
Photo by Mingke Zhu

PLOTS IN THE WOOD

P1 REPORT

APRIL 15TH 2019

COLOFON

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GRADUATION STUDIO

HERITAGE & ARCHITECTURE

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1. INTRODUCTION

1.1 INTRODUCTION

The ensemble 'plots in the woods' lays in the center of the former military complex of Hembrug. The initial research done on the contextual scale has shown the development of Hembrug over time and the role the complex has played in the past and will play in the future. The research clearly indicated the very practical attitude of the military. Functionality always was one of the key points during the whole lifetime of Hembrug. This is visible on all scales, from the decision to place the production of weaponry on Hembrug in the first place, to the set-up of the production process on site.

As stated in SteenhuisMeurs (2010), the functional design approach stems from the historical division of tasks in the military. In the second half of the 19th century, the construction of the fortifications and defense lines was the responsibility of the 'Korps der Genie'. This branch of officers was highly educated in diverse fields and were trained for four years at the Royal Military Academy (KMA). Here, the Genie-officers were also trained in civil architecture and they learned about topics such as materials, construction, organization and decoration of buildings. The proper approach towards proportions, composition, symmetry and a constant grid were also part of this training. The architecture practiced by the Artillerie Inrichtingen is no exception within this schooling.

However, when visiting the ensemble, functionality is certainly not the first thing that springs to mind. The cluster of small-scale buildings hidden in the greenery, separated by narrow strips of water, creates a romantic atmosphere, hence the name 'plots in the woods'. It reads more like a village than a military production site.

Therefore, the goal of this analysis is to determine:

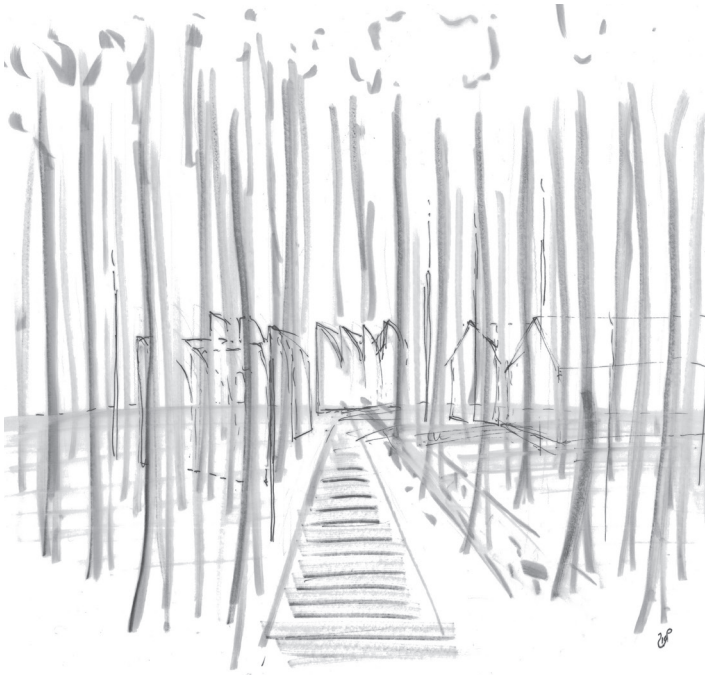
'How does the functional design approach practiced by the 'Artillerie Inrichtingen' presents itself in the 'plots in the woods?'

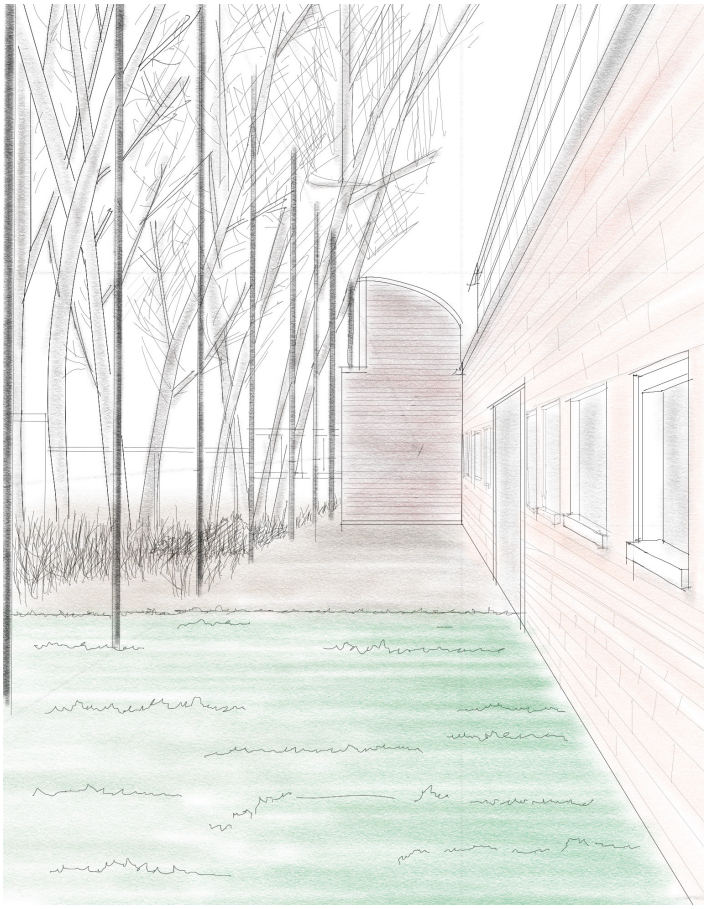
This will address the role of 'the plots in the woods' in the bigger context, the production process, the design of the landscape and the design of the specific buildings. The aim is to find out what is functional on site, what is not and especially why. After this in-depth analysis, an assessment is made about the values this functional approach brings to Hembrug. With these values as a basis, each student forms an individual position statement, addressing the opportunities and challenges they have identified.



Location of 'plots in the wood' within Hembrug. Image by Amanda Verschuur.

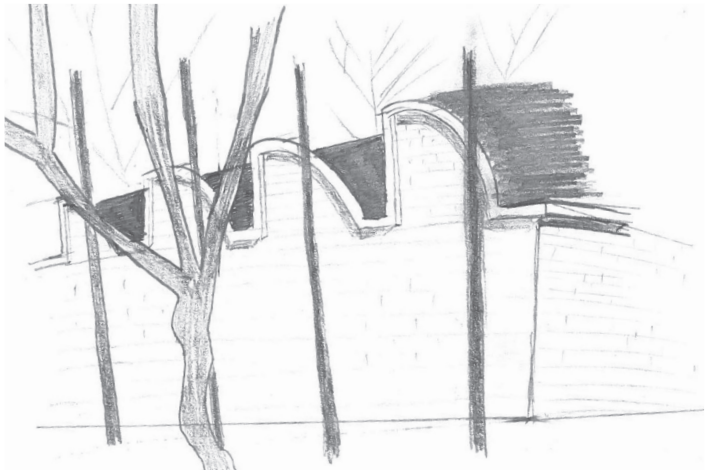
1.2 FIRST IMPRESSIONS





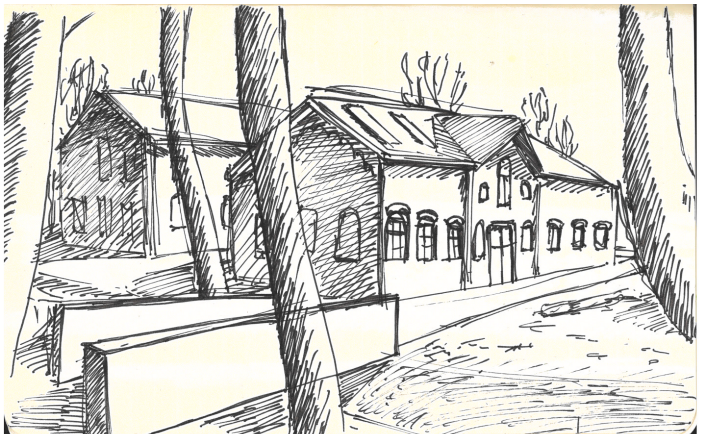




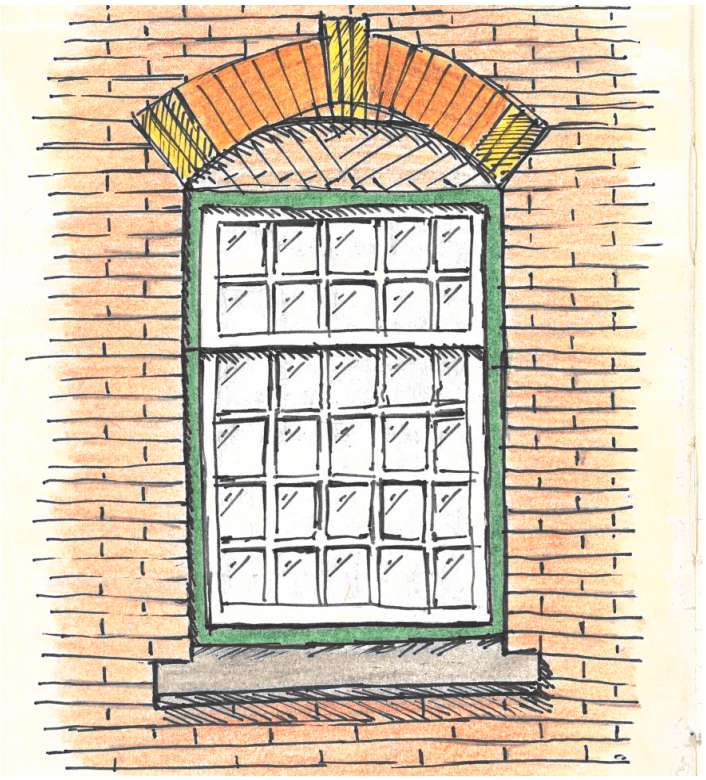


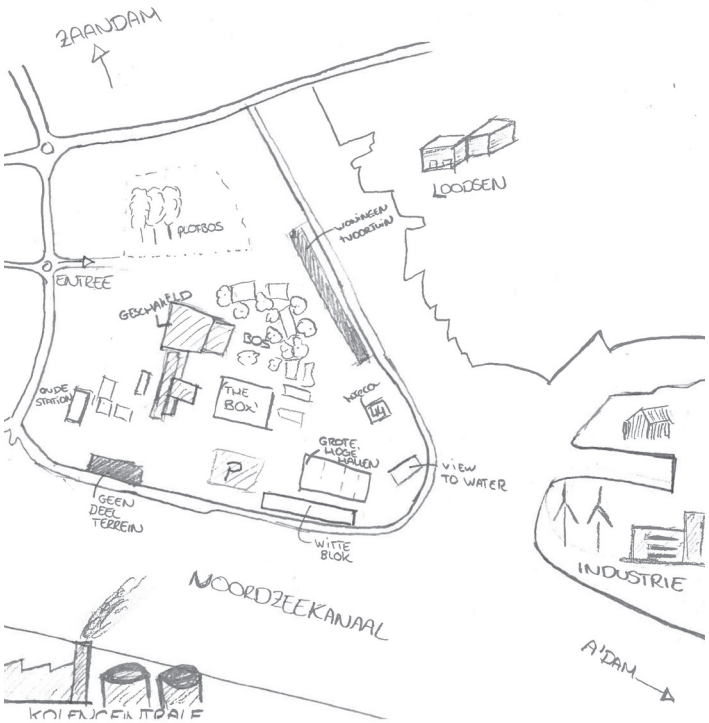
First impressions during the site visit.
Images by all team members.







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LOODSEN
PLOTBOS
WONINGEN TWOORTWIN
ENTREE
GESCHAKELD
BOS
OUDE STATION
'THE BOX'
KERCO
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GEEN DEEL TERREIN
WITTE BLOK
INDUSTRIE
NOORDZEEKANAAL
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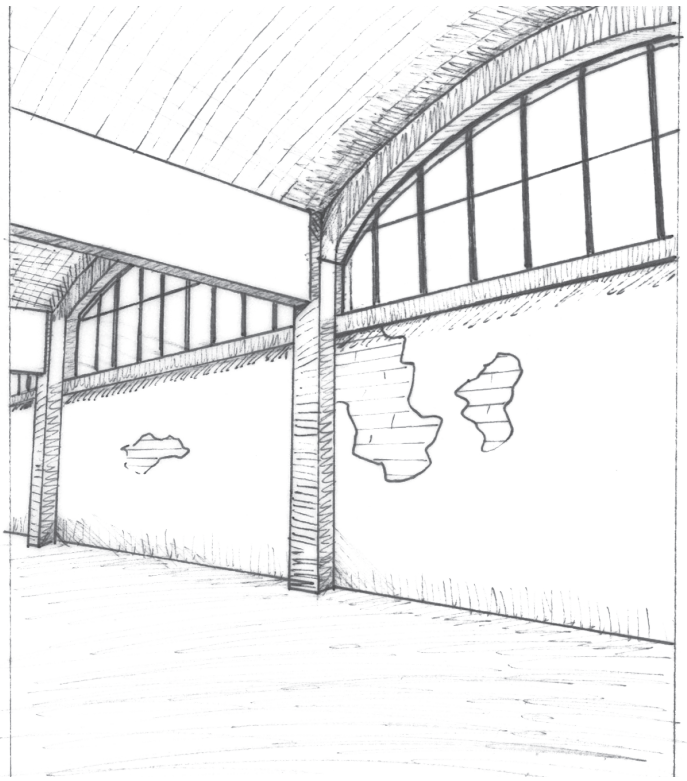


2. PLOTS IN THE WOOD



INTRODUCTION

To answer the posed research question 'How does the functional design approach practiced by the 'Artillerie Inrichtingen' presents itself in the 'plots in the woods', this analysis focuses on different scale levels.

The first scale level is the ensemble as a whole. As indicated by the name 'plots in the woods', 'the woods' play a significant role in this ensemble. The analysis of the landscape and the lay-out of the site will bridge the gap between the contextual research of Hembrug and the research on the scale of the buildings and show the interrelations within the plot.

This chapter is split up into six parts. To provide the reader with the necessary background information for this analysis, the historical development of the site is shown within a time line, stating the most important changes. After that, the analysis addresses five relevant topics, which are necessary to answer the main research question: the topography, the spatial elements present, the atmosphere, the production process of munition and at last the functions of the buildings on site. For each of these topics a sub-question is posed in the corresponding sub-chapter.

The topography sub-chapter deals with the physical properties and main functions of the topographical landscape. The topography of a site forms the context for every design project and is therefore an essential part of this analysis.

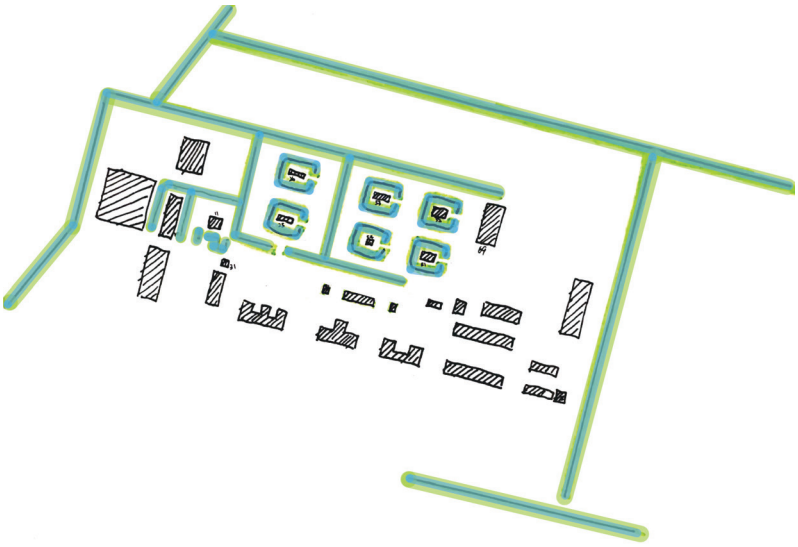
Within this landscape there are some very characteristic spatial elements present. Their functionality and relations with the surroundings will be analyzed, to determine what their role is in the 'plots' and how to possible deal with them in case of a transformation.

Besides the characteristic elements, the atmosphere on site is also unique for Hembrug. For most students this atmosphere was the reason to select this ensemble. Therefore, it is important to understand how this specific atmosphere came to be and if creating this atmosphere was the intention of the original design.

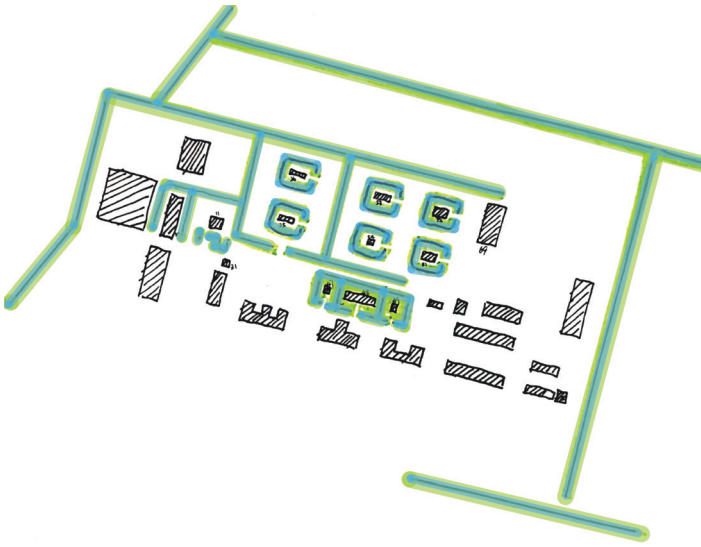
One of the most important aspects in understanding how the 'plots in the woods' functioned, is the production process of the munition and pyrotechnics. Without knowing how certain products were manufactured, it is very difficult to grasp the reasoning in the lay-out of the site and the development over time. The functional properties of the buildings and the story of what used to happen here give the landscape, the elements and the buildings meaning.
And last, the specific functions of, and relations between, the buildings on site will be discussed. This sub-chapter will form the bridge between the 'plots' scale and the more in-depth 'building' scale, which will follow in the next chapter.

2.1 Timeline

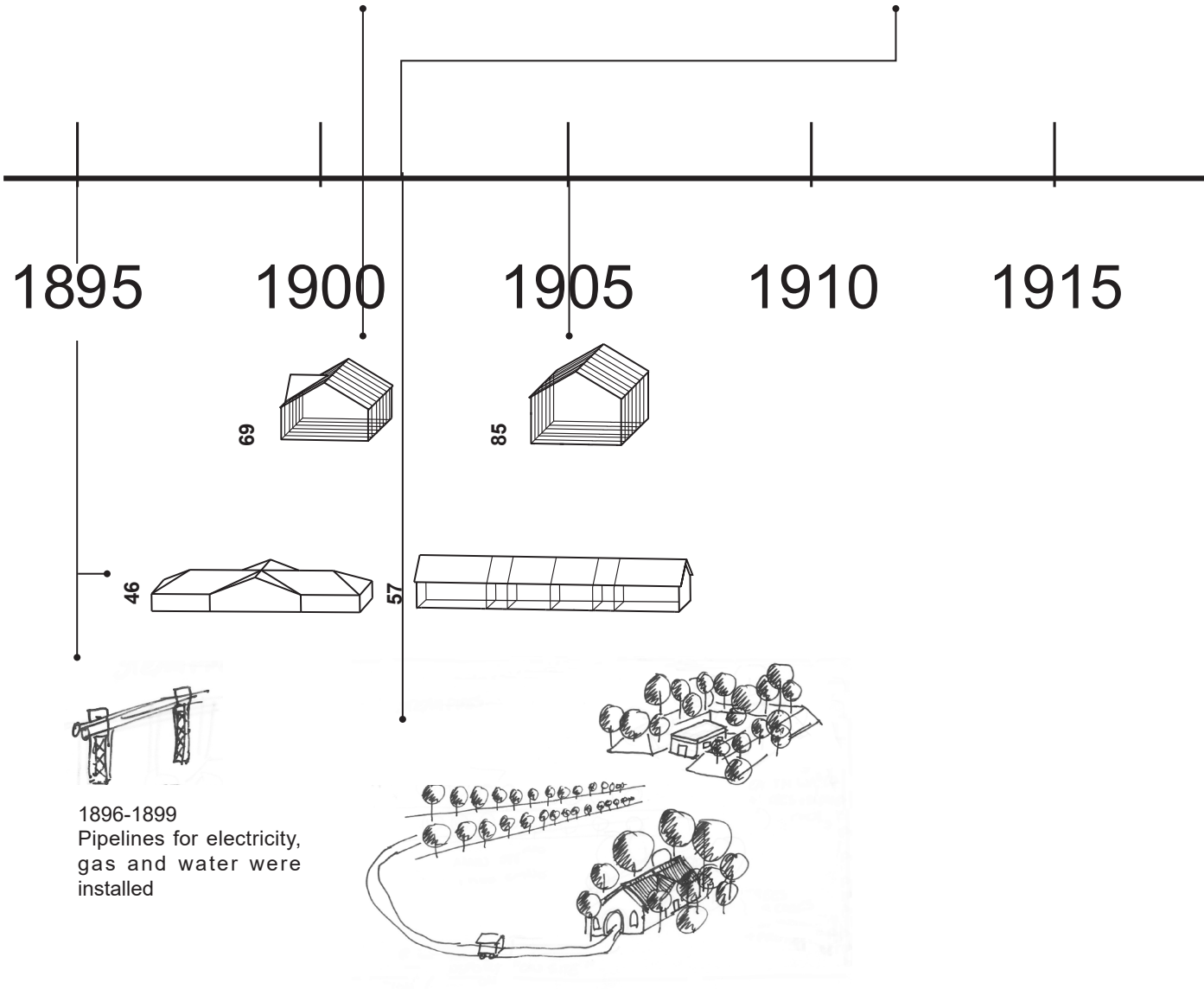
2.1.1 TIMELINE



1901
Ditches and earthen walls are built around palces where explosion hazard is high



1902
Earthen walls built around building 47-49
Trees planted along the paths and where explosion mixture were stored



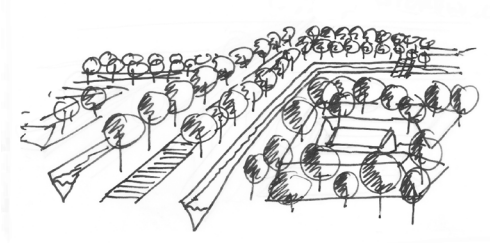
1896-1899
Pipelines for electricity, gas and water were installed

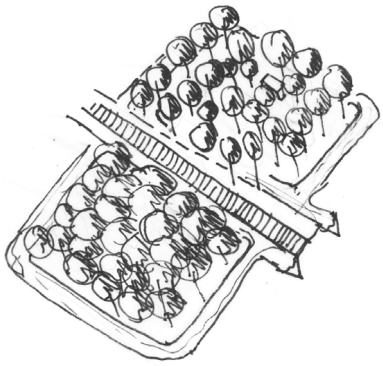
Timeline overview, from 1895 to 2019, made by Mingke Zhu & Lucas Pol



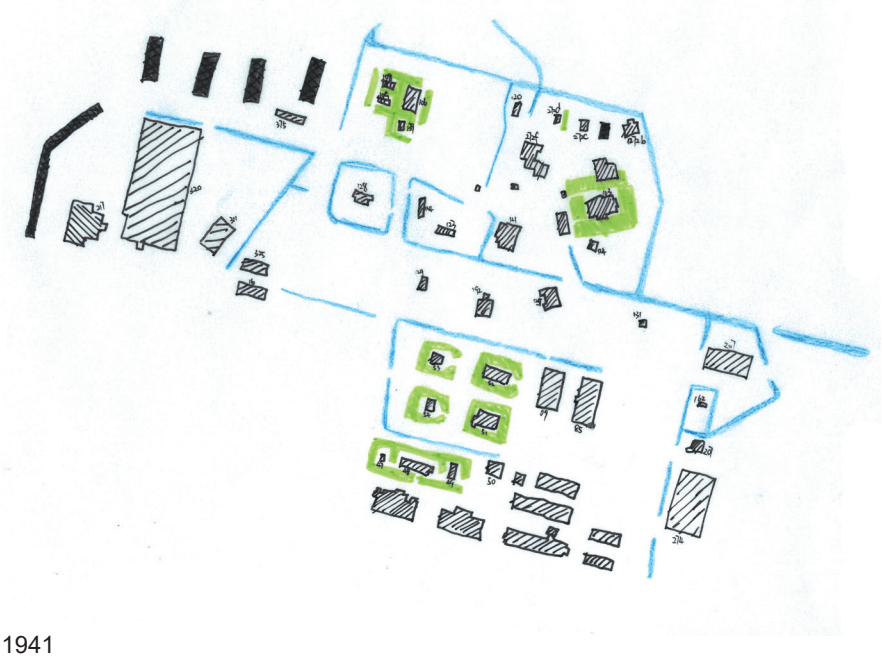
1924
Ditches and earthen walls expanded into the north, and clay forest formed
Clusters of walled warehouses and testing buildings were built in the clay forest

1920 1925 1930 1935 1940





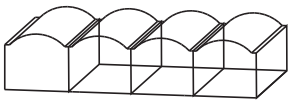
1940
Densification of forest



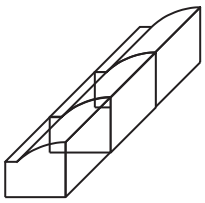
1941
Bunkers built in the forest,
Some earthen walls disappeared

1940 1945 1950 1955 1960 ...

414



415/420



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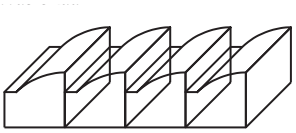

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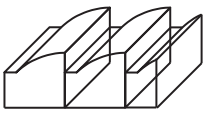
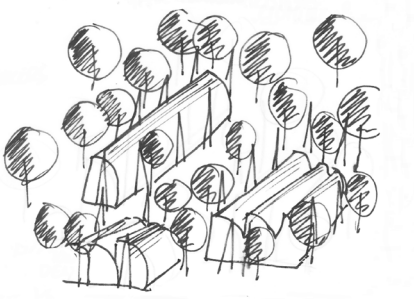




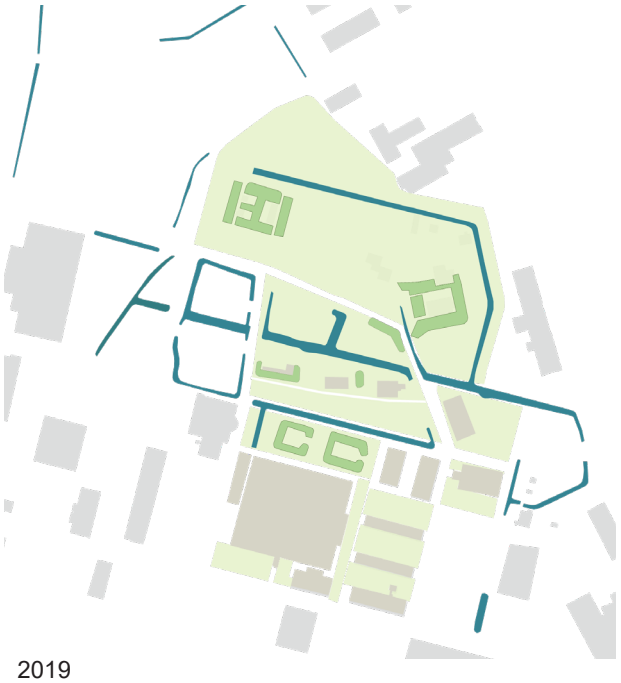


1952
"Shell roof" and "Circular roof" buildings were built;
Lightning conductors also were built beside to reduce the explosion risk

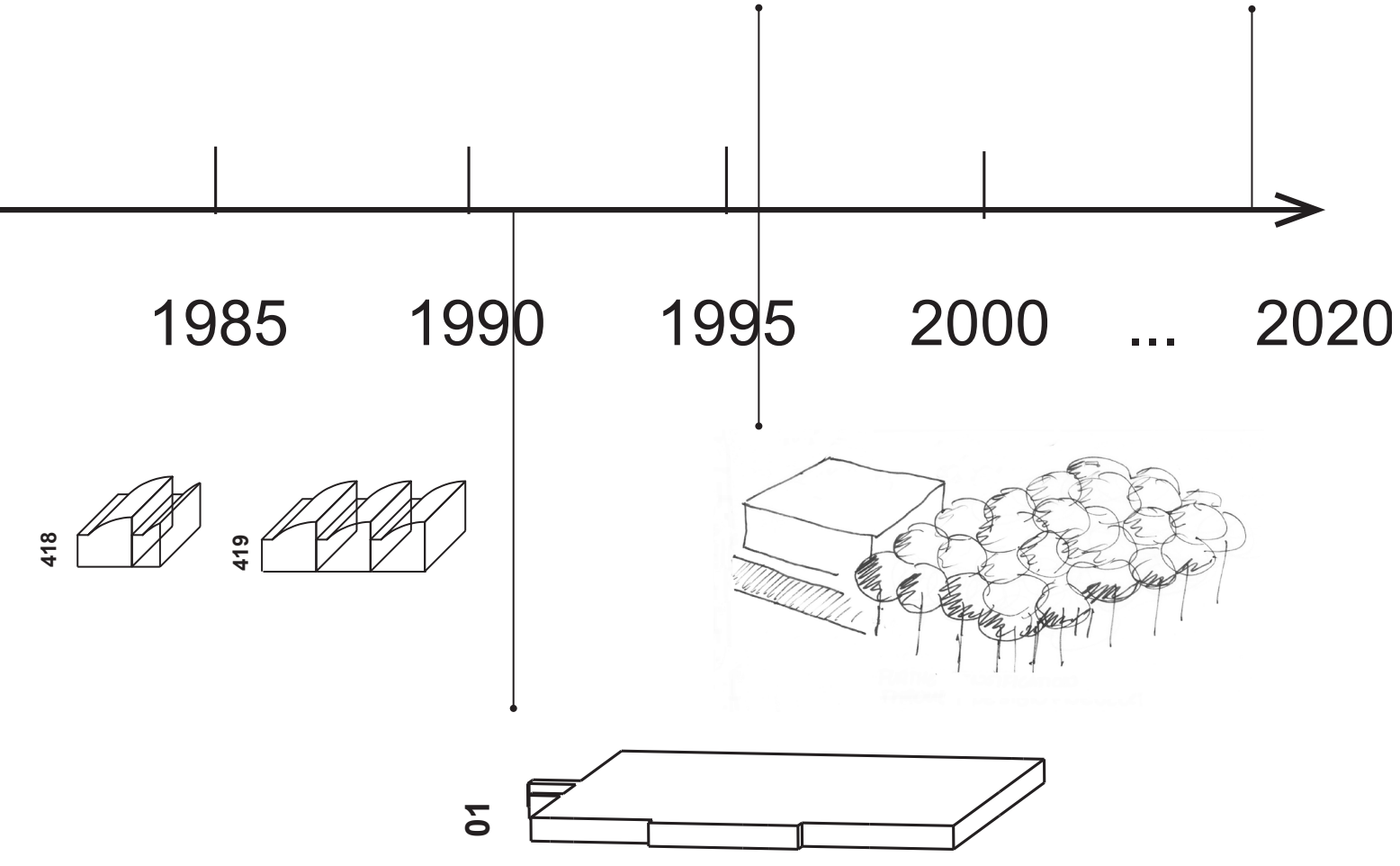
Timeline overview, from 1895 to 2019, made by Mingke Zhu & Lucas Pol



1996
Expansion of the forest to almost entire north part

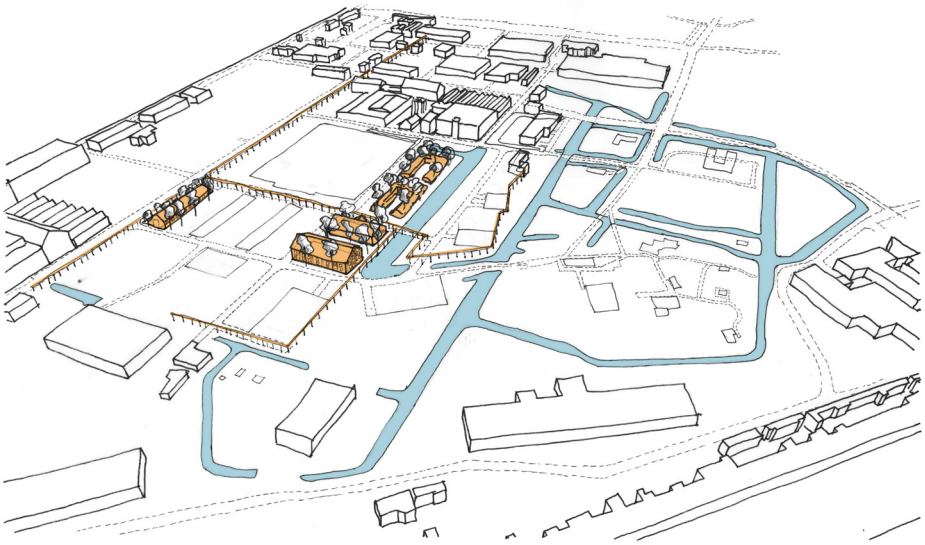


2019
Cleaning works are being done on site. Three earthen walls are added on site.



1991
Large building 1 replaced the small SASgebouws

2.1.2 CONCLUSION

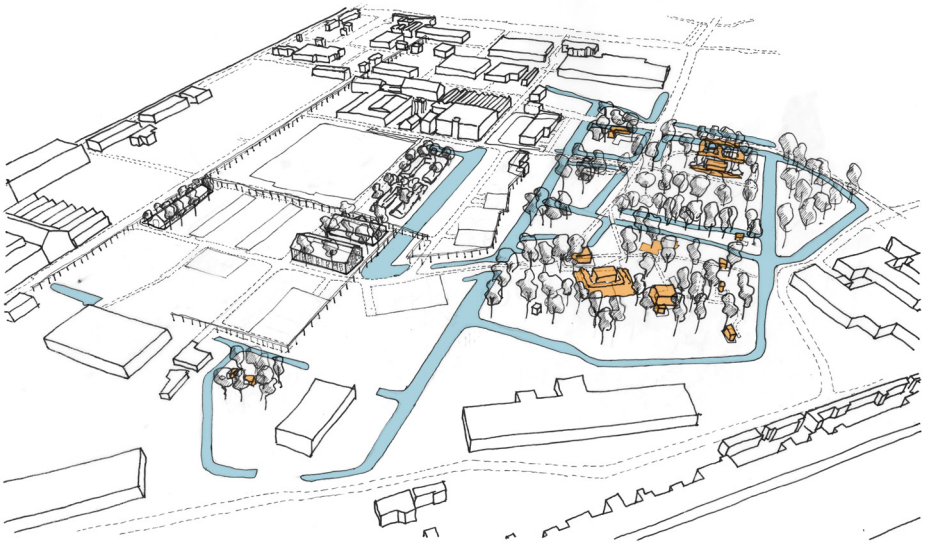


Overview in 1895-1920, sketch by Lucas Pol, analysis by Mingke Zhu

Above-ground pipelines are installed in 1896-1899 to produce steam heat to site.

Two gable roof buildings are the oldest ones in the plots in the woods. Building 69 was built in 1901 and building 85 was built in 1905.

Two earthen walls have been there since the beginning to protect the other buildings from damage when there is an explosion.



Overview in 1920-1941, sketch by Lucas Pol, analysis by Mingke Zhu

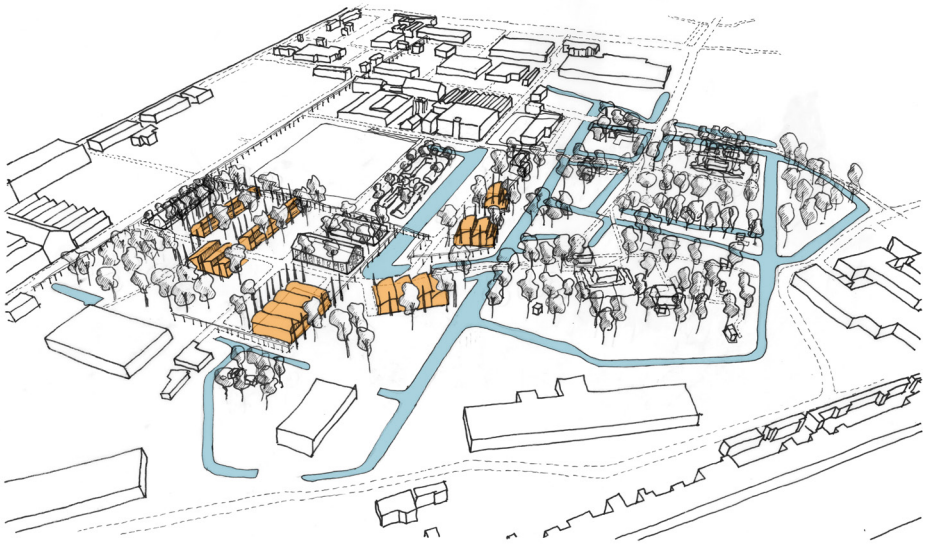
Forest was densifiied to the north.

More ditches were formed with the built of many clusters of walled warehouses and testing buildings.

Bunkers was built on site.

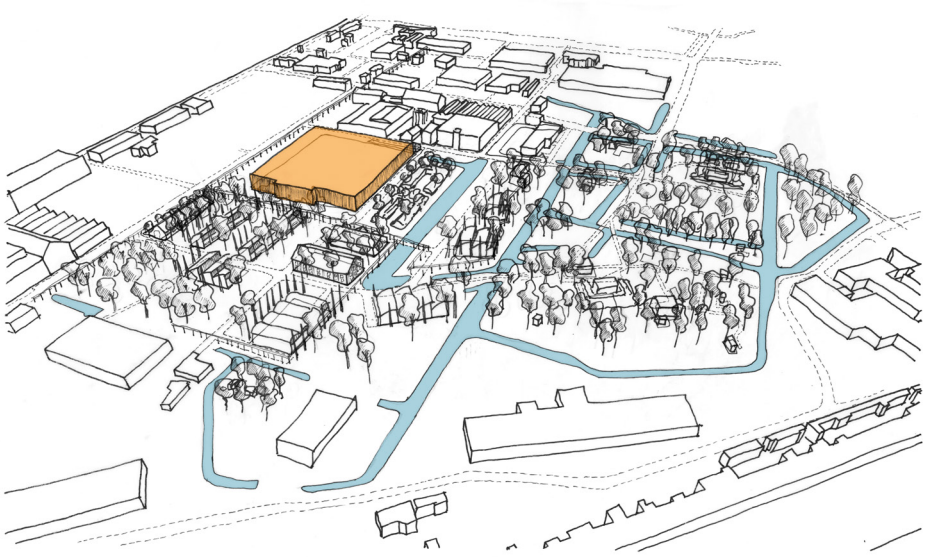
"Shell roof" and "Circular roof" buildings were built on site in 1952.

Lightning conductors also were built beside to reduce the explosion risk.



Overview in 1941-1973, sketch by Lucas Pol, analysis by Mingke Zhu

Large building 1 replaced the small SAS buildings. The terrain logic and grown structure were abandoned.



Overview in 1973-2019, sketch by Lucas Pol, analysis by Mingke Zhu

2.2 Topography



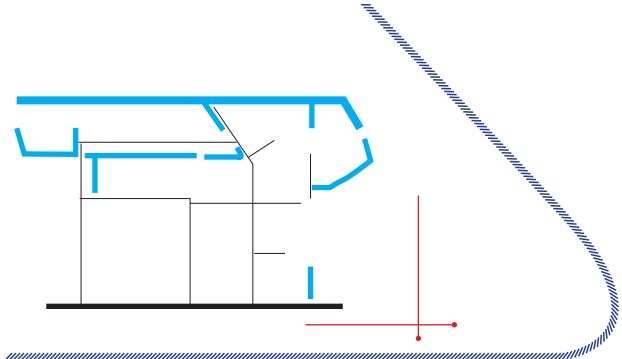
Birdseye view of the plots in the wood, screen cut from the website: https://artillerieinrichtingenhembrug.wordpress.com/category/filmpjes/,diagram by Mingke Zhu

2.2.1 TYPICAL TOPOGRAPHY

Hembrug, an artificial land filled up along the riverbank of Zaandam has its own identity with both natural and industrial elements. Our site, the plots in the woods, is also a place full of contrast. Locates in the heart of the Hembrug, which connects the southern production area and the northern testing area. There are contrast between the buildings and greenery, and between regular grid of construction (buildings and buildings are mostly perpendicular or horizontal to the canal) and irregular rhythm of trees in the wood. It is hidden in the green canopy of tall trees, offering a smooth transition to the clay forest.

The ditches and earthen walls provides the site with ups and downs. Which make the plots in the woods more unique with its landscape. It must contains historical value of the past old days. So research question is raised that what are the physical properties and main functions of the topographical landscape in the “plots in the wood” area?

Ditches separate the land between buildings, which is a main characteristic of the site. When a new test building was needed, a piece of island surrounded by ditches would be formed. They separate test buildings and act as extinguishing reservoirs. Besides, some even with earthen walls about 2.5 meters high to isolate the explosion.

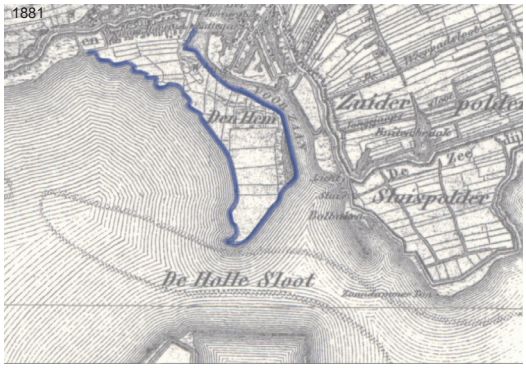


Roads and waters are horizontal or perpendicular to the canal, by Mingke Zhu

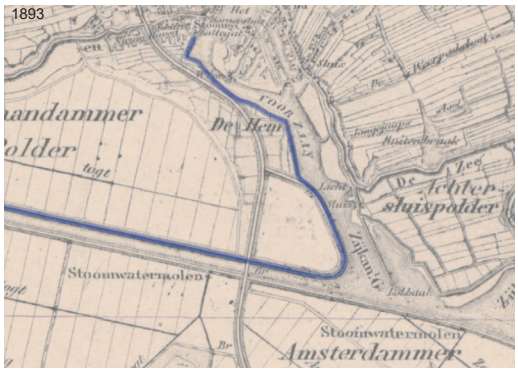


Sketch of the unique land seperation on site, by Mingke Zhu

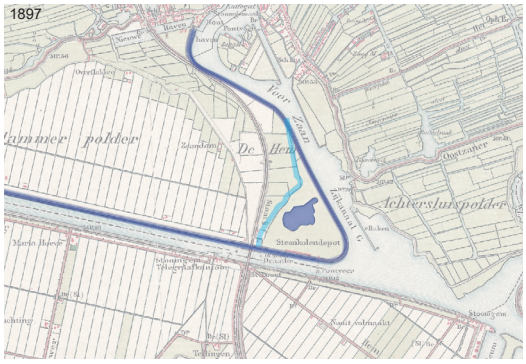
2.2.2 DEVELOPMENT



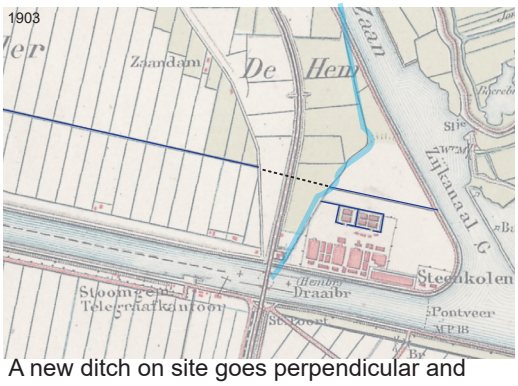
The original riverbank line.



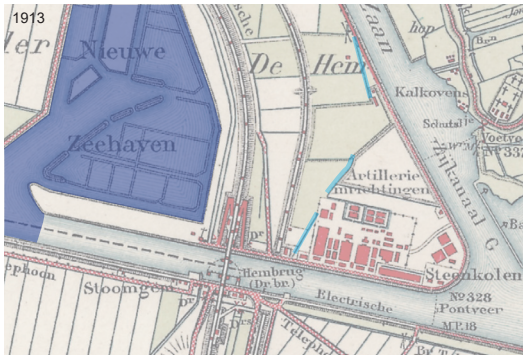
Artificial land and North sea canal was built.



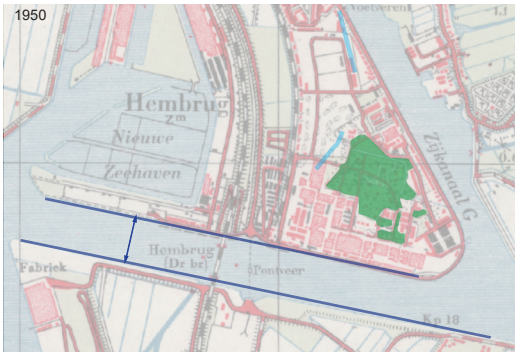
Only a pond is there. Old riverbank is still visible but become a ditch on site.



A new ditch on site goes perpendicular and continuous to the ditch next to Hembrug, which later became a border between military and artillery. Earthen walls are built where explosion hazard is high.



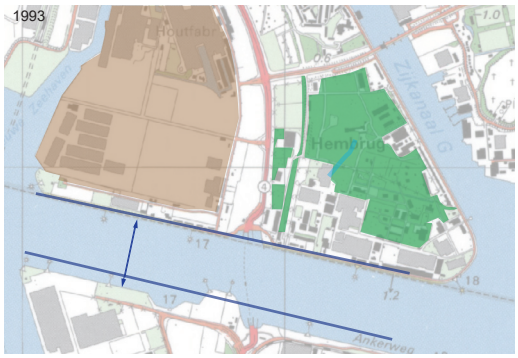
Some part of the ditch which used to be old riverbank is filled up.



Canal was widen. Fragments of the original riverbank is visible. More trees grew on site.



Trees grew to the north part of Hembrug and along the border which make Hembrug more hidden.

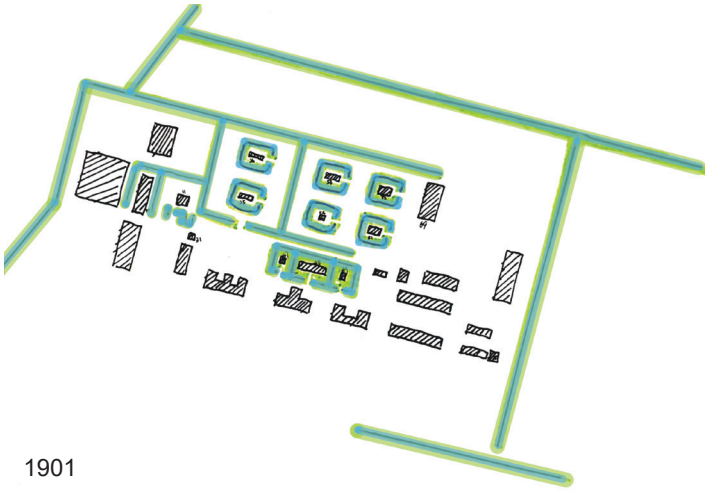


Canal was widen. Only a small part of the original riverbank is visible. Trees grew entirely in Hembrug.

Riverbank line changes
Ditches used to be the original riverbank
Greenery

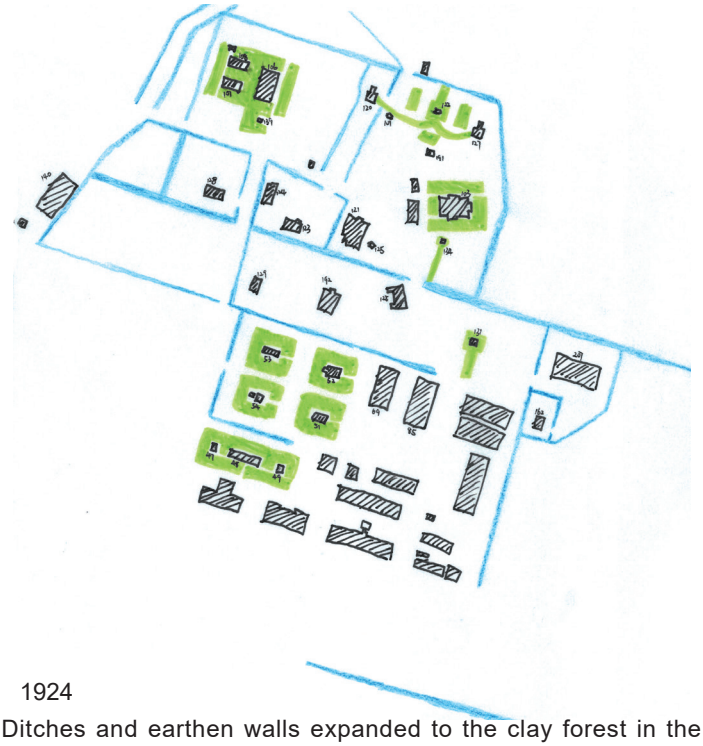
On site, we can even notice the very old stream traced back to the original coastal line. There is still part remaining in Hembrug. by Mingke Zhu

2.2.2 DEVELOPMENT



1901

Ditches and earthen walls are built around places where explosion hazard is high. They also worked as boundaries of the Artillery Establishment, which close up the Hembrug terrain.



1924

Ditches and earthen walls expanded to the clay forest in the north.
Clusters of walled warehouses and testing buildings were built in the clay forest.



1941

Bunkers built in the forest.
Some ditches and earthen walls disappeared.

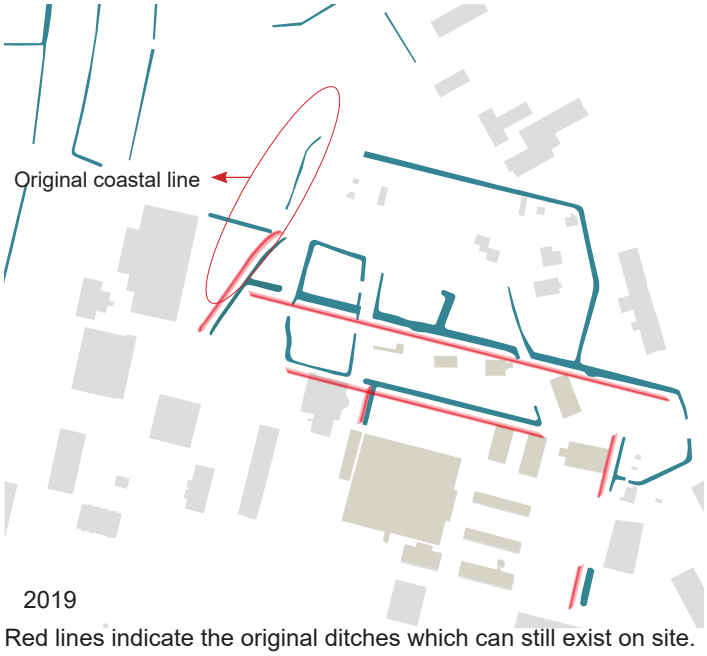


1996

Since large production hall replaced some small buildings, some earthen walls and ditches disappear as well.

Main ditches built in 1901. The branches went into the forest in the following years with the setup of new testing buildings. In the south part, ditches and earthen walls decreased by years. Diagrams by Mingke Zhu

2.2.2 DEVELOPMENT



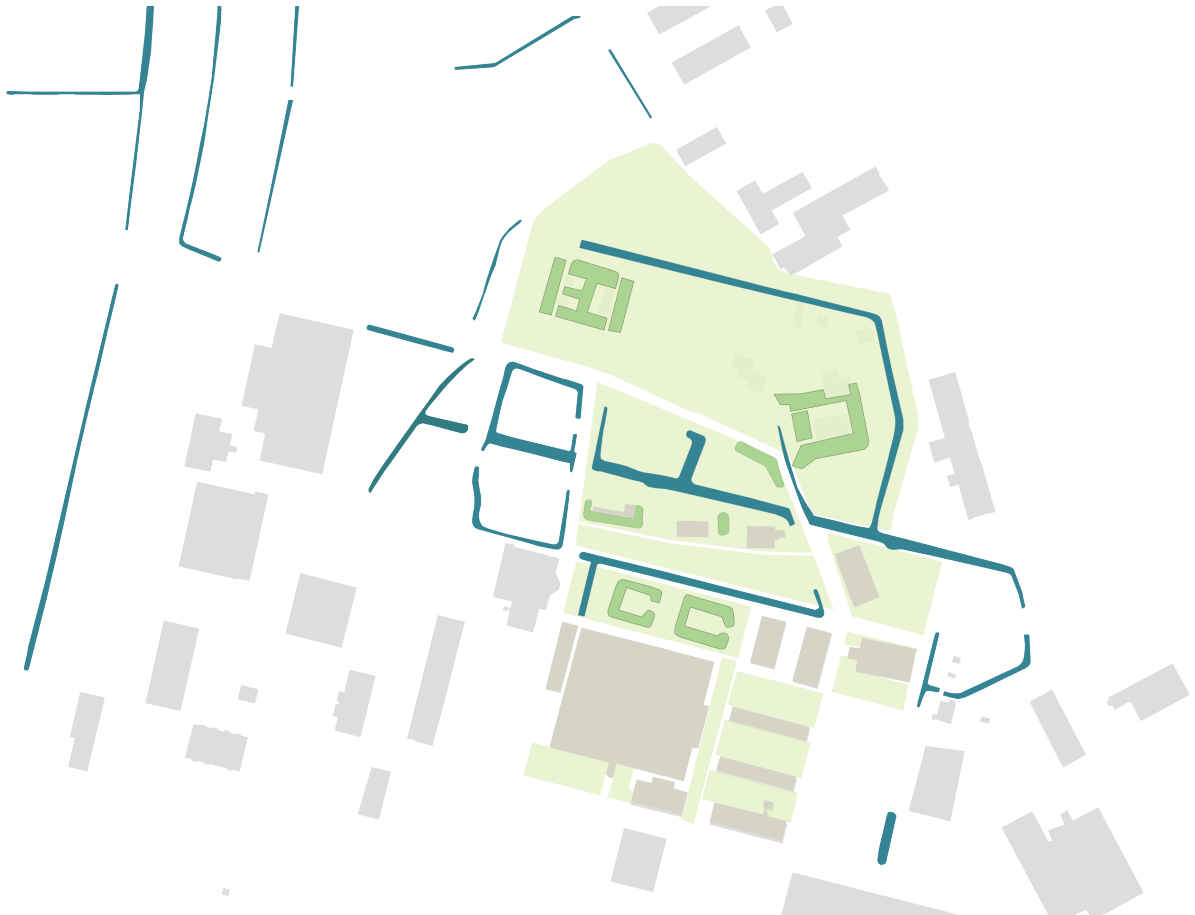
2019

Red lines indicate the original ditches which can still exist on site.



2019

Old earthen walls which still exist on site.



2019

Ditches and earthen wall in current situation. Some new ditches and earthen walls appears due to the cleaning work on site now.

Diagrams by Mingke Zhu



2.2.3 CONCLUSION

The plots in the woods has a unique landscape compared to other areas, apart from the clay forest. There is age value on trees, earthen walls and ditches. The layout of the ditches has a relationship with the original riverbank . There is also non-intentional value of the landscapes and orientation of layout, which shows the it was a strict area for the military. The unique landscape also create spiritual value of hidden.

The site is covered by greenery. Ditches separate the land in between the buildings. Earthen walls are standing on the land surrounded by the ditches. The ditches and the roads are perpendicular to the North sea canal. The ditches and earthen walls were added whenever a new test building was built. Trees were planted along the paths and surround the buildings. Greenery grew a lot because of lack of maintenance after the site was abandoned in 2003. Fragments of the old riverbank is still visible on site somewhere. Large amount of greenery provides smooth transition to the forest. There is also contrast between the irregular rhythm of the trees in the wood and regular grid of infrastructure.



Ditches near building 416, which become boundary between the Artillery area and Military area, also now as a boundary of accessibility, photography by Mingke Zhu



Oldest earthen wall in Hembrug. It is about 2.5 meters high. Cleaning works are doing there. Photography by Mingke Zhu

2.3 SPATIAL ELEMENTS

2.3.1 ASSESSMENT OF SPATIAL ELEMENTS

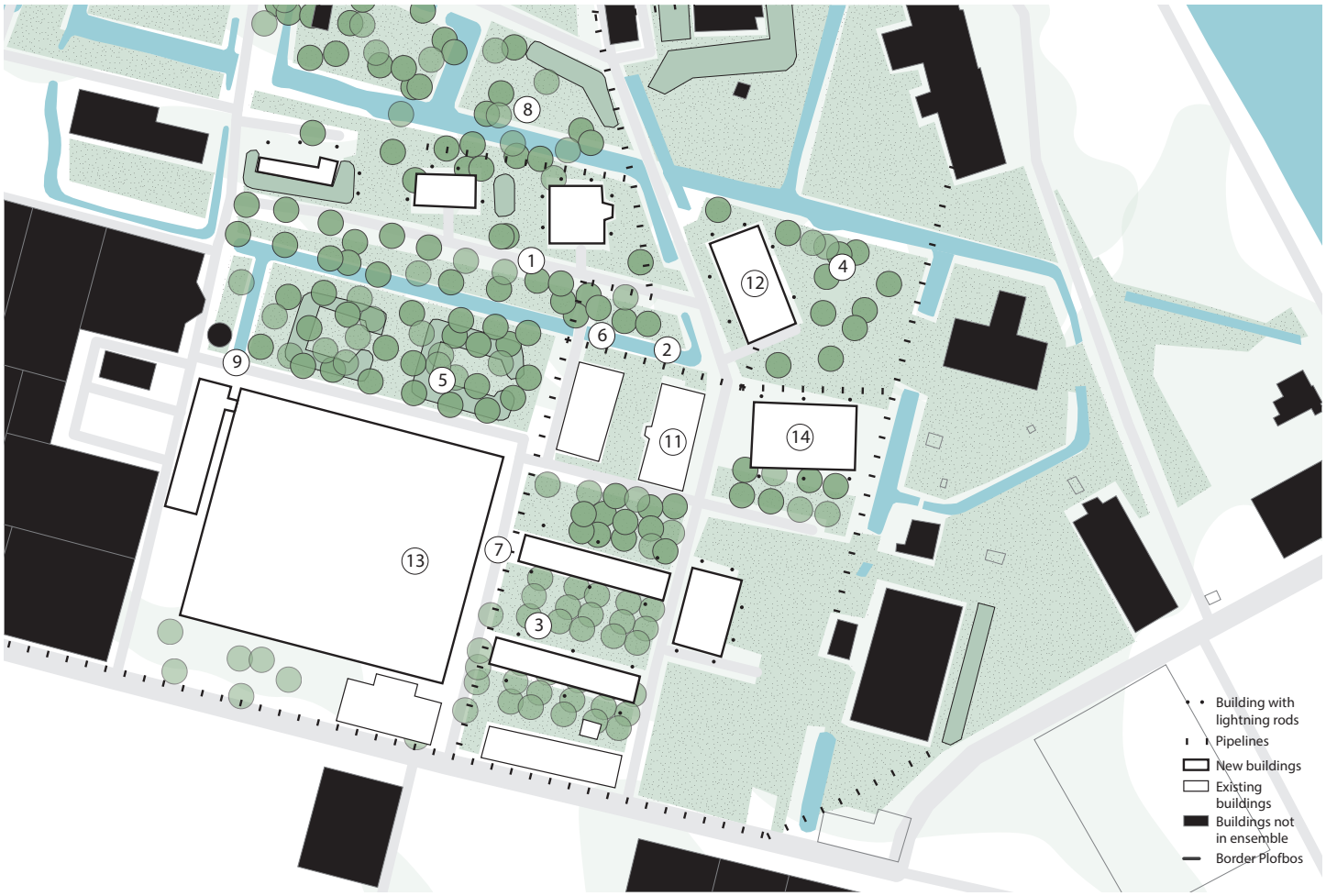
To get an idea of the functional properties of the elements and their relation to the surroundings they need to be assessed first for the site. The "Plots in the wood" site located just south of the testing forest called the Plofbos or clay forest in English. This testing forest consists of different chambers that were used to test explosives for example. The site has several different elements scattered in a very green area. These elements can be roughly divided in elements of landscape, utility structures and finally buildings. The first two describe more landscape architectural elements and the third is more focused on architecture and typology. The buildings are discussed in detail in another chapter and will only be regarded as elements here. All the elements currently work in several ways like closing off, blending, guiding, separating, these properties are mostly spatially. A lot of the elements are not in use at the moment and do not seem to have a current purpose, like the pipelines for example.

The site is quite unique compared to the rest of the Hembrug area, which is filled with large buildings with large surface areas. The large production hall (13), with its low-slope roof, is the only one on site that is similar to these buildings in the rest of the Hembrug area. The "plots in the wood" consists of freestanding buildings positioned or scattered in between trees which have grown quite dense over the past years. Other elements with different purposes seem to be scattered throughout the site as well. The heights of the different elements match quite well. This helps to view the "plots in the wood" area as one, despite the number of different elements.

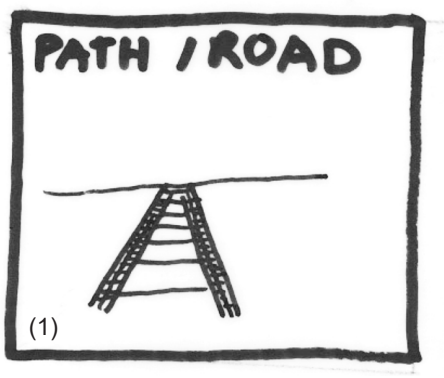
The Plofbos, the testing forest, north of the site is now quite indistinguishable from the "plots in the wood". This forest used to be structured very clearly. The green on site needed to be maintained because of safety reasons.

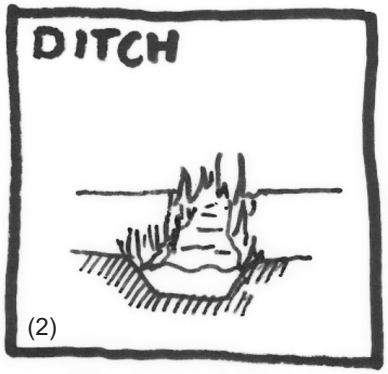
As mentioned, before the forest has densified a lot over the years, this was done on purpose for a part, but a lot of this is because of neglect for the past 15 years. The undergrowth is either quite low, which means its relatively new, or around 3 to 4 meters, which describes planted bushes on and around the chambers of the Plofbos and the earth walls.

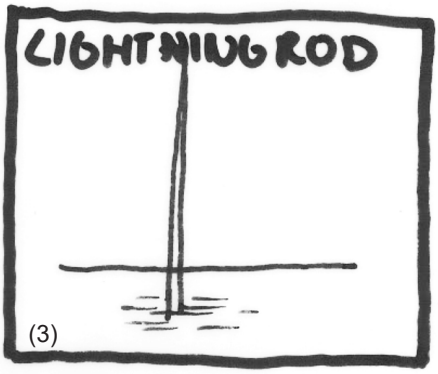
At the moment the soil is being cleaned, this disrupts the biological processes. On the other hand, it presents the possibility of restructuring some of its original character.

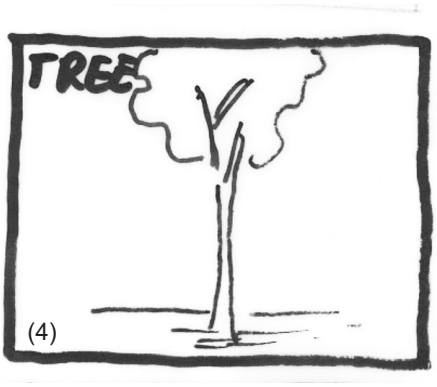


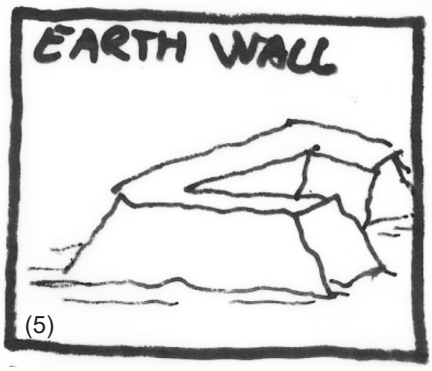
Mapping of the spatial elements in the Plofbos area, they are marked by number 1 to 14. Original image by Valerie Arntz, edited by Lucas Pol.

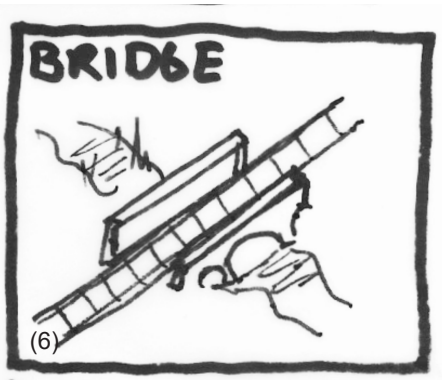


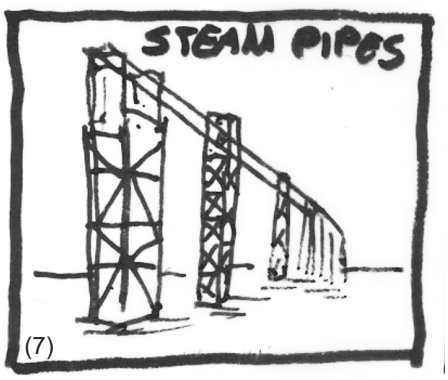


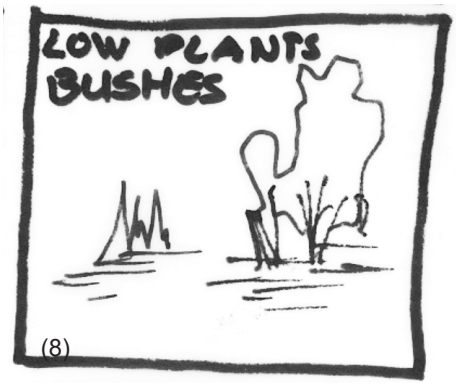


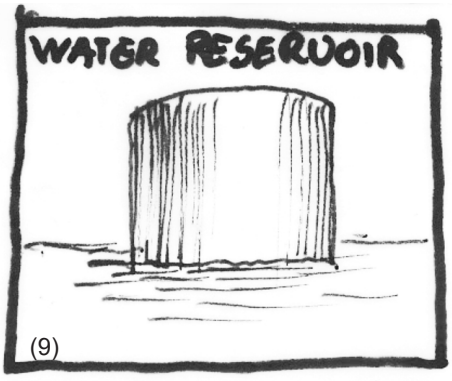


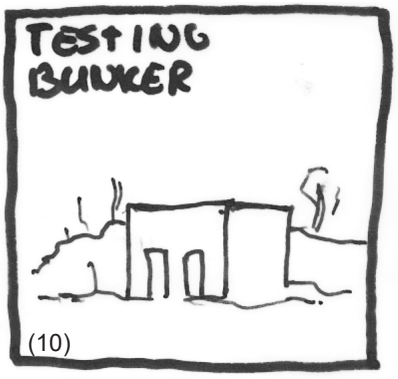


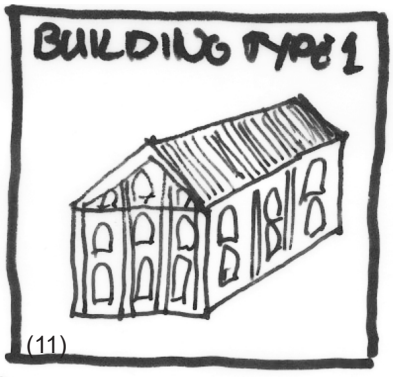


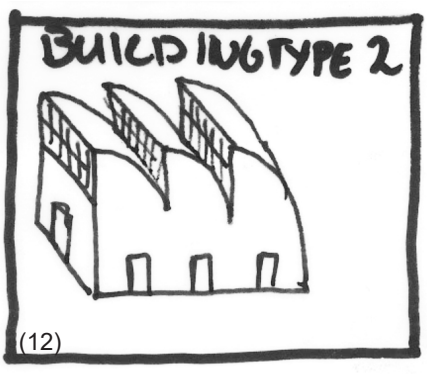


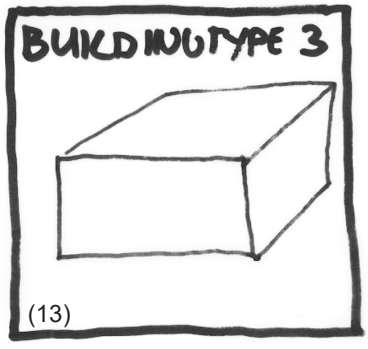


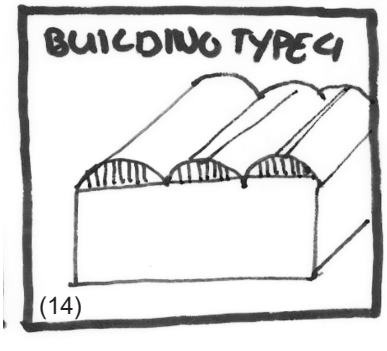












Elements that were placed in different times that are part of “plots in the wood” and the Plofbos area. Images by Lucas Pol.

DITCHES, EARTH WALLS AND BUNKERS

These are the typical typologies of the constructions within the landscape.

Earthen walls about 2.4 meters surround the warehouses and testing buildings, which is to reduce the explosion hazard.

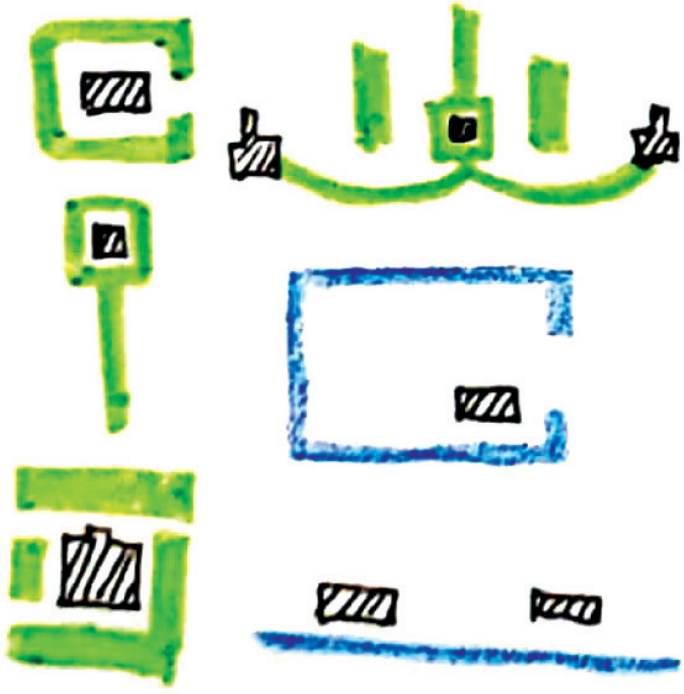
Ditches also work as water sources to extinguish a fire if it might happen.

An employee that used to work on site mentioned that there were some issues with the water system. The water was not pumped around properly at a certain point. This caused the water to be dirty and hinder the workers partly because of the smell. The water reservoir marked in 2.3.1 as (9) was added to the water system to clean the water and help it circulate regularly. This way the area would be clean. Another conclusion to take away from this is that the water system is possibly something that works on its own and is not connected to the surrounding water systems.

Bunkers appear on the map in 1941 to help protect the site from air strikes.



1901 situation.



1924 situation.



1941 situation. Images by Mingke Zhu. Research by Mingke Zhu & Lucas Pol.

EARTH WALLS & BUNKERS

"On the night of Dec. 31st 1934, something unknown caused an explosion to happen in the department of defense. Roof made of very light material can be easily released by the explosion. During explosion, roof, iron doors, brick exterior walls completed removed. Concrete wall remained intact. No fire broke out, and no other building broken."

——Artillery Establishment Hembrug (2019)

Concluding, the ditches, earthen walls and trees have historical value as it performed as functional elements for artillery production. These artificial natural elements practiced well in the old year without high technology. Besides, lightings conductors, above-ground pipelines are also practical for safety issues and convenient maintenance. These elements kept the production safe and ordered.

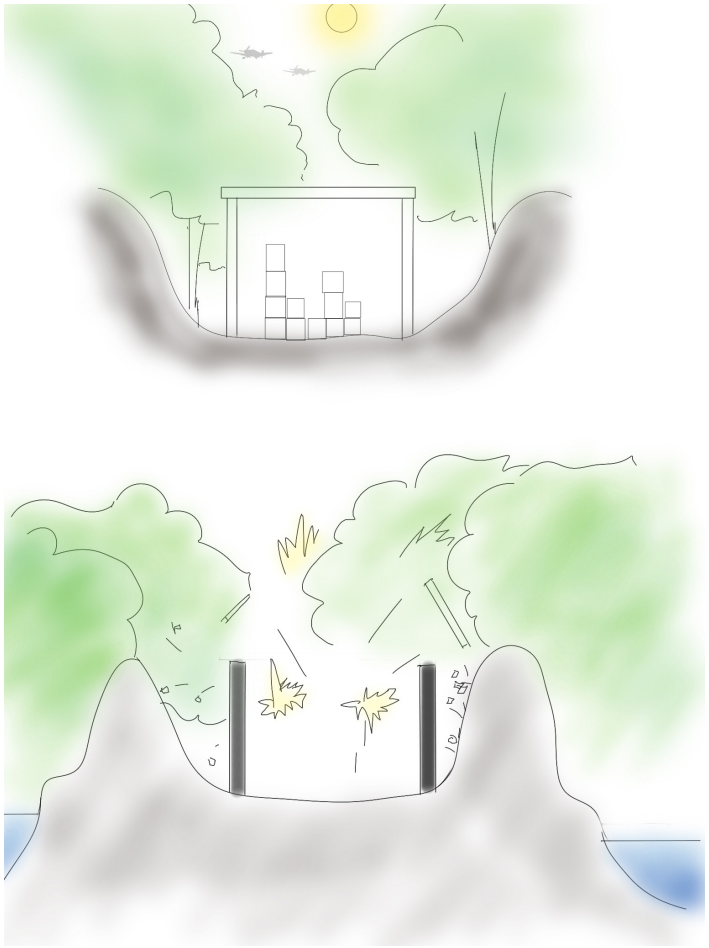


Image by Mingke Zhu.
These two drawings show how the landscape worked on site. Earthen wall as the isolation of the explosion. Ditches as extinguishing. Trees was first grown as the shading provided to the warehouse. They can adjust temperature. And in the year of 1920, more trees grown as camouflage for air-protection.

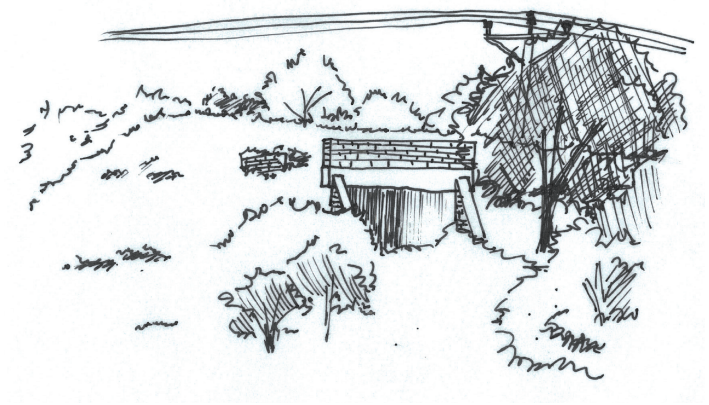


Image by Mingke Zhu.
Bunkers are low, small and elongated. They are with thin walls and heavy roof. Building is absorbed by earthen walls. They are hidden by the forest.

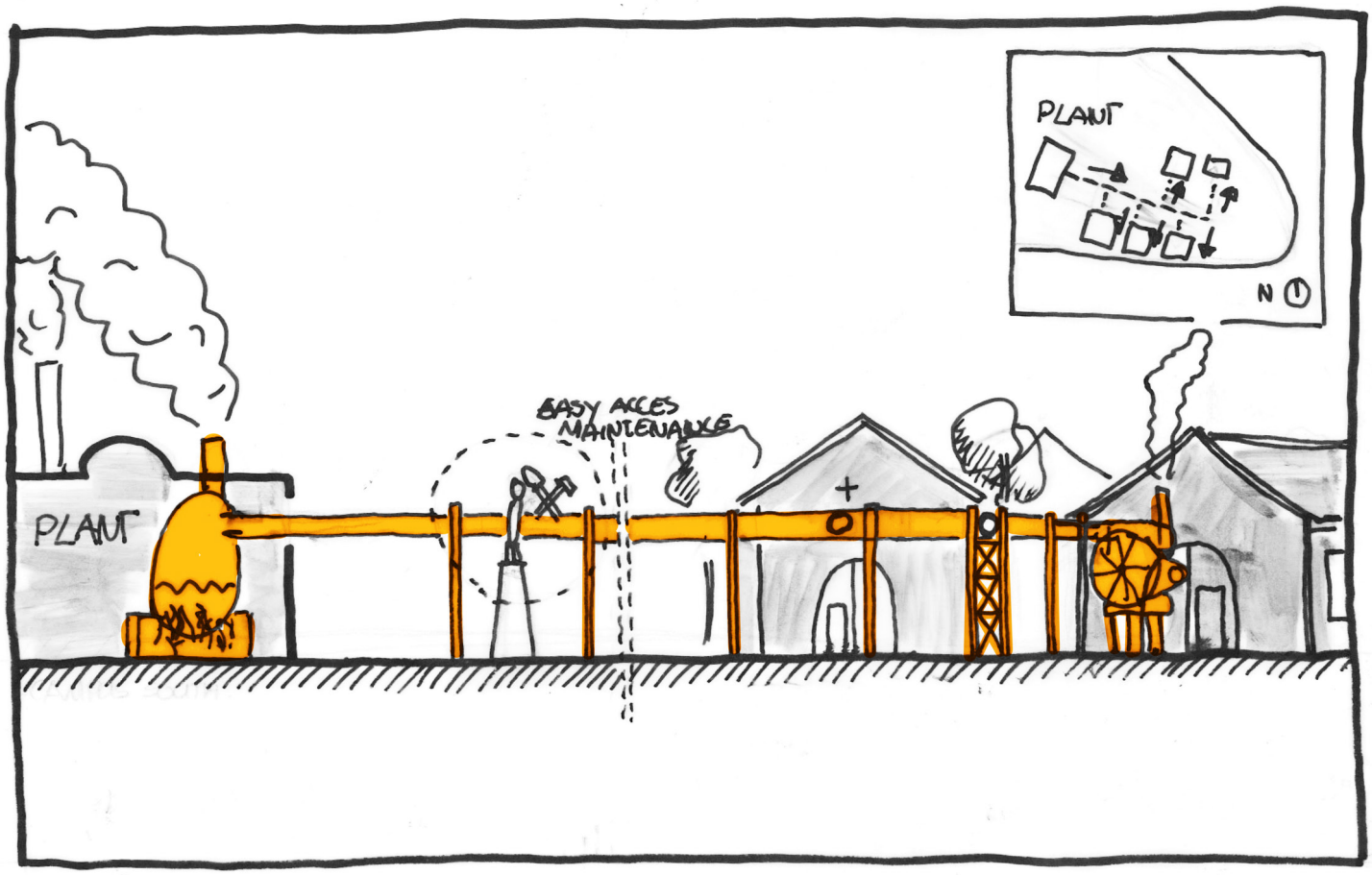


Diagram of the different buildings connected through the pipe-lines. The plant would produce steam to power the machines needed in the different production or assembly buildings. Image by Lucas Pol. Analysis by Mingke Zhu.

PIPE LINES

In Hembrug, the production needs electricity, heat and water. Electricity grid was constructed between 1896 to 1899. Gas pipelines were installed during 1896 to 1897 which came from the municipal gas station in Zaandam. Water was also connected to Hembrug in 1896 to 1897 to provide the site with water for drinking and production and extinguishing water in case of fires.

Above ground pipelines are obvious in the plots of woods. They are mostly constructed with the direction of the roads, which are perpendicular or horizontal to the North sea canal. The pipelines extended to the clay forest to produce energy for the test buildings. Different from other pipelines, they are constructed above ground instead of buried underground. The reason is to make the maintenance easier, since the ammunition production needs frequent maintenance to keep safe. Pipelines rest on half-timber columns, so it won't catch on fire easily. The above-ground pipelines were used for steam heating. They were connected to the steam building on the west of the Hembrug terrain. The boiler burned coal to heat the water, and hot water was transferred by the above-ground pipelines to warehouses and workshops.

Heating by water is safer than by the use of gas. The warehouses in the plots in the woods were to store dangerous mixtures in the munition and grenade. Most buildings were warehouses and workshops. That is why above-ground pipelines are dense here. In this case, the above-ground pipelines have historical values. It shows the characteristic of the area different from others. As well as the earthen walls and ditches, these elements indicate there is more danger in the part of the former production that happened on this site. So many outstanding elements are functional placed to keep safe. They are the monuments of this area for the old days.

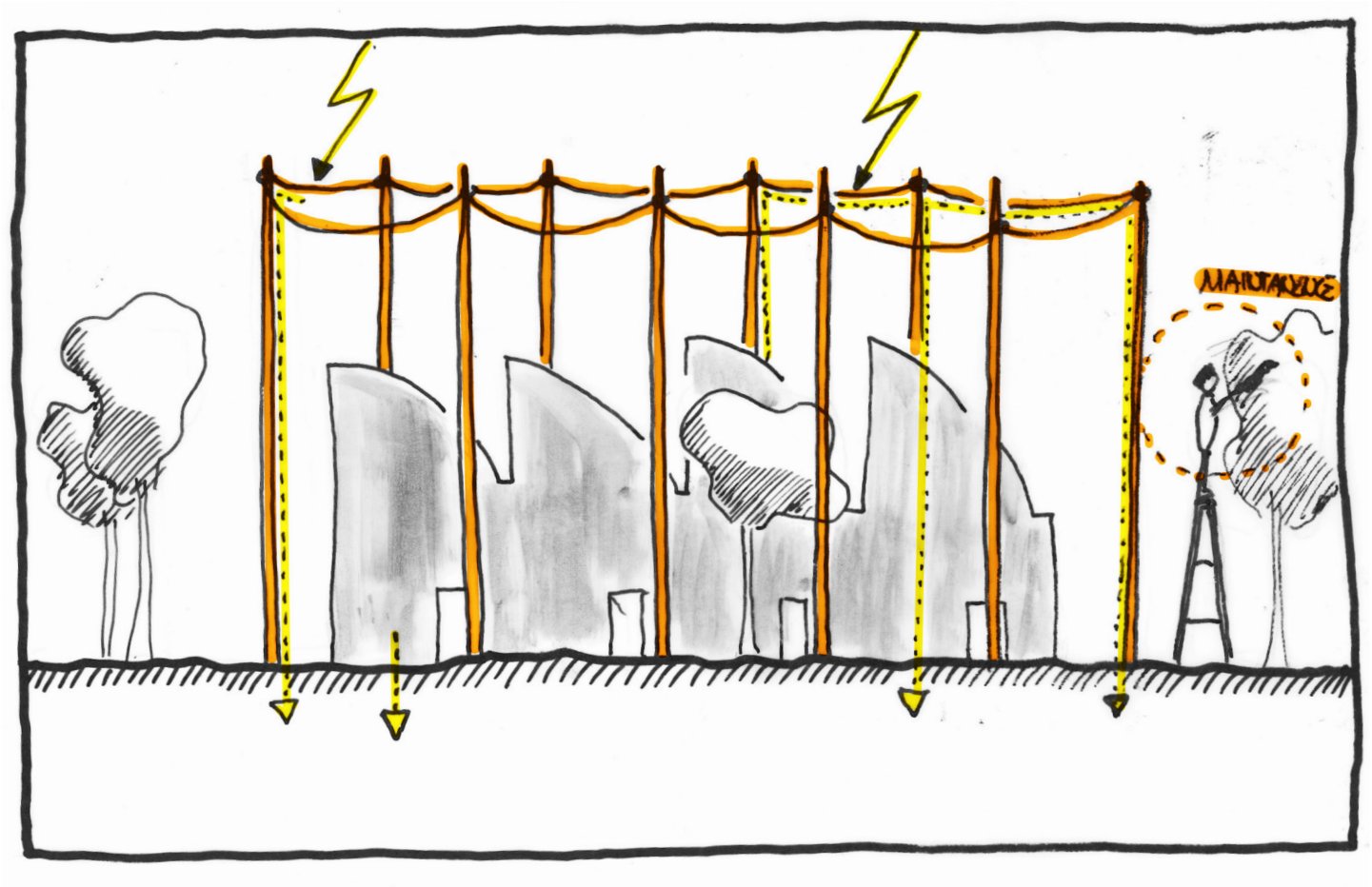


Image showing how the lighting rods are placed around one of the shell-roof buildings. The cage makes sure all the lighting is diverted from the buildings and the trees. Image by Lucas Pol.

LIGHTNING RODS

During the 1950's a number of buildings with shell-roof and circular-roof typologies were added on the site. Most of the buildings on site stem from this period. With these buildings a new kind of area of landscape design was added.

Around the relatively small buildings a system grid of lighting rods and trees were placed (SteenhuisMeurs, 2010). The lighting rods are not single elements, they are placed in a grid and they are connected by cables. In this way the buildings would be surrounded by a cage structure. The cables have mostly been removed now, only the grids of lightning rods remain.

This cage structure would prevent the buildings from being damaged by lighting bolts and therewith preventing the explosive substances and explosives from exploding.

The trees have grown quite a bit since the 1950's. The trees used to be strictly maintained just like all the green in the Hembrug area. At the moment the trees are quite a bit higher than the lighting rods, so they have lost their purpose for the most part now. They also became less effective with the removal of the cables.

The lightning rods are one of the main physical structures apart from the buildings on site and are hard to miss. They are in a way part of the architecture of the shell and circular roof buildings, as they were designed in unison.

2.3.3 BORDERS

In this part the edges of the "plots in the wood" are described and defined. The site is quite unique in the sense that the trees are more present than most of the buildings, except for the large production hall. It can also be described as one of 7 clusters described by Palmbout (2015), that it is more filled with trees and green than buildings. A lot of the space in between the buildings have been overrun by green.

Currently the area has two very clearly defined borders and in the north and the east it just seems to blend into the surrounding areas. Firstly, on the west side, the area is bordered off visually by the big building complex, the "Changeover Zone". The paths around also do not connect directly or straight to the ones within the "plots in the wood" area, they just seem to move a few meters. The road and the large building complex on the other side clearly mark the edge of the site.

Secondly the main axis that is on the south side of the area is a clear separation. The buildings and trees are more or less directly placed along this street. This axis is emphasized by the pipeline which runs all the way along this road. All the main paths within the site are perpendicular or parallel to this road. Only further north in the Plofbos they deviate from this orthogonal pattern.

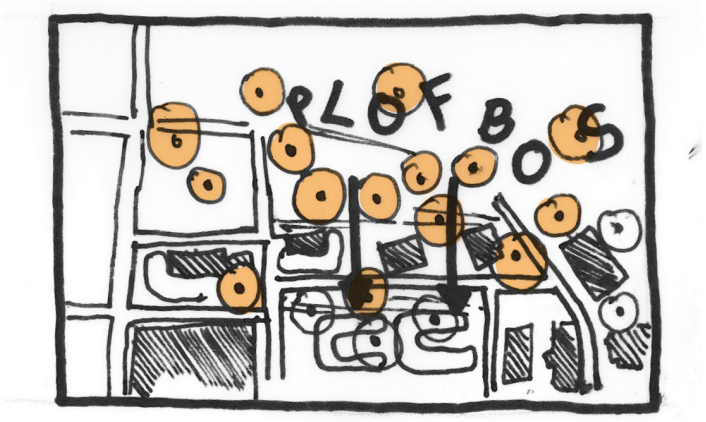
The place where the paths turns about 45 degrees, marks the north side of the "plots in the wood". The overgrown character causes the site to blend with the Plofbos. Although less visually obvious within this overgrown area the ditches do mark the north-end of the site quite clearly. There is only one clear road into the Plofbos.

The east side of the site has a similar character as the northern edge and seems to blend in with the area behind called "green cape of the head" by Palmbout (2015). Behind the ditches some remains of the Plofbos area with some ruins of test buildings can be seen.

The overgrown character is in direct correlation with the final leaving of the (military) industrial companies and production in 2003 (Steenhuis Meurs, 2010). Only 11 years later in January 2014 with the re-opening of the Hembrug area, with the vision of Palmbout, human activity started again (Palmbout, 2015).

The area, when still used for military industrial purposes, was very strictly maintained, especially the testing forest named Plofbos. The green was used for protective purposes, it needed to be neatly maintained. The green would be clustered, to prevent fires from spreading. The trees used for camouflage next to the smaller buildings from the 1950's were trimmed regularly because of the lighting rod structures. So, the entire Hembrug area was very well maintained and had a completely practical and functional layout, including the green.

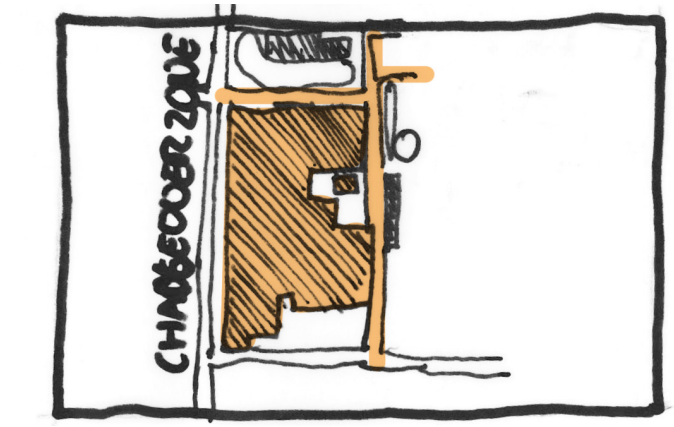
During its active production years the different factory and military zones were completely surrounded and divided by fences. There were several access gates and checkpoints all



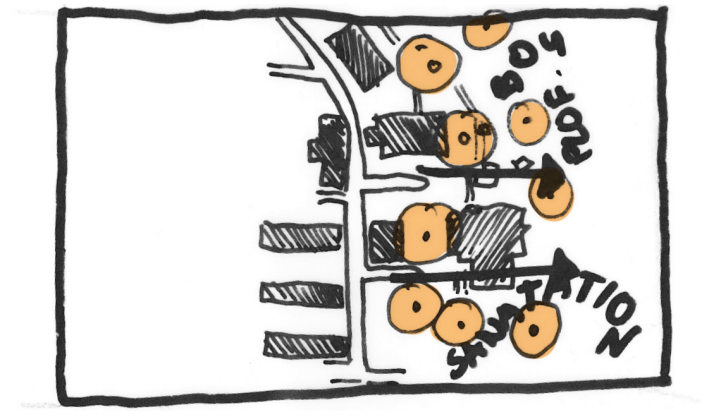
North border edges of the Plofbos. There are no significant large spatial things that add a clear visual border. Image by Lucas Pol



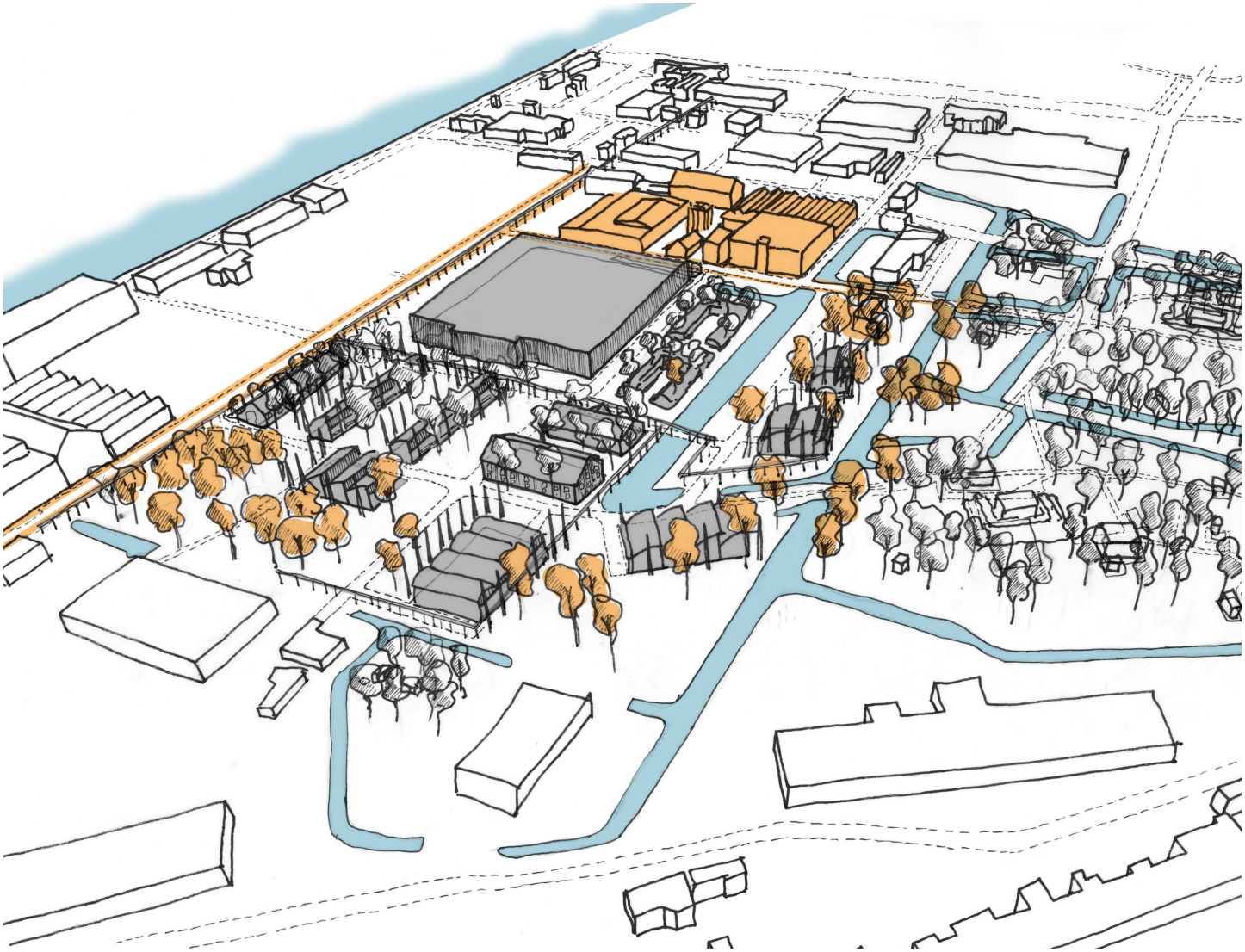
South border of the site. The main street is a clear line and the end of the site, Image by Lucas Pol



West border is clearly defined by the road and the large building complex on the opposite side of the road, Image by Lucas Pol



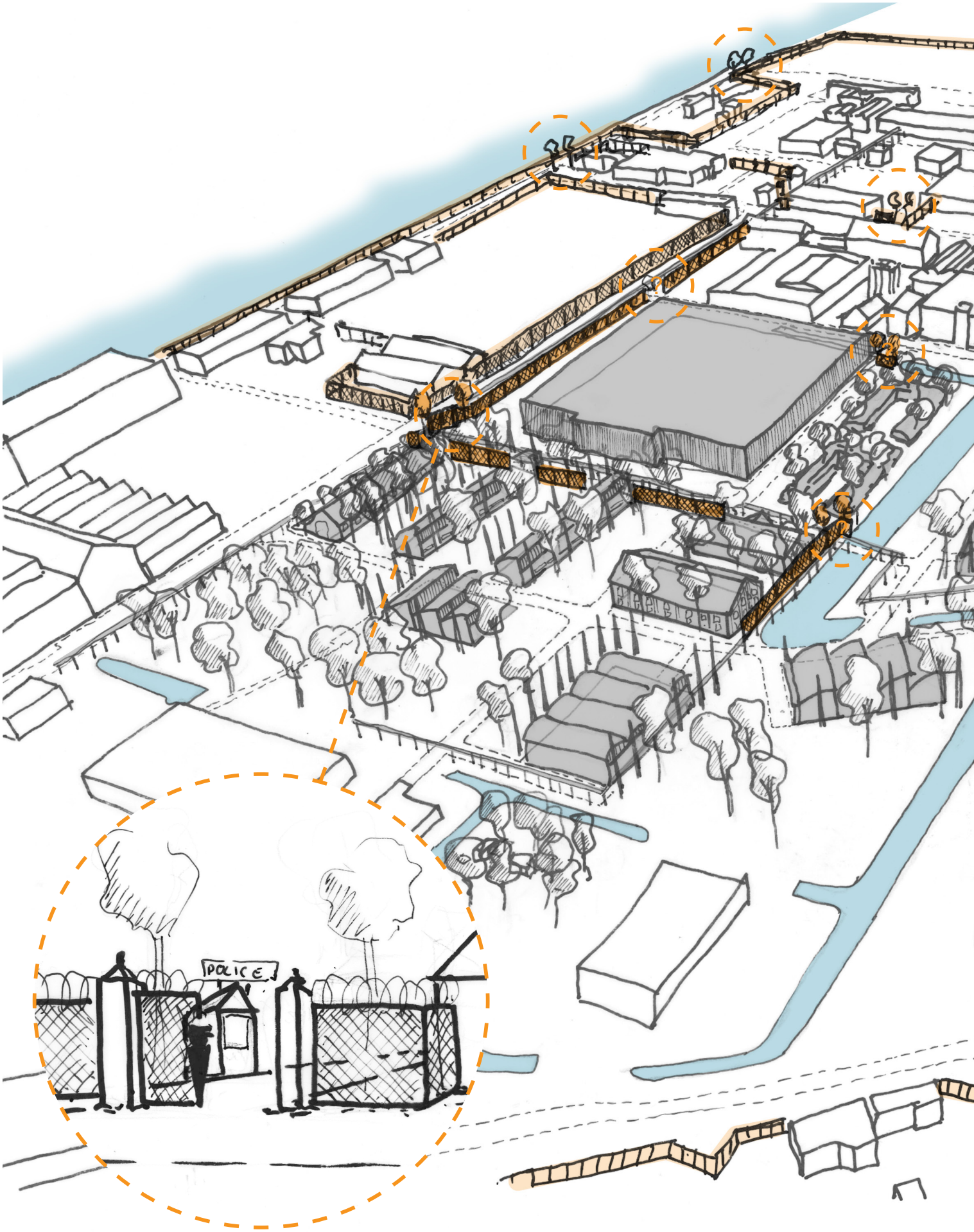
East border is not that clear. I goes around the buildings and some forests behind, Image by Lucas Pol



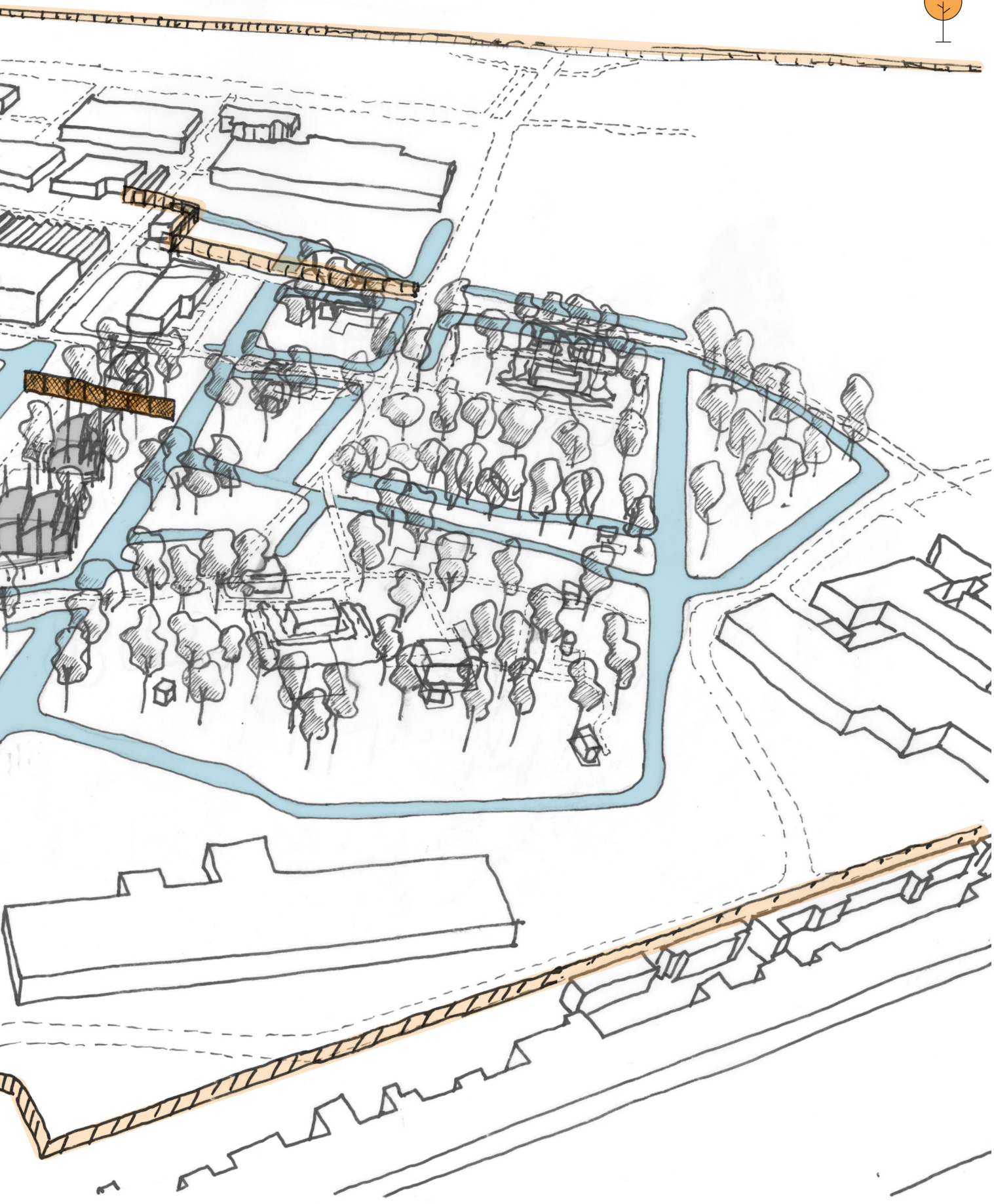
Birdseye perspective showing the elements that either blur or define a border of the “plots in the wood” area. Image by Lucas Pol.

guarded by the company police and security officers. The level of security was high, a lot of the workers only saw the small area they worked in. Only after 2014 they could actually see the entire Hembrug area just like the public.

The “plots in the woods” area was once more or less completely closed off but the green was structured and clustered very neatly so visually it was a lot more clear back then. Currently the site is a lot more open compared to what it used to be and easy to access, except for the areas where the soil is being cleaned now. Edges are marked by large structures, ditches and paths. The trees make the transitions to the other clusters named by Palmbout more gently and seamless in the east and the north.

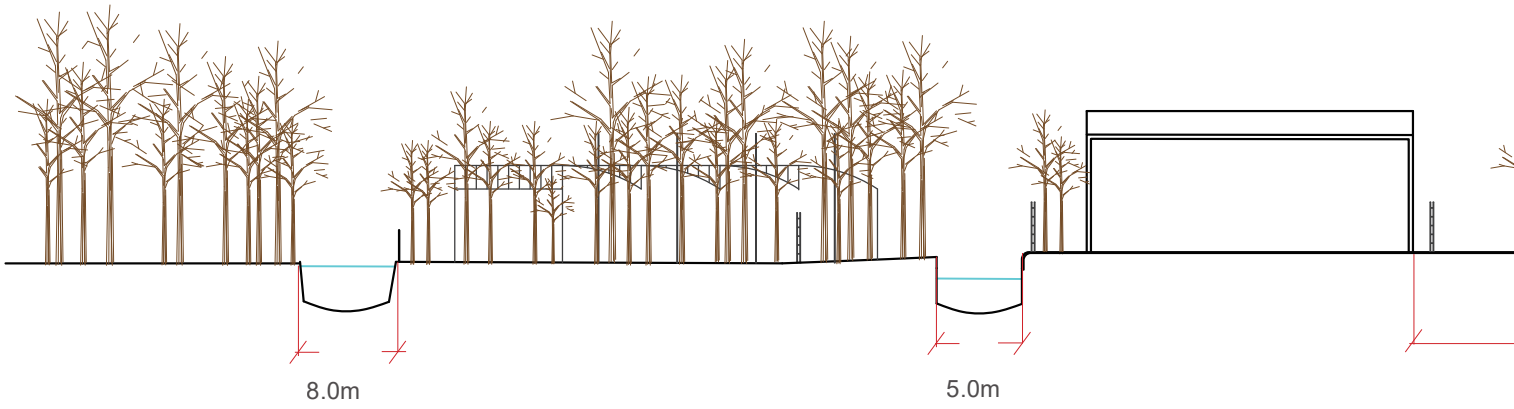


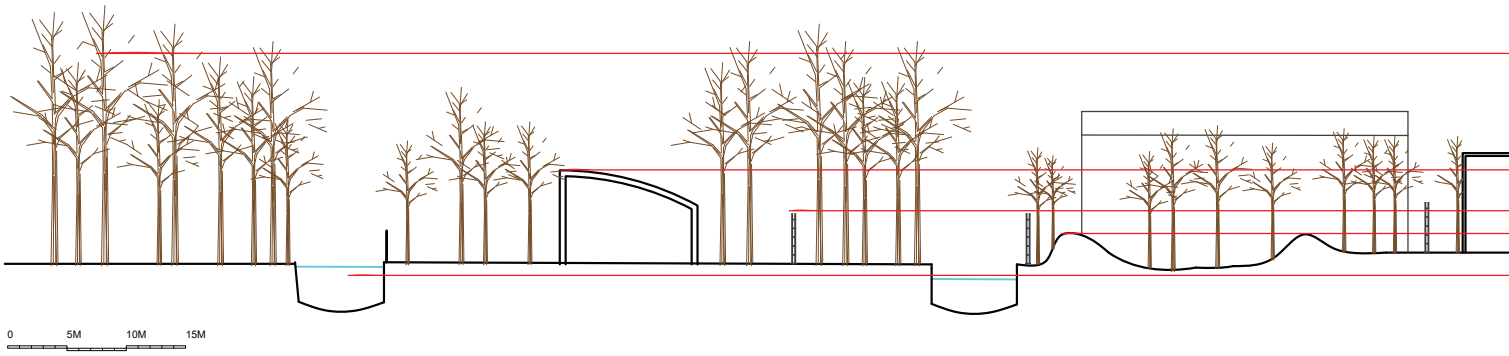
Birdseye view showing the “plots in the wood” during the 1990’s when it was still fully functional. The fences created different zones within the Hembrug area. These zones all had gates with security checks. Image by Lucas Pol.

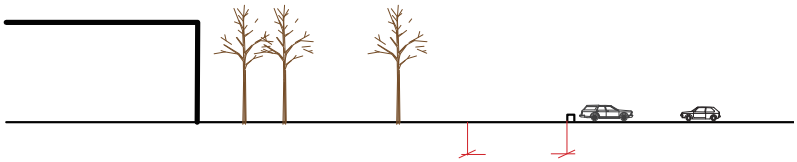


Birdseye view showing the “plots in the wood” during the 1990’s when it was still fully functional. The fences created different zones within the Hembrug area. These zones all had gates with security checks. Image by Lucas Pol.

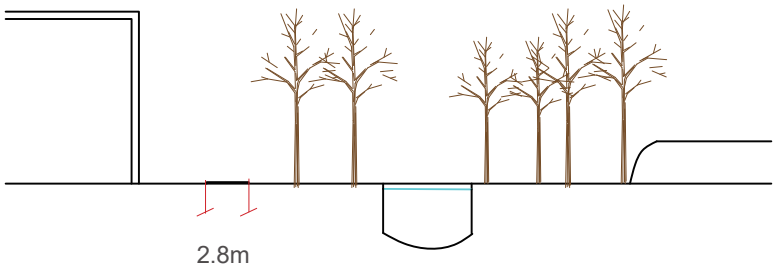
2.3.4 SECTIONS



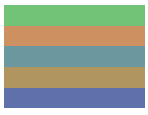




Borders to the water front.
The border to the waterfront is the wide main street which is 8 meters wide. A parking lot is next to the street.

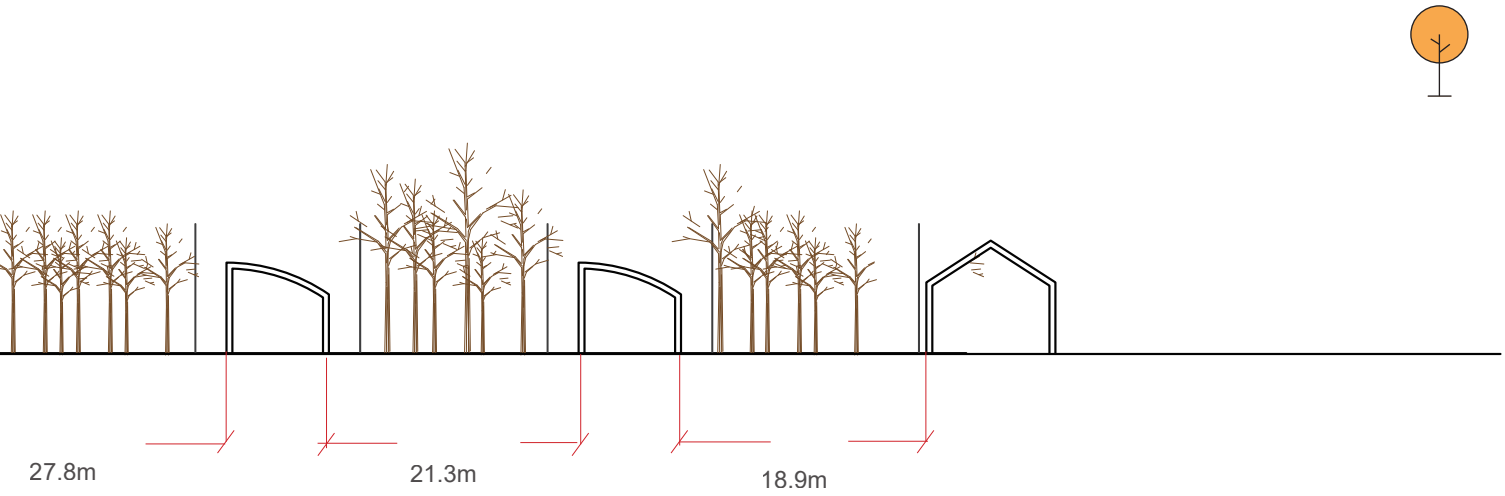


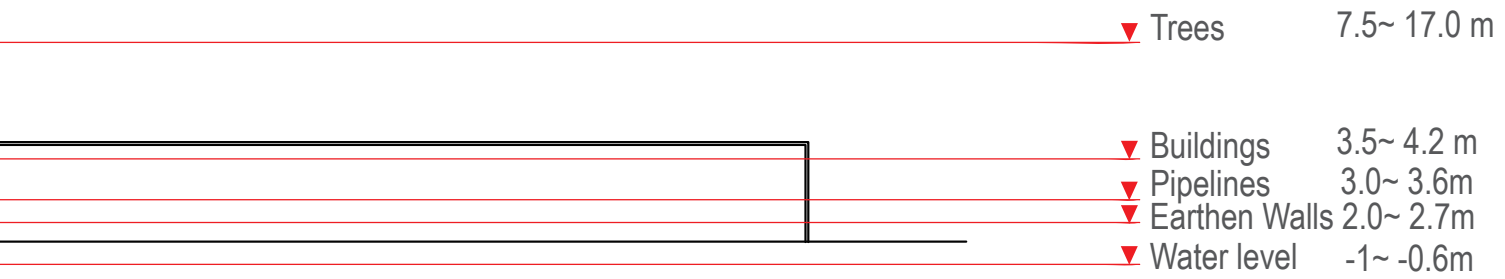
Borders to the changeover zone.
The path is only 2.8m wide. Trees and ditches becomes a buffer zone in the border. The buildings change into a big scale and more compact.



These are two sections cut on site. The height of different elements can be compared with each other. It can be concluded into five layers, which are water level, height of earthen walls, height of pipelines, building height and the height of trees. Trees cover the site as a canopy. They are built in lines. Some follow the paths and some follow the buildings (now the cleaning work breaks the order on some stage). Trees built in different times also in different height which give rhythm to the greenery. The more to the north the higher trees will be. This also shows a smooth transition to the forest. Elements on site are in small scale and low density, which forms a scenario like a town.

Images by Mingke Zhu.







Overview of trees, ditches and earthen walls. By Mingke Zhu

2.3.5 SUMMARY & CONCLUSION

The spatial elements on site act in unison with the underlying landscape. This part of the research continues the story that was started in 2.2 Topography, under the following research question: What are the functional properties of the spatial elements and how to they relate to their surroundings?

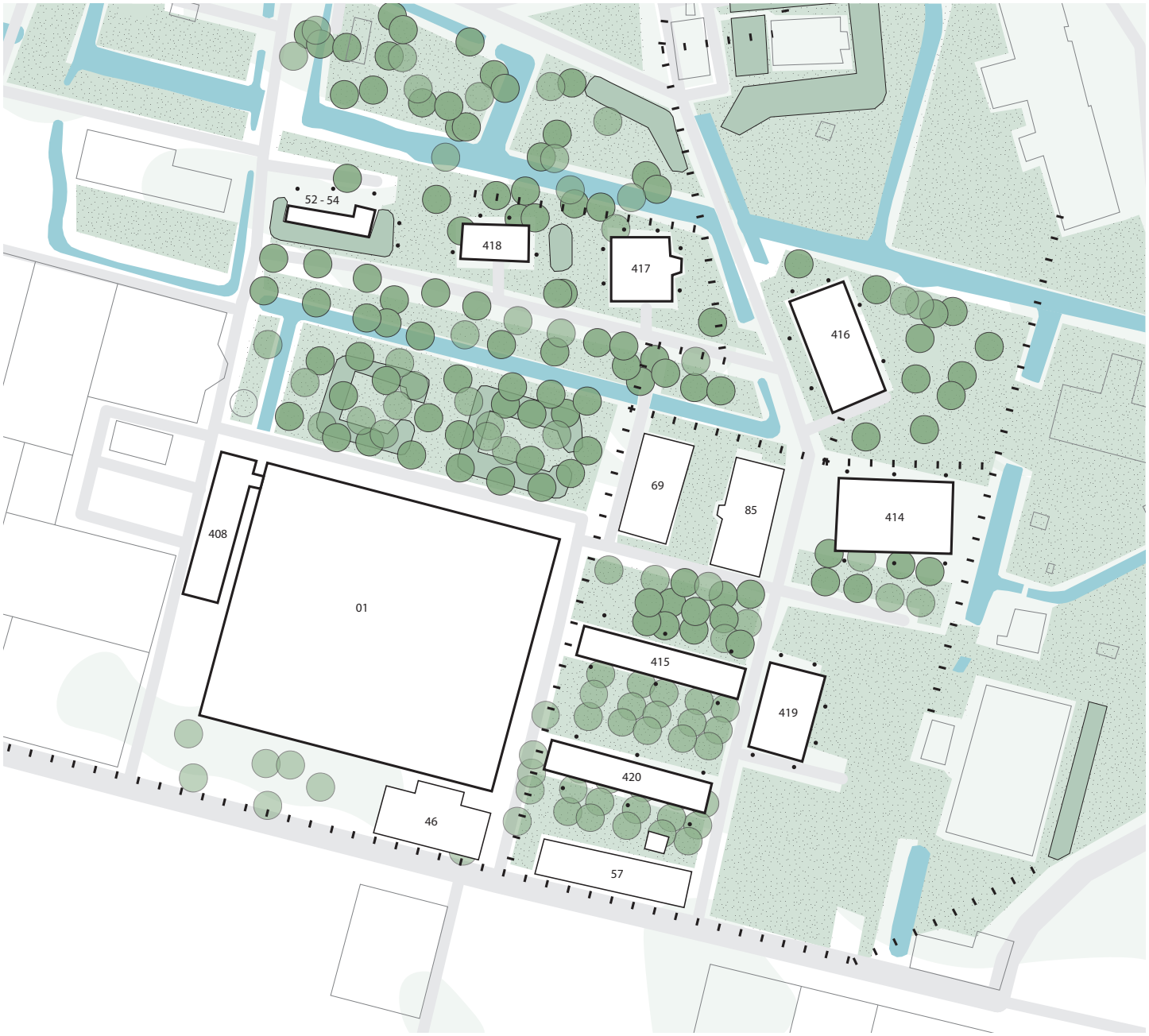
The plots in the woods have a unique landscape compared to other areas, apart from the clay forest. The site is covered by greenery. Ditches separate the land in between the buildings. Earthen walls are standing on the land surrounded by the ditches. The ditches and the roads are perpendicular to the North Sea canal. The ditches and earthen walls were added whenever a new test building was needed. Trees were planted along the paths and surrounding the buildings. Greenery grew a lot because of lack of maintenance after the site was abandoned in 2003. Fragments of the old riverbank are still visible on site somewhere. Large amount of greenery provides a smooth transition to the forest. There is also contrast between the irregular rhythm of the trees in the wood and the regular grid of infrastructure.

As mentioned before the north and east borders are soft and blend quite seamlessly with the areas around. There is a clear west border. On the other side of the road, the building characters drastically change. They become dense clusters of buildings of various sizes. The south border of the site is the main road, all physical structures are placed along this road. The site was not always open, it used to be closed off by fences, just like the rest of the Hembrug area. The fences were removed after 2003, so in the new situation the borders in between the zones became softer.

The spatial elements on site can be divided in three main categories. The group of elements falls under landscape architectural elements, these are the ditches, paths, trees and other green elements and finally the earth walls.
The second category mostly former utility structures contains the following elements: The lightning rods and the pipe-lines. Within this second category the water reservoir has a story of its own connected to the ditches on site. The water system is probably not connected to a bigger system. The water reservoir was added to keep the water clean and so the area more pleasant.
The final group of elements are the buildings, which have 4 main typologies. The former test buildings in the forest can be considered follies as a lot of them are in ruins at the moment.

Earthen walls and ditches have specific functions. They isolate each building which is to protect the workers from being hurt whenever there is an explosion. These landscape elements are functional and collaborate well with the buildings. Above-ground pipelines and lighting conductors are also measures to keep the buildings safe from the chance of explosions as well. The buildings were placed with a certain distance between each other and were mostly quite small. These elements indicate that the production here is more dangerous. All of them are functional properties to keep the workers and their surroundings safe. They are, in a way, the monuments of the history from this area.

All the elements are placed in ensemble with each other and all had a specific purpose. The whole site was strictly planned. Now, when you are on site, it's hard to see this former functional and practical layout.



Baseplan of the “plots in the wood” for the new design. Image by Valerie Arntz.

2.4 ATMOSPHERE



Sightlines and routes are marked with letters and their viewing direction. Some sightlines will need more than one drawing to show it's complete quality, thus showing how walking through the area can be experienced. Original image by Valerie Arntz,edited by Lucas Pol.

The characteristic atmosphere on site will be defined with the following question: How do the spatial elements on site create the atmosphere and do their functions add to the atmosphere of the "plots in the wood" area?

This will mostly be described through research focused on eye level experiences.

2.4.1 SIGHTLINES

The paths in the "plots in the wood" area are mostly based on the orthogonal grid of the entire Hembrug site. Some of the paths and roads shift in some places, therefore some of the views are blocked. The paths are however neatly framed by trees and all other spatial elements, a remain of practical and strict setup of the site.

The paths, as per the Palmbout plan, recognizable per cluster or area throughout the entire Hembrug site. The ones perpendicular to the main road have the longest and most spectacular views towards the water, ammunition factory soon to be renovated by the design of OMA or the Schaftlokaal or canteen.

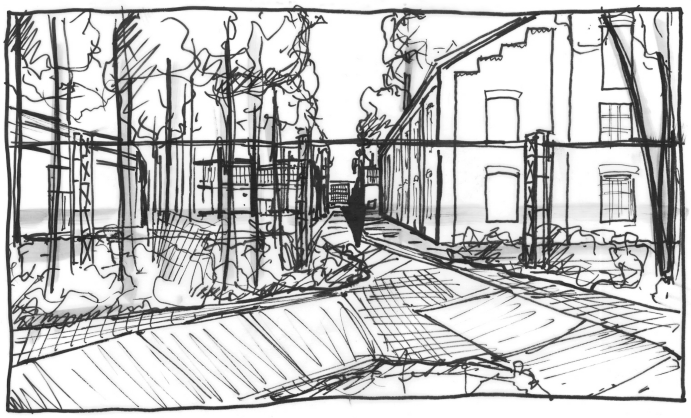
Walking through the area makes one think of walking through the forest, because of the many trees. In other cases, the pipe lines and the lightning rods seem to have the same purpose visually and blend in seamlessly in the environment. The area feels quite homogenous because



(A) View allong the main road with the "plots in the wood" site on the right. Image by Lucas Pol.

of the density of the forest. The viewing lines and roads show some traces of the old structures and plans that used to be just as structured as it seems to be more apparent on the rest of the Hembrug area.

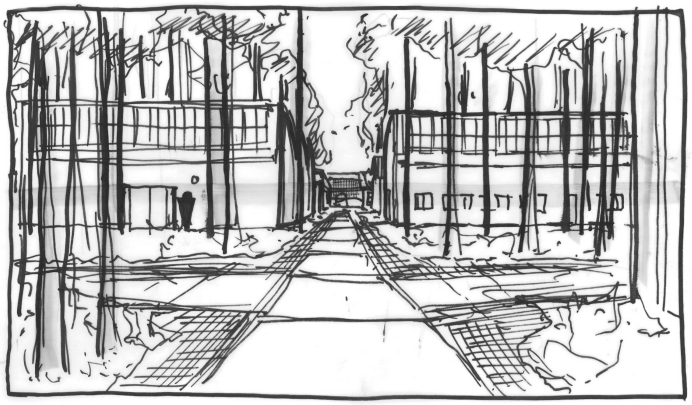
This is certainly a quality and very much one of the planned functions for the green. Cleaning up, apart from the damage being done by the cleansing of the soil, needs to be done with a lot of nuance. The Plofbos, with clearly clustered green, had a strict layout before but that is hard to distinguish because of its current density. Occasionally one can spot a row of trees or neatly planted bushes.



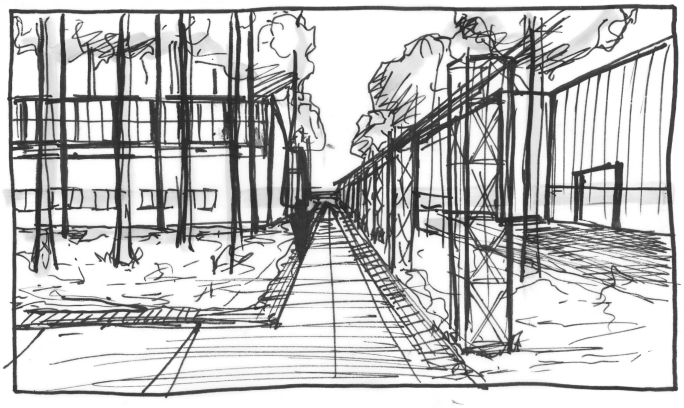
(B) View towards the ammunition factory and the Ladder (1). Image by Lucas Pol



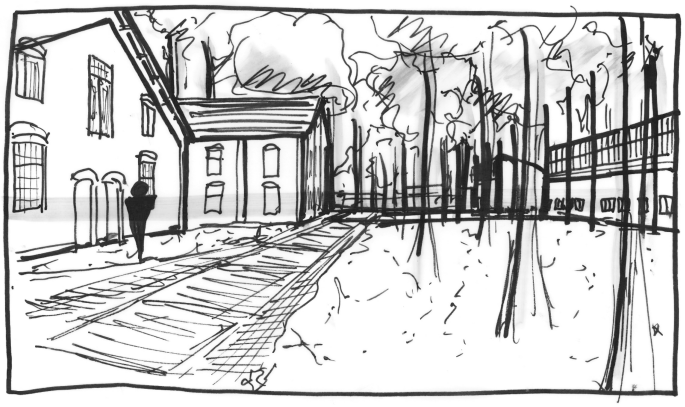
(G) View towards the water (1). Image by Lucas Pol



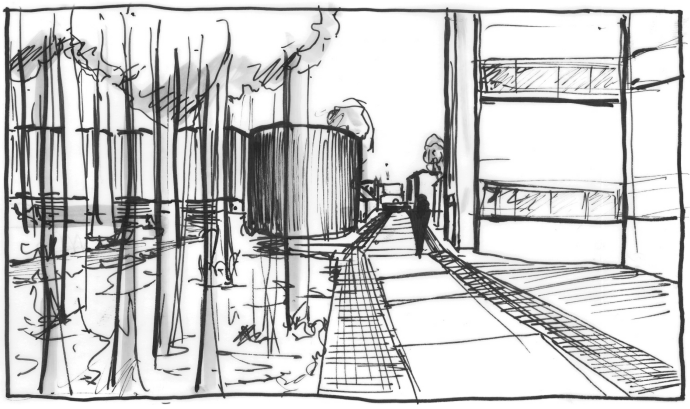
(B) View towards the ammunition factory and the Ladder (2). Image by Lucas Pol



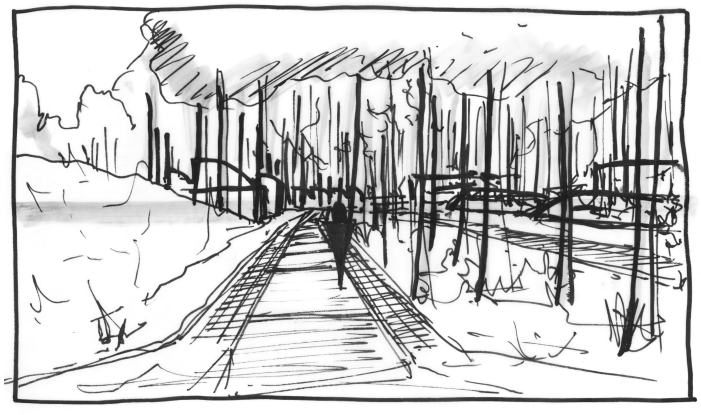
(G) View towards the water (2). Image by Lucas Pol



(C) View towards the east into the more forested looking past the farm buildings. Image by Lucas Pol



(E) View towards the schaftlokaal. Image by Lucas Pol

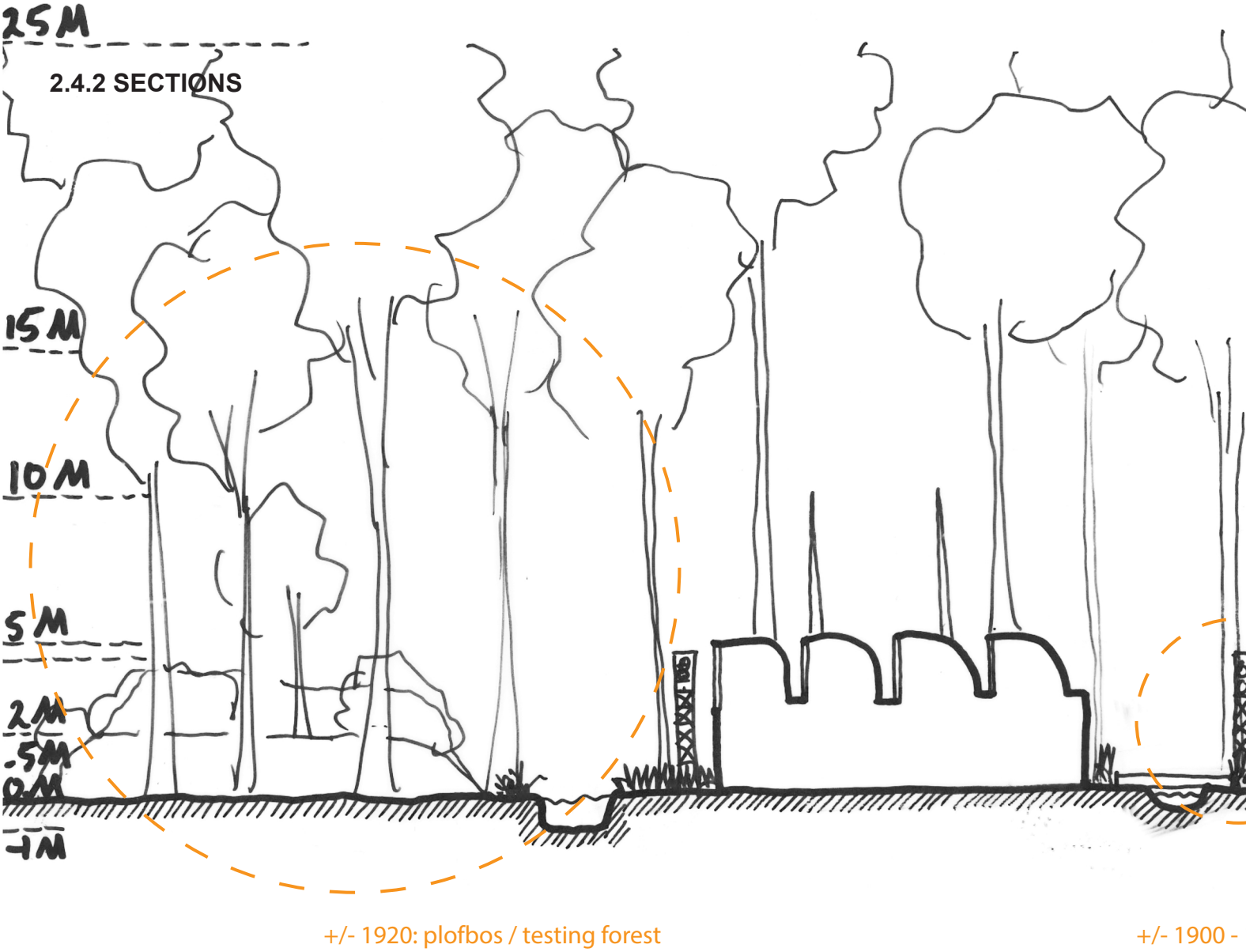


(D) View of the outskirts of the Plofbos and some of the small buildings . Image by Lucas Pol



(F) View of the plofbos, currently closed off because of cleaning activities. Image by Lucas Pol

2.4.2 SECTIONS



A section of the area that is relevant for the plots in the wood. The scale used from left to right is 1:500 for up and down scale 1:200 was used. This to illustrate and seperate the different layers and elements of the site more easily. For most cases one representative element is circled to keep the section clear. Image by Lucas Pol.

+/- 1920 PLOFBOS

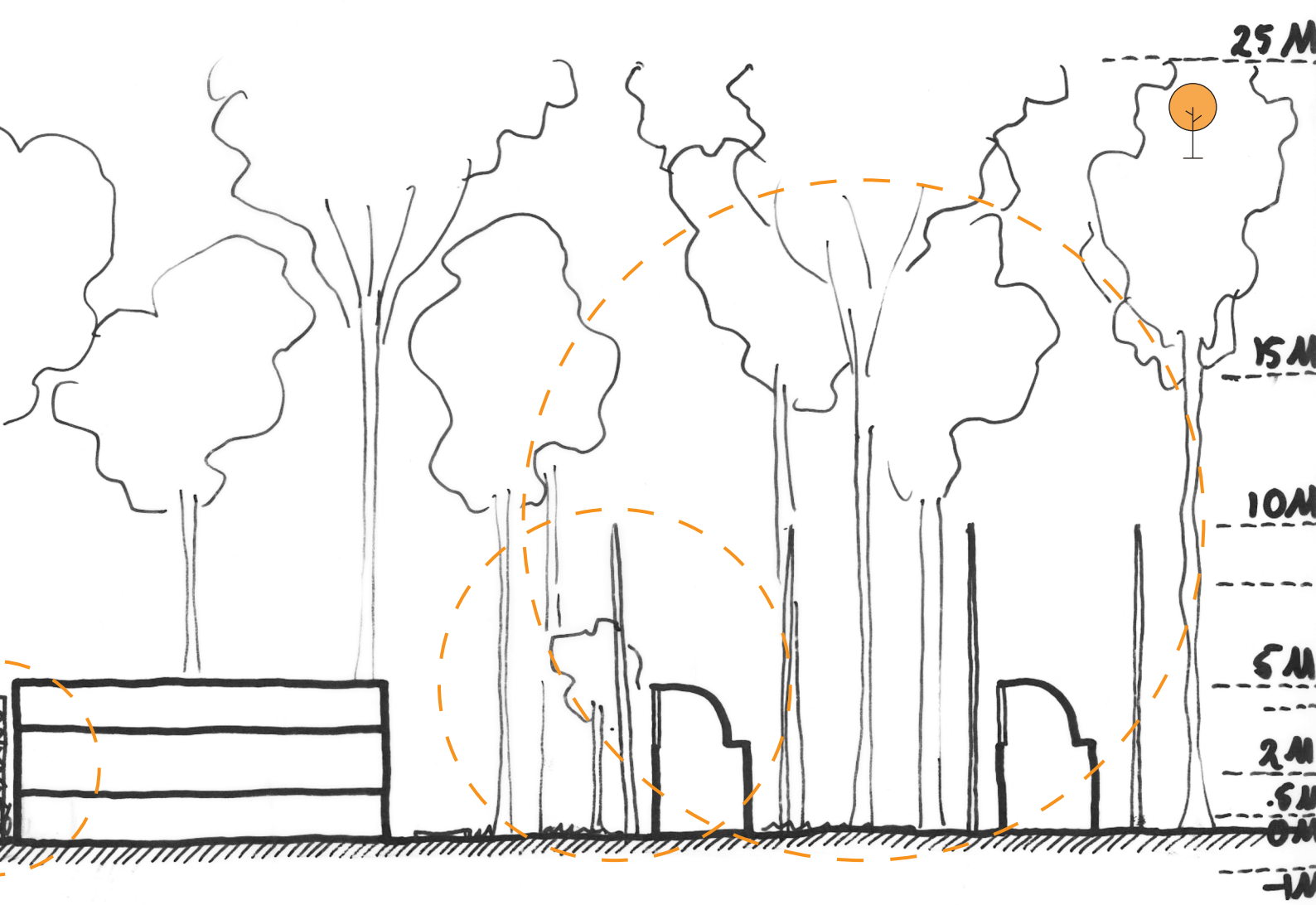
The Plofbos, is a group of areas that would be used for testing of the completed weapons and explosives. The forest consists of several islands as described by Steenberg Meurs (2010). These are surrounded by ditches to stop fires and people from wondering on these islands. In-between these islands paths with strict rows of trees to guide the people to the different test sites.

Because of the strict tree rows and the clustered character, the green used to have these islands which could be very well described as the different chambers of the testing forest named the Plofbos. Some of the test buildings were surrounded by a protective earth wall with bushes and trees on and around. Others just buildings with trees and bushes around. All the trees, bushes and topographical features are used for a very specific functional purpose. During the 1940's the forest was densified to hide the area and the buildings from planes that could fly over the area and potentially spot or bomb it, this in combination with the neglect makes the forest feel like an inside space within Hembrug.

+/- 1900-1960 PIPELINE STRUCTURES

These originate all the way from the beginning of the site. In the early years the steel structures would enable all the factories and workshops to be powered by the large steam engine on the campus in the "Ketelhuis". Large pipes would be placed in it for an easy (steam)power transfer system. Water, electricity and gas were added around the start of the century as well but underground (Steenhuis Meurs, 2010). Steam was a safe way to power the machines, because it could not cause sparks. The pipes being above ground would be easy to maintain. It was most probably branched off every time a new building or group of buildings was added to the complex.

At the moment the structures are not used for anything and look quite deteriorated. This is partly because the asbestos was removed for the area to be accessible and safe for people. They could probably be re-used quite easily because it seems that it would take little effort to restore some of the missing ones or add to it for that matter.



1960: piping and cabling structures +/- 1950-1960: lighting rods +/- 1940-1960: camouflaging trees

A section of the area that is relevant for the plots in the wood. The scale used from left to right is 1:500 for up and down scale 1:200 was used. This to illustrate and seperate the different layers and elements of the site more easily. For most cases one representative element is circled to keep the section clear. Image by Lucas Pol.

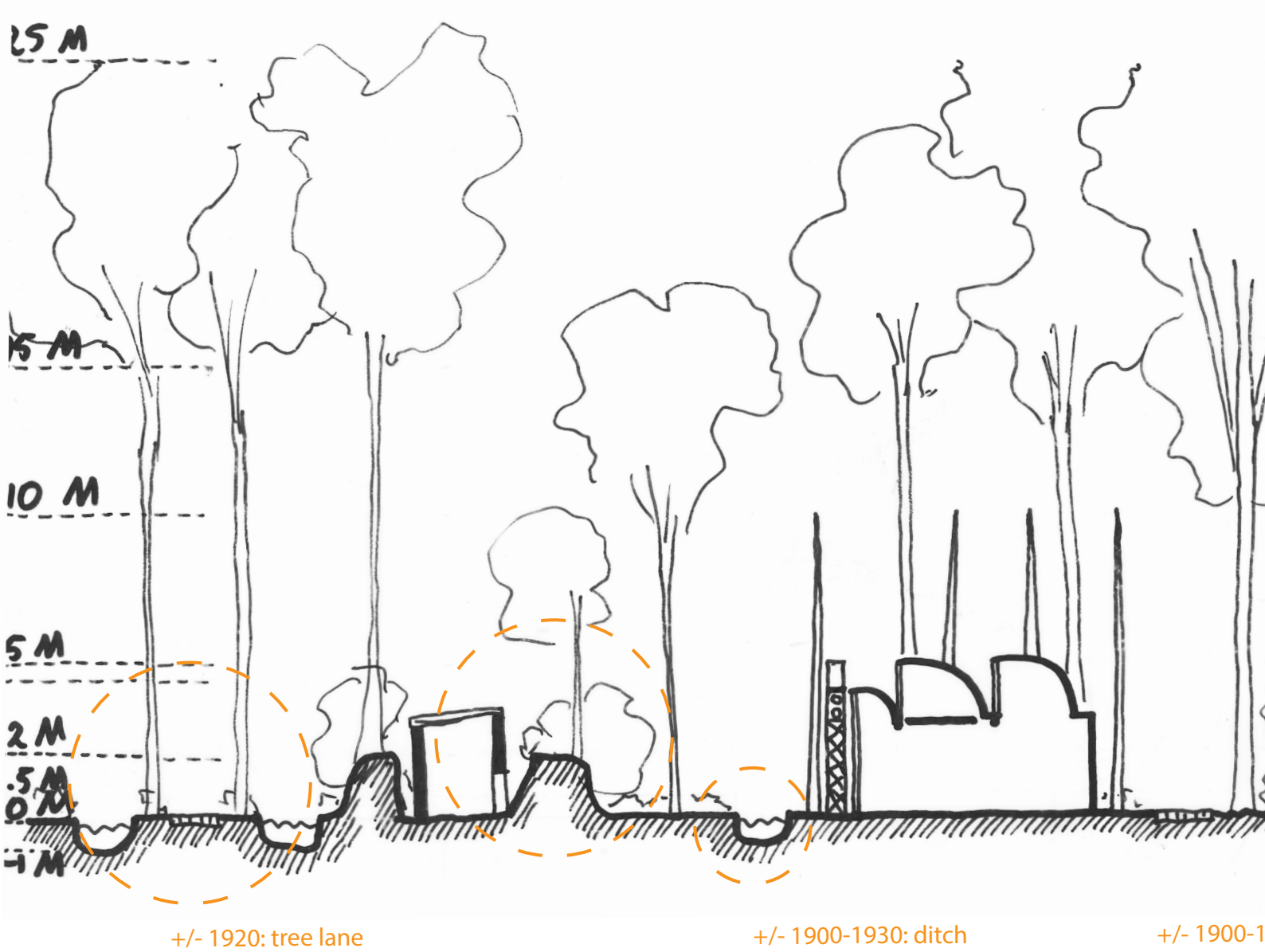
+/- 1950-1960 LIGHTING RODS

In the 1950's new buildings were added of a new typology. These were long and thin or quite small. Lightning rods would be placed around all these buildings and connected with cables. Again, for safety reasons so lighting would not ignite any of the explosive substances used.

+/- 1940-1960 CAMOUFLAGING TREES

In the time of the German occupation the Germans densified the testing area for camouflaging purposes. Later during the 1950's this camouflaging purpose was used in ensemble with the small and long buildings with the shell roofs.

On the other hand, they could also have had a similar purpose of making sure the buildings are properly shaded as well. Just like the buildings around the gabled roof buildings which originate from around 1900-1910.



A section of the area that is relevant for the plots in the wood. The scale used from left to right is 1:500 for up and down scale 1:200 was used. This to illustrate and seperate the different layers and elements of the site more easily. For most cases one representative element is circled to keep the section clear. Image by Lucas Pol.

+/- 1920 TREE LANE

Along the water near the old entrances of the different factories this was a spatial element used there: a tree lane and hedges as well. However more into the complex this was not necessary. In the Plofbos these lanes were very likely used in ensemble with the ditches and earth walls as a means of protecting. In this case to guide the pedestrians along the planned paths in a visual way. Together with the ditches the tree lanes had to make sure the pedestrian or user did not leave the path. This solution and other means made the forest easy to read visually.

At the moment the tree lanes are hard to distinguish, however the current sanitation process on the site could be a starting point to restructure, or spatially clean, the entire forest space. Then elements like these can be preserved or saved.

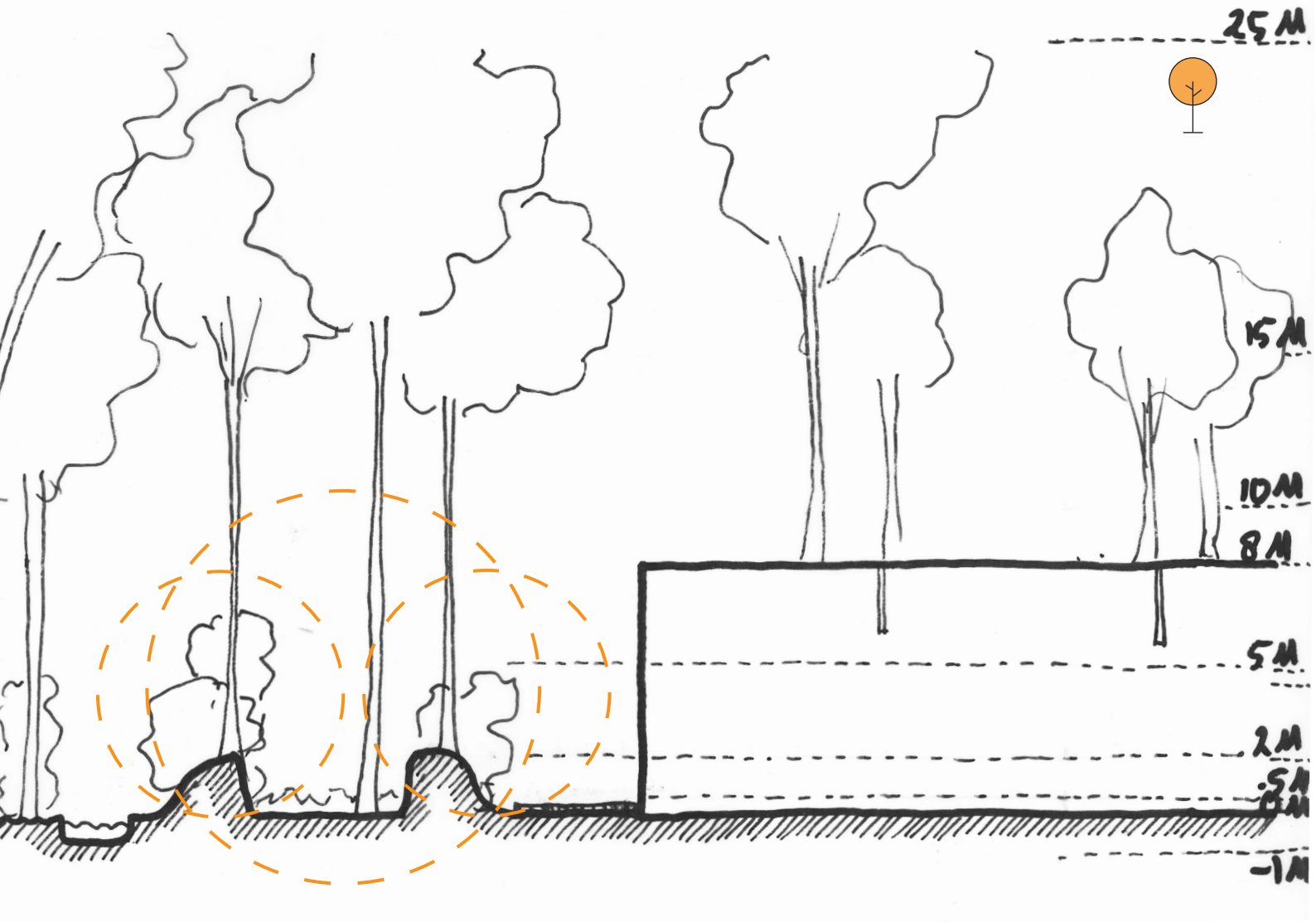
+/- 1900-1930 DITCH

Ditches are part of the Dutch culture landscape. They are a vital part of the polder system which makes that the land can be used for different purposes. In the case of Hembrug there is one ditch which previously bordered the north end of the military industrial site, this one is derived from the polder plan further to the west.

In this case most of the ditches on the Hembrug site are part of the Plofbos and do not have the same purpose as a polder. This is the structure of test-sites used for testing and storing dangerous materials and explosives.

The ditches are surrounding different shaped chambers with several buildings used for the testing and storing of the previously mentioned dangerous materials.

These ditches are one of the layers of protection. They stop fires from spreading beyond one of the chambers if they were to happen. The green needed to be maintained to prevent this from happening. Another function is to stop people from randomly wondering on one of the test islands.



A section of the area that is relevant for the plots in the wood. The scale used from left to right is 1:500 for up and down scale 1:200 was used. This to illustrate and seperate the different layers and elements of the site more easily. For most cases one representative element is circled to keep the section clear. Image by Lucas Pol.

+/- 1900-1950 EARTH WALLS

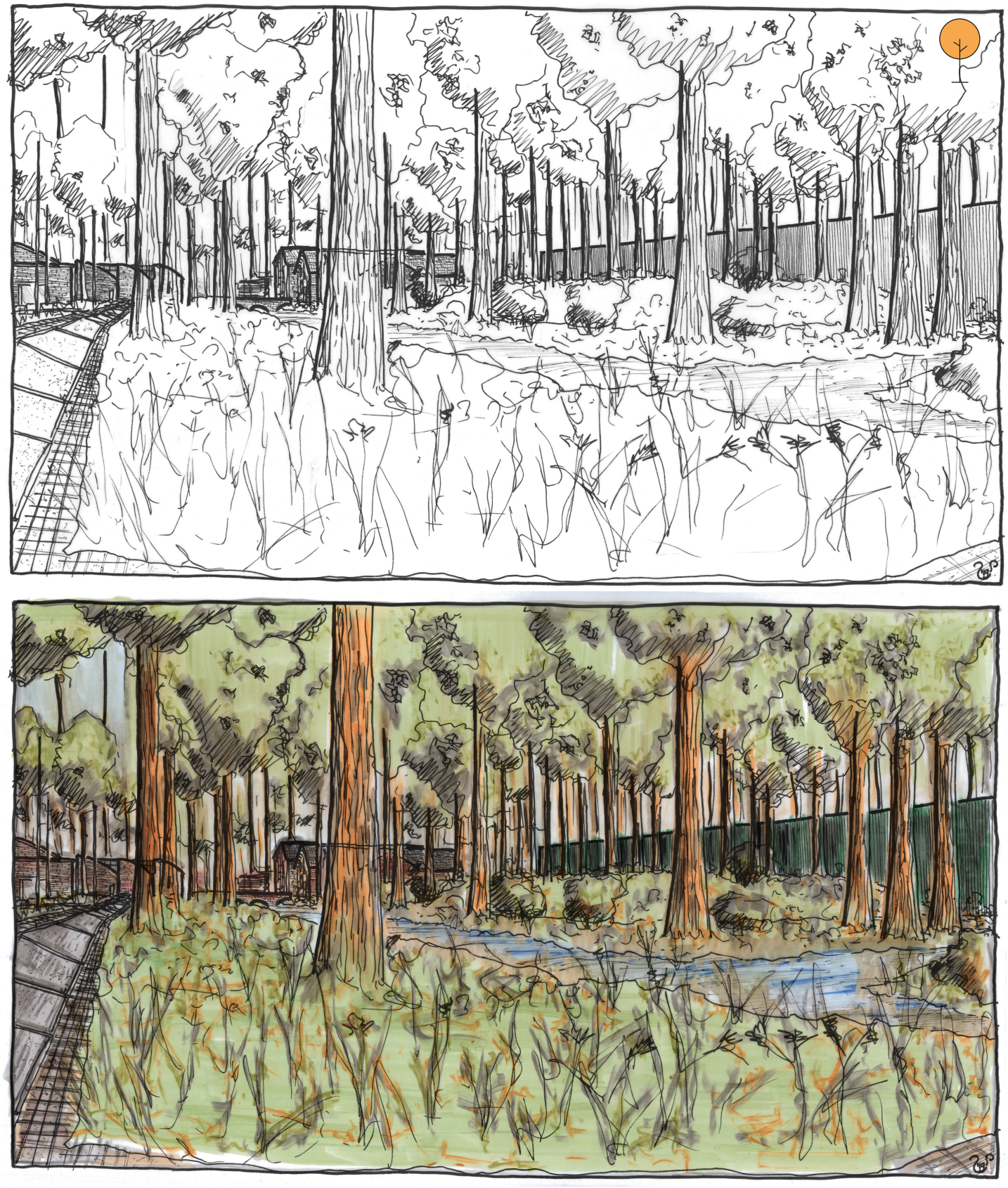
Some of the earth walls are one of the original structures from the first layout from around 1900. Later ones were added and some of them were (re)moved.

They are one of the lines of protection. This in ensemble with the specific structure of heavy walls, light roof and easily removable doors, windows and the planting around and on the earth walls. They made sure an explosion or other incident stayed as local as possible and possible debris will not hurt any of the possible surrounding area and people. An example of a recorded incident like this is mentioned end of the spatial elements sub chapter.

+/- 1900-1996 PROTECTIVE PLANTING

The green and the trees were used purely for protective purposes in most cases. In different periods however they used it in different ways and for different scales.
In the early beginnings, around 1900, of the site in weapons manufacturing it was used twofold. First, a lot of trees were places around the buildings to provide shade, so the building did not heat up too much. This way the temperatures could be kept as consistent as possible so it could be handled and stored in a more controlled environment.

Secondly the bushes, hedges and trees were used for protective purposes on the earth walls mentioned previous. The Plofbos was densified with ivy and vine for effectiveness in winter as well. During the 1940 the Germans planted more trees to camouflage the buildings from overflying planes from the allies. In the 1950's this purpose was used in a designed spatial plan with the smaller shell roof buildings. After leaving in 2003 the site the forest slowly densified because of neglect.

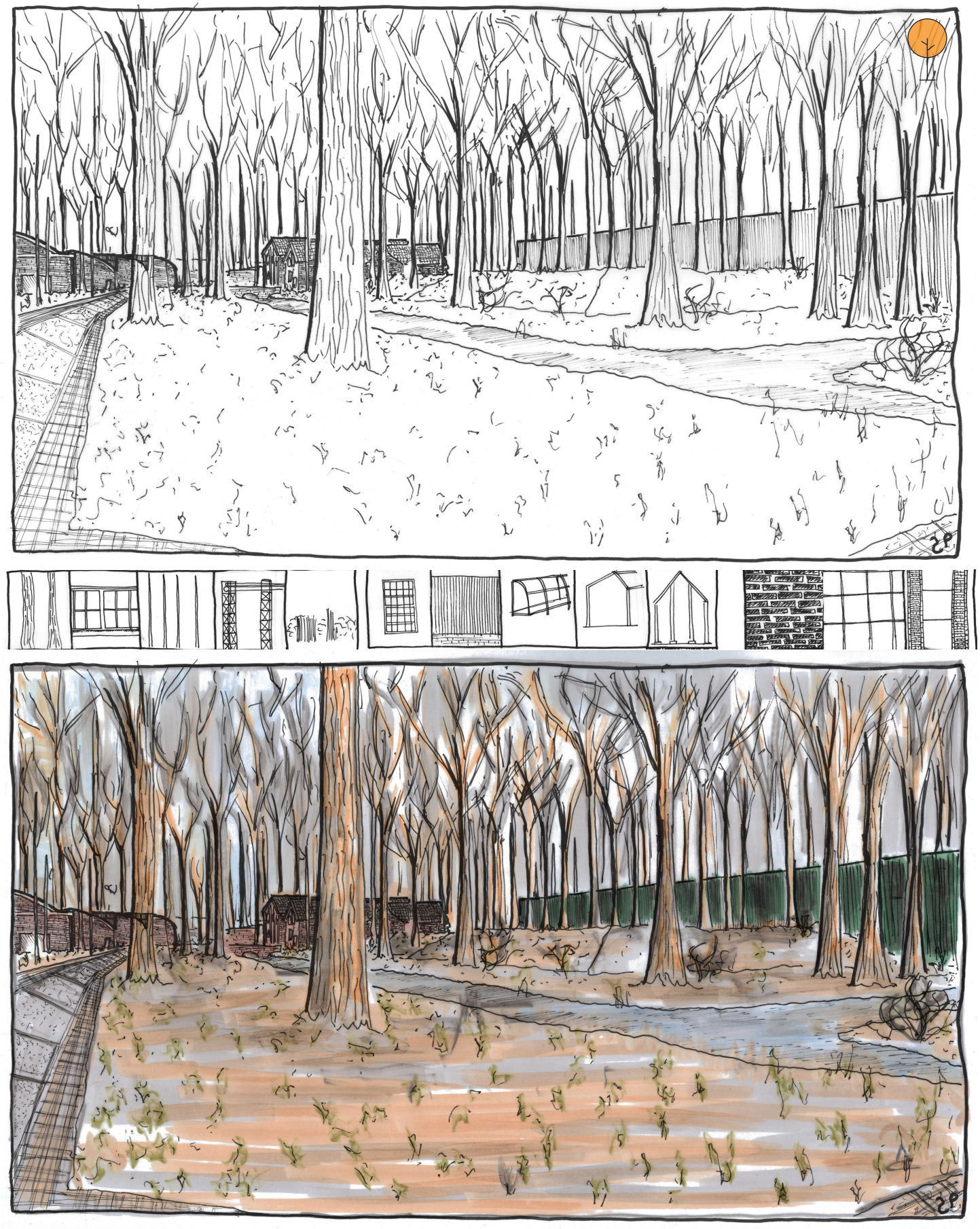


Perspective view of “plots in the wood” with the main colours and textures during the spring and summer seasons. Images by Lucas Pol.

2.4.3 TEXTURES & COLOUR

The textures on Hembrug and particularly this site around the Plofbos has a lot of vertical textures and rhythms which come back in the trees, lighting rods, pipelines, even window frames, columns and even cladding of the box. These vertical rhythms are contrasted by a few elements which go right through them like the roads or brick patterns with a horizontal direction.

The colours of all the materials resemble camouflage colours and there are no real bright and outstanding colours. Although the green colour of the big production hall does stand out more than the other buildings. In the summer the colours are



Perspective view of “plots in the wood with the main colours and textures during the fall and winter seasons. Different textures are highlighted either vertical or horizontal. Images by Lucas Pol.

brighter. The trees being fully green and with their leaves makes that there is significantly more shade. Which could make this area cooler than the rest of the Hembrug area. During winter and fall there is a lot more sunlight because of the tree canopies being more open. The colours are in this case a lot more brown and grey.

2.4.4 SUMMARY & CONCLUSION

This subchapter was focused on the following question: How do the spatial elements on site create the atmosphere and do their functions add to the atmosphere of the "plots in the woods" site?

When walking through the area, different elements come into view and have different purposes. To explain some of these elements a little of their backstory was necessary, because a lot of the elements, also mentioned in chapter 2.3, are mostly functional. Not all of these elements held their original function but certainly add to the atmosphere of the site.

The most apparent contributor to the atmosphere at the moment are the trees that make the "plots in the wood" blend in with the Plofbos to the north. This overgrown character now mostly dominates the site and creates a quiet area blocking out a lot of the surrounding sounds. This almost creates an inside space within the Hembrug area.

The name "plots in the woods" works quite well here. The site and building plots, including the Plofbos for this explanation, were not planned as plots in the wood. The trees were planted very carefully and maintained strictly because of safety reasons. For example, the tree lanes in the Plofbos were probably meant as a visual guide to lead people through the forest and not wonder accidentally into the different forest chambers and get hurt. On site the remains of earth walls can be seen, but without the buildings in the. The protective planting is hard to distinguish from the surrounding bushes and trees it has almost all grown to one forest.

This dense clay forest creates a very serene and calm area. The forest was densified during the 1940's to hide from overflying planes. Throughout the Plofbos ruins of the test buildings now peak through the green just like a lot of the buildings on site.

At the moment the soil of the site and the Plofbos is being cleaned. This will affect the area quite a lot, as this is not done carefully. A lot of the trees, bushes and plants will be disturbed or disappear entirely. This may seem negative, but this creates an opportunity to restore the neat and clear character with tree rows and clustered green that made the area so unique. If done with nuance the serene character will be kept.

The paths are one of the factors that still create visual clarity due to the differences of textures but also the direction. The tree lanes in the Plofbos and other areas emphasize them. The orthogonal structure and its clear layout create different long view lines which help one orientate on the site and be aware of the surroundings. The clear structure and layout are applied overall on the former military industrial site of Hembrug.

The ditches are not strictly part of the Plofbos but create different chambers in combination with the green and the earth walls. The ditches create clear edges and borders but do not obstruct your field of view.

The utility elements like the lighting rods and the pipe lines are very much part of the site, because they were designed on a larger scale and in unison with the buildings and surroundings. Although both do not hold their former purpose they blend in with the atmosphere of the forest because of their vertical rhythms and textures.

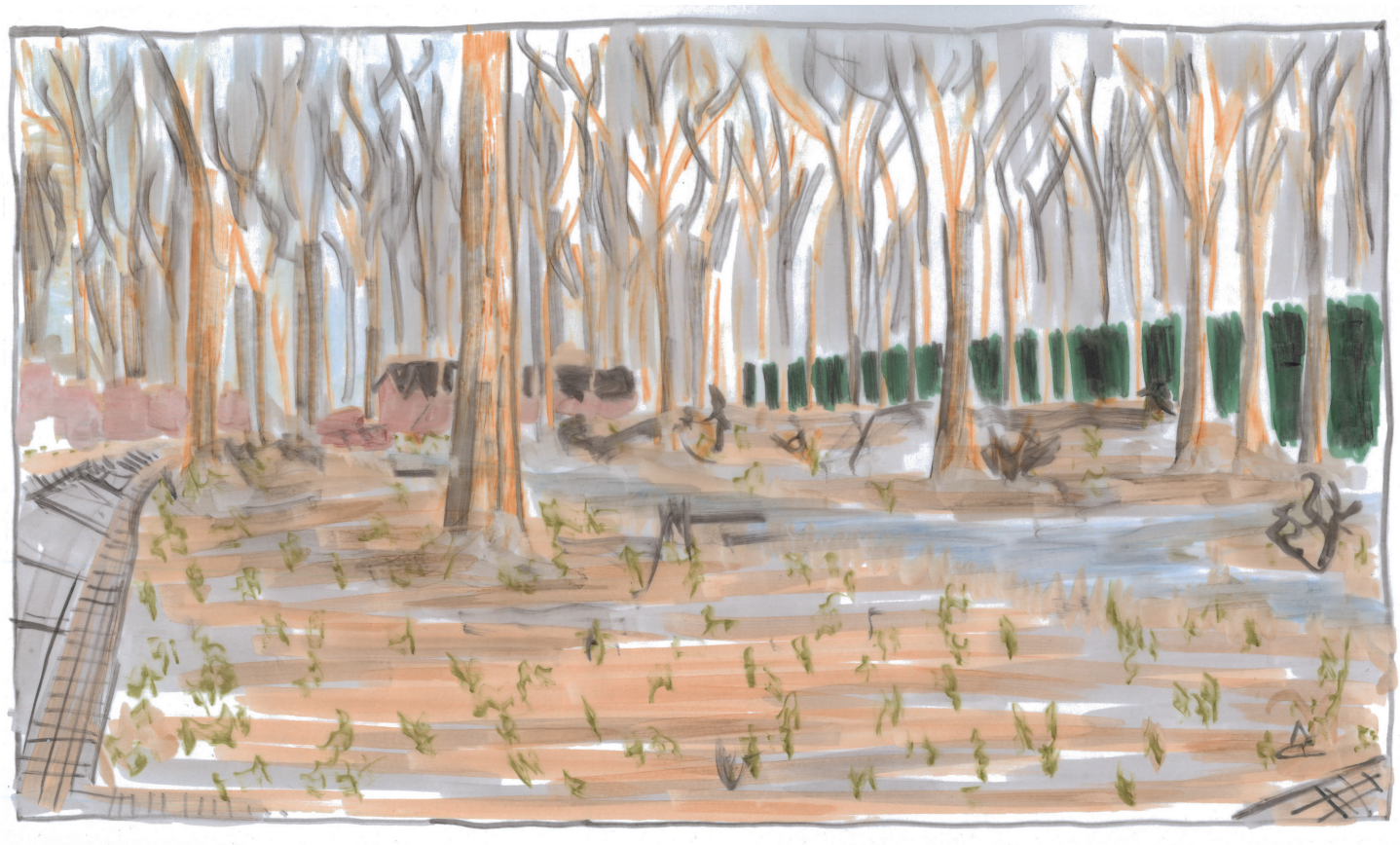
The textures, mostly vertically orientated, make the site a whole and create a sense of unity in combination with the soft colours. The colors are almost literally camouflage colours and blend quite well. Certain elements stand out more because of their more horizontal textures and their more outstanding colors, especially in the buildings.

The site can almost be described as an English landscape garden but then in a forest setting. A lot of the physical elements like the earth walls, damaged testing buildings, lighting rods and pipe lines could be considered follies now. This in combination with their historical value. The dense character hides a lot of the elements. In combination with the clear paths this creates unexpected sightlines that could peak one's interest when walking through the site.

Although a lot of elements have lost their function they still do contribute to the atmosphere and character of the site. They can be repurposed in the future, so they do not lose their functional value, just like the buildings.



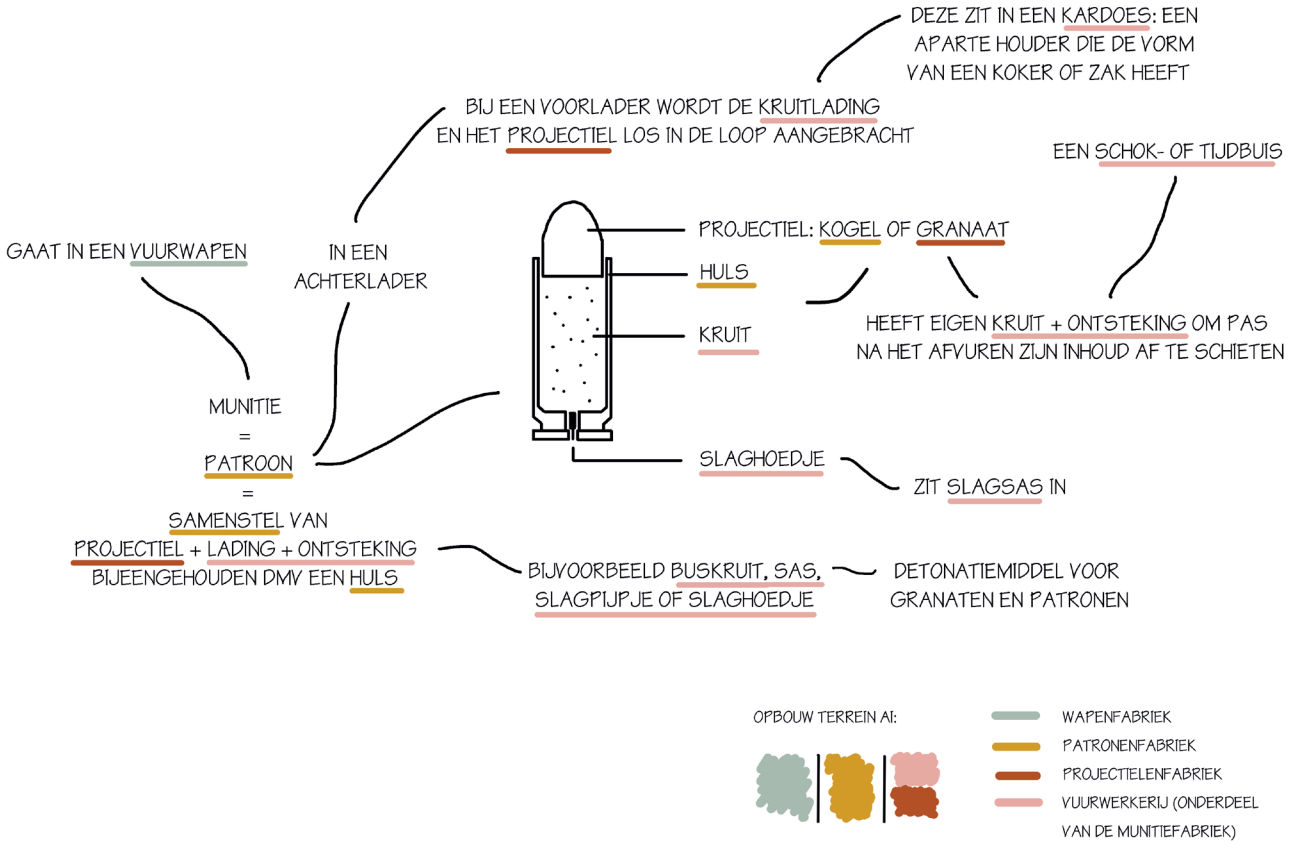
Color view of the “plots in the wood” during summer and spring. Image by Lucas Pol.



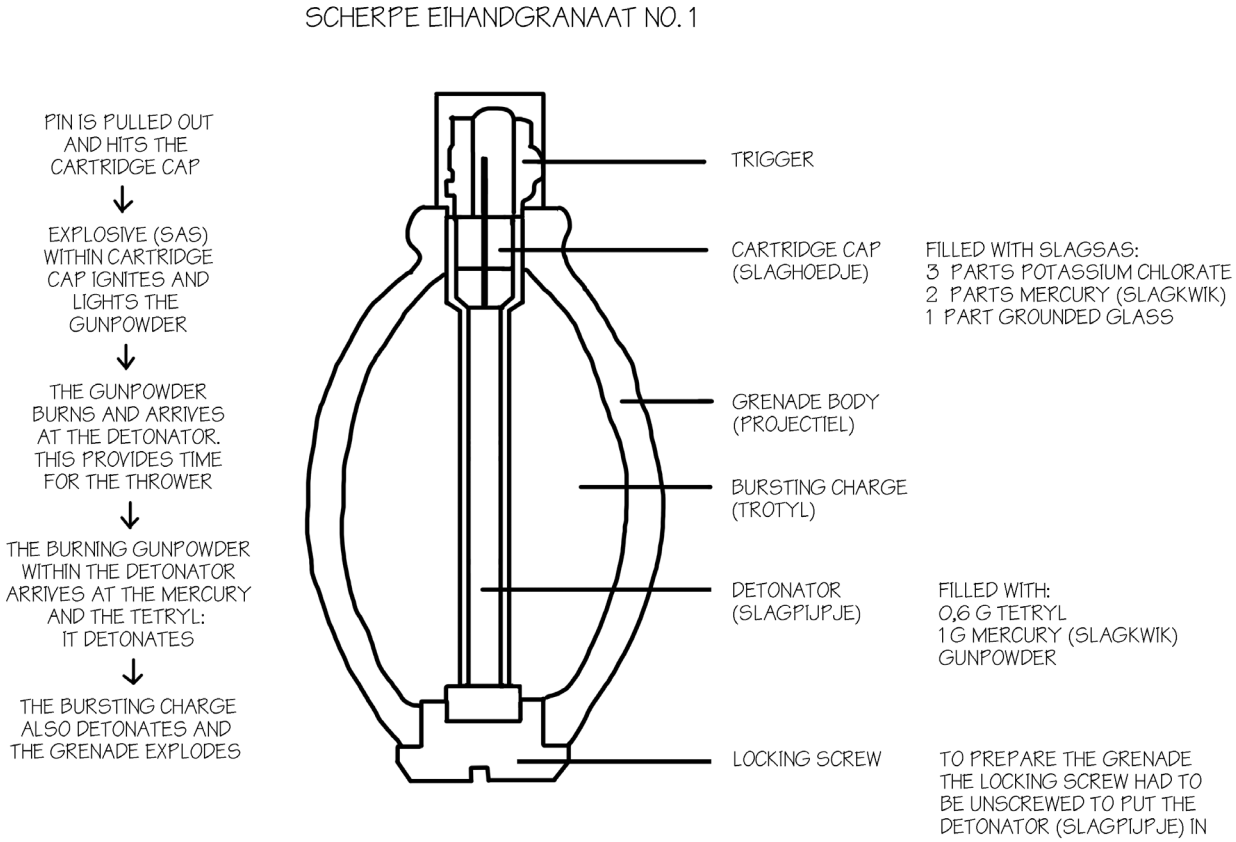
Color view of the “plots in the wood” during fall and winter. Image by Lucas Pol.

2.5 MUNITION

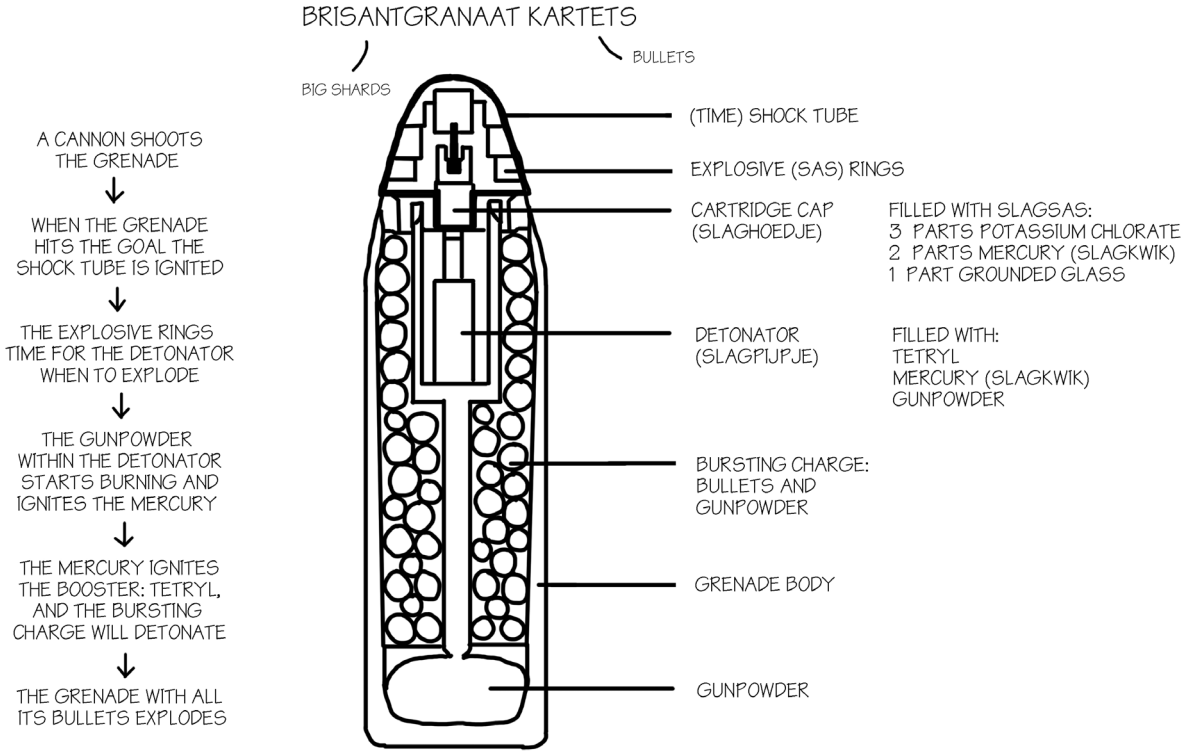
Made by Valerie Arntz



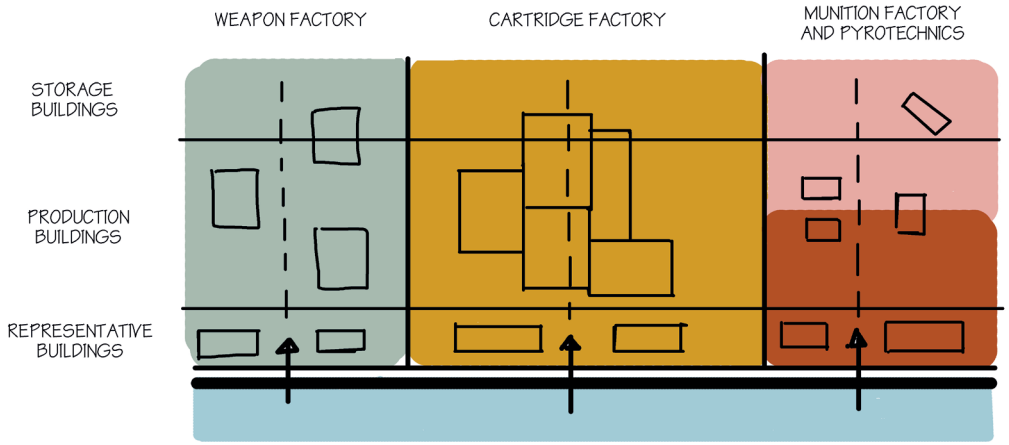
Explanation of the structure of the Hembrugterrein and how munition is composed.
(Het Legermuseum, -; Steenhuismeurs, 2010)



Explanation of a ‘sharp egg hand grenade’, a hand grenade produced on the Hembrugterrein and typical for the production process.
(Het Legermuseum, ?; Wielenga, 2016; Koninklijke Militaire Academie Breda, 1935)



Explanation of a grenade with shards and bullets, a grenade produced on the Hembrug-terrain. This is typical for the production process.(Het Nationaal Militair Museum, 2012/2013; Wiechen, 1977; Wielenga, 2016; Peverelli, 2011)



Original set-up of the site. Three different factories separated by fences with each their own individual entrances. (Steenhuismeurs, 2010)

Before being able to understand the Hembrug site more in depth it is essential to understand more about munition and the set-up of the site. As visible on the image on top of the other page is the site divided in three parts, from right to left: the munition factory and polytechnics (vuurwerkerij), the cartridge factory and the weapon factory. This is the same build up as munition is composed. From the projectiles, bullets and grenades, to the patterns and eventually the firearms. Originally the site consisted of three completely seperate working factories, but slowly over time this became more integrated, although they always kept the same build up.

At the plots in the woods the polytechnics were made: the explosives and bursting charges, the cartridge caps and detonators, they made everything themselves on the site. The projectile factory, a little more south on the site, delivered the empty projectiles and these were step by step filled with all the different components visible on the drawings above and on the left side. The scherpe eihandgranaat no. 1 and the bristantgranaat kartetst were typical products produced at the pyrotechnics. More about the production process and the different functions within the buildings will follow on the next pages.

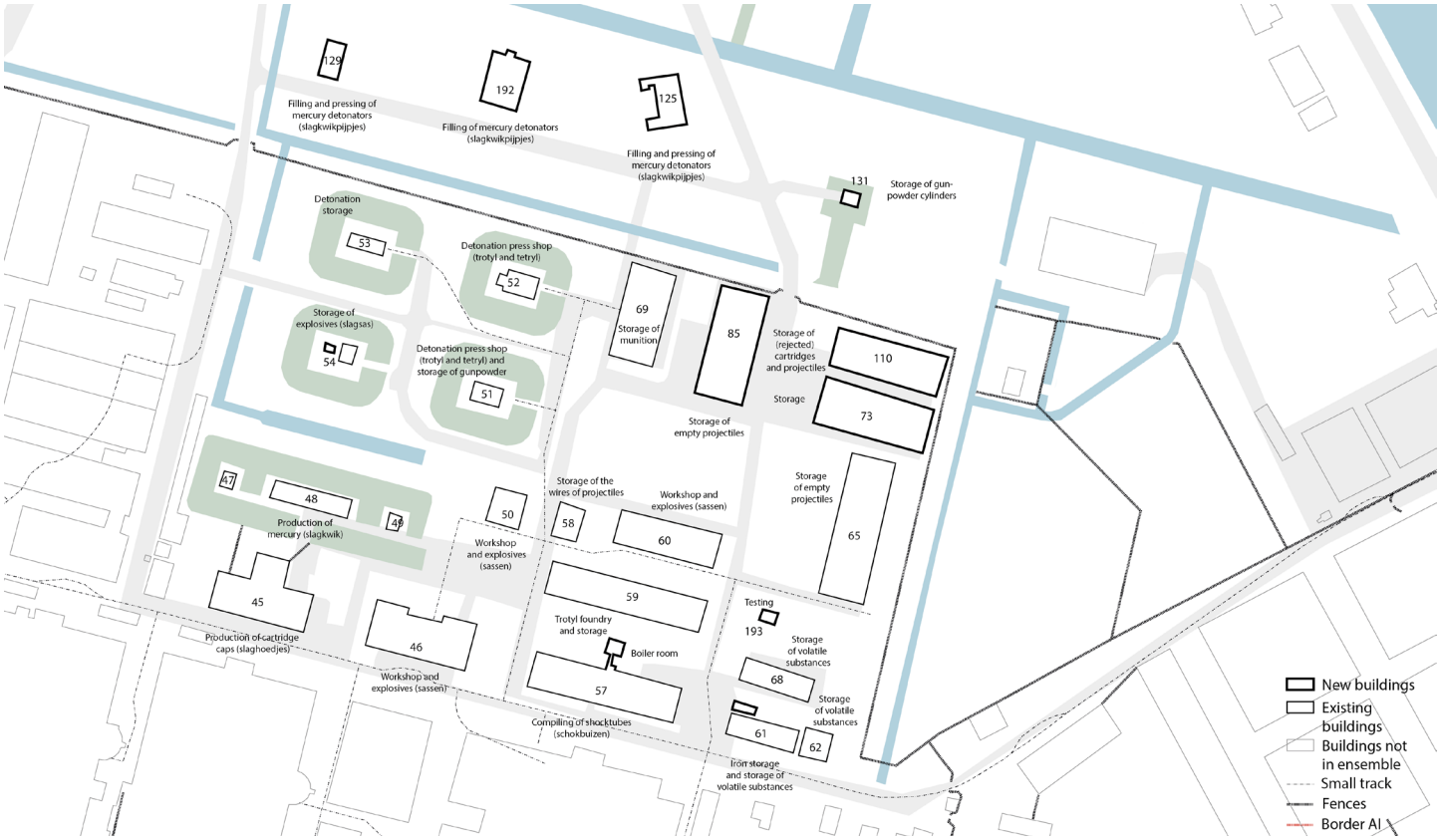
2.6 FUNCTIONS

Made by Valerie Arntz

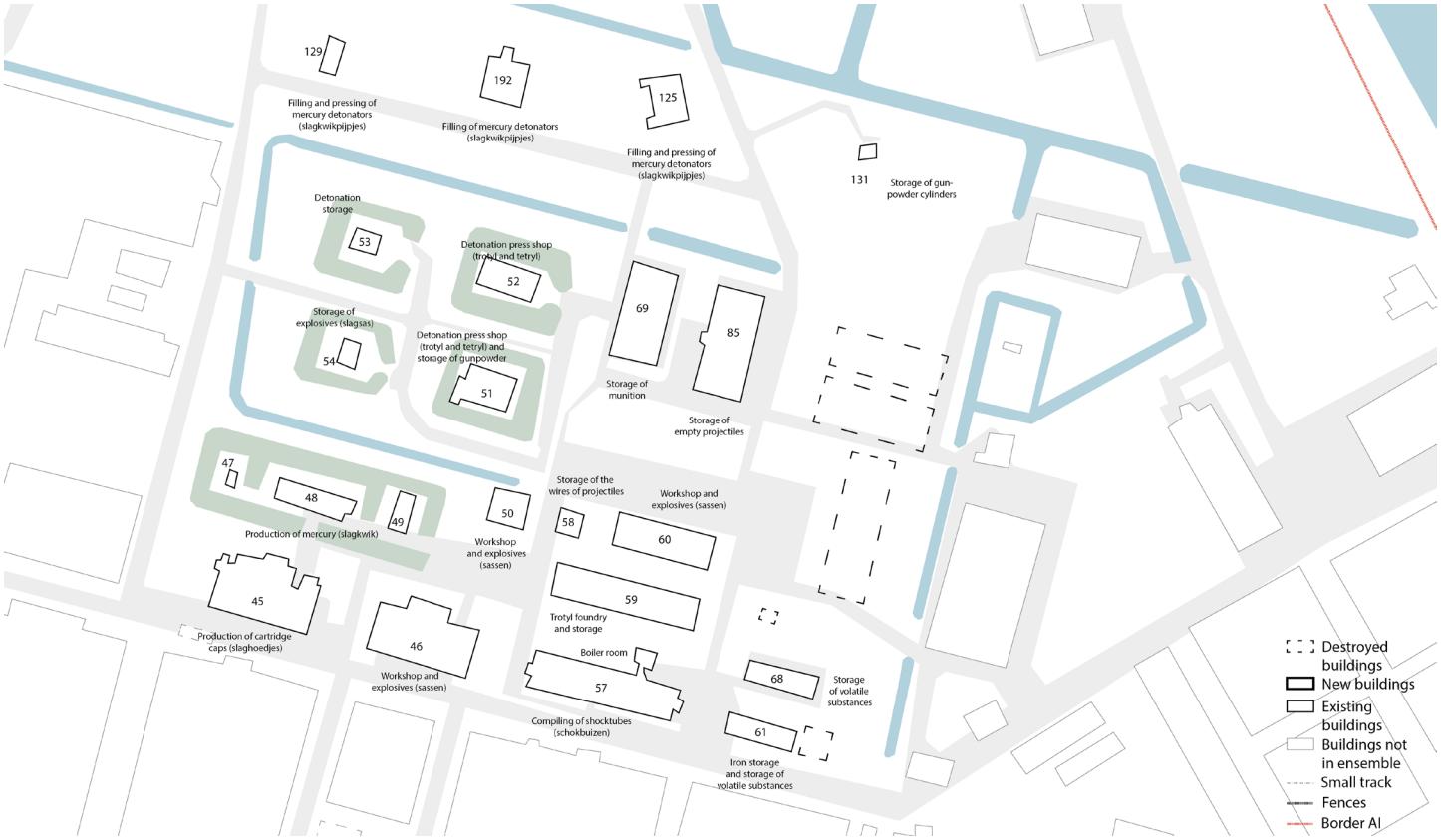
2.6.1 SET-UP OVER TIME



Situation 1901. The munition production just started and the buildings focus mostly on production and storage of explosives (sassen). (Steenhuismeurs, 2010; Goossens, 2007; Artillerie Inrichtingen Hembrug, 2018; Projectbureau Hembrug, 2018; Koen & Visser, 2003)



Situation 1924. Addition of buildings in the north for mercury detonators, on the west side extra storage and a test building is added. (Steenhuismeurs, 2010; Goossens, 2007; Artillerie Inrichtingen Hembrug, 2019; Projectbureau Hembrug, 2018; Koen & Visser, 2003)



Situation 1941. (Wooden) storage buildings are moved north. Lots of bunkers are added to the terrain, but this part seems untouched. (Steenhuismeurs, 2010; Goossens, 2007; Artillerie Inrichtingen Hembrug, 2019; Projectbureau Hembrug, 2018; Koen & Visser, 2003)



Situation 1996. Eurometaal is now the owner, lots of buildings are destroyed and new production buildings are build. (Steenhuismeurs, 2010; Goossens, 2007; Artillerie Inrichtingen Hembrug, 2019; Projectbureau Hembrug, 2018)



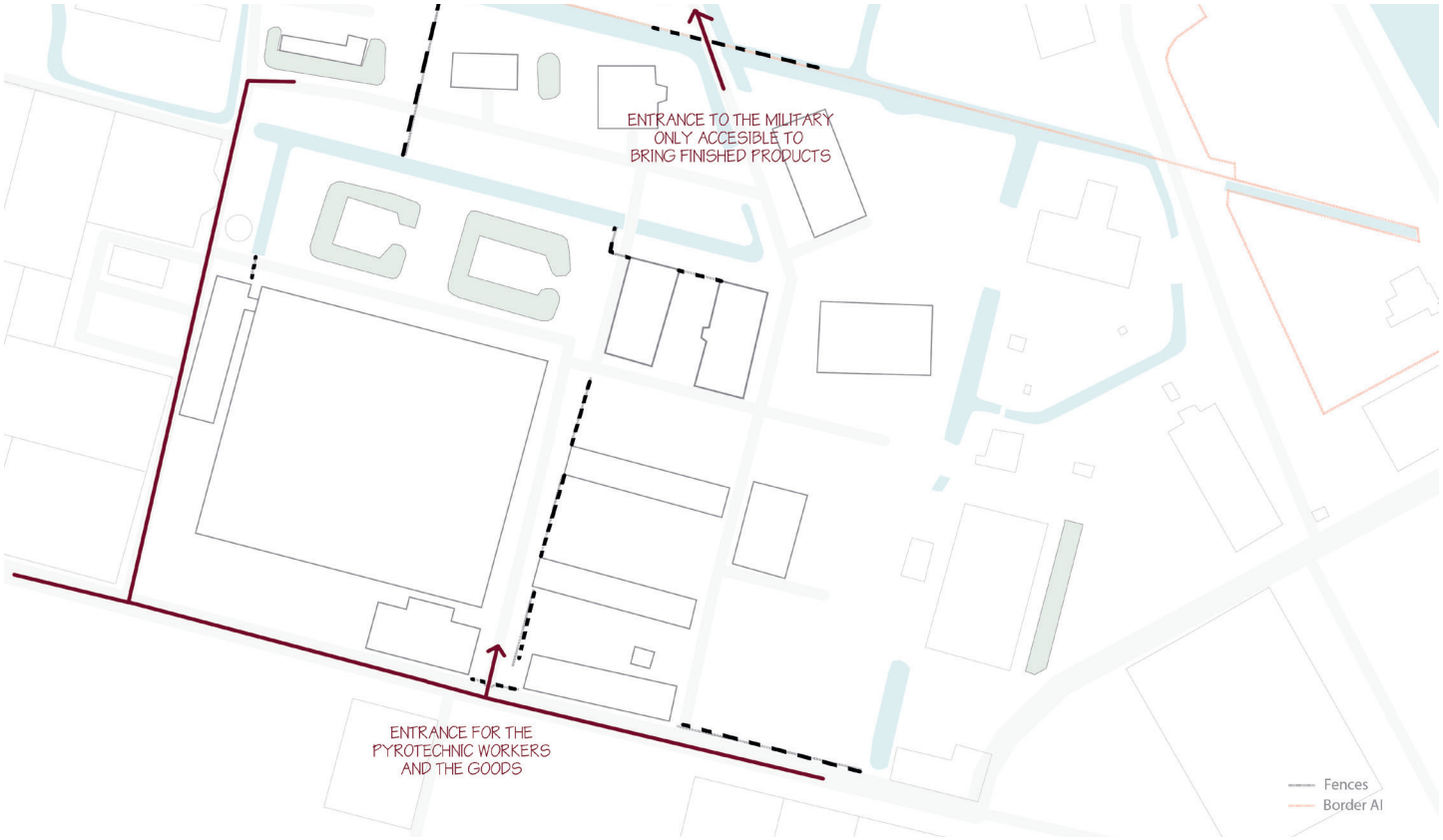
All four situations. The pragmatic philosophy of the terrain is always followed: if you need something you add it, if you do not need something a
(Steenhuismeurs, 2010; Goossens, 2007; Projectbureau Hembrug, 2018)



nymore then you destroy it.

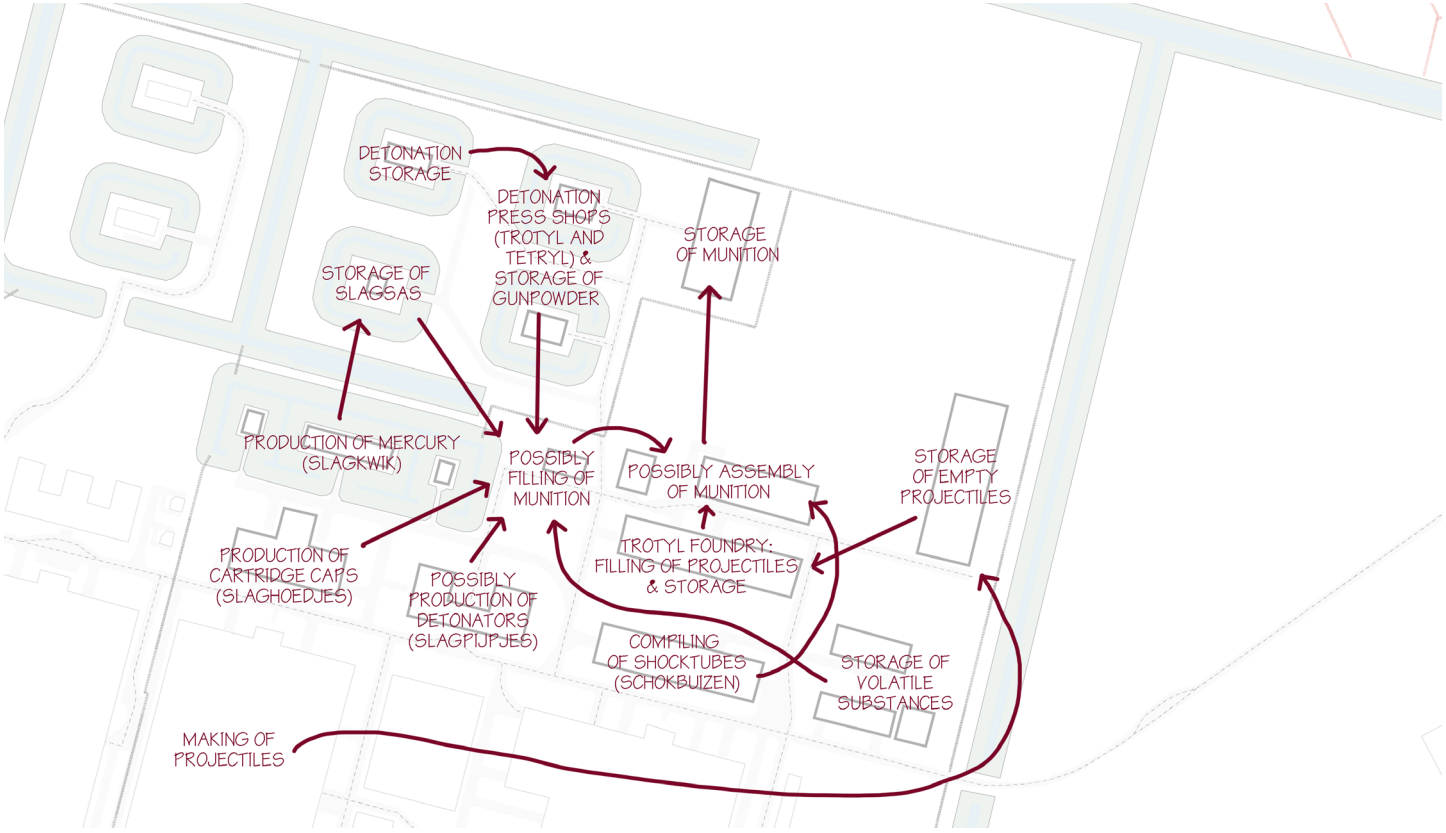


Explosion distances between the buildings. The buildings were on purpose built freestanding, so in case of an explosion in one building not all the other buildings would also be damaged (Steenhuismeurs, 2010)

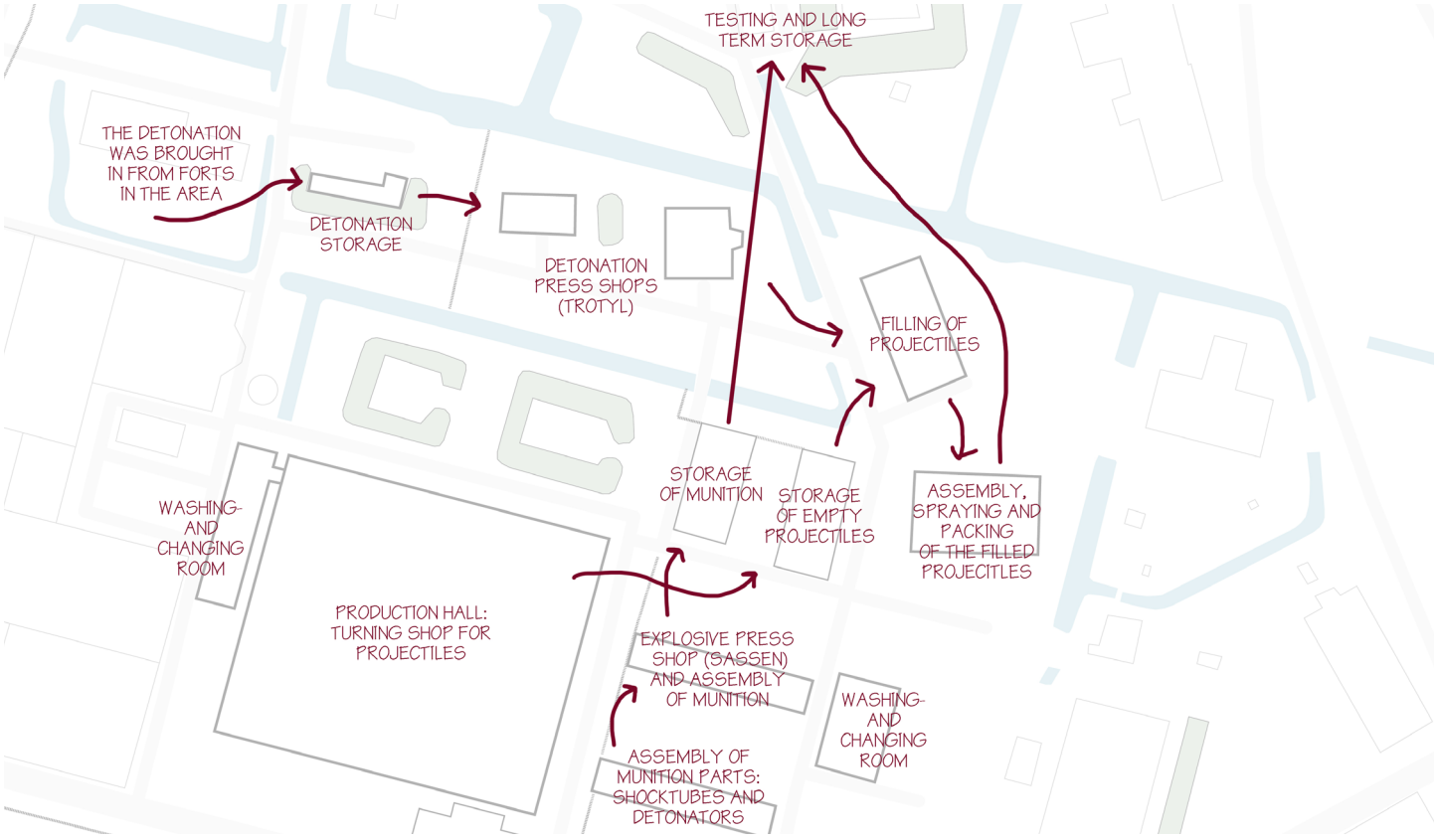


The fences and borders of the ensemble in the time of Eurometaal, 1996. The ensemble was only accessible by the people working within one of the buildings, it was a completely enclosed area by means of fences and water.
(Steenhuismeurs, 2010; Peter de Vries, a former employee of Eurometaal)

2.6.2 PRODUCTION PROCESS

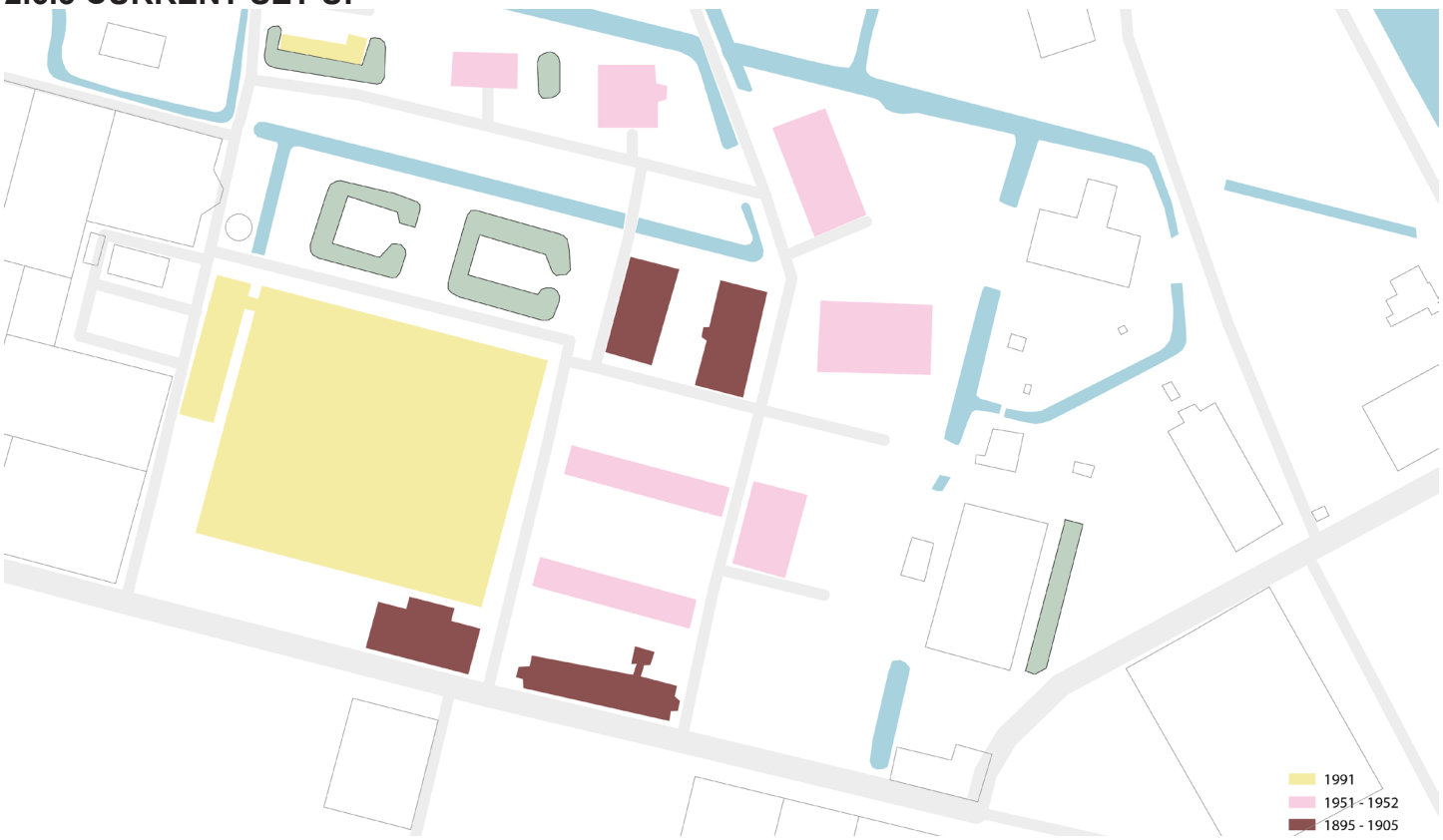


Production process of munition in 1901. The relations between the buildings and the storage and workshops is shown. (Steenhuismeurs, 2010*; Goossens, 2007;* Wielenga, 2016; Artillerie Inrichtingen Hembrug, 2019; Wiechen, 1977)

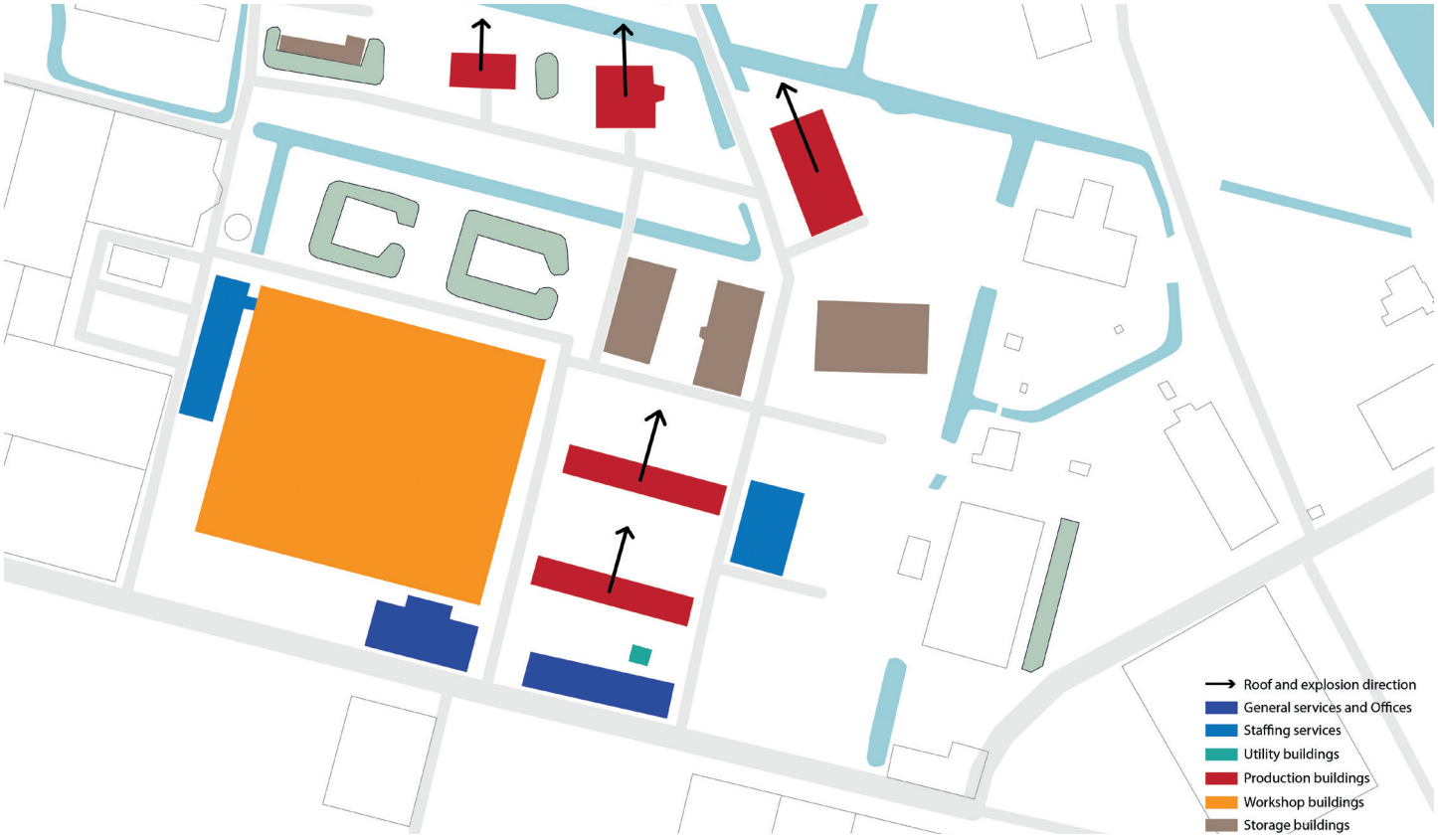


Production process of munition in 1996. The production process seems simplified compared to the one in 1901. This could be because a lot less different products were made and the production is getting less and less. Steenhuismeurs, 2010; Goossens, 2007; Wiechen, 1977)

2.6.3 CURRENT SET-UP

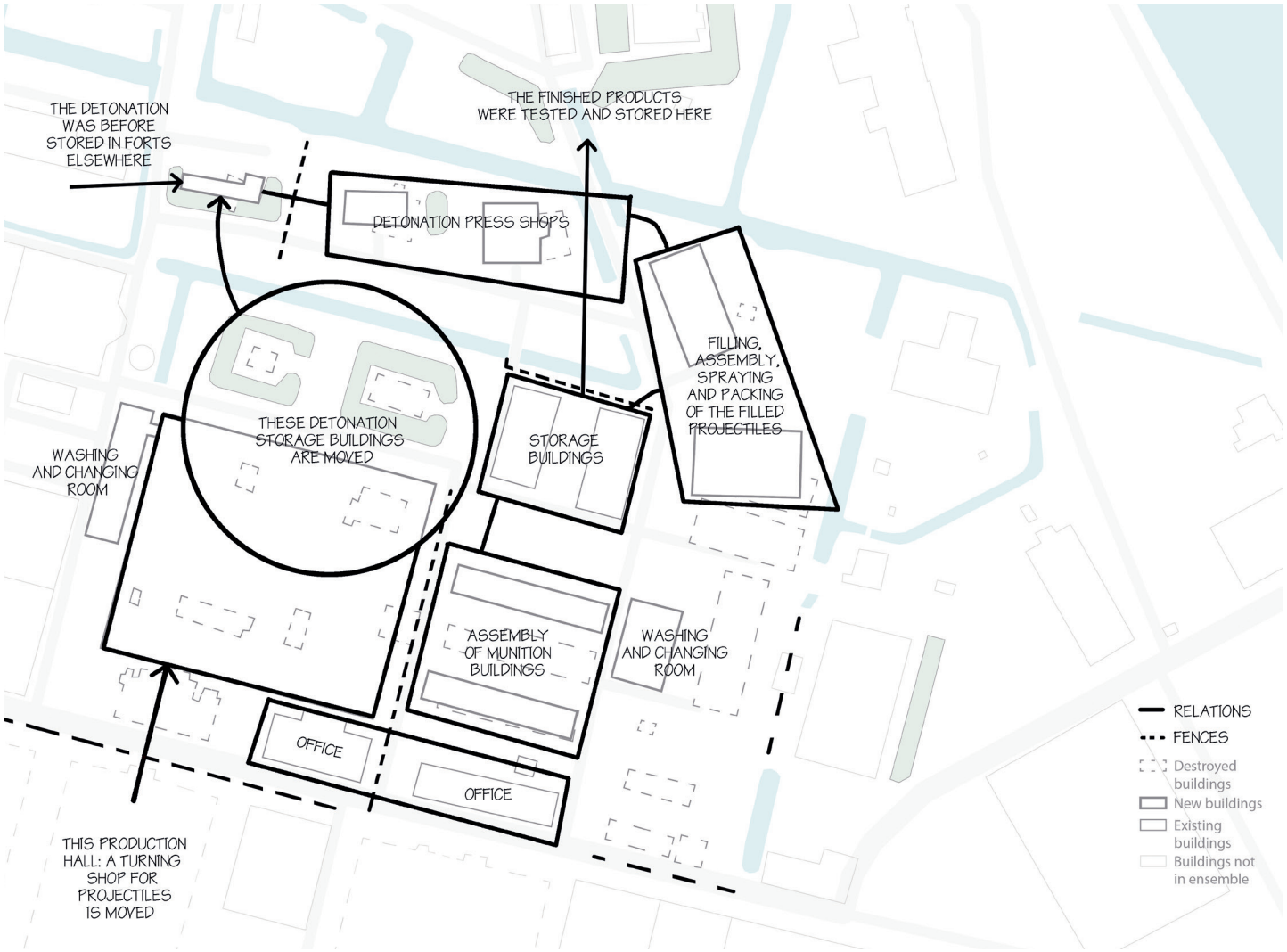


Building phases. Four buildings belong to the oldest phase of the Hembrugterrein, in 1951-1952 a lot of new buildings were build because of scaling-up and modernisation after the wars. The two yellow buildings are build by Eurometaal.
(Steenhuismeurs, 2010*)*



Functions and direction of the buildings, 1996. The production buildings have shell roofs directed towards the forest in case of an explosion. (Steenhuismeurs, 2010*; Goossens, 2007;* Projectbureau Hembrug, 2018; fieldwork in Q1 of 2019*)*

2.6.4 RELATIONS BETWEEN THE BUILDINGS



Conclusion drawing of the functions and relations of the current set-up of the buildings.
(Steenhuismeurs, 2010*; Goossens, 2007;* Projectbureau Hembrug, 2018; Artillerie Inrichtingen Hembrug, 2018)

According to the functions of the buildings, the different typologies and the production process combined with the old fences it is possible to group them. This can help us further in the design process, for example to decide which building(s) to transform or to know which consequences your design can have on the other buildings.
To answer the overall question asked before analyzing the plots in the woods: "How the functional design approach practiced by the 'Artillerie Inrichtingen' manifests itself in the 'plots in the woods'? from the function and production processes viewpoint: the steps of understanding munition, the set-up of the buildings over time and the changing production process are essential. Everything was functional and if a certain option is cheaper than another the cheapest option is chosen. For example the production hall of the projectiles is moved north, simply because it was cheaper to place it there and destroy the old detonation buildings. Or the functional decisions about the buildings where employees worked with explosions where placed next to the explosion forest. Next to that, there is the layering in time with the certain building phases that are clearly visible when walking on the site and very unique is the visibility of the functions in the shape of the buildings.
In conclusion, the pragmatic philosophy and coherence of the terrain is always followed: If you need something, you add it, if you do not need something then you destroy it.

2.7 CONCLUSION



LANDSCAPE

The 'plots in the woods' as an ensemble was a crucial part in the production and development of Hembrug and has its specific character because of its role in this process. The plot was designed to produce munition and had to deal with all the risks that came with this kind of production. This resulted in the low density of the buildings, the abundance of green, the lay-out of the site and the placement of spatial elements such as earthen walls and ditches. This very pragmatic mindset also becomes clear when looking at the development over time. If the military needed additional resources or buildings, they built more. When a building lost its use, they would destroy it. This mindset has the consequence that nowadays there is not much left of the original design of the 'plots in the woods'. The influence of Eurometaal in the 1970's, which worked according to the same philosophy, is because of this also clearly visible.

So, to be able to answer the question 'How does the functional design approach practiced by the 'Artillerie Inrichtingen' presents itself in the 'plots in the woods'? on the level on the landscape, it is very important to look at the 'plots in the woods' in the context of its historical development and intentions. In its essence, the original design intent was, as far as is known, purely functional. However, through the years, the site changed enormously, especially after the terrain was closed. Maintenance of the 'plots' stopped and as a result nature took over. This caused for example for elements like the lightning rods to lose their original function, because the trees grew higher. However, they do add to the atmosphere on site and are important traces of the past. Other elements, such as the ditches, do not serve their original purpose anymore as well, but could in the current day society have another function that they were not originally designed for. Here lays also the challenge for the designer to deal with this historical context in an innovative way, balancing the past and present. After the analysis, in the value assessment and position statements each student will present his or her own view on this matter.

3. THE TYPOLOGIES

INTRODUCTION

After analysing the 'plots in the woods' as an ensemble, the research question "How does the functional design approach practiced by the 'Artillerie Inrichtingen' presents itself in the 'plots in the woods'?" will be answered on the building scale level.

As there are numerous buildings present on site, this chapter will not analyze each individual building, but will address four different building typologies. The buildings are separated into the gable roof, shell roof, circular roof and low-sloped roof typology. The choice to divide the buildings based on their roof shape derives from two main reasons. First, there are four very distinctively different roof shapes present in the 'plots in the woods', so the building typologies are easily identified. Second, the roof shapes strongly related to the former function of these buildings, as mentioned in the previous chapter. Roughly the buildings can be categorized as following: the gable roof typology (1895) (note: building 46 is not included due to lack of material) as office and storage buildings, the shell roof typology (1952) as explosive risk buildings, the circular roof typology (1952) presumably as a storage or production building and the low-sloped roof typology (1991) as a production hall.

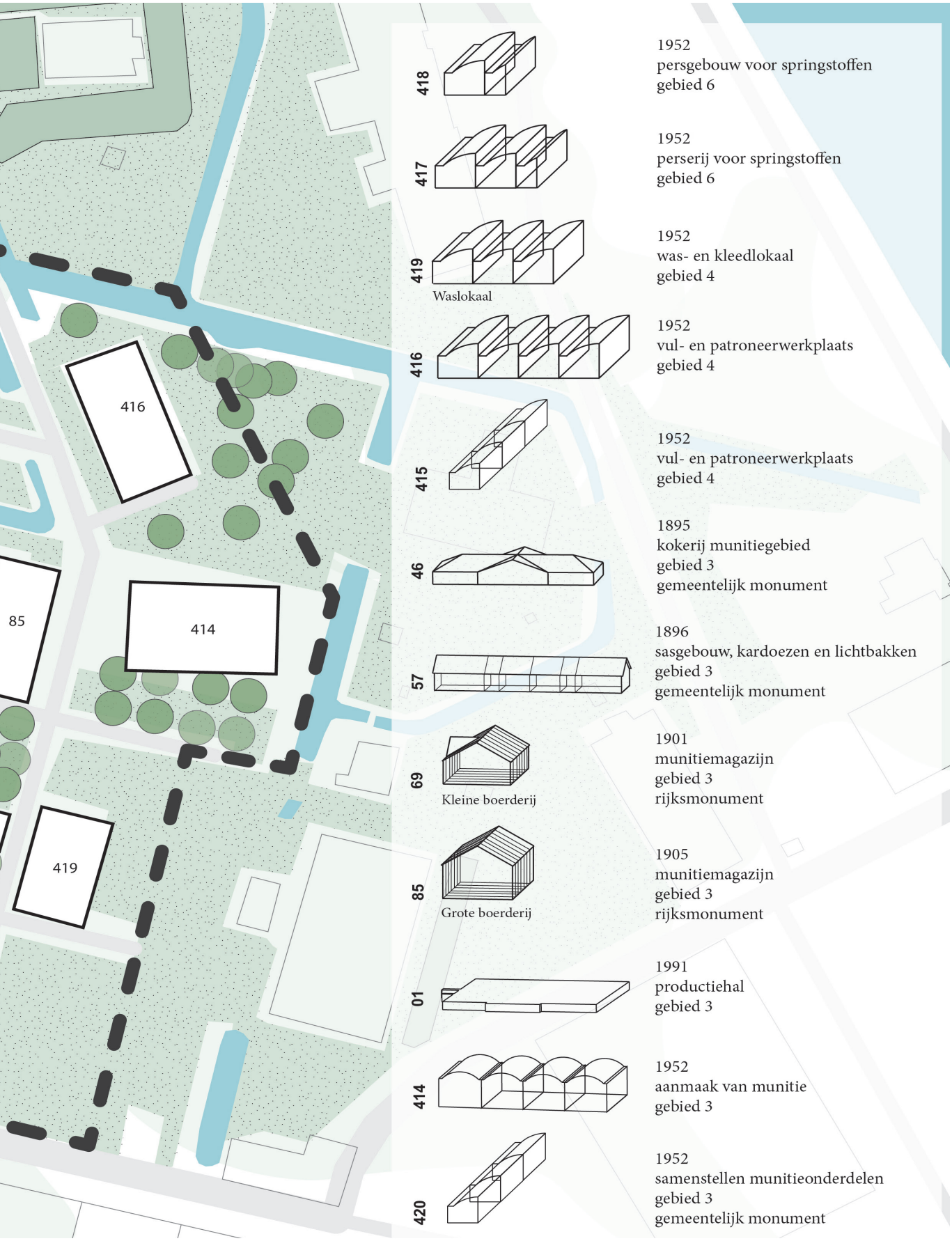
Each building typology will be analyzed according to the nine levels of Brand (Kuipers & de Jonge, 2017): surroundings, site, skin, structure, space plan, surfaces, services, stuff and spirit of place. The surroundings are already extensively mentioned in the previous chapter, so this level will be left out of this chapter. However, it is important to keep the prior knowledge of the context in mind, as this plays a crucial role in the design of the buildings. Additionally each building will be mapped according to its development over time, even though the amount of changes are usually quite minimal.

This method of analysis is used to be able to objectively assess each building typology on an architectural, technical and cultural-historical level. After the analysis, the same levels will return in the value assessment matrix, linking research to the attributed values and the following opportunities and challenges.

3.1 OVERVIEW BUILDINGS



Overview of the buildings and their location within the ensemble. Image by Amanda Verschuur



418

1952
persgebouw voor springstoffen
gebied 6

417

1952
perserij voor springstoffen
gebied 6

419

Waslokaal
1952
was- en kleedlokaal
gebied 4

416

1952
vul- en patroneerwerkplaats
gebied 4

415

1952
vul- en patroneerwerkplaats
gebied 4

46

1895
kokerij munitiegebied
gebied 3
gemeentelijk monument

57

1896
sasgebouw, kardoezen en lichtbakken
gebied 3
gemeentelijk monument

69

Kleine boerderij
1901
munitiemagazijn
gebied 3
rijksmonument

85

Grote boerderij
1905
munitiemagazijn
gebied 3
rijksmonument

01

1991
productiehal
gebied 3

414

1952
aanmaak van munitie
gebied 3

420

1952
samenstellen munitieonderdelen
gebied 3
gemeentelijk monument

3.2 GABLE ROOF

3.2.1 SITE

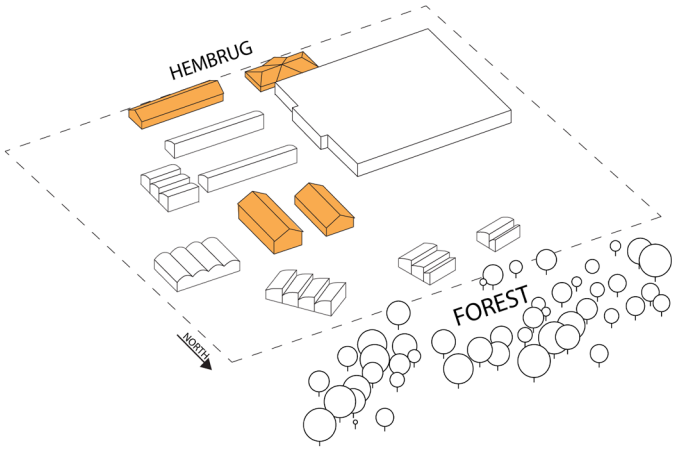


Location of all the buildings within the gable roof typology. Image by Amanda Verschuur.

Within the 'plots of the woods' there are four buildings (building 46, 57, 69 and 85) belonging to the gable roof typology. These buildings are part of the first generation buildings on the site, being built between 1895 and 1905.

Within the typology a division can be made between building 46 and 57 (which functioned in the end as offices) being orientated along the main road and the North Sea Canal, and building 69 and 85 (which functioned as ammunition storage) which are pointing in the direction of the forest.

The buildings within these typology are, next to the obvious roof shape, recognizable by their rectangular form and the outstanding facades. And, consequently, having a big contribution to the character of the 'plots in the woods'.



Orientation of all the buildings within the gable roof typology. Image]adjusted from Barbara de Groot by Amanda Verschuur.

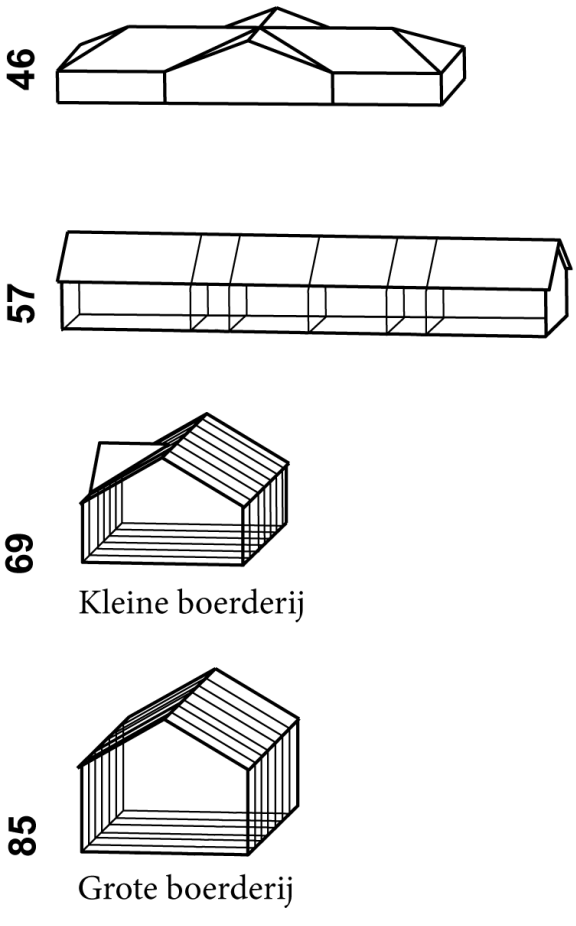
3.2.2 SPACE PLAN

The buildings within the gable roof typology contain a big variation within their space plans and the same division between buildings 46, 57 and 69, 85 is visible. Building 46 and 57 both consist of a single floor and building 69 and 85 have multiple levels. The space on the ground floor is functioning differently per building: the farms have internal space dividers, but the offices have an open floor plan.

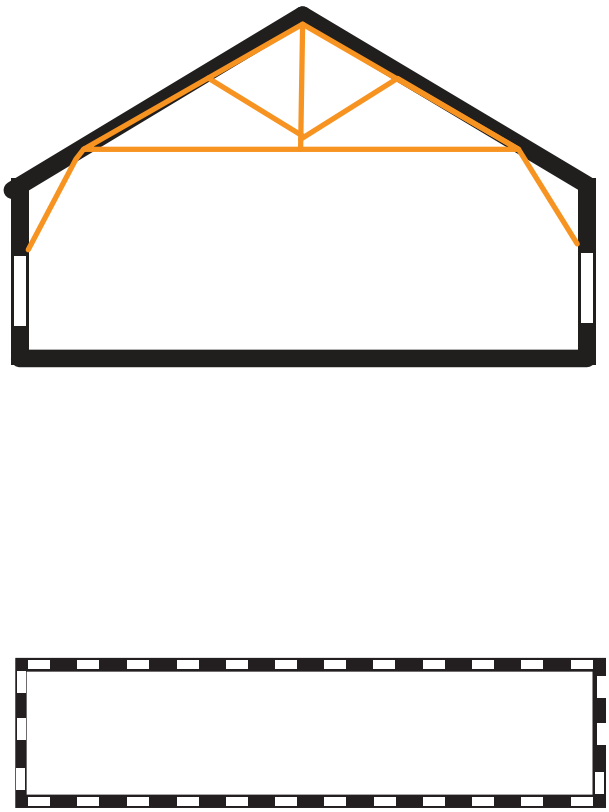
The buildings within the gable roof typology all have a rectangular shape with multiple window openings and trusses supporting the slated roofs.

As mentioned before, building 46 and 57 consist of one floor level, while building 69 and 85 contain multiple levels. The latter requires a bigger construction to carry the upper level(s). Within building 69 the ground floor is divided by internal walls which also support the first floor. Building 85 consist of three levels. On the ground and first floors columns carry the weight of the floor and roof.

This is opposed to building 46 an 57 which both have an open floor plan.

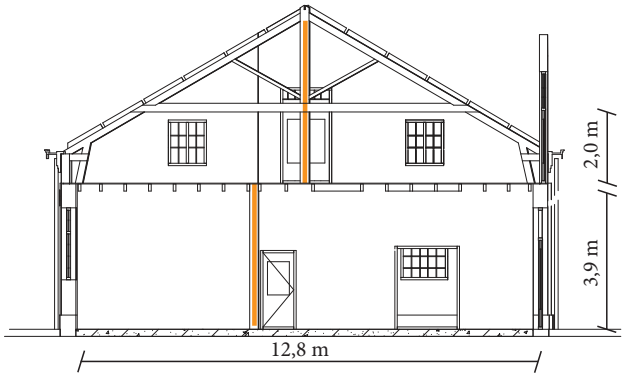


Different configurations of the module.
Image by Amanda Verschuur

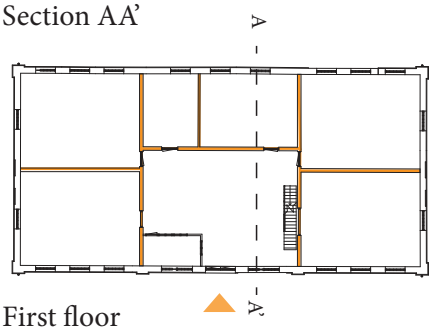


Standard floor plan and section within the gable roof typology.
Image by Amanda Verschuur

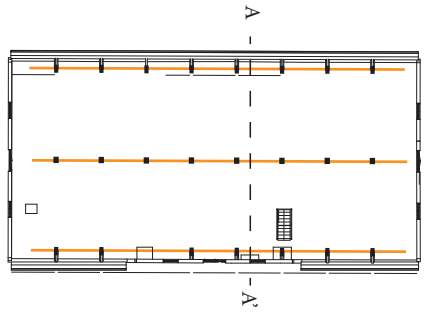
BUILDING 69 ‘Kleine Boerderij’



Section AA’

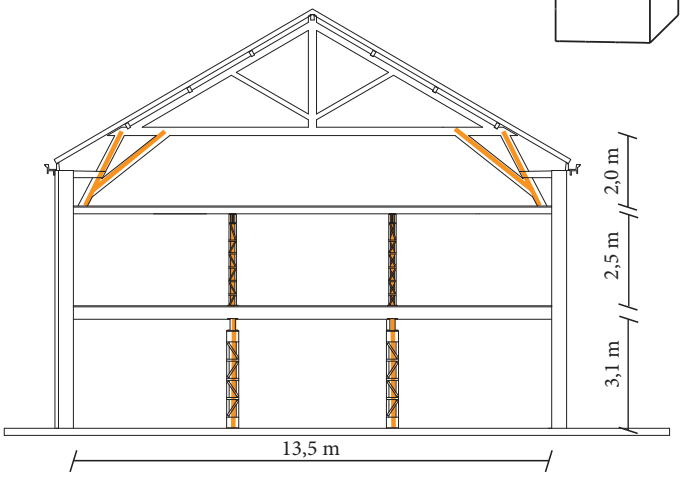


First floor

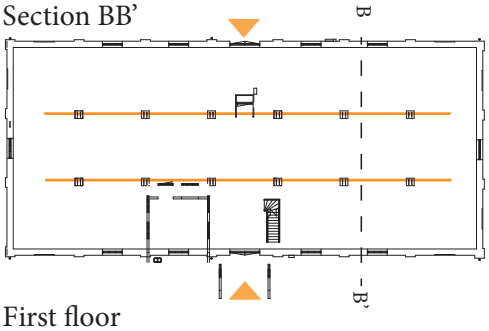


Second floor

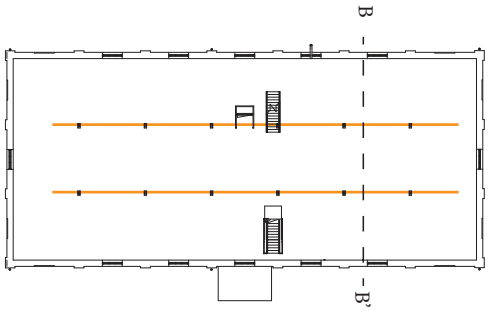
BUILDING 85 ‘Grote Boerderij’



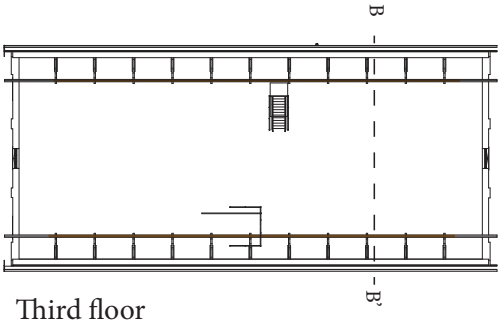
Section BB’



First floor

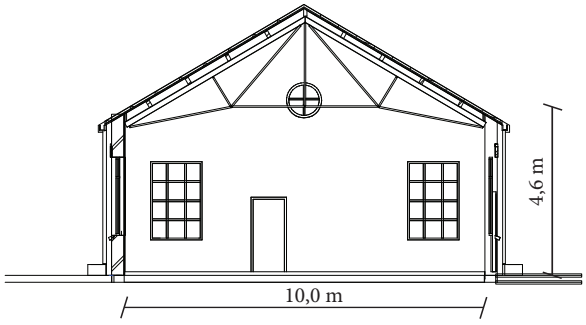


Second floor

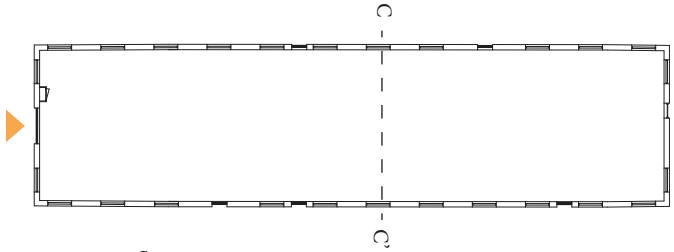


Third floor

BUILDING 57



Section CC’

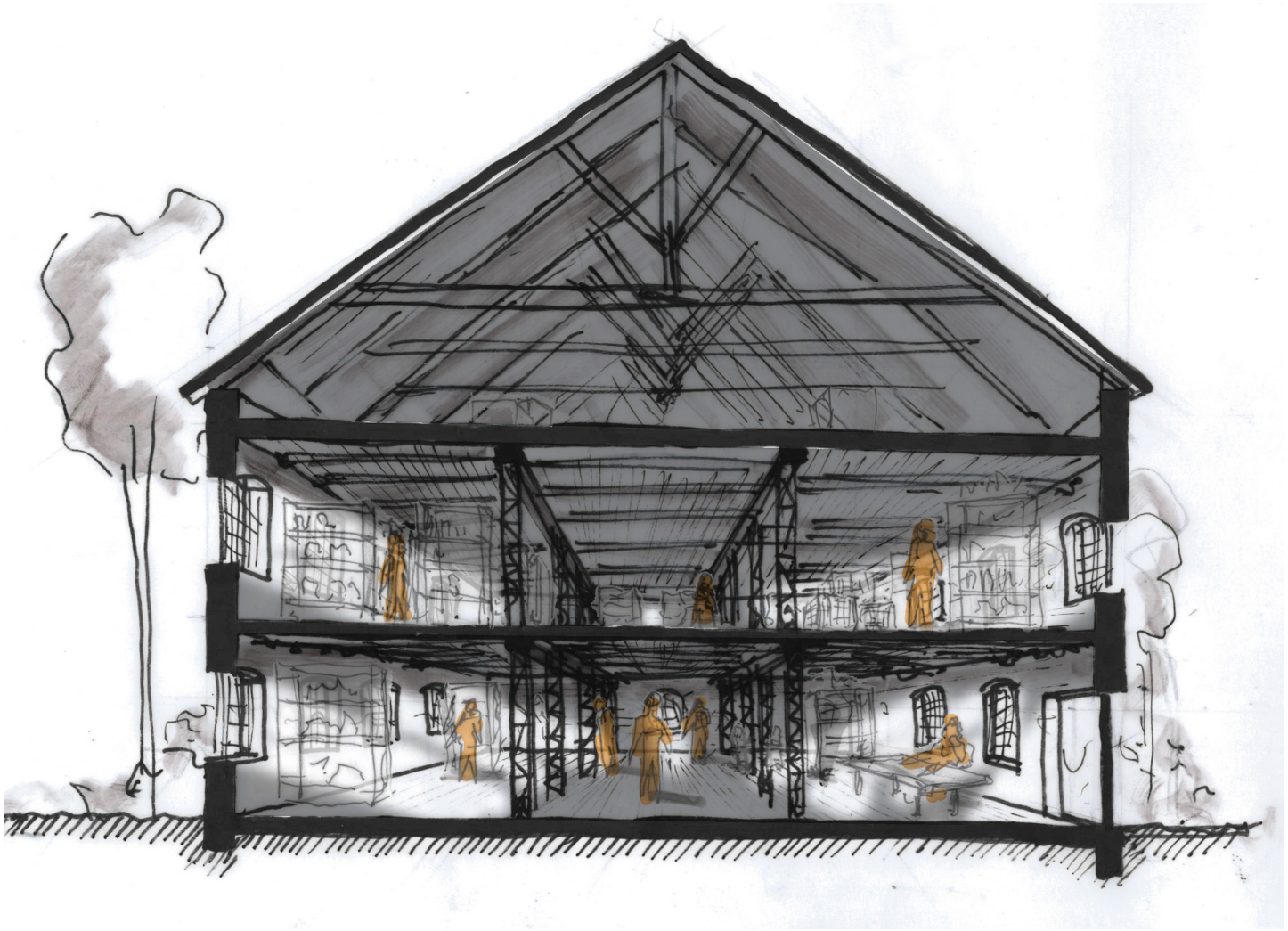


First floor

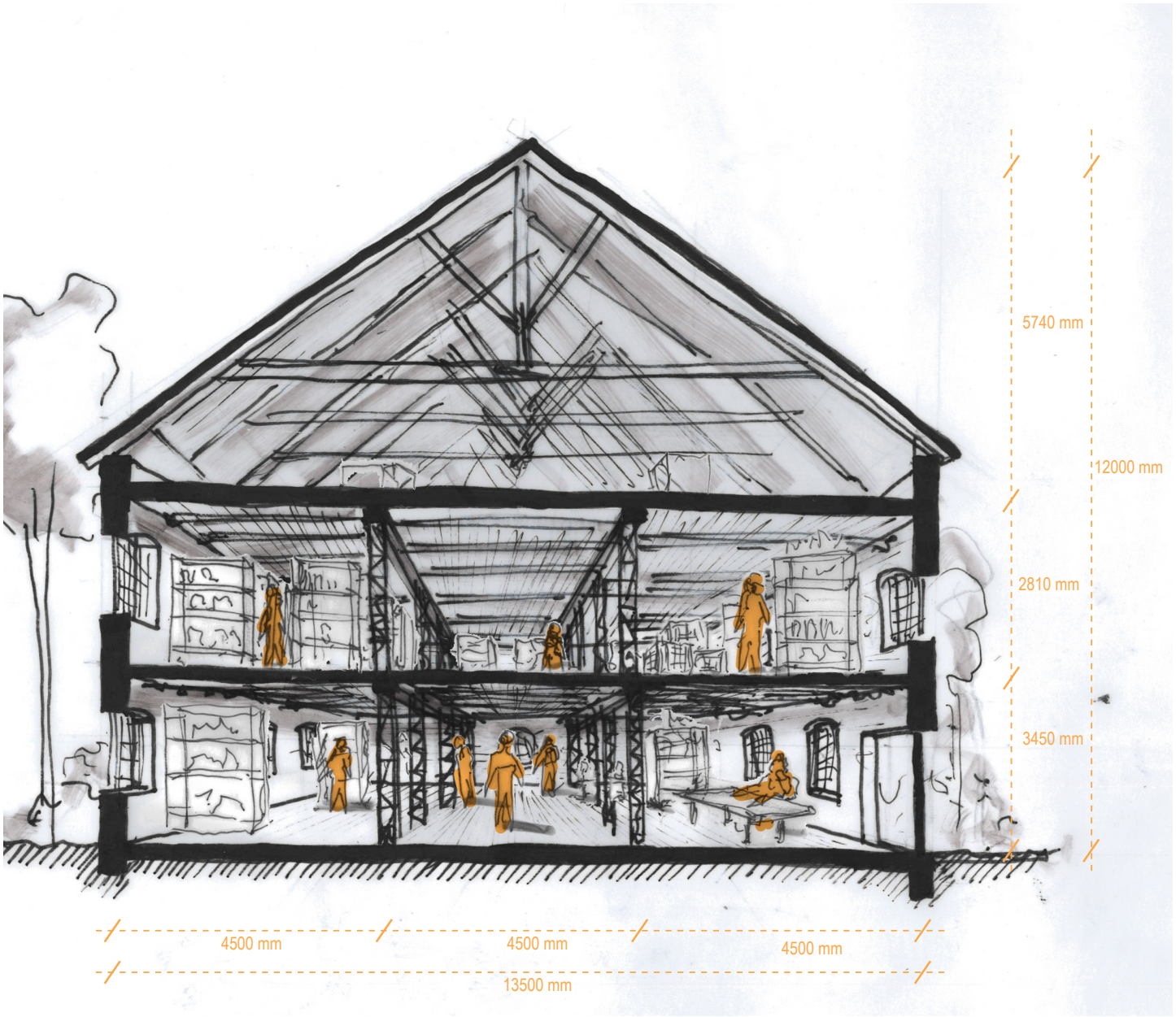
Floor plans and sections of the gable roof typology buildings with the space dividing elements highlighted. Image by Amanda Verschuur



Perspective section of building 57 showing a daylight render, scale 1:100. Image by Lucas Pol.



Perspective section of building 85 showing a daylight render, scale 1:100.
Image by Lucas Pol.

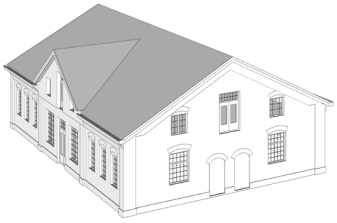


Perspective section of building 85 showing the space plan regarding human scale and usage, scale 1:100. Image by Lucas Pol.



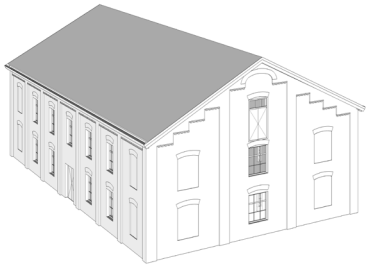
Perspective section of building 57 showing the space plan regarding human scale and usage, scale 1:100. Image by Lucas Pol.

3.2.3 STRUCTURE



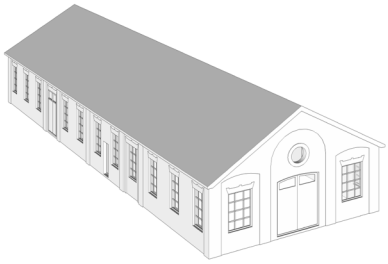
69 Kleine Boerderij, national monument

Year of construction: 1901
Function: storage of munition



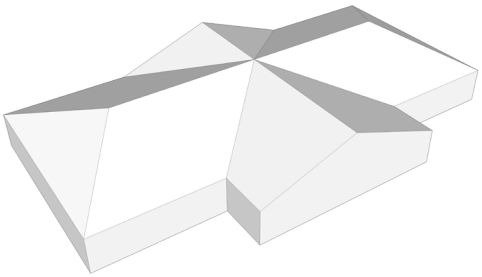
85 Grote Boerderij, national monument

Year of construction: 1905
Function: storage of empty projectiles



57 Sasgebouw, municipal monument

Year of construction: 1896
Function: compiling of shocktubes (detonators), later office

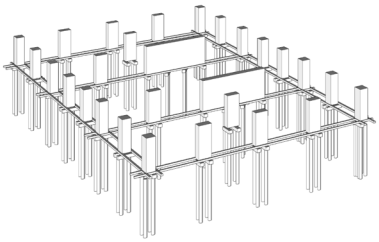


46 Kokerij munition factory, municipal monument

Year of construction: 1895
Function: production of detonators (slagpijpjes), later office

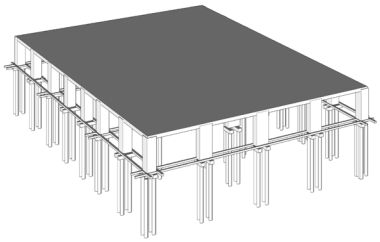
All images on this page made by Marjan Sadeghi

BUILDING 69 ‘KLEINE BOERDERIJ’: BUILD-UP ORDER



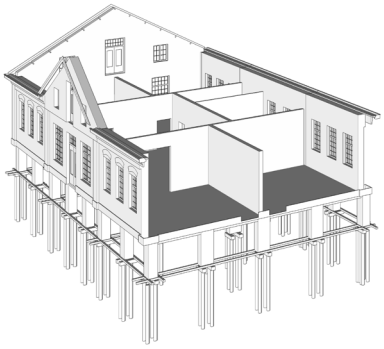
Step 1

Wooden foundation piles with wooden foundation beams



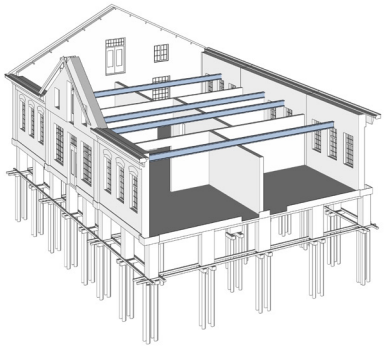
Step 2

In-situ poured reinforced concrete floor



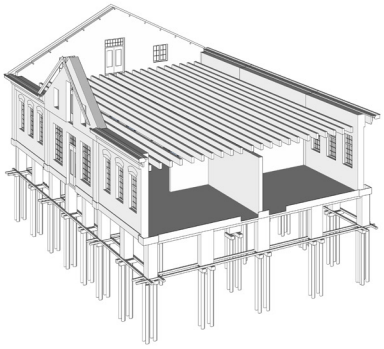
Step 3

Brick facade and interior walls build.



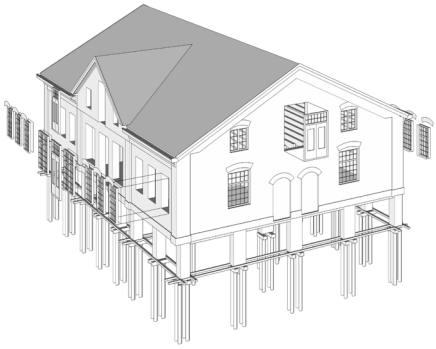
Step 4

Load bearing steel beams



Step 5

Wooden beams and wooden floor



Step 6

Windows, doors, slated roof and rain pipes and other installations added.

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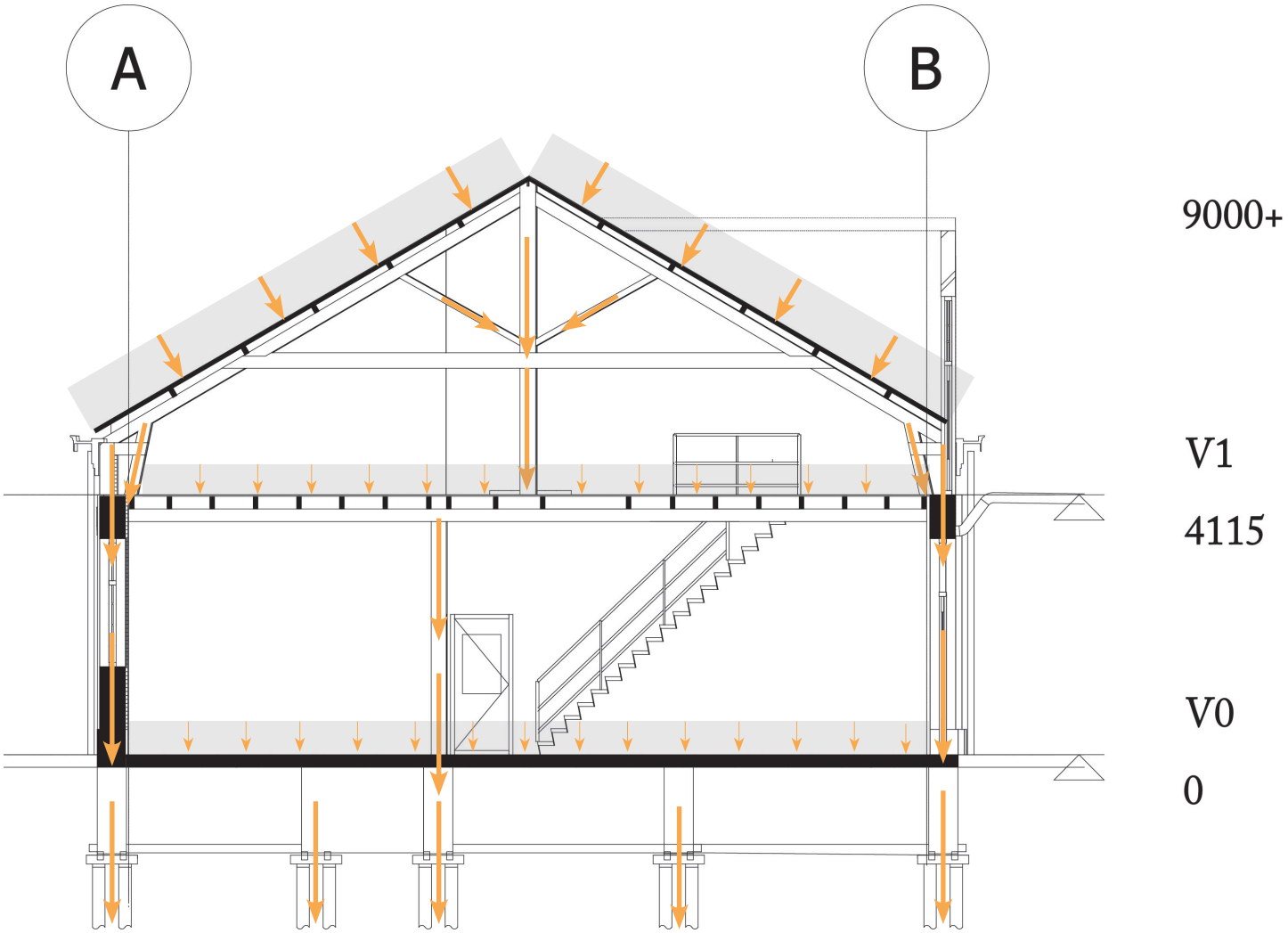
BUILDING 69 ‘KLEINE BOERDERIJ’: LOAD BEARING WALLS



Vertical forces translated in the walls and foundation



Interior walls, brick wall

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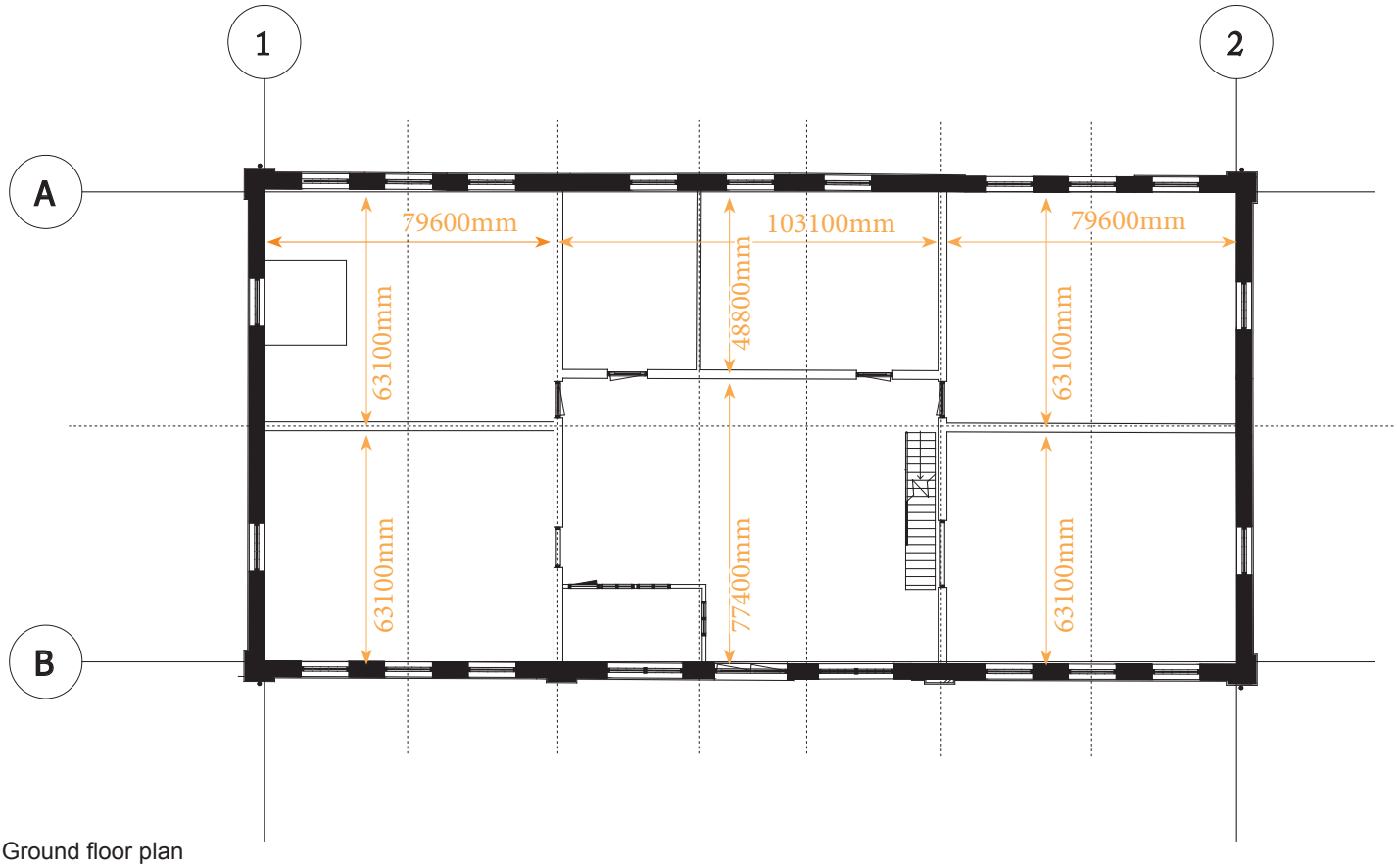
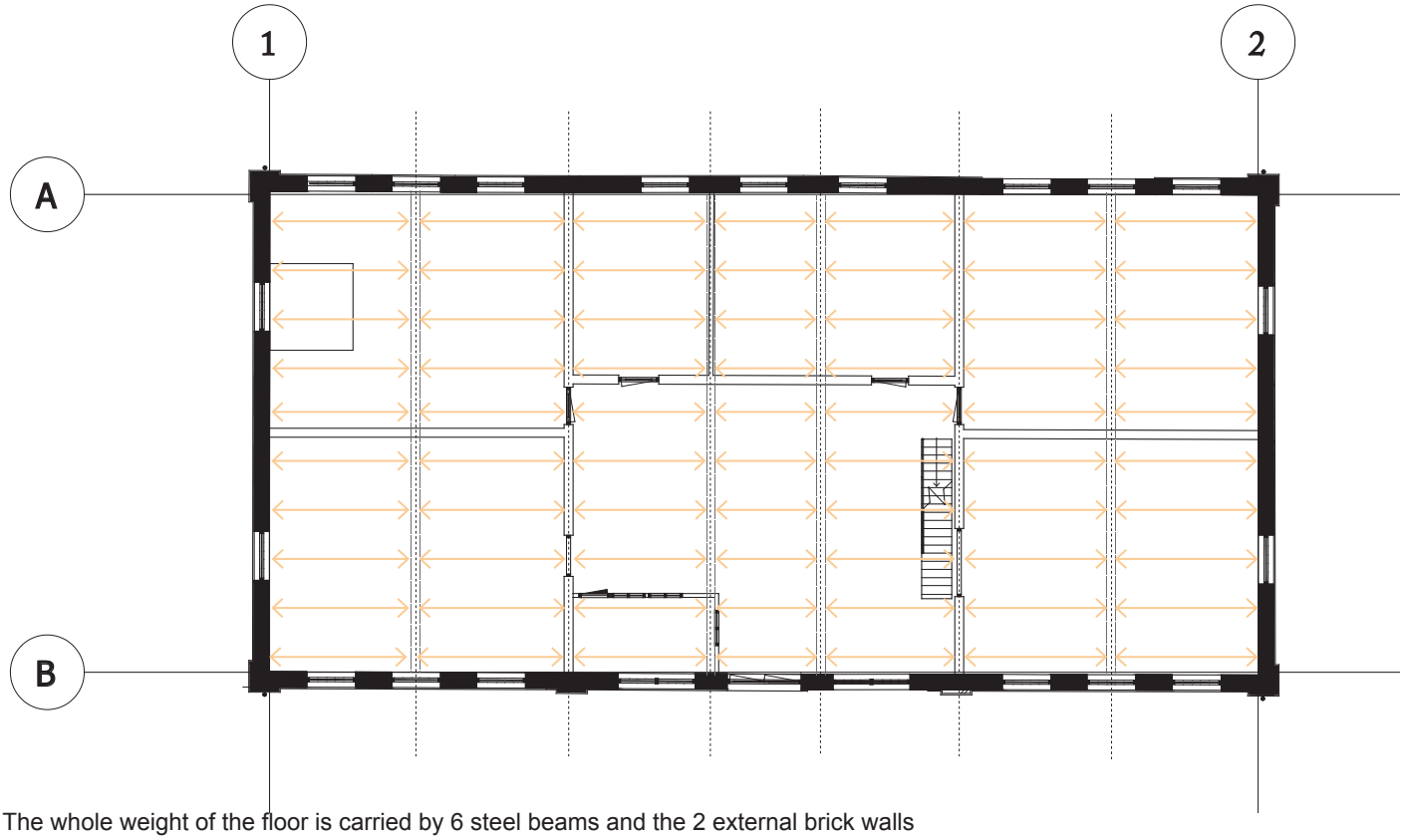


Ground floor plan



The whole weight of the floor is carried by 6 steel beams and the 2 external brick walls

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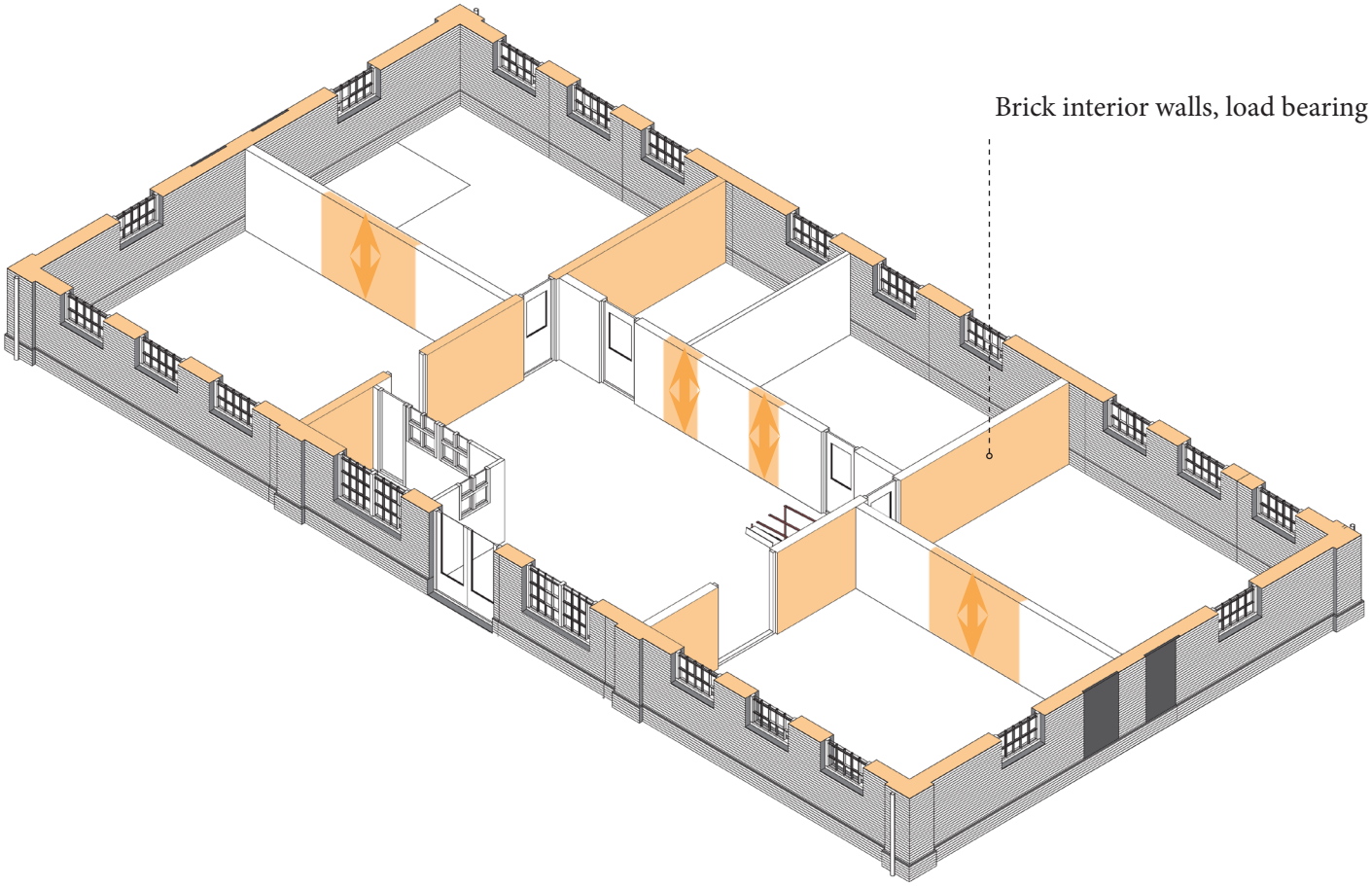

All the interior walls parallel with the beams are load-baring. However, the perpendicular walls are not the same. Only the part of the wall, which is carrying the beams is load-baring and transferring the weight forces.

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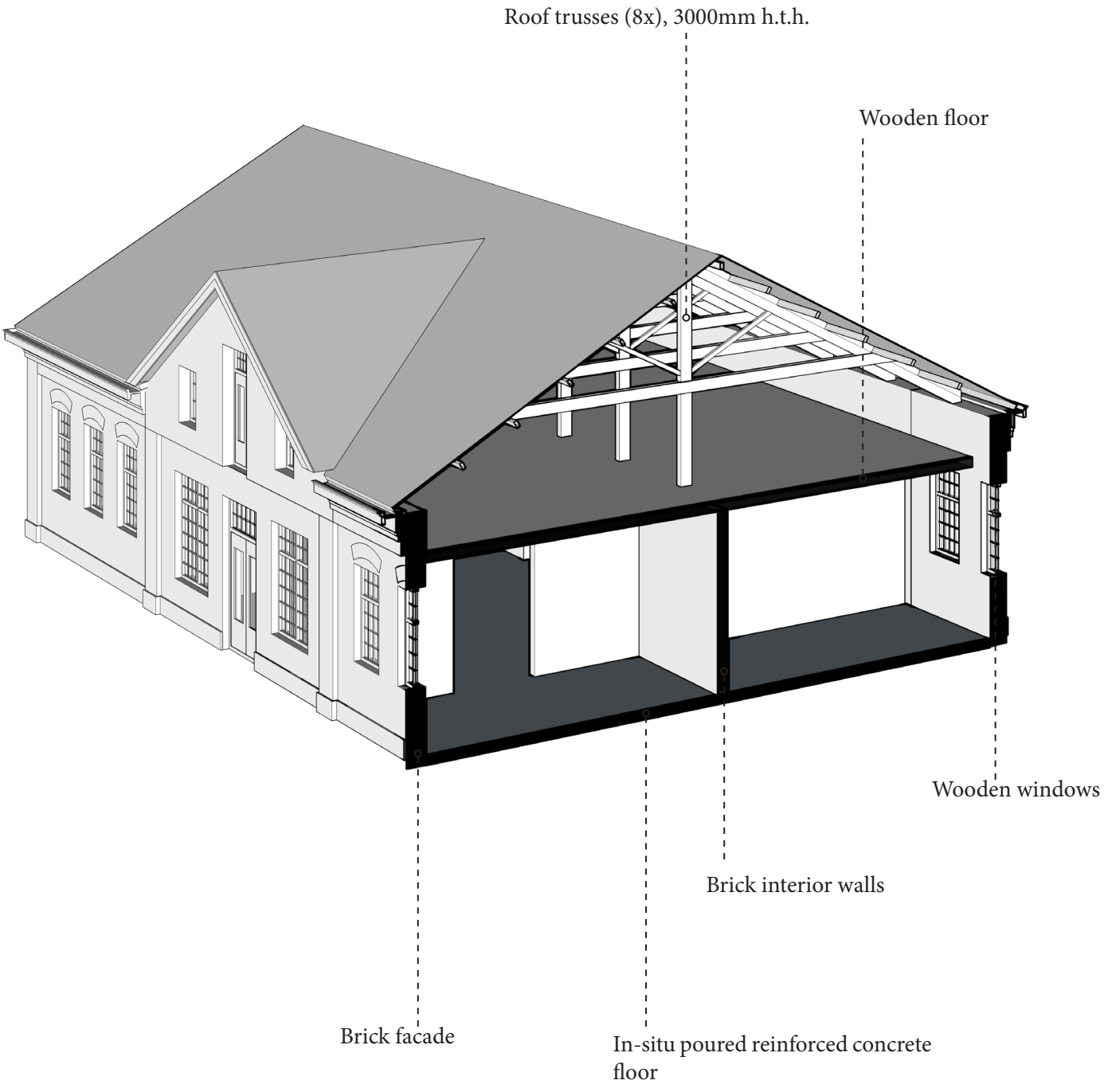

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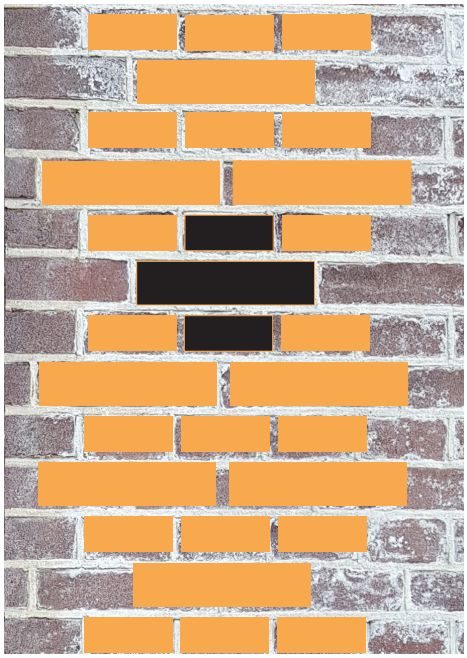
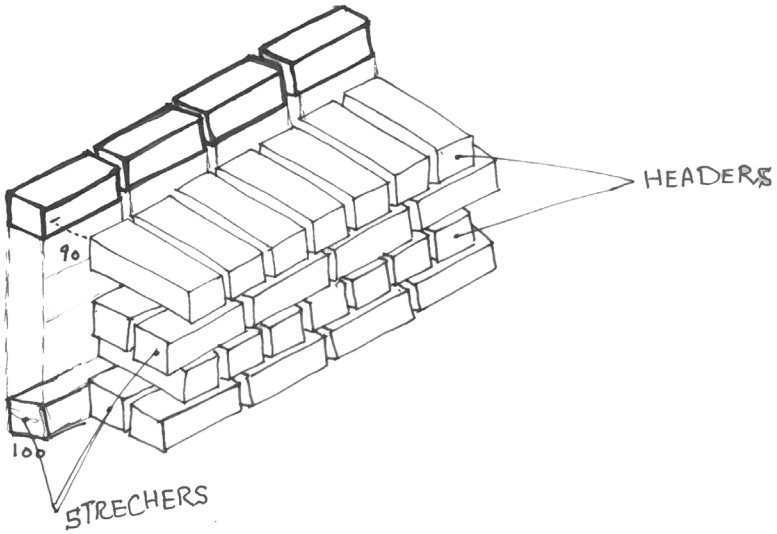
BUILDING 69 ‘KLEINE BOERDERIJ’: SKIN



Brick wall

Waal format brick (210 x 100 x 50 mm)
Cross bandage pattern (kruisverband)
‘Lagenmaten’: 60
‘Koppenmaten’: 110 mm





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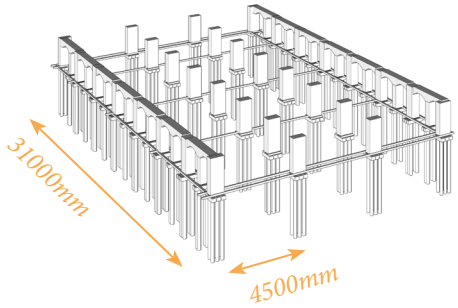
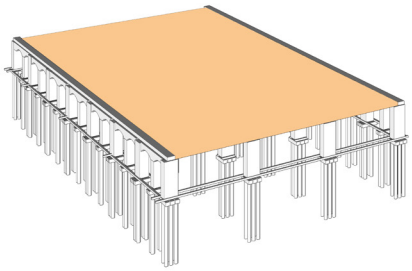
BUILDING 85 ‘GROTE BOERDERIJ’: BUILD-UP ORDER



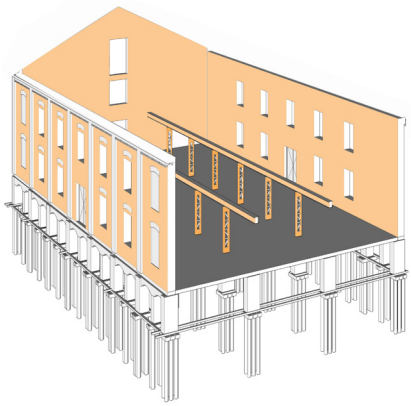
Step 1

Wooden foundation piles with concrete foundation beams



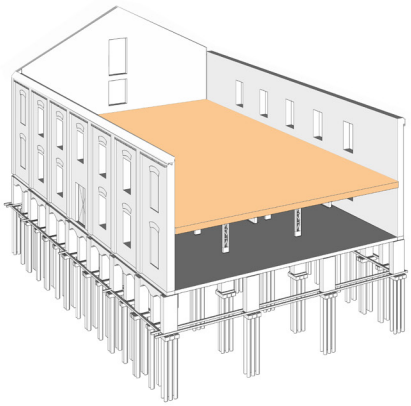
Step 2

In-situ poured reinforced concrete floor



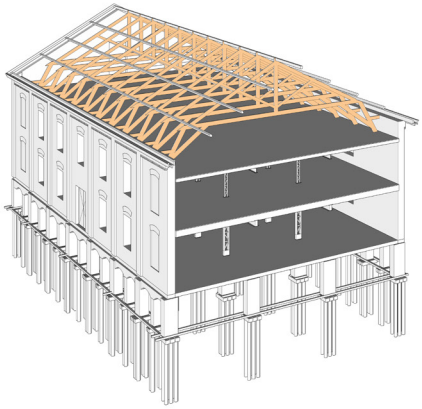
Step 3

Steel columns and beams added



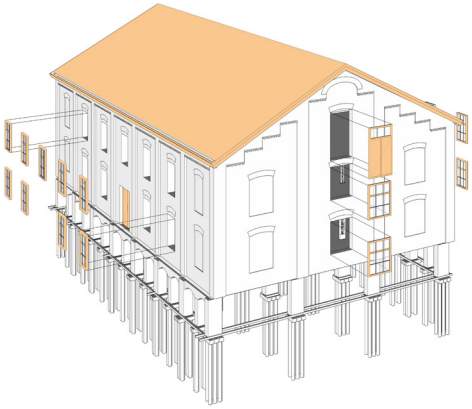
Step 4

Wooden beams, floor added



Step 5

Slated roof (580mm h.o.h.) added



Step 6

Windows, doors, rain pipes and other installations added.

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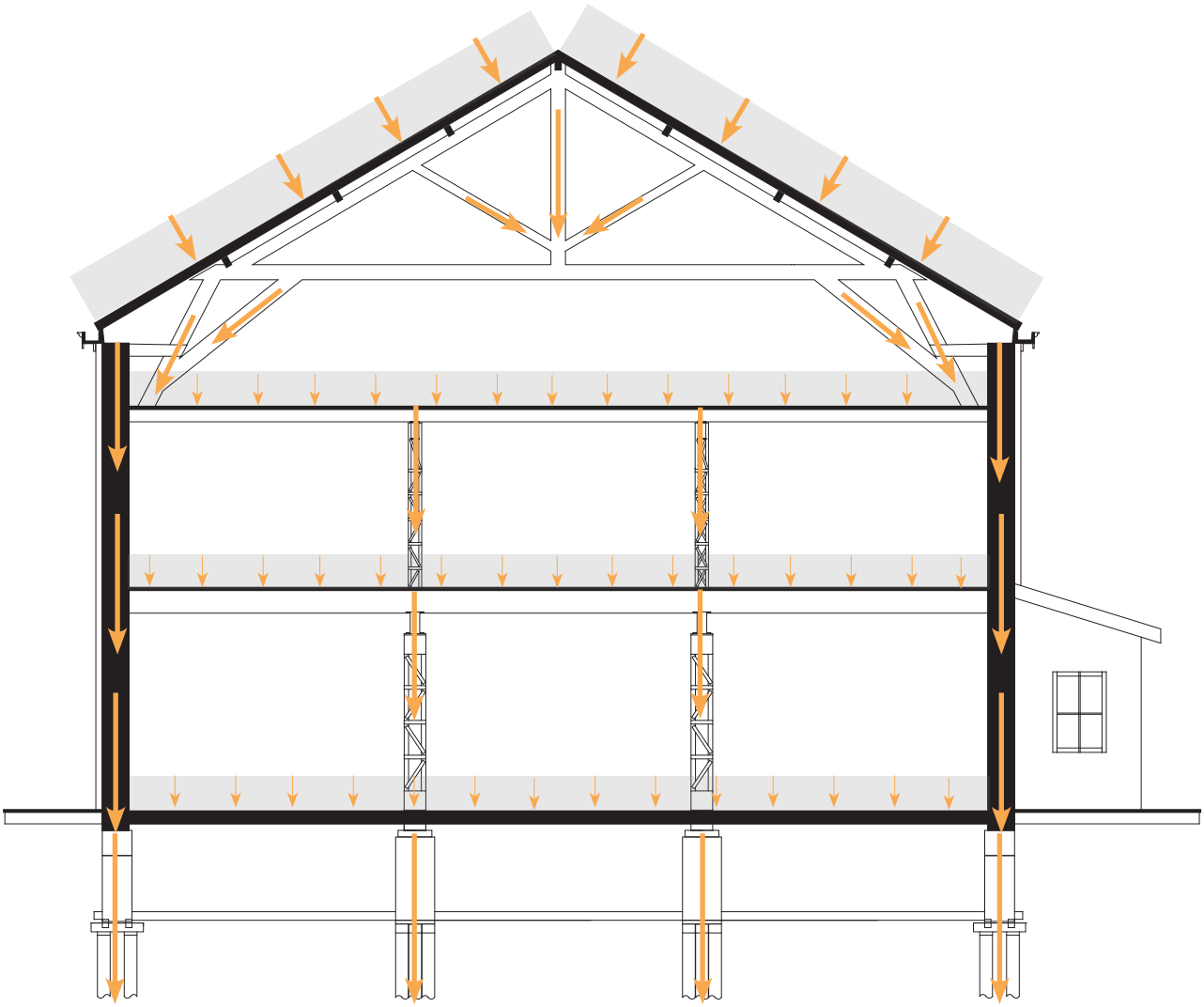
BUILDING 85 ‘GROTE BOERDERIJ’: LOAD BEARING WALLS



Vertical forces translated in the steel columns and foundation, ‘Amsterdamse paalfundering’





Replacement of the old beams with new ones, with more resistance.

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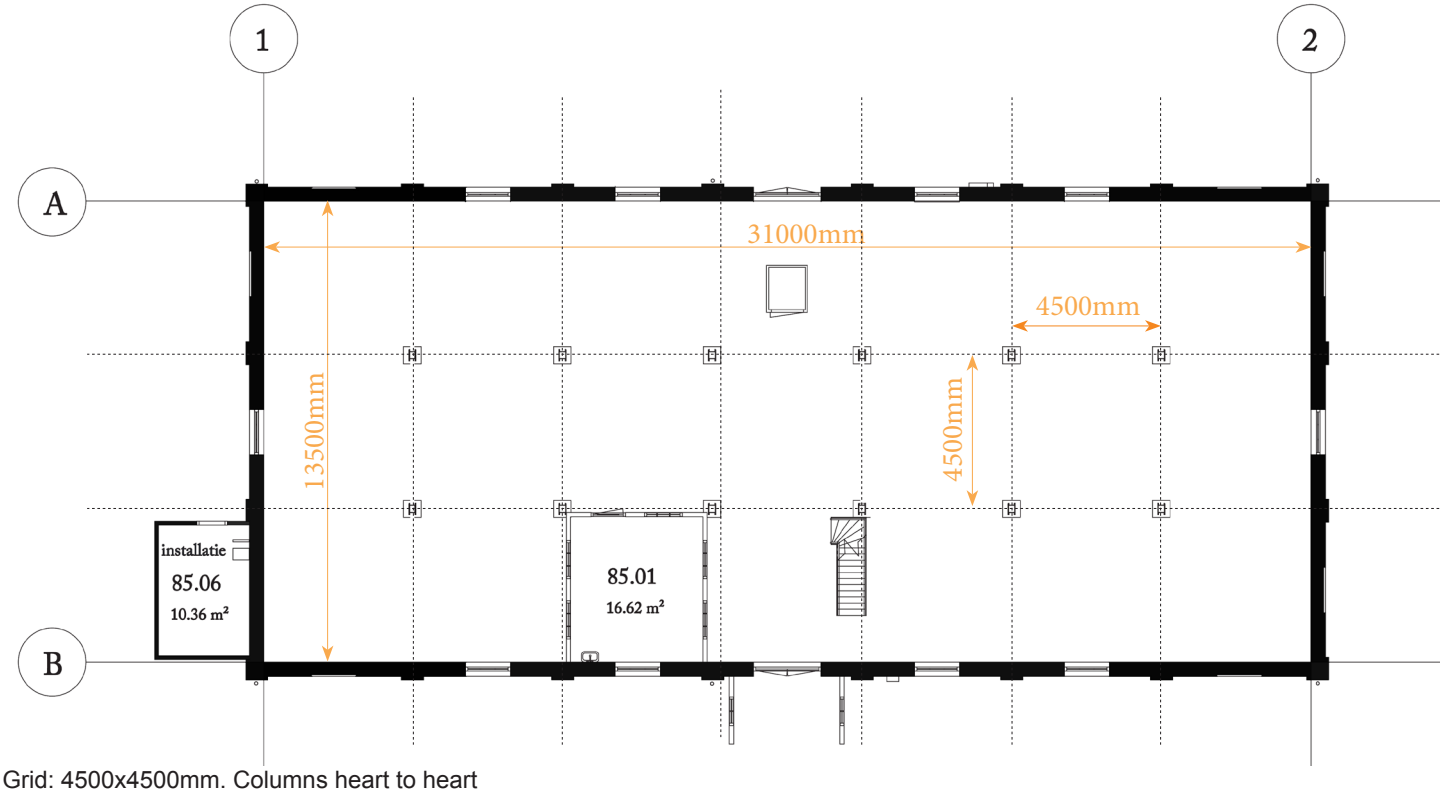
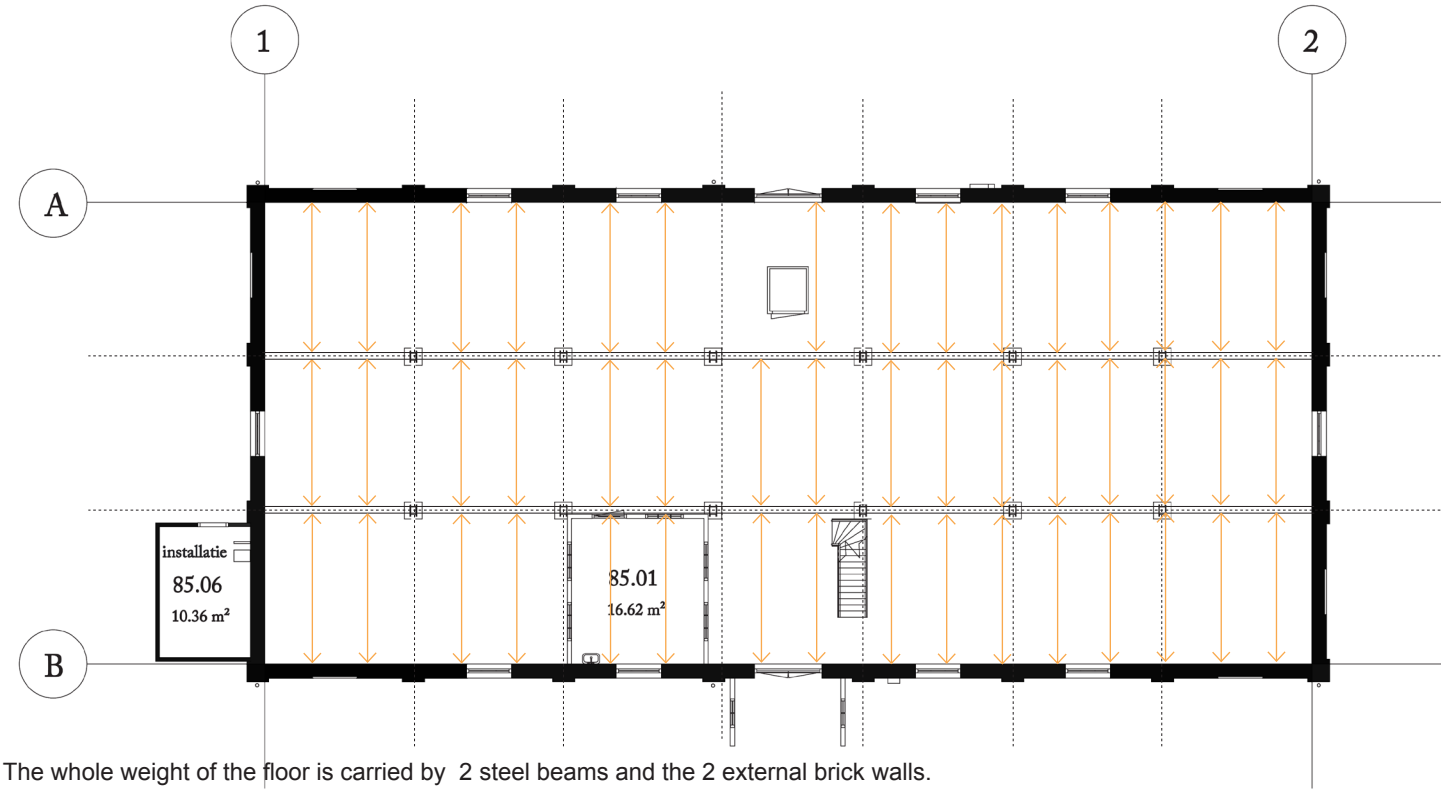
Square meters:
Ground floor (420m2), First floor (420m2), Attic (420m2)



Grid: 4500x4500mm. Columns heart to heart



The whole weight of the floor is carried by 2 steel beams and the 2 external brick walls.

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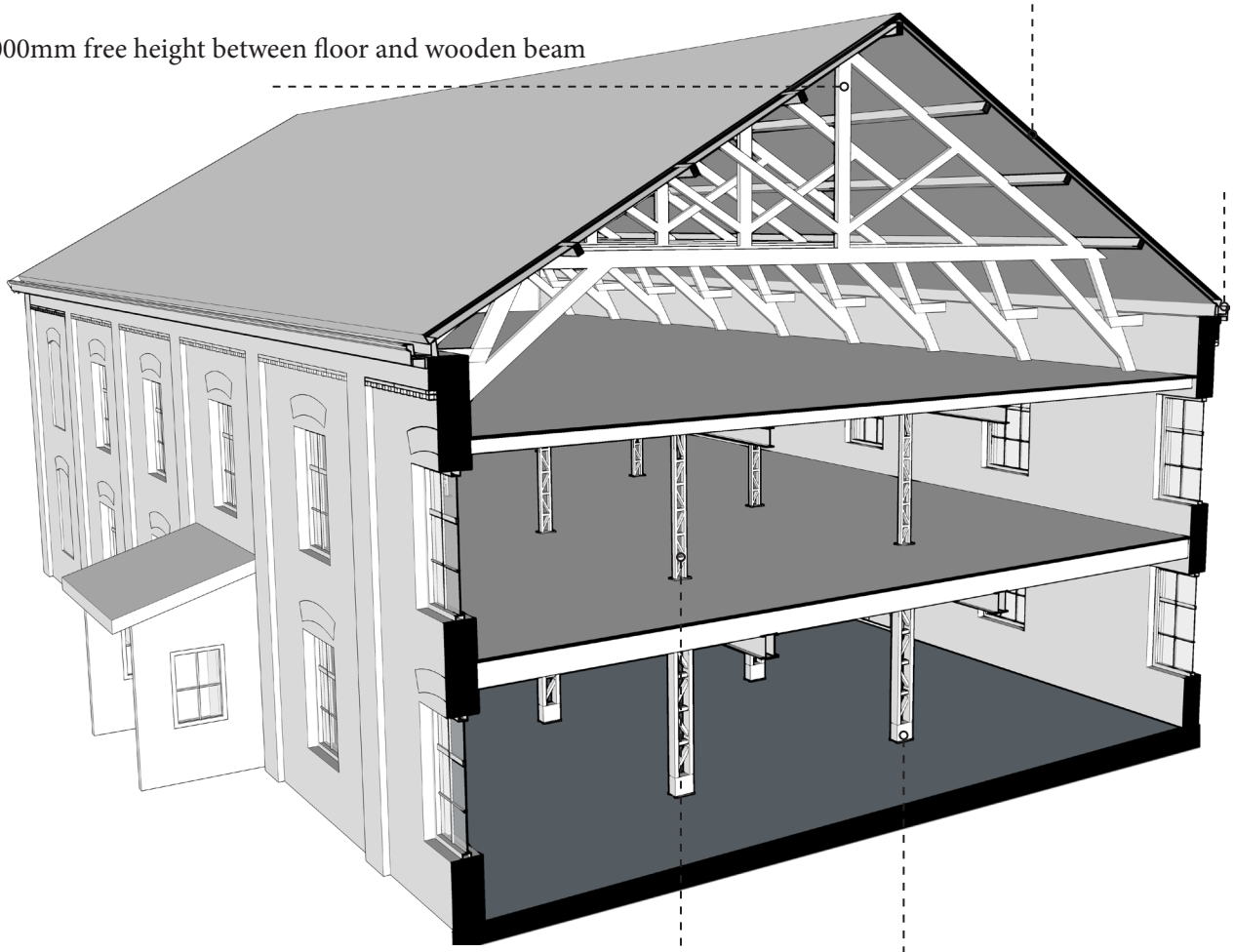
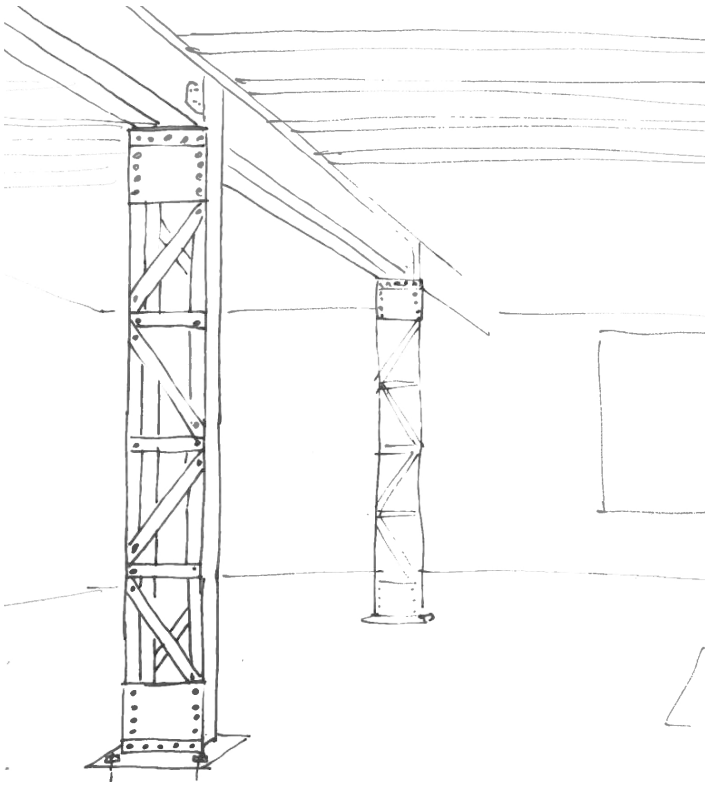
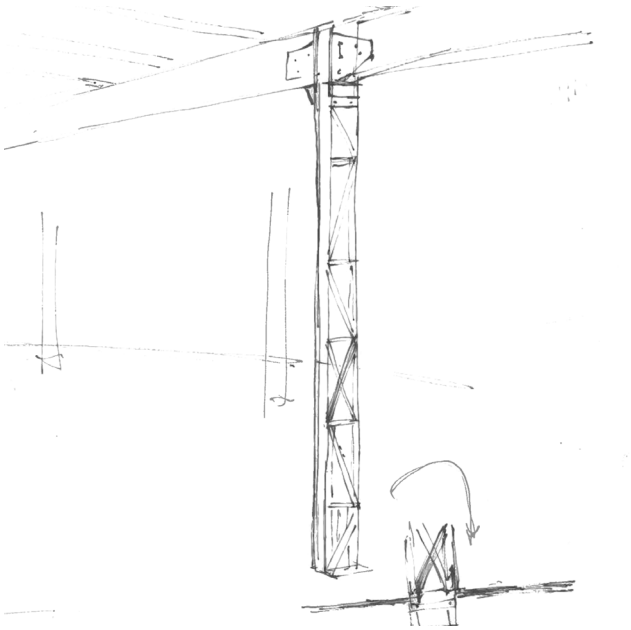
slated roof (580mm h.o.h.)

2000mm free height between floor and wooden beam



Truss column composition: Two steel U-profiles riveted together by steel bars.
* Steel column 342 x 214 x 2700 mm





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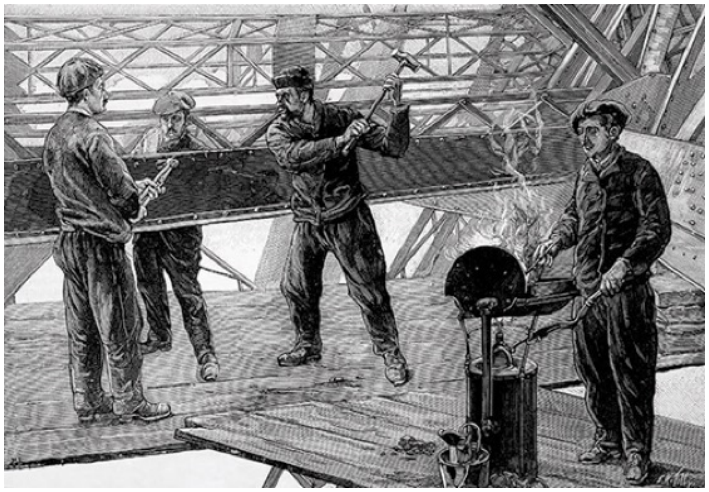
A rivet “Klinknagels “is a metal fastener consisting of a cylindrical shank fitted with a so-called "factory" head forged in the workshop. The length of the rivet varies depending on the number and thickness of the parts to be assembled. The second head, or "shop" head, is forged on the work site using a hand-held hammer (sledge-hammer) or an air hammer.



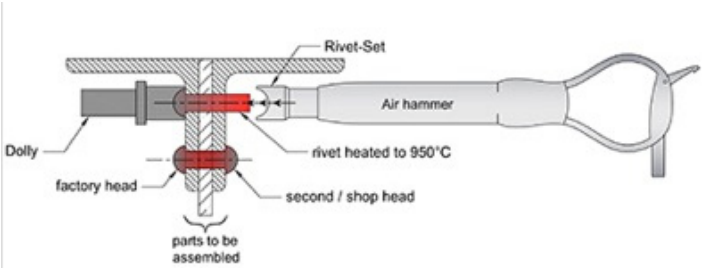


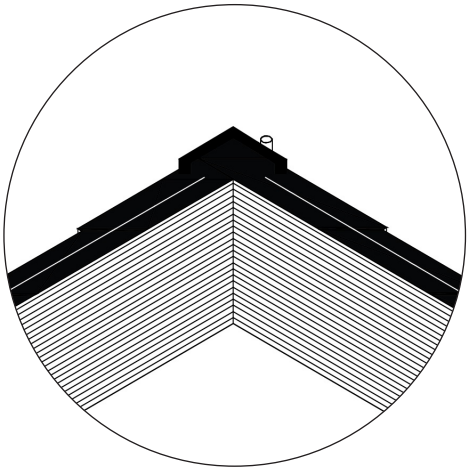
Riveting is usually done by a team of four workmen: a riveter, a rivet-heater, a holder-up, and a rivet-set holder. The rivets are heated in a furnace to above 1100°C until they are "cherry-red".
Then the rivet-heater removes the rivet from the furnace using tongs, knocks it on the ground to remove the scale (iron oxide crust formed during heating) and then throws it to the rivet-set holder who catches the rivet, inserts it in the hole and keeps it in place holding the tail with tongs.

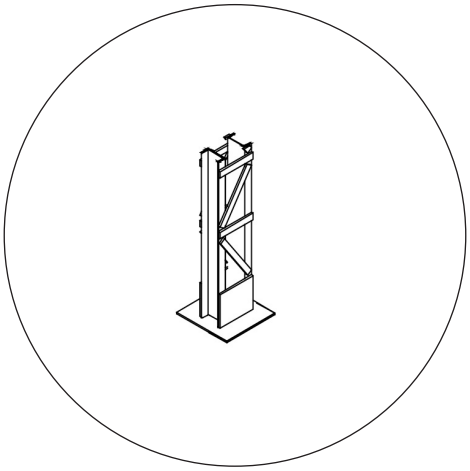




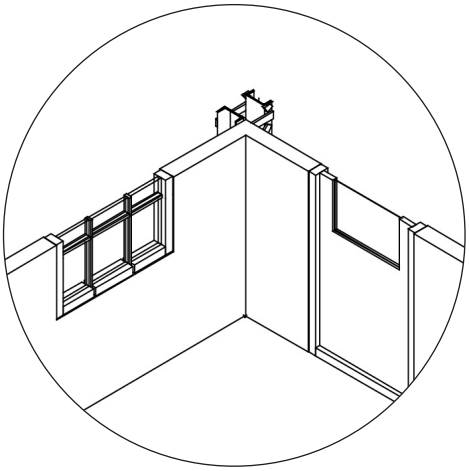
http://www.rivetsfrance.com/histoire_du_rivet_UK.html



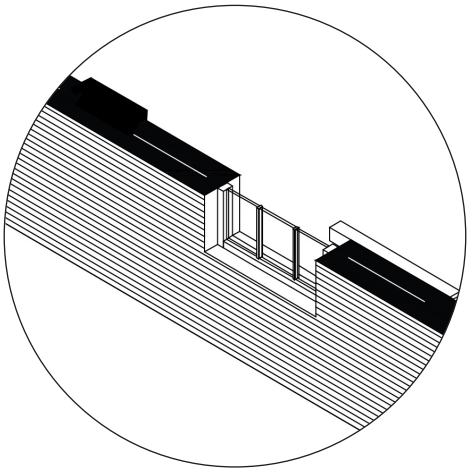


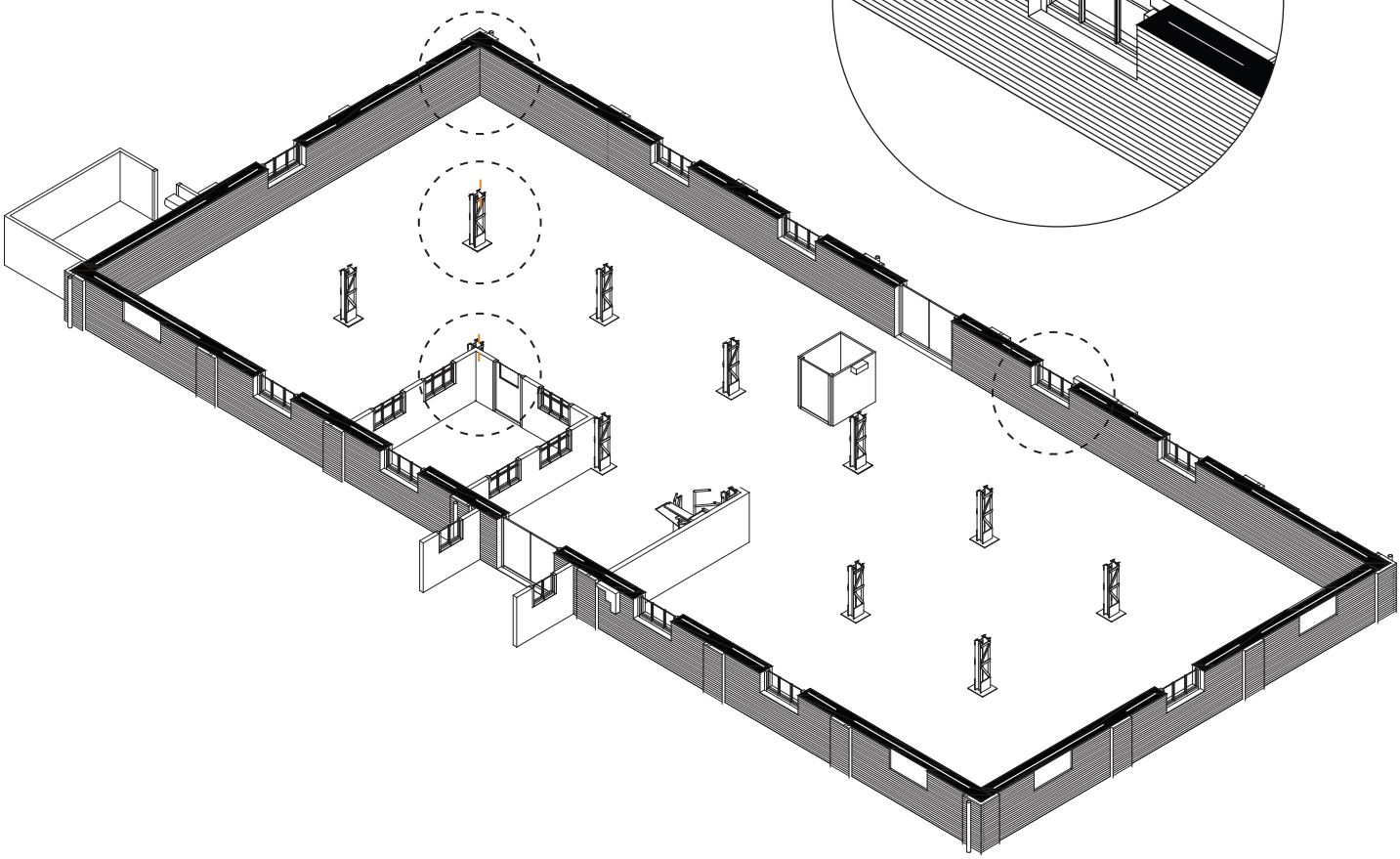


Steel column 342 x 214 x 2700 mm



Non constructive wooden interior wall, 100 mm thick





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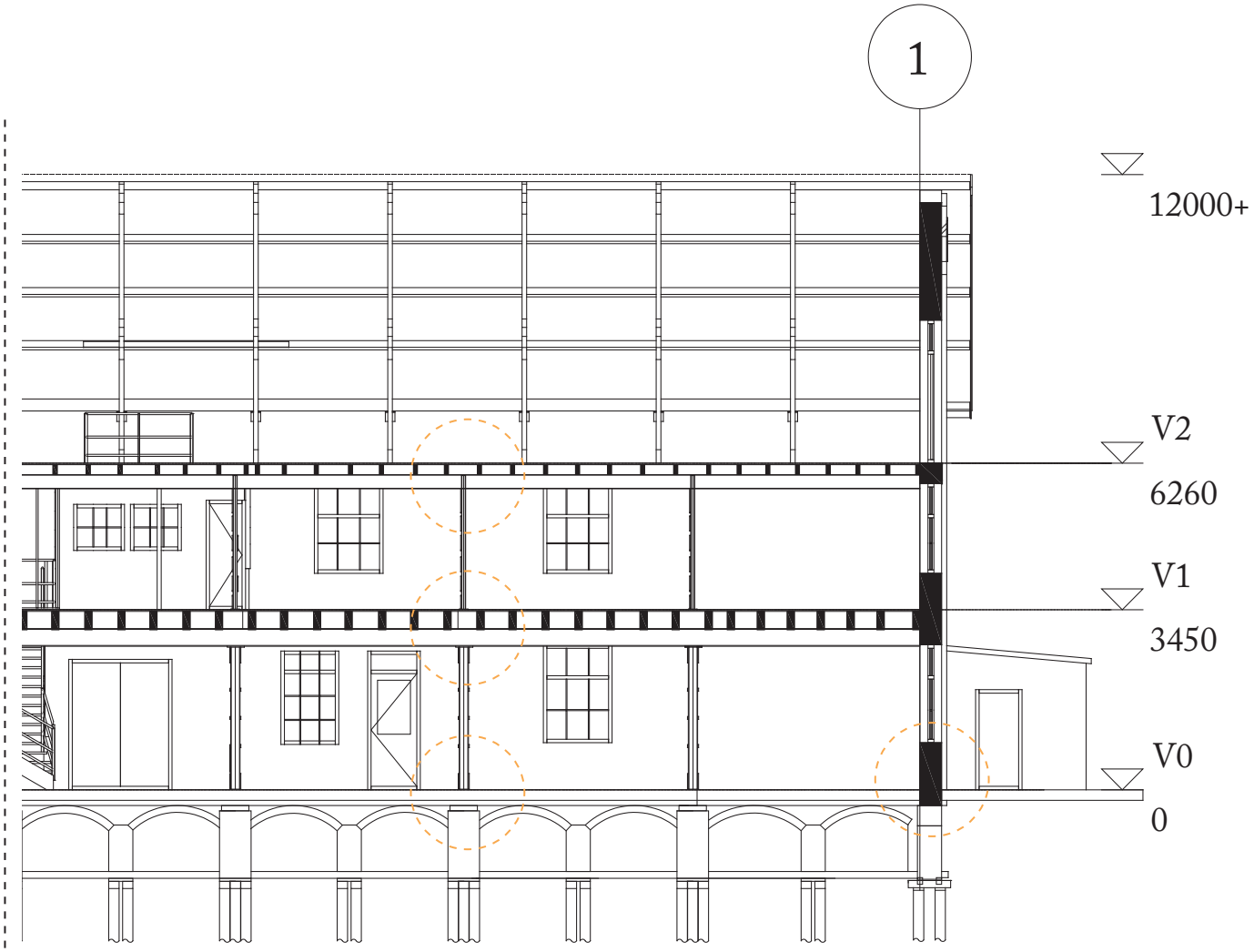
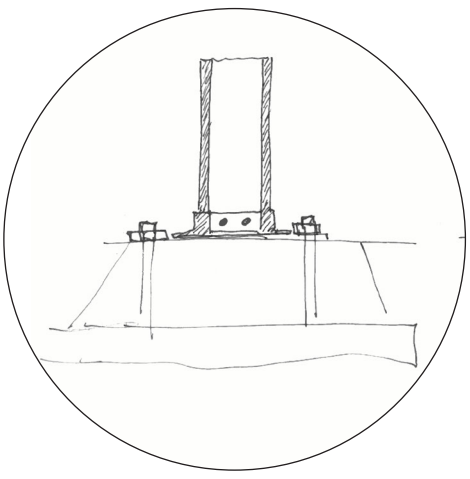
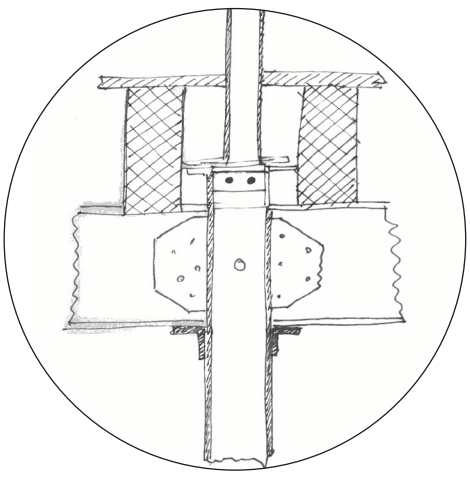
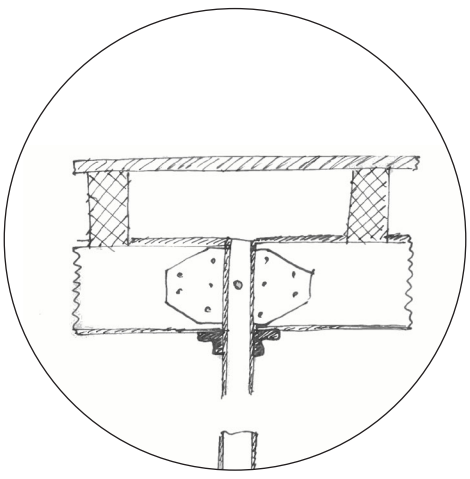
BUILDING 85 ‘GROTE BOERDERIJ’: DETAILS









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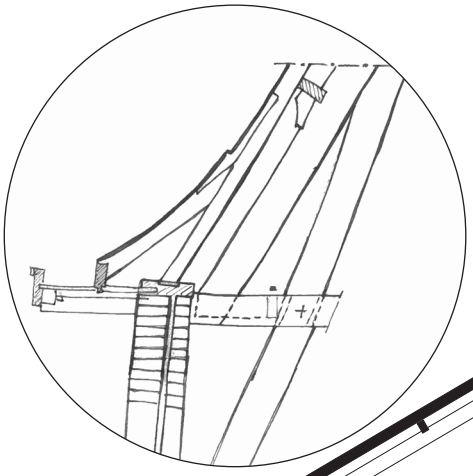

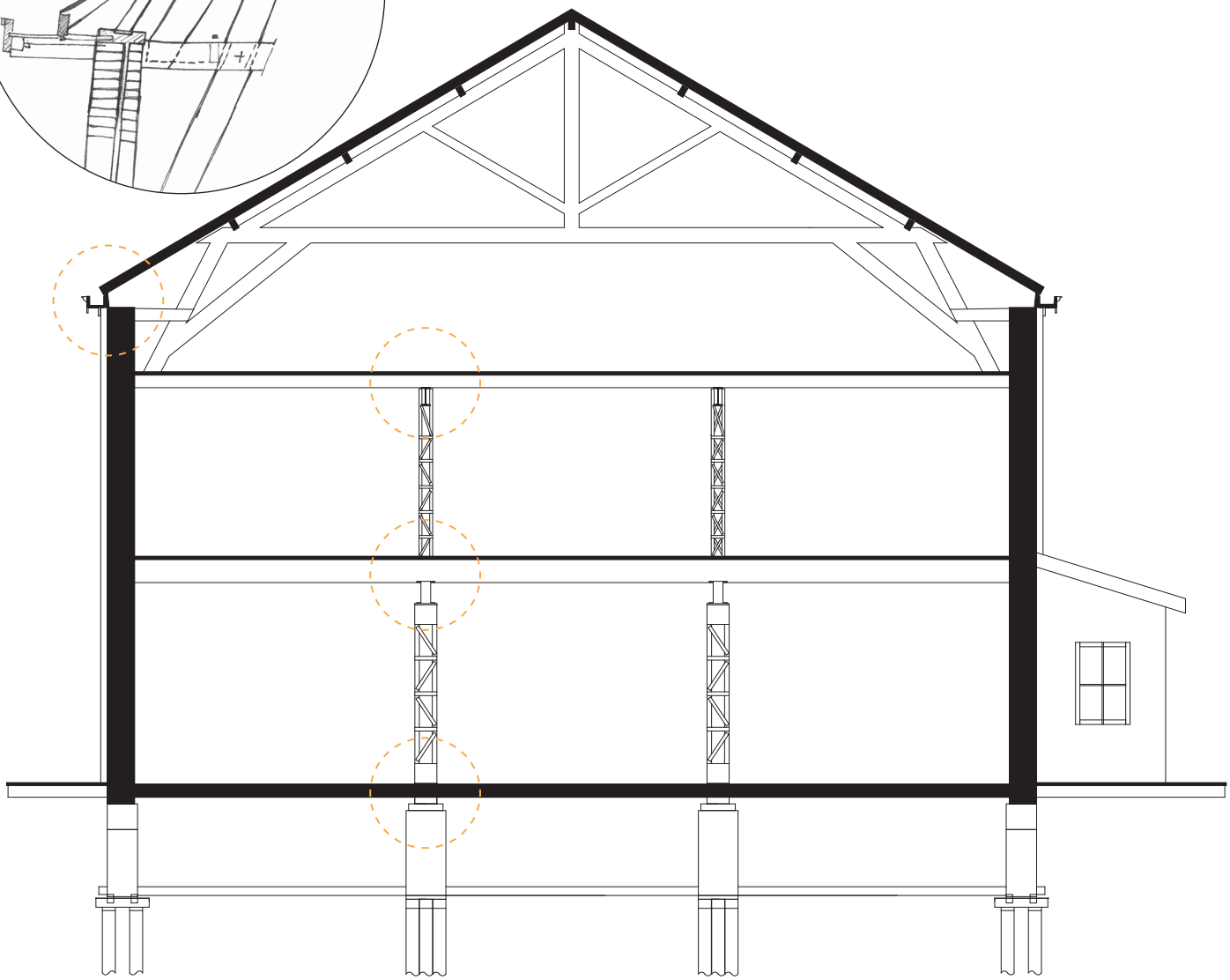

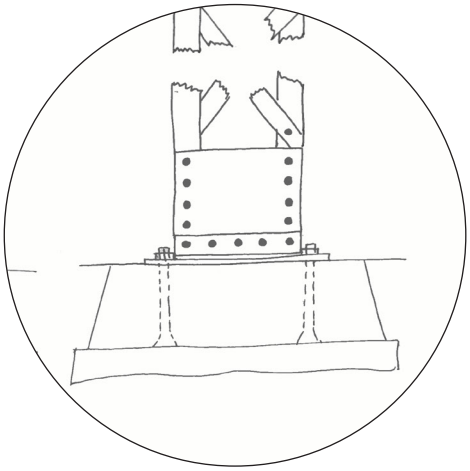

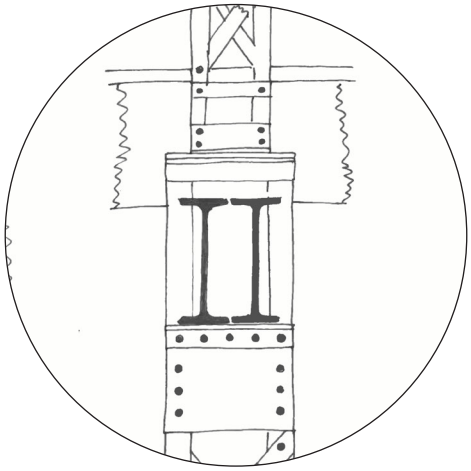

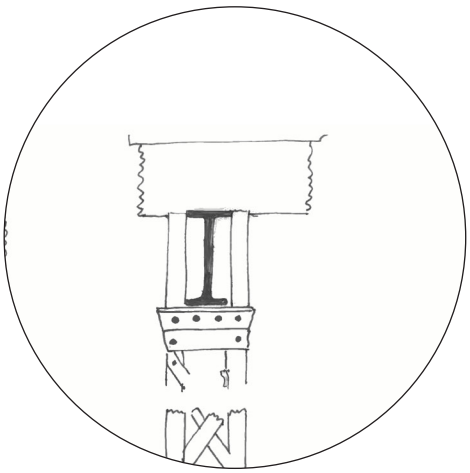

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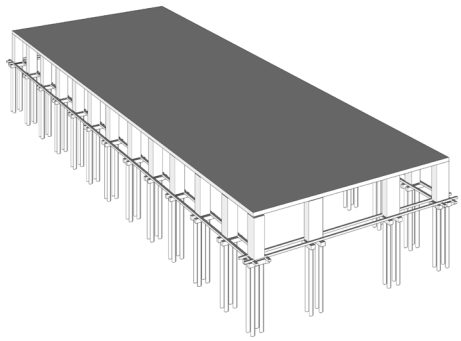
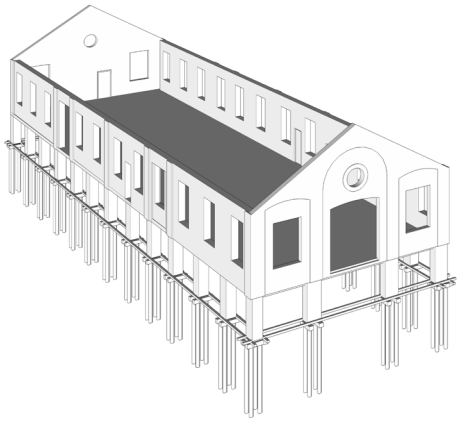
BUILDING 57 ‘SASGEBOUW’: BUILD-UP ORDER



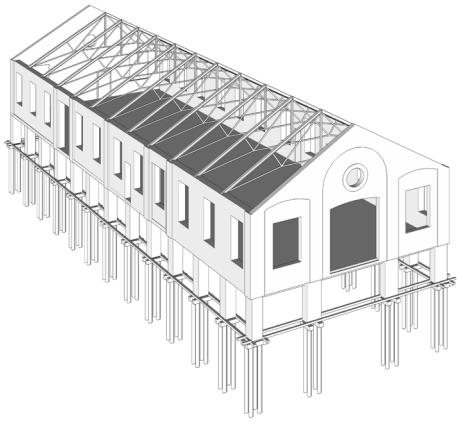
Step 1

Wooden foundation piles with wooden foundation beams



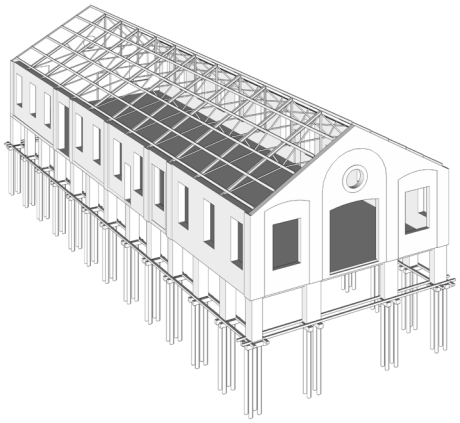
Step 2

Brick facade build



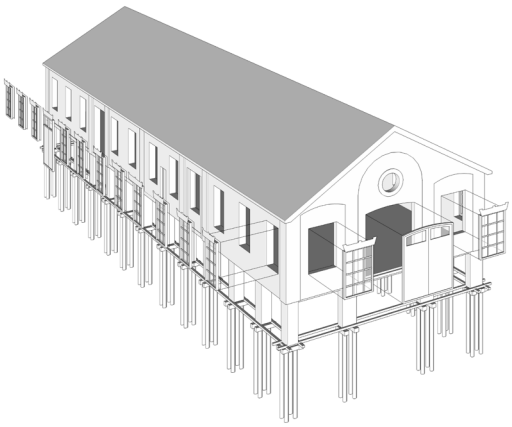
Step 3

Steel roof trusses (11x), 3500mm h.t.h. added



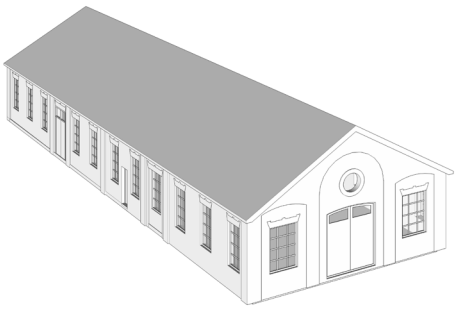
Step 4

Slated roof and rain pipes and other installations added.



Step 5

Windows, doors added.



Step 6

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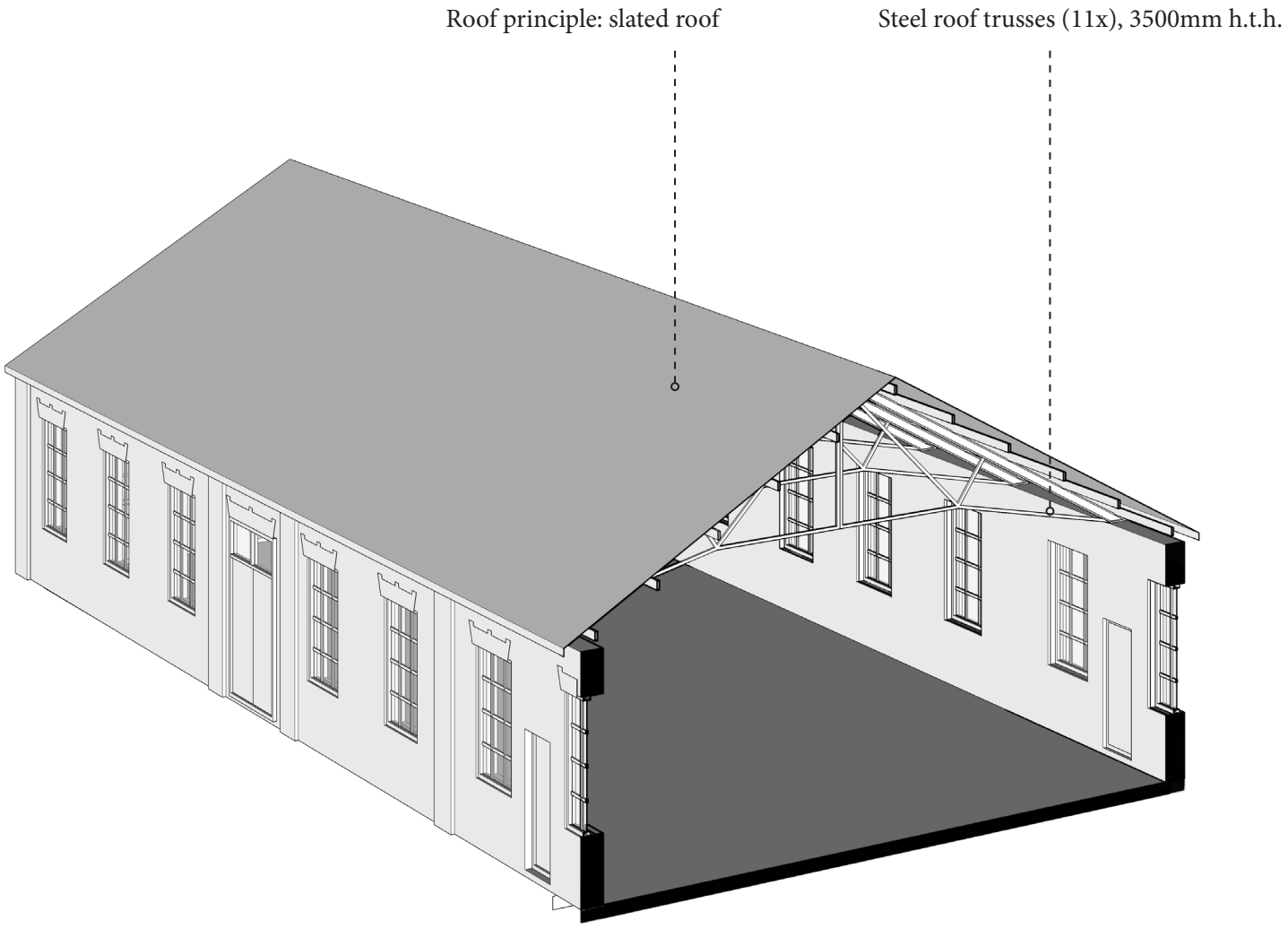
BUILDING 57 ‘SASGEBOUW’: STRUCTURE



This building is one of the oldest buildings in the military terrain . The structure of he building has changed during the time. The wooden trusses got replaced by the steel trusses. This structure carries the whole roof’s weight.

All images on this page made by Marjan Sadeghi



Concluding, the wooden foundation piles, concrete foundation, concrete floor, wooden beams, slated roof steel columns and steel beams are still in a good condition.

Interior walls of the big farm are not load-bearing, while the small farm has load-bearing interior walls.

All electronic devices used to be functional but now they are out of service.

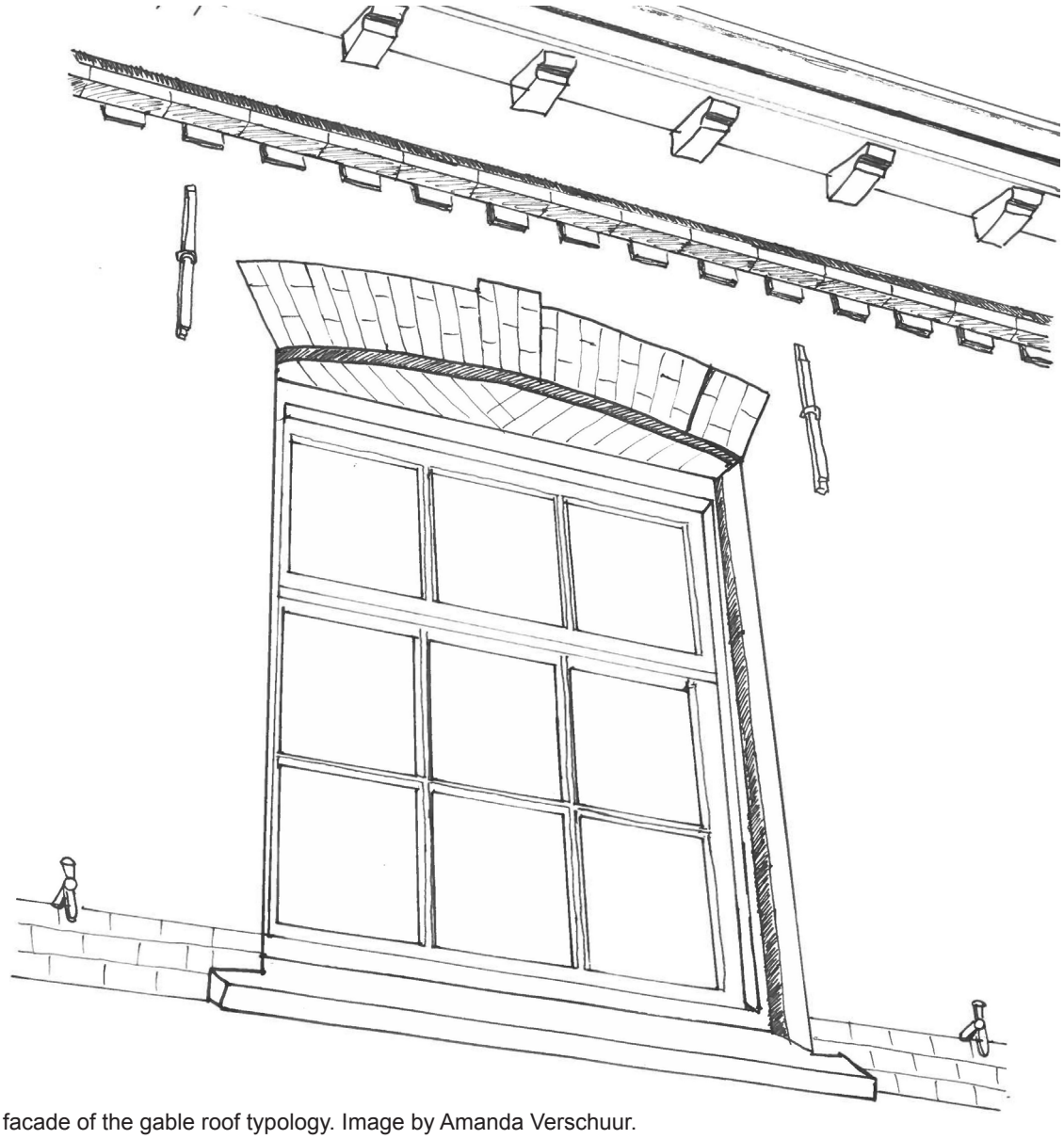
The cavity walls are functional, the weep holes allow wind to create an air stream through the cavity that exports evaporated water from the cavity to the outside.

3.2.4 SKIN

The facades of the buildings belonging to the gable roof typology immediately stand out within the plots in the woods. The brick facades with all their details are exceptional, especially compared with the rather simply designed facades of the other typologies present. These detailed facades are one of the main characteristics of the gable roof typology, whereas at first sight they do not seem to conform to the functional approach of the former military site.

The buildings belonging to the first generation of Hembrug, which include the gable roof typology, were designed by Genie officials. These so called "genies" followed a study at the Royal Military Academy (Koninklijke Militaire Academie) to become a military engineer, which took four years (Steenhuis Meurs, 2010). During this study, Civil Architectural study books were not excluded. While designing the "genies" were also inspired by the civil buildings styles used at the end of the 19th century, having strong influences of neoclassical, neo-renaissance and eclectic architecture. These influences can be seen throughout the entire first generation building layer, since mostly standard materials and techniques from that time were used.

It seems that a rather functional approach does not completely clarify the presence of the detailed facades. One explanation could be that there was a feeling of traditionalism while designing these storage buildings, since the gable roof is also not the most functional form for a storage building. This could have been done in a more functional, simpler manner.



Characteristic facade of the gable roof typology. Image by Amanda Verschuur.



Characteristic facade of the gable roof typology. Photo by Mingke Zhu.



Brickwork



Wooden frames



Concrete slabs



Wooden roofs

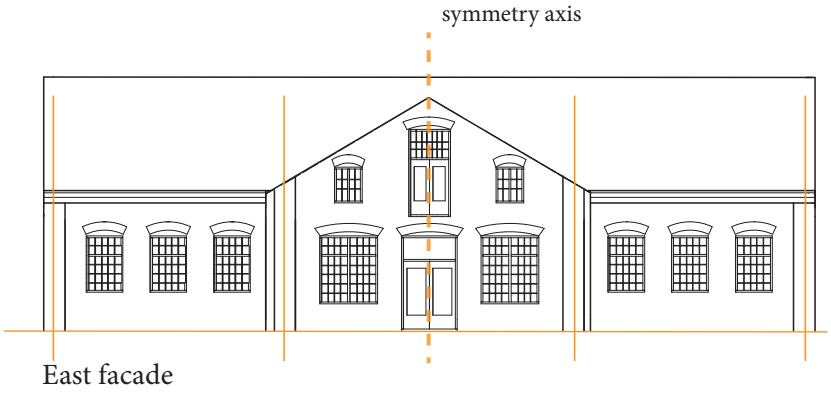
Applied materials in the facades of the gable roof typology. Photos by Amanda Verschuur





Applied colors in the facades of the gable roof typology. Image by Amanda Verschuur

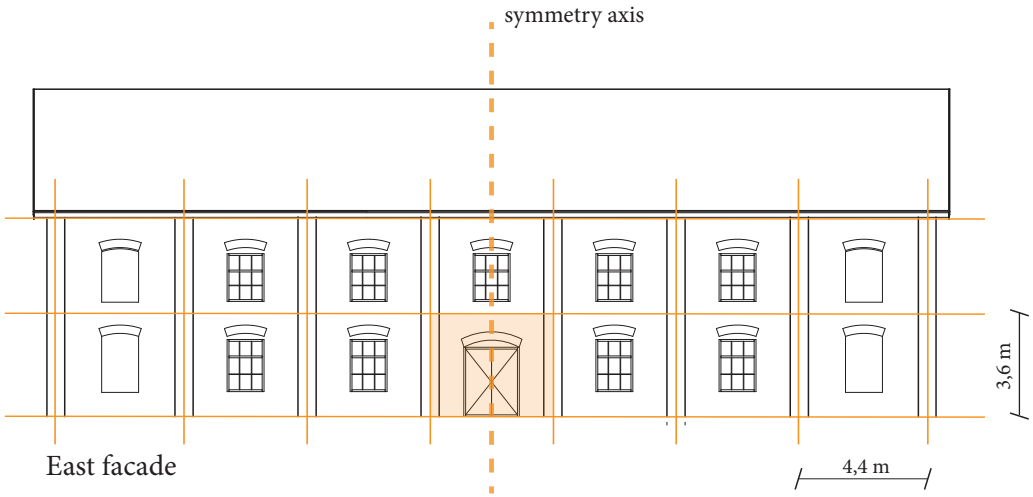
BUILDING 69 ‘Kleine Boerderij’



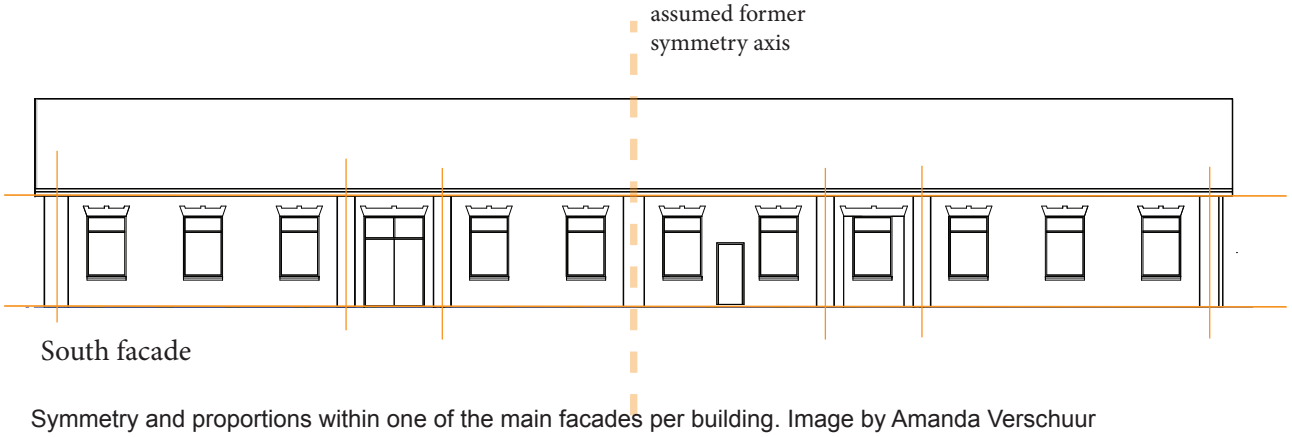
The characteristic facade elements and the decorations, as shown on the previous pages, are present in all the buildings within the gable roof typology. The facades are primarily symmetric, although the different elements manifest themselves per building in a different way. Resulting in a big variation throughout the different buildings; similar to, and also related to, the space plan.

Building 69, ‘de kleine boerderij’, has the clearest front facade within the typology. The slated roof on one side in the perpendicular direction of the main roof indicates the entrance. This results in a middle part with two levels. Contrary to other facades with one level, which draws the attention. Like all the facades of building 69, the front facade is unconditionally symmetric.

BUILDING 85 ‘Grote Boerderij’



BUILDING 57

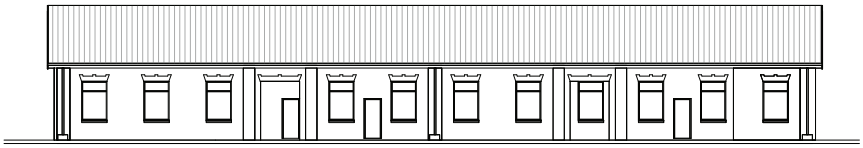


Symmetry and proportions within one of the main facades per building. Image by Amanda Verschuur

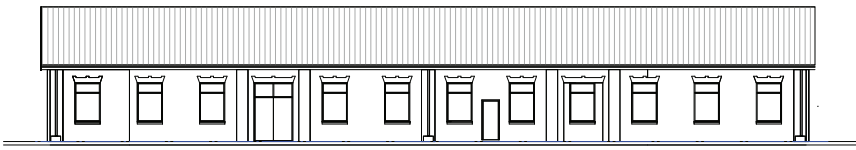
BUILDING 57

Building 85, 'de grote boerderij', has the strongest repetition and symmetry. There is no clear distinction between the front and remaining facades. The long facades are originally identical to each other, while nowadays there is a small difference visible between the two entrances. The entrance of the west facade still has a canopy, were the one in the east facade has been removed. These facades contain a strong symmetry created by the repetition of the placement of one window between two columns, visible in horizontal and vertical direction. At the end of the facades solely the shape of the window has been formed in the brickwork to maintain the rhythm.

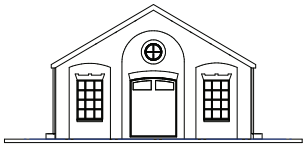
Building 57 seems to be the exception to the rule with the asymmetric facade. Although after a closer look the original symmetry can be seen in the 3-1-2/2-1-3 rhythm of the windows. Nowadays this is less visible as a result of the two added entrances, which replaced one of the windows.



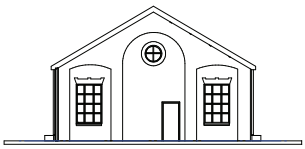
North facade



South facade



East facade

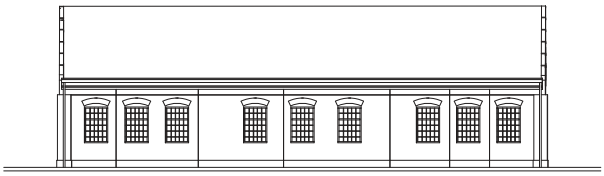


West facade

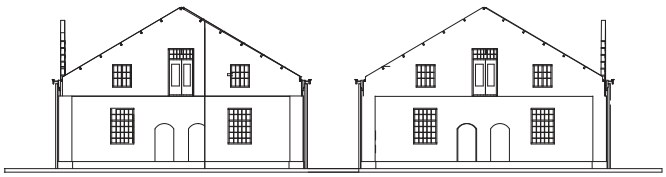
BUILDING 69 'Kleine Boerderij'



East facade

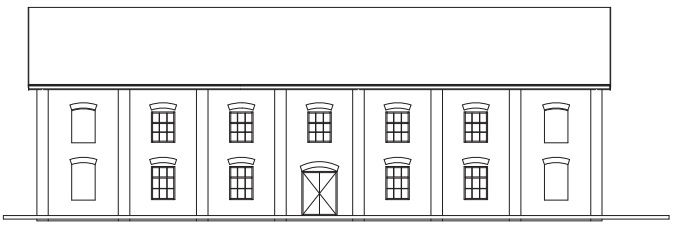


West facade

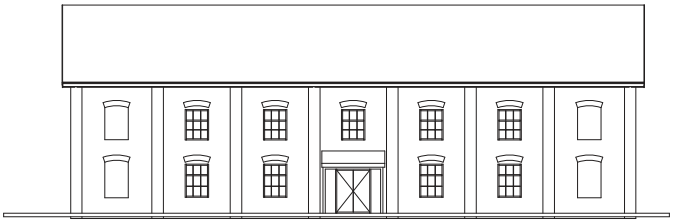


South facade North facade

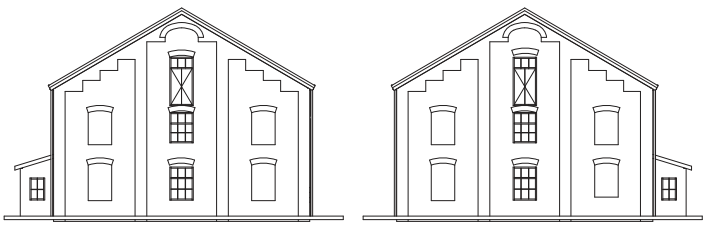
BUILDING 85 'Grote Boerderij'



East facade



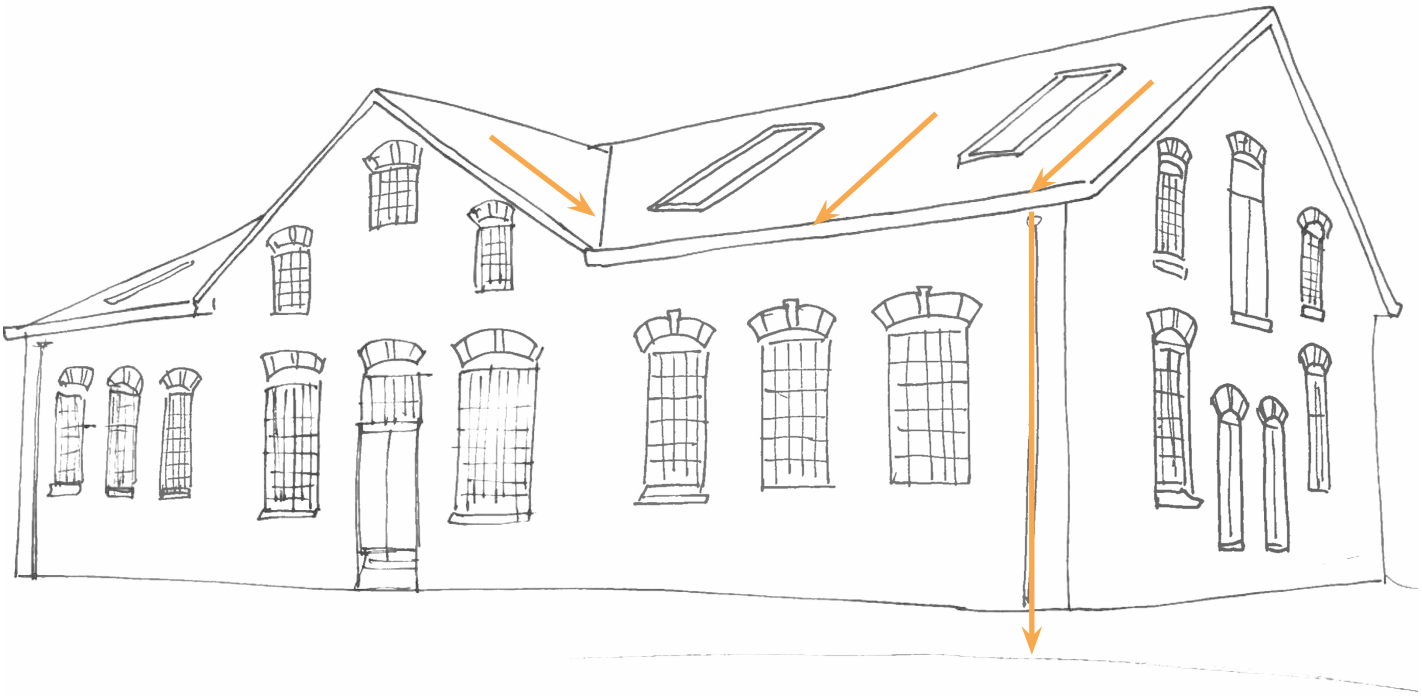
West facade



South facade North facade

Elevations of the gable roof typology buildings. Image by Amanda Verschuur

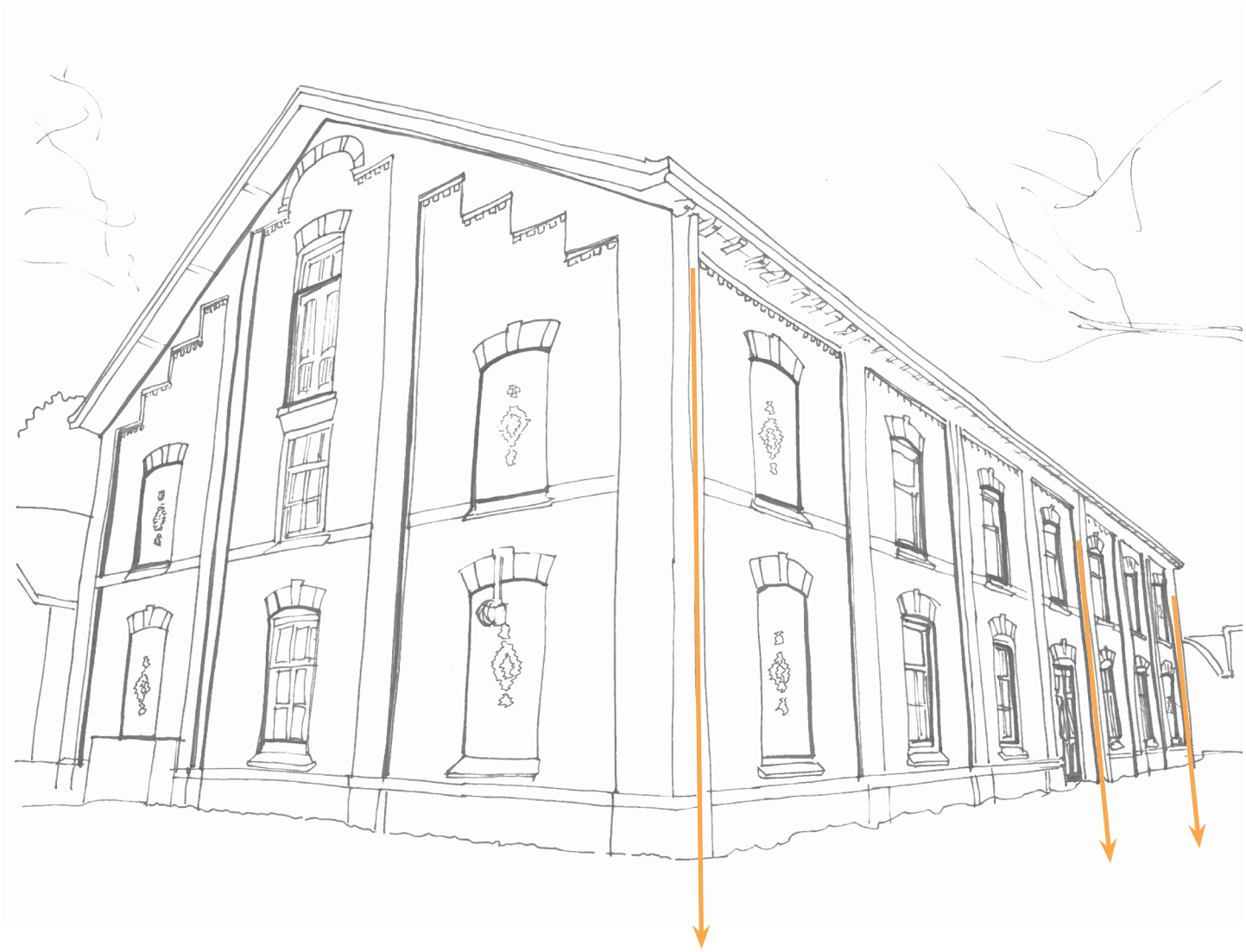
3.2.5 SERVICES



Water flow of building 69 'Kleine Boerderij'

The picture above represents the rain water flow on the roof. The water is guided to the rain gutter by the angle of the roof, through the pipes, and eventually to the ground.

All images on this page made by Marjan Sadeghi

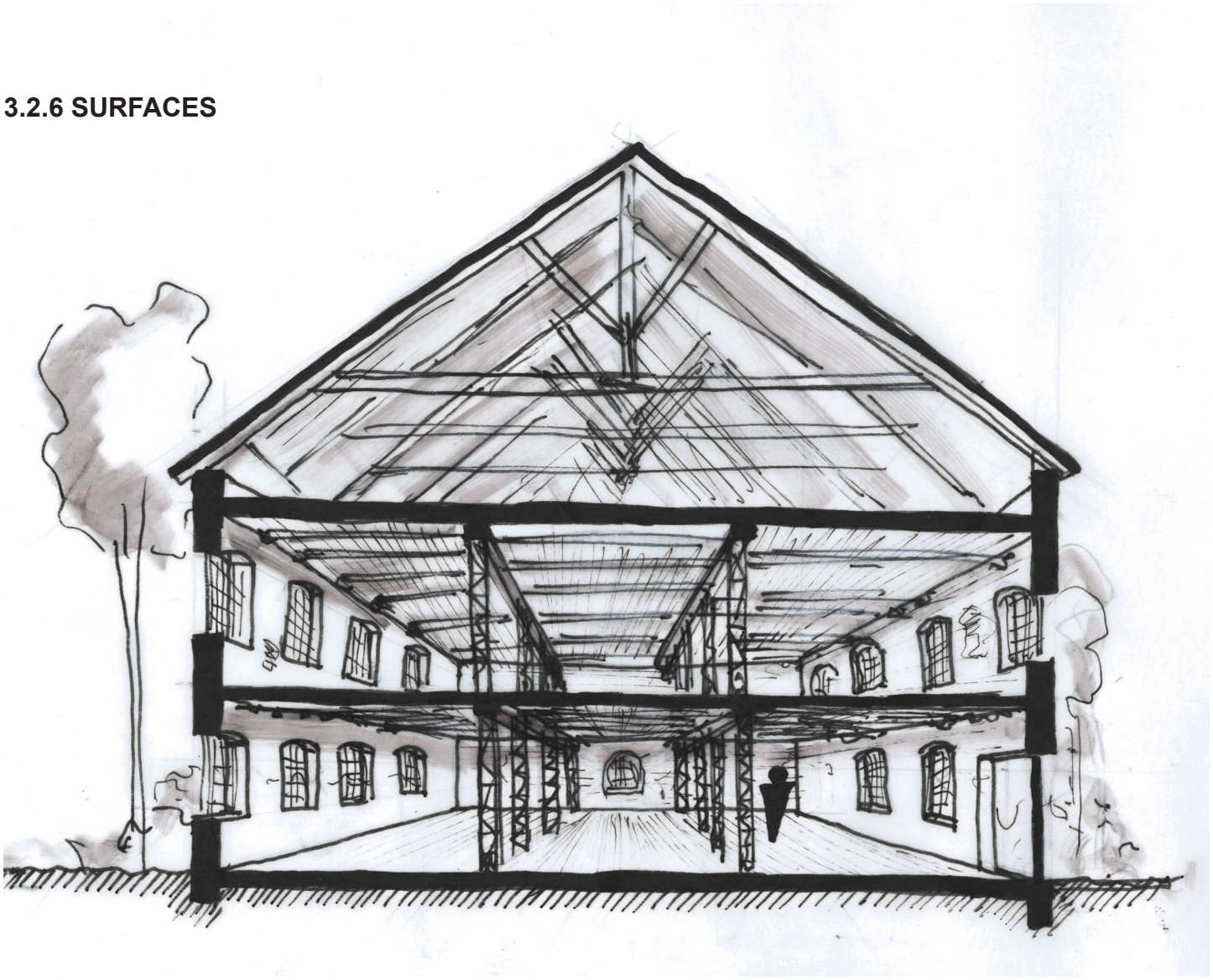


Water flow of building 85 ‘Grote Boerderij’

The picture above represents the rain water flow on the roof. The water is guided to the rain gutter by the angle of the roof, through the pipes, and eventually to the ground.

All images on this page made by Marjan Sadeghi

3.2.6 SURFACES

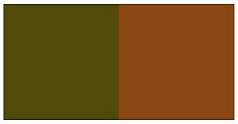


Perspective section of building 85, scale 1:100. Image by Lucas Pol.



Interior photograph of the ground floor. Photo by Mingke Zhu.





Color scheme for the interior. Image by Amanda Verschuur.



Interior photograph of the attic. Photo by Mingke Zhu.



Perspective section of building 57, scale 1:100. Image by Lucas Pol.



Interior photograph of the wood and steel structure.
Photo by Lucas Pol.



Traces of a previously different roof structure.
Photo by Lucas Pol.

3.2.7 STUFF

Within the buildings of the gable roof typology no traces of the original interior are found. A possible explanation for this could be the fact that for the office and storage functions of the buildings no particular machinery or items were necessary.



Interior of building 85. Photo by Amanda Verschuur.

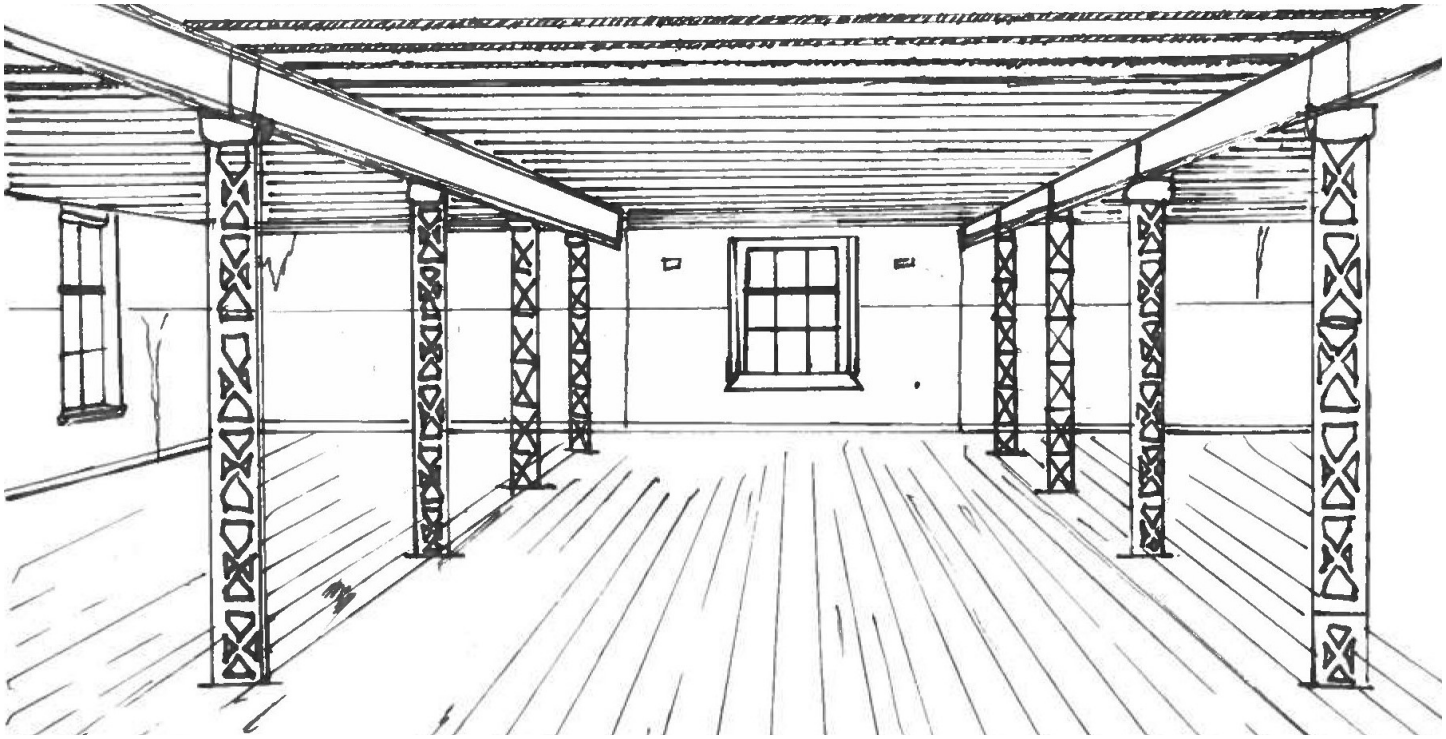


Interior of building 57. Photo by Lucas Pol

3.2.8 SPIRIT OF PLACE



Spirit of place around building 69 ‘Kleine Boerderij’. Image by Amanda Verschuur.



Spirit of place inside building 85 ‘Grote Boerderij’. Image by Amanda Verschuur.

3.2.9 DEVELOPMENTS. BUILDING 69 ‘KLEINE BOERDERIJ’: ROOF STRUCTURE



The former structure of the roof is shown in the above photo, which is the starting point of the renovation and the replacement of the complete roof. Since the former structure was too old and not functioning anymore, the replacement with the new structure was needed.

Picture retrieved from https://www.postacoustics.nl/contact/bpodium-hembrug2/. Page made by Marjan Sadeghi



The structure of the building has changed.
The wooden trusses are replaced by the wooden trusses which are more resistance. This structrue carries the whole roof's weight.

This photo illustrates the replacement of the wooden elements during transformation.



Pictures retrieved from https://twitter.com/hetprojectburo and @Hembrug #debouwmaakthet.
Made by Marjan Sadeghi

BUILDING 57 ‘SASGEBOUW’: ROOF STRUCTURE

The structure of he building has changed during time. The wooden trusses got replaced by the steel trusses. This structure carries the whole roof’s weight.

The traces of the former structure are visible on the external wall.





All images on this page made by Marjan Sadeghi



Interior photograph of the ground floor. Photo by Mingke Zhu.

3.3 SHELL ROOF

3.3.1 SITE

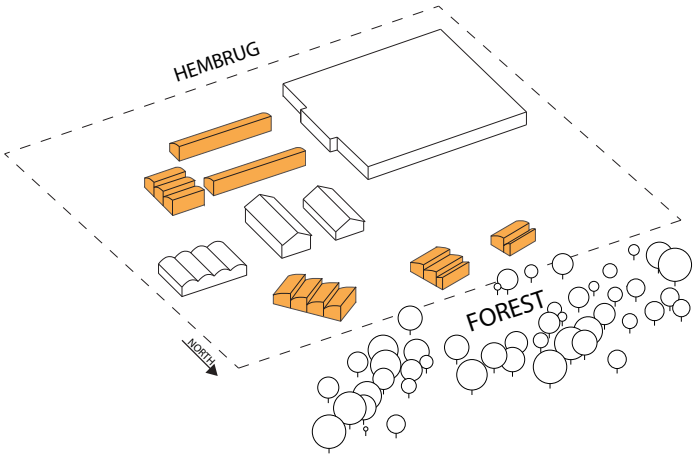


Location and orientation of all shell roof buildings on site. (Image: Valerie Arntz, edited by Barbara de Groot)

The majority of the buildings (415 up to 420) in the 'plots in the woods' are from the shell roof typology. The shell roofs are prominantly present in the site.

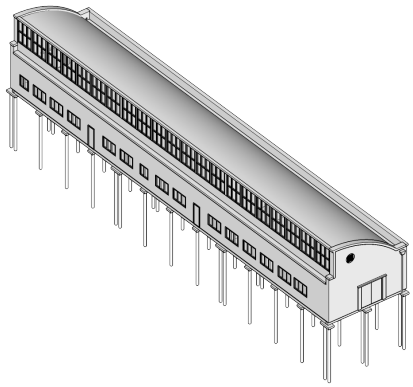
This roofscape derives from the functions of these buildings (SteenhuisMeurs, 2010). The function of the buildings meant that there was a large chance of explosions. Besides the shape of the roof, this also influenced the orientation of the buildings. As is visible on the drawing on the right, all shell roof buildings are orientated towards the forest. In the case of an explosion, the force would be directed away from the main production area to a less intensely used part. This was supposed to reduce the possible damage to the complex. As a result, the windows inserted in the shell roofs are orientated (roughly) north, keeping out direct sunlight.

The main value of this ensemble (Finaly, Kooiman, & Prins, 2000) of shell roof types lays in its recognizable modularity, but diverse configurations. This creates a unity, but does not become monotonous. Another main value is in the way the buildings are embedded into the unique landscape.



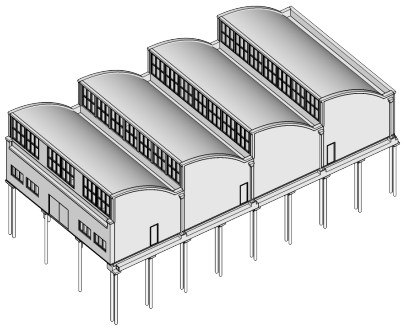
Orientation shell roofs to the forest (Image: Barbara de Groot)

OVERVIEW



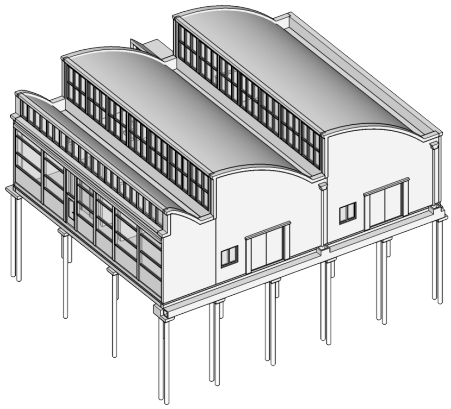
415 / 420

Year of construction: 1951 / 1952
Function: assembling of ammunition (parts)



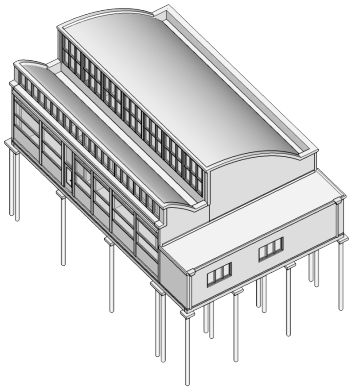
416

Year of construction: 1952
Function: filling and patronage workshop



417

Year of construction: 1952
Function: pressing of explosives



418

Year of construction: 1952
Function: pressing of explosives

(All images on this page made by Jan-Willem Spek)

3.3.2 SPACE PLAN

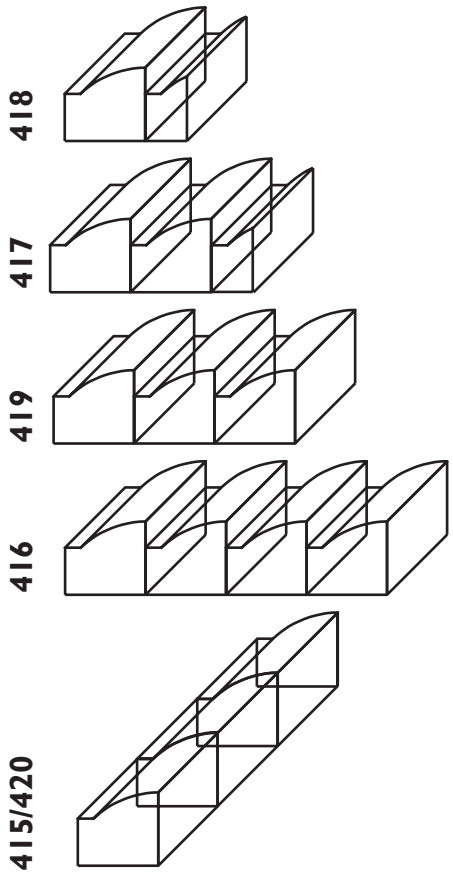
All the buildings of the shell roof typology appear to be very similar. That is indeed the case. The architects from the military designed their buildings to be above all functional. With a set of buildings that would be built multiple times, they therefore used a system of standardization.

In its essence, the buildings exist of a single module. This module consists of a single shell roof unit. As mentioned before, this typical roof shape was related to the risk of explosions. The section shows that the shape of the roof re-directs the shockwave (SteenhuisMeurs, 2010). The windows placed underneath the roof allow for indirect daylight to enter the space. Good light conditions were also a necessity for a smooth production process and for the minimization of accidents. As a result of this shape, the space underneath the roof remains free from supporting walls or columns. This meant an open floor plan, which could facilitate many different functions and formed an easily adaptable space.

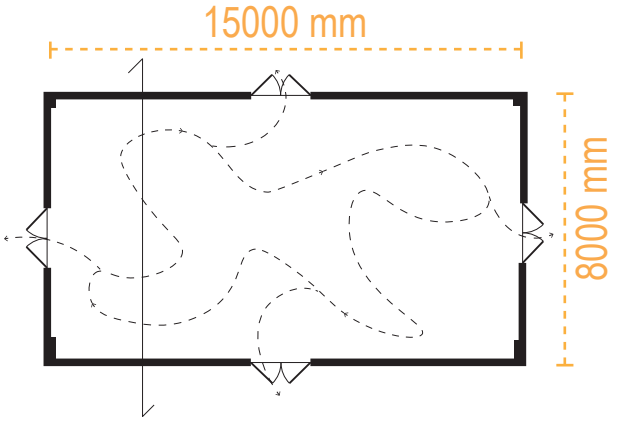
With this single module, the designers then made different configurations, depending on the exact function or the amount of required space. It is interesting to note that there is a functional difference between the configurations that expand in the length (415 & 420) and those that expand in the width of the module (416 up to 419). The longitudinal buildings functioned as assembly places. For the organization of an assembly line (already indicated in the word 'line), a long space is more efficient.
Apart from the general floor plan and the modular system introduced on the previous page, there have been made adaptations to the building typology whenever necessary. The functions of each building (Dienst Welzijn, Economie en Bestuur, Cluster monumentenzorg en archeologie, Goudeau, & Van der Kleij, 1996) is listed in the header.

This has resulted a three main exceptions that occur:
- 'Half shell roof' expansion
- 'Flat roof' expansion
- Internal seperating walls

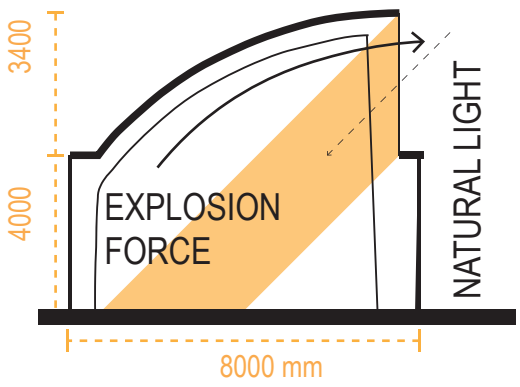
BUILDING 418 (Press building for explosives)
Building 418 has two of these adaptations. The 'half shell roof' expansion is seperated from the rest of the plan with a closed wall with three door openings and is sub-divided into smaller compartments. The expansion was accessible from the outside and presumably contained supporting functions such as electricity. This way these functions could be reached without having to cross through the main explosives fabrication space (based on the similar function to 417).
The 'flat roof' expansion has a visual connection with the main space through the glass wall.



Different configurations of the module (image: Barbara de Groot)



Floor plan (image: Barbara de Groot)



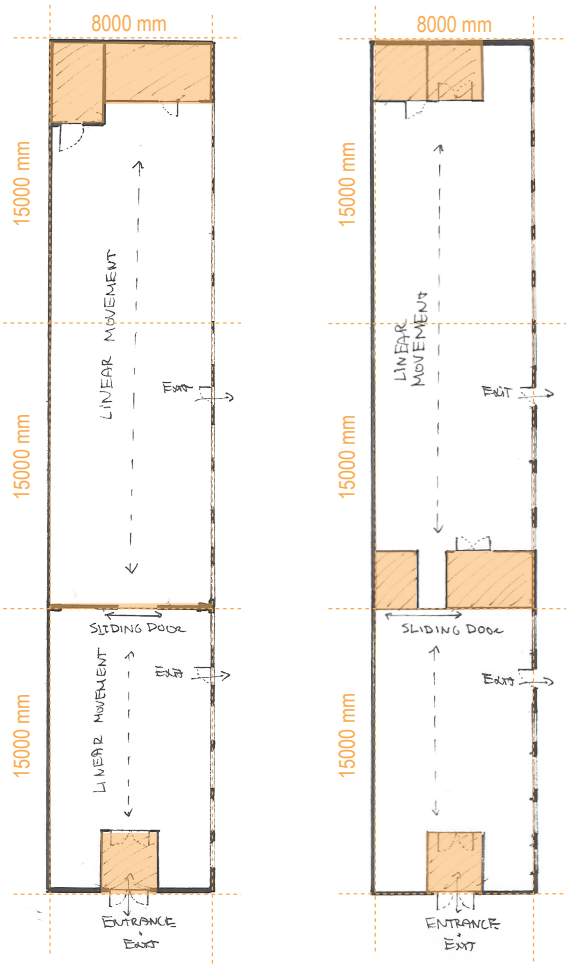
Section (image: Barbara de Groot)

BUILDING 417 (Press building for explosives)
There has also been a 'half shell roof' expansion added to building 417, similar to 418. Again these spaces presumably contained small supporting functions that in this way could be reached directly from outside. The small 'flat roof' expansion contains the press. The press could in the original plan only be accessed from the outside.

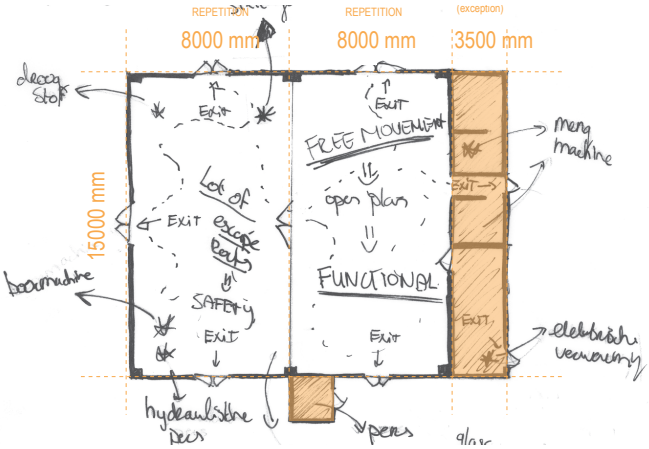
BUILDING 419 (Wash and dress building)
Internal seperating walls have been placed in building 419. This is strongly related to the function as washing and dressing building.

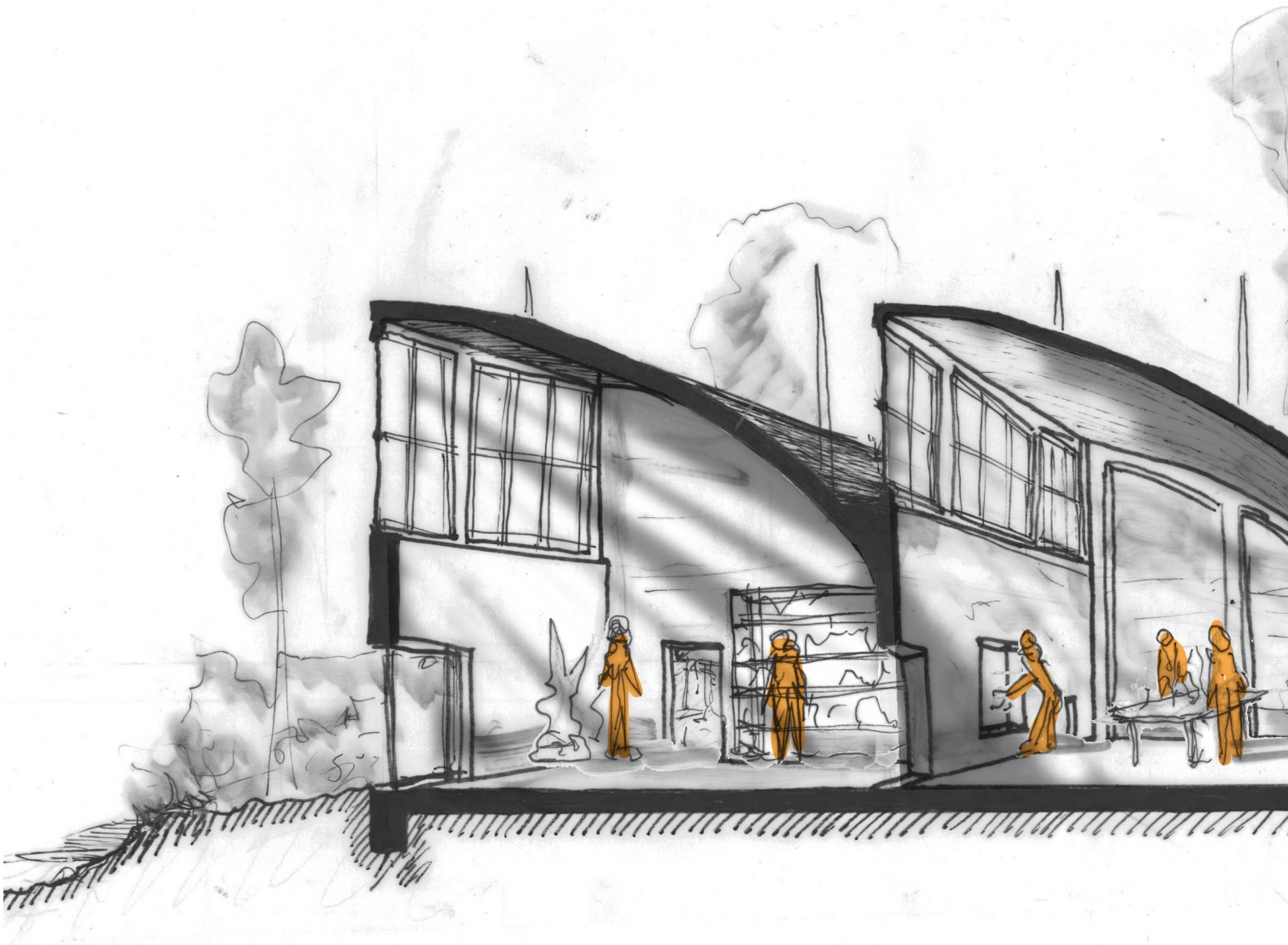
BUILDING 416 (Fill and patronage workshop)
Building 416 has one large wall with window openings in it, where the with 'sas' filled boxed (Artillerie Inrichtingen Hembrug, 2019) would be passed through. The space behind is splitted into three rooms of the same size.

BUILDING 415 & 420 (Assembly ammunition)
Not only are 415 and 420 both the only longitudinal configurations, they also have a similar internal layout, divided by walls. The main entrance hall is seperated from the assembly part. Both buildings also have a wall splitting the building into a one-third and two-thirds, equipped with a sliding door.

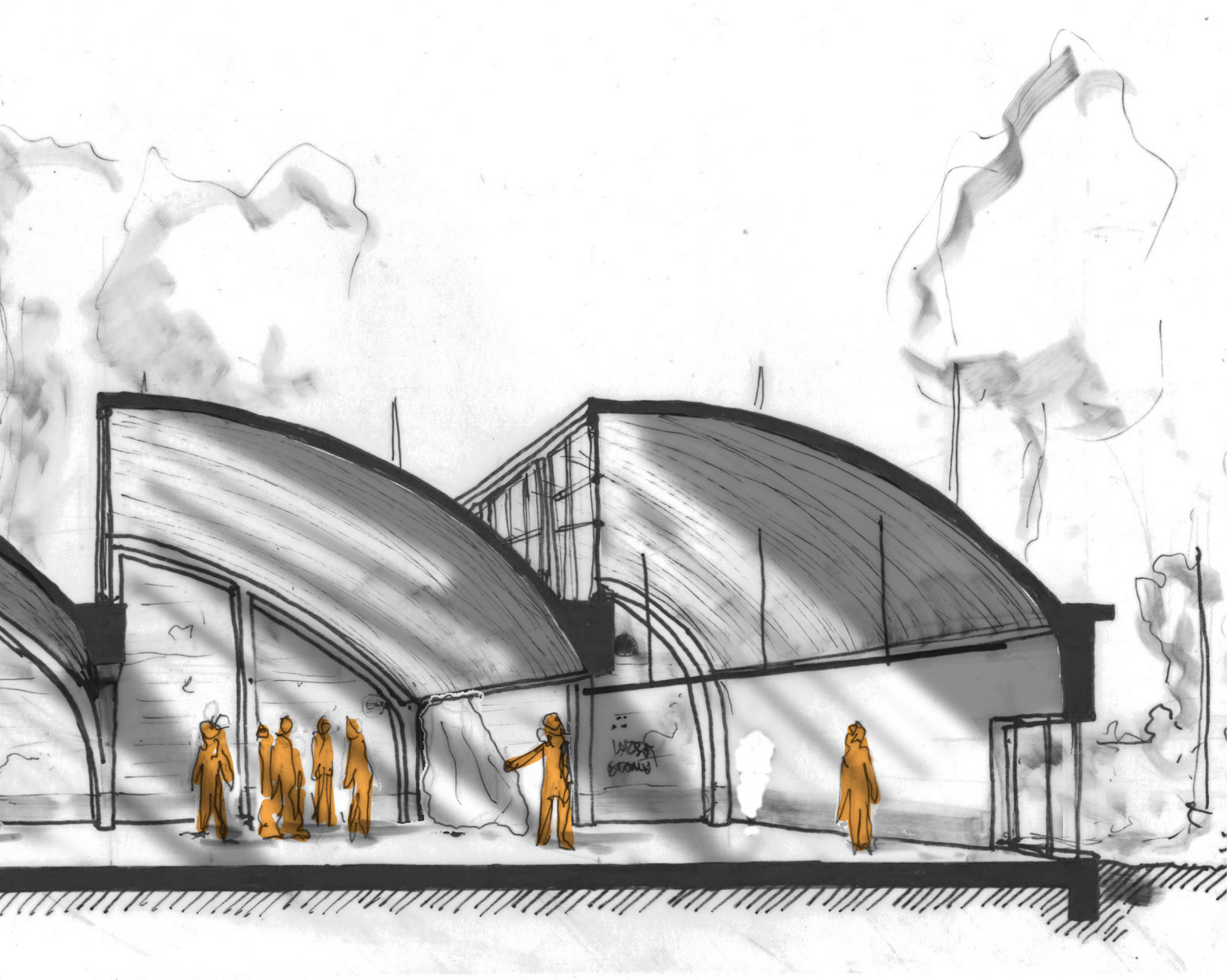


Exceptions 420 (left) & 415 (right) (image: Barbara de Groot)


REPETITION
REPETITION
(exception)
8000 mm
8000 mm
3500 mm
15000 mm
FREE MOVEMENT
open plan
FUNCTIONAL
SAFETY
EXIT
EXIT
EXIT
EXIT



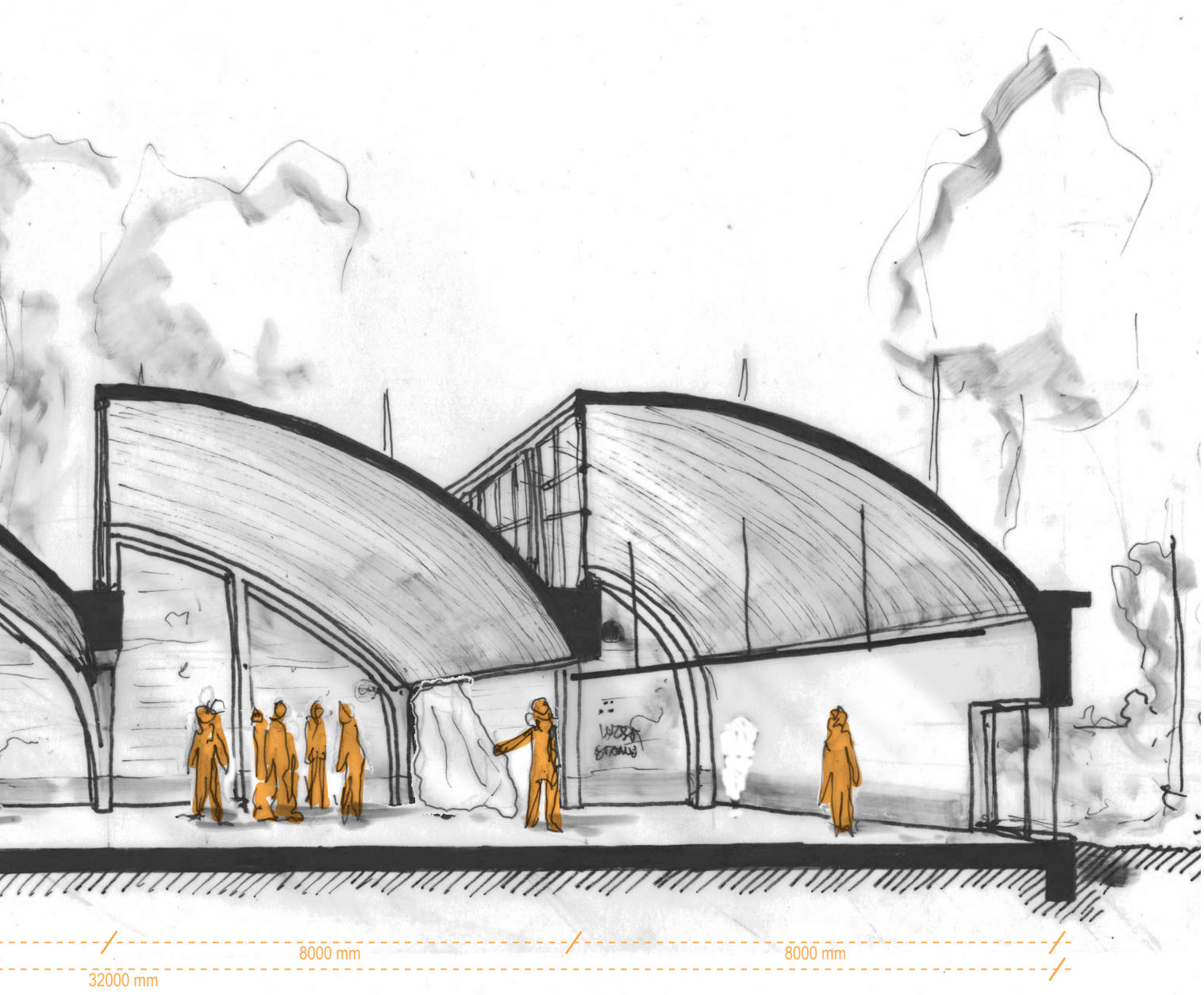
Perspective section of building 416 showing a daylight render, scale 1:100. Image by Lucas Pol.



Perspective section of building 416 showing a daylight render, scale 1:100. Image by Lucas Pol.

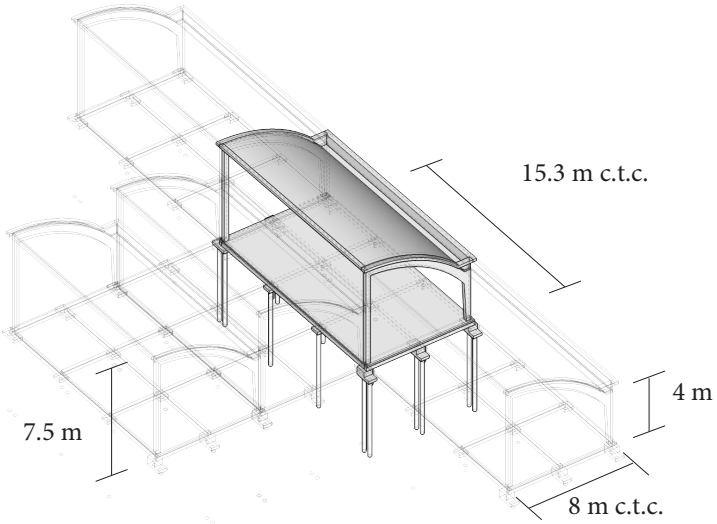


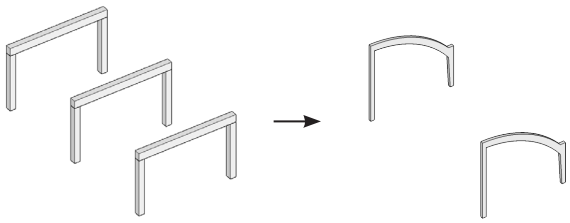
Perspective section of building 416 showing the spaceplan regarding human scale and use, scale 1:100. Image by Lucas Pol.



Perspective section of building 416 showing the spaceplan regarding human scale and use, scale 1:100. Image by Lucas Pol.

3.3.3 STRUCTURE

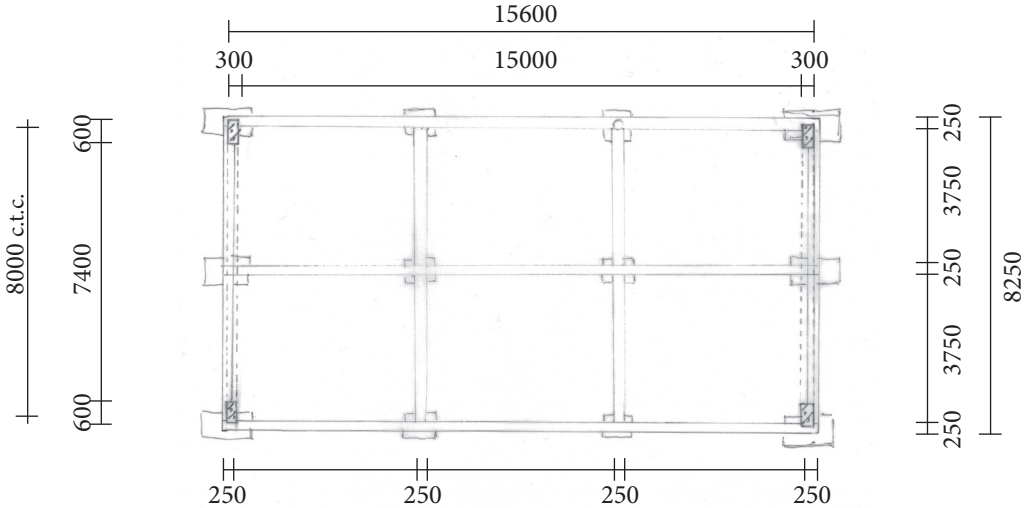


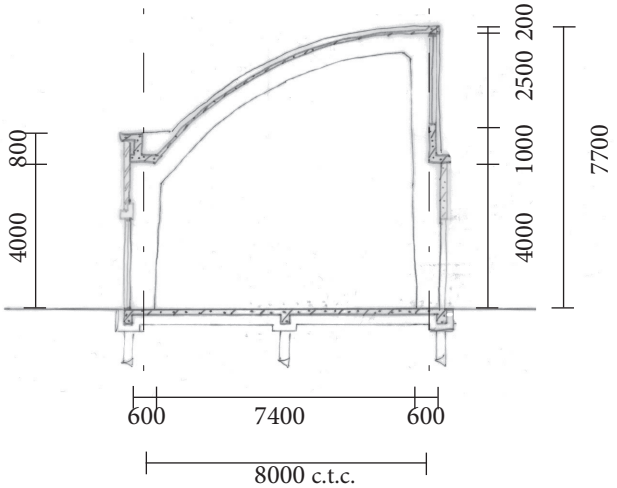


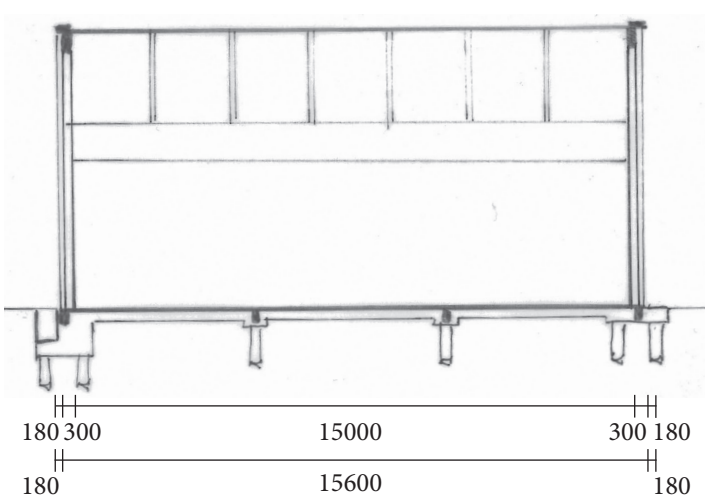
The base structure of all the explosion roof type buildings consists of the same reinforced concrete structure. This structure is fixed in its width, height and length. This structure can be repeated in both directions to make up different building sizes.

The structural typology of these buildings is in its core a column and beam structure.
This is transformed to columns with quarter-circle arches.

STANDARD DIMENSIONS

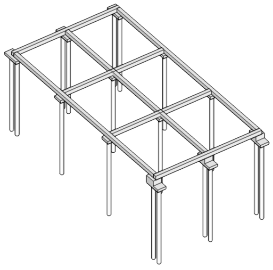






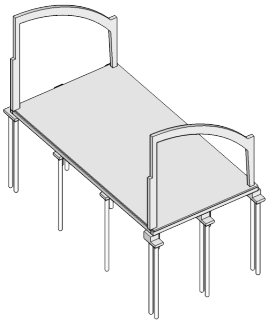
 (All images on this page made by Jan-Willem Spek)

TYPICAL BUILD-UP ORDER



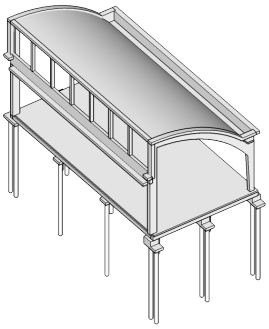
step 1

Concrete foundation piles with concrete foundation beams. Beams are widened where they support on a pile.



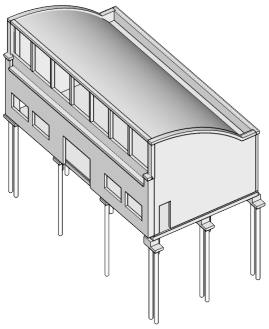
step 2

In-situ poured reinforced concrete ground floor and reinforced concrete arches.



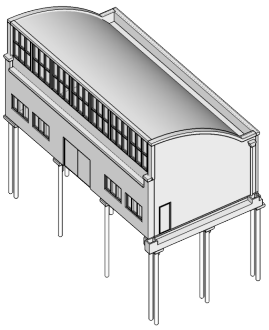
step 3

Reinforced concrete roof shell and beams poured in-situ. At this point the structure is stable on its own.



step 4

Brick facades constructed.

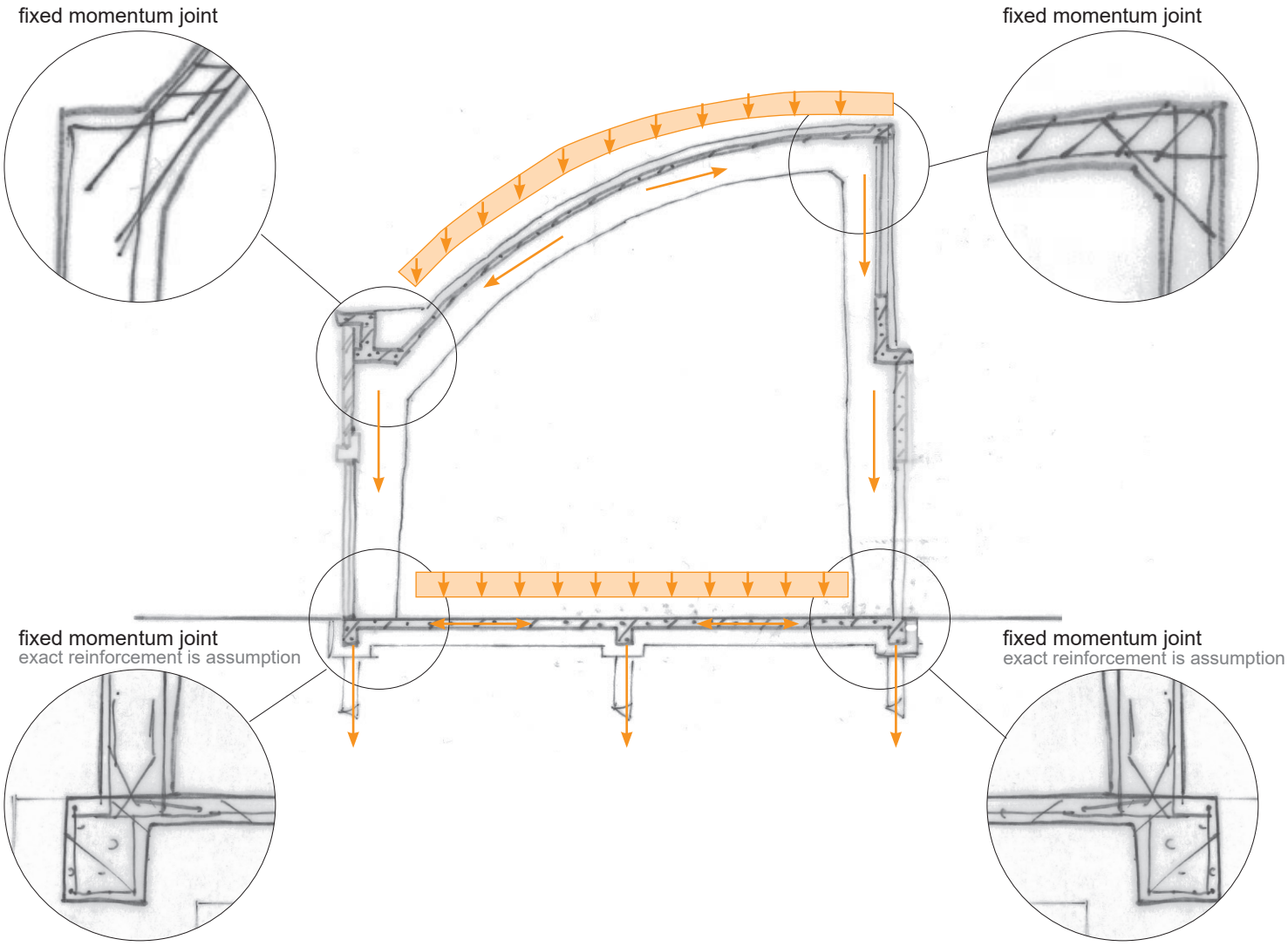


step 5

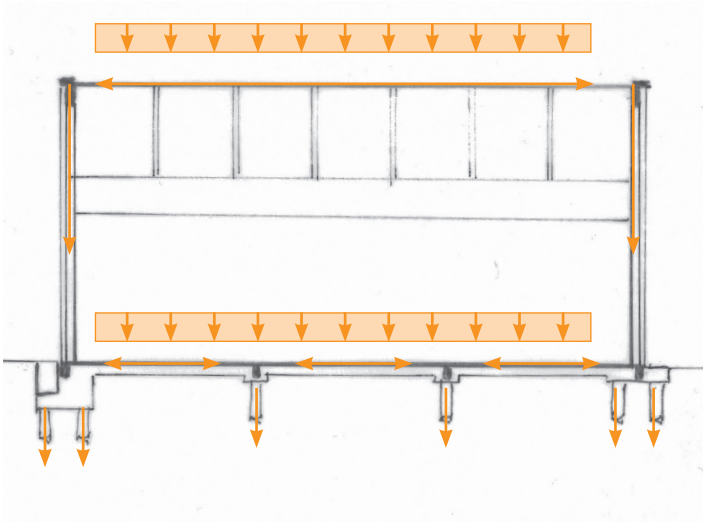
Windows, doors, rainpipes and other installations added.

(All images on this page made by Jan-Willem Spek)

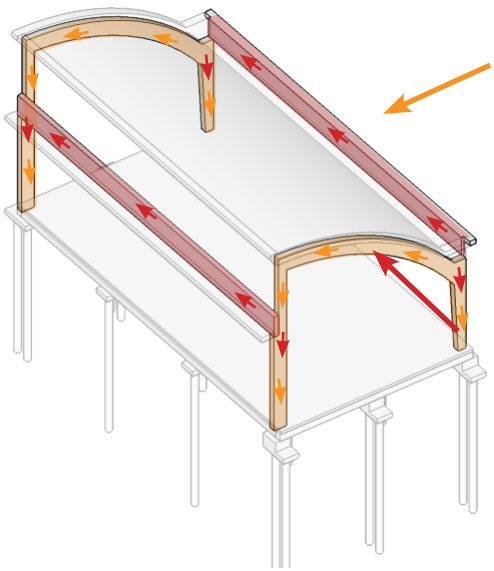
TYPICAL FORCE DISTRIBUTION



TYPICAL FORCE DISTRIBUTION



STABILITY



(All images on this page made by Jan-Willem Spek)

BUILD-UP ELEMENTS

Bitumen roofing

Reinforced concrete shell roof
(70mm center / 200 mm edges)

Brick wall

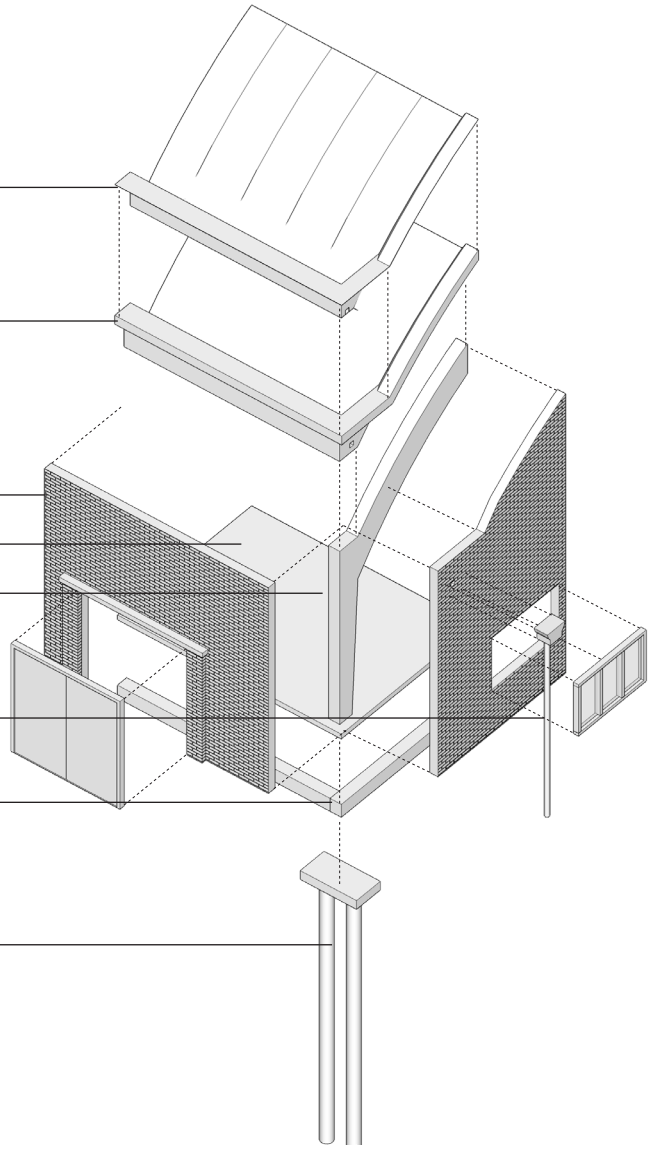
Reinforced concrete floor

Reinforced concrete arch

Rainwater drainage

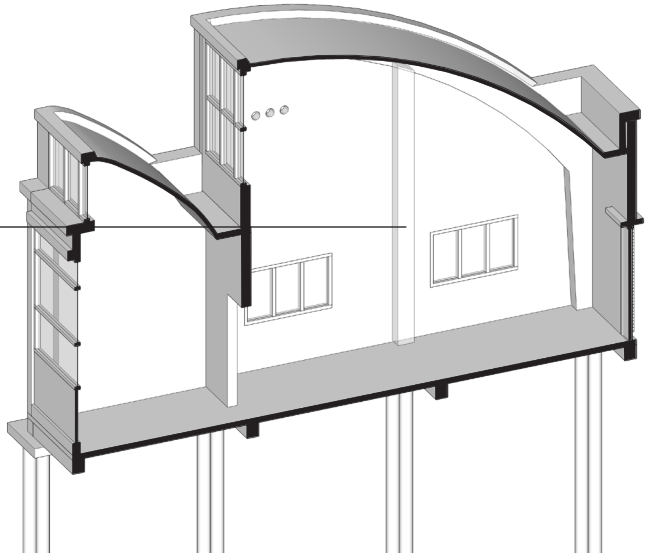
Reinforced concrete
foundation beams

Concrete foundation piles



Extra load bearing columns are present in some buildings within the typology

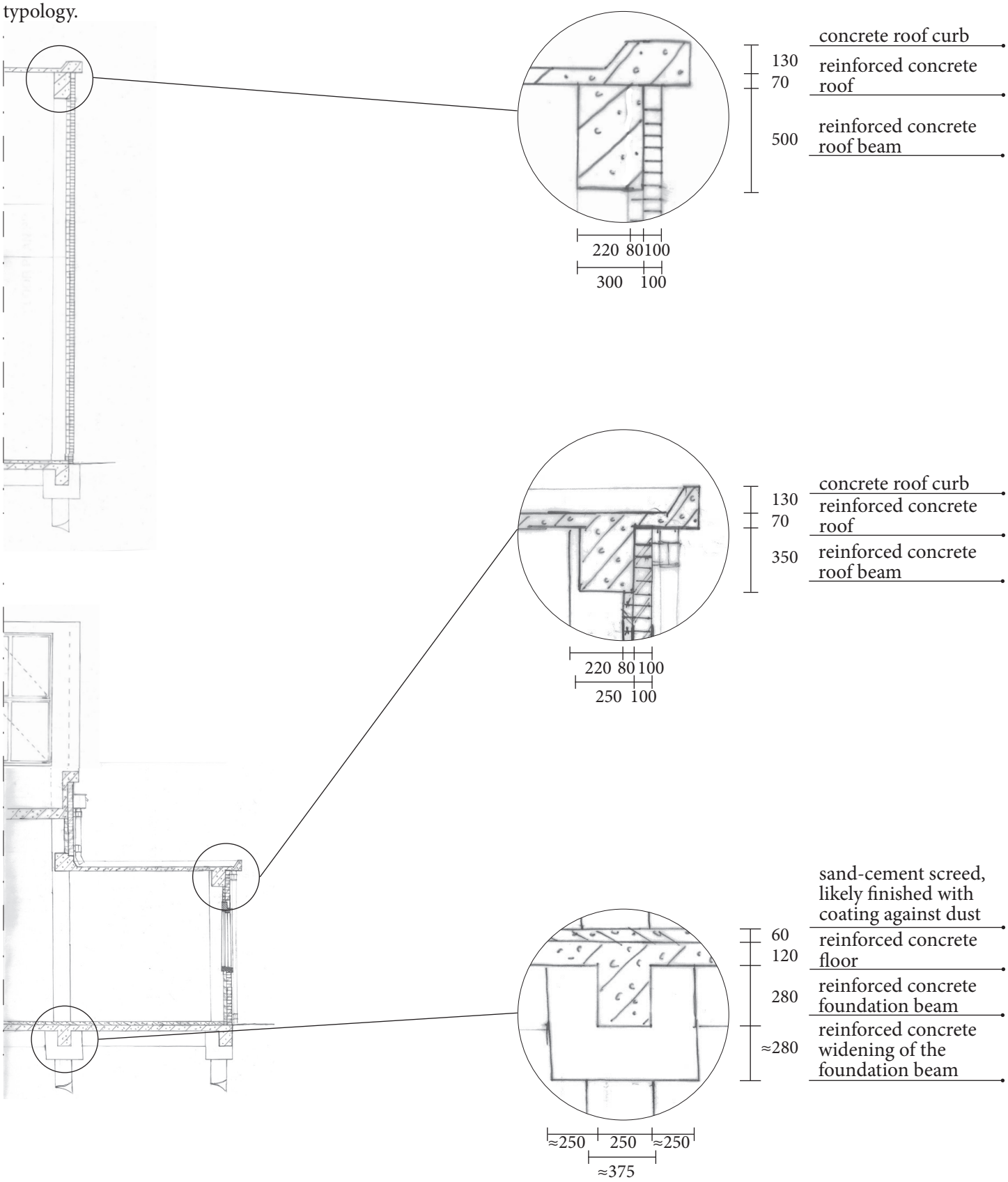
It is unknown why these columns are present in some buildings and not in others.



(All images on this page made by Jan-Willem Spek)

STRUCTURE DETAILS

Typical structure details of the shell roof typology. The same principal details are applied in all buildings of this typology.



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FOUNDATION

Reinforced concrete foundation beam

Reinforced concrete slabs to widen the foundation beams

Concrete foundation piles

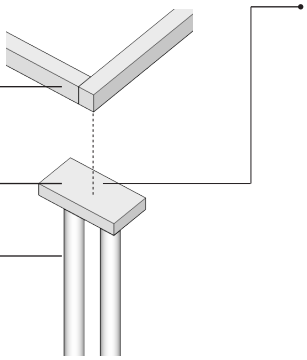
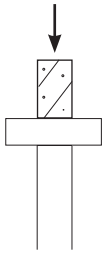


Image by Jan-Willem Spek

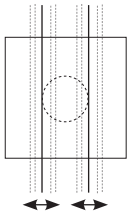
Needed for:

Extra strength for point load



Images by Jan-Willem Spek

Allow for slight insecurities in positioning of the piles and beams



FOUNDATION GRID

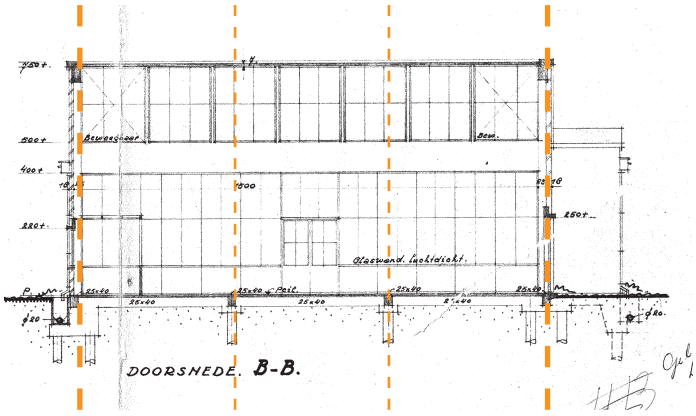
418
build year: 1952
function: pressing of explosives

similar in functions

assume similar foundation as building 418

416
build year: 1952
function: filling and patronage workshop

417
build year: 1952
function: pressing of explosives



source: Nederlandsche Maatschappij voor Havenwerken (1950)

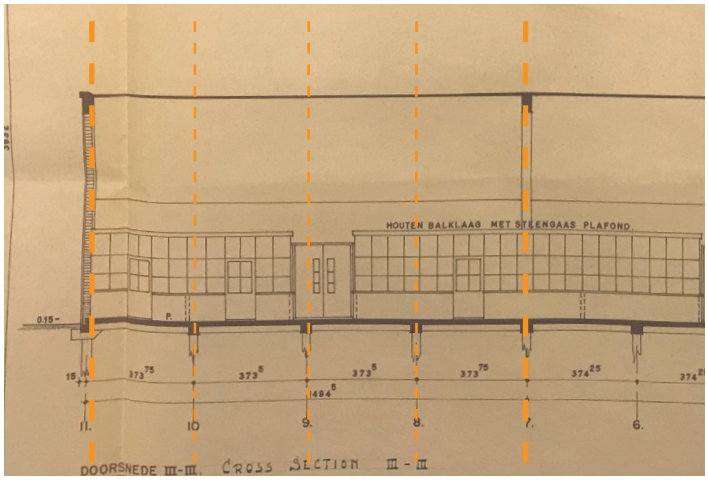
430
build year: 1958
function: assembling of ammunition

similar in functions

assume similar foundation as building 430

415
build year: 1951
function: assembling of ammunition

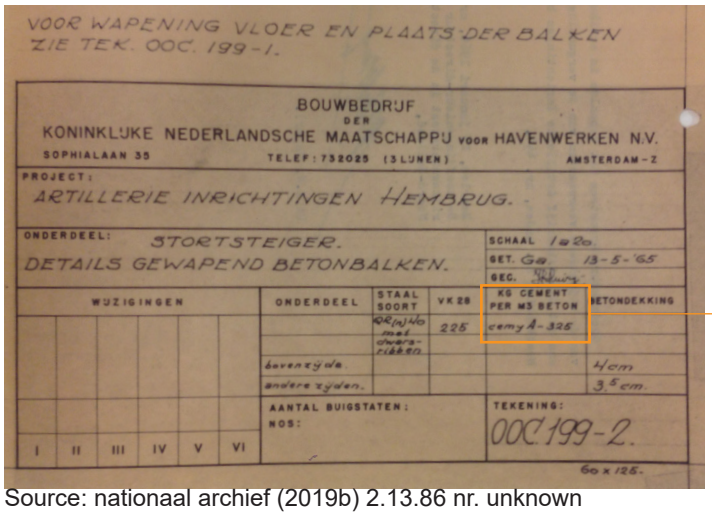
420
build year: 1952
function: assembling of ammunition (parts)



source: nationaal archief (2019a) 2.13.86 nr. 2672

Buildings with the function of assembling ammunition likely have a stronger foundation due to this function. This could be due to heavy machinery that was needed within these buildings. However, this remains an assumption and would need to be checked before any construction.

CONCRETE COMPOSITION



Source: nationaal archief (2019b) 2.13.86 nr. unknown

This indicates the amount of kg's of cement within one m^3 of concrete, in this case 325 kg. This figure corresponds with a regularly used ratio for one m^3 of concrete for regular/average applications, being 1 part cement - 2 parts sand and 3 parts gravel (http://www.joostdevree.nl/shtmls/beton.shtml, 2019). Thus the concrete is not either extra strong or extra light, but an average concrete composition.

↓

This sheet isn't from a shell roof type building. However it is from Hembrug from around the same time of construction. Therefore we can assume that a similar composition of concrete is used in our explosion roof type buildings.

↓

No other notions of the composition of the concrete used in the buildings is found. However it's deemed likely that a similar composition of concrete is used for the other load bearing reinforced concrete elements. Only the screed (top floor layer) doesn't have a load bearing function and thus is made of a different composition, with relatively more sand.

HISTORY OF CONCRETE SHELLS

History of concrete shells
The 50's of the 20th century were the 'golden ages' of building with concrete shells. Building thin concrete shells derived from a scarcity of materials but cheap costs of labour (Tang, 2015)(Huijben, van Herwijnen, Nijsse, 2011).

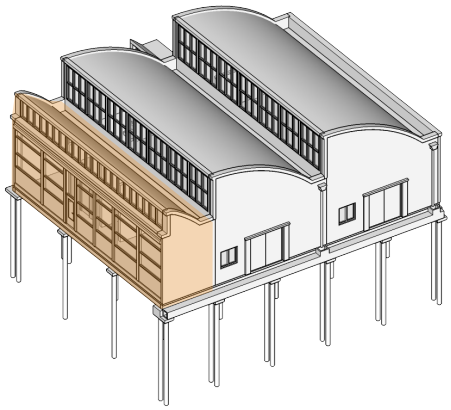
Possible formworks for concrete shells (Tang, 2015)

- concreting over timber formwork (straight timer or curved timber)
- use of pre-cast elements
- use of pneumatic formwork
- fabric formwork, foam or other developments

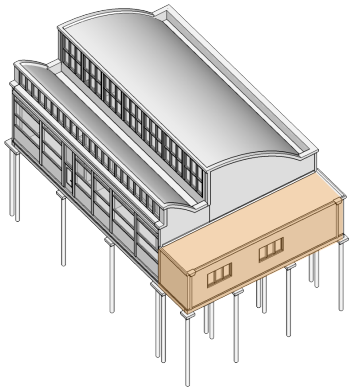
Application in Hembrug
At the time of construction the most used method remained timber casework and pouring concrete in-situ. There are cases of the use of pre-cast elements, most known early example by Nervi in 1935-1942, but these use pre-cast girders and not complete pre-cast shells (Tang, 2015). The other two formwork methods mentioned above are only commonly applied in a later time.
The shells on the Hembrug site are single curved and the timber casework is still visible, both indications of the use of timber formwork, most likely in-situ. The casework is most likely re-used in the different buildings to save costs.

EXCEPTIONS TO THE RULE

There are two main exception to the standard base principle. The first is a half-sized curved roof extension. This exception is applied twice.



The second exception is an extension to the side of the building with a flat roof, occurring one time. Both exceptions are original and thus not the result of a addition of a later time.

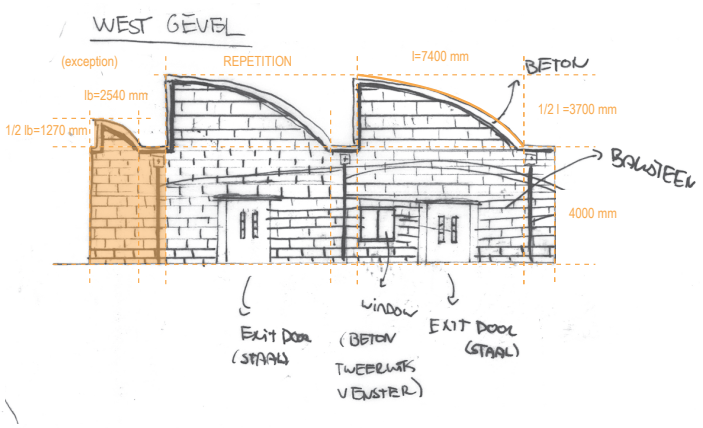


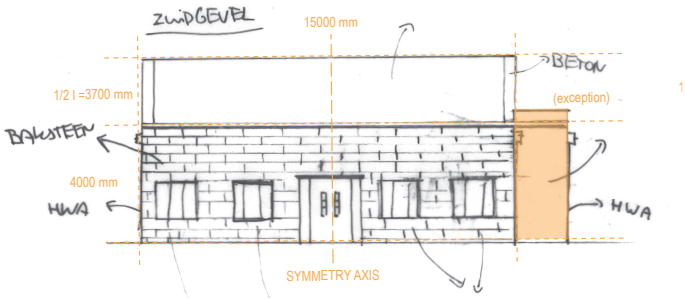
(All images on this page made by Jan-Willem Spek)

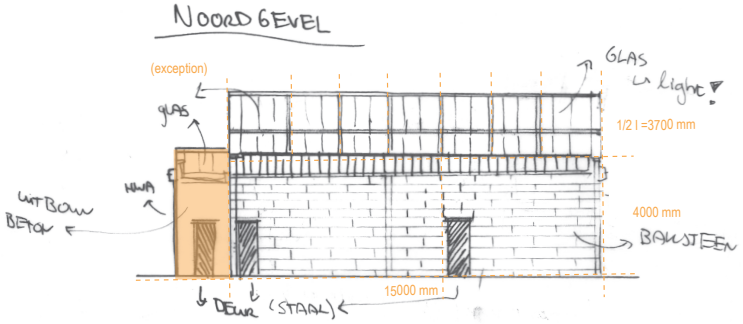
3.3.4 SKIN

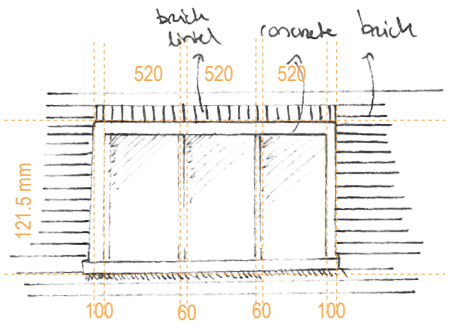
The design of the shell roof typology, and therefore the skin, is mainly functional. The materialization of the typology is, besides the shape, the other important unifying element of the ensemble. The main facade materials are brick, concrete, steel, glass and bitumen on the roof. There is some repetition in the facade, in line with the repetition of the module mentioned before. The south facade is designed symmetrically, with the exception of the additional volume. The curve of the roof is not a perfect quarter circle, but is half as high as it is wide. This love for symmetry and proportions probably stems from the education the civil architects had (SteenhuisMeurs, 2010), but does not have a functional reason.

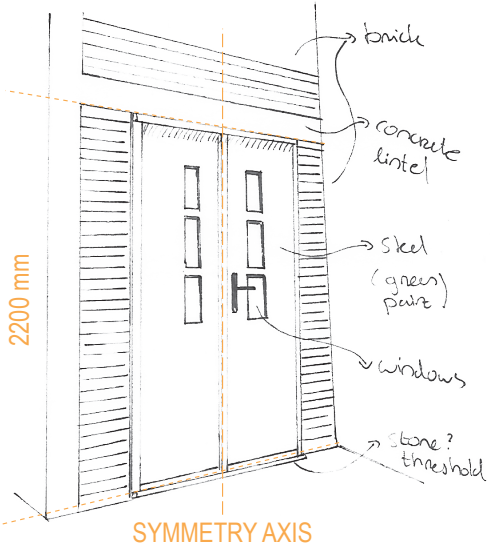
The concrete framework is visible along the edge of the roof and around the windows. All windows are encased in a steel window frame, which is in turn connected to the concrete. Between the buildings there is a variety of double window panes in one concrete frame and three windows panes into one frame. Other concrete elements are found above the doors. The importance of the doors is visible in the materialization and the size of the doors. All dou doors are made of steel and covered with a concrete lin The emergency exit doors are made out of wood and surrounded by brick.

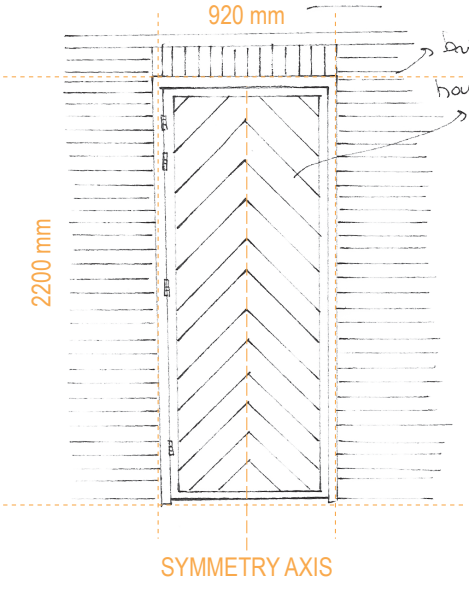












Facade views & elements (images: Barbara de Groot)






From top-left to bottom-right: Steel roof with concrete lintel, concrete roof edge and steel window frame, brick wall with wooden door, concrete window frame (images: Barbara de Groot)



Color scheme exterior. Predominantly the warm color from the brick, other elements mostly cool-toned

BRICK FACADE IN DETAIL

Exterior brick layer
Half-stone pattern

Interior bricks-on-edge layer.
Half-stone pattern but on the side of the brick.
Layered against the outer layer without mortar.

Plaster layer as interior finishing

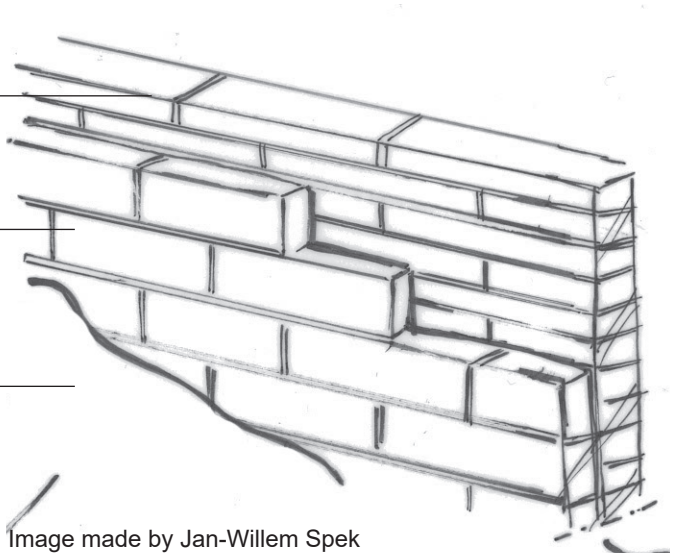


Image made by Jan-Willem Spek

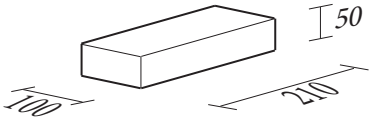
Why an bricks-on-edge layer?

A bricks-on-edge layer is usually used to prevent water penetration through the wall. Another reason can be to strengthen the wall, however since this wall isn't load bearing this is most likely not the case in this situation.

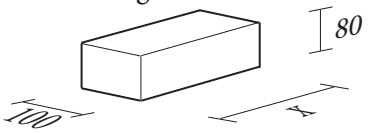
For the bricks-on-edge layer a different brick is used. This brick would not be visible and could therefore be a less appealing brick that would be cheaper.

Dimensions

Waalformaat brick size is used for all the exterior brickwork in the buildings of this type



A different size brick is used for the interior brickwork. Additional on site measuring needed for exact dimensions.



Images made by Jan-Willem Spek

Bricks-on-edge layer on the inside



Picture made by Marjan Sadeghi, overlay by Jan-Willem Spek

Half-stone brick pattern on the outside



Picture made by Marjan Sadeghi, overlay by Jan-Willem Spek

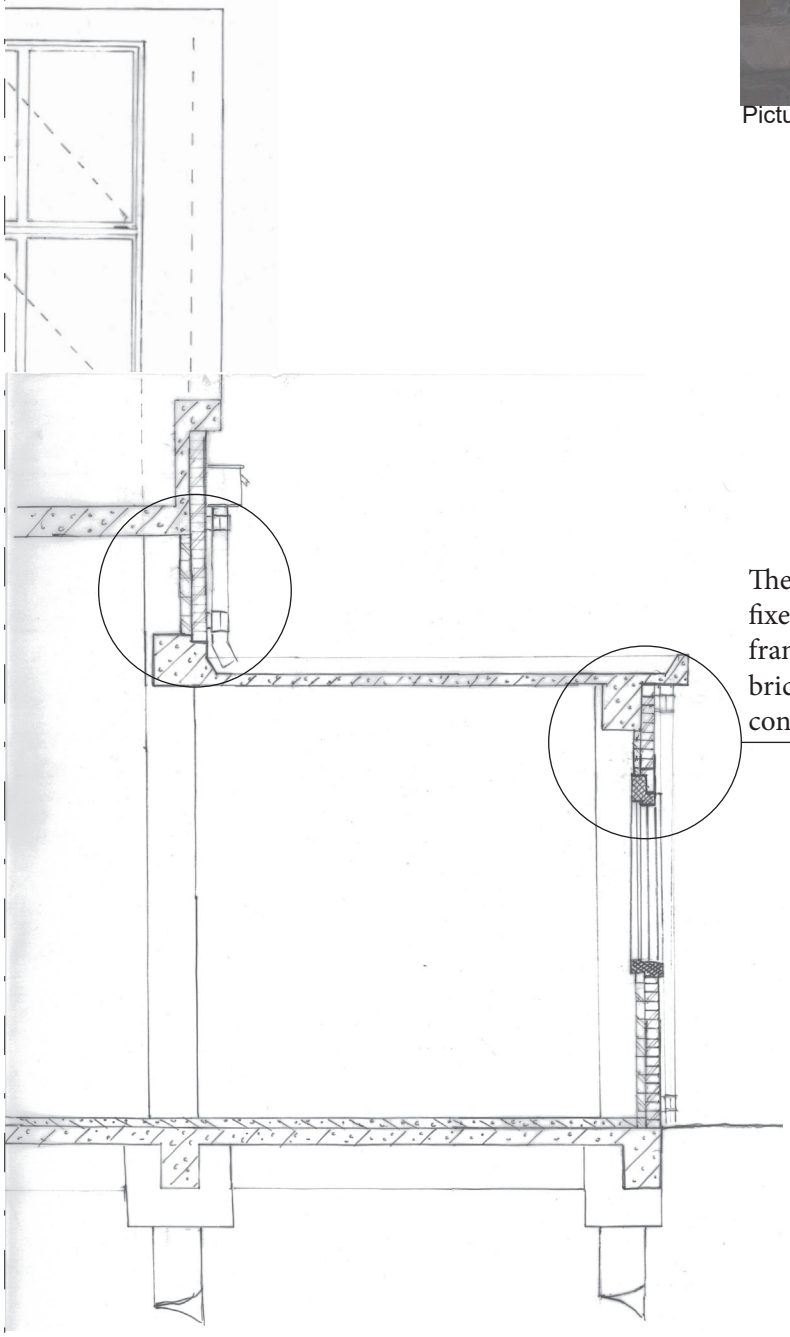
BRICK FACADE IN DETAIL

A crack in the wall that goes through the bricks instead of following the morter. This indicates that the morter is stronger than the brick, which is due to the use of cement within the morter mixture. This is applied in modern buildings, while in older ones only sand and chalk is used.



Picture by Lucas Pol, overlay by Jan-Willem Spek

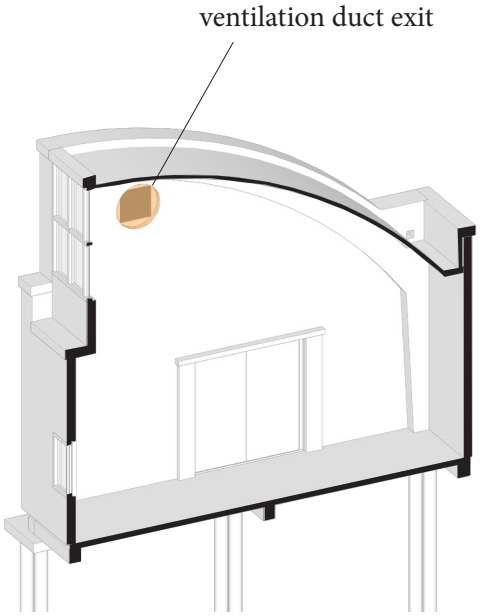
DETAIL SECTION

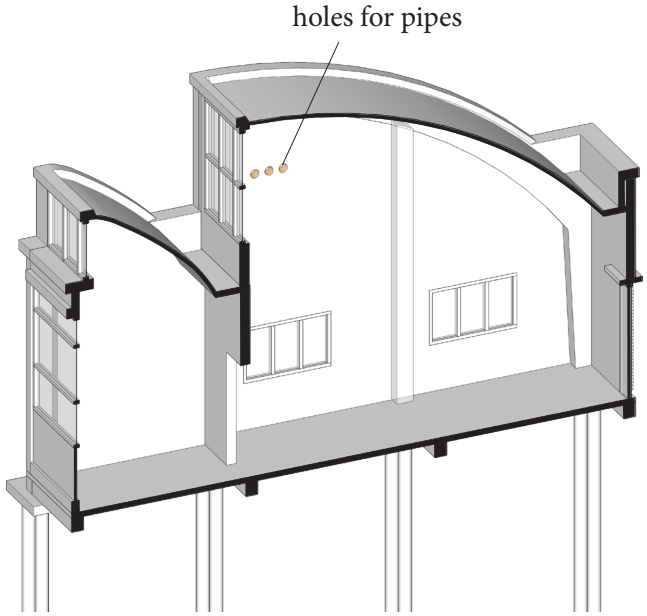


The inner layer of brickwork is fixed in between the concrete framework. The outer layer of bricks is placed outside of the concrete.

Image made by Jan-Willem Spek

3.3.5 SERVICES

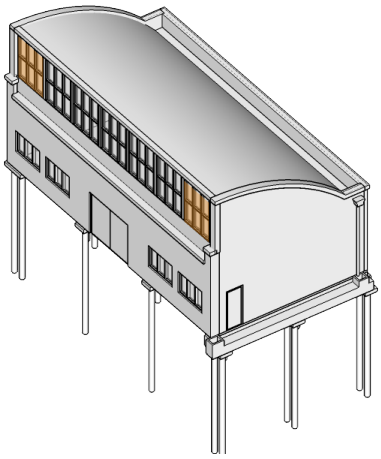


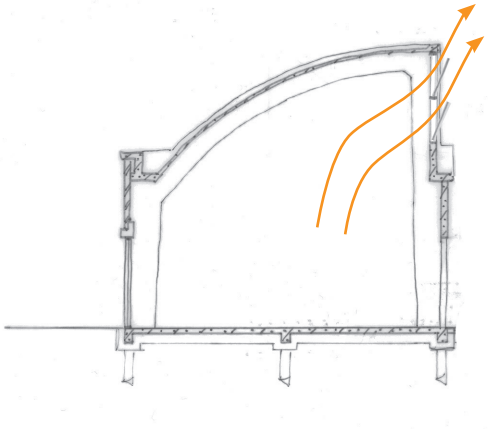


The remnants of the services of these buildings differ per building. In the generic structure of the building there is no specific space for service installations included. Wherever holes for services or ducts were needed they were made, specific to the situation.

In the buildings as they are now multiple holes in the walls can be found as remnants as past service installations. These holes are always in the brickwork, never in the concrete.

VENTILATION

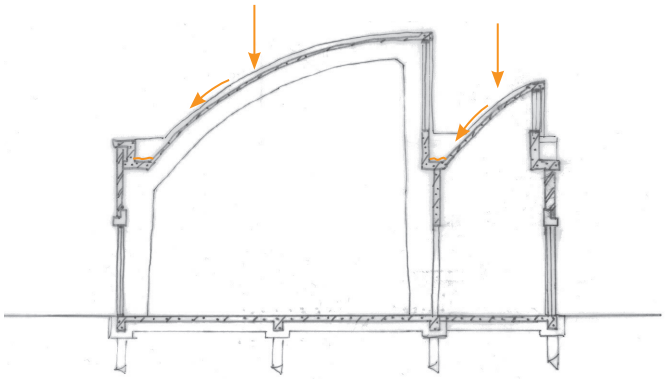


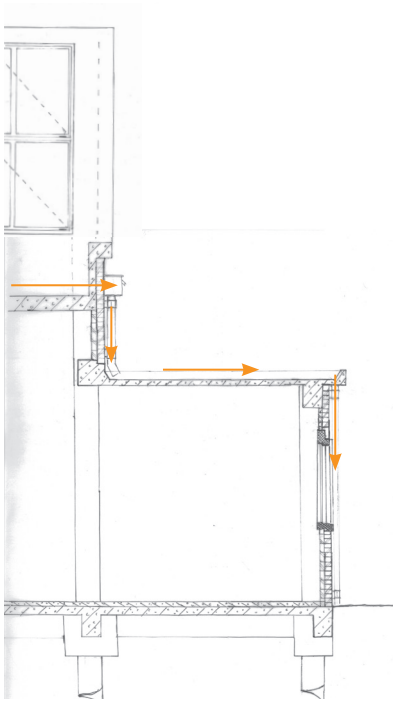


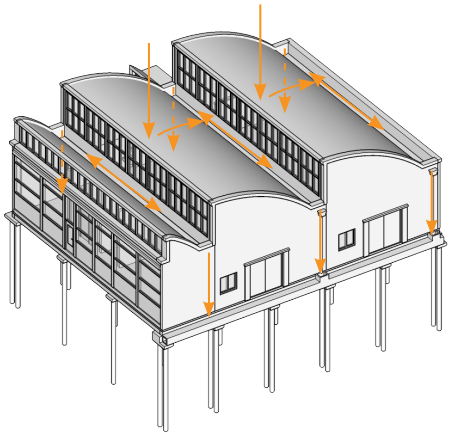
Ventilation only took place through natural ventilation (mechanical ventilation wasn't common in the 1950's yet). The top windows on both ends of the building(unit) could be opened to allow for ventilation.

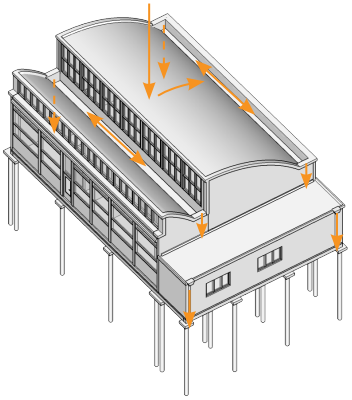
(All images on this page made by Jan-Willem Spek)

RAINWATER DRAINAGE









Rainwater is collected per quarter-circle roof shell and gathered in a gutter formed by the concrete roof. From there it can flow out through the rainwater pipes on the two head sides of the building.

(All images on this page made by Jan-Willem Spek)

3.3.6 SURFACES



Perspective section of building 416, scale 1:100. Image by Lucas Pol.



Cracked stucco. Photo by Barbara de Groot.



Holes and steal traces. Photo by Barbara de Groot.



Junction of roof end with column and brick wall. Trace of a pipe. Photo by Barbara de Groot.



Rail and textured ceiling.
Photo by Barbara de Groot.



Steel elements for walls. Photo by Barbara de Groot.



Traces, damaging lighting rail, pipe in let, texture and colour.
Photo Barbara de Groot.



Color scheme interior. Predominantly the cool tones from the stucco, red from the brick were the stucco is damaged.

3.3.7 STUFF

There is nothing left of the original interior or machinery that was used in the buildings. On some walls there are however traces of old piping running through or of places where machines would have been connected. In the landscape there are also traces that can be found of the old infrastructure elements, such as above ground pipes and lightning rods.

In the interior are nowadays mainly the results of later interventions visible. A few example are shown below.







Interior 416 (image: Barbara de Groot)

3.3.8 SPIRIT OF PLACE

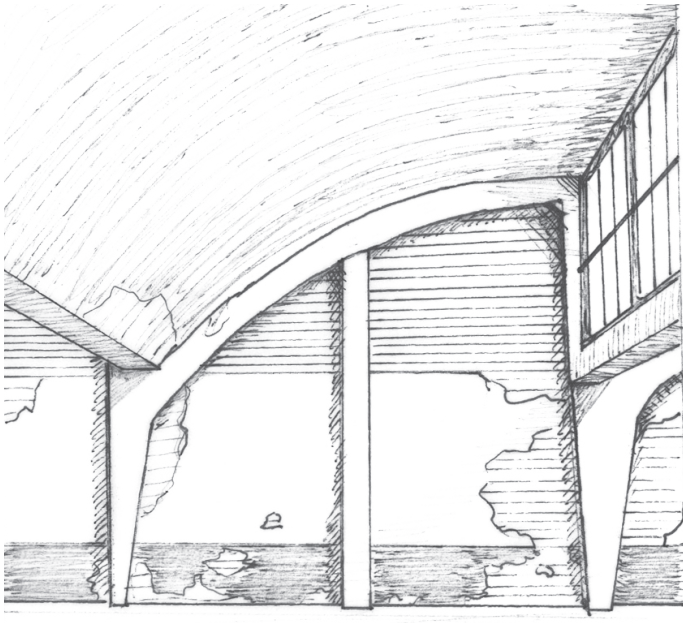


Building 416 in the green surrounding (image: Barbara de Groot)

The buildings are hidden gems in the green surrounding. The undulating landscape, with its various elements such as hills and water, is complimented by the 'wave'-like roofs peaking through the trees.

When entering one of these buildings, the contrast between the stimulating outside, with the forest bursting with life, especially in the spring season, and the serenity indoors is striking.

Inside, the alternation of high curved ceilings with lower spaces in between creates a feeling of intimacy mixed with moments of awe when the ceiling rises up again. This sensation is only strengthened by the play of light and shadow. There is a certain beauty in the decayed state of the building, revealing its layers and showing the passing of time.

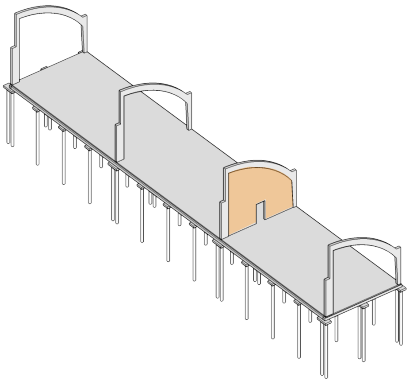


Interior 416 (image: Barbara de Groot)

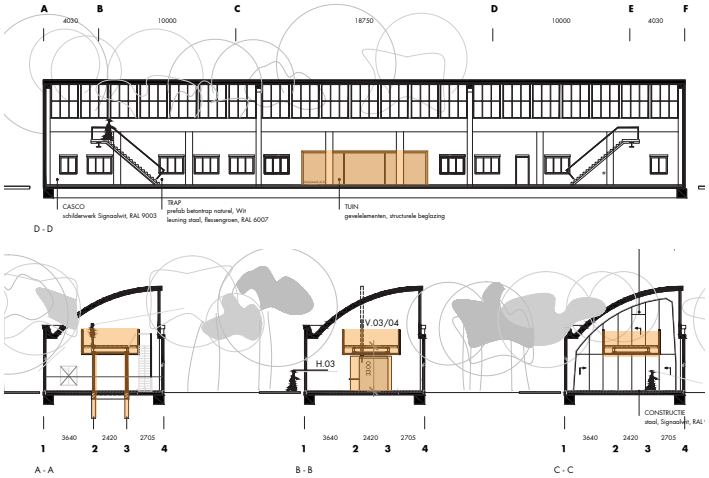
3.3.9 DEVELOPMENTS

The buildings of the shell roof typology have undergone not a lot of major changes or adaptations in general. However, this chapter summarizes the changes or adaptations that are known and tries to explain, where possible, the reasons of why these changes were made.

Buildings 415 / 420
On the original drawings can be seen that there used to be an interior wall, most likely of concrete, within either one or in both of these buildings. This wall isn't present anymore.



Building 415 is currently undergoing a transformation in which they add a free-standing floor within the building and cut a hole in the middle of the longitudinal facade to create a new glass entrance. These adaptations are made to support a modern day office function.



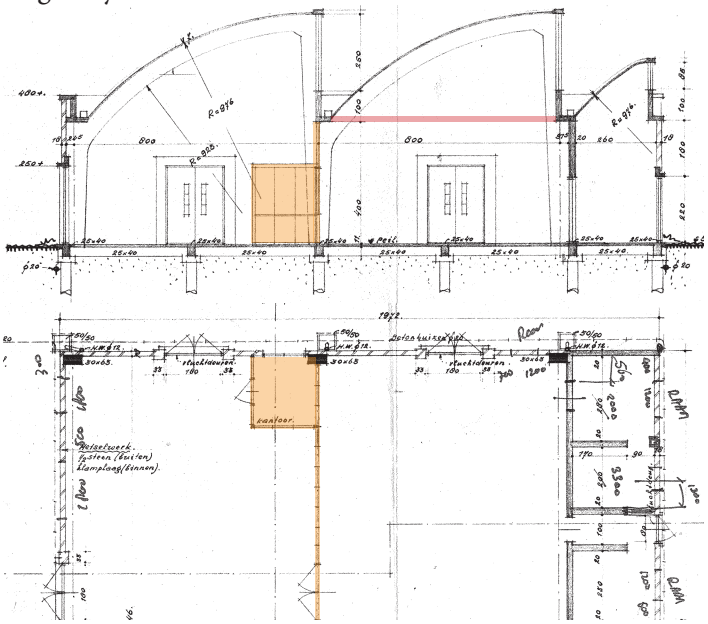
Source: StudioM10 (2017) Aanvraag omgevingsvergunning.
Overlay by Jan-Willem Spek

Buildings 416 / 417 / 418
The spaces in these buildings were segmented into smaller spaces through a glass and steel interior wall. This wall was airtight for safety reasons containing the production processes that were going on. These walls are gone but some of the railings in which they were placed still remain. It is unknown when these walls were removed.

Adjoined to these glass walls were small offices, made of a similar glass and steel construction. These offices are present in original drawings from which their existence can be derived. Nowadays, only a steel column on the corner where the glass wall and the small office adjoined remains standing as can be seen in the picture underneath.

In building 417 there is currently a floor placed in one of the roof shells, as seen in red in the drawing underneath. It is not known why and when this floor is added.

Unfortunately there was no way to enter building 418 up till now, so it is unsure if the interior walls are still as they were originally.



Source: Nederlandsche Maatschappij voor Havenwerken (1950)
Overlay by Jan-Willem Spek



Picture by Marjan Sadeghi, overlay by Jan-Willem Spek

No other adaptations and/or transformations are known. Most present day functions only have an interior with minimal adaptations. During production years the buildings did not undergo any other known transformations.



Traces, damaging lighting rail, pipe inlet, texture and color. Photo Barbara de Groot.

3.4 CIRCULAR ROOF

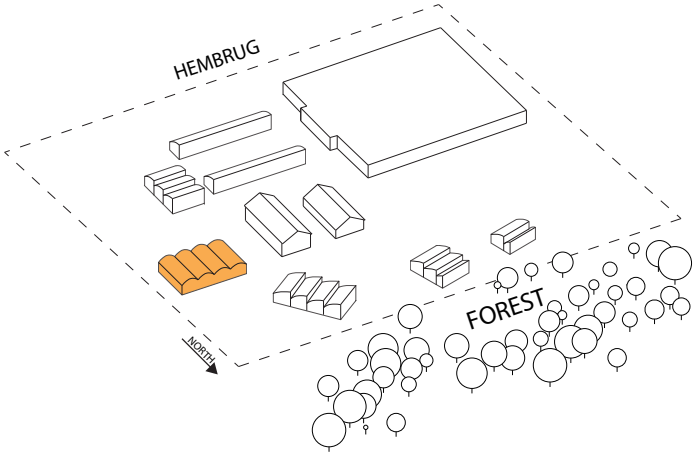
3.4.1 SITE



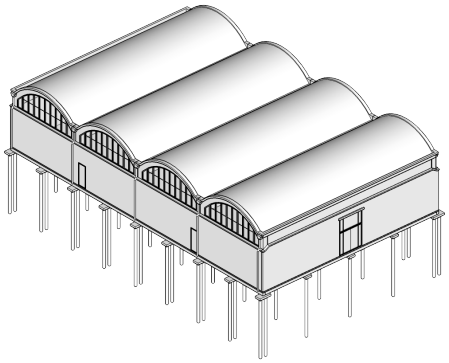
Location of the circular roof building (414) (Image: Valerie Arntz, edited by Barbara de Groot)

There is only one example of the circular roof type on the site. While built in the same period as the shell roof typology, this building has a distinctively different roof shape. This is probably because the design was not originally intended for dealing with possible explosions, however this is not confirmed as different sources mention different functions (Dienst Welzijn, Economie en Bestuur, et al, 1996; Koen & Visser, 2003). Probably the building was for a while used as a storage facility of non-explosive materials and at a different time for assembling, spraying and packing the filled projectiles. Therefore, the shape and orientation of the building would have a different shape from the rest of the buildings from that time.

Because the orientation was not fixed due to the non existing explosion risk, this is the only building of this period in the 'plots in the woods' that has direct sunshine entering the building.



Orientation of the circular roof type (Image: Barbara de Groot)



414

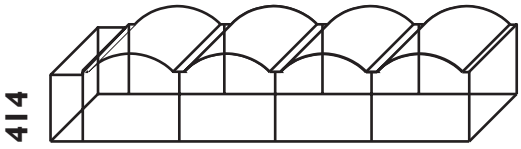
Year of construction: 1952
Function: changed over time. A storage facility or assembly, spraying and packing of the filled projectiles.

All images on this page made by Jan-Willem Spek

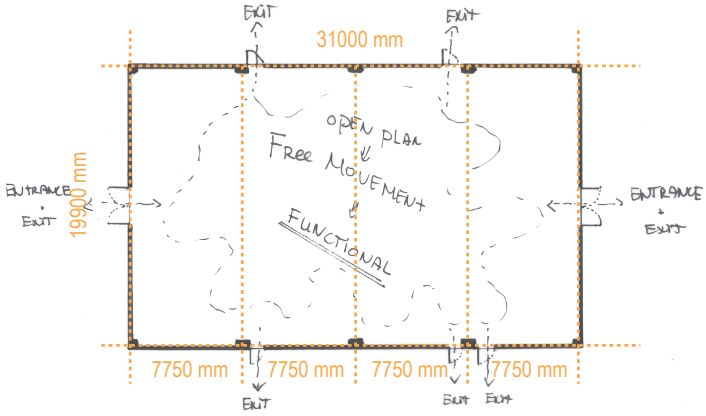
3.4.2 SPACE PLAN

The design of the circular roof typology follows the same functional principle as the 'shell roof' buildings on site. A single module, in this case with a half circle, instead of a quarter, is repeated four times. The building contains a big open space without columns or walls in-between and has a lot of daylight. Especially in the time when these types of buildings were made, electric lighting was not standard yet. Maximizing the amount of daylight was therefore essential.

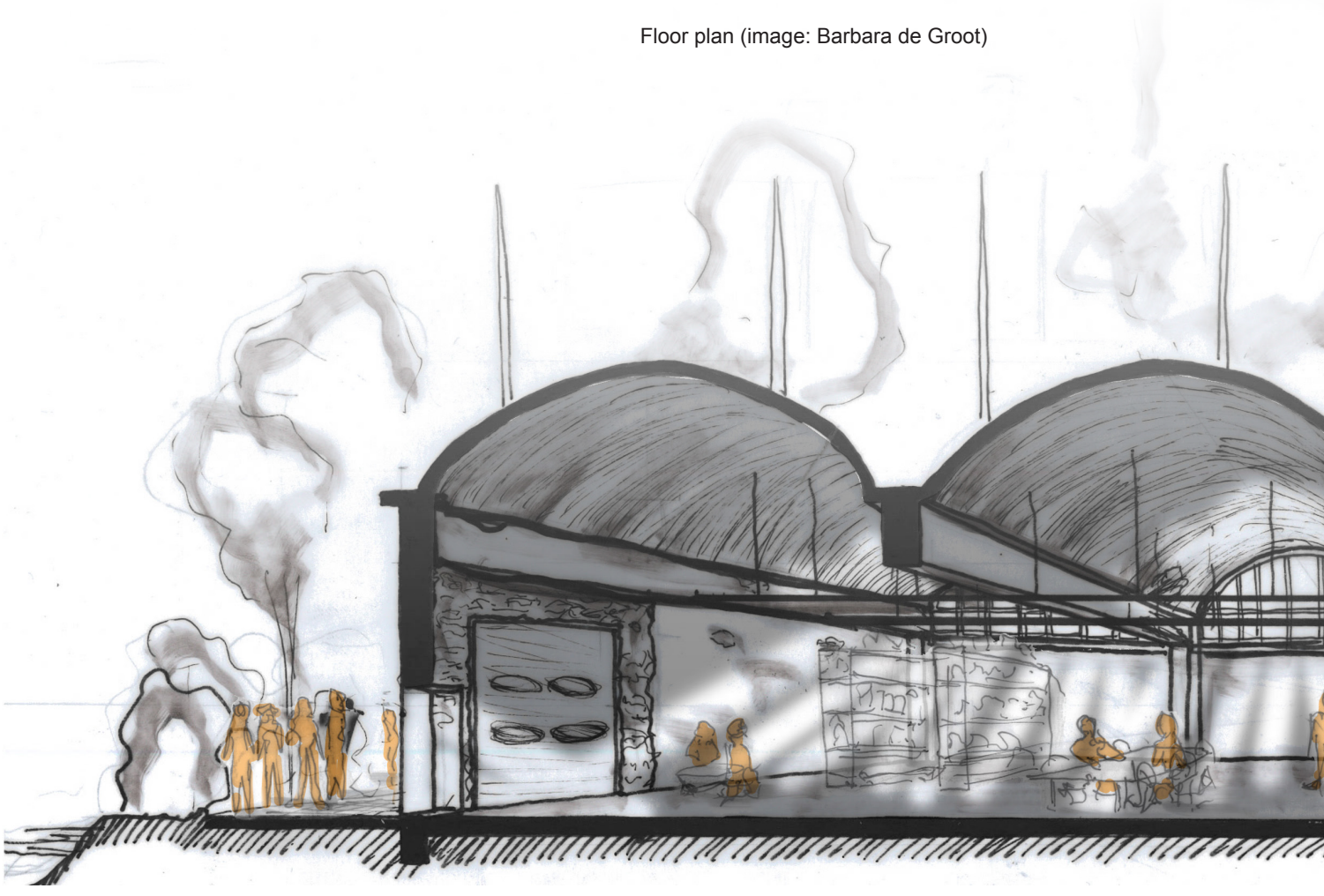
The required large span for the building led to the characteristic roof shape, with the concrete vaults. The daylight enters from both sides of the buildings, as seen in the cross section.



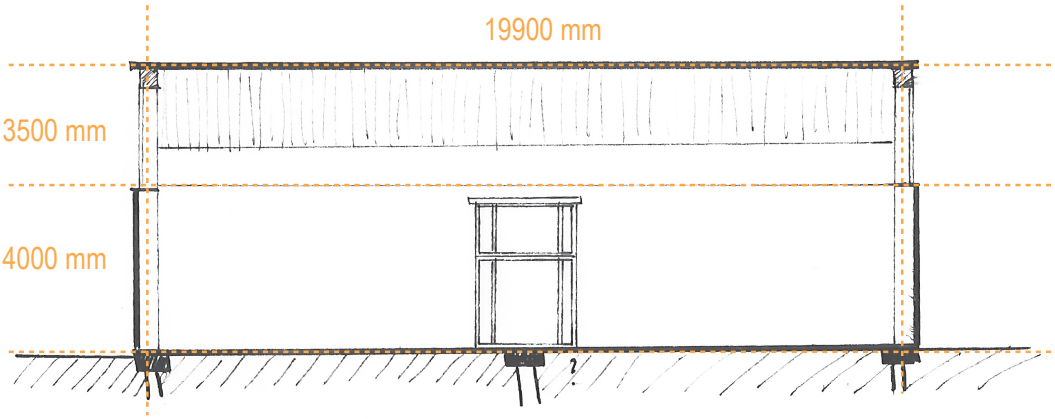
Single configuration (image: Barbara de Groot)



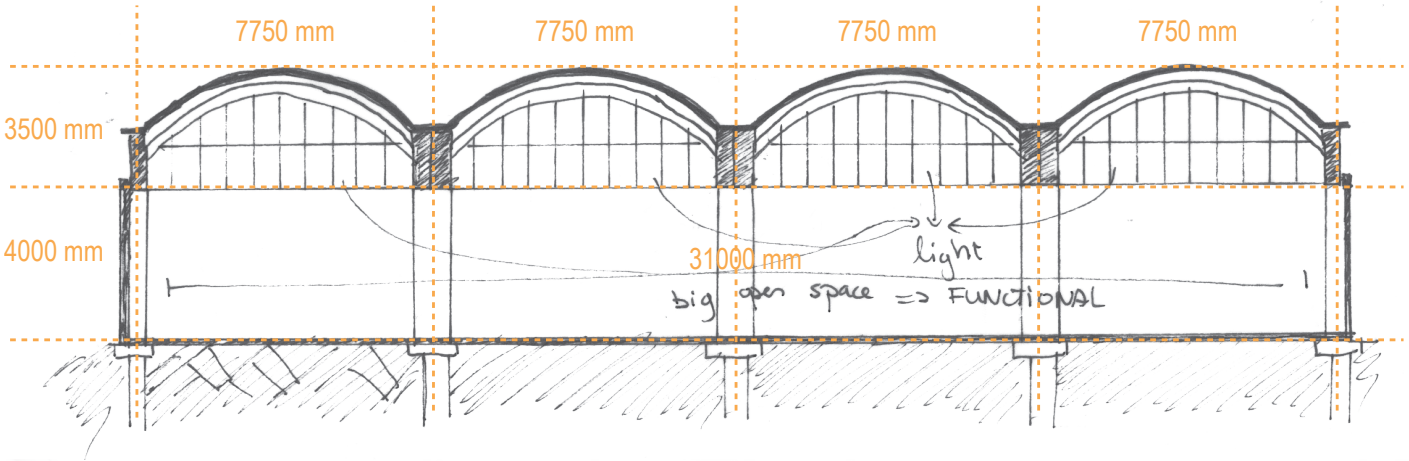
Floor plan (image: Barbara de Groot)



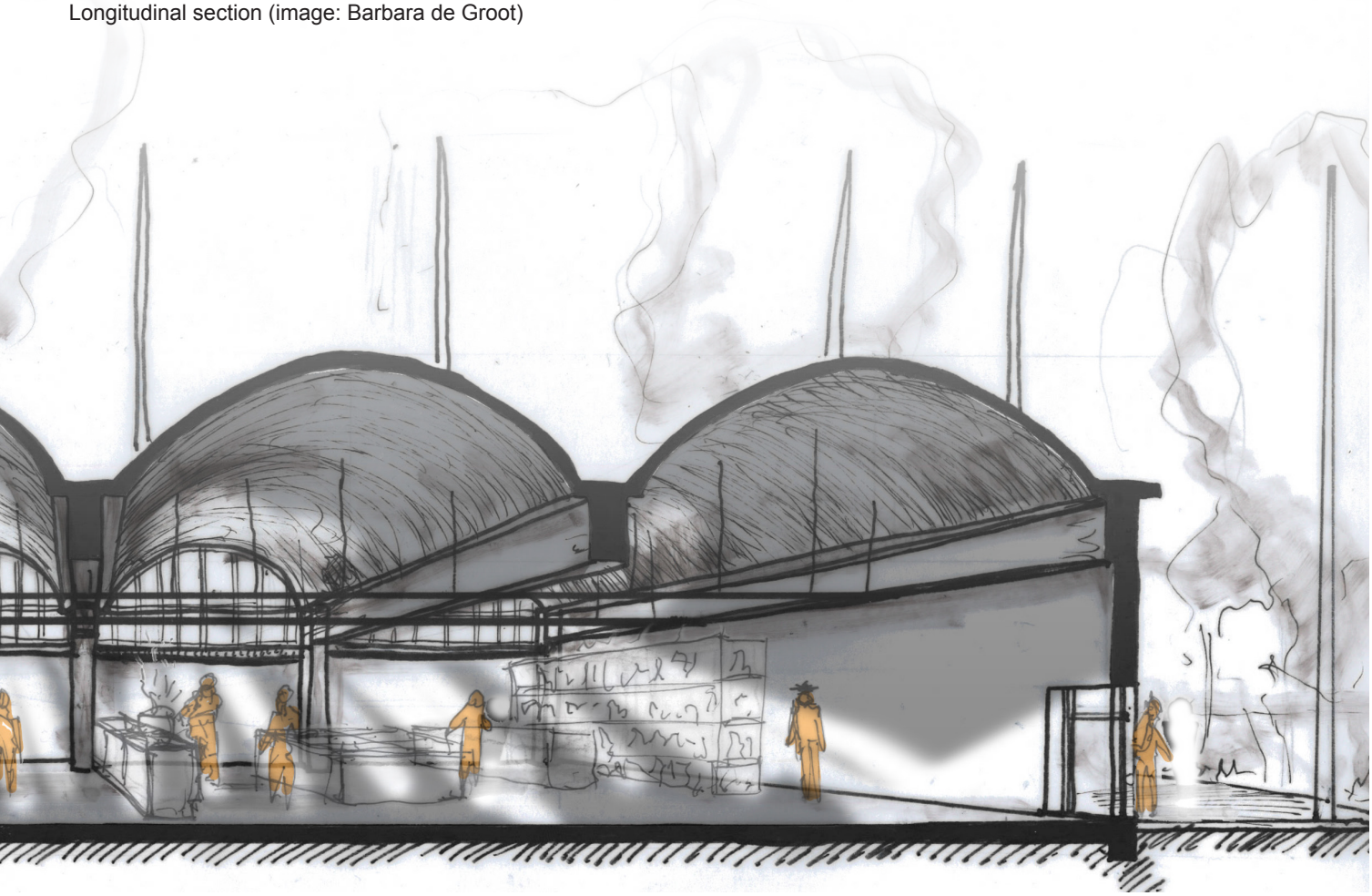
Perspective section of building 414 showing a daylight render, scale 1:100. Image by Lucas Pol.

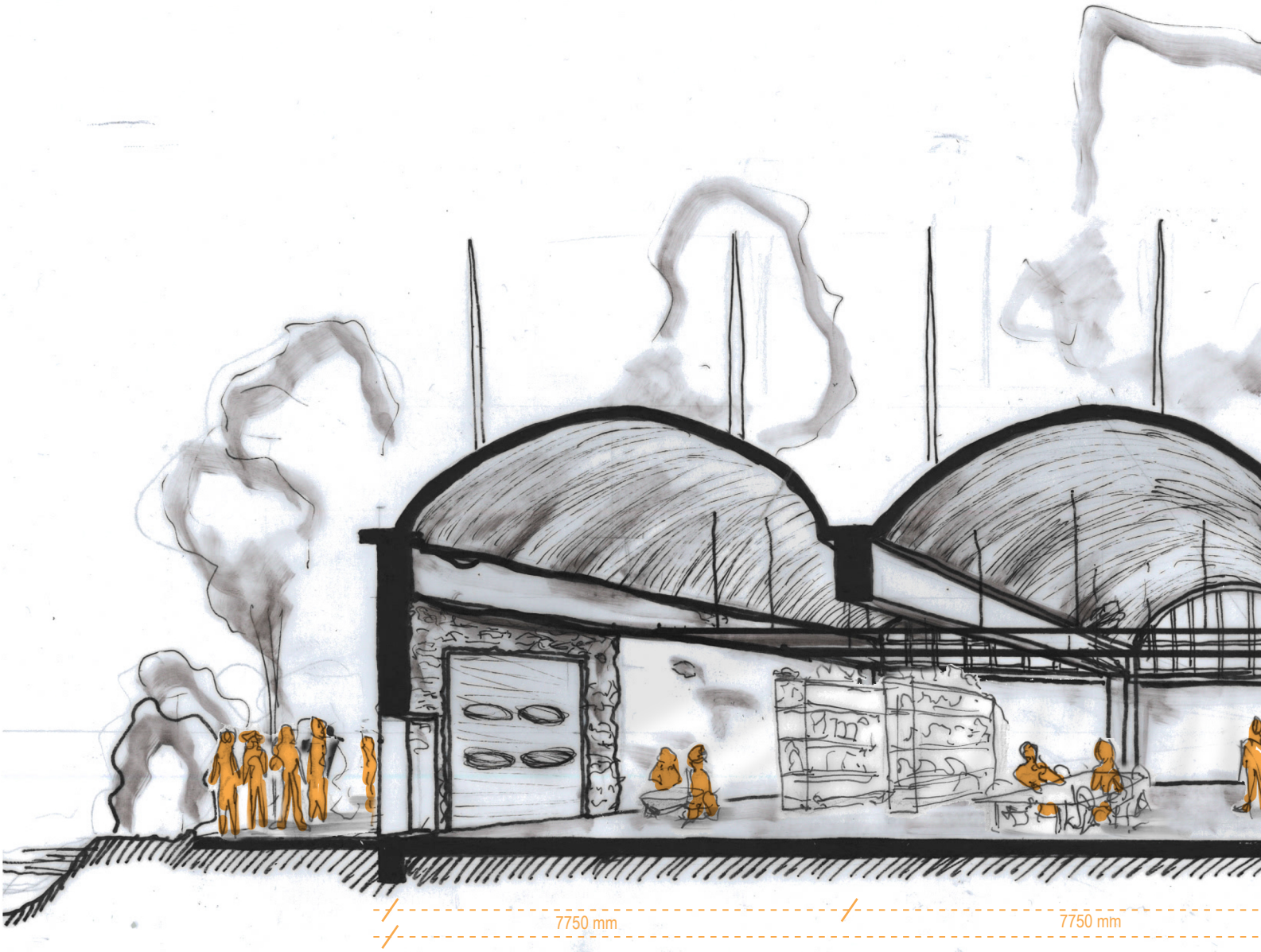


Cross section (image: Barbara de Groot)

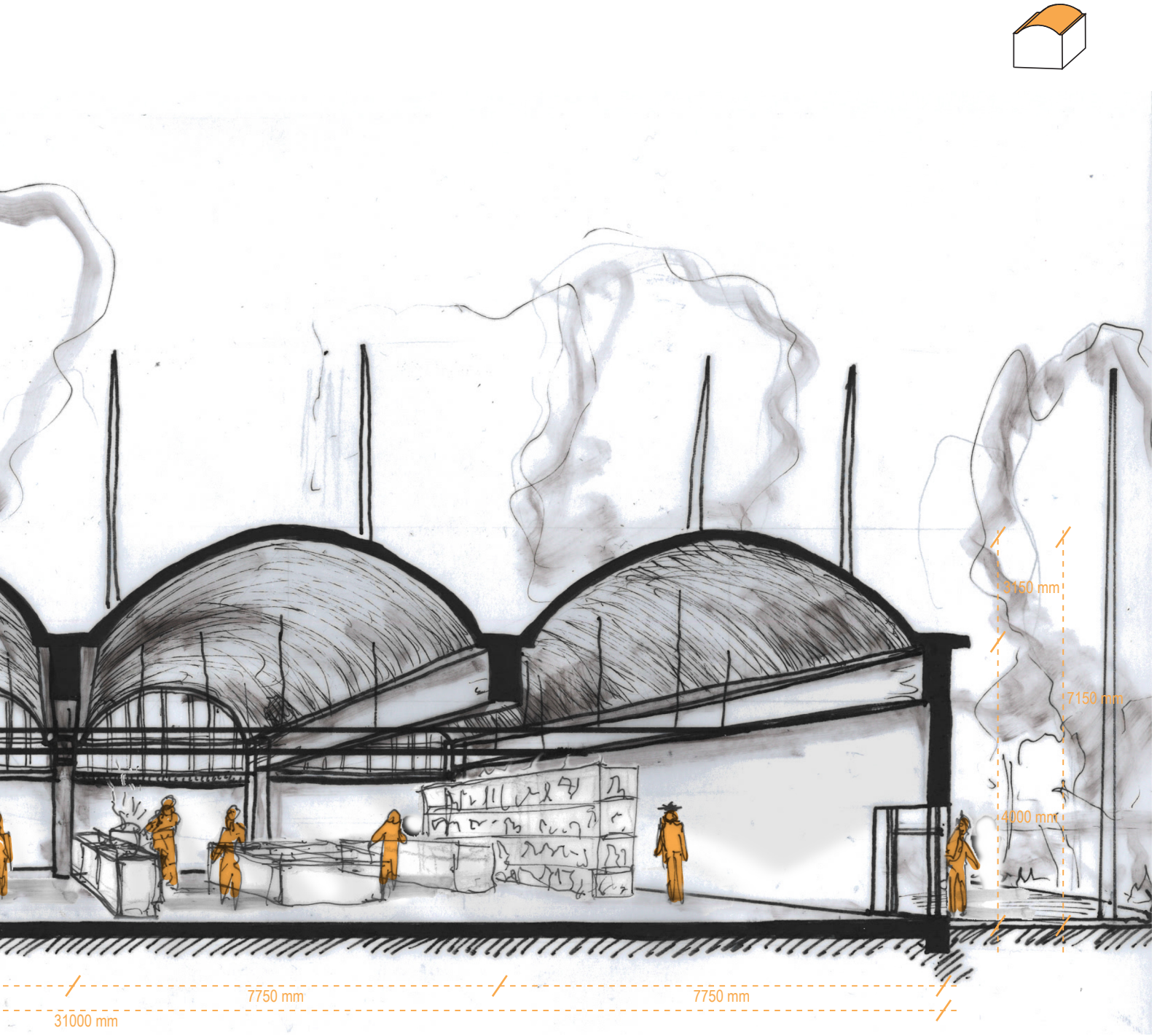


Longitudinal section (image: Barbara de Groot)



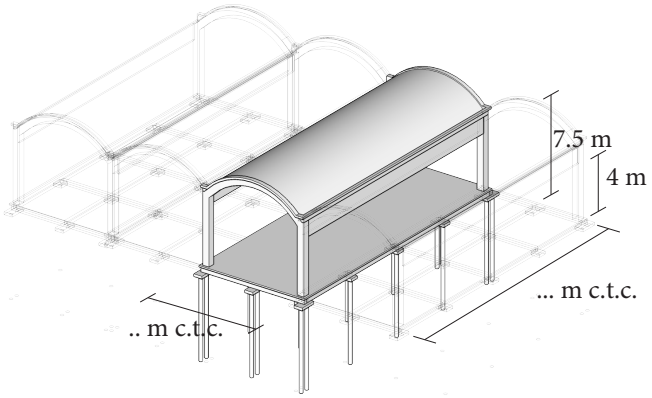


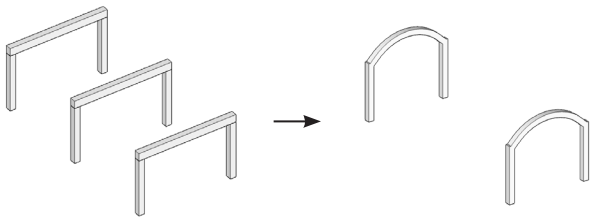
Perspective section of building 414 showing the space plan regarding human scale and use, scale 1:100. Image by Lucas Pol.



Perspective section of building 414 showing the space plan regarding human scale and use, scale 1:100. Image by Lucas Pol.

3.4.3 STRUCTURE

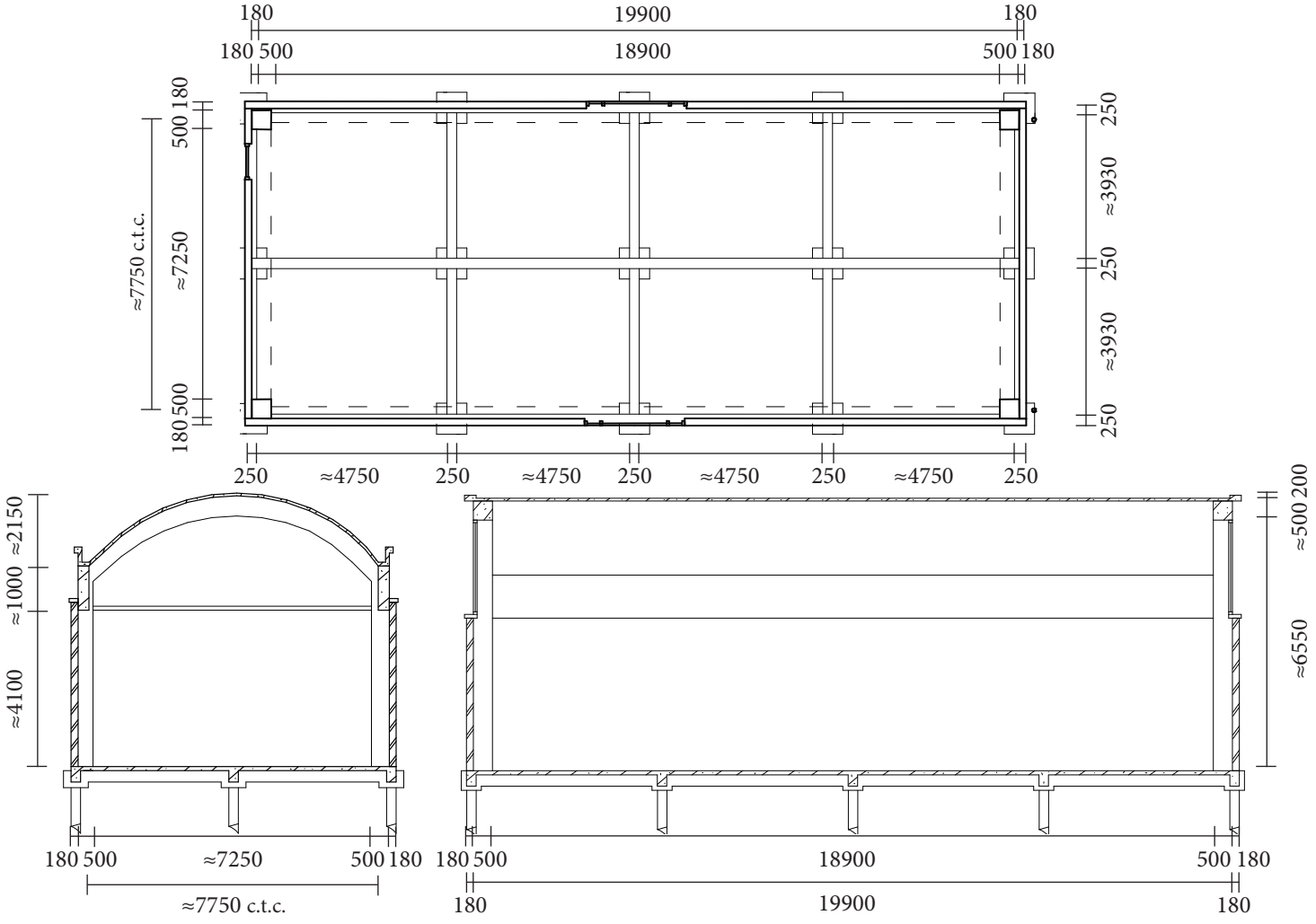




The base structure of the curved roof type building consists of a reinforced concrete structure. This structure is fixed in its width, height and length. This structure can be repeated in both directions to make up different building sizes.

The structural typology of these buildings is in its core a column and beam structure. This is transformed to the column with the half-circular arches.

STANDARD DIMENSIONS



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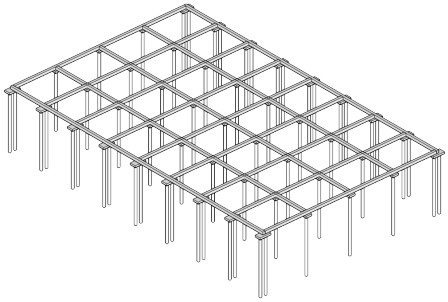
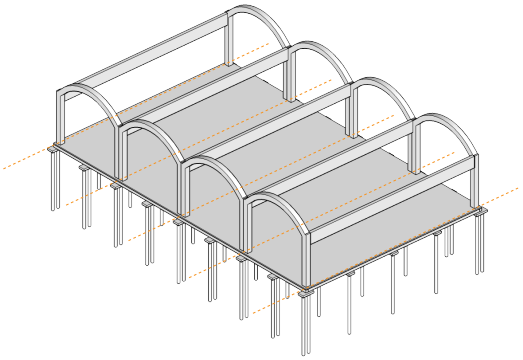
BUILD-UP ORDER



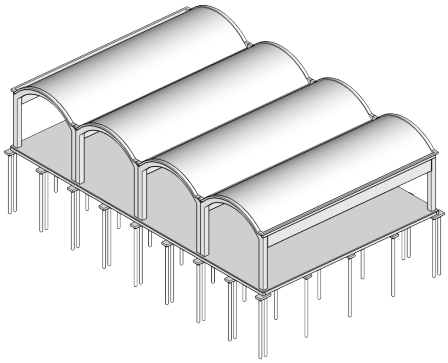
Step 1

Concrete foundation piles with concrete foundation beams.



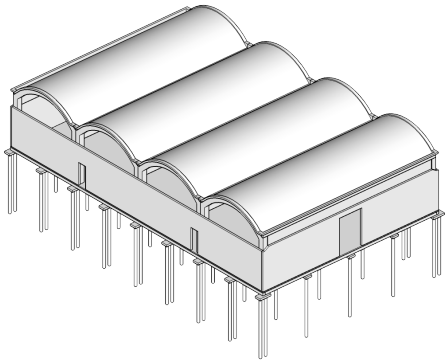
Step 2

In-situ poured reinforced concrete arches.



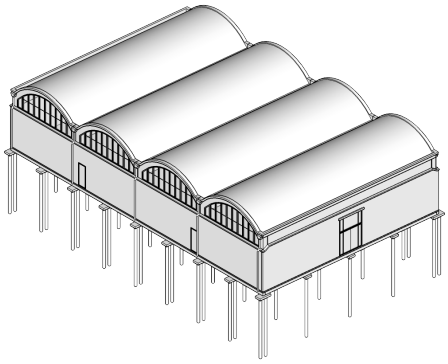
Step 3

Reinforced concrete roof shells poured in-situ.



Step 4

Brick facades constructed.



Step 5

Windows, doors, rain pipes and other installations added.

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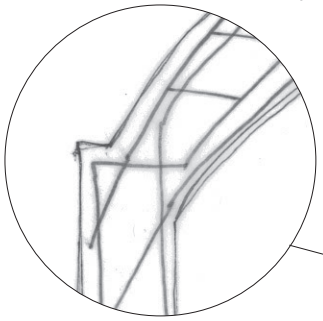
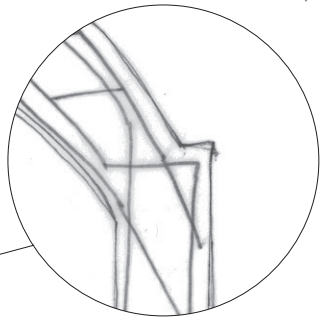
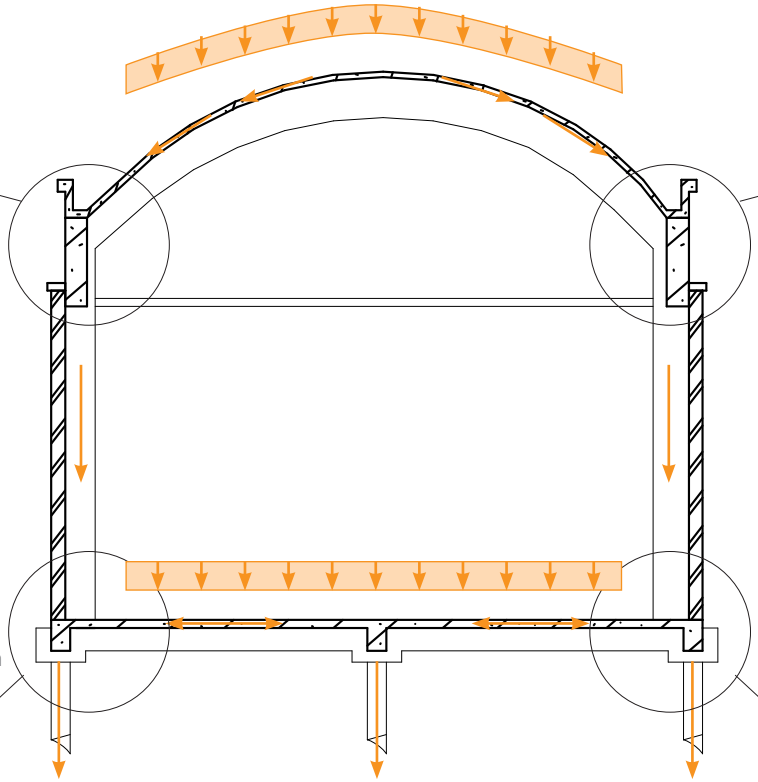
TYPICAL FORCE DISTRIBUTION & STABILITY

fixed momentum joint
exact reinforcement is assumption

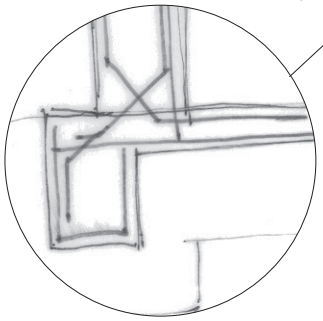


fixed momentum joint
exact reinforcement is assumption

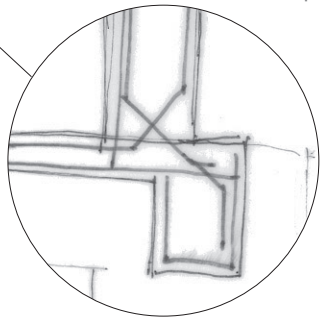


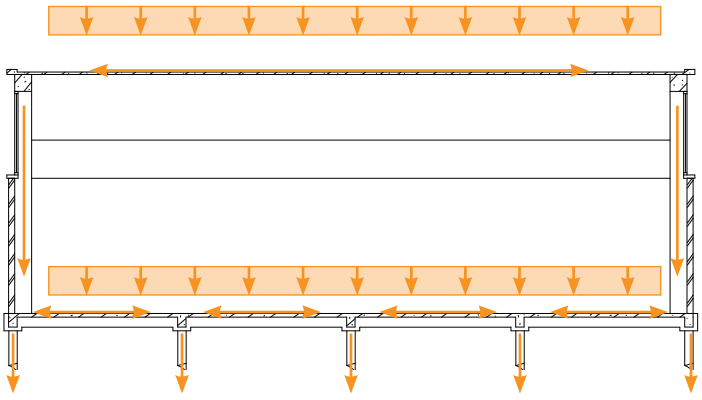


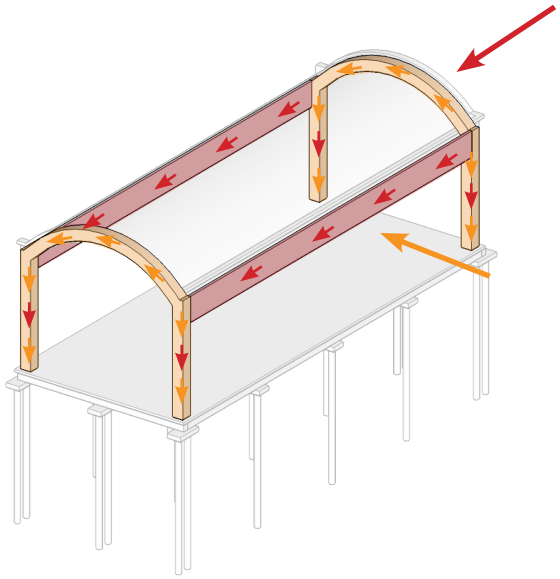
fixed momentum joint
exact reinforcement is assumption



fixed momentum joint
exact reinforcement is assumption







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BUILD-UP

Bitumen roofing

Reinforced concrete shell roof
(70mm center / 200 mm edges)

Reinforced concrete arch

Concrete eaves

Reinforced concrete beams

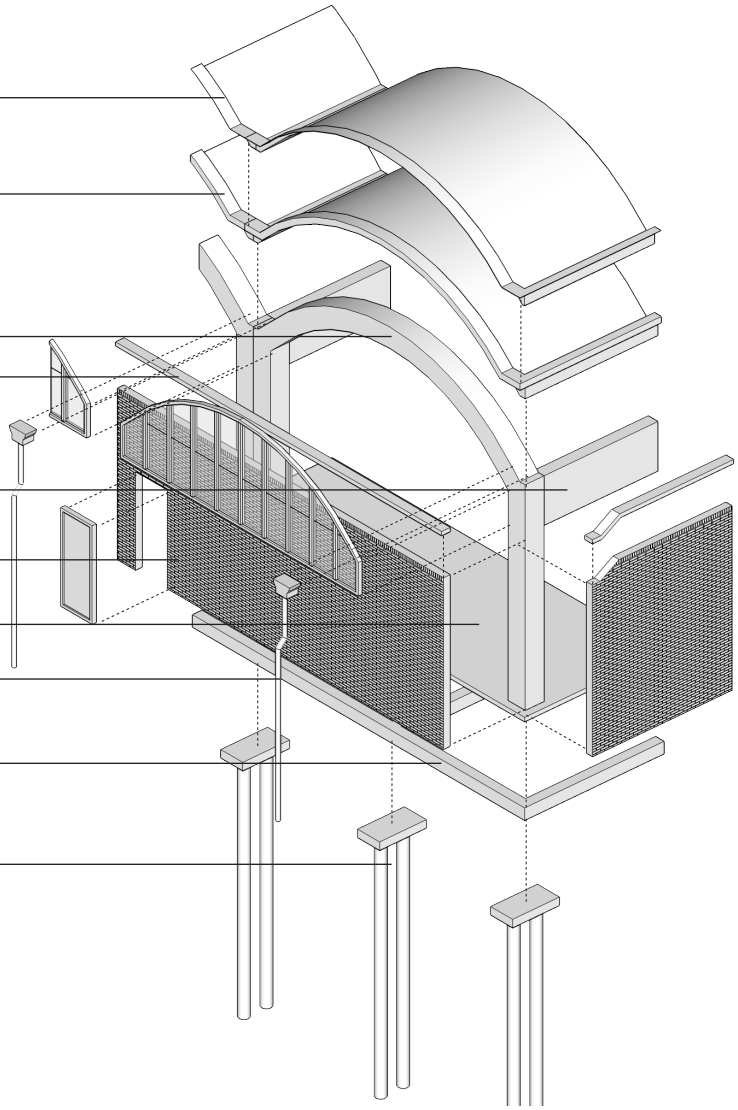
Brick wall

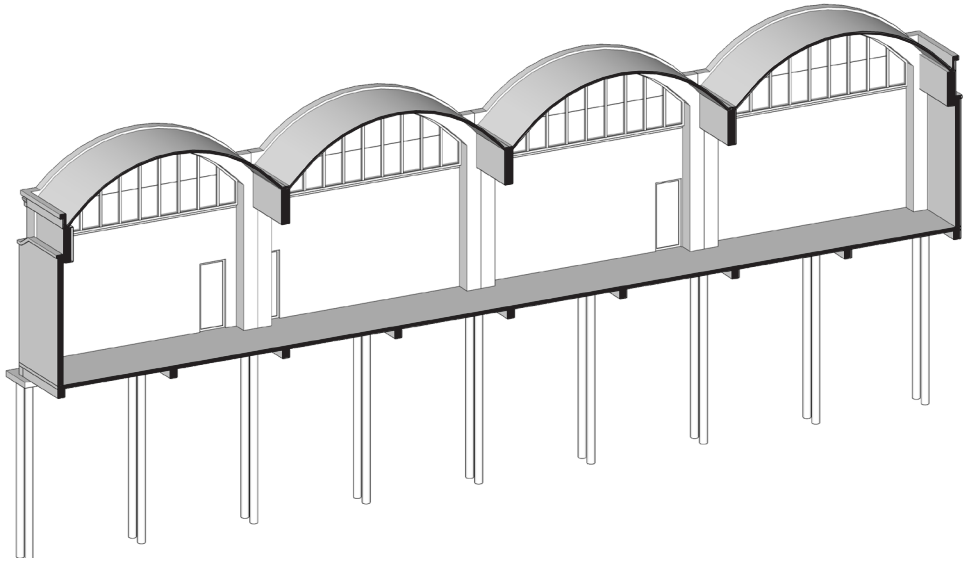
Reinforced concrete floor

Rainwater drainage

Reinforced concrete
foundation beams

Concrete foundation piles





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FOUNDATION

No drawings or notions about the foundation of this type of building have been found. However, structurally this typology is very similar to that of the shell roof typology and this building is also constructed within the same year as those of the shell roof typology. Therefore it is reasonable to assume that the foundation of the circular roof typology is similar in dimensions and material as that of the shell roof typology. It might be possible that, if the storage function was the original function, there are more foundation piles in building 414 compared to the production functions of the shell roof buildings. However, this is an assumption and would need to be checked.

CONCRETE COMPOSITION

Similar to the foundation, no notions about the concrete composition of this typology have been found either. However, this as well can be assumed to be similar to that of the shell roof typology.

STRUCTURE DETAILS

The typical structural details of this typology are similar to that of the shell roof typology. Therefore this chapter doesn't present new structural details, but refers to the details within chapter 3.3.3.

The materials of the skin of circular roof typology are the same as that of the shell roof typology. More detailed information is in chapter 3.3.4.

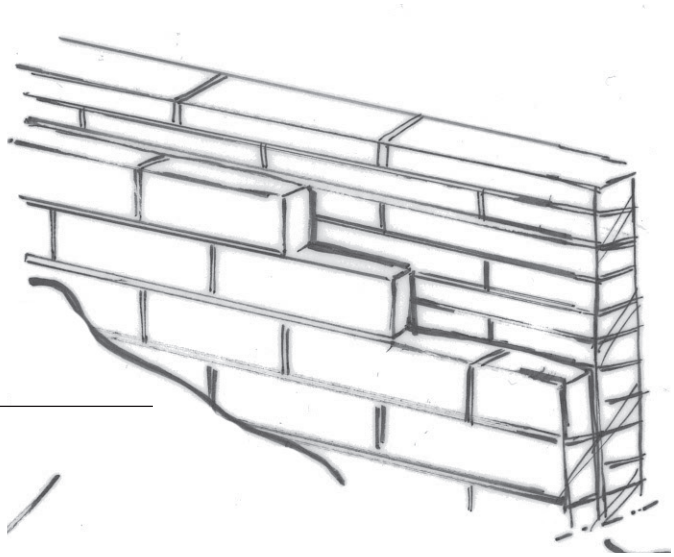


Image made by Jan-Willem Spek

Bricks-on-edge layer on the inside



Picture made by Barbara de Groot

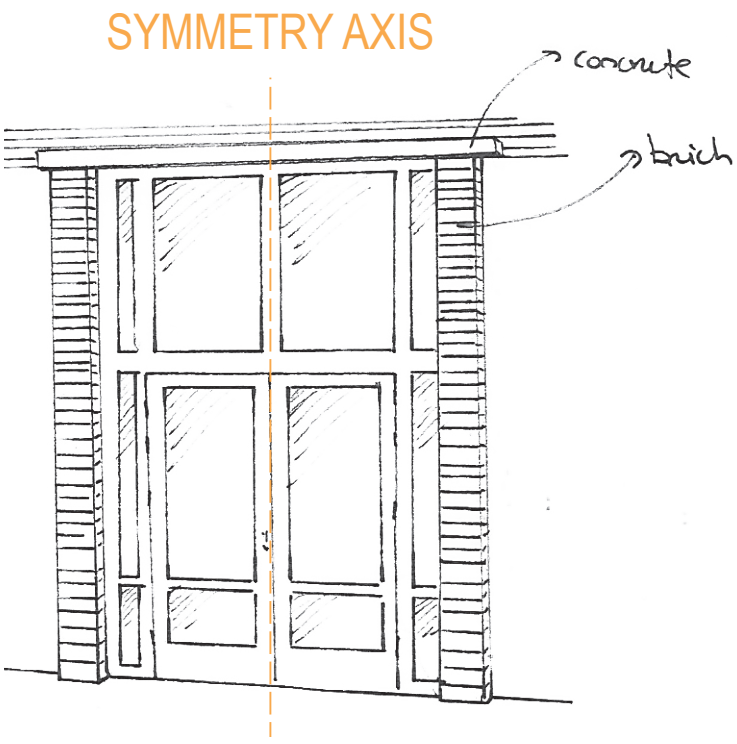
Half-stone brick pattern on the outside

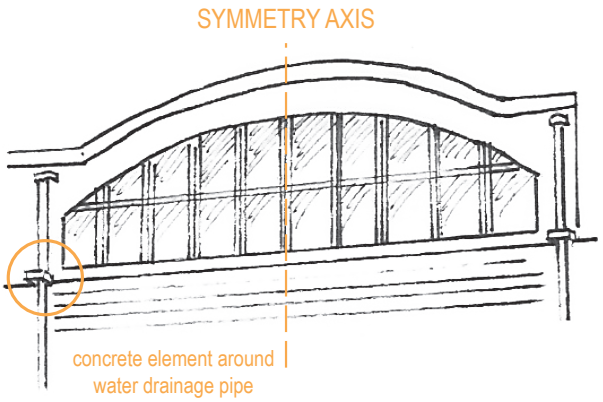


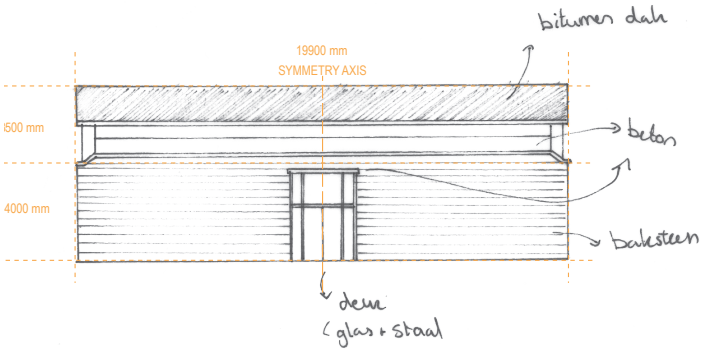
Picture made by Mingke Zhu

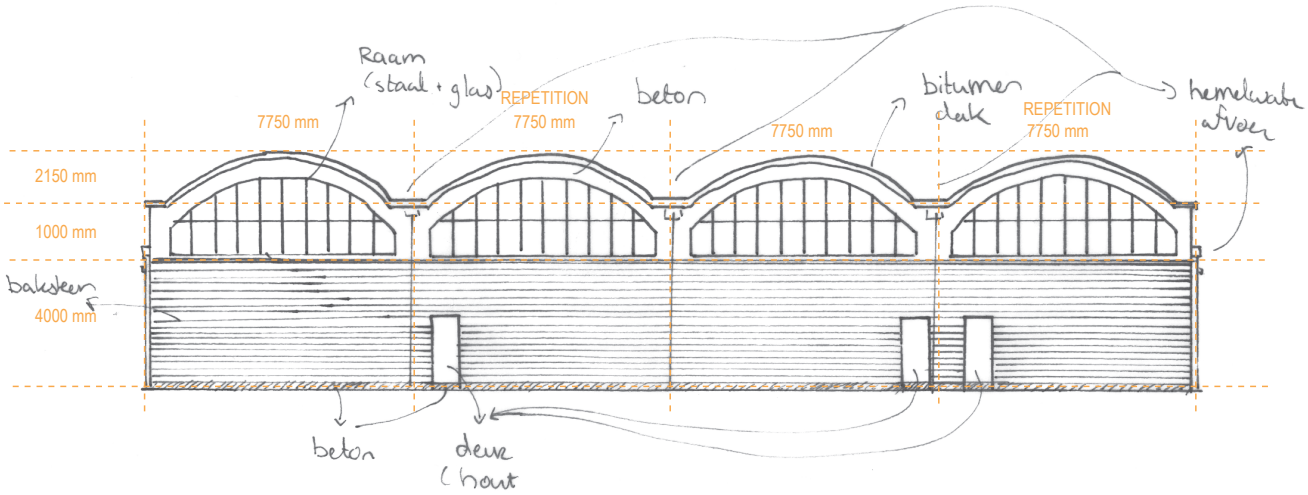
3.4.4 SKIN

Just like the design of the shell roof typology, the circular roof typology is very functional. The main facade materials are the same as the 'shell roof'; brick, concrete, steel, glass, with bitumen on the roof.
Similar to the shell roof typology, there is some repetition in the facade, in line with the repetition of the module mentioned before. The west facade with the entrance is designed symmetrically. The curve of the roof is flatter than the shell roof.
Most facade elements are the same as those implemented in the shell roof typology. The two main alterations can be found in the front door, mainly made out of glass, and in the top windows, which differ in shape, but not in material. This building has apart from the windows directly underneath the roof and the windows in the front door no other windows.









Facade views & elements (images: Barbara de Groot)

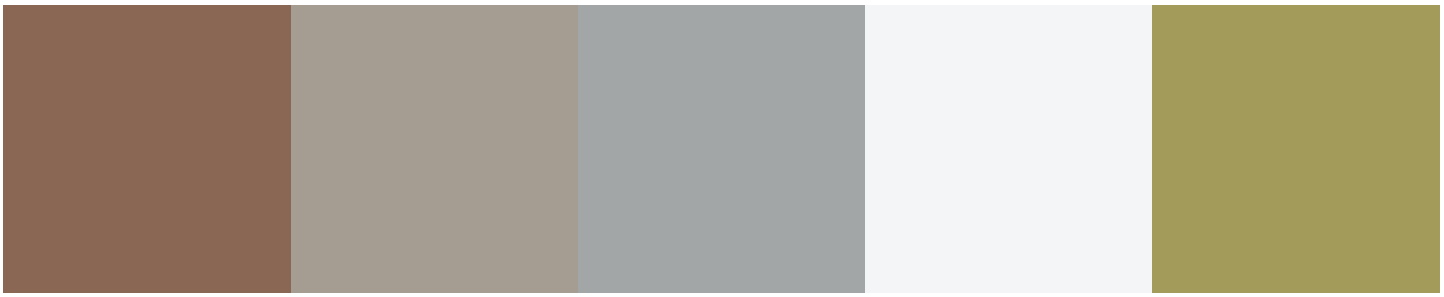








From top-left to bottom-right: Concrete roof framework with steel window frames, concrete roof edge around the water drainage, wooden door in brick wall and ventilation grill, bitumen roof visible (images: Barbara de Groot)



Color scheme exterior. Predominantly the warm color from the brick, other elements mostly cool-toned.
(Image: Barbara de Groot)

3.4.5 SERVICES



Modern service installations are hung on the concrete roof or concrete beams.



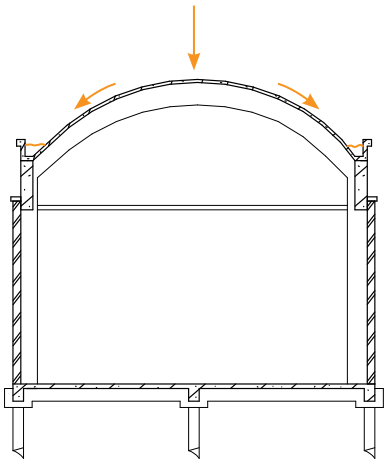


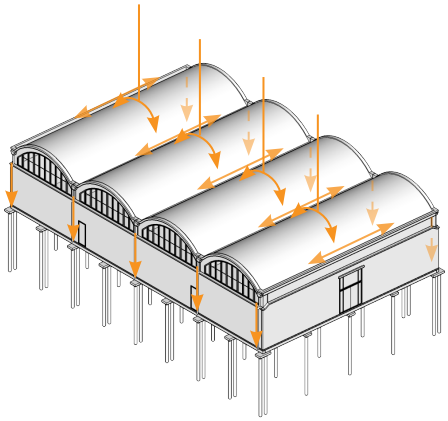
Modern ducts for ventilation are currently going out of the building through the original window frames.



Holes in the brick walls show how installation systems were applied in the past. Wherever there was an installation needed for the function, a simple hole in the wall was made.

RAINWATER DRAINAGE



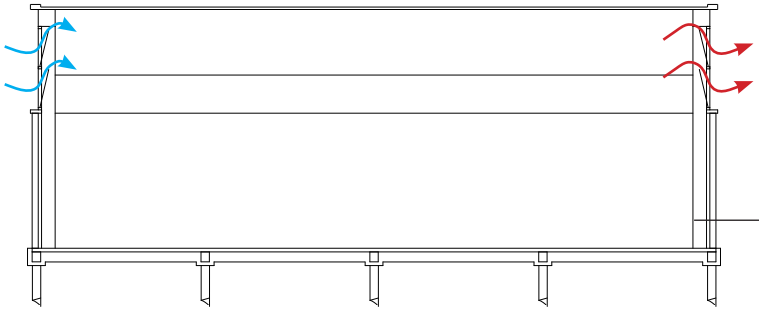


Rainwater is collected per half-circle roof shell and gathered in a gutter formed by the concrete roof. From there it can flow out through the rain pipes on the two head sides of the building.

VENTILATION



Ventilation in the original building happened through openable windows. Remnants of this system can still be seen on some windows, but they don't work anymore.



Natural ventilation flows by opening the windows on both sides of the building.

3.4.6 SURFACES

Perspective section of building 414, scale 1:100. Image by Lucas Pol.



Rail with cables hanging from the ceiling. Lighting from the sides. Photo by Barbara de Groot.



Back exit directly into the forest. Heavily deteriorated brick wall with texture. Photo by Barbara de Groot.



Holes, windows, rough window frames, traces and stains.
Photo by Barbara de Groot.



Rough window frames, rust and stains.
Photo by Barbara de Groot.



Color scheme interior. Predominantly the warm color from the brick or rust/staines. Steel and stucco elements mostly cool-toned
(Image by Barbara de Groot)

3.4.7 STUFF

There is nothing left of the original interior or machinery that was used in the buildings. On some walls there are however traces of old piping running through or of places where machines would have been connected. In the landscape there are also traces that can be found of the old infrastructure elements, such as above ground pipes and lightning rods.

In the interior are nowadays mainly the results of later interventions visible. A few example are shown below.
Currently the company 'Flex Kitchen' is renting building 414, so the majority of the stuff (cooking supplies, boxes for storage, tables, chairs) is related to this function and will move out with the company when they decide to leave.







Interior stuff building 414 (Photos: Barbara de Groot)

3.4.8 SPIRIT OF PLACE

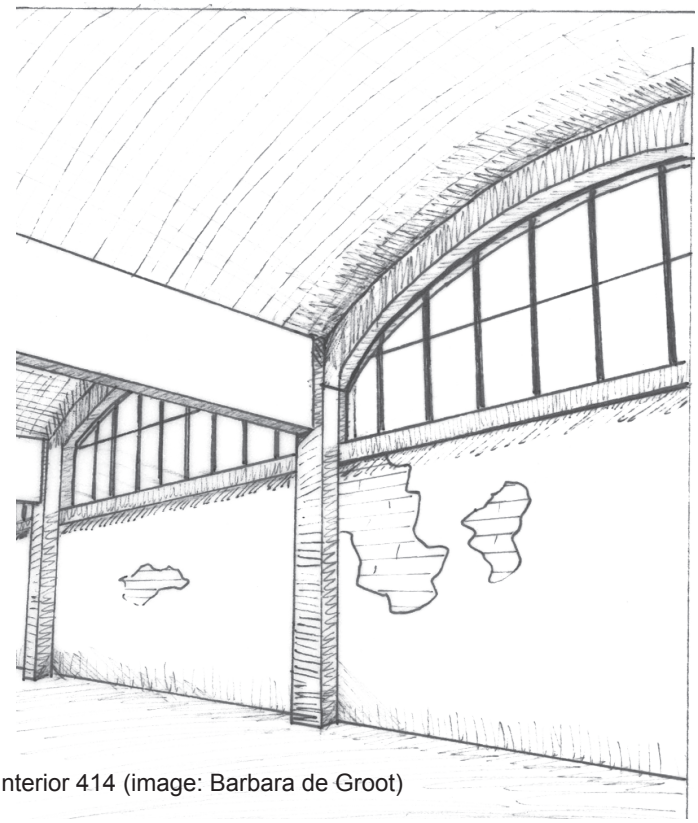


Building 414 in the green surrounding (image: Barbara de Groot)

Building 414 is with its circular roof an exception in the 'plots in the woods'. Because it is 'one of a kind', it stands out from the rest of the building in the woods. However, the circular roof still fits into the character of the undulating landscape, with its various elements such as earthen walls and water (similar to the shell roof buildings 3.3.2).

Inside, as a result of the vault ceiling with windows on both sides, there is a lot of light. Direct sunshine can enter through the windows on the south facade (as mentioned in Site 3.4.1). This presents a different experience to the shell roof typology and offers different perceptions of the space as the sun moves.

Again, the deterioration because of the passing of time has left its marks on the buildings interior. However, this only contributes to the aesthetic quality indoors and adds character to an otherwise quite straight-forward space.



Interior 414 (image: Barbara de Groot)

3.4.9 DEVELOPMENTS

The building of the circular roof typology has not undergone a lot of major changes or adaptations in general. However, this chapter summarizes the changes or adaptations that are known and tries to explain, where possible, the reasons of why these changes were made.

BUILDING 414

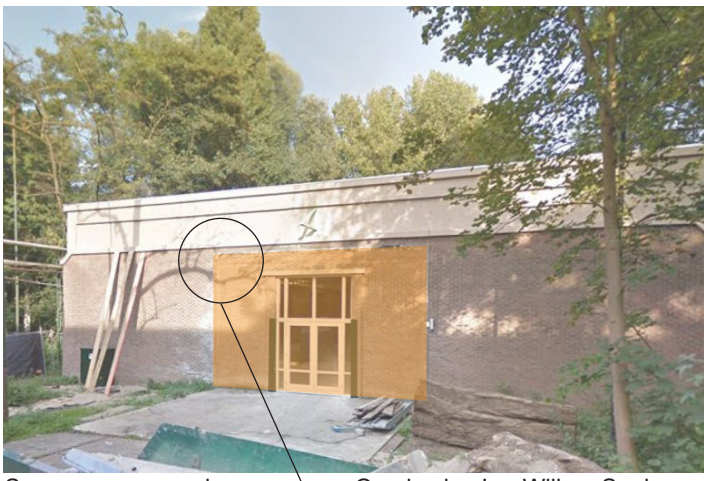
No original drawings of building 414 are known, so it is difficult to state the exact original situation. However, there are some traces in the present building that indicate the historic presence of interior walls and extensions to the building.

In the interior of building 414 there are traces of where an interior wall used to be. It is not known if this wall was original or a later addition, but a likely possibility would be that the walls and extension were placed because the building changed from the original storage function to a production function dealing with explosives for which the room needed to be divided in separate spaces. The extensions and interior walls seem to have disappeared only recently, possibly for their present day function.

On the exterior of the main entrance there are traces of an extension to the building visible, as indicated in the image underneath. The extension was most likely a small hallway before entering the rest of the building, however it is demolished now. It is not known for sure, if this extension was original or of a later time, however the later seems most likely. The facade that remains seems designed as a main entrance and is exactly the same as the facade on the other side of the building. This suggests that these facades were originally designed to be the exterior facade and an extension was later placed in front of it.



Picture made by Barbara de Groot, overlay by Jan-Willem Spek



Source: www.google.maps.com. Overlay by Jan-Willem Spek



Traces of an interior wall in the building



Traces of an extension to the building



Building 414 in the green surrounding (image: Barbara de Groot)

3.5 LOW- SLOPED ROOF

3.5.1 SITE

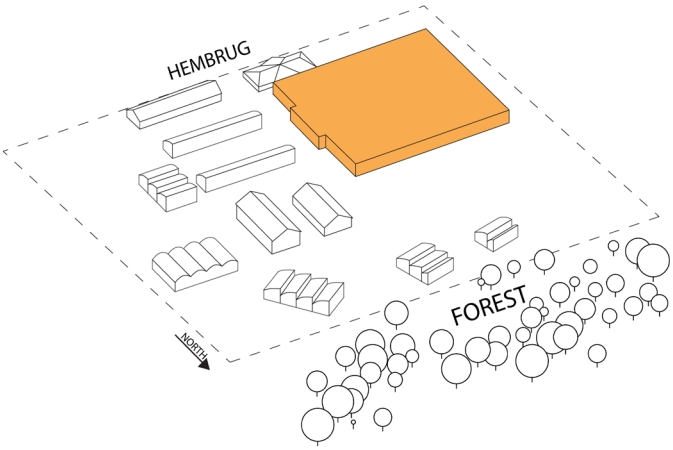


Location of all the buildings within the low-sloped roof typology. Image by Amanda Verschuur.

Within the 'plots of the woods' only building 01, the production hall belongs to the low-sloped roof typology. The production hall belongs to the latest or the fourth generation of buildings on the site and has been build in 1991 by Eurometaal.

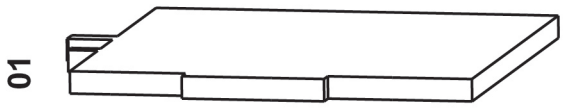
The hall is placed between one of the main roads of Hembrug and the earthen walls of the 'plots in the woods' , although in first instance it was planned to be build in another area. The location was changed because of financial reasons, since building the hall on this spot was cheaper.

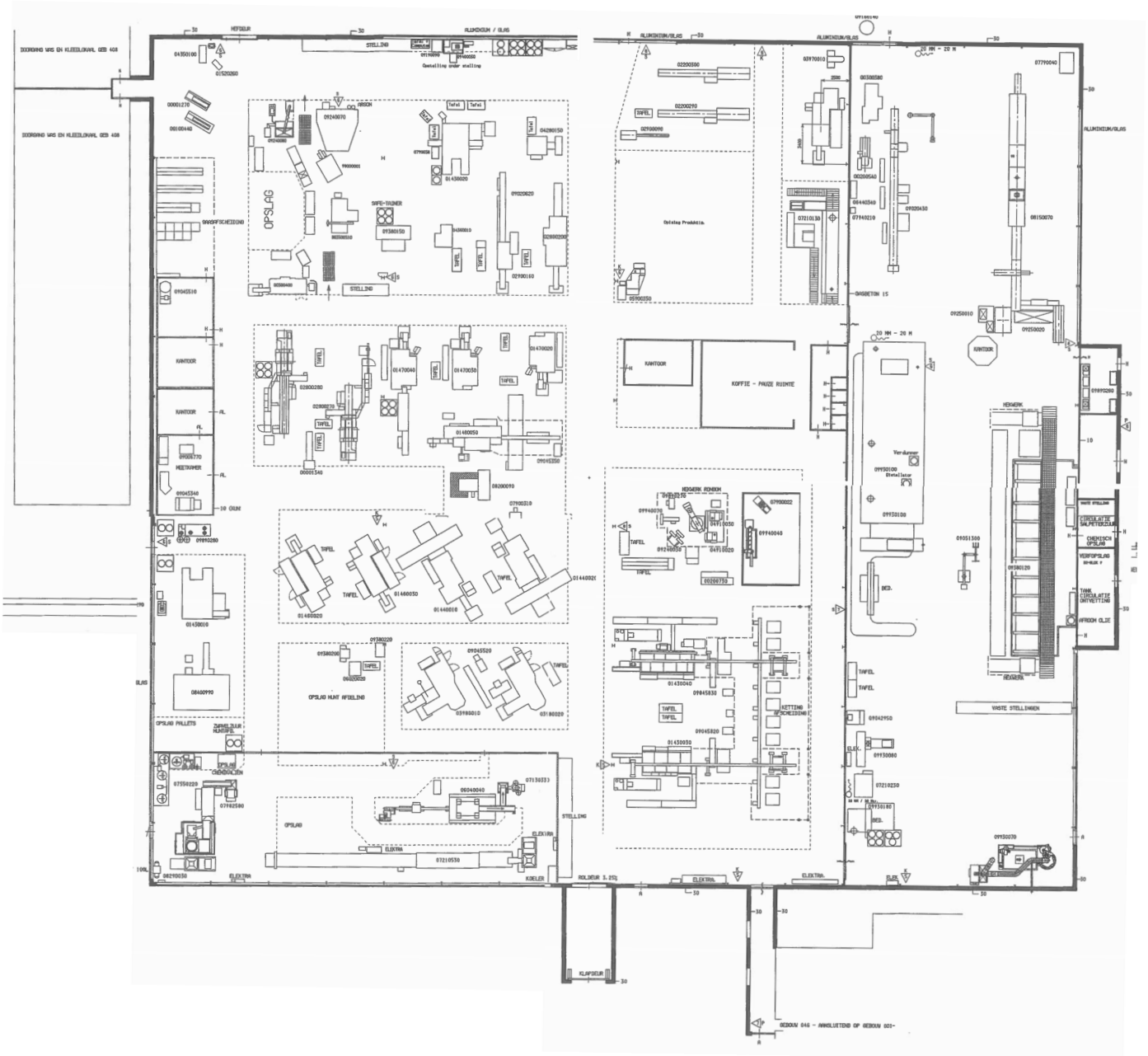
The production hall is easily recognizable by its scale and the applied materials.



Orientation of the building within the low-sloped roof typology. Image adjusted from Barbara de Groot, by Amanda Verschuur.

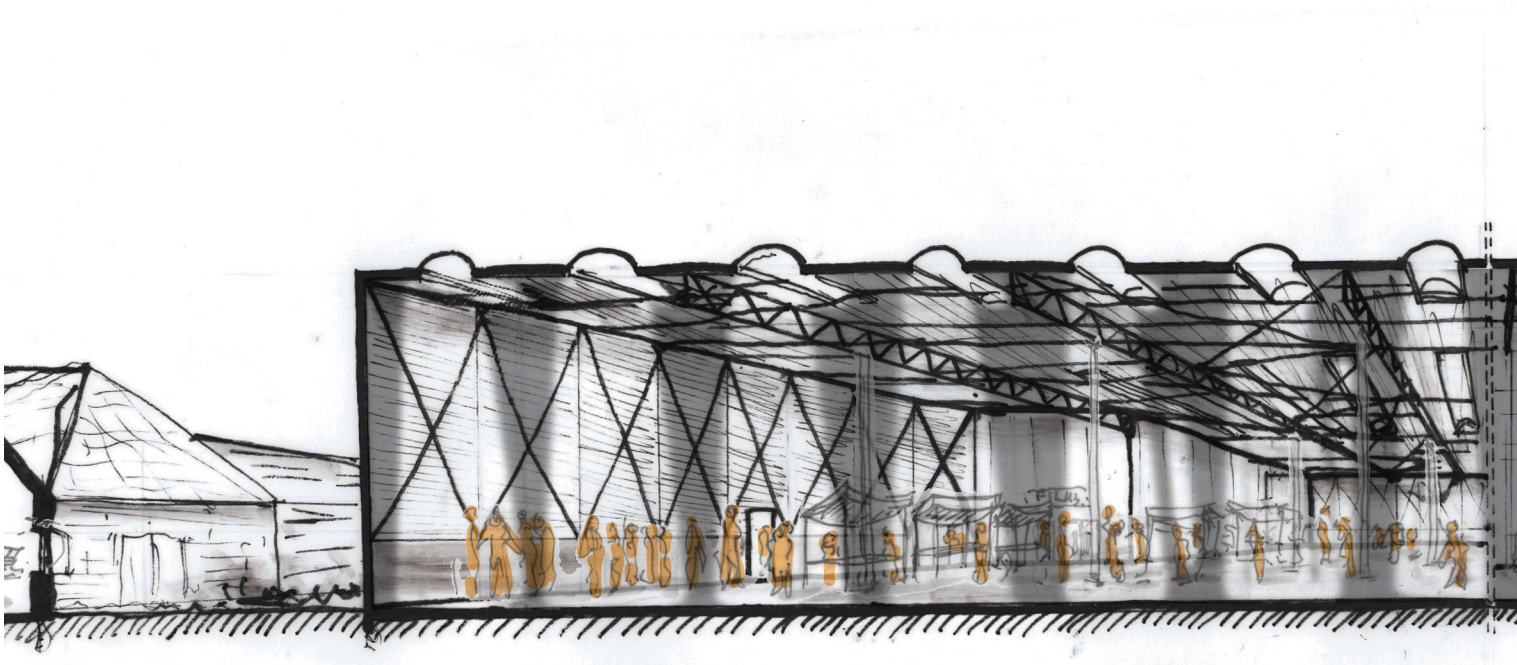
3.5.2 SPACE PLAN



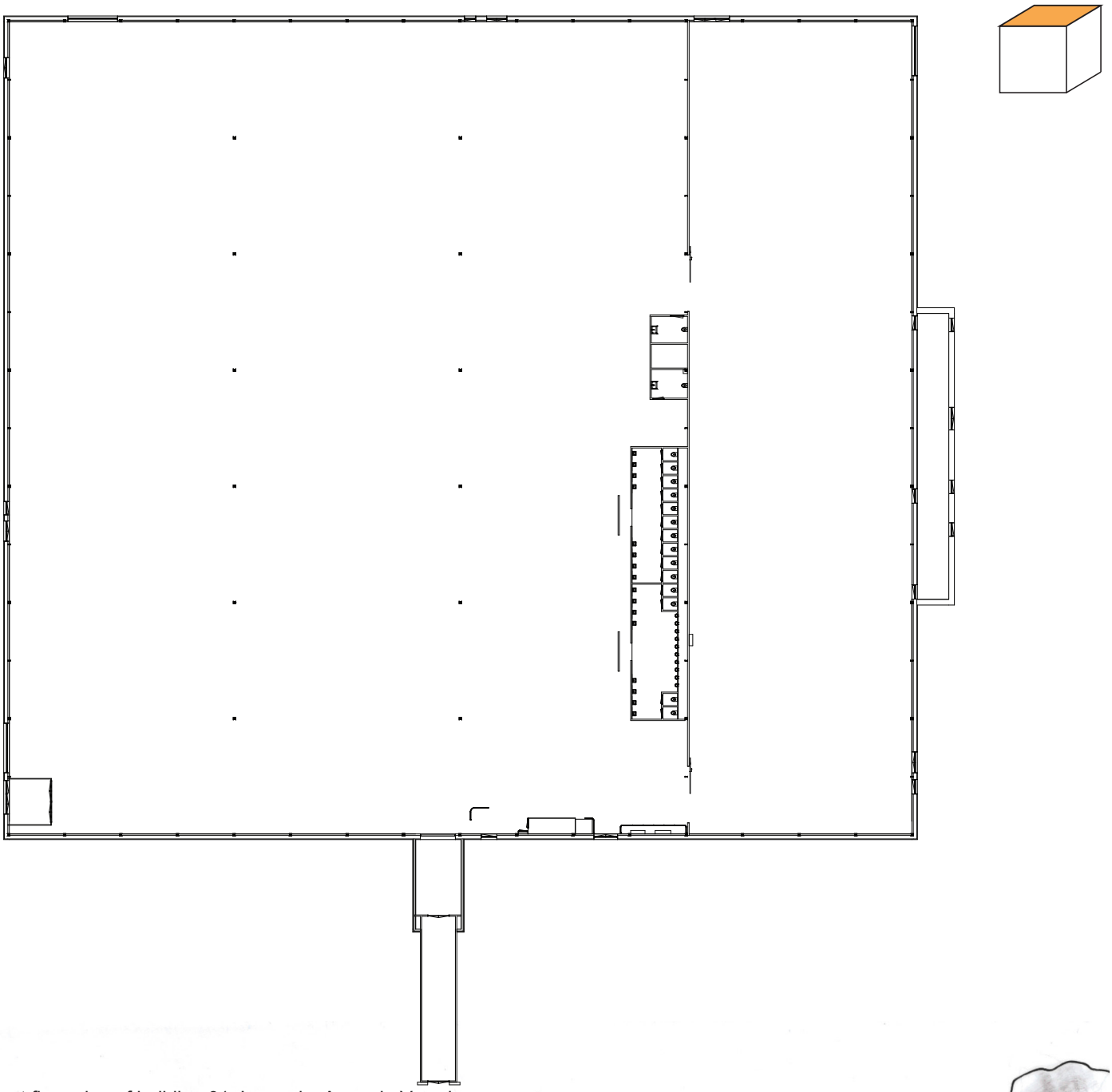


Original floor plan of building 01. Image by Amanda Verschuur.

The building functions nowadays as an event hall, but was built in 1991 as a big production hall from Eurometaal NV. This asked for a big, open surface with enough space for the production machineries. To achieve optimal flexibility there is an open floor plan with steel structure and skylights allow enough light to come into the building.



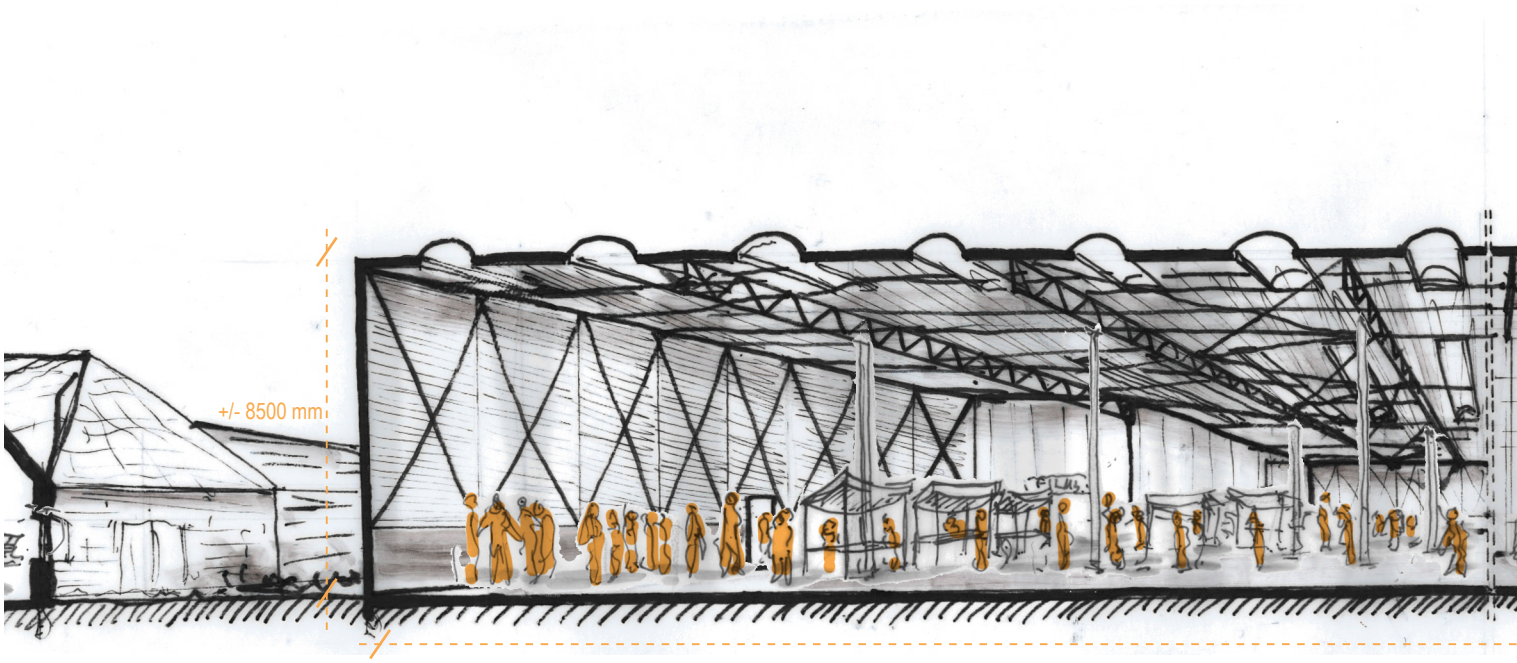
Perspective section of building 01 showing a daylight render, scale 1:200. Image by Lucas Pol.



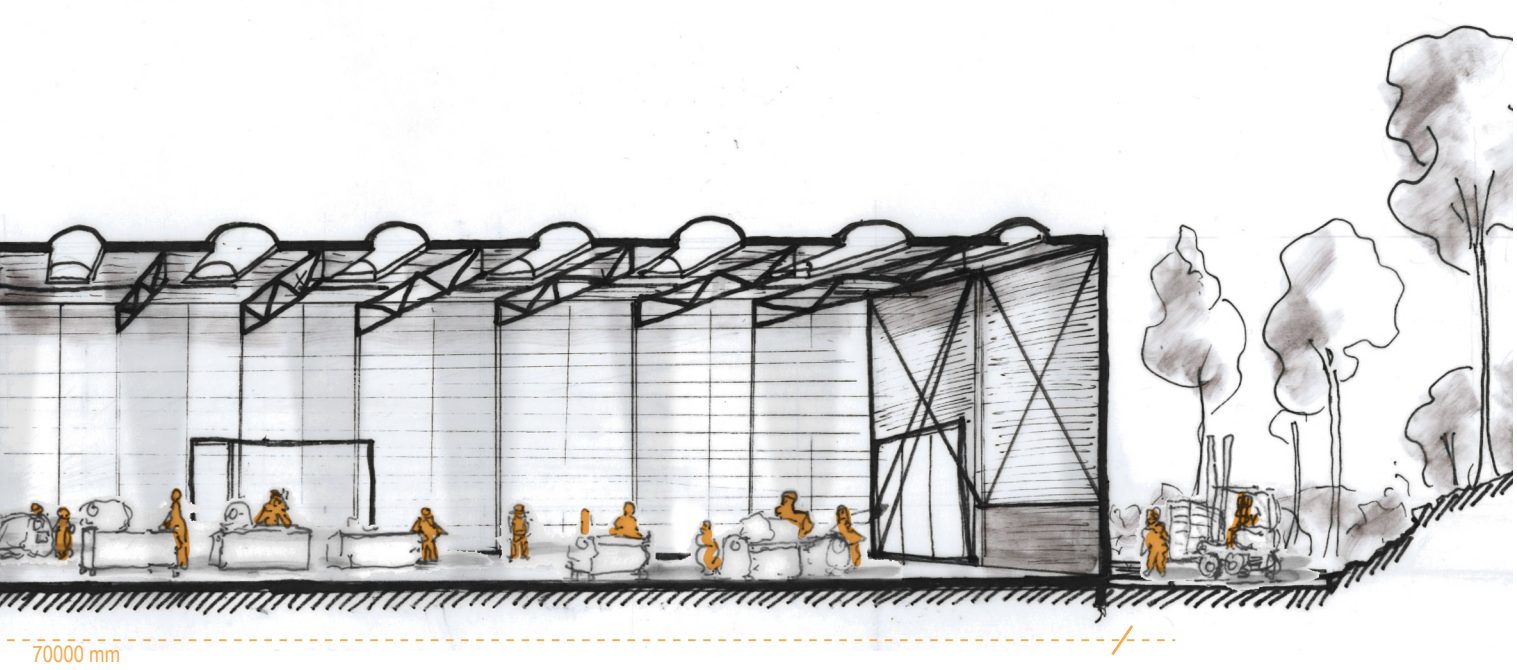
Current floor plan of building 01. Image by Amanda Verschuur



Perspective section of building 01 showing a daylight render, scale 1:200. Image by Lucas Pol.

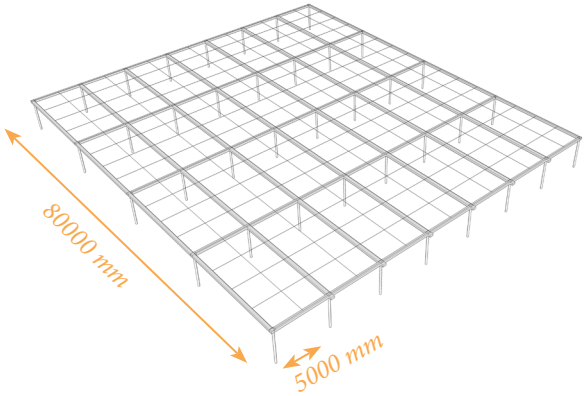


Perspective section of building 01 showing the space plan regarding human scale and use, scale 1:200. Image by Lucas Pol.



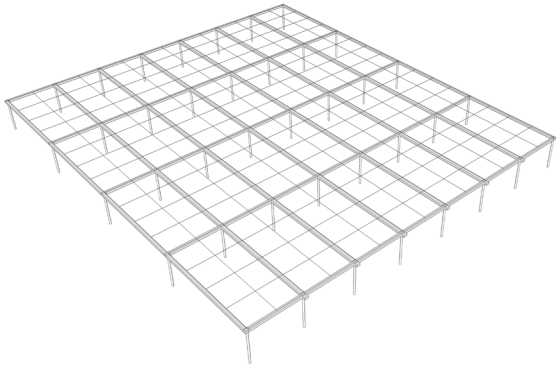
Perspective section of building 01 showing the space plan regarding human scale and use, scale 1:200. Image by Lucas Pol.

3.5.3 STRUCTURE



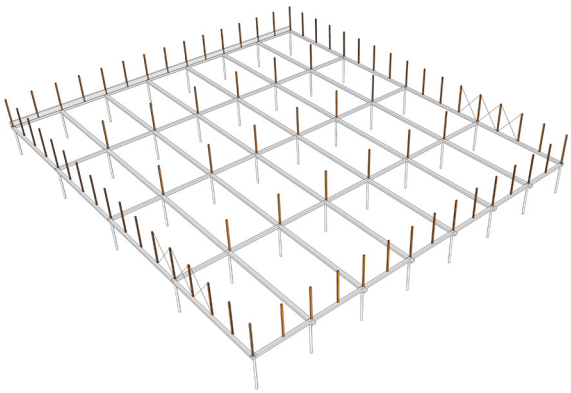
Step 1

Grid 5000 x 5000 mm
Ground floor: 80600 x 72700 mm



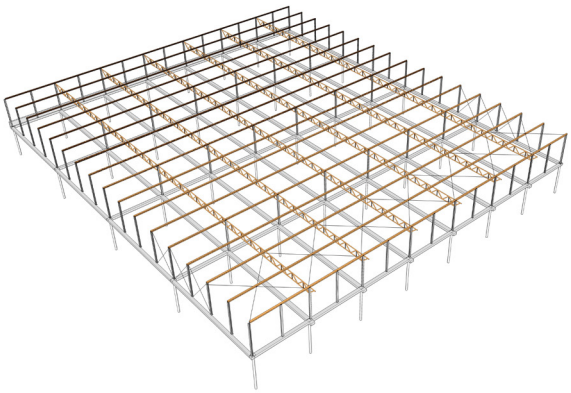
Step 2

In-situ poured reinforced concrete floor



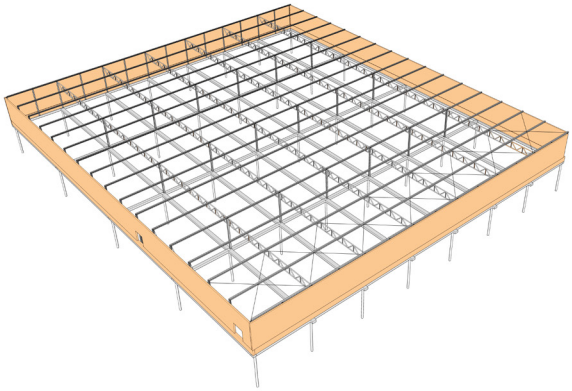
Step 3

Steel column HEA 180x180 mm
Standard truss to support in construction



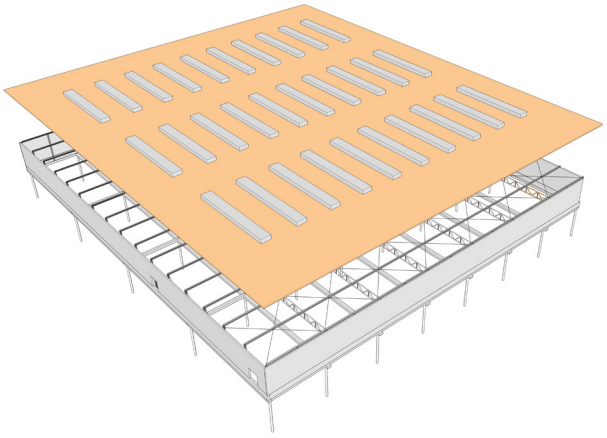
Step 4

Roof and Brace structure against the vertical and horizontal forces in the roof and facade are visible.



Step 5

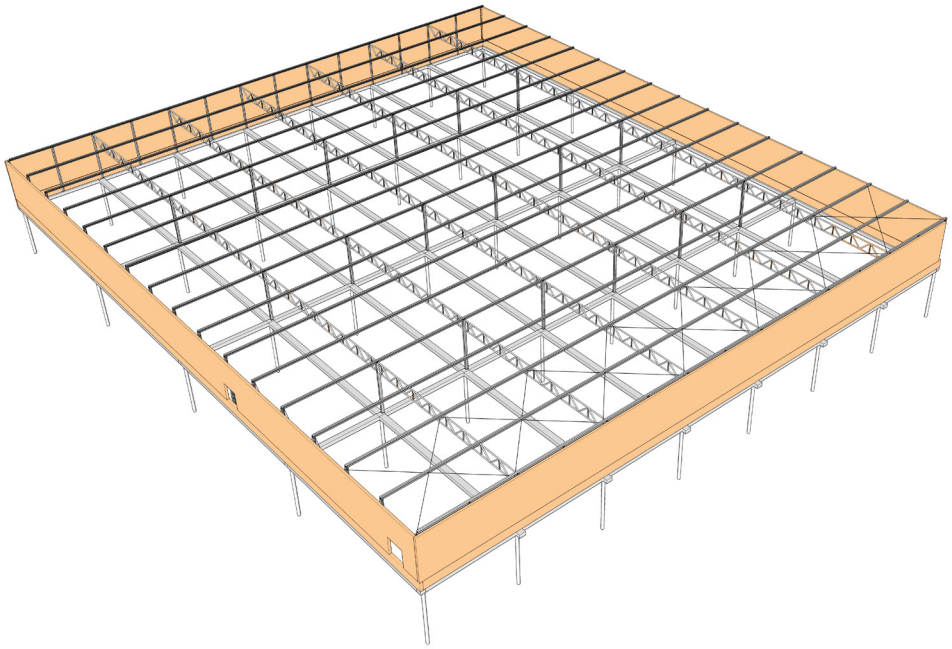
1.Brick 300mm thick, height 1000mm
2.Aluminum plating 210 mm thick, Height: 5000 mm



Step 6

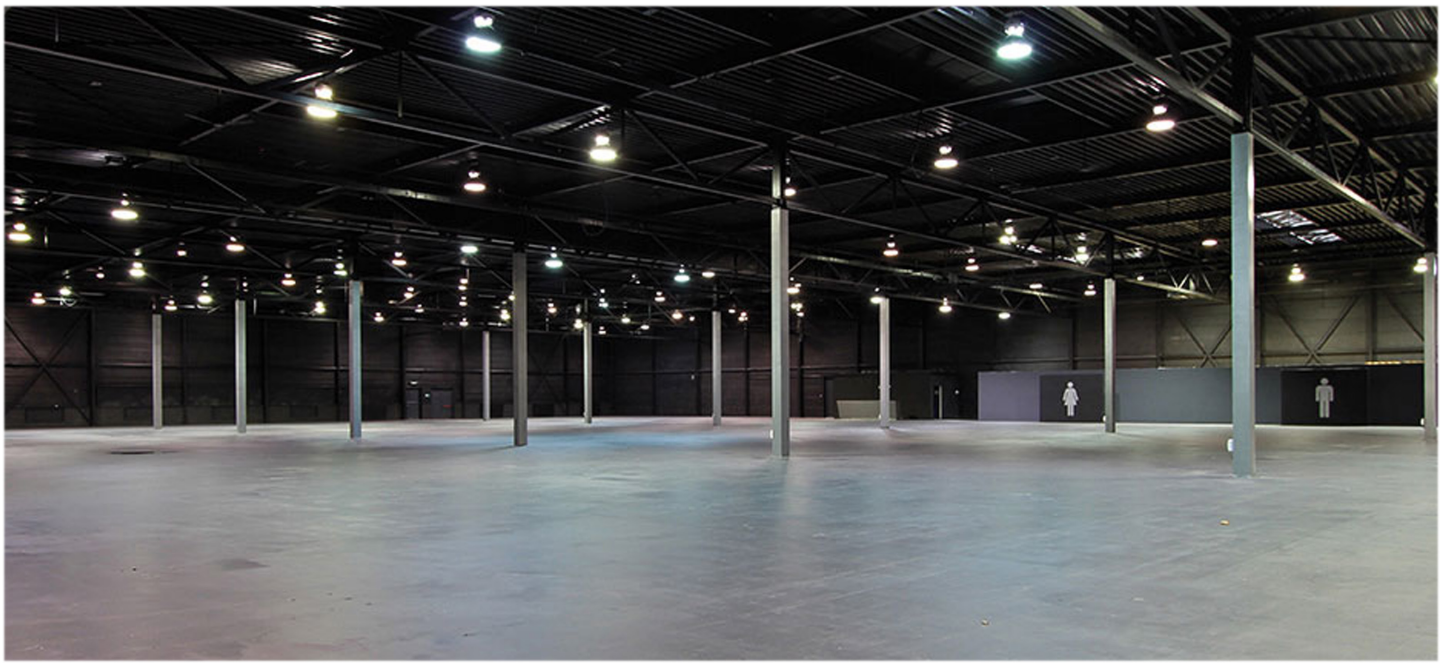
Roof is built by aluminum plating and it has opening.

All images on this page made by Marjan Sadeghi



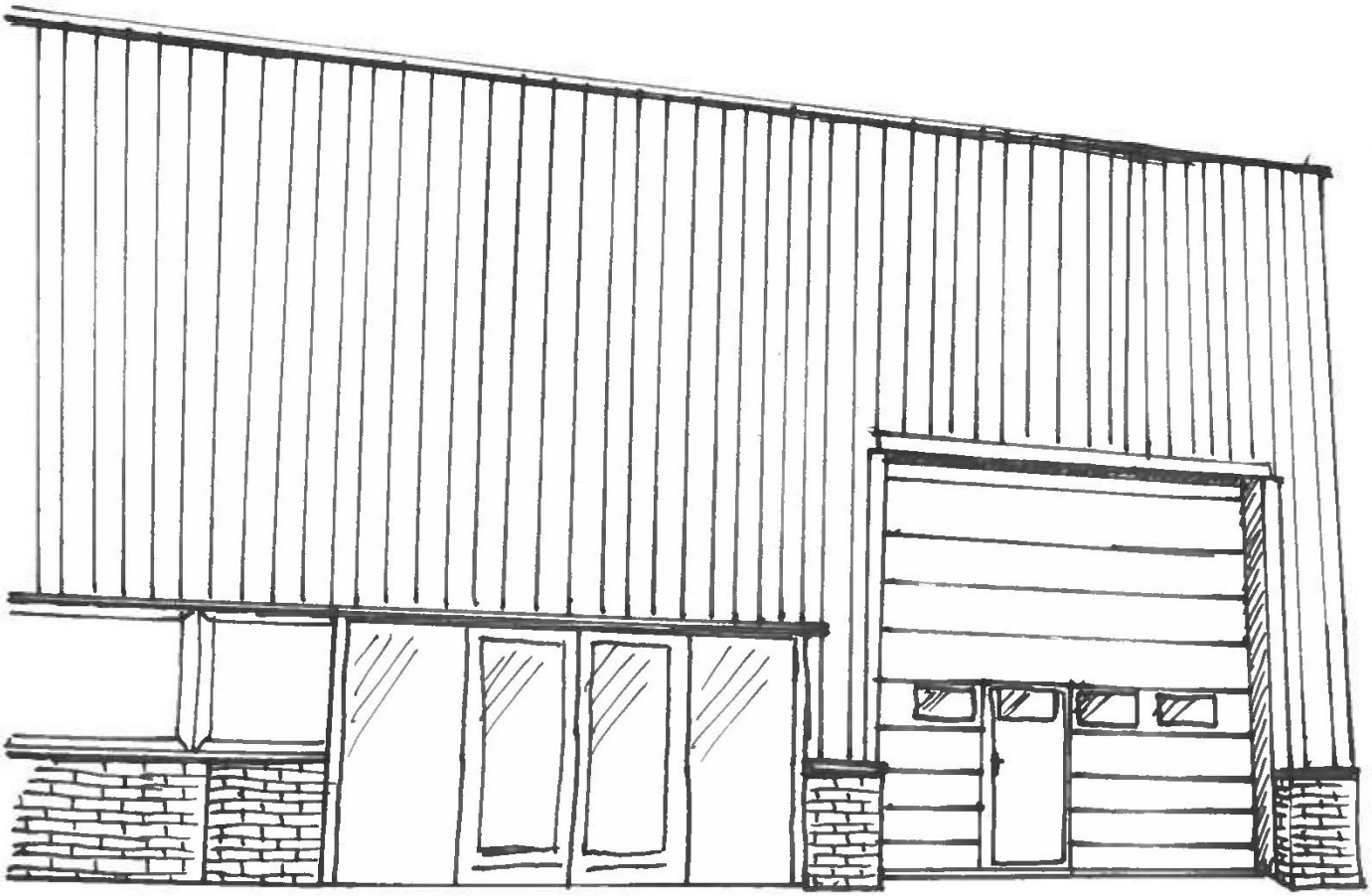
Low- sloped roof structure

Concluding, steel column and trusses, brace structure are load-bearing . Non load bearings elements are facade and roof, which can be quickly removed or replaced.



(Taets Art and Event Park, 2017)

3.5.4 SKIN

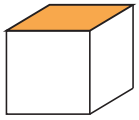


Characteristic facade of building 01. Image by Amanda Verschuur.



Front facade of building 01. Photo by Amanda Verschuur.





Building 1 is an example of an industrial hall of the 90s, constructed in a functional and cheap manner. With the facades consisting of brick work followed by aluminum plating on top and access through big entries allowing materials and big products to be transported in and out of the building.

Characteristic facade of building 01. Photo by A. Verschuur



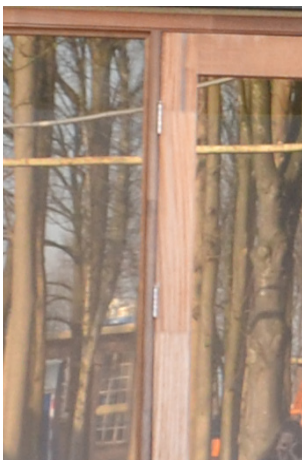
Aluminum plating



Brickwork



Plastic frames



Wooden frames

Applied materials in the facades of building 01. Photos by Amanda Verschuur



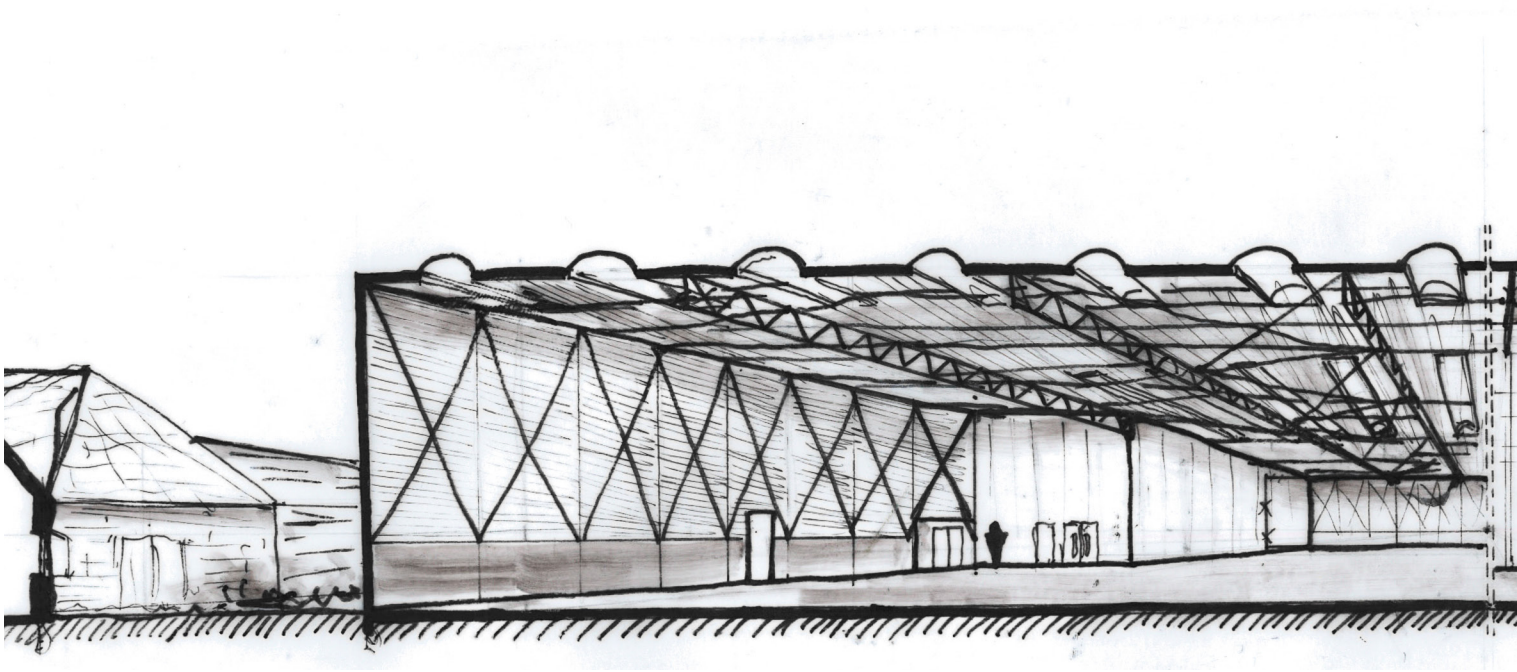


Applied colors in the facades of building 01. Photos by Amanda Verschuur

3.5.5 SERVICES

During the transformation there is four production office and crew rooms create.
Facilities for these spaces are: Power current connection in the roof, Work lighting and mood lighting, Two 'VIP' rooms, above the toilets, 10 women and 14 men toilet, Wi-Fi, Heating and air conditioning ("hembrugterrein.com", n.d.).

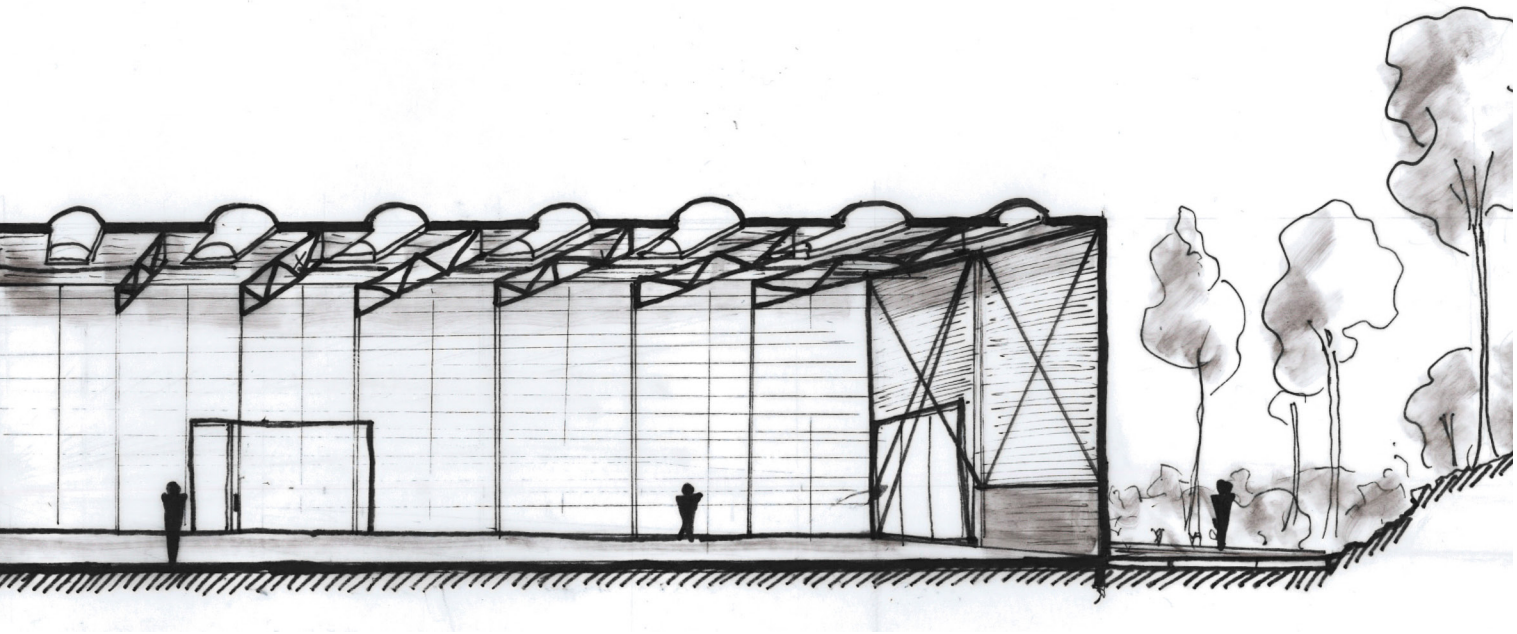
3.5.6 SURFACES



Perspective section of building 01, scale 1:200. Image by Lucas Pol.



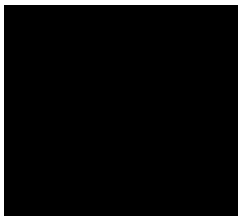
Interior view of the large space containing one of the closed boxes, collums to support extra weight. Photo by “TADA Fotografie grafische vormgeving Marcel Valkema”.





Structure, black and white. Photo by “TADA Fotografie grafische vormgeving Marcel Valkema”.





Color scheme of the interior of building 01. Image by Amanda Verschuur.



Door. Photo by “TADA Fotografie grafische vormgeving Marcel Valkema”.

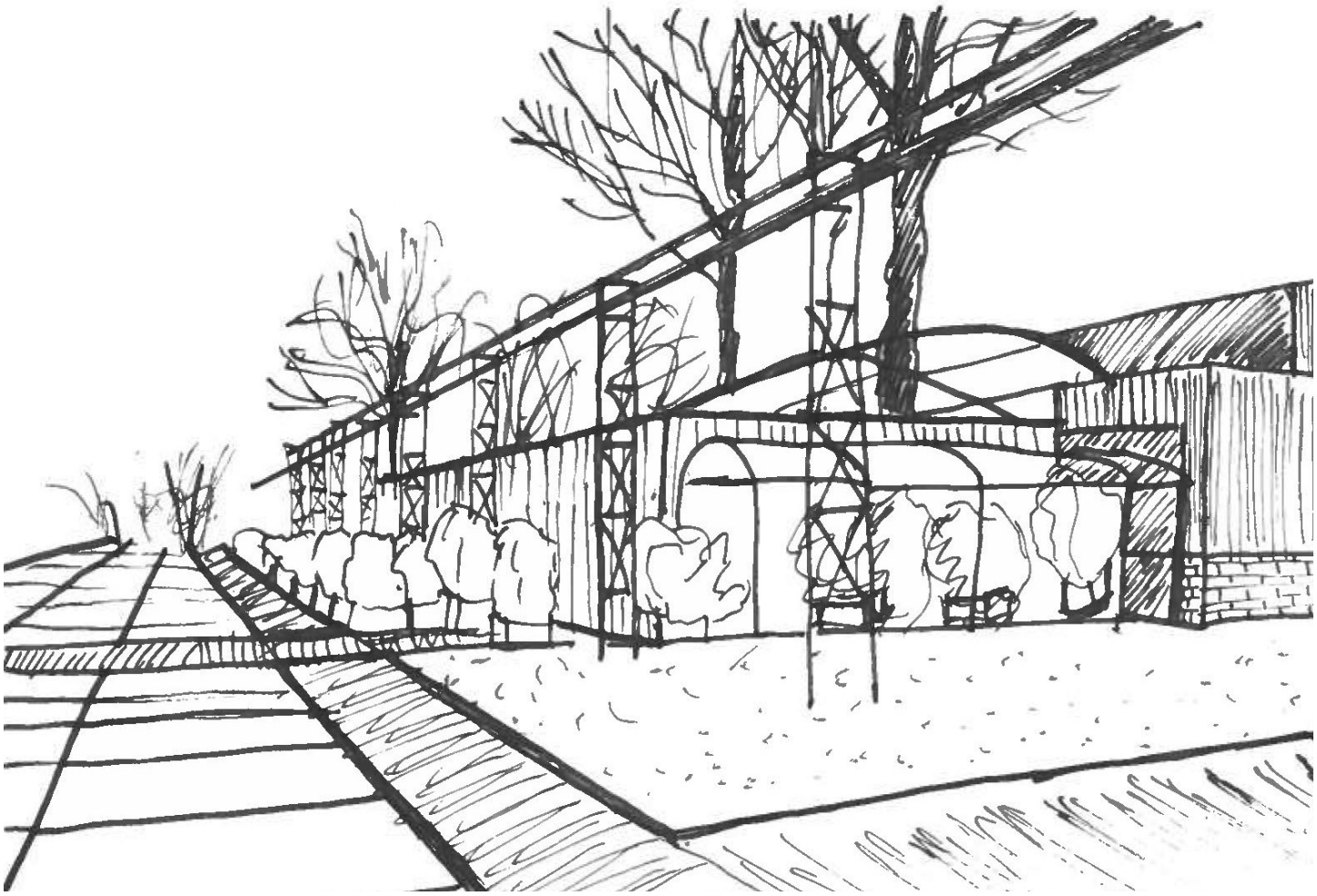
3.5.7 STUFF

There is no clear evidence of traces from the original interior of the former production hall.



Current use and interior of building 01. Photo by Dimitri Traas.

3.5.8 SPIRIT OF PLACE



Spirit of place around building 01. Image by Amanda Verschuur.

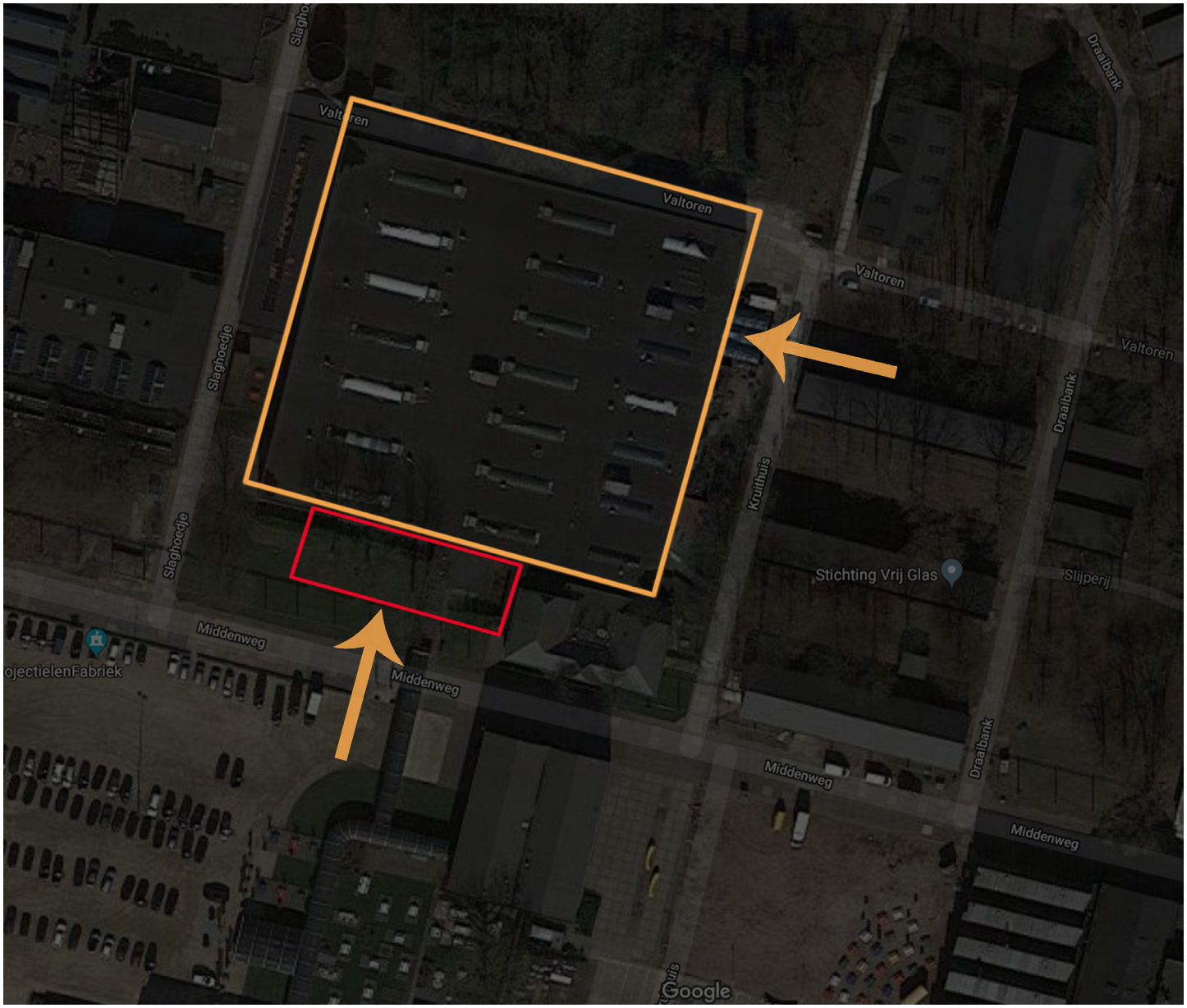


Building 01 blending into the landscape. Photo by Amanda Verschuur.



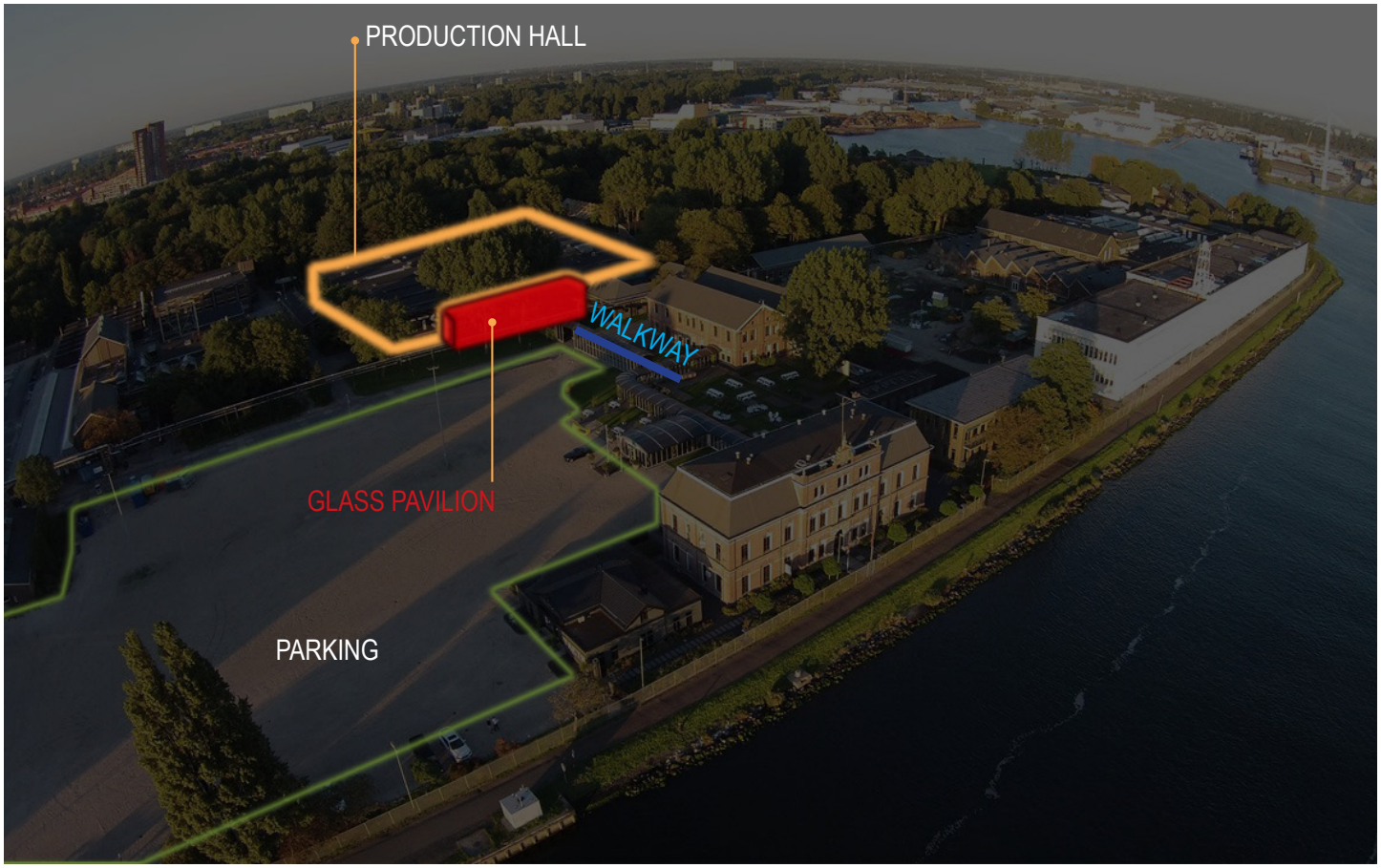
Difference in scale between building 01 and the other buildings of 'plots in the woods'. Image by Amanda Verschuur.

3.5.9 DEVELOPMENTS



Low-sloped roof structure, Image by Marjan Sadeghi.

Production hall has two Entrances in different corners of the building. One of these entrances located on the north side have been added after the original situation. A glass pavilion was added to the south-side of the building.



Additions and connections to the production hall. Image by Marjan Sadeghi.

The glass pavilion added to the former production hall and it has an indirect connection to the surrounding buildings and the parking lot.


Image showing the glass pavilion connected to the production hall, placed along the main road. Image by Marjan Sadeghi

3.6 CONCLUSION



LIMITATIONS & POSSIBILITIES

The building typologies in the 'plots in the woods' offer a lot of variety. Because all typologies differ, each building also offers other possibilities and dilemmas, as further discussed in the value assessment.

The oldest buildings on site are from the gable roof typology and are very characteristic in their architectural style. This typology functioned as office and storage buildings, but do not look like they were designed for this purpose. The pitched roof and decorated facades were probably a result of the education that the military architects, the 'Genie-officers', took, inspired by other architectural styles from that time. However, the interior shows more of the functional approach, with its open floor plan with riveted steel columns in building 57 and 85, a relatively new technique at the time. The facades also contain an innovation of the time, the cavity wall was designed to keep out moisture. The functionality of this typology is not instantly clear to the untrained eye, but most certainly present. Interesting to note with this typology is, that the exterior of all the buildings is very similar, but internally the setups and construction methods are quite different, demanding a different re-design approach for each of them.

In 1952 the second major construction phase starts on Hembrug because of the rise in production as preparation for the pending war. For 'plots in the woods' this results in the addition of the shell roof typology and the circular roof typology. Although both building typologies are very similar in methods of construction and appearance, they do differ.
The shell roof typology is quite clear in its setup. For the construction of these buildings they used a reinforced concrete frame, which was stable on its own. As a result, the space underneath remained free from columns or walls. Furthermore, because of this frame, the brick walls are not load bearing, offering opportunities for redevelopment. Other aspects, such as the over dimensioned floors, the extra foundation piles, the shape of the roof and the indirect daylight were all also the result of function and provide flexibility for the future. The main exception in this design approach was the design of the facades. It included a certain love for symmetry visible in the facade elements.

The circular roof building, however, poses more questions. In most aspects this building is very similar to the shell roof building. It also has a reinforced concrete structure of columns and arches, creating an open space plan, and non-load bearing brick walls. However, the roof shape and orientation don't follow the same logic as the shell roof typology. Instead of a quarter circle, the circular roof typology consists of half a circle, creating a vaulted ceiling. There is only one example of this typology in the 'plots'. It would make sense to change its form, and make a new form work, if more buildings of this typology were made. However, only one is constructed, thus making it quite inefficient to make a different design for just one building. One would expect that the military had a good reason for this exception. The assumption is that originally this building did not have to deal with explosive risks or that the original function required more daylight, therefore not needing the characteristic roof shape from the shell roof typology. However, this could not be confirmed.

The most recent addition to the site, built by Eurometaal, is also the most imposing building. The low-sloped building (1991) typology is one of a kind in the 'plots' but takes up almost a quarter of the site with its 6000 square meters. Ignoring this building when redeveloping the site is therefore not possible. Because this building is the youngest, it is also in the best condition. It follows the same reasoning as most of the typologies, using a steel structure of columns and beams, creating an open floor plan. The exact measurements of the grid are not clear, but the enormous amount of square meters, the height of the building and the overcapacity in the structure all offer potential for change. A downside of the current setup is that daylight can mainly enter through the roof lights, which is not ideal for every function.

Overall, it seems like the architects allowed themselves more artistic freedom during the design of the buildings compared to the landscape design. While still mainly functional, there are elements that cannot be explained by pure functionality, but which do offer aesthetic qualities. However, the amount of freedom differs between the different typologies. This might have to do with the period in which each typology was constructed and the current trends in architectural and engineering at that time. These differences bring diversity to the 'plots in the woods' and make the historical development visible. For designers, the task is to work with this diversity while embracing the functionality and therefore flexibility that the 'plots in the woods' buildings offer.



SITE				
SKIN				
STRUCTURE				
SPACEPLAN				
SURFACES				
SERVICES				
STUFF				
SPIRIT				

Typology scheme & summary. Image compiled by Barbara de Groot. Individual Images by Amanda Verschuur, Barbara de Groot, Marjan Sadeghi, Jan-Willem Spek and Lucas Pol.

4. VALUE ASSESSMENT

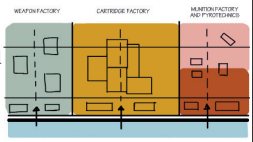
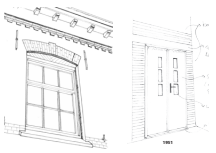
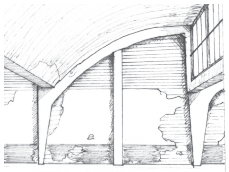
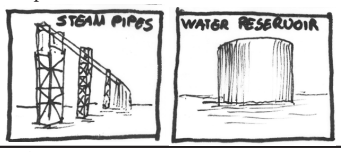
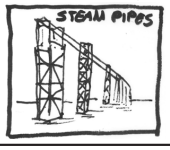
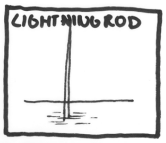
4.1 INTRODUCTION

The analysis so far has shown that 'plots in the woods' still contains a lot of the original functional design from the Artillerie Inrichtingen, even though the passing of time has made an impact on the site as well. In an era where one of the largest tasks in the field of architecture is revitalization of abandoned buildings, Hembrug can no longer deny the need for change. Part of this development has been the opening of formerly military terrains to the public. On a site where functionality was very important, one would expect that finding a new use for these abandoned buildings could be easily achieved. The goal of this value assessment is to determine which values, and therefore opportunities, dilemmas and obligations, the functional design approach has brought. And if the site offers any other unintended opportunities nowadays.

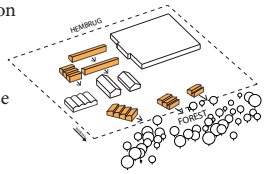
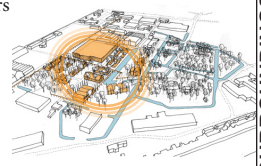
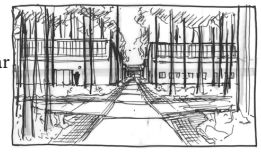
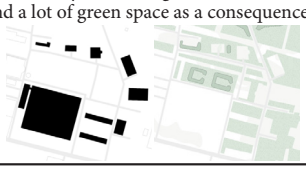
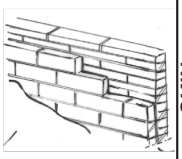
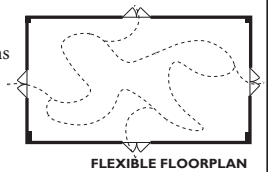
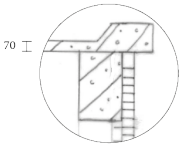
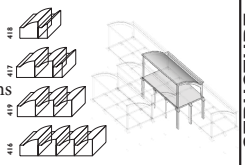
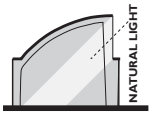
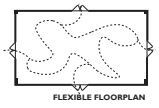
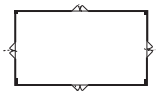
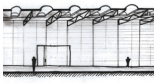
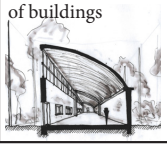
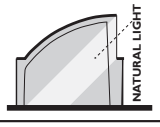
With the previous analysis as a basis, including the chrono-mapping of both the landscape and the buildings, this chapter will present the value matrix, as posed in Kuipers & de Jonge, 2017, defined by the whole group of students with the corresponding three levels of significance. Elements of high value are indicated with red, medium value with yellow and low value with green. These levels return in the significance mapping in 3D exploded views, sections and plans, adding a deeper layer of information to the matrix. These drawings will help each student to validate their design decisions later in the project.
This chapter ends with the conclusion identifying the opportunities for possible interventions, the obligations for conservation and the dilemmas where conflicts of interest occur when re-designing a heritage building. After the conclusion, each student will create their individual position statement as a starting point for the design.

4.2 VALUE MATRIX

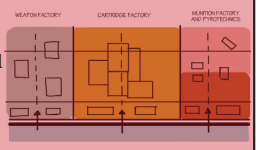
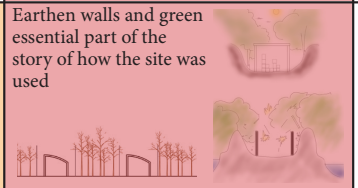
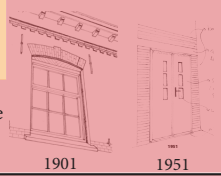
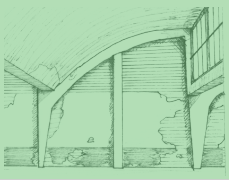
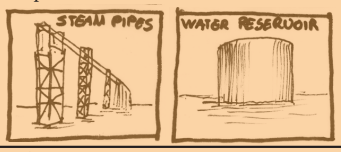
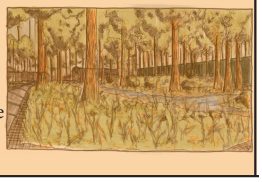
4.2.1 VALUE MATRIX

	AGE VALUE	HISTORICAL VALUE	INTENTIONAL VALUE	NON INTENDED VALUE
SURROUNDINGS		Important part of production process and history of Hembrug 		
SITE	Earthen walls and some trees are original elements of first use of the area 	Earthen walls and green essential part of the story of how the site was used 		The of origin functional water ditches are now a memory of the history 
SKIN	Facade shows signs of its age, for example in cracks 	Readability of the age of the building from the facade. Represents the style of that time. 	Butterfly ornamentation on the bridge. The name of the bridge refers to this ornamentation. 	
STRUCTURE		Thin concrete shell as a technique of that time  Shape due to possible explosion explains story of the building 		
SPACE PLAN				
SURFACES	Decay of surfaces show its age and give character 	Color scheme within the buildings is original 		
SERVICES		Pipelines and water reservoir are original and part of how the site functioned 		The of origin functional pipelines are now a remembrance to the history of the site 
STUFF		Lightning rods are original and part of how the site functioned 		
SPIRIT	Decay of surfaces show its age and this roughness gives the character to the site 	The greenery that historically had a function now creates the atmosphere within the ensemble 		Non-intentional growth of green gives current atmosphere of the ensemble 

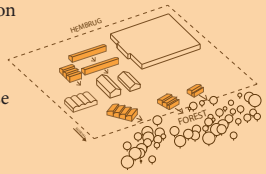
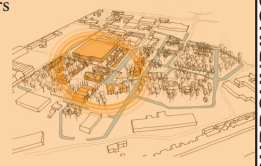
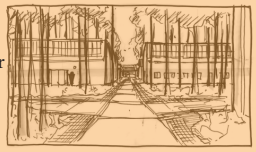
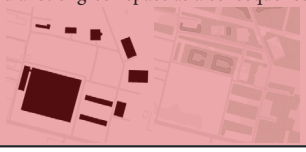
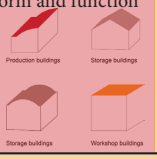
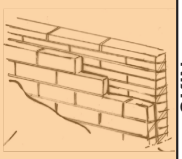
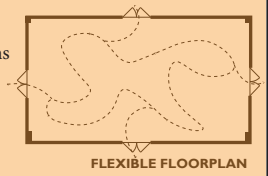
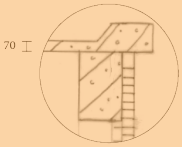
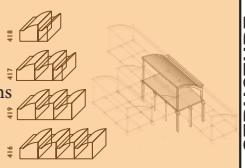
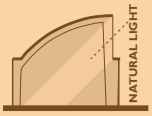
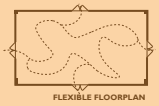
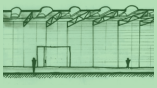
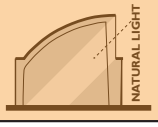
Value matrix. Compiled by Valerie Arntz & Jan-Willem Spek. Images by everyone.

USE VALUE	RARITY VALUE	OTHER VALUES	
Orientation towards forest creates unique use value of forest 	Amount of green unique within Hembrug and sur-roundings 	Soft borders of the ensemble (especially towards plofbos) 	SURROUNDINGS
Clarity of the paths due to clear sightlines 	Low density of buildings (and small scale) and a lot of green space as a consequence 	Relation between form and function  Vertical textures of the forest as character 	SITE
		Unity in the use of brick as a material in the facades 	SKIN
Structure allows for large spans to create an open floorplan 	Thickness of the concrete roof is quite rare 	Use of same modular structure in different configurations to create different buildings 	STRUCTURE
Indirect daylight  Flexible floorplan 		No front or back facade. Multi-directional  Orientation inwards of the box building 	SPACE PLAN
		Color schemes of the buildings capture both the 'warm' and the 'cold' aspects of the site 	SURFACES
			SERVICES
			STUFF
		Contrast between inside and outside of buildings  Natural light coming from above in interiors 	SPIRIT

4.2.2 VALUE MATRIX WITH SIGNIFICANCE

	AGE VALUE	HISTORICAL VALUE	INTENTIONAL VALUE	NON INTENDED VALUE
SURROUNDINGS		Important part of production process and history of Hembrug 		
SITE	Earthen walls and some trees are original elements of first use of the area 	Earthen walls and green essential part of the story of how the site was used 		The of origin functional water ditches are now a memory of the history 
SKIN	Facade shows signs of its age, for example in cracks 	Readability of the age of the building from the facade. Represents the style of that time. 	Butterfly ornamentation on the bridge. The name of the bridge refers to this ornamentation. 	
STRUCTURE		Thin concrete shell as a technique of that time  Shape due to possible explosion explains story of the building 		
SPACE PLAN				
SURFACES	Decay of surfaces show its age and give character 	Color scheme within the buildings is original 		
SERVICES		Pipelines and water reservoir are original and part of how the site functioned 		The of origin functional pipelines are now a remembrance to the history of the site 
STUFF		Lightning rods are original and part of how the site functioned 		
SPIRIT	Decay of surfaces show its age and this roughness gives the character to the site 	The greenery that historically had a function now creates the atmosphere within the ensemble 		Non-intentional growth of green gives current atmosphere of the ensemble 

Value matrix with significance. Images by everyone.
Compiled by Valerie Arntz & Jan-Willem Spek. Significance mapping by Jan-Willem Spek.

USE VALUE	RARITY VALUE	OTHER VALUES	
Orientation towards forest creates unique use value of forest 	Amount of green unique within Hembrug and surroundings 	Soft borders of the ensemble (especially towards plofbos) 	SURROUNDINGS
Clarity of the paths due to clear sightlines 	Low density of buildings (and small scale) and a lot of green space as a consequence 	Relation between form and function  Vertical textures of the forest as character 	SITE
		Unity in the use of brick as a material in the facades 	SKIN
Structure allows for large spans to create an open floorplan 	Thickness of the concrete roof is quite rare 	Use of same modular structure in different configurations to create different buildings 	STRUCTURE
Indirect daylight  Flexible floorplan 		No front or back facade. Multi-directional  Orientation inwards of the box building 	SPACE PLAN
		Color schemes of the buildings capture both the 'warm' and the 'cold' aspects of the site 	SURFACES
			SERVICES
			STUFF
		Contrast between inside and outside of buildings  Natural light coming from above in interiors 	SPIRIT

4.2.3 ELABORATION ON VALUE MATRIX

The value matrix gives an overview of all the values that are identified within the site. This chapter will give an elaboration on why these values are valued the way they are. It will do this in the hierarchical order of high value, medium value and low value.

High values

There are six values assigned as being of 'high value'. Only the values that are absolutely crucial to understanding the historic context of the site are assigned 'high value'.

1. *The role of the 'plots in the wood' ensemble within the whole site of Hembrug.*
   Both the urban layout of the ensemble as the specific buildings cannot be properly understood without understanding the role the ensemble played within the whole production process of Hembrug. Therefore this is placed under 'surroundings' and 'historic value' and assigned 'high value'.
2. *The earthen walls and the greenery.*
   Both the earthen walls and the greenery played a crucial role in the way the ensemble functioned. The ensemble could not have functioned the way it did without them, therefore they are assigned 'high value' under 'site' and 'historic value'.
3. *Low density of buildings and the green space that came as a consequence.*
   Crucial and unique to the plots in the woods is the low density of buildings. This is critical for understanding the original function, both within Hembrug as within the ensemble, and can only be found on the plots in the woods at Hembrug. Therefore it is valued 'high' under 'site' and 'rarity value'.
4. *The relation between the form and function.*
   Typical of the buildings within plots in the woods is how their forms are related to their original functions, as most clearly visible in the shell roofs. This is crucial to understanding the original functions, thus is valued 'high'. It doesn't fit any other value so it's an 'other value'.
5. *The facades of the gable roof type buildings.*
   These facades not only contain innovative techniques for their time, they also represent a clear example of the architectural style of that time. They are an exception to the otherwise functional architectural design and are therefore unique within the ensemble. Therefore they are valued highly under 'skin' and 'historical value'.
6. *The concrete structure of the shell roof type buildings.*
   This concrete structure is a direct consequence of both the original function of these buildings and of a way of constructing specific to that time. The structure is crucial to understanding these buildings within its time and function, therefore it is valued highly under 'structure' and 'historical value'.

Medium values

The medium values are those that are of big importance to the site, but are not essential to understanding the site as a whole.

1. *Orientation towards (and location in) the forest.*
   The plots in the wood ensemble makes 'use' of the forest in a unique way. Therefore this is valued as a 'use value'.
2. *The amount of green* is unique within Hembrug and within the larger surroundings and is therefore valued with a 'rarity value'.
3. *The soft borders of the area.*
   The ensemble is well connected to both the 'Plofbos' and the other neighboring ensembles within Hembrug. These borders are valued under 'other values'.
4. *Earthen walls and trees.*
   These elements are from the first use of the ensemble and are therefore assigned an 'age value'.
5. *The ditches*. These originally functional elements are now a non-intended remembrance to the old use.
6. *Clarity of the paths due to the sight lines.*
   The sight lines within the ensemble make the routing through the site clear and easy to use. Therefore it is assigned as a 'use value'.
7. *The vertical textures of the site,* due to the large amount of trees, give the site its specific character. This doesn't fit any other value, thus assigned as an 'other value'.
8. *Unity within the use of brick.*
   All buildings of different times are connected by the consequent use of brick as a material for the facade. This is part of the character of the site and is thus assigned an 'other value'.
9. *Large spans to allow open floor plans.*
   Though the spaces were not always completely open but originally subdivided, the construction is made to flexibly support an open floor plan when this was needed. Therefore this is valued as a 'use' value.
10. *The thickness of the concrete roof.*
    This is a unique construction method of that time, but even then not applied very often and not a lot of extremely thin shell roofs remain. Therefore it has a 'rarity value'.
11. *The (re-)use of a modular structure* to make different building configurations is an essential part of the choice for the construction method that was used. Furthermore it gives a unity within the buildings in the ensemble. Therefore it is assigned a medium value under 'other'.
12. *Indirect daylight* from the high windows in the shell roofs gives a special atmosphere, furthermore it adds a lot of daylight to minimize needed additional lighting, giving it a 'use value'.
13. *The flexible floor plans* in the ensemble allow for a flexible use of the space, giving it a 'use value'.

14. *The pipelines and the water reservoir.*
    Both are physical remnants of installations that allowed the site to work the way it did. They are an important part of the historic use of the site and are therefore assigned with 'medium value' under 'historic value'.
15. *The pipelines as non-intentional remembrance* to the industrial history of the site. The pipelines are the most clear physical element in the site that shows the industrial past, while originally they were purely functional. Therefore they are assigned 'non-intentional commemorative value'.
16. *The lightning rods* are similar to the pipelines and the water reservoir, a physical remnant of the historic use of the site. However, as being more of a physical object than an installation or machine it is placed under 'stuff'.
17. *The greenery that gives the atmosphere.*
    The of origin functional greenery is already valued 'high' due to its historic function. Besides that, the functional greenery in it's current state also defines the spirit of the place and therefore receives a 'medium' value for 'spirit of place' and 'historic value' as well.
18. *The non-intentional growth of the greenery.*
    The of origin functional greenery is now, literally and figuratively, more than that. Due to neglect it grew to the current state which gives the current character of the site. Therefore this is assigned as an 'non-intended commemorative value'.
19. *Contrast between inside and outside.*
    The empty interiors, of the buildings from the 1950's, of concrete and plaster are a strong contrast to the overgrown and green surroundings. This atmosphere is typical to the site and is therefore valued as a 'medium value' under 'spirit of place' and 'other values'.
20. *The natural light coming from above.*
    This does not only have a 'use value', but also contributes to the specific atmosphere of these buildings. Light coming from above creates a specific atmosphere, as it does, for example, in a church. Therefore this is assigned with an 'other value' for 'spirit of place'.

Low values

The low values are values that can be valuable to someone and therefore be preserved, but they are not critical to understanding the ensemble or the buildings in its historic context. To prevent confusion about the term 'low values' it is needed to point out that values assigned as 'low' are not 'not valuable' but are only of lesser value compared to other values.

1. *Facade shows signs of its age.*
    Despite this being defects to the building, the small cracks and damages show that the building is of a certain age. This can be seen as a value for some and is thus assigned a 'low age value'.
2. *The butterfly stone on the bridge.*
    This is intentionally placed as a decoration or to commemorate something. This is not a critical part of the history of the ensemble but is part of the local history and an original element of the bridge.
3. *Multi-directional facades of the buildings on site.*
    Multiple buildings in the ensemble have no clearly defined front and back facade, but are multi-directional. This is not crucial for the buildings, but nevertheless a character of the buildings. Thus it is assigned a 'low other value'.
4. *The decay in the surfaces* shows the age of the buildings. This can be interpreted as a character of the building and thus a value on 'age value'. (It can however also be interpreted as a damage that needs to be fixed).
5. *The color schemes of the buildings* are a sign of how the buildings originally looked as well and are thus valuable as a 'historic value'.
6. *The color schemes of the buildings* also give the current character of the buildings and the site. There is a unity in them as well, to which can also be assigned as 'other value'.
7. *The decay of the surfaces* within the site gives the current specific character to the site. Therefore this does not only have an 'age value' as a surface, but also for the 'spirit of place'.

4.3 SIGNIFICANCE MAPPING

Historical Value:
Landscape changes overtime with the development of Hembrug.
Non-intended Value:
Landscape is unique and impressive in the plots of woods.
Other Value:
Combination between landscape and buildings.

Historical Value:
Site was divided into different production district by fences.

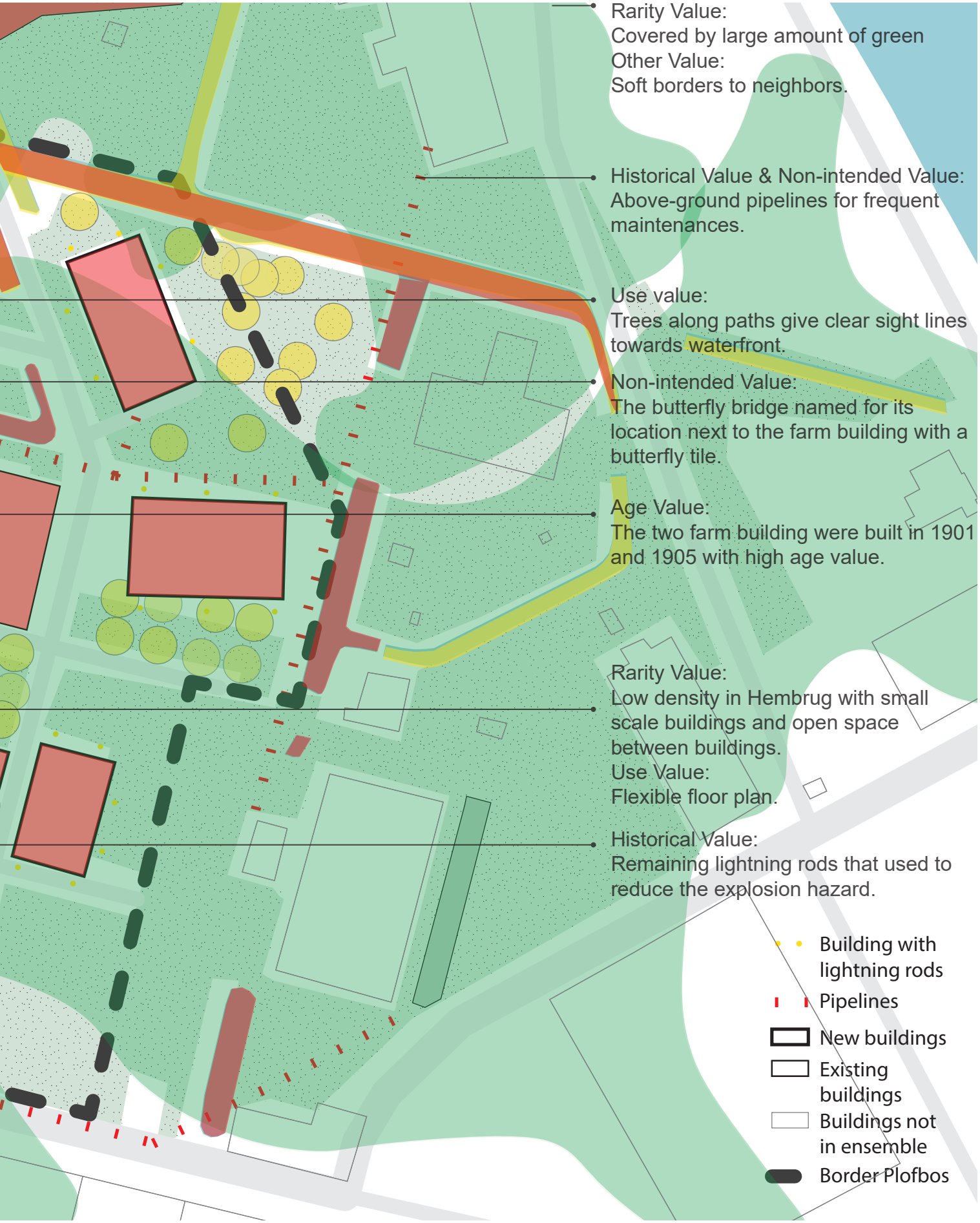
Age Value:
Trees, ditches and earthen walls.
Use Value:
Ditches and earthen walls reduce the explosion hazard
Trees adjust temperature for ware houses and camouflage.

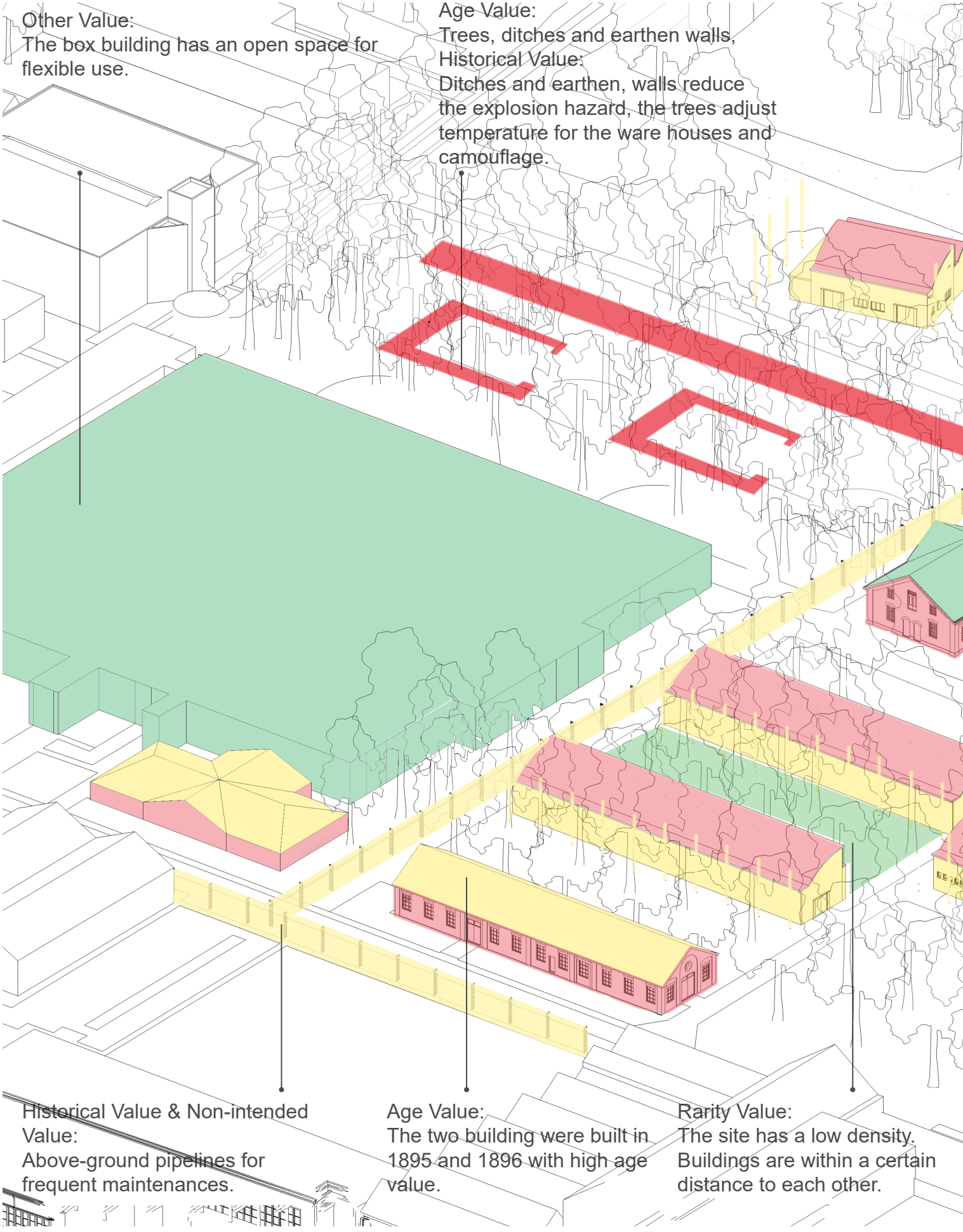
Other Value:
The box building has very open space for flexible use.

Age Value:
The two building were built in 1895 and 1896 with high age value.

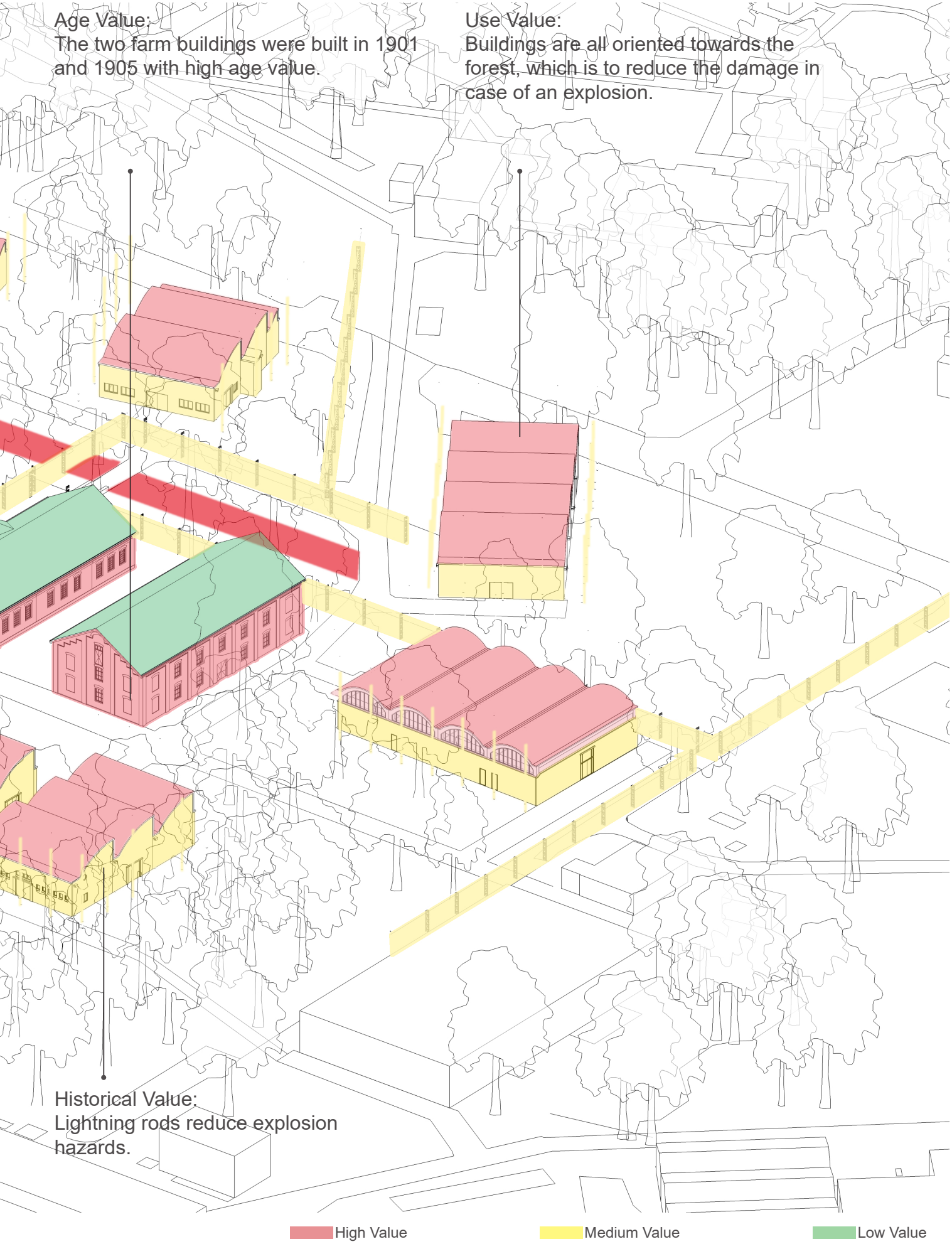


Significance mapping overall in 2D, by Mingke Zhu


Rarity Value:
Covered by large amount of green
Other Value:
Soft borders to neighbors.
Historical Value & Non-intended Value:
Above-ground pipelines for frequent maintenances.
Use value:
Trees along paths give clear sight lines towards waterfront.
Non-intended Value:
The butterfly bridge named for its location next to the farm building with a butterfly tile.
Age Value:
The two farm building were built in 1901 and 1905 with high age value.
Rarity Value:
Low density in Hembrug with small scale buildings and open space between buildings.
Use Value:
Flexible floor plan.
Historical Value:
Remaining lightning rods that used to reduce the explosion hazard.
Building with lightning rods
Pipelines
New buildings
Existing buildings
Buildings not in ensemble
Border Plofbos
High Value
Medium Value
Low Value



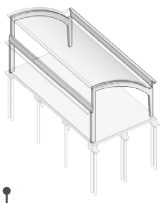
Significance mapping overall in 3D, by Marjan Sadeghi and edited by Mingke Zhu.


Age Value:
The two farm buildings were built in 1901 and 1905 with high age value.
Use Value:
Buildings are all oriented towards the forest, which is to reduce the damage in case of an explosion.
Historical Value:
Lightning rods reduce explosion hazards.
High Value
Medium Value
Low Value

SHELL ROOF BUILDINGS

Use Value:
The orientation of the shell-roof buildings is to the forest, because of the former explosion risk

Historical Value:
Building technology. Reinforced concrete frame structure with rigid connection casted on site.



Other Value:
Repetition of modules. Same structure typology but unique building configurations



Use Value:
The window provides natural light into the building.

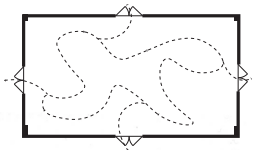
Historical Value:
The windows could direct the explosion in a safe direction

Age Value:
Cracks on the wall show passing of time decay. Roughness and layering makes people feel the age.

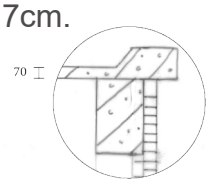
Other Value:
The roofs indicated the functions. Shell-roof buildings are production buildings.

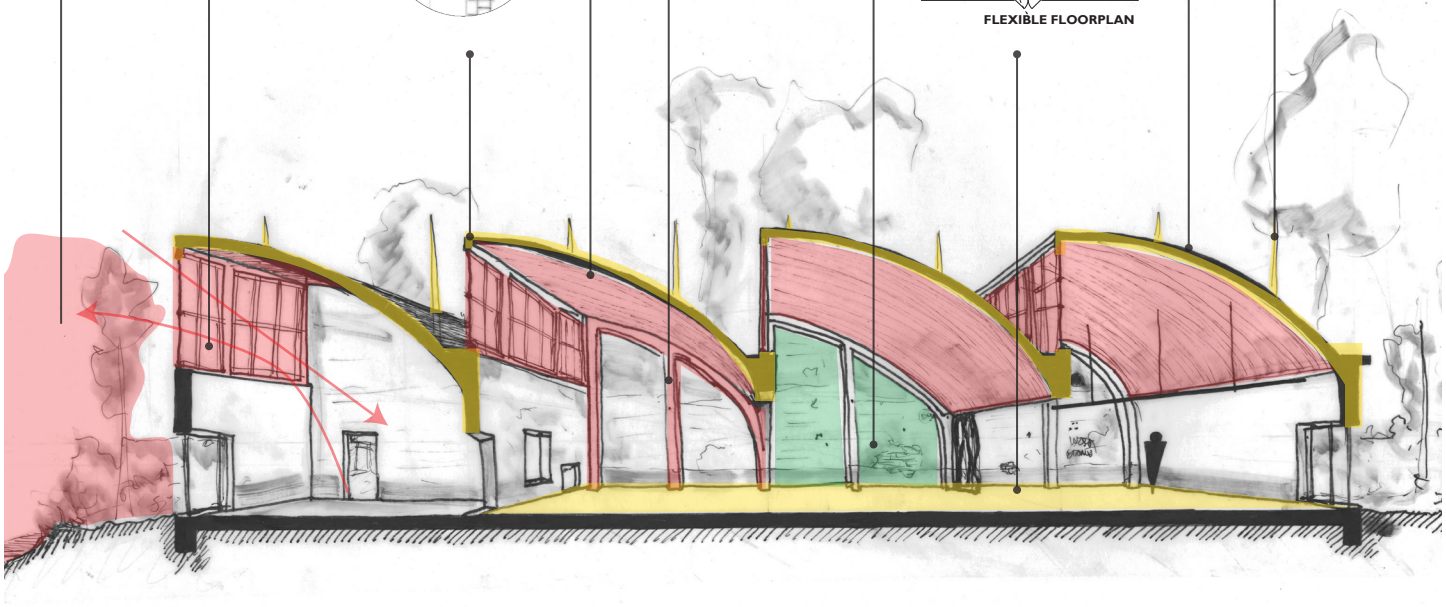
Historical Value:
Reduced the explosion risk of the production buildings.

Use Value:
Structure leads to large span. Open floorplans provide flexible movement.



Rarity Value:
The thickness of the roof is 7cm.





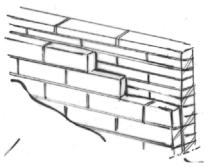
High Value Medium Value Low Value

Significance mapping for the shell roof buildings, by Mingke Zhu

GABLED ROOF BUILDINGS

Historical Value:
The facades of the gable roof typology are ornamentated. They represent a specific period of time.

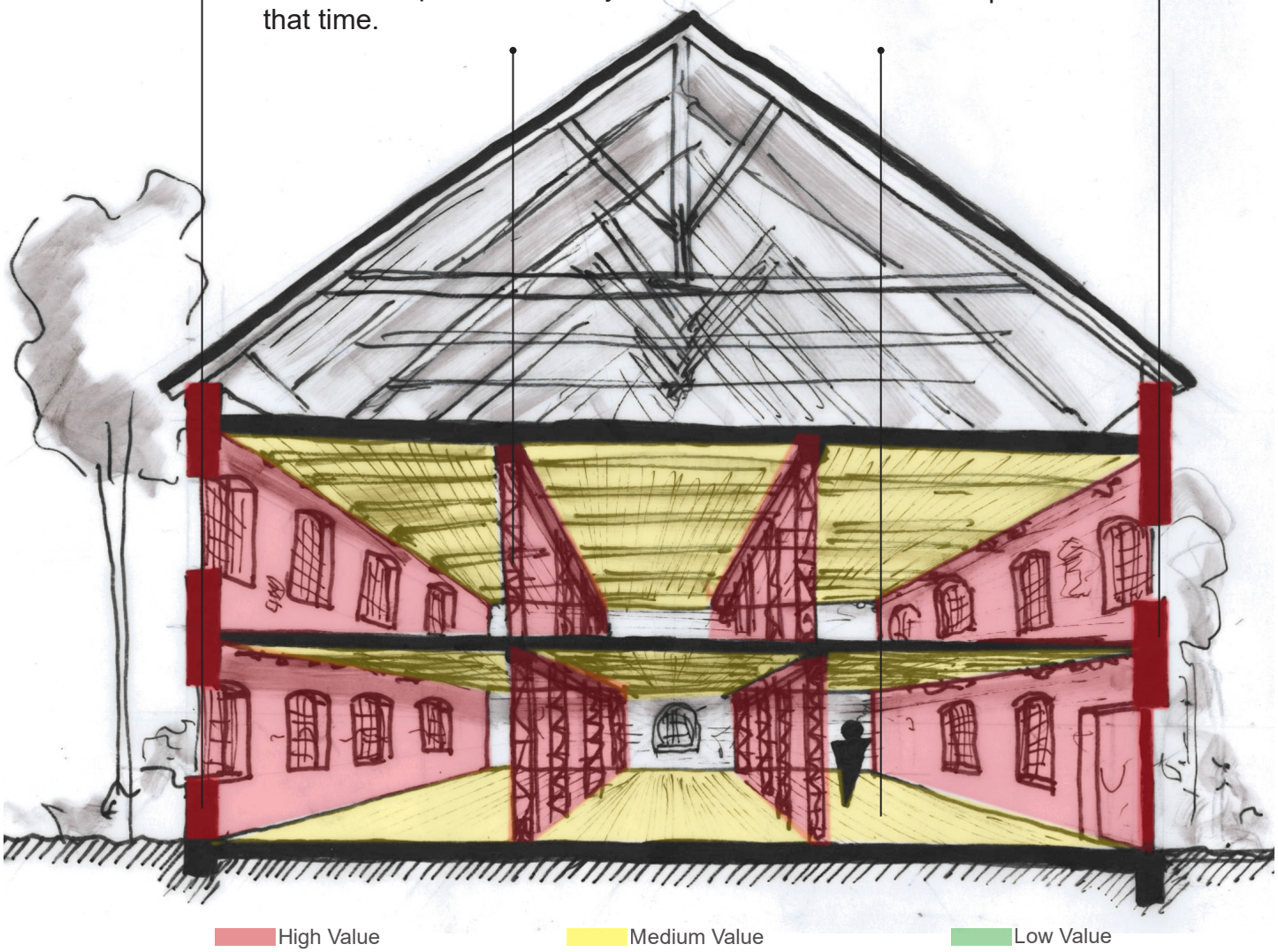
Age Value:
The readability of the building age.



Historical Value:
The use of cavity walls was not normal for that time. It was done to keep the moisture away from the warehouse.

Historical Value:
Truss column composition, Two steel U-profiles riveted together by steel bars represents the style of that time.

Use Value:
Structure allows for large spans to create an open and flexible floorplan



Significance mapping for the gabled roof buildings, analysis by Marjan Sadeghi and edited by Mingke Zhu

4.4 OPPORTUNITIES, OBLIGATIONS AND DILEMMAS SCHEME

'Plots in the woods' contains many values, intended and non-intended by the original designer. To be able to provide a conclusion on the cultural value assessment, these values need to be translated into opportunities for interventions, obligations for the conservations of the site and wherever these collide, the dilemmas that the designer will have to deal with. After mapping out the significance levels on landscape and building level, the following opportunities, obligations and dilemmas presented themselves.

	OPPORTUNITIES	OBLIGATIONS	DILEMMAS
ENSEMBLE	The story of the ensemble and the buildings are nearly intact.	The story of the AI needs to be guarded.	Complex area with a lot of different aspects and changes over time.
	The pragmatic philosophy of the site: if something is no longer needed, you destroy it. If you need something new, you build it.	The connection of the landscape/context and the buildings should not be lost.	Ensemble is part of a bigger area.
	Central position of the ensemble within the site.	The views to the forest and water need to be kept.	
	It is a (natural) green haven in the middle of Hembrug.	The open structure of the ensemble should be kept.	
	The plot is bordered by the ditches	There are monuments within the ensemble. These buildings and the earthen walls are protected.	
	Central role for the ensemble within the revitalization process of Hembrug.		
LANDSCAPE	The cleaning of the soil in the forest and other areas creates an opportunity to restore and restructure the ordered, clear green character that was so unique about this (green) site.	The structure of chambers and ditches from the Plofbos and surrounding areas need to be maintained.	The cleaning work involves cutting trees and digging away from the upper green layer. What will be left?
	Large amount of trees along the north border makes it easier to connect to the clay forest.	When restructuring the green, it needs to be done with nuance because it is not entirely clear what is original and what is not.	The secondary road structure changed into the primary structure.
	The clear structure of roads gives guidance.	Large amount of greenery provides a smooth transition to the forest.	
	Parts of the areas used to be for gardening, this could be restored.		
BUILDING LAYER	The time layers with their own typologies and character resulted in a unique site.	The low density characteristic should be kept.	A lot of the buildings show signs of deterioration, but this does add to the atmosphere and a certain aesthetic of the buildings.
	Orientation and view of the buildings towards the forest.	Maintain the unity of the materialization of the buildings.	The structures (bunkers and test buildings) in and around the area are part of the clay forest structure, but are nearly all in a destroyed or in a very deteriorated state.
	Buildings with distance to each other creates spaces for public use or chances to add new (functions).	Maintain the unity of shape of the different typologies.	

	OPPORTUNITIES	OBLIGATIONS	DILEMMAS
	Buildings already have strong relations which allows to make connections between different buildings.		
	The constructions within the buildings made large spans, creating a flexible open space plan.		
BUILDINGS	Most of the buildings have an open floor plan.	Maintaining the detailing within the gabled roof facades.	The buildings are not insulated.
	The daylight quality inside the buildings, specifically in the shell and circular roof typology.	Preserve the contrast between the traditional exterior of the gable roof typology and the more industrial interior.	Efficient use of the interior space of the farms (building 69 an 85) due to low free height at the attic.
	The closed windows within the gabled roof typology could be opened up.	Maintain the roof shapes of the shell roof and circular roof typology.	The thin concrete shell roofs are characteristic for the typologies, but result in a thermal bridge and thus decreasing interior comfort.
	The cavity walls from the gable roof typology can be used to insulate the buildings.	Connecting building 01 with the surroundings.	Building 01 does not blend in visually and in scale with the rest of the plots, but it plays a role in its story and history.
	The low-sloped roof building (building 01) can regain its function as a central multi functional hall.		Building 01 does not have windows in the facades which could reduce the visual comfort among the users.
	The floors of the gable roof and low-sloped roof typology are probably over dimensioned because of the former production / storage function, which enables the capacity to bear a new function.		It might be difficult to give a new function to the small buildings.
	The wooden roof constructions within buildings 69 and 85 are completely new and might allow constructive strength for additional roof lights.		
SPATIAL ELEMENTS	The pipelines have the potential to get their former function back, when redesigning the site.		The lighting rods do not serve their original purpose anymore, but are part of the atmosphere and the buildings they surround.
	The water reservoir and connection to the ditches create a start to redesign the water system (maybe even integral on a bigger scale).		
	The clear structure of the pipelines gives guidance.		

Opportunities, obligations and dilemmas for the 'plots in the woods'. Table assembled by Amanda Verschuur

The main take-away from this extensive list, is that the functional design approach has certainly added to the character on site and with its overall flexible well-organized structures offers great potential for change but requires a balanced approach to honor the historical value of the Artillerie Inrichtingen and its architecture. Each student will individually state their position based on this cultural value assessment, which will help to identify the obligations that come with the adaptive reuse of a heritage site. This personal statement will provide the starting point of the future design project. It is important to note that further research into 'plots in the woods' and therefore adjustments of these statements are part of the design process. The aim of these statements is therefore not to limit the students in their design journey, but function as a tool to discover the role and position of a heritage architect in todays practice and to develop a sensitivity that is essential in the process of re-designing.

5. PERSONAL STATEMENTS

5.1 AMANDA VERSCHUUR

PERSONAL STATEMENT

The 'plots in the woods' ensemble immediately stood out for me during the first visit to Hembrug. The ensemble possesses an unique atmosphere and my fascination didn't change after the following visits. The wide-ranging presence of the greenery is not only exceptional within the former military terrain, but also on a bigger scale within the industrial area around Hembrug. Additionally, the buildings in the ensemble positively stood out for me by their small-scale and diversity in shape, function, building technique and orientation.

Following the history of the military terrain during the research showed the efficient and functional approach towards the setup of the site. This is also the case for the 'plots in the woods' ensemble, which is located in the center of Hembrug. All the elements contributing to the unique atmosphere are placed there for a primarily functional reason. The low density of the small-scale buildings creates multiple open spaces between the buildings where the landscape plays a significant role. Containing a lot of greenery, trees, earthen walls and ditches arranged according to the functional logic. These elements were placed for a specific reason and are now characterizing and even unintended beautifying the ensemble. In this report a value assessment is done as group to obtain an understanding of the values present within the ensemble. In my opinion, the following elements contribute in an outstanding positive manner to the character of the 'plots in the woods' ensemble and therefore have the highest significance level:

The various open spaces between the buildings created by the small scale buildings with an obligational buffer zone to minimize the explosion risk causing the open structure of the ensemble.

The exceptional generous amount of greenery within the open spaces leading to an area where the greenery and buildings are interlocked with the landscape as a fundamental element in the set up instead of being added afterwards into leftover spots.

The outstanding facades of the buildings of the gable roof typology (aesthetic and historical value) don't seem to conform to the functionality at first sight with their traditional, almost romantic style. While the interior, with the steel structure seems quite modern for that era.

The shape of the roofs and placement of the windows from the buildings belonging to the shell roof and circular roof typologies. Roof shape shows the historical function and herewith you get an understanding of what was going on within this ensemble.

Diversity within building typologies. Although most of the buildings belong to two typologies; the gable roof and the shell roof, the buildings still have their own characteristics due to variations within their configuration, floor plan and orientation on the site. This leads to an interesting and diverse setting of the buildings within the landscape.

Central position within Hembrug which gives the ensemble a key-role within the revitalization of Hembrug and possibilities to connect and strengthen (and be strengthened by) the surrounding areas. The sightlines throughout the ensemble to the other parts of Hembrug and even to the North Sea Canal make these relations distinguishable to other parts of Hembrug.

Visibility of the history throughout the ensemble (pipelines, building facades and earthen walls). Eye-catching through the entire site, not only in the exterior space, but also within the individual buildings.

To conclude, the plots in the woods can be described as an open structure of a variety of buildings interlocked within the landscape. Although the design of this ensemble, similar to the entire Hembrug, came from a functional approach. Nowadays it will be experienced as quite a romantic scenery which won't be expected to be present within an old military site. It can be interpreted as a green canvas with the different layers embedded on it; the trees, the ditches, the open spaces and the buildings. Underneath these layers there is the history running through the site which is visible throughout the ensemble. The character of the site is highly valued and distinguishes the plots in the woods from the other ensembles on Hembrug.

The challenge for this ensemble will lay in maintaining the current character while re-adjusting the site to accommodate new functions without losing the connection to the past. This means that the interventions which will be taken have to be considered carefully to see the consequences for the site. This due to the fact that there is no empty canvas in the beginning, but already a given canvas which, in my opinion, should function as guideline throughout the design.

With the central position that the 'plots in the woods' possesses the ensemble can play a key role within the revitalization of Hembrug. On ensemble level the main opportunities lie within the interior of the individual buildings and the open spaces between them, which can create new open spaces for the public and make connections between the individual buildings.

5.2 BARBARA DE GROOT

PERSONAL STATEMENT

The 'plots in the woods' can, as the name already says, not be separated into buildings and landscape, but presents a whole. Every type of transformation in this area will have to deal with both aspects and find a balanced approach. The intimate relation between the buildings and landscape derives from the historical function of the site and is therefore unique in its layout in Hembrug, adding historical and rarity value. Originally the greenery was well maintained, but with the closing of the site, the maintenance stopped and the vegetation grew 'out of control'. This caused the original clarity to be lost. Nowadays the natural character of the 'plots' contributes to the biodiversity, to the reduction of the 'urban heat effect' and forms a welcome escape from the busy cities and industry surrounding Hembrug. The cleaning of the topsoil poses a threat towards the current character of the woods, which possesses age value. Therefore, a careful approach when re-designing the landscape is necessary. It poses the dilemma between restoring the original functional lay-out that tells the story of the 'Artillerie Inrichtingen' and the conservation of the present-day character, while contributing to increasing the biodiversity.

While 'the plots in the woods' contains very clear relations between the buildings and landscape within the ensemble, the connection of 'the plots' with the rest of Hembrug is not very clear. The isolated character of the ensemble can be traced back to the times of the 'Artillerie Inrichtingen', when the area was only accessible to the people who worked in the pyrotechnics department. This isolation offers the opportunity to increase the 'uniqueness' of the plots. However, the central position on the terrain and connections to Zaandam and Amsterdam that are necessary to house new functions presents a conflict with this principle. There is a possibility of utilizing the old layout of the roads to maintain or clean out important sightlines, without restructuring all the borders, to bring back the visibility of the 'plots in the woods'. This visibility can help to improve the accessibility and sense of safety when attracting people to the area.

Bringing back functions and life to the site is part of the redevelopment of Hembrug. In line with the spirit of the 'Artillerie Inrichtingen' could be said that without function the buildings have no use. Especially the shell roof and circular roof typologies, built in 1952, offer potential for change because of their building and construction method. Because of this method, the shell roof and circular roof typology form a strong unity on site. This unity was expressed in shape, space and material, but at the same time offered a great diversity, manifested into the many configurations. It offers the opportunity for a designer to play with this concept in the transformation without disturbing the cohesion of the plots in the woods, which is an important obligation.

To conclude, 'plots in the woods' offers almost endless possibilities and qualities. It is up to us as architects to make all these values visible to the public. As David Hockney (2018) states: 'Lots of people just scan the ground in front of them so they can walk, but they don't really look at the things'. The aim of designing is to make people look, really look, so they can enjoy the qualities of Hembrug fully.

Hockney, D. (2018). Hockney-Van Gogh. Two painters, one love. Retrieved April 15, 2019, from https://www.vangoghmuseum.nl/en/stories/hockney-van-gogh-two-painters-one-love

JAN-WILLEM SPEK

PERSONAL STATMENT

The most striking aspect of the plots in the wood ensemble, and in a way in the Hembrug site as a whole, is the functional approach that has consistently been used.

In the larger urban scale of the ensemble as a whole it is this functional approach that defines the complete composition of buildings, landscape and infrastructure. On the scale of the ensemble the most crucial value for me is the low density of buildings and therefore the large amount of space and greenery in between the buildings. This aspect follows directly out of the functional approach to the urban composition while at the same time it is the direct reason for the beautiful, peaceful and natural atmosphere of the area and the uniqueness of the place within the whole of Hembrug.

On the scale of the buildings, this functional approach directly leads to the form of the building as well. The shape of the roof and the construction method that is used is a direct consequence of the function that the building was supposed to take. Within the farm buildings this is seen in the thick, solid walls that carry the loads of the products that were stored there. Within the shell roof buildings it leads to the very efficient but at the same time beautiful concrete structure and a brick facade that deliberately is made 'inferior' to that concrete structure.

All of the most crucial cultural values that I pointed out above have one thing in common. That is the extremely functional idea with which they were made that as an unintended consequence has that it leads to the beauty and uniqueness of the site.

5.4 MINGKE ZHU

PERSONAL STATEMENT

The first day I went to Hembrug, my first impression for the whole Hembrug area was 'hidden'. The 'plots in the woods' is the most hidden space you can access on site. The reason that it is hidden is because of the tall trees, earthen walls and small scale buildings.

I was interested and curious about these unique landscapes. I raised questions to see the how these landscape approach practiced by Artillery Establishment manifest itself in the plots in the woods.

After doing the research, I found these landscapes are rational with old functions. As they make sure the production on site safe. They are very practical way of using nature within the days lack of modern technology. For instance, ditches used as extinguishing equipment and earthen walls as isolation to other buildings in case of explosion. Trees were first built to moderate temperature that it provided shading to the warehouses. During war, more trees grew for camouflage to prevent air strikes. It is no longer a romantic landscape when we first come into the site, but with typical function. Landscape changes shows in every period of the historical development of Hembrug. Ditches came with the newly built test buildings and warehouses. Use in the production is the drive, which takes landscape into its pattern.

Functionality always was one of the key points during the whole lifetime of Hembrug. This is visible on all scales. Besides age value, they all have historical values.

In the future design, I would like to starting with the landscape. Since the unique landscape provide me curiosity to trace back to the old days. Keep its uniqueness, and adding another new layer to give new life to site again.

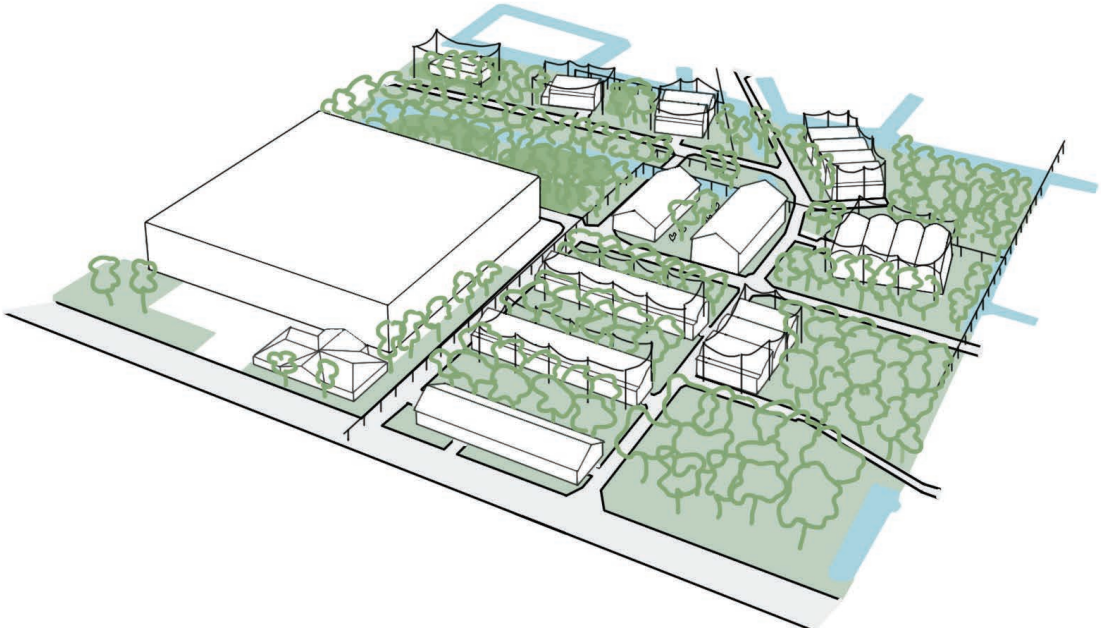
Our site used to be the production area of ammunition. Buildings are in distance to keep safe. But they all belongs to a production line, supporting each other. However, now they are individual workshops. I want to reunion them in new use. Still keep their characteristic of individualism but have relationship with each other. Programming a chain of activities or creating the natural space in between to public space for sharing can be strategies to realize the connection.

Strategy can be used for the built environment. For instance, the solar pool or the cooling pool for energy sustainability. Or water fog, which can collaborate with the romantic and mysterious atmosphere in the woods. Further research should be done on that.

For the buildings. Open floor plan provides flexible use of the space. More possibilities for adding new structures are available in new use. Besides, the construction methods used on the buildings are also valuable. For instance, the truss to support the roof and the iron columns used in the two farm houses provides feeling of light construction. The brick exterior cavity walls and the interior bricks-on-edge-layer also have rarity value for the construction method at that time. The crack on the wall to display the passing of time. It is a curtain kind of beauty in decayed state of the building.

5.5 VALERIE ARNTZ

PERSONAL STATEMENT



When visiting the Hembrug site for the first time certain elements immediately feel important, for example the bewildered green and the interesting shell roofs. While analysing the Hembrug site and the ensemble 'plots in the woods', more and more elements and relations were discovered, but there are two overall themes. Nearly all decisions were made based on the functional aspects of the production of the munition and interesting enough this led to the looks of an estate. A lot of green in chambers, where the buildings and the landscape compliment each other.

In the larger scale of Hembrug, I value the highest that the site was originally enclosed. It had a connection to the Plofbos in the north and the entrance on the south, because this is how the whole ensemble functioned. For example this is still visible in the ditches. However, the new connecting road to the west creates a dilemma and I believe that the enclosed value should be brought back. This has a higher value than for example connections to all the ensembles on Hembrug. Being a part of this big complex area creates most of the dilemmas for the site and should be carefully addressed.

On the ensemble scale, the word functional pops up many times. The landscape is functional, the set-up of the buildings with the specific direction and freestanding is functional, the many changes made over time were just pragmatic and the relation between the buildings is relatable to the production process: also functional. This is why I value the functionality of the site very high. A lot of the elements on the site are related to this and a lot of them are still intact. For example the steam pipes and lightning rods, although they give guidance and structure to the plot, they are not in use anymore. Also the influence of time creates a dilemma, the functional green that changed into bewildered green or the deterioration of the buildings that give a certain atmosphere. Do you want to tell the story of the Artillerie Inrichtingen or the story until now? I believe that the abandoned time of the Hembrug is also very valuable and we are obligated to tell the story as a whole.

On the more detailed scale I value the contrast between inside and outside, the inwards and upwards orientation, the open omni- directional floor plan and the still visible aspect of protected working very high. This is all because of the way they worked with munition and are telling elements of the past. They also make the buildings, together with the flexible construction, without freestanding columns or loadbearing walls, perfect for a future function with a lot of natural daylight. But on a more detailed level, the biggest dilemma is finding a way to insulate the buildings without losing their character.

In conclusion, the 'plots in the woods' is an originally very functional ensemble with the looks of an estate. The story of the production of munition is still nearly complete, the buildings are mostly original and it is a natural green haven with a lot of opportunities. The biggest dilemma will be to prepare the ensemble for the future while having the obligation of not losing the story of what happened.

5.6 MARJAN SADEGHI

PERSONAL STATEMENT

During this project, we started to understand the transformations in Hembrug, both in the whole area and in the individual buildings during time. While researching and learning about this history, I found a fact, which was really interesting and important to me: every development and design in this area was made based on a specific functionality.

As an example, zooming in into Plots in the wood, most of the building were built in small scales, due to the limitation of the concentration of explosives. The open spaces between the buildings had a safety role. Even the trees were planted to provide shading, to adjust the temperature for the warehouse store explosion mixture. All the elements, from the man-made and landscape, had a role in the functional system of the area.

Moreover, the elements in the area have a monumental status, which gives them a cultural and historical value that should be preserved. There are some trees, almost over 80 years old; the pipelines, which are a part of the military history, as well as the earthen walls and the lightning decoys.

Although, today these elements lost their functionality, the traces of the history can be found in them. The world war period is a significant part of the history. The employees worked hard in the factories, to provide the military needs in order to protect people. From my point of view, buildings and areas represent what happened in them, in the past. Therefore, the historical character of this area, has a significant importance to me, which I believe should be preserved.

Besides, after the absence of the military, the natural infrastructure has been growing, and after years, spread all over the area, especially in Plots in the wood, which brought a new value to the area. Nowadays, this greenery creates a quiet and peaceful atmosphere, which is a part of the character of this area and should be preserved along with the historical and cultural elements mentioned before.

In my opinion, every renovation and new functionality in this area should be based on preserving these values of the area, and even enhancing them. I would like to emphasize this issue in my project, and do some further research about it.

5.7 LUCAS POL

PERSONAL STATEMENT

After having done the research now, for the larger context and the more specific ensemble 'plots in the wood', my view of the area has changed. Initially I chose for the 'plots in the woods' for the serene and quiet forest with a lot of buildings hidden within the trees. This forest with its unique atmosphere however has, as we discovered quite quickly during the research, a lot of layers that give it meaning. The overgrown and wild character of the site is mostly because of neglect during the years that the site was not used. The landscape, as well as the buildings, used to be purely functional, practical and strictly maintained.

The greatest strength of this ensemble lies in the fact that both the buildings, including their utility structures, and the landscape act as an ensemble. From the very beginning, landscape elements like the trees, earthen walls have been placed in unison with the buildings. The buildings were carefully placed with certain distances in between them. These things are all related to the activities of the military industrial functions of the site. The main activities that the buildings were used for production of projectiles, assembly of the munition and finally storing the munition. These activities happened roughly from the south end of the site then moving north, eventually towards the clay-forest named Plofbos were the munition would be tested. This explains the position, direction, and elements around all the buildings.

The buildings themselves, because of their industrial purpose, have mostly single large open spaces that can be used for several purposes. The buildings, back then, were used quite flexibly. Places for producing changed frequently and depended on the specific order the company got. The flexibility also works height wise; It is very easy to add another level within these buildings. This needs to be done with nuance however because all the buildings were designed with the intention of getting daylight from higher up. This was apparent in one of the shell roof buildings, building 417, were another floor was added. This created a great office space but greatly declined the quality of space below. This flexibility is a high quality for the different buildings on site. Most of these buildings have elements like large glass panes that can provide a lot of daylight and provide views towards the Plofbos. These elements, like some of the windows, were designed with the idea that they might for example blow out during an explosion. This makes the buildings quite modular.

It is important to mention the largest building on site, with its low-slope roof, because it does not seem to fit but has great potential to add to the site. It does have a place in the story of the site. It is the newest building on site, because of its large spans and open spaces it can be used for big and small scale activities. It used to function as a multi-purpose production hall, currently it is used for events. It has the potential to act as a central public function for the whole site. It is important to keep the developments like the redesign for the munition factory along the water by OMA and the Yada Yada Market that already focus on wider areas in mind. The building could almost be regarded and treated as part of the landscape for future use, because of its size. Its closed character needs to change for that to happen.
Finally, the buildings on site all have detailing that do not help to create a pleasant inside climate, because of its former industrial function but also safety reasons from that time. They are quite modular, so it is clear what to replace and what to leave, as the structures are made to last changes within the spaces of the buildings. A lot of things like the walls, especially, in the buildings from after World War II can be relatively easily replaced to improve the qualities of these buildings on several levels.

The Plofbos is not part of the site. It is separated by ditches from the site. This forest that used to have different chambers of sorts for testing. These chambers used to be clearly defined by, the paths with tree lanes, ditches and finally by the earth walls with green on and around to provide protection from the explosives handled in the structures within. This clear layout has mostly disappeared and is hard to distinguish just like a lot of places around the buildings on site. The green of the Plofbos and the 'plots in the wood' seem to have become one thing.
A lot of the structures in the Plofbos are in ruins and in a poor state. Elements present in "plots in the wood" but do not hold their original function, or any at all for that matter. They can now be described as follies in this forest acting as in an English landscape park. The site with traces of its former clarity that made it so unique, where these follies and buildings have been placed within, creates views that peak interest and refers to the story on the site.

To redevelop the site, a top down approach is necessary, especially this area. The buildings and landscape work as an ensemble, so should be restructured, at least in its first stages. This is not to discount the bottom up approach that was used for the site up to now as per the masterplan of Palmbout. This has worked well for attracting people and developers to the site again. The 'plots in the wood' area has a lot of, mostly vertical, rhythms, textures and structures from different time periods that manage to create a sense of unity and create an atmosphere for the site and the buildings, but these need to be ordered and restructured for it to be able to sustain in the future. The cleaning of the soil creates a first step for this in a way.

6. BIBLIOGRAPHY

LITERATURE

Actueel Hoogtebestand (2019) Retrieved on 11 March, 2019 from http://ahn.arcgisonline.nl/ahnviewer/

Artillerie Inrichtingen Hembrug. (2019, March 19). Hoe ons leger aan zijn bewapening komt. Retrieved April 12, 2019 from https://artillerieinrichtingenhembrug.wordpress.com/2019/03/19/hoe-ons-leger-aan-zijn-bewapening-komt/

Artillerie Inrichtingen Hembrug (2018, March 31). AI Hembrug - Herinneringen uit de havenbuurt. Retrieved March 26, 2019 from https://artillerieinrichtingenhembrug.wordpress.com/tag/trotylgieterij/

Artillerie Inrichtingen Hembrug. (2019, 21 januari). KRUITHUISJE ONTPLOFT. Retrieved April 2, 2019 from https://artillerieinrichtingenhembrug.wordpress.com/2019/01/21/kruithuisje-ontploft/

Brethouwer, D. H. G. (1937). Constructie van Brisantgranaten. Retrieved from https://www.militairespectator.nl/sites/default/files/bestanden/uitgaven/1937/1937-0352-01-0110.PDF

Dienst Welzijn, Economie en Bestuur, Cluster monumentenzorg en archeologie, Goudeau, J. J. W., & Van der Kleij, E. (1996). Hembrugterrein te Zaandam: Cultuurhistorische inventarisatie en beschrijving van de monumentale waarden in hoofdlijnen. Haarlem, Nederland: Provincie Noord-Holland.

Ecologisch Adviesbureau B. Kruisen. (2004) Natuuronderzoek Hembrugterrein in 2003 toetsing Flora en Faunawet. Zaanstad, Nederland.

Finaly, I., Kooiman, M. A., & Prins, L. (2000). Cultuurhistorische verkenning Hembrugterrein Gemeente Zaanstad. Zeist, Nederland: Rijksdienst voor de Monumentenzorg.

Goossens (2007). Het Staatsbedrijf der Artillerie Inrichtingen: Factsheet gebouwen Hembrug (2018)
Huijben, F., Herwijnen, F., Nijsse, R. (2011) Concrete shell structures revisited: Introducing a new 'low tech' construction method using vacuumatics formwork. International Conference on Textile Composites and Inflatable Structures. Structural Membranes.

Hembrugterrein.com. (n.d.). Retrieved April 15, 2019, from http://www.hembrugterrein.com/jouw-event/evenementen-locaties/blackbox/

Joostdevree.nl (2019) Retrieved from http://www.joostdevree.nl/shtmls/beton.shtml. Consulted on March 21, 2019
Koninklijke Militaire Academie Breda (1935). Handboek voor den soldaat

Koen, D. T., & Visser, A. R. (2003). Cultuurhistorische inventarisatie en beschrijving van de monumentale waarden van de gebouwen op liet fabrieksterrein van Eurometaal NV. Zeist, Nederland: Rijksdienst voor de Monumentenzorg.
Kruit, P. (2019). Artillery Establishments Hembrug, Retrieved on March 25, 2019 from https://artillerieinrichtingenhembrug.wordpress.com/

Kuipers, M. and Jonge, W. (2017) Analytical Mapping, Designing from Heritage, pp.72-97, Retrieved on 10 April, 2019

Kuipers, M., & De Jonge, W. (2017). Designing from Heritage: Strategies for Conservation and Conversion. Delft, Nederland: TU Delft.

Het Legermuseum (n.d.). De Nederlandse handgranaat na 1815: deel 1 de periode t/m 1918. Retrieved March 20, 2019 from http://www.militairmagazijn.nl/wapens/armamentaria/artikel/wapens_armas_xml_114daa68-f212-445d-9c59-da9b9fdba9ef/

Het Legermuseum (n.d.). De Nederlandse handgranaat na 1815: deel 2 de periode 1918-1940. Retrieved March 20, 2019 from http://www.militairmagazijn.nl/wapens/armamentaria/artikel/wapens_armas_xml_1c9cc138-3ce7-4e9e-a395-f92d3b0202a4/

Het Legermuseum (n.d.). Nederlandse tijd-, schok- en nabijheidsbuizen in de collectie van het Legermuseum. Retrieved March 20, 2019 from http://www.militairmagazijn.nl/wapens/armamentaria/artikel/wapens_armas_xml_e72e8230-163f-427b-a40a-5f2a267d32a8/

Nationaal archief (2019a) 2.13.86 nr. 2672. Retrieved March 12, 2019

Nationaal archief (2019b) 2.13.86 nr. unknown. Retrieved March 12, 2019

Het Nationaal Militair Museum (2012/2013). Brisantgranaatkartets: 75 x 277R, voor Nederlandse kanonnen van 7 veld, doorsnede. Retrieved March 20, 2019 from https://www.nmm.nl/zoeken-in-de-collectie/detail/258212/

Het Nationaal Militair Museum (2012/2013). Nederlands percussie slaghoedje met gekroonde W. Retrieved March 20, 2019 from https://www.nmm.nl/zoeken-in-de-collectie/detail/467686/

Nederlandsche Maatschappij voor Havenwerken (1950) Hembrug Artillerie
Inrichtingen. Bestektekeningen gebouw E.

Palmbout. (2015). Hembrug-Terrein Zaanstad. Ruimtelijke visie en ontwikkelingsstrategie voor een voormalig militair productieterrein.. Retrieved from https://brightspace.tudelft.nl/d2l/le/content/124973/viewContent/1214346/View

Peverelli, L. (2011). Dooshandgranaat. Retrieved March 20, 2019 from https://www.lexpev.nl/grenades/europe/netherlands/dooshandgranaat.html

Projectbureau Hembrug (2018). Hembrug: Portfolio Hembrug Zaandam - Factsheets. Retrieved from www.hembrugontwikkelt.nl

SV de Vrijheid Haarlem (2011). Munitie testen en sorteren. Retrieved from https://www.schiettechniek.nl/system/files/pdf/munitie_testen_en_sorteren.pdf

SteenhuisMeurs BV. (2010). Hembrugterrein - Zaanstad CULTUURHISTORISCHE ANALYSE. Retrieved from http://www.hembrugterrein.com/wp-content/uploads/2016/04/Historie-Hembrugterrein-web.pdf
SteenhuisMeurs BV (2). (2016). Hembrugterrein Zaanstad Gebiedspaspoorten en omgevingsplan. Schiedam, Nederland.

Studio M10 (2017) Aanvraag omgevingsvergunning. Gebouw 415 Hembrug, Zaandam.
Tang, G. (2015) An Overview of Historical and Contemporary Concrete Shells, their Construction and Factors in their General Disappearance. International Journal of Space Structures, 30(1), 1-12.

Tijdreis (2018), Retrieved on 19 March, 2019 from https://www.topotijdreis.nl/

Wiechen, J. A. van (1977). Driehonderd jaar munitie voor de Nederlandse Artillerie. Retrieved from https://www.militairespectator.nl/sites/default/files/bestanden/uitgaven/1977/1977-0279-01-0073.PDF

Wielenga, M. (2016). De ontwikkeling van de moderne granaten. Retrieved March 20, 2019 from https://wereldoorlog1418.nl/vuurkracht/03granaten.html

Wielenga, M. (2016). Springstoffen: vroeger en nu. Retrieved March 20, 2019 from https://www.wereldoorlog1418.nl/vuurkracht/02springstoffen.html

IMAGES

Post acoustics. (n.d.). Retrieved April 15, 2019, from https://www.postacoustics.nl/contact/bpodium-hembrug2/

Beckers, B. A. S. (n.d.). Post acoustics. Retrieved April 15, 2019, from https://twitter.com/hetprojectburo

Post acoustics. (n.d.). Retrieved April 15, 2019, from https://twitter.com/hetprojectburo



Photo by Mingke Zhu

PLOTS IN THE WOOD

P1 APPENDIX

APRIL 15TH 2019

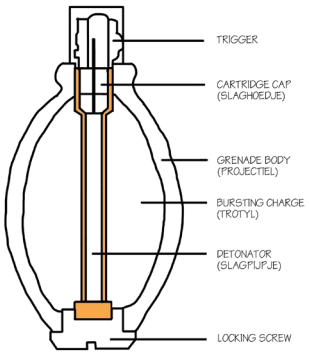
7. APPENDIX

Made by Valerie Arntz

2.5 MUNITION
PRODUCTION PROCESS EXPLAINED PER STEP



SCHERPE EIHANDGRANAAT NO. 1





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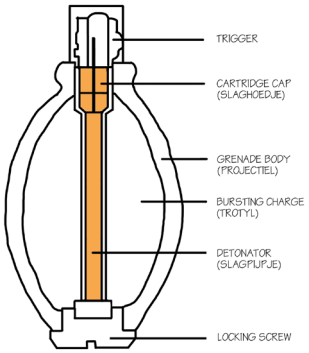

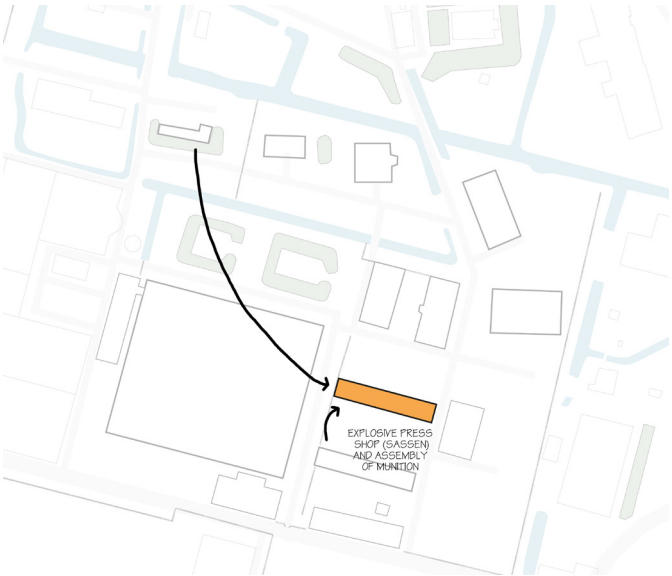

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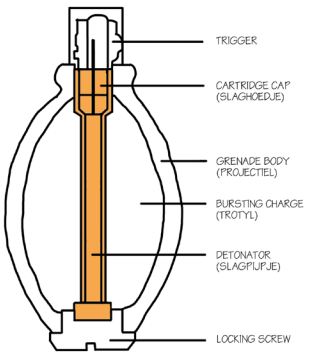

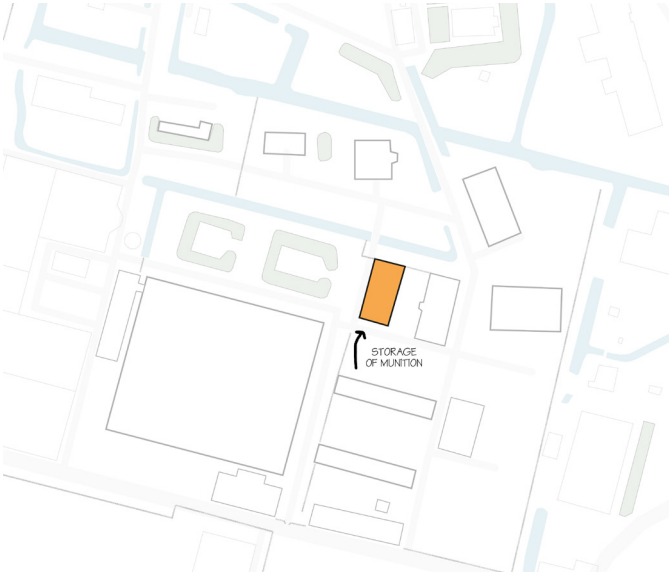

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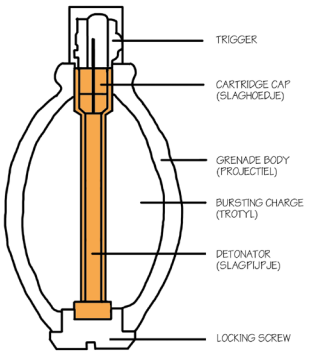

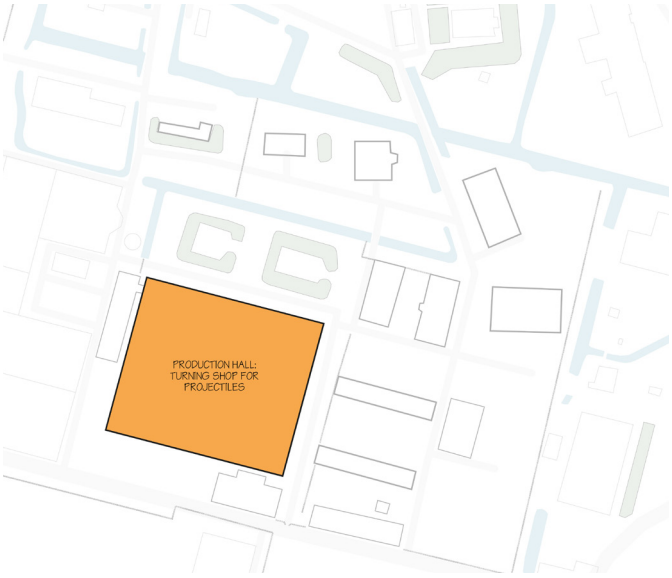

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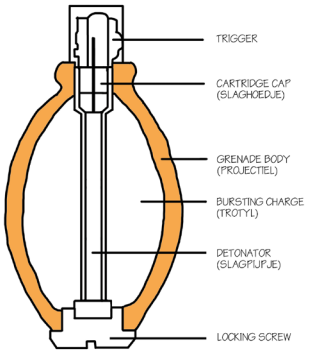

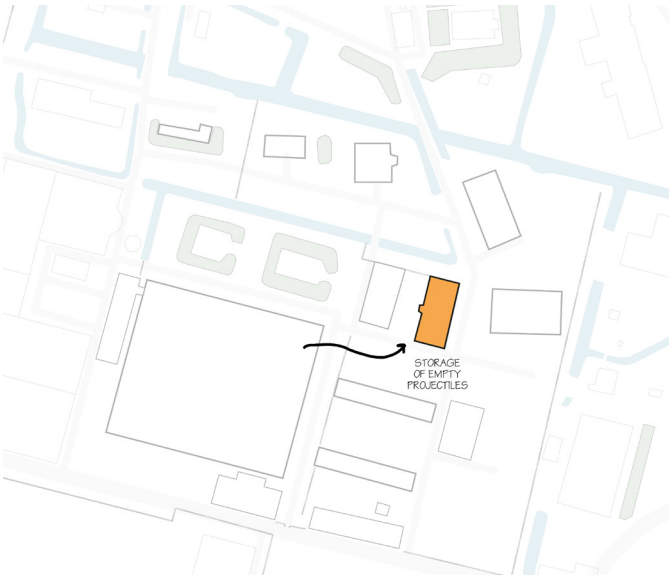

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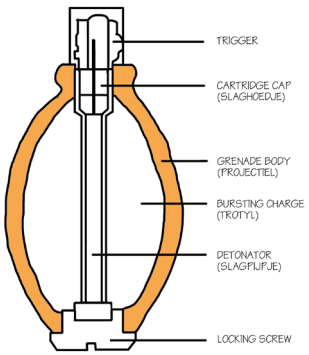



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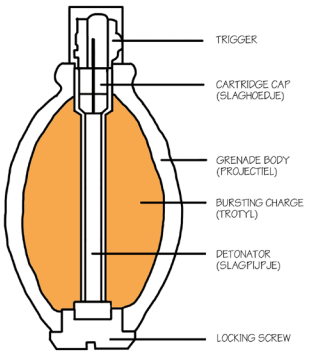

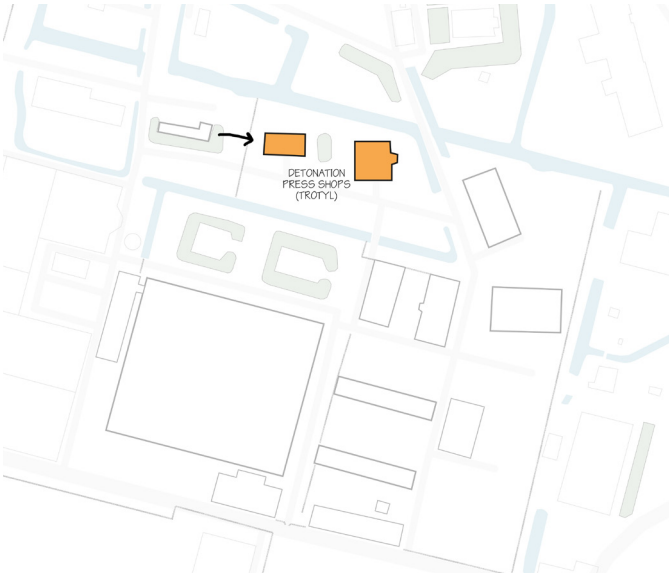

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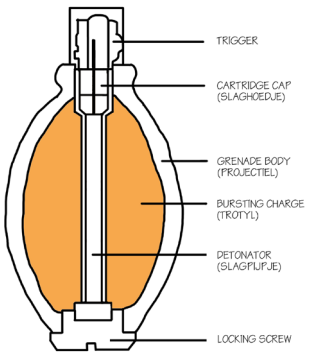

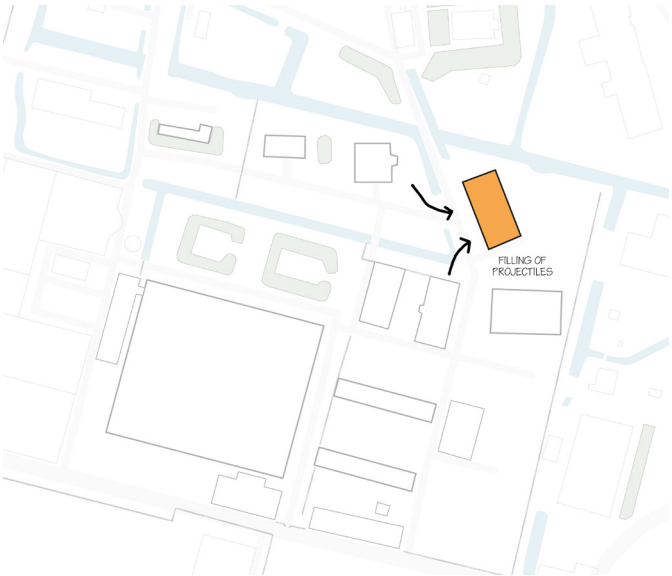

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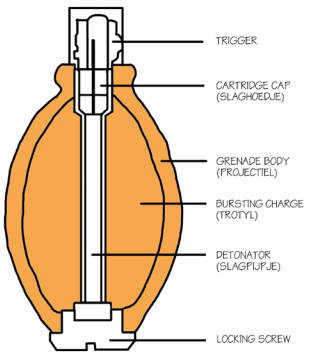

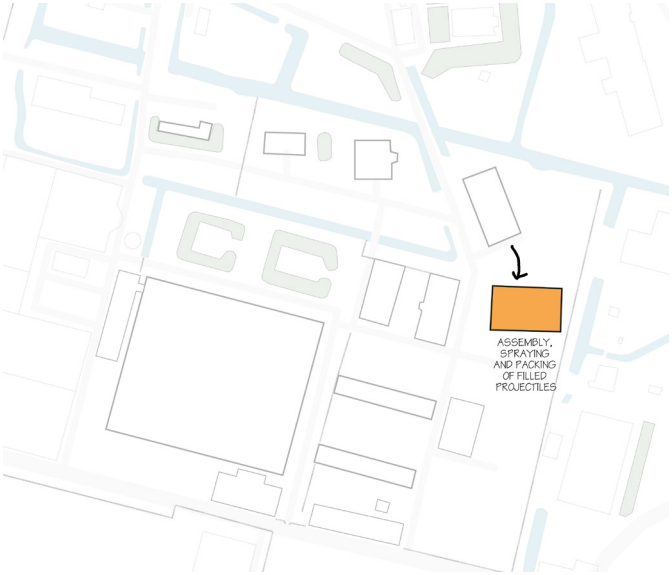

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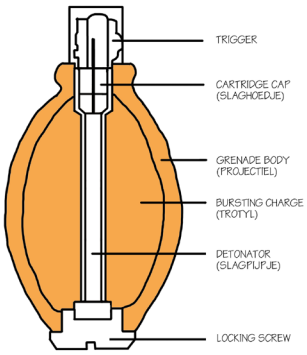

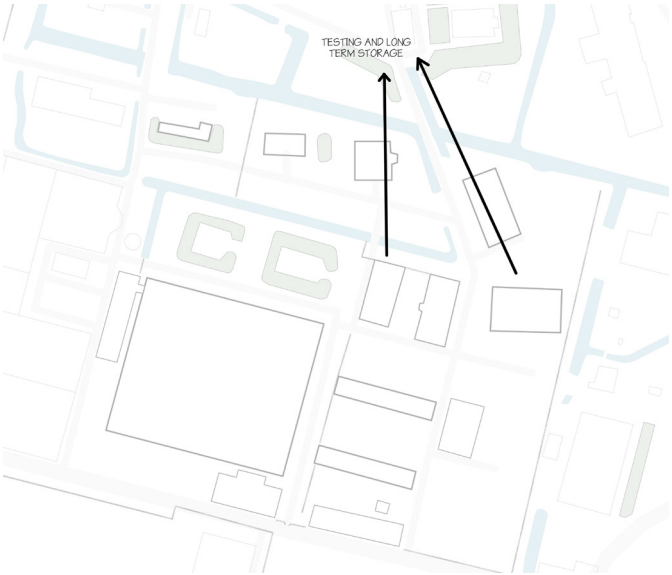

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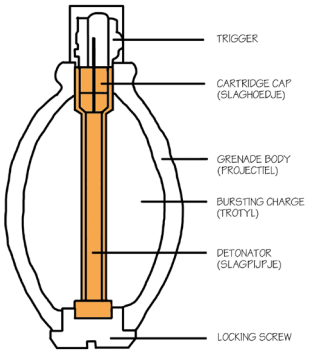

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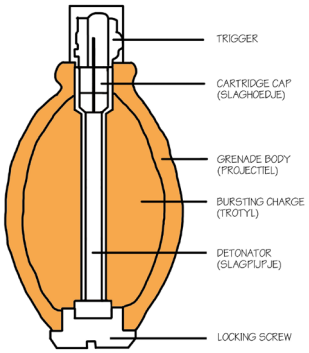
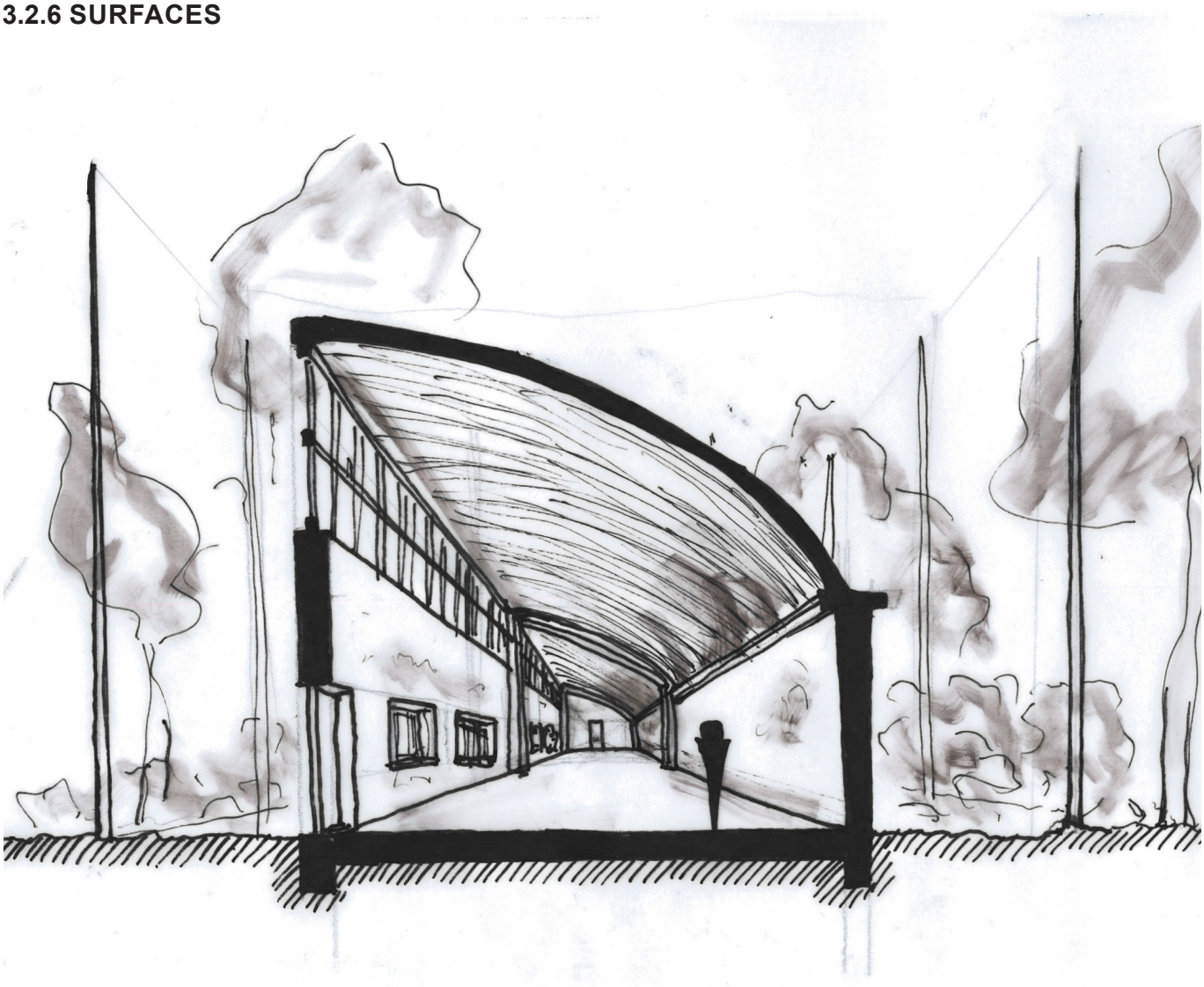


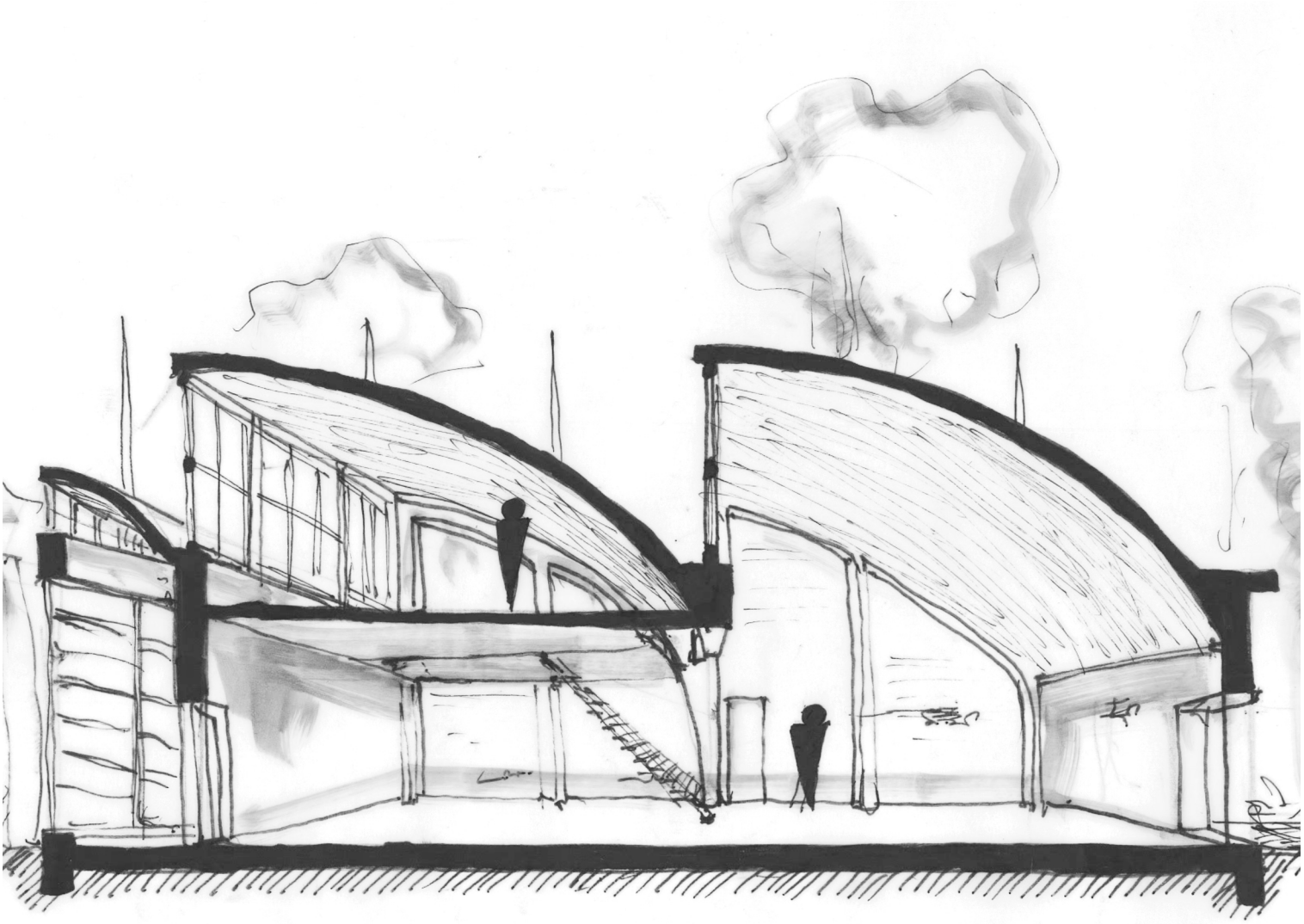
3.2.6 SURFACES



Perspective section of building 420, scale 1:100. Image by Lucas Pol.



Photo of a longer shellroof building with trees and lighting rods as part of the design. Photo by Lucas Pol.



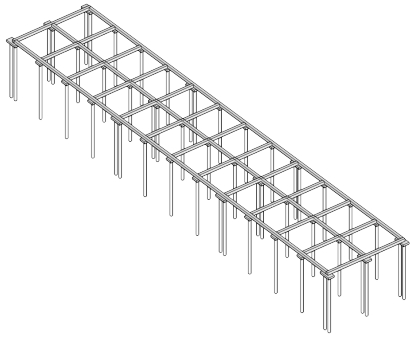
Perspective section of building 417, scale 1:100. Image by Lucas Pol.



Back of the building aimed towards the Plofbos, just like the office space in one of shells of this building. Photo by Lucas Pol.

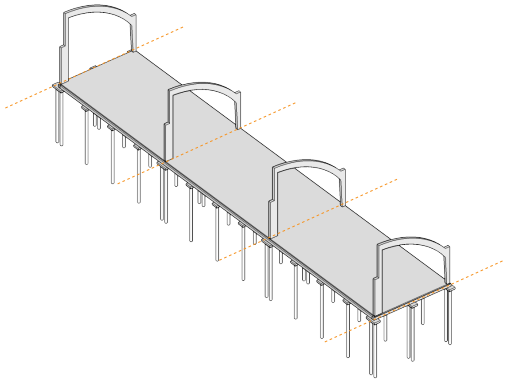
3.3.3 STRUCTURE
BUILD-UP ORDER BUILDING SPECIFIC

BUILDING 415 / 420



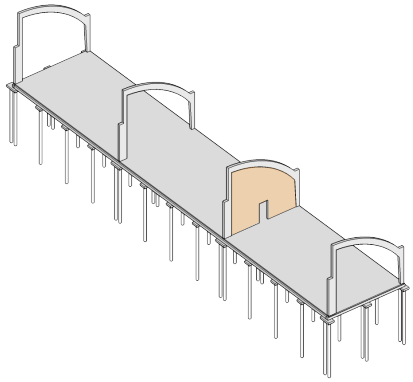
step 1

Concrete foundation piles with concrete foundation beams



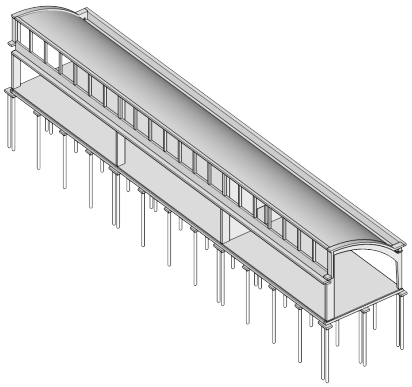
step 2

In-situ poured reinforced concrete arches.



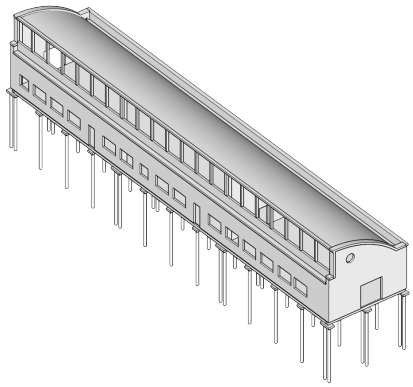
step 3

Reinforced concrete interior walls added. This wall isn't there in the current situation anymore.



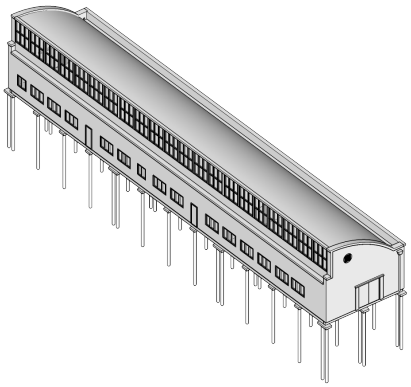
step 4

Reinforced concrete roof shell poured in-situ.



step 5

Brick facades build up.



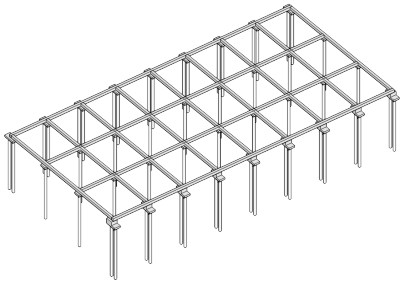
step 6

Windows, doors, rainpipes and other installations added.

All images on this page made by Jan-Willem Spek

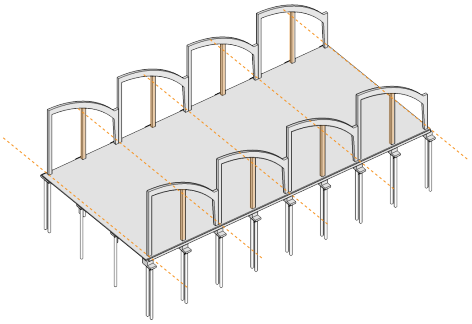
BUILD-UP ORDER BUILDING SPECIFIC

BUILDING 416



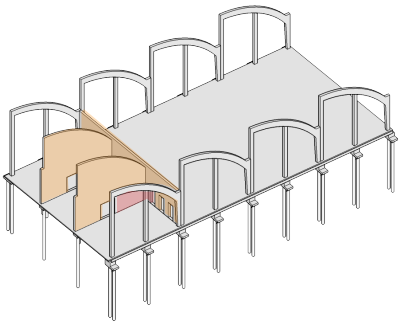
step 1

Concrete foundation piles with concrete foundation beams



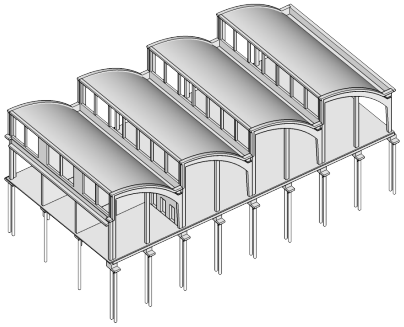
step 2

In-situ poured reinforced concrete arches. Extra reinforced concrete column are added.



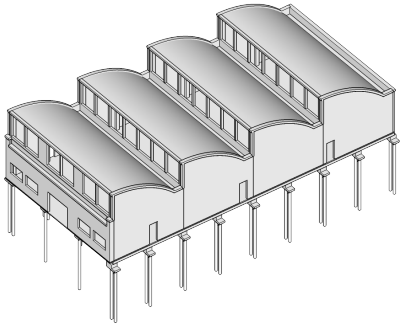
step 3

Reinforced concrete interior walls added.



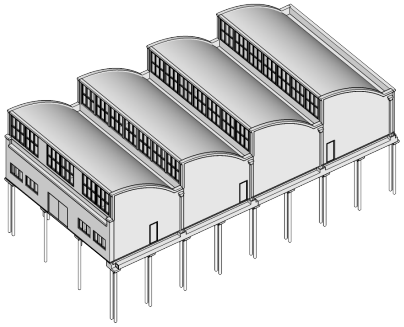
step 4

Reinforced concrete roof shells pouren in-situ.



step 5

Brick facade build up.



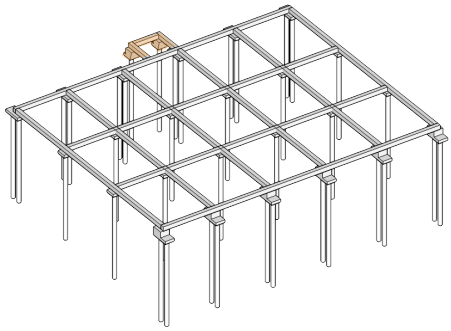
step 6

Windows, doors, rainpipes and other installations added.

All images on this page made by Jan-Willem Spek

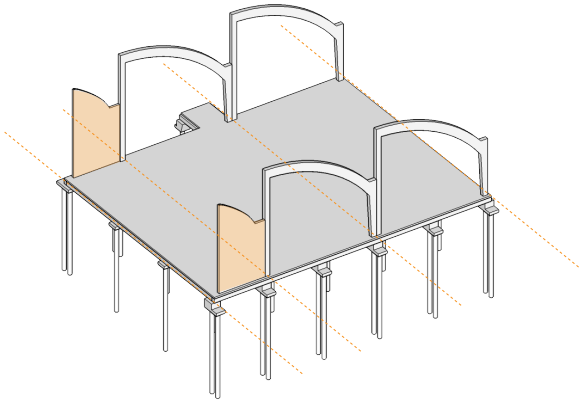
BUILD-UP ORDER BUILDING SPECIFIC

BUILDING 417



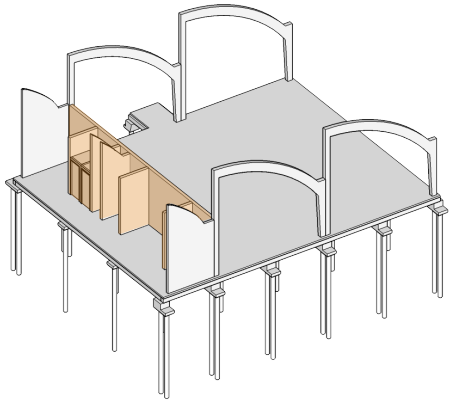
step 1

Concrete foundation piles with concrete foundation beams



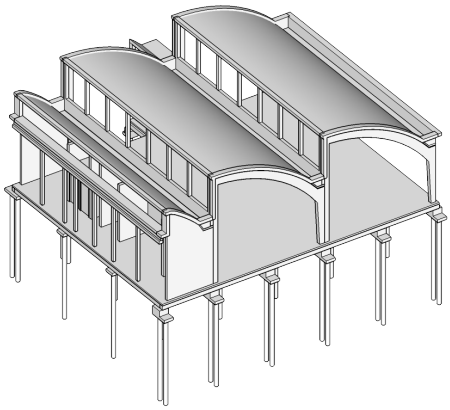
step 2

In-situ poured reinforced concrete arches and walls.



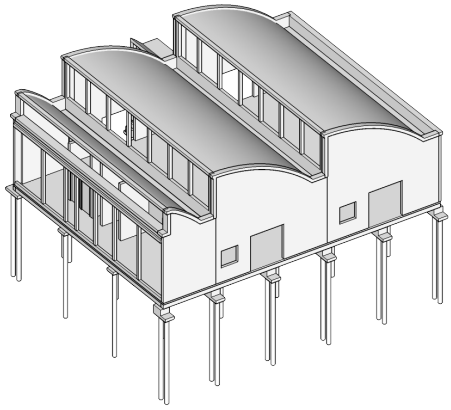
step 3

Reinforced concrete interior walls added.



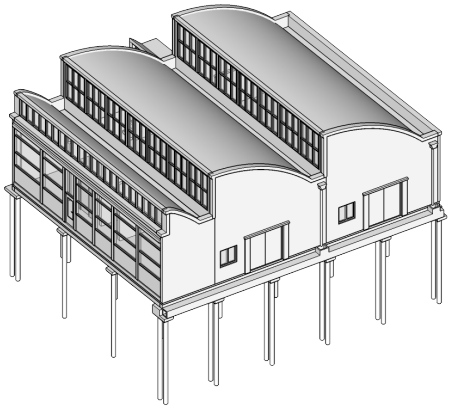
step 4

Reinforced concrete roof shells poured in-situ.



step 5

Brick facade build up.



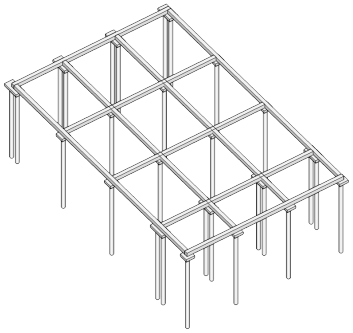
step 6

Windows, doors, rainpipes and other installations added.

All images on this page made by Jan-Willem Spek

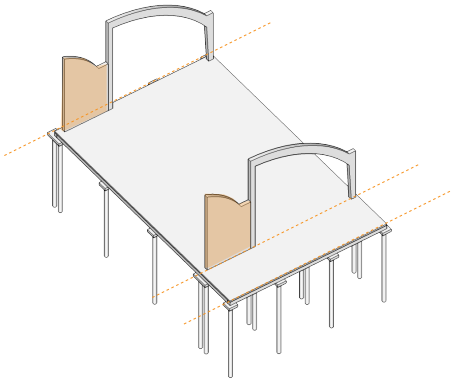
BUILD-UP ORDER BUILDING SPECIFIC

BUILDING 418



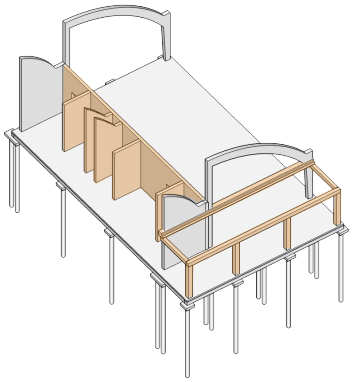
step 1

Concrete foundation piles with concrete foundation beams



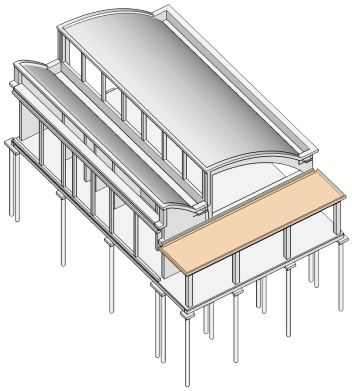
step 2

In-situ poured reinforced concrete arches and walls. Reinforcement ends sticking out for further attachments



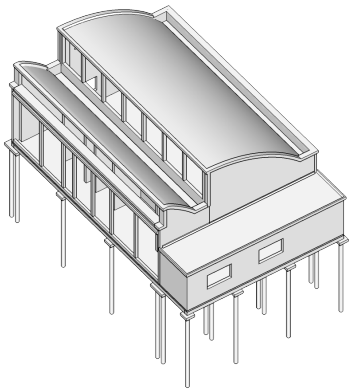
step 3

Reinforced concrete interior walls and columns and beams added. Reinforcement of arches (step 2) poured in.



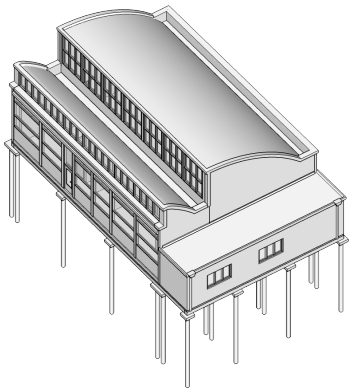
step 4

Reinforced concrete roof shells poured in-situ.



step 5

Brick facade build up.



step 6

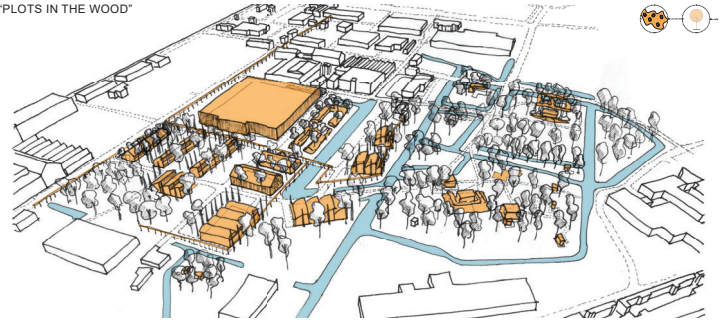
Windows, doors, rainpipes and other installations added.

All images on this page made by Jan-Willem Spek

P1: GROUP PRESENTATION

“PLOTS IN THE WOOD”

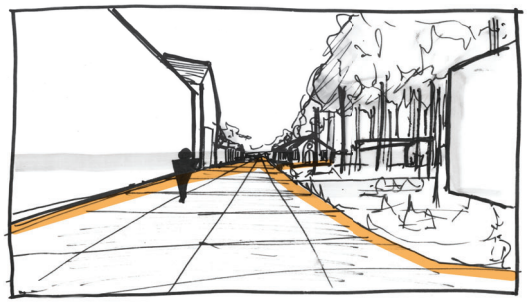
“PLOTS IN THE WOOD”



How does the functional design approach practiced by the ‘Artillerie Inrichtingen’ manifest itself in the ‘plots in the woods’?

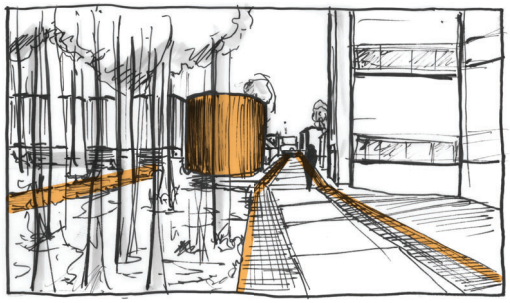
Birdseye perspective of the ‘plots in the wood ensemble’.

1.1 ELEMENTS



View along the main axis of Hembrug with the ‘plots in the wood’ site on the right, this is also the south border of the project site.

VIEW TOWARDS THE CANTINE



After walking all the way around the site one looks towards the water and the schaftlokaal past the water reservoir.

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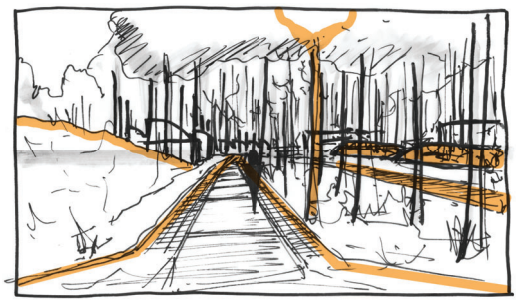
‘PLOTS IN THE WOOD’



Looking the other way one can see the whole area of ‘plots in the wood’ with the buildings almost completely hidden away by the trees. The most important landscape elements are trees, the ditch and the earthen walls.

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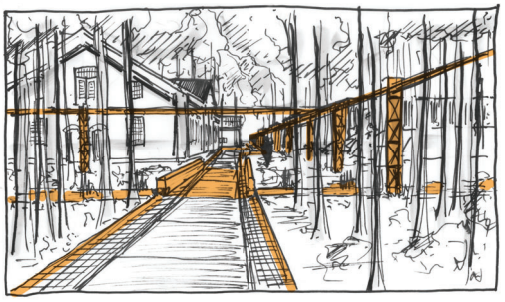
LOOKING TOWARS THE WATER



Walking further on to the site one comes across a bridge, from this spot you can see the water of the Noordzeekanaal. This view is looking past the bridge over the ditch past the pipe lines.

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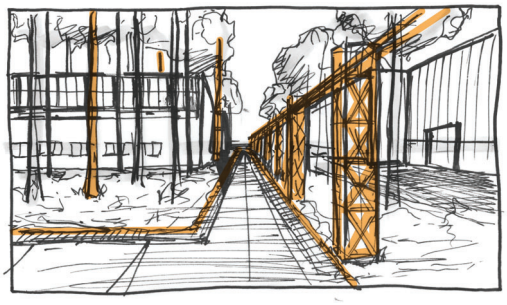
LOOKING TOWARDS THE WATER



Walking along this axis buildings with lighting rods and trees around appear allong the road.

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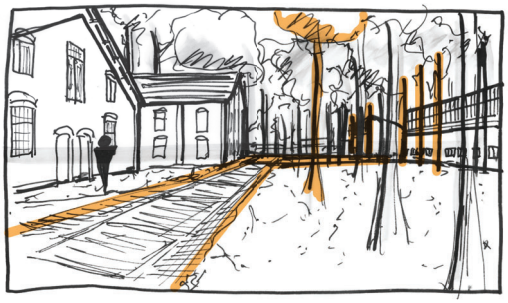
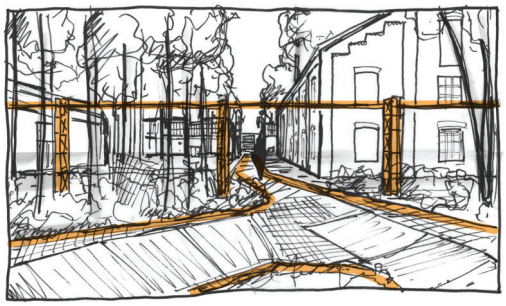
INBETWEEN FARMS AND THE LONG SHELL BUILDINS



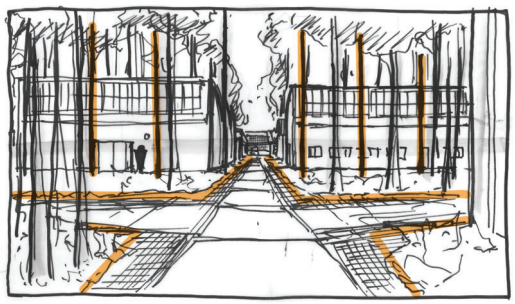
Allong the same road when one looks to the direction of the cape, looking past the farms and the longitudinal shell buildings inbetween the trees and lighting rods.

VIEW OF THE AMMUNITION FACTORY



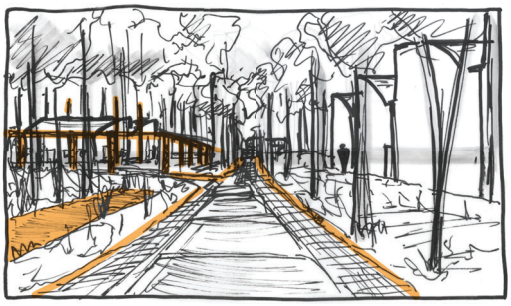
After walking back towards the forest and then past the farms on has a view of the ammunition factory at the end of the road.

VIEW OF THE AMMUNITION FACTORY



Along this path the iconic shell buildings with their accompanying lighting rods and trees appear, they have outgrown the lighting rods by now.

INTO THE PLOFBOS



Finally the view of the plofbos to conclude the route, looking allong an axis with tree lanes, currently is the plofos unaccessible, the ditches seperate the islands of the plofbos. All the green on site was heavily maintenanced, so they would not loose their purpose.

1.2 FUNCTIONAL LANDSCAPE

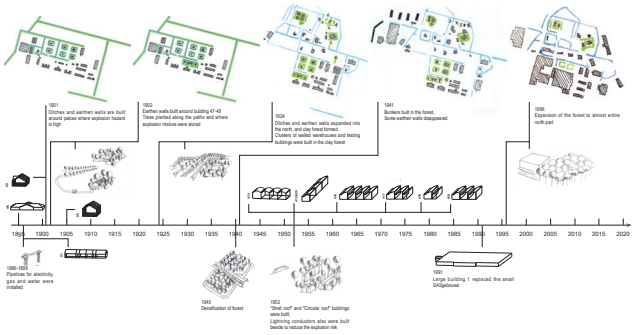


"On the night of Dec. 31st 1934, an unknown cause explosion happens in the department of defence. Roof made of very light material can be easily released by the explosion. During explosion, vinyl, iron doors, brick exterior walls completed removed. Concrete wall remained intact. No fire broke out, and no other building broken."

——Military Establishment Hembrug

Sketches explain the use of the landscape

1.3 OVERVIEW



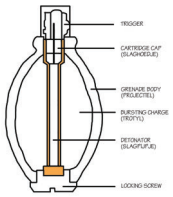
Timeline of all the elements and buildings developed in the plot of woods

1.4 PRODUCTION PROCESS



Production of munition parts: shocktubes, detonators and cartridge caps.

SCHERPE EIHANDGRANAAT NO.1

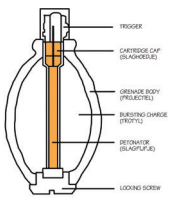


1.4 PRODUCTION PROCESS

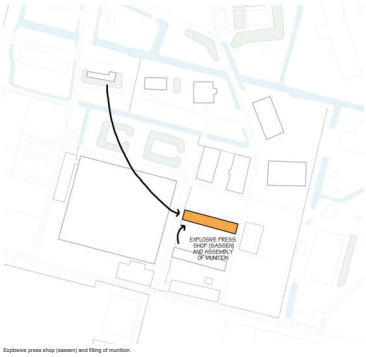


Explosives for the detonator.

SCHERPE EIHANDGRANAAT NO.1

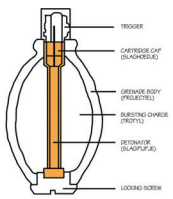


1.4 PRODUCTION PROCESS



Explosive press shop (saagen) and filling of munition.

SCHERPE EIHANDGRANAAT NO.1



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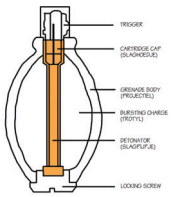
1.4 PRODUCTION PROCESS



Storage of munition. This is put into the hand grenade at the moment the grenade is thrown.

SCHERF'E EIHANDGRANAAT NO.1



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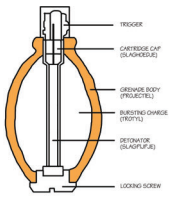
1.4 PRODUCTION PROCESS



Productionhall: turning shop for projectiles.

SCHERF'E EIHANDGRANAAT NO.1



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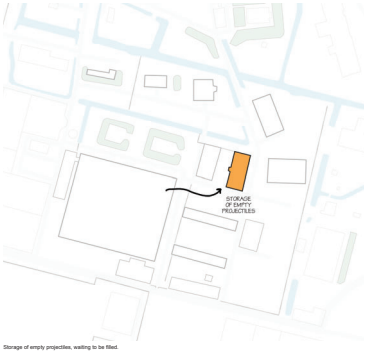
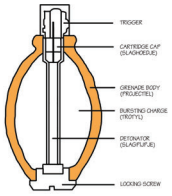
1.4 PRODUCTION PROCESS



Storage of empty projectiles, waiting to be filled.

SCHERF'E EIHANDGRANAAT NO.1



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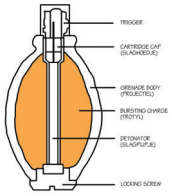
1.4 PRODUCTION PROCESS

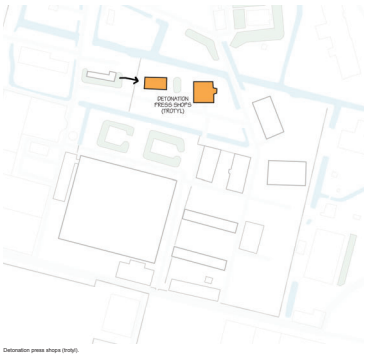


Bursting charge storage

SCHERF'E EIHANDGRANAAT NO.1

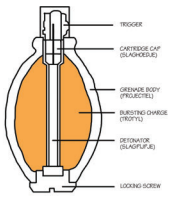


1.4 PRODUCTION PROCESS

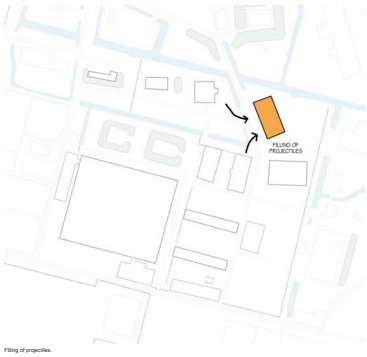


Detonation press shops (trotyl).

SCHERF'E EIHANDGRANAAT NO.1

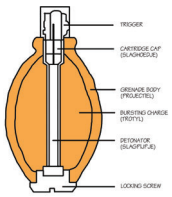


1.4 PRODUCTION PROCESS

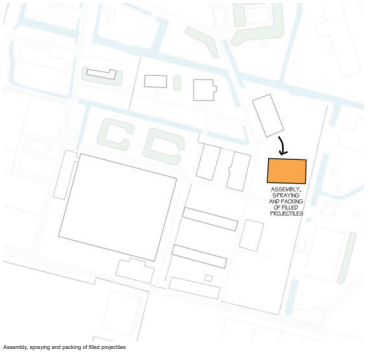


Filling of projectiles.

SCHERF'E EIHANDGRANAAT NO.1

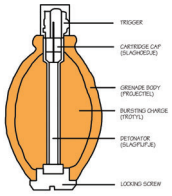


1.4 PRODUCTION PROCESS

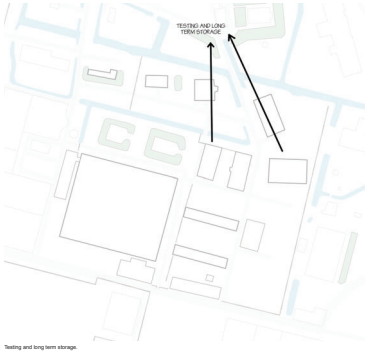


Assembly, spraying and packing of filled projectiles

SCHERF'E EIHANDGRANAAT NO.1

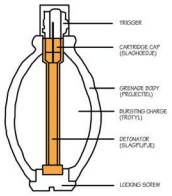


1.4 PRODUCTION PROCESS



Testing and long term storage.

SCHERF'E EIHANDGRANAAT NO.1



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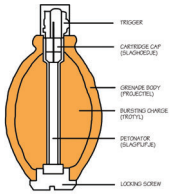

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1.5 SET-UP OVER TIME: 1901



Situation in 1901: The start of the production of pyrotechnics.

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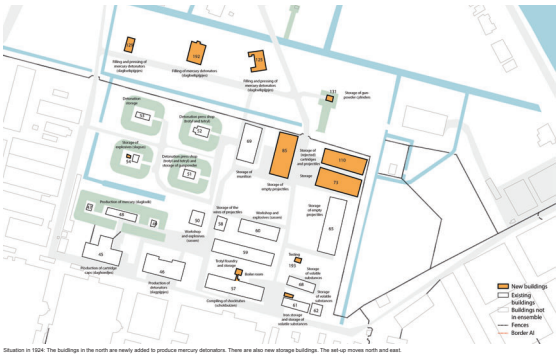
1.5 SET-UP OVER TIME: 1924



Situation in 1924: The buildings in the north are newly added to produce mercury detonators. There are also new storage buildings. The set-up moves north and east.

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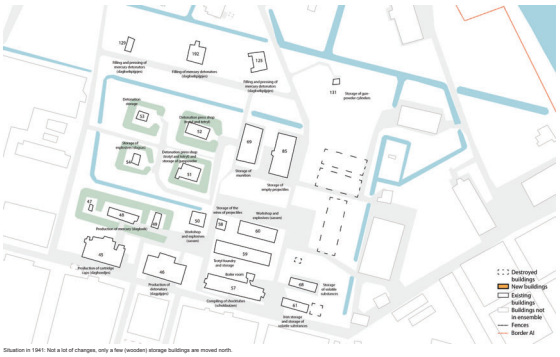
1.5 SET-UP OVER TIME: 1941



Situation in 1941: Not a lot of changes, only a few (wooden) storage buildings are moved north.

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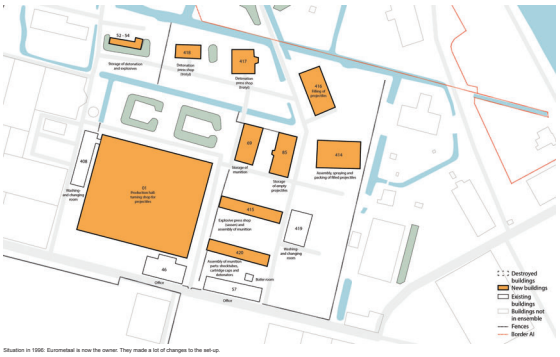
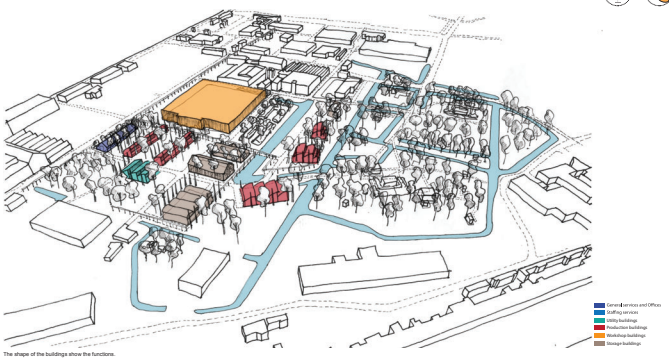
1.5 SET-UP OVER TIME: 1996



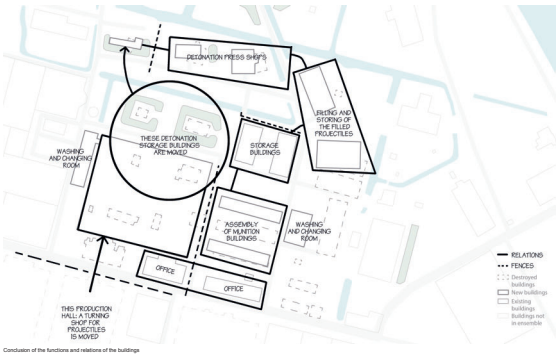
Situation in 1996: Eurometaal is now the owner. They made a lot of changes to the set-up.

1.6 FUNCTIONS OF THE BUILDINGS



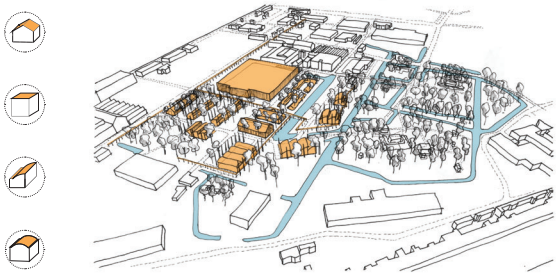
The shape of the buildings show the functions.

1.6 RELATIONS OF THE BUILDINGS



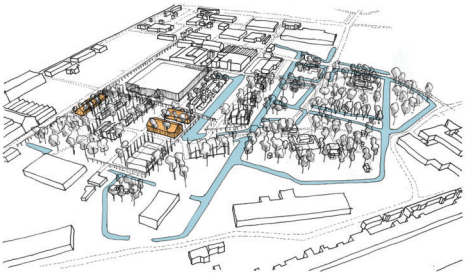
Conclusion of the functions and relations of the buildings

2 TYPOLOGIES OVERVIEW



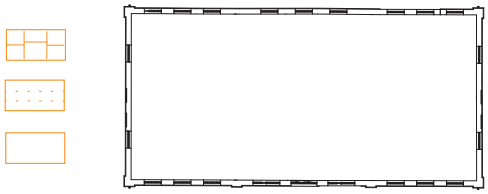
Location and orientation of the buildings on the site

3.1 OVERVIEW



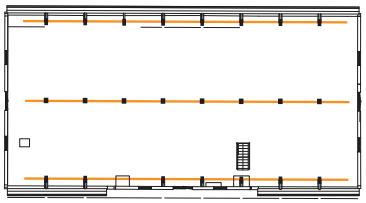
Location and orientation of the buildings from the gable roof typology

3.2 SPACE PLAN



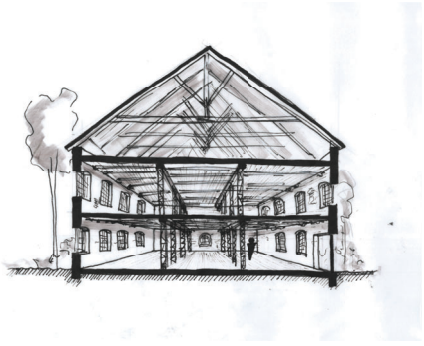
Floor plan ground floor

3.2 SPACE PLAN



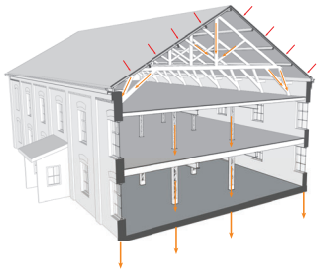
Floor plan highest floor

3.2 SPACE PLAN



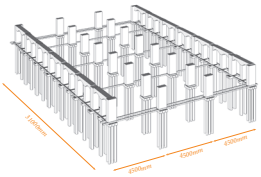
Gable roof section

3.3 STRUCTURE



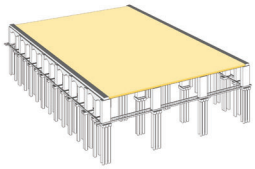
Vertical forces

3.3 STRUCTURE



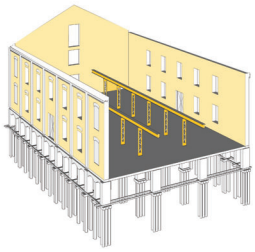
Build-up of Gable roof typology building.

3.3 STRUCTURE



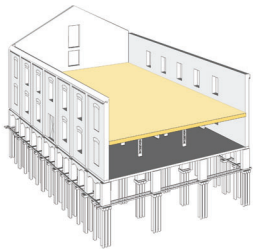
Build-up of Gable roof typology building.

3.3 STRUCTURE



Build-up of Gable roof typology building.

3.3 STRUCTURE



Build-up of Gable roof typology building.

3.3 STRUCTURE

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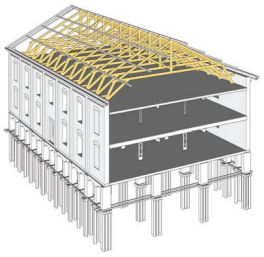

Build-up of Gable roof typology building.

3.3 STRUCTURE

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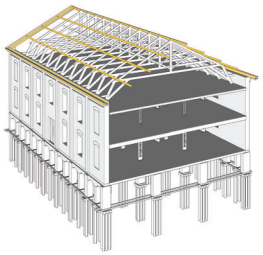

Build-up of Gable roof typology building.

3.3 STRUCTURE

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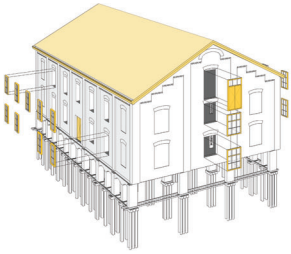

Build-up of Gable roof typology building.

3.4 SKIN

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Skin colors and materials of gable roof typology

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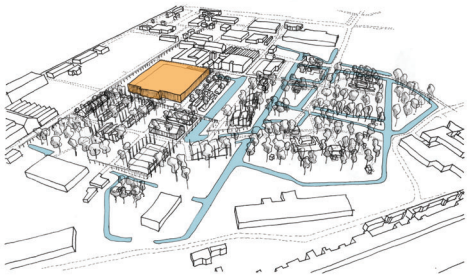
4.1 OVERVIEW



Location and orientation of the buildings from the flat roof typology

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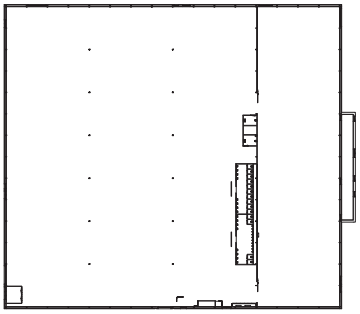
4.2 SPACE PLAN



Floor plan flat roof

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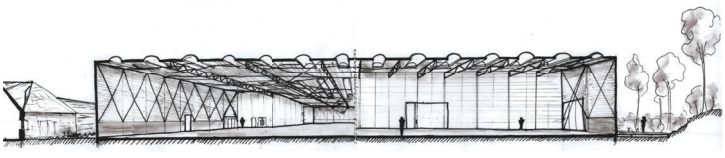
4.2 SPACE PLAN



Flat roof section

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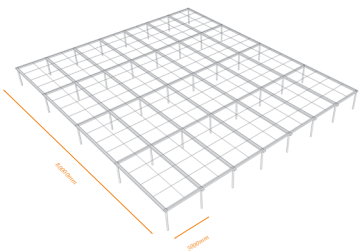
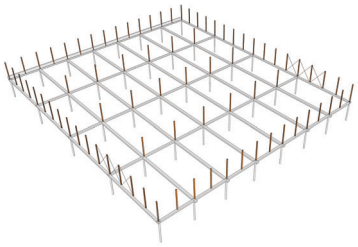
4.3 STRUCTURE



Build-up of flat roof typology building.

4.3 STRUCTURE

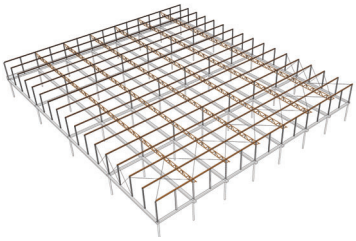




Build-up of flat roof typology building.

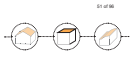
4.3 STRUCTURE

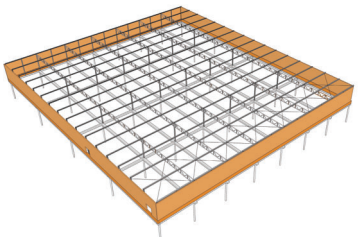




Build-up of flat roof typology building.

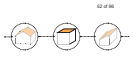
4.3 STRUCTURE

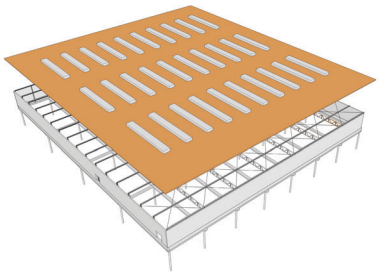




Build-up of flat roof typology building.

4.3 STRUCTURE





Build-up of flat roof typology building.

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4.4 SKIN



Skin colors and materials of flat roof typology

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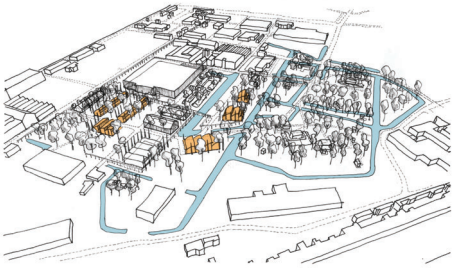
5.1 OVERVIEW



Location and orientation of the buildings from the shell roof typology

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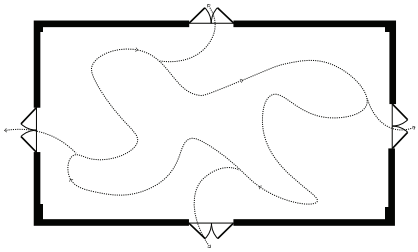
5.2 SPACE PLAN



Shell roof floor plan

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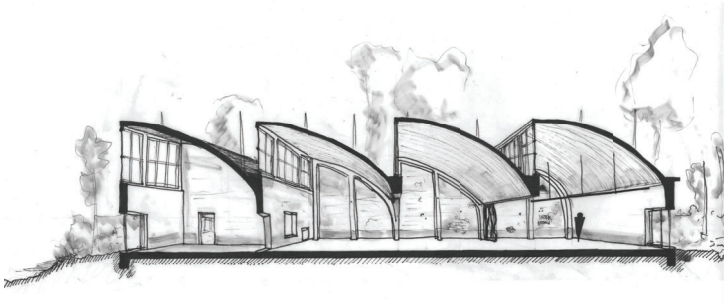
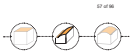
5.2 SPACE PLAN



Shell roof section

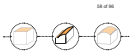
5.3.1 STRUCTURE

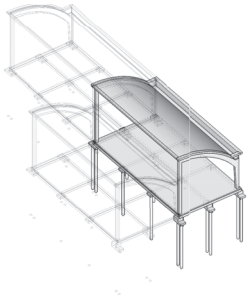




Structural module and how it can be repeated.

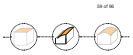
5.3.1 STRUCTURE

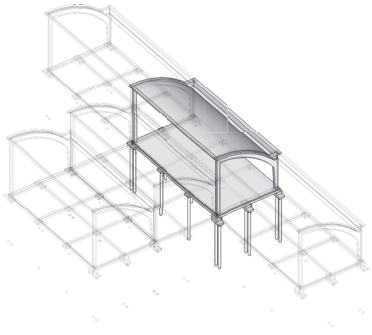




Structural module and how it can be repeated.

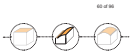
5.3.1 STRUCTURE

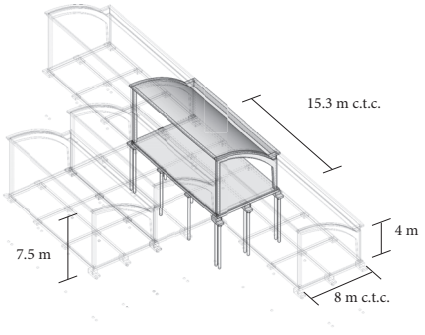




Structural module and how it can be repeated.

5.3.1 STRUCTURE





Structural module and how it can be repeated.

5.3.1 STRUCTURE

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Stability of concrete structure shell roof typology.

5.3.1 STRUCTURE

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Stability of concrete structure shell roof typology.

5.3.1 STRUCTURE

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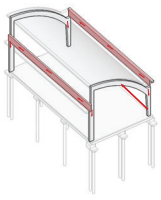

Stability of concrete structure shell roof typology.

5.3.1 STRUCTURE

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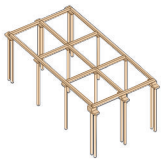

Build-up of shell roof typology building.

5.3.1 STRUCTURE

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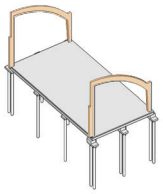

Build-up of shell roof typology building.

5.3.1 STRUCTURE

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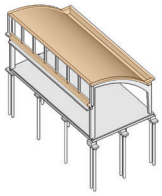

Build-up of shell roof typology building.

5.3.1 STRUCTURE

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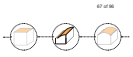

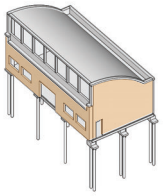

Build-up of shell roof typology building.

5.3.1 STRUCTURE

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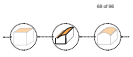
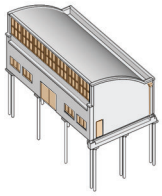
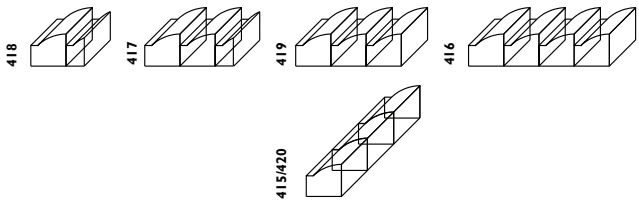




Build-up of shell roof typology building.

5.3.2 CONFIGURATIONS



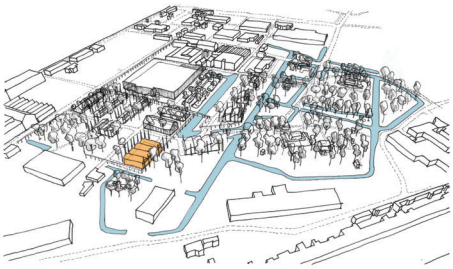
Shell roof configurations

5.4 SKIN



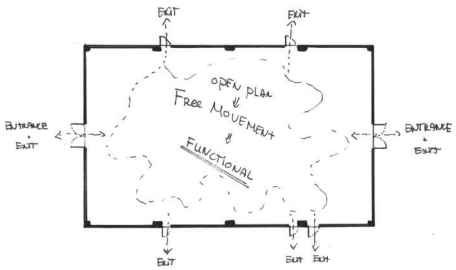
Skin colors and materials

6.1 OVERVIEW



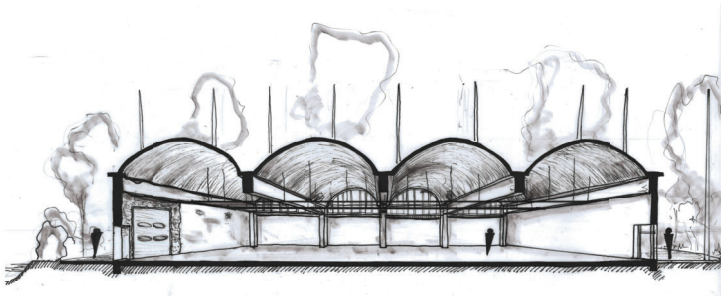
Location and orientation circular roof typology

6.2 SPACE PLAN



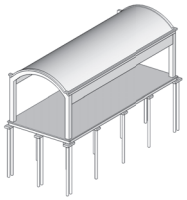
Circular roof floor plan

6.2 SPACE PLAN



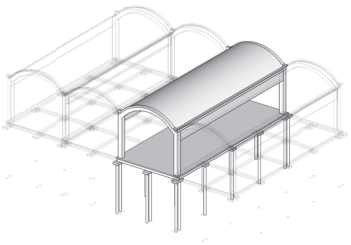
Circular roof section

6.3 STRUCTURE



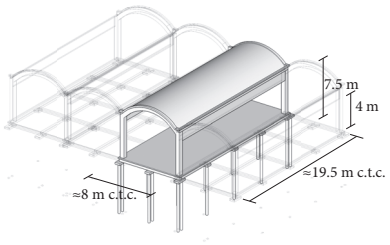
Structural module and how it can be repeated.

6.3 STRUCTURE



Structural module and how it can be repeated.

6.3 STRUCTURE



Structural module and how it can be repeated.

6.3 STRUCTURE

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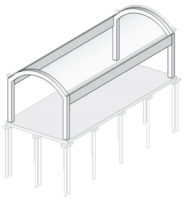

Stability of concrete structure of the circular roof typology.

6.3 STRUCTURE

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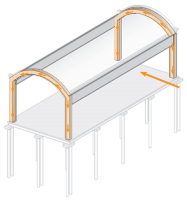

Stability of concrete structure of the circular roof typology.

6.3 STRUCTURE

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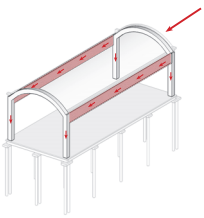

Stability of concrete structure of the circular roof typology.

6.3 STRUCTURE

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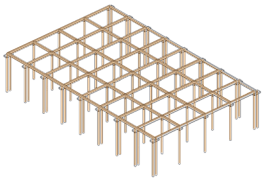
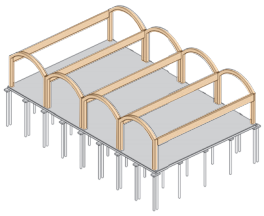


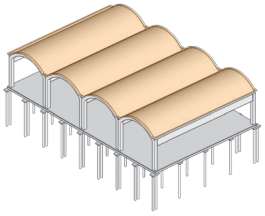
Build-up of circular roof typology building.

6.3 STRUCTURE



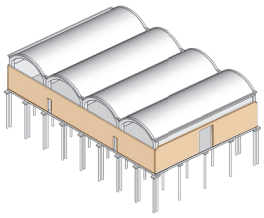
Build-up of circular roof typology building.

6.3 STRUCTURE



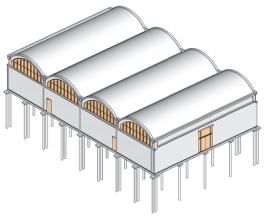
Build-up of circular roof typology building.

6.3 STRUCTURE



Build-up of circular roof typology building.

6.3 STRUCTURE



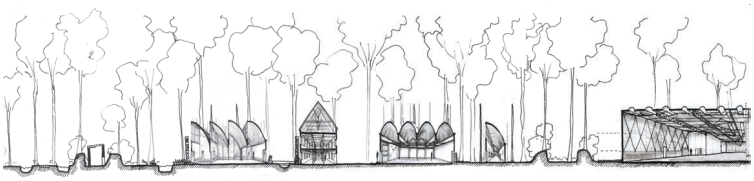
Build-up of circular roof typology building.

6.4 SKIN



Skin colors and materials

7 CONCLUSION



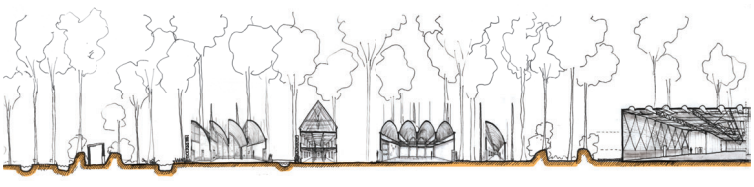
Section concluding and summarizing the research and describing the functional qualities.

FOREST



Section concluding and summarizing the research and describing the functional qualities.

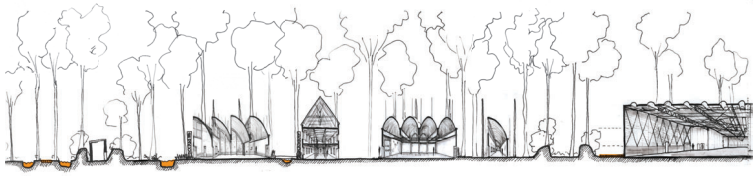
TOPOGRAPHY



Section concluding and summarizing the research and describing the functional qualities.

DITCHES & PATHS

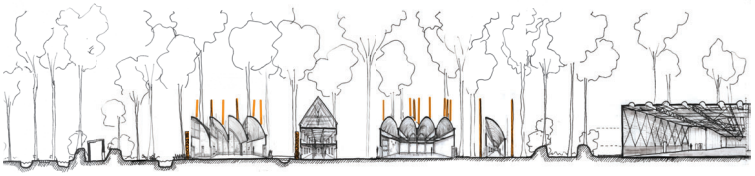




Section concluding and summarizing the research and describing the functional qualities.

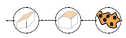
STEEL STRUCTURES

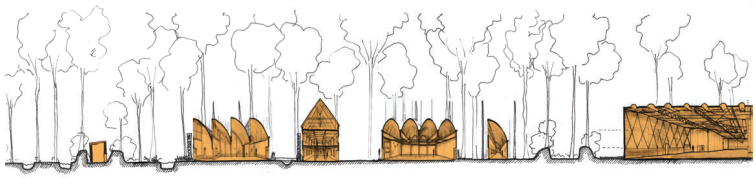




Section concluding and summarizing the research and describing the functional qualities.

DENSITY & SHAPES

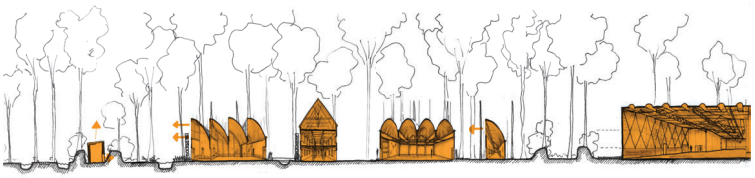




Section concluding and summarizing the research and describing the functional qualities.

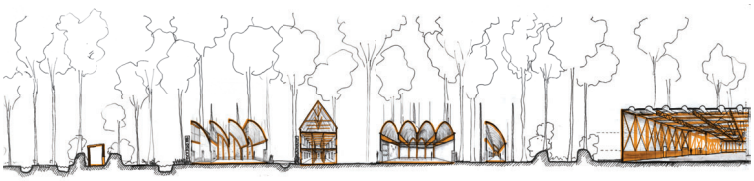
ORIENTATION





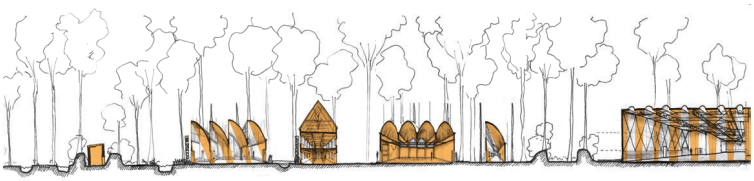
Section concluding and summarizing the research and describing the functional qualities.

STRUCTURE SIZE



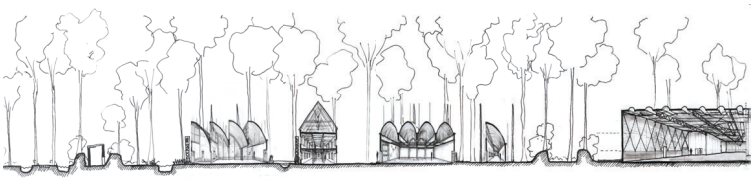
Section concluding and summarizing the research and describing the functional qualities.

DAYLIGHT FROM ABOVE



Section concluding and summarizing the research and describing the functional qualities.

7 CONCLUSION



Section concluding and summarizing the research and describing the functional qualities.

FIN

P1: PERSONAL PRESENTATIONS

P1 PRESENTATION

PLOTS IN THE WOODS

P1 PRESENTATION
AMANDA VERSCHUUR

01

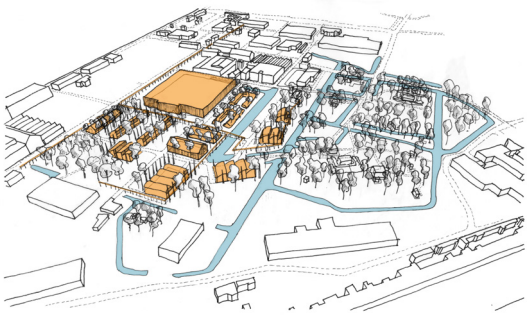
PLOTS IN THE WOODS | FIRST IMPRESSIONS



P1 presentation | Amanda Verschuur

02

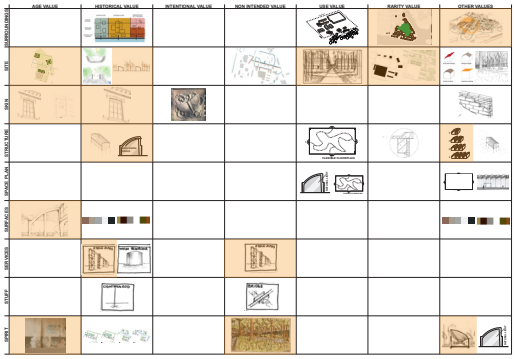
PLOTS IN THE WOODS | OVERVIEW



Bird-eye by Lucas Pol
P1 presentation | Amanda Verschuur

03

PLOTS IN THE WOODS | VALUE MATRIX



P1 presentation | Amanda Verschuur

04

VALUES | OPEN SPACES BETWEEN THE BUILDINGS



P1 presentation | Amanda Verschuur

05

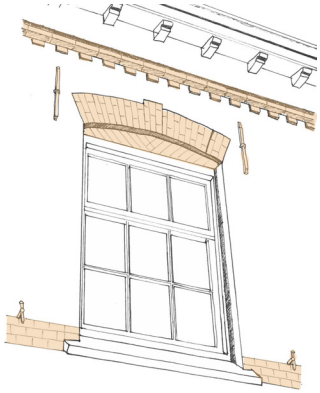
VALUES | AMOUNT OF GREENERY



P1 presentation | Amanda Verschuur

06

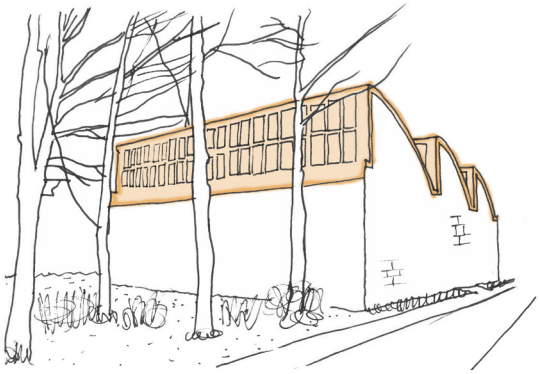
VALUES | CHARACTERISTIC FACADES OF GABLE ROOF TYPOLOGY



P1 presentation | Amanda Verschuur

07

VALUES | SHAPE OF SHELL ROOF AND CIRCULAR ROOF TYPOLOGY



P1 presentation | Amanda Verschuur

08

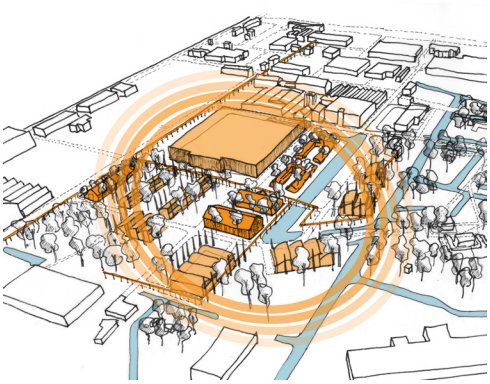
VALUES | DIVERSITY WITHIN BUILDING TYPOLOGIES



P1 presentation | Amanda Verschuur

09

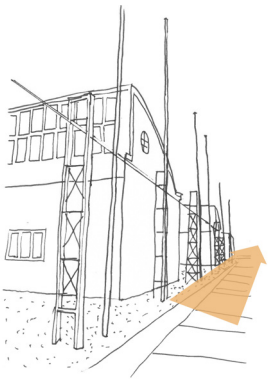
VALUES | CENTRE POSITION WITHIN HEMBRUG



Bird- eye by Lucas Pol
P1 presentation | Amanda Verschuur

10

VALUES | SIGHTLINES TO OTHER PARTS OF HEMBRUG



P1 presentation | Amanda Verschuur

11

VALUES | VISIBILITY OF THE HISTORY THROUGHOUT THE ENSEMBLE



P1 presentation | Amanda Verschuur

12

P1 PITCH: BARBARA DE GROOT

This recap of the P1 presentation contains the slides and text of the presentation. The first slide shows the many different impressions one would get when visiting 'plots in the woods'. The presentation addresses the most important aspects, the original function and the opportunity or challenge they pose for the redevelopment of the site.

One of these aspects was the way the small-scale buildings are embedded in the green landscape and the low density. This low density is strongly related to the functional approach of the military. There needed to be a safe distance between the individual buildings, sometimes even separated by the ditches or earthen walls. Besides the functional benefits of this layout, it also makes the plots unique on Hembrug and in the region of Zaandam and Amsterdam. It was one of the main reasons for me to choose the plots in the woods as my ensemble. It represents a closeness to nature that lacks in modern day society and presents an opportunity and challenge to bring this back into current day design.

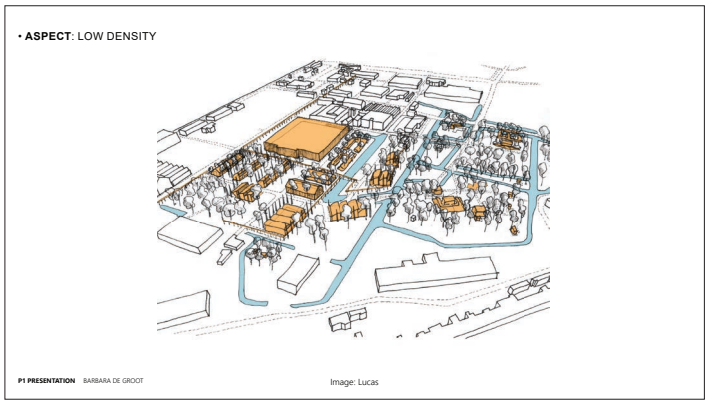
The second aspect that was important were the relations with the context. The plots in the woods has a hard border on the west and southside with the Changeover zone and main road. Towards the north and east the transition is more gradual. This relates to functional setup of the site. It is split up in three main production parts. The production of the empty projectiles happens on the southside, are filled at the Pyrotechnics in the plots in the woods and move on towards the production of weaponry in the west. This layout makes it logical that there is at the same time a hard border as another function requires a different approach and a soft border, where there is no clear connection. For the design the challenge is to make the 'plots accessible without loss of character'.

Another characteristic of the current day site are the trees and nature. Originally these were for controlling temperature, later they also functioned as camouflage. Now it is part of the visible effect of the passing of time. When visiting the site, this aspect plays a large role in the way Hembrug is perceived. Without the passing of time, the nature in the woods would have never been allowed to grow this 'out of control'. In a cultivated and mainly urbanized country as the Netherlands, this is something special, that should be kept and embraced. With the cleaning of the topsoil, it is a challenge for the design to 'design with' the overgrown nature instead of clearing everything and starting over.

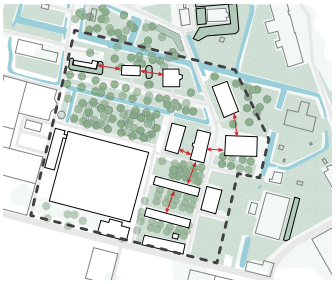
These are a few of the main challenges that I identified on site. However, plots in the woods offers, thanks to its functional approach also a lot of opportunities. Where this is most visible is in the modularity of the buildings from 1952, shell and circular roof typology. With the concrete framework they could easily built different configurations for the different functions they needed. Adaptations to the interior where already made in the time itself. An interesting example was for me building 416. Here they used to fill the projectiles. The main space is separated from three compartments and these have little windows, where they used to pass the filled boxes from one to the other space. In case of an explosion, the workers were separated, to reduce the risk of injuries. These kinds of elements give depth to the history of the buildings and can be implemented in its current day use.

To conclude, 'plots in the woods' offers a wide range of challenges and opportunities, across all scales. The landscape filled with hidden buildings and the relation to the other ensembles is especially relevant in unlocking the potential and making the beauty of this ensemble visible to the rest of the world.





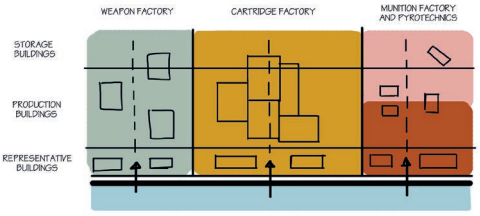
• **FUNCTION**: SAFETY



Buildings keeps in larger distance to reduce the influence between each otherif there is an explosion.

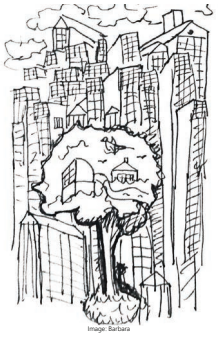
P1 PRESENTATION BARBARA DE GROOT Image: Mingke

• **FUNCTION:** SETUP IN PRODUCTION PROCESS



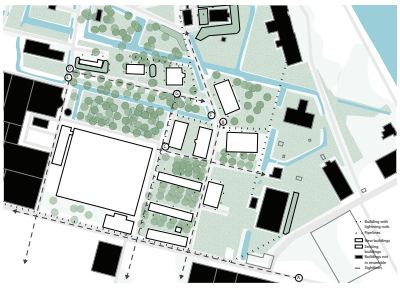
P1 PRESENTATION BARBARA DE GROOT Image: Valerie

• **CHALLENGE**: TRANSFORMATION WITHOUT LOSS OF CHARACTER



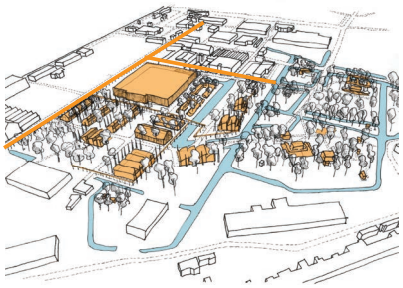
P1 PRESENTATION BARBARA DE GROOT Image: Barbara

• **CHALLENGE**: VISIBILITY AND ACCESSIBILITY



P1 PRESENTATION BARBARA DE GROOT Image: Lucas and Valerie

• **ASPECT:** HARD BORDERS

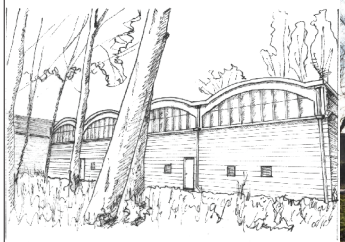






P1 PRESENTATION BARBARA DE GROOT Image: Lucas

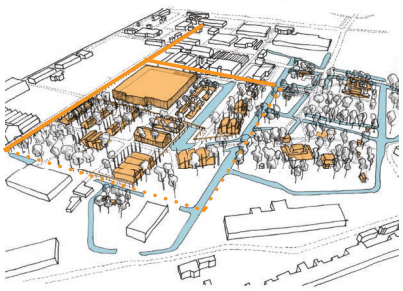
• **ASPECT:** OVERGROWN NATURE



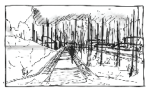


P1 PRESENTATION BARBARA DE GROOT Image: Barbara

• **ASPECT:** SOFT BORDERS







P1 PRESENTATION BARBARA DE GROOT Image: Lucas

• **FUNCTION:** TEMPERATURE CONTROL AND CAMOUFLAGE



P1 PRESENTATION BARBARA DE GROOT Image: Mingke

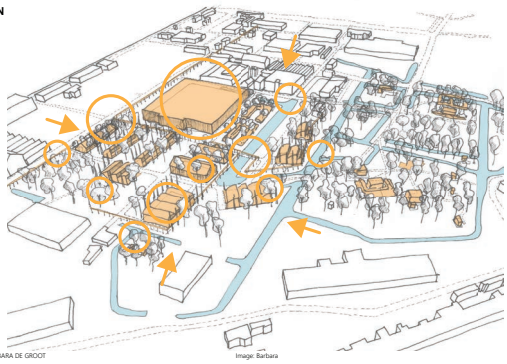
• **CHALLENGE**: PRESERVE THE 'PATINA' ON SITE





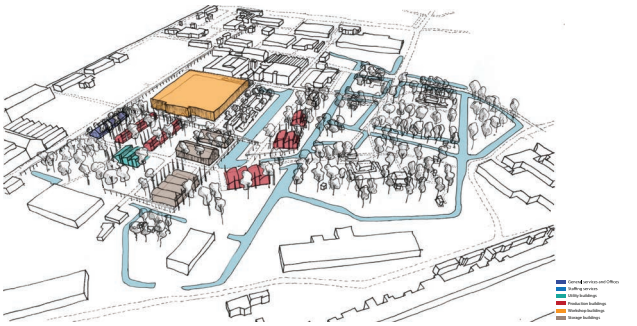
P1 PRESENTATION BARBARA DE GROOT Image: Barbara

• **CONCLUSION**



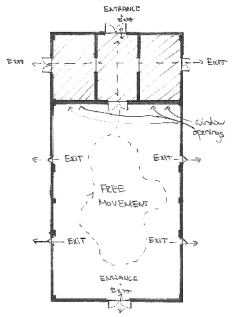
P1 PRESENTATION BARBARA DE GROOT Image: Barbara

• **ASPECT:** CONFIGURATIONS VERSUS FUNCTIONS



P1 PRESENTATION BARBARA DE GROOT Image: Lucas and Valerie

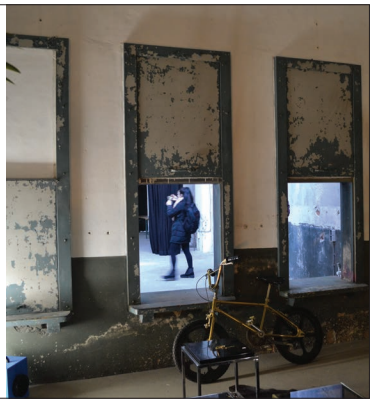
• **FUNCTION**: FILLING OF THE PROJECTILES





P1 PRESENTATION BARBARA DE GROOT Image: Barbara

• **OPPORTUNITY**: BUILDING 416 NOW



P1 PRESENTATION BARBARA DE GROOT Image: Barbara

P1 PRESENTATION SLIDES: LUCAS POL

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08.04.2019

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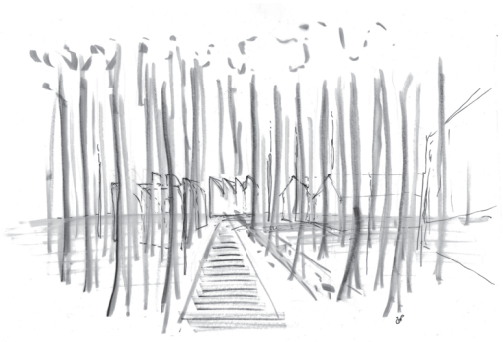
FIRST IMPRESSION ‘PLOTS IN THE WOOD’



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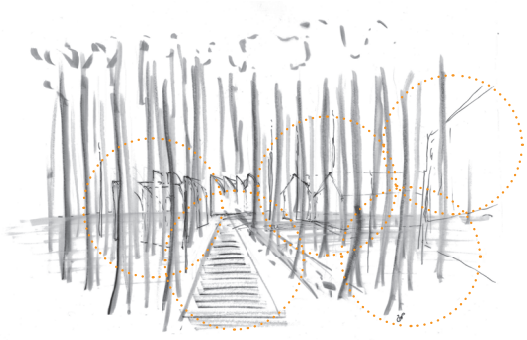
‘VILLAGE IN THE WOODS’...?



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RESEARCH



Image from the research report related to the atmosphere chapter. Illustrating the different kind of (vertical) patterns and textures.

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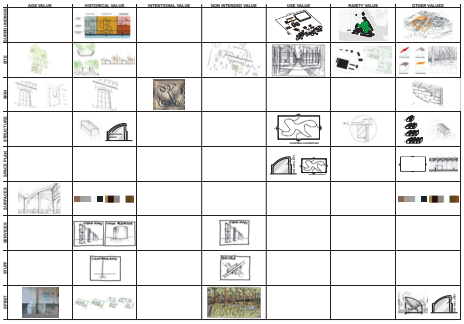
VALUE MATRIX



Latest version of the value matrix for 'plots in the wood'.

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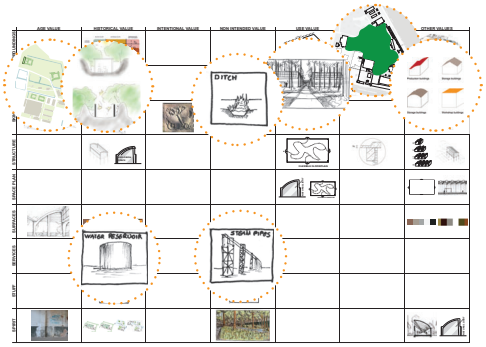
SURROUNDING AND SITE VALUES



Latest version of the value matrix for 'plots in the wood'. Value matrix by the entire group, compiled by Valerie Arntz.

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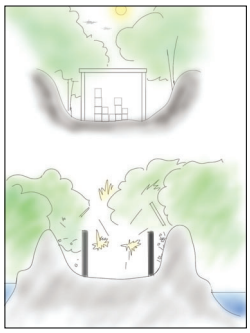
ANECDOTE



Sketch that illustrates what would happened during the only actual recorded explosion on site. Image by Mingke Zhu.

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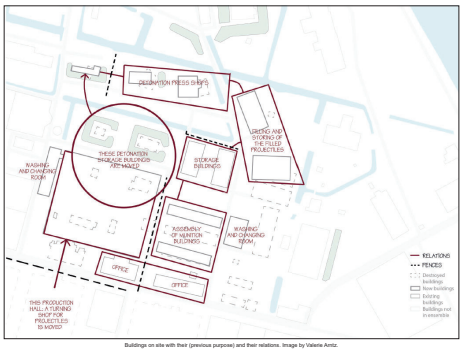
PRODUCTION PROCESS



Buildings on site with their (previous purpose) and their relations. Image by Valerie Arntz.

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PROGRESS



Buitenhuis chandelier by Dirk van der Kooij. Source: https://www.dirkvanderkooij.com/collections/collection/products/buitenhuis-chandelier.

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PROGRESS



The workshop of Vrijglas in building 420. Source: http://www.vrijglas.nl/.

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PROGRESS



Interior design by Rietveld Design. Source: http://tiemerietveld.nl/projecten#/kuvva/

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PROGRESS



Flexkeuken in building 414, the old storage building. Source:

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PROGRESS



Lab-44 restaurant. Source: http://www.ophethembrug.nl/nieuws-op-het-hembrug/1084/.

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PROGRESS



New design for the ammunition factory by OMA. Source: https://eefgoedstem.nl/in-munitiefabriek-hembrugterrein-komt-het-hem-plek-vol-kunstambilie-e/.

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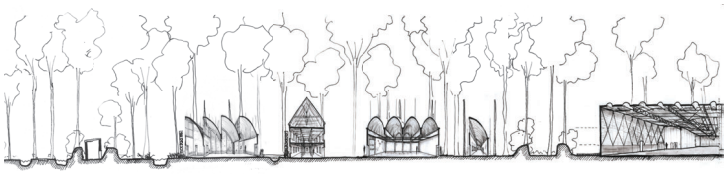
LANDSCAPE



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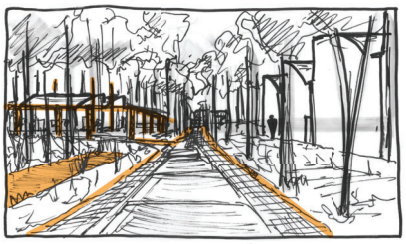
PIPELINES



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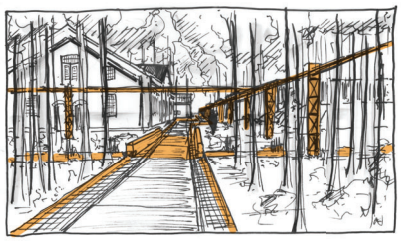
PIPELINES



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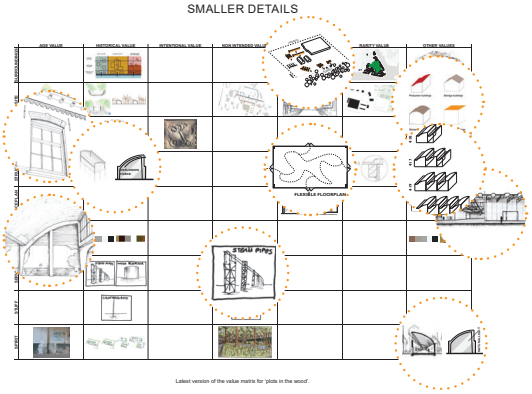
SMALLER DETAILS



Latest version of the value matrix for 'plots in the wood'.

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SHAPES, DIRECTION, PURPOSE

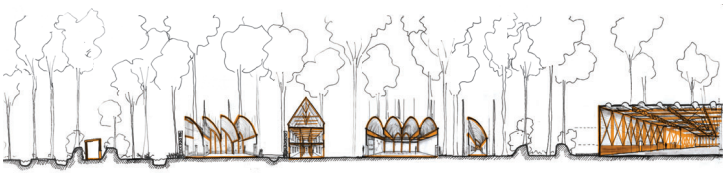

Image description, references (if necessary) Ut quiatet omni auda vent ellenit dollectiis es doluptat ent eiuritia tibus, occumAborro te el re, officab orectatem simi, sam estio dempore mperibus, et arior autatem nectatio. Nem. Arum, acerori sciandus, te nus ecesequam si ducit ligenis moditiis dolorib

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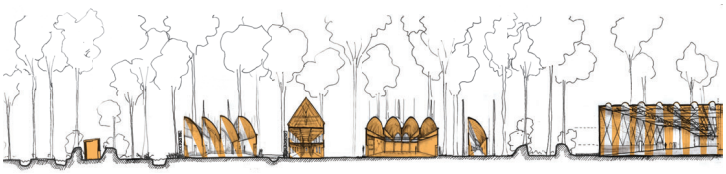
DAYLIGHT



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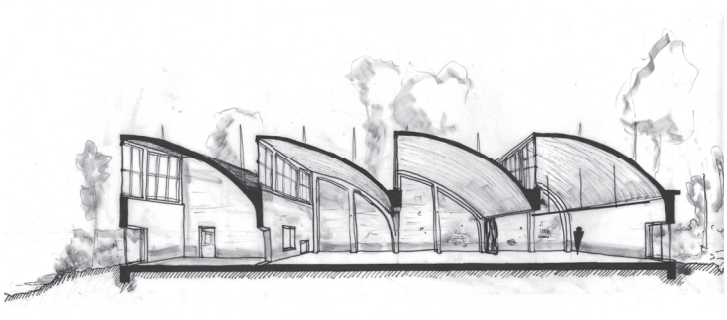
INSIDE SPACES



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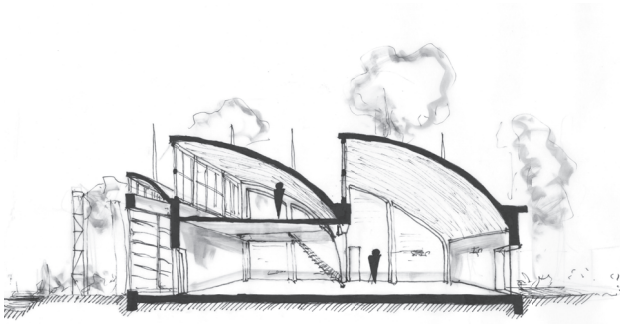
FLEXIBILITY



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REFERENCE



Bagsværd Church by Jorn Utzon. Photo by Lucas Pol

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REFERENCE



Bagsværd Church by Jorn Utzon. Photo by Lucas Pol

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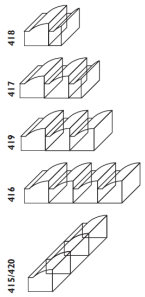
CONFIGURATIONS



Different modules. Image by Barbara de Groot

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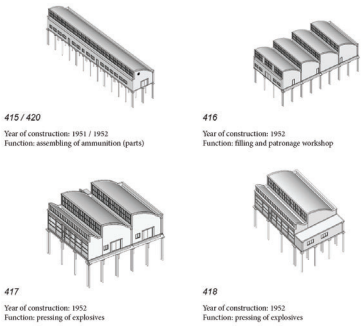
SHELL ROOF BUILDINGS



415 / 420
Year of construction: 1951 / 1952
Function: assembling of ammunition (parts)

416
Year of construction: 1952
Function: filling and patronage workshop

417
Year of construction: 1952
Function: pressing of explosives

418
Year of construction: 1952
Function: pressing of explosives

Image by Jan-Willem Spek.

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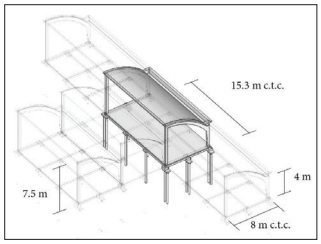
MODULARITY



Modules of construction. Image by Jan-Willem Spek

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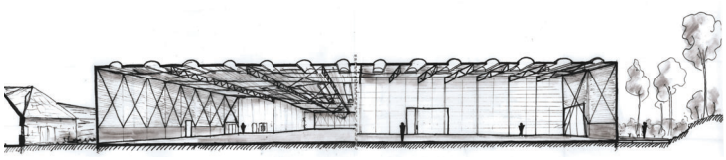
BOX



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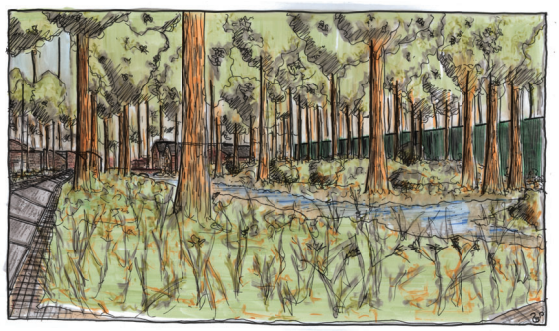
COLOUR



Colour image, showing the camouflage character and the (vertical) textures on the site.

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LAYERS



Colour image, showing the camouflage character and the (vertical) textures on the site.

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FIN

PERSONAL PRESENTATION: VALERIE ARNTZ

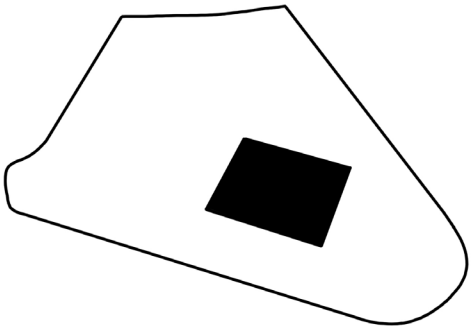
THE PRODUCTION ESTATE

PLOTS IN THE WOODS - P2 - VALERIE ARNTZ - 4160576
LIDY, ANNETTE, CHARLOTTE, FRANK & GER

CONTEXT

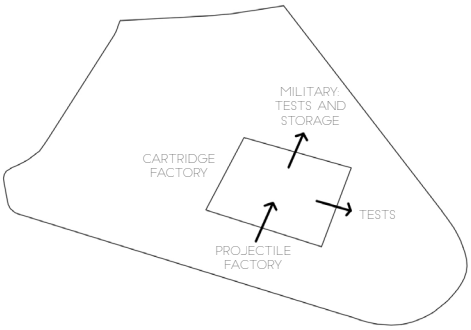
HEMBRUG SCALE
PLOT SCALE
BUILDING SCALE

OPPORTUNITIES & DILLEMAS
CONCLUSION



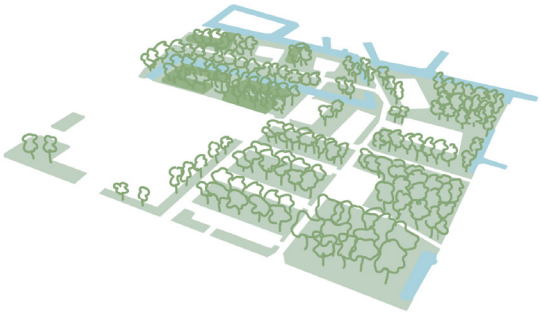
ENCLOSED IN THE MIDDLE

The ensemble lays in the middle of the site and was originally completely enclosed by fences. The production of munition was done here and only the workers who worked in this part could enter. The security checked the id and took away all the things that could start a fire. The area was very secured: the worker for example wore special clothes and all the equipment was made from copper and/or shockproof.



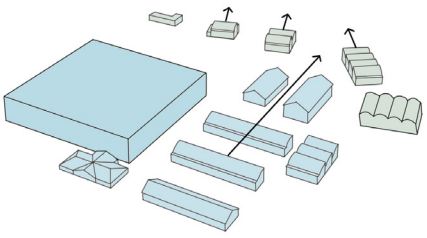
RELATIONS ON THE SITE

On the south site of the area was originally the projectile factory, where the projectiles were made and afterwards transported to the pyrotechnics. Here the projectiles were filled and assembled into for example hand grenades. When finished they went either to the east of the area to be tested by the Artillerie Inrichtingen themselves or they went to the military area. Here they were also stored for a longer term. These tests included for example multiple day vibration tests or being thrown from great heights.
At the west side is the cartridge factory. There was no direct relation with this, munition was never placed within the cartridges on the site. This happened at the front.



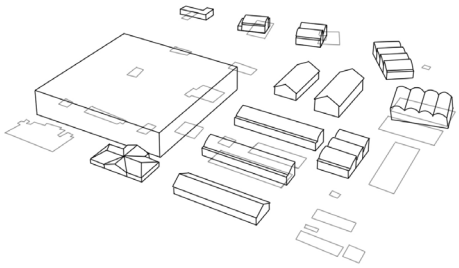
FUNCTIONAL LANDSCAPE

When going deeper within the ensemble the forest and the water immediately grabs your attention. The set-up of this is completely functional. The function of the trees was to reduce the explosion blast, the earthen walls had the same function. The trees were also used to shade the buildings. The water was there to ensure that a possible fire would not spread. This resulted in several garden rooms. The landscape was strictly maintained for the obvious safety reasons.



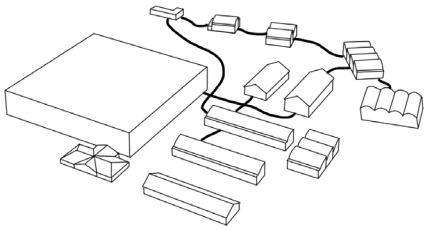
FUNCTIONAL SET-UP

The way the buildings are set-up is also completely functional. All the buildings are freestanding to lower the risks in case of an explosion or fire. The buildings in the north are also directed to the forest, so again in case of an explosion it will go to the forest. The forest in the north of the Hembrug terrain is completely planted in 1920 for this reason. The other buildings are parallel or perpendicular to the North sea canal. This set-up is used on most of the Hembrug terrain.



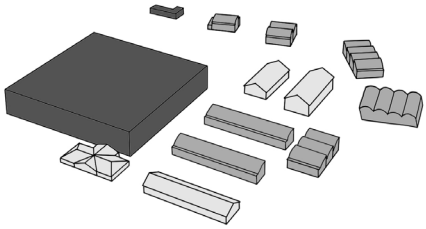
CHANGE

"The only constant factor was change. The pragmatic philosophy was if something is not needed anymore you destroy it, if you need something new you build it. In general the functions within the buildings also changed per order. The whole site is on purpose build very flexible. The washing and changing building is for example build with a shell roof. Just so in case it was needed it could be turned into a munition buildings where they could work with explosions. The big building, number 01, is also not originally from this factory. It belonged to the south projectile factory. And the building most left up consisted before of four smaller buildings that had to make room for the big workshop building.



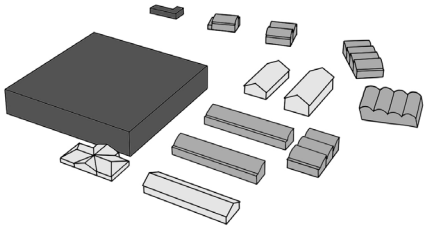
A COMPLETE PRODUCTION PROCESS

The production of munition was divided over multiple buildings. Step by step the grenade was filled and became more finished. This way all the buildings have a relation to each other. All the steps of production were on site and it could function nearly completely on its own. They didn't want to be dependent on others.



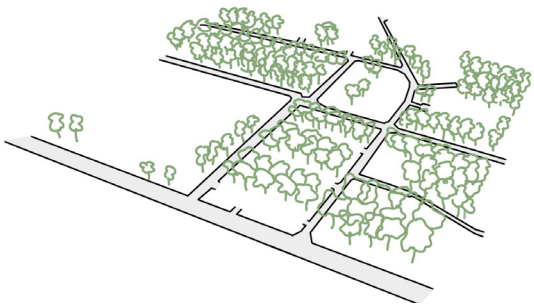
LAYERS OF TIME

The present ensemble is roughly build in three stages. The first in 1895-1905, this are the shed type buildings. The second is 1951-1952, the shell roof buildings, specifically build for work with explosions. The third is done by Eurometaal and was in 1991. These layers are still very visible when walking on the site. The architecture is very specific from a very detailed more traditional way of building to more industrial and functional to very functional.
These layers are also visible on a more detailed level: cracks in the walls, layers of paint and the bewildered forest.



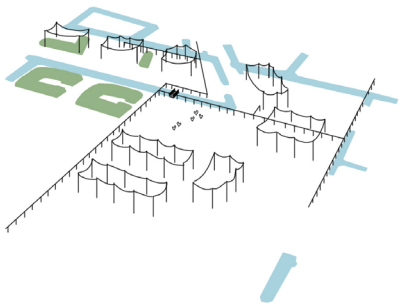
TYPOLOGIES SHOW FUNCTIONS

The roof typologies just explained: shed, shell and box also show the functions of what happened within them. The shed buildings were for storing munition and partly for producing or assembling parts of the munition. The shell roof buildings were this shape because in case of an explosion the roof will lead the explosion to the forest. Here they worked with explosions. The box building was a production hall, which needed to be very big and flexible with daylight coming from above to give the most perfect working conditions.



PRECISE VS BEWILDERED

When the AI and Eurometaal were producing munition here the landscape was kept very tidy, the green had to reduce a possible explosion blast, but in case of a fire the green should not spread the fire. Also the trees were kept at a special height to stay below the lightning rods. When the site was left the green could grow however it wanted and resulted in the bewildered and romantic state it is in now. The roads and the buildings were however set-up very precise. The industrial site was very clean, organised, strict and precise. Nothing could go wrong, working with munition asked for a precision of sometimes up to one-hundredth of a millimeter.



STORY TELLING ELEMENTS

On the ensemble are quite a few story telling elements left. For example the lightning rods that were around the buildings so they would not catch fire in case of thunder, or the steam pipes which lead the steam into the buildings to heat them and give the workers a convenient working atmosphere. The original tubes were way bigger, but they are reduced by many layers when the asbestos was taken off. Also the earthen walls and the ditches are left. The bridge is called the butterfly bridge after an engineer working on the site and the farm buildings are not only called farms because of how they looked like but also because the guest workers held chicken and grew vegetables here.



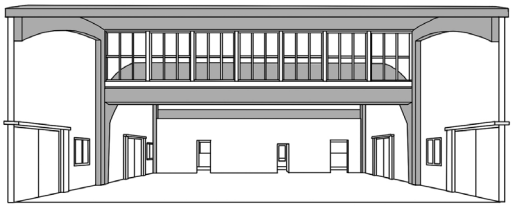
CONTRAST INSIDE & OUTSIDE

On the building level is the contrast between inside and outside very striking. Inside is a zen like atmosphere where nothing could distract you from your work. Outside is bewildered nature where you don't feel like you are at an industrial site.



INWARDS AND UPWARDS ORIENTATION

Because of windows placed up a lot of natural daylight comes in, this gives an upwards orientation. Most of the walls are also blind, so the only connection with outside is upwards. Because of the blind walls the orientation is also inwards.



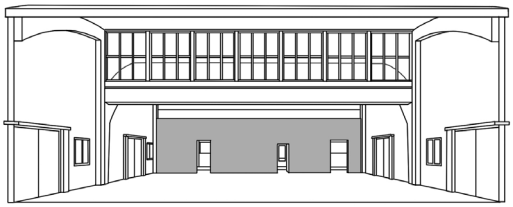
FLEXIBLE CONSTRUCTION

The construction is build in a way that the walls are only there for stability, but they are not load- bearing. This means that whatever can be done with the walls. This gives a lot of flexibility to the buildings.



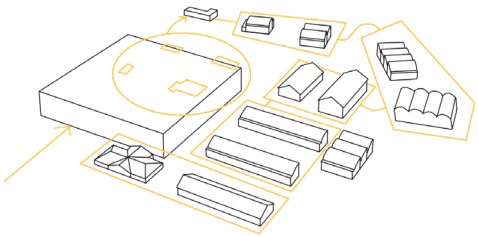
OPEN FLOORPLAN & OMNI-DIRECTIONAL

The floor plan was completely open, no columns and nearly now walls that are in the way. This way also done to keep the building as flexible as possible. Next to that is an omni-directional orientation. The buildings don't really have a front and back and have doors in all directions. Again for the functionality and flexibility.



PROTECTED WORKING

A lot of precautions are done to lower the risks as much as possible in case of an accident. The explosives were placed in a different cell than the workers, completely sealed by armor steel. In the next cell are a few workers filling for example the cartridge caps who took the explosives through a small shutter. The filled cartridge caps were then put through the shutter again where another person filled the projectile under a plate of unbreakable glass, so even if there would be an explosion nearly no hinder would be there. All this to protect the workers. You could also never work alone, this was for safety of the workers but also to ensure that nothing would happen to publish the secrets. When a worker had to work alone a security person would stay with him.



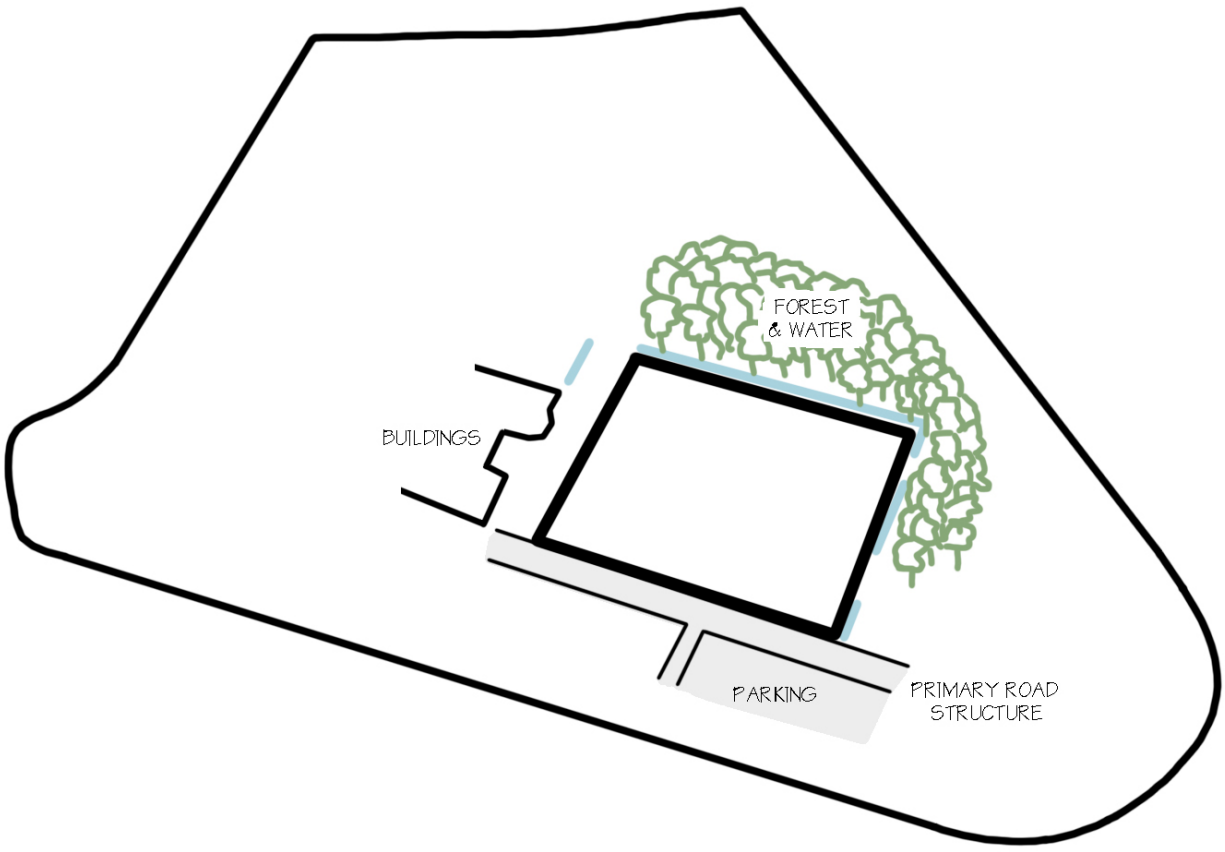
RELATIONS

Concluding, the buildings have a certain relation to each other, mostly because of the production process. The storage buildings, the offices, the making and assembly of munition, the pressing and filling of projectiles. But also relevant to know is where building 01 and 51-54 came from. 51-54 even took their old numbers with them to the new building.

OPPORTUNITIES	DILEMMAS
THE STORY AND THE BUILDINGS ARE NEARLY INTACT. EXCEPT OF BUILDING 01	THE DENSITY HAS TO BE KEPT: LIMITED AND DETACHED BUILDINGS
PRAGMATIC PHILOSOPHY OF THE SITE: IF SOMETHING IS NOT NEEDED ANYMORE YOU DESTROY IT. IF YOU NEED SOMETHING NEW YOU BUILD IT.	THE STORY OF THE AI NEEDS TO BE GUARDED
THE TIME LAYERS WITH THEIR OWN TYPOLOGIES AND CHARACTER RESULTED IN A UNIQUE SITE	COMPLEX AREA WITH A LOT OF DIFFERENT ASPECTS. TIMES AND CHANGES AND THE PLOT IS PART OF A BIGGER AREA
THE CLEAR STRUCTURE OF ROADS AND THE PIPELINE GIVE GUIDANCE	THE BUILDINGS ARE NOT INSULATED
IT IS A NATURAL HAVEN IN THE MIDDLE OF HEMBRUG	THE CLEANING WORK INVOLVES CUTTING TREES AND DIGGING AWAY THE UPPER GREEN LAYER. WHAT WILL BE LEFT?
THE PLOT IS BORDERED BY THE DITCHES	THE VIEWS TO THE FOREST AND WATER NEED TO BE KEPT
THE MONUMENTS, THE BUILDINGS AND EARTHEN WALLS ARE PROTECTED	IT IS MORE DIFFICULT TO GIVE SMALL BUILDINGS A NEW FUNCTION
THE CONSTRUCTIONS ARE FLEXIBLE	BUILDING 01 IS DETONATING
THE BUILDINGS HAVE OPEN FLOORPLANS	THE SECONDARY ROAD STRUCTURE CHANGED INTO THE PRIMARY STRUCTURE

THE PRODUCTION ESTATE

EVERYTHING WAS BASED ON THE FUNCTION OF THE PRODUCTION OF MUNITION. THIS FUNCTIONAL SET-UP RESULTED IN THE LOOKS OF AN ESTATE: LOTS OF GREEN IN CHAMBERS WHERE THE BUILDINGS AND THE LANDSCAPE COMPLIMENT EACH OTHER.



Extra image added: Spatial elements in relation to the other ensembles

MINGKE ZHU PERSONAL PRESENTATION

INTRODUCTION

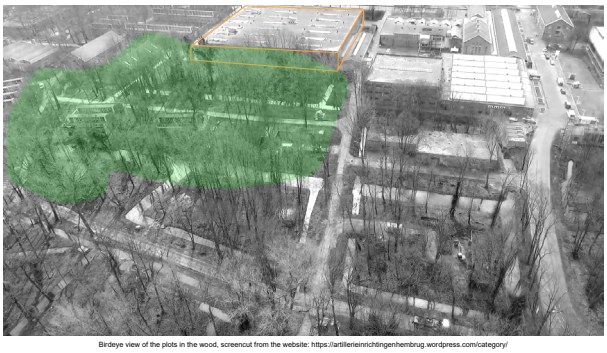


Birdeye view of the plots in the wood, screencut from the website: https://artillerieinrichtingenhembrug.wordpress.com/category/

Hidden

In the first day I go to Hembrug, “hidden” was the impression to me for the whole Hembrug area. While the plots in the woods is the most hidden space you can access on site.

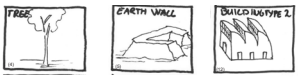
INTRODUCTION



Birdeye view of the plots in the wood, screencut from the website: https://artillerieinrichtingenhembrug.wordpress.com/category/

Hidden

Plots in the wood is the representatives of “Hidden”.
Reason to be hidden: tall trees, earthen walls, small scale buildings

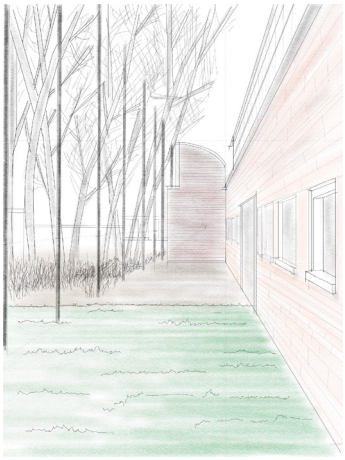


The reason of hidden is because of the tall trees, earthen walls and small scale buildings.

INTRODUCTION



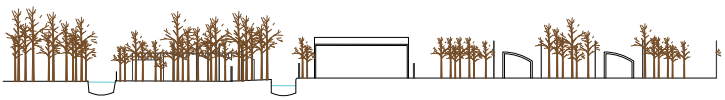
Most value part in the plots of wood sketched on March 24th, by Mingke

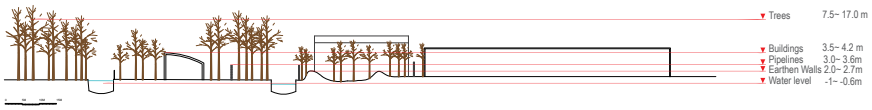


Sketche by Mingke

I found interesting and curious about these unique landscapes. I raised questions to see the how these landscape approach practiced by Artillery Establishment manifest itself in the plots in the woods.

FUNCTIONAL LANDSCAPE







Sketches explain the use of the landscape

landscapes are rational with old functions. As they make sure the production on site safe. They are very practical way of using nature within the days lack of modern technology.

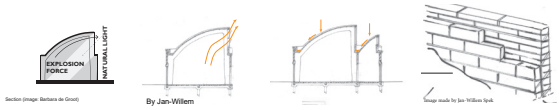
FUNCTIONAL ELEMENTS



Functionality always was one of the key points during the whole lifetime of Hembrug. This is visible on all scales.
Not always original functions, but add to atmosphere on site.
Romantic feeling comes in mind first.

Functionality always was one of the key points during the whole lifetime of Hembrug. This is visible on all scales. Besides age value, they all have historical values.





Section (image: Barbara de Groot)

By Jan-Willem

Image made by Jan-Willem Spek

The building techiques are also used to keep the building be practical to be used as storages and workshops.

MINGKE ZHU PERSONAL PRESENTATION

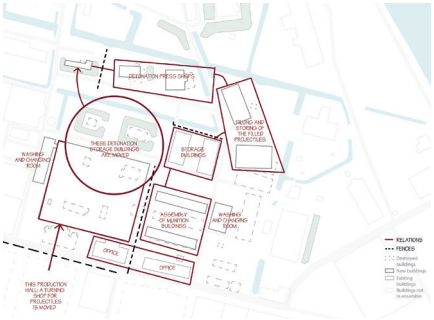
OPPOTUNITIES



Start with the landscape.
Keep its uniqueness, and adding another new layer to give new life to site again.

Keep its uniqueness, and adding another new layer to give new life to site again.

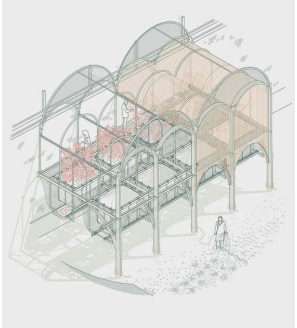
OPPOTUNITIES



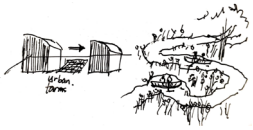
Buildings are in distance, remain individually.
They all belongs to a production line. They are supporting each other.

Our site used to be the production area of ammunition. Buildings are in distance to keep safe. But they all belongs to a production line, supporting each other.

OPPOTUNITIES



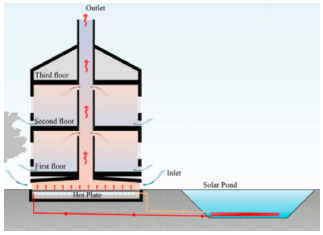




Reunion them in new use.
Still keep their characteristic of individualism but supporting.
Possibility: program a chain of production
create public space for sharing in between

I want to reunion them in new use. Still keep their characteristic of individualism but have relationship with each other. Programming a chain of activities or creating the natural space in between to public space for sharing can be strategies to realize the connection.

OPPOTUNITIES





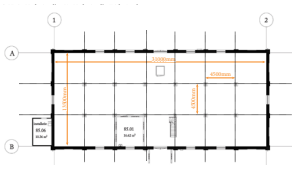


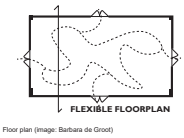
Sketch by Lucas, edited by Mingke

Use the existing landscape for built environment.
Spirit of mysterious and romantic

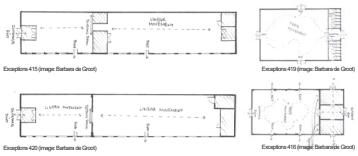
Strategy can be used for the built environment. For instance, the solar pool or the cooling pool for energy sustainability. Or water fog, which can collaborate with the romantic and mysterious atmosphere in the woods.

OPPOTUNITIES-INTERIOR





Floor plan (image: Barbara de Groot)





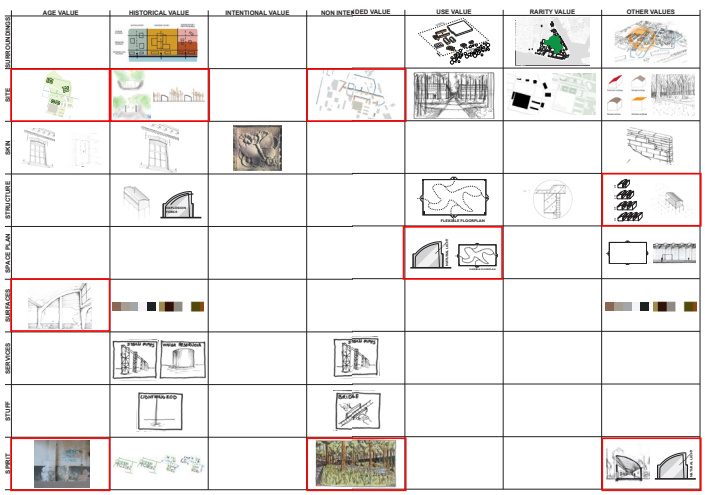


Open floor plan for flexible use.
Crack plaster on the wall provide feeling of passing of the time. It is a certain kind of beauty.

Open floor plan provides flexible use of the space. More possibilities for adding new structures are available in new use. The crack on the wall to display the passing of time.

VALUE MATRIX

4. VALUE ASSESSMENT



To sum up, landscape and the building techniques are valuable to me. Because they indicate the practical characteristic and the activities happened on site. They have high historical values to me. The flexible floor plan also provides use value for future. Low density also bring opportunities for future use of the space. The cracks on the walls, natural lights and large greenery also provides feeling of time and peace.

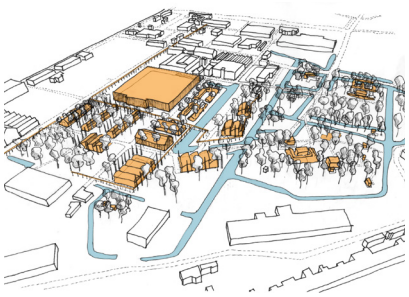
P1 PRESENTATION JAN-WILLEM SPEK

PLOTS IN THE WOOD
CONCLUSIONS AND VALUES
JAN-WILLEM SPEK

How does the functional design approach practiced by the 'Artillerie Inrichtingen' manifest itself in the 'plots in the woods'?

08-04-2019 AR3AH110 TU Delft

URBAN SCALE



Overview of the ensemble plots in the wood.



Overview map of the plots in the wood ensemble



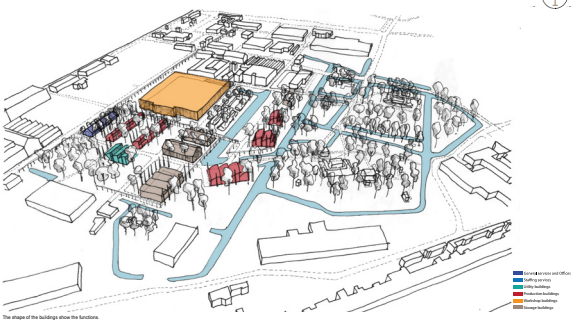
Possibility of explosion from the buildings leading to the big distances between the buildings.



Space in between the buildings (both the low density of buildings as the greenery) as a crucial value of the ensemble.

TYPOLOGIES

How does the construction method that is used relate to the functional design approach used by the 'Artillerie Inrichtingen' and to the story of the goods and the people of the area?



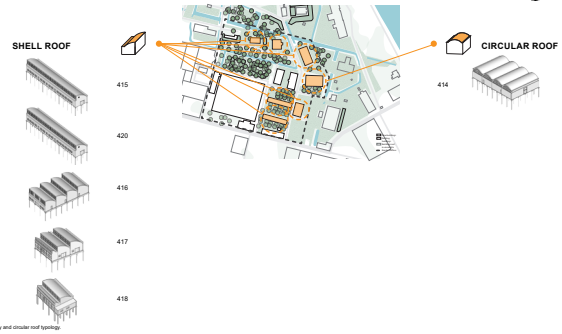
The shape of the buildings show the functions.

Functional overview of the buildings within the ensemble.

TYPOLOGIES OF 1951-52



Shell roof typology and circular roof typology.



Shell roof typology and circular roof typology.



Shell roof typology and circular roof typology and their core structure.

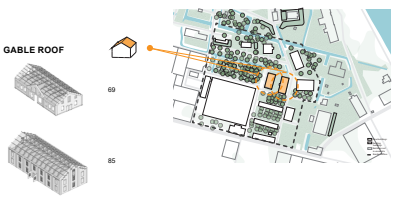
TYPOLOGIES OF 1901-05



Gable roof typology buildings.



Gable roof typology buildings.



Gable roof typology buildings and their core structure.

MAIN VALUES

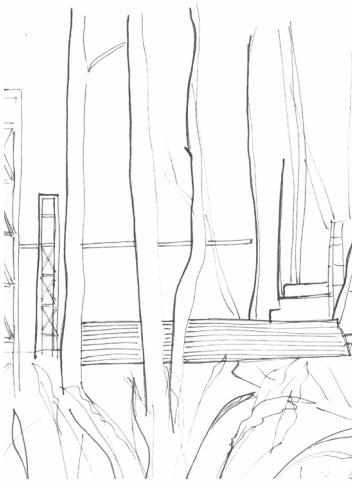


first image: space in between the buildings as crucial cultural value. Second image: the concrete frame of the shell roof typology buildings as a crucial cultural value. Third image: the facade and the interior load bearing structure as the crucial cultural value of the gable roof typology buildings.

PERSONAL PRESENTATION: MARJAN SADEGHI









Images by Marjan

'plots in the wood' with the buildings completely hidden away by the trees

landscape elements are trees, the ditch and the earthen walls and small plants

Other elements such as Pipeline structure and lighting rods

FIRST IMPRESSION



Farms



Shell roof type



Circular roof type



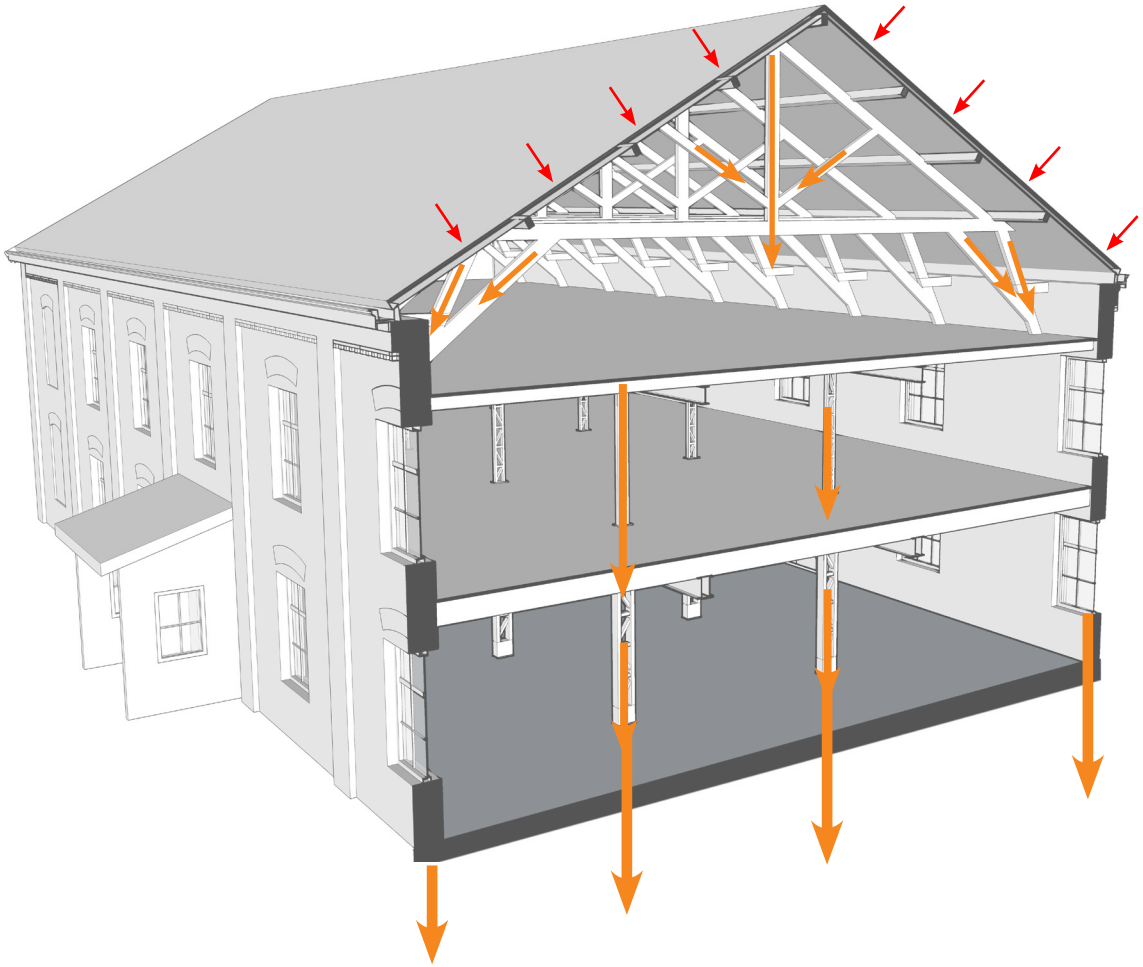
Pipeline structure and lighting rods

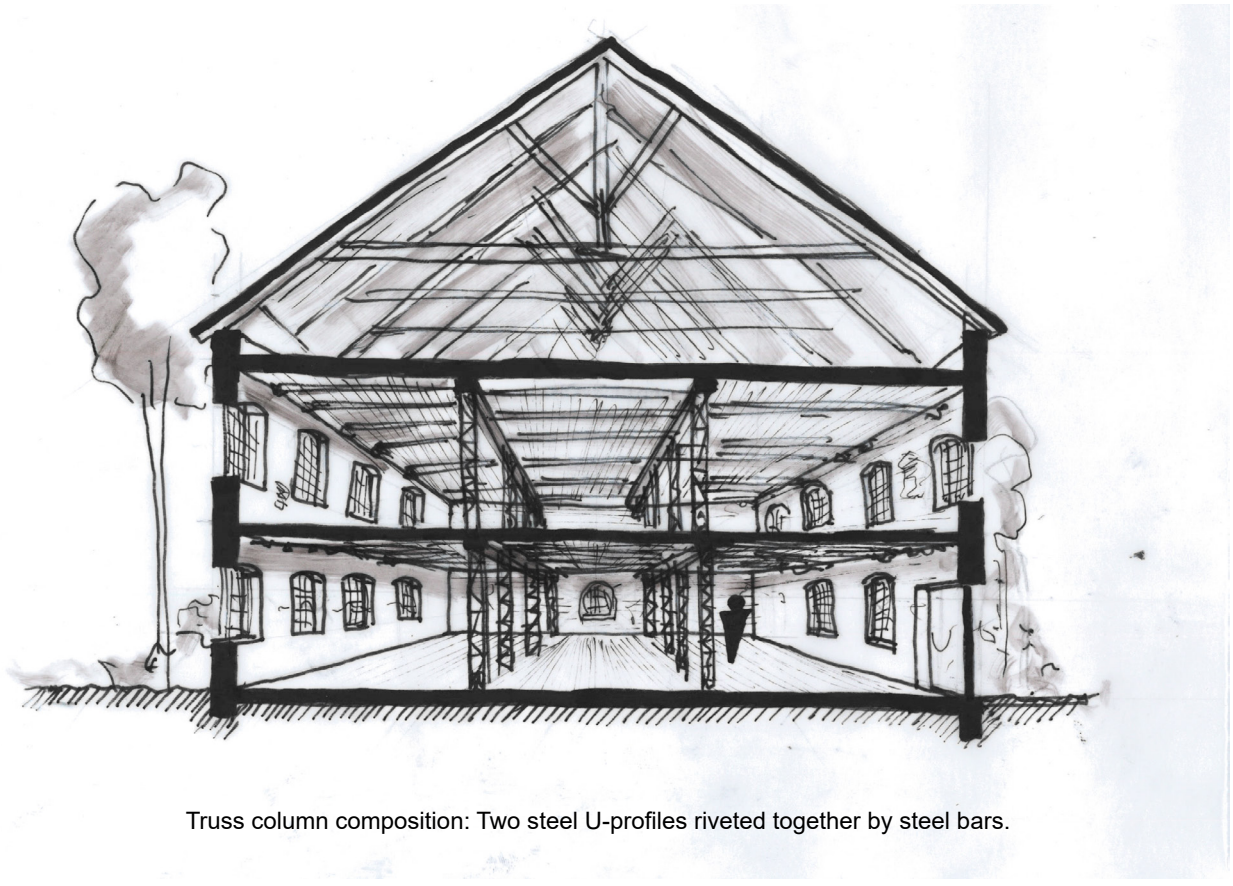


The ditch



Earthen walls





Truss column composition: Two steel U-profiles riveted together by steel bars.

SPECIAL ELEMENTS

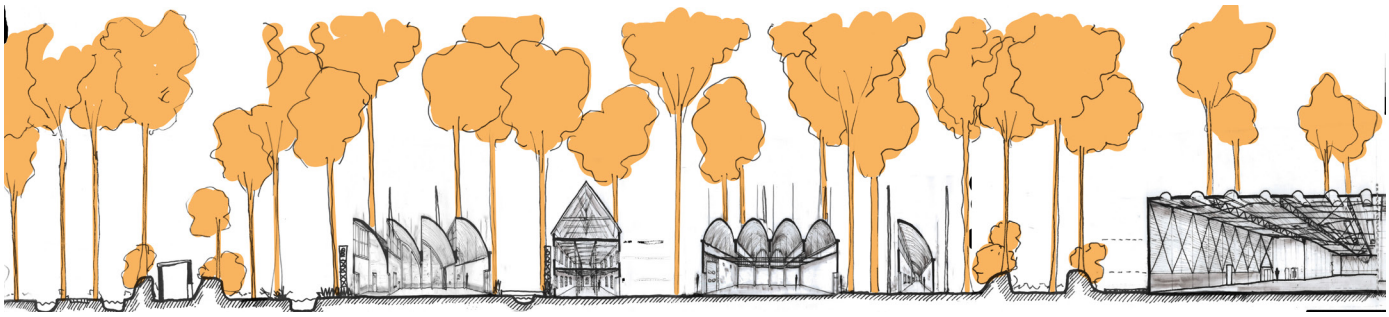
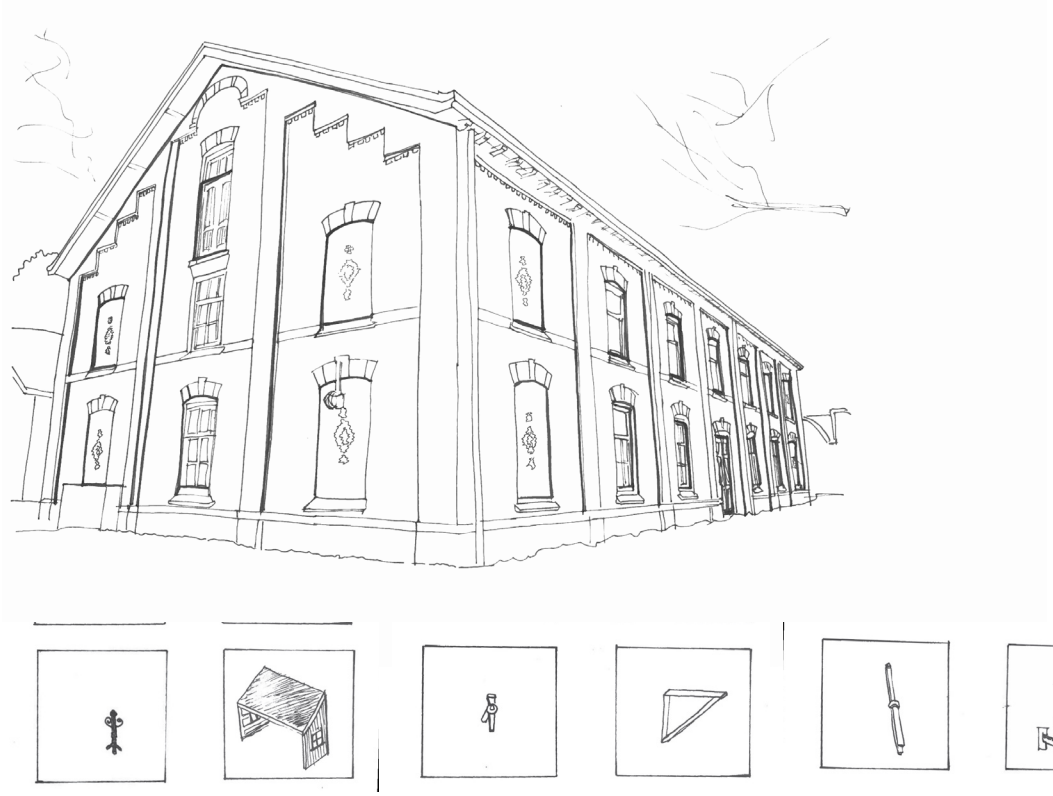
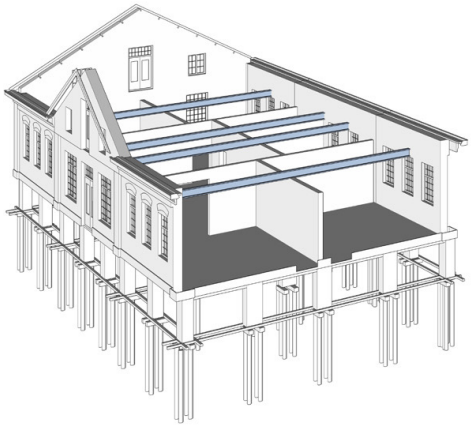


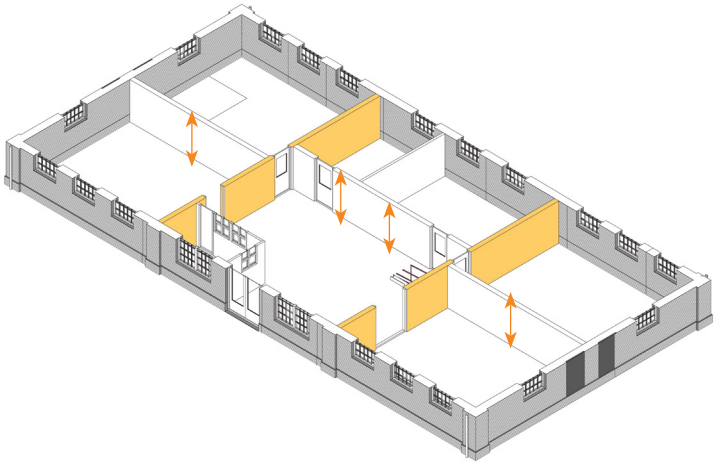
Image by Lucas Pol

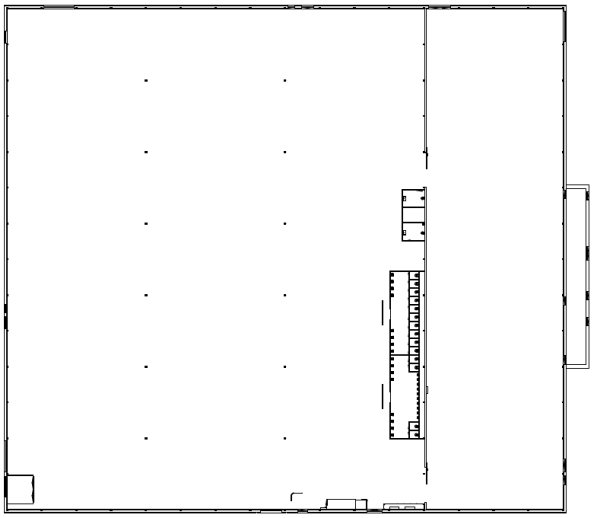
Which elements should be preserve and why?

GABLE ROOF TYPE

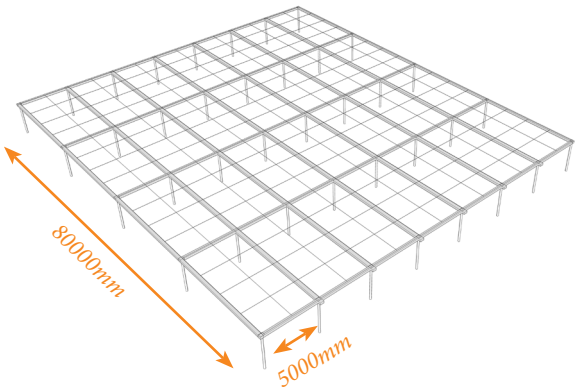




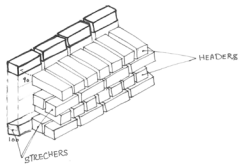


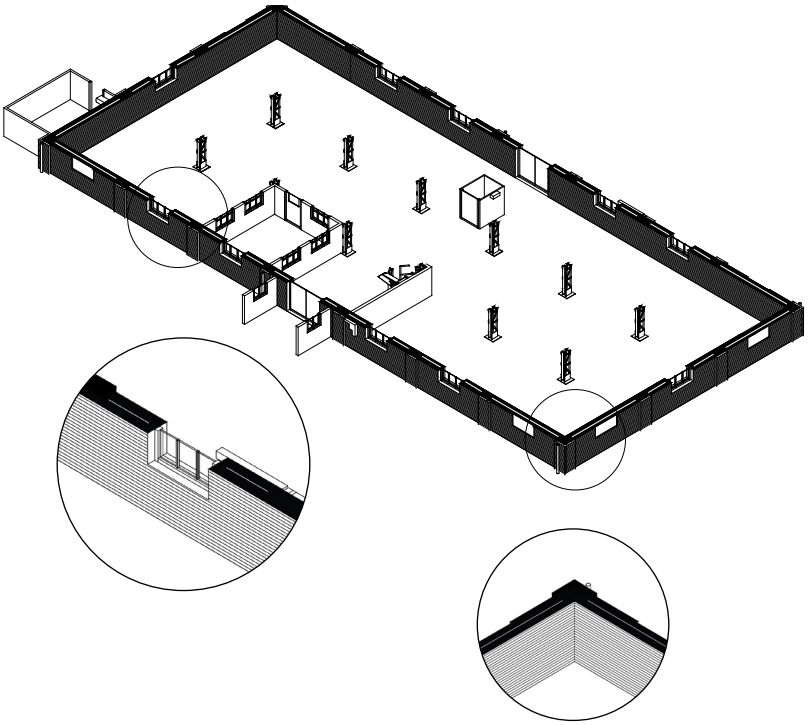


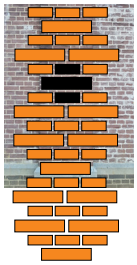
Ground floor: 80600 x 72700 mm
6.000 m2



GABLE ROOF TYPE







Brick wall

Waal format brick (210 x 100 x 50 mm)
Cross bandage pattern (kruisverband)
'Lagenmaten': 60
'Koppenmaten': 110 mm

GABLE ROOF TYPE

