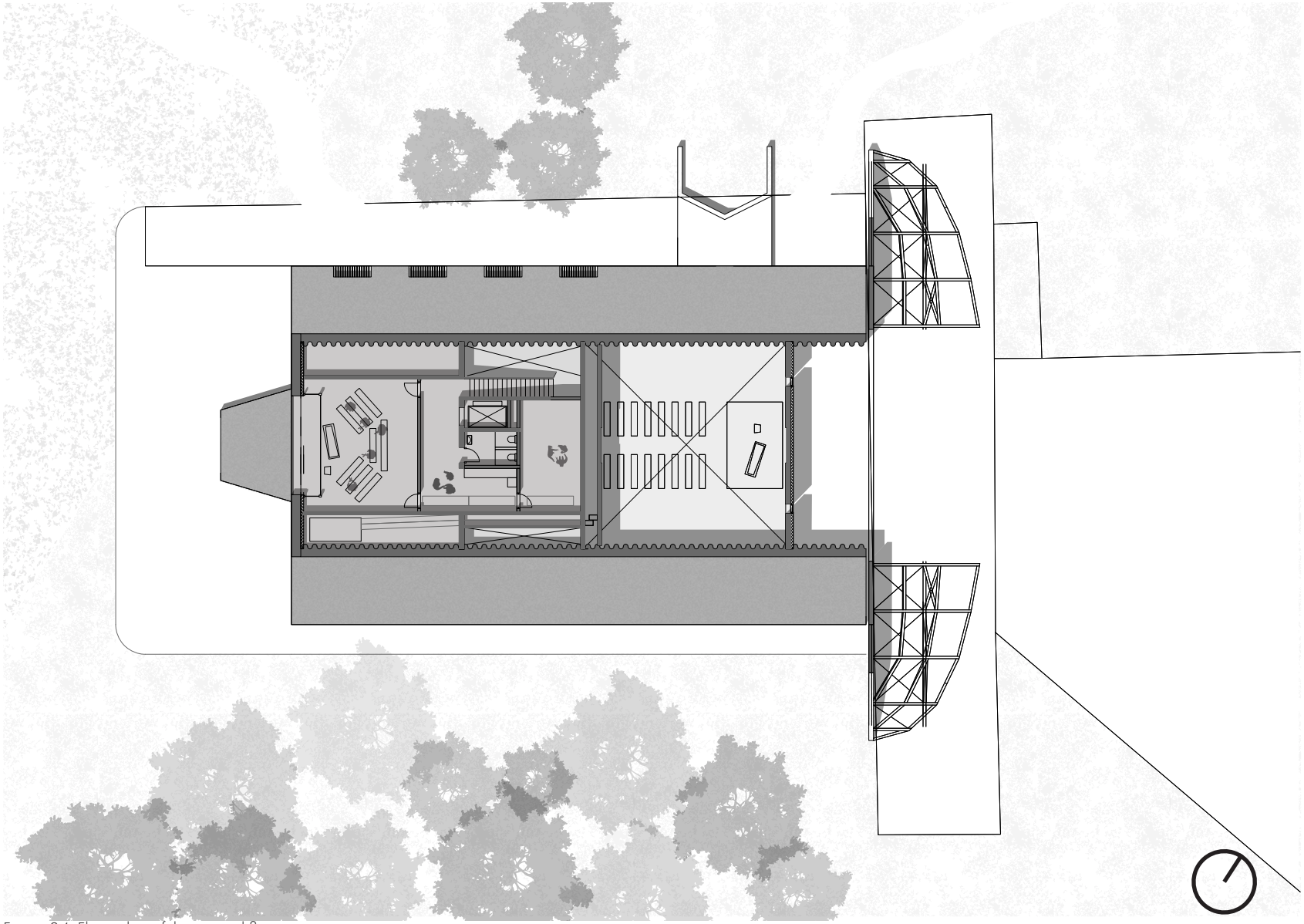
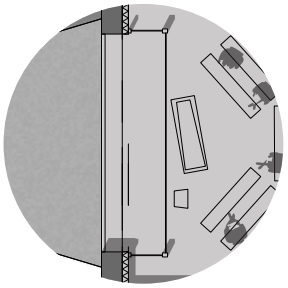
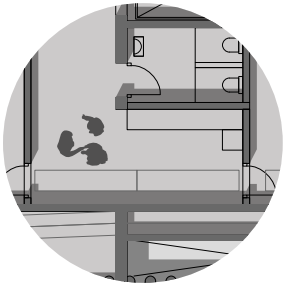


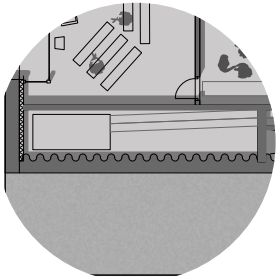
Figure 84: Floor plan of the second floor



Indoor balcony functioning as sun shading and ensuring a view on the outside



Small cafe area created in the hallway supporting the smaller ceremonial room



Air handling unit worked away in the attic

3.5 Developed scenario

3.5.7 Architectural concept

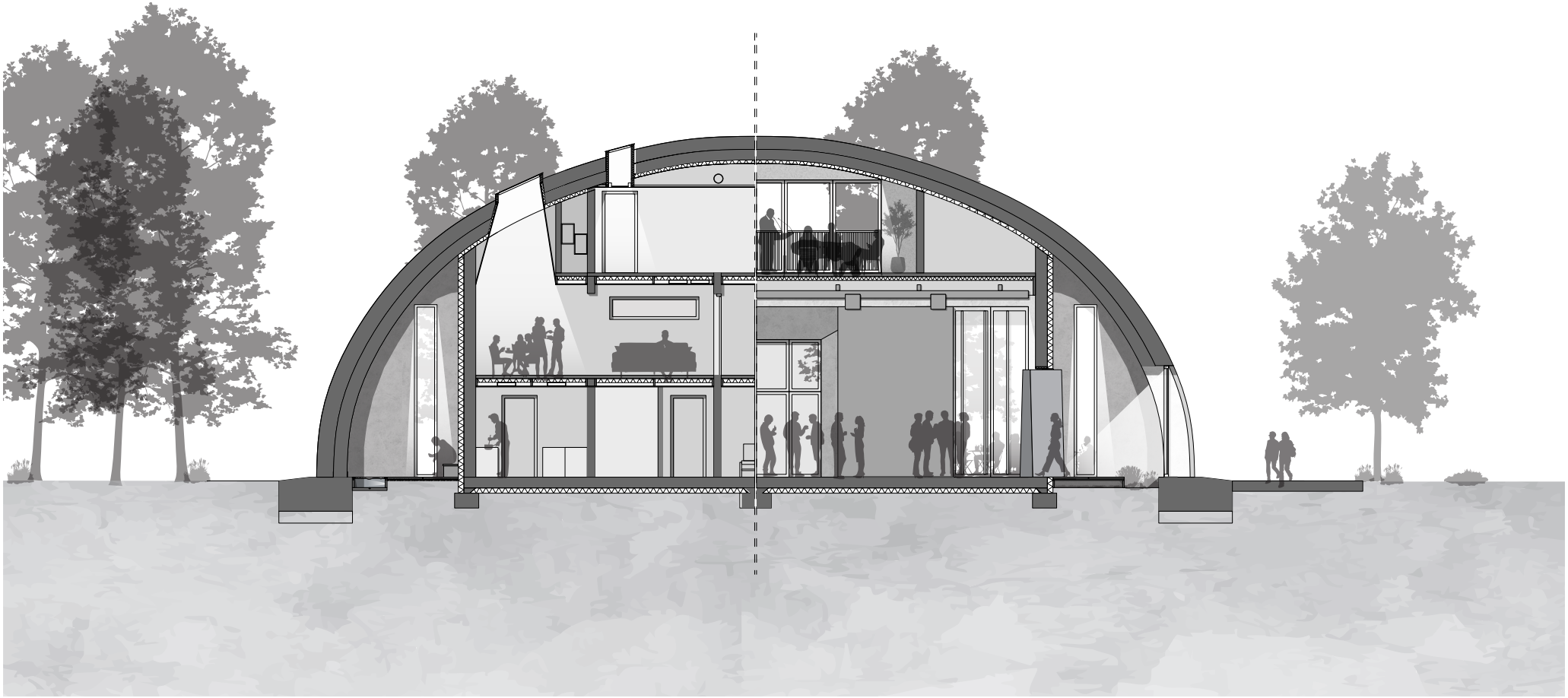


Figure 86: Section showing the architectural principles, materiality and design concept

3.5 Developed scenario

3.5.7 Architectural concept

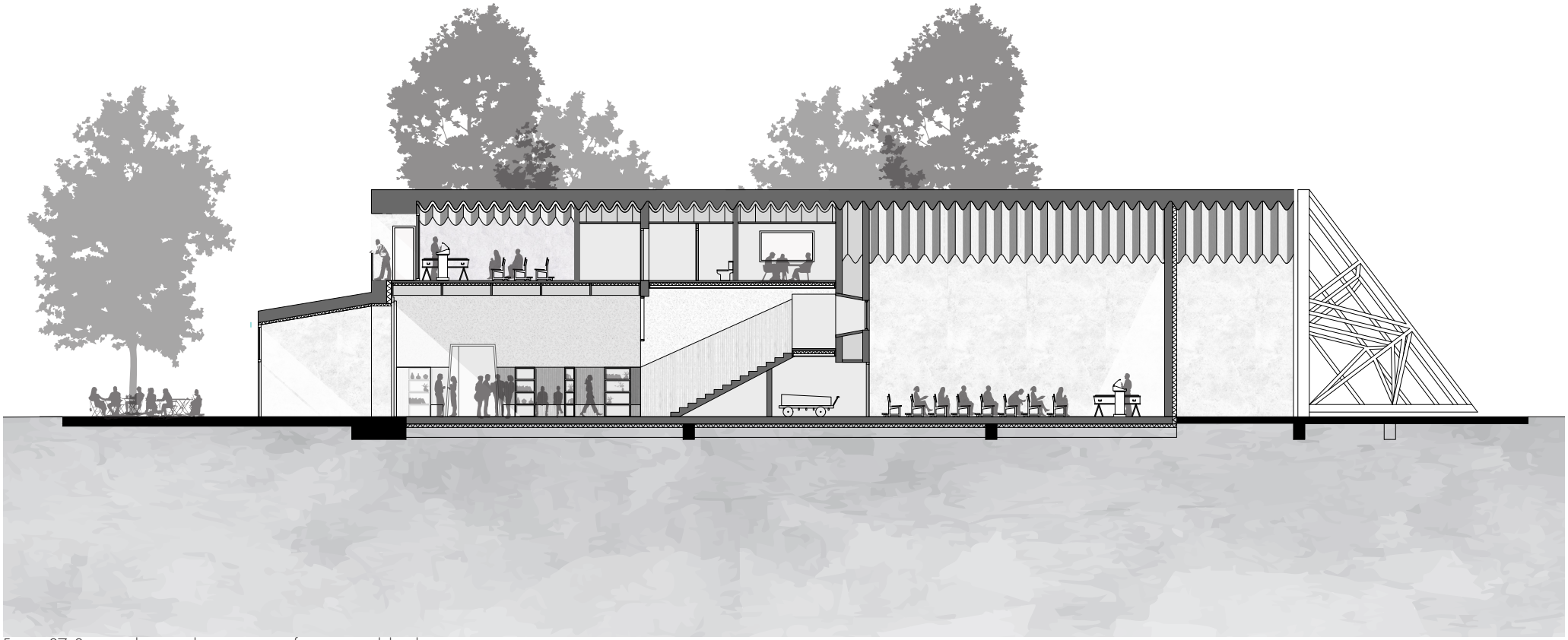


Figure 87: Section showing the sequence of spaces and the design concept

3.5 Developed scenario

3.5.7 Architectural concept

The following collages show the atmosphere of the natural cemetery in general. With sandbags as a reference to the historic past and as a way to commemorate buried.







Figure 89: Collages showing the overall atmosphere of the cemetery

3.5 Developed scenario

3.5.7 Architectural concept

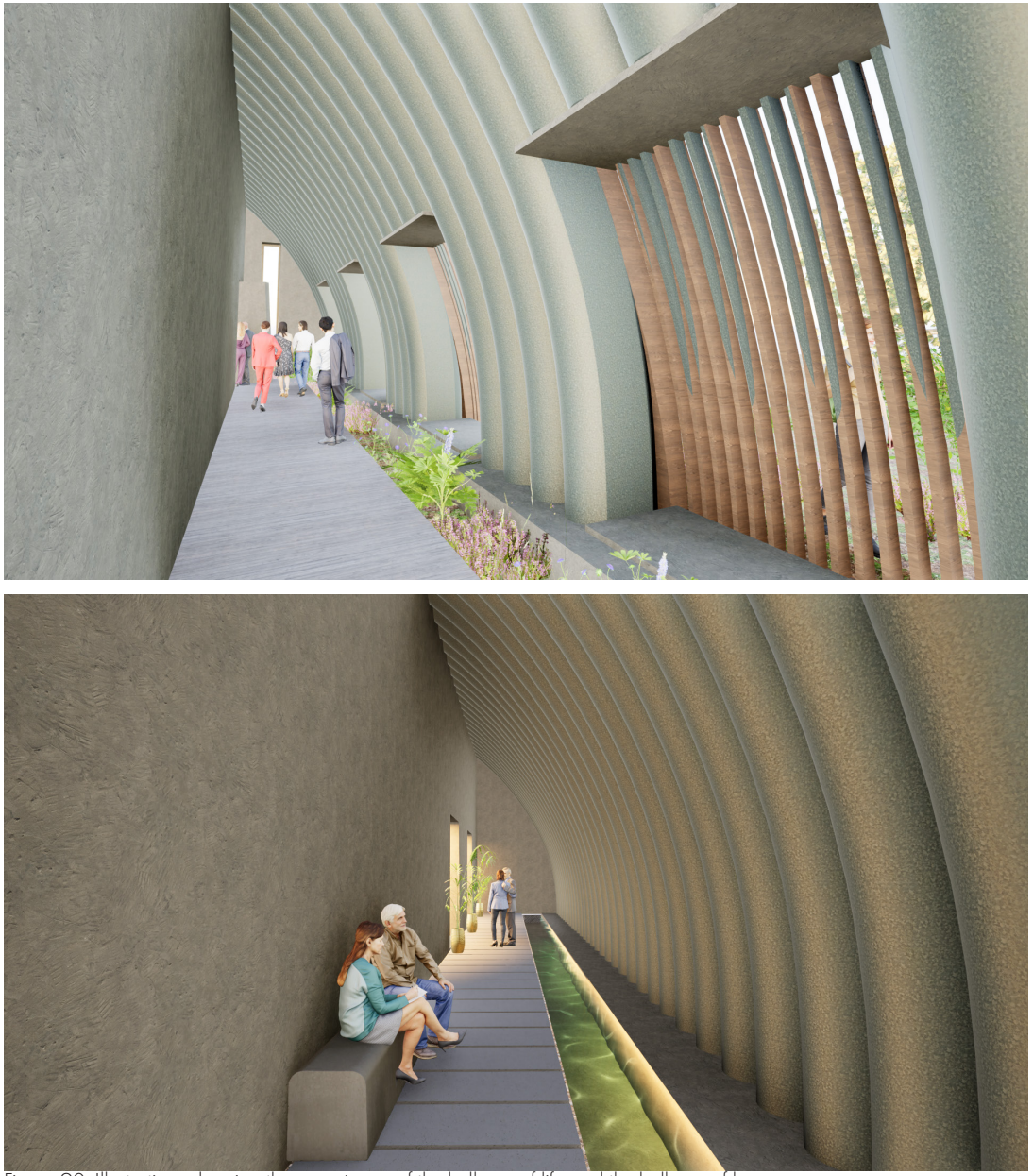


Figure 90: Illustrations showing the experience of the hallway of life and the hallway of loss

3.5 Developed scenario

3.5.7 Architectural concept



Figure 90: Illustrations showing the foyer opened up to the terrace and closed

3.5 Developed scenario

3.5.7 Architectural concept



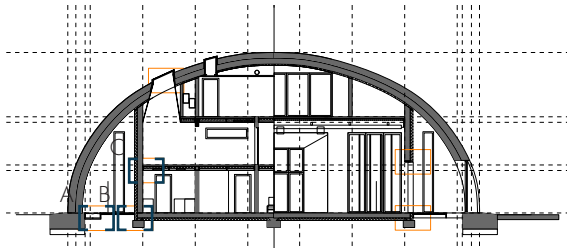
Figure 90: Illustration showing the ceremonial room with a view on the surrounding nature

3.5 Developed scenario

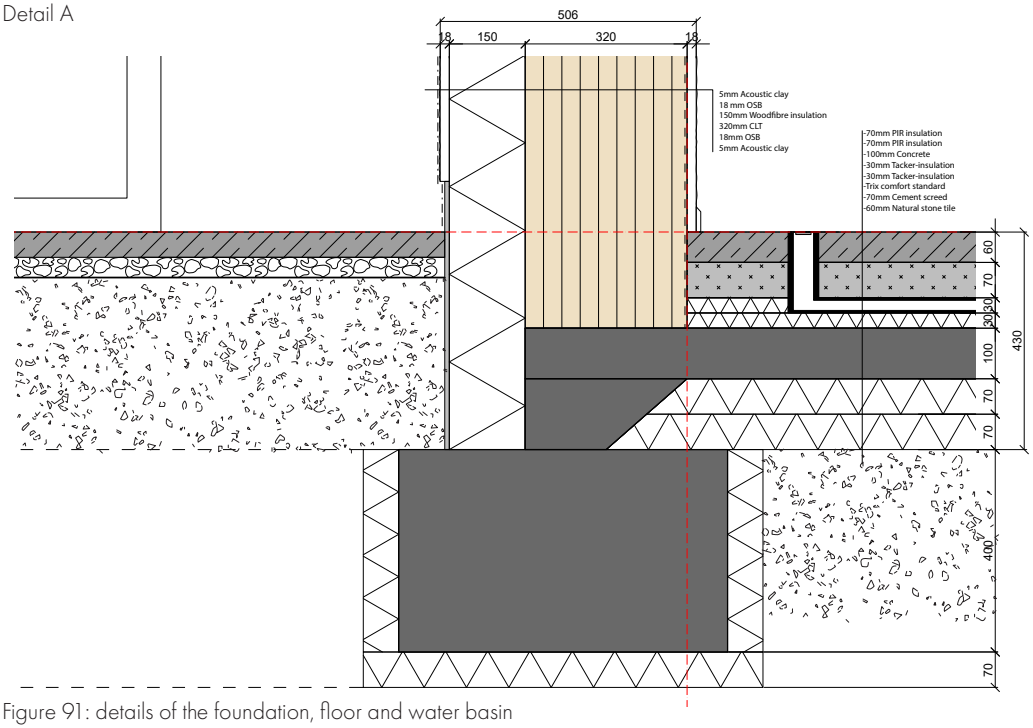
3.5.8 Construction

The construction is made out of CLT to imitate the massiveness of concrete and it uses a Kerto Ripa floor system so that ventilation and lighting can be integrated.

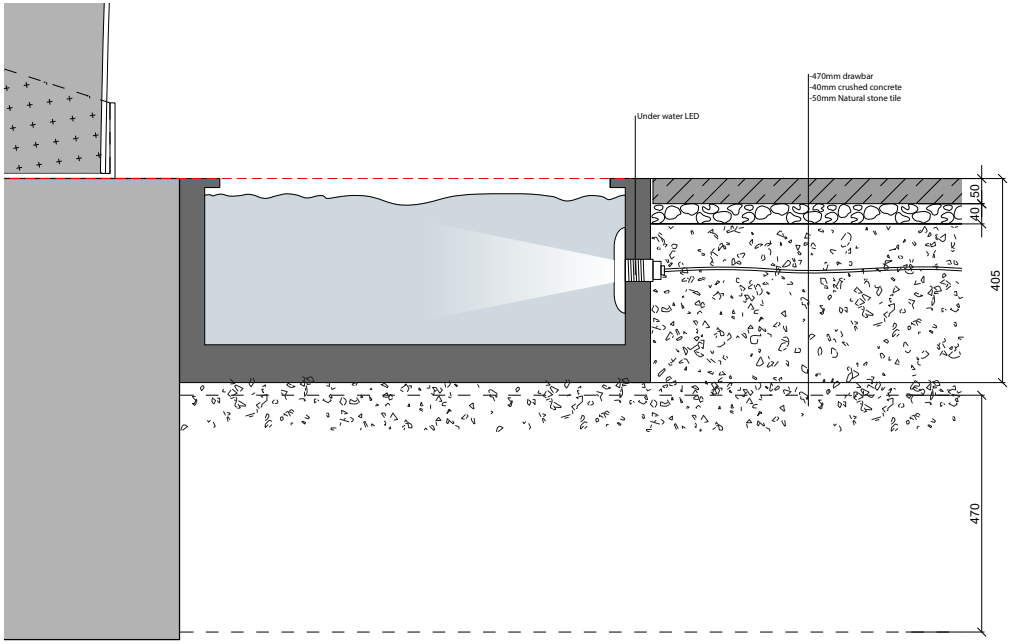
Furthermore the whole foundation is newly made so that a box in box principle can be created. Using the existing building as a second skin. The details show how the construction is realized in certain parts.



Detail A



Detail B



Detail C

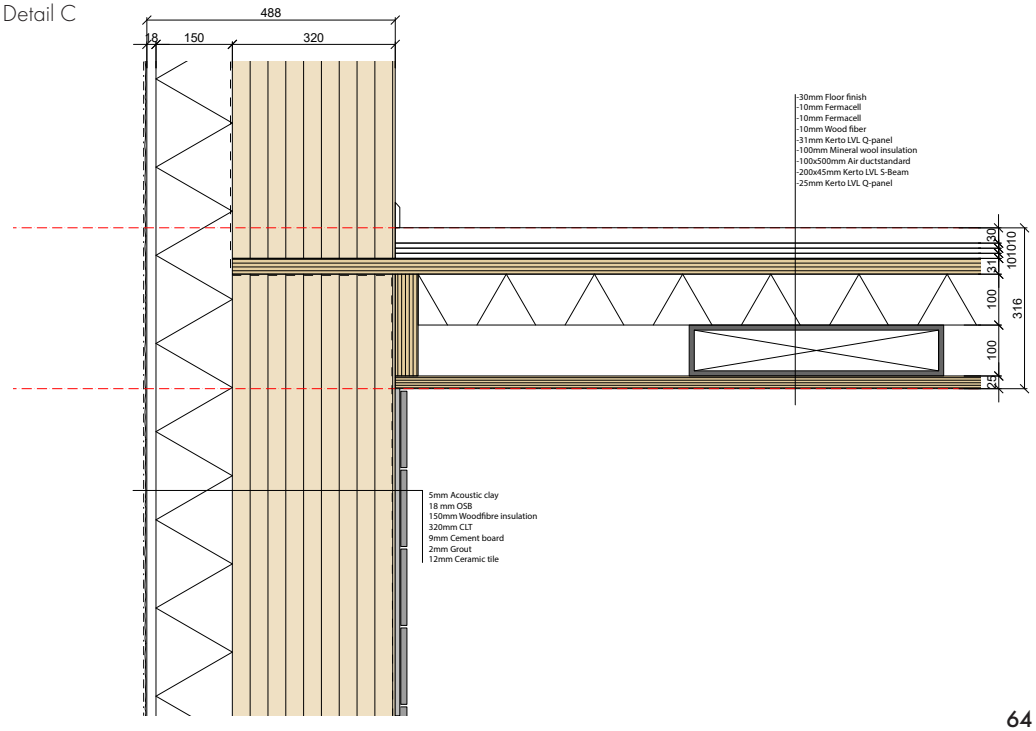
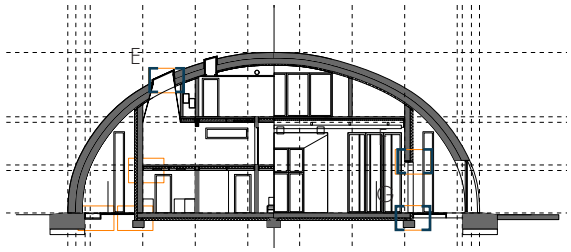


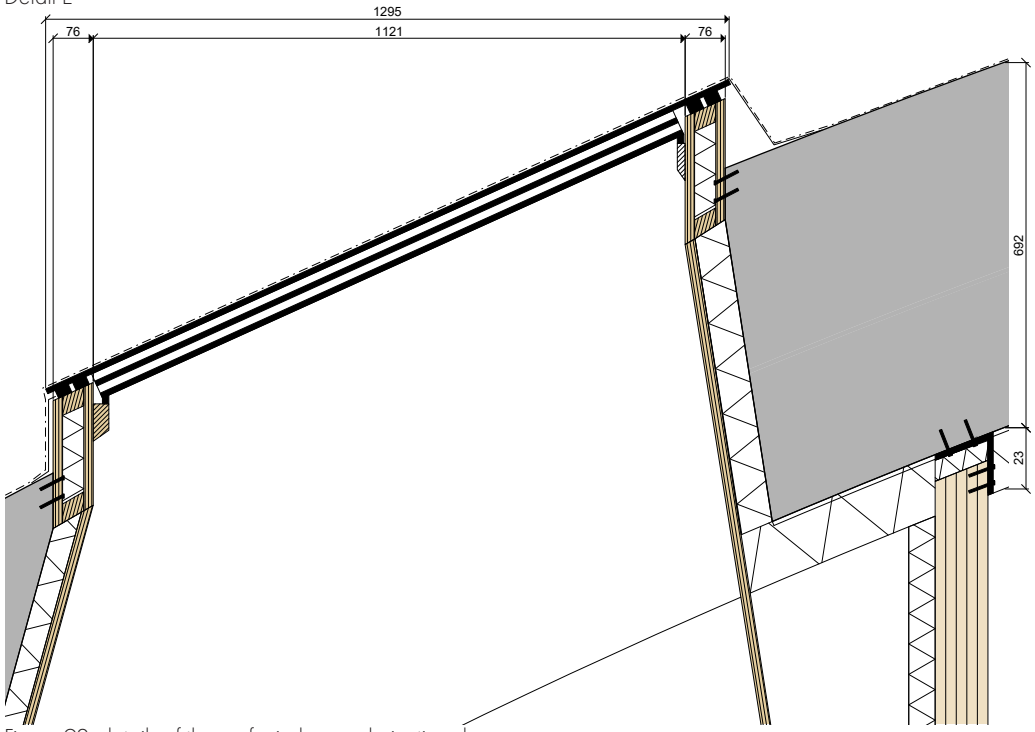
Figure 91: details of the foundation, floor and water basin

3.5 Developed scenario

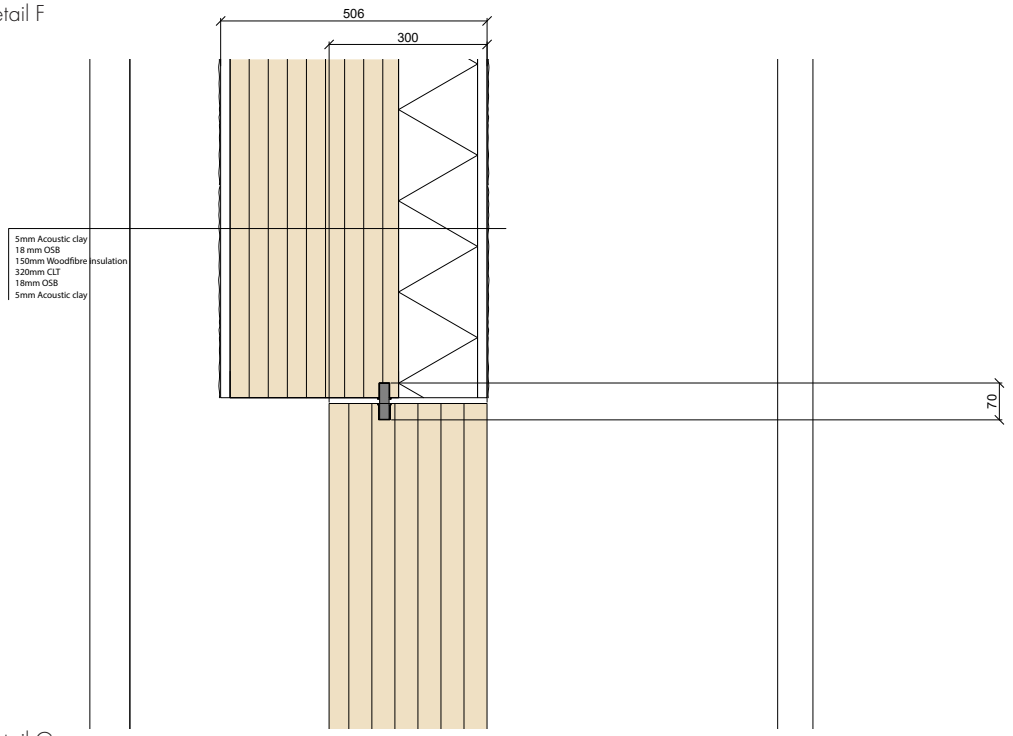
3.5.8 Construction



Detail E



Detail F



Detail G

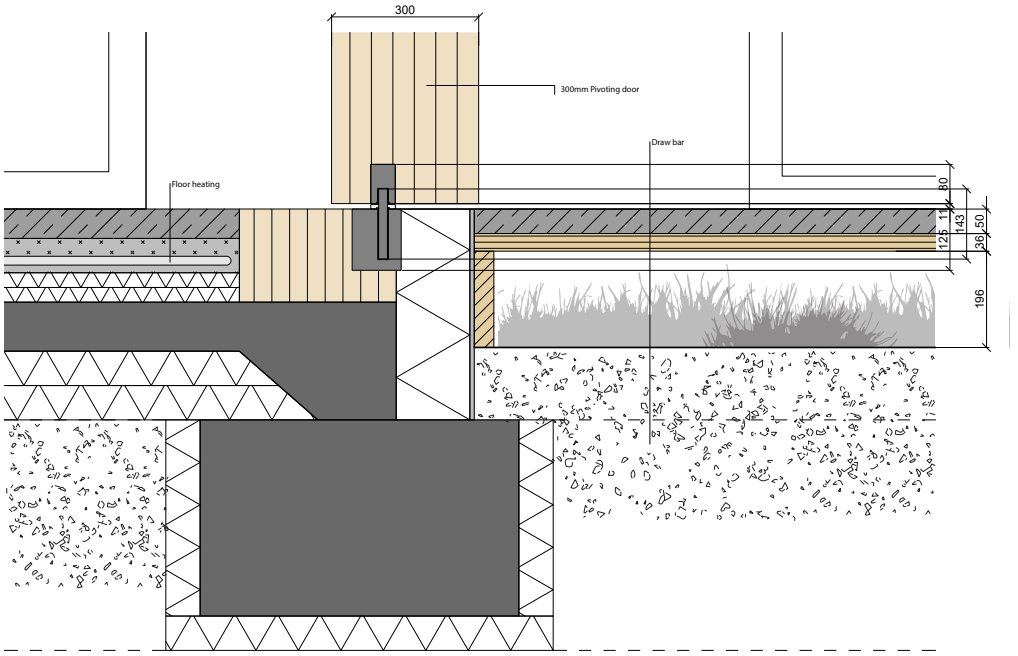


Figure 92: details of the roof window and pivoting door

3.5 Developed scenario

3.5.9 Climate concept

The climate concept is divided into the system within the shelter, and the site itself. The diagrams show which systems and methods are applied to create a pleasant indoor climate in a sustainable way.

Next to that an analysis on available second hand material retailers shows what can be used within a parameter of 15km. The choice to use second hand material is made because the patina of second hand materials match well with the desired atmosphere and the aging of the shelters

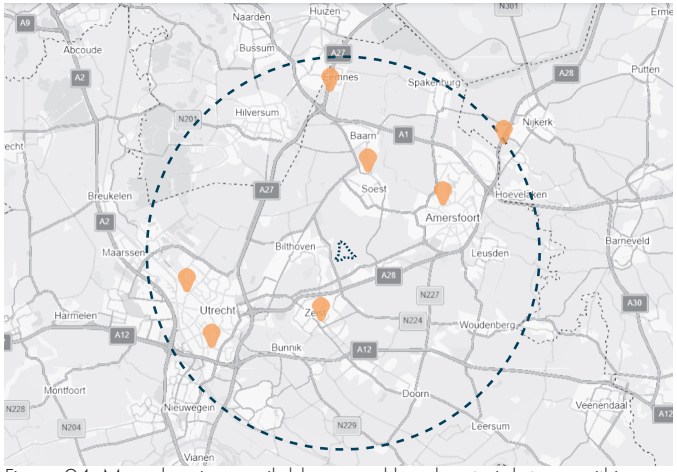


Figure 94: Map showing available second hand material stores within a 15km radius

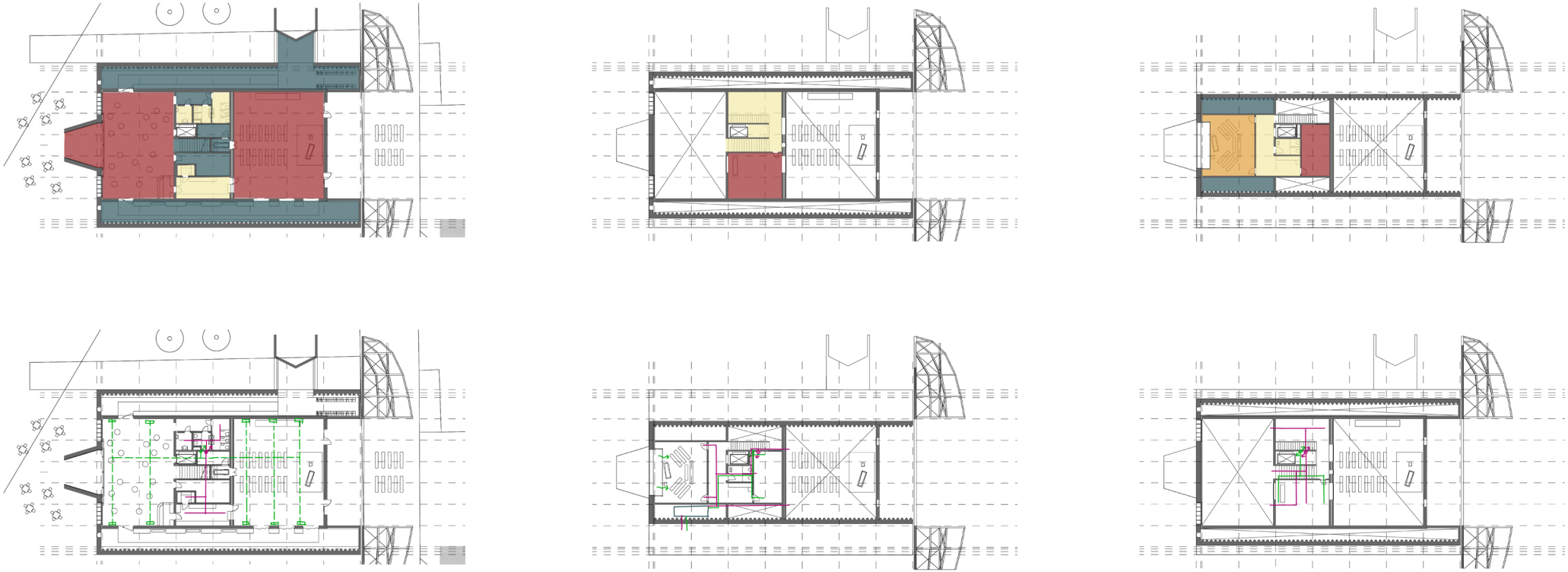


Figure 93: schemes showing the ventilation concept

3.5 Developed scenario

3.5.9 Climate concept

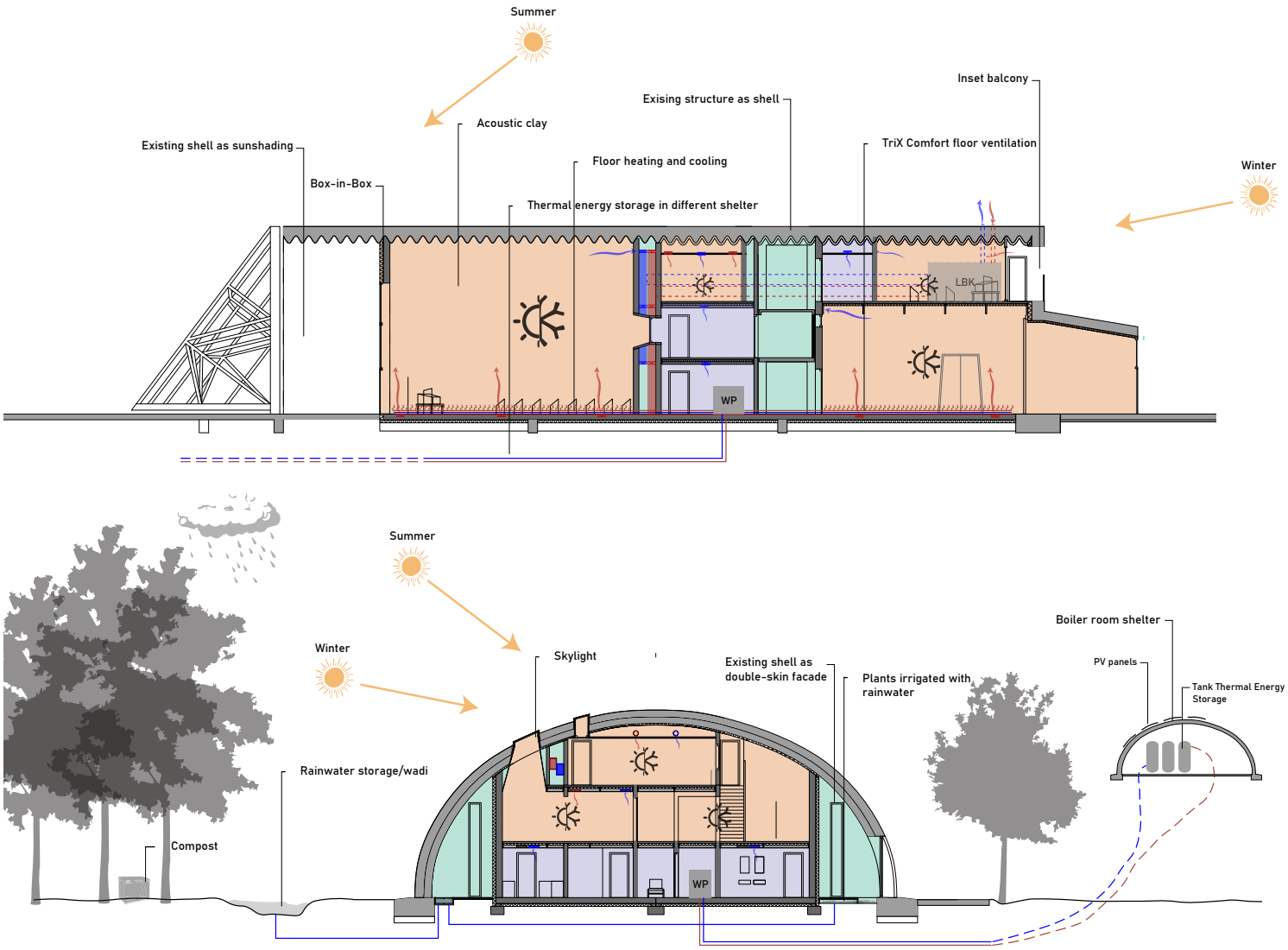


Figure 95: Climate sections showing the main principles

The sustainability is evaluated through the wilderness-based checklist:

- ☑ 1. Create pure air
- ☑ 2. Creates pure water
- ☑ 3. Stores rainwater
- ☐ 4. Produces its own food
- ☐ 5. Creates rich soil
- ☑ 6. Uses solar energy
- ☑ 7. Stores solar energy
- ☑ 8. Creates silence
- ☑ 9. Consumes its own wastes
- ☑ 10. Maintains itself
- ☑ 11. Matches nature's pace
- ☐ 12. Provides wildlife habitat
- ☑ 13. Provides human habitat
- ☑ 14. Moderates climate and weather
- ☑ 15. ... And is beautiful

Figure 96: Wilderness-based checklist

3.5 Developed scenario

3.5.10 Evaluation

The following paragraph provides an overview of the evaluation of the proposed scenarios and their overall impact on the site.

For the shelter area at Soesterberg Air Base, the scenarios that perform best overall are the ruin park, event ruin, and natural burial landscape. These scenarios align most closely with the criteria and generally strengthen the main values of Utrechts landschap.

However this is also because the nature value is strongly taken into account, if there would be more room for different functions then the cultural area or the school would be a good option. As a result, they demonstrate how new functions can coexist with both the heritage character and the ecological qualities of the former airbase.

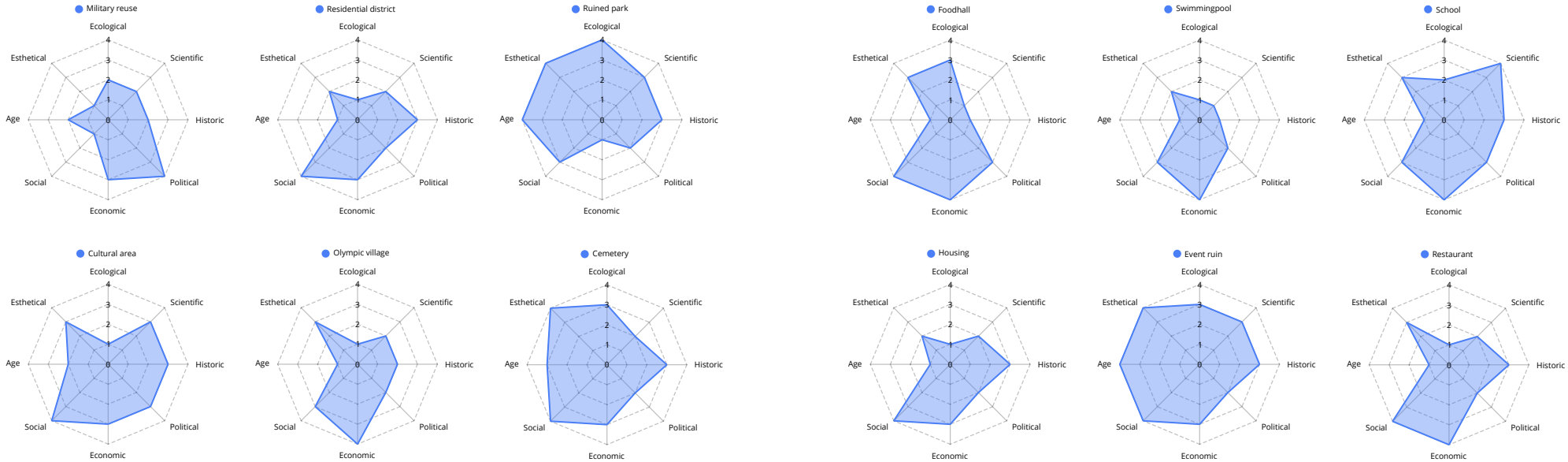


Figure 97: Graphs showing the impact of the scenarios on the heritage values

3.5 Developed scenario

3.5.10 Evaluation

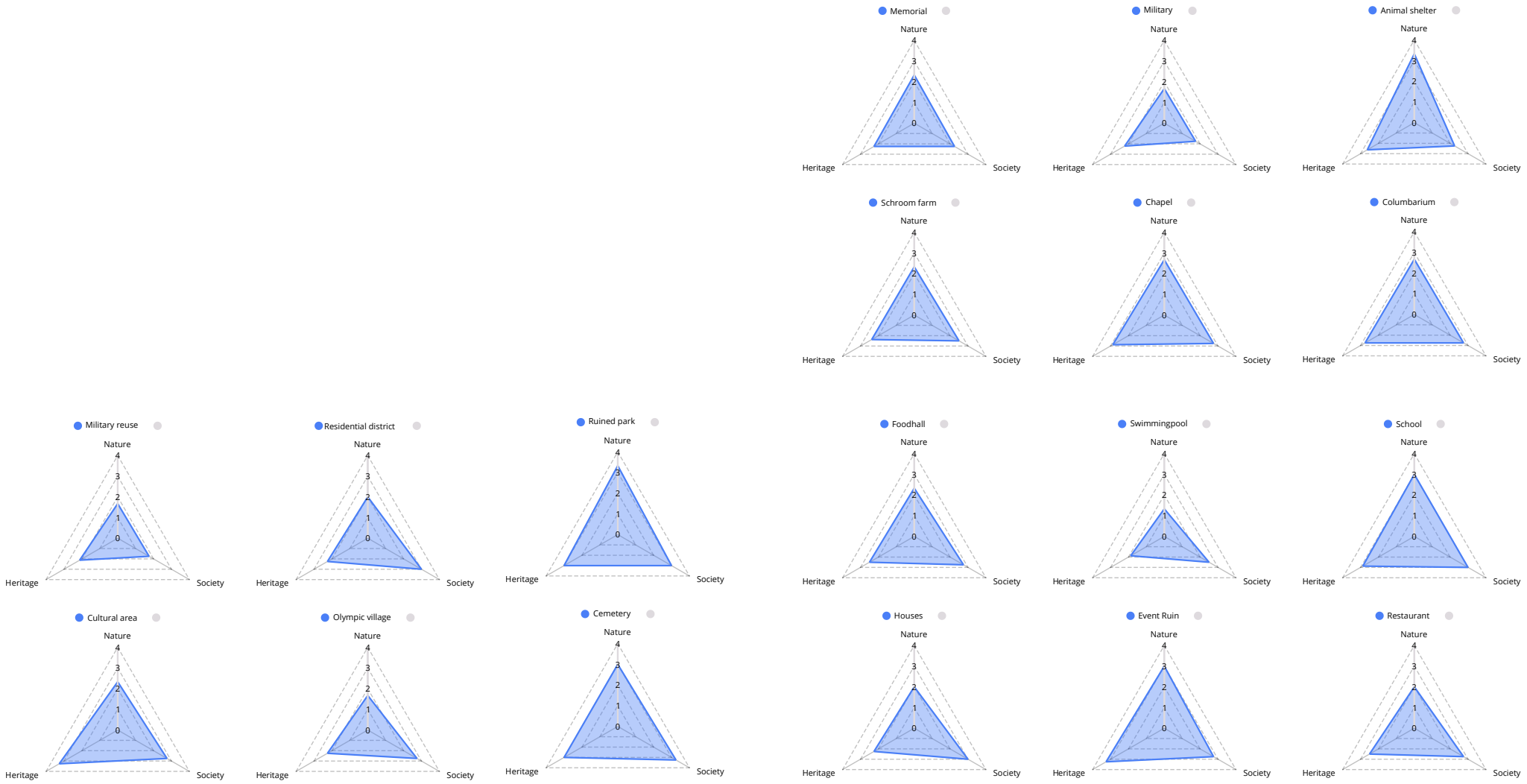


Figure 98: Graphs showing the impact of the scenarios on Utrechts Landschap's values

3.5 Developed scenario

3.5.10 Evaluation

Evaluation ensemble

Intervention

Small — Large

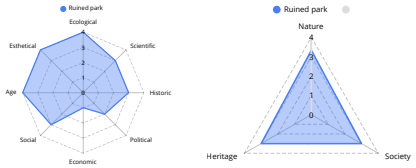
Public/Private

Public — Private

Occupation

0 06 12 18 24

Heritage & Utrechts Landschap



Evaluation ensemble

Intervention

Small — Large

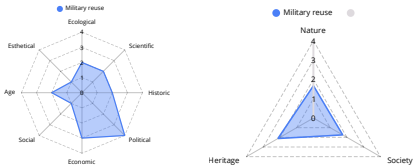
Public/Private

Public — Private

Occupation

0 06 12 18 24

Heritage & Utrechts Landschap



Evaluation ensemble

Intervention

Small — Large

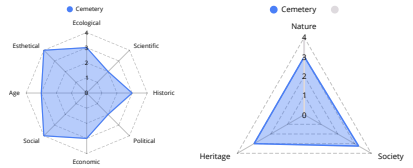
Public/Private

Public — Private

Occupation

0 06 12 18 24

Heritage & Utrechts Landschap



Evaluation ensemble

Intervention

Small — Large

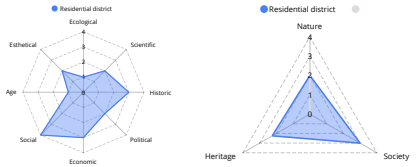
Public/Private

Public — Private

Occupation

0 06 12 18 24

Heritage & Utrechts Landschap



Evaluation ensemble

Intervention

Small — Large

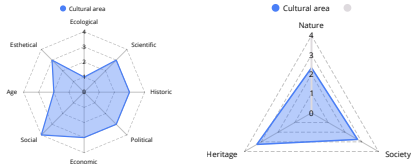
Public/Private

Public — Private

Occupation

0 06 12 18 24

Heritage & Utrechts Landschap



Evaluation ensemble

Intervention

Small — Large

Public/Private

Public — Private

Occupation

0 06 12 18 24

Heritage & Utrechts Landschap

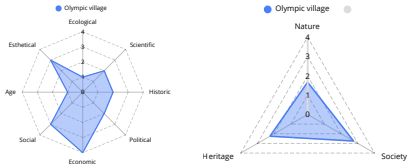


Figure 99: Evaluation of the ensemble scenarios

3.5 Developed scenario

3.5.10 Evaluation

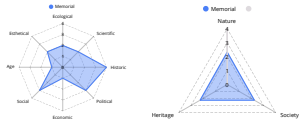
Evaluation shelter

Intervention:
- 95% Removed & 0% Added
- Method V

Public/Private
- Public

Occupation:
- Once a year a large ceremony
- 09:00-22:00

Heritage & Utrechts Landschap



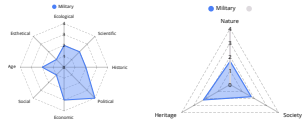
Evaluation shelter

Intervention:
- 0% Removed & 0% Added
- Method IX

Public/Private
- Private

Occupation:
- Whole year round
- 00:00-24:00

Heritage & Utrechts Landschap



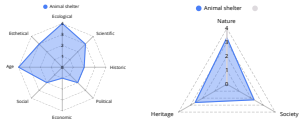
Evaluation shelter

Intervention:
- 15% Removed & 0% Added
- Method I

Public/Private
- Private

Occupation:
- Closed all year
- Closed

Heritage & Utrechts Landschap



Evaluation shelter

Intervention:
- 0% Removed & 20% Added
- Method III

Public/Private
- Private

Occupation:
- Mon-Sat
- 09:00-17:00

Heritage & Utrechts Landschap



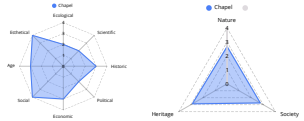
Evaluation shelter

Intervention:
- 10% Removed & 50% Added
- Method I, II, IX & X

Public/Private
- Semi Public

Occupation:
- Few times a week
- 09:00-14:00 & 17:00-22:00

Heritage & Utrechts Landschap



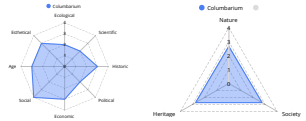
Evaluation shelter

Intervention:
- 50% Removed & 30% Added
- Method IV, V & IX

Public/Private
- Public

Occupation:
- Whole year round
- 08:00-22:00

Heritage & Utrechts Landschap



Evaluation shelter

Intervention:
- 45% Removed & 50% Added
- Method II, V & VII

Public/Private
- Semi-Public

Occupation:
- From spring till autumn
- 11:00-01:00

Heritage & Utrechts Landschap



Evaluation shelter

Intervention:
- 30% Removed & 60% Added
- Method I,II,IV,V

Public/Private
- Semi-Public

Occupation:
- Whole year round
- 07:00-21:00

Heritage & Utrechts Landschap



Evaluation shelter

Intervention:
- 35% Removed & 60% Added
- Method III & V

Public/Private
- Semi Public

Occupation:
- Mon-Fri
- 08:00-16:00

Heritage & Utrechts Landschap



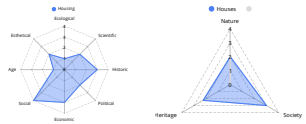
Evaluation shelter

Intervention:
- 35% Removed & 60% Added
- Method III & V

Public/Private
- Semi Public

Occupation:
- Mon-Fri
- 08:00-16:00

Heritage & Utrechts Landschap



Evaluation shelter

Intervention:
- 75% Removed & 40% Added
- Method IV,V, IX & X

Public/Private
- Semi Public

Occupation:
- Wed-Sun
- 12:00-02:00

Heritage & Utrechts Landschap



Evaluation shelter

Intervention:
- 80% Removed & 80% Added
- Method IV,V

Public/Private
- Semi-Public

Occupation:
- Wed-Sun
- 14:00-24:00

Heritage & Utrechts Landschap

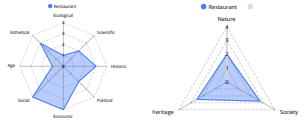


Figure 100: Evaluation of the shelter scenarios

Part 4. Conclusion

What are the conclusions? What are the implications? How do i look back on the project?

Part 4. Conclusion

4.1 Conclusion

4.1.1 Subquestions

First the subquestions will be answered, this lead to an answer to the main research question.

Which heritage values, spatial qualities, and architectural characteristics define the HAS at Soesterberg airbase?
The research identifies several key heritage values, the most important are the ecological significance of the site, the rarity of the shelter ensemble, and the way the shelters are hidden within the landscape through camouflage and vegetation.

In addition, the site possesses important intangible values related to memory, storytelling, and the perception of the Cold War era.
The spatial and architectural qualities of the HAS are defined by their ensemble composition, their unique construction, ribbed domed interior, and large open spaces. The harsh materiality of concrete and steel forms a strong contrast with the surrounding natural environment, creating a unique spatial atmosphere.

Which criteria, strategies and evaluation methods can form the basis of a design-based toolbox for the HAS?
The toolbox is structured around six main criteria: intervention, occupancy, public-private use, heritage values, the vision of Utrechts Landschap, and sustainability. Each criteria is evaluated through different methods.

In addition, the toolbox uses transformation strategies derived from literature being: perception, maintenance, behavioral, renovation, conversion, infill, redesign, subtraction, addition, material recycling and gestalt recycling. Together, these criteria and strategies provide a framework for organizing, comparing, and evaluating the scenarios.

Which transformation scenarios and future functions are compatible within the context?
The research proposes six ensemble scenarios and twelve shelter scenarios exploring a broad range of future uses and intervention. These scenarios investigate how the HAS can accommodate new functions while responding to the ecological, spatial, and heritage qualities of the site.

How can a selected transformation scenario be developed into an architectural design?
The natural cemetery scenario is further developed into a detailed architectural design. This design demonstrates how the toolbox can be applied in practice and how a transformation strategy can be translated into spatial interventions and architectural solutions.
At the same time, the design represents only one possible interpretation of the selected scenario, as each scenario can be developed in multiple ways depending on design choices and priorities.

How do the proposed interventions and design scenarios affect the heritage values and transformation potential of the HAS?
The evaluation shows that different interventions produce different effects on the heritage values, spatial qualities, and future usability of the shelters. Some scenarios preserve the existing atmosphere and materiality more strongly, while others prioritize accessibility, occupancy, or new functionality.
All scenarios are evaluated using criteria derived from the value assessment and the characteristics of the site. As a result, the outcomes are connected to the specific context of Soesterberg Air Base and may differ when applied to HAS ensembles in other locations.

4.1 Conclusion

4.1.2 Main research question

Through the subquestions the main research question can be answered.

To what extend can a design-based toolbox define the possibilities of transforming HAS at soesterberg airbase?

A toolbox can definitely guide the possibilities of transformation, furthermore it helps starting the conversation and it helps to compare certain scenarios. Depending on the goal of the toolbox different possibilities can be explored. This toolbox is primarily focused on heritage values and strategies and not on specific standardized interventions.

The research shows that a design-based toolbox can define and explore the transformation possibilities of HAS. By combining heritage values, spatial characteristics, intervention strategies, and evaluation methods into a single framework, the toolbox provides structure for comparing and evaluating different transformation scenarios.

Rather than ending up with one specific solution, the toolbox functions as a conversation starter that helps reveal opportunities, limitations, and conflicts between different scenarios. Depending on the focus, a toolbox can prioritize different aspects such as ecology, heritage preservation, occupancy, or sustainability.

This toolbox primarily focuses on heritage values and transformation strategies instead of standardized architectural interventions. As a result, it allows for a flexible approach in which multiple futures for the HAS can be explored while keeping the context and its values in mind.

4.2 Implications

The significance and implications of the project can be reflected upon at five different scale: the Heritage & Architecture department, the Faculty of Architecture and the Built Environment at the TU Delft, the architectural profession, the TU Delft in general and society.

Heritage & Architecture

For the Heritage & Architecture department, the project contributes to discussions on how changes in heritage values can be evaluated within adaptive reuse projects. It also demonstrates how the ten intervention methods proposed by the Vlaams Bouwmeester can be applied to a different building typology like the HAS.

Faculty of Architecture and the Built Environment

Within the faculty, the project raises broader questions about the role of adaptive reuse in architecture. It challenges the assumption that every existing structure must be transformed for human use and instead considers whether some buildings may be more valuable when given back to nature. In this way, the project opens a discussion on the balance between preservation, reuse, and ecological preservation.

Architectural profession

For the architectural profession, the research explores new possibilities for dealing with Cold War heritage and demonstrates how a toolbox can be developed from the specific values and characteristics of a site. This approach offers an alternative method for starting a design while incorporating the spirit and context of a place.

TU Delft

At the university level, the project contributes to discussions on how intangible architectural qualities can be quantified and communicated. By attempting to structure and quantify heritage values, the toolbox helps bridge the gap between architectural design and policy makers. It also illustrates the impact of different intervention strategies.

Society

On a societal level, the project provides new perspectives on how Cold War heritage can be approached in relation to current day challenges and conflicting interests, particularly between heritage and ecological. The toolbox can support stakeholders in future plan making processes. Next to that it raises the question whether human use should always be the focus in development or that maybe we should reserve more space for animals and plants as

4.3 Reflection

The project started from a personal interest in Cold War heritage, adaptive reuse and conceptual design. Leading to the creation of a toolbox. However at first this was quite difficult to define and the toolbox remained vague. One of the difficulties was how to quantify and evaluate scenarios without fully developing them. First the ambition was to create a toolbox that would be applicable to all shelters and airbases around Europe. However, this was difficult to achieve for the design and its criteria are mostly influenced by the specific context and values. Resulting in the narrowing down of the research.

While further developing one of the scenarios the focus shifted towards this design and the toolbox moved into the background. Making me doubt about what should be the main focus of the graduation project and how to balance between the design and the toolbox. Eventually I managed to bring them both together into one project.

An important aspect of the process was the use of different research and design techniques. Maintaining a better balance between sketching, testing, and finalizing ideas helped strengthen the development of the project. In addition, integrating constructional and climate design from the beginning resulted in a more coherent architectural design.

What also really proved useful was brainstorming with fellow graduation students, this helped organizing my thoughts and also brought new insights

A point that could be further developed is the applicability of the research findings on other shelters. While the project demonstrates how the toolbox can be applied to the HAS at Soesterberg Air Base, further research could investigate which principles, evaluation methods, and design strategies can be transferred to other shelters, cold war heritage or adaptive reuse in general.

Part 5. Back matter

Appendices and references

Sources

The sources are divided into literature references and illustrations. All illustrations and images without a references are self produced. AI has only been used as tool to check grammar and help translations.

Literature

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	Memorial	military	Animal shelter	shroom farm	chapel	columbarium	Foodhall/market	swimming pool	school	houses	Event ruin	restaurant
Nature												
1	3	2	4	2	2	2	2	1	2	1	3	1
2	2	2	4	2	3	3	2	1	3	2	3	2
3	2	1	2	3	3	3	3	2	4	3	3	3
total	2,33	1,67	3,33	2,33	2,67	2,67	2,33	1,33	3,00	2,00	3,00	2,00
	Memorial	Military	Animal shelter	shroom farm	chapel	columbarium	Foodhall/market	swimming pool	school	houses	Event ruin	restaurant
Society												
1	3	3	2	3	3	3	3	3	3	3	2	3
2	1	1	1	2	2	2	2	2	3	4	3	3
3	3	2	2	1	4	4	4	4	4	3	4	4
4	2	1	4	4	2	2	2	1	2	2	2	1
total	2,25	1,75	2,25	2,50	2,75	2,75	2,75	2,50	3,00	3,00	2,75	2,75
	Memorial	Military	Animal shelter	shroom farm	Chapel	columbarium	Foodhall/market	swimming pool	school	houses	Event ruin	restaurant
Heritage												
1	2	2	4	3	2	2	3	1	2	1	3	1
2	2	2	3	3	2	2	1	1	4	2	3	2
3	4	2	2	1	3	3	1	1	3	3	3	3
4	3	4	2	2	2	2	3	2	3	2	2	2
5	1	3	1	4	3	3	4	4	4	3	3	4
6	3	1	2	2	4	4	4	3	3	4	4	4
7	1	2	4	2	3	3	1	1	1	1	4	1
8	2	1	3	2	4	3	3	2	3	2	4	3
total	2,25	2,125	2,625	2,375	2,875	2,75	2,5	1,875	2,875	2,25	3,25	2,5

	Military reuse	Residential district	Ruined park	Cultural area	Olympic village	Cementary
Nature						
1	2	1	3	2	1	3
2	2	2	3	3	2	3
3	1	3	4	2	2	3
total	1,67	2,00	3,33	2,33	1,67	3,00
	Military reuse	Residential district	Ruined park	Cultural area	Olympic village	Cementary
Society						
1	3	3	4	3	3	4
2	1	4	1	2	3	2
3	2	3	3	4	4	3
4	1	2	4	2	1	4
total	1,75	3,00	3,00	2,75	2,75	3,25
	Military reuse	Residential district	Ruined park	Cultural area	Olympic village	Cementary
Heritage						
1	2	1	4	1	1	3
2	2	2	3	3	2	2
3	2	3	3	3	2	3
4	4	2	2	3	2	2
5	3	3	1	3	4	3
6	1	4	3	4	3	4
7	2	1	4	2	1	3
8	1	2	4	3	3	4
total	2,125	2,25	3	2,75	2,25	3