Keeping the Tacit* Knowledge Alive

Development of a New Building Typology to Save Our Heritage

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**Tacit knowledge (as opposed to formal, codified or explicit knowledge) is the kind of knowledge that is difficult to transfer to another person by means of writing it down or verbalizing it.*

CHALMERS
UNIVERSITY OF TECHNOLOGY

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1.1 Introduction

Abstract

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Gothenburg was during the 1960s one of the world s most important shipbuilding cities. But during the late 1970s the shipbuilding industries gradually liquidated (www.portofgothenburg.com). The large areas formerly used for shipbuilding were transformed to new housing areas. During this shift much implicit shipbuilding knowledge and craftsmanship were lost. This process is common to many cities, we are good at preserving objects and written knowledge, but the craftsmanship techniques are often falling into oblivion. The craftsmanship knowledge is often referred to as a tacit knowledge, this means a kind of knowledge that is difficult to transfer to another person by means of writing it down or verbalizing it. It has is acquired largely through association with other people, and requires joint or shared activities to be imparted from one to another.
This master thesis explores on how a museum can exhibit tacit knowledge. The aim is to create a hybrid between a museum and a workshop, to tell a story but also to teach craftsmanship techniques.

The thesis is based on a research by design process. Two crucial questions are: How can architecture be used to raise interest of our history for a larger public? And how can architecture be used to keep old craftsmanship techniques alive? The result is a design proposal for a shipbuilding museum located in Lindholmen, Gothenburg. Focus will be on the materiality, the relationship to the context and on how architecture can be used to add values to the experience of the museum visitor. The master thesis result in a new typology, the museum-workshop, a building to tell about the history but also a place to pass on tacit knowledge to new generations through participation in a workshop.

Content

Design

Aim:
The main purpose is to investigate on how a new type of typology, a museum-workshop, both can tell about our common history but also preserving tacit knowledge.

Method:
A research by design process will investigate ways of combining a traditional museum with a workshop for active learning of tacit knowledge. Design proposals are studied in models and drawings.

Questions:
Two crucial questions is: How can architecture be used to raise interest of our history for a larger public? And how can architecture be used to keep old craftsmanship techniques alive? The result is a design proposal for a shipbuilding museum located in Lindholmen, Gothenburg.

1.4 Introduction

Background

Background

The main purpose of this thesis is to investigate on how a new type of typology, a museum-workshop, both can tell about our common history but also preserving tacit knowledge. The term tacit knowledge is attributed to Michael Polany a Hungarian-British philosopher, he states tacit knowledge is knowledge that is hard to quantify or pass from one person to another through verbal or writing, instead it can be passed on through practice, mentoring and networking (socialization) Davenport & Prusak (2000). Traditionally a museum store and exhibit artifacts and other objects of importance, they work as a static collector. This way of exhibition makes the visitor a passive spectator. For explicit knowledge that can be articulated and verbalized this way of exhibit historical artifacts works well, but how do we preserve the tacit knowledge that can't be exhibited this way? The purpose of this thesis is to form a new typology that tackle this problem. As a result of globalization and new manufacturing techniques much of the old boatbuilding craftsmanship techniques and skills are at a risk of falling into oblivion.

Aim

The outcome of this thesis should be a new building typology in Lindholmen in Gothenburg. By combining museum exhibition spaces with workshops for practice, both explicit knowledge and tacit knowledge can be passed on to future generations. The building should encourage visitors to take an active part instead of just being passive spectators. By exploring the history and materials of the site the projects will be rooted in place. Instead of just imitate the materials and building typology in the context, the focus will be on understanding the essence of the surrounding buildings and then develop this ideas in a contemporary way. The project will both tell a story about the craftsmanship and history of the region but it will also encourage the visitors to be active.

Delimitations

In order for the thesis not to lose focus, a specific site and program was decided early in the process. The program is based on a pre study made by the municipality of Gothenburg. The primary focus has been on creating a hybrid between a museum with open archives and a workshop, to narrow the work down the economic aspects of the work have not been taken into consideration.

Figure 1. Lindholmen Gothenburg, (Söderberg, 1966).

1.4 Introduction

Background

Method

A research by design process will investigate ways of combining a traditional museum with a workshop for active learning of tacit knowledge. Design proposals are studied in models and drawings.

Result

The result is a proposal for a shipbuilding museum in Gothenburg. The focus is on how a museum can combine tacit learning with museum exhibition spaces for objects and written knowledge.

1.5 Introduction

Typological evolution

(1) 3rd Century BC, ATHE TEMPLES, PALACES AND LIBRARIES OF MESOPOTAMIA DATING FROM THE THIRD AND SECOND MILLENNIA BC WERE THE EARLIEST FORMS OF PROTO-MUSEUMS; THERE THE PRESERVATION AND COMMUNICATION OF KNOWLEDGE BEGAN.

(3) 1793 (OPEN TO PUBLIC), THE LOUVRE, PARIS

(2) 1683, THE FIRST PUBLIC MUSEUM, THE ASHMOLEAN, OXFORD

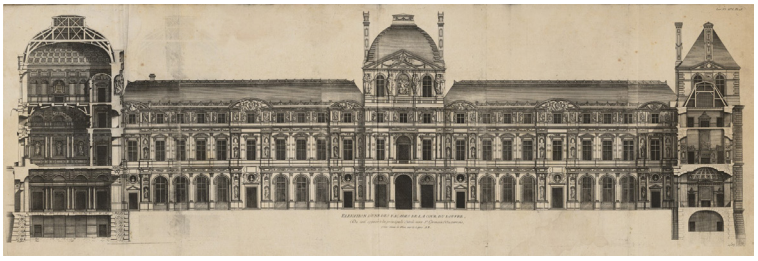
(5) 1830, ALTES MUSEUM, BERLIN

(1) 1625-1649, KING CHARLES I COLLECTION OF ART, ENGLAND

(4) 1830, GLYPTOTHEK, MUNICH

PRECEDENTS	ROYAL COLLECTIONS	PUBLIC MUSEUMS	ALLUDED TO THE PAST
3rd century bc	1600	1793	1800

1



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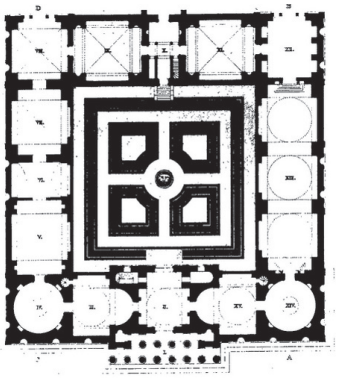

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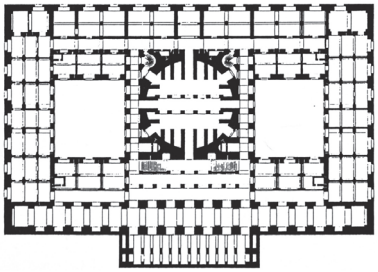

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Figure 2.
Picture 1 Paintings for Charles I of England, paint by Antony Van
Picture 2 Old Ashmolean Museum. Wikimedia Commons. https://en.wikipedia.org/wiki/File:Old_Ashmolean_2006.JPG
Picture 3 Drawings by Jacques-François Blondel
Picture 4-9 from https://www.architectural-review.com/Journals/2012/12/18/y/s/s/TYPOLOGY-TIMELINE_2.pdf

(10) 1999,JEWISH MUSEUM, BERLIN

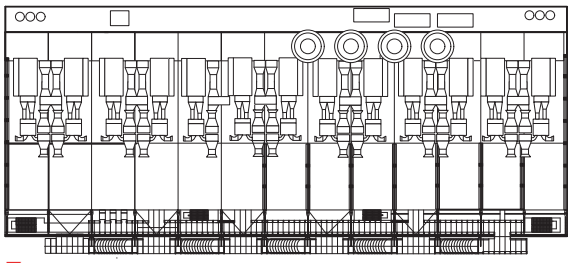
(7) 1977, CENTRE POMPIDOU, PARIS

(9) 1999, GUGGENHEIM BILBAO

(6) 1959, GUGGENHEIM, NEW YORK

(8) 1984, NEUE STAATSGALERIE STUTT-GART

1959 NEW ERA, FUTURIST | 1970 EXPREMENTAL | 1980 MUSEUM CITY | 1990 NEW COMPUTER PROGRAMS, NEW POSSIBILLITIES



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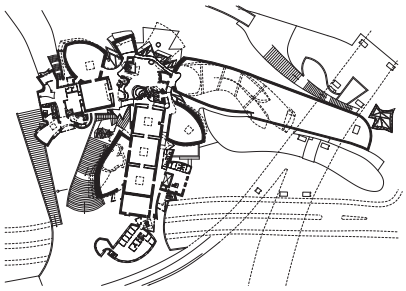

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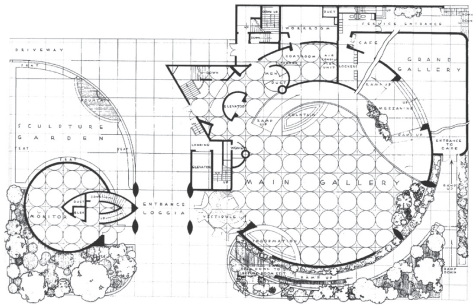

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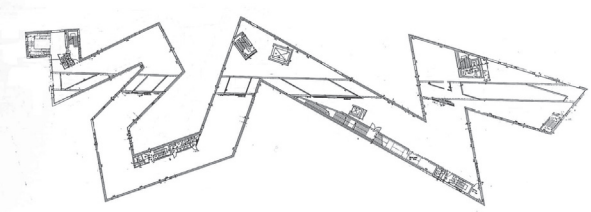

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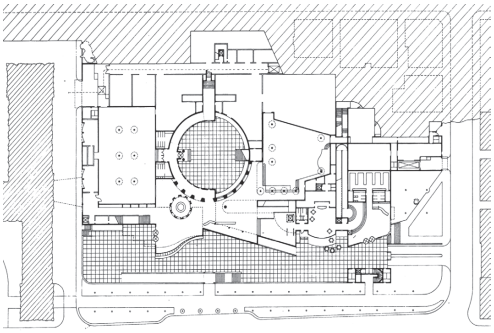

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Analysis

2.1 Analysis

Site analysis

Lundbyvass, Gothenburg

The proposed plot is situated on Lundbyvassen on Hisingen island in Gothenburg. Until 2014 the site was used by Cityvarvet (Damen Shiprepair). The site is part of a development part of the city, in a close future there will be built almost a new city around the site (Göteborg stad, 2017). So in a not to far future the location will be in a very central part of Gothenburg. The site is also clearly visible from the other side of the city, and a museum could work as a interestpoint on Hisingen.

Figure 3. Traces from a lost era, Lindholmen. Author's own copyright. (2017)

2.1 Analysis

Site analysis

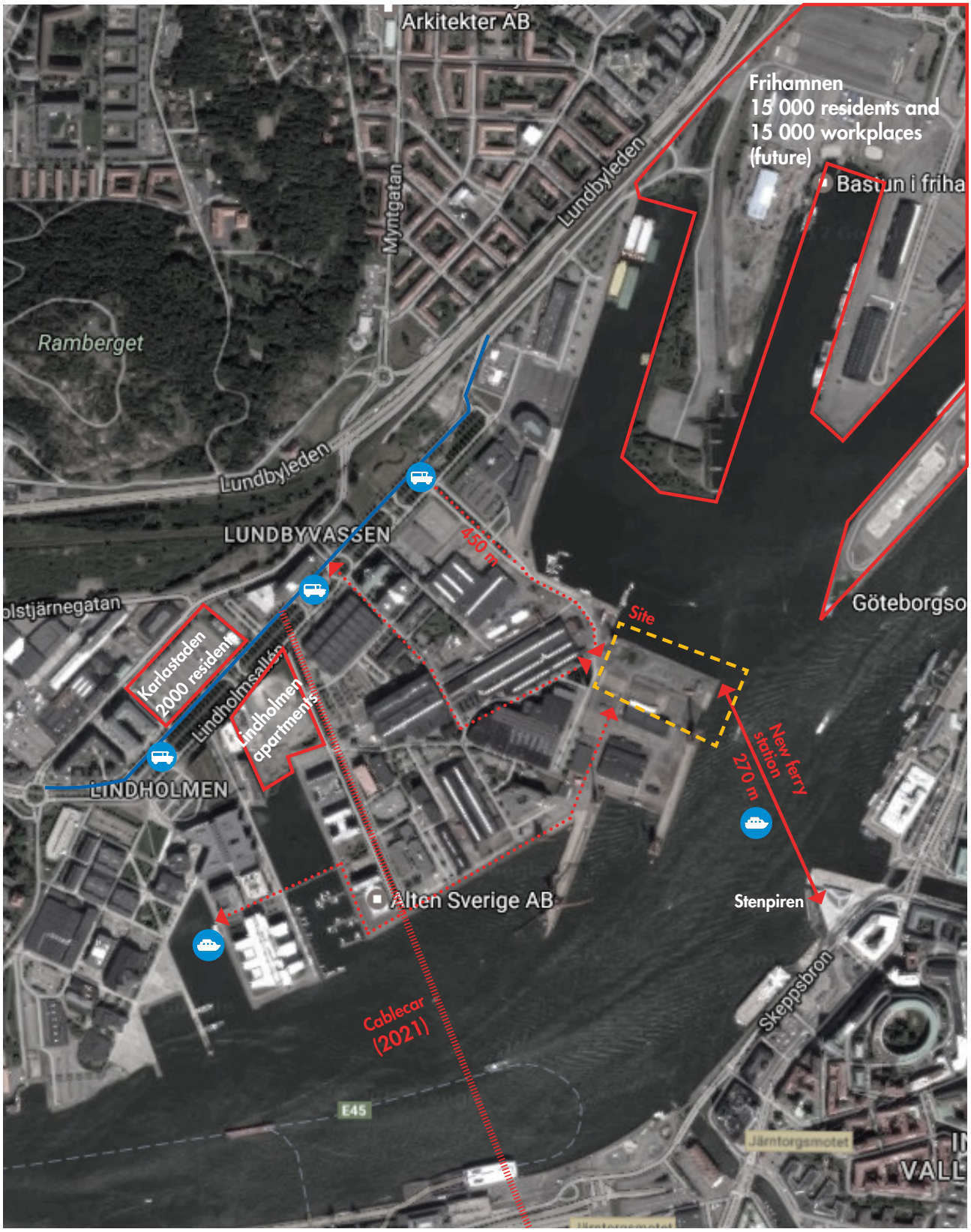


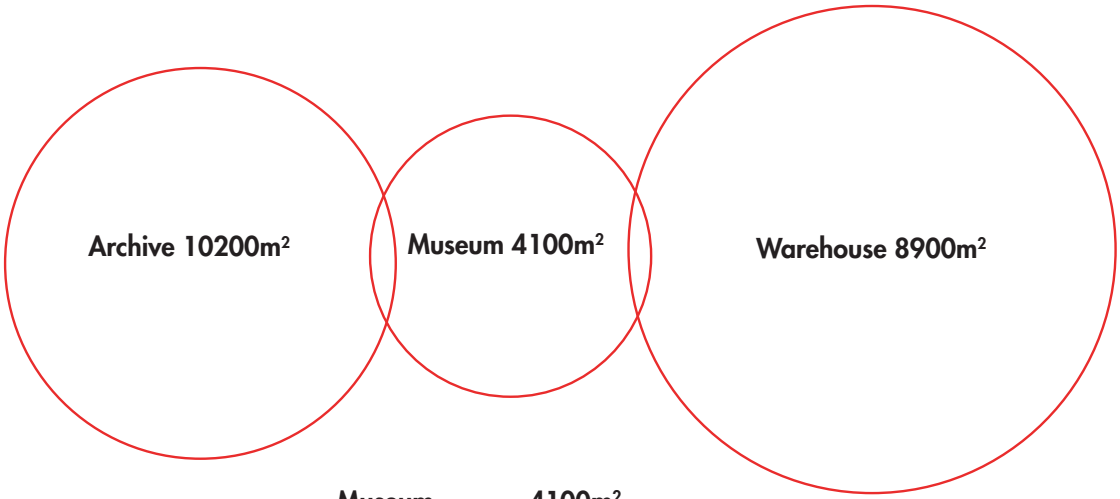
Figure 4. Map over Lindholmen. (Bing maps, 2017) Transportation lines added by author.

2.2 Analysis

Program

Program from pre-study

Today the museums in Gothenburg are in great need of new warehouses for the collections not on display. Due to the lack of space the museums rent warehouses around the city for the collections, as a result the material is hard to overlook (Göteborgs stad, 2003). It´s also a very expensive and temporary solution. By building a new museum with a big capacity to store all the different materials from the museums in Gothenburg in one location is both cheaper in the long run and much more efficient. With this in mind the municipality of Gothenburg asked Liljewalls Architects in 2013 to do a pre-study on how a museum with a large warehouse capacity might work. The program and room sizes shown below are based on the pre-study.



Archive **10200m²**
- Archive space
- Wc/Elevator
- Workspace

Museum **4100m²**
- Permanent exhibition
- Temporary exhibition
- Study room
- Workshop
- Grouproom
- Wc
- Conferanceroom
- Office
- Staff room
- Conservator "paper"
- Conservator "textile"
- Conservator "lab"

Warehouse **8900m²**
- Studio space
- Loading room
- Cleaning
- Decontimination
- Workspace

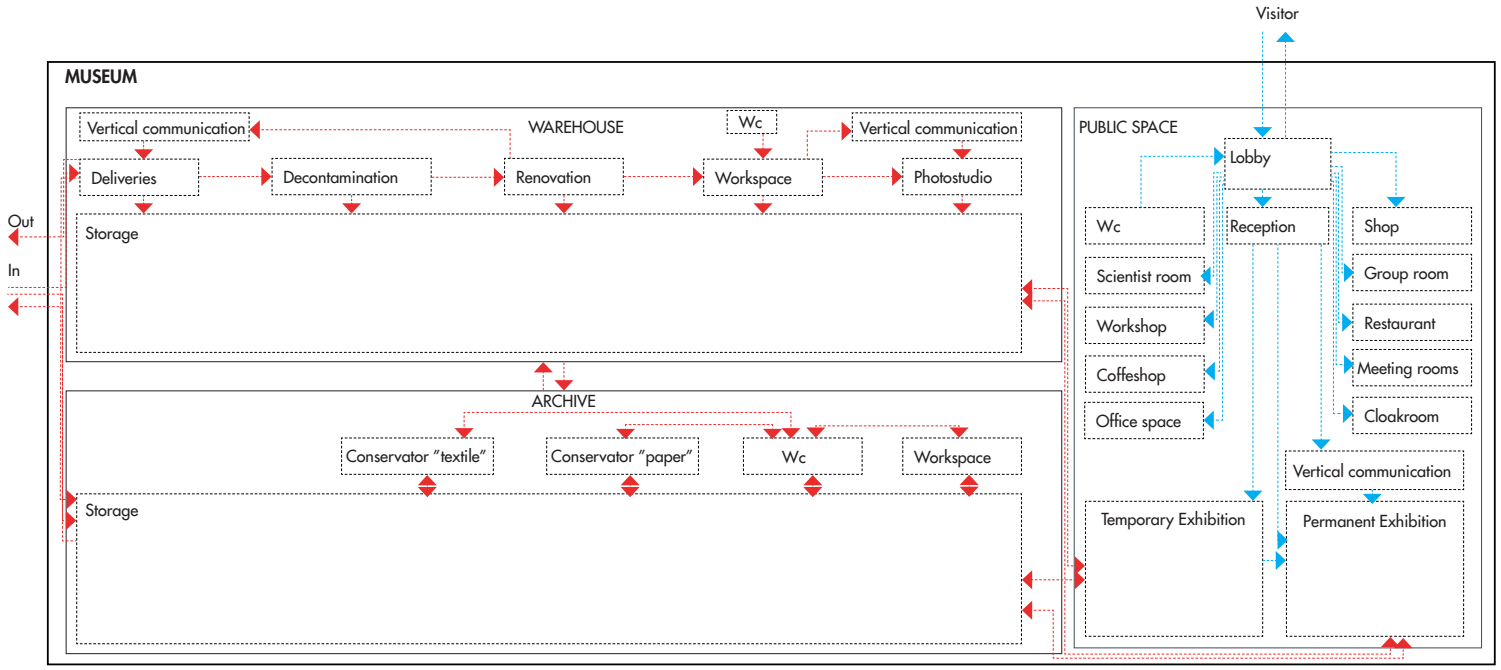
Source: Prestudy "Varvs-& Industri Historiskt Centrum", Liljewalls 2013.

2.3 Analysis

Flow chart

Benefit from each other?

In a traditional museum the warehouse is closed for the public. Is it possible to design the warehouse as a part of the experience of the museum?
How can these different parts be merged together to benefit from each other?
The demand for large warehouse space is a challenge, how should the space be designed?



Flow chart based on a 19h century museum organization. Blue lines shows relationships between public rooms and red lines shows relationship between the non public functions.

References

The references shows ways of dealing with the movement of people, new ways to combine storage and exhibition space and how to design a shared warehouse. The reason I choosed these references was that they all deals with aspect that I could use in my museum design. The Werkraum House is a good example on a shared workshop, and how to expose the work to the people passing by the building to create interest.

In the Möbius House the focus is on people movement this gave me the idea of creating a circular movement loop for the visitors for my design. The Shaulager opened my eyes for the relationship between the exhibition space in a museum and the archive space.

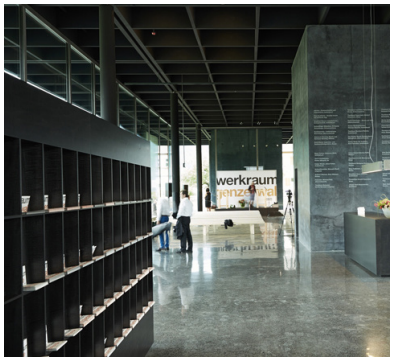


Figure 5

Werkraum House, Bregenzerwald
Peter Zumthor and Partners

The Werkraum House is a craft and trade association in Austria. The goal is to unite craftsmen of different guilds, promoting cooperation and exchange of ideas. In 2008 Peter Zumthor designed a building where the members of the association can exhibit, discuss and keep the local craftsmanship tradition alive. The building consists of a repetitive column and beam structure. Big windows exposes the building to the people passing by.

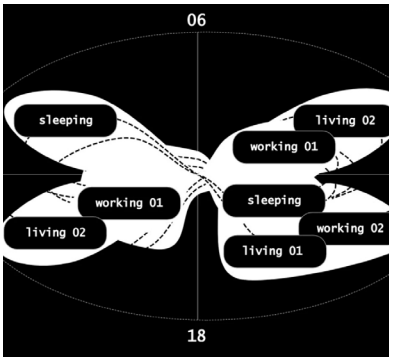


Figure 6

Möbius House, Netherlands
UNstudio architects

The Möbius House has a strong focus on spatial qualities and movement patterns. The design is based on the Möbius band, a surface in a continuous loop. By integrating the Möbius band both in plan and section in the design, it creates a 24 hour loop for the residents of the house.

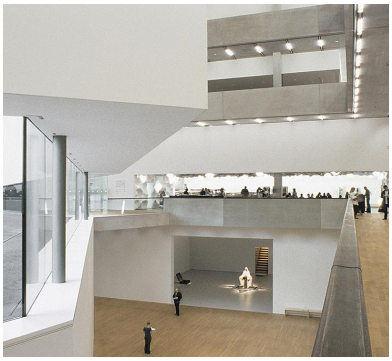


Figure 7

Schaulager, Basel
Herzog de Meuron

Opened in 2003, Schaulager can be described as an open warehouse that provides the optimal spatial and climatic conditions for the preservation of works of art. The rooms are designed as spaces for both storage and display.

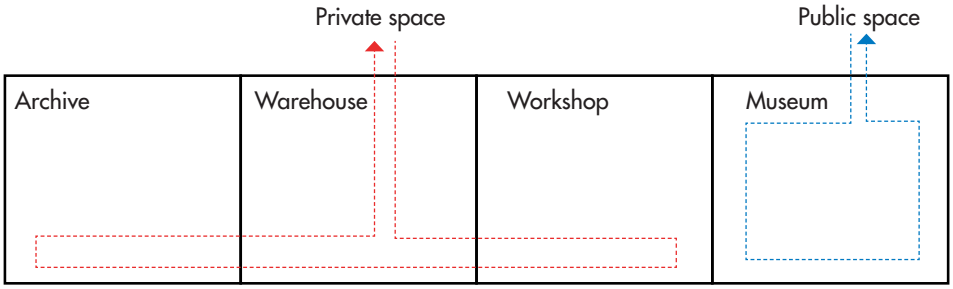
Figure 5: Werkraum House, Photography: Adolf Bereuter.
Figure 6: 24 h Lifecycle, Diagram from UNstudio.com.
Figure 7: Schaulager, Concept, from schaulager.org

2.6 Analysis

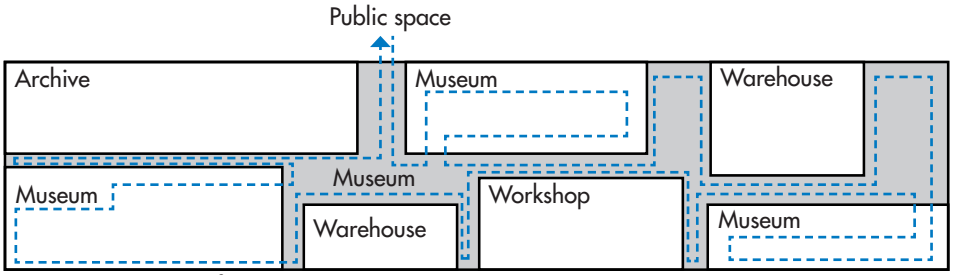
Movement pattern

Concept of movement patterns

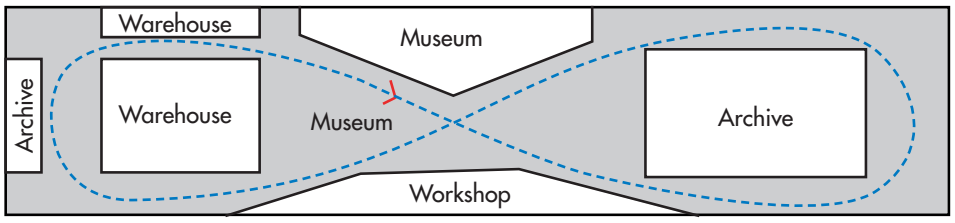
By organizing the key functions such as space for exhibitions, warehouse and archives, different movement patterns can be archived. By spreading the public functions across the building the visitor has access to a much larger part of the museum.



Linear arrangement of program. Blue lines represent public space and red lines represent non public space.



Linear arrangement of program with divitions



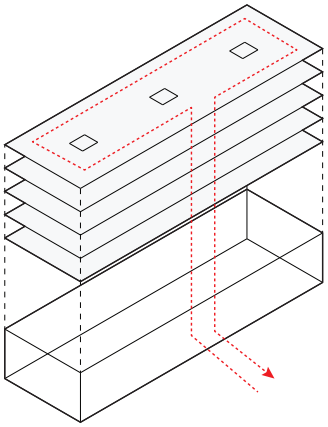
Arrangement of program to create a loop both in plan and section

2.5 Analysis

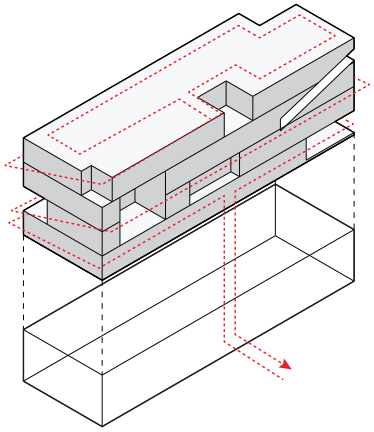
Inner core

Concept of inner core

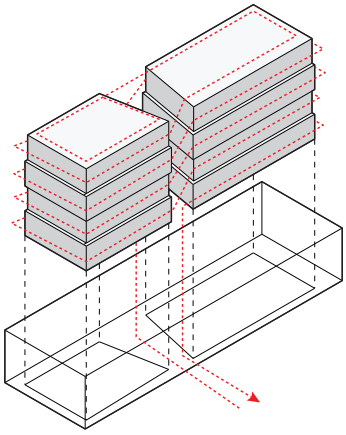
The idea of an inner core was a result of the exploration of movement patterns. The design of the core was examined in model studies and diagrams. Diagrams below shows how different designs gives different movement pattern throughout the building.



Layers
The conventional way of working, each floor covers a level in the museum. Effective use of floor area, but with lack of spatial qualities.



Substract of mass
Instead of working with layers, volume is substract from a solid mass. This gives intresting sightlines and unexpected rooms.



Mix of volumes and layers
By releasing the inner core from the buildings exterior walls, a space between occurs. A tension between the inner core and the outer walls is present for the visitor.

2.7 Analysis

Concept models

From extrovert to introvert

The process was based on a research by design approach, ideas was carried out in model form and then analyzed. The form started out as a extrovert building, but was during the design phase gradually transformed to a introvert building instead. The main idea is a building with a simple form on the outside but with a unexpected interior, to give the visitor a surprise effect when entering to building.

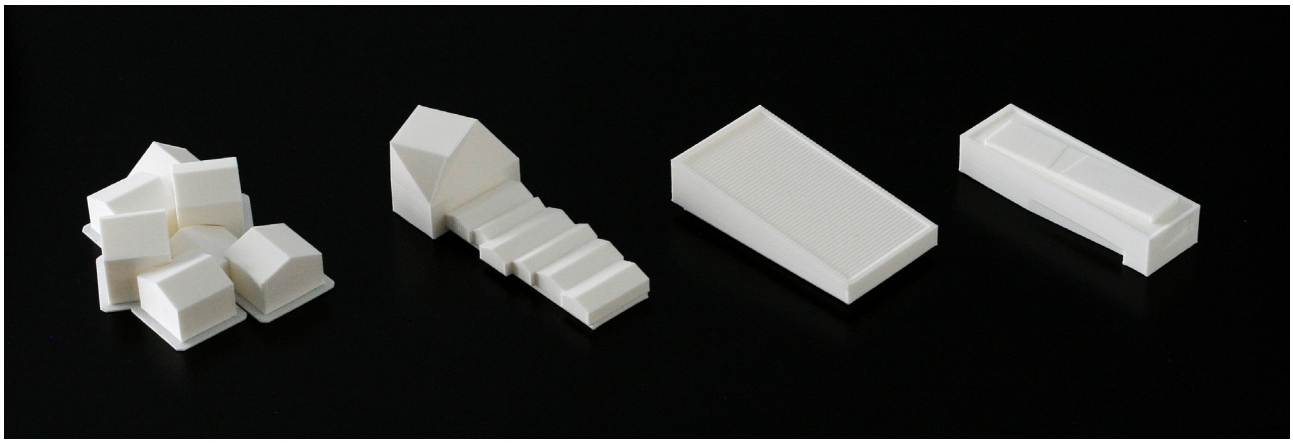


Figure 8. Study models, 3D printed. Author's own copyright. (2017)

2.8 Analysis

Key ideas

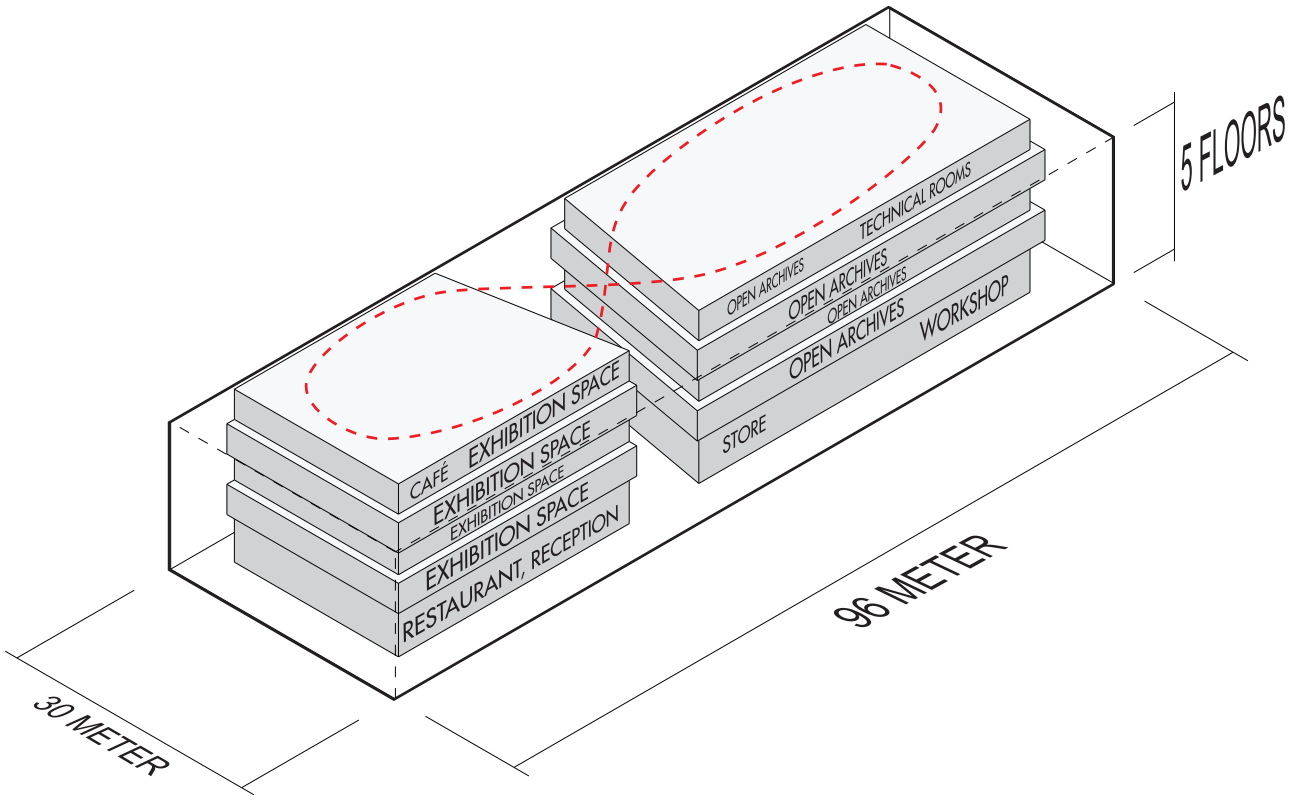
Process
From the previous work a couple of rules was determined for the future design of the museum.

Multi functional
The museum should be a a place to learn about history but also a place to practice craftsmanship techniques, to keep history alive.

Movement pattern
The design of the space should encourage visitors to discover the different parts of the museum

Hybrid between museum and workshop
The aim is to create a hybrid between a museum and a workshop, to tell a story but also to teach craftsmanship techniques.

Genius Loci
The design should be connected to the site and history. Local materials and craftsmanship techniques should be used.



Proposal

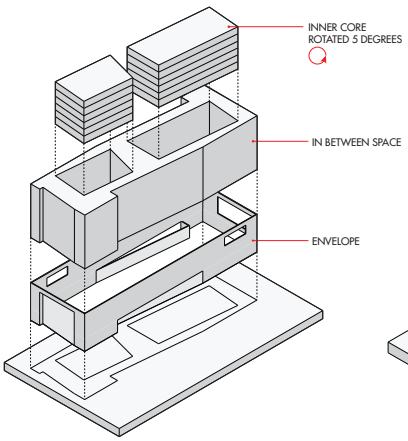
3.1 Drawings
Plans,faces,sections,details

3.2 Perspectives
Exterior and interior

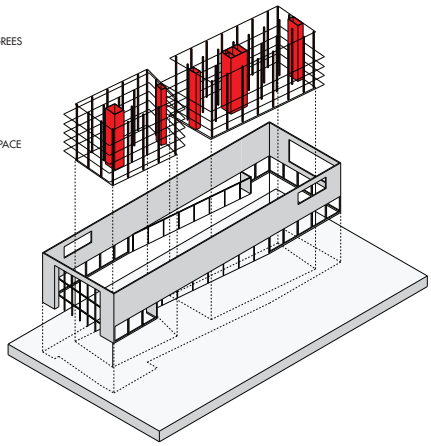
3.3 Conclusions
Reflections

3.1 Drawings

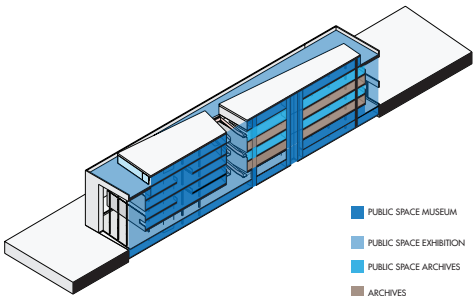
Concept Diagram



Volyme concept
Basic form rotated 5 degrees



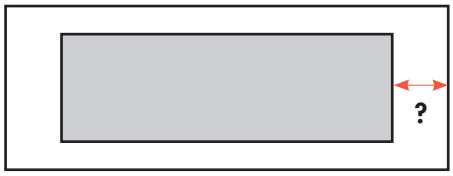
Structural system
6x6 meters repeatable



Spatial concept
Room sizes

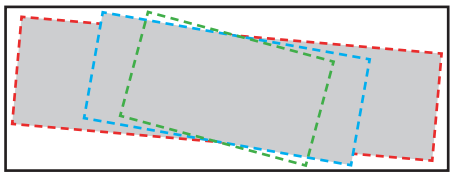
Gross floor area 100%

Floor plans covers 100% of the inside of the building. Maximum floor area is archived, no openings between floors except, stairs, elevators and shafts.



Controlling tension

The floor plans are organized in a inner core. The floor area is 80% of the building. A tension between inner core and outer walls is created, the height of the building is experienced on the inside.



Rotation of inner core in 5 degrees intervals, and outcome

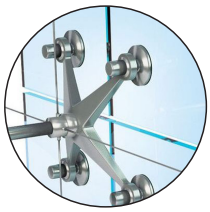
By rotating the inner core the space between core and building is given a direction and stronger tension is archived. Different degrees of rotation affects the total length of the inner core.

Materials

The material used for the building is both based on their function but also the historic context. When choosing materials for the buildings in the industrial area the function of the materials have always come in first hand.

Tough materials with as less maintenance as possible have been used for the industrial buildings. The same parameters have been used when choosing the materials for the museum, they should reflect the context both in appearance and in their function.

Corten



Glass

Concrete

Plywood

3.1 Drawings

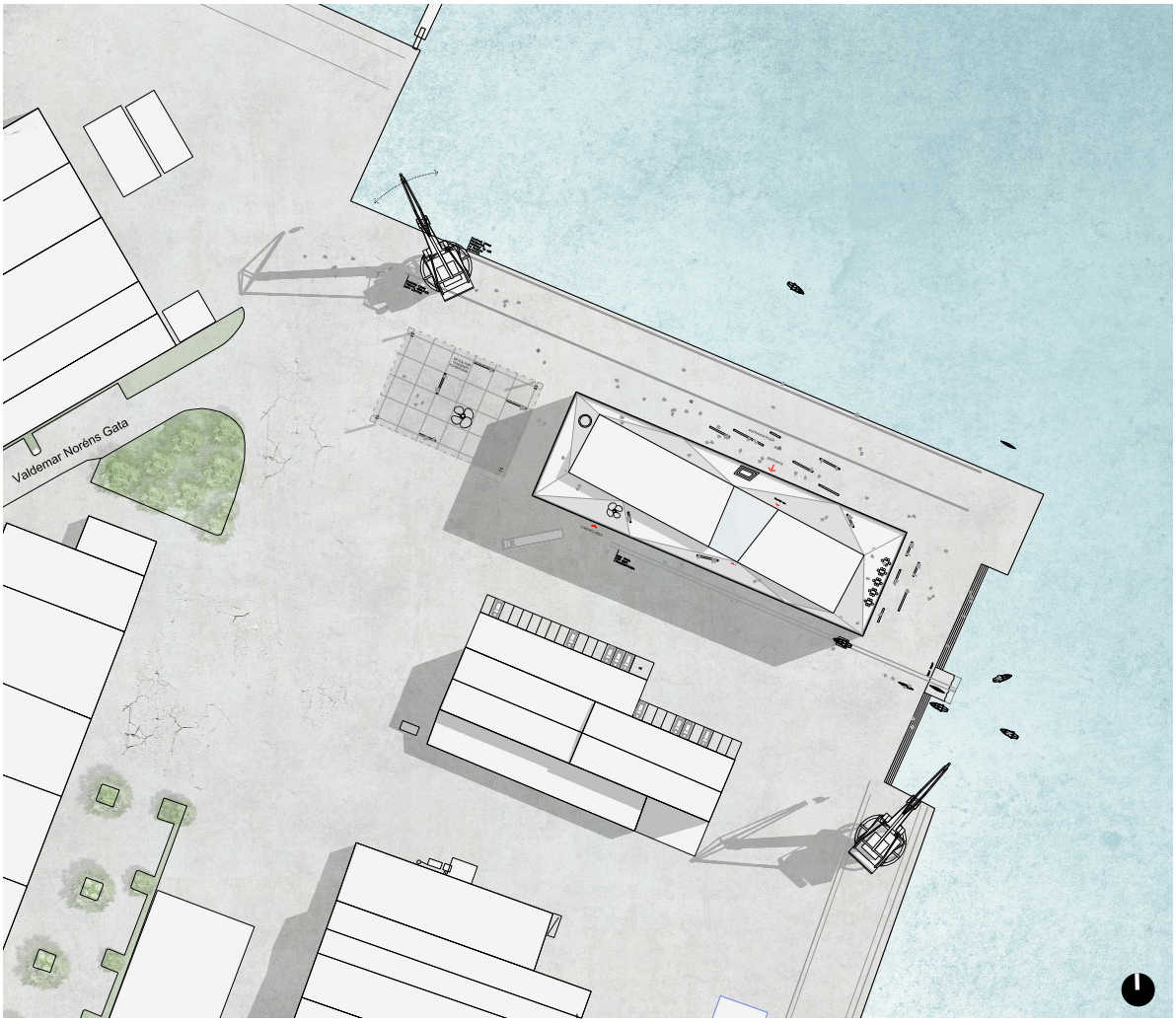
Siteplan

Siteplan 1:2000

The Museum is located in an industrial area. The form and size of the building makes it a natural addition to the city fabric. The old cranes outside the museum are renovated and are a part of the exhibition. There is also a space for temporary exhibitions north of the museum, the idea is a space that's easy to build different exhibitions on that shows current exhibitions on the inside. There is also a new track for boat launching outside the museum, the boats built in the workshop in the museum can easily be launched to the sea. A big stair towards south east creates a seating area for people passing by.

Siteplan 1:40 000

The siteplan clearly shows the differences between the old city centre and the industrial area the site is located on. The new building is adapted after the surrounding buildings.

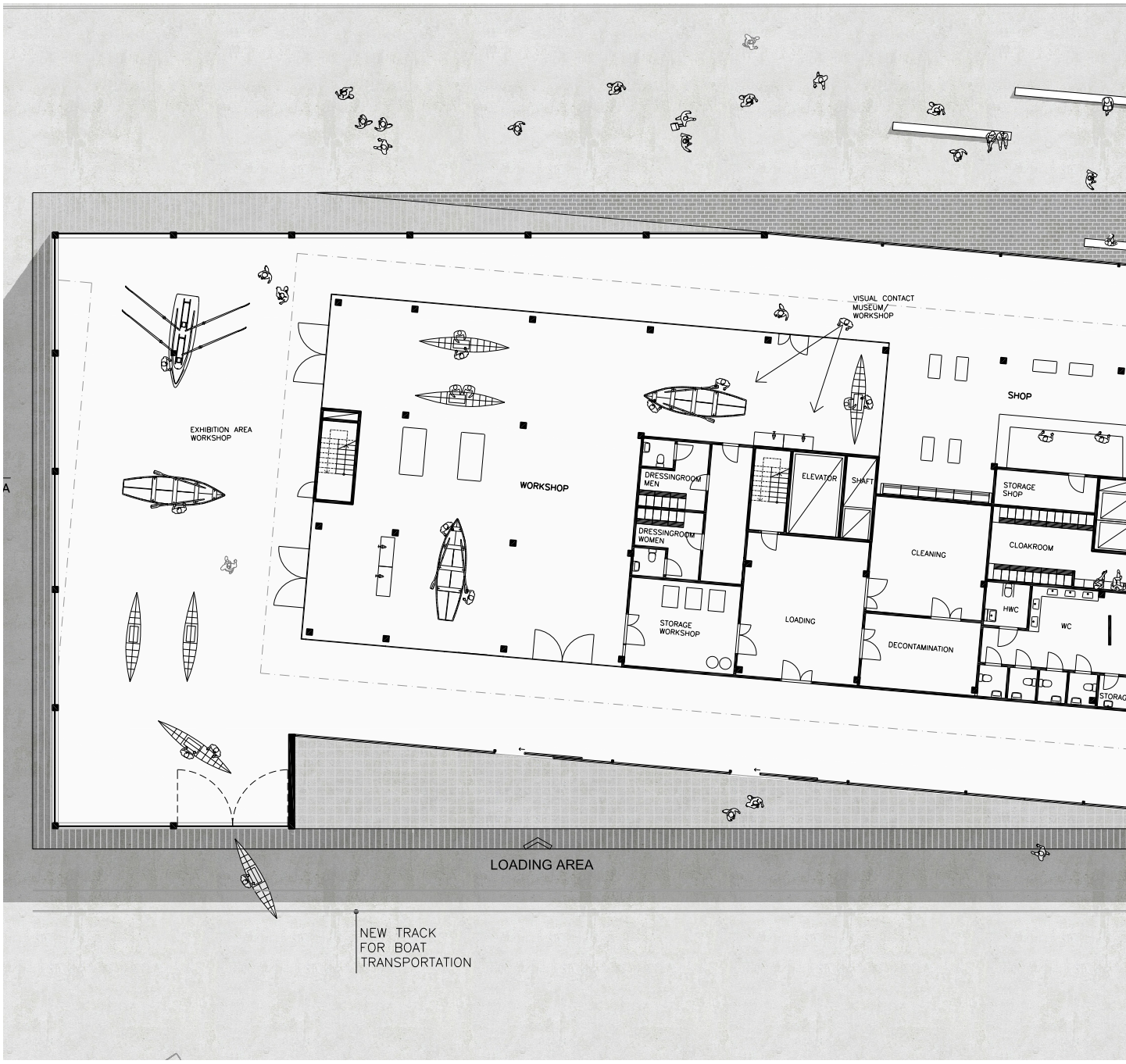


3.1 Drawings

Entrance floor

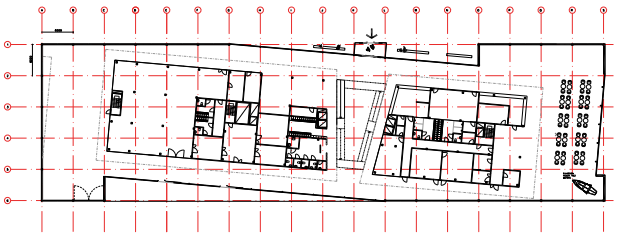
Plan 1, Entrance floor 1:600

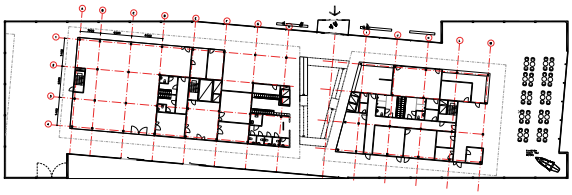
The central entrance gives the visitor a clear overview and a near proximity to several key functions and to the main staircase. The first floor contains reception, restaurant, library and a shop to name a few functions. A workshop is also located close to the entrance, big glass walls displays the work in the workshop and arouse interest for visitors. Visitors can sign up for classes in the workshop to learn old craftsmanship techniques. The workshop is also open for schools and associations.



3.1 Drawings

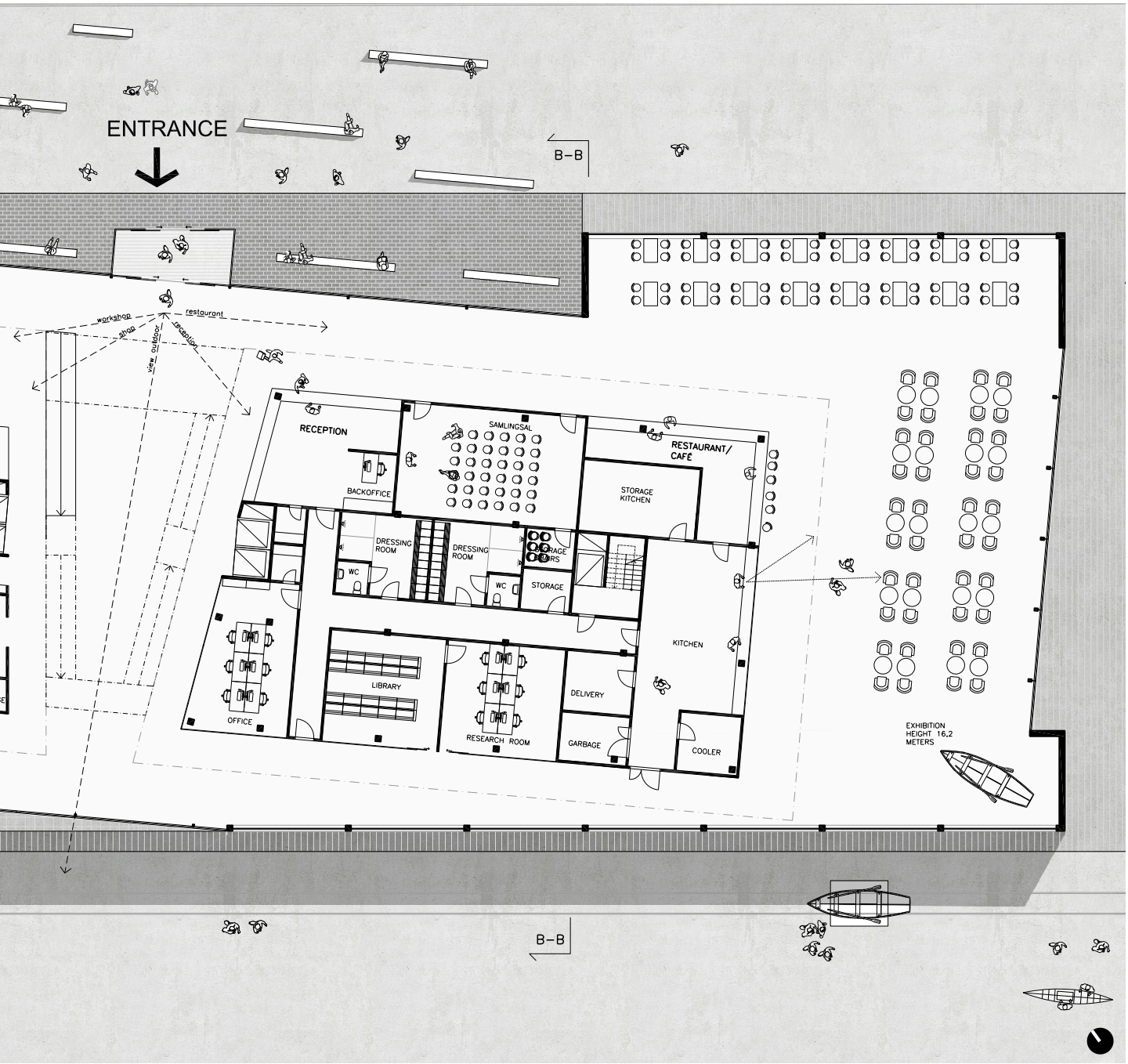
Entrance floor





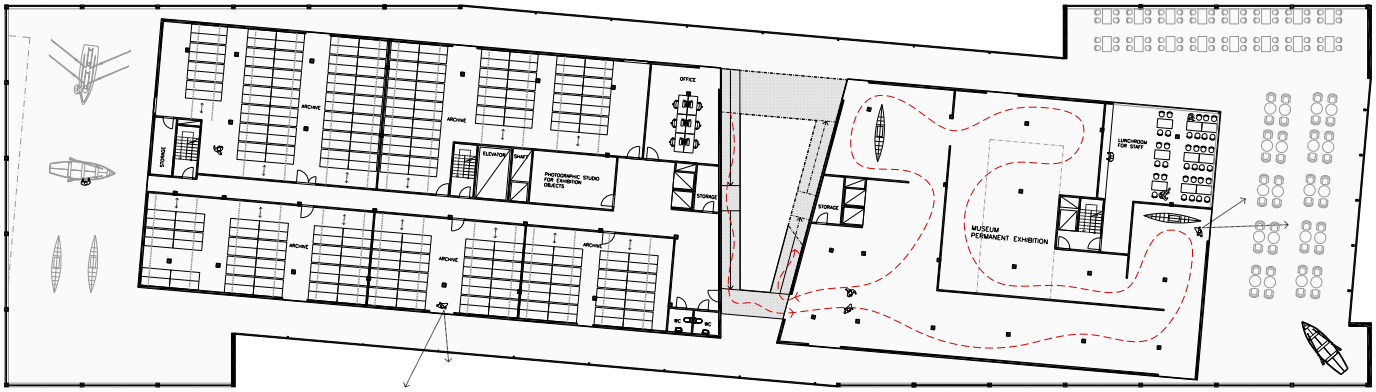
Structural system shell
The shell of the building is based on a 6x6 meters grid system.

Structural system inner core
The inner core is mainly based on a 6x6 meters grid system.



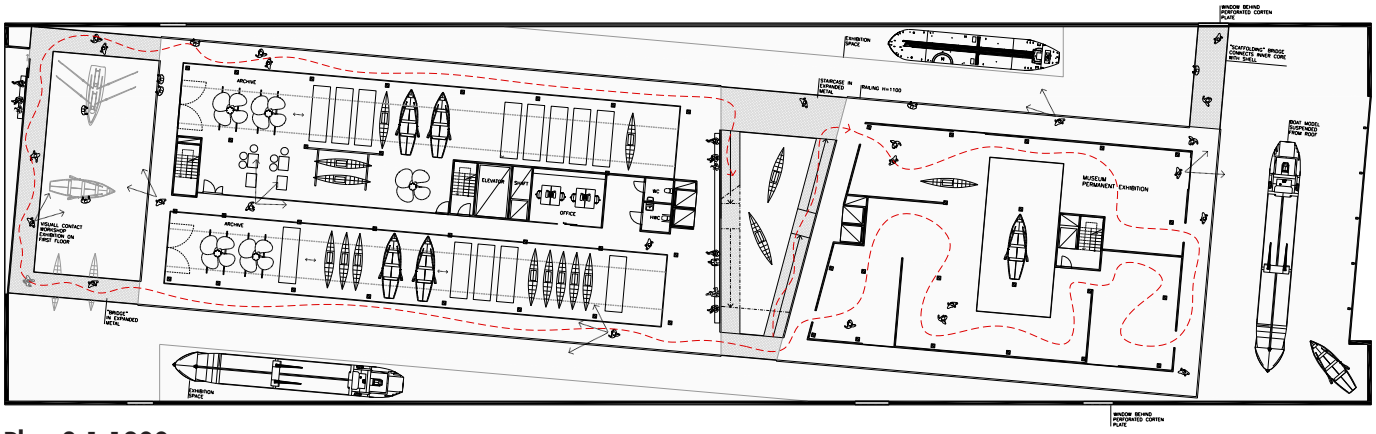
3.1 Drawings

plan 2, 3, 4



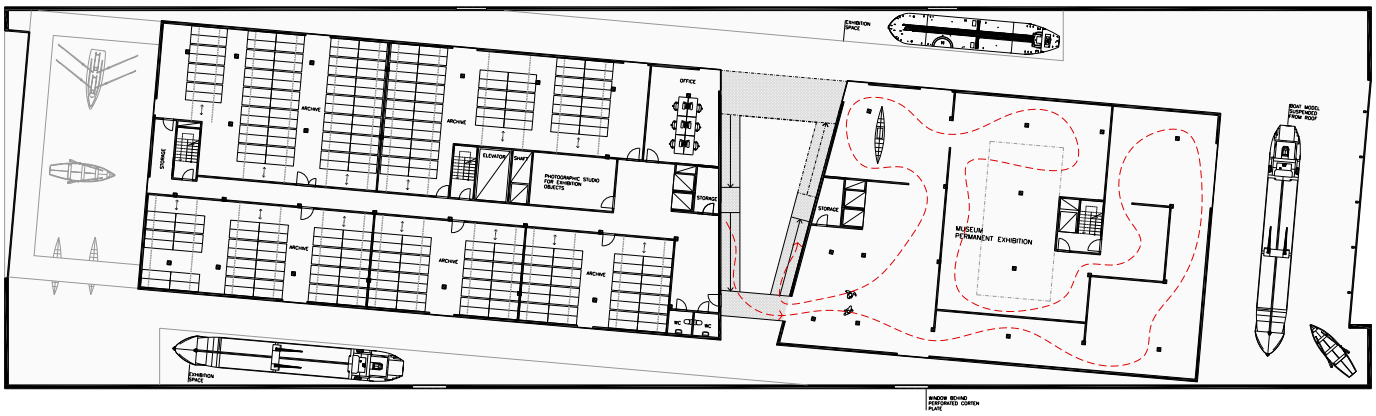
Plan 2 1:1200

Second floor contain space for archives and exhibition space. It also contains a lunch room for the staff.



Plan 3 1:1200

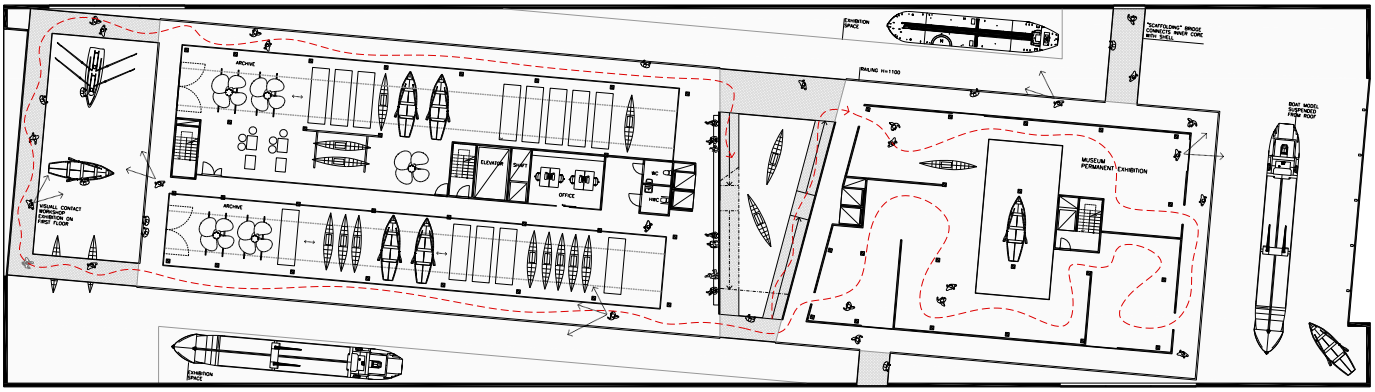
On the third and fifth floor visitors can walk around the archives and take a look at the objects not on display in the exhibition space.



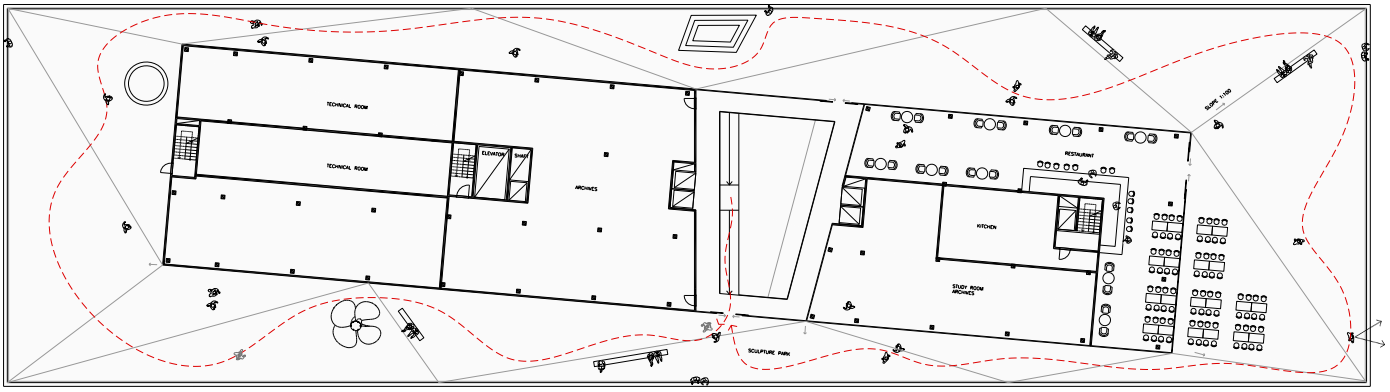
Plan 4 1:1200

3.1 Drawings

plan 5, 6



Plan 5 1:1200

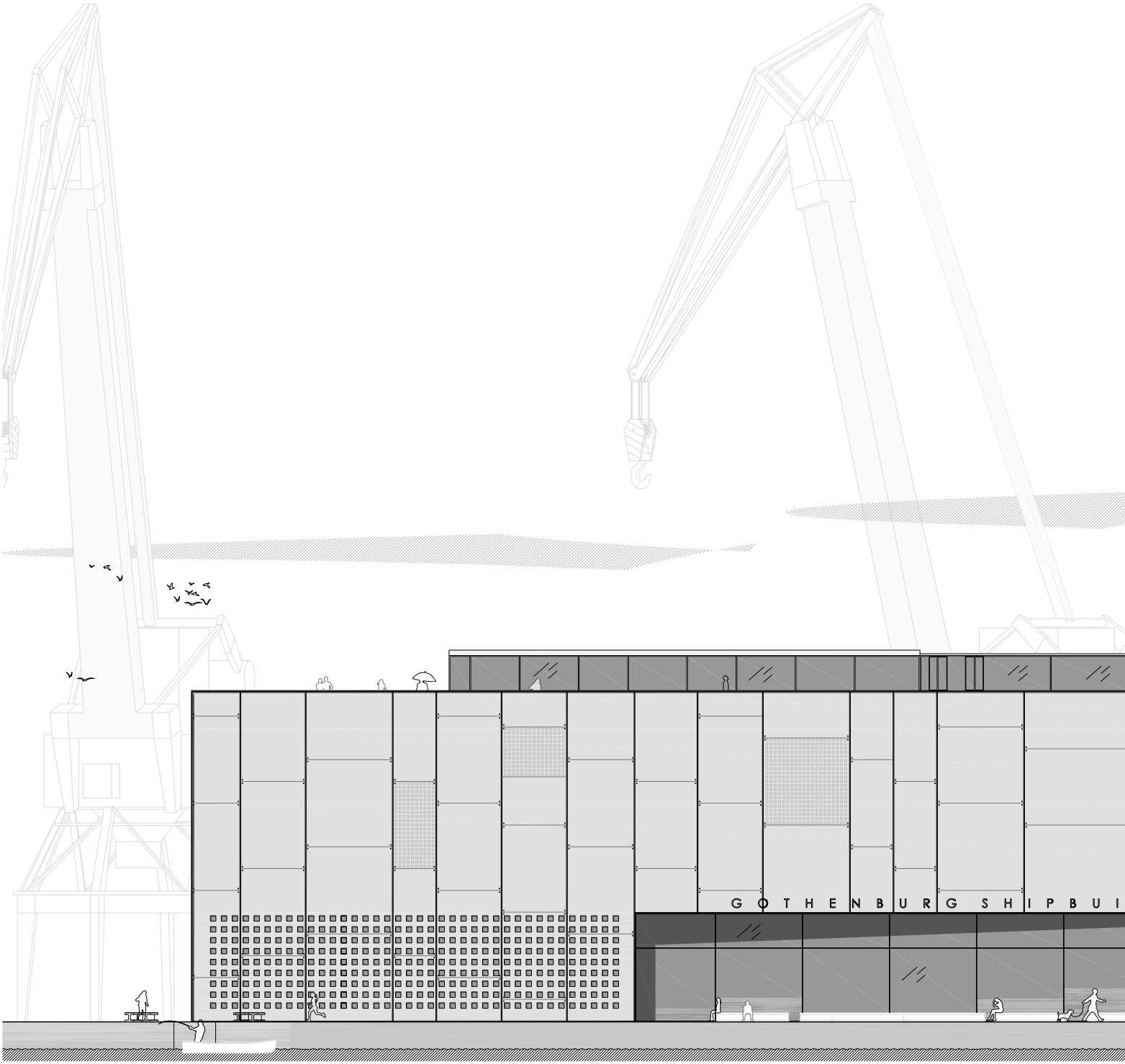


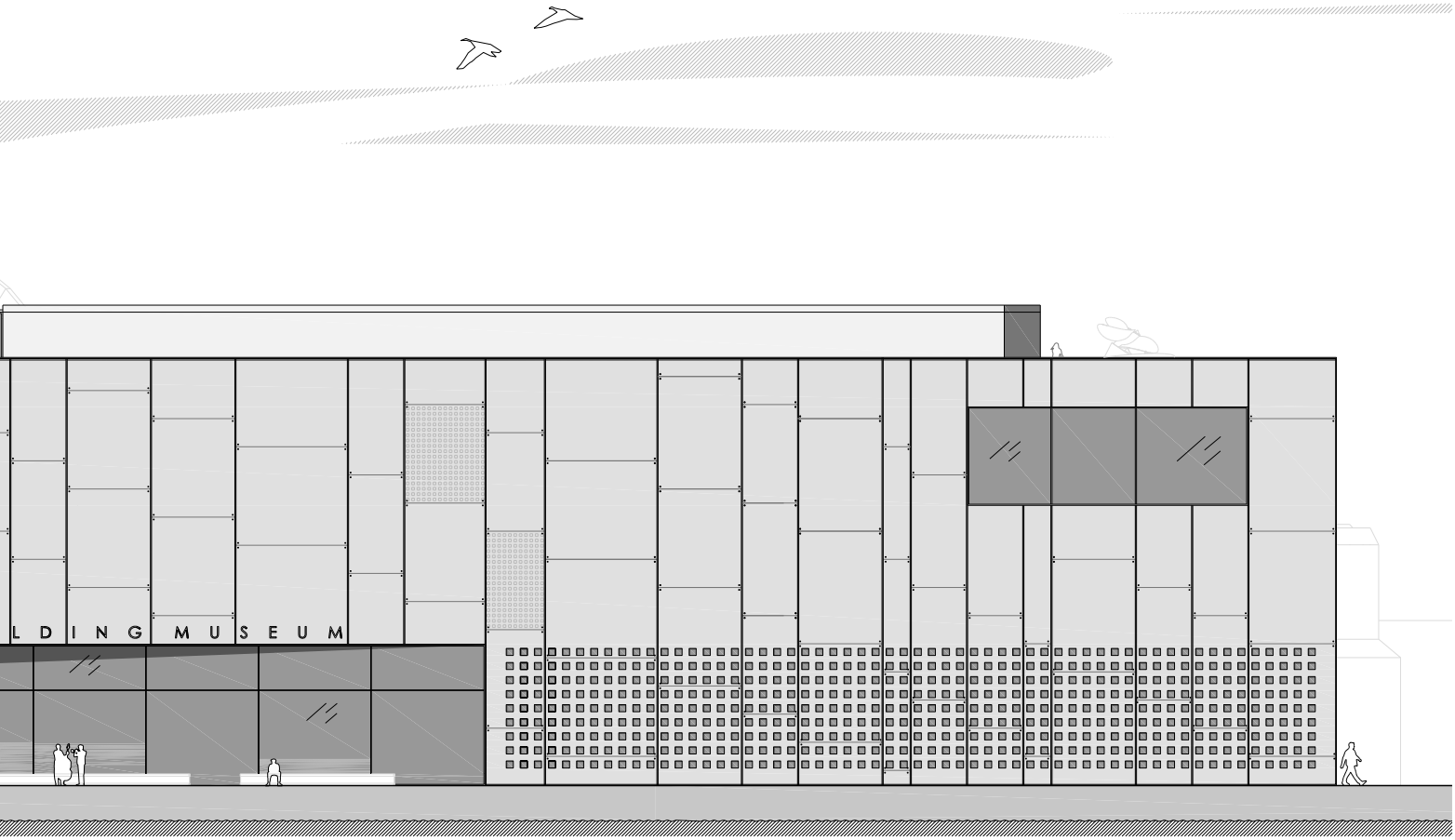
Plan 6 1:1200

The exhibition continuous on the roof, the visitors can walk around the roof in a sculpture park. There is also a cafe with outdoor seating with views over the harbor.

3.1 Drawings

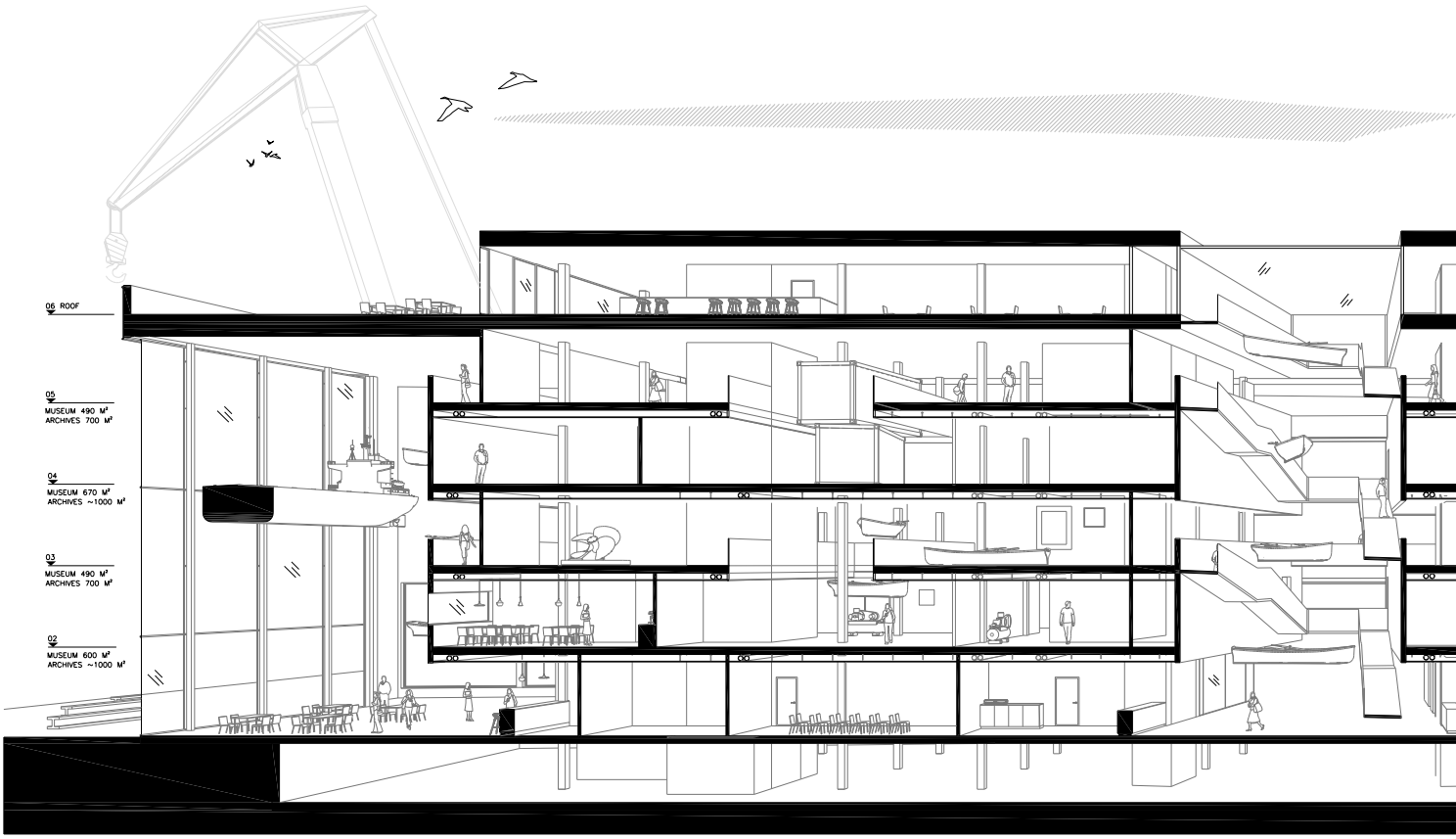
Facade 1:800



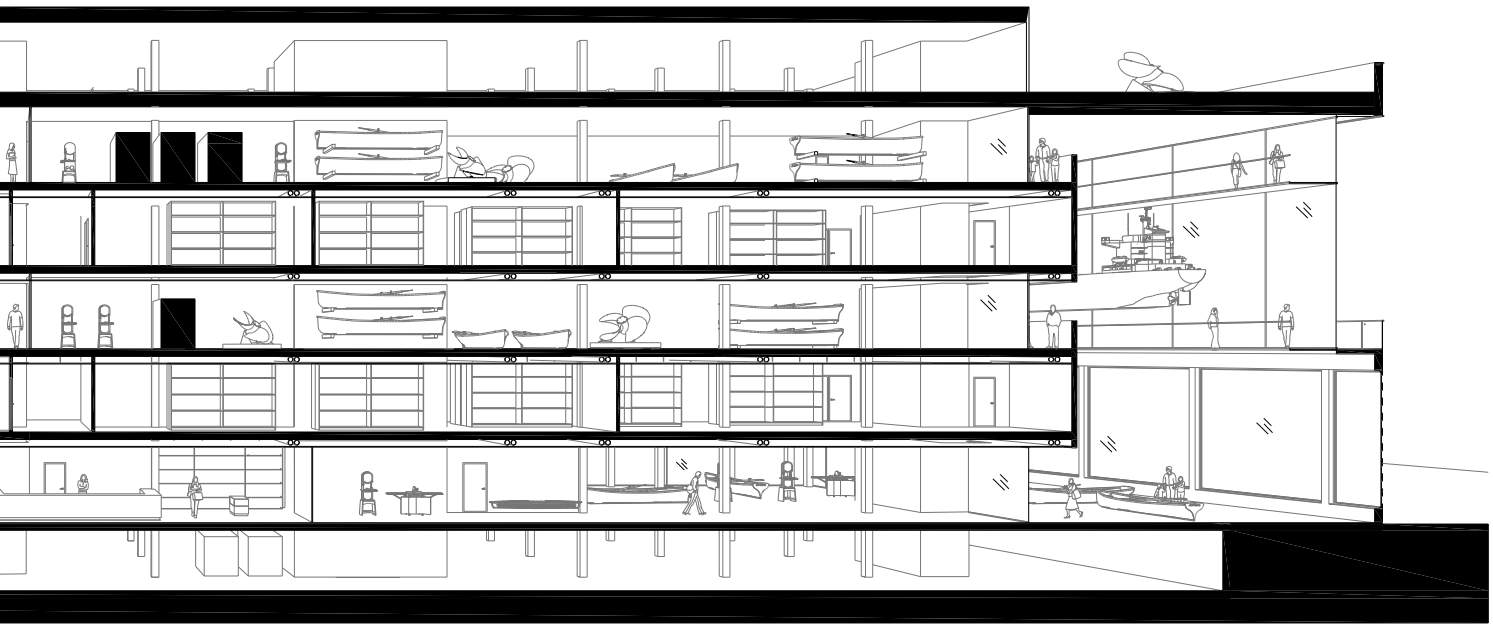

L D I N G M U S E U M

3.1 Drawings

Section 1:800

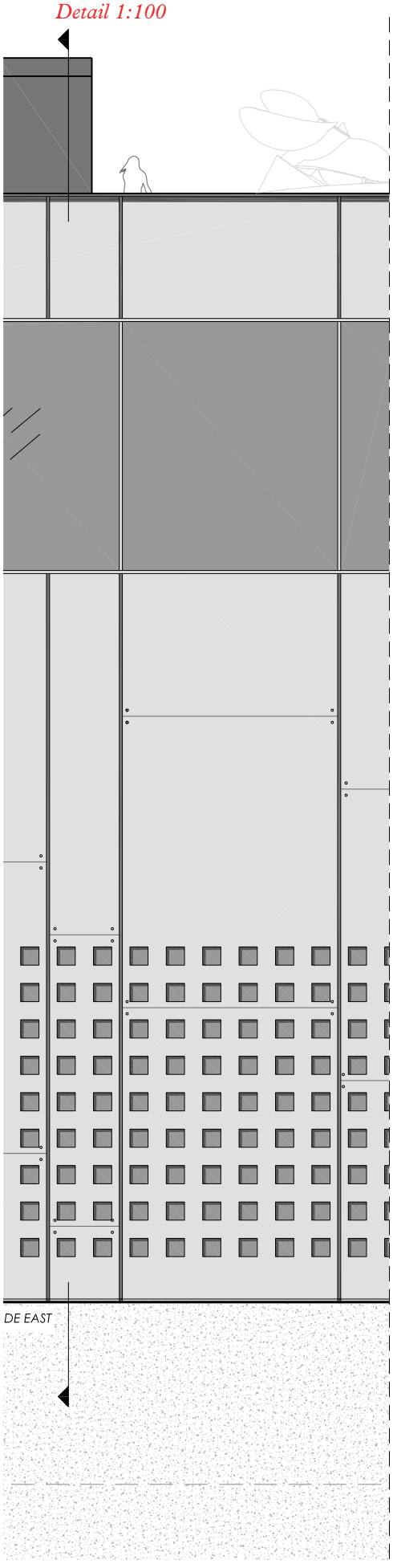


LONG SECTION
A-A



3.1 Drawings

Detail 1:100



1. METAL FLASHING, STAINLESS

2. 4 mm STEEL FLOOR PLATE
100 mm CONCRETE
120 mm XPS THERMAL INSULATION
30 mm XPS THERMAL INSULATION
FIBERCLOTH
10 mm ASFALTMASTRIX
5 mm POLYMERASFALTSMATTA YEP 6000
SLOPE CONRETE 1:100
300 mm REINFORCED CONCRETE
300 mm SUSPENDED CELING (VENTILATION, LIGHTING)

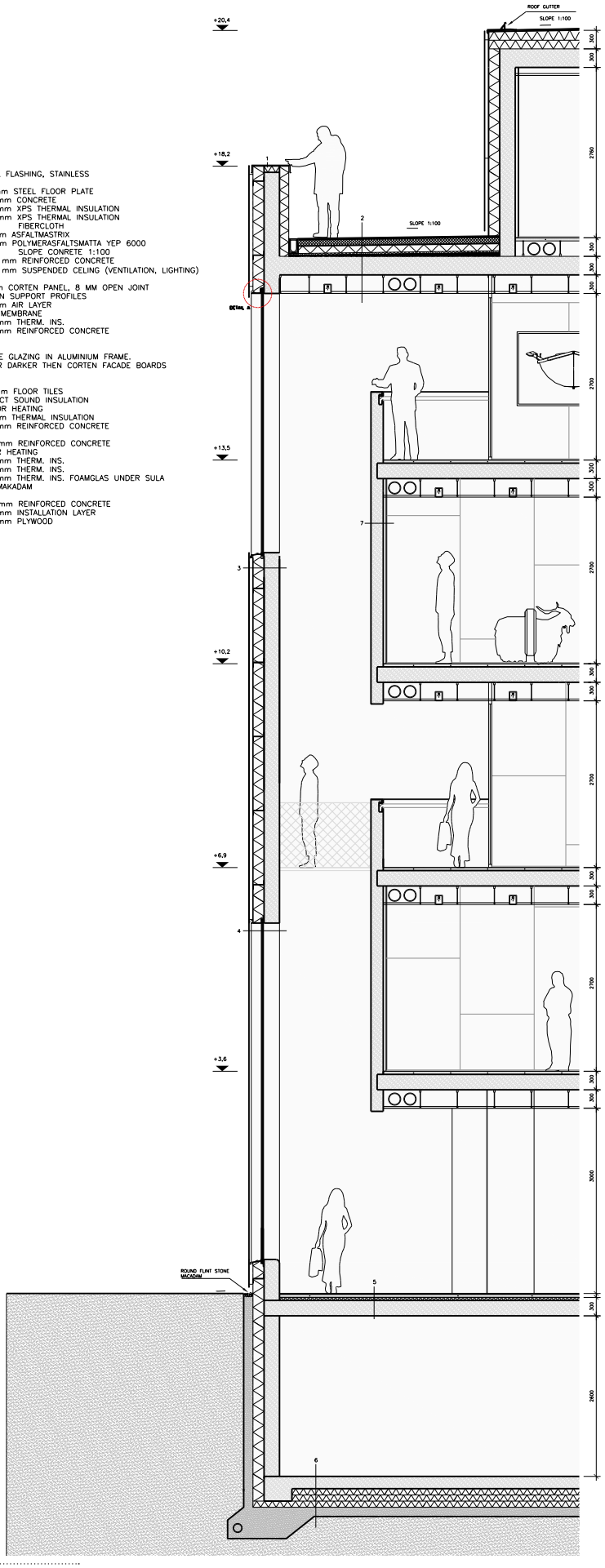
3. 4 mm CORTEN PANEL, 8 MM OPEN JOINT
HIDDEN SUPPORT PROFILES
60 mm AIR LAYER
WALL MEMBRANE
180 mm THERM. INS.
250 mm REINFORCED CONCRETE

4. TRIPLE GLAZING IN ALUMINIUM FRAME.
COLOR DARKER THEN CORTEN FACADE BOARDS

5. 13 mm FLOOR TILES
IMPACT SOUND INSULATION
FLOOR HEATING
50 mm THERMAL INSULATION
250 mm REINFORCED CONCRETE

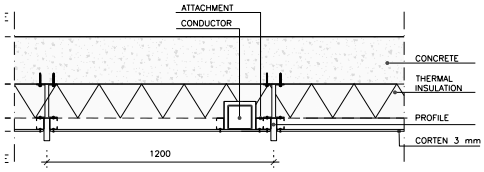
6. 200 mm REINFORCED CONCRETE
FLOOR HEATING
100 mm THERM. INS.
100 mm THERM. INS.
100 mm THERM. INS. FOAMGLAS UNDER SULA
150 MAKADAM

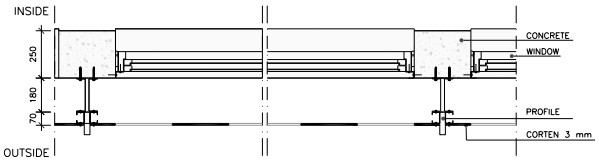
7. 200 mm REINFORCED CONCRETE
45 mm INSTALLATION LAYER
12 mm PLYWOOD

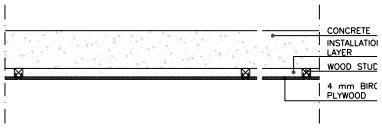


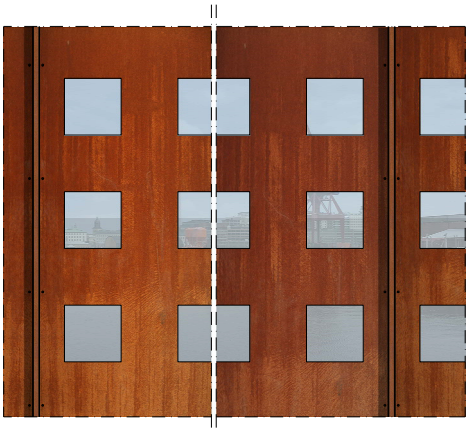
3.1 Drawings

Details 1:40



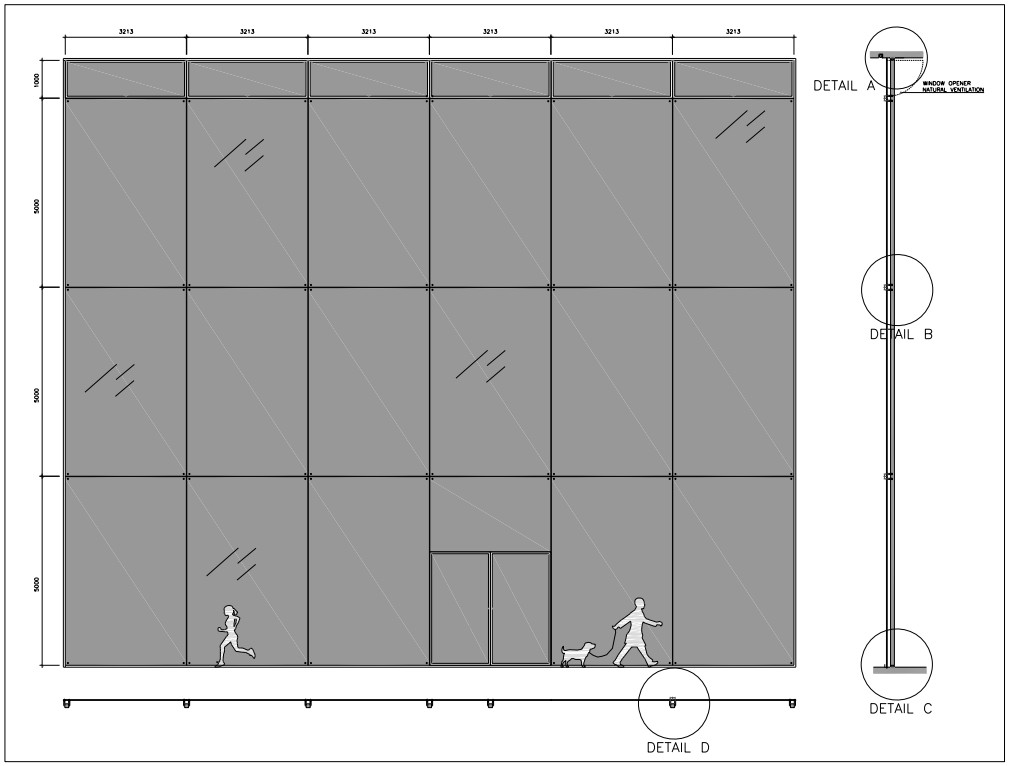




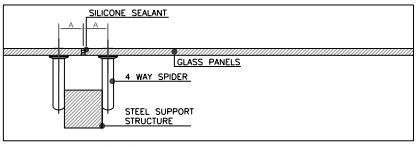


3.1 Drawings

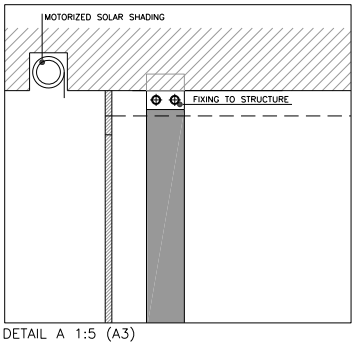
Section 1:800



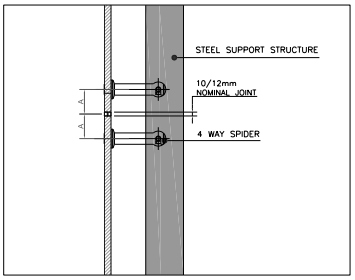
STEEL SUPPORTED GLAZED FACADE 1:50 (A3)



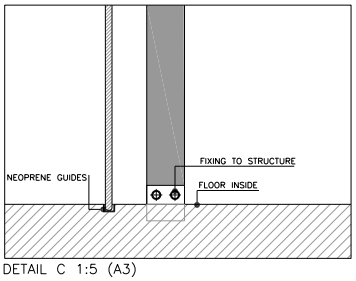
DETAIL D 1:5 (A3)



DETAIL A 1:5 (A3)



DETAIL B 1:5 (A3)



DETAIL C 1:5 (A3)

3.2 Drawings

Perspective exterior

Exterior Perspective

3.2 Drawings

Perspective interior

Restaurant on entrance floor

3.2 Drawings

Perspective interior

Museum exhibition space

3.2 Drawings

Perspective interior

Main staircase and archives

4.1 Conclusions

Reflections

I chose the topic of the museum because it´s a building typology which brings many of the themes I´m interested in together. It´s also a building typology that demands a high level of detailing which is something I´m interested in but never had the chance to dig deep into. In the beginning of the course I decided to use an old pre study of a shipbuilding museum that the municipality of Gothenburg already had made. I think this was a very lucky decision, along the process I understood how complex the typology of a museum really are, so I was happy that I didn't´t had to spend time on program studies. In the beginning of the design my focus was on the relationship between the exhibition space in a museum and a workshop, but along the work I also got interested in the design of the archive space. The references presented to me by my tutor showed new ways of dealing with archive space and public space. I found that very interesting and it become a central part of my work.

I´m grateful for the time I got to spend on this work. It gave me much new knowledge, and I learned a lot about, materiality, spatial understanding and the complexity of a museum design. I hope this thesis can show new ways of designing museums with the tactile knowledge in mind. Hopefully the thesis also shows the potential for a shipbuilding museum in Gothenburg, one of the most important shipbuilding cities during it´s heydays.

4.2 References

Written references

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Liljewalls Architects. (2013). Varvs-& Industri Historiskt Centrum.

Göteborg stad. (2003). Handling 2003 nr 144, Kommunfullmäktige, motion. Hämtad från www5.goteborg.se/prod/Intraservice/Namndhandlingar/...nsf/.../Protokoll__9.doc

All illustrations, renderings, drawings, photographs and related graphics are created by Per Slättberg unless written otherwise.

Keeping the Tacit Knowledge Alive.
Development of a New Building Typology to
Save Our Heritage.
Per Slättberg

Master Thesis in Architecture for
Chalmers School of Architecture.
Gothenburg, 2017
Examiner: Mikael Ekegren
Tutor: Björn Gross