

# SITE AND BUILDING ANALYSIS

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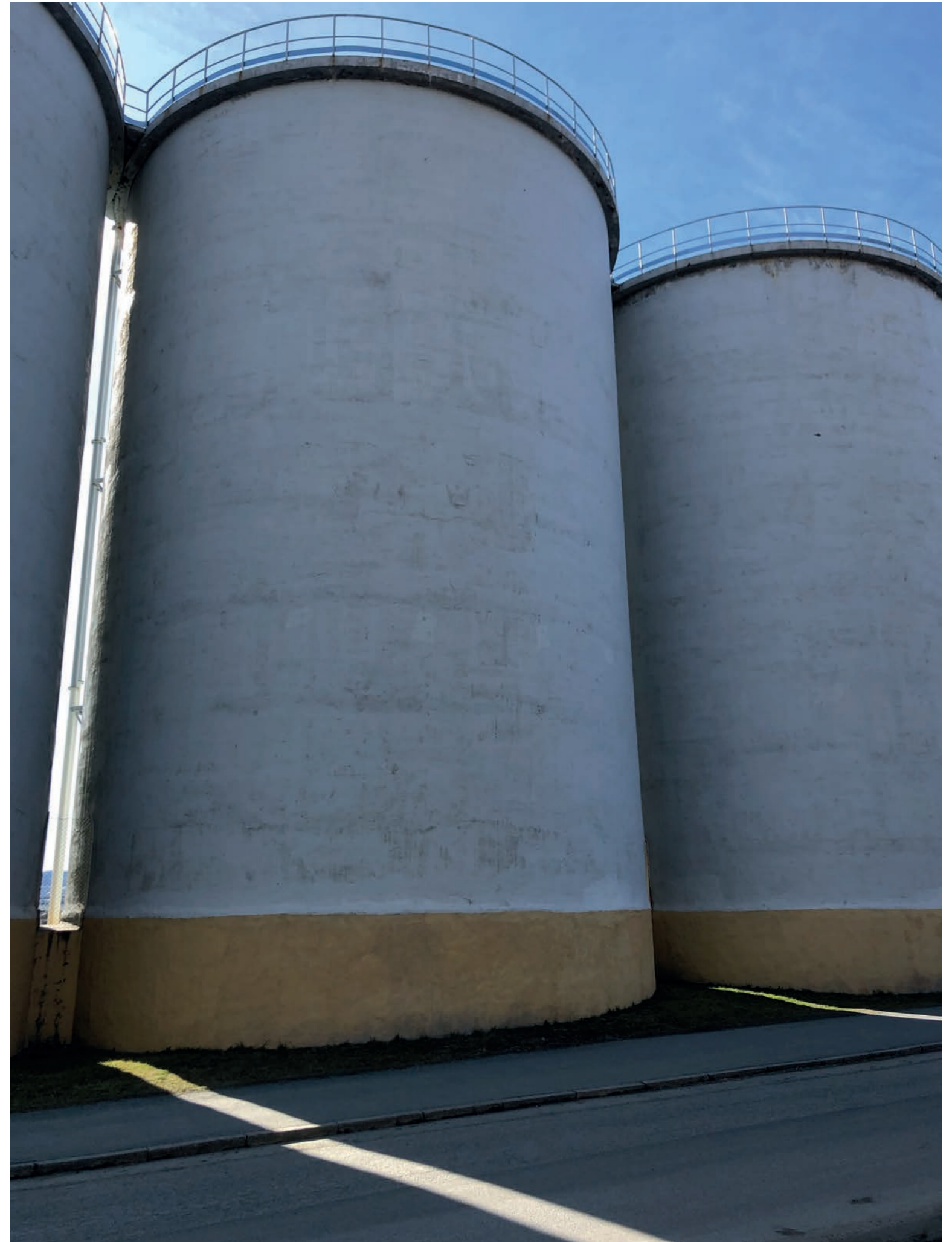
# INTRODUCTION

Through our work we have designed a proposal transforming cement silos from 1962. The silos are located at Nyhavna, an industrial area that will change drastically the following decades.

To understand the development of Nyhavna and what it will become, we have studied the area as it is today and its future plans. Nyhavna is divided into area zones, and the silos are a part of Ladehammerkaia. We have researched the history of Ladehammeren and the municipal master plans for the future.

We have studied the complex by looking at the site, its heritage value and architectural qualities, as well as its history, materials, construction and technical condition.

These studies have been important to later make decisions regarding what to transform and what to tear down, as well as deciding the buildings' program.





**NYHAVNA**

## NYHAVNA TODAY

Starting at the end of Nidelva, just east of where the river meets the ocean and Trondheim's city center, lies Nyhavna. The area is distinguished by its contrasts, where heavy industry meets artistic souls. The most defining monuments are the two submarine bunkers built by the Germans in WWII, reminding us what Trondheim was like during the war. In the east you find charming Svartlamoen, with tiny, colorful houses, urban farming and alternative lifestyles. In the north starts Ladestien, an immensely popular Sunday walk-destination. Huge harbour basins let the water flow in and out of the area, creating barriers and opportunities. The post-war era led to an explosion of industrial complexes, some of which are still in use. Others have left since then and opened up for culture and creative souls in the old industrial facilities. The mix of industry, culture and creativity is what marks Nyhavna today.





### **INDUSTRIAL BUILDINGS**

Today Nyhavna is characterized as being an industrial area. This map shows the remaining industry today. The numbers of industrial complexes will decrease in the years to come, as it is a desire by the municipality that they move further out of the city.



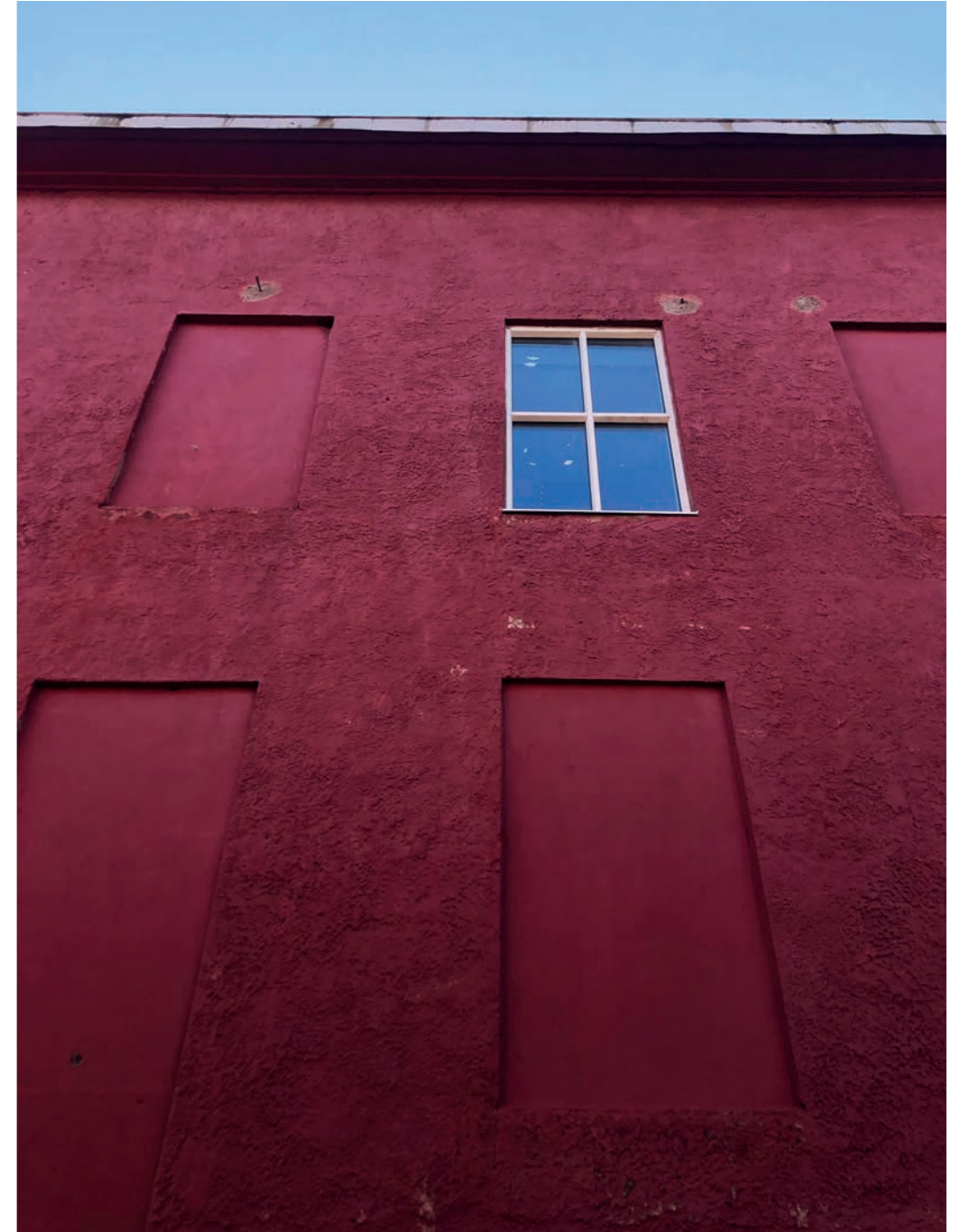
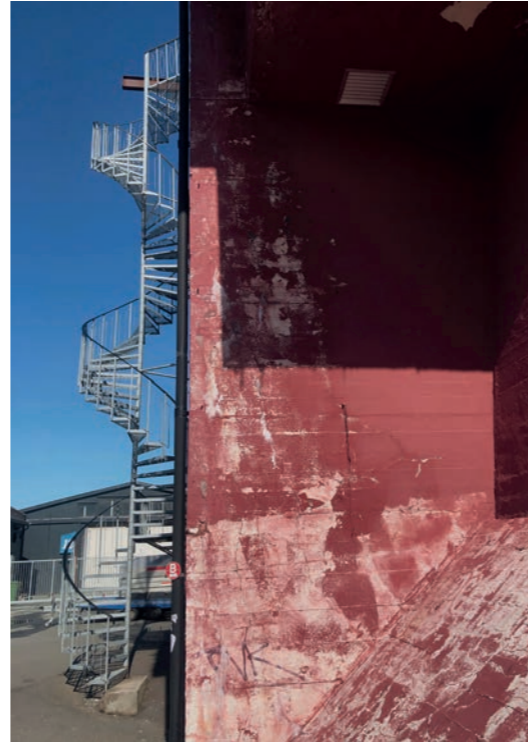
### **GREEN AREAS**

There are scarcely any public green spaces at Nyhavna today (marked in dark green). Other private or inaccessible green areas (light green) are a little more common, but generally Nyhavna is more grey than green. Ladestien, a popular walking trail, starts to the north of Nyhavna and continues along the coast. In the future, the municipal master plan<sup>1</sup> describes how Ladestien will continue into Nyhavna and create a green connection.



### **INACCESSIBLE AREAS**

Nyhavna is an industrial district, which leads to big areas being inaccessible for the public. Fences and other barriers make it impossible to walk around freely, especially along the harbour, which today is used for shipping.



*Façades and materials at Nyhavna*



### EMPTY BUILDINGS

Nyhavna is going through big changes, and a lot of the industry is moving out because the area is no longer suitable. As the city center of Trondheim expands, the area is more appealing for housing and public activity. The area is less suitable for industry because of higher property prices, new regulation regarding noise and more traffic, and that is why many buildings are left vacant by their previous owners. The map marks the vacant buildings we know of.



### COMMERCE AND ACTIVITY

Nyhavna is not a very commercial district today, nor should it become one in the future, according to the municipal master plan. The buildings marked in red are the shops and restaurants present today. Nyhavna accommodates a lot of alternative cultural and athletic activities, marked in yellow. To mention some, there is a bowling alley, several dance studios, training and climbing facilities, concert halls and an artistic collective.



### OFFICES AND HOUSING

Some office buildings (green) have been erected in the last years, and in the future there will likely be more. There is no housing (grey) at Nyhavna today, but close by you find the alternative Svartlamoen, the new development at Lilleby and the traditional single-family homes at Ladehammeren. Approximately 20 - 25 000 inhabitants will be living close to or at Nyhavna by 2050, according to estimates. <sup>2</sup>





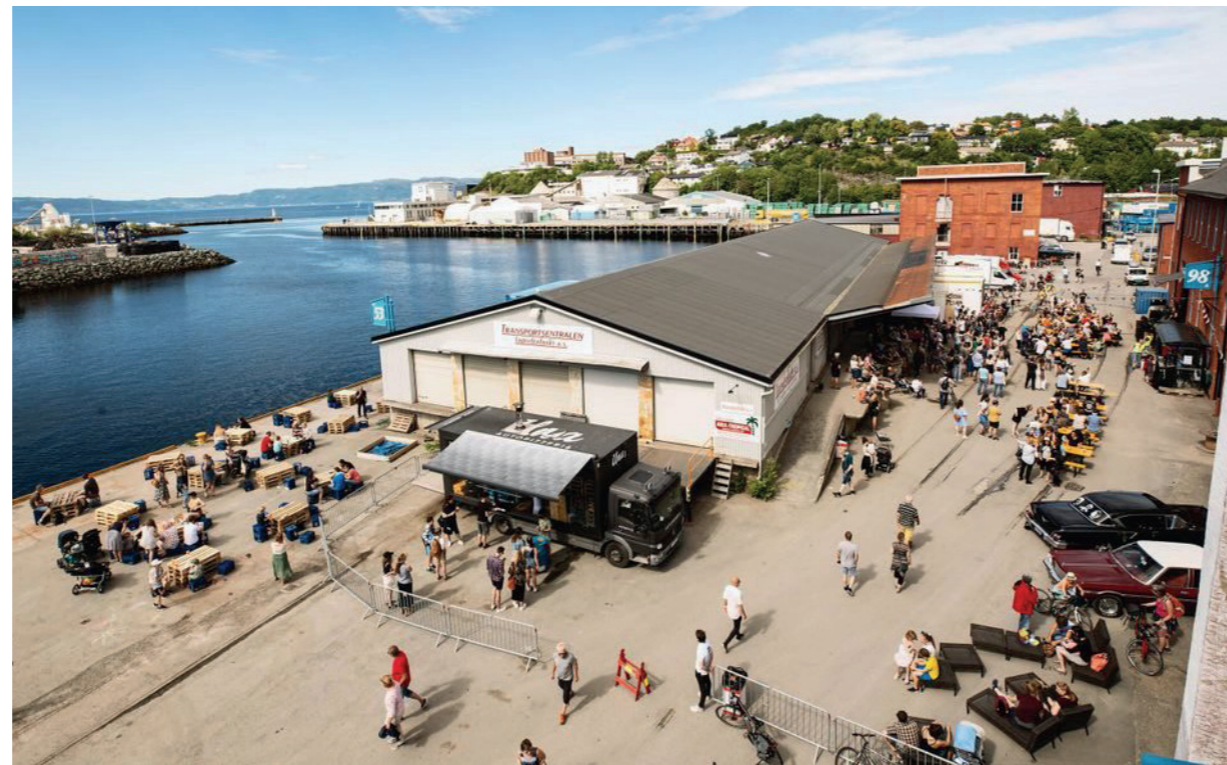
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*Pictures from cultural events at Nyhavn*

## NYHAVNA IN THE FUTURE

Being so close to the city center, the municipality has many plans for the future Nyhavna. It will change drastically the following decades. In the Nyhavna municipal master plan they emphasize the connection to the water, and they want Lade-stien's greenery to flow into the city. They plan to create a series of new parks, public squares, roads and walkway bridges. The post-war industrial era will come to a definitive end, and the industry remaining today will soon move out. Housing, offices, commerce and culture will be the new Nyhavna. This will lead to a lot of tear downs and new builds. These illustrations are from a conceptual competition held by the municipality.



8



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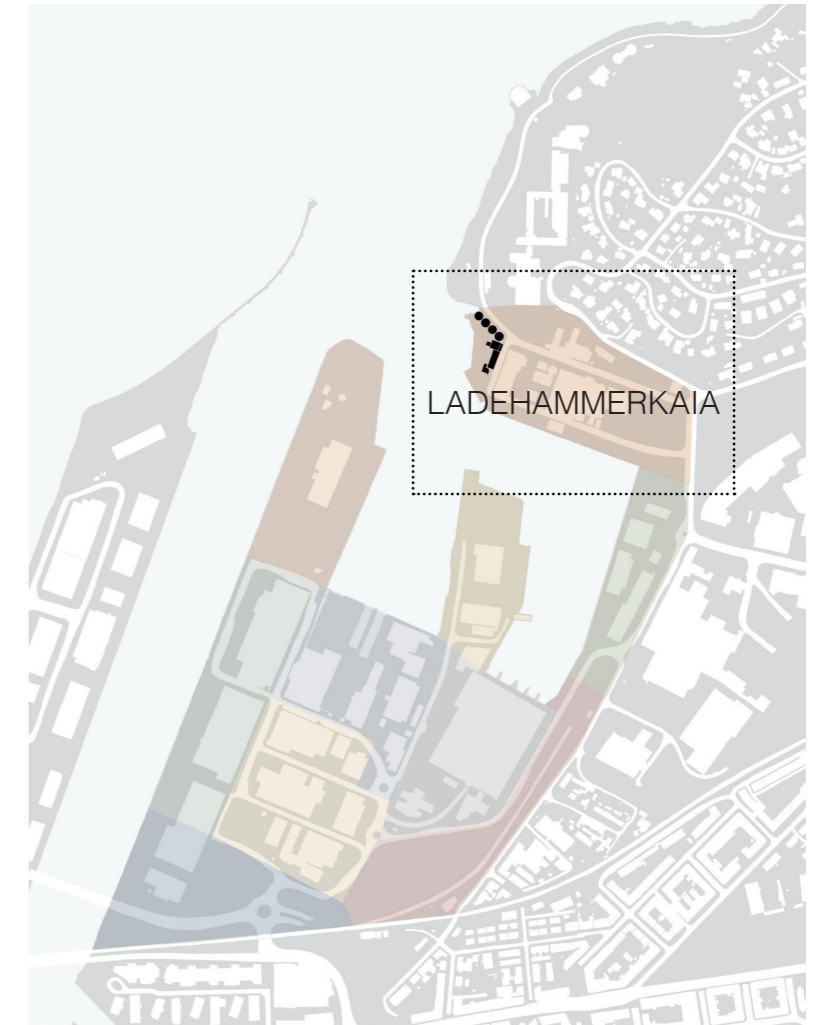
### **PRESERVED BUILDINGS**

The future Nyhavna will be very different from the Nyhavna we know today. A lot of buildings will be torn down and new ones will replace them in the next decade. The municipality claims that the spirit of Nyhavna will still be maintained by conserving the WWII buildings and some industrial buildings, here marked in yellow.



### **FUTURE PROJECTS**

The red lines are the main axis of connection through the area. The city meets the new developing area Lilleby and historic Lade at the orange junction. For pedestrians, bikers and public transport this axis will be crucial in the future. The white dotted areas show future developing projects that are in motion. Some have even started to build. The new developments will contain housing, offices and a huge new conference center and hotel.

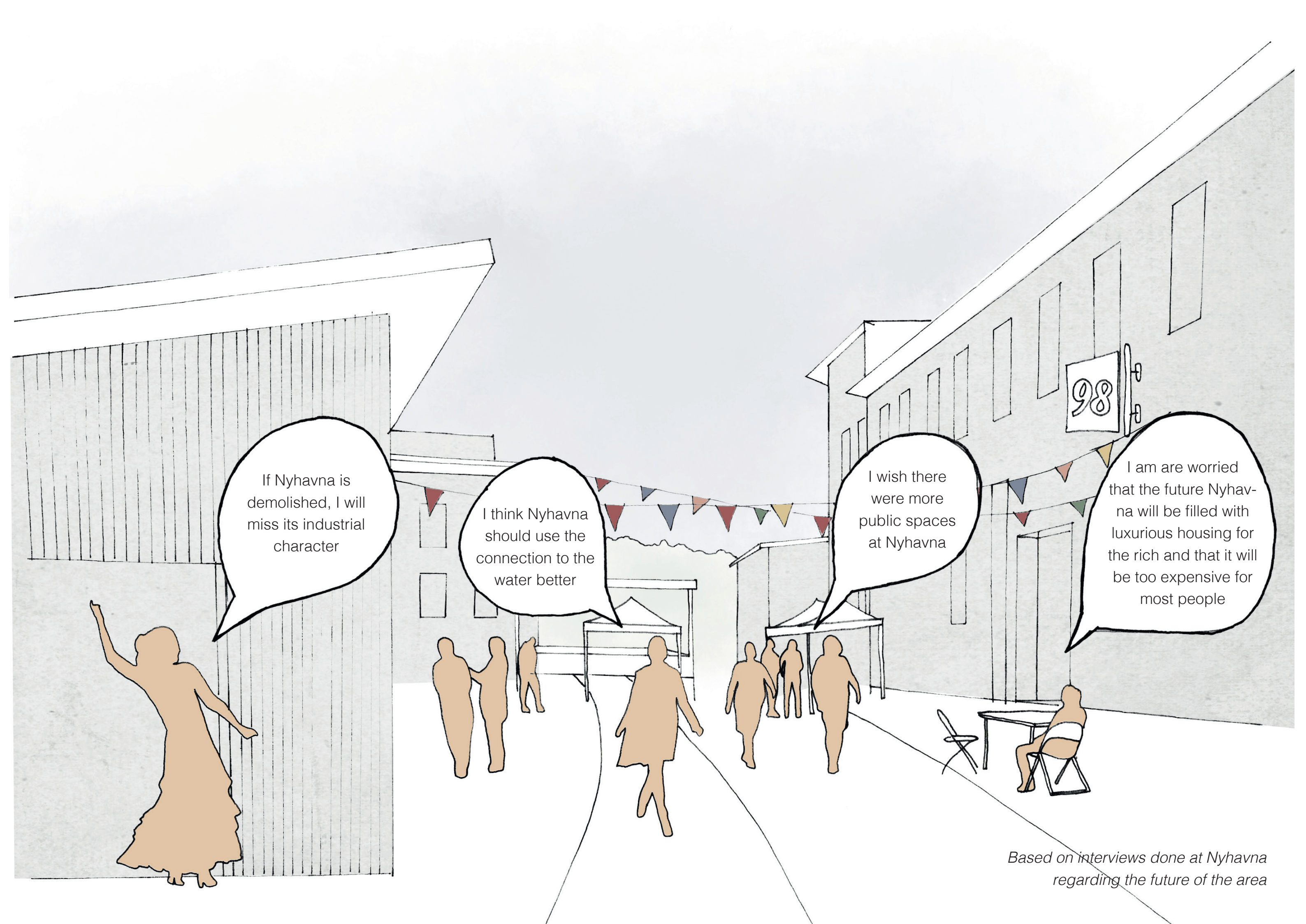


### **AREA ZONES**

Nyhavna will be divided into 10 smaller areas, differentiated by typologies and activities in that area. Some will be more private with housing and parks, like Ladehammerkaia. Others will contain public squares, offices, historic landmarks and public buildings.



*Pictures from "Talerørsplassen". The sculpture is an attraction in the area.*



If Nyhavna is demolished, I will miss its industrial character

I think Nyhavna should use the connection to the water better

I wish there were more public spaces at Nyhavna

I am are worried that the future Nyhavna will be filled with luxurious housing for the rich and that it will be too expensive for most people

*Based on interviews done at Nyhavna regarding the future of the area*

**LADEHAMMERKAIA**

**NORCEM**



# THE HISTORY OF LADEHAMMEREN

PREHISTORIC AREA

THE VIKING AGE

THE MIDDLE AGE

Ladehammeren is used as a cairn mountain

An important pagan temple was established, and it has likely been a place for worship ever since, with Lade Church supposedly standing on the same spot today

Bakke nunnery is founded and the farms at Lade is taken by the church

The farms are given back to private owners, and produce mainly meat, vegetables, wheat and animal biproducts

9th century

1000 AD

12th century

1198 /99 AD

16th century

Ladehammeren is a strategic point due to its view and the access to fertile soil, in addition to the mild climate. It is one of the first places in the area where people settle

The Viking earls of Lade arrive from the north and settle at Lade: they owned the coast and tax rights from Troms to Trondheim

Ladehammerkaia is used as a boat building site, and Ormen Lange is built on the sandbanks at Lahamran (Viking name for Ladehammeren)

Baglerne attacks Trondheim from the Lade peninsula



10



11



12

THE ENLIGHTENMENT

The farmers are  
chucked out in  
favour of the  
nobility and their  
new country  
estates

THE INDUSTRIAL REVOLUTION

The first industrial  
complexes replace  
some of the wheat  
fields, like soap, rope  
and brick production

The railway is  
extended until  
Lade

Ladehammeren  
is turned into a  
park and villa  
area

1845

1880s

1893

1897

Baroque ideas about  
living in the country side and in  
touch with nature prevail, and  
Lade is turned into a continuo-  
us park landscape, with baro-  
que architecture and gardens

Trondheim prohibits building  
with wood after several fires,  
but Ladehammeren is not  
included in the prohibition.  
Many move to the area and  
build their cheap wooden  
houses there instead

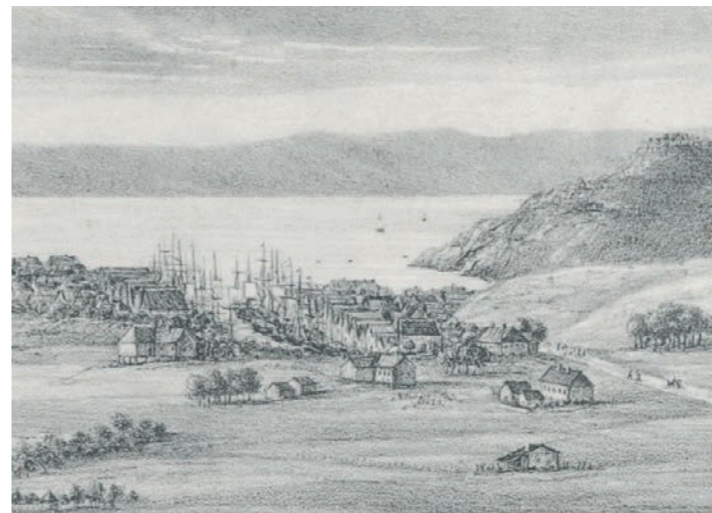
Ladehammeren  
is included in the  
City of Trondheim



13



14



15



16



Early  
1900

Several stone quarries are founded at Ladehammeren

1920s

The sandbanks are turned into a port and the area becomes an industrial hub, Nyhavna

1936

City planner Sverre Pedersen recommends the continuation of a green peak at Ladehammeren, and a new promenade at Ladehammerstranden

WWII

Dora I, the submarine factory, is finished by the Germans in 1943, and at Ladehammeren they build bunkers, fortifications and a coast battery (canons)

Post-war

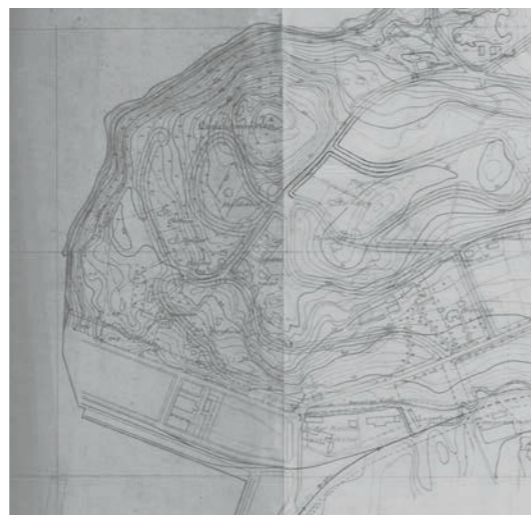
The municipal plans include an expansion of the industry, infrastructure and more housing at Ladehammeren and Nyhavna

1957

The construction of the maritime school centre, and later Ladejarlen High School, starts



17



18



19



20 17

The municipal master plan includes several ambitious points. The city planners want Nyhavna to be an extension of the city center marked by history, culture and sustainability

1962

Trondheim Cement silo is built

1989

Ladestien, the Lade trail, is founded

1992

Ladehammeren wastewater treatment plant is built

2000s

UTE-hallen climbing facility is built

Today

Nyhavna and Ladehammeren is in the process of change, and discussions about the future evolves around cultural heritage, new developments and the presence of industry

2030



21



22



23



24 18

# MUNICIPAL MASTER PLAN



## LADEHAMMERKAIA TODAY

The buildings along the harbour are mainly industry. Ships deliver supplies to the complexes and other deliveries come by truck. The industrial area meets nature where the popular walking trail, Ladestien, starts (marked in orange).



## THE MUNICIPALS MASTER PLANS FOR THE FUTURE OF LADEHAMMERKAIA

The city planners plan to preserve two round bunkers and one other building remaining from WWII. Two parks will surround the bunkers. A promenade is planned along the harbour. The areas marked in orange are supposed to contain housing and offices, mainly for families.<sup>25</sup> The silos we are transforming are not planned preserved.



# THE BUILDINGS

## THE SITE

The silos stand at the edge of various districts, and create an intersection between them.

Walking from the city and through Nyhavna, it is the industrial impact that overwhelm our senses. Concrete, steel, machinery, loud noises, the smell of burned coffee and dust are all a part of Nyhavna. The silos stand as the final barrier between the industry and the greenery of Ladestien. Passing the tall, round, concrete buildings that block the view, you finally reach the open space, the nature and the sea.

The landscape behind the silos climb up a steep slope, and on the top of the slope lies Ladehammeren. The area has always been viewed as a strategic point since prehistoric times, and can today offer a spectacular view, big gardens and expensive single-family houses. It creates a beautiful, green backdrop to the southern façade of the silos.

On the southern and western part of the complex there is an open space that welcomes the sun and the ocean. Ladehammerkaia has an historic connection to the sea since the Viking lords started to build their famous ships here. It is easy to understand the appeal of the site when the sun shines on a clear day and Ladehammeren creates shelter from the cold, northern winds.





## HERITAGE

Nyhavna represents a special time period in Norwegian history, the 20th Century industrial era. The buildings' shapes, materials and construction methods are unique for this time. Few people today see a historic or cultural value in buildings from this time period, and they are therefore demolished in huge numbers.

We felt an immediate attraction to the buildings when we saw them. It is a functionalist complex, built to be productive and smart, but the shape is still eccentric and interesting. It is not really something you would expect from something so logical.

Today everyone easily sees the value of a 17th Century wooden cottage, but many fail to see the purpose of protecting post-war industrial buildings. Silos around Norway are generally being torn down, as ours will be too, and we feel it is important to also keep 1960s industrial monuments as part of the built heritage.



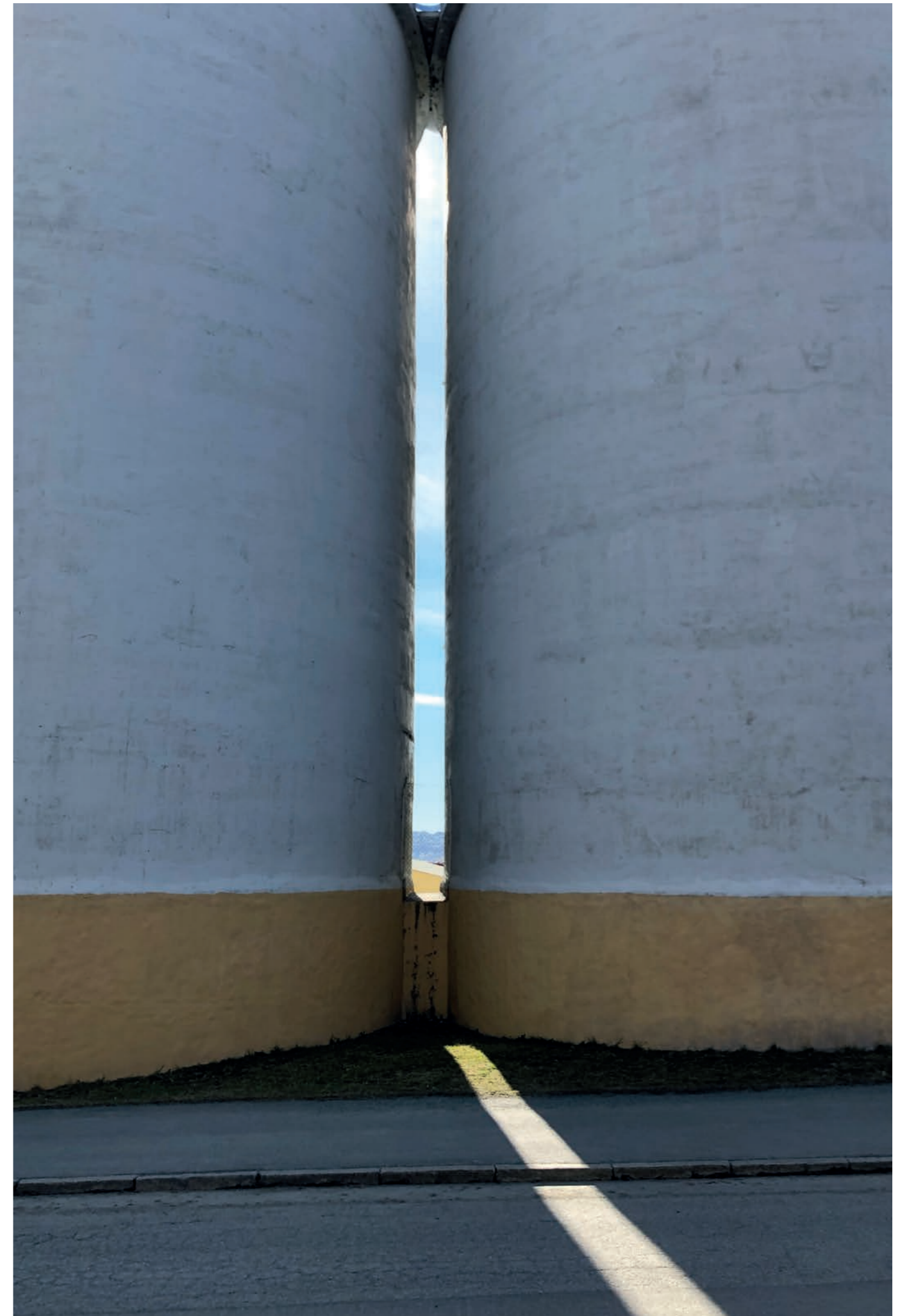


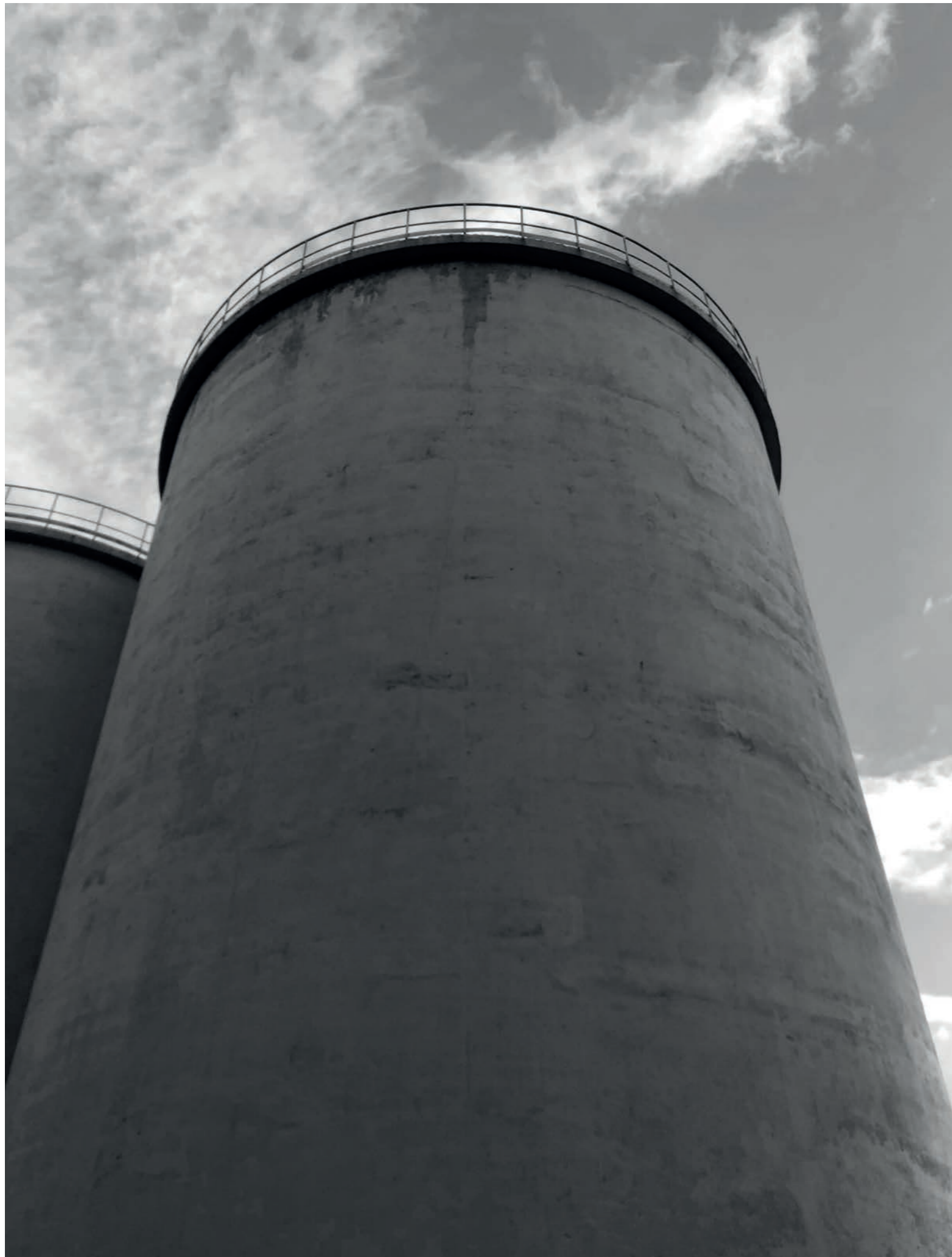


## ARCHITECTURE

The architecture of the silos is defined by monumentality and geometric forms. The four perfectly circle-formed silos stand in contrast to the squared communication-silo. The round silos give you a cathedral-like feeling when you pass them, with their verticality, their shape and the way that the light shines through the gaps between them.

The footprint of the buildings looks like it has been divided in two and one side has been rotated. The two sides balance each other out nicely. Between themselves they create a sunny, open and welcoming space. You feel protected by the big buildings to the north-west, making the place feel private and intimate.





## THE INTERIORS

The feeling of being in a cathedral continues on the inside of the buildings. While some rooms are cold and dark, others are enormous, and contrasts defines the complex.

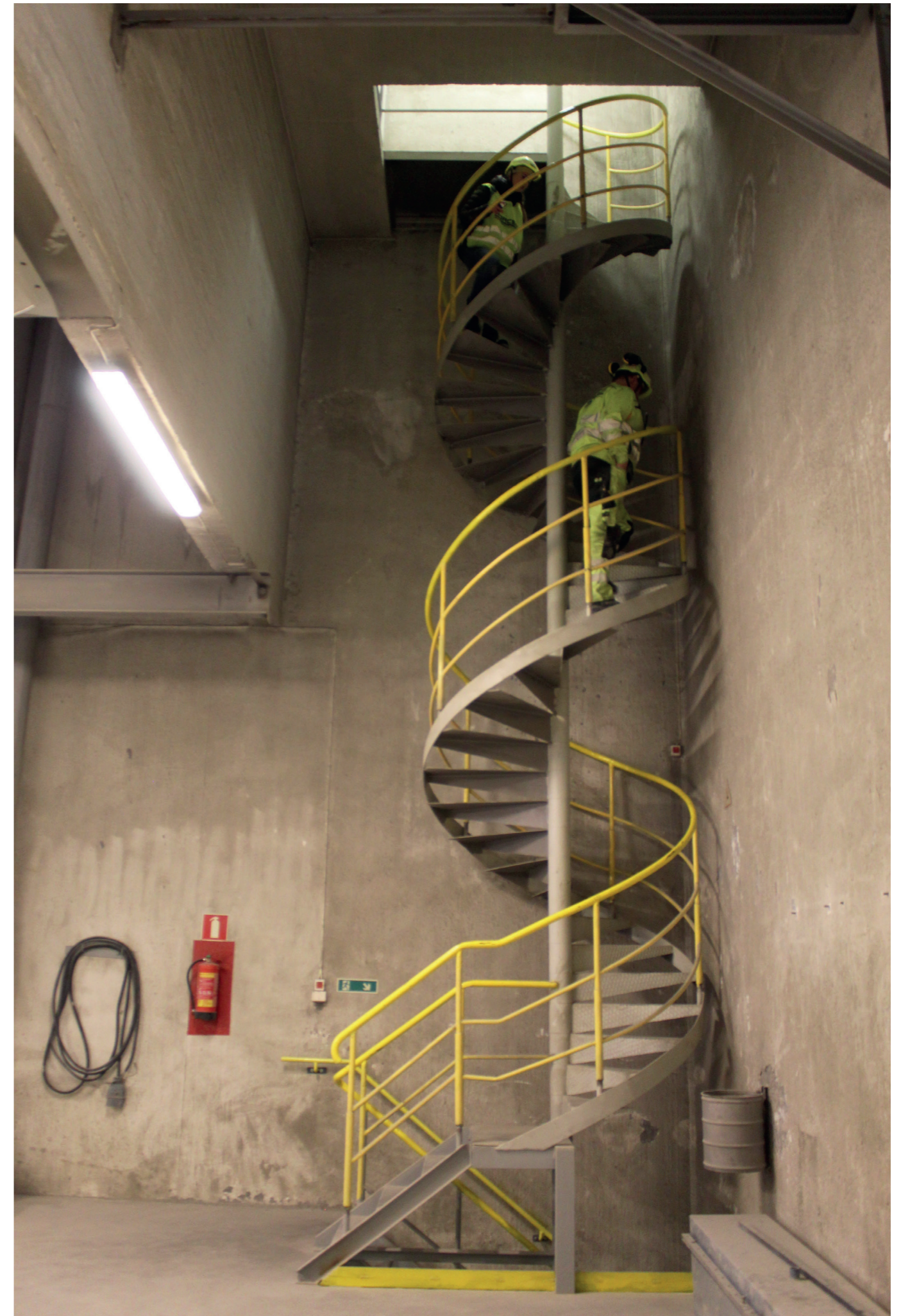
The ground floor and the first floor of the squared silo feel low and tight because of their low-hanging beams and they are lit up by a ghostly fluorescent light. The rooms feel gloomy and dusty.

The second and third floor on the other hand are spacious and grand. The light shines through the windows on the southern façade and give a majestic feeling to the rooms. Big, industrial machines hang from the ceiling, creating a contrast between tall and low spaces.

The material of the buildings is mostly a rough, untreated, grey concrete, but it is contrasted by steel elements in bright, signal colours.

These buildings truly give you a feeling of how unique industrial architecture can be, both sublime and claustrophobic.

*We only had the opportunity to see inside the squared silo as the round silos are filled with cement and not meant for people.*





**OWNER:**

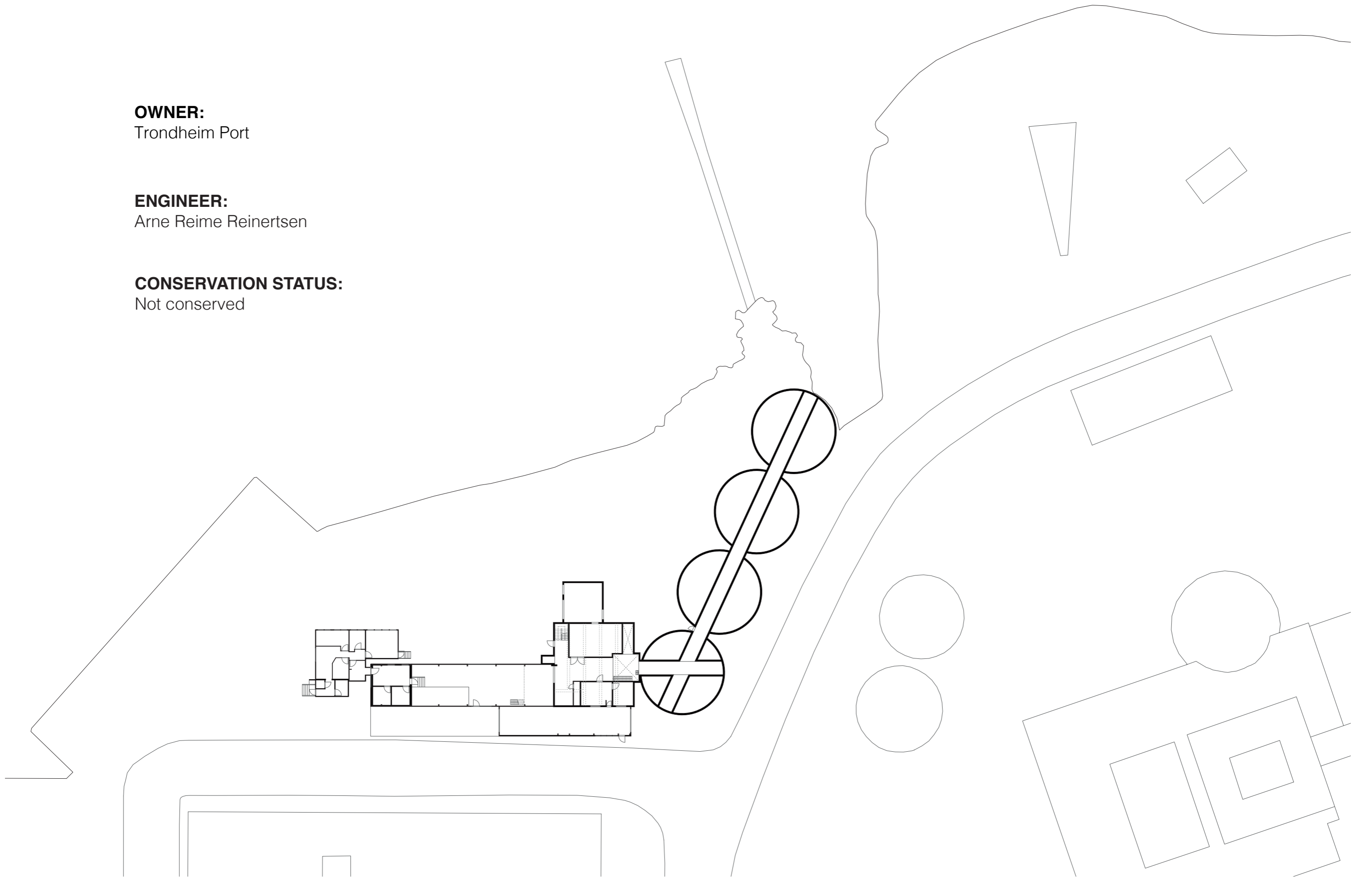
Trondheim Port

**ENGINEER:**

Arne Reime Reinertsen

**CONSERVATION STATUS:**

Not conserved

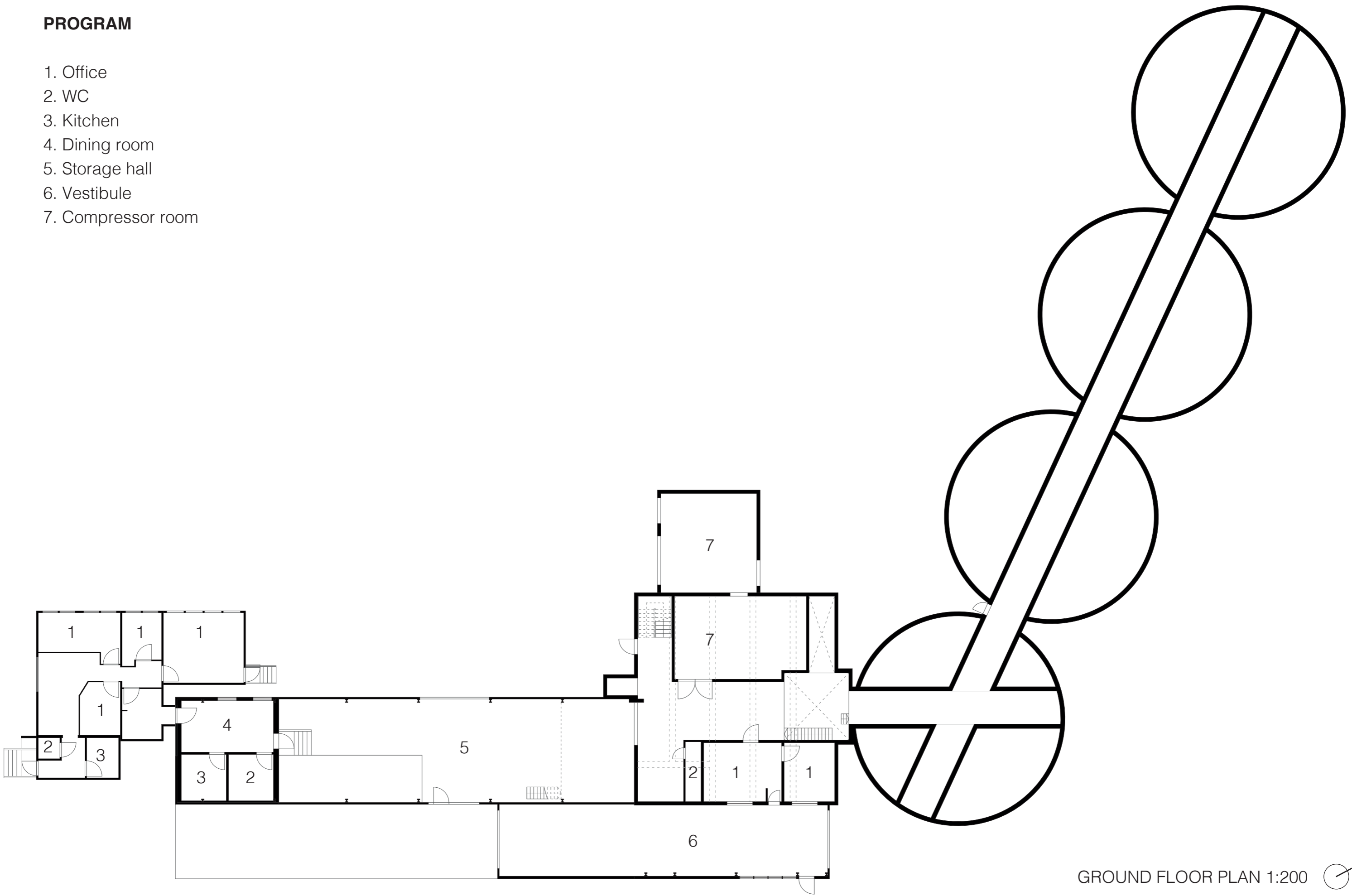


GROUND FLOOR PLAN 1:500



**PROGRAM**

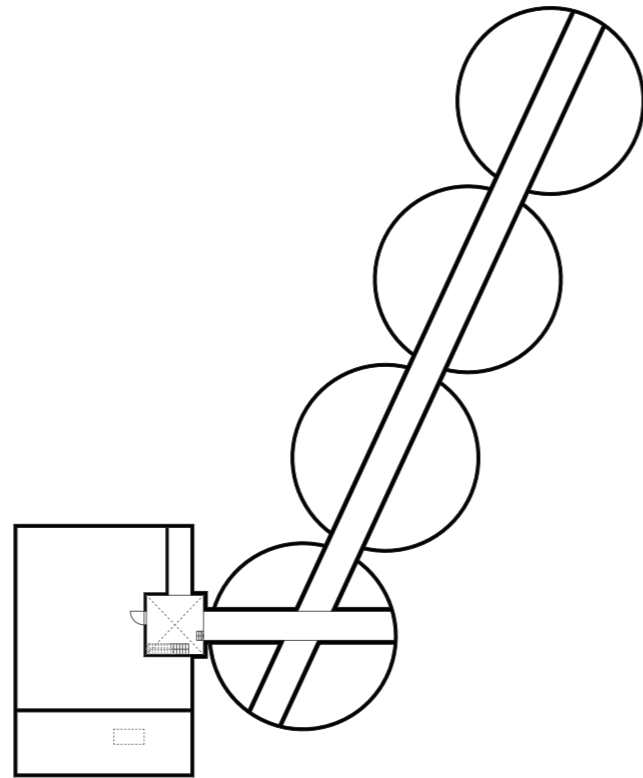
- 1. Office
- 2. WC
- 3. Kitchen
- 4. Dining room
- 5. Storage hall
- 6. Vestibule
- 7. Compressor room



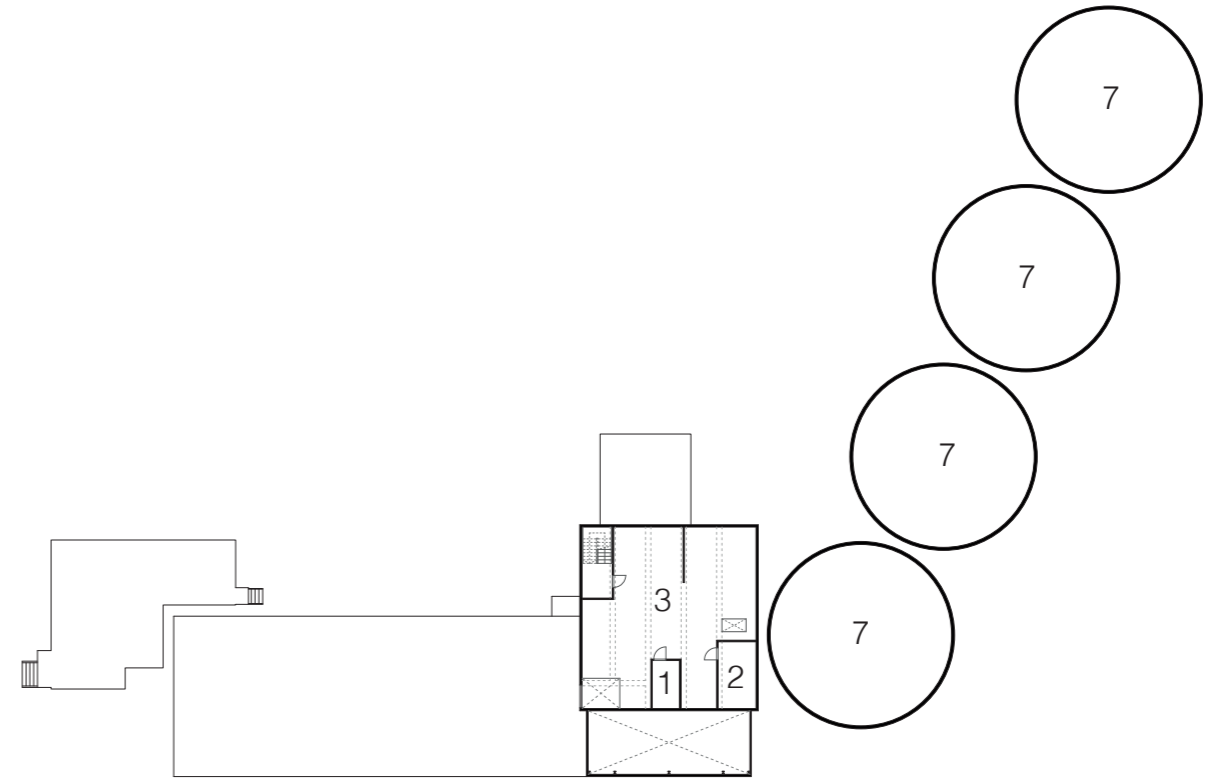
GROUND FLOOR PLAN 1:200

**PROGRAM**

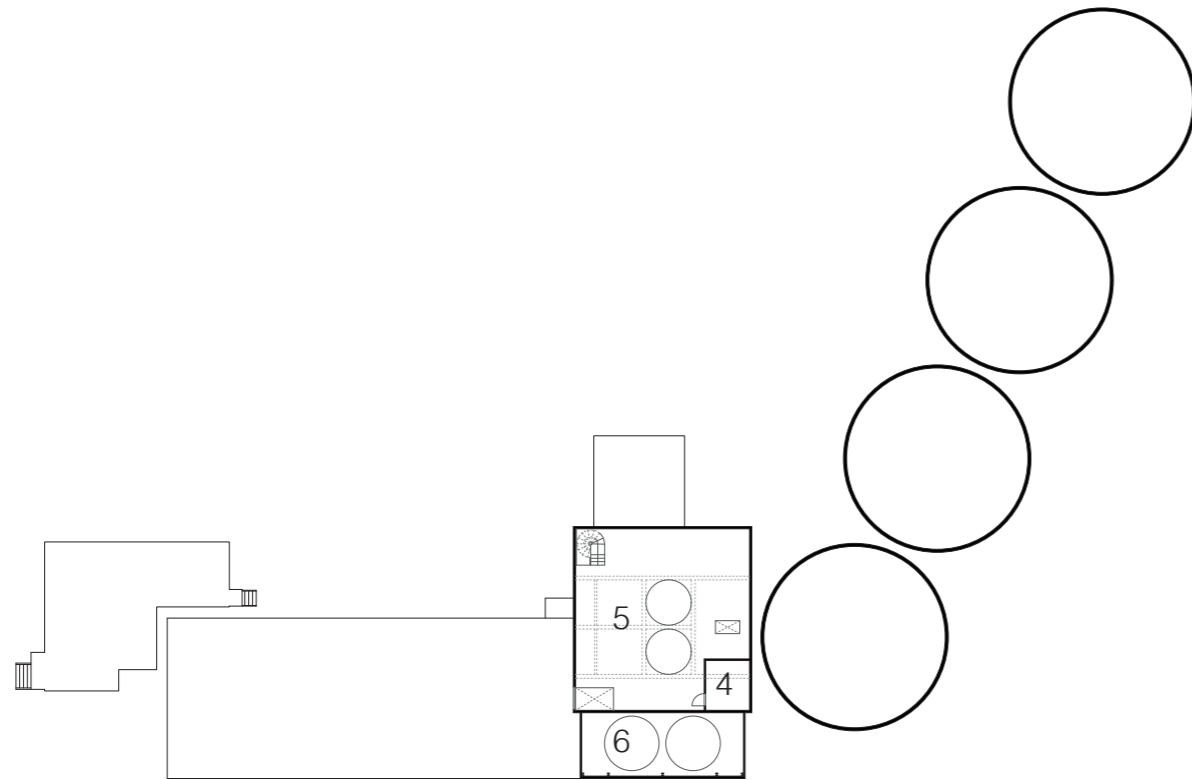
- 1. Wardrobe
- 2. Control panel room
- 3. Workshop
- 4. Storage
- 5. Machine room
- 6. Silos
- 7. Cement storage



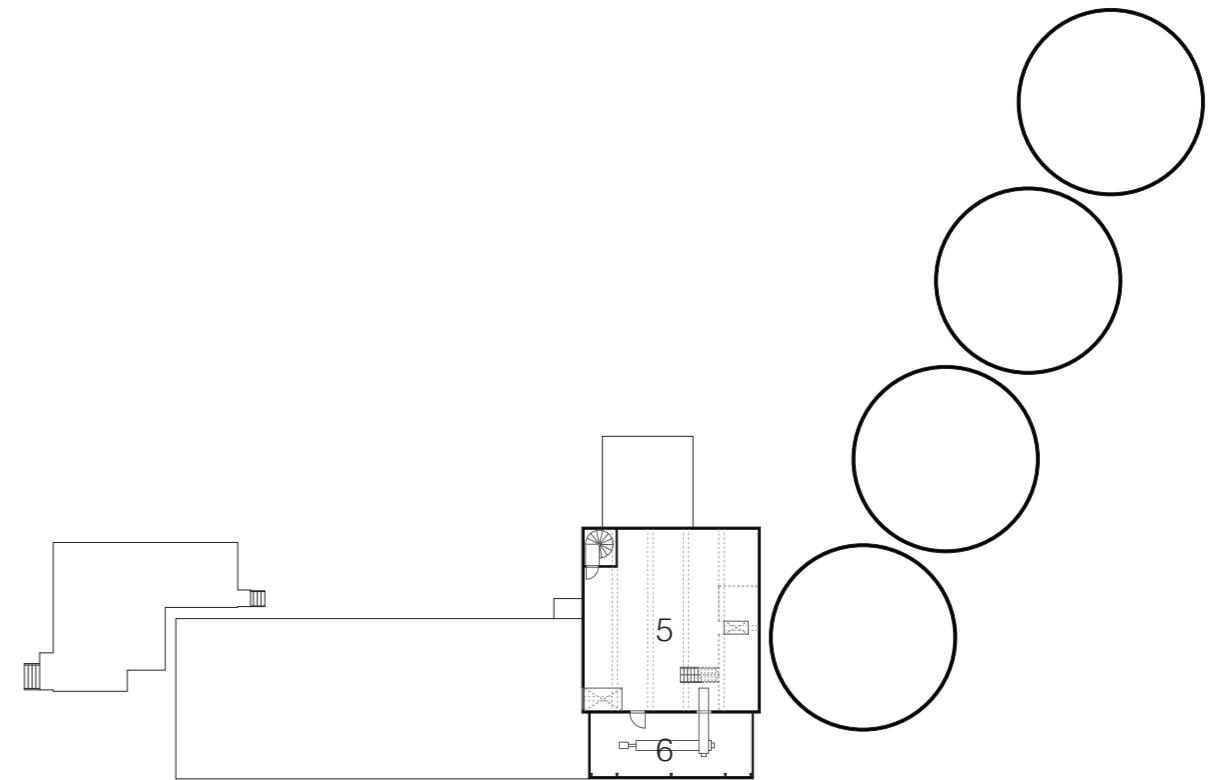
BASEMENT FLOOR PLAN 1:500 ↻



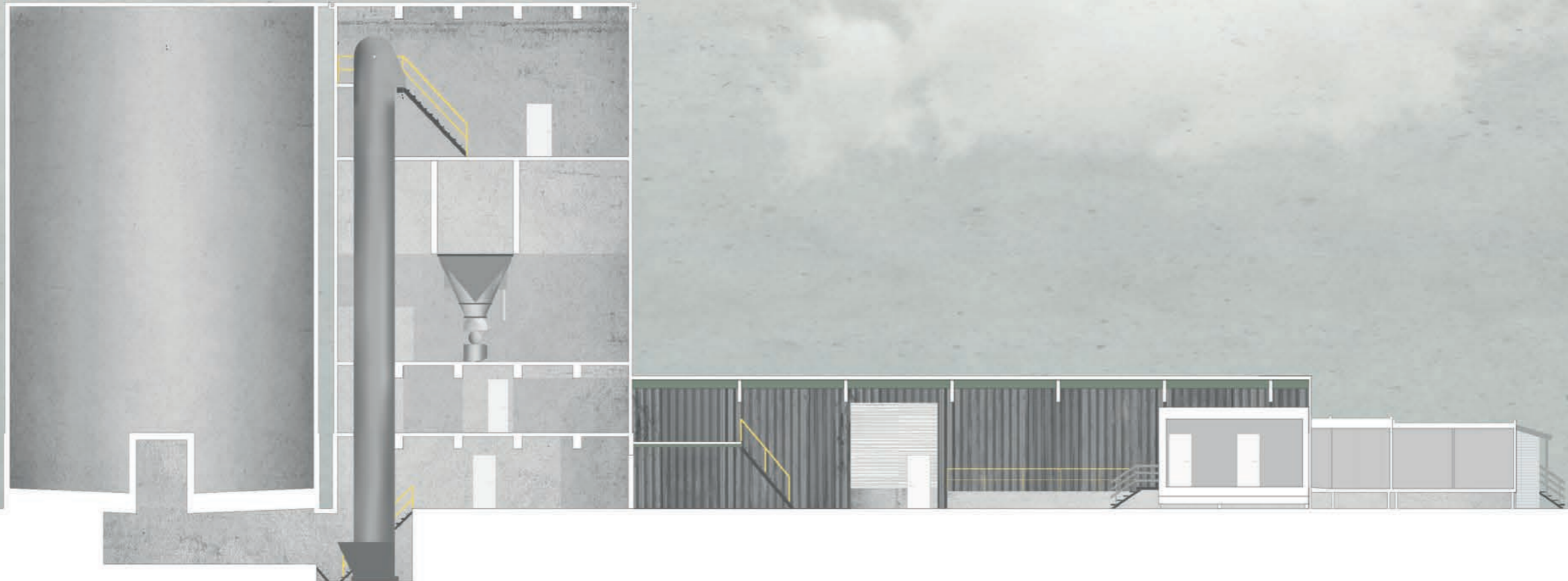
1ST FLOOR PLAN 1:500 ↻



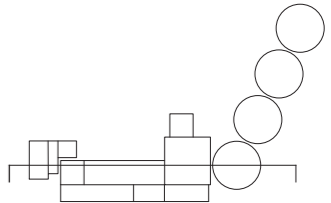
2ND FLOOR PLAN 1:500 ↻



3RD FLOOR PLAN 1:500 ↻



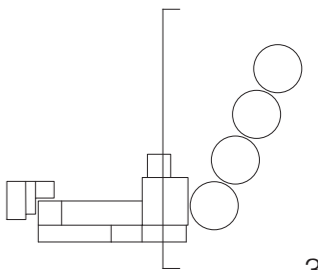
SECTION 1:200





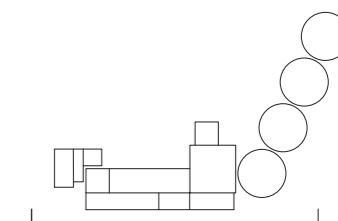


SECTION 1:200



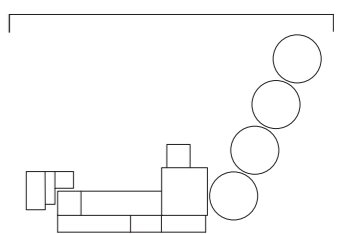


FACADE 1:200



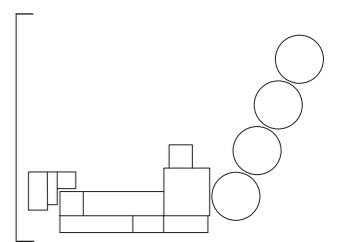


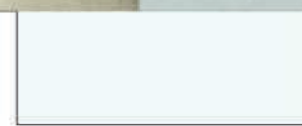
FACADE 1:200



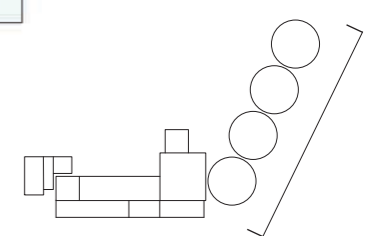


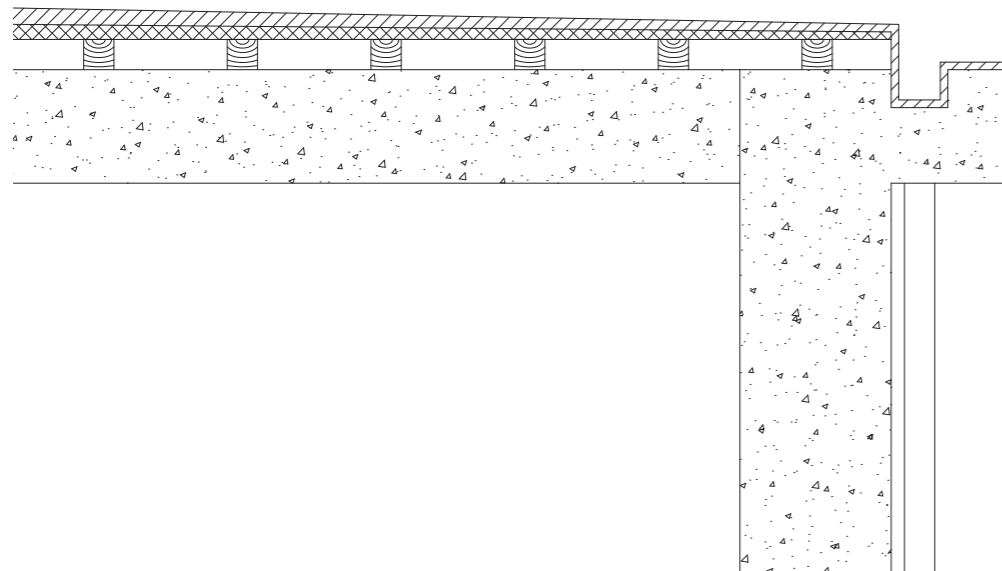
FACADE 1:200





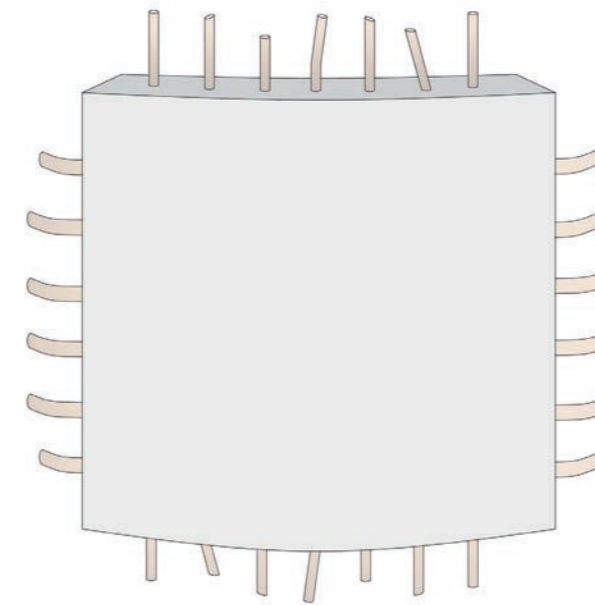
FACADE 1:200





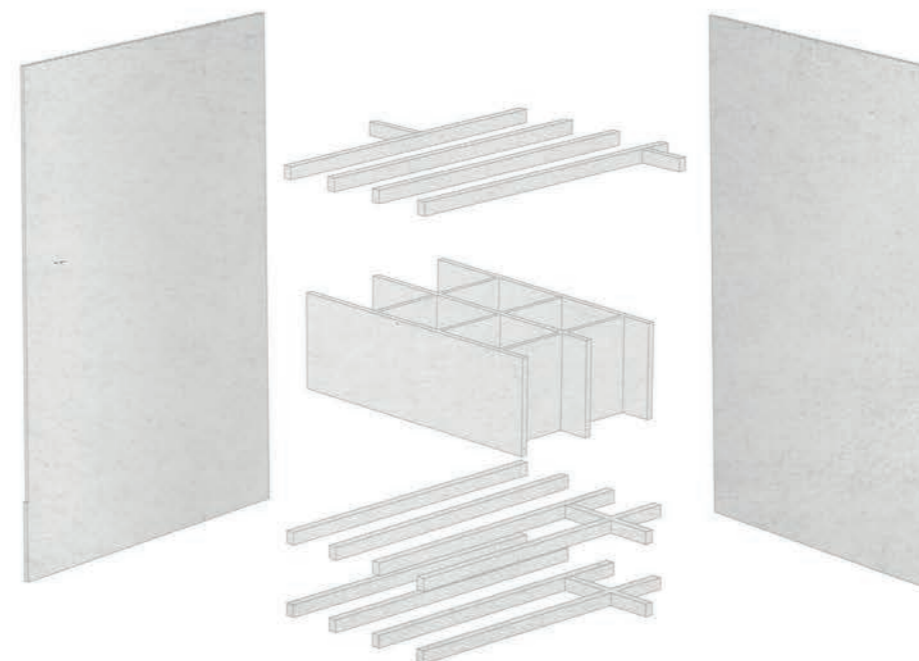
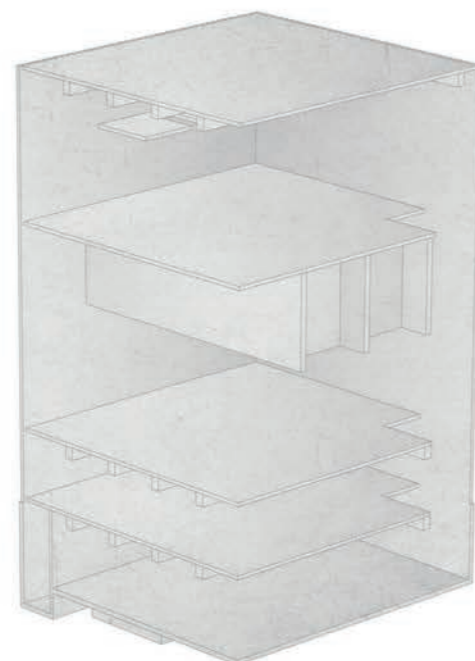
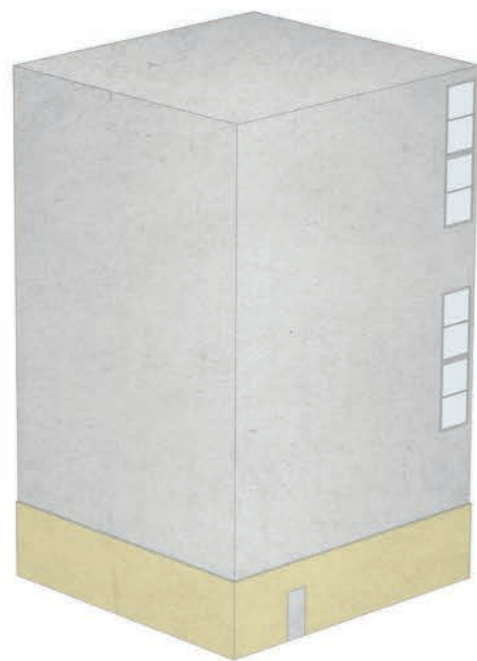
**ROOF DETAIL 1:10**

- Roofing felt
- Wooden boards
- Air gap
- Reinforced concrete



**REINFORCED CONCRETE**

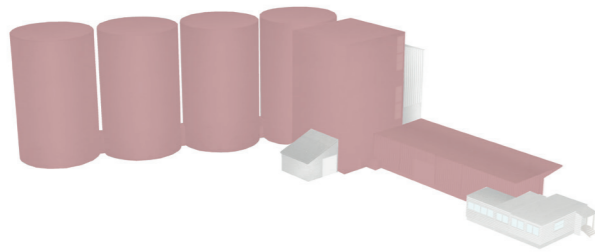
The walls in the silos are made of reinforced concrete, with the steel stretching both vertically and horizontally



**THE CONSTRUCTION IN THE SQUARED SILO**

The beams and the walls are the load bearing elements in the squared silo

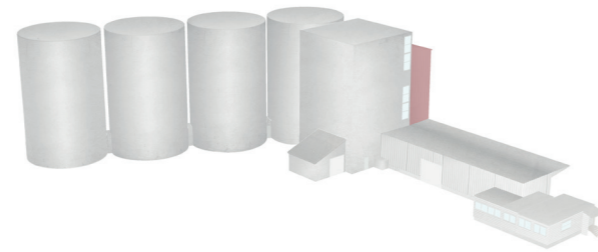
## THE PHASES OF THE BUILDINGS



1962

### THE ORIGINAL BUILDINGS

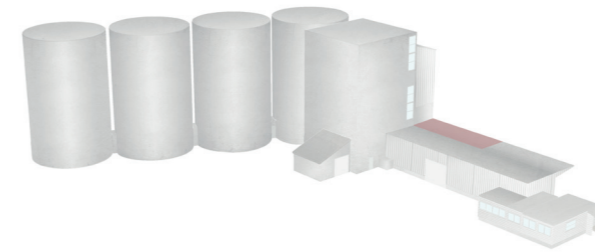
The original buildings were built in 1962 and consist of four round silos used for storage of cement, while the squared silo is the main communication of the complex. Connected to the squared silo is a storage hall. The storage hall has a concrete foundation. Steel frames are bolted to the concrete and the connection is later covered in another layer of concrete. Later, a steel mezzanine has been added.



1972

### THE ADDITION OF TWO SILOS

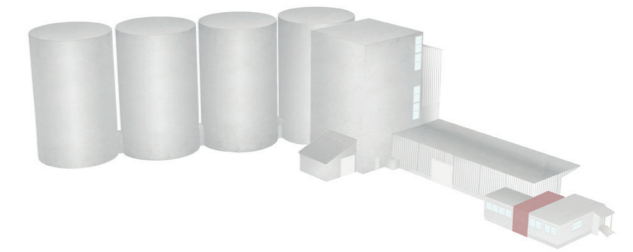
Built in 1972, an appendage with two small silos was added to the complex. It is placed on top of the driveway so that the trucks can situate themselves directly below it and load cement onto the trucks. It is built in steel and corrugated galvanized iron.



1980

### VESTIBULE FOR THE TRUCKS

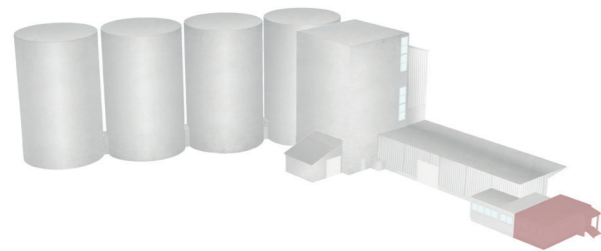
In 1980 they built an addition to the trucks' loading area, so that the trucks can be completely sheltered when loading the cement. It is also built in steel and corrugated galvanized iron.



1981

### THE FIRST BARRACK

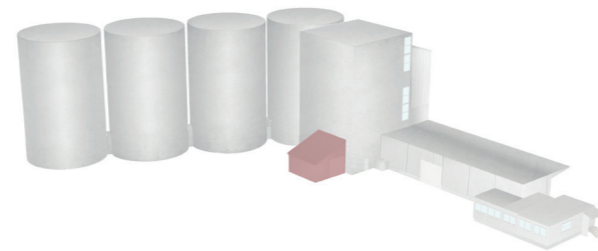
The first barrack with offices was built in 1981. It is built in wood on a foundation of LECA blocks.



1985

### THE SECOND BARRACK

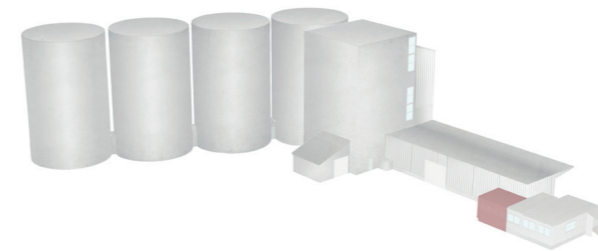
The second barrack was built in 1985, containing a bathroom and a small kitchen in addition to more offices. It is also built in wood on a foundation of LECA blocks.



1990

### THE COMPRESSOR ANNEX

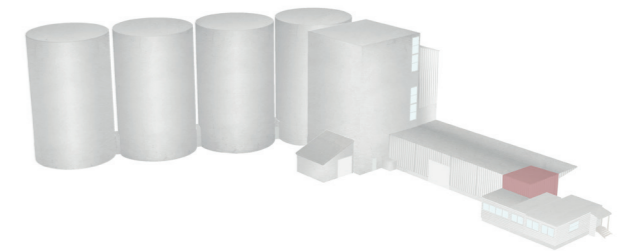
Built as an extension of the squared silo, the compressor annex was added in 1990. The construction material used is LECA blocks with an external layer of plaster. It was later painted in the same colour as the silos.



2007

### THE THIRD BARRACK

The third barrack was first used as a room for dining and meetings, but is now used as a big office. This building is also constructed in wood and with a LECA block foundation.



2018

### THE BUILT-IN BARRACK

In 2018 they decided to fit a barrack within the walls of the storage hall. It has a big dining and meeting room, a kitchen and a changing room. The dining room has a nice view of the fjord and is also built in wood. Just the internal parts of the barrack were used, and the façade was removed to fit the barrack within the storage hall.





*Pictures from inside the storage hall, built in 1962.*

# MATERIALS AND PERCIEVED COLOURS

EXTERNAL PAINTED  
CONCRETE WALL



1502-B

EXTERNAL PAINTED  
CONCRETE WALL



1030-Y20R

INTERNAL CONCRETE  
WALLS IN THE SILOS



2002-Y50R

PAINTED INTERNAL WALLS  
IN THE SQUARED SILO



1030-G80Y

PAINTED STEEL RAILING IN  
THE SQUARED SILO



0560-G90Y

PAINTED STEEL BEAM IN  
THE SQUARED SILO



4030-Y80R

PAINTED STEEL FRAME IN  
THE STORAGE HALL



2010-G20Y

CORRUGATED IRON IN THE  
STORAGE HALL



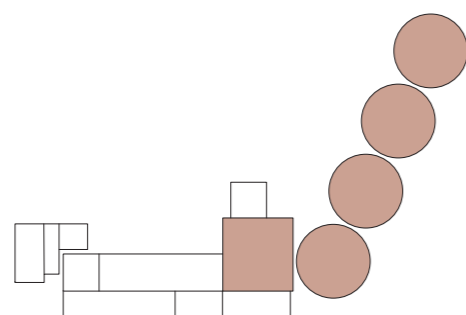
7502-R

# THE TECHNICAL CONDITION OF THE BUILDINGS



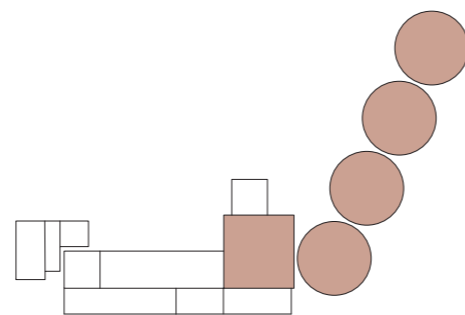
## REINFORCED CONCRETE

Most of the complex is built in reinforced concrete. They used a slip-form casting as construction method and the steel armature stretch both horizontally and vertically. The buildings were rehabilitated in 1990, and the concrete and the steel have been in good condition since then. No rust from the steel is present.



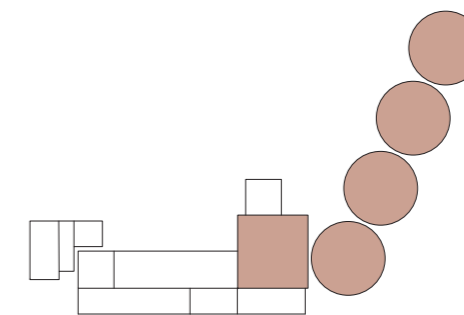
## SETTING DAMAGES

Due to heavy machinery and the filling and emptying of cement, the complex has some setting damages. The buildings have to tolerate a lot of movement within, and it is taking a toll on the concrete, leading to cracks.



## WATER LEAK

Leakage is caused by the movement of the building. When filling or emptying the boats or trucks with cement, the cement moves through huge tubes on the roof. These are prone to move a lot during the process, and the areas around them are especially exposed to leakages.

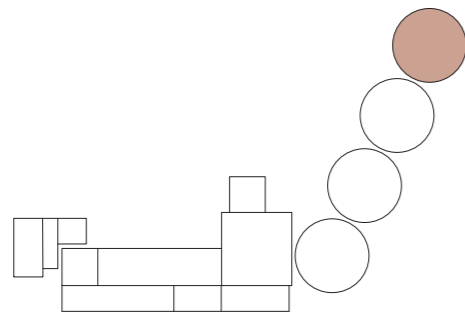


# THE TECHNICAL CONDITION OF THE FACADES



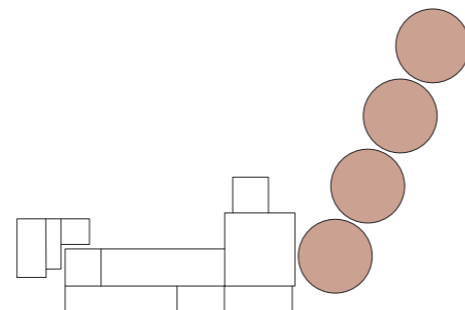
## THE FACADE FACING THE WATER

The façade facing the sea needs more maintenance than the rest of the façades. It requires regular repainting and treatment against corrosion.



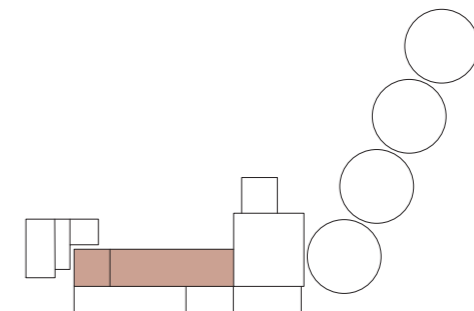
## THE SILO FACADE

The façades of the silos are painted yellow on the lower part and white on the upper part. They were last painted in 1990 and are generally in a good condition.



## THE STORAGE HALL FACADE

The façade plates in corrugated iron require more maintenance than the rest of the façades. They have previously been painted but are prone to corrosion.

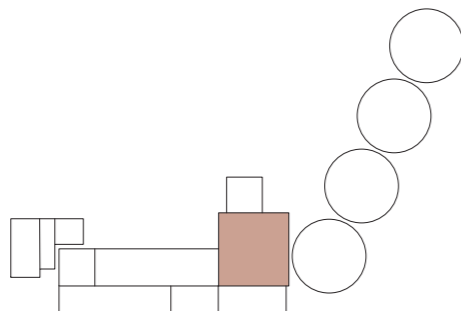


# THE TECHNICAL CONDITION OF THE INTERNAL WALLS



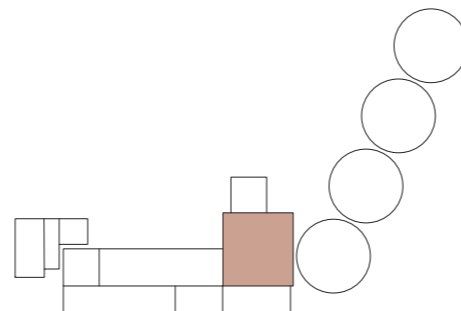
## THE CONCRETE WALLS

The concrete walls are in a good condition on the inside. They have no visible cracks or corrosion. As of today, they remain maintenance-free.



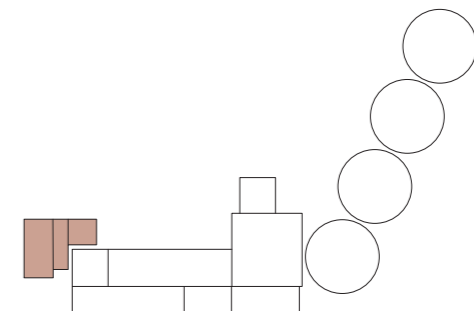
## PAINTED CONCRETE WALLS

Some of the interior concrete walls are painted. They are also in a good condition and they only require painting as maintenance.



## WALLS INSIDE THE BARRACKS

The barracks are relatively new and require little maintenance. Some of the interior walls have been changed and painted, but more for aesthetical than technical purposes.

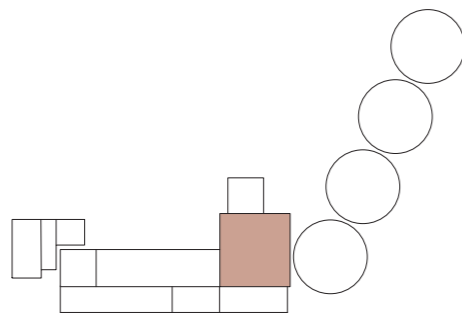


# THE TECHNICAL CONDITION OF THE BUILDING ELEMENTS



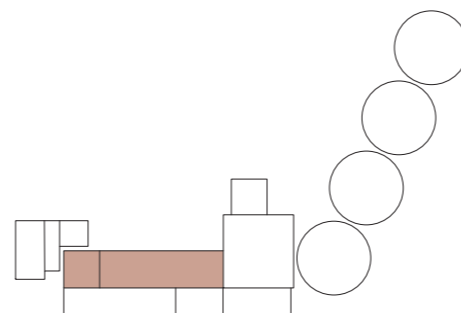
## THE SILO WINDOWS

The windows in the squared silo are in good condition, but do not keep up with today's standard. The windows are single framed with one glass plane only. The buildings are not insulated, and have a very high U-value. Therefore it is not important that the windows emit heat.



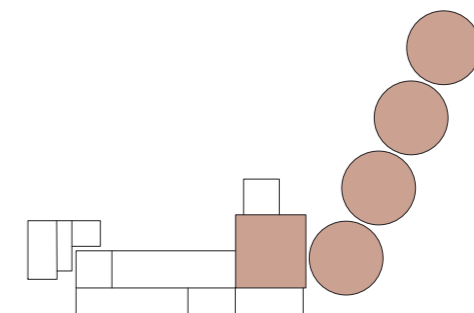
## THE STEEL FRAMES

The steel frames in the storage hall are bolted onto the concrete foundation, and a new layer of concrete has been poured on top. The top layer of the concrete has started to decompose. The steel beams have been painted green with fire retardant painting. The paint is old, and the steel shows some traces of corrosion.



## THE ROOF

Due to the movement of the building and the location close to the sea, the roof is in a bad condition. A high level of maintenance is required to keep the leakages at bay and keep the moss of the roof. The roofing felt should be changed every 10-20 years, but only the squared silo has been rehabilitated since 2003.



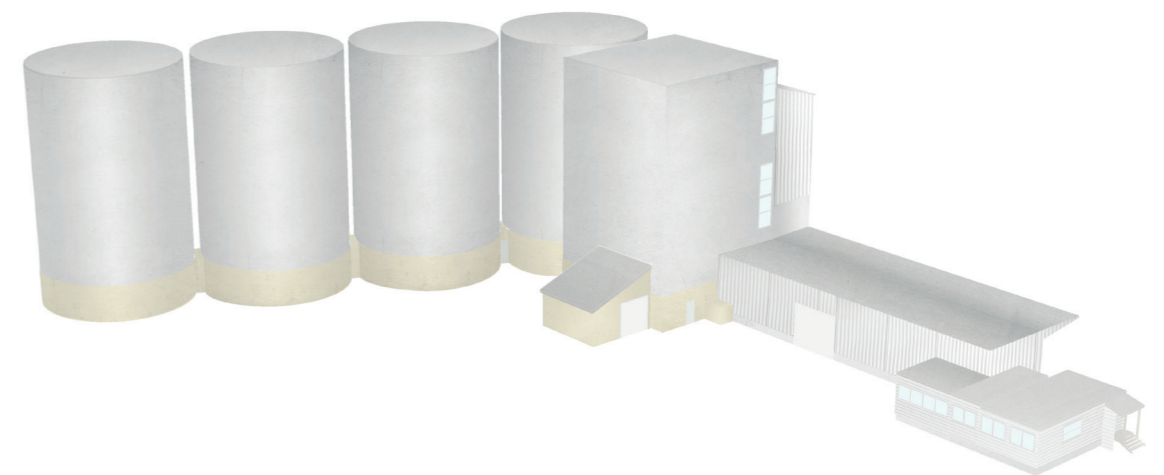
## SUMMARY

Nyhavna will change drastically the following decades. Today it feels inaccessible to the public though it still holds a certain charm. Only time will tell what Nyhavna's future really looks like, but the plan is to make the area greener and more available to the public. A promenade along the harbour, parks and public squares will join together new buildings and old landmarks.

The silo complex located at Ladehammerkaia is not conserved in the municipal master plan, but we see an uniqueness in its unusual shapes and monumentality. The spatial qualities within shows a huge potential for transformation. The site is ideal for public use with the connection to the sea and Ladestien, and as an intersection between districts.

Through studies of the municipal master plan we have decided to include the conservation of the bunkers and add the new parks around them. We also like the idea of creating a promenade along the dock that leads to Ladestien.

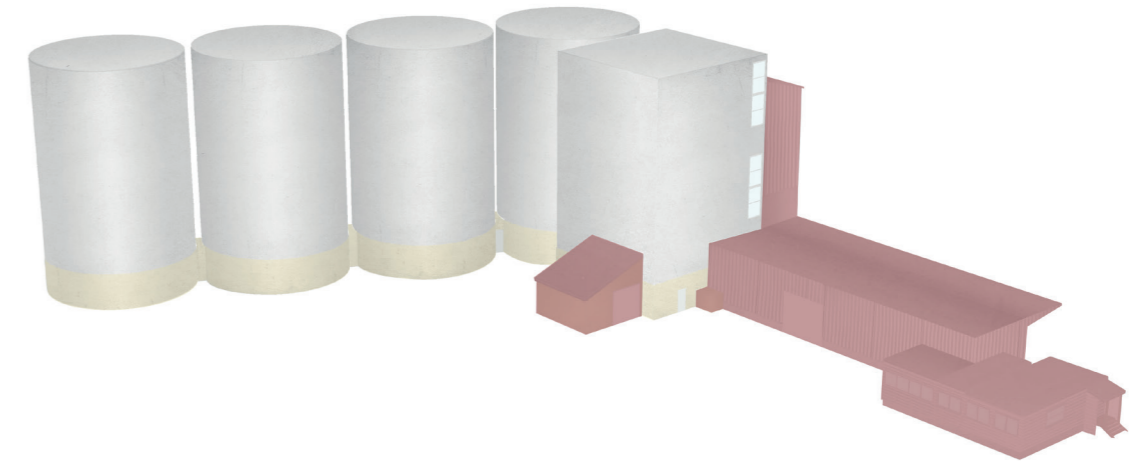
The silo complex is in a good technical condition. The materials inside the silos are beautiful, with the raw concrete showing signs of aging. We think that the footprint of the buildings create a nicely sheltered space in front of them. Even today it is a pleasant place to stay looking out onto the fjord.



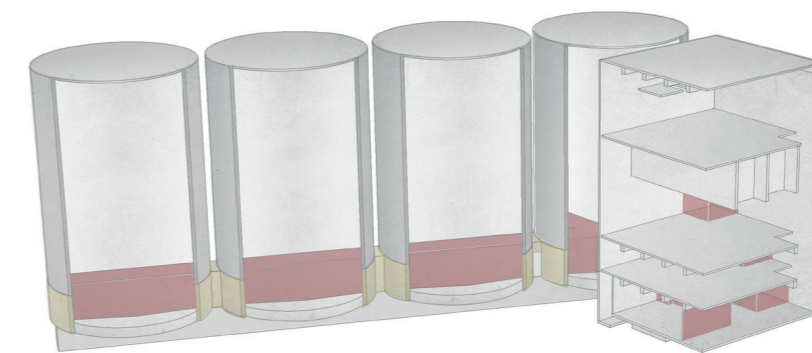
## PREMISES FOR THE DESIGN PROCESS

Evaluating the different parts of the complex, we see a big value in preserving the four round silos and the squared silo. We also want to preserve the concrete slab and the steel structure within the storage hall. We see few architectural values in the barracks or the appendages in corrugated steel. They were meant as temporary additions to the complex and have little technical or aesthetical value. We have therefore decided to remove them, along with the façade of the storage hall.

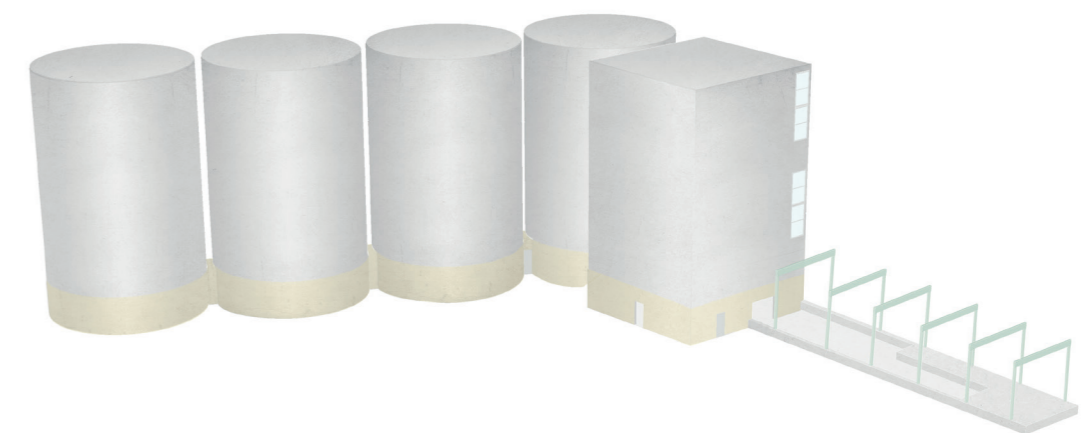
We have also removed all the interior walls in the squared silo as they are non-loadbearing walls made of timber framing and wooden boards. The round silos are empty apart from a concrete hallway down the middle. The hallway is removed as well to achieve a more open ground floor.



What we tear down outside

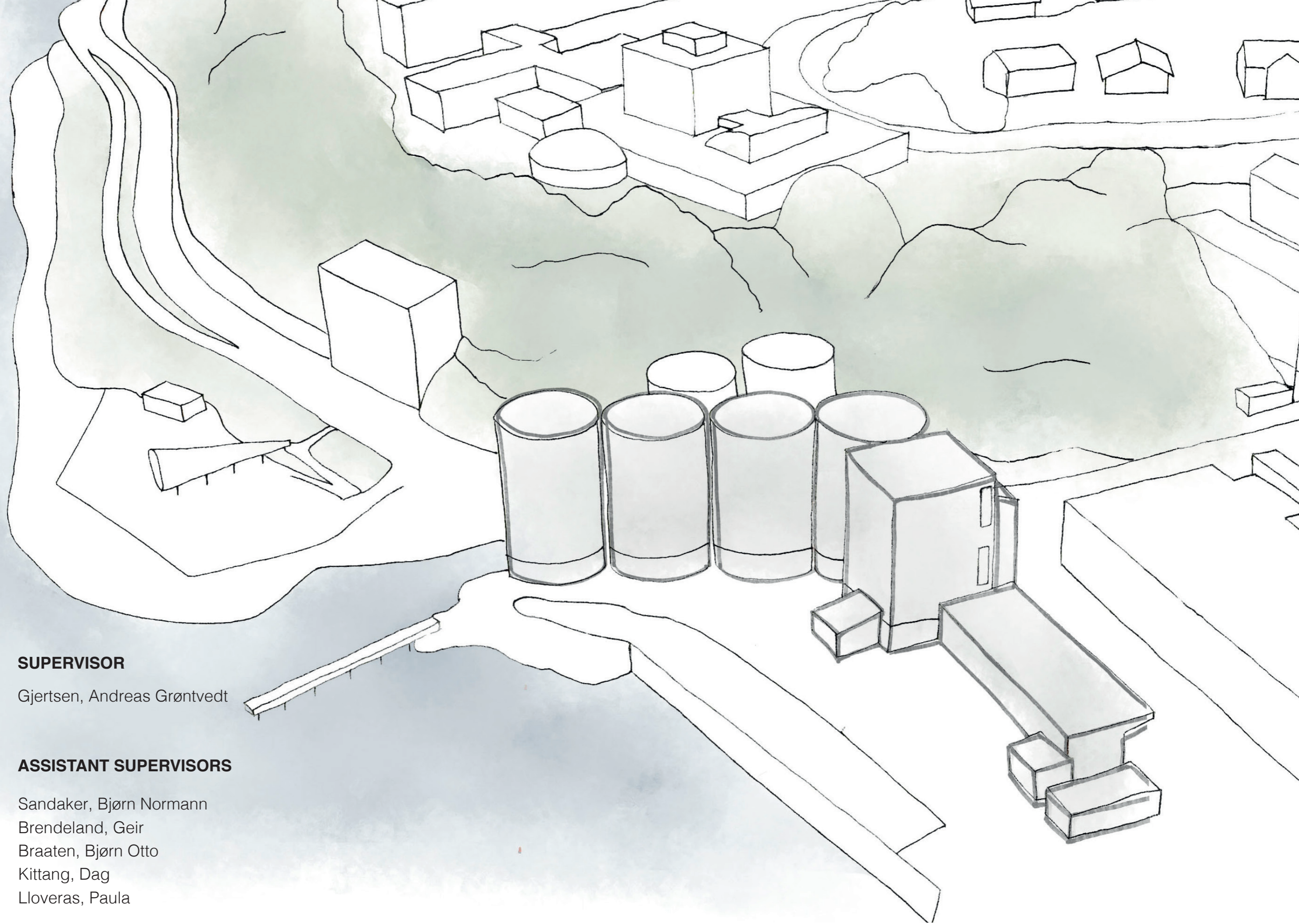


What we tear down inside



The remaining buildings





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