KATOENVEEM

MSc III Heritage & Architecture

Architectural & Building Technology Analysis

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07/04/2017

PREFACE

You can work with your building's surroundings, characteristics and features by repressing them, hiding from them, celebrating them, juxtaposing them, making fun of them, uplifting them, supporting them, replacing them, improving them, or even changing them. But to make a decision you have to look beyond your building's subjective beauty or uglyness and it's immediate site, you have to analyze it's history, everyting that surrounds it and the building consists of to make the right judgement.

There are many factors that come into play regarding an architectural, cultural and technological analysis, but we think it may be important to understand (as you are coming up with solutions to your architectural design) what the perception is by yourself, the public and the municipality of what is currently on and in your building site (or what once was there). You should however not be limited by this with regard to the site and building awaiting your design and the design process, but we do think you will formulate a better design concept if you understand the different and sometimes intangible dimensions to the site where you will build and/or intervene. We will use this as a springboard during our graduation to think outside of the box by still being true to our own design style, but still solve all the challenges, opportunities and needs this place, the building and the surroundings bring.

This site and building analysis in front of you is very important for many reasons. And key among those is that it presents you with many clues and provides arguments which together add up to help you determine what design opportunities and challenges you can solve, leverage and build upon. A good analysis gives you a peek into the underlying "personality" of where you will build — and that may just spark and/or justify your own best innovative design solution and approach.

INDEX

INTRODUCTION

The Katoenveem, a fascinating building a fascinating place. This large oblong building maybe seems boring and ready for demolition for the untrained eye, but the eyes only see what the mind is prepared to comprehend. We'll first try to comprehend the building as a hole, the site and it's surroundings and later value the building and the place as it is.

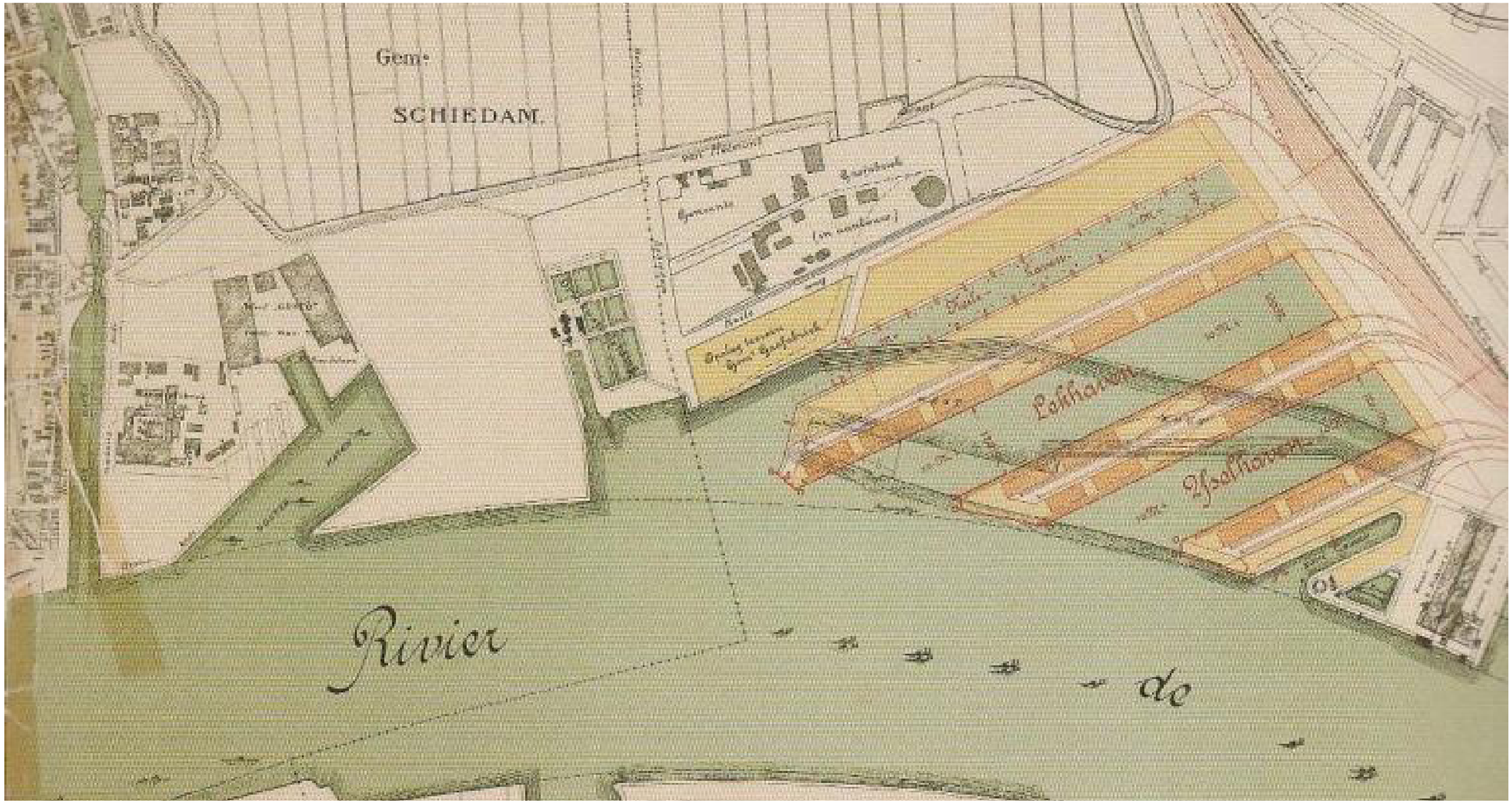
The still standing structure, designed by J.J. Kanters, was built along one of the quays of the, at that moment, brand new and busy Vierhavens industrial and harbor area. In only two years; 1919-1920 the building was constructed together with several structures which together made the Katoenveem Complex. The main building, the one still standing, was built for the storage and transshipment of cotton. In Rotterdam this was the first warehouse that was especially designed for storing and distributing cotton. Katoenveem and the complex functioned for the cotton industry for over 43 years untill 1964 when the company quitted due to the rapid development of synthetic fabrics. After 1964 the building still functioned as a warebouse but not exclusively for cottonbales. Later Atelier van Lieshout had it's offices here and even later an appartment was made on the roof.

This analysis, as mentioned in the preface, will help us in the next phase of the design process; the proposal for an intervention. However we have to mention that due to the bombing on the 14th of May 1940 the building drawings of the building and the Katoenveem complex were lost. This is why our analysis is based on several sources from documents delivered on blackboard and the Rotterdam archives to earlier analyzes that have been made of the building and the site. Next to that we have taken our own measurements at the building site as already present maps and elevations are all a little bit different. The analyzes that have already been made of the building and site have helped us understanding the building and it's main components however they didn't give us the appropriate amount of information about how the complex and building exactly worked. This information we mainly got by looking into documents found in the archives of Rotterdam and logical thinking.

Our research is divided in several chapters which are mostly placed in chronological order and from large to small scale. We will start the way you normally start the design process; by visiting the site and it's surroundings. By making a spatial sequence of the area and through the building we will first try to show how we experienced the place and the characteristics and highlights it provides. Secondly we will look at the development of the surroundings of the Katoenveemcomplex on several distinctive but equally important themes by mainly mapping. After this we will look at the development of the Katoenveemcomplex itself from it's origins untill now by mainly archival research. The next part will be a research into the building itself, the typology and it's relation to other warehouses and especially the ones which were designed by the same architect as the Katoenveem. The main volumes, elements and the building scale will be the next subjects and from here we will research the building more deeper and more in detail. The structure, the technology, the circulation, materialisation, current state, facades and all kinds of important parts and elements will be looked at in the coming chapters.

SURROUNDING DEVELOPMENT

In this chapter we will look at the direct surroundings of Katoenveem. By analysing the environment around the site we will try to understand how and why the area's morphology and structure developed. We wil first look at the development of the water, the harbors and other waterways. After this we will look at the infrastructure, then we will analyse the development of the built environment and after this we will look at green structures and functions in the Vierhaven area. The collected knowledge collected will be used to form a conclusion which will be usefull for the value assesment and by that for the design process. The conclusion of this chapter is not mentioned seperately at the end of the chapter but in the texts underneath the illustrations. This is the case because of the large amounts of different subjects.



design drawing Vierhavens by unknown
Daalder R. & Ter Bruggen J. (2008). Havens van Amsterdam en Rotterdam sinds 1870. Den Bosch: Walburg Pers.

waterways 1930-2017 by joost van den berge
Daalder R. & Ter Bruggen J. (2008). Havens van Amsterdam en Rotterdam sinds 1870. Den Bosch: Walburg Pers.

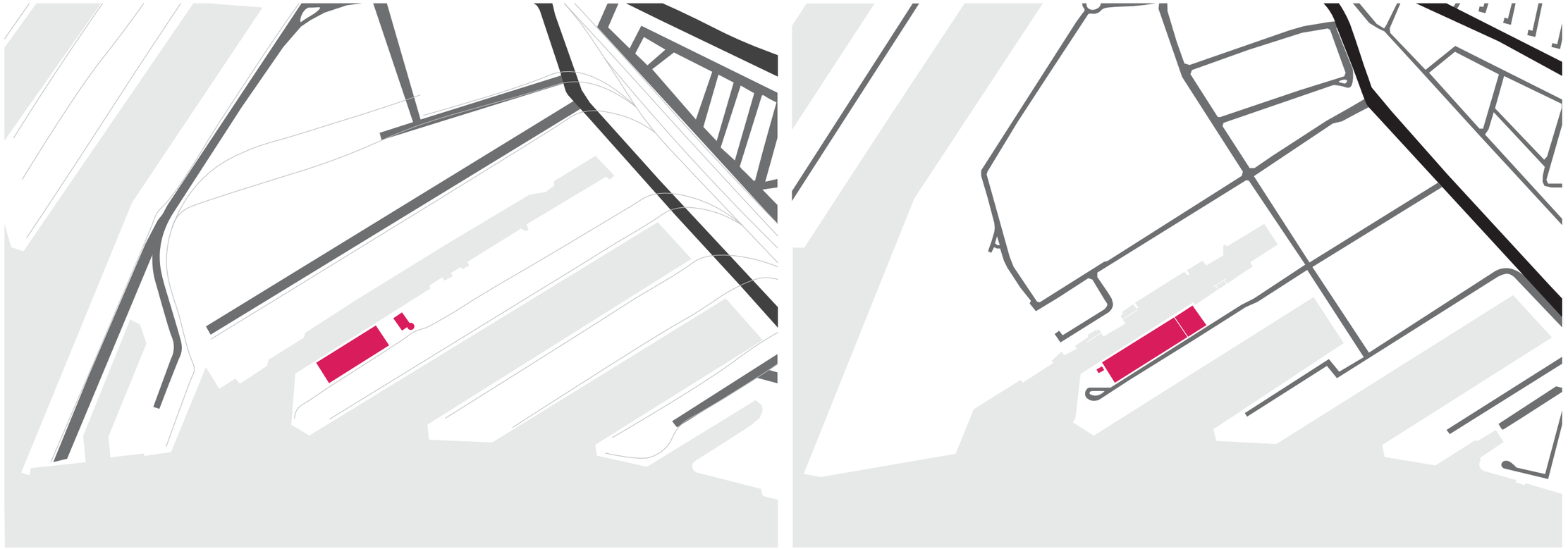
WHY?
to understand how the area's morphology and structure developed and to use the knowledge collected for the design process

HOW?
by looking why and how the watersituation was at the beginning when the harbors and Katoenveem were finished and how it is at the moment and how it is at the moment through several sources and historical maps from the web and documents

WATERWAYS
on the previous page you can see the design drawing of the Vierhavens area. You can also see the former shorelines. In the illustration above you can see the site in red and the waterway situation around 1930. On the illustration next to it you can see the situation at the moment (2017). You can see that the structure has hardly changed. However one harbor on the left side has been closed and all harbors except one on the right side have been shortened, but why? After the war the trade in petrol became much more important for Rotterdam. Next to that the technique improved greatly and larger and larger ships came in use. They needed a great depth and larger harbors. That's why new harbors were constructed to the west. Like Europoort and later even artificial harbours in the sea: Maasvlakte and the Nieuwe Maasvlakte. So this former busy area and it's harbors just as the Maas- and Rijnhaven became redundant and less and less functional over time. Almost all ships and activity went to the west of the city and the once so busy harbors and quays became mostly empty and silent. That's why the area could better be used for industry not immediately related to water and the har-

WATERWAY DEVELOPMENT 1:10.000

- Katoenveem
- water
- former water



infrastructure 1930-2017 by joost van den berge
Daalder R. & Ter Bruggen J. (2008). Havens van Amsterdam en Rotterdam sinds 1870. Den Bosch: Walburg Pers.

WHY?
to understand how the area's morphology and infrastructure developed and to use the knowledge collected for the design process

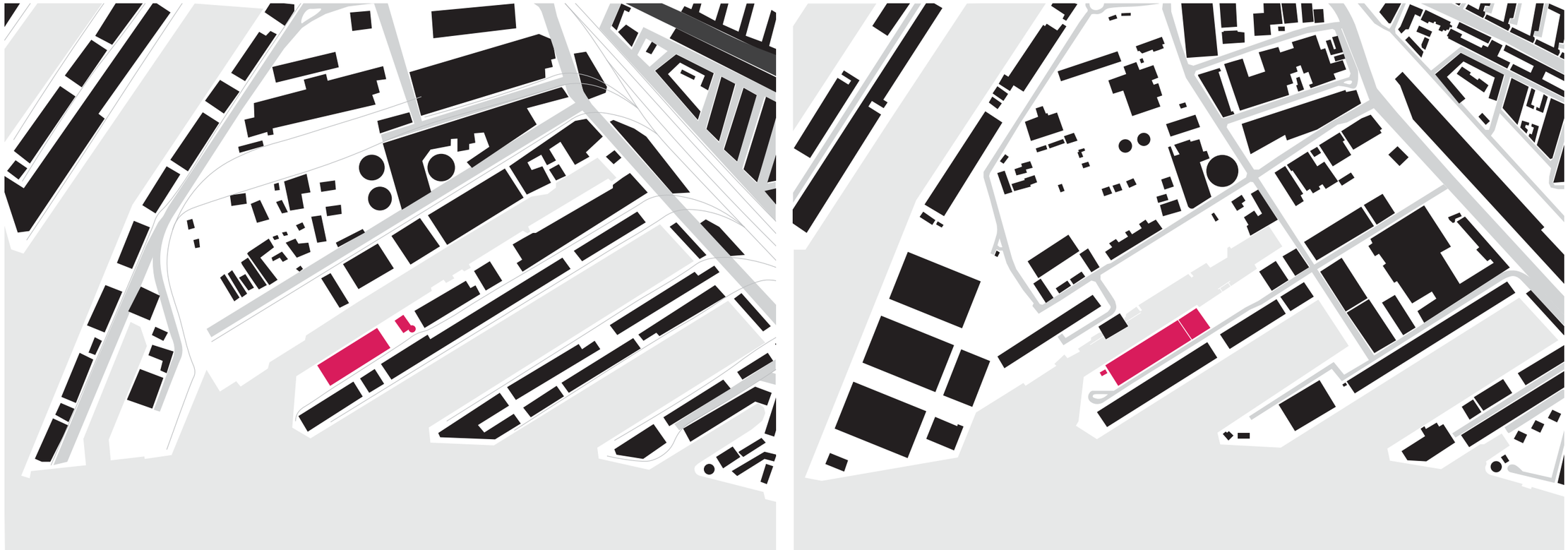
HOW?
by looking why and how the infrastructural situation was at the beginning when the harbors and Katoenveem were finished and how it is at the moment through several sources and historical maps from the web and documents

INFRASTRUCTURE
On the left illustration above you can see the infrastructural situation around 1930 and on the right side the current situation. Clearly here the situation has changed a lot. The direction north-east south-west is still intact. However a new axis has been drawn from north to south across the hole area at the spot where the harbors are cutoff and shortened. This intervention has took place in the nineties so not that long ago.
Next to the changes in road structure the largest 2 changes of the area are the almost completely lost infrastructure over water to the Vierhavens, while in the 30´s the harbors were filled with ships leaving and entering the area, and the disappearance of the railtracks. As you can see there was an abundance in the area of railroads for the improvement of the accessibility of all the industrial buildings. In the east, at the end of the harbors, a large railroad junction was present where all trains came together to continue their journey to their destination in the harbor area or the inland. Over time the railroads became redundant and were removed. The large junction has not that long ago been removed to make place for the development of the largest roofpark in Europe: the Dakpark.

INFRASTRUCTURE 1:10.000

- Katoenveem
- water
- small road (2 lanes)
- large road (4 lanes)
- railroad

DEVELOPMENT



built environment 1930-2017 by joost van den berge
Daalder R. & Ter Bruggen J. (2008). Havens van Amsterdam en Rotterdam sinds 1870. Den Bosch: Walburg Pers.

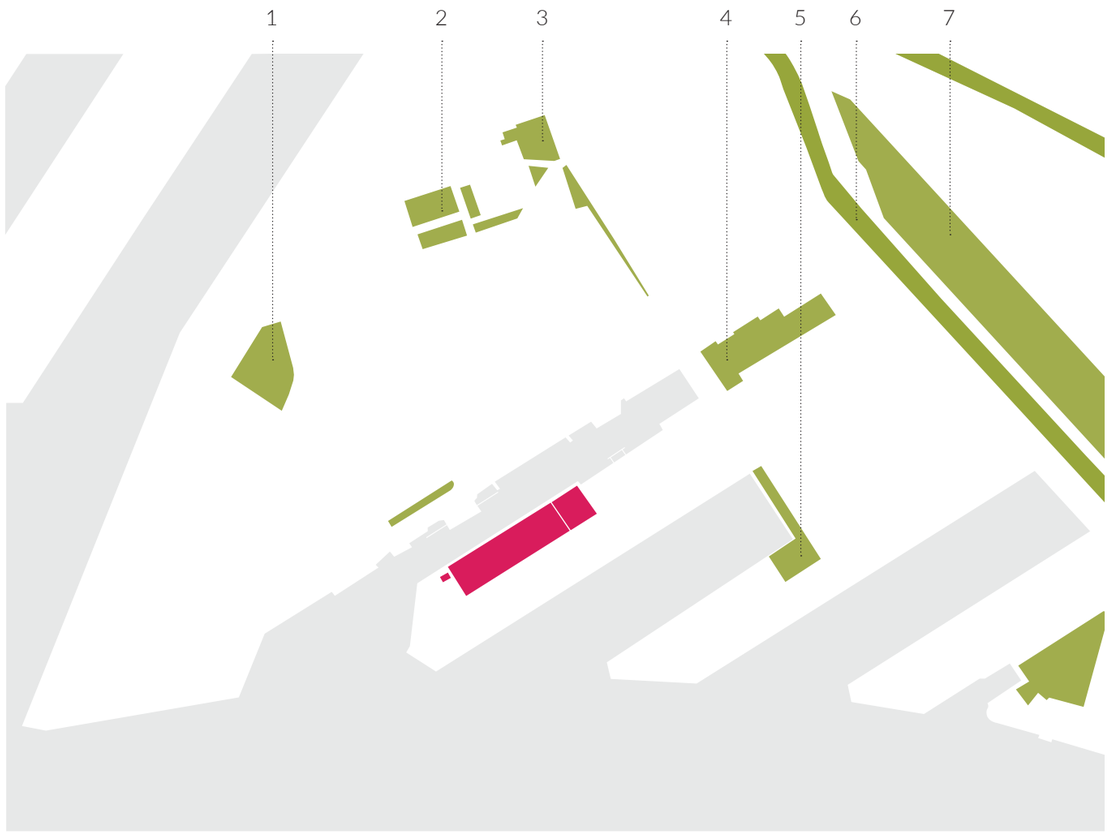
WHY?
to understand how the area's morphology and built environment developed and to use the knowledge collected for the design process

HOW?
by looking why and how the built environment situation was at the beginning when the harbors and Katoenveem were finished and how it is at the moment through several sources and historical maps from the web and documents

BUILT ENVIRONMENT
the left illustration above shows the built environment situation around 1930 and the right illustration shows the current situation. If you look at was has changed the most you clearly see the change in built structures. In the beginning most buildings are rectangular, long and slim structures built along the water and it's quays. At the moment there is apart of some buildings along the harbors no clear structure visible. This mainly is due to the shortening of the harbors, the demolition of large buildings, the road that has been built from north to south and the change in functions and ways of transport over time.
The other thing we found is that the area is not extremely more empty than it was in the beginning or before; as you can see in the illustrations. The area in 1930 was not that more dense than it is now but large open spaces at that time were also used much more than at the moment. Large open spaces in the illustration were in that time mainly used for storage, as construction site or as a spot for temporary buildings/structures. Now the open spaces in the area are mostly empty paved area's or grassland with no clear purpose or funtion so it is perceived much less dense.

BUILT ENVIRONMENT 1:10.000

- Katoenveem
- water
- roads
- built structures



green structures & functions by joost van den berge
de Keijzer M., Mouwen W., Vollaard P. (2016). Rotterdam groene stad.
Rotterdam: nai010.

WHY?
to understand where the area's green structures are and how they developed and to use the knowledge collected for the design process

HOW?
by looking why and how the green structures lay at the moment through maps and several sources from the web and documents

GREEN/NATURE
in the first illustration you can see the bold project of the Dakpark. The largest roofgarden in Europe. A large park on top of the former railway junction where now a shopping center with all kinds of shops and restaurants is constructed. This spot is really close to Katoenveem (650 meter) and offers all kinds of facility's. There is grassland, trees, gardens, fountains, playgrounds and terraces. But next to this large park there are a few green places in the Vierhaven area while they originally weren't present in this formerly dense industrial area. We numbered 7 spots that have some natural green properties.
1. This is a large flat grassland area that is private property 2. This area is too private property and also consists of grasslands with a few bushes 3. This area is private property too and consist of large trees with grassland and bushes 4. The area at no. 4 is a new initiative of gardens called Voedseltuin or in English: foodgarden. Here volunteers produce their own vegetables and fruit for own use and to bring it to the food bank for the poor. 5. This public area consists of grassland with regular placed trees 6. Along the new roads large rows of trees and grassland have been added. 7. The Dakpark

GREEN STRUCTURES 1:10.000

- Katoenveem
- water
- green area's

functions by joost van den berge
Google. (z.d.). Consulted at 2nd of April 2017, from https://goo.gl/maps/y5mfY

WHY?
to understand what kind of functions the area consists of and whay and how that developed during the existence of the Vierhaven area. The knowledge about this we collect in this way and use for the design process

HOW?
by looking and researching the current use of the built environment and how they were used originally through maps and several sources

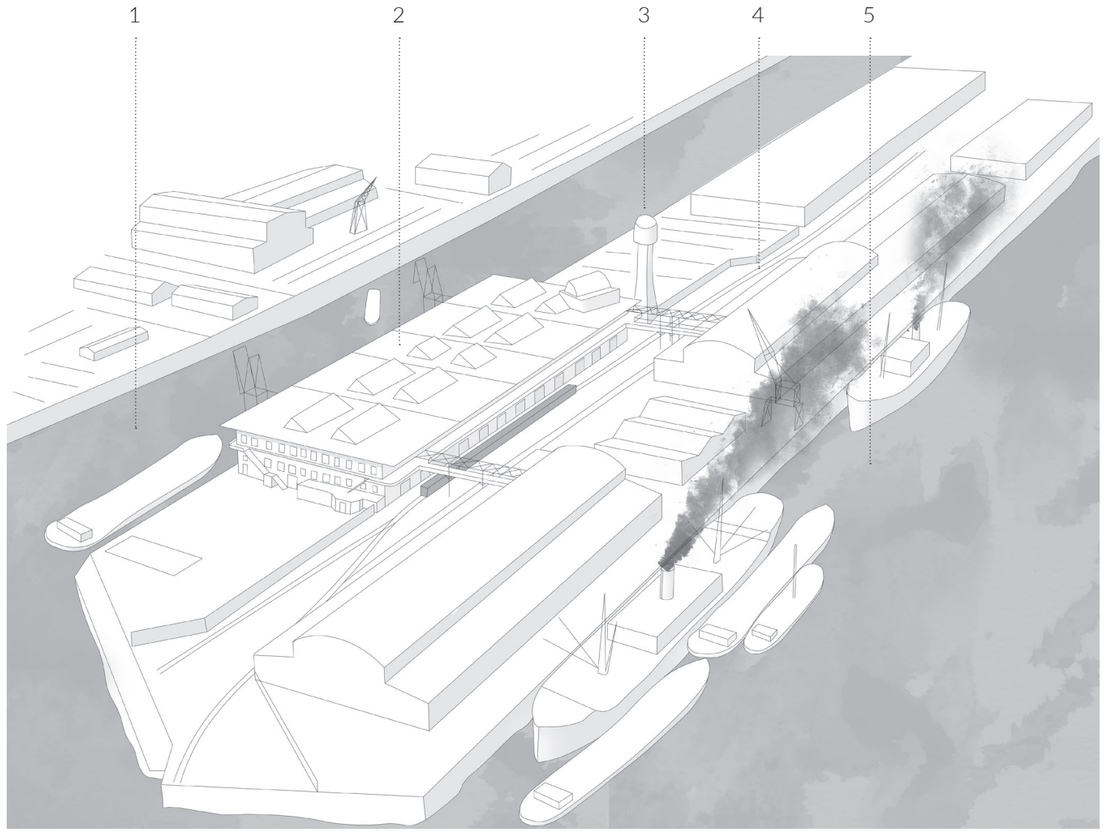
FUNCTIONS
in the picture on the left you can see how the area was mostly used in the beginning. Ships delivered and loaded their goods to and from large warehouses and factory's along the long quays and on land the trains, cars and men distributed it inlands. Clearly a very industrial use and functionality of the area.
After the move to the west of most company's and industry's and the abandonment of most harbors you would think not a lot industrial company's would still be present. This is not the case. In the right illustration you can see all the different functions the present buildings have. Almost all buildings along the still present harbors have an industrial function but mostly lost their relation with the water except a few ones. On the end of the Keilehaven you can see a small cluster of ateliers and leisure buildings like a climbing wall and a place for festivals/parties. In the north-east you can find a large cluster of commercial buildings as shops, restaurants and super- and construction markets. Finally behind the Dakpark and the large road you can find the living neighbourhoods between Delfshaven and Schiedam called Tussendijken with it's educational and religious buildings.

FUNCTIONS 1:10.000

- Katoenveem
- water
- roads
- industry
- leisure
- commercial
- atelier
- religious
- housing
- education

SITE DEVELOPMENT

In this chapter we tried by analysing the site development to understand how the site's morphology and structure developed and why it did in it's particular way. We mainly done this by looking why and how the situation at the site was at the beginning when the harbors and Katoenveem were just finished and all developments and changes untill how it is now. We have tried doing this by making overviews of the site in different time periods and by making so called chronomaps which show the development of the Katoenveemcomplex in simple but clear colors and simple and short explanations under the illustrations. After this a timeline will show the main events and functions the building and complex had during it's lifetime untill now



keilepier 1930 by joost van den berge
Daalder R. & Ter Bruggen J. (2008). Havens van Amsterdam en Rotterdam sinds 1870. Den Bosch: Walburg Pers.
Enderman M. and Stewart R. (2005) Bouwhistorische Verkenning Katoenveem, Keilestraat 39 Rotterdam. Utrecht
Van Dam H.H. (1919) 'The Cotton Warehouse of Katoenveem', The pioneer For the Shipping and Trade of the Nethetlands and Her Colonies

WHY?
to understand how the site's morphology and structure developed and to use the knowledge collected for the design process

HOW?
by looking why and how the situation at the site was at the beginning when the harbors and Katoenveem were finished

SITE DEVELOPMENT
1. The Keileharbour was used by only small ships to deliver the cotton. The harbour was too small and shallow to allow larger ships to reach Katoenveem.

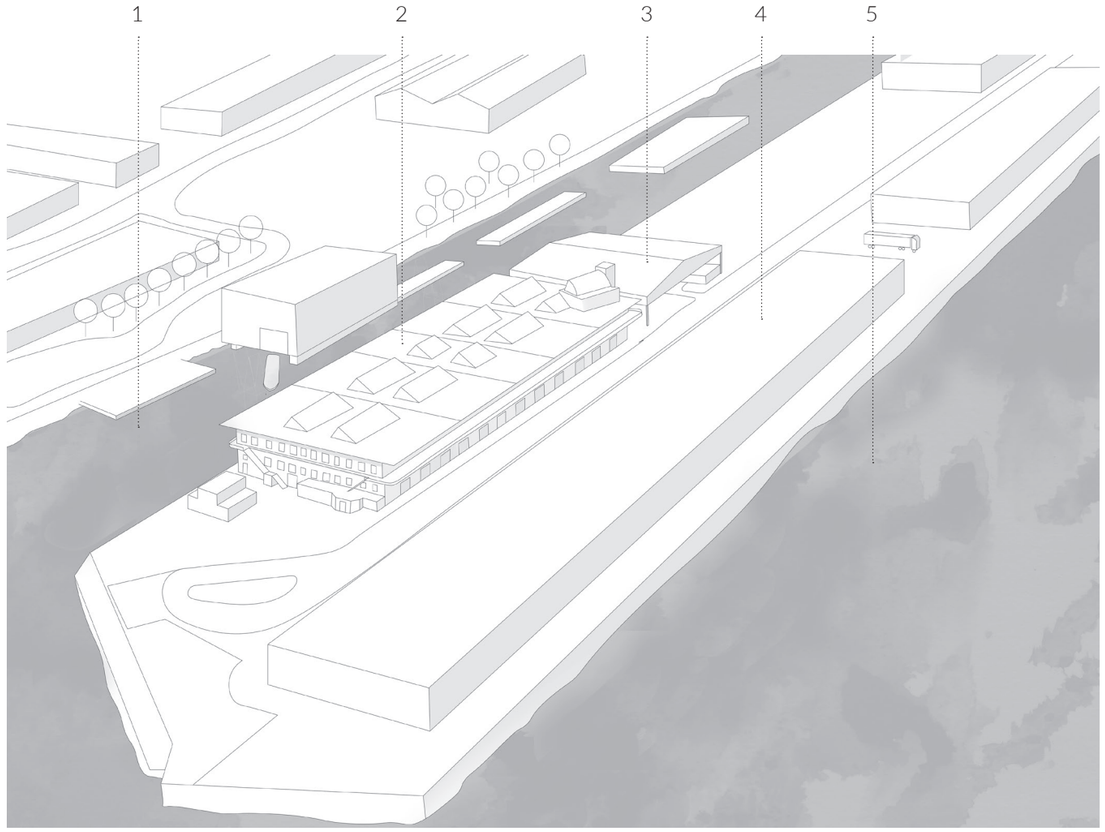
2. The main building called Katoenveem was the place where the cotton was stored in compartments and by quality. Two steel cranes and a railing system made it possible to move the goods easily from harbour to harbour, from building to building and from gallery to train. Next to that the terrain of Katoenveem was confined by a large concrete wall.

3. Outside a watertower was build to provide a constant waterpressure for the modern sprinkler installation. Next to the tower was a watertowerhouse and a large exterior terrain which was used also as temporary storage of cotton. At the front of the building the outside area was also used for temporary storage of cotton and could also be used for any extensions of the building if needed

4. Already in the beginning several railtracks were constructed so the buildings could be reached by tram and train. The trains were able to reach underneath the gallery's where strategic holes were placed. Through these holes and the railing system the trains could easily and efficiently be loaded with the cotton.

5. Large and deep ships could only reach Katoenveem by entering the Lekharbour and load their goods into the two temporary warehouses of the Holland America Line; New Orleans and Galveston (seeable on the left picture) where the chain of transshipment continued by steel bridges to Katoenveem.

sources shown above



keilepier 2017 by joost van den berge

Daalder R. & Ter Bruggen J. (2008). Havens van Amsterdam en Rotterdam sinds 1870. Den Bosch: Walburg Pers.
Enderman M. and Stewart R. (2005) Bouwhistorische Verkenning Katoenveem, Keilestraat 39 Rotterdam. Utrecht
Van Dam H.H. (1919) 'The Cotton Warehouse of Katoenveem', The pioneer For the Shipping and Trade of the Nethetlands and Her Colonies

WHY?
to understand how the site's morphology and structure developed and to use the knowledge collected for the design process

HOW?
by looking why and how the situation at the site is at the moment

SITE DEVELOPMENT
1. The Keileharbour has become empty and abandoned. It is only used by a company that cleanes ships directly across from Katoenveem

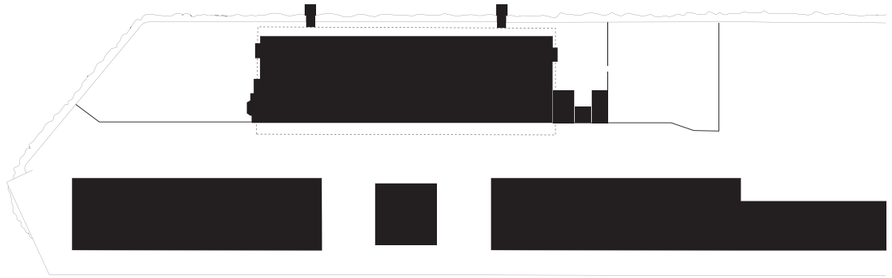
2. Katoenveem has had several functions since the cotton business stopped in the 60's. It has been a storage again and partly office but the building was mainly empty.

3. The watertower and cranes have been demolished but the watertowerhouse is still present. Next to that a large steel roof has been built that is open on all sides. Finally some volumes have been placed against the North-West facade. The main volume is a construction for an elevator.

4. Quite early on the warehouses of the Holland America Line were demolished and replaced decades ago by a distribution centre. The same happened with the railtracks which have been replaced by a wide road which ends at the end of the pier with a roundabout.

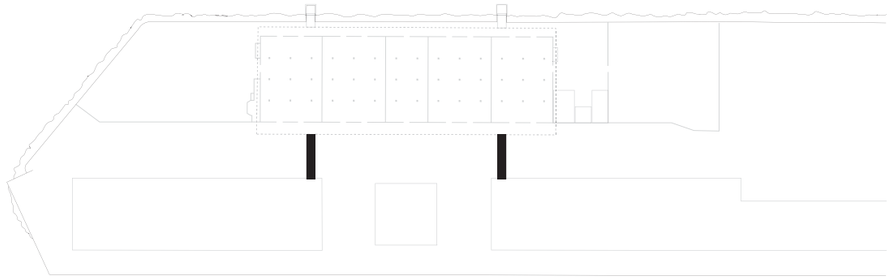
5. The Lekharbour has become much more quiet than it once was. However It is still quite in use by the harbour company as a harbour for pilot ships and by large ships for transshipment with the large warehouses next to Katoenveem. This harbor still works in somewhat the same way as it once did.

sources shown above



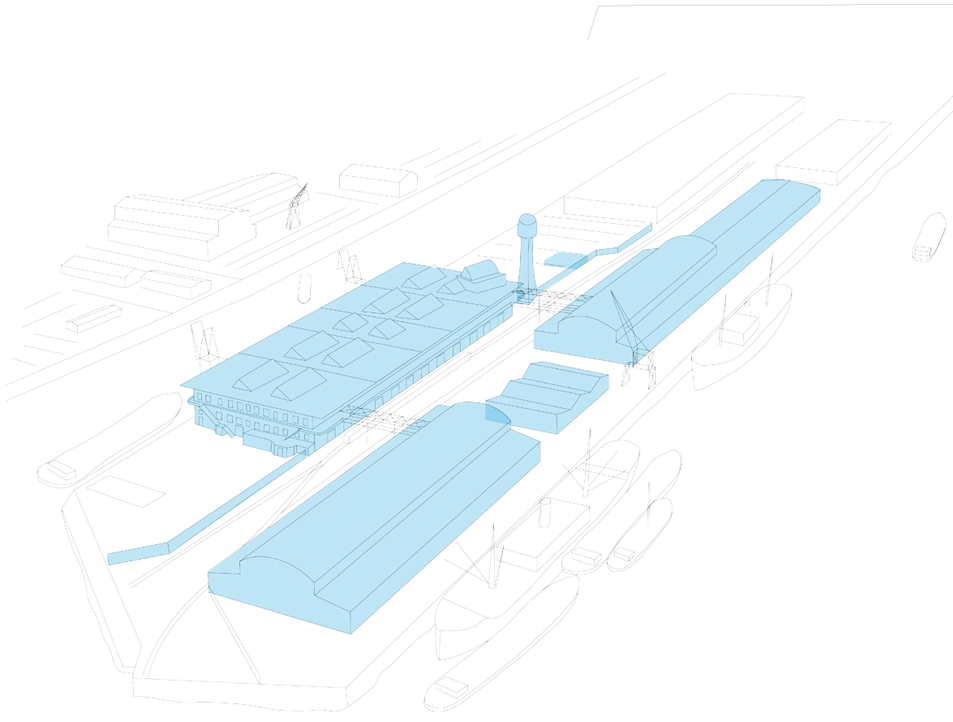
1920

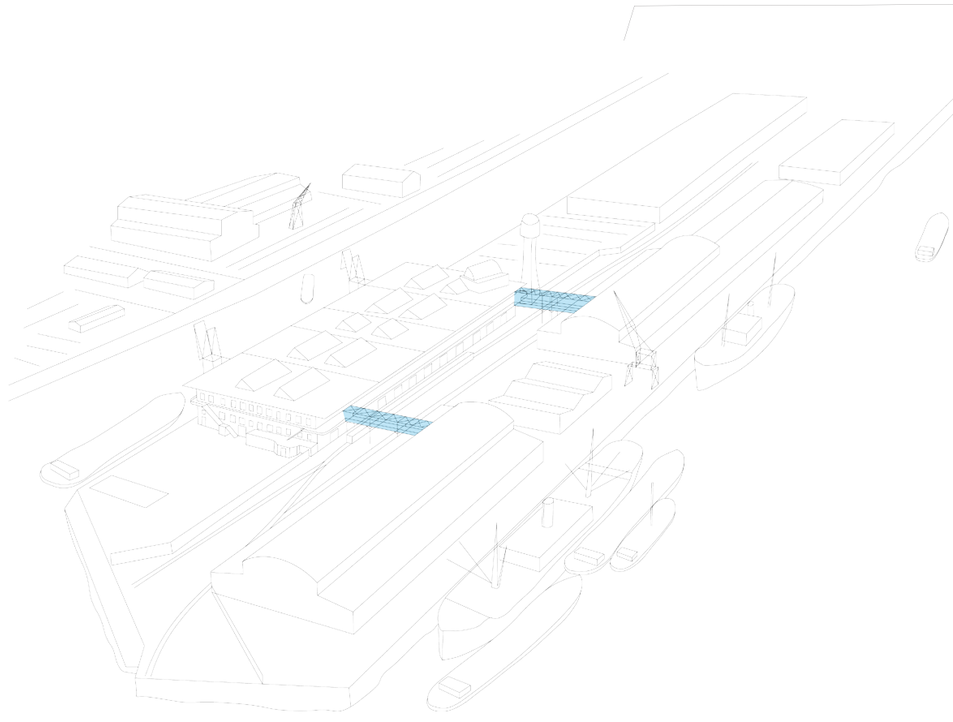
constructed/built



1921

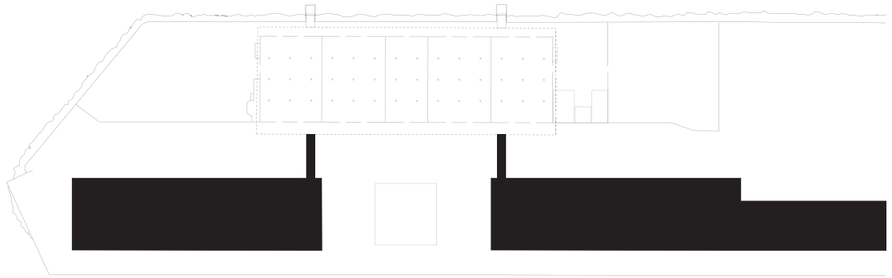
constructed/built





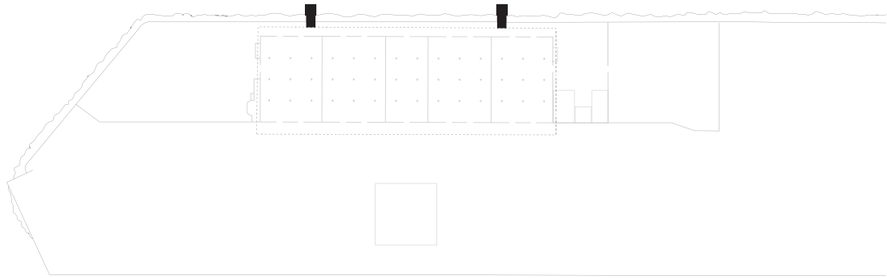
chronomaps Katoenveemsite by Joost van den Berge
The Katoenveem main building has been moslty untouched, however the Katoenveem complex and site has totally changed due to historical events and the cotton trade decline as shown on the next pages on the timeline
Here we try to show the main changes and interventions made during it's lifetime

1920 - construction of the Katoenveem complex starts in 1919 and is finished in 1920
1921 - the circulation and transport system are later finalized together with the construction of the two steel bridges due to mainly shortages of materials
sources:
Enderman M. and Stewart R. (2005) Bouwhistorische Verkenning Katoenveem, Keilestraat 39 Rotterdam. Utrecht
Van Dam H.H. (1919) 'The Cotton Warehouse of Katoenveem', The pioneer For the Shipping and Trade of the Nethetlands and Her Colonies



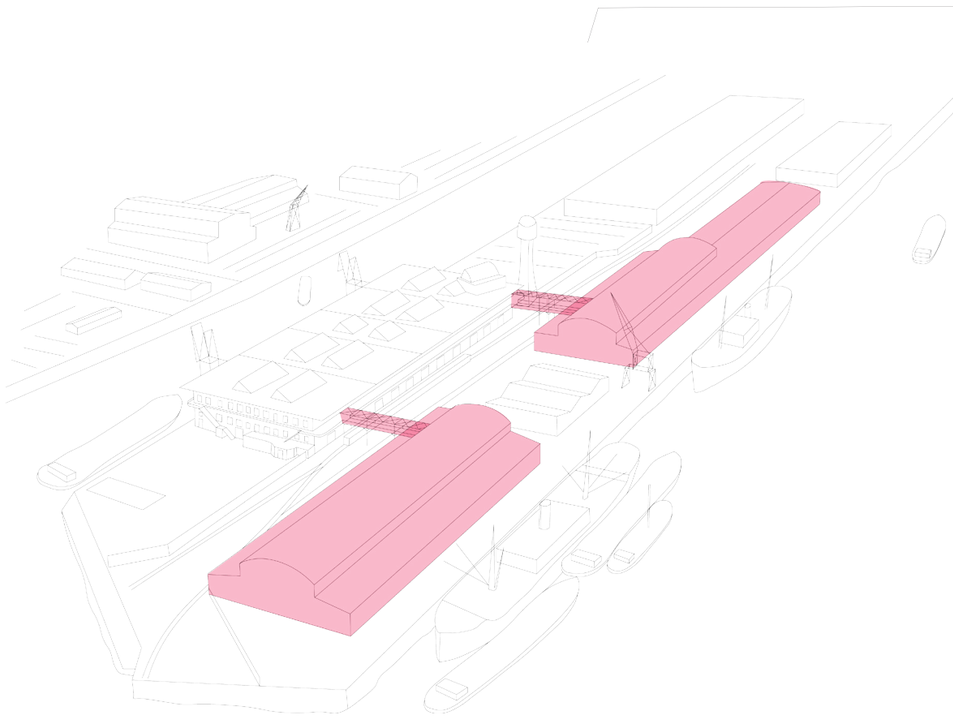
1931

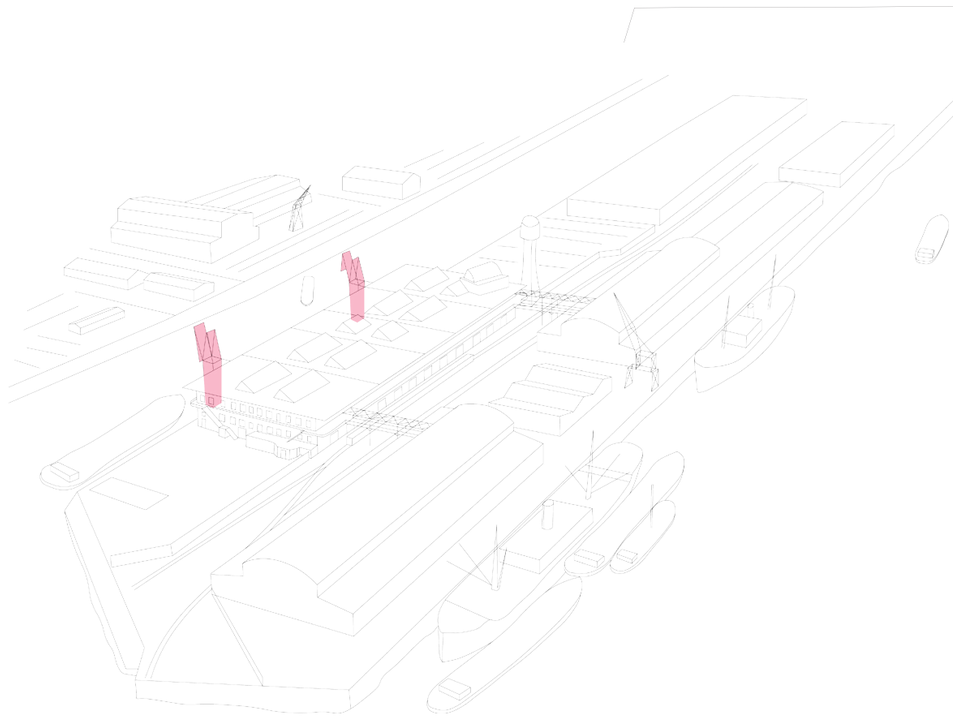
demolished/removed



1964

demolished/removed



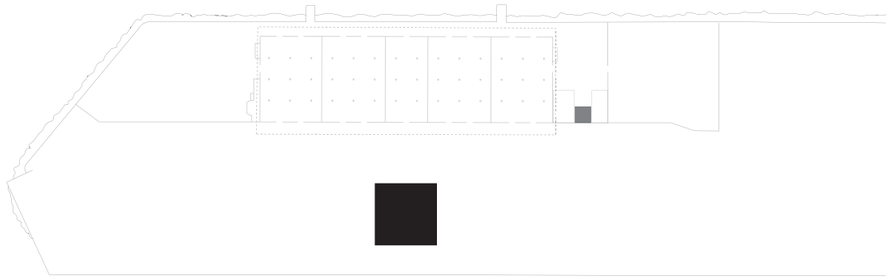


chronomaps Katoenveemsite by Joost van den Berge

1931 - the two warehouses of the Holland America Line are demolished which lead to changes in ways of transshipment. This will be more elaborated in the chapter about organisation and use
1964 - the two cranes of the Katoenveem on the Keilehaven are directly removed after the Katoenveem closure because of detoriation and the loss of function

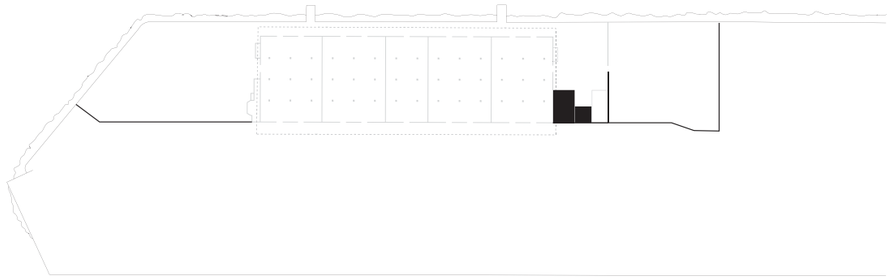
sources:

Enderman M. and Stewart R. (2005) Bouwhistorische Verkenning Katoenveem, Keilestraat 39 Rotterdam. Utrecht
Van Dam H.H. (1919) 'The Cotton Warehouse of Katoenveem', The pioneer For the Shipping and Trade of the Nethetlands and Her Colonies



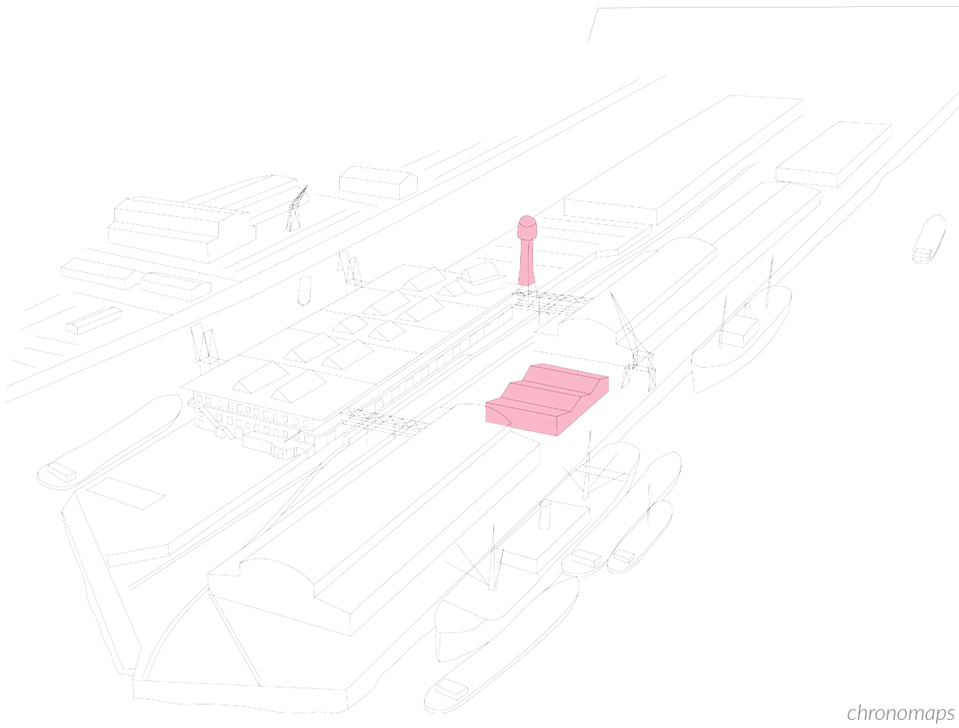
1966

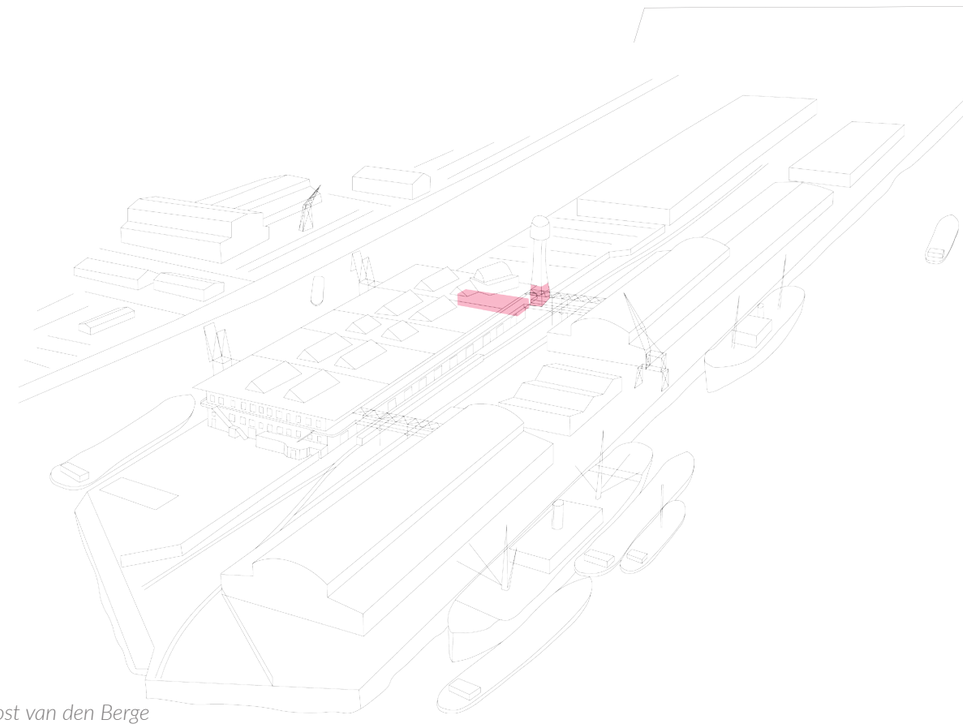
demolished/removed



1988

demolished/removed

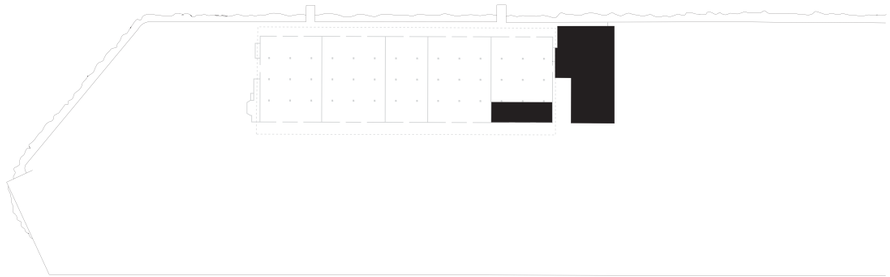




chronomaps Katoenveemsite by Joost van den Berge

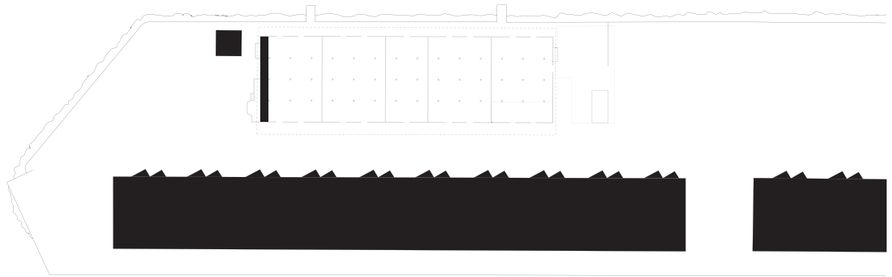
1966 - the top of the watertower and the remaining sheds are removed because of detoriation and being out of use since the closure of the building
1988 - the base of the watertower, most surrounding walls of the complex and the directers office are removed as well because of detoriation and being out of use since the closure of the building

sources:
Enderman M. and Stewart R. (2005) Bouwhistorische Verkenning Katoenveem, Keilestraat 39 Rotterdam. Utrecht
Van Dam H.H. (1919) 'The Cotton Warehouse of Katoenveem', The pioneer For the Shipping and Trade of the Nethetlands and Her Colonies



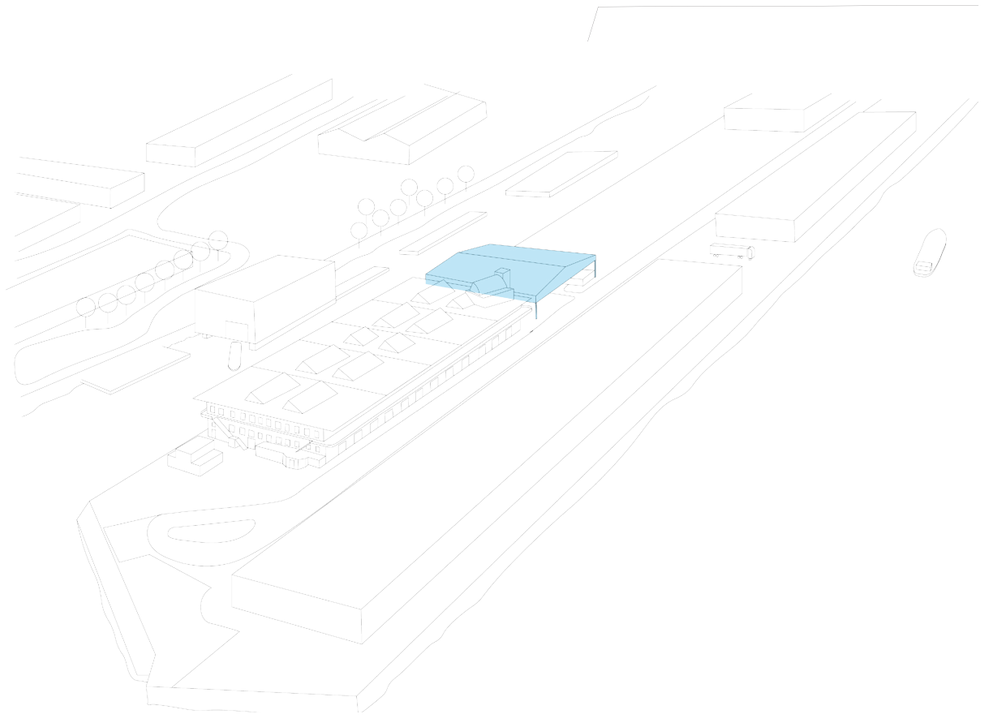
1991

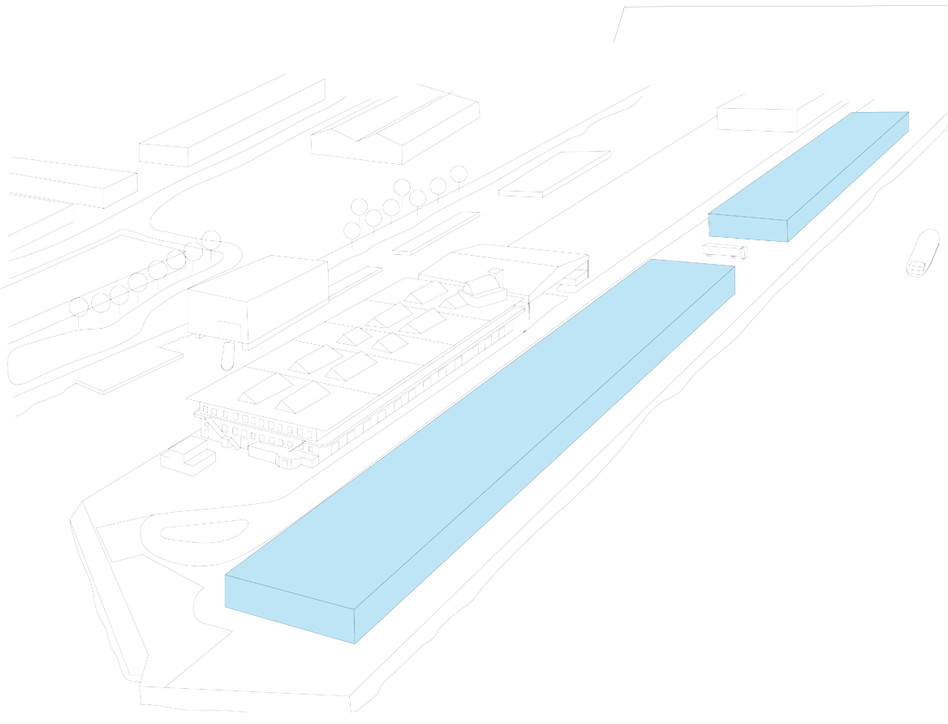
■ constructed/built



1997-2017

■ constructed/built





chronomaps Katoenveemsite by Joost van den Berge

1991- a new roof for outside storage and some structures are built in the Katoenveem
1997 - 2017 new warehouses are built to accommodate the transshipment of fruit from ships to trucks and atelier van Lieshout starts an office in the Katoenveem

sources:
Enderman M. and Stewart R. (2005) Bouwhistorische Verkenning Katoenveem, Keilestraat 39 Rotterdam. Utrecht
Van Dam H.H. (1919) 'The Cotton Warehouse of Katoenveem', The pioneer For the Shipping and Trade of the Nethetlands and Her Colonies

HIGH USE
after installation of advanced equipment, usage of space was in its highest state of functionality intended by the intention of the programmed building

1916 INITIATIVE
initiated to cunduct a part of the cottontrade and transport market through Rotterdam.
Establishing nv Katoenveem by Blaauwhoedenveem, Handelsveem, Hollandsveem, Leydsche Veem, het Nederlandsche Veem, Vriesseveem en Pakhuismeesteren, with 'Vereeniging voor den Katoenhandel' as important entrepeneurs.

1919 NV KATOENVEEM
completion of the building
first storage of Cotton

1923 - 1926
DEGRESSION
loss and rearangement
of the financial situation

1927
PROGRESSION
period of loss and rearangement
brought little profit

1945
PROGRESSION
period of profit after World War II

1919 FIRE
shortly after construction fire break out in compartment E
Services were highly needed to operate efficiently

1917 FUSION
because of the insurrance of being a Cotton Warehouse, standing alone as 'Katoenveembedrijf' was not rendable. Cooperation was a solution and parties as Blaauwhoedenveem and Vriesseveem started to work together to combine forces

1925 FIRE
in compartment D fire broke out and the firesystem was well tested

1929 - 1945
DEGRESSION
low efficiency of the cottonwarehouse
loss of profit and high transportation costs to hinterinlands by railway due to competition of the ports of Bremen and Hamburg.

1964 END KATOENVEEM
reduced demand cotton
increasing sypply of synthetic fabrics

1921 SERVICES
due to World War II and the lack of copper the construction of transportation system was delayed. Also the innovative Sprinklerinstallation was ready and after these installations the building runned on full speed

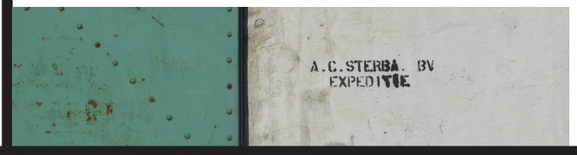
illustration 5 Usage over time: cotton warehouse 'NV Katoenveem' by Audrey Loef
(own illustration according to M. Enderman and R. Stewart, (2005) Bouwhistorische Verkenning Katoenveem, Keilestraat 39 Rotterdam, Utrecht, p. 9
Pothoven, B., (2016) 400 jaar opgeslagen 1616-2016. Rotterdam, p. 77-78)

LOW USE
new use of space, although no original sense of advanced functionality of use is implented in the usage

1995? AVL & AC STERBA BV SITUATED IN KATOENVEEM
current rented atelier of Kunst & Complex became too small for AVL and they decided to rent more warehouses. They rented one from Specerijenfabrikant Sterba which became too small as well and moved to Katoenveem.

'Op een gegeven moment huurden we een loods van specerijenfabrikant Sterba en toen ook die te klein werd, stelden zij ons voor naar het katoenveem te komen.'

The writing of this sentence make it seem like Sterba were also in Katoenveem, perhaps before AVL, enhanced by the fact of the written name on the facade of the building.



1995 ESTABLISHING ATELIER VAN LIESHOUT
founded by Joep van Lieshout, creating contemporary art, design and architecture.
First atelier at Kunst & Complex, Keileweg, Rotterdam

EXHIBITION (?)
Katoenveem used to exhibit objects of Atelier van Lieshout?

1986? AC STERBA BV
usage inbetween not clear, possibly storage of Specerijenfabrikant AC Sterba

1986 OFFICE

1991 SHED

added structures, specific user and usage not clear (?)

2016? EMPTY KATOENVEEM
Exact moving out period of AVL and Sterba not clear

NO USE
usage is decreased to zero, space has no functionality due to a lack of program

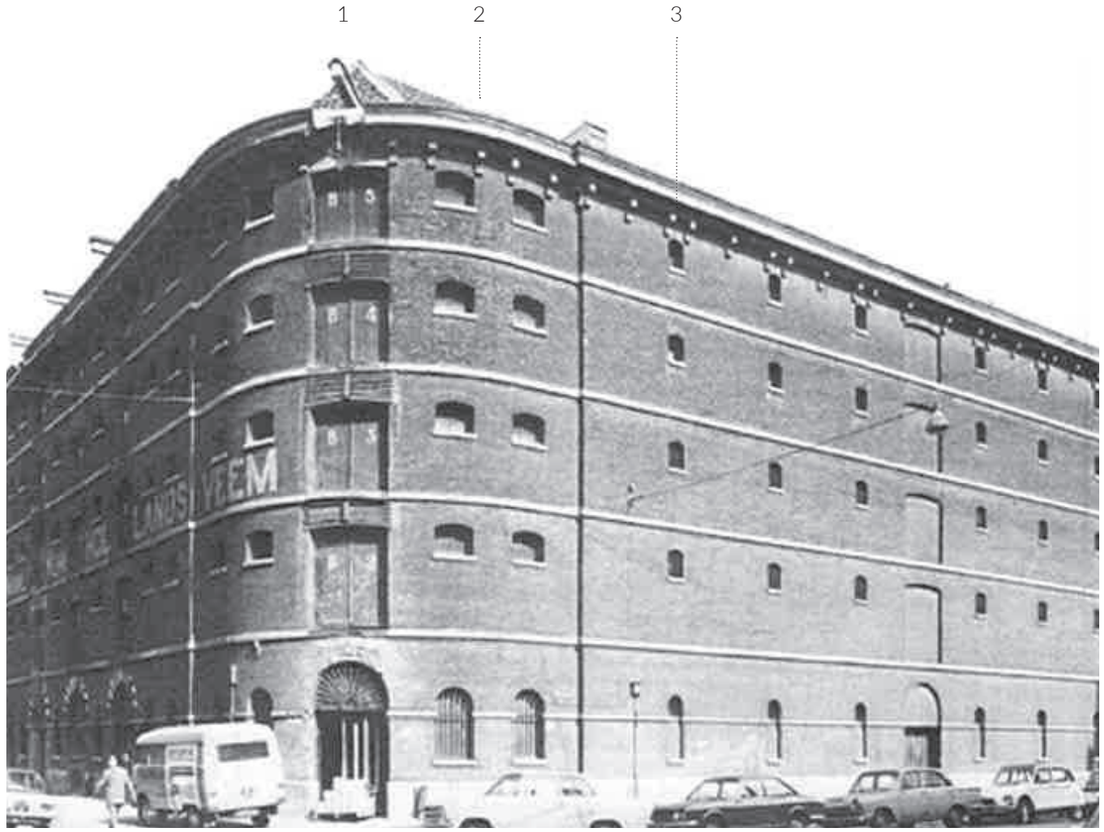
MEDIUM USE
original usage of storage, however without the advantage of high functionality

illustration 6 Usage over time: 'AC Sterba NV' & 'Atelier van Lieshout' by Audrey Loef
(own illustration according to Dijkstra, I., Heijen, H., (2005) Fruitport, een haven in de groei. Rotterdam: Drukkerij de Maasstad., p. 52. www.ateliervanlieshout.nl)

TYPOLOGY

This chapter of typology has been written to get a better understanding of the Katoenveem and it's place in the warehouse development in Rotterdam and in the oeuvre of J.J. Kanters.

To understand this placement and position we have tried to, by researching other warehouses, the harbor and industry development, the city architecture and the background and design development of the architect of the Katoenveem JJ. Kanters, mark the most important changes through time of the warehouse typology in Rotterdam and the designs of J.J. Kanters.



Niewe Werk warehouses by unknown
de Winter P. (1982) Havenarchitectuur, een inventarisatie van industriele gebouwen in het Rotterdamse havengebied. Rotterdam: Rotterdamse Kunststichting Uitgeverij

WHY?

To get a better understanding of the Katoenveem and it's place in the warehouse development in Rotterdam and use this information in the design process.

HOW?

By trying to mark the most important changes through time of the warehouse typology in Rotterdam and by researching the background and design development of the architect of the Katoenveem JJ. Kanters.

DEVELOPMENT OF WAREHOUSES

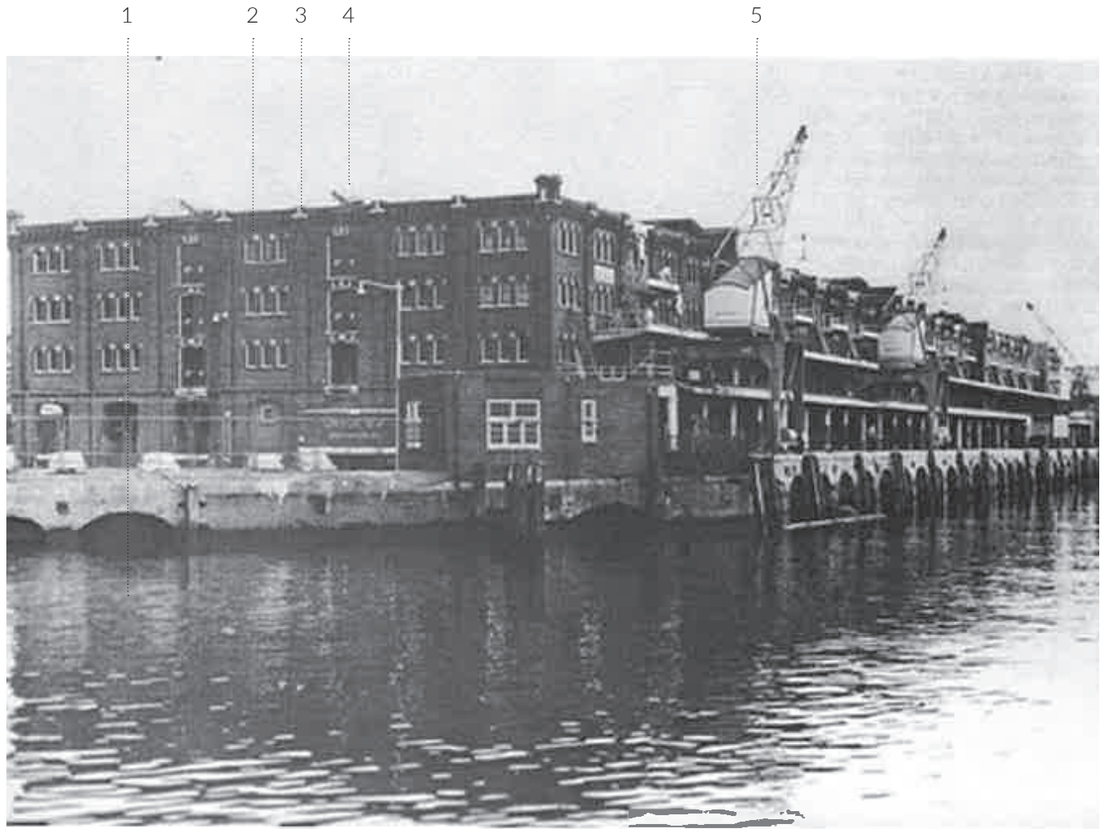
The first warehouse built in the harbour of Rotterdam is the Warehouse Nieuwe Werk for the Hollandse Veem in 1855. The architect however is unknown. This warehouse is one of the first that is built outside the old harbor area's of the oìd city centre.This area is called the Scheepsvaartkwartier and consist of the Veerhaven and the Westerhaven.

The old harbors and these newer ones still had a very strong connection with the urban environment. That's why the regulation for building warehouses were extremely strict. Most of the time it was not allowed to build a factory or company along these new area's. Next to that the height of the buildings was restricted by the municipality. And one of the rules was that on the riverside only dwellìngs were allowed. Here they solved the problem by making the façade look like the façade of a dwelling (schijngevel). Another typical feature of warehouses in this area and time is the rounded facades on the corners.

TYPOLOGICAL FEATURES

- first warehouse in the Harbour of Rotterdam
- before the World War I the bìggest warehouse of Rotterdam

1. lyres used lor transhipping
2. use of classical ornaments/decorations
3. small windows
4. warehouse behind a dwelling façade (schijngevel)



Vrij Entrepot, de Vijf werelddelen warehouse by Th. J. Stieltjes
de Winter P. (1982) Havenarchitectuur, een inventarisatie van industriele gebouwen in het Rotterdamse havengebied. Rotterdam: Rotterdamse Kunststichting Uitgeverij

WHY?

To get a better understanding of the Katoenveem and it's place in the warehouse development in Rotterdam and use this information in the design process.

HOW?

By trying to mark the most important changes through time of the warehouse typology in Rotterdam and by researching the background and design development of the architect of the Katoenveem JJ. Kanters.

DEVELOPMENT OF WAREHOUSES

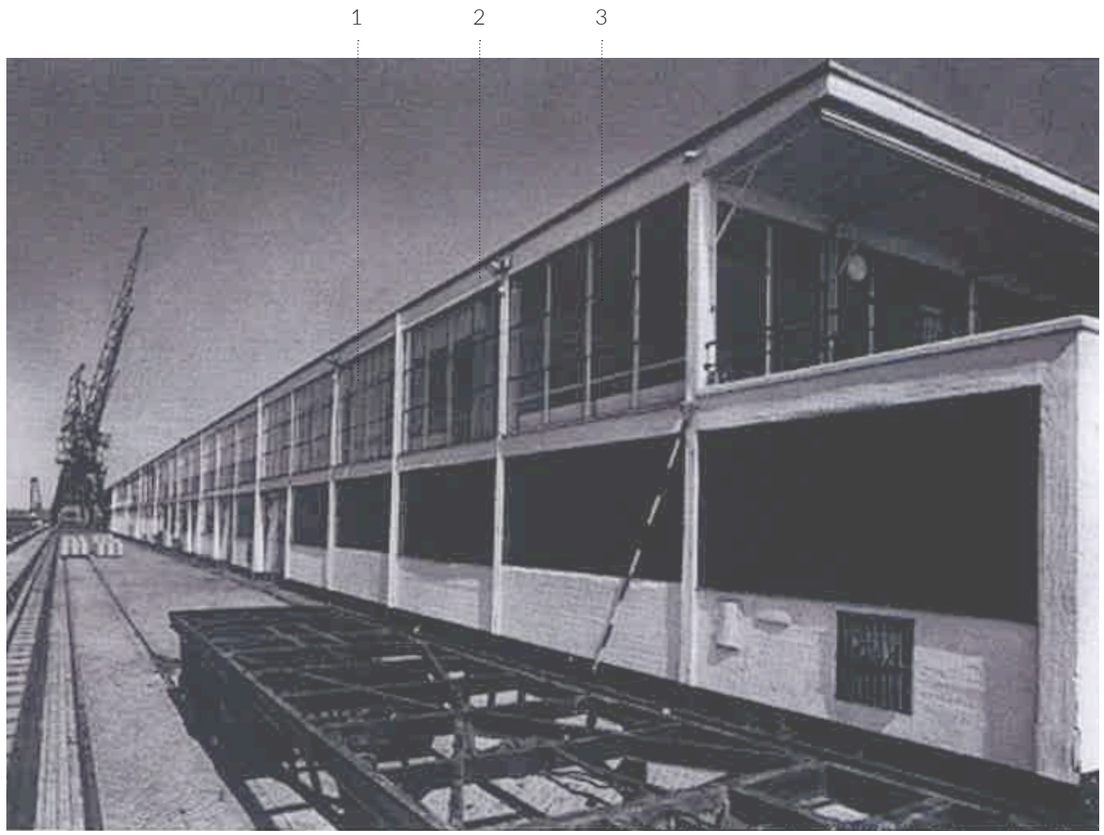
The warehouse Vrii Entrepot de Viif Werelddelen from 1879 by Th. J. Stieltjes was at the time the most modern warehouse in the world. When products arived in the harbour of Rotterdam they had to be stored somewhere. Merchants could use the Vrij Entrepot for temporary storage.

The building is 200 meter long and 37 meter wide. The warehouse is separated into 5 smaller warehouses, which all care their own name coming from our worlds continents. This warehouse has all the features of a 19th century warehouse. The exterior is build up out of heavy brickwork with small windows and a cast iron structure.

TYPOLOGICAL FEATURES

- most modern warehouse at that time

1. location close to the water
2. small windows
3. use of ornaments
4. lyres used lor transhipping
5. use of cranes and overhang for efficient transhipping
6. cast iron structure and railings



warehouse New York and warehouse westelijk Handels Terrein by J.A. Broelanan en J.H. Van den Broek & Theo Kanters
de Winter P. (1982) Havenarchitectuur, een inventarisatie van industriele gebouwen in het Rotterdamse havengebied. Rotterdam: Rotterdamse Kunststichting Uitgeverij

WHY?

To get a better understanding of the Katoenveem and it's place in the warehouse development in Rotterdam and use this information in the design process.

HOW?

By trying to mark the most important changes through time of the warehouse typology in Rotterdam and by researching the background and design development of the architect of the Katoenveem JJ. Kanters.

DEVELOPMENT OF WAREHOUSES

On the left you can see the warehouse New York from 1901 by the architects J.A. Broelanan en J.H. Van den Broek at the Kop van Zuid. It was the first warehouse in the Netherlands that was build in the Hennebique system (this wil be explained later on). Later this warehouse has been transformed in 1938 into the passenger's terminal of the Holland America line.

On the right you can see the facade of the westelijk Handels Terrein built in 1894 and designed by the father of the architect of Katoenveem: Theo Kanters.

This was his most important work and was commissioned by the company of Blaauwhoedenveem. The front façade of the building consists of traditional brick dwellings. This to not have the warehouse seeable at the street (similar as at the Nieuwe Werk, schijngevel). A gate would lead to the warehouses behind the dwellings and the facade. This building area has been transformed into modern trendy restaurants, galleries and bars.

TYPOLOGICAL FEATURES

warehouse New York
1. use of concrete and steel
2. use of a Hennebique construction principle
3. big windows and rooflights used

westelijk Handels Terrein
4. Warehouse behind a dwelling façade
5. small windows
6. use of ornaments
7. lyres used lor transhipping
8. cast iron structure and railings

warehouse Santos by J.J. Kanters
de Winter P. (1982) Havenarchitectuur, een inventarisatie van industriele gebouwen in het Rotterdamse havengebied. Rotterdam: Rotterdamse Kunststichting Uitgeverij

WHY?

To get a better understanding of the Katoenveem and it's place in the warehouse development in Rotterdam and use this information in the design process.

HOW?

By trying to mark the most important changes through time of the warehouse typology in Rotterdam and by researching the background and design development of the architect of the Katoenveem JJ. Kanters.

DEVELOPMENT OF WAREHOUSES

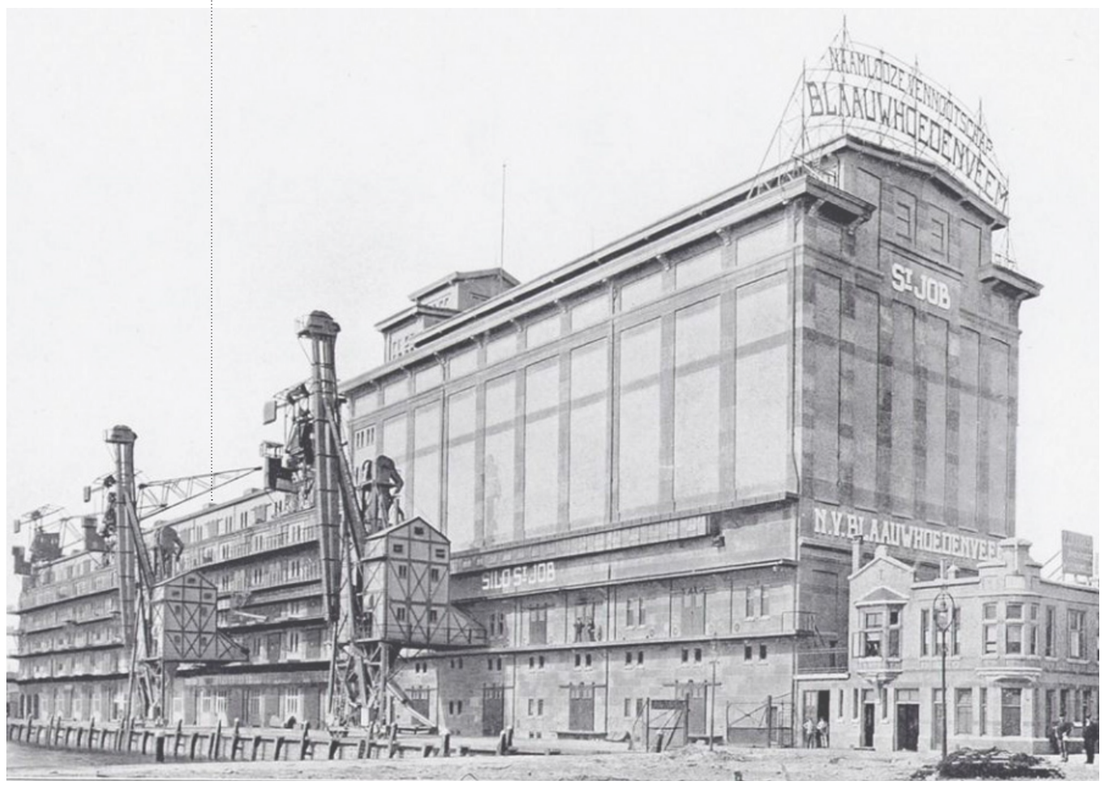
This warehouse by Katoenveem´s architect J.J. Kanters was built in 1903 on the south side of the Rijnhaven. The six story building was for a long time the highest warehouse in Rotterdam. The building was used for storage of coffee. The structure consists of revived cast iron columns on an outline of 4,22m by 5,3m. The foundation rests on a big number of wooden piles. All the floors consists of wooden beams and wooden boards, the ground floor however is built up out of concrete. This building seems to be a clear example of the transition of use in material in structure and building as their is made use of the conventional brick and steel with the at the time new material of concrete.

The warehouse was very modern but was placed quite far away from the quays. The goods would be taken from the barges, transported over the terrain and loaded into the building by using lyres and cranes. In 1970 these were removed.

TYPOLOGICAL FEATURES

- tallest warehouse at that time in Rotterdam
- no overhang
- use of two types of construction, cast iron and reinforced concrete

1. use of ornaments and decoration
2. cranes/lyres on the roof
3. small windows (the same as Katoenveem and the Vrij Entrepot)
4. brick facades with hardstone lintels



warehouse St Jobsveem by J.J. Kanters

de Winter P. (1982) Havenarchitectuur, een inventarisatie van industriele gebouwen in het Rotterdamse havengebied. Rotterdam: Rotterdamse Kunststichting Uitgeverij
Groenendijk P. (2008) Jobsveem Rotterdam een gebouw in bwegiog 1912-2008. Rotterdam: uitgeverij 010

WHY?

To get a better understanding of the Katoenveem and it's place in the warehouse development in Rotterdam and use this information in the design process.

HOW?

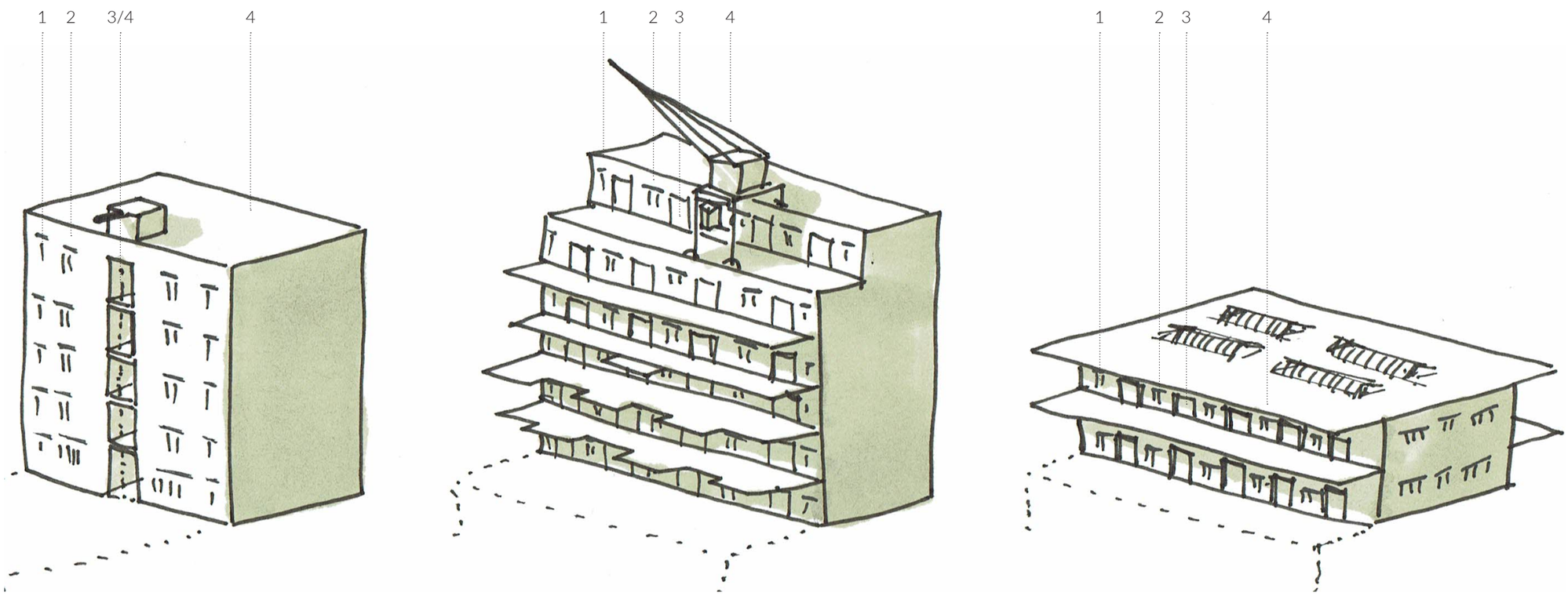
By trying to mark the most important changes through time of the warehouse typology in Rotterdam and by researching the background and design development of the architect of the Katoenveem JJ. Kanters.

DEVELOPMENT OF WAREHOUSES

The original building by J.J. Kanters from 1912 consisted from right to left in the picture above of an office building, a silo building and a warehouse. In 1987 the office building and the silo building were demolished. The building has two faces. The harbour side is dominated by horizontal lines of the loading platforms. This side is organised for efficient transhipment. The other side of the building has a closed character with small windows and large wooden doors. Here the facade has a vertical and repeating character. The building structure is made of cast iron beams and columns and reinforced concrete in combination with traditional brickwork and wooden floors. Because the use of formwork for concrete was relatively expensive, new and unknown it seams they used several systems together, cast iron, reinforced concrete and wood. The building was one of the biggest at that time. The building has a high architectural value nowadays because of the industrial architecture used, almost no decorative façade treatment, but honest use of material and incorporation of modern materials and techniques for the time.

TYPOLOGICAL FEATURES

1. use of concrete and steel structures (hennebique)
2. use of cranes and trapezium shaped overhangs for efficient transhipping (similar as Santos)
3. small duet windows
4. clearly horizontal character and lines
5. less and less use of ornaments besides above windows and building edges like roof



Santos 1903 *Sint Jobsveem 1912* *Katoenveem 1920*

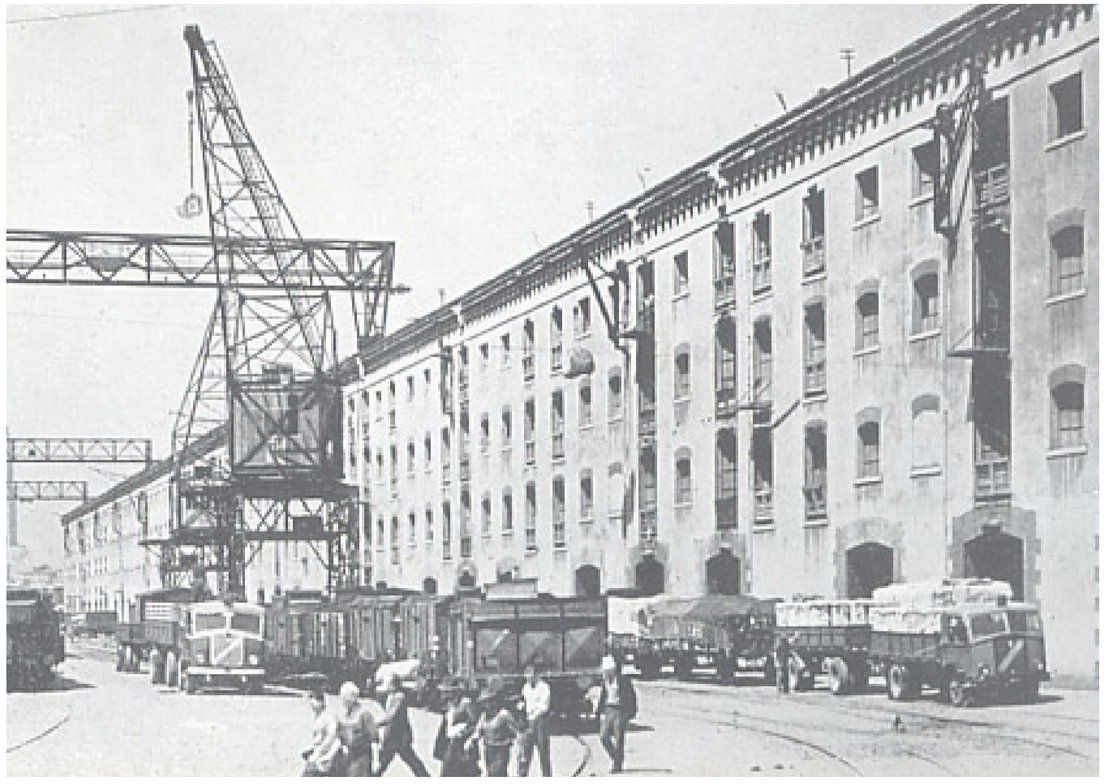
warehouses designed by J.J. Kanters in Rotterdam
similarities warehouses J.J. Kanters: 1. small similar windows 2. decorated lintels 3. large mostly sliding doors 4. cranes, lyres, gallery's, vertical hoisting, use of hennebique system, repetition facade & structure
de Winter P. (1982) Havenarchitectuur, een inventarisatie van industriele gebouwen in het Rotterdamse havengebied. Rotterdam: Rotterdamse Kunststichting Uitgeverij

DEVELOPMENT OF WAREHOUSES

The large warehouses we know today in Rotterdam were developed when the ships were bringing in more and more load which didn't have a destination at the moment of unloading. Before this time the loads were stored in basements or at top floors of big merchant houses that were built next to the harbor. With the extensions of the harbor the demand of efficient storing and transshipment increased. Specific transshipment harbors with warehouses were built. Some of these harbors were even able to lock of from the river to prevent trouble from the tides. In Rotterdam this happened at the Westerhaven and the Entrepothaven.
The first warehouses were built up out of brick with cast iron and/or wood. Reinforced concrete buildings were developed since 1890. The main benefits of reinforced concrete buildings are that the costs are lower, than for example iron strucrures, and the resistance to fire is much higher. The most important development is the use Hennebique like systems. The characteristics of this system are the monolith structure of beams and columns which will later be explained more in this booklet. Examples of this system are St. Jobsveem and the Katoenveem.
The most Important aspects when developing a warehouse were:
1: The biggest efficient surface as possible
2: Sufficient transshipment
3: Independent of weather conditions.

These aspects determined the shape of the façades and the plans of the building. With the rapid development of the harbor efficient transshipment became more and more important. This leaded to harbor sheds, with a rational system, big and high doors on booth sides of the sheds and cranes which were able to load and unload through the roof of the shed like the Fenixloodsen.

Around 1900 there's a shift in the storing principle of merchandises. More and more merchandises are stored in specially designed warehouses, like Santos and the Katoenveem, with transshipping principles adapted to the stored product. Before this period merchandises were stored in general warehouses like the Vrij Entrepot. The merchants were treated like single cargo (stukgoederen).



Magazzini del Cottono on the left around 1930 and Katoenveem on the right in the 1920's
left photo: Google. (z.d.). Consulted at 10th of May 2017, from http://www.ilmioarchiviovirtuale.it/la_mia_citt%C3%A0.html
right photo: Enderman M. and Stewart R. (2005) Bouwhistorische Verkenning Katoenveem, Keilestraat 39 Rotterdam. Utrecht

TYPOLOGY KATOENVEEM/CONCLUSION

A comparison with another Katoenveem is hard to make and formulating a definition of the Katoenveem typology is by that even more difficult. At first there are not many left which makes the building very rare and by that valuable. There were Katoenvemen in Germany but these were mostly destroyed during the Second World War. There is still a good example of a Katoenveem in Porto Franco in Genua as seen above. This warehouse was built in 1926 and was called Magazzin del Cottono.

In this enormous building cast iron beams and bricks were used for the structure and it consists of many compartments to improve the fire protection.
When you compare the Katoenveem in Rotterdam to the Magazzini del Cottono you'll notice several similarities:
- the oblong and rectangular shape of the building
- use of cranes for transhipment
- location close to the water
- repetition of the facade
- use of fire compartments
- small windows and large doors

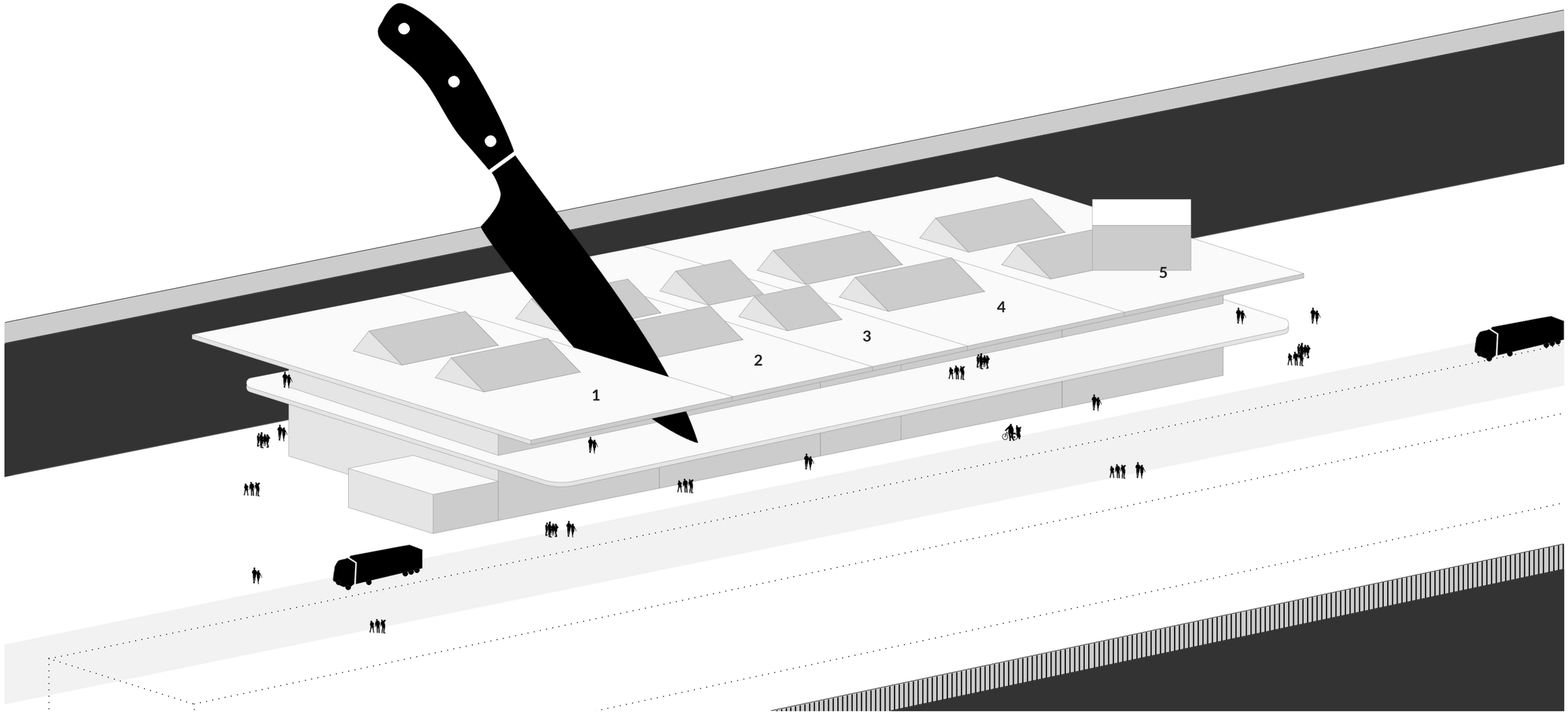
Four of the five similarities mentioned are common for warehouses from that period, the distinguishing element are the fire protection measurements. Besides the similarities mentioned there are also some differences:

- there are no overhangs in the Italian warehouse
- more use of ornaments in the facade of the Magazzini del Cottono
- a cast iron structure
- use of lyres
- no skylights in Magazzini del Cottono

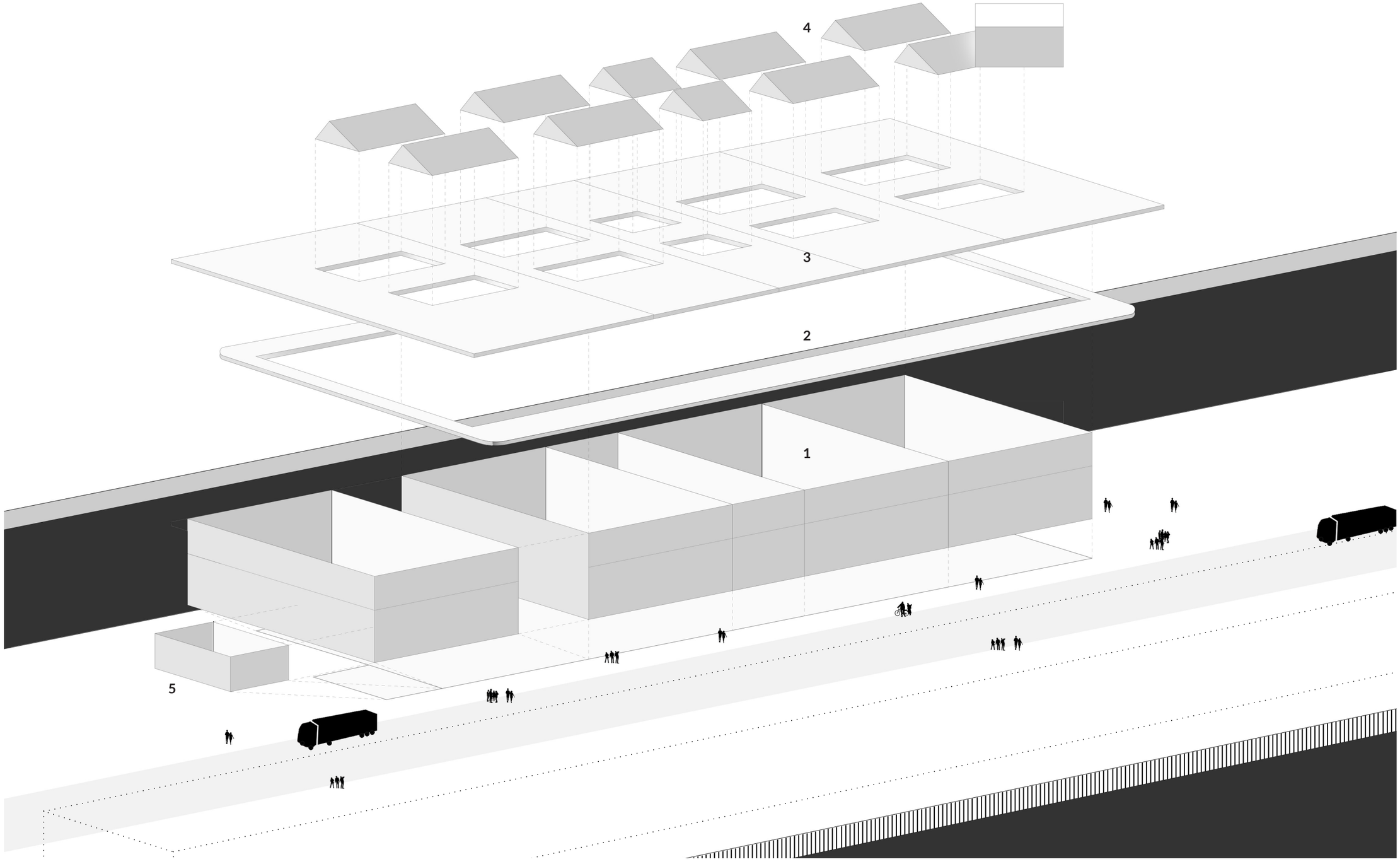
Finally if you would define the typology of a Katoenveem you can only say it almost always has these characteristics:
- oblong, rectangular and horizontal shape
- location close to the water and along quays
- repetition facade and structure
- use of cranes or lyres for distribution and circulation
- fire compartments
- small windows and/or small amounts of windows

MASS / VOLUME

This small chapter about mass and volume is made to simply understand of which main elements, masses and volumes the building consists of. At first an illustration will show the building as a large oblong building which has been cut into five pieces and the second illustration shows an exploded view to get a better understunding of the different volumes and morphological structures of the building. An important thing to mention is that te building except of being cut into five pieces is not built out of these seperate elements. The building has been constructed almost exclusively in situ concrete which means it acts as one mass but to understand the building as a hole we still made a distinction in element and form; like the gallery's, the skylights and/or the the roofs we defined in this case as seperate elements although they factually are not.



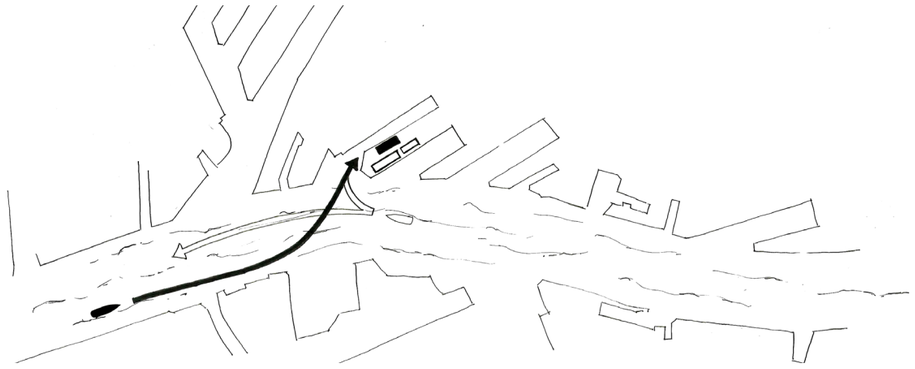
mass study & scale Katoenveem by joost van den berge
here you can clearly see the enormous scale and oblong mass of the Katoenveem. The large horizontal and rectangular building seems to be one block but actually is sliced into 5 pieces (see numbers) for fire protection, division in quality and act as dilatation for expansion and shrinkage of the large concrete masses. The 5 volumes all have the same measurents except the middle one, which is less wide.



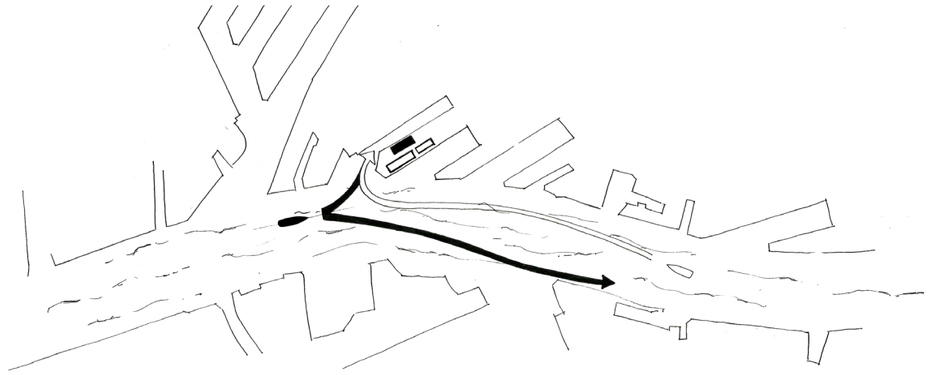
mass study, scale & exploded view Katoenveem by joost van den berge
When you would explode the building in it's main elements you could clearly see the five compartments (1), the gallery as one element (2), the roof, also cut up in five pieces, with holes for skylights (3) and the skylights themselves (4).
Last but not least; some smaller volumes are built against the main structure (5) as you can see on the left of the illustration

ORGANISATION & USE

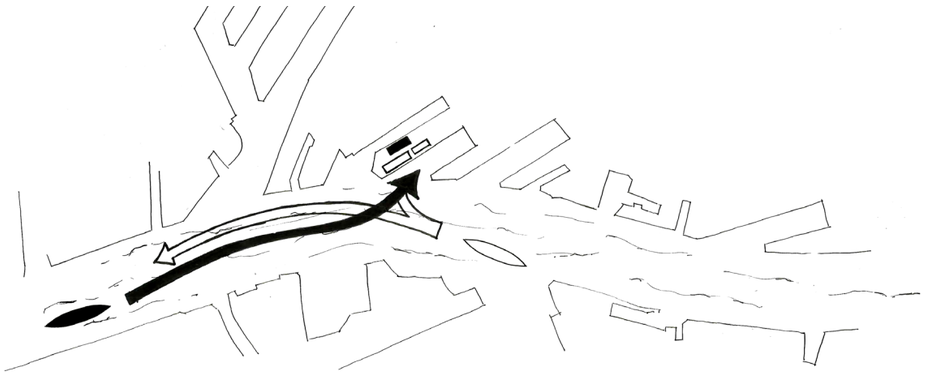
Both in historic perspective as in the current state of the building and its layers, the organisation and use is determined. By understanding types of transportation and circulation we can draw the organisational situation and use of space. Further investigation shows a detailed routing of movements throughout these layers and where it integrates with the set up of the architectural and structural system.



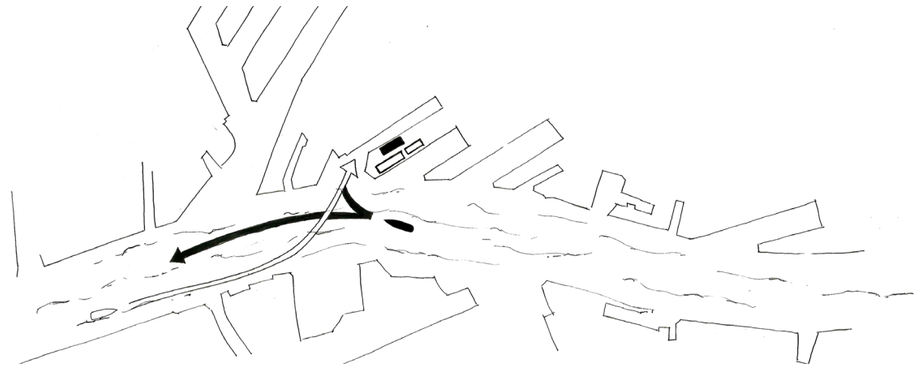
England > Keilehaven > Katoenveem



Katoenveem > Keilehaven > Hinterlands



England > Lekhaven > Warehouse Galveston or New Orleans > Katoenveem



Katoenveem > Keilehaven > Bremen / Belgium

illustration 1 Waterway system: Maas river by Audrey Loef
(own illustration according to M. Enderman and R. Stenvert, (2005). Bouwhistorische verkenning Katoenveem, Keilestraat 39 Rotterdam, Utrecht, p 6-7)

WHY?
To understand the type and sort of transportation over water, reaching the ends of the quay between the keilehaven and Lekhaven.

HOW?
by researching the history of the different routings and type of the ships during the cottontrade period.

TRANSPORTATION OVER WATER
In illustration 1 the diverse routings of the ships are set out. Cotton purchased in England was brought to Rotterdam for storage. The cotton input for Katoenveem Rotterdam had two routes. For bigger ships, they moored at Lekhaven on the south. Cotton was temporarely stored in the warehouse “New Orleans” and “Galvenston”, then transferred to Katoenveem. For smaller ships, they moored at the two piers on Keilehaven, where cotton was directly brought into the Katoenveem by cranes. Cotton was stored separately according to their quality and owners. A large portion of the cotton storage was transported to Germany and Belgium, partly by rail and partly along the waterways.

Barges were used to enter the narrow and shallow Keilehaven (ill. 2.1), bigger commerce went by Imports-teamers of the Holland America Line (ill. 2.2).

WATERWAY SYSTEM 1914

- Arrival route
- Departure route
- Katoenveem warehouse
- Temporary warehouse “New Orleans” and “Galvenston”

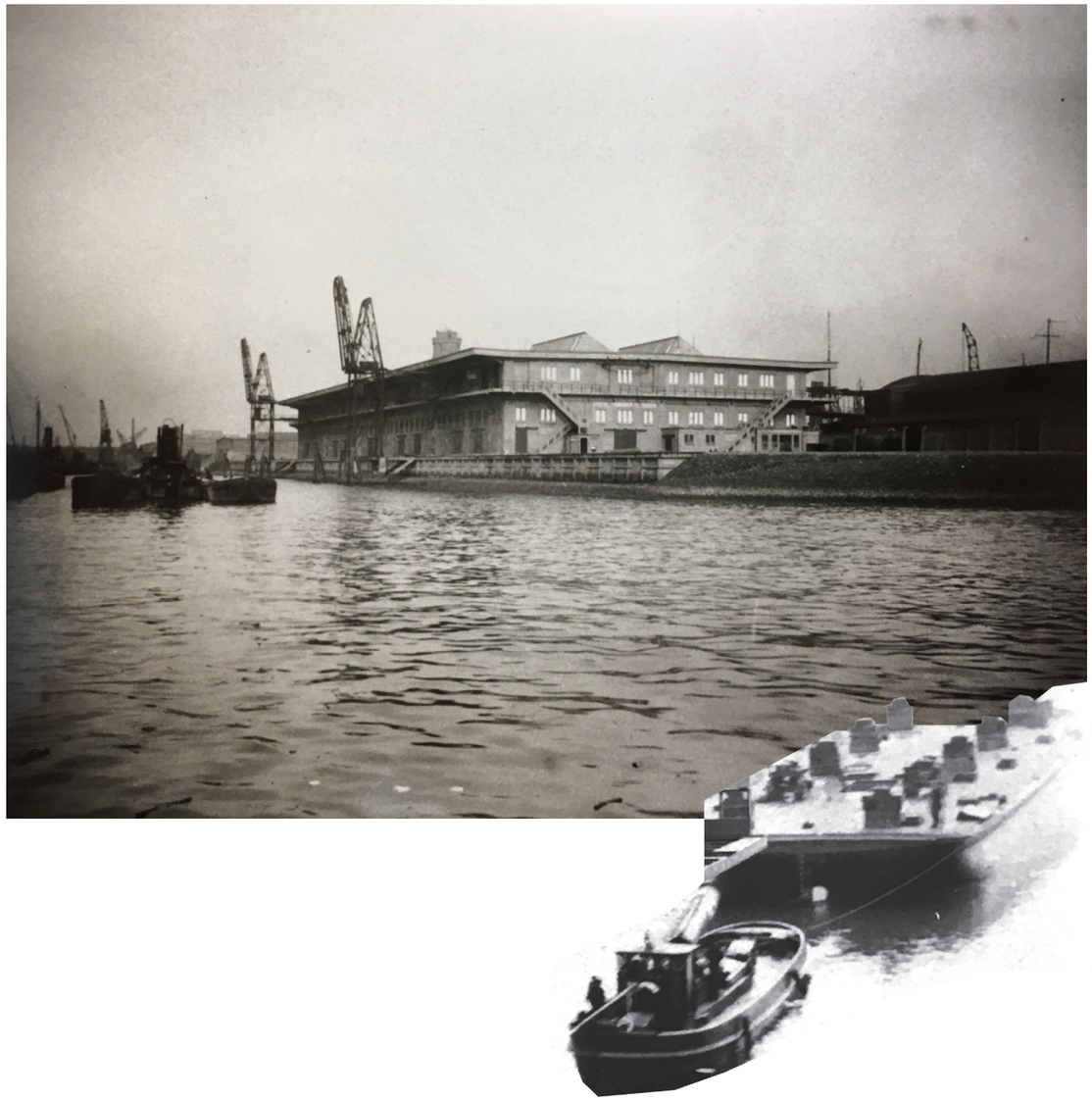


illustration 2.1 Keilehaven 1933 and barge by Audrey Loef
illustration 2.2 Lekhaven 1940 and importsteamer Holland America Line by Audrey Loef
(own illustration according to Images Gemeentelijke Archiefdienst Rotterdam)

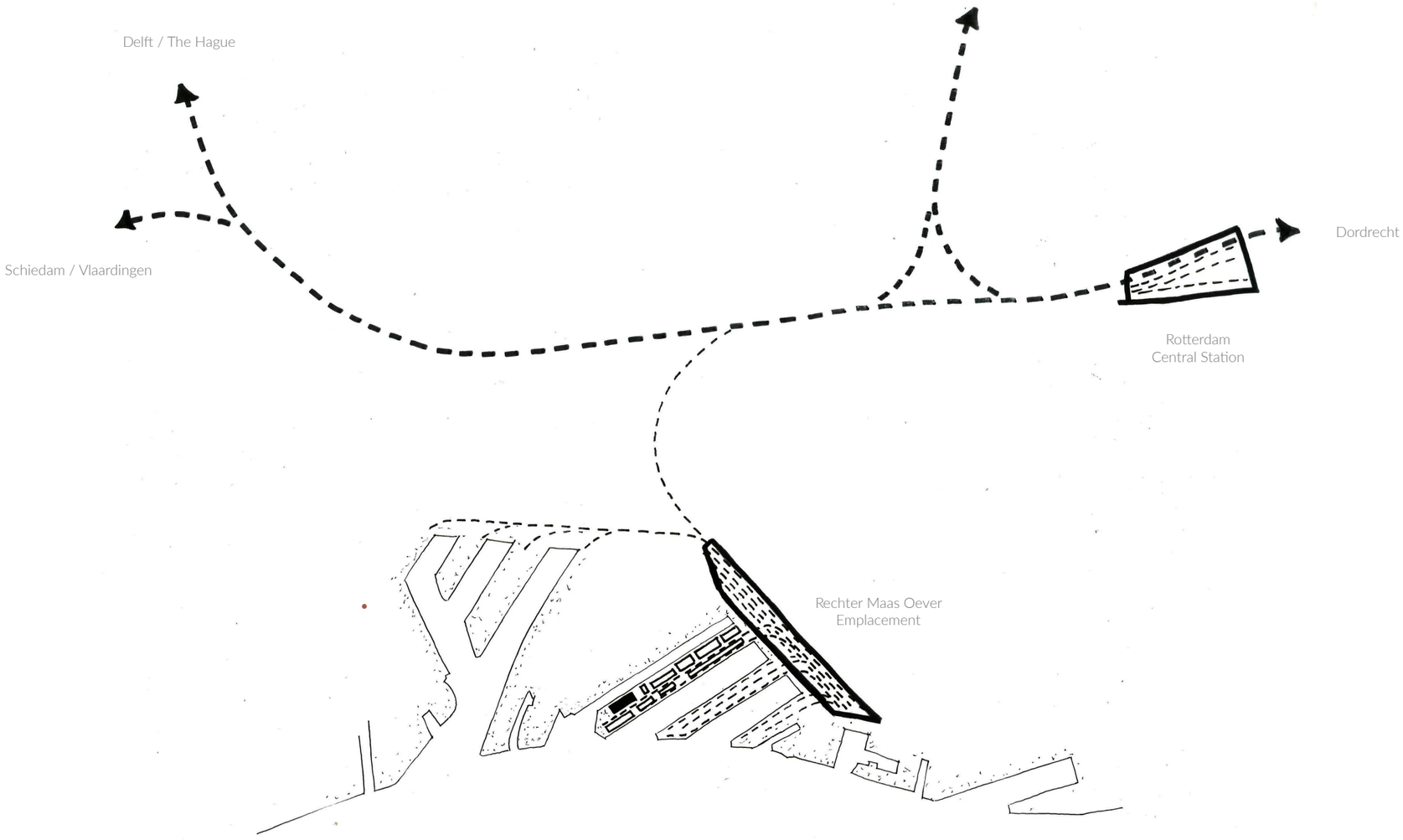


illustration 3 Harbour railway system by Audrey Loef
(own illustration according to https://nl.wikipedia.org/wiki/Havenspoorlijn_Rotterdam_West, http://www.feijenoordsemeesters.nl/RMO.htm, rotterdaminkaart.nl, M. Dicke and A. van der Zouwen, (2006). Stadshavens Rotterdam, Rotterdam, p. 25

WHY?
To understand the type and sort of transportation over land reaching the ends of the quay between the keilehaven and Lekhaven connecting it to watertransport.

HOW?
by researching the history of the construction of the railway system and its travel company.

TRANSPORTATION OVER LAND

After storage of the cotton in the warehouse, transportation proceeded over land by goods-trains (ill. 4.2) These trains were traveling over a railway system along the harbour activity of the Maas River. It was the goods-railway system 'Havenspoorlijn Rotterdam West' which started to develop after negotiations from the municipality of Rotterdam between the Rijk and the Hollandsche Ijzeren Spoorweg Maatschappij (HIJSM or HSM) to connect a harbour railway line onto the general passenger railwayline between Schiedam and Rotterdam. In 1908 this 'havenspoorlijn' route was opened.

After both the Keilehaven and the Lekhaven were constructed, the building of a new emplacement started in 1914, from the Hudsonstraat (with a walking bridge) to the harbour area of the Vierhavenstraat. It was the emplacement of Rotterdam RMO (Rechter Maas Oever), shown in illustration 3.

The goods-trains were now able to reach the warehouses of Katoenveem and New Orleans and Galveston at the end of the Keilestraat. It was most likely that these trains were locomotives running on dieseloil. A part of the railway is still present at the site (ill. 4.1).

RAILWAY SYSTEM 1940

- passenger railway
- harbour railway

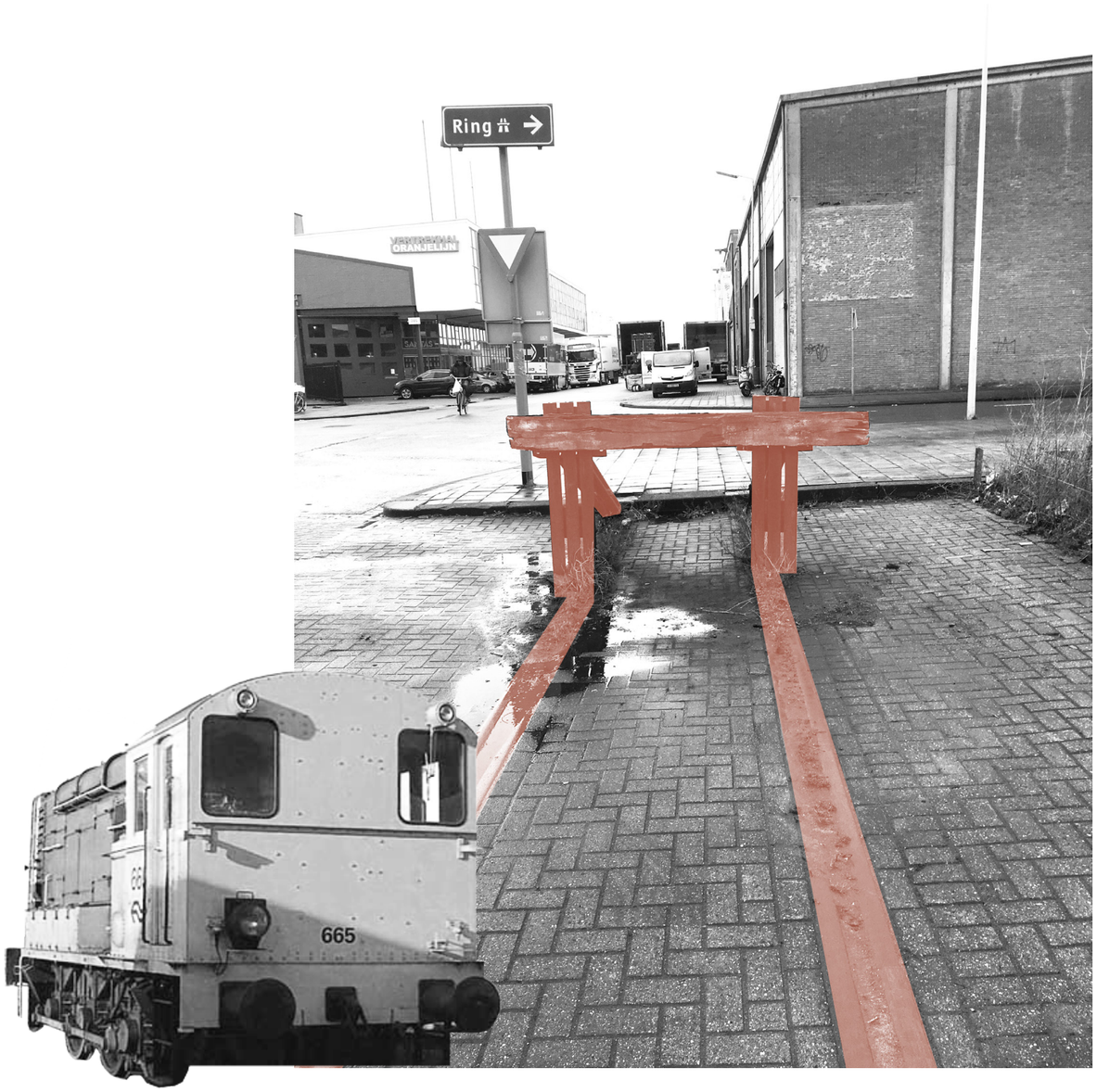


illustration 4.1 Present trace of RMO Railtrack 2017 and goodtrain by Audrey Loef
illustration 4.2 Keilestraat 1919
(own illustration according to Images Gemeentelijke Archiefdienst Rotterdam)

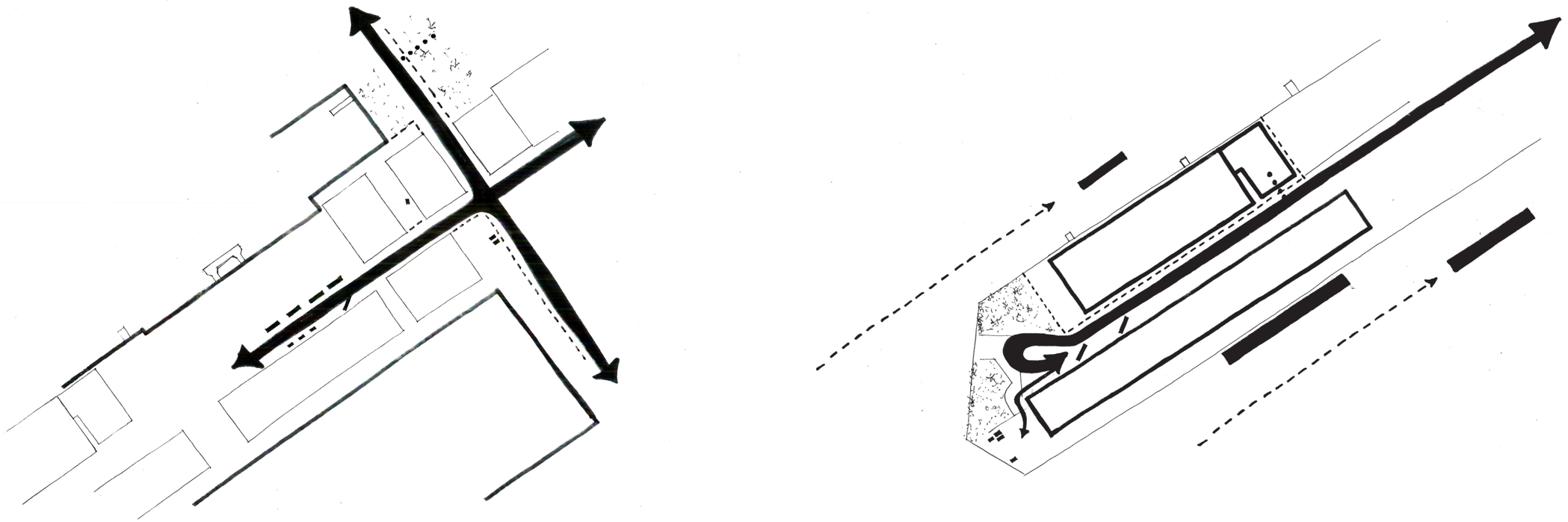


illustration 7.1 Current approach Merwevierhaven - Keilestraat
illustration 7.2 Current approach site
by Audrey Loef (own illustration according to maps.google.com)

WHY?
What is the situation of the current approach of the Merweviehaven, Keilestraat and the of the site?

HOW?
by looking at the factors marking the beginning of the pier (Keilestraat) and the factors marking the end.

SCALES OF CURRENT APPROACH

While arriving close to the Keilestraat a crossing of the street marks the entrance of the pier, which is enhanced by the line of the water. Along the route different scales of approach are present, to walk, to cycle and to drive. While this main route to enter the pier is marked by trucks, it is the only physical route of entering the site. Ways to cycle and paths to walk are not represented (ill. 7.1).

The site is marked by the end of the pier and trucks are still active next to the building which faces Katoenveem. A roundabout leads back after overlooking the dynamics of the ships. Katoenveem is closed off towards its surrounding because of a fence around the site of the ensemble (ill. 7.2).

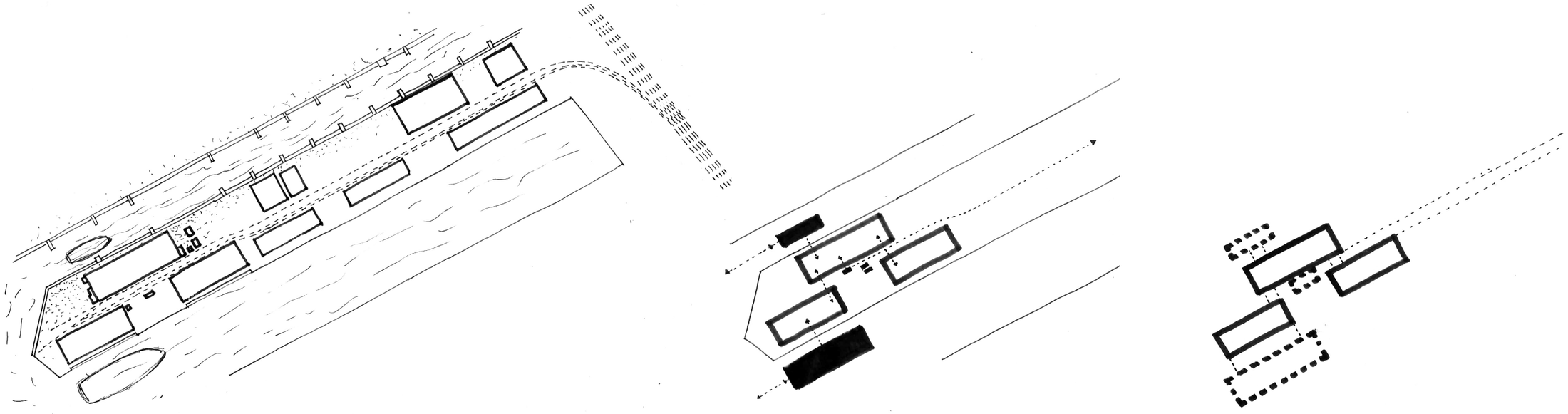


illustration 8.1 organisational situation in plan
illustration 8.2 process of storage and transport in plan
illustration 8.3 types of move in plan
by Audrey Loef
(own illustration according to Plevier, R., Adema, T., Hoope, J., (2009). Katoenveem Analysis & Values AR3AR02, Delft: TU Delft)

WHY?

How does the specific function of a cotton warehouse affect the organisation and move of the building?

HOW?

By analysing the organisation of plan, cross and longitudinal sections with their system of cottontrade added and translate tem into process and type of move.

MOVEMENTS

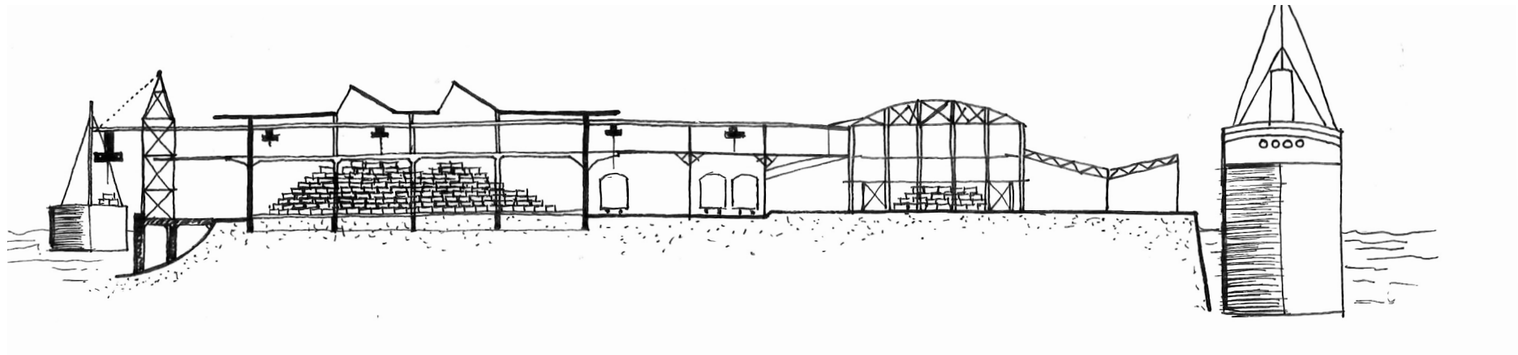
Situation of the Cotton Trade in plan and section (ill. 8.1, 8.4, 8.7), This process is enhanced by the appearance of ships at the waterfront close to the buildings as warehouses and the structures in between serving the organisational processes.

Within the organisational situation of the Cotton Trade there is a division between storage and transport. This process is shown in illustration 8.2, 8.5, 8.8 and characterized by the outer and middle areas of transport and the two warehouse areas in between. These are fluently connected, this intermediair through storage and transport is switching from lower to the higher level and back.

These processes generates different types of move (ill. 8.3, 9.6, 8.9). The input and output is represented by the ships and trains which equals to the transport. The dynamic is the system of intermediating through input/ output and the static as storage.

LAYERS OF MOVE

- transport
- input / output
- storage
- dynamics
- stored cotton
- travelling cotton



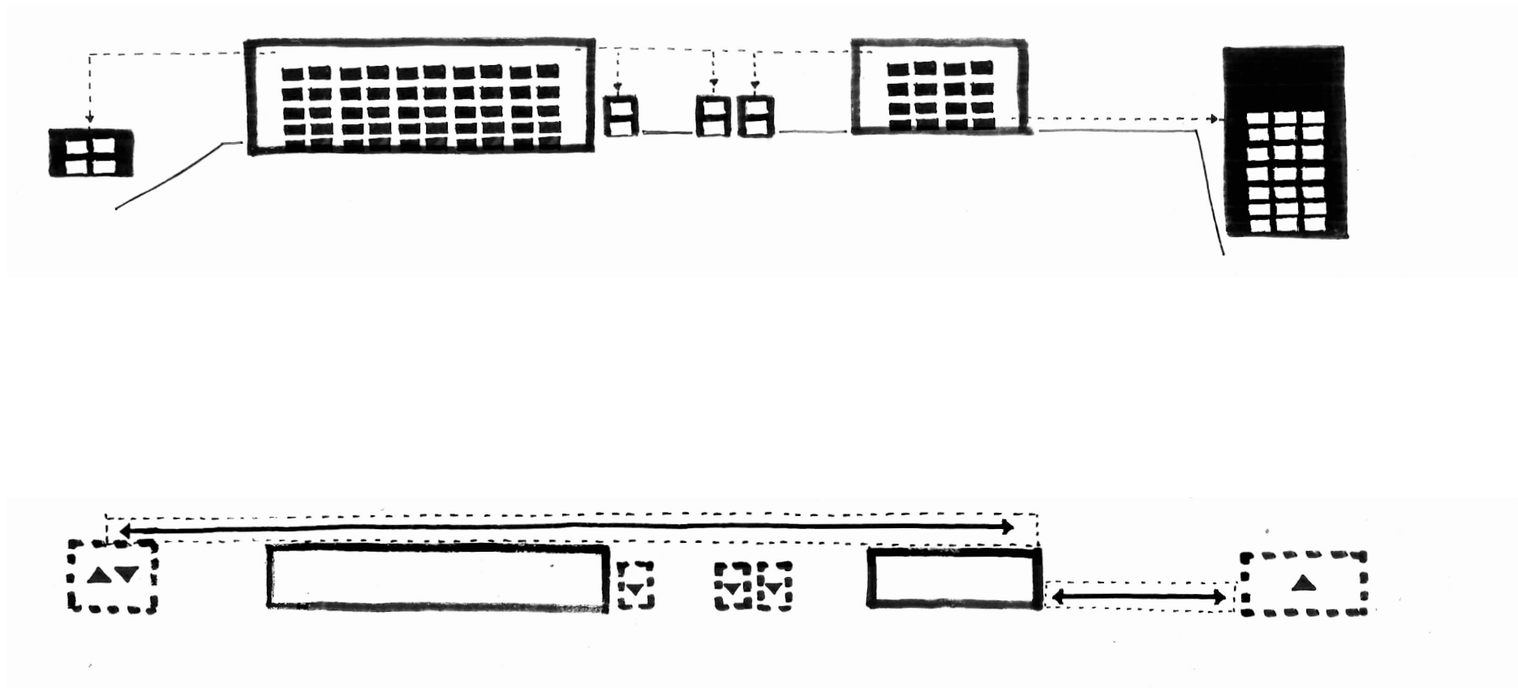
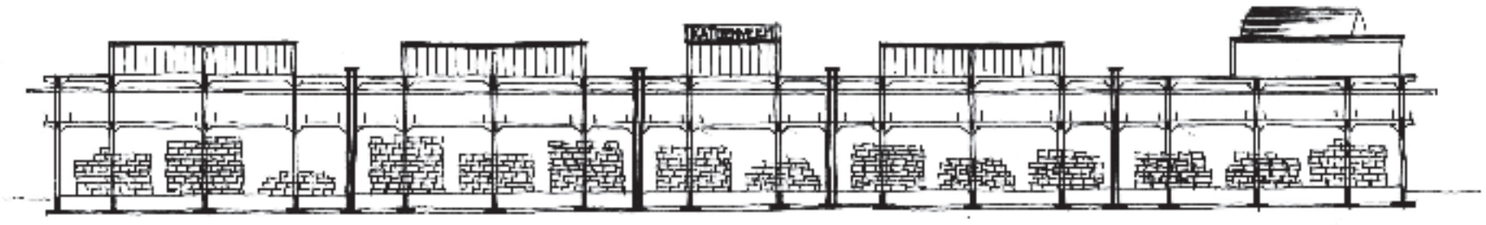


illustration 8.4 organisational situation in cross section
illustration 8.5 process of storage and transport in cross section
illustration 8.6 types of move in cross section
by Audrey Loef (own illustration according to Bijvoet, J., Manager, S. W. I., (1919). The pioneer for the shipping and trade of the Netherlands and her colonies, nr. 3 march, 68.)



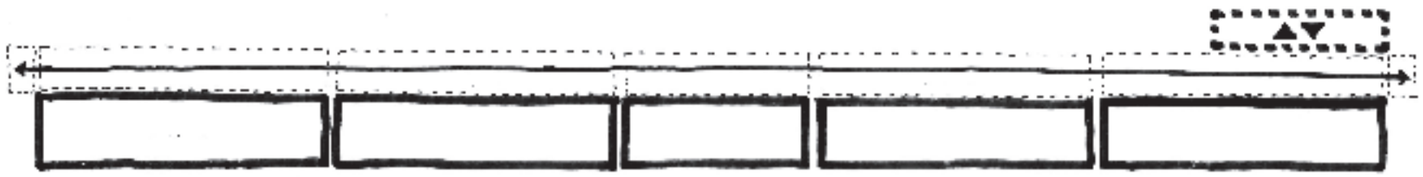


illustration 8.7 organisational situation in longitudinal section
illustration 8.8 process of storage and transport in longitudinal section
illustration 8.9 types of move in longitudinal section
by Audrey Loef (own illustration according to Bijvoet, J., Manager, S. W. I., (1919). The pioneer for the shipping and trade of the Netherlands and her colonies, nr. 3 march, 69.)

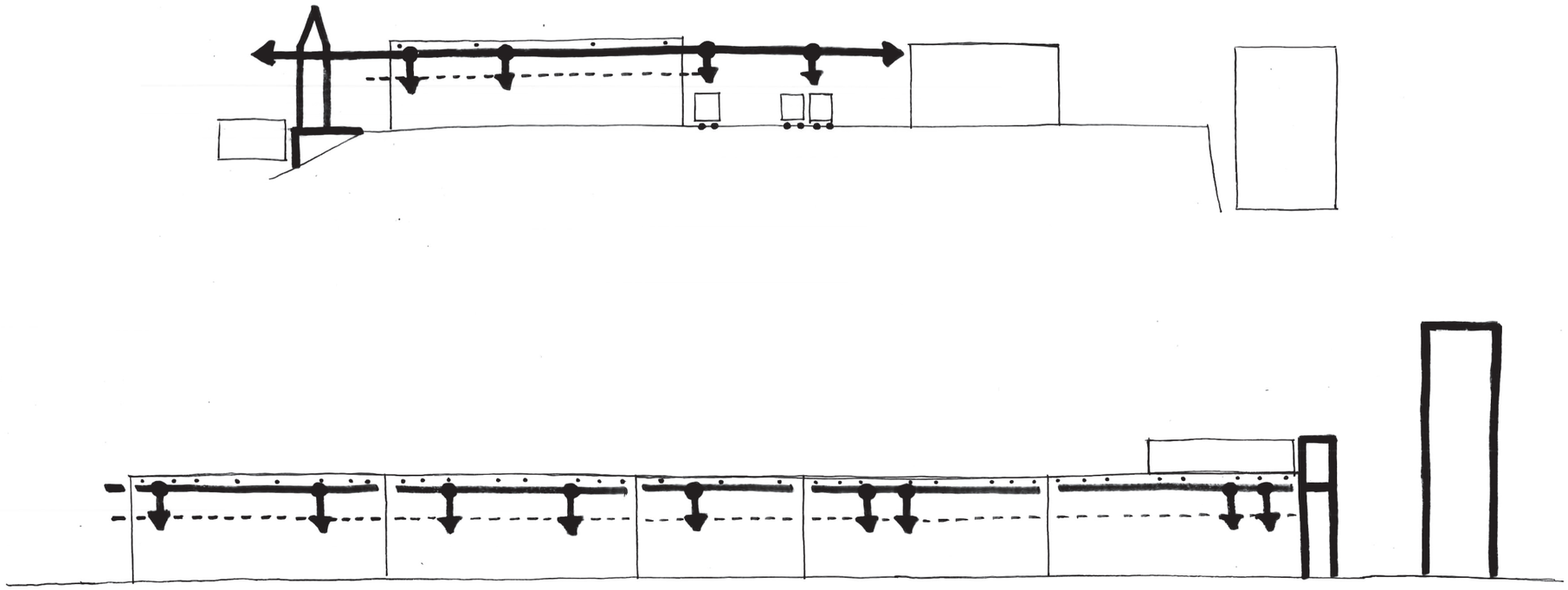


illustration 9.1 services of move in cross section
illustration 9.2 services of move in longitudinal section
by Audrey Loef (own illustration)

WHY?
To understand the building in the perspective of serving functionality.

HOW?
by looking at the scheme of service and functionality and put them into the context of the structural set up of the building.

SERVICES OF MOVE
To enable the move of the process of cotton trade organisation, services are added onto the site and building of Katoenveem: the pier, cranes & steel bridges, a train track, galleries and conveyor system and a fire system to safeguard.

These installations serves the movement of the cotton bales through the whole building and influenced the lay out and construction of the architecture as shown in illustration 9.1 and 9.2.

Unloading the smaller barges at the Keilehaven required a pier to reach the boat and a crane to lift it to the top level of the building envelope where one can overlook the whole plan.

A framework of construction with a free set up was in advantage of the conveyor system to lower a bale of cotton at every spot in the building simultaneously to the galleries and the workers. Also within the facade, the possibility of creating several openings allowed them to enter every compartment from the outside. The conveyor runned outside to connect towards the cranes at the Keilehaven and the steel bridge leading to the temporary storage in the Warehouses of Lekhaven. Extremely functional with only a cloth around the set up of service.

We can see that these services guided the cotton through the building by different routes to reach the specified area of stored cotton (ill. 10).

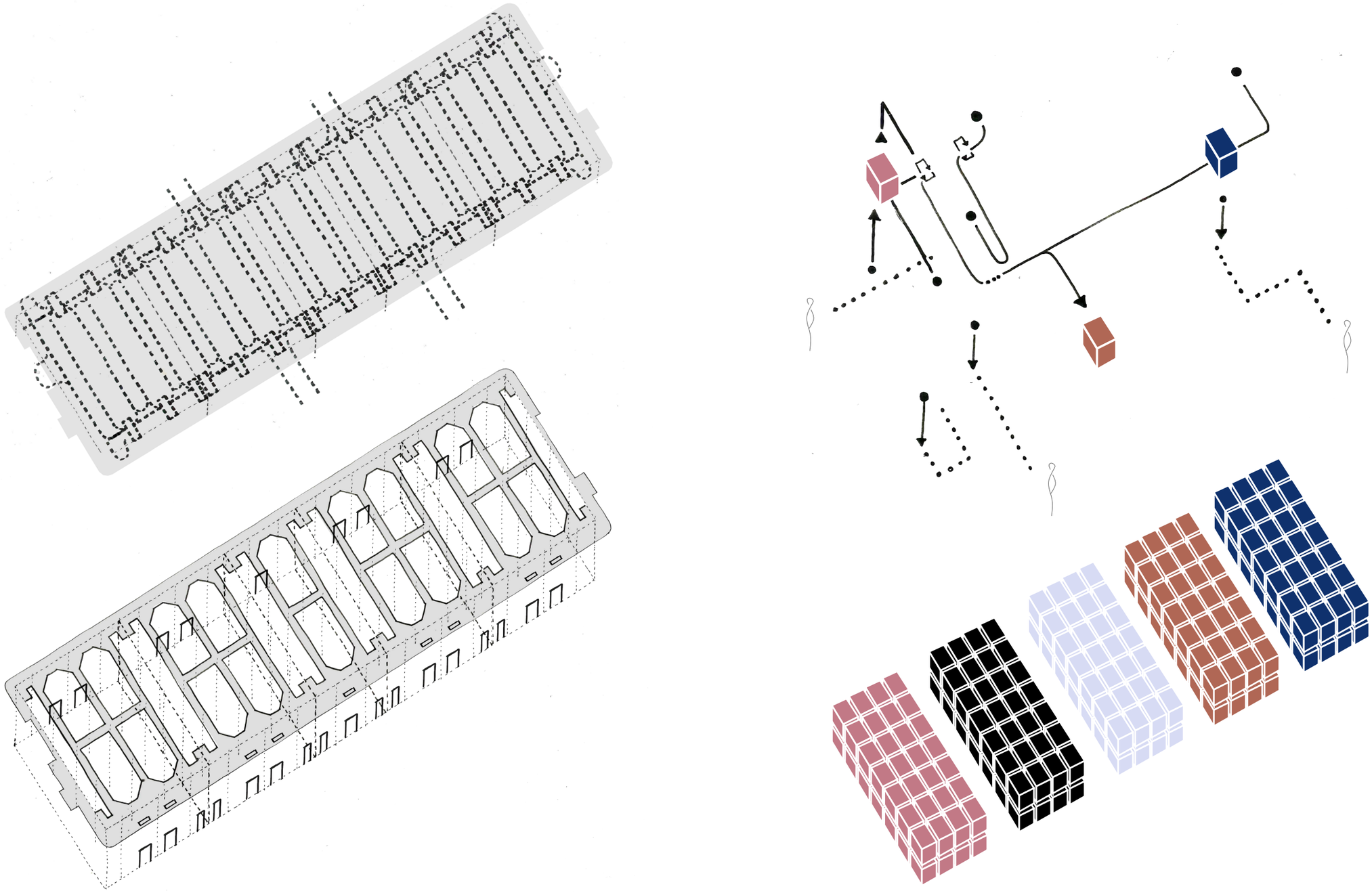


illustration 10 interaction between construction and the movement of services by Audrey Loef (own illustration)

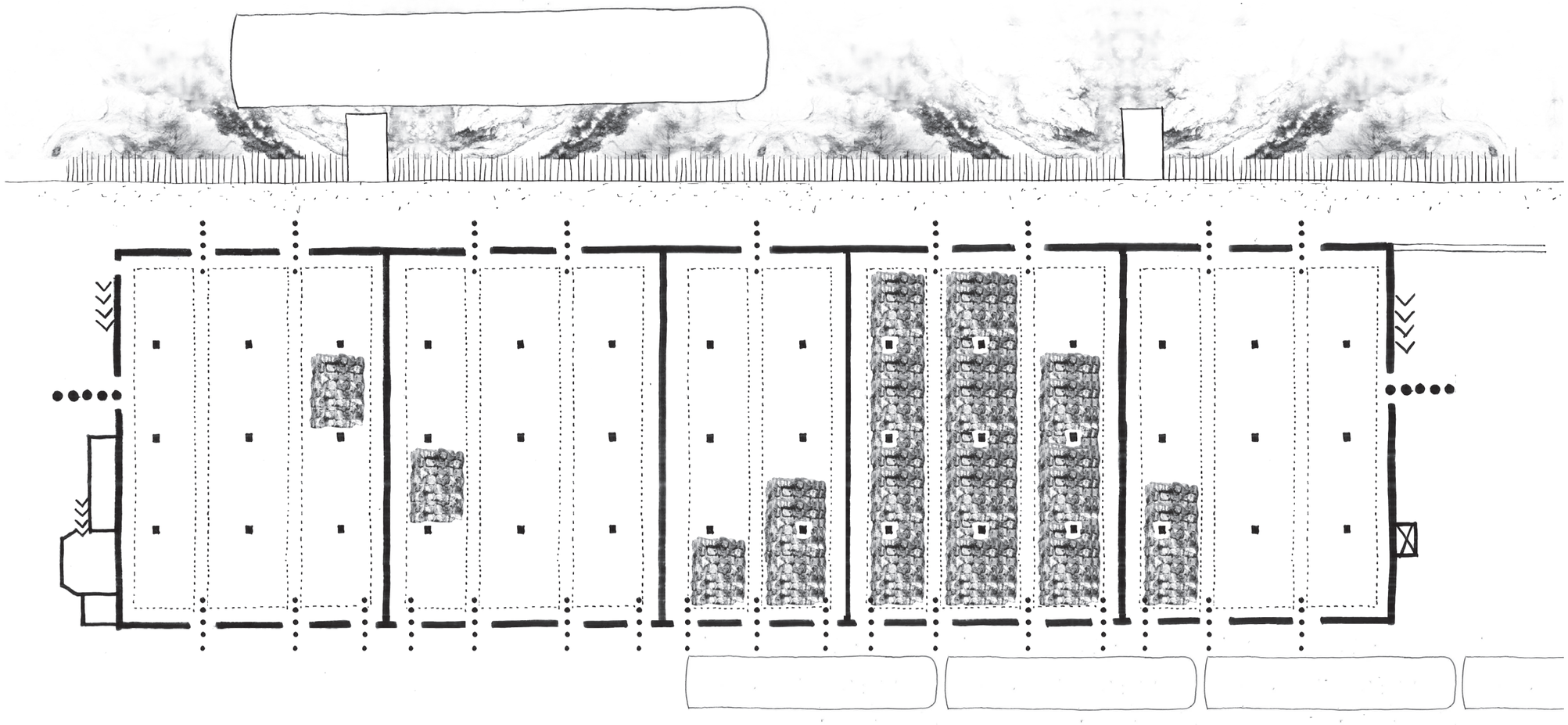


illustration 11.1 organisation and use of the ground floor by Audrey Loef
(own illustration according to plans by Huis in 't Veld, J.)

WHY?
In what organisation is the ground floor used?

HOW?
By defining areas according to their use.

ORGANISATION & USE OF SPACE

The inside area of the building is separated in five compartments. The middle one is the smallest, two rows of columns to three rows on the other four compartments. Within the compartments on the ground floor (ill. 11.1) we recognize areas where to place the cotton, done by tiling a pattern on the floor (ill. 11.3). In between these zones there were walkways connected to the openings in the facade. These are the relations between inside and outside and guide to either the waterside where the ships were moored or the side where the goods-train were driving. On the short facades bigger openings were located as well as the elevation points.

Arriving at this next floor level (ill. 11.2), a gallery is running along the complete facade, again with entrances on both sides guiding to the cotton. By a system of galleries running over the grid of the structure of the building interaction between the two levels is enabled. It was possible to see both the zones with stored cotton and the walkways in between, possibly the keep the communication of organisation of use of space optimal.

LEVELS 00 - +01

- cotton
- tiling
- passage
- main passage
- water

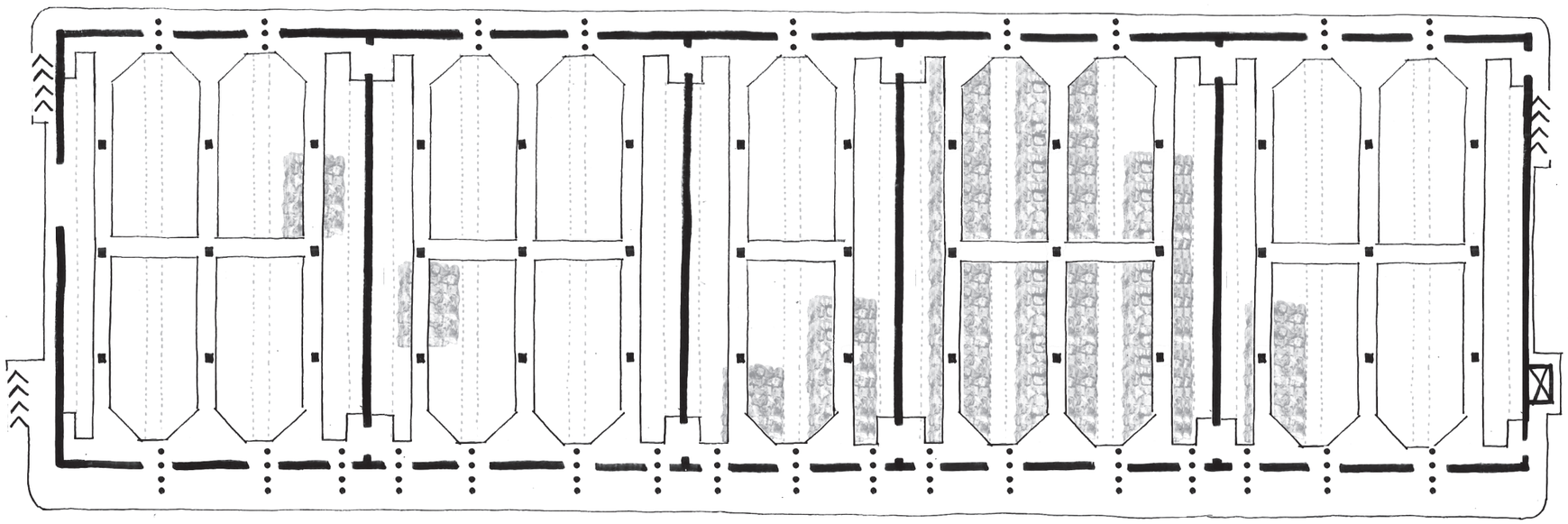


illustration 11.2 organisation and use of the first floor
illustration 11.3 tiling to indicate zoning on ground floor
by Audrey Loef (own photograpgh and illustration according to plans by Huis in 't Veld, J.)

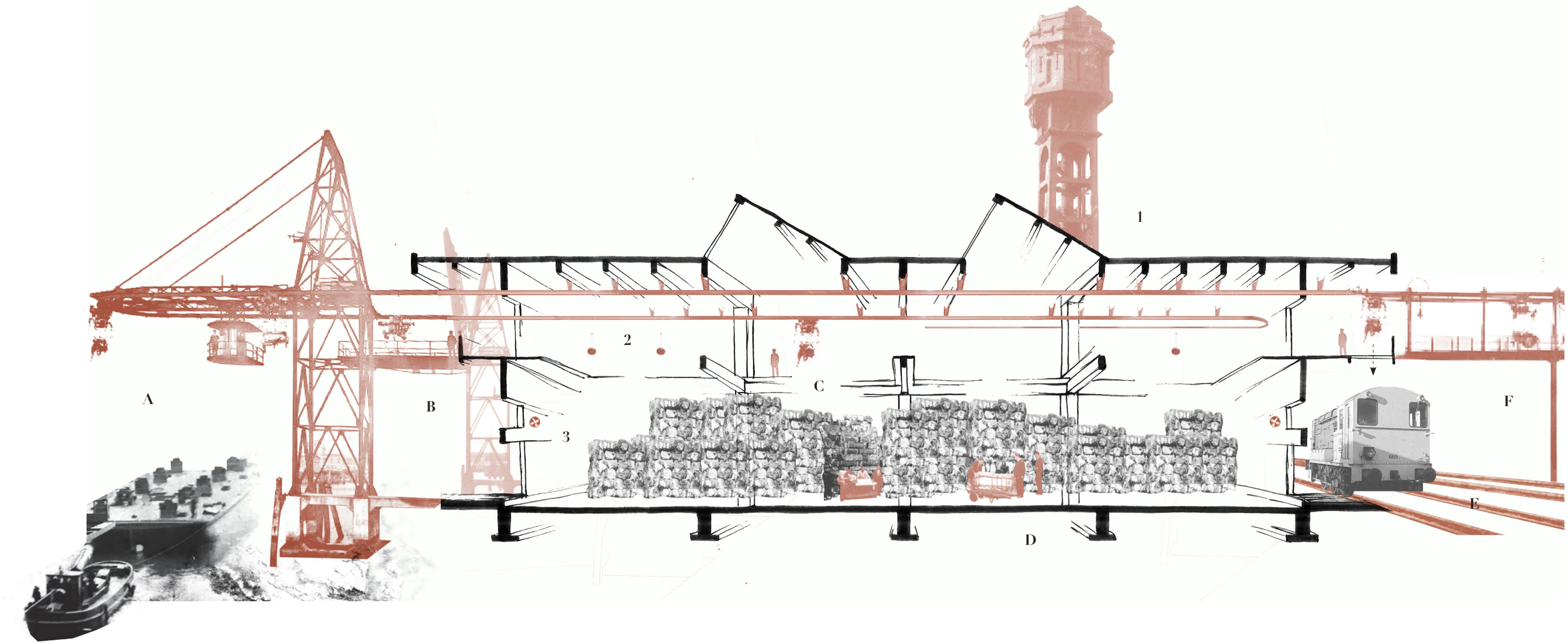


illustration 12 Impression of past functionality of the building in section by Audrey Loef
(own illustration according to The pioneer for the shipping and trade of the Netherlands and her colonies (1919) nr. 3 march, 66-69)

WHY?
To give a understanding of the functionality of space in its past use.

HOW?
By assembling the activities of the function as cotton-warehouse in the space.

FUNCTIONALITY OF SPACE
The total functionality of the building and its services was precisely worked out to work as economically and practically as possible to safe labour and costs. In illustration 1.12 is this working process shown in relation to the service of the building with its advanced functionality.

When a barge arrives at the Keilehaven, one operator fixes a bale onto the hooks and activates the hoisting system (A). When raised at the level of the cotton piles, the system is set to direct the bale to its right destination where to store (B) where an operator inside has to stop the system (C) to lower the bale into the right area of the compartiment. Workers on the ground level position and stow the bale in the right way by the help of traveling cars (D).

This mechanical method of traveling allows further transportation by the bridges crossing the street where an operator stands (F) to load the bale into the railway-car to travel inlands (E) or to cross the street and direct it to the warehouse and quay of the Lekhaven.

To safeguard the cotton and its system of service a Sprinkler system was constructed, the Grinnel type which was an innovative improvement. It required a water tower to keep the supply of pressured water constant along with tanks and electric pumps (1).
Moveable armatures (2) provided light in every corner of the building in dusk or night periods of work. Fans rotated by wind (3) gave a soft natural breeze (?).


1919 - 1964

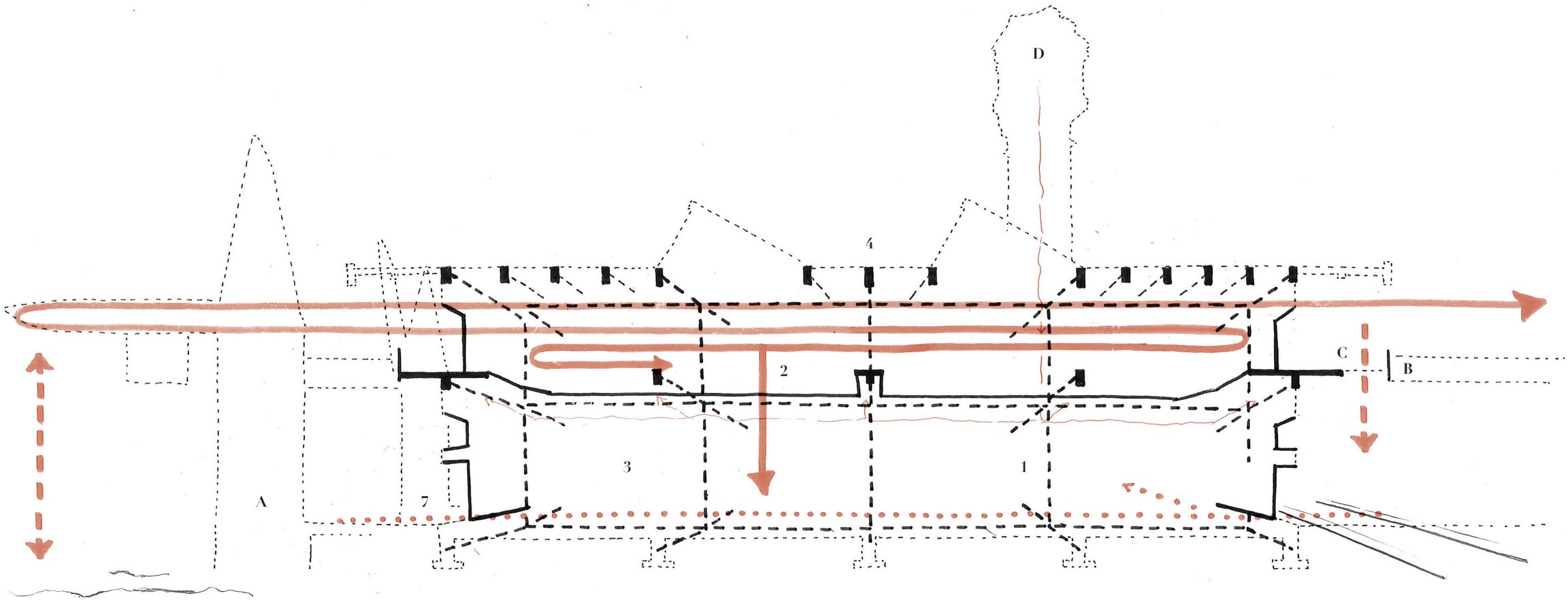


illustration 13.1 interventions on building scale to serve the functionality by Audrey Loef (own illustration)

WHY?
To understand how the functionality influenced the expression of the architecture.

HOW?
by looking at the points where the operating system meets the physical building.

EXPRESSION OF FUNCTIONALITY
The physical building was designed in such way the operating system of the cotton flow worked optimal. Starting from a plan libre (1) as constructed structure of the building it allowed the service system to enter in all places where needed. The two layers generates the division between the route of the cotton (2) and the open space of storage (3). At the dynamic layer of the cotton, the route is embraced by interventions to serve the functionality. The running conveyor is hold in place by a beam and rib structure carried by the roof (4). The openings in the facade allows the system to run continuously, where the workers were also allowed to pass (7). Onto the galleries underneath the system they could continue their route to assist the system, while at the same time looking towards the place where to store, where it was possible to continue on ground level, also opened up towards outside by the direct doors to the places of arriving and departure of the cotton.

These outside interventions were mainly supported by the added structures (A). The bridges attached to the galleries (B) and the holes (C) made to load into the goods-trains. Also the added water system runned underneath the layer of the operating flow of cotton (D), in the lines of the constructed structure.

The three layers of cotton:
- the mechanical route
- the flow of people positioning it in its right place
- the water as safeguard.

In conclusion we can say that the building is fully designed to serve the functionality, visible in its expression of compositioning the architectural elements.

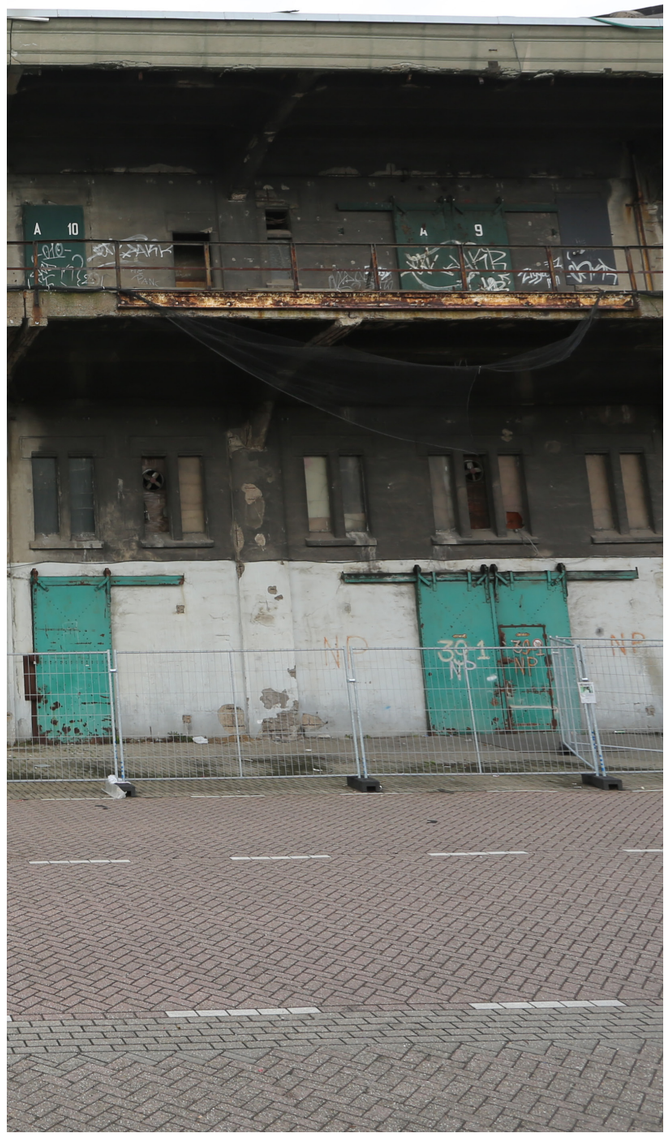


illustration 13.2 Traces of the added structures onto the galleries, carriage of the conveyor system and holes in the balconies to transfer towards goods-trains by Audrey Loef (own illustration according to photographs by Xihao Yi)

CONVEYOR SYSTEM

The conveyor system is a very important part of the Katoenveem building. It was used to transport the bales of cotton around the warehouses and to the various means of transport.
Currently the system is but a remnant of the past and is only present on the inside of the building.

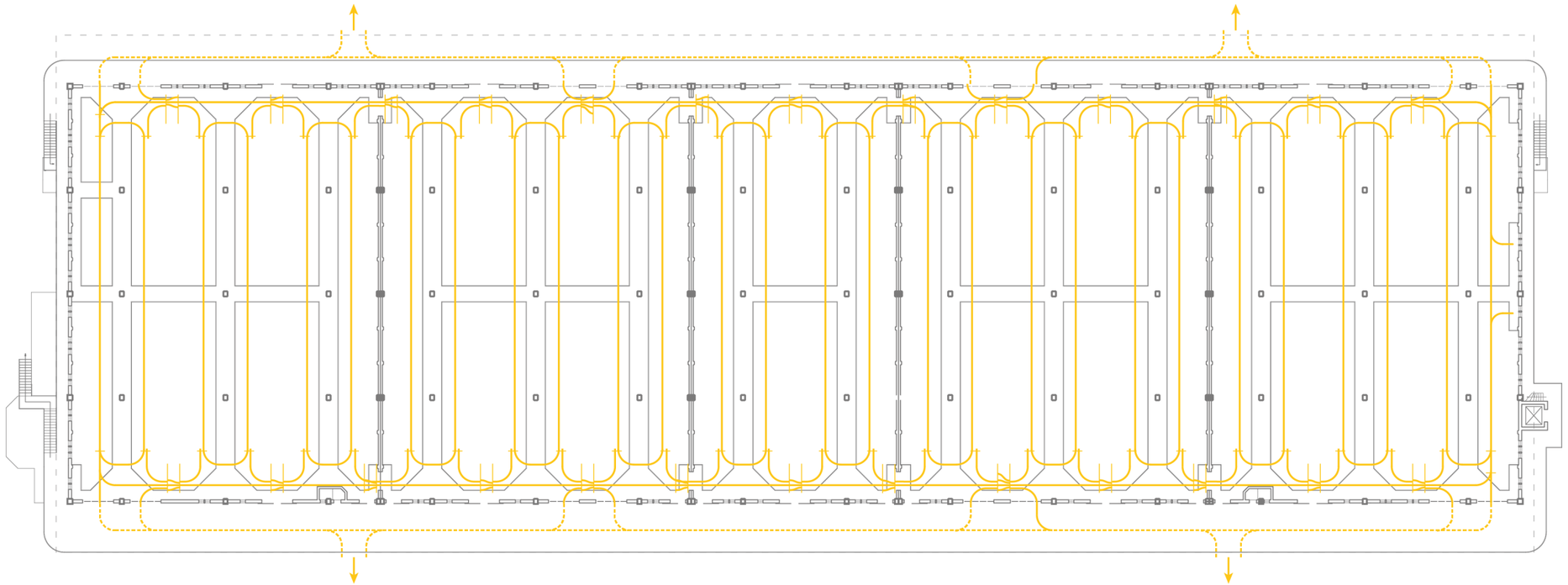


illustration 1 by Elmer Pietersma

WHY?

Question of the research, to understand the working of the conveyor system installed in the Katoenveem as this was an important part of the functioning of the building.

HOW?

by looking at pictures of the site, on the inside and outside, to figure out how the original system worked.

THE CONVEYOR SYSTEM

The basis of the system is that it allows the cotton bales to be transported from the dockside on either the north or the south quay, to the interior of the warehouse.

The layout of the system follows the construction; 14 loops surround the 14 rows of columns. These loops are connected to the big loop running alongside the wall. At the meeting points of these loops there is a relatively simple switch system in which a set of 3 or more tracks allow the monorail to connect with different tracks. By moving the frame in which these tracks are placed, one can select the route.

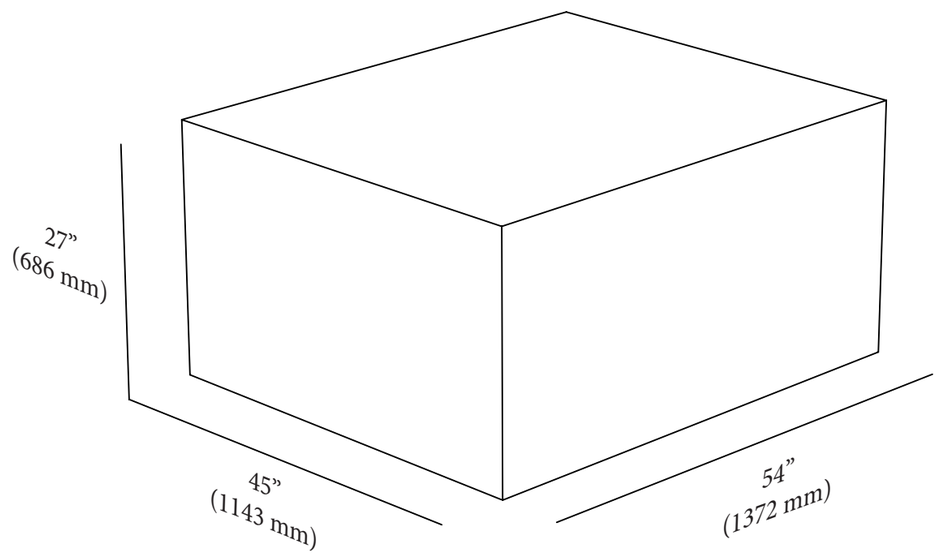
Running on these tracks were devices called “loop-katten” or travellers, these electrical machines could be operated along the elevated walkways by staff that walked alongside the travellers. These travellers could lift one bale of cotton at a time and transport it across the building, either from the inside to the outside or from one compartment to the other.

The cotton that arrived would have been stored somewhere on the complex before it was graded and moved to a compartment holding the same type of quality cotton.

CONVEYOR SYSTEM 1:500

- Walls
- Assumed route of the conveyor system
- Conveyor system as present

American cotton



Egyptian cotton

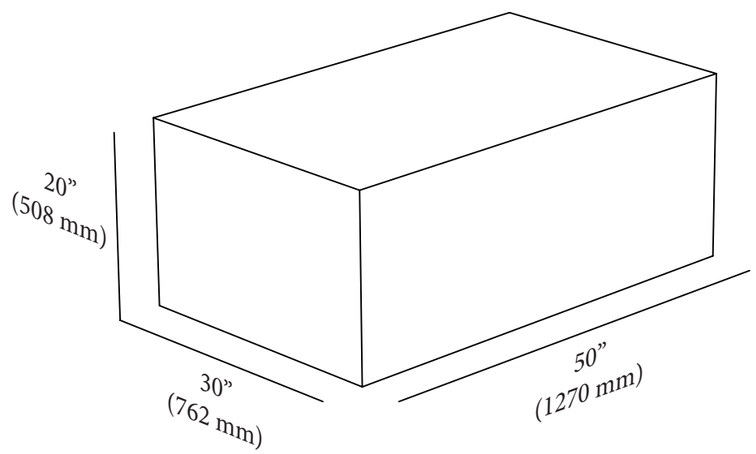


illustration 7 by Elmer Pietersma
(Johnson, W. H., & Himbury, W. H. (1926). Cotton and its production. London: Macmillan and Co.)

WHY?
Question of the research, to understand which different sizes of cotton there were and what process it underwent in transport.

HOW?
By looking at documents from the time of the construction of the Katoenveem, as that gives the most accurate description of how the cotton could influence the building.

COTTON
Cotton is a natural product grown in the warmer climates around the world. The top producing countries at the time were the United States and Egypt, these were also most frequently exported to Europe.

After picking the cotton from the plant on the plantations, the cotton is gathered in bails that are compressed in order to move the most amount of cotton at a time. The size of the bales comes from the packaging machines used, and therefore differ in size per country as each country holds its own standards. The material used to cover the cotton is mostly burlap.

In transport the Egyptian bails are preferred because of their higher quality and also their higher compression, holding the same amount of cotton but at a smaller size bale than the American counterpart.

The reason the bales tend to look badly packaged in the images from around the 1920’s, is because of the sampling that took place. In order to grade the cotton, up to half a kilogram of material was removed by inserting a knife into the fabric. The samples were than compared to the standardised sample kit originating from the USA. On the bill that was signed to acknowledge the standardized using of this kit, Rotterdam is also noted as a participant.

In order to use the standardised USA grading kit, the lighting qualities needed to be similar all over the world, calling for northern faced windows and special yellow paint in the sampling room, hence the specially build sample room on top of the Katoenveem.

illustration 2,3,4&5 by Elmer
(source: personal photographs)

These images show the conveyor system as it currently is in the Katoenveem. The second image shows a actual traveller of which several still remain inside the building. These travellers were powered via electrical cables that ran underneath the I-beams. In most places this electrical system is no longer in place. However the I-beams themselves are still in the original place.

On the third image the doors separating the compartments are shown. This is a system of double doors called the Kinnaer system consisting of iron roller blinds that kept the integrity of the fireproofing walls whilst still allowing for transportation between compartments. The fence in front of the roller blinds is movable, making it possible to keep the people safe but also allowing bales of cotton to move through the gate. How the physical connection between the two compartments is made, is difficult to say but most likely one of the two beams will be moved in order to link the system together (as it is broken up when the Kinnaer doors are down).

The system used to run underneath the roof on the outside, above the balcony. However there is only one part left on the outside, shown on the right image. This outside track was once used to transport the bales from inside to outside to place it on the trains as is shown in the research on the functioning of the building.

In the scheme, the dotted lines show the assumed track of the conveyor system, showing that at the north side the system was directly connected to the two cranes allowing the travellers to directly drop and collect bales from ships. On the south side the system connected the main warehouse to two warehouses of the Holland America line, how this connection precisely took place is difficult to tell as there are only a few images left.

On the next page, two original photograph taken shortly after completion in 1920, show the original state of the conveyor system.

Photographs showing the original state of the conveyor system
(Images owned by Municipal Archive Rotterdam)

ORIGINAL FUNCTIONING

The exact running of the conveyor system will be discussed in another chapter, but these images give a clear insight.

On the left side the view on the Katoenveem from the other side of the Keilehaven is shown. This image shows the two original cranes. On close inspection one might see that these two cranes look a bit strange; they are more wide that is normal. The reason for this is a follows, the travellers could be directly connected with the track on the crane, allowing the same system that moved the bales inside, to also interact with the ships outside. In doing this a step of unloading and further processing was skipped as this could all happen in a single motion.

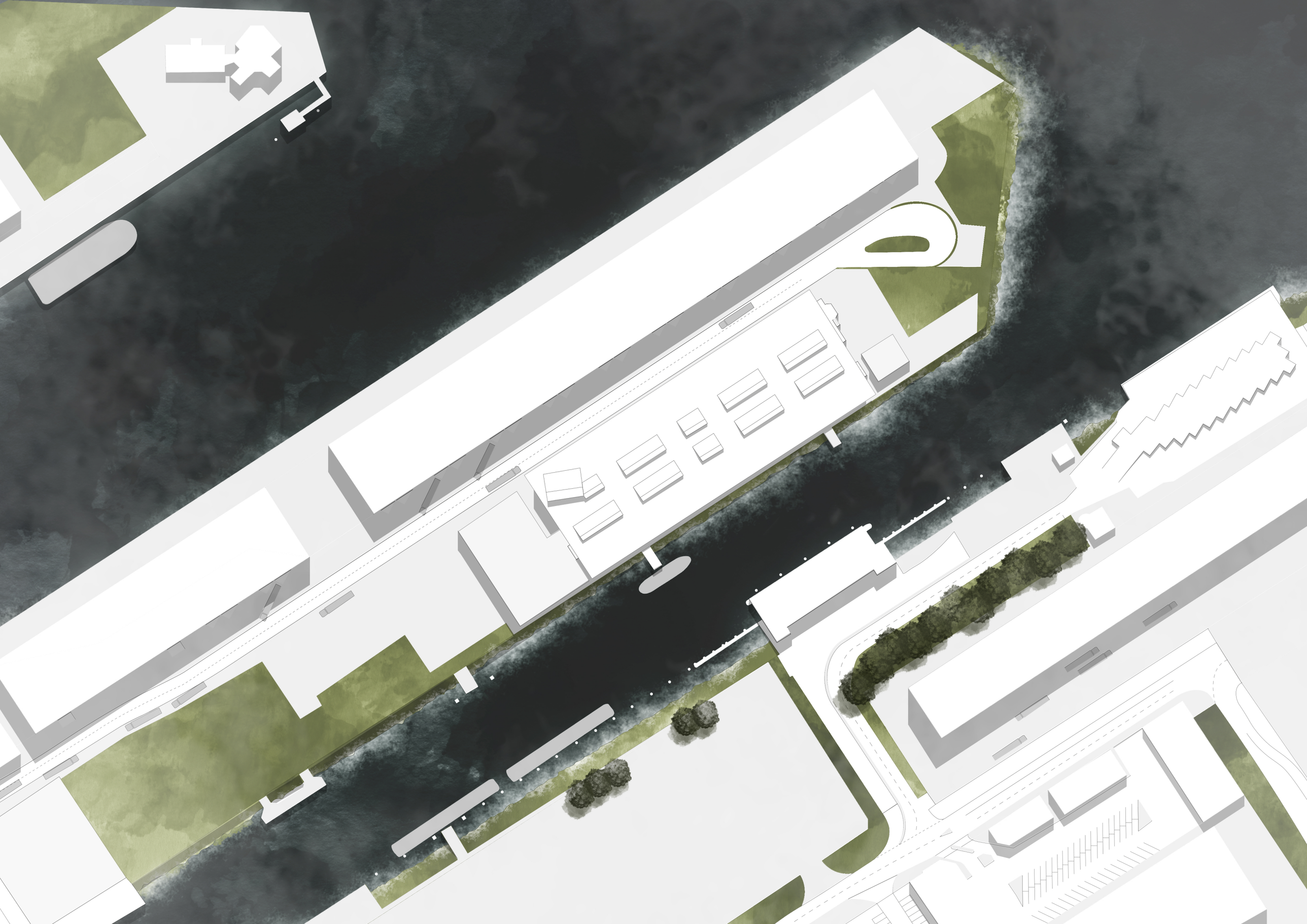
The bales that were loaded or unloaded directly from the ships via the cranes could be moved inside the warehouse to be stored. The Keilehaven has a lower depth than the Lekhaven, making this side only accessible for inland ships. The Lekhaven, however, was used to dock bigger ships coming from international ports to deliver the cotton to Rotterdam.
The connection between the warehouses of the Holland America Line were these ships docked, and the Katoenveem itself, is shown in the second image.

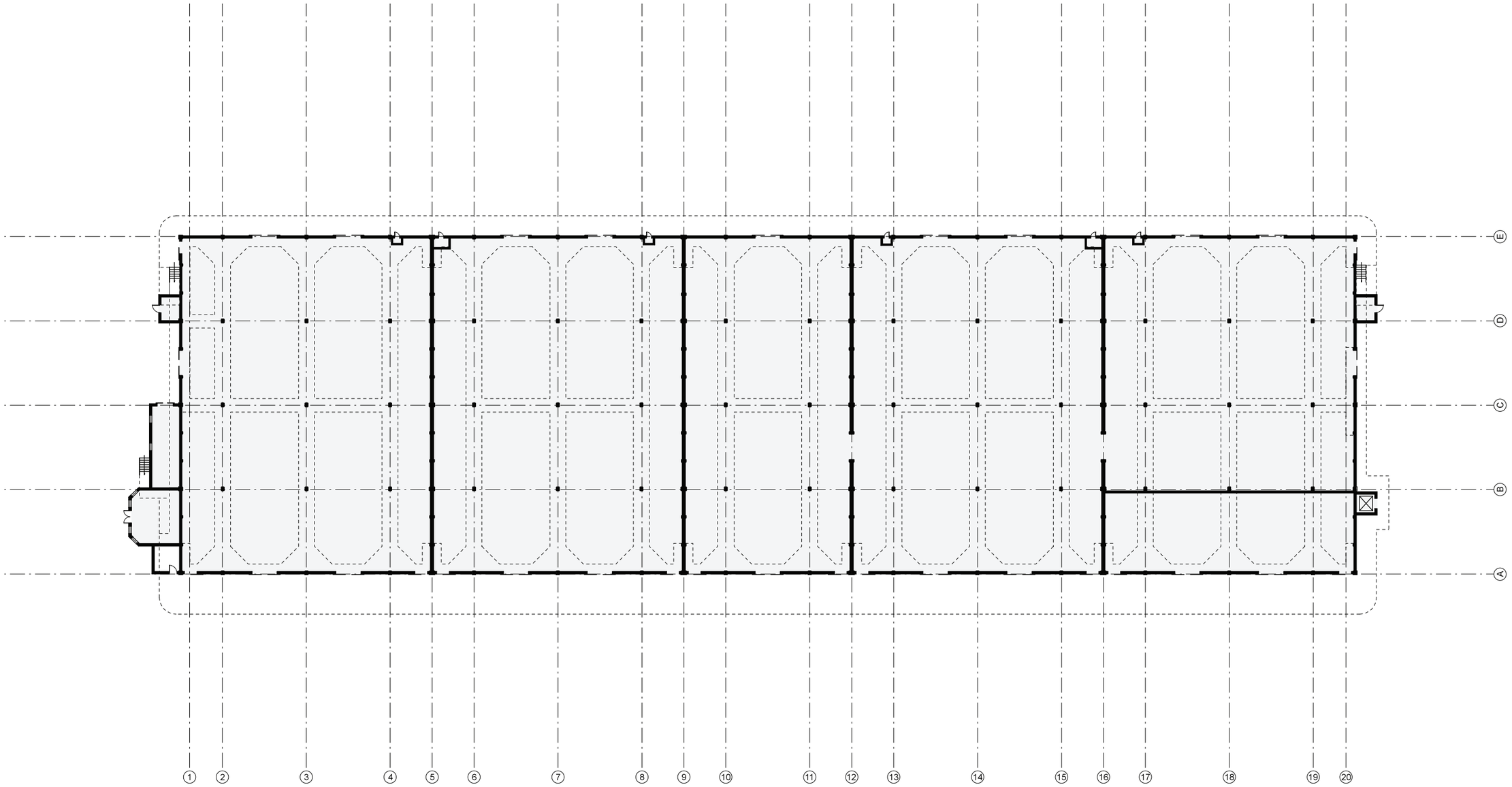
Two bridges, with the conveyor system, cross the street. This image also shows the train tracks leading towards the warehouses. Where the balcony extends over the train track, the trains could be loaded using the travellers to directly lower bales into the carts.

Because of the complete connection of ship, train and storage with one system, the Katoenveem was a highly innovative and efficient warehouse specifically equipped and designed for its function as a storage and transshipment warehouse of cotton.

CURRENT SITUATION

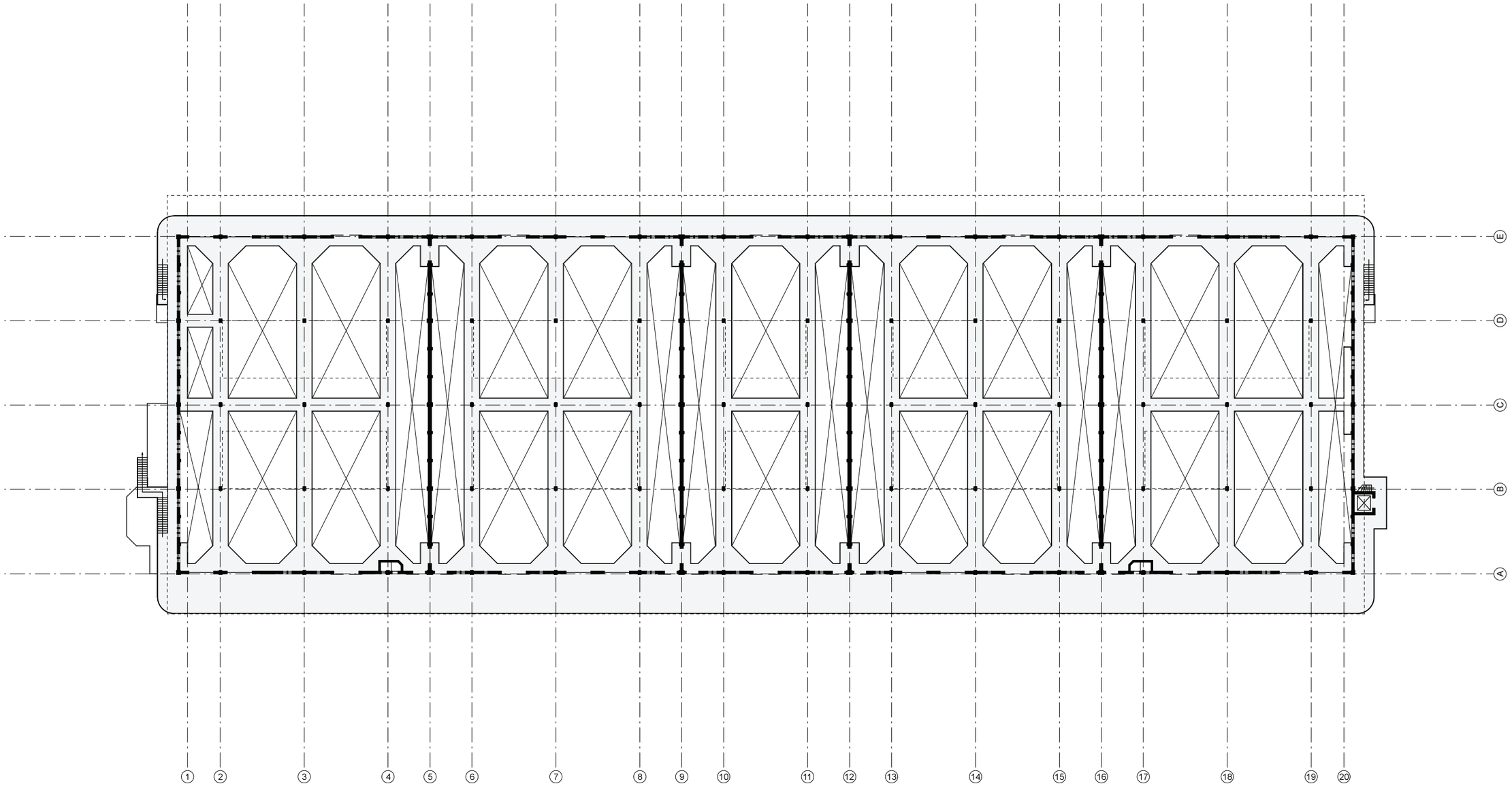
When shifting the scope of the analysis from an urban scale to the scale of the building it is significant to get a general idea of what the building is like in its current state. By looking at the plans and elevations of the contemporary Katoenveem a more rounded understanding of the aspects discussed in the following analysis chapters can be formed. The next page displays a view of the direct surroundings of the Katoenveem, followed by a the ground floor, first floor and roof plans. The chapter is concluded with the elevations of the four façades in order to complete the drawing set of the current state of the building.

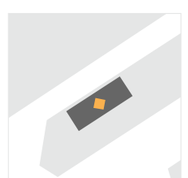




1:500

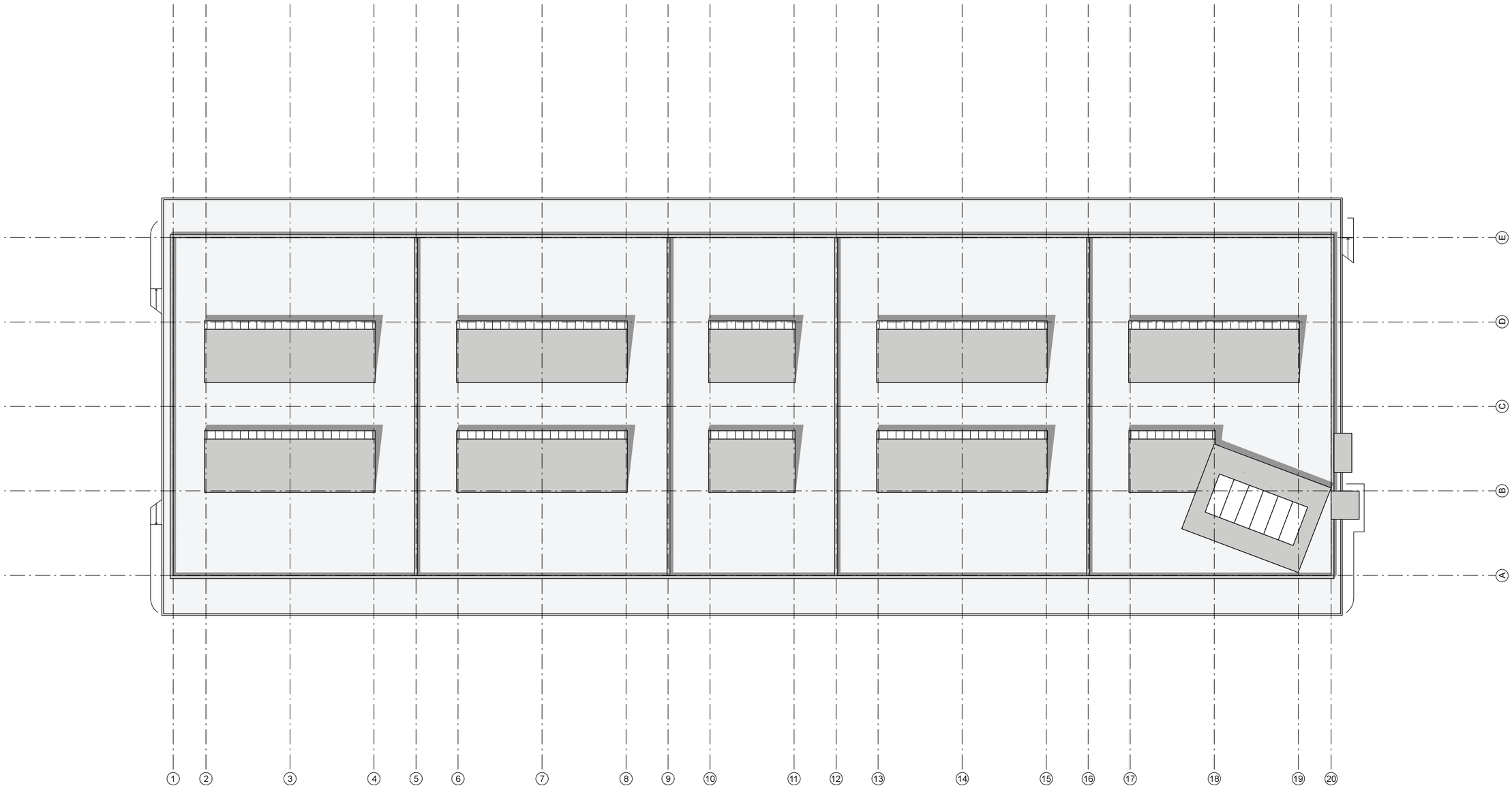
ground floor plan by Jan Huis in 't Veld
(own illustration)

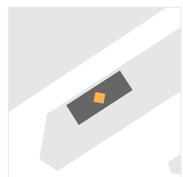




1:500

first floor plan by Jan Huis in 't Veld
(own illustration)





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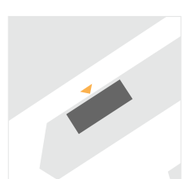
roof plan by Jan Huis in 't Veld
(own illustration)



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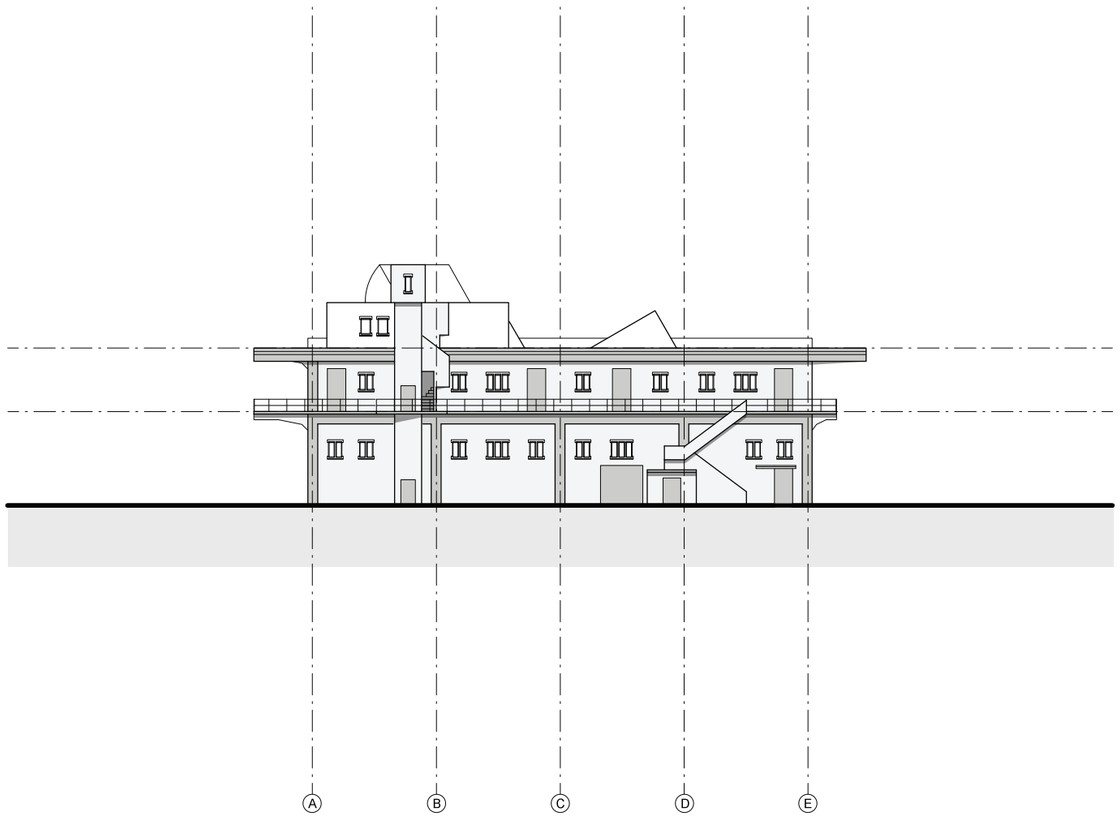
north facade elevation by Jan Huis in 't Veld
(own illustration)

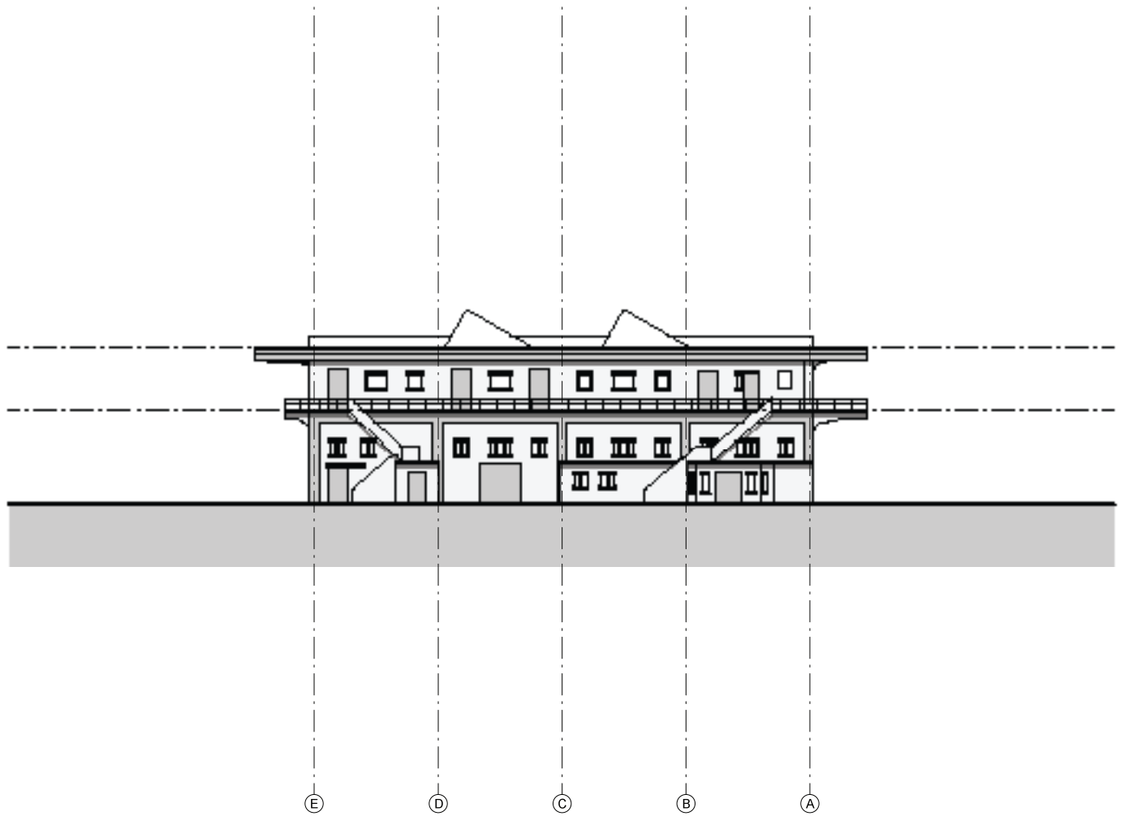


1:500

east facade elevation by Jan Huis in 't Veld
(own illustration)

1:500

south facade elevation by Jan Huis in 't Veld
(own illustration)

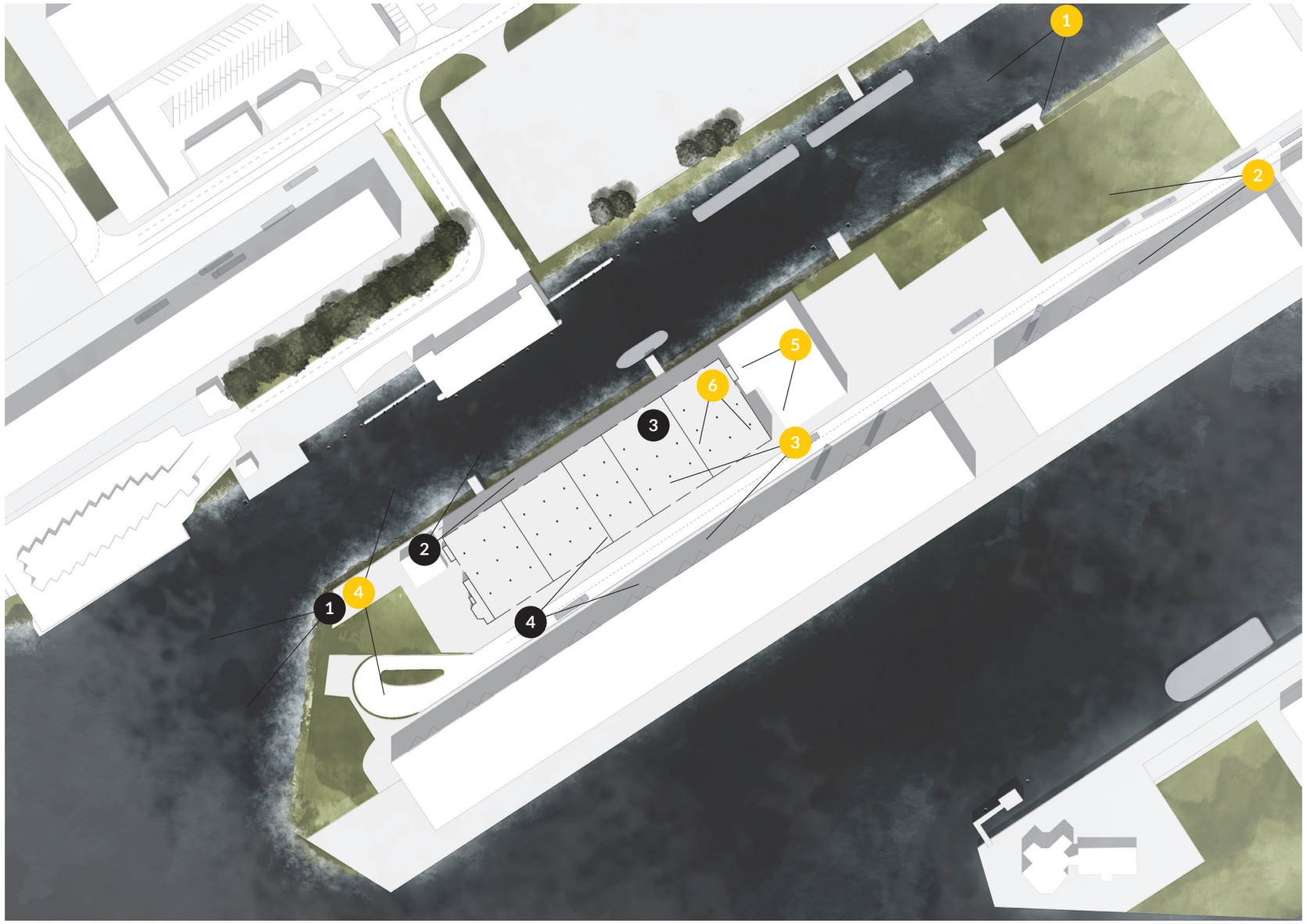


1:500

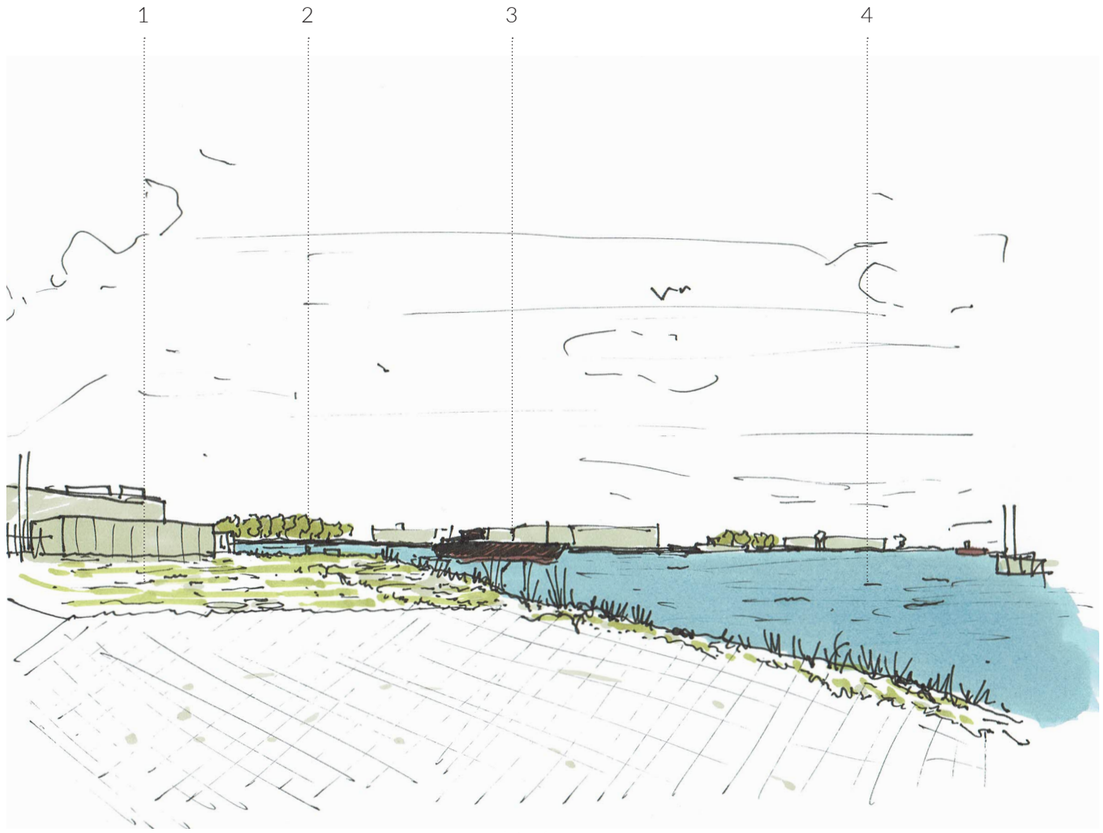
west facade elevation by Jan Huis in 't Veld
(own illustration)

VISTA / SPATIAL SEQUENCE

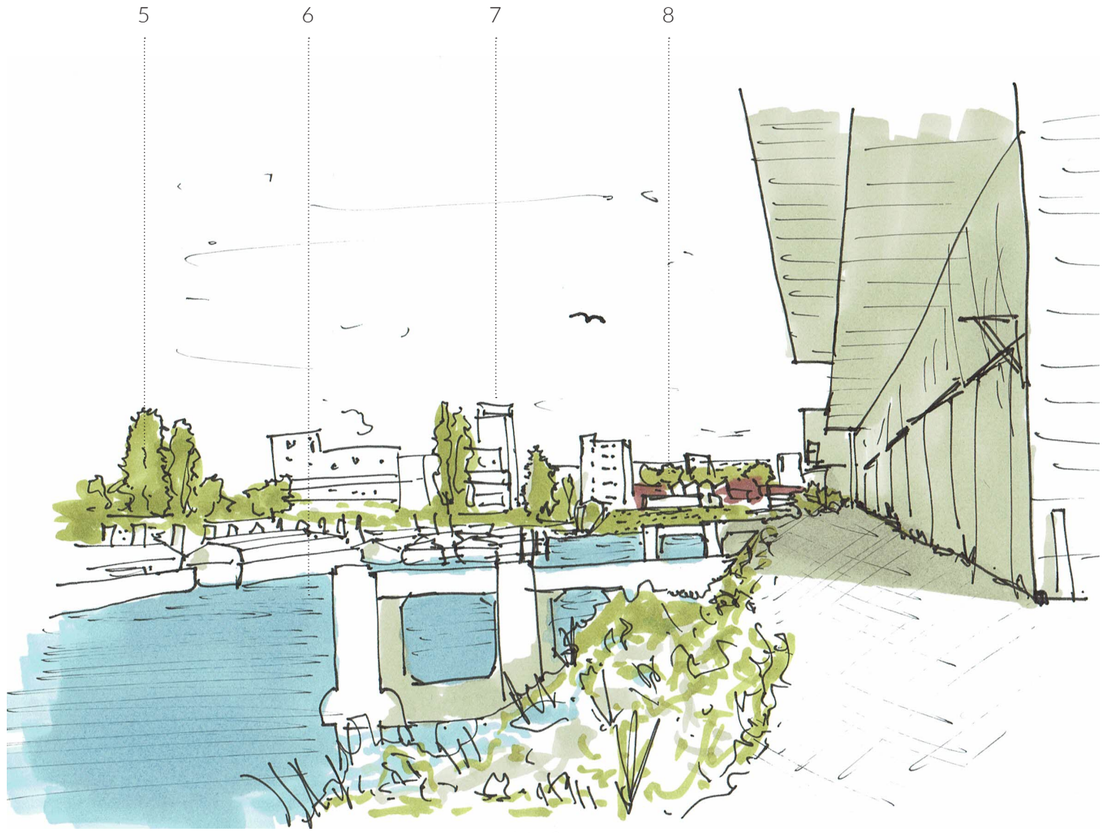
The vista & spatial sequence is all about understanding the site and it's relationship with it's surroundings. By sketches and highlighting important and/or relevant elements we will try to formulate the connecdtion and relation of Katoenveem with the environment it is surrounded by and the other way around. We first start with the Vista's which are basically sightlines from mainly the site unto everything that might be interesting or relevant. After this a map will show from where you can see these illustrations. Finally a number of sketches and illustrations will form the spatial sequence of the site. This part mainly consists of the most interesting and clear views from the surroundings towards the site of the Katoenveem building and the building itself. This to show what are the highlights and main elements of the building but also of the surroundings and the relationship between them.



direct surroundings and vista's by joost van den berge



vista 1



vista 2

vista 1 & 2 by joost van den berge

WHY?
We are looking at vista's or sightlines to see what kind of relationship the site has with it's environment and the surroundings and use this information in the designprocess

HOW?
by using sketches, pictures and illustrations to analyse and show the surroundings and highlights in relation to Katoenveem

VISTA'S
vista 1 shows the view at the end of the pier over the harbour and the main waterways. The view consists of 4 main elements:
1. at the end of the pier some built structures are present together with grassland and some bushes

2. on the other side of the Maas you can see large built structures of industrial buildings together with green structure; mainly trees

3. the main element clearly is all the water. The waterway here is very wide and full of activity. A relationship between Katoenveem and the harbors and ships is clearly established.

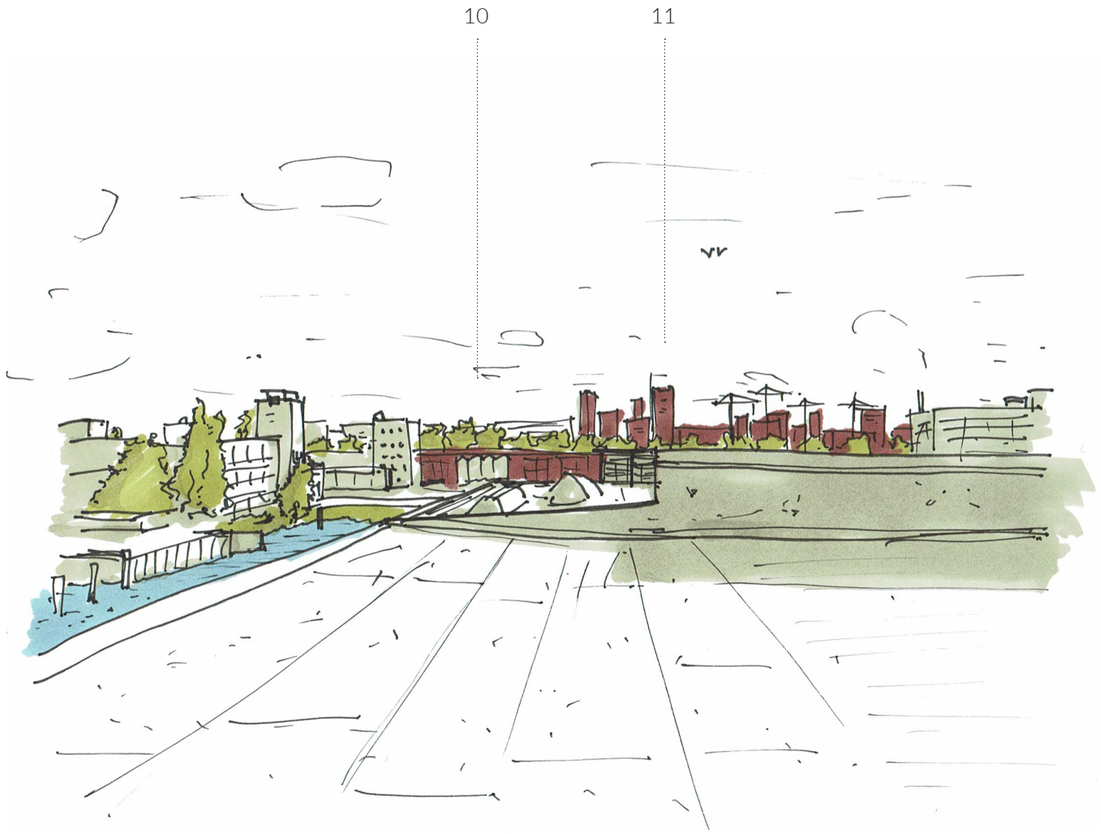
vista 2 shows the view from Katoenveem along the Keilehaven and the other side of the harbor.

At no. 5 you can see the other side of the harbor with large open fields with an abundance of trees and in front of the quays some small ships and pontoons

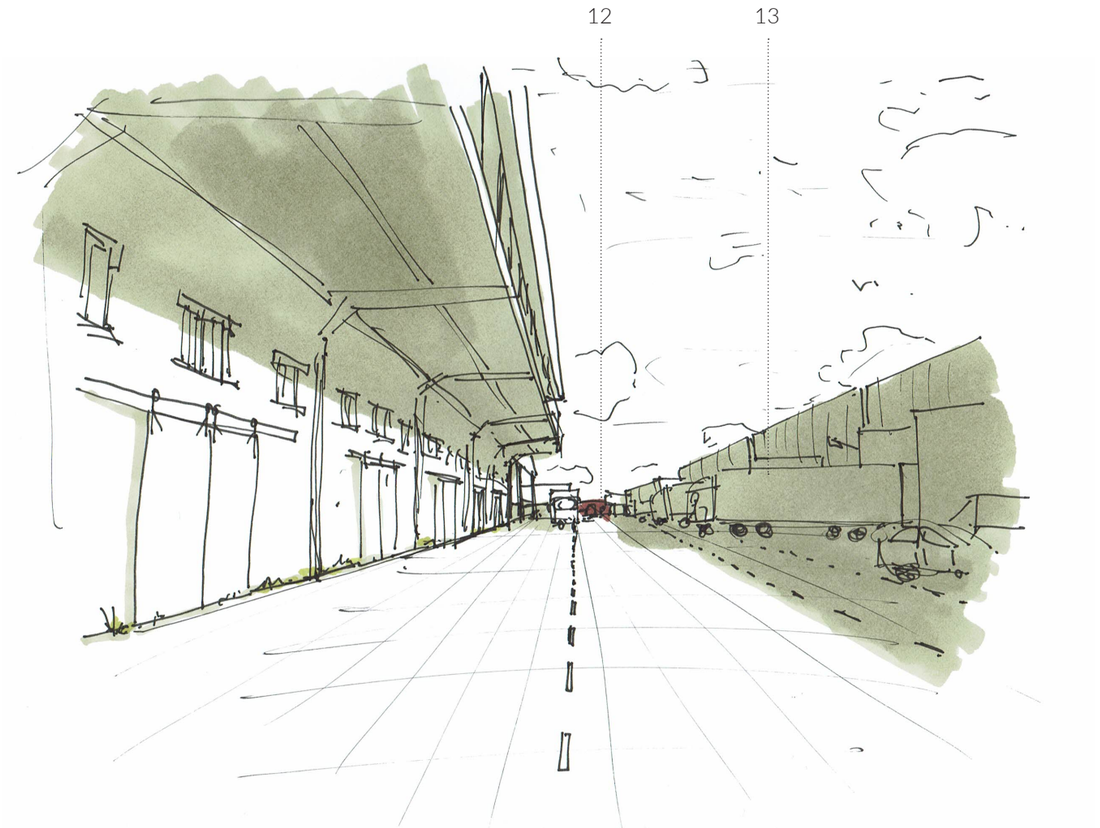
6. in front the Keilehaven is still very present. The relationship between the harbor and Katoenveem is still intact but needs a push

7. on the end of the harbor you can still clearly see the old industrial buildings and other built structures

8. between the built structures at the end of the harbor you can see fragments of the main road, the Dakpark and the many green structures it offers.



vista 3



vista 4

vista 3 & 4 by joost van den berge

WHY?
We are looking at vista's or sightlines to see what kind of relationship the site has with it's environment and the surroundings and use this information in the designprocess

HOW?
by using sketches, pictures and illustrations to analyse and show the surroundings and highlights in relation to Katoenveem

VISTA'S
vista 3 shows the view of the roof and the relationship Katoenveem has with the city on a larger scale.
No. 9 shows the old and newer industrial buildings and other built structures

10. above the small built structures at the end of the harbor you can clearly see of the main road, the Dakpark and the many green structures it offers

11. from the roof an impressive view unfolds on Rotterdam and it's highrisers

the last vista (no. 4) is the view from Katoenveem to the north-east along the Keilestraat.

As you can see at no. 12 asphalt, stone and trucks dominate the view here. There is practically no relationship with the city, water or green. However this area and sightline is very active. Here trucks are coming and going all the time and people are walking along the road to reach their cars and trucks.

No. 13 shows further on the street bicycles and cars crossing the junction between the Keileweg and the Benjamin Franklinstraat. Finally on the end of the street you can see, if you look very good, the Dakpark, some green and the Vierhavensstraat

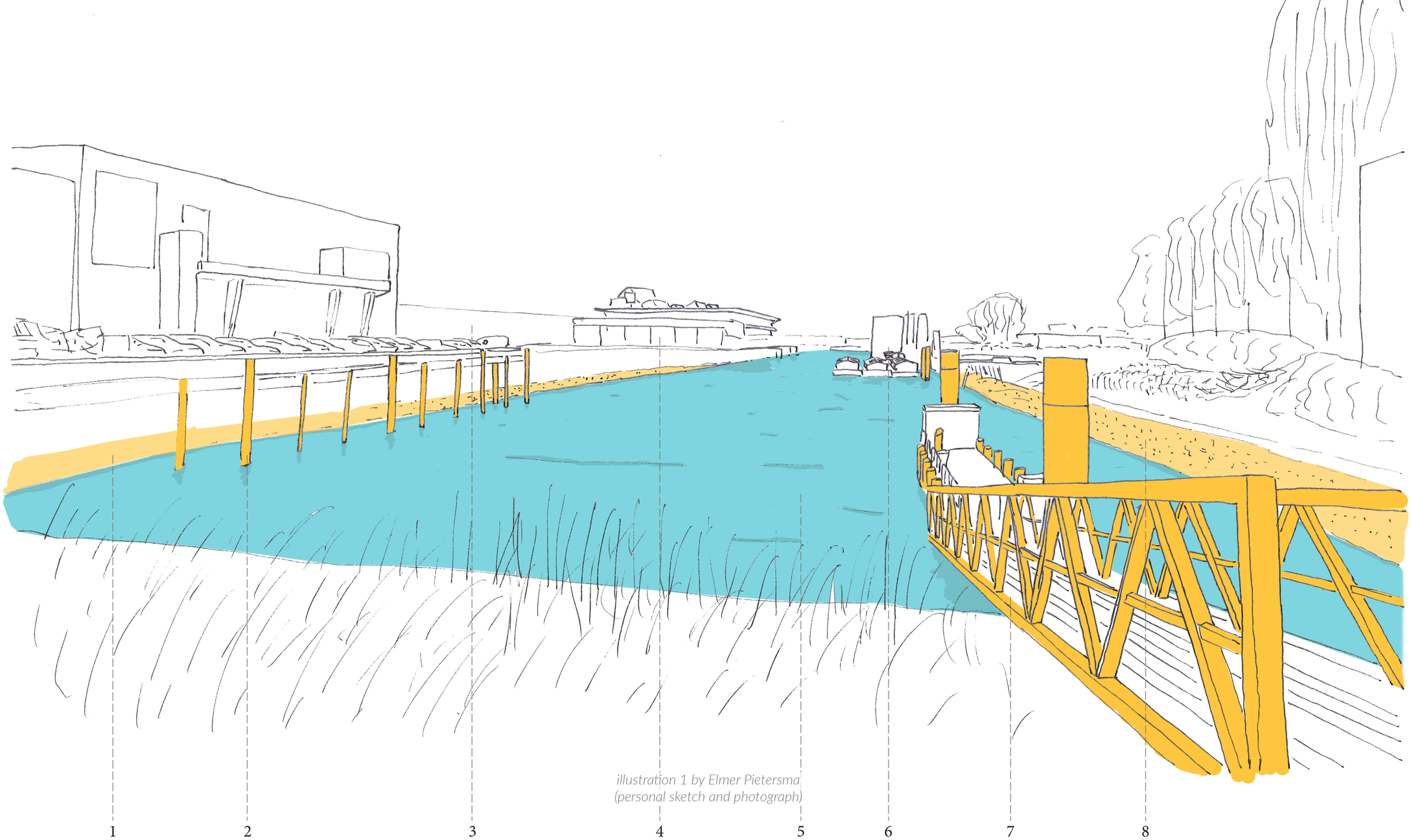


illustration 1 by Elmer Pietersma
(personal sketch and photograph)

WHY?

The goal of this research is to understand the spatial sequence going from the street towards our building. This is done to show the approach and to determine what spatial qualities can already be found at the location.

HOW?

By sketching and tracing photographs of the surrounding it is possible to reduce the amount of information in the image to the most important elements.

VIEW OVER THE KEILEHAVEN

This first view show the Katoenveem as it is situated next to the Keilehaven at the end of the pier. This image clearly shows its harbour identity.

Although this harbour used to be a very busy area, the Keilehaven is now hardly in use. Only a few ships come here to be cleaned at the facility (6) on the other side of the harbour. Trees hide the industry still remaining facing the Katoenveem.

Notable elements:

1. Breakwater
2. Wooden posts
3. Fruit transshipment with loads of trucks
4. Katoenveem
5. Keilehaven
6. Ship cleaning station
7. Water taxi docking point
8. Breakwater

SPATIAL SEQUENCE 1

- Important element; shade determines order of importance.
- Water

illustration 2 by Elmer Pietersma
(personal sketch and photograph)

KEILEWEG

At the beginning of the Keileweg, one might already see the Katoenveem; behind all the trucks moving about, the top of the elevator shaft and the sample room are visible.

The left side of the image shows the Vertrekhallen, a party centrum. The name and location refer to the original departure halls of the Holland America line, of which multiple warehouses were also present further down the pier.

The markings on the road suggest where the vehicles should be free to move. However, the trucks and cars tend to be parked wherever they might be, waiting in line to deliver or gather their goods. At number two, underneath the Vertrekhallen, the parking of the local offices is shown.

On the right part the office of the fruit transshipment is shown. This function is therefore connected to the warehouses further down the pier.

Notable elements:

1. Vertrekhallen (party centre)
2. Car parking for the offices
3. First dock of the fruit transshipment warehouses
4. The Katoenveem; showing only the roof, elevator shaft
   and the sample room.
5. Marking on the street, showing which part of the road
   to keep clear

SPATIAL SEQUENCE 2

- Important element;
  shade determines order of importance.
- Water

illustration 3 by Elmer Pietersma
(personal sketch and photograph)

KEILEWEG 2

Further down the road, a clearer view of the Katoenveem is showing. This is also the gap between the two large fruit transshipment warehouses as is shown on the left. The gate guards the entrance to the quay where the international ships dock to deliver their fruit.

Number two marks one of the truck docks. One might notice that there are three trucks in this image that are just standing around; these are waiting for their turn to go the docking station.

The Katoenveem is now easier to be seen. The sample room on the roof clearly stands out from the rest of the horizontal building. In front of the Katoenveem, a shed is also visible. This metal roof is an addition to the complex build in 1991 (see the chornomap for more information).

From this distance one can also see the balcony running around the building, for the first time. This striking element gives great character to the building and makes it recognisable.

Notable elements:

1. Gate to the quay
2. Fruit transshipment warehouse
3. Katoenveem
4. Metal roof in front of Katoenveem
5. One of the parked trucks

SPATIAL SEQUENCE 3

- Important element;
  shade determines order of importance.
- Water

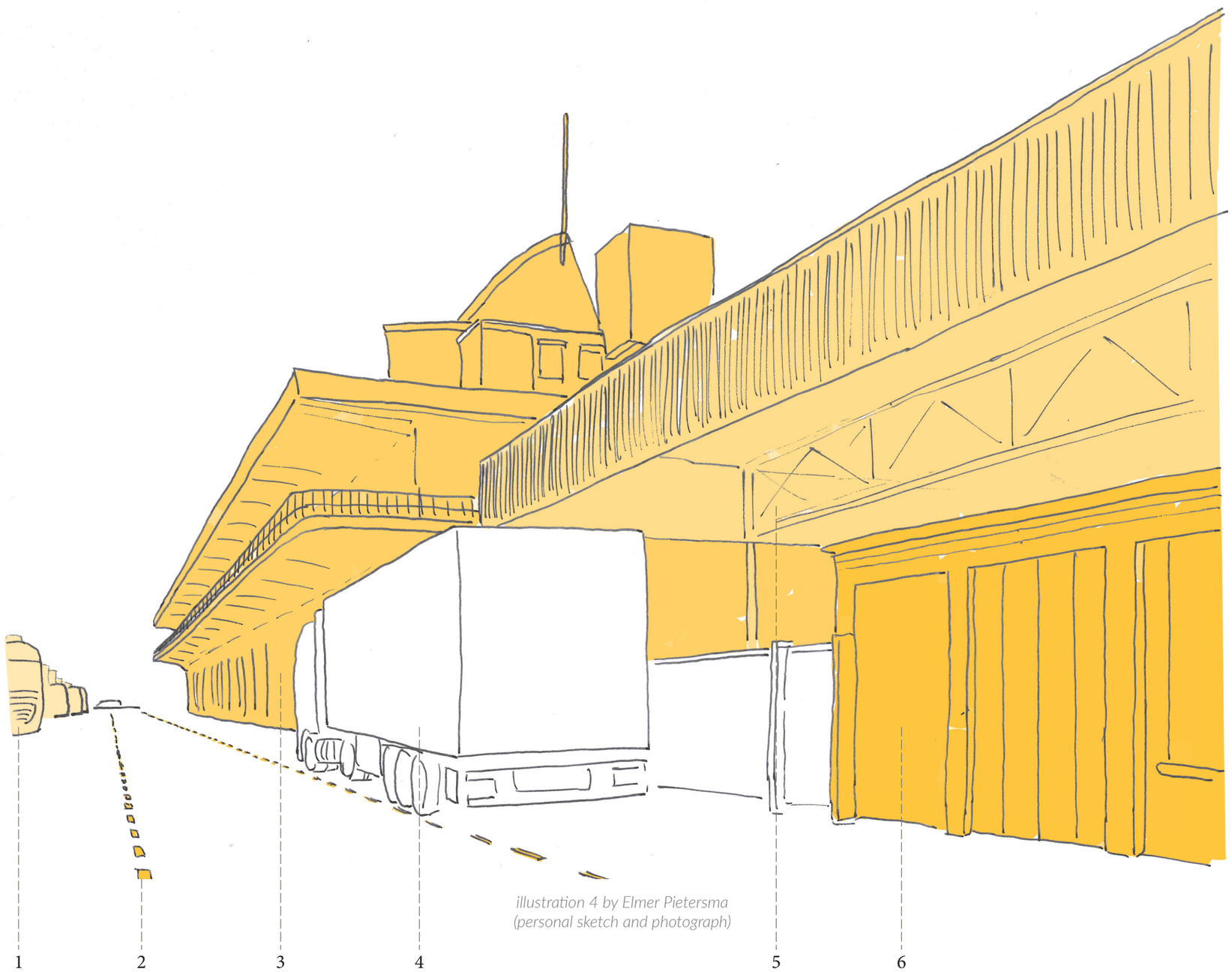


illustration 4 by Elmer Pietersma
(personal sketch and photograph)

KATOENVEEM - GATE ENTRANCE

This image shows the main entrance to the Katoenveem, through the gate (behind the parked truck). Next to the gate is the pumping station of the old sprinkler installation of the Katoenveem (for more information see the chapter on the sprinklers). This building is empty now but used to house the pumps to maintain the water pressure for the sprinklers. The buildings stands apart from the main warehouse but is also listed as a monument.

The markings on the street continue all the way to the end of the pier, showing where the trucks can temporarily park. With the continued movement of trucks on the street, it is a unsafe environment to be just walking around; you need to pay attention to all the trucks in the chaos of loading and unloading.

Beyond the gate of number five an oasis of calm starts. The area underneath the metal roofing has been cleared and nothing remains there anymore except for the concrete flooring and traces of activity.

Notable elements:

1. Fruit transshipment warehouse
2. Markings on the street
3. Katoenveem
4. Parked truck
5. Metal roof added in 1991
6. Pumping station, added with the complex in 1920

SPATIAL SEQUENCE 4

- Important element;
  shade determines order of importance.
- Water

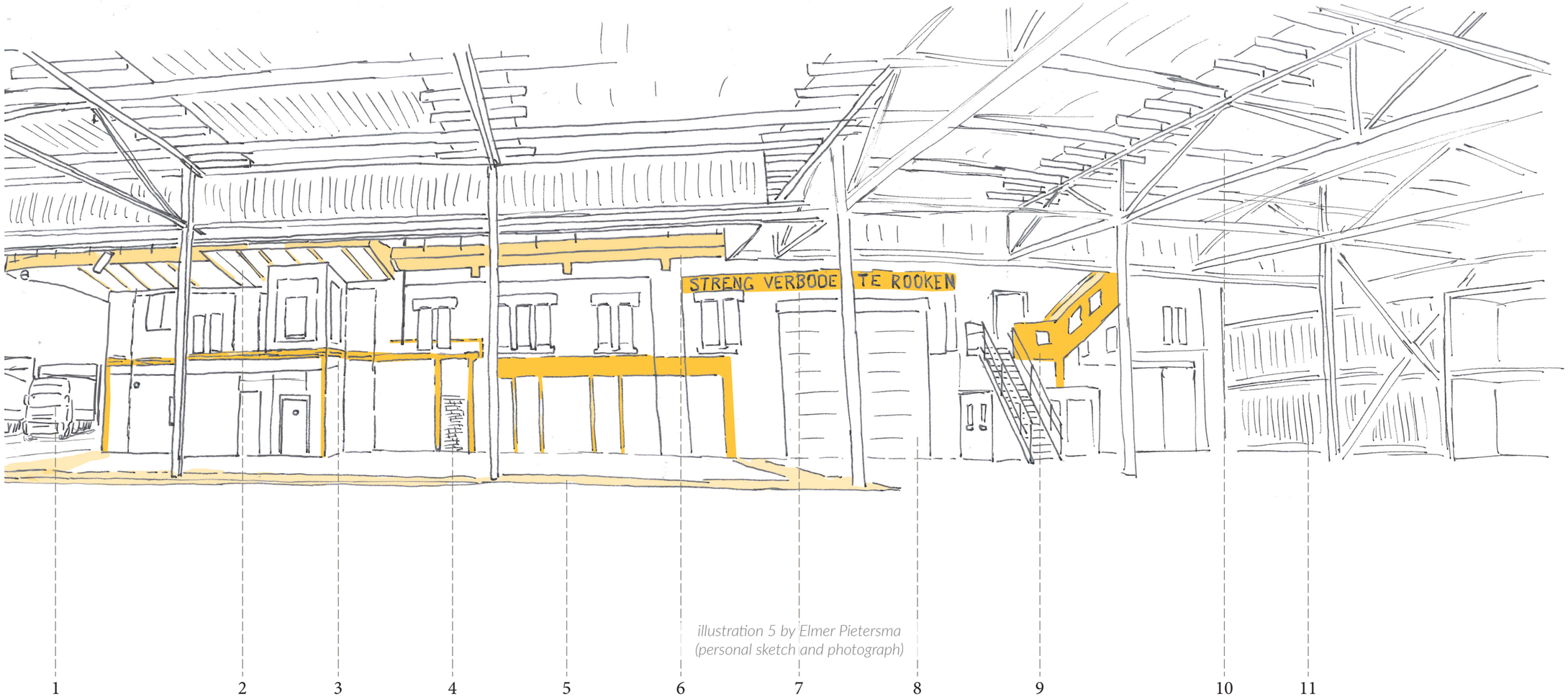


illustration 5 by Elmer Pietersma (personal sketch and photograph)

KATOENVEEM - MAIN ENTRANCE

The current main entrance of the entire warehouse is the roller door on the northern end of the building. All the other doors have been bolted up to prevent squatters of entering.

When facing the Katoenveem from this side, traces of removed buildings are visible. This line (3&5) marks the old directors office, removed in 1988 (see chronomap). The old entrances to the warehouse have been bricked up as is shown by number four.

The traces of the building show the complete disregard the owners had for the building, they did not care if the new roof was in front of the windows (at some parts the windows show traces of the old roof crossing the glass). This element shows that the Katoenveem was a very functional building and that aesthetics were not important.

At number nine, one of the original concrete stairs is visible. It is in a very bad shape, the bottom part has already been replaced by a new, metal staircase.

Notable elements:
1. Fruit transshipment warehouse
2. Traces of boarding that used to protect the skin
3. Traces of the removed directors office
4. Bricked up entrance
5. Traces of the removed directors office
6. Still present white boarding to protect the skin
7. Original warning against smoking
8. Roller door giving acces to the warehouse
9. Original but broken, concrete stairs.
10. Metal roofing added in 1991
11. Shipping containers blocking the view to the har-

SPATIAL SEQUENCE 5

- Important element; shade determines order of importance.
- Water

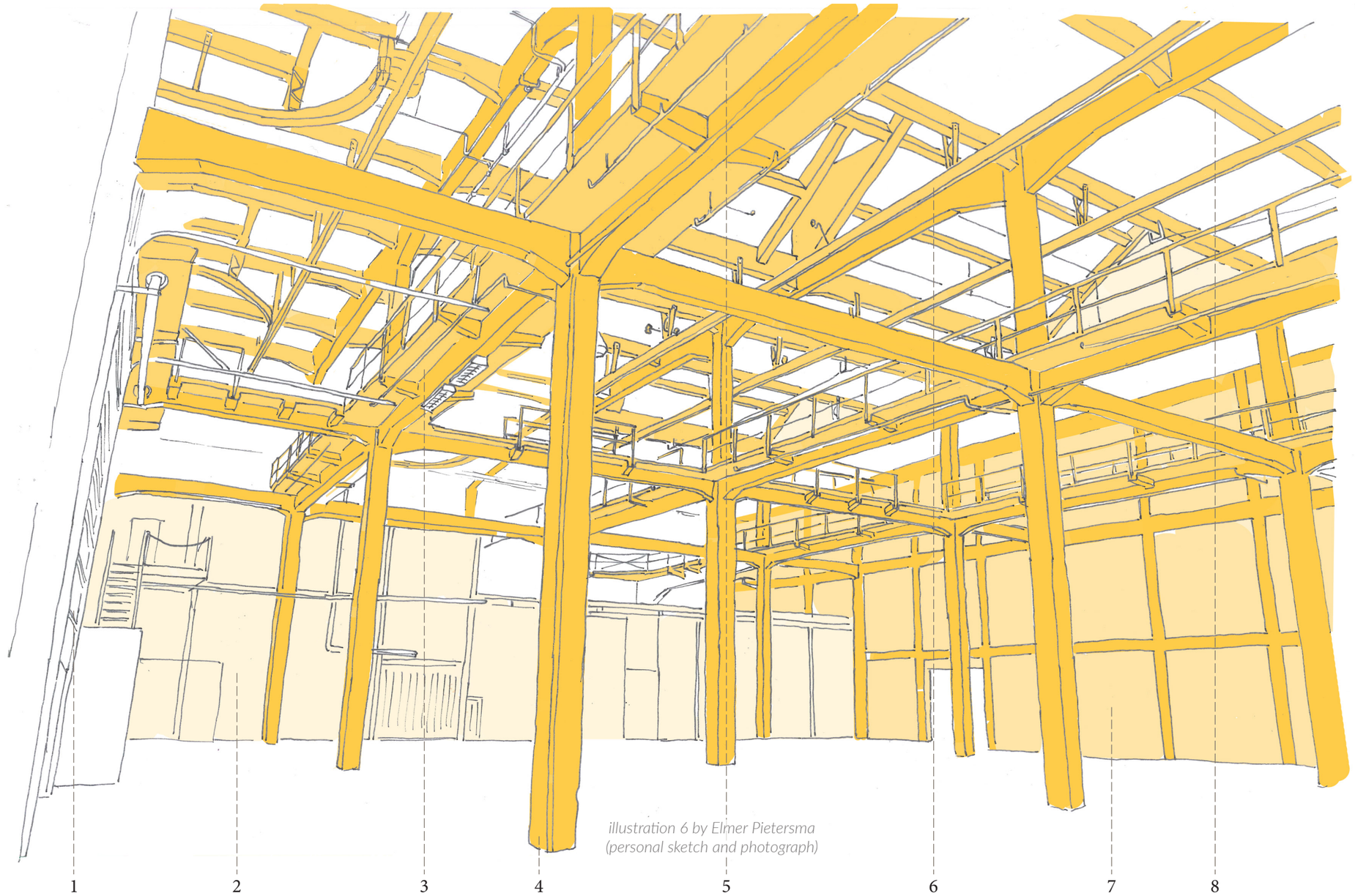


illustration 6 by Elmer Pietersma
(personal sketch and photograph)

INSIDE THE KATOENVEEM

This sketch shows the interior of the warehouse. As is clearly seen at first glance; there is a lot going on. There is a complex network of construction, walkways, installations and roof beams obscuring the room. Due to the complexity of the image it is easy to forget the size of the space, the walkways start at a height of seven and a half metres, allowing for a grand and open ground floor area.

At the back of the room there are some later additions to the warehouse. Built in structures that suited the needs of the users at the time. They hold no value and are damaged in parts (see value assessment).

On the right side of the image, a yellow wall shows the first of four fire proof walls that separate the longitudinal building into five compartments. The breakthrough that is shown in this image is a later addition; it compromises the integrity of the fire proofing and also breaks with the transverse direction of the compartments. The functioning of the walkways and the compartments will be discussed further on in this research.

Notable elements:

1. Roller door to the outside (previous image)
2. Later additions to the interior (not original)
3. Walkways
4. Monolithic concrete structure
5. Original sprinkler installation
6. I-beams of the conveyor system
7. Fire proof wall
8. Roof beams

SPATIAL SEQUENCE 6

- Important element; shade determines order of importance.
- Water

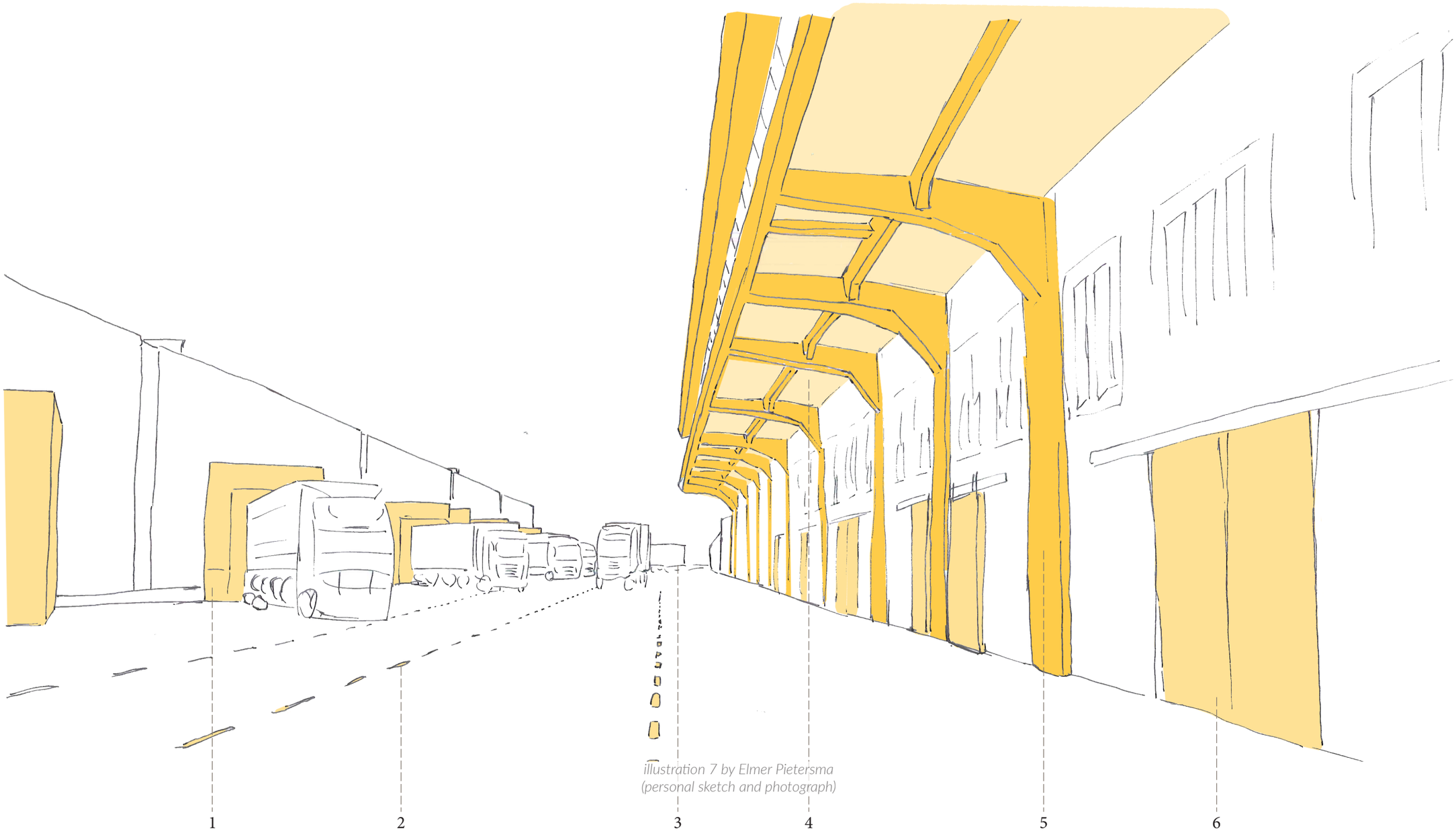


illustration 7 by Elmer Pietersma
(personal sketch and photograph)

KEILEWEG 3

Once outside again, we continue towards the end of the pier. In this image one can clearly see the old and new coming together; both warehouses have doors to allow goods to be moved to whatever medium can transport them elsewhere (more on this later).

The balcony of the Katoenveem is now seen from below, showing it's slimming structure. The function and hidden treasures of this balcony are discussed in a later chapter.

The current state of this balcony is very poor; it is due to the degradation of this balcony and especially the falling off of concrete is the reason this building is no longer safe to use. As a safety measure netting has been added along the entire underside of the balcony.

The yellowed sliding doors on the right side, are the original metal doors that were installed nearly a hundred years ago. Although they show clear signs of rust they are in relatively good state.

At the end of this road is the end of the pier, giving a grand vista over the harbour area.
Notable elements:

1. Fruit transshipment
2. Marking on the street
3. End of the pier, opening up to the Maas river
4. Structure of the balcony, nets protect against falling concrete
5. Thickening of the wall, resembling a column
6. Original steel sliding doors

SPATIAL SEQUENCE 7

- Important element; shade determines order of importance.
- Water

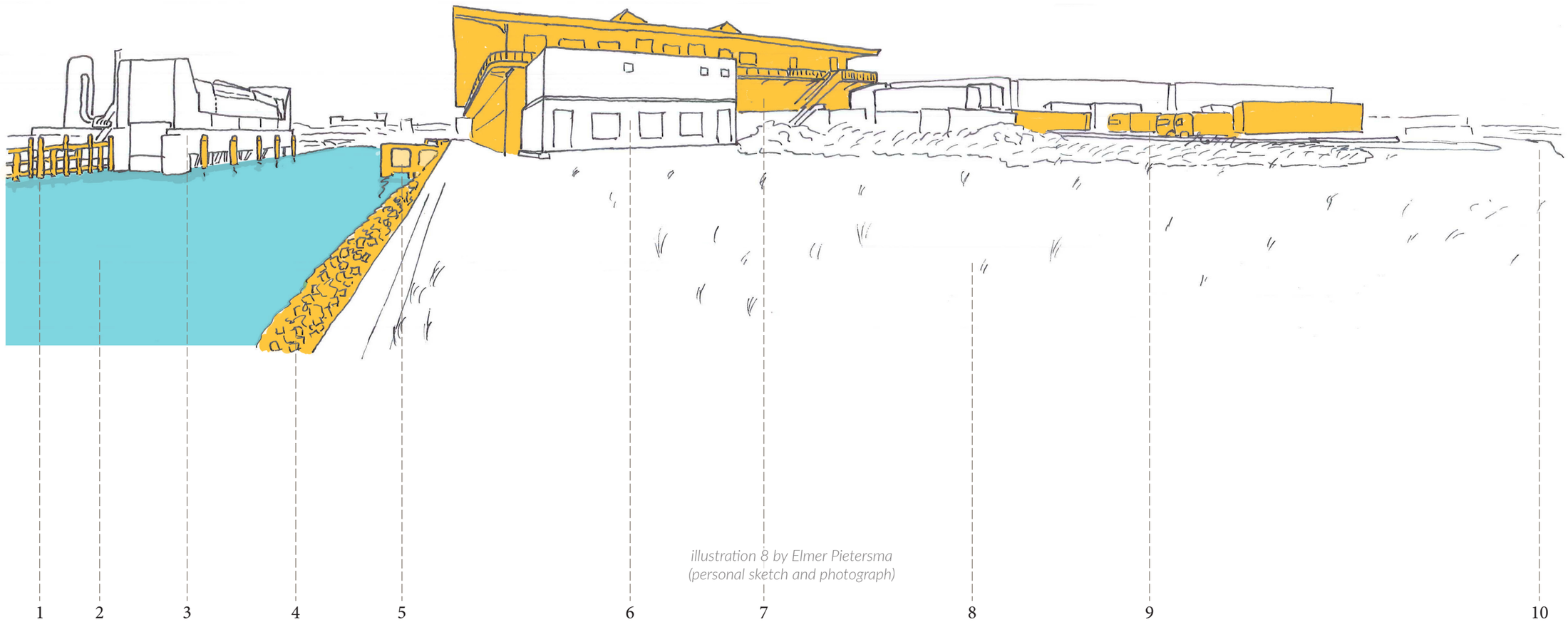


illustration 8 by Elmer Pietersma
(personal sketch and photograph)

END OF THE PIER

Shown here is the view of the end of the pier, looking back at the Katoenveem and the Keilehaven. On the far right of the image the end of the pier is visible, but another sketch will show its view. The location of this viewpoint is on a small green field located at the very end of the pier.

Between the water of the Keilehaven and the pier is a quay of roughly three metres high, making the connection with the water only a visual one. The concrete quay, which was built around 1920 as well, is protected from the waves by breakwater.

At five, the original foundation of the two cranes is visible. This is the position of the dismantled cranes that used to connect the interior conveyor system to the ships that docked next to the building (more on that later).

The head of the building is obscured by a few temporary container units, used as a barrack or shack of the previous users.

Notable elements:

1. Wooden posts to guide the ships
2. The Keilehaven
3. Industrial ship cleaning facility
4. Breakwater
5. Foundation of the demolished cranes
6. Derelict barracks and containers
7. Katoenveem
8. Empty grass field
9. Fruit transshipment warehouse

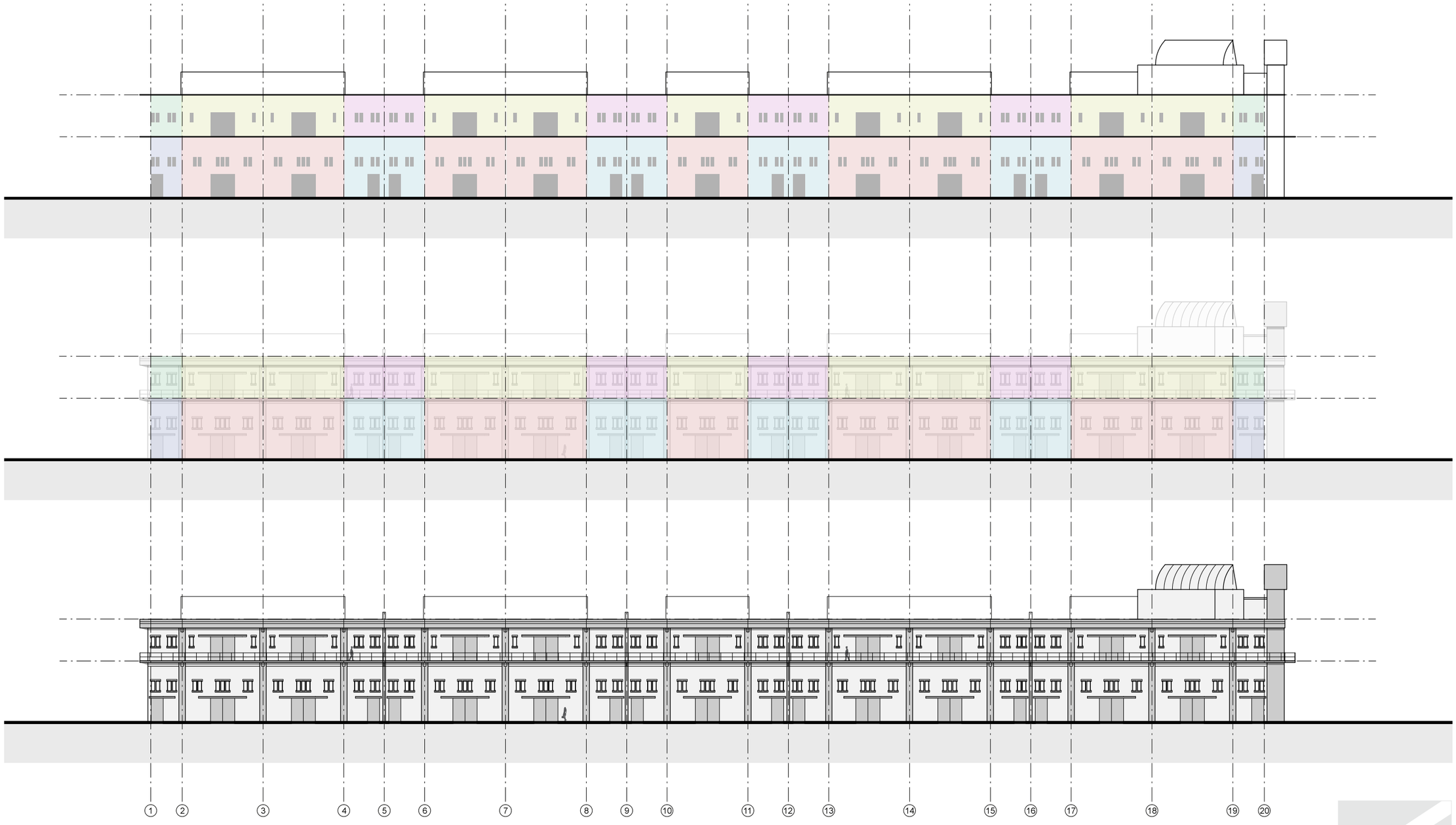
SPATIAL SEQUENCE 8

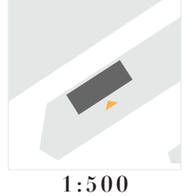
- Important element; shade determines order of importance.
- Water

SKIN

In this chapter a more extensive view on the elevations of the Katoenveem will be given. The east-, west-, south- and roof elevation will be discussed. The northern facade has not been added as it is almost similar to the southern facade, or at least is built up in the same fashion. Each facade is first shown in three layers in a 1:500 scale, after which a 1:200 drawing has been added to display the ratios, angles and measurements in more detail. A conclusion page has been added at the end to show all facades together in one drawing.

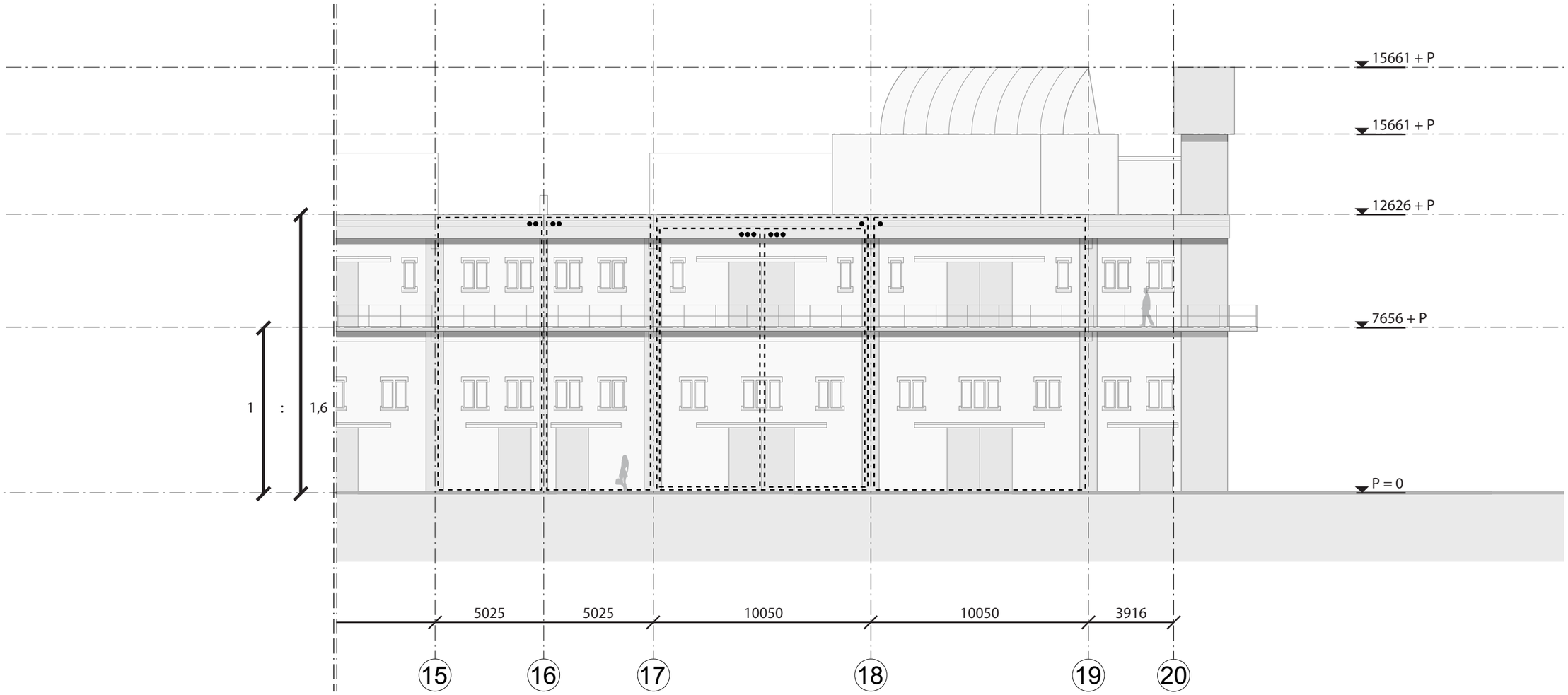
The 1:500 layers contain a 'regular' elevation, an elevation that displays the division of the facade and a schematic elevation. Each of these elevations can be traced back through the grid lines that run through all of them at once.





1:500

south facade elevation 1,2,3 by Jan Huis in 't Veld
(own illustration)



south facade elevation 4 by Jan Huis in 't Veld
(own illustration)

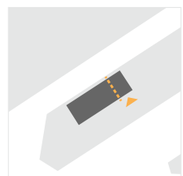
WHY?
How can the skin be understood through the façades?

HOW?
By looking at the elevations of the façades in different ways and layers.

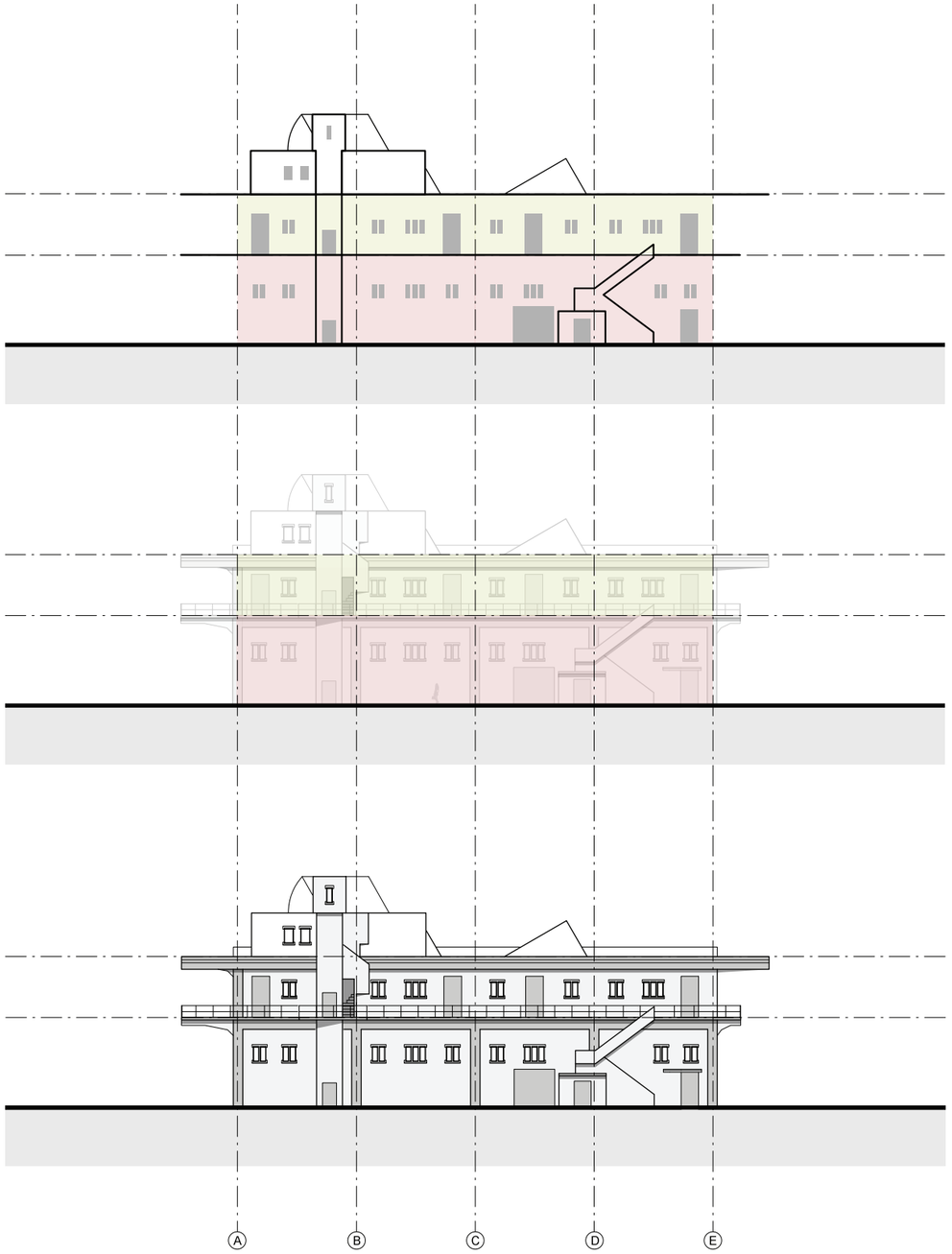
COMPOSITION AND EXPRESSION
The façades of the building have designed in accordance with the structure and functionality of the building. The openings have been chosen in order to facilitate the process of the Katoenveem in its best form. The placement of the doors corresponds directly to the conveyor system that transports the cotton through the building. The rhythm in the facade is organised with great consistency because of the same original function of the entire building. A few identical building blocks have been used to make the composition of the longitudinal façades (north and south). At the opposite heads of the building the same system has been used, however stairs, elevators and new entrances have broken through this pattern. The roof has a consistent rhythm and expression as well, only interrupted by the sample room angled on top. The 1:200 images provide a more detailed insight in the dimensions, angles and ratios used within the different façades of the building. The recurring and mirroring elements have been marked through the dotted lines in the 1:200s. The 1:500 drawings provide a gradual transition from elevations to simplified schemes of the façades, showing the key elements.

SOUTH FACADE

- building block 1
- building block 2
- building block 3
- building block 4
- building block 5
- building block 6
- facade opening
- mirroring part

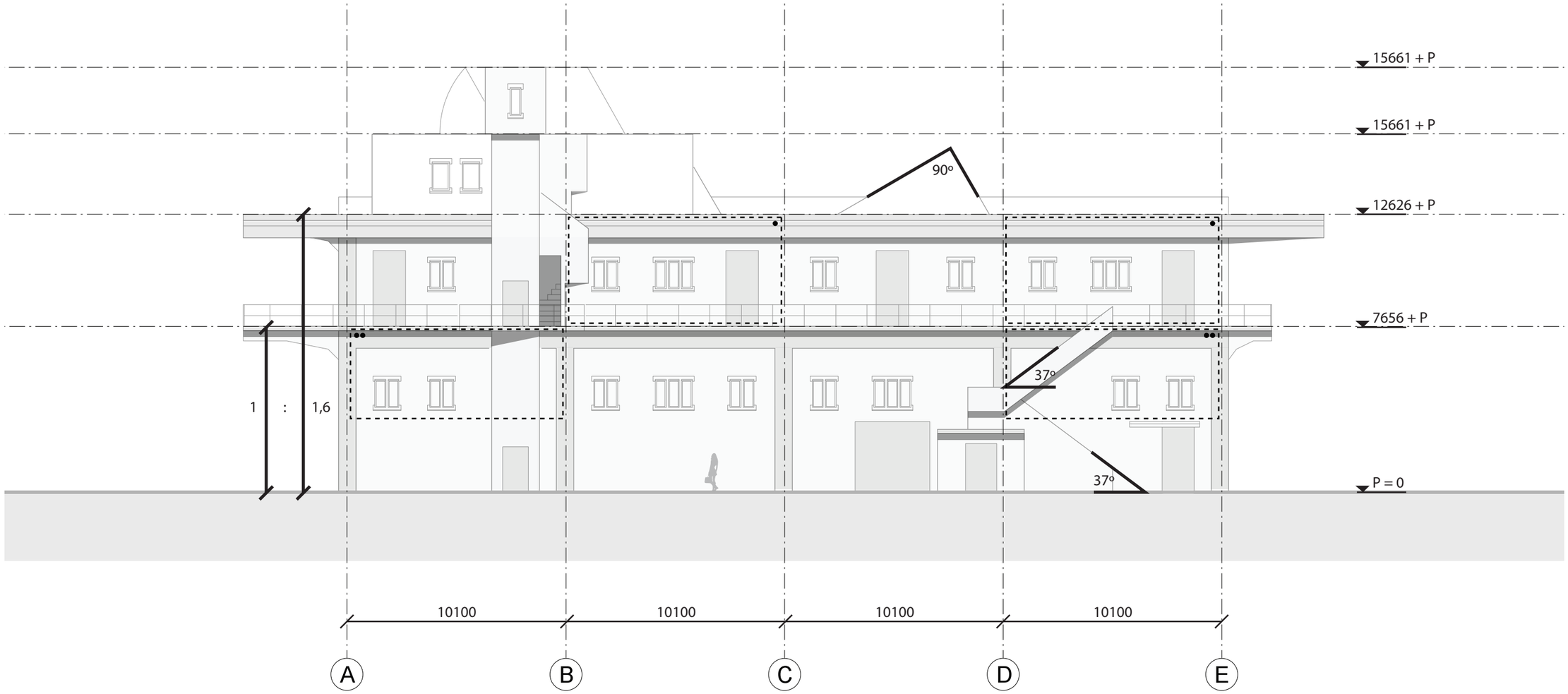


1:200



east facade elevation 1,2,3 by Jan Huis in 't Veld
(own illustration)

1:500

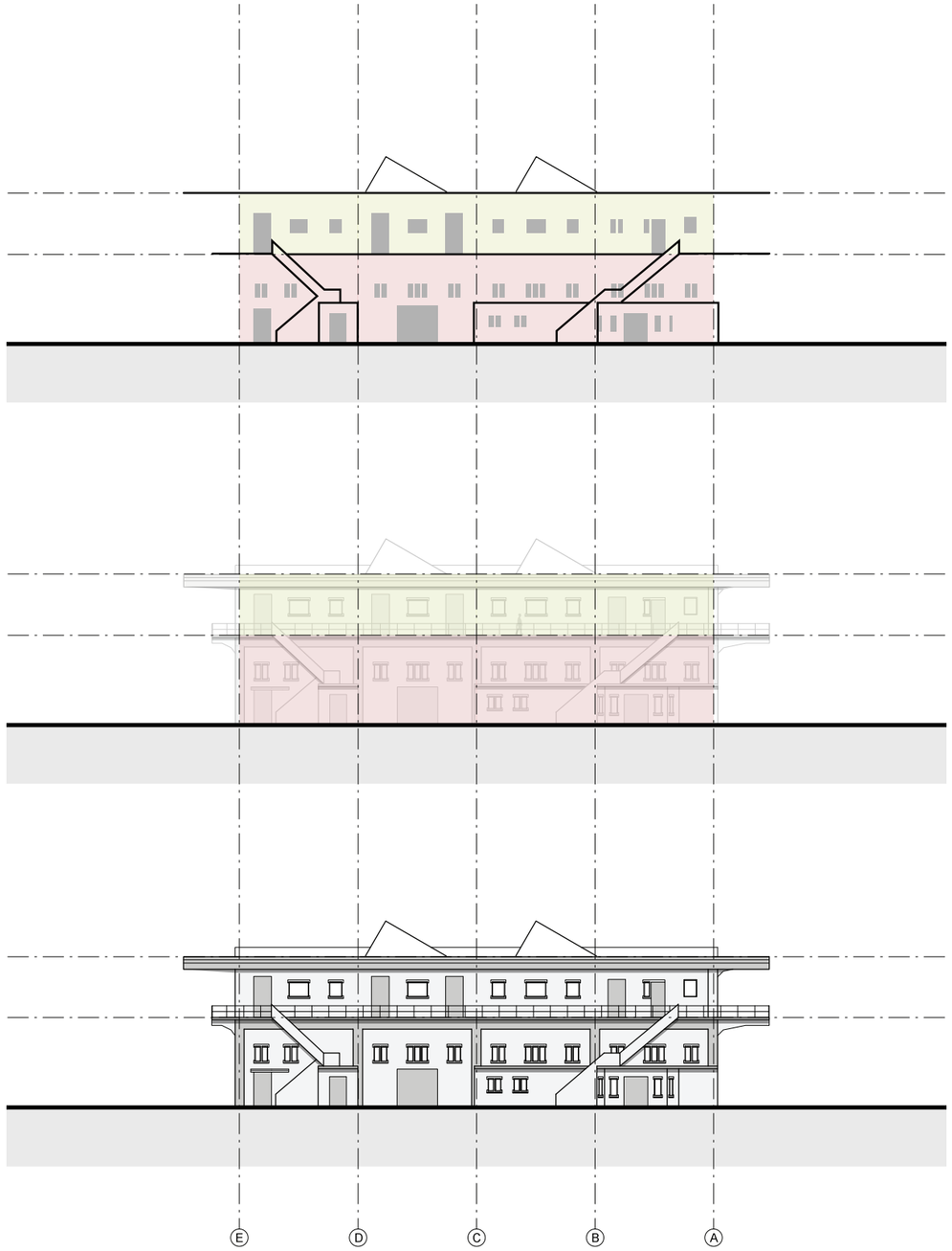


EAST FACADE

building block 1
building block 2
facade opening
mirroring part

1:200

east facade elevation 4 by Jan Huis in 't Veld
(own illustration)



west facade elevation 1,2,3 by Jan Huis in 't Veld
(own illustration)

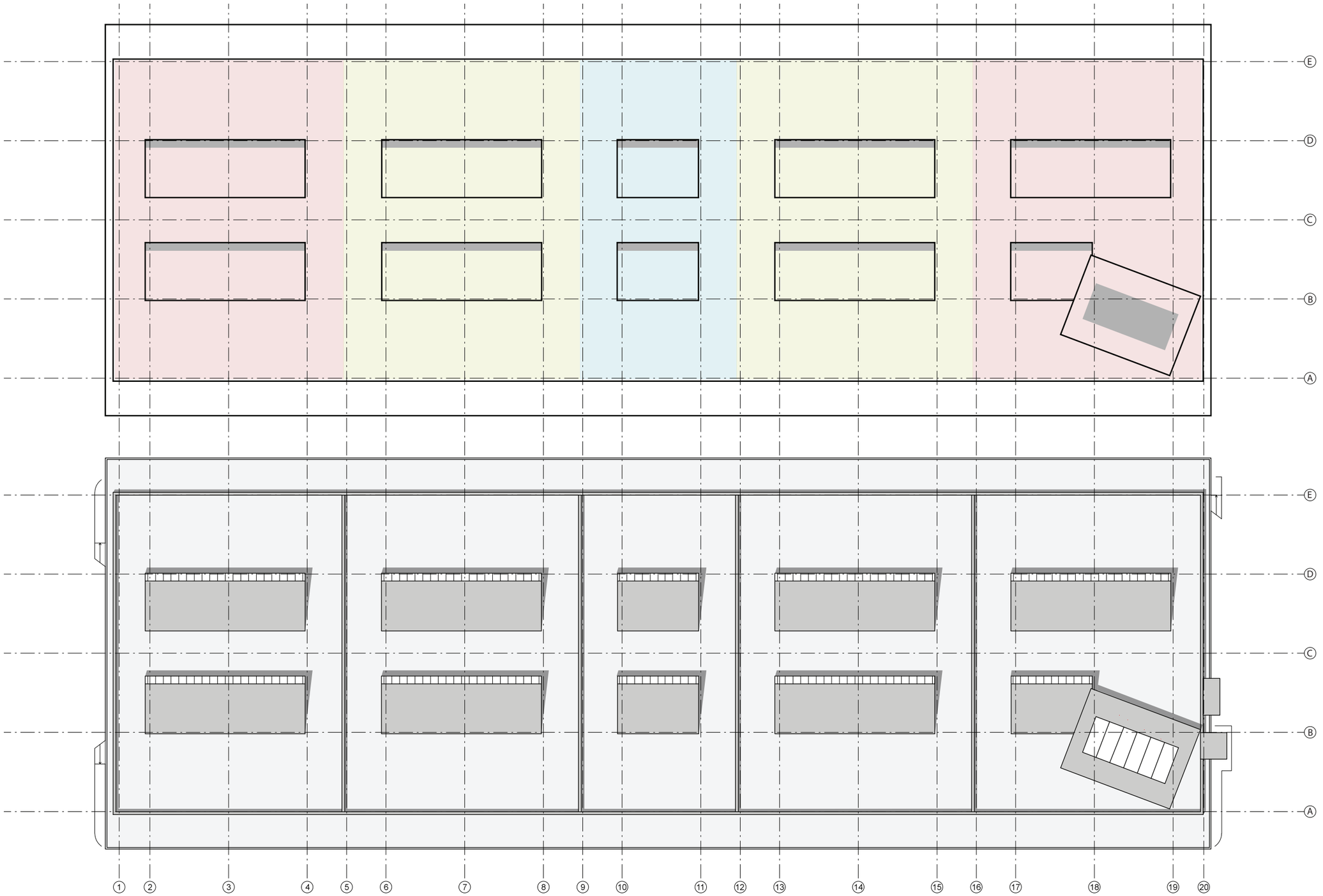
1:500

WEST FACADE

building block 1
building block 2
facade opening
mirroring part

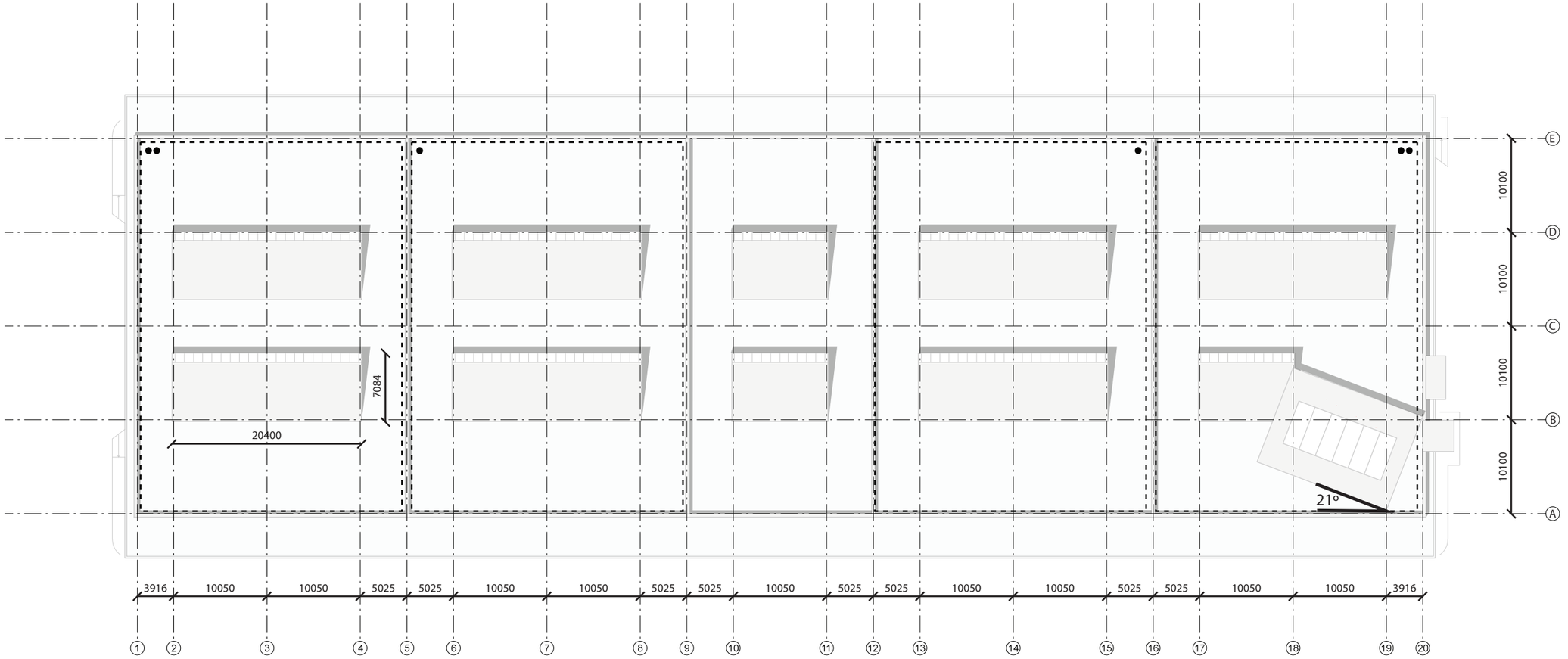
1:200

west facade elevation 4 by Jan Huis in 't Veld
(own illustration)



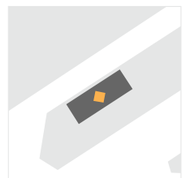
roof facade elevation 1,2 by Jan Huis in 't Veld
(own illustration)

1:500



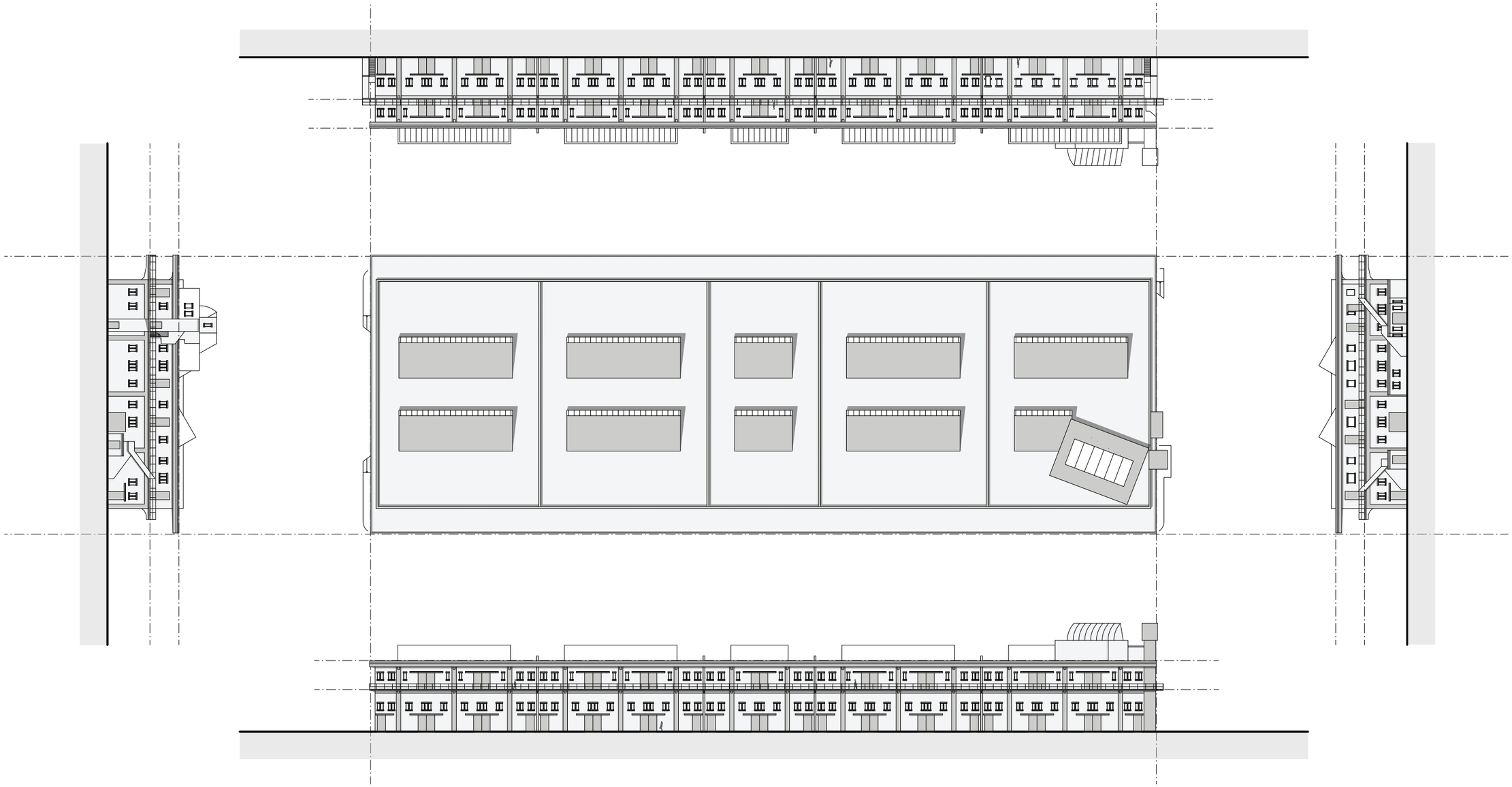
ROOF FACADE

- building block 1
- building block 2
- building block 3
- facade opening
- mirroring part



1:500

roof facade elevation 3 by Jan Huis in 't Veld
(own illustration)



CONCLUSION

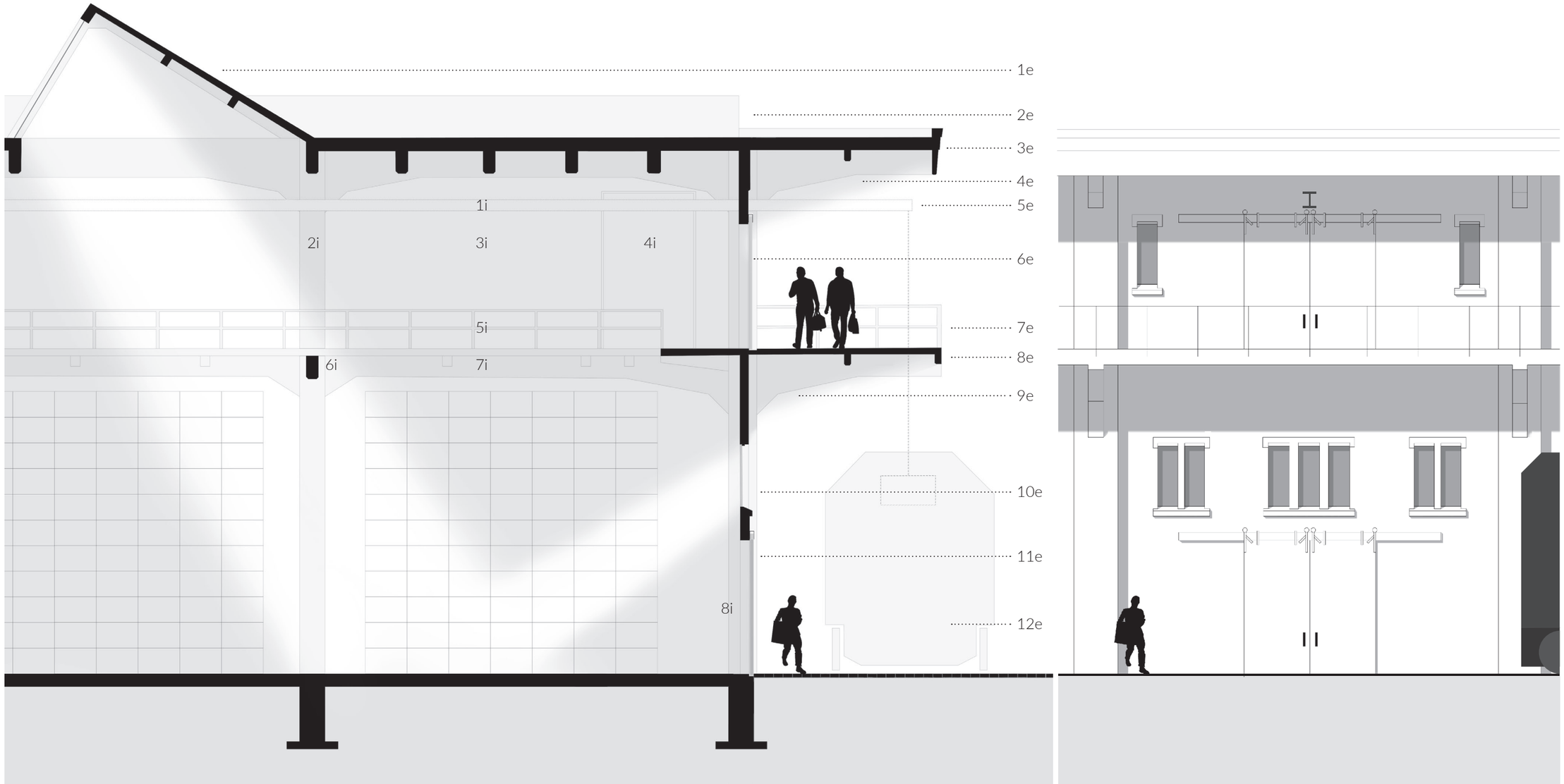
The northern and southern facade bare a striking resemblence, while the eastern and western facade each have their own character. Each facade is built up through a universal grid. N and S follow this grid striktly, in accordance with the optimal functionality of the building. In E and W adaptations have been made to fit different attributes to the head of the building (e.g. stairs, elevators and offices). The ratio between the ground and first floor is always 1:1,6 (golden ratio), in order to provide the optimal division between storage and usability. The facades are in each case a representa-

combined facade elevations by Jan Huis in 't Veld (own illustration)

1:750

MATERIALISATION

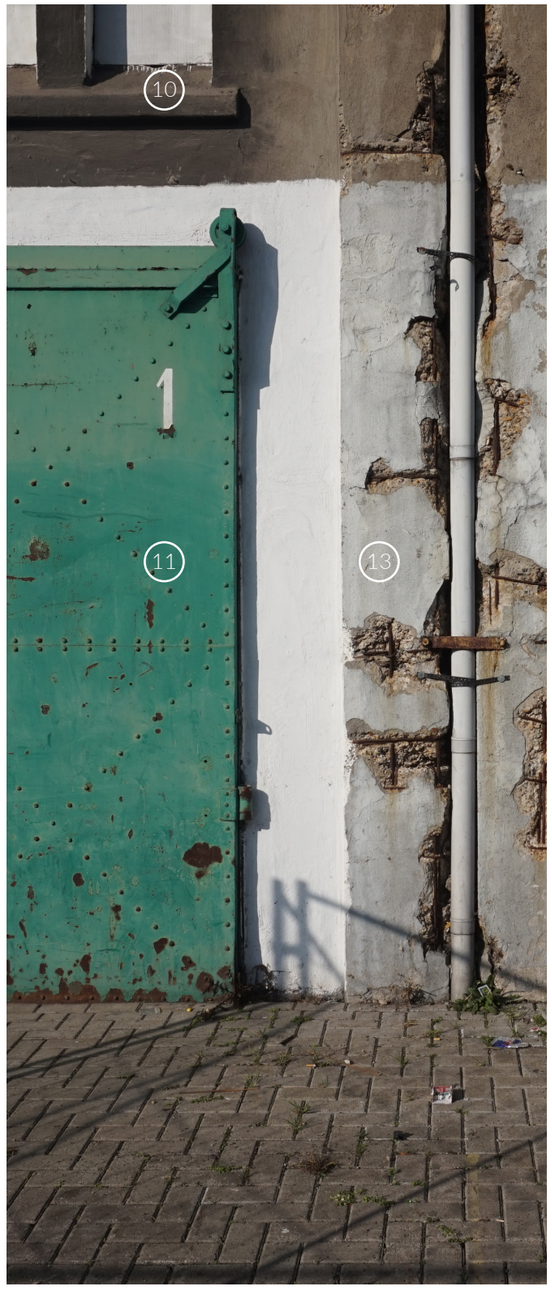
The skin and materialisation chapter is all about understanding the building. The skin are the finishes, the decorations, the windows, the doors, etc. it is how we perceive the building and understand it's esthetic quality's. This chapter is a description of the building on how we see it's surfaces and the main elements it caries, as well on the inside as on the outside. The first illustrations will show a section and a facade fragment of that section with numbers. These numbers are mentioned below with a description of where it is referring to. On the next pages representative photographes have been chosen that show all these same numbers but now you can see how they look like and where they refer too in real life and furthermore; show the state there in. The state or the condition of the skin will be explained after this chapter more extensively. After the materialisation a small part is dedicated to the windows of the Katoenveem building and the decorations of the windows and the building..



Katoenveem facade section & elevation 1:100 by joost van den Berge

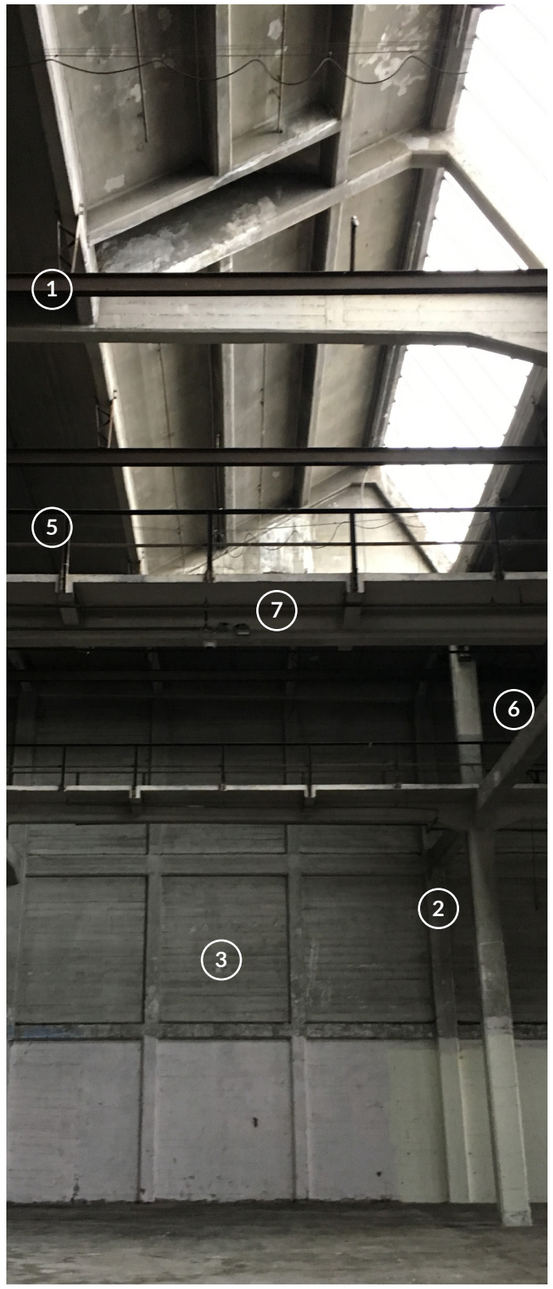
interior: 1. concrete in situ and steel skylight structure - 2. seperation wall at dilitation - 3. concrete profiled eaves in situ, sand cement finishing - 4. concrete supporting beam in situ of the roof edge, sand cement finishing - 5. steel beam trolleys for the transport and relocation of the cotton bales - 6. green colored steel double sliding door suspended from a steel railing - 7. iron balustrade - 8. concrete in situ gallery with strategic openings for the relocation of the cotton, sand cement finishing - 9. concrete in situ supporting beam of the gallery, sand cement finishing - 10. wired glass window with on the interior a sand cement sealing - 11. green colored steel double sliding door suspended from a steel railing - 12. steel railtrack for easy transshipment of cotton bales through the use of trains and trams

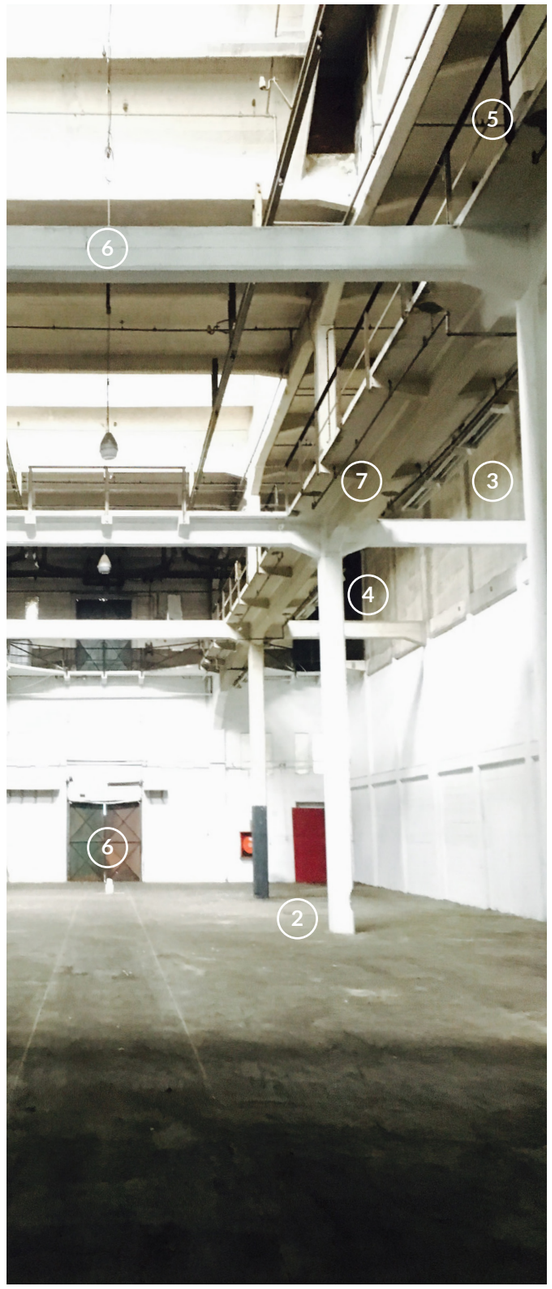
exterior: 1. steel railtrack for easy transshipment of cotton bales - 2. large in situ concrete columns with paint finishing from ground floor till 2 meters above ground- 3. concrete in situ seperation walls without finishing (traces timber casings still visible) - 4. Kinnear iron curtain doors/roller doors - 5. iron balustrade - 6. in situ concrete beams which connect columns and walls - 7. concrete in situ gallery's supported by small in situ concrete beams - 8. steel double sliding door suspended from a steel railing



materialisation exterior and main elements by joost van den berge

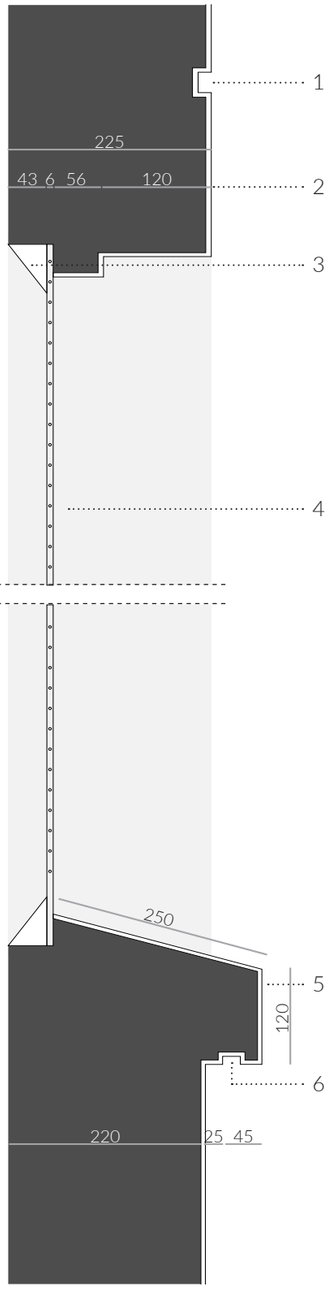
7. here you can see the steel balustrade on the gallery and the bad state it is in. The balustrade is extremely weathered and damaged and some parts are even gone or destroyed - 8. at no. 8 you can see traces of the former holes in the gallery - 9. here you can see the bottom of the gallery with it's supporting beams and the reinforcement in the concrete. Clearly it has weathered in great measure and at several places the sand cement layer has come of. Next to that you can still see the black/greyish soot layer at many points derived from the industry, ships but mainly the trains that used to drive underneath the gallery's. - 10. the window sill and the window itself is visible at no. 10, also constructed in concrete (more about this on the next pages) - 11. here is one of the many green finished steel sliding doors of the American Kinnear system visible. They have many traces of damage and rust but are still in quite a good state - 13. here you can see the dilatation and a water drain between the different building volumes with extreme damages and rust - 14. in the last picture you can see the small part that is left of the former enclosing wall of the site with the same concrete structure as the Katoenveem building

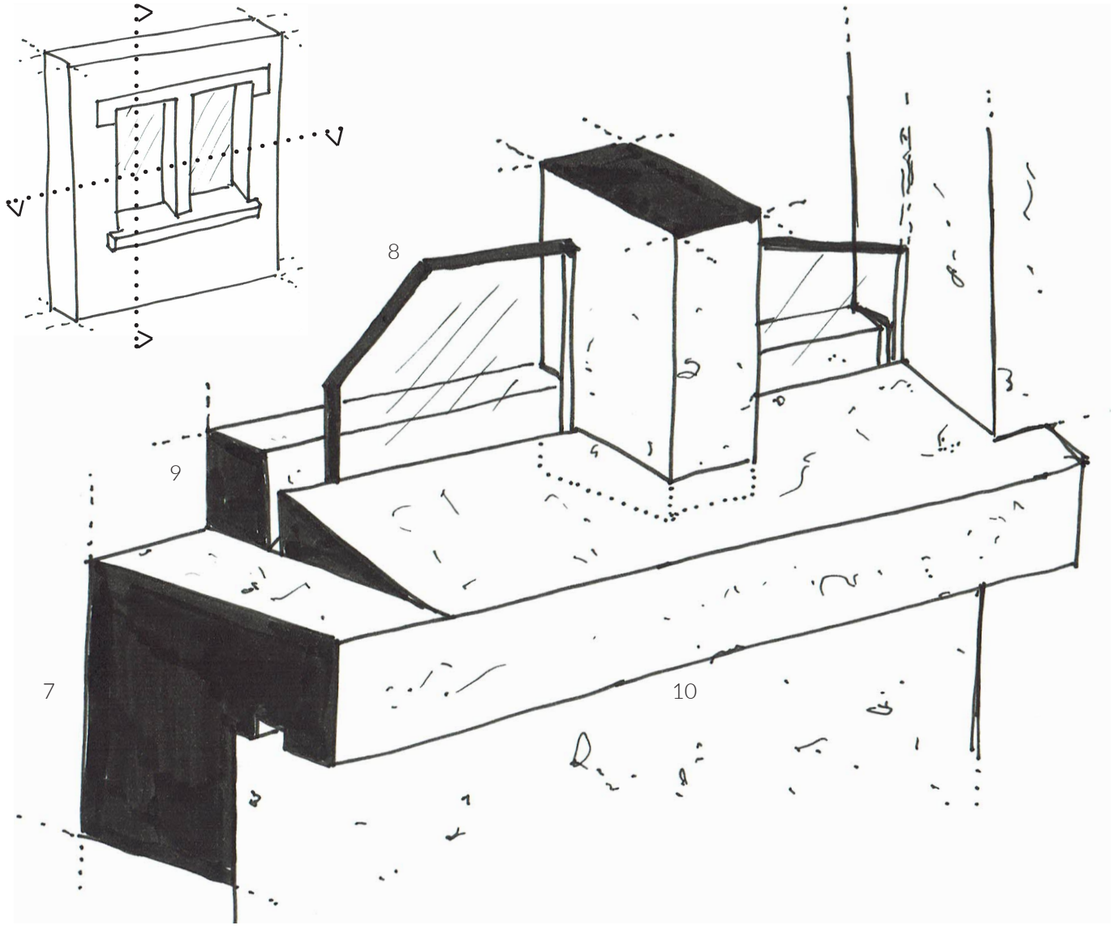


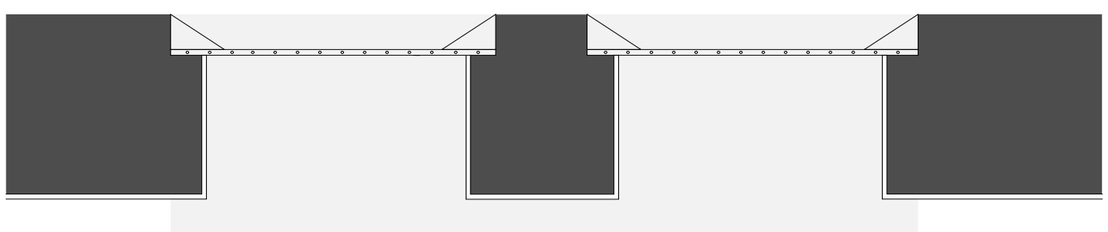


materialisation interior and main elements by joost van den berge

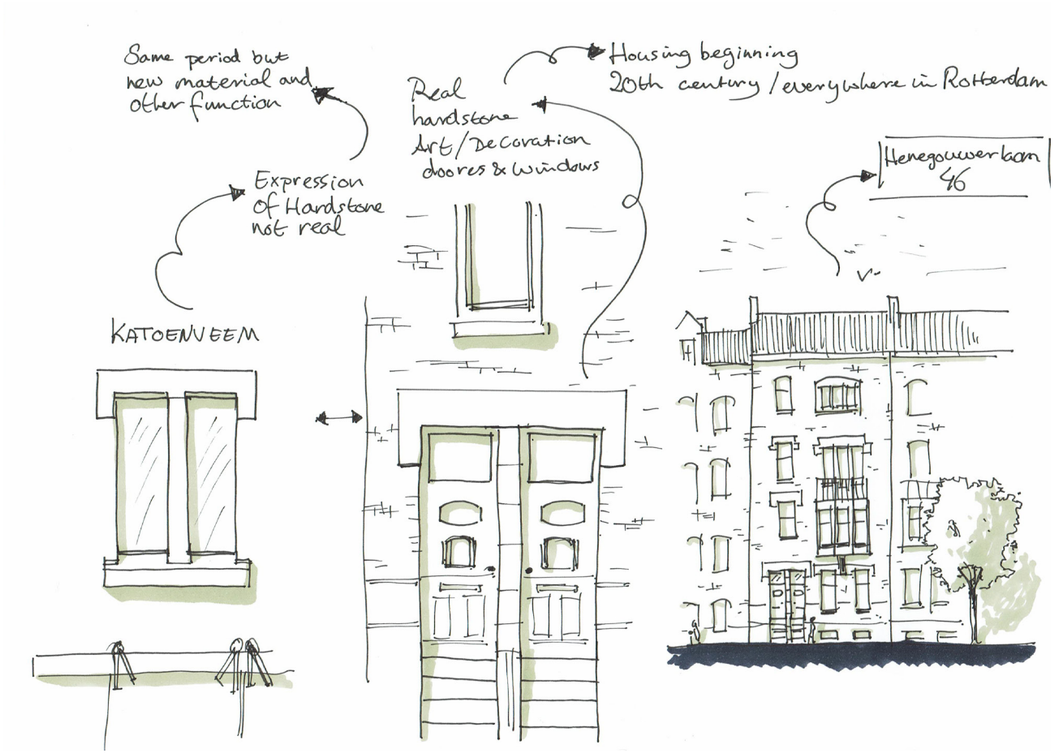
1. at the no.'s 1 you can see the loopkat or steel railtrack still in good shape - 2. at no. 2 you can see the large concrete columns, in sometimes unfinished state but mostly painted or with painted finishing untill 2 meters from the floor - 3. here you can see the large concrete in situ seperation walls where the way of constructing by wooden castings is still clearly visible, sometimes the walls are painted white - 4. at no. 4 the Kinnear iron curtain doors/roller doors are present - 5. no. 5 shows the iron balustrades present along the gallery's - 6. here the in situ concrete beams which connect columns and walls are visible, also painted white at some spots - 7. at no. 7 you can see the gallery's with the small concrete beams - 8. the last number shows the inside of the steel doors which have quite large amounts of rust but are still in quite good condition







windows by joost van den berge
1. hole to suggest a lintel - 2. 10 mm sand cement layer - 3. sand cement sealing - 4. wired glass - 5. profiled concrete window sill - 6. water cutting hole
The window frames are built in one piece on the construction site, and poored into the concrete wall.
A remarkable detail is the suggestion of a lintel in het façade (see details and next page). The windows have wireframed glass, probably to prevent a fire transfer to another cornpartment.
construction principle: 7. first step: create window opening - 8. second step: placement wired glass - 9. third step: fixation glass sand cement sealing - 10. last step: addition sand cement layer



Katoenveem window decoration lintel study by joost van den berge

roof decoration study by joost van den berge

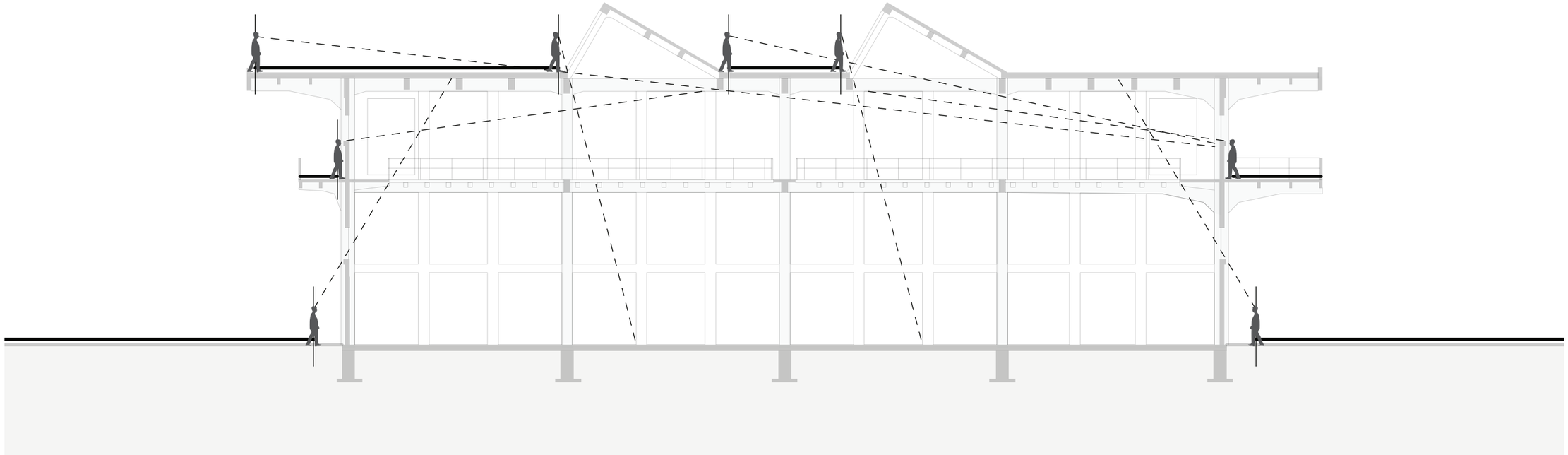
ARTISTIC EXPRESSIONS

On the left illustration and study you can see that the decoration lines around the windows are a reference to the housing architecture in the beginning of the 20th century in Rotterdam. Many houses in Rotterdam around this time received and possessed hardstone lintels and ornaments as decoration around the windows and doorways. This fashionable element at the time was used at the Katoenveem building too by it's architect but not by using hardstone or a real lintel (more expensive) but by making strategic holes in the same form in the concrete structure around the windows.

In the right illustration you can see that there are still traces of the original steel roof sign which was built on a decorated side of the centered roof skylight. The steel sign which said: Katoenveem has been removed long ago but the spot is still visible on the roof by showing a distinguished concrete structure and traces of steel connections together with a small concrete slab.

TRANSPARENCY

This chapter will take a look at the transparency of the facade by looking at sight lines and sunlight. Views from both the exterior and interior are analysed, as well as sunlight during the summer and winter time. The aim of this chapter is to discover the degree of transparency of the facade and the reasons behind this.



exterior - interior vision by Jan Huis in 't Veld
(own illustration)

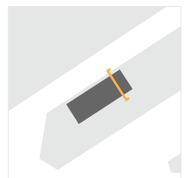
WHY?
What is the visual relationship between the in- and exterior of the Katoenveem?

HOW?
By looking at the visual lines within the Katoenveem at eye-level areas of sight can be distinguished.

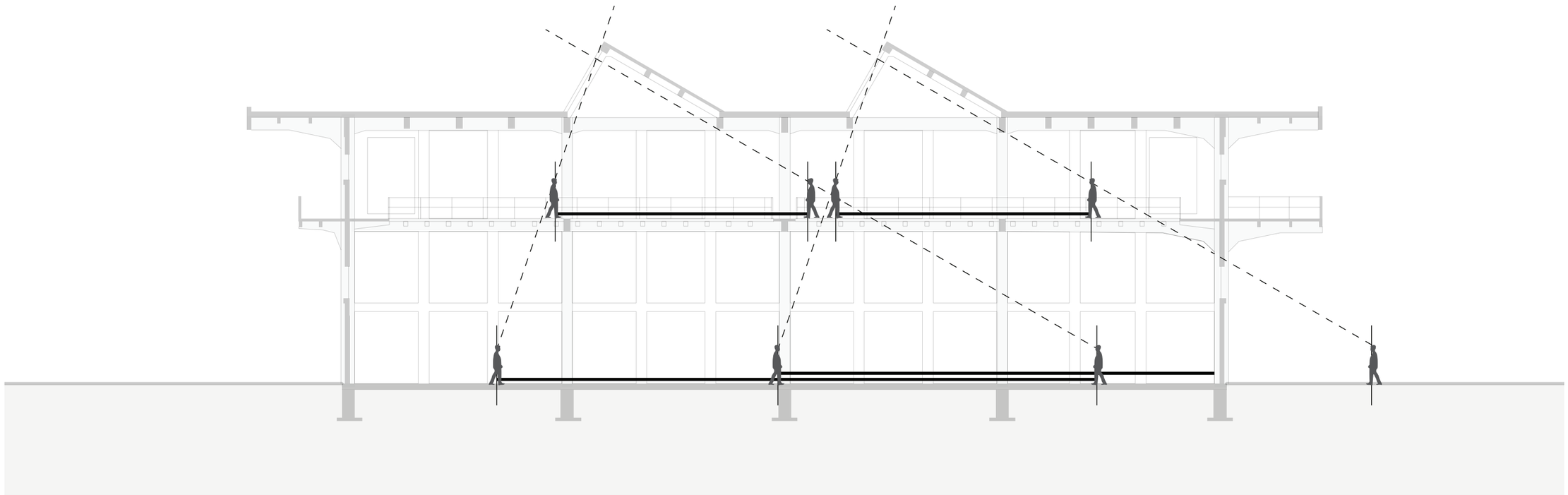
IN- AND OUTSIDE
Because the height of the windows and the position of the roof lights there is limited visual connection between the interior and the exterior of the building. These drawings provide an insight in the possible visual relationships. The areas of the ground-, first-, and second floor (roof) from which visual penetration of the skin is possible are marked in these 3 illustrations. While these areas appear to be quite vast, the lines of sight that have been illustrated show that the views are almost always very limited due to different constructional elements of the Katoenveem. Windows are never on eye-level, therefore the ground floor is only visible by looking through the roof lights. When outside the building only the ceiling and its construction are visible. This aspect works in reverse as well; the sky and construction elements of the balustrades are the only thing that can be viewed from the inside. Only by opening doors this in-, outside connection can be enhanced at the present time.

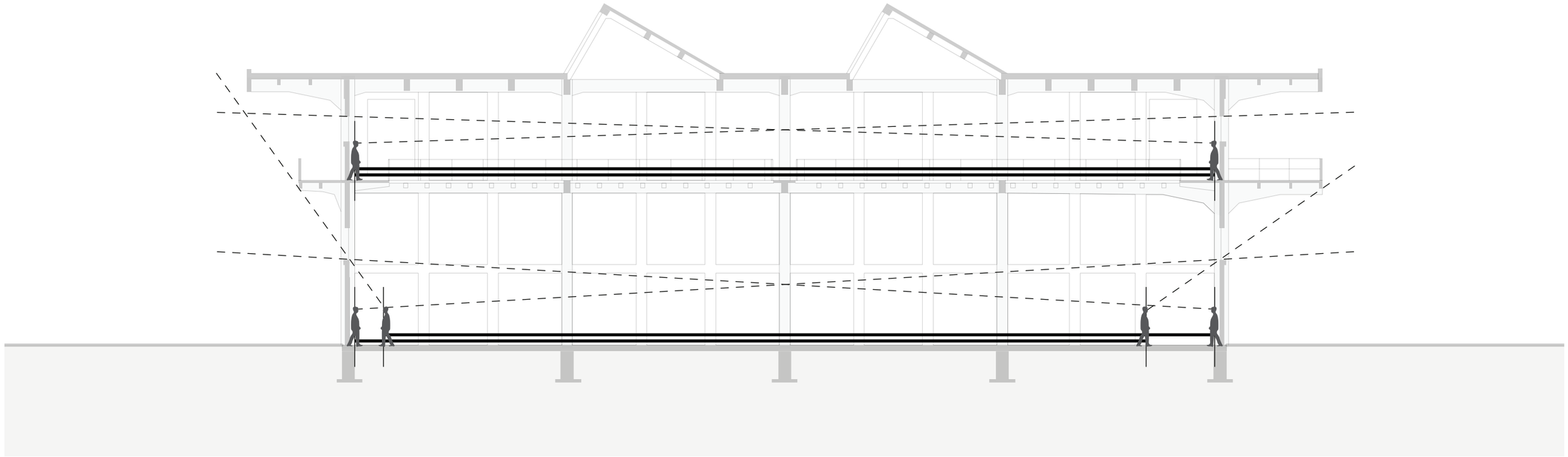
IN- AND EXTERIOR VISION

– single vision area
= double vision area
- - visual line



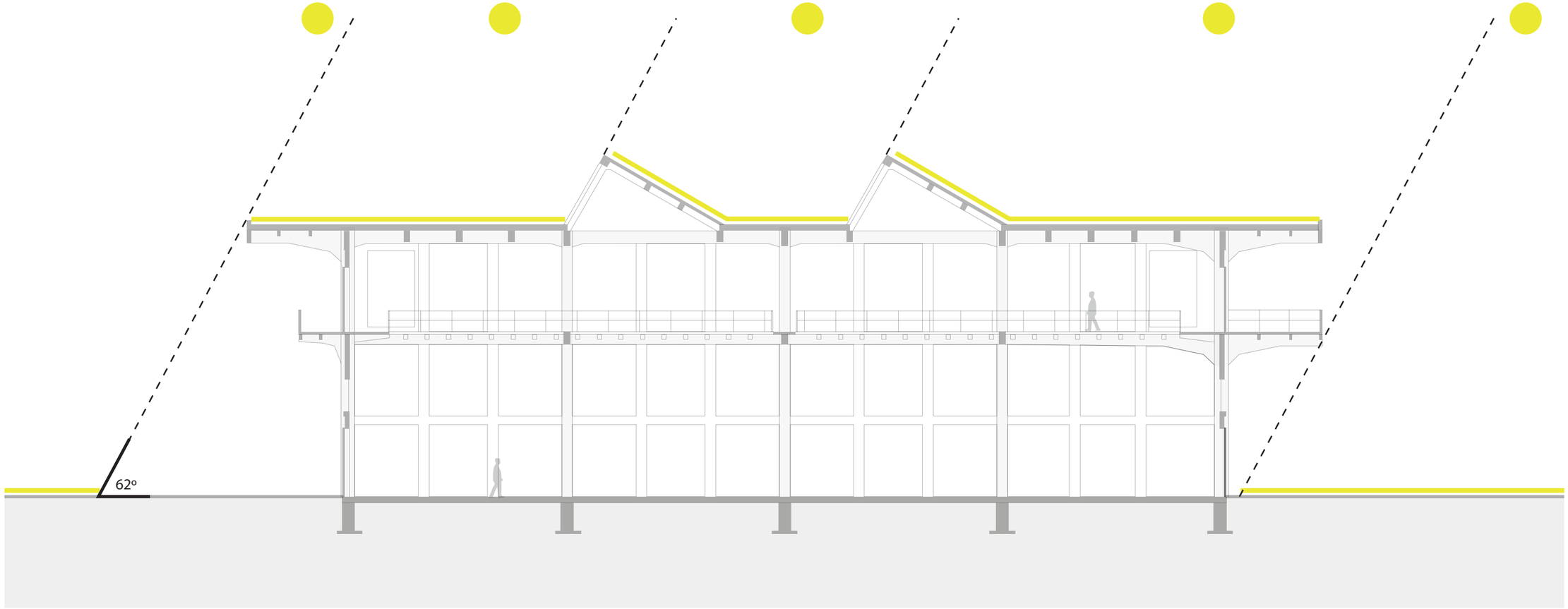
1:200





interior - exterior vision 1,2 by Jan Huis in 't Veld
(own illustration)

1:200



summer sun by Jan Huis in 't Veld
(own illustration)

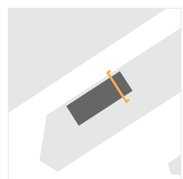
WHY?
How does the sun enter the building during the winter and the summer?

HOW?
By looking at the maximum angle of the sun in both times of the year.

SOLAR EXPOSURE
Both the roof lights and the balustrades have been positioned in such a way that the cotton is protected from the elements and agreeable climate is achieved. In the summer no direct sun light is permitted to enter the building. The roof lights are orientated to the north/north-west, preventing the sun to enter through the roof all year round. It was designed this way because sun light can be damaging to cotton if it is exposed for to long a period of time. Of course indirect light is still permitted to enter through the roof lights. The windows in the roof are almost completely parallel to the maximum angle of the sun rays in the summer. During the winter however the sun is permitted to travel through the building almost entirely. The winter sun, at a maximum angle of 14°, travels almost precisely to the wall on the other side of the Katoenveem. In an empty Katoenveem to be more exact. These images provide an insight in the possibilities of the sun and the way the sun is used in the current situation.

SUMMER- AND WINTER SUN

- - solar direction
▬ area touched by sun



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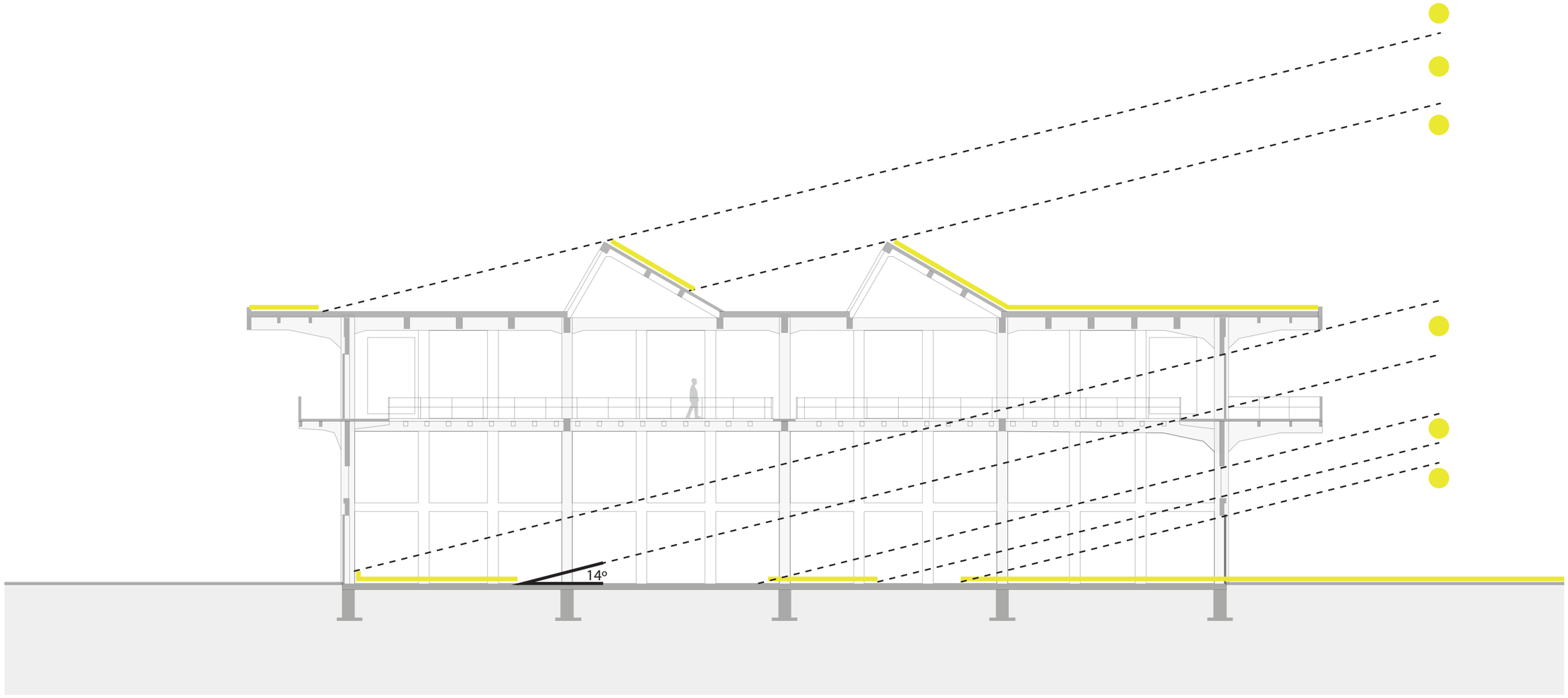
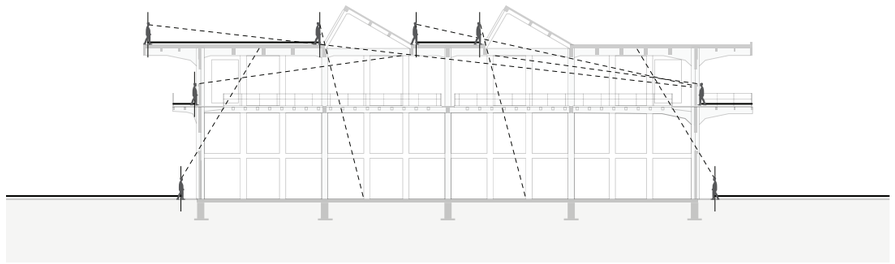
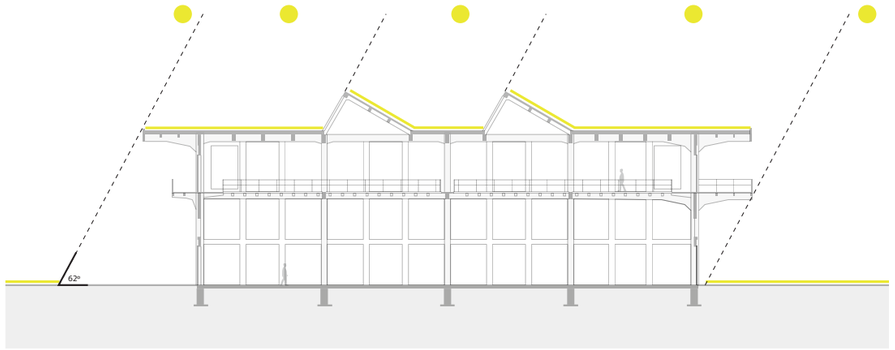
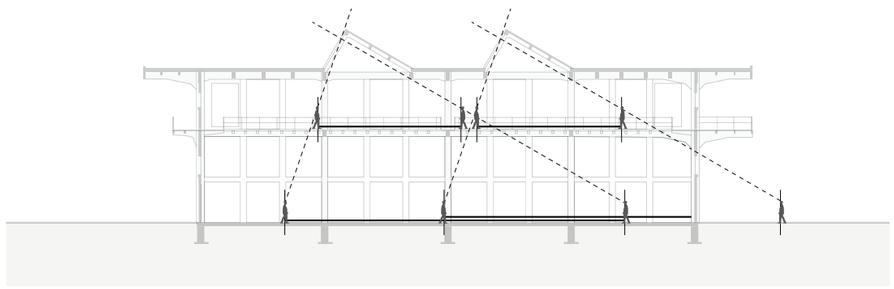


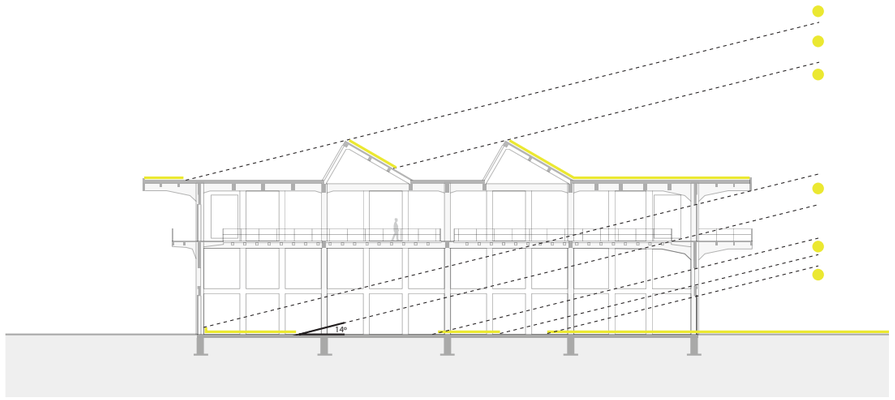
winter sun by Jan Huis in 't Veld
(own illustration)

1:200





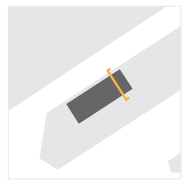




transparency schemes by Jan Huis in 't Veld
(own illustration)

CONCLUSION

The skin of the Katoenveem is designed in such a way that transparency is limited. Only select parts of the building can be looked out of / in to. A building like the Katoenveem is not designed to accommodate great views. The building is designed purely to store cotton and to work, the openings in the facade are a representation of this fact. The penetration of sunlight is also limited. In the summer direct sunlight is blocked from entering the building, due to the northern skylights. In the winter sunlight can enter the building. This is done to create a climate that suits the functionality of



1:500

BUILDING STRUCTURE

In this chapter the building technologies including structure, services, and surfaces (and their damages) will be carefully analysed in relation to the original function of the building - the storage and transpoetation of cotton.

fig1.Bird's view of Katoenveem and the choice of compartment for structural analysis.

source of image: bing maps

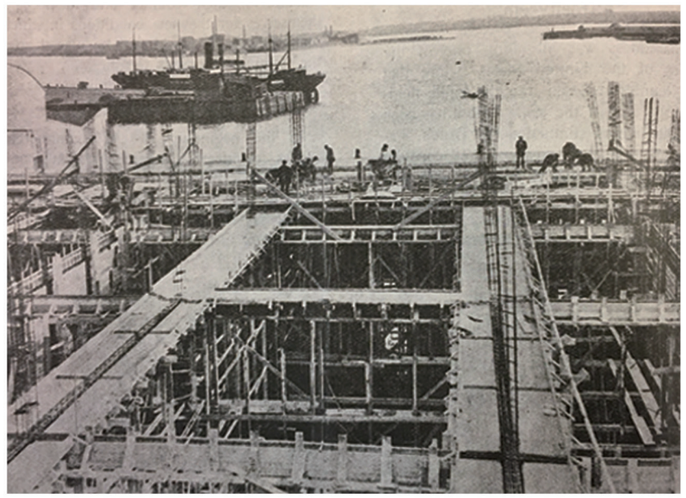


fig2. Building in construction. The use of reinforced concrete and wood moulds are visible in the photo.

fig3. Interior appearance of the grid structure. The structure is over-human-scale.

Drawings by Xihao Yi
(Source: fig1- bing maps
fig2 -H.H. Van Dam, 'The Cotton Warehouse of Katoenveem', The pioneer For the Shipping and Trade of the Nethetlands and Her Colonies (1919),p66
fig3 - own illustration

WHY?
To understand the general idea of the structure.

HOW?
-field investigation
-study the Building Report
-study relevant archives

STRUCTURE IN GENERAL

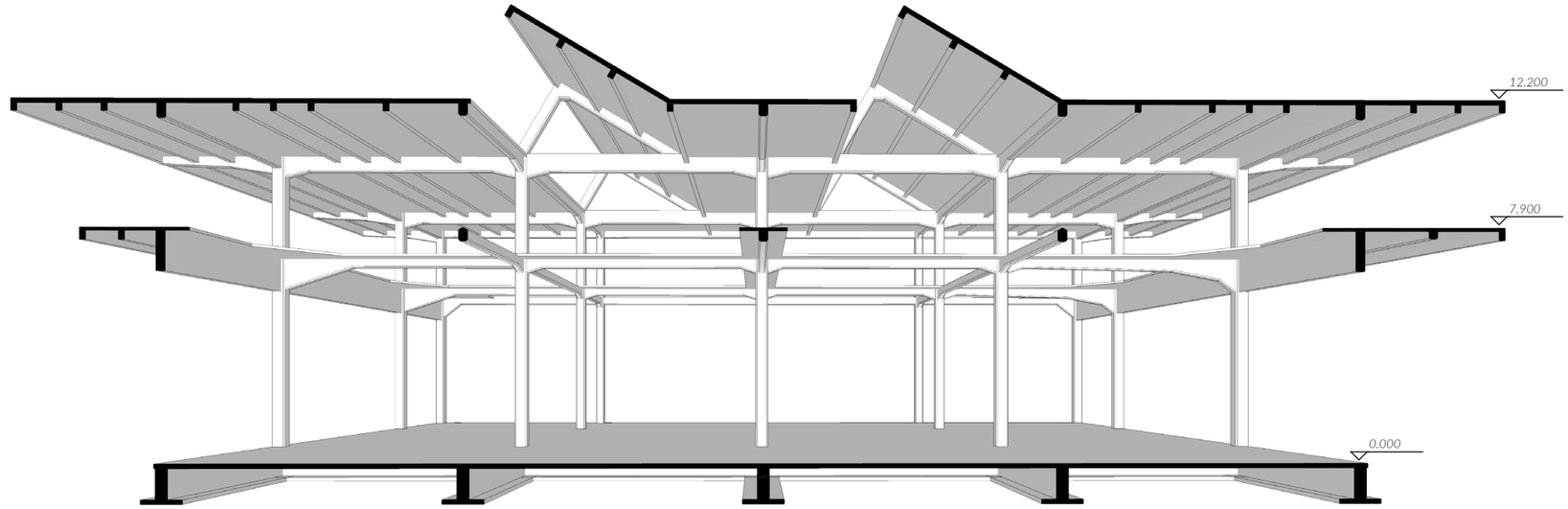
The structural method of Katoenveem is a crystallized way of the Hennebique system. There is a separate page for the system in our report.

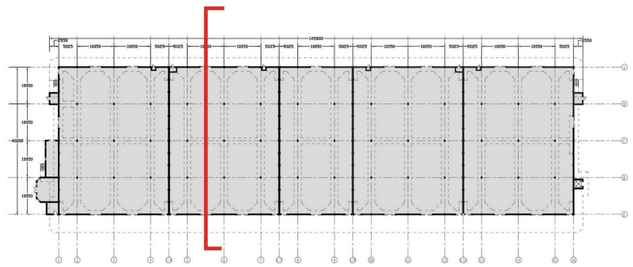
It is believed that the architect JJ Kanters has known the method since the St. Jobsveem(1912-14). In any case, he could use the calculations of The revised Reinforced Concrete Regulations(1918). Due to the improved understanding of the material, it was possible to allow twenty percent higher voltages in the concrete comparing to the standard of 1912, which led to the thin structure in Katoenveem.[1]

The building consists of 5 compartments, of which four of them are basically the same dimension in main structure. The smaller compartment, which is in the middle, has one fewer span in width. Therefore, we decided to take compartment-D as our object of analysis.

The building is approximately 146m x 50 m in total. The dimensions of the compartment-D is shown in the drawing above.

1:**M. Enderman and R. Stewart, Bouwhistorische Verkenning Katoenveem, Keilestraat 39 Rotterdam,Utrecht(2005),p12**





Cross section-perspective

Drawings by Xihao Yi
(own model and illustration)

WHY?
To understand the general idea of the structure.

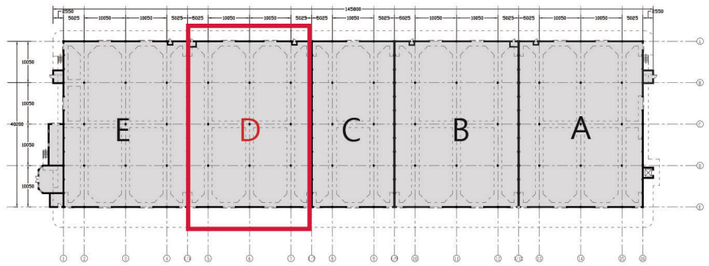
HOW?
-field investigation
-study the Building Report
-study relevant archives

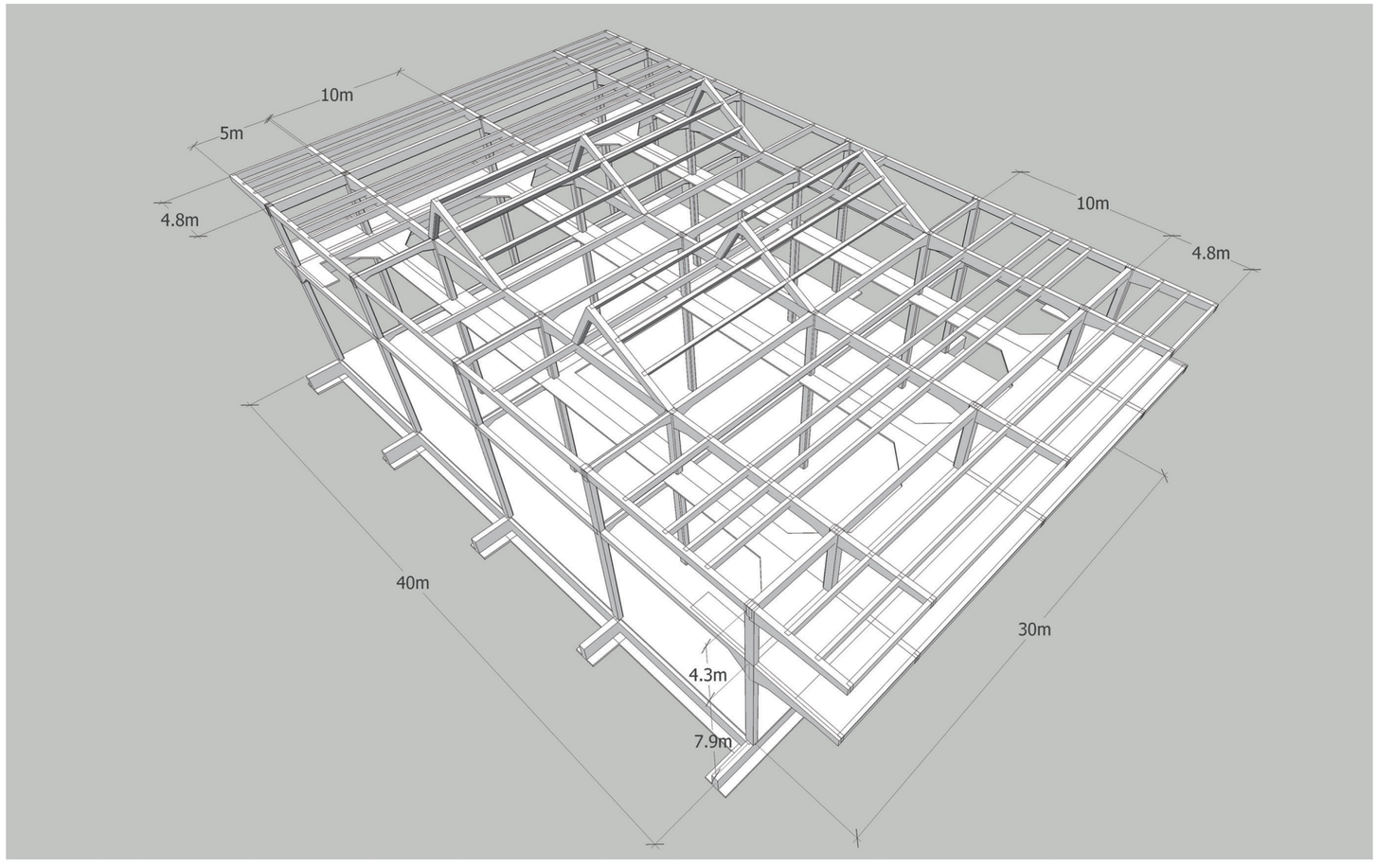
STRUCTURE IN GENERAL

The monolith structure consists of all parts of the building, including foundation, columns, beams, floors, roof, and cantilever balconies. Further analysis on each part will be carried out in the following pages.

The structure is economic and function-oriented, for very little decoration can be found in the building, and every aspect of the structure is related to the storage and transportation of the cotton.

The drawing above shows the tall space and walkways in the middle of the building which the structure enclosed.





Perspective view of the structure of a compartment

Drawings by Xihao Yi
(own model and illustration)

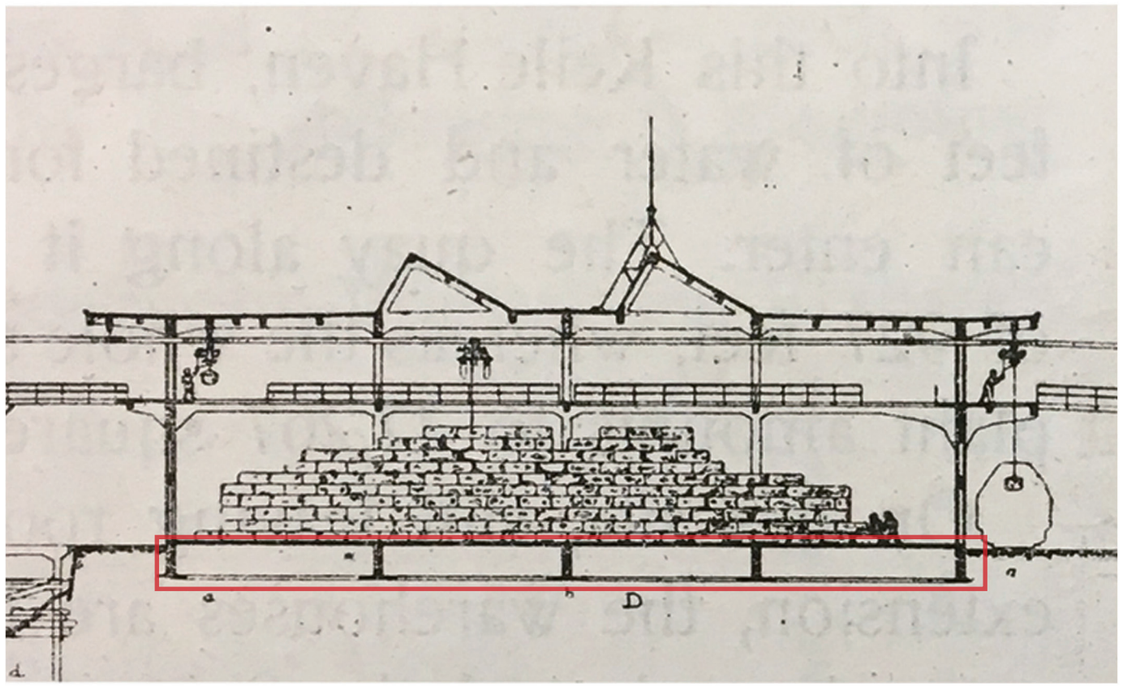


fig1. Foundation shown in section(historical drawing).

Heavy piles of cotton were placed in the Katoenveem.

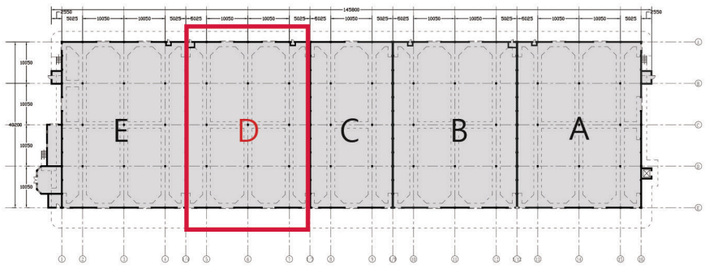
Drawings by Xihao Yi
(source:fig1- H.H. Van Dam, 'The Cotton Warehouse of Katoenveem', The pioneer For the Shipping and Trade of the Nethetlands and Her Colonies (1919),p66
fig2- M. Enderman and R. Stewart, Bouwhistorische Verkenning Katoenveem, Keilestraat 39 Rotterdam,Utrecht(2005),fig1c)

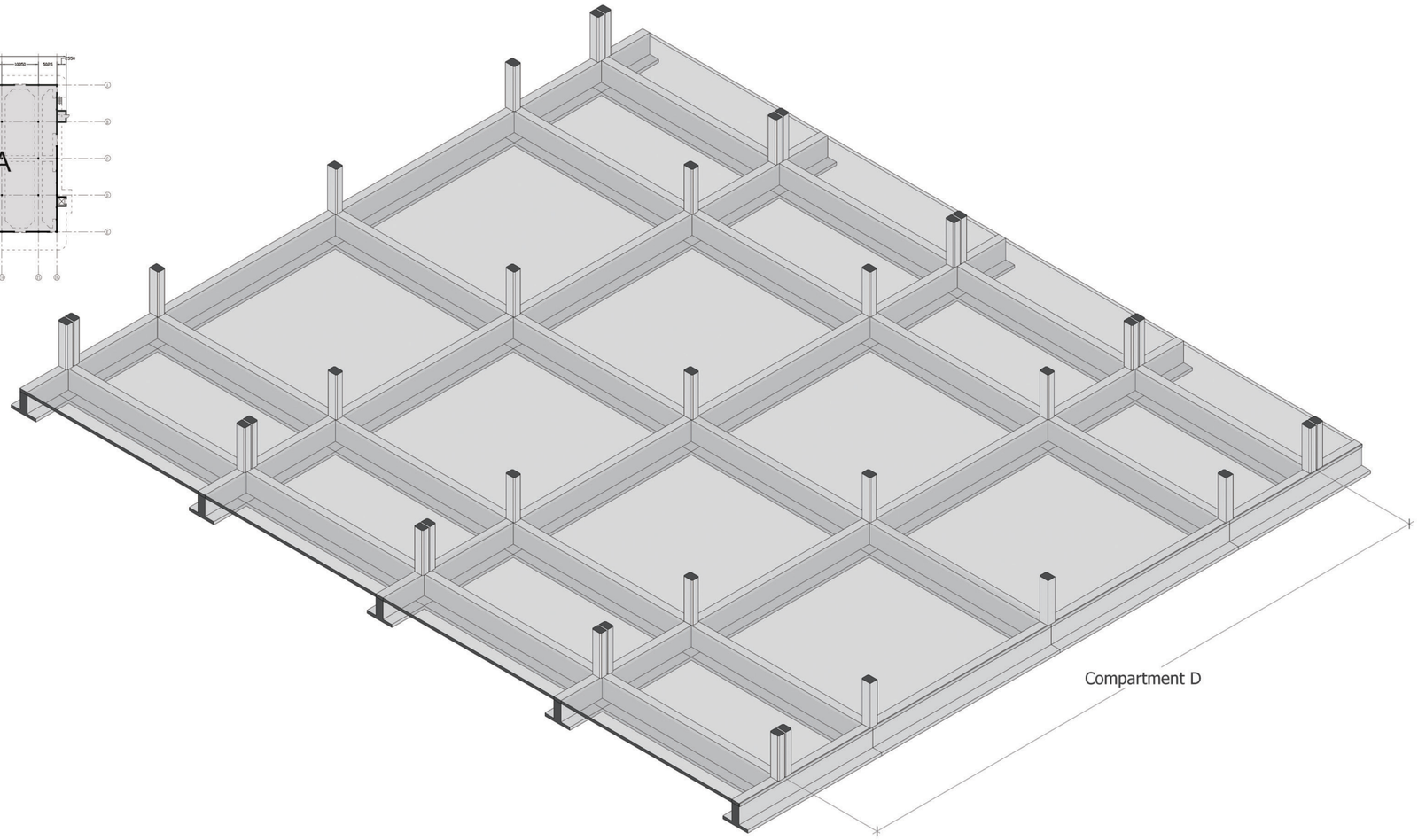
WHY?
To research the foundation of the building.

HOW?
-study historical drawings

FOUNDATION

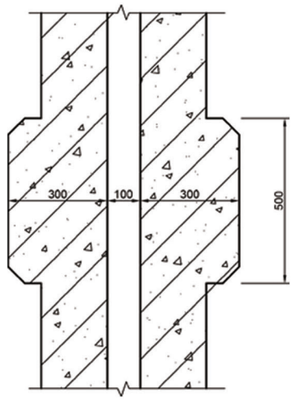
The foundation is a type without piles,with a cross section of up-side-down "T" shape. The 10m x 10m grid foudation is placed on the hard sand layer of the pier.The columns and the ground floor is directly sustained by this foundation
This foundation can be compared with thefoundation of the Santos storage building in Rotterdam, which was also designed by architect JJ Kanters.



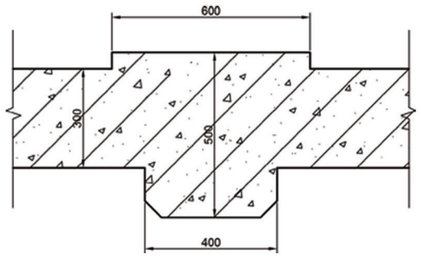


Axnometric view of foundation

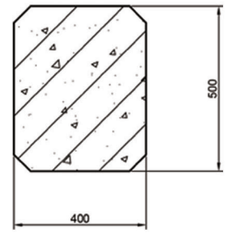
Drawings by Xihao Yi
(own model and illustration)



compartment wall columns
(colored in red)



outer wall columns
(colored in yellow)



free standing interior columns
(colored in blue)

Drawings by Xihao Yi
(own illustrations)

WHY?
To study the vertical load-bearing columns and their typical types.

HOW?
-field inverstigation
-study the Building Report

COLUMNS

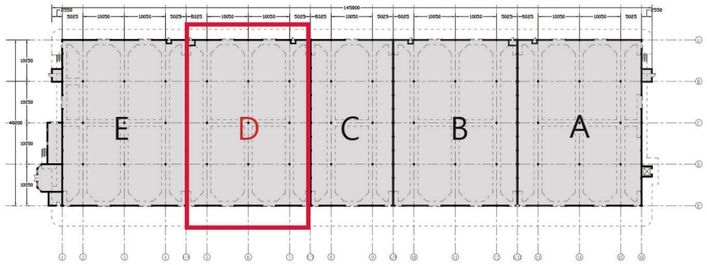
The columns in the builidng are thin, comparing to their height. The width/height ratio is lower than 1/20. All corners of the columns in the interior has a chamfering surface, while the corners on the outside are 90 degrees. This is for the protection against the abrasions of the cotton bales.

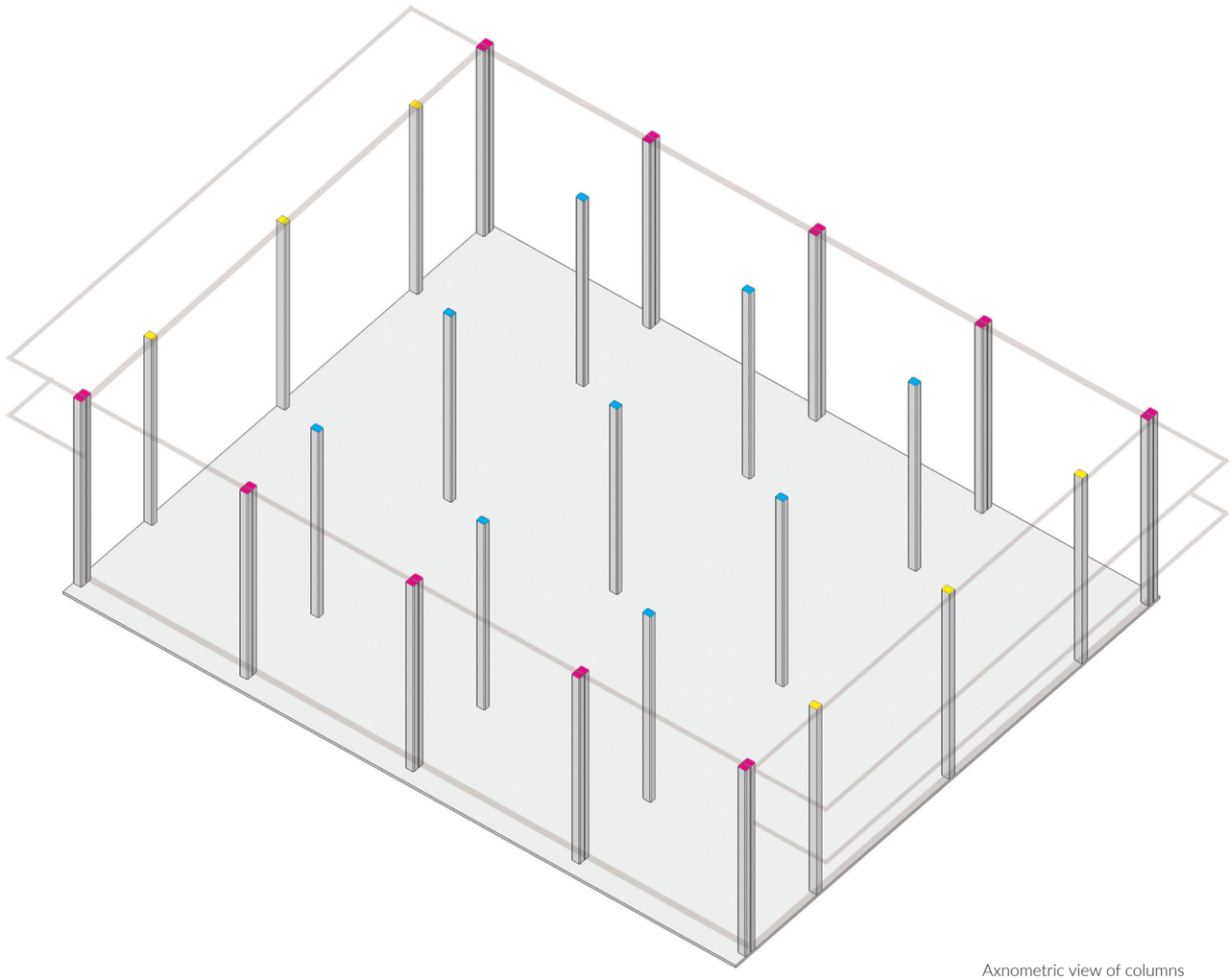
There are three typical kinds of columns in the building: the compartment wall column, the outer wall column and the free standing column.

The compartment wall columns always appear in a pair, having a cavity between them. In a standard compartment, there are 10 columns of this kind.

The outerwall columns has a wider surface on the outside, which results in a repetitive rhythm on the elevations. There are 6 outer wall columns in a standard compartment.

The free standing columns are equaly distributed in the tall space. They defined the space without actually dividing it into parts. There are 9 of this kind in a compartment like compartment-D.





Axnometric view of columns

Drawings by Xihao Yi
(own model and illustration)

fig1. The walkway with secondary beams and steel hand rails.(marked in yellow)

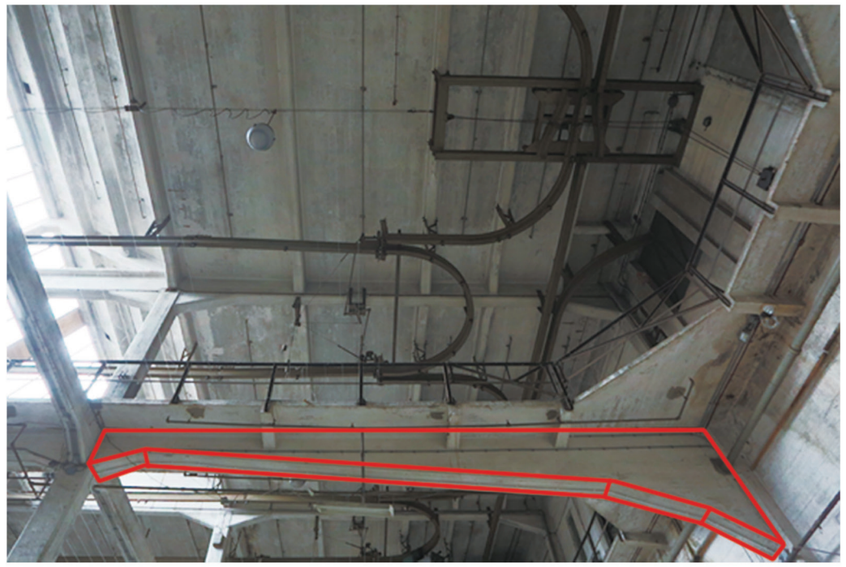


fig2. The big bracket on the 2nd beam from the south.(marked in blue)

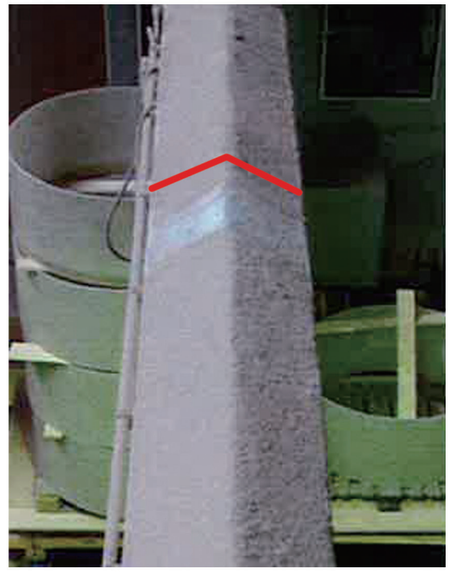


fig3. The sloped top surface of the beams without walk-ways on them.(marked in red)

Drawings by Xihao Yi
(source: fig1&2 - own illustrations
fig3 - R.Plevier,T. Adema, J.Hoope. Analysis and Value of Katoenveem , 2009,p34)

WHY?
To understand the structure of the 1st floor.

HOW?
-field investigations
-study photos

1F STRUCTURE

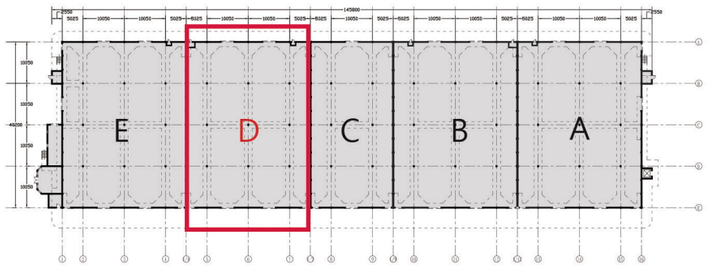
The 1F is for the workers to operate the conveyor system on the narrow walkways, therefore its load is the weights of the men. The height of the beams and the depth of the floor is thin because of this.

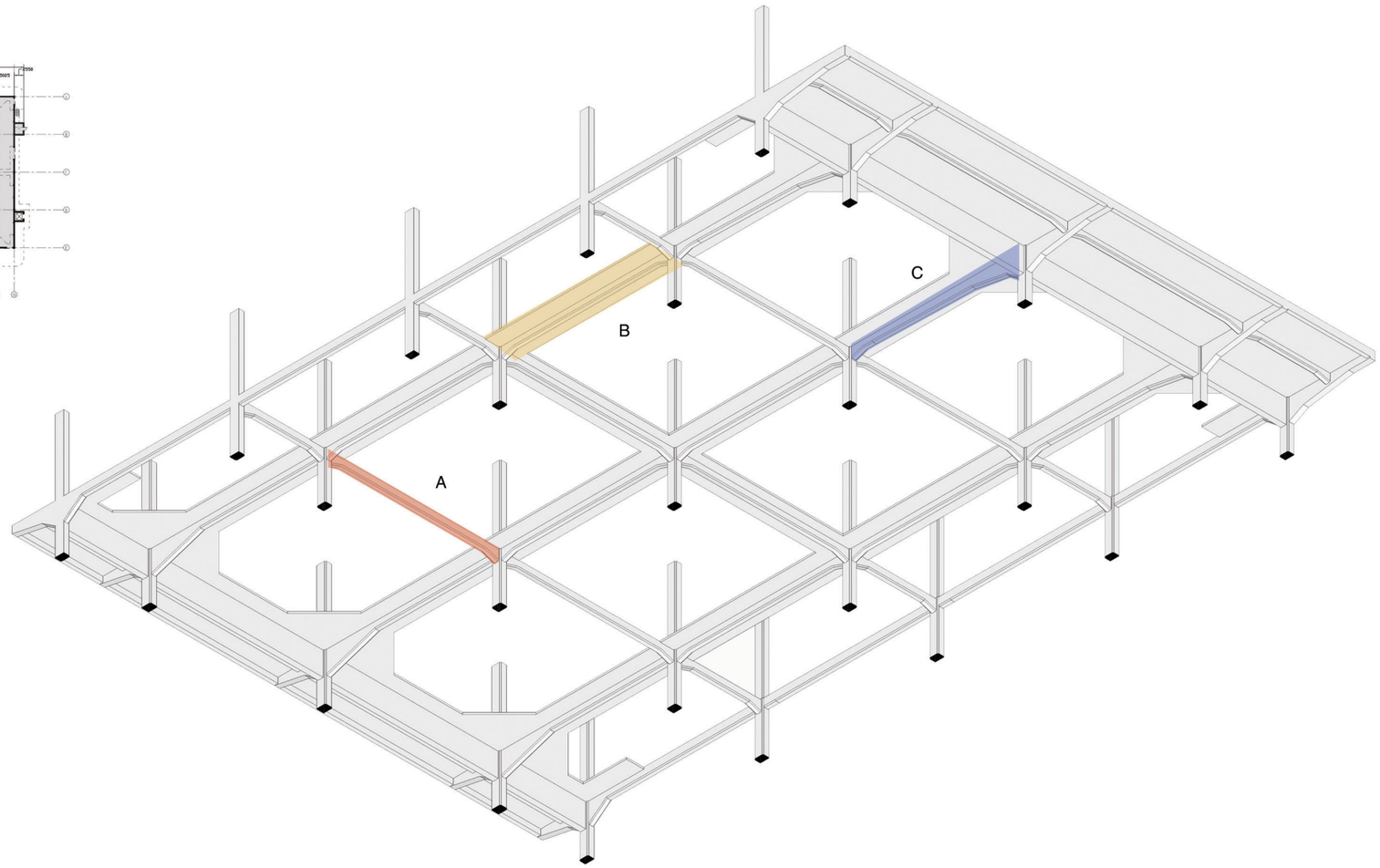
One of the typical structures on the 1F is the walkways shown on the top-left image. Two pairs of secondary beams are added for the installation of the steel hand rails.

Another one is the beams with big brackets on both south and north spans of the interior. These beams has strenghten the structure in its stiffness.\

The third one is the beams with a slope top surface.This is presumably done to prevent that it could be walked on the beam to tlhe other side of the void for safety reasons.[1] We suggest that it it can also prevent dust to some extrend.

1:M. Enderman and R. Stewart, Bouwhistorische Verkenning Katoenveem, Keilestraat 39 Rotterdam,Utrecht(2005),p15





upward axnometric view of 1F structure

Drawings by Xihao Yi
(own model and illustration)

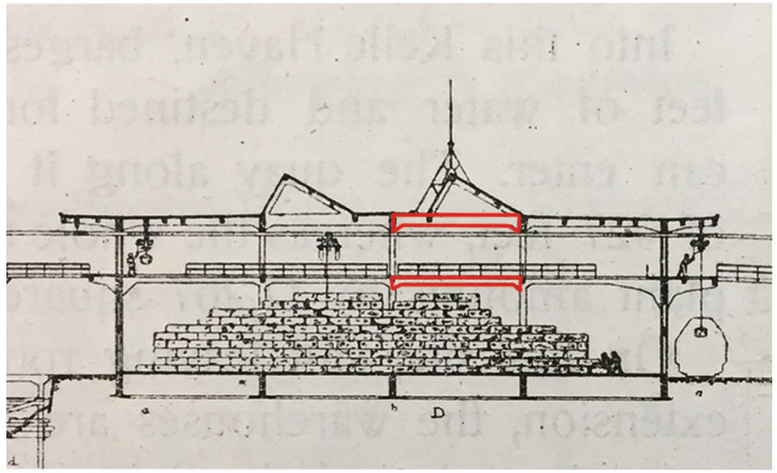


fig1. The height of roof beams is bigger than the 1f beams.

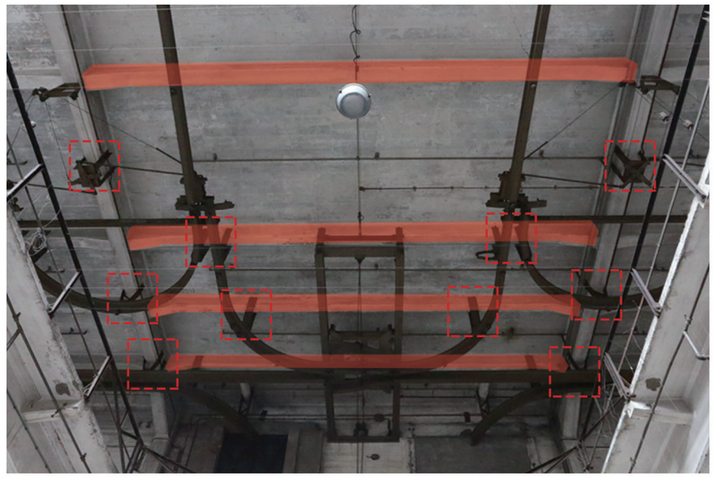


fig2. The additional smaller beams are designed for the loads of the conveyor system and cotton.(marked with “A”)

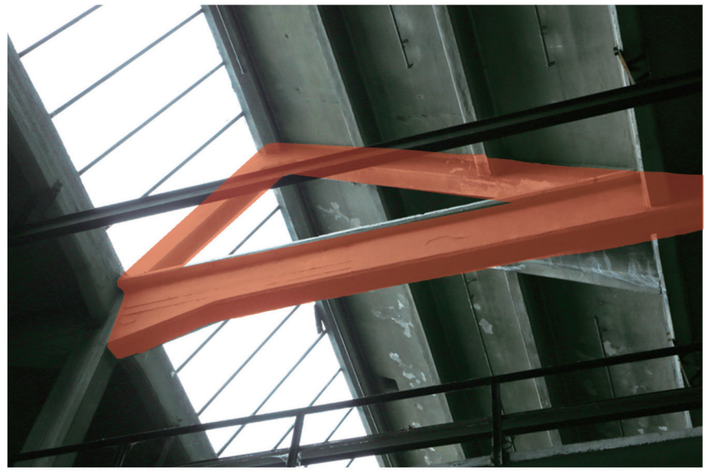


fig3. close-up look of the beams of the skylight.

Drawings by Xihao Yi
(source: fig1 - H.H. Van Dam, ‘The Cotton Warehouse of Katoenveem’, The pioneer For the Shipping and Trade of the Nethetlands and Her Colonies (1919),p70
fig2&3 - own illustrations)

WHY?
To understand the structure of the roof.

HOW?
-field investigation
-study relevant archives

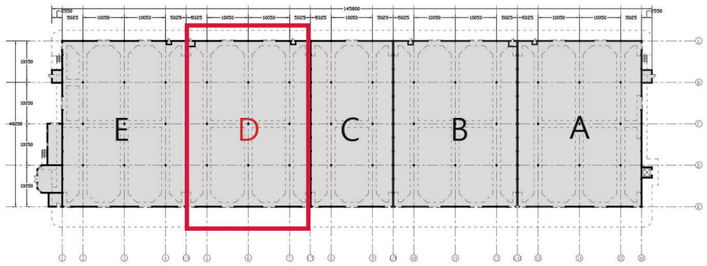
ROOF STRUCTURE

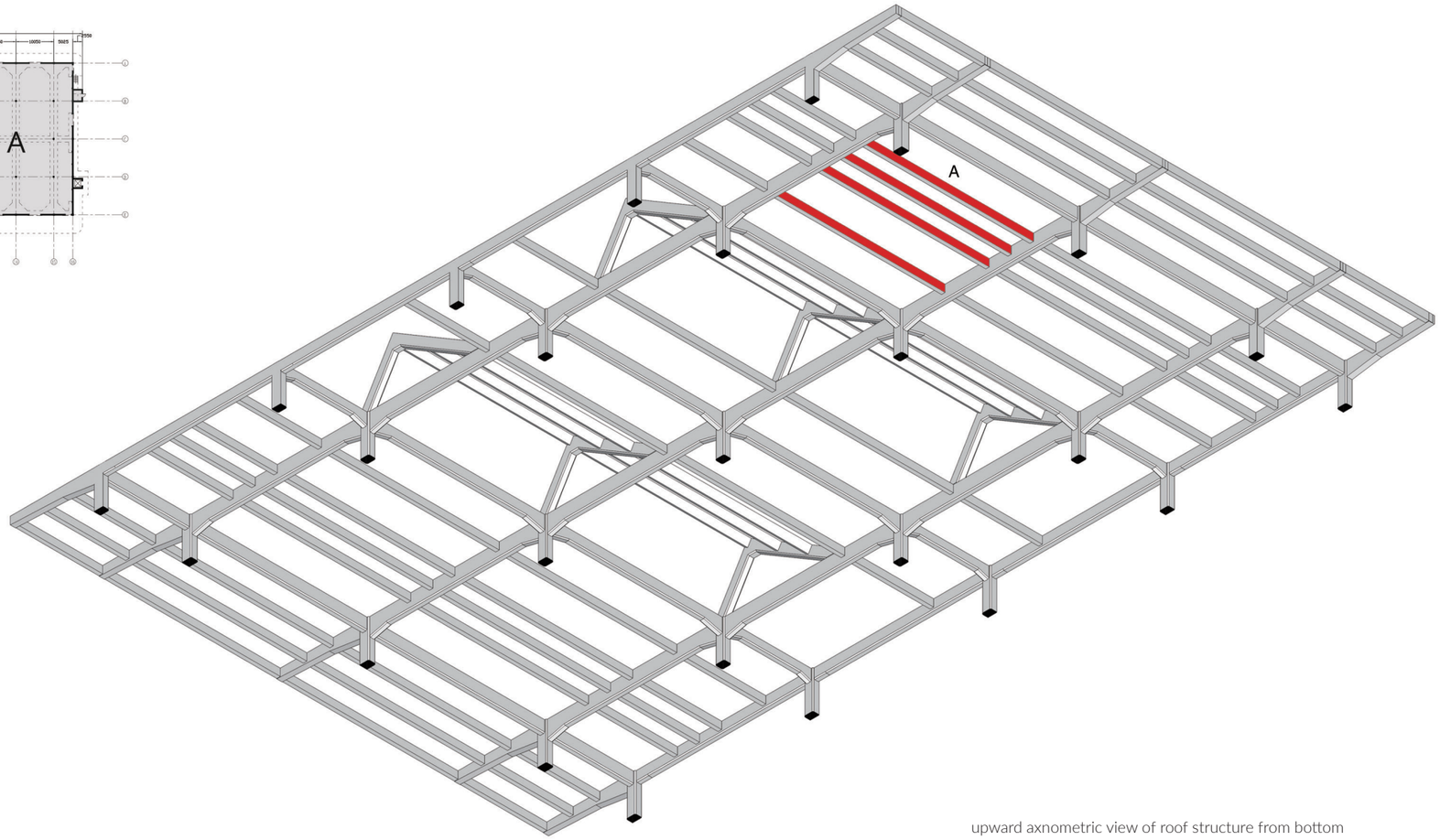
One very recognisable feature of the roof structure is the secondary beams. They are added for the load of the conveyer system that was directly installed on these beams, bringing extra loads to the roof structure.

Also for this reason, the main beams on the roof is significantly taller than those on the 1st floor. This is noticeable in the original section drawn by the architect himself.

The roof also has a function of natural lighting. The triangle truss structure for the big skylight windows has made it possible. There are secondary beams on the sloped surface as well, possibly because of the extra wind loads on them.

On the south and north side of the roof are the cantilever covers for the balconies. Both 4.8m-deep structure are sustained by the tappered beams .





upward axnometric view of roof structure from bottom

Drawings by Xihao Yi
(own model and illustration)

The compartment walls viewed from the interior

The dilatations of the compartments can be seen from the outside.

The cavity between compartment walls

Drawings by Xihao Yi
(own illustrations)

WHY?
To understand the structural and functional meaning of the dilatations and compartment walls.

HOW?
-field investigation
-study the Building Report

DILATATIONS AND COMPARTMENTS

The five separate compartments are placed on the continous foundation.

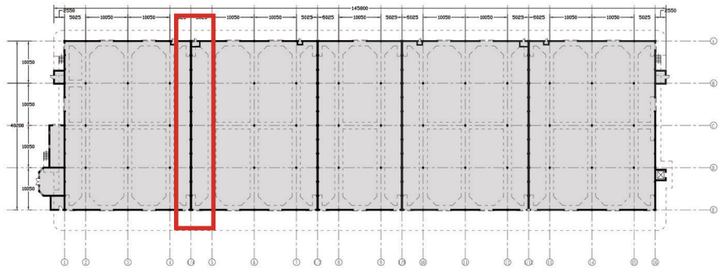
The compartments are separated from each other mainly to prevent the spread of fire within the cotton warehouse. There are additional ribs on the compartment walls, which has strengthen the the structure. The dimension of the ribs is smaller than the columns and beams.

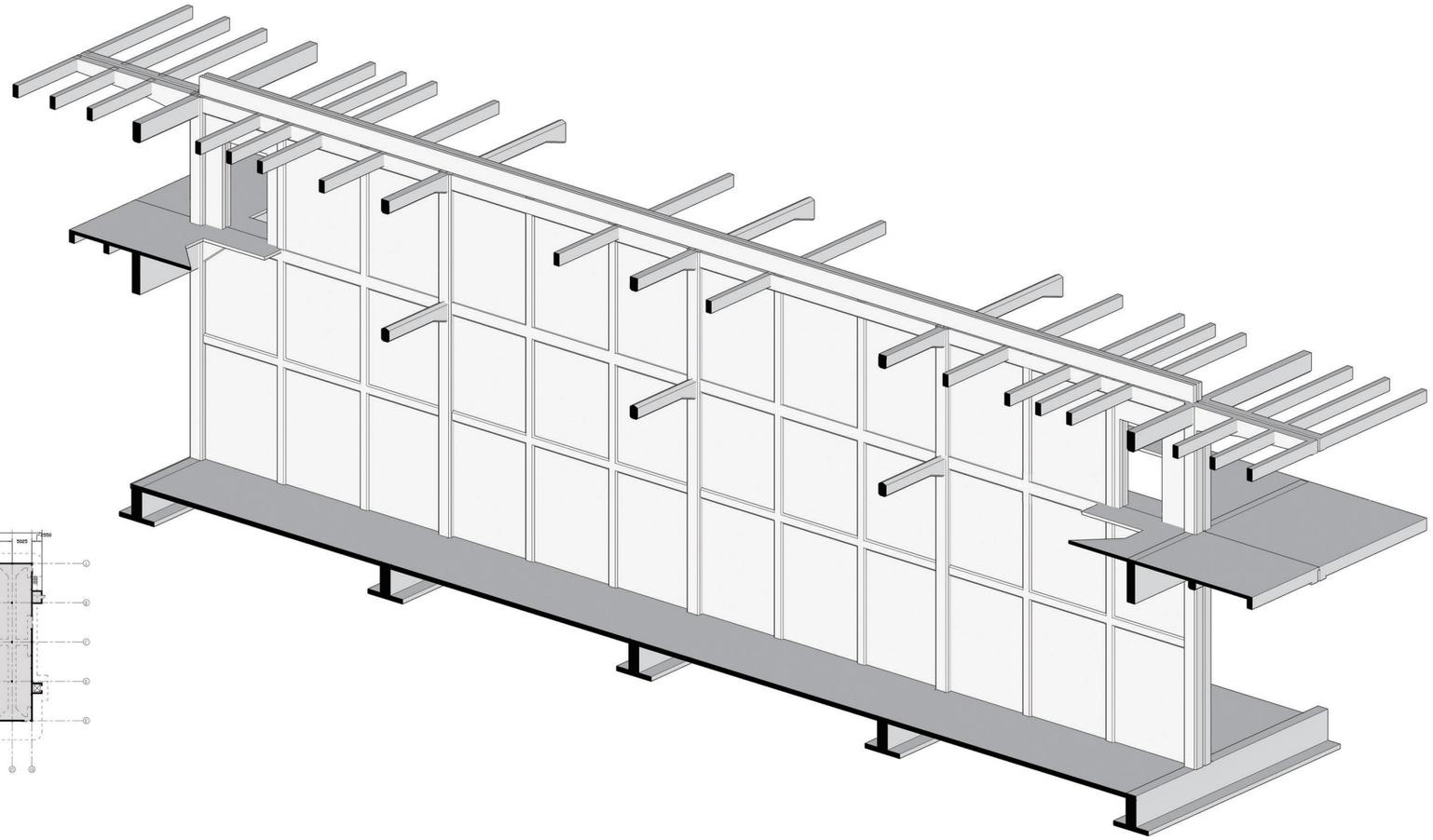
The two symmetrical openings on the compartment wall is for the conveyor system. It is reasonable to believe that these opening can be shut down in case of fire to stop it from spreading to the adjacent compartment.

The compartment walls continues on the roof. They are one meter higher than the roof surface, also for the prevension of fire.

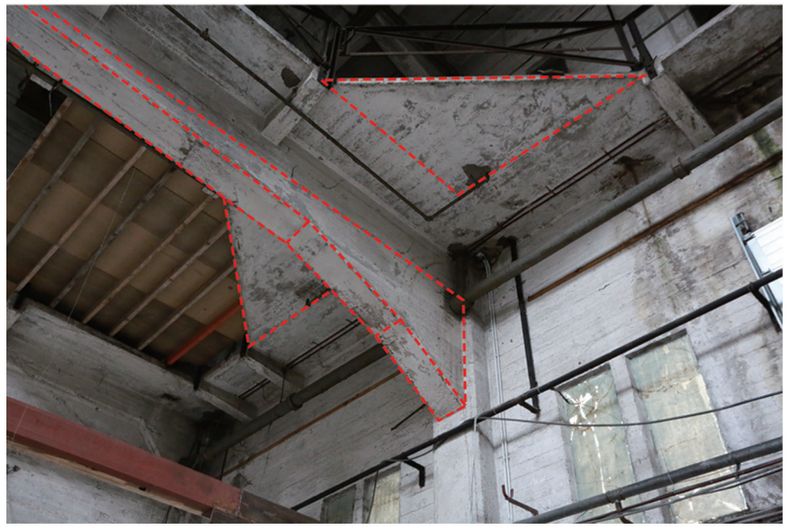
The other possible reason for the separation of the whole volume is to adapt to the thermal expansion and contraction.

Axnometric view of compartment wall

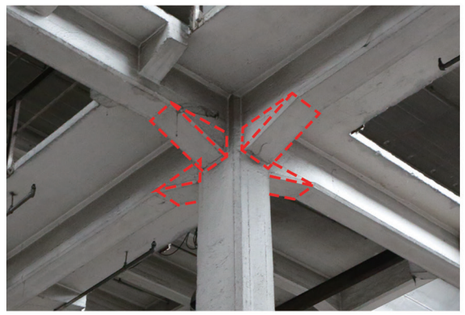




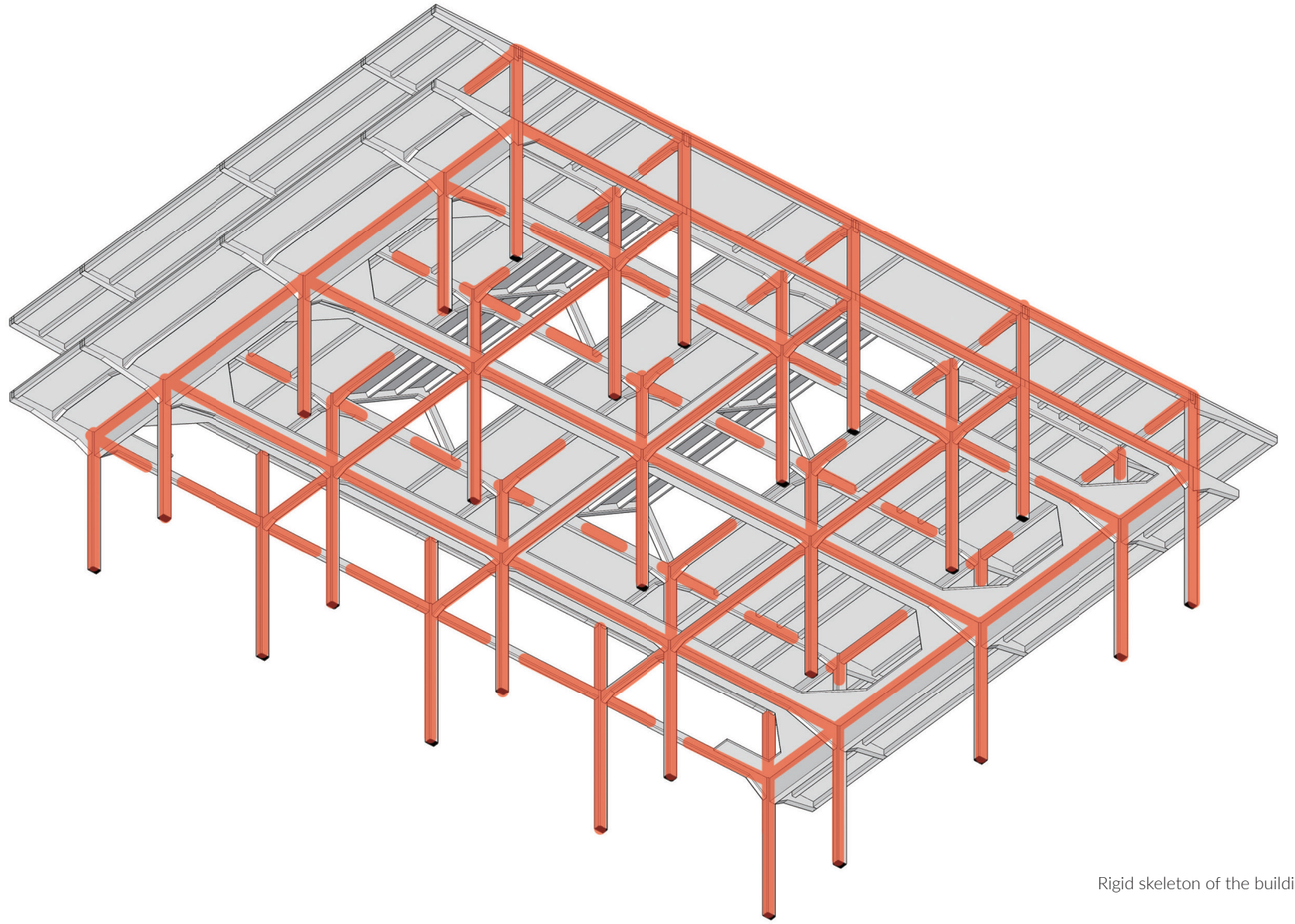
Drawings by Xihao Yi
(own model and illustration)



brackets of the beams and walkways



brackets of the beams



Rigid skeleton of the building

Drawings by Xihao Yi

WHY?
To find out how does the building achieve its siffness.

HOW?
-field investigation

STIFFNESS OF THE BUILDING

Because of the monolith connections among the different elements, e.g. beams, columns and walls, the structure can be seen as a stiff and stable skeleton.

The vertical stiffness of the building is strengthen by the brackets at the ends of beams, while the horizontal stiffness is enhanced by the diagonal surfaces at the corners of the walkways.

Yellow paint of the inner walls in section D

Raw concrete surface and white paints of the inner walls

Plaster and white paints on the outer surface of the walls

Drawings by Xihao Yi

WHY?
To define the types of walls within the building

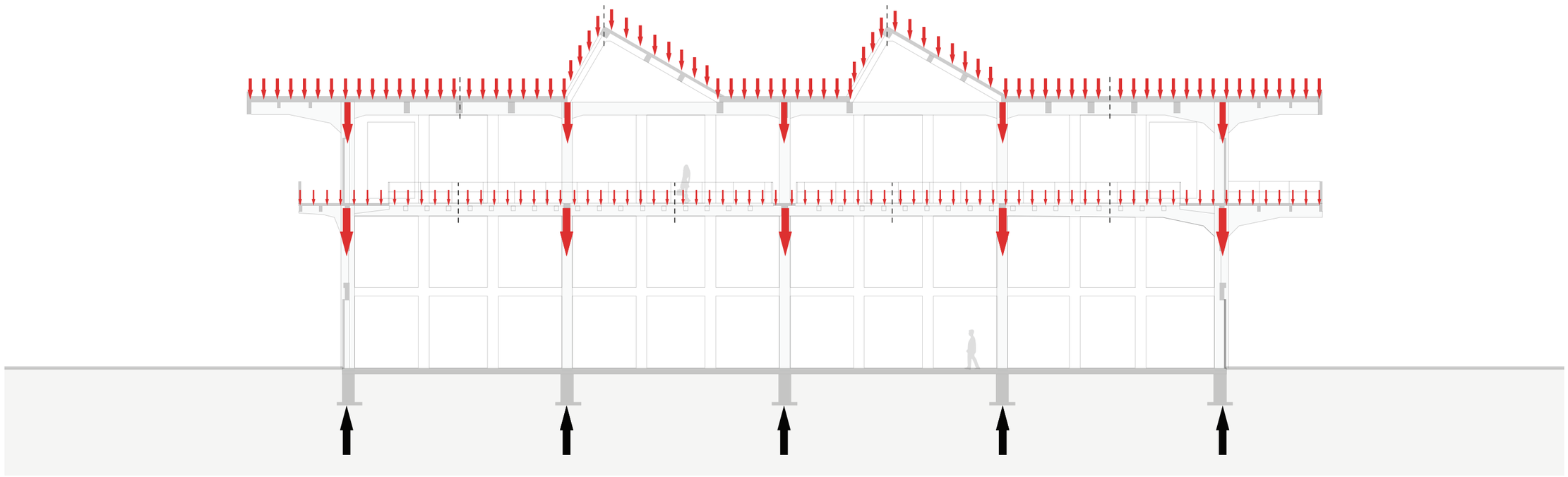
HOW?
-field investigation
-study the building report

INNER WALL AND OUTER WALLS

The walls of the building were constructed by wood molds, leaving apparent evidence on the inner surface of the building. This trace of wood mold has added sence of nature and human scale to this over-scale cotton ware-house.

The majority of the inner surface of the walls were left as raw concrete, while in the section D, the original yellow paint can still be found. In other sections, the lower part of the wall (0-3m), were painted white.

On the outside of the walls, the trace of wood molds is covered by plaster and white paints on top. The damgage and detail of the windows on the walls will be discussed as a separate topic in this report.



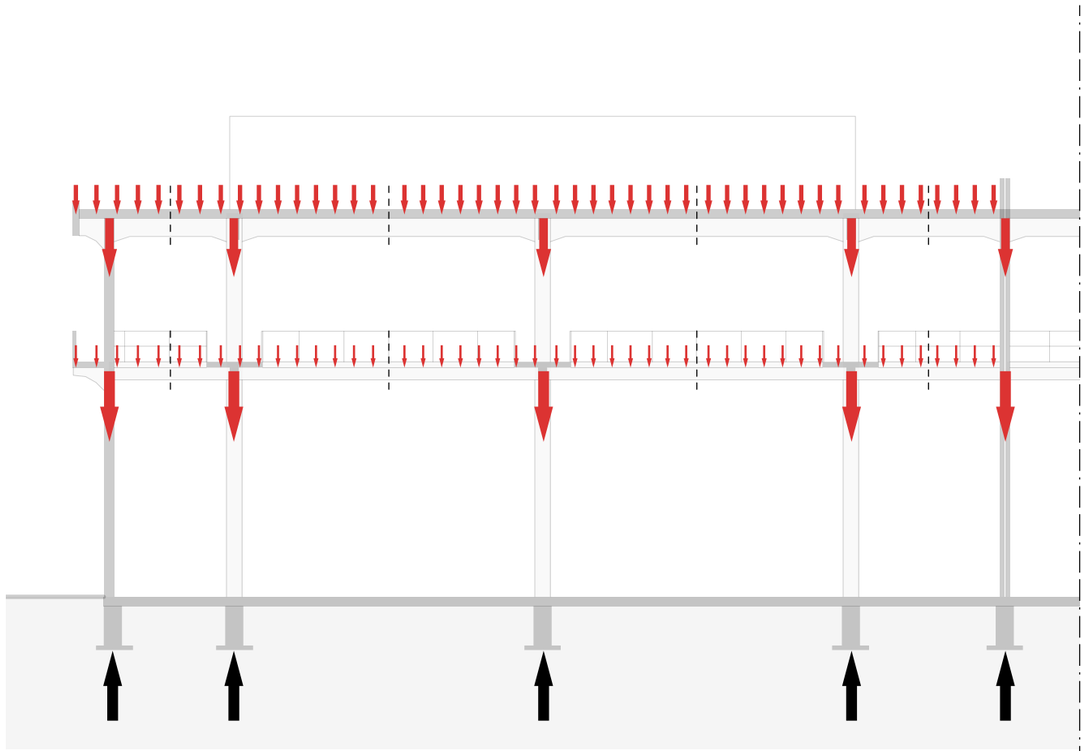
section AA vertical loads by Jan Huis in 't Veld
(own illustration)

WHY?
How are the vertical loads distributed through the building?

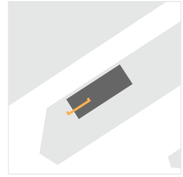
HOW?
By looking at the sections and following the forces of the roof, floors, beams and columns.

VERTICAL LOADS
In these sections the vertical load distribution through the building is displayed. The red arrows signify the forces on the building and the black arrows are a visualisation of the counter forces. The roof is much heavier than the first floor therefore the arrows have been thickened. The larger arrows are thicker at the first floor however, because the force of the floor is added to the weight of the roof structure. Throughout the building is the constructional rhythm is very consist; the forces are spread evenly through each columns, leading to the foundation. On the adjacent page only one portion of section BB is displayed, however the other 4 parts perform in exactly the same manner. The 5 parts each work separate from each other, because of the dilatations between them.

1:200



section BB vertical loads by Jan Huis in 't Veld
(own illustration)



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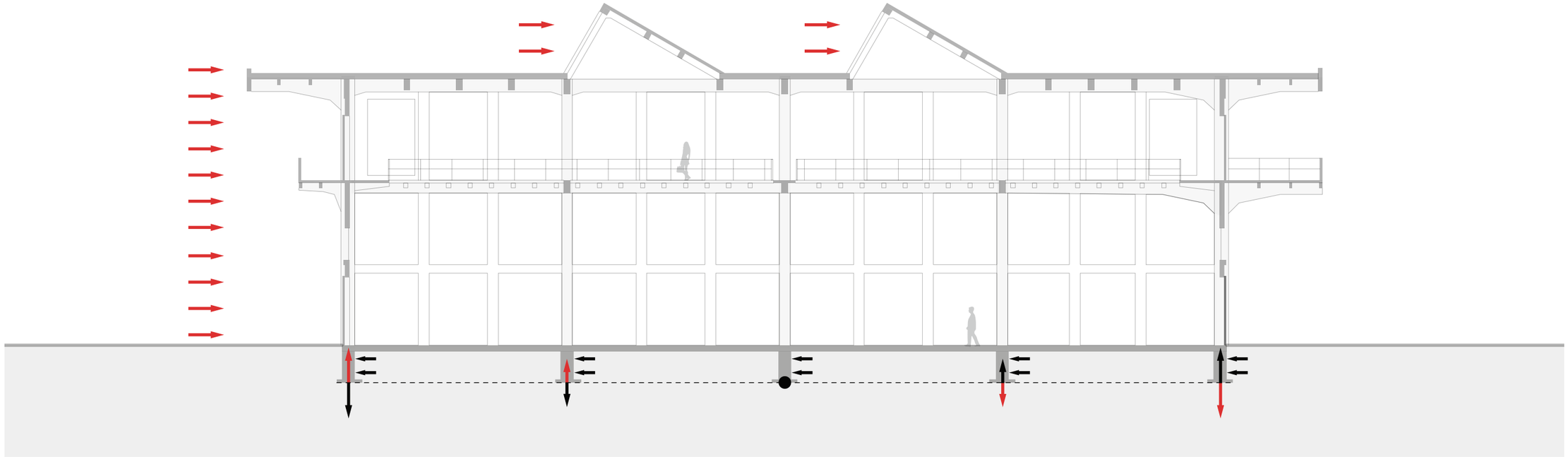
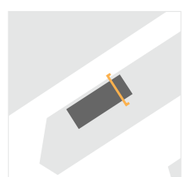


section AA horizontal loads by Jan Huis in 't Veld
(own illustration)

WHY?
How are the horizontal loads distributed through the building?

HOW?
By looking at the sections and following the wind forces of the roof, floors, beams and columns.

VERTICAL LOADS
In these sections it becomes evident that the horizontal (wind) force causes 2 things. First of all the building wants to move horizontally. This is countered by horizontal forces on the foundation. The friction of the ground because of the weight of the building is the main reason for this effect. Second of all the building wants to turn (clockwise in this illustration) around the centre. The vertical forces (and its counterparts) in the foundation make sure that the building stays in place. The circle in the centre of the foundation represents the pivot point of the phenomena through the forces. On the adjacent page only one portion of section BB is displayed, however the other 4 parts perform in exactly the same manner. The 5 parts each work separate from each other, because of the dilatations between them.



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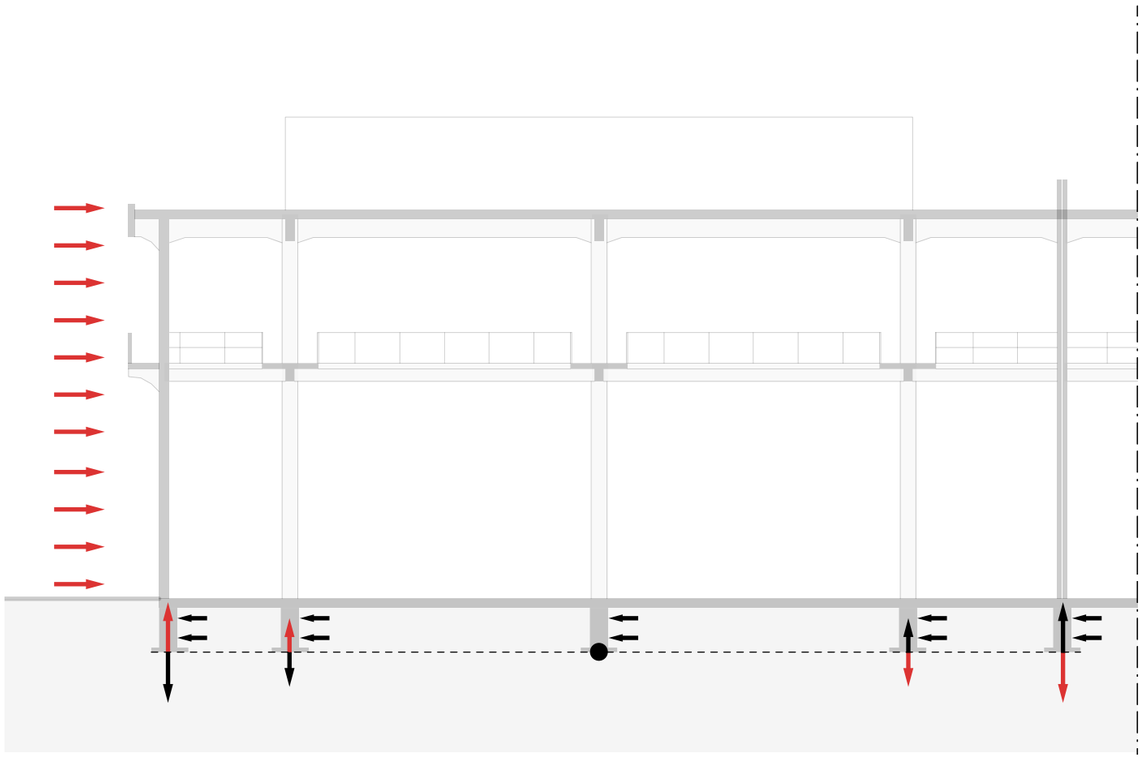
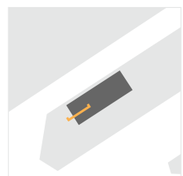


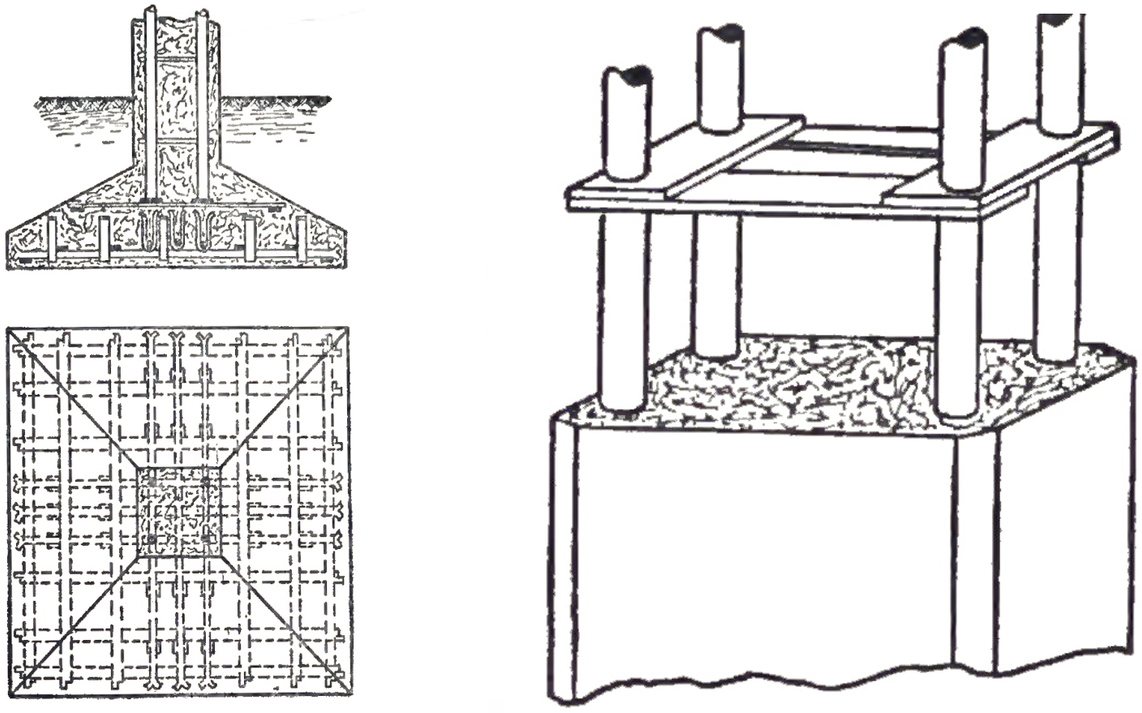


1:200

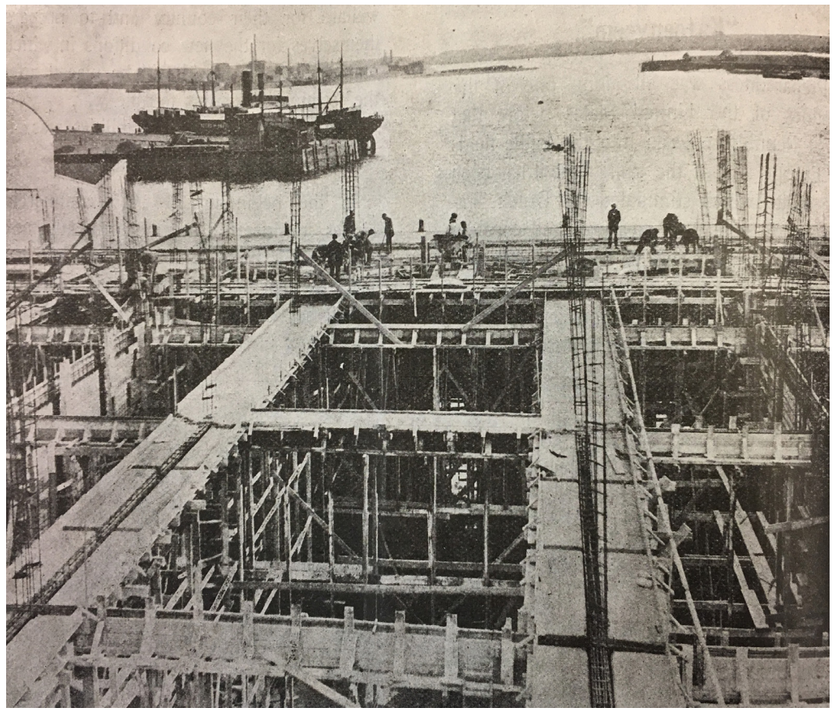
section BB horizontal loads by Jan Huis in 't Veld
(own illustration)

HENNEBIQUE SYSTEM

The Katoenveem building has a very specific construction system. At first sight a bares a striking resemblance to the Hennebique construction system. In this chapter a closer look will be taken to the Hennebique construction system and the construction system of the Katoenveem. A comparison will be made to determine the true nature of the system used to build the Katoenveem.



Hennebique System 1,2 by Jan Huis in 't Veld
(Radfords encyclopedia of construction - Volume 6: Concrete Construction)



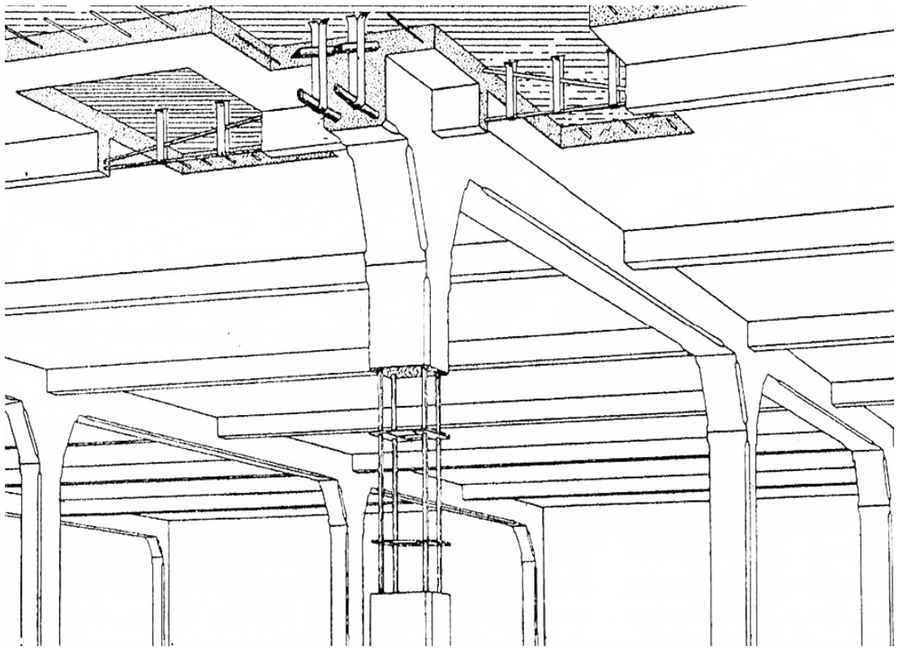
building site Katoenveem by Jan Huis in 't Veld
(The Pioneer #3, march 1919)

WHY?
What system of reinforced concrete is used in the Katoenveem building?

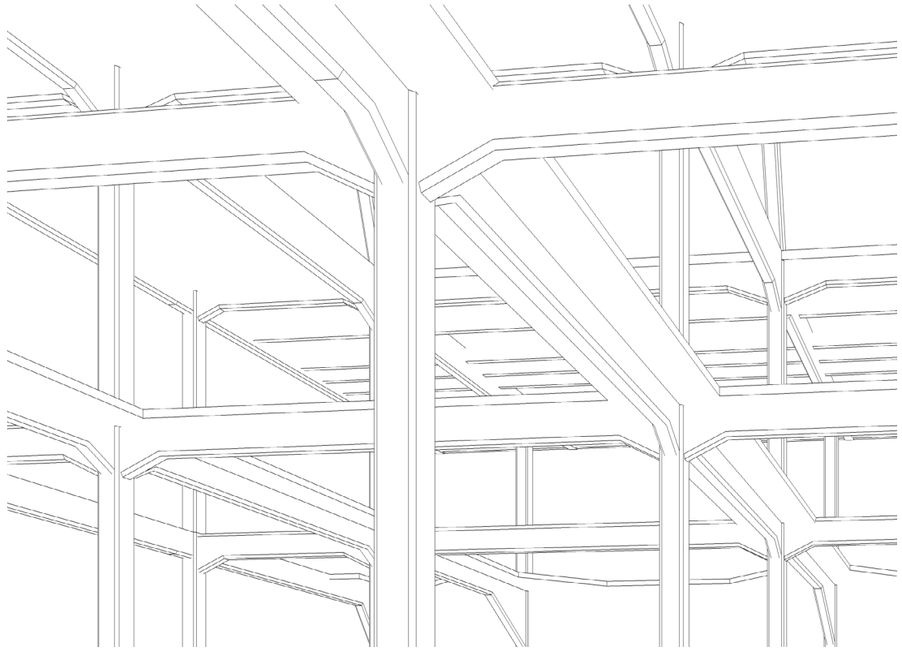
HOW?
By making a comparison between the Hennebique system and the construction of the Katoenveem.

HENNEBIQUE AND KATOENVEEM
The Hennebique system is one of the first building techniques in which concrete is used in a modern way. François Hennebique was born in 1842 in Neuville-Saint-Vaast in France, but he worked most of his career in Belgium. At the Paris Exposition in 1867 sees the wire reinforced concrete for the first time and he starts looking for ways to use this technique in housing.

He began experimenting in 1879 with slabs of reinforced concrete. In 1886 Hennebique files for a patent on a floor of tubular elements in a reinforced concrete construction. Around 1892 Hennebique files for a series of new patents, which are the basis for his famous concrete beam, which he will develop into a complete building system.
Hennebique used round poles of iron as reinforcement, which he placed in longitudinal direction, parallel to each other. The poles are interconnected with a series of horse-shoe shaped brackets, which are fixed in the concrete mix. The tension forces that will occur can be distributed when the concrete is put under pressure. Without such reinforcement of concrete, it is not strong enough to resist the compressive and tensile forces exerted on a building structure.
Within a few years Hennebique perfects his system, which can also be used for upright columns, horizontal support beams and even floors. The patents lasted 25 years, therefore they started to expire from 1911 onwards. New 'Hennebique-like' systems started to emerge throughout Europe. The Katoenveem contains one of these systems. It is closely related to the Hennebique system, but it is not identical. The foundation of the Katoenveem is not displayed in any drawing or photograph in detail, only an outline is visible. The outline seems identical to the outline of the Hennebique foundation system (illustration 1). Therefore, without any further knowledge we will assume that the



Hennebique System 3 by Jan Huis in 't Veld
(Radfords encyclopedia of construction - Volume 6: Concrete Construction)



Katoenveem 3D construction by Xiaho Yi
(Radfords encyclopedia of construction - Volume 6: Concrete Construction)

foundation of the Katoenveem. The system of the columns in the Hennebique system and the Katoenveem appear to be similar. In certain damaged parts of the Katoenveem the structure was visible. Additionally the construction photograph of the Katoenveem shows a resemblance with the Hennebique system column (illustration 2).

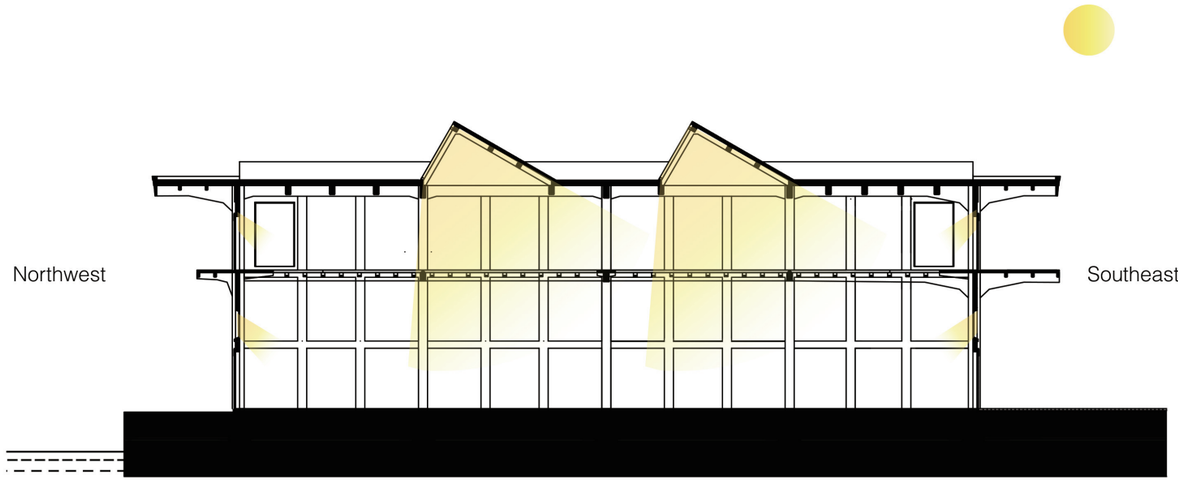
When looking at the illustrations on this page a strong resemblance in the beam and floor systems between the Katoenveem and Hennebique. The column- and beam joints have a fixed angle in both systems and also the edges constructional elements have been rounded off in both illustrations. What sets the construction apart from the Hennebique system, at least externally, is the double direction of the heaving load carrying beams in the Katoenveem. In the Hennebique system the heavy load carrying beams are supported by smaller, thinner beams in the other direction. Therefore we can assume that the entire joint has a different reinforcement system within the concrete.

CONCLUSION

We can conclude that the Katoenveem has an Hennebique-like system that constitutes the entire construction. The complete construction; foundation, floors, beams, columns and the roof, is interconnected through the reinforcement of the steal. Certain elements of the Katoenveem bear a striking resemblance to the Hennebique system, where as other elements have been altered to fit the specific building.

BUILDING PHYSICS

In this chapter the building technologies including structure, services, and surfaces (and their damages) will be carefully analysed in relation to the original function of the building - the storage and transpoetation of cotton.



natural lighting shown in section

Skylights

High windows

Drawings by Xihao Yi

WHY?

To understand the choice of openings for natural lighting in relation to the cotton storage.

HOW?

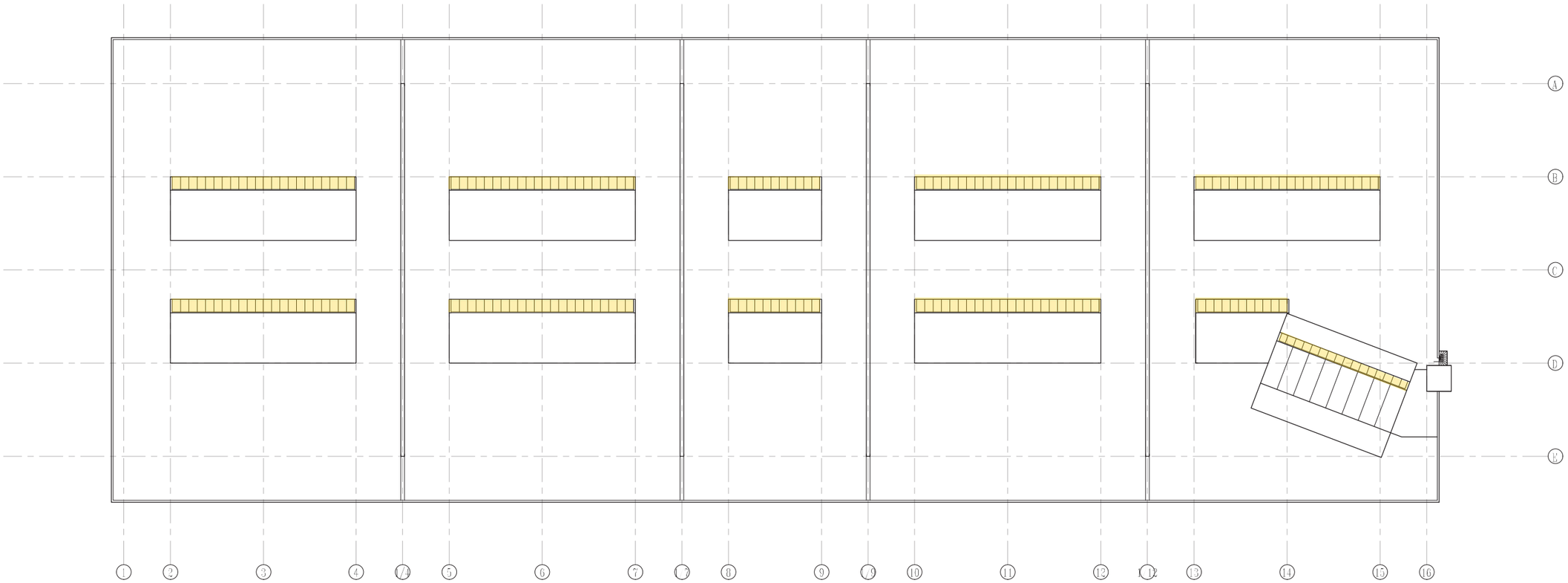
-fileld investigation
-studying the Building Report

NATURAL LIGHTING

Each compartment of the five parts has big skylights on top to provide natural daylight. The mild light could prevent the building and cotton from overheat. The northern skylights on the roof are equipped with a ladder, which connects to the roof.
The sample room on the roof is of a rectangular shape. In relation to the building is not placed parrellel to the compartments but towards the straight north direction. The semicircular shape of the roof of the sample room is remarkable for the 1920s and more usual for the curved roof structures after 1950. [1]

The high windows on the ground floor are placed above the 3-meter-high doors. All windows are under the shade of the cantilever balconies and roof. In this way, almost no direct sunlight would go into the building.

To conclude, the natural lighting of the Katoenveem is indirect and mild, sometimes insufficient (which is solved by artificial lighting)



Skylight

Roof Plan showing the location of skylights 1/500

Drawings by Xihao Yi
(Own illustration)

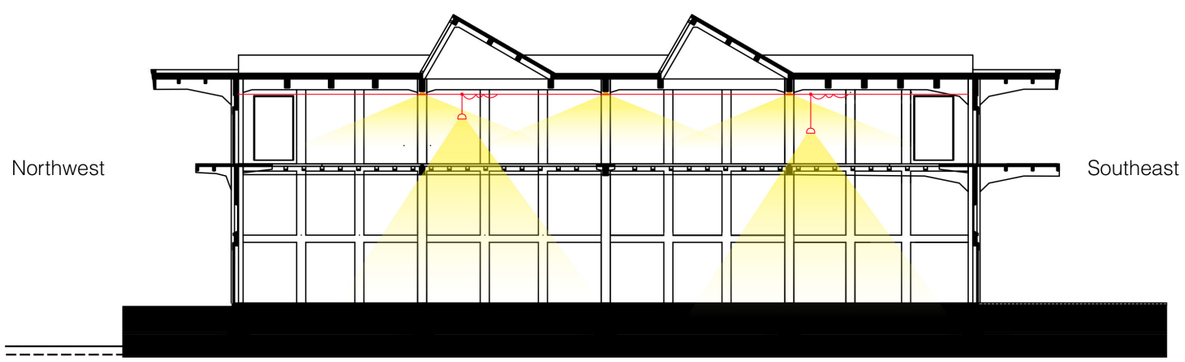


fig1.artificial lights shown in section

fig2. Moveable light

fig3. Fixed light

Drawings by Xihao Yi

(sources: fig1-own illustration.
fig2-M. Enderman and R. Stenvert, Bouwhistorische Verkenning Katoenveem, Keilestraat 39 Rotterdam,Utrecht(2005)).fig33.
fig3-M. Enderman and R. Stenvert, Bouwhistorische Verkenning Katoenveem, Keilestraat 39 Rotterdam,Utrecht(2005)).fig32)

WHY?

To understand the artificial light environment within the building

HOW?

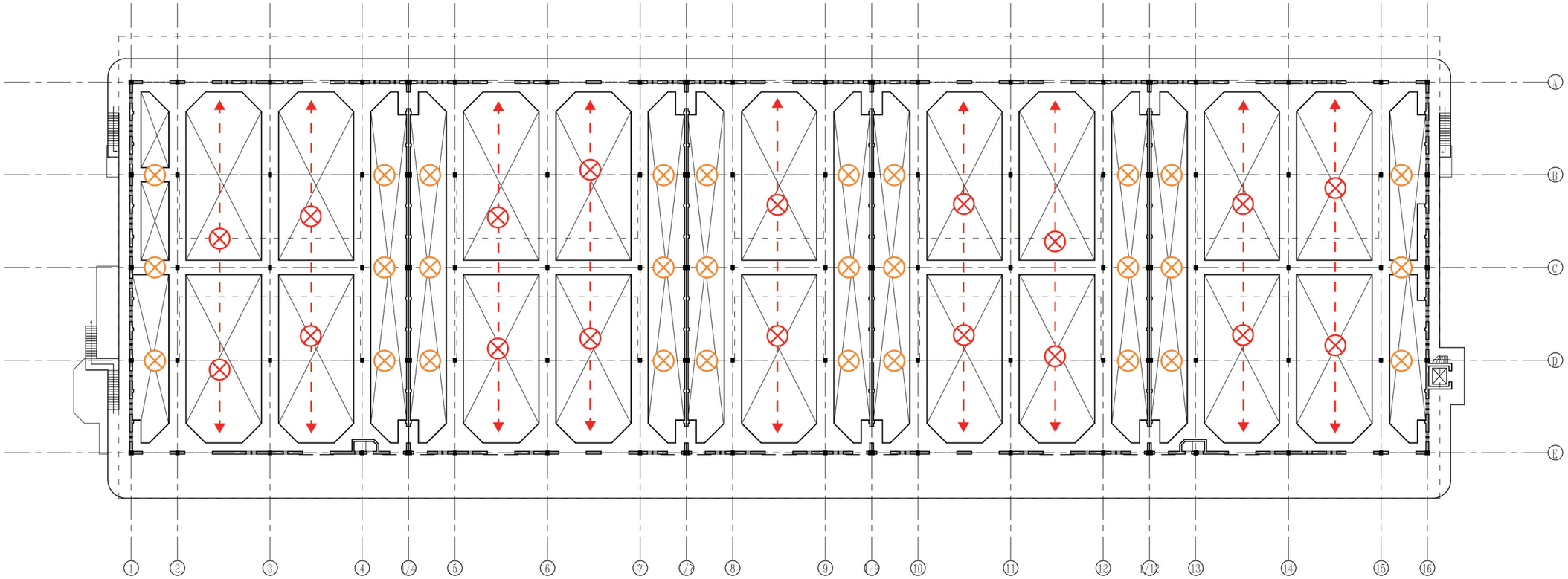
- Field investigation
- Study the Building Report
- Looking at historical pictures of the interiors

ARTIFICIAL LIGHTING

The lighting for halls. Above the narrow spans hang the regular intervals lamps with a metal cap. In the middle of the wide spans are tensioned cables which hangs a larger light . By a system of wires and pulleys, these lamps can be moved in the width of the building. It is almost certain tha the metal lamps belong to the original inventory of the building. For moving lights, this is not to say with certainty.[1]

It is worth mentioning that the fixed lights shown in the Building Report does not exist in the building anymore, while the moveable lights can be found in every halls. With the two kinds of lights, the storage and transportation of cotton was operatable whtn the natural lighting was not enough.

1:M. Enderman and R. Stewart, Bouwhistorische Verkenning Katoenveem, Keilestraat 39 Rotterdam,Utrecht(2005)



Fixed light

Moveable light

Location of lights in relation to the walkways 1/500

Drawings by Xihao Yi
(Own illustration)

fig1.Sprinkler rails are placed on 2 different heights in the building.

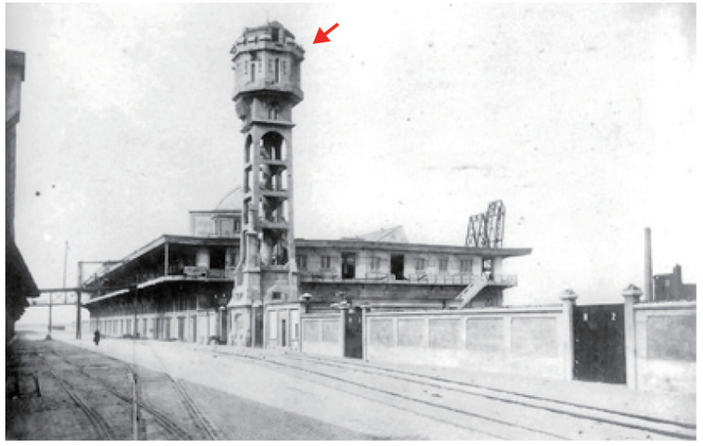


fig2. The water tower was an important part of the system

fig3. Close-up look of the sprayer of the system.

Drawings by Xihao Yi
(Sources:fig1-own illustration
fig2-M. Enderman and R. Stewart, Bouwhistorische Verkenning Katoenveem, Keilestraat 39 Rotterdam,Utrecht(2005),fig1a
fig3-own illustration)

WHY?

The sprinkler system was an essential part for the security of cotton storage.

HOW?

-field investigation
-study the Building Report
-looking at historical photos

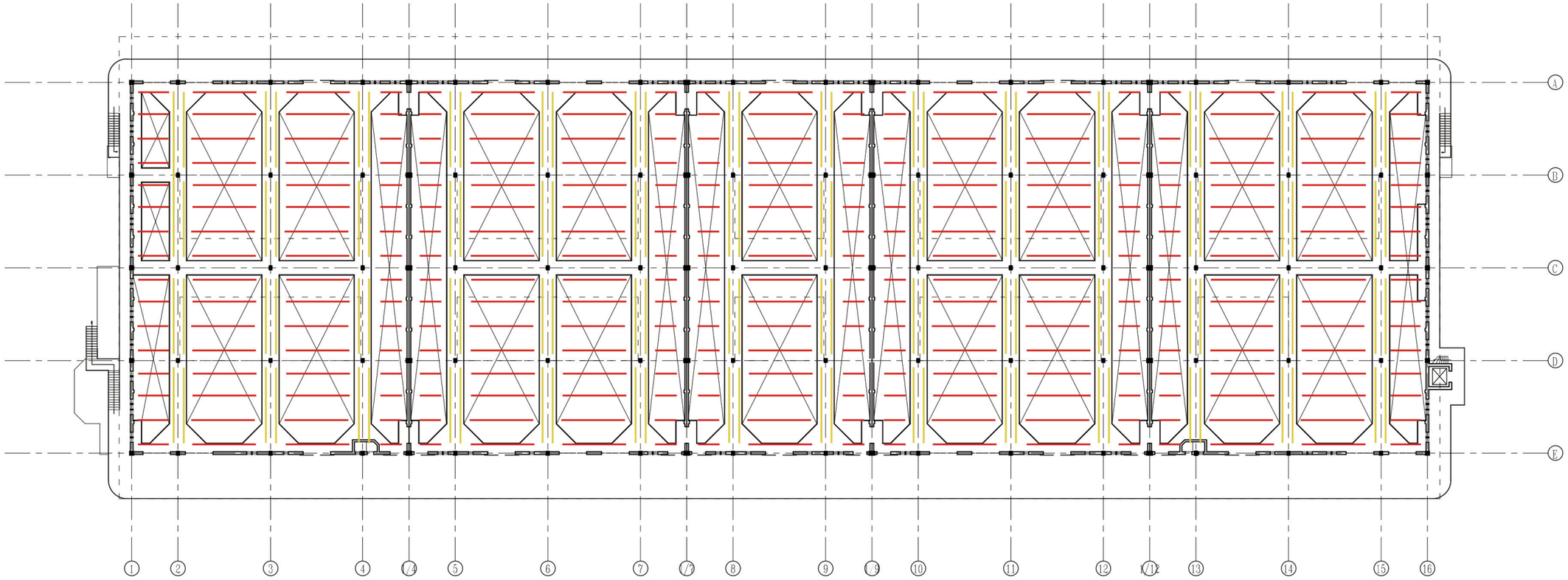
SPRINKLER SYSTEM

The initial capital of the Katoenveem was budgeted initially fl. 800,000, but with the requirements for purchasing a sprinkler system (with water tower), the total increase to Fl. 950,000. The sprinkler system was delivered from England in 1918. Katoenveem was one of the earliest buildings that was equipped with an automatic sprinkler system.[1]

The first bales of cotton were recorded in May 1919 and immediately in that year, 5 September 1919, there was a heavy fire in Section E. On March 25, 1921 the new sprinkler system of the Katoenveem was tested successfully. It got its first big test in a fierce fire on December 6, 1925 in section D.[2]

The sprinkler system was no longer in use since the demolition of the water tower in 1966.[3]

1,2,3:M. Enderman and R. Stewart, Bouwhistorische Verkenning Katoenveem, Keilestraat 39 Rotterdam,Utrecht(2005),p8-9



sprinkler under the roof

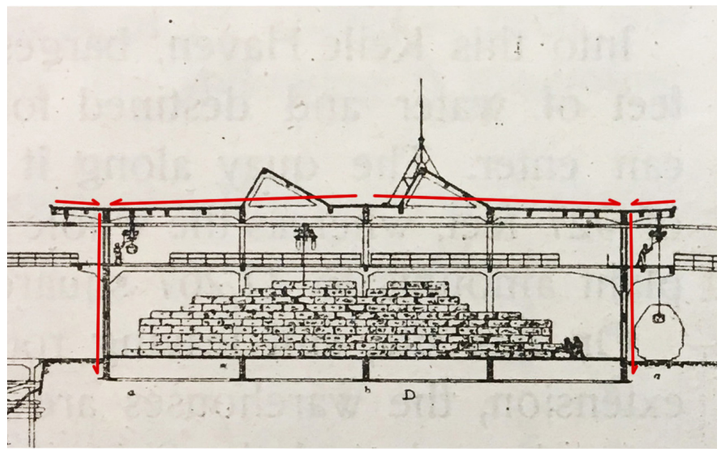
sprinkler under the walkways

Location of lights in relation to the walkways 1/500

Drawings by Xihao Yi
(Own illustration)

Drainage pipes shown on the facade.

Two symmetrical drainage pipes and holes on the both sides of the compartment walls.



Rain water movement on the roof.

Drawings by Xihao Yi
(Source:fig1-own illustration
fig2-own illustration
fig3-H.H. Van Dam, 'TheCotton Warehouse of Katoenveem', The pioneer For the Shipping and Trade of the Nethetlands and Her Colonies (1919),p68)

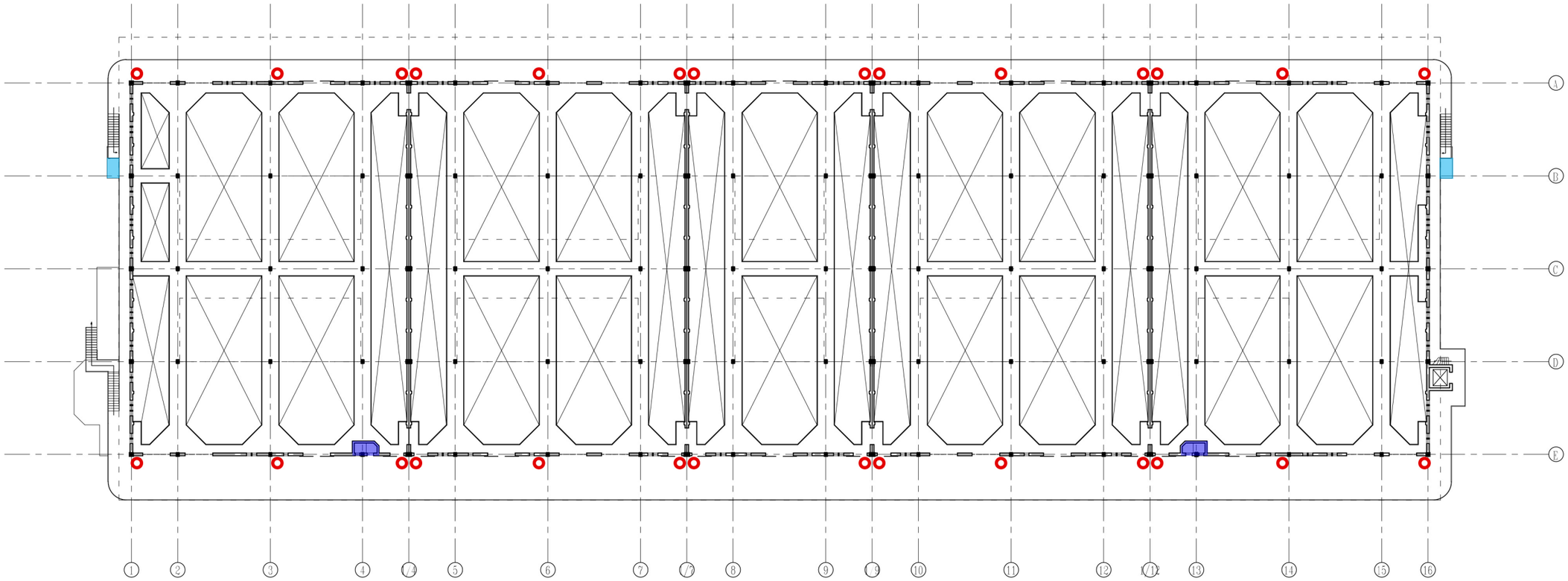
WHY?
To understand how the building dealt with rain water and where are the toilets for the workers are.

HOW?
-field investigation
-study historical drawings

WATER: DRAINAGE AND TOILETS

The drainage holes of the building are located on the walls along the south and north facades. Each standard compartment has 6 water pipes, while the smaller compartment in th middle has 4 pipes. Through these pipes, rain water was collected from the roof, where slight slopes allow water to flow from the middle and both ends to the location of the holes.
There is much damp damage on the surfaces around the water pipes. This will be analysed on a separate topic in our report.

There are four toilets in total, two on the ground floor ,two others on the first floor. All of the toilets can only be accessed from the outside of the building. The morrioring location of them provided efficiency of use.



toilets GF

toilets 1F

drainage holes

Location of drainage system and toilets shown on the 1F plan 1/500

Drawings by Xihao Yi
(Own illustration)

fig1.The tube in the middle of the roof that contains electrical wires for the building.

fig2. the covers can be opened for inspection and reparation

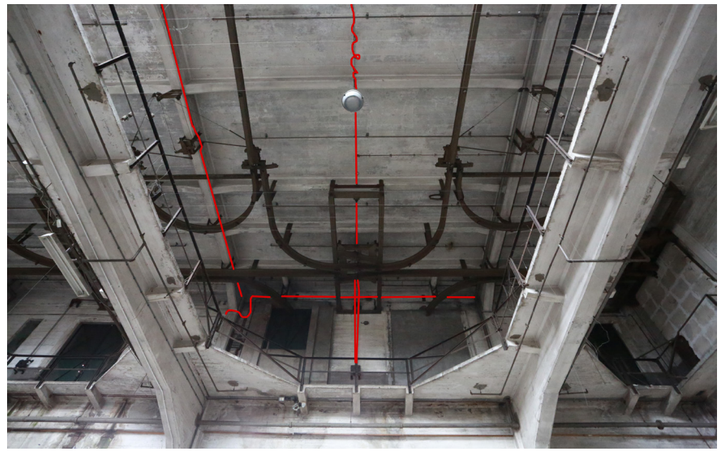


fig3. Wires from the roof that provide power for lighting and the conveyor system.

Drawings by Xihao Yi
(source: fig1 - Alexander de ridder
fig2- Elmer Pietersma
fig3 - own illustration)

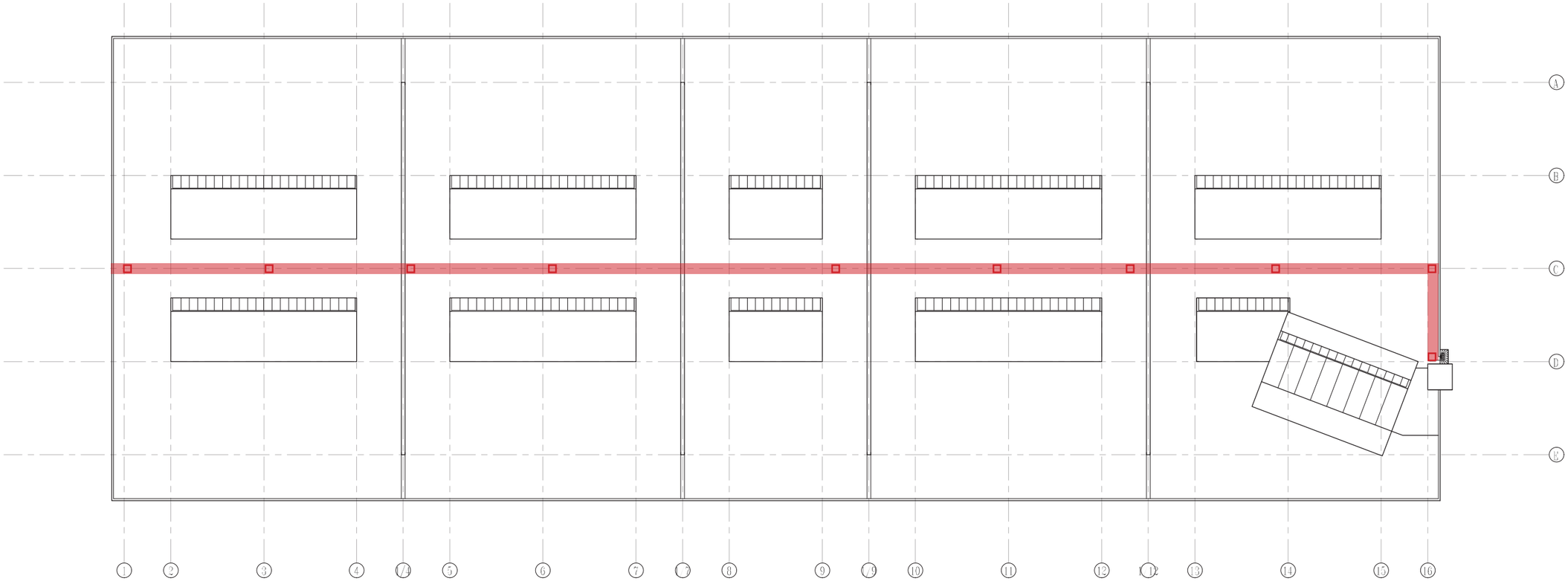
WHY?
To understand the supply of electricity of the building in relation to the cotton storage

HOW?
-study photos

ELECTRICITY

There is a main tube for electricity on the roof of the building. This “artery” of eletricity runs mainly in the middle axis of the building, and also extended on the east end because of the sample room. Electricity was distributed to the 5 compartments for the lights and the conveyor system. Moreover, for every certain distance, a covering lid is placed on the tube. We think it is reasonable to say that they are for the inspection of the electrical system.

This arrangement of electricity distribution was able to minimize the chance of fire by separating the wires and cotton as much as possible.
It is also safe to address that the original electricity system does not work anymore.



tunnel of electricity

covering lids

location of electricity shown on roof plan 1/500

Drawings by Xihao Yi
(Own illustration)

DAMAGES

When looking at the building it becomes immediately clear that there are damages present on the facade. The sources, severity and means of repairs are discussed in this chapter.

illustration 1&2 by Elmer
(source: personal sketch and photo)

WHY?
To understand the types of damages found at the Katoenveem, what causes them and how to restore and prevent them in the future.

HOW?
by looking at images of the facade, singling out the cause and result.

DAMAGED CONCRETE

First up is the visual damage, as can be seen when visiting the building. On the right image above, the yellow represents the damage to the concrete.

The source of this damage becomes clear at some point, the bright yellow shows this. This is where the metal reinforcement has been laid bare and is rusting away. The reason this happened is probably because the covering of the concrete that is supposed to protect the reinforcement has been to shallow; allowing the metal to come in contact with water and to start rusting. As rust takes up more space than the iron it comes from, pressure is created. This pressure builds until the concrete cover cannot hold it any longer and breaks, leading to cracks originating at the reinforcement, as seen above here.

To prevent this from happening in the future, we must first understand where this damage comes from.

SPALLING DAMAGE

- Rusted reinforcement
- Spalling damage caused by rusted iron

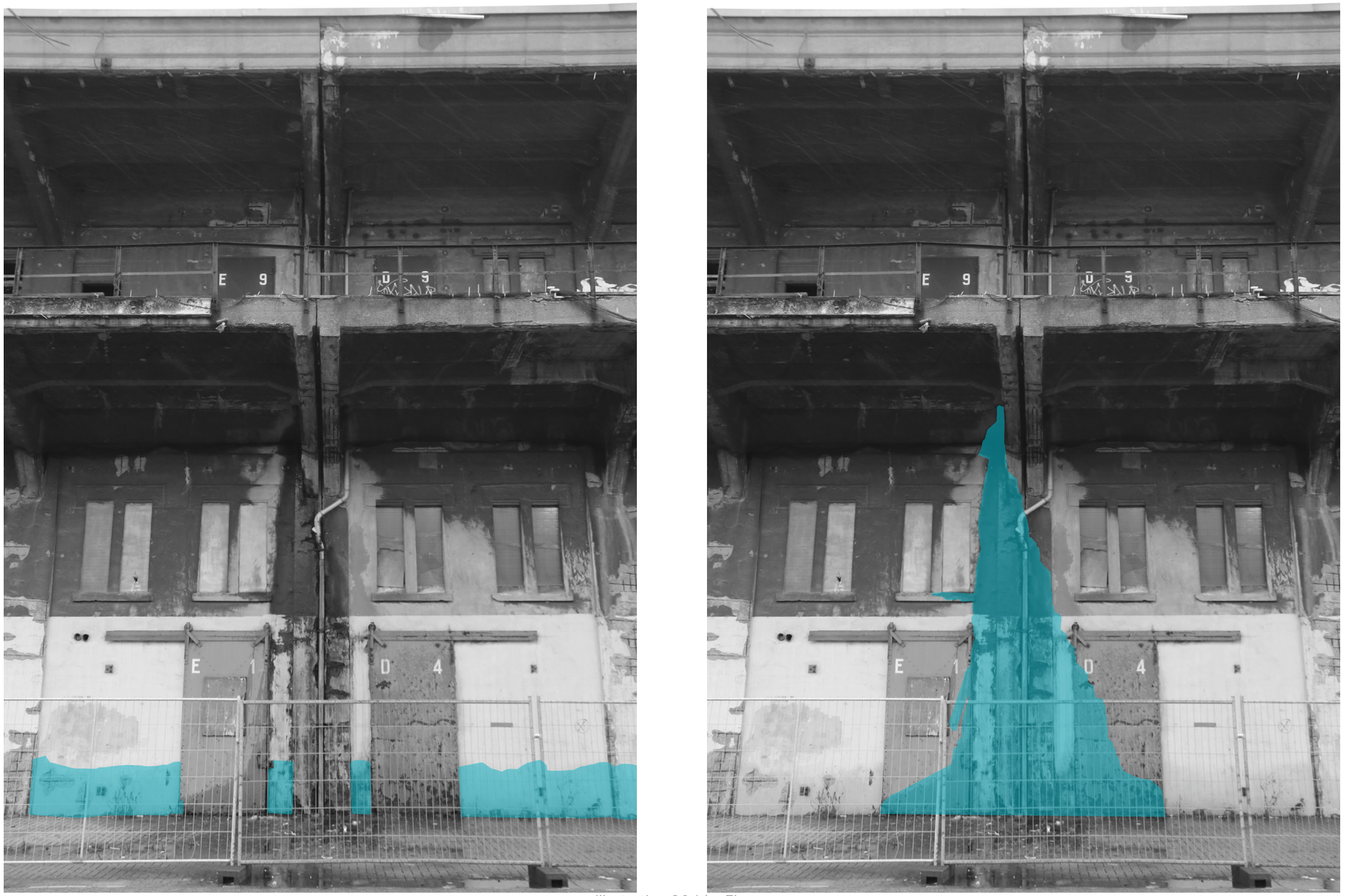


illustration 3&4 by Elmer
(source: personal sketch and photo)

THE SOURCE

The major damage to the facade is caused by spalling, as discussed by on the previous page. This phenomena is caused by water coming in contact with the reinforcement, causing it to rust. The water that causes this comes from three sources in this situation: directly from the sky in precipitation, in splashing from the street and from leakage in the drainage system. A fourth source could be noted, the salt water spray that comes from the river.

The effects of precipitation are difficult to single out as the area this affects has been painted white, the rest of the facade is shielded by the roof and balcony. Because of this we will focus mainly on the splash and leakage.

The splash water originates from the streets, when trucks ride past and cause the water lying on the street to splash up. This wetness is further increased by the precipitation and perhaps even rising damp from the soil.

The second major source is leakage, caused by broken drainage pipes. This can be easily be fixed by replacing the broken pipes, but the effects can be devastating as seen in the image above here. The second image shows the traces of water as they were present there on the day of our visit. It was dry at the time of this picture, showing that a leakage such as this keeps a certain area wet for long periods than the rest of the building. The fact that the facade has been cleaned of the darkening soot (following page), shows that this leaks has been there for some time.

SPLASH AND LEAKAGE

Moisture visually present

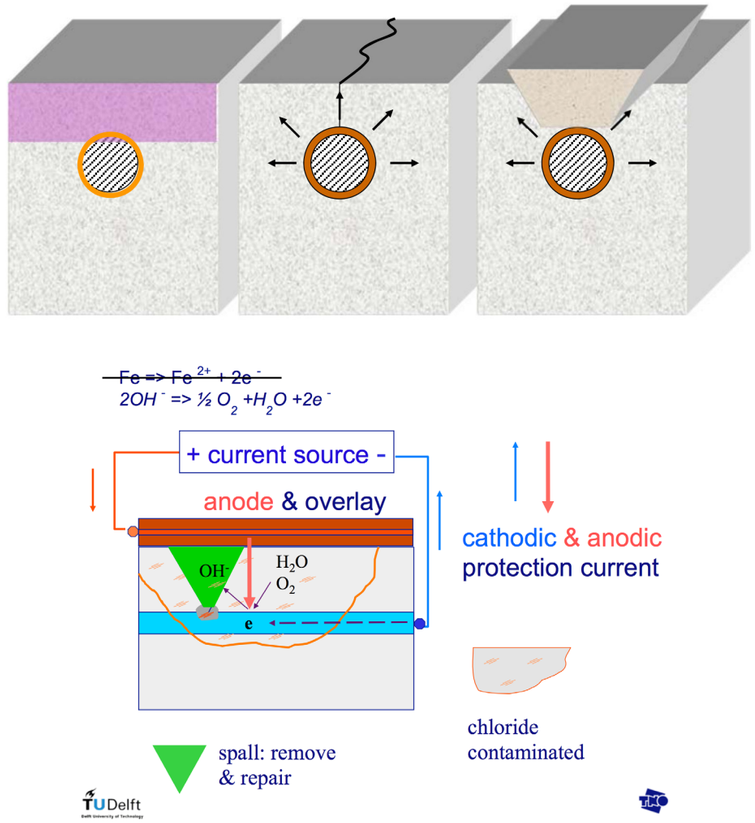


illustration 5 by Elmer Pietersma (personal sketch and photo)
Illustration 6 by Barbara Lubelli (lecture degradation mechanisms: concrete 12-11-2015, p21)
Illustration 7 by Rob van Hees (lecture Corrosion and treatment: Cathodic protection of rusting iron, p.47)

PREVENTING AND REPAIR

The damage caused by the spalling is permanent and irreversible. To prevent it from happening in the future, the sources of water must be removed or stopped. For the leakage the remedy is clear; repair the drainage system and the problem is fixed.

For the splash water at the bottom of the facade, the fix is more difficult. The concrete that has fallen off needs to be replaced, and in order to prevent it from happening again a cover needs to protect the concrete and the reinforcement. The cover that is present on the concrete right now is not more than 5mm, whereas it is advised to have a cover of concrete protecting the reinforcement of at least 15 to 55mm depending on the environment (Lubelli, 2015, p10).

If rising damp is involved the problem becomes bigger, because there will need to be a physical separation between the source (the ground) and the concrete to prevent further damage. To obtain this, the entire length of the facade will have to be adjusted, which will cost a lot of effort and money.

However, restoring the concrete and removing the water will not be enough.

The damaged reinforcement must also be treated. First it needs to be checked for structural integrity, needing replacing there were it fails. Secondly further spread of rust needs to be stopped. This can be done by cathodic protection. In this reaction a metal of lesser nobility will degrade instead of the iron, making sure the rust is not eating away the reinforcement any further as is shown by the image 7.

WASHING OF SOOT

Cleaned area

illustration 8 by Elmer Pietersma

STRUCTURE INTERIOR

So far the damages on the exterior have been discussed, where they originate and how they can be repaired and prevented in the future. But it is very important to state the overall condition of the buildings structure, which is in outstanding condition still.

The only damage present in the building is that on the facade, which can be restored. The interior is undamaged and structural sound. This makes the Katoenveem a good choice for reuse as it does not require extensive repairs in order to be in use; only the balcony needs to be repaired.

The columns on the inside show some signs of damage but these are all caused by objects hitting the concrete. These damages can be repaired in order to make it look whole again but this will remove traces of age and use which might be deemed valuable (see the cultural value analysis). A new layer of paint will probably be enough to cover up most of the blemishes on the interior.

One big problem still remains after the repairs; there is no insulation in the building. This will make it difficult to control the climate inside the building. The monolithic structure will only make it more difficult as the whole facade is one giant cold bridge.

Either the whole building needs to be packed in insulation or the interior, which will require thermal bridging, or other principles of maintaining a indoor climate need to be look at. This can for instance be a box within a box system. Or else a function that does not require a strict and stable building climate might be favourable.

DAMAGE CONCLUSION

All in all, the exterior will require some repairs but the structure of the rest of the building is intact and hardly damaged in its nearly hundred years of existence.

Combining the good state of the structure with the clear grid, big dimensions of space and strong roof there is ample possibility for new programs to inhabit the Katoenveem; one major issue is going to be the insulation.

FUTURE PLANS

This chapter will walk through the plans the municipality has made for future development of the site.

illustration 1 by Projectbureau Stadshavens Rotterdam
(http://stadshavensrotterdam.nl/wp-content/uploads/2009/05/Merwe-Vierhavens8-def-4-2.pdf)

WHY?
To understand what plans the municipality has for the site surrounding the Katoenveem

HOW?
by looking at their plans, programs and wishes for the site.

MERWE VIERHAVENS
This map shows the plans the municipality has for the Merwe Vierhavens area up to the year 2025. This plan is formed in 2009 in cooperation between the municipality and the Havenbedrijf Rotterdam, the organisation responsible for the harbour area of Rotterdam.

The plan shows the ambition for the area to change from an industrial site to a combination of housing, commerce and offices. The yellow lines indicate a network of public spaces, opening up the area. For our site at Katoenveem, this plan has the ambition to add a new connection somewhere at the end of the pier. This will turn the dead-ended street into a continued route, allowing it to become a more active part of the area.

The plan also states that the Keilehaven pier should be split in two separate halves with different functions, claiming that the fruit transshipment warehouses will remain for the long term.

MAPTITLE SCALE ^

- Housing and urban economy
- Long term urban transformation area
- Greenery
- Network of public spaces
- Viewpoint
- Redevelopment of cultural heritage
- Waterways
- Climate campus

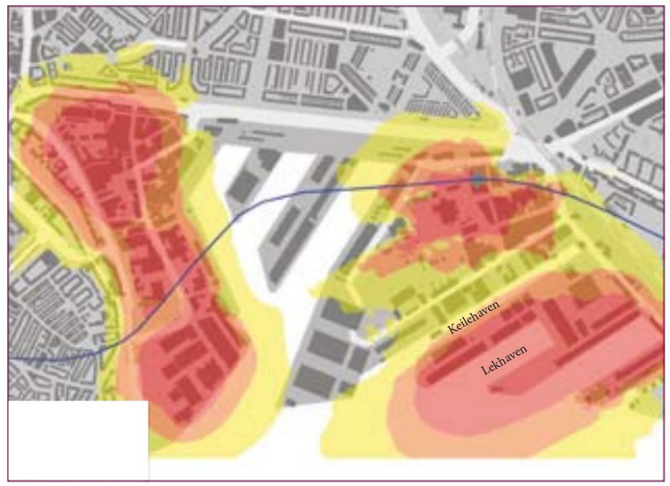


illustration 2 & 3 by Projectbureau Stadshavens Rotterdam
(http://stadshavensrotterdam.nl/wp-content/uploads/2009/05/Merwe-Vierhavens8-def-4-2.pdf)

WHY?
To know how bad the sound pollution is in the area, as this might influence the possibility of future functions.

HOW?
By looking at the levels of sound pollution and how they changed after the heavy industry left the area.

SOUND POLLUTION
The left sided image shows the situation in the year 2007, the right handed side shows the situation from 2009 and onwards.

Despite the map being somewhat dated the harbour activity has yet decreased more than is shown as activity has yet to slim down further in the area.

The map does show that the Keilehaven is much more calm than the Lekhaven, this is due to the discontinuation of harbour activity on the Keilehaven.

The major point of this image is that if you want to create a new function at the Katoenveem that requires some sort of shielding from loud noises, there will be additional interventions necessary to provide this.

SOUND POLLUTION

- >60 dB (A)
- 55 dB (A) - 60 dB (A)
- 50 dB (A) - 55 dB (A)
- 55 dB (A)T Plus contour

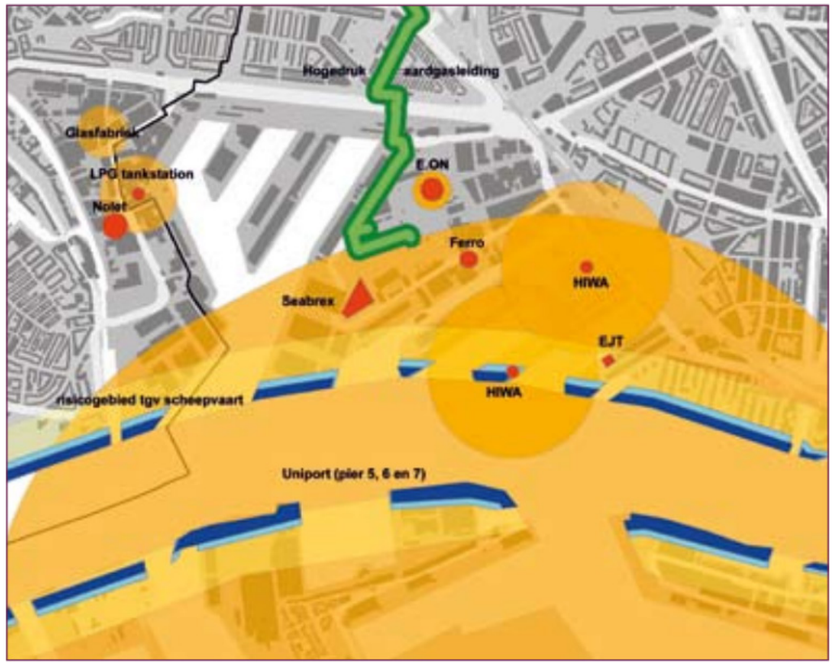


illustration 4 by Projectbureau Stadshavens Rotterdam
(http://stadshavensrotterdam.nl/wp-content/uploads/2009/05/Merwe-Vierhavens8-def-4-2.pdf)

WHY?
This maps shows the safety map for the area, showing where it is safe to build.

HOW?
by looking at the map, it shows that it is not allowed to build on the end of the piers. It also shows the dangerous areas in the harbour area, and the source of that danger.

SAFETY GUIDELINES
The orange areas show the spaces that might be influenced by a incident and that are within the 1% lethality zone. The red dots show the buildings that cause these dangers, like for instance the E-ON energy plant.

Despite the unlikelihood of such an event ever occurring, it is good to know that the Katoenveem is placed within the risk area caused by proximity to dangerous industry as well as proximity to the river over which dangerous chemicals are transported. However, it is not to be expected that our designs will need extra safety measures because of this.

It is also good to note that the municipality has stated that there is a building restriction on the end of the pier due to the shore safety line (which has probably to do with the change of the pier being rammed by a ship).

SAFETY MAP

- Location bound risk zone
- Influence area 1% lethality zone
- 40 m clearance zone shore safety
- 40-65m build restrictions area shore safety
- 200m risk zone chemical transport
- Clearance zone high pressure gas pipe
- Risk zone High pressure gas pipe

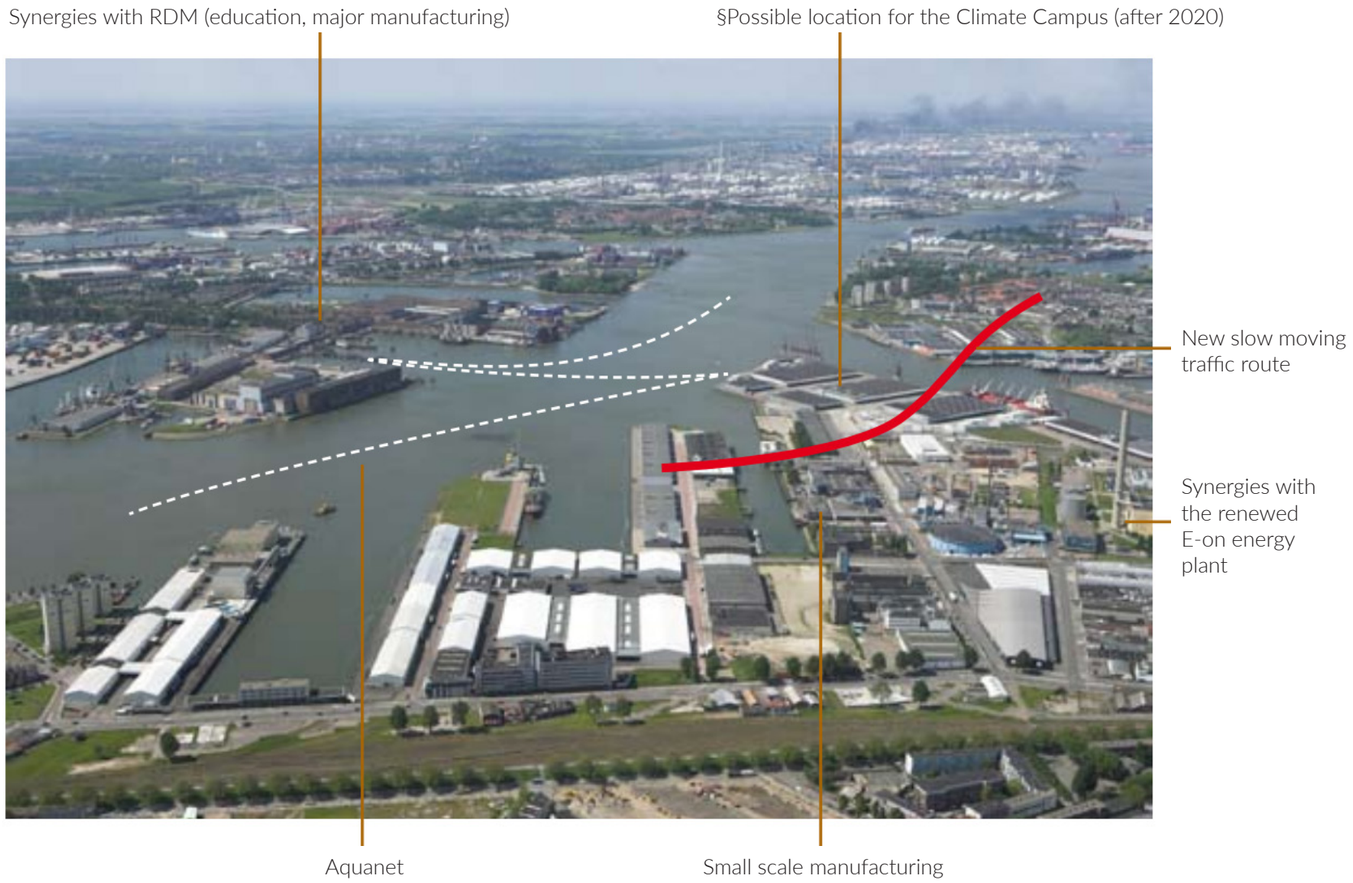


illustration 5 by Projectbureau Stadshavens Rotterdam (http://stadshavensrotterdam.nl/wp-content/uploads/2009/05/Merwe-Vierhavens8-def-4-2.pdf)

OVERVIEW

Concluding, the municipality has many plans for the area. However, there has yet to be much activity taking place to actually realise these plans. The only thing to have changed since the publication of these plans in 2009, is the construction of the Dakpark, a building with a park on top. This building does separate the site from the rest of Rotterdam, so this might be a point of interest for later study.

In the same publication, the municipality also states the ambition to increase the amount of houses in the area. Claiming that by 2015 there will be around a hundred houses realised in the area; these are not to be found on visiting the site. The goal is to increase this number by up to 5500 by the year 2040.

The lack of detailed planning, but more of an overal theme and direction for the area can be a good starting point for designing. It should still be stated that in this plan the Katoenveem is still a left-over area; stuck in between two worlds.

In the first image of the future plans it is already stated that the Keilehaven pier, on which the Katoenveem is placed, is in the transition zone between industry and a new urbanisation. This can be a change to improve on the existing situation whilst also creating an element in the urban landscape that can attract more activity to the area.

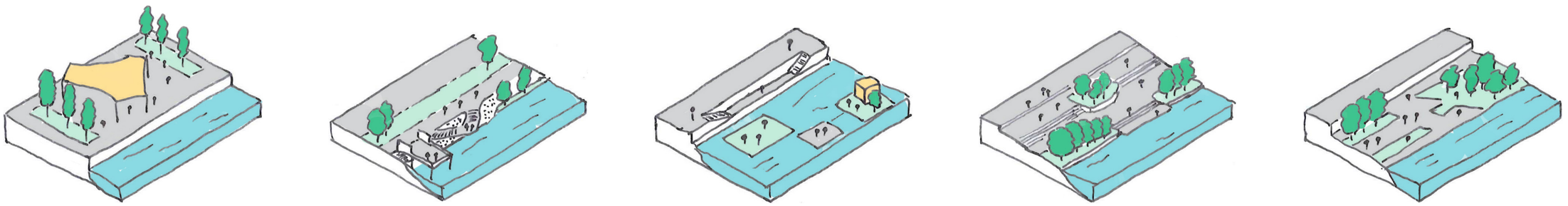


illustration 6 by Elmer Pietersma
((own illustration))

WHY?

To illustrate a couple of possibilities on how to connect with the water. The site used to have a strong relationship with the water but since it has lost its activity, this relationship has been lost. In order to revitalize the Katoenveem, it might be a good idea to work on the connection with the water.

HOW?

by looking at various options on how to connect with the river.

WATER CONNECTION

From left to right we will walk through the five examples. Note that there are many more options or even combinations of these examples possible.

1. Activity on the quay
Create activities on the quay, for example underneath a tent. The close proximity to water will give a visual connection. This is the smallest alteration, leaving the quay untouched. It also has a very temporary nature.

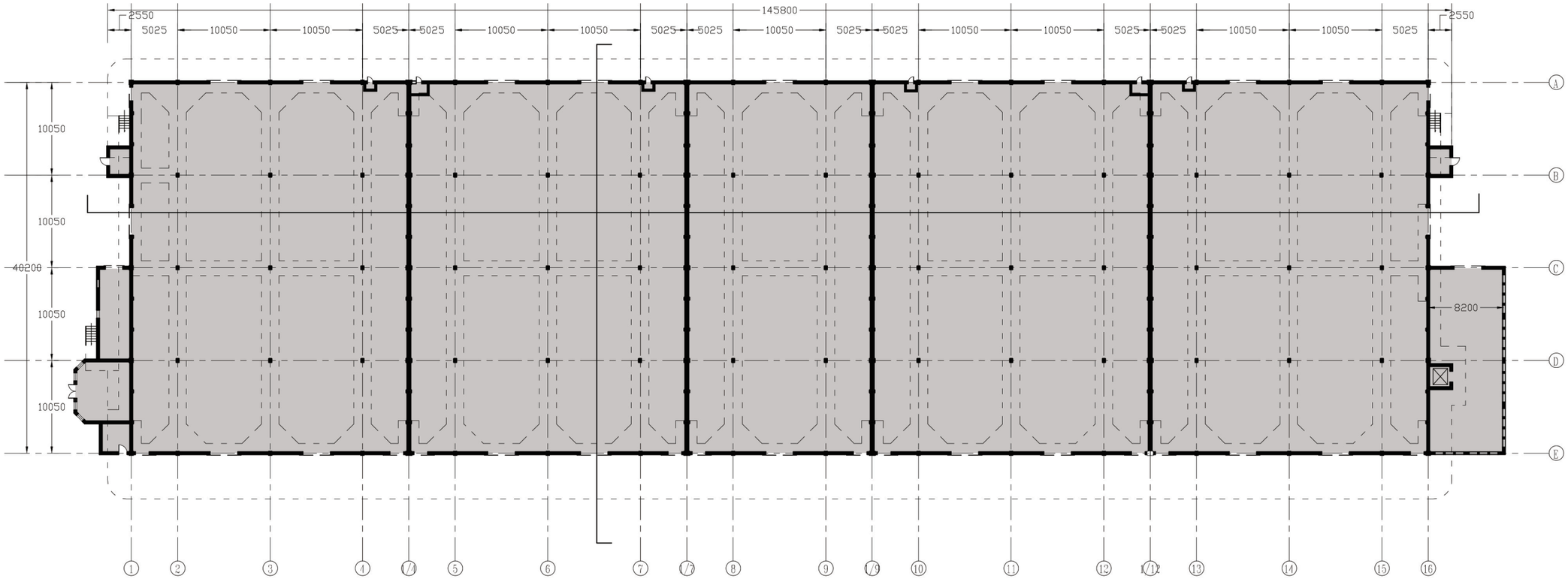
2. Lookout platform
Create a platform that will allow visitors to stand above the water, this will create a view point. This is also only a visual connection but it will single out the height of the quay and will make the connection more focussed than doing nothing.

3. Floating elements
By creating activities on the water, with a direct connection from the quay, the strongest relationship to the water can be achieved. Visitors will be walking on top and around the water, perhaps even go swimming.

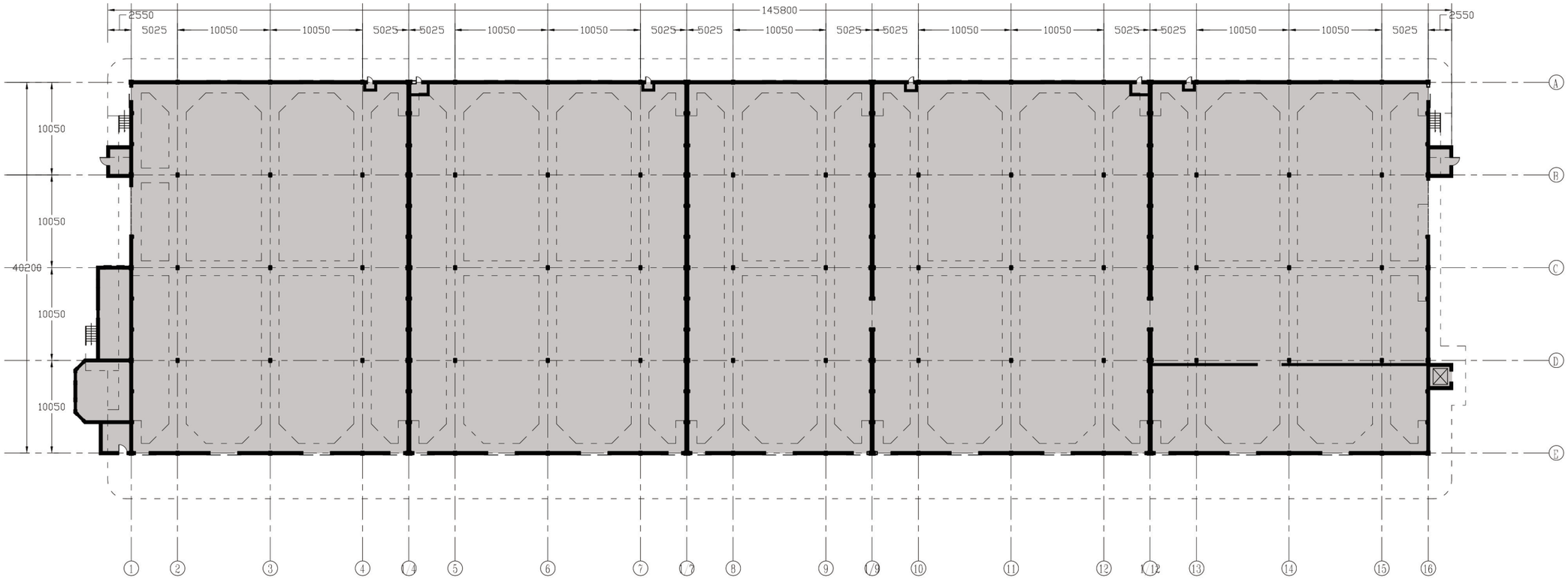
4. Gradual transition
A collection of terraces and levels can make a gradual slope towards the water, creating a public space. In this space different types of activities can take place and even a direct connection to water can be made. It will take up a lot of space to achieve and alter the quay.

5. Park along the water
A park that runs along the water level can also be done, allowing people to gently walk alongside the water instead of above it. This act will also take up space but can leave the quay intact.

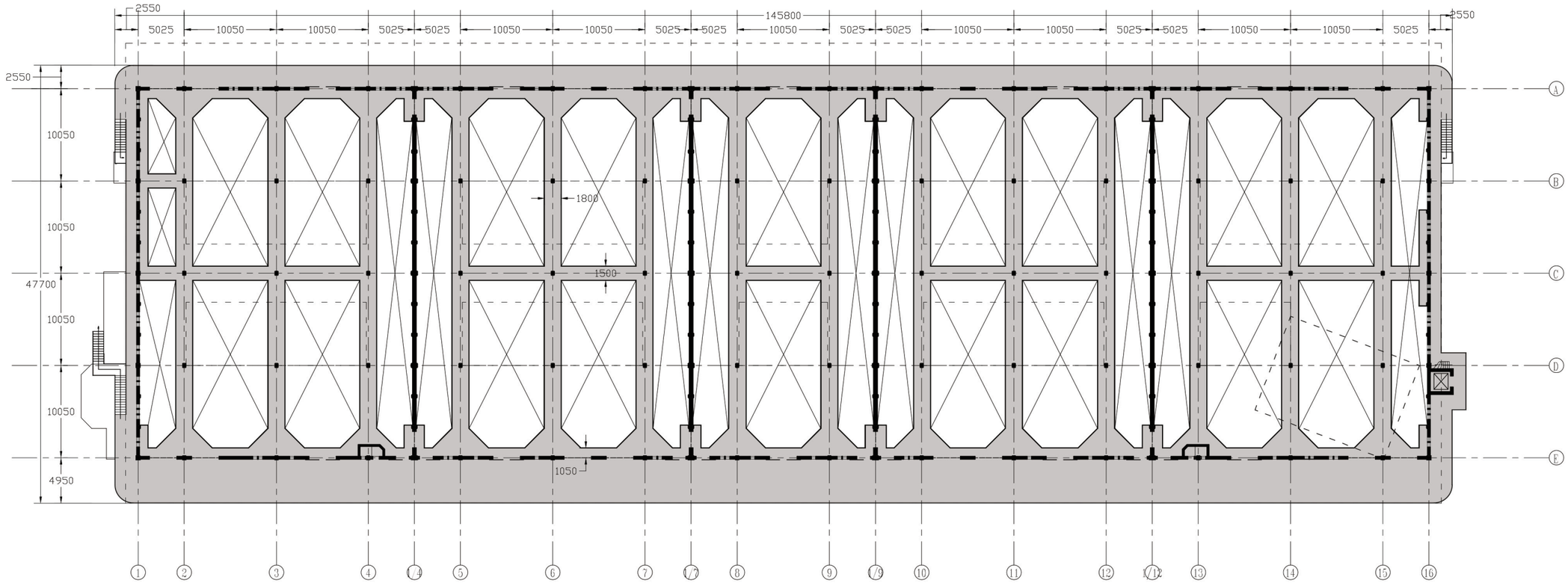
DRAWINGS



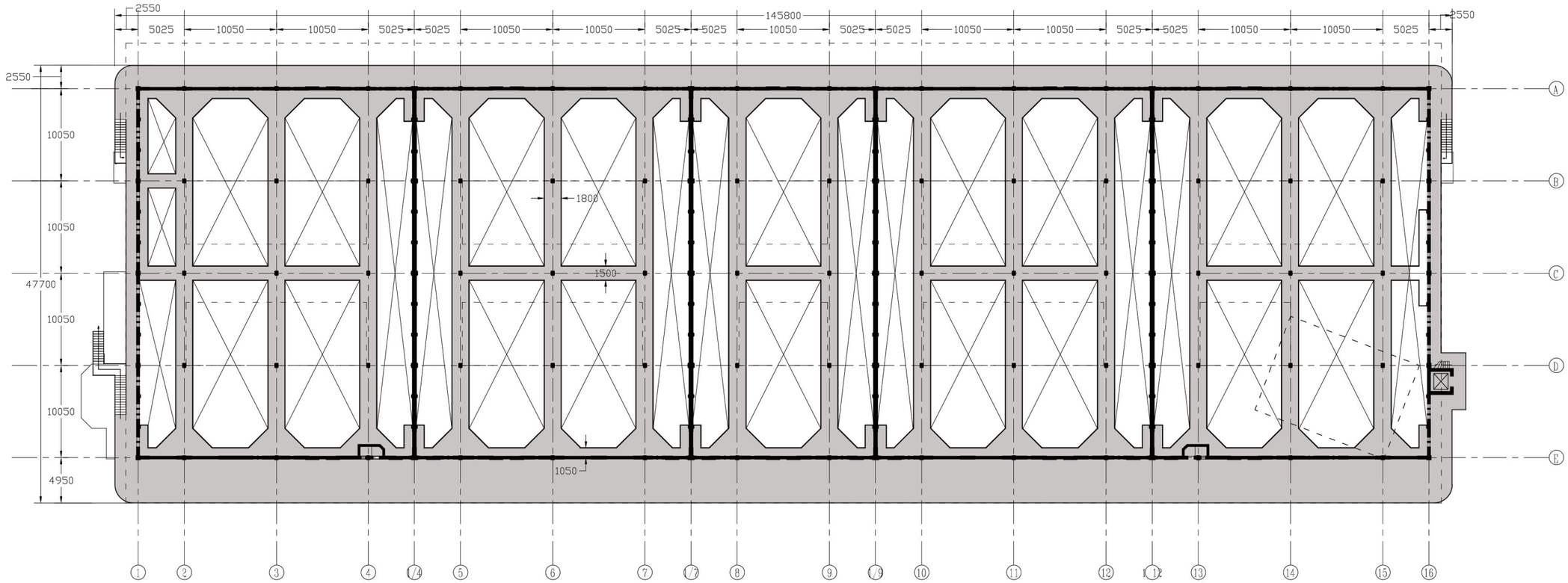
GF Plan 1/500_original status by Xihao Yi



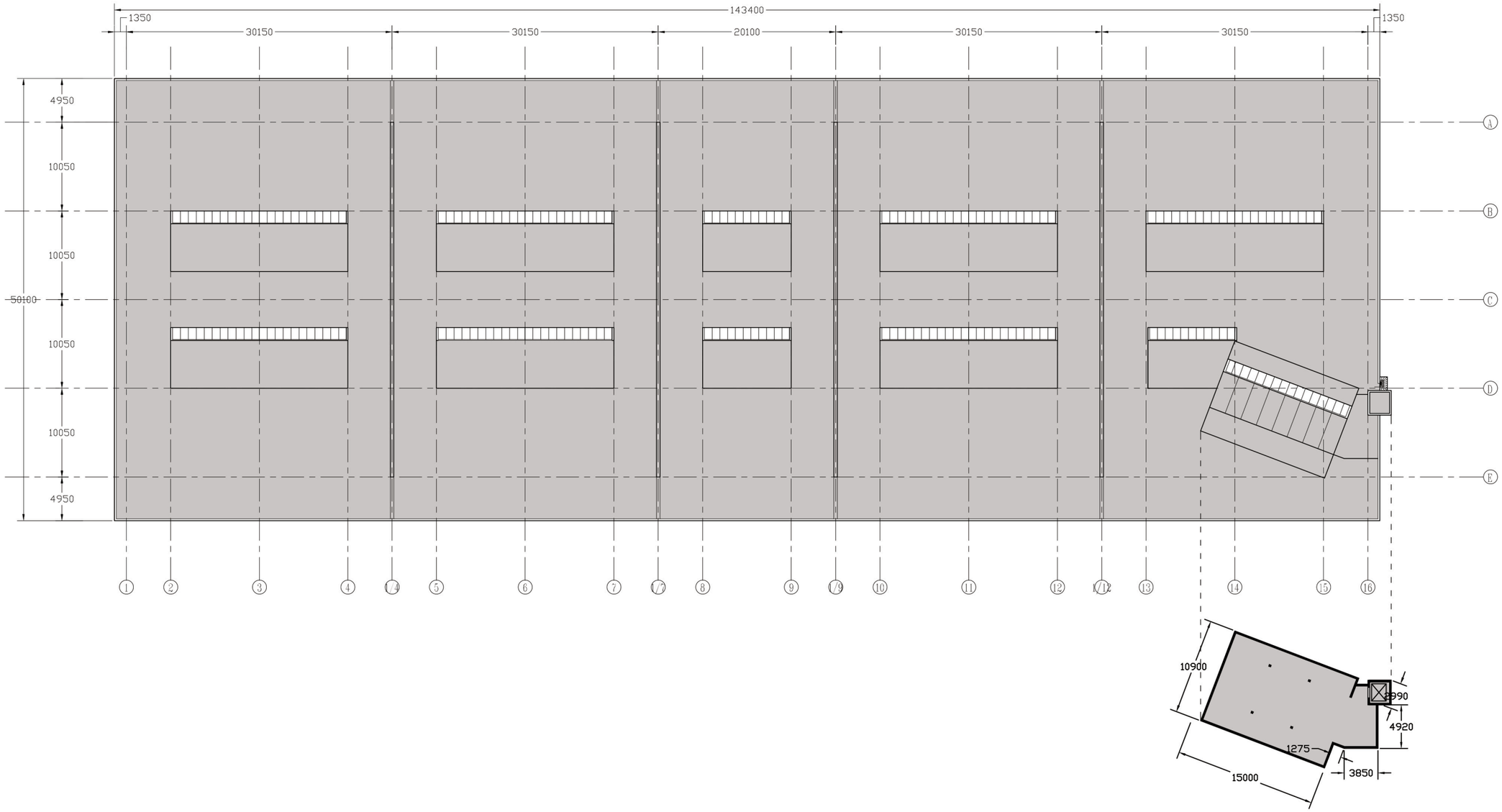
GF Plan 1/500_current status by Xihao Yi



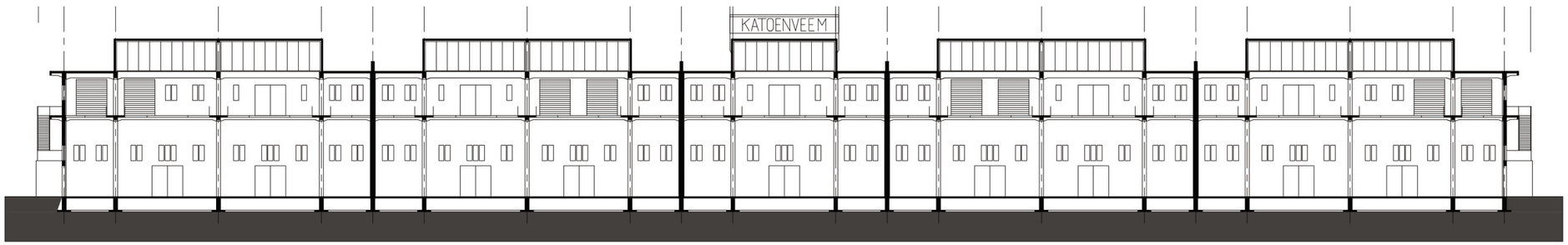
1F Plan 1/500_original status by Xihao Yi

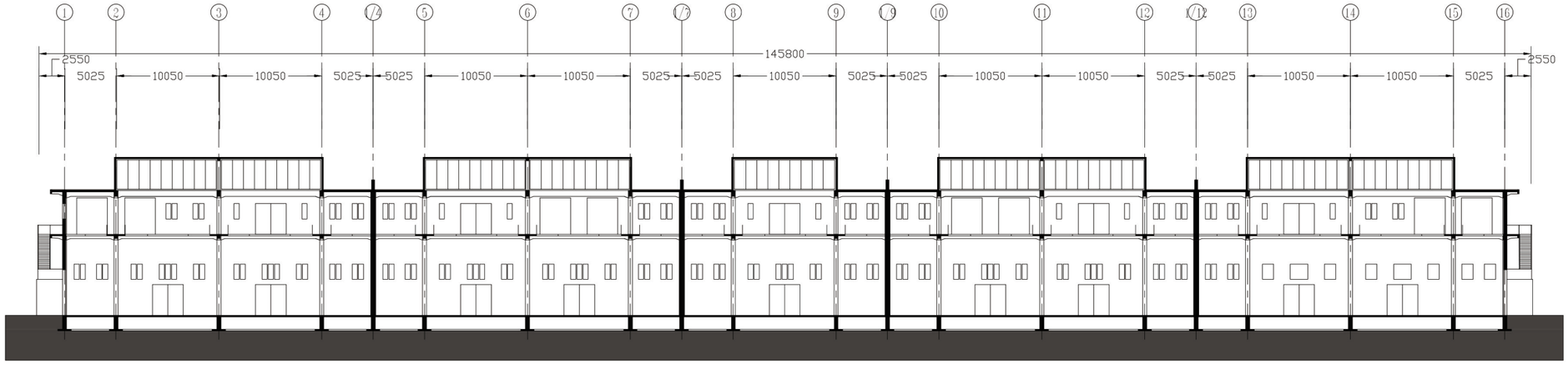


1F Plan 1/500_current status by Xihao Yi

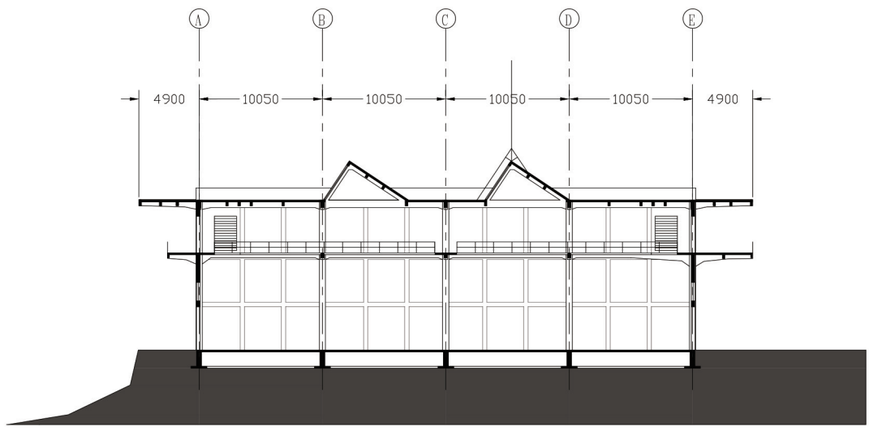


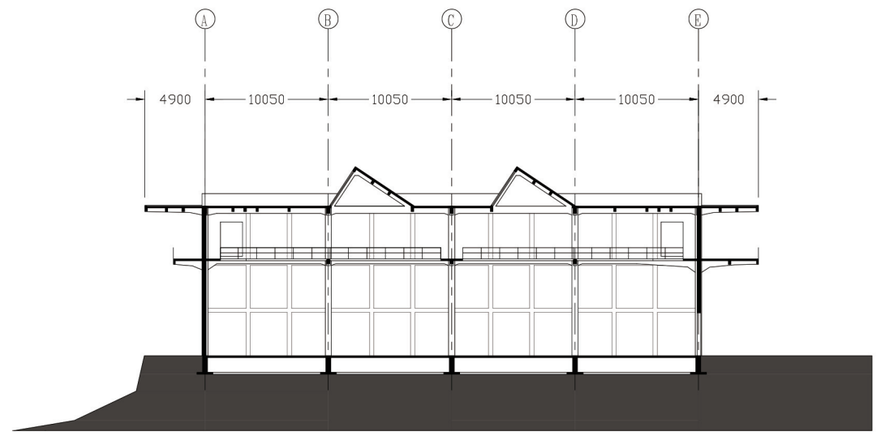
Roof Plan 1/500_original status by Xihao Yi





Upper drawing: Longitude Section 1/500_original status by Xihao Yi
Lower drawing: Longitude Section 1/500_current status by Xihao Yi



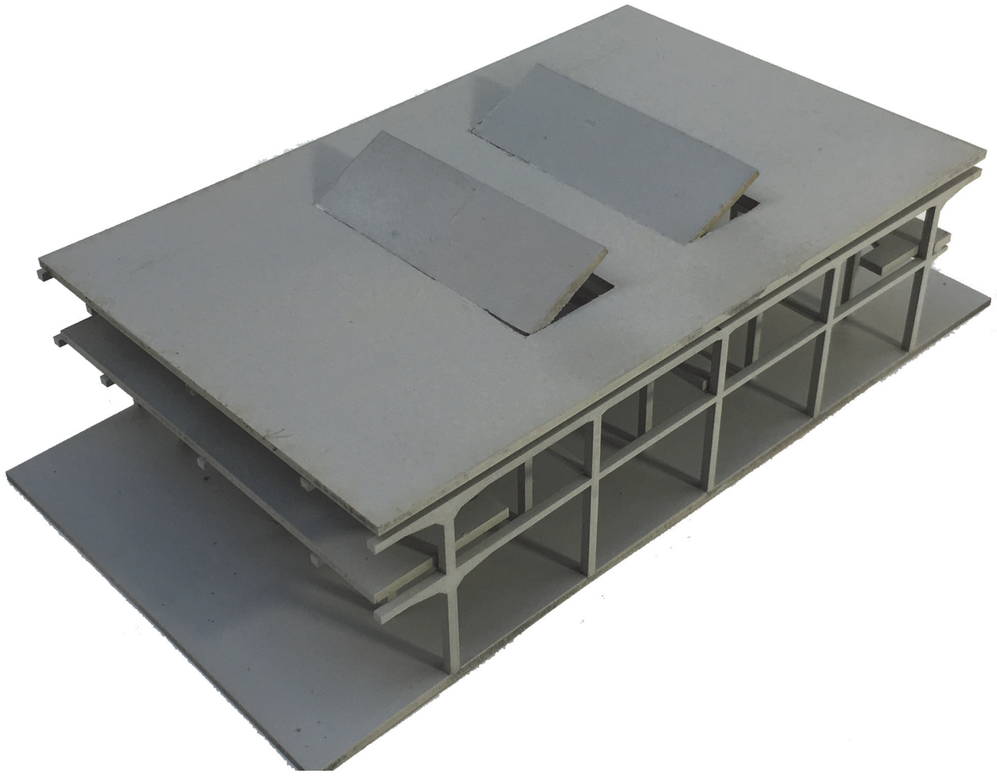


Left drawing: Cross Section 1/500_original status by Xihao Yi
Right drawing: Cross Section 1/500_current status by Xihao Yi

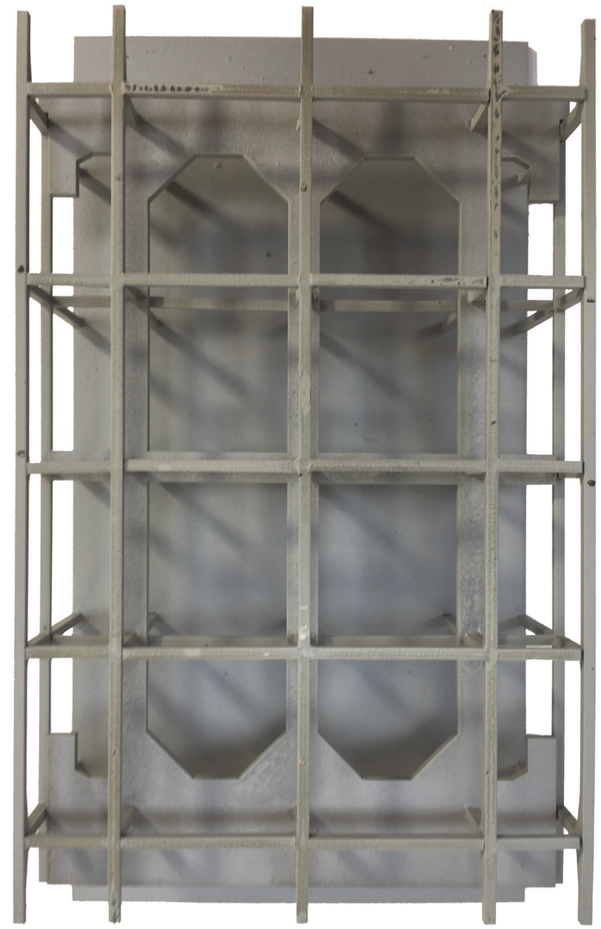
MODELS

This chapter is all about the models. We as a group decided that we need something of the analysis that you can hold in your hand or arms that is an addition to the analysis and the further design process. We decided to make a small model of the Katoenveem and the surroundings and a model of one of the building compartments to show especially the structure of the building. On the following pictures you can see some photographs we took of the two models.

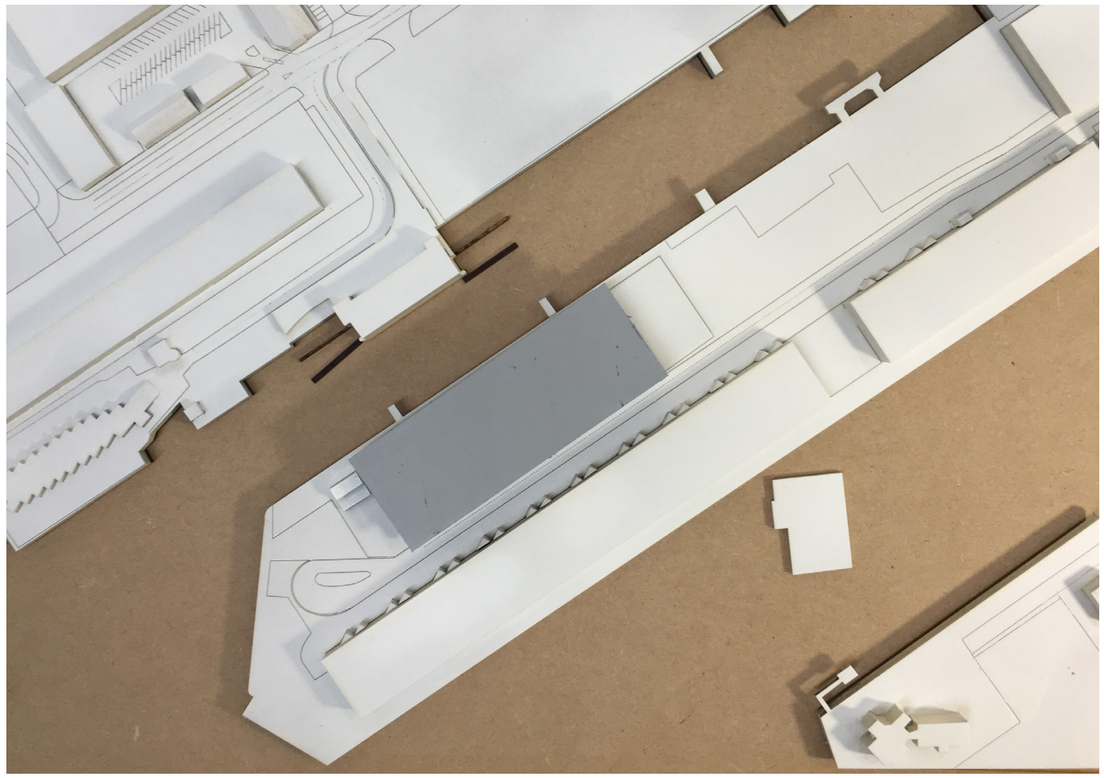
structure model adjusted photograph for the sence of scale by joost van den berge

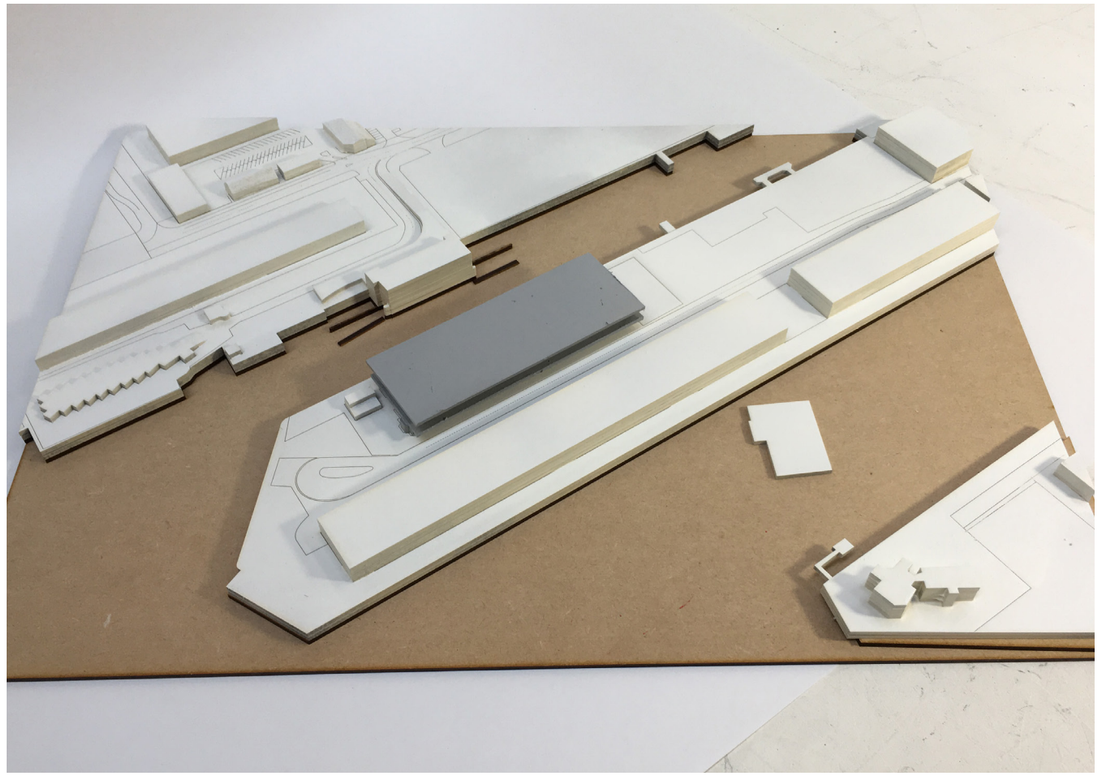


two photographs of the structure model by joost van den berge
one from above and one sectional or sideways

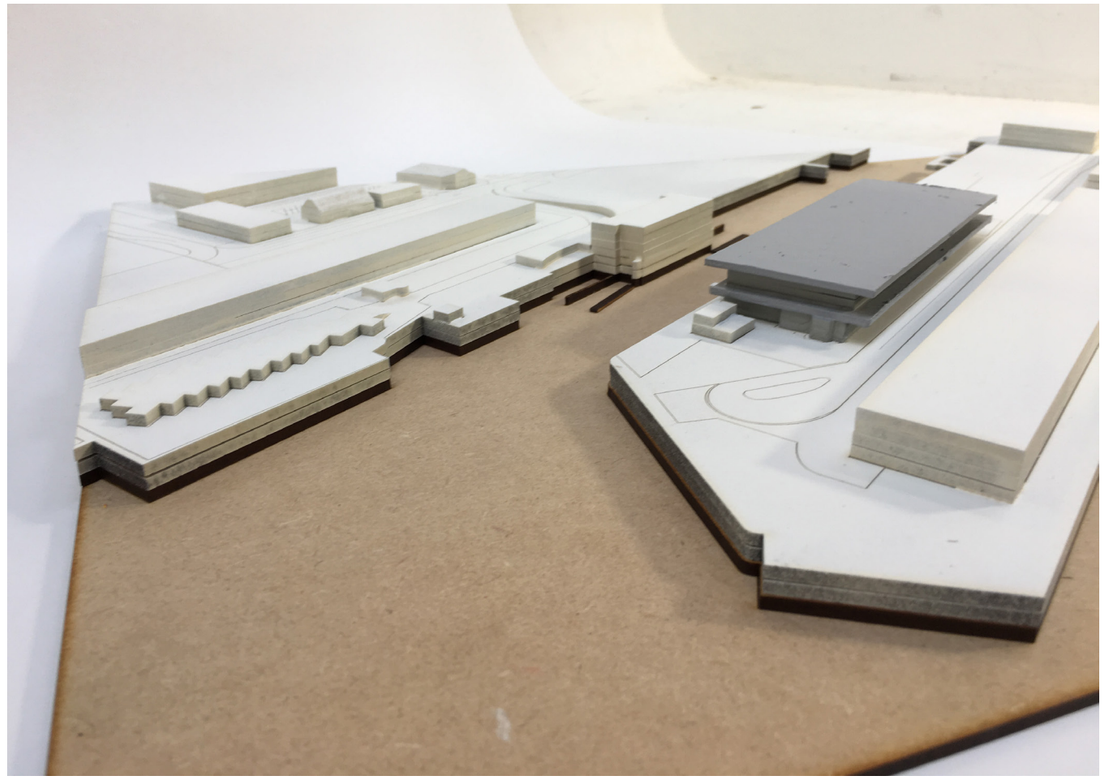


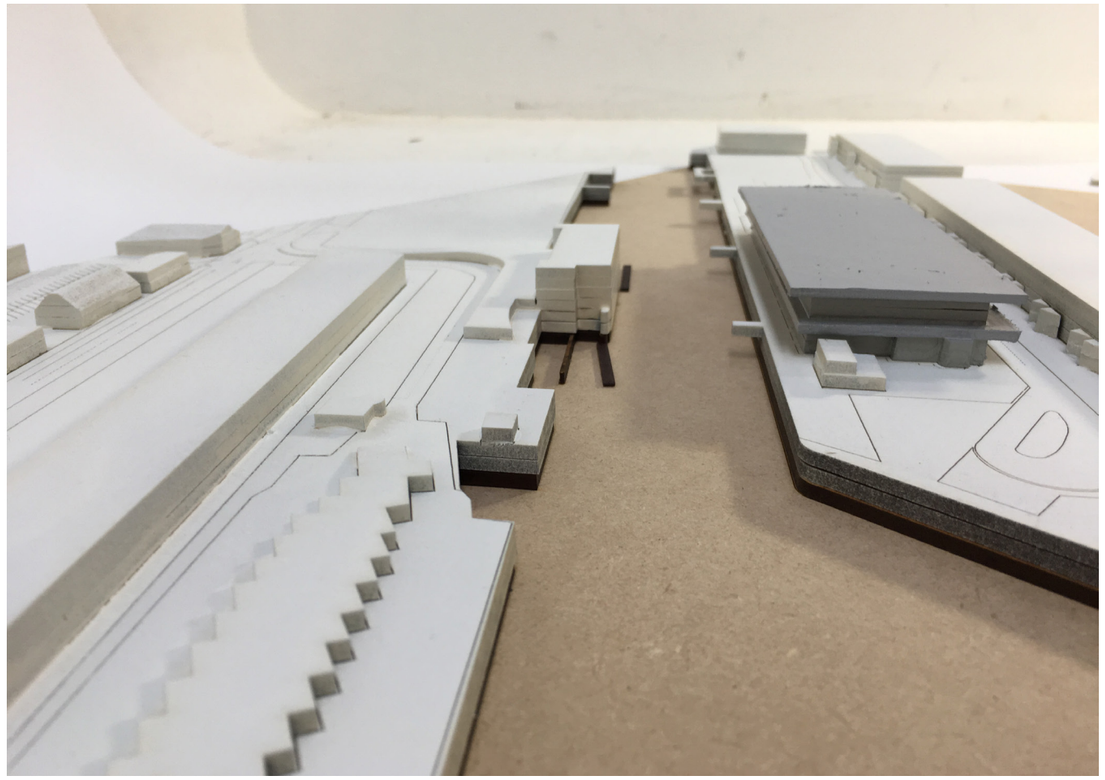
two photographs of the structure model by joost van den berge
both from above but both without the roof





two photographs of the urban model
both from birdseye view





two photographs of the urban model
both looking into the Keilehaven

CONCLUSION

The skin of the building has literally and figuratively two faces. Offcourse the interior and the exterior but these two are totally different in reality. The exterior has been badly weathered and eroded, as you will see in the damages chapter after this, but the interior skin is almost completely untouched besides paint and damages due to the movement of cottonbales.

However both are still mainly in there original state. Almost all original elements, services and materials are still present and even traces of former structures like the holes in the gallery's or beams of the former steel bridges are seeable. The original doors & windows are still present but a lot are shut by concrete or wood and even some windows are completely destroyed due to the placement of new square windows at the west and east side of the building as you can/could see in the current situation chapter.

The window decoration was something interesting we found out. This subtle but striking use of ornamentation in the facade turned out to be a reference to the former designs of J.J. Kanters and the use of this kind of decoration in the city of Rotterdam. Last but not least the small decoration left on one the skylights on the roof turned out to be after research the base and leftovers of a much larger decorative element of the building, namely: the steel Katoenveem roof sign.

The structure, services and the interior physical environment of the Katoenveem were specifically designed for the storage and transportation of cotton. Without any part of the complex, the operation of cotton would be inefficient and unsafe, some times even impossible. The building technologies applied on the building were advanced at the time when the building was built.

Except for the weathering and damages on the surfaces of the building, the major structure of the building still stays in a stable status. The services including the sprinkler system and conveyor system are no longer operational, however, their existence can undoubtedly be evidences of the history of the building.