



# Hybrid Atmospheres

Crafting a Sustainable Cultural Centre for Lindholmen.

David Cortés López

Master thesis  
Chalmers School of Architecture  
Department of Architecture and Civil Engineering  
Examiner: Walter Unterrainer  
Supervisor: Filip Rem  
Spring 2025



*Thank you, Filip, Walter, and Family, for your support during this process.*



Master Thesis, Spring 2025

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Architecture and Planning Beyond Sustainability

Examiner: Walter Unterrainer  
Supervisor: Filip Rem



Architect and urban designer with interest in sustainability and human experience in architecture.

BSc Architecture  
Universidad Piloto de Colombia

MSc Urban Design  
Universidad Nacional de Colombia

Intership  
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- 2nd Architects, Nottingham, UK

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MSc. Architecture and Planning Beyond Sustainability .

Studios:  
- Key Projects for Sustainable Development in a Local Context  
- Prototypes and Assemblages  
- Integrated Sustainable Building Design

Profile:  
Building Design and Transformation for Sustainability

## Previous experiences and ideas

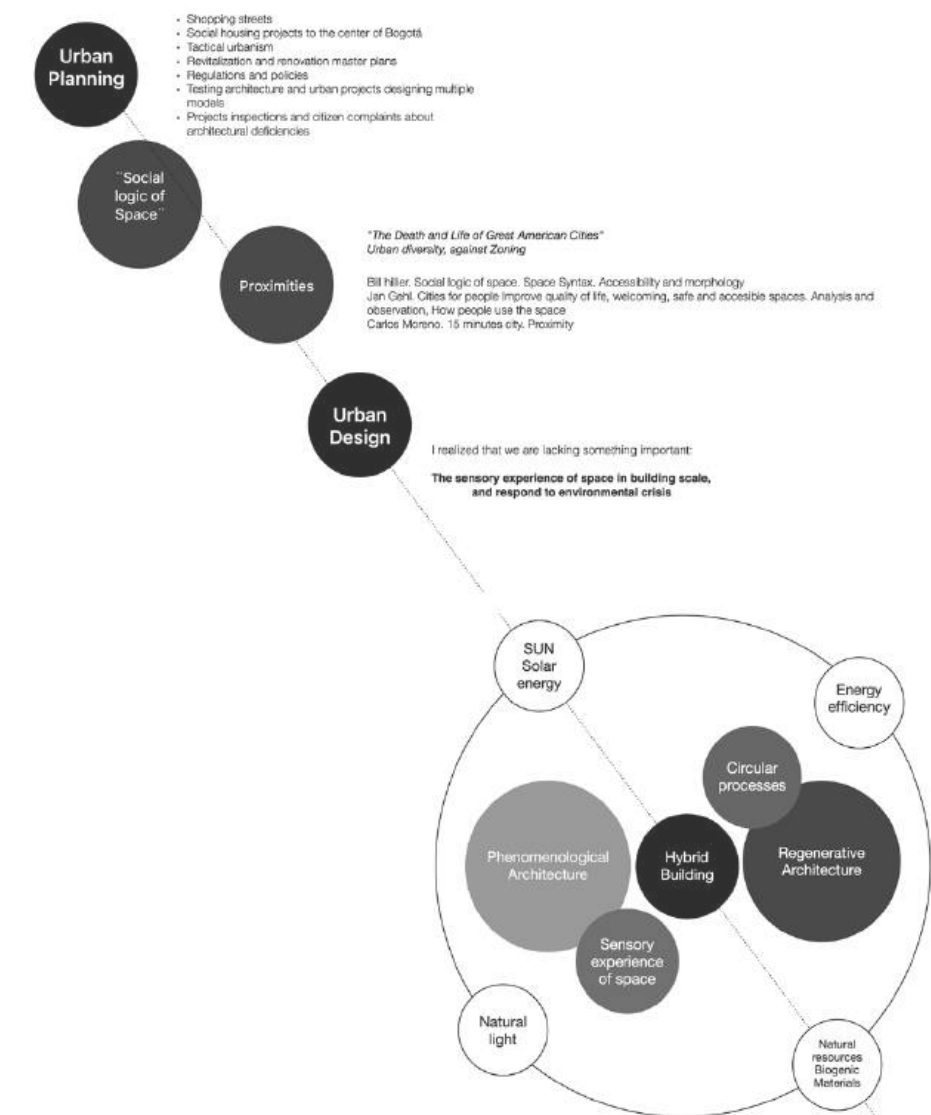


Figure 1: Preliminary scheme.  
Note: This scheme illustrates how my experience connects with the preliminary thesis idea.

*I consider the sensory experience of space and respect  
for the environment to be fundamental*

**Abstract**

**01 Introduction**

Problem and Propose  
Aim and Research Question  
Sustainable Development  
Delimitations  
Method  
Theory

**02 Design Process**

- a. Research for design
  - Site Analysis
  - Thematic Observation
  - References
  - Literature Studies
  - Criteria for Design Phase
- b. Research by design
  - Qualitative Approach
  - Optimization Approach
- c. Research on design
  - Design Process Reflections

**03. Discussion**

**Bibliography**



*We all know there is something in the 'air'  
that we call atmosphere, but words cannot  
completely explain it.*

## Hybrid Atmospheres

Crafting a Sustainable Cultural Centre for Lindholmen.

### Abstract

Today, the planetary ecosystem faces significant pressure from human activities, in large part due to the impacts of the built environment. Likewise, this built environment offers fewer and fewer qualified spaces and engaging atmospheres essential for human well-being. Integrating this dual challenge highlights a gap in the building design process.

This thesis explores the integration of the atmospheric experience of space with sustainable design in creating a cultural center in Sweden. It focuses on utilizing natural resources, such as natural light and wood, to create sensory atmospheres while incorporating environmentally friendly processes. This approach centers on a parking lot along the riverbank of Lindholmen in Gothenburg, a site historically degraded by a century of shipyard operations but now presenting a unique opportunity for recovery. Its strategic position offers the opportunity for a cultural public building, connecting a sequence of art exhibitions along the Älv riverbank. The intervention is a vibrant place that recovers nature and symbolizes the historical creative industry through exhibition spaces, such as a permanent exhibition for Hasselblad. The building also functions as a viewpoint. Its southern exposure on the waterfront minimizes obstacles to appreciating Gothenburg while harnessing solar resources. This combination further enhances the inspiring atmosphere and the potential for sustainable development.

Drawing on the theoretical frameworks of phenomenological and restorative architecture, this research examines spatial configurations that involve the experiential quality of space and recovering of the existing area. The methodology integrates research for design and research by design through a fluid iteration of two phases and their corresponding methods. Research on design approach is included in the final stage as a reflection on the design process.

Ultimately, this thesis aims to expand the knowledge of the design process by exploring the relationship between atmospheric qualities of the space and sustainability in designing a public cultural center. It also contributes to the restoration of an environmentally degraded area, fostering an integrated approach to sustainable design and transformation.

*Keywords: design process, atmospheres, cultural building, sustainability, art and design.*

Viipuri Library.  
Adapted from the article the secret of light by Paul Rogers, 2023.  
Source: daylightarchitecture.com. Note: Also displayed on the frontpage.



## 01 Introduction

Problem and Propose  
Aim and Research Question  
Sustainable Development  
Delimitations  
Method  
Theory



## Problem and Propose

There is an urgent need for action to restore environments affected by human impact on the planet and to address the dehumanization of architecture, fostering a more empathetic and experience-driven society that enhances well-being.

As a first point, in recent years, Sweden has seen a notable increase in single-person households, "The number of households in Sweden In 2022, increased by 52 000, the relative increase was greater than Sweden's population growth. In 2023, Sweden had over 4.9 million households. Among these, the most common type was single-person households without children, which amounted to more than 2 million."<sup>1</sup> This changes in population dynamics highlights the need for inclusive public areas that support well-being and reduce isolation.

On the other hand, Richardson et al. (2023) note that humanity has exceeded critical planetary boundaries, causing environmental degradation. Net Primary Production (NPP)<sup>2</sup> has increased from 55.9 to 71.4 gigatons of carbon per year by 2020 due to human activity. Researchers recommend limiting NPP appropriation to under 10% of pre-industrial levels, a threshold surpassed in the late 19th century (p.3). The Irresponsible use of biomass increases carbon emissions, highlighting the need for sustainable design approaches that transform degradation for restoration.

Furthermore, Around 40% of global carbon emissions are linked to the built environment. According to the report of United Nations (2024), in 2023,

<sup>1</sup> Source: Statistics Sweden, 2024

<sup>2</sup>. Net Primary Production (NPP) is an effective metric for assessing the flow of photosynthetic energy coming from solar resources (photosynthesis) into the biosphere.

global CO<sub>2</sub> emissions from energy combustion and industrial processes increased by 1.1% to a record 37.4 gigatons. Additionally, many buildings meet energy efficiency goals, but often report discomfort with lighting, ventilation, and overall space quality (UN, 2024).

This thesis addresses both issues through the design process. It enhances spatial quality and experiences to address the dehumanization of public architecture while reducing environmental impact through restorative approaches.



Figure 2. Loneliness and site potential



Figure 3. Shipyard Lindholmen, 1961.  
Source: Sjöstedt, Stig/Reklamfoto Ab./Sjöhistoriska museet.

## Aim and Research Question

The thesis aims to expand the knowledge of the design process by exploring the relationship between atmospheric qualities and sustainability of a cultural center and public building in Lindholmen. By restoring a deteriorated industrial site, enhancing sensory experience of the architecture and optimizing the use of resources. It seeks for a more integrated approach to sustainable building design that addresses both social and environmental concerns.

### Main question

How can the design of a cultural center in Lindholmen integrate qualified atmospheres and sustainable architecture?

### Sub question

How can a cultural center contribute to the environmental and social restoration of a former industrial site currently occupied by a parking lot?



## Sustainable Development

In terms of sustainable development, this thesis seeks to restore degraded environments, promote the sustainable use of resources, and enhance building comfort. It also promotes social sustainability by engaging society to responsibly enjoy public cultural spaces, and enhancing well-being. This work aligns with the Sustainable Development Goals (SDGs) through direct and indirect positive impacts.

### Direct Positive Impact:

- **Goal 7: Affordable and Clean Energy:** The project enhances energy use by integrating solar resources as natural light in public buildings, reducing fossil fuel use and carbon emissions to support the transition to clean energy.
- **Goal 11: Sustainable Cities and Communities.** A cultural center as an inclusive and restorative public space addresses urban needs, minimizes environmental impact, and restores degraded areas, enhancing accessibility to communities, especially for vulnerable groups.
- **Goal 13: Climate Action:** By incorporating restorative processes, such as the transformation and recovery of a parking lot into a natural environment, this project mitigates climate change and promotes resilience. It also raises awareness of sustainable architecture, contributing to global climate goals.

### Indirect Positive Impact:

- **Goal 3: Good Health and Well-being:** The project promotes well-being by improving ac-

cessibility to Gothenburg's assets through inviting spaces and exhibitions. It uses natural light, and greenery to revitalize a contaminated area, reducing health risks.

- **Goal 10: Reduced Inequalities:** A cultural public centre is an example of a good democracy. It fosters community engagement and inclusive participation, ensuring equal equitable access to cultural benefits and promoting local growth.
- **Goal 14: Life below Water:** Restoring and greening a parking lot made of concrete and asphalt on the riverside, which was also a shipyard for a century and left heavy metals and other materials on the ground, helps indirectly improve life below water.
- **Goal 15: Life on Land.** The project promotes ecosystem health by restoring a degraded industrial area with restorative plants, and solar energy, reducing environmental impact.

## Delimitations

### Outside the Scope of the Thesis:

- **Site Challenges:** Issues such as soil contamination, water level, and connectivity are integrated into the thesis process. However, the main emphasis remains on architectural and urban design rather than deeply detailing the resolution of these multidisciplinary challenges.
- **Theoretical Depth:** Disciplines such as urban theory, climatology, or philosophy, are not the main focus in this work, however they are considered only to support the primary goal of articulating human experience with sustainable design.

### Within the Scope of the Thesis:

- **Design Focus:** Emphasize in space qualities and human experience to improve atmospheres. It also integrates environmental awareness, contributing to the sustainable restoration of the site.
- **Human Experience and Sustainability:** Explore how a cultural center can enhance human experience while improving sustainability.
- **Scale Approach:** Adopt a iterative bottom-up and top-down approach, emphasizing the context and design that directly impact user experience.
- **Integration of Qualities:** Combine experiential qualities and sustainable measures. For instance, the use of natural light for improving atmospheres as well as saving energy.

## Method

The methodology includes research for design, research by design and research on design approaches, incorporating a fluid iteration of three phases with corresponding methods.

### Phase 1: Research for design

Focus on gathering background knowledge, collect elements and understanding the site context to inform design decisions.

- **Site Analysis:** Understanding the project location.
- **Photography and Thematic Observation:** Observing different phenomena and characteristics of the place.
- **Literature studies:** To build a theoretical foundation on phenomenological architecture and sustainable design.
- **Project References:** To study successful public buildings that include qualified atmospheres and sustainable resources in similar contexts.

### Phase 2: Research by design

This phase focuses on translating insights into initial designs and refining the integration of spatial quality and architectonic characteristics. The phase is divided into two stages.

#### Stage A. Qualitative Approach.

- **Design diary:** Documenting the process
- **Schemes and diagrams:** Develop rapid ideas for the early design stage.

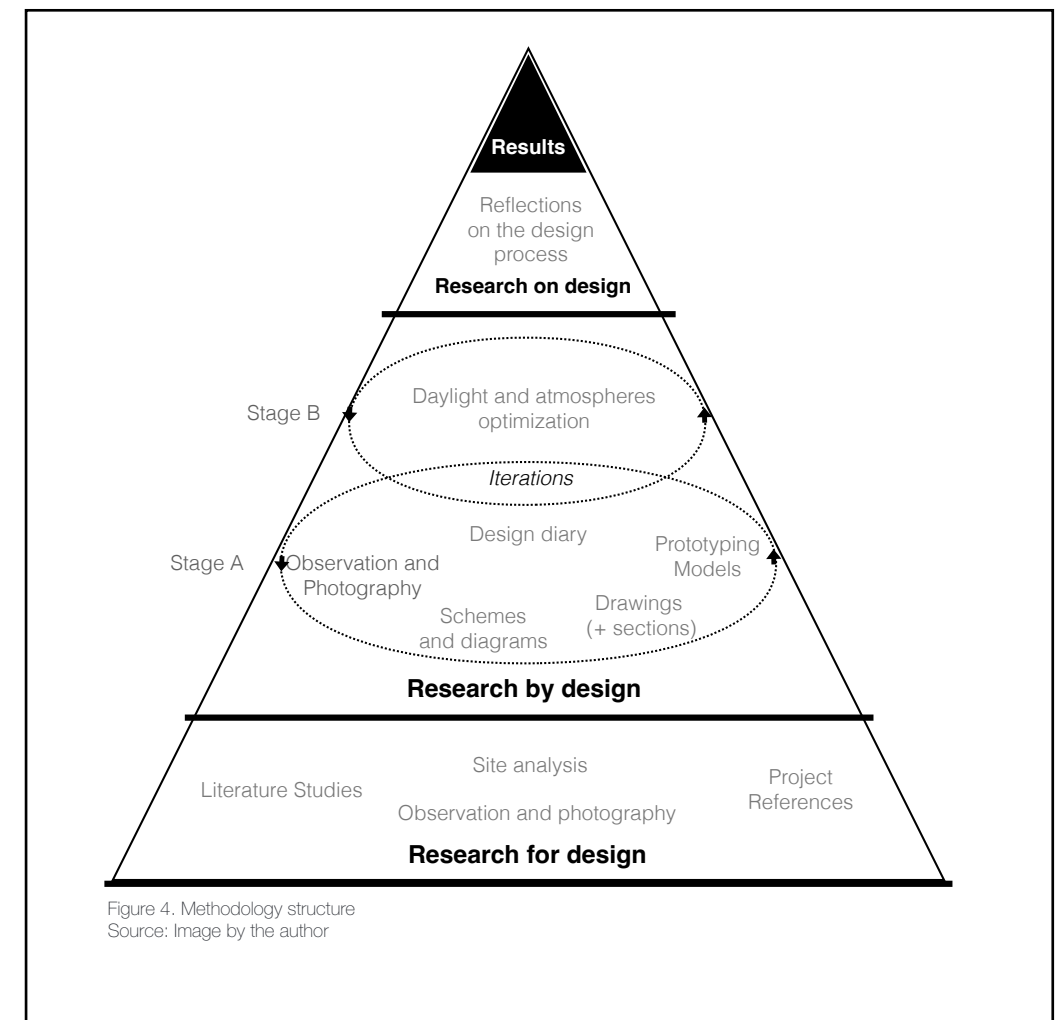
- **Rapid Prototyping:** For site recognition, architectonic elements, and developing atmospheric spaces.
- **Observation and Photography:** Explore the human experience by observing how the design would affect users, using both physical models and real environments.
- **Drawings:** Developing architectural drawings that focus on light, morphology and spatial relationships.
- **Model Making:** Physical or digital models that represent the process ideas.

#### Stage B. Optimization Approach.

- **Daylight and atmospheres optimization:** Digital simulations, drawings and models to review the use of natural light and form while ensuring atmospheric effects and resource efficiency.

### Phase 3: Research on design.

Finally, the methodology ends with the design result, discussion and reflections on the design process.





## Theory

This research is based on two main theoretical frameworks: phenomenological architecture and restorative architecture, aiming to integrate human experience and sustainability in building design.

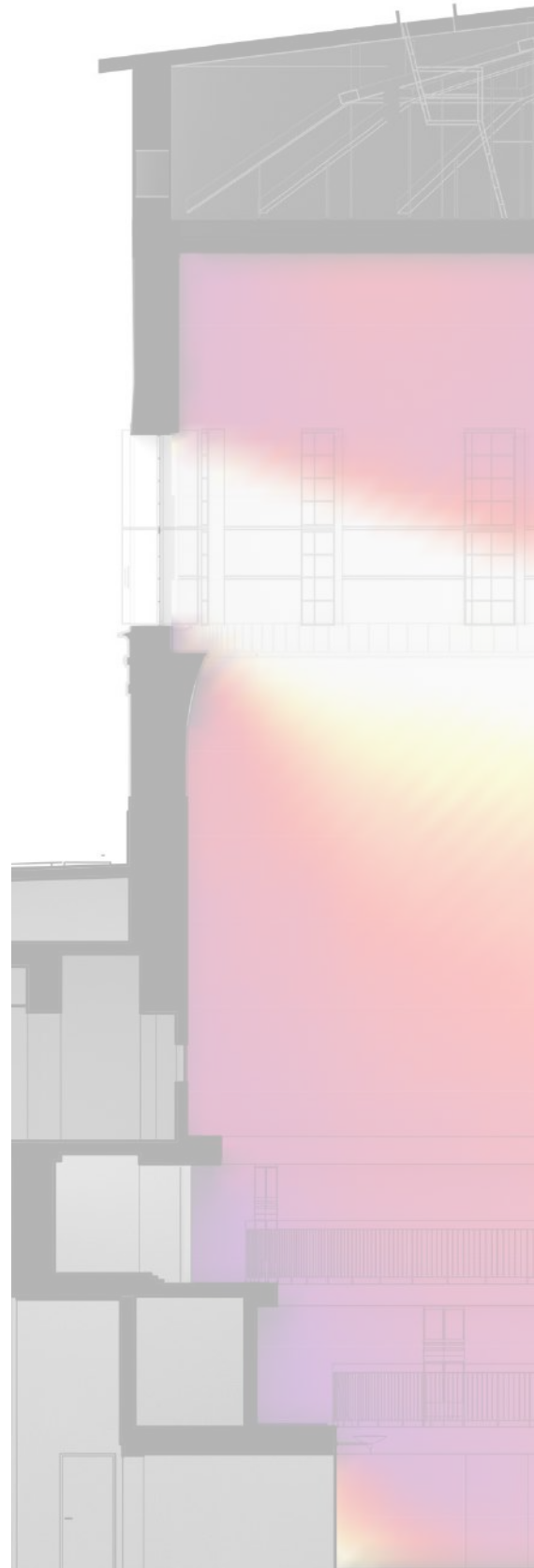
### A

**Phenomenological architecture** emphasizes the sensory experience of space, focusing, in this work, on how light, space and materials, interact to evoke emotions and enrich human experience.

A key element of this framework is the concept of atmospheres. As Zumthor (2006) mentioned, atmospheres refer to the quality of space that can create qualified sensory experiences.

The use of daylight in this thesis is central to conceive these atmospheres, as it shapes our perceptions of space and time. As Böhme et al. (2018) suggested the sense of sight gains significance through the experience of observing the interplay between light and matter as a phenomenon, which contributes to the overall sensory experience within built environments.

Although the emphasis on light is central to this thesis, it also incorporates essential factors from phenomenology in the design process, such as tactility, materiality sound, and thermal comfort, to create immersive atmospheres.



Stockholm Central Library.  
Adapted from the article the secret of light by Paul Rogers,  
2023. Source: daylightarchitecture.com.

### B

#### Sustainable and Restorative Architecture

Based on Reed's (2007) trajectory of environmentally responsible design, this thesis aligns with both sustainable and restorative architecture, which together represent the most applicable theoretical framework. As Mang and Reed (2020) state, *"restorative architecture sometimes called restorative environmental design; is a design system that combines returning degraded or damaged sites back to a state of acceptable health through human intervention"*

Specifically, the main three components of the project are categorized as follows:

Gothenburg Gallery-Museum: The building is placed at the sustainable level due to its social contribution, urban enhancement, and the integra-

tion of passive design strategies such as natural lighting and energy generation through photovoltaic panels.

Restorative Park: The former parking lot is being de-paved and transformed into a permeable surface that invites vegetation and supports phytoremediation. This gradual process returns the contaminated soil to a more natural and healthy state. This intervention is classified at the restorative level.

Memorial: This element is also restorative, both socially and environmentally, as it recovers the site by allowing water to shape the concrete dry dock, preserving the memory of the shipyard.

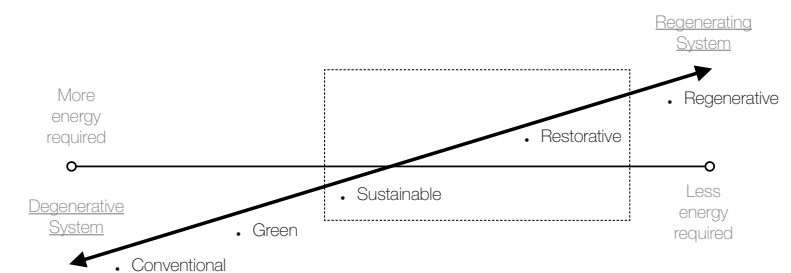


Figure 4. Trajectory to environmentally responsible design, adapted from (Mang and Reed, 2020)

## 02 Design Process

### a. Research for design

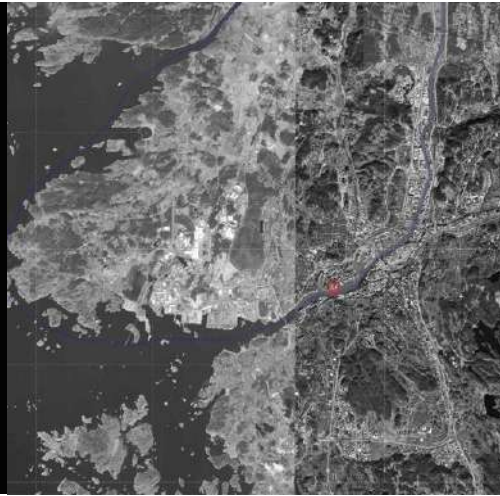
Focus on gathering background knowledge, collect elements and understanding the site context to inform design decisions.

- Site Analysis
- Photography and Thematic Observation
- Project References
- Literature Studies
- Synthesis and Criteria for Research by Design Phase



## Site Analysis

The site analysis aims to understand the characteristics of the place. It is initially presented with a general context of the area, followed by its history, municipal urban plans, urban characterization and thematic observations using the tool of photography. As a result, the analysis is presented with a schematic synthesis and criteria that inform the research by design process.



## Context of the Project

The site for the cultural center project is a parking lot located along the Göta River in the Lindholmen area of Gothenburg, Sweden.

This location has an intrinsic relationship with water due to its specific location on the riverbank and, on a larger scale, the connection between Sweden and the North Sea. It is strategically situated close to the city center, on the western coast of Göteborg, which historically made it a valuable location for shipyards. The area has undergone a significant transformation, changing from an island with linden trees to an industrial hub filled with shipyards, factories, and large-scale buildings. The decline of the shipbuilding industry led to a re-imagining of the site.

Today, Lindholmen symbolizes urban transformation, where innovation, education, housing, and industry meets in one piece. In this context where the transformation is still in process, the inclusion of cultural activities and meeting points can act as a catalyst for cultural engagement and foster connections among citizens.

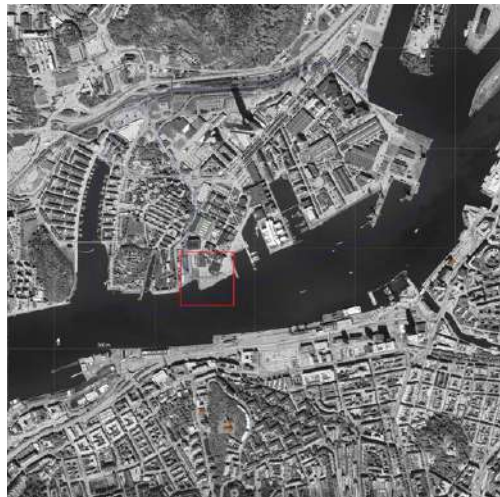


Figure 5. Localization  
Adapted from Google Earth image, 2024.



Figure 6. Site perspective  
Adapted from Google Earth image, 2024.



Figure 7. Gothenburg map, 1815.  
Source: <https://www.helahisingen.se/>



Figure 8. Slottsberget, 1952  
Source: Erik Liljeröth/Nordiska Museet.



Figure 9. Lindholmens Shipyard, 1943.  
Source: Okänd, Sjöhistoriska Museet.

## History

Lindholmen was originally an island. During the Middle Ages, a castle was installed on the top of Slottsberget. It was demolished in the 1600s. As early as the 1500s, a shipyard existed below Slottsberget. Until 1840, Lindholmen was mainly used for agriculture. In 1845, Lindholmen's shipyard was established. The shipyard developed rapidly, and in 1875, a dry dock was built between Slottsberget and Skatberget, which was, at the time, the largest in Sweden (and the only one in Gothenburg until 1914).

The shipyard operated until the shipbuilding crisis in the mid-1970s, when it was one of the first to be shut down. Today, only the dry dock remains from the shipyard's older structures, but within the area, several buildings from the later period of the shipyard still exist. In 1978, the shipyard's land and buildings were taken over by the municipally owned company Projekt Lindholmen AB. Through collaboration between the government, the municipality, and industry, activities in the fields of education, production, and research were established here.

When the City of Gothenburg launched the Project Lindholmen Corporation in 1981, the goal was to create a district where education, production, and research could coexist in harmony. This strategy aimed to revitalize the industrial landscape by focusing on research and technological development as the new foundation for economic growth. Lindholmen as an Innovation Hub Since the 1980s has evolved into one of the most important knowledge hubs in Gothenburg, reflecting a global shift towards the knowledge economy as a driver of urban development.<sup>1</sup>

<sup>1</sup> Part of the historical context is adapted from the Lindholmen detail plan, 1997



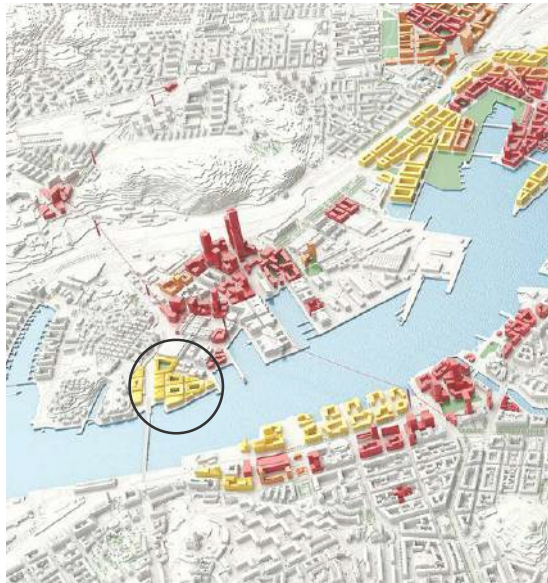


Figure 10. River city Gothenburg vision.  
Source: Göteborgs Stad.

### Urban Planning

Today, Lindholmen hosts an array of research institutions, universities, and high-tech industries, making it a center for innovation that extends its influence far beyond the district's borders. A New Direction for Urban Development Lindholmen's transformation aligns with a broader trend seen in many post-industrial cities around the world, where the focus shifts from traditional manufacturing to science, technology, and education as primary economic forces. By embracing the knowledge economy, Gothenburg has successfully restructured old industrial sites, like Lindholmen, into vibrant districts that are crucial for future urban activities. This shift represents a new direction in urban development, where sustainable architecture, social collaboration, and economic innovation go hand-in-hand.

RiverCity Gothenburg is the strategy from the municipality for the waterfront areas facing the Älv river in Gothenburg. It aims to reconnect the city with the river and transform aging industrial areas into vibrant urban environments. RiverCity is designed to extend the city center across the river, creating new opportunities for business, housing, and public life. For the specific area of the project the owner

of the parking plot facing the river expressed that "it would be a good place to develop new residential buildings in the future. Although, the "Lindholms-förbindelsen", a new tram-tunnel under the river, will be built here and the development of the land will have to wait until the tunnel is in place."

Lindholmen's role in the future of Gothenburg as it continues to grow, serves as a model for the future of urban development in the city and beyond. The new creative clean industries and innovation in synergy with the academy, new housing projects and connectivity with the other border of the river by tram is a perfect scenario for a cohesive urban facility such as a Cultural Centre, that invites citizens to exhibitions and public activities for all and also serves as symbol of restoring the ecosystem of this area.

### Urban Characterization

The site's topography has only a slight slope, with around 1.5 meter difference. It faces the river and is located near Slottsberget Hill to the west. The site sits at a low elevation of 90 cm above sea level and faces south toward the river, receiving sunlight with minimal obstacles. The prevailing wind mainly comes from the south and southwest, continuously hitting the area at varying speeds.

Within a 500-meter walking radius, the site has access to a bus station and a ferry terminal, which connects to central Gothenburg on the other side of the river. Currently, the area is primarily home to academic facilities and offices, surrounded by moderate-density housing projects. However, urban plans propose building approximately 1,800 housing units in the area.



Figure 11. Site. Lindholmen, Gothenburg.

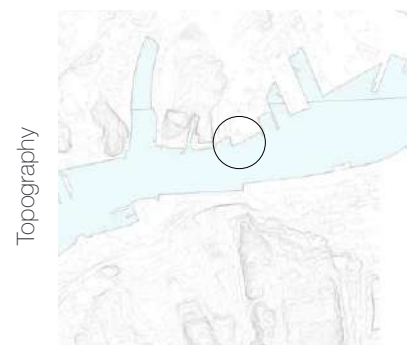


Figure 12. Topography. Plain area facing the river and close to the Slottsberget hill

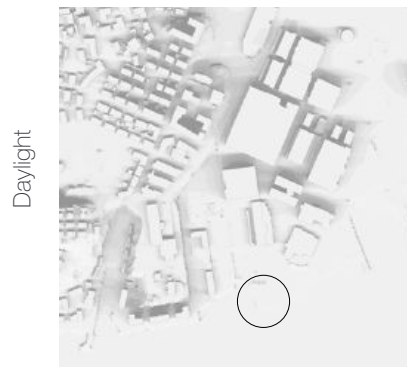


Figure 13. Daylight. Main angle of isolation on south between 57 and 7 deg. No obstacles on the south.

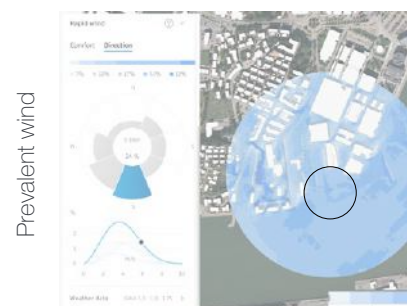


Figure 14. Wind. South and southwest prevalent wind. Speed between 2 and 6 m/s.



Figure 15. Altitude. The lowest ground level is 90 cm above sea level.

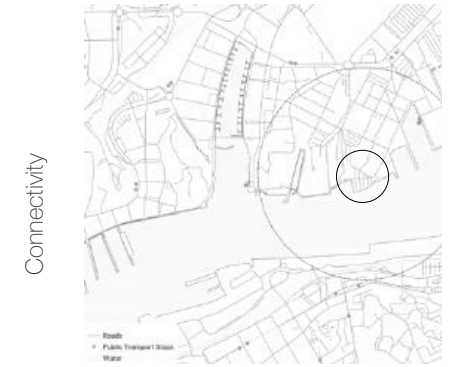


Figure 16. Connectivity. Public transport by ferry and bus within a walkable distance of 500 m.

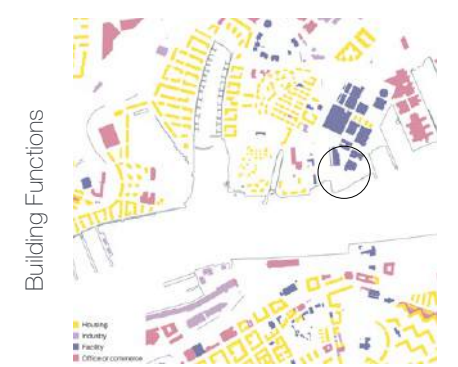


Figure 17. Functions. The area has mainly academy facilities and offices. It is surrounded by housing.

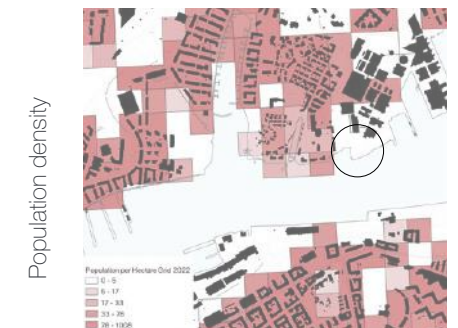


Figure 18. Population per Hectare. There is a moderate density around the site.





Figure 19. Site Localization Perspective. Source: Google Earth

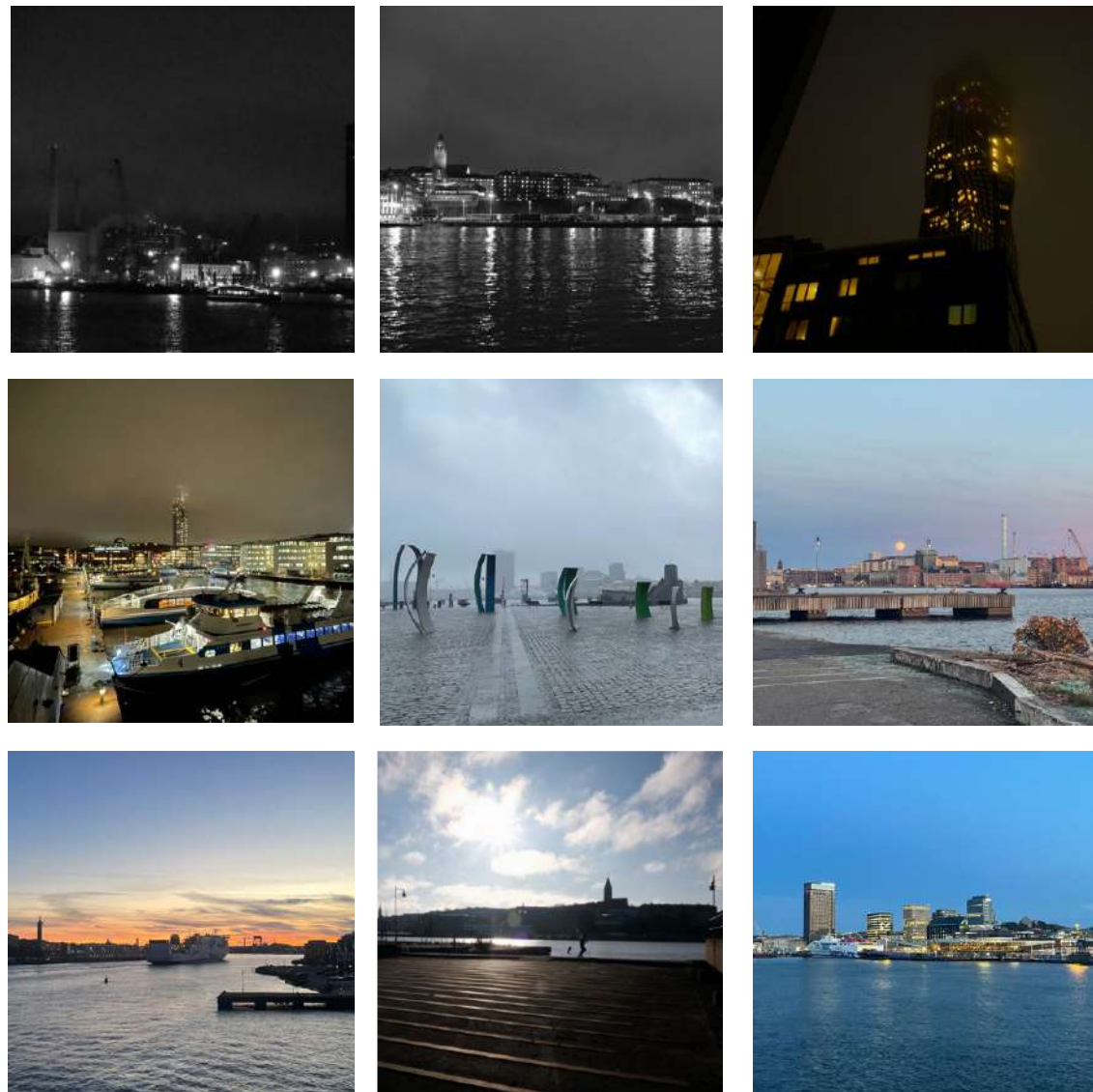


## Photography and Thematic Observation

This method was used to identify, at different times of the year and day, the characteristics of the place in terms of its physical attributes, but also in what Norberg-Schulz refers to as Genius loci in connection with the sense of the place and atmospheres. The observation was concentrated on the following four groups.

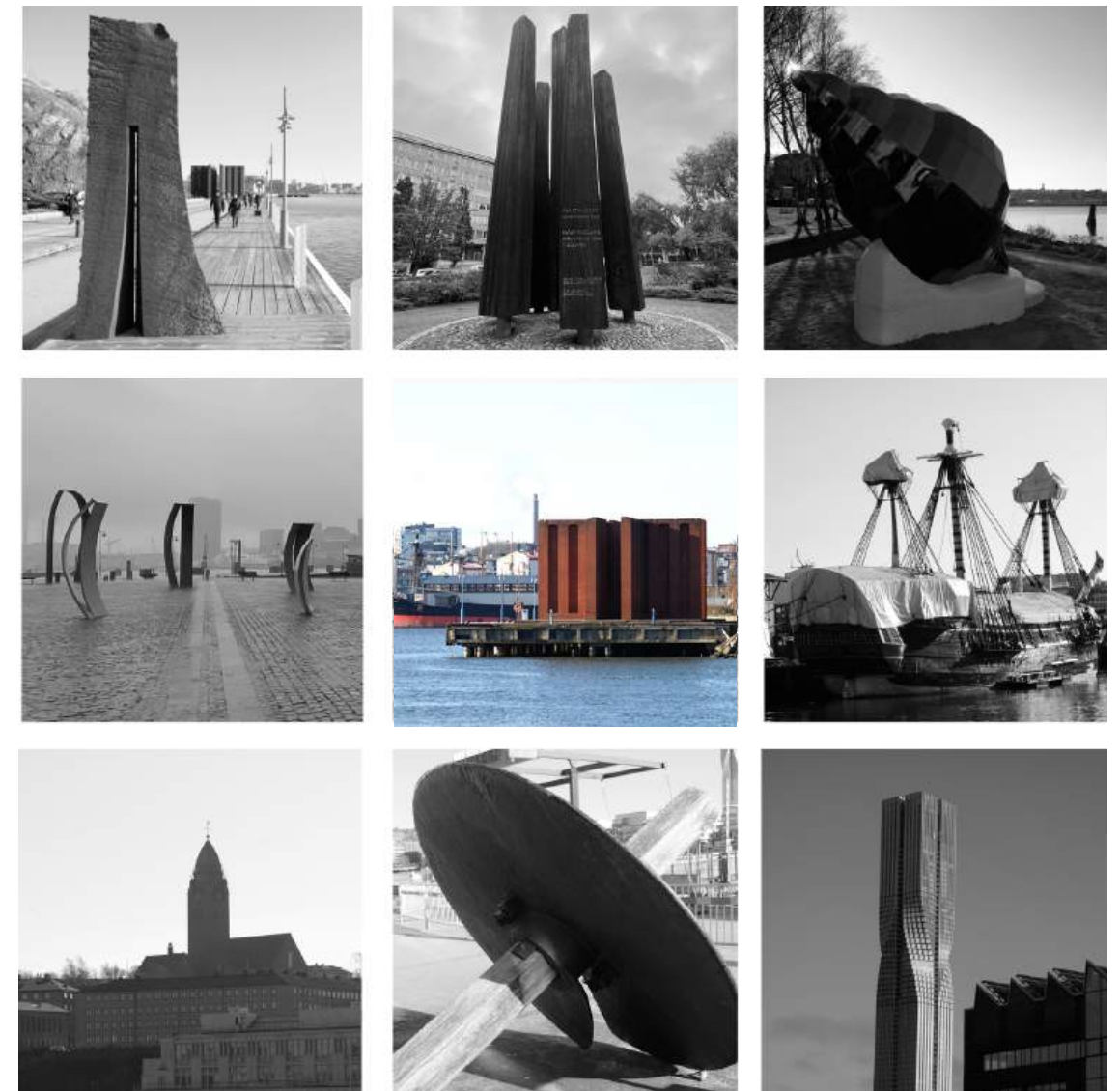
### Hybrid Atmospheres

The name of the project is inspired by the multiple atmospheres experienced in this place, where the climate, light, and mood change rapidly. This is the identity that I find in this place and the representation of the qualified space that I looked to articulate during the design process.



### Art and landmarks

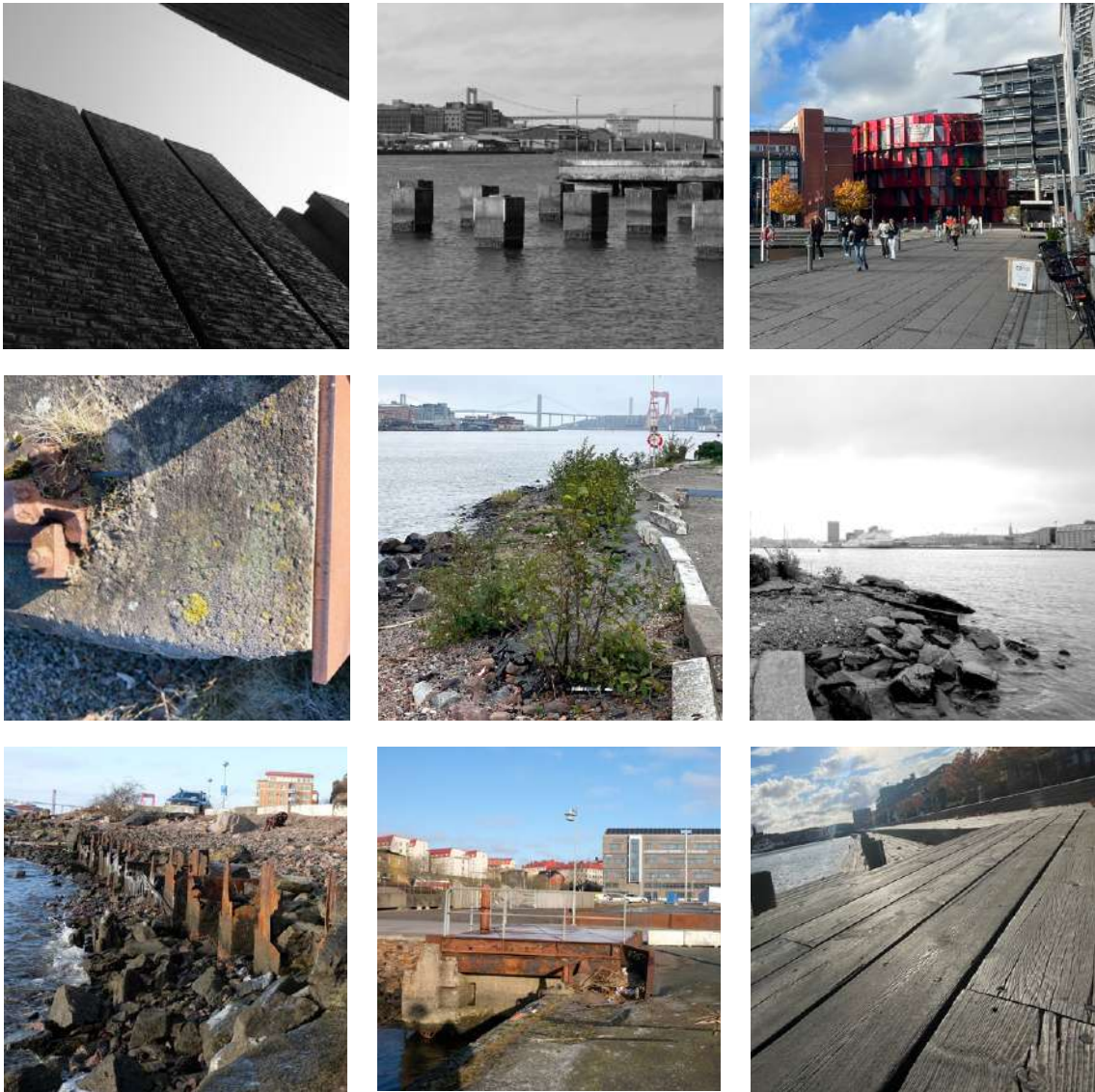
Art is present along the waterfront pathway that connects the project, which aims to become part and inspired by these landmarks> these are public object for the enjoyment of all the citizens.





Materiality

The site still retains the footprint of industry, with rusted steel and concrete ruins of structures. Natural materials such as stone and wood are also present, interacting with the textures of bricks and reflectiveness of glass. There are tones of oranges combined with greys, blending with water reflections, nuances and strong shadows. Nature is returning with green accents.



Human activities

The waterfront is an evident place for enjoyment and well-being for citizens around Lindholmen, who engage in various activities. It is also clear that there is potential for public buildings, where everyone has the right to be welcomed and enjoy this place.





## Project References



Figure 20. Nelson-Atkins Museum of Art, 2007  
Source: Steven Holl Architects

Museum, Art Exhibitions, workshops.

Extension of the Nelson-Atkins Museum of Art  
Steven Holl Architects  
Year: 2012

The museum serves as an inspiration for its use of natural light, materials, and shapes. The translucent glass cladding protects the building and creates a special atmosphere in the interiors, where diffuse light illuminates most of the circulation areas saving energy, while protecting against glare and UV radiation, and minimizing the use of artificial light during the day. The architects considered the glass as "lenses that bring different qualities of light to the galleries"



Figure 21. Volvo world, 2024.  
Source: Henning Larsen Architects

Meeting place, restaurant, experience center, museum, conference.

World of Volvo  
Henning Larsen Architects  
Year: 2024

This building is an inspiration for its structure, and use of materials in its construction to reduce environmental impact and extend its lifespan, as well as its restorative approaches, such as re-greening, and renewable energies. "It combines entertainment; exhibitions, talks, conferences, and music, as well as food, drinks and shopping,"



Figure 22. Cultural Center. Skellefteå, 2021  
Source: White Arkitekter

Event spaces, library, Café and restaurant studios and workshops, art exhibitions, hotel, stage rooms.

Cultural Center. Skellefteå, Sweden  
White Arkitekter  
Year: 2021

This project is a representation of the potential of wooden construction in cultural buildings across Nordic countries at different scales, as well as the possibilities of combining wood with glass cladding. It also serves as a reference due to its vibrant activity as a meeting place for the community.

Oodi Helsinki Central Library  
ALA Architects  
Year: 2018

This library serves as an example of light management and the atmospheres it offers, as well as the functions it provides as a public building for the well-being of the people. The building acts as a meeting center with comfortable spaces.

Book and Material Lending, study spaces, events, meeting Areas, café and social spaces, creative areas, access to technology.



Figure 23 Oodi Helsinki Central Library, 2018  
Source: ALA Architects

Natura Laponia, Sweden  
Wingårdh Arkitektkontor  
Year: 2014

This center serves as a reference because the use of wood as biobased main material, the connection with water, community heritage and nature. "The building itself sits easily on the site. It consists of a sequence of rooms, through the entrance you are met by a reception which at one end turns into a cafe and at the other end into a fireplace. There is also an observatory here, whose only window looks upwards and through which the spectacle of the night sky can be viewed."

Exhibition, auditorium, offices, reading room.



Figure 24. Natura Laponia, 2014  
Source: Wingårdh Arkitektkontor

Kunsthhaus , Bregenz  
Peter Zumthor  
Year: 1997

The project serves as a reference for its scale, building function, and minimalist atmosphere. The concept of a structure within a glass box beside water is also an inspiration.. "Seen from the outside, the building resembles a filament. It absorbs the changing light of the sky, the misty light of the lake, emanates light and color and, depending on the angle of view, the time of day, and the weather, permits something of an insight into its own inner life."

Museum, Art exhibition.

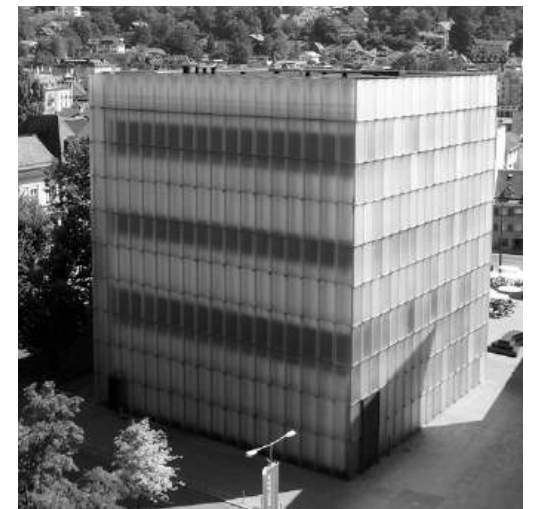


Figure 25. Kunsthhaus Bregenz ,1997  
Source: Kunsthhaus Bregenz

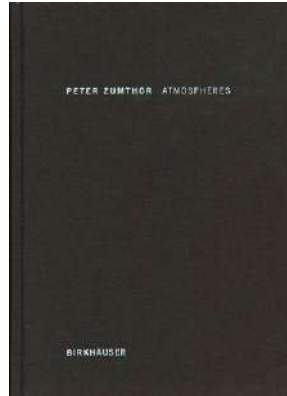


## Literature Studies

For the qualitative aspect of the design process, the following texts were reviewed in detail within the framework of design practice and phenomenology. I found primary compatibility with the work of Peter Zumthor, as well as other works related to the experience of the place, which are included in the reference section of this work..



Thinking Architecture  
Zumthor, P  
Design process



Atmospheres  
Zumthor, P  
Experience of the space

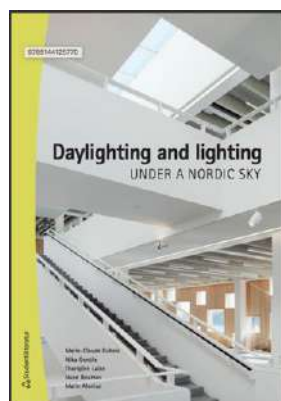


Dear to Me  
Zumthor, P  
Mainly the conversation  
with Hélène Binet about  
space and photography.



Atmospheric Architectures  
Böhme, G  
Sensory experience of  
the space and the role of  
natural light in atmospher-  
ic spaces.

For the optimization and technical part, the principally following texts were reviewed



Daylighting and Lighting  
The logic of light in archi-  
tecture, in Nordic context.



Climatic Architecture  
Energy efficiency



## Synthesis and Criteria for the following phase: Research by Design

As a result of Phase 1 Research for Design, and based on site analysis, the context was understood through its history, tracing its transformation from a natural environment to a shipyard industry, and now as a knowledge-based economy. In this phase, various characteristics were also identified, including the multiple climatic conditions present at the site, urban planning aspects such as proximity to public transport and urban activities, land use functions, and issues related to soil contamination and climate risks. This information was primarily obtained from secondary sources.

Subsequently, the use of photography and thematic observation methods allowed for a deeper understanding and incorporation of specific aspects of the site through primary information. These included the multiple atmospheres experienced in the area, the active use of the Göta Riverbank by locals and visitors, the vibrant artistic pathway along the river, and the diverse architectural materials and typologies observed on-site. All of this brought the design process closer to a more sensitive and experiential understanding of the place.

Reference projects helped identify potential architectural configurations, scale, materials, and functional strategies for interventions related to cultural centers in contexts relatively similar to the intervention site.

Finally, although an extensive review of the state of the art was conducted, texts focused on phenomenological and restorative architecture provided the main theoretical support that reinforces the validity and alignment of ideas within the current design process.

The following section presents nine criteria as synthesis from this first phase of research for design. These criteria served as key drivers and foundation for the project and for next phase: Research by Design.

**Restorative Riverbank:** The industrial site was primarily used for shipyard activities for over 100 years, leaving a clear mark of the Anthropocene on both the soil and the river. Today, the affected area functions as a parking lot, presenting an opportunity to restore biodiversity, foster social engagement, and enhance well-being.

**Changing Atmosphere:** High precipitation, exposure to wind and sun, and the proximity to the river create quickly shifting and dramatic atmospheric conditions which mix with the existing morphology and materiality. It creates the experiential layers and foundation for new interventions.

**Solar Resources:** Direct sunlight from the southern direction faces minimal obstructions, offering an opportunity for projects on this site to maximize solar resources such as natural lighting and energy potential

**Weather protection:** The site is affected by southern and south-western winds, frequent rainfall, and low temperatures from October to April, which reduce comfort. Flooding is also a concern due to low elevation and climate change. Despite this, the riverside remains popular even in colder months, indicating potential for public facilities, as noted through photographic observation.

**Viewpoint:** This site is a strategic point along the riverbank, offering views of many of Gothenburg's key landmarks and assets in all cardinal directions. It is also an ideal location to observe the changing light and atmospheres across the seasons, from sunrises to sunsets.

**Art:** The riverbank hosts multiple pieces of art connected along the Göta River. Due to its location and characteristics, the site has the potential to become part of this artistic ensemble.

**Memorial:** Even though the shipyard industry has left an environmental impact on this area, its contribution to Gothenburg's economy, innovation and employment over several decades is one of the city's most recognized and significant assets. People still acknowledge this legacy, and the vestiges of that era remain imprinted on the site. In this sense, the place should be remembered.

**Hub of knowledge and creativity:** Lindholmen Science Park is home to around 375 companies focused on innovation and creativity in fields such as information and communication technology, mobility, media, visualization, and design. One example is the headquarters of Hasselblad, a company renowned worldwide for its innovation in photography. These advancements offer an opportunity to showcase Gothenburg's strengths.

**Proximity and landmark:** The site is connected to the rest of Gothenburg by two main axes. On one side, it links to the riverbank and nearby neighbourhoods, where people frequently walk, cycle, and take the ferry. On the other side, it connects to Lindholmen Science Park's facilities, bus stations, and the planned tram line. All these connections are within a walkable distance of approximately 500 meters. A project at this location should strengthen these two axes, highlighting the site's advantages and establishing it as a recognizable landmark.

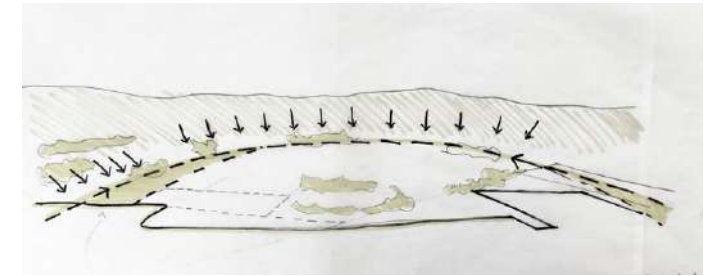


Figure 26 Green and blue structure  
Possible restorative green system  
Plants can absorb and filter soil contaminants

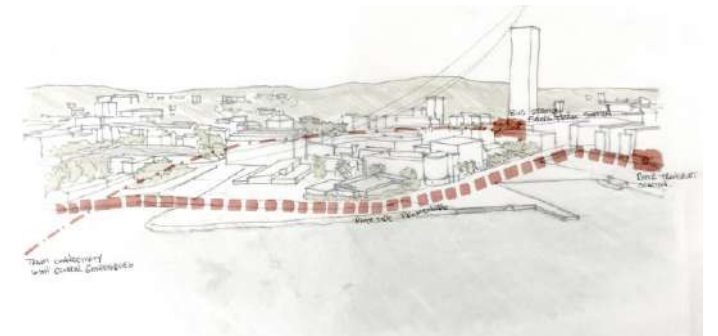


Figure 27 Proximity and connectivity



Figure 28 Schematic section of potential restorative lines



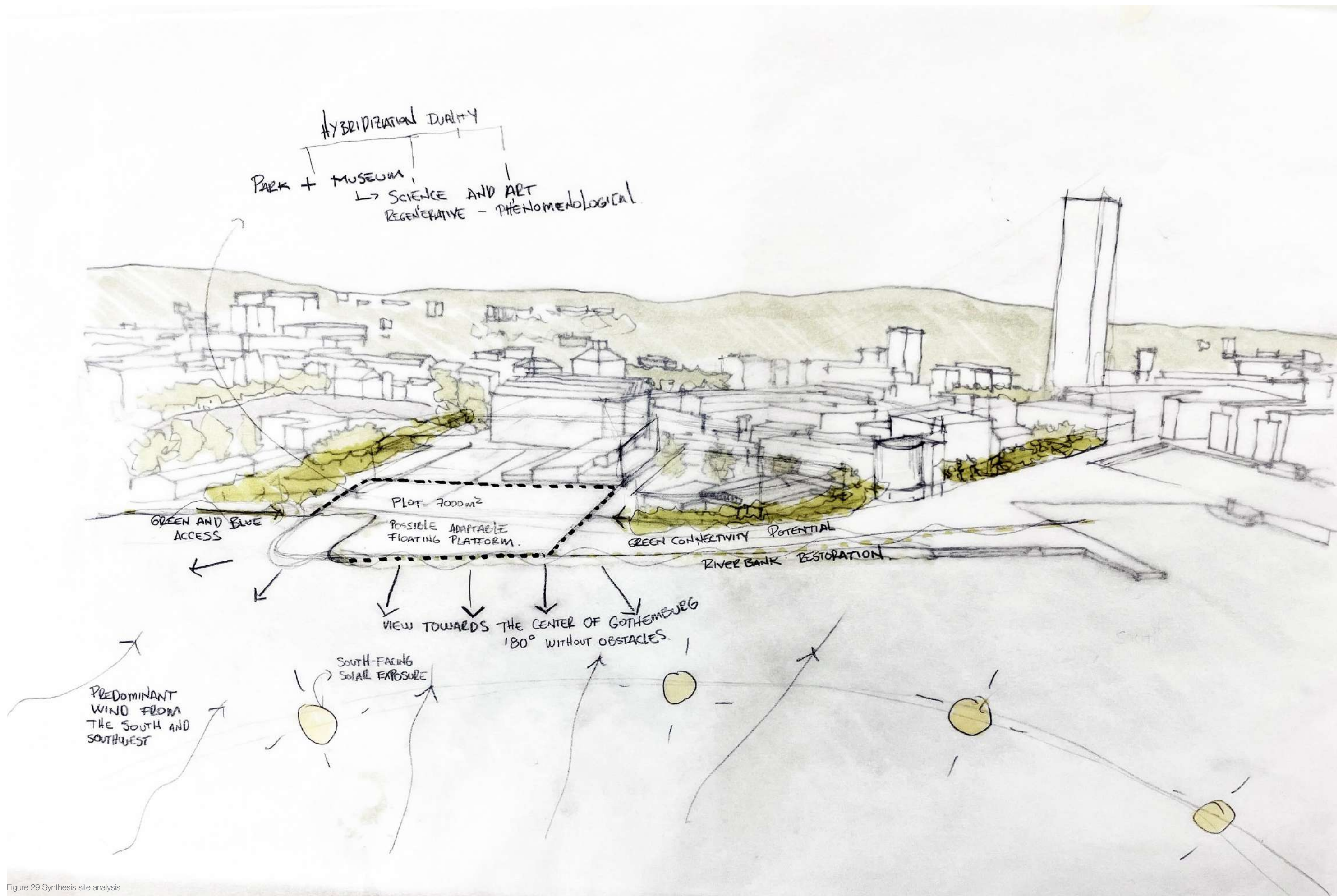



Figure 29 Synthesis site analysis





## 02 Design Process

### b. Research by design

This phase focuses on translating insights into initial designs and refining the integration of spatial quality, architecture and site characteristics.

Overall, this process involved the interaction of various tools and methods, including a design diary, schemes and diagrams, rapid prototyping, observation, and photography. It also incorporated drawings and model-making.



### Qualitative approach.

This section adopts a phenomenological perspective focused on experience in the first part, followed by connecting the site's criteria synthesis, presented in the previous phase.

Drawing on the phenomenological approach and Zumthor's reflections on the essence of architecture, which emphasize in experiential perspectives, the project began as an experiment for the practical phase of research by design. It started by expressing the initial impressions of the site, intentionally disconnecting from previous experiences and from certain elements of the first phase.

*'The design process is based on a constant interplay of feeling and reason... I believe that the essential substance of the architecture we seek proceeds from feeling and insight.' Peter Zumthor*

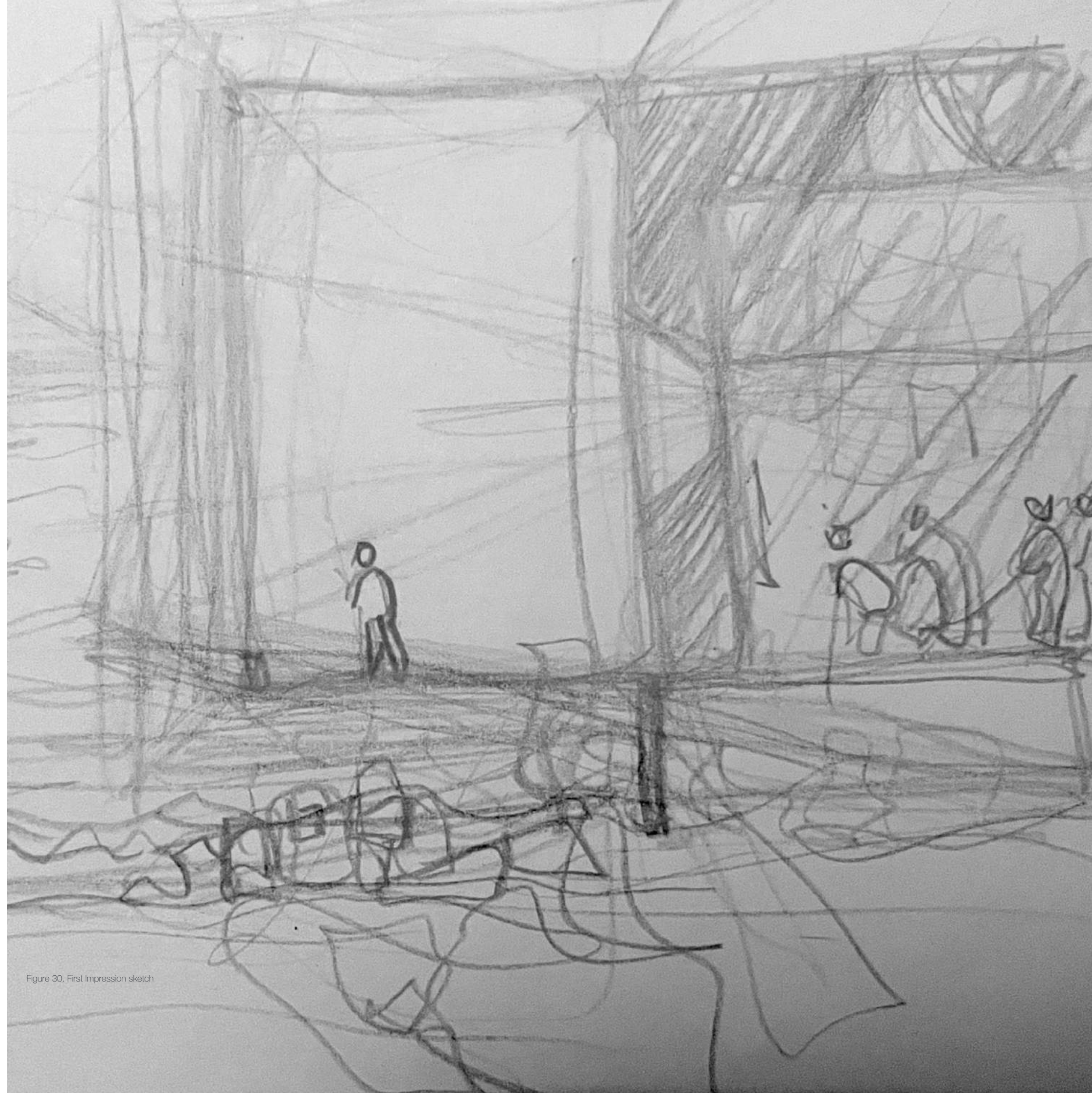


Figure 30. First Impression sketch





#### Step 1 First impression

The first impression for the intervention on sketches and models after visiting the place several times is resume on the following text:

An object that recalls the ships built here and the materials of the island at the beginning. This is a volume with a deep interior within another volume, transparent and opaque, soft and strong, with echo, with soft light. The building rises, allowing native nature to reappear and gradually restore the damaged soil.



Step 2 Connecting the site's criteria synthesis and previous experiences.

Aiming designing an schematic proposal as a second option that incorporate the criteria taken from the research for design phase. they were translated into 4 design principles:

Research for Design Synthesis — 9 Criteria

- 1. Restorative riverbank
- 2. Memorial
- 3. Proximity and landmark
- 4. Changing atmosphere
- 5. Solar resources
- 6. Viewpoint
- 7. Weather protection
- 8. Art
- 9. Hub of knowledge and creativity

4 Design Principles

Restorative Riverbank and Memorial

Focuses on restoring the site both environmentally and socially, while preserving the cultural memory of the shipyard period, transforming the current parking lot into an inclusive and vibrant public space.

Changing Atmospheres

Focuses on designing with the shifting and sensory conditions of the place. By connecting with the changes in natural light, winds and seasonal variations, the site becomes a stage for experimentation with daylight, materials and form. Its direct solar exposure offer a strong potential to maximize sustainability through natural light and renewable energy while enhancing the overall user experience.

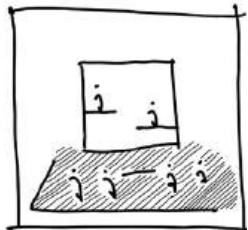
Gothenburg Framed

This principle is the visual connection of the cultural center with Gothenburg. It is the opportunity for reflection about the multiple potentials of Gothenburg framing memorable views as pieces of art from interior spaces that protect the users from harsh climatic conditions while offer an immersive experience.

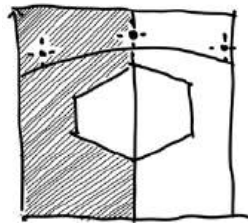
Creative Knowledge

Encourages the fusion of public art, creative industry, and innovation, transforming the site into a cultural center where Gothenburg's creative values are showcased. It envisions a space for exhibitions that celebrate the work of industries like Hasselblad, highlighting the intersection of technology, art, and light.

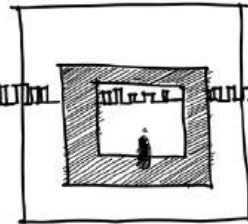
Conceptual diagrams



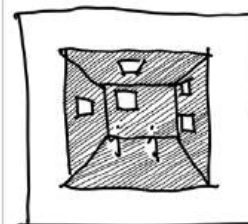
Restorative Riverbank and Memorial



Changing Atmospheres



Gothenburg Framed



Creative knowledge

Preliminary sketches

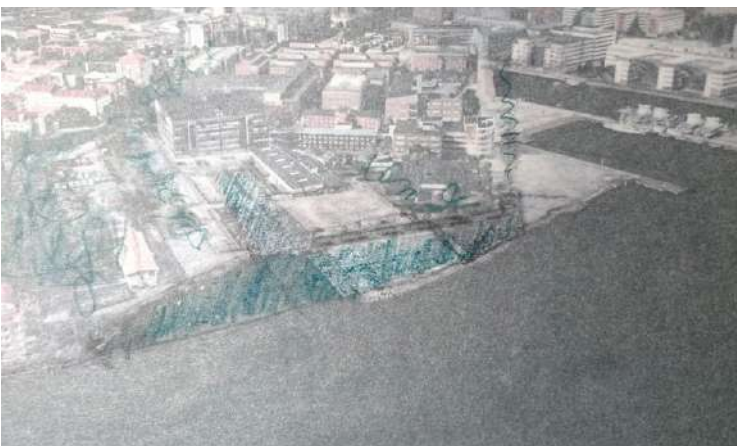
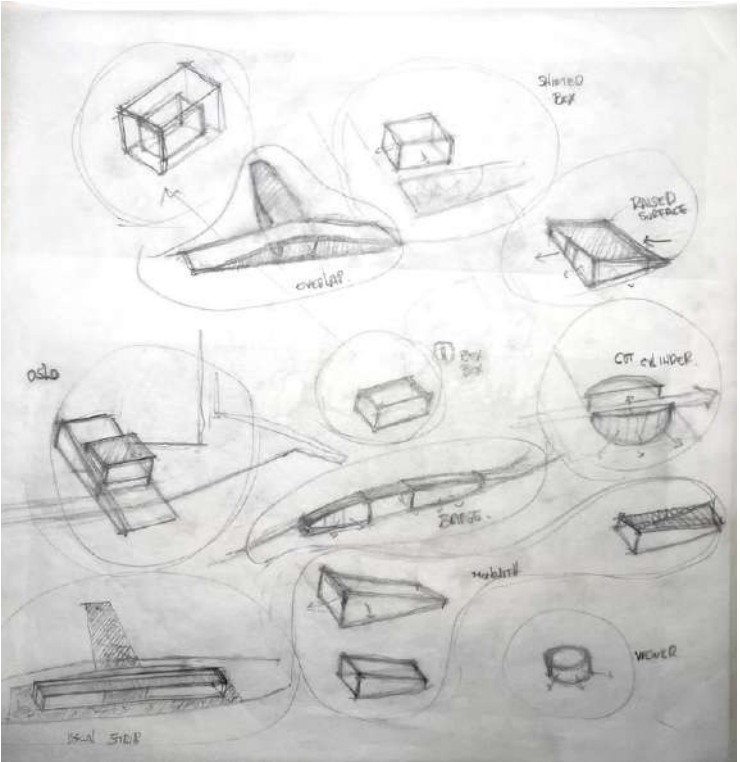


Figure 31 Diagram for connecting research for design with research by design

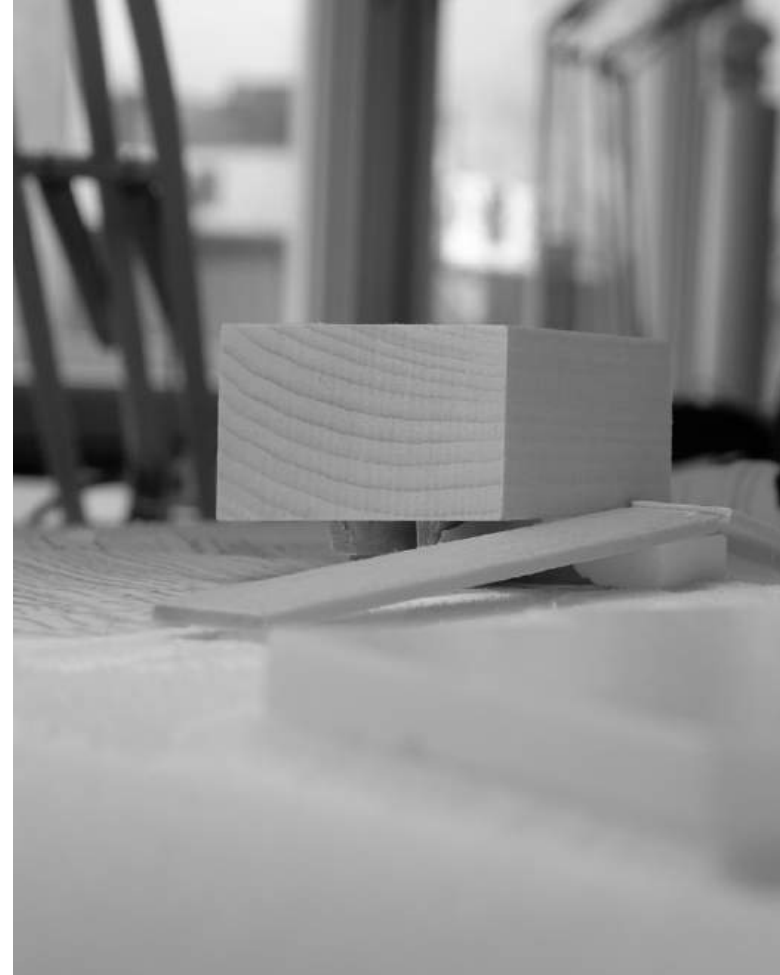
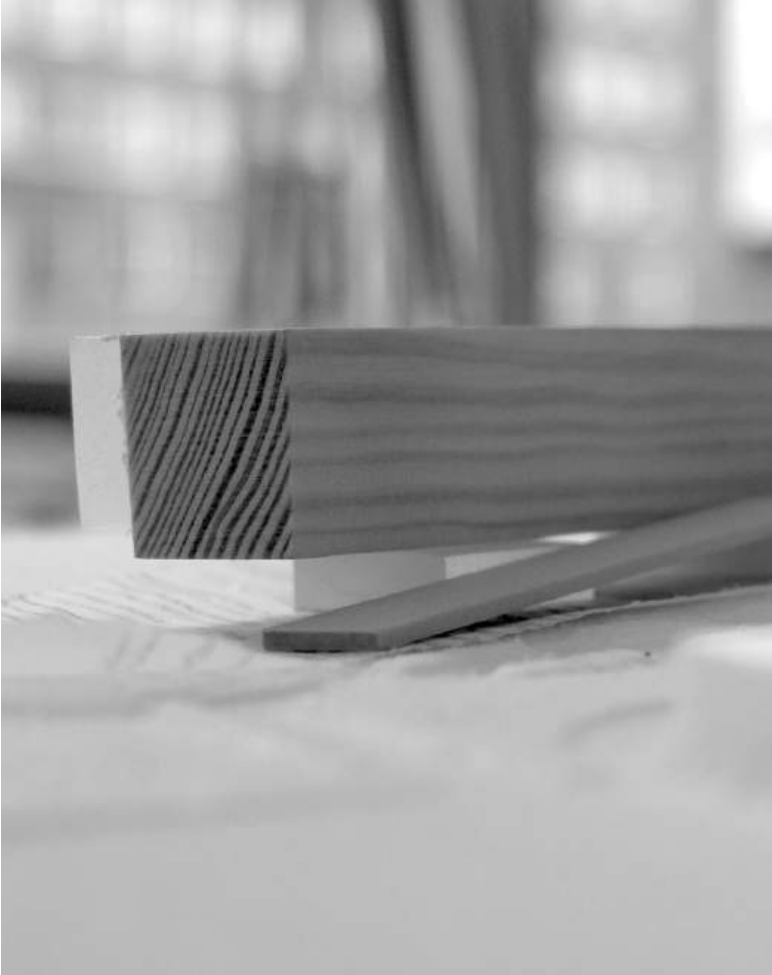


Step 3 Reviewing the Site Plan



Figure 32 Sketch including design principles on site scale





### Step 3: Preliminary result: Two Schematic Alternatives

The design process continued by identifying the design principles and reviewing the site plan as a foundation for experimentation with iterations through rapid prototyping, conceptual models, and sketches. Two schematic alternatives were selected: the first one responding more to the initial impression, and the second one articulating more with the design principles and site characteristics, while also retaining elements from the first impression and previous experiences.

At this stage, it became evident that conceiving the project solely based on the initial impression could result in individual and subjective imagery, potentially leading to, for instance, oversized elements or ones not fully aligned with the actual needs of the site. Nevertheless, these early explorations helped establish deep and meaningful parameters for architecture and human experience.

Additionally, after connecting with the results of the Research for Design phase, the design started to take proportion and be aligned with the functional characteristics of the place at this stage. As Zumthor suggested, the interplay between feelings

and reason is necessary during the design process, but the essence of architecture, he suggests, lies in interior feelings. (Zumthor, 1998, p.21)

The two alternatives were initially evaluated qualitatively in relation to the defined design principles in order to continue the process.



Figure 33 Sketch of the design alternative 1



Figure 34 Sketch of the design alternative 2



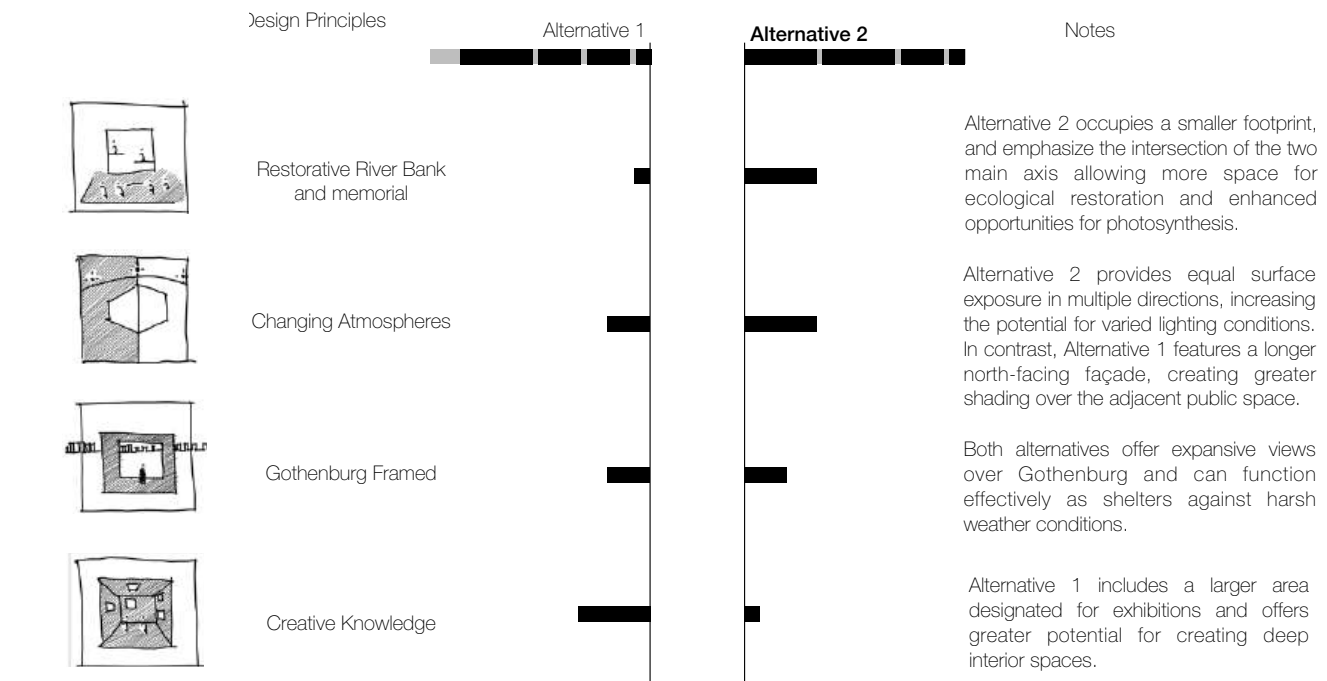
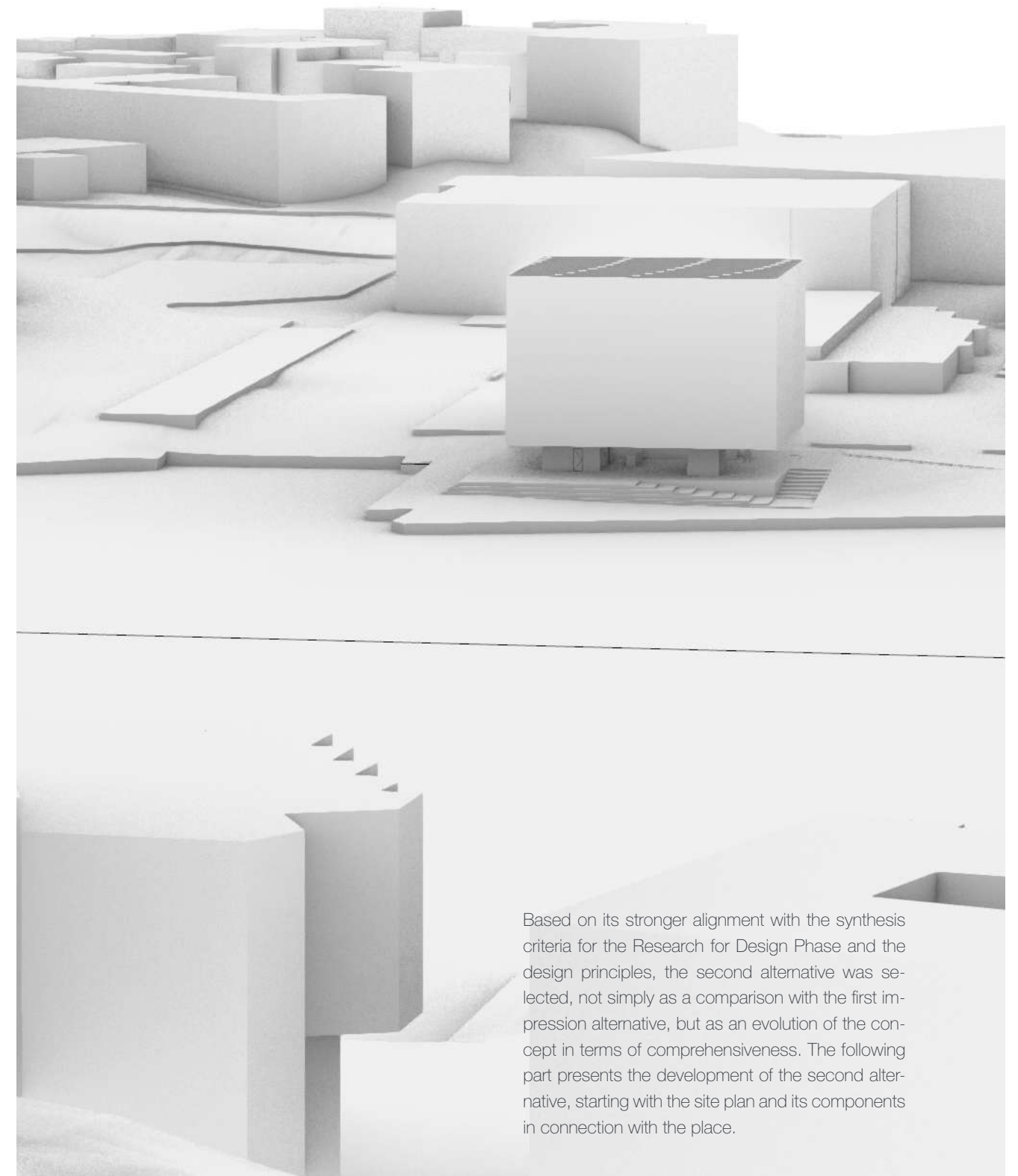
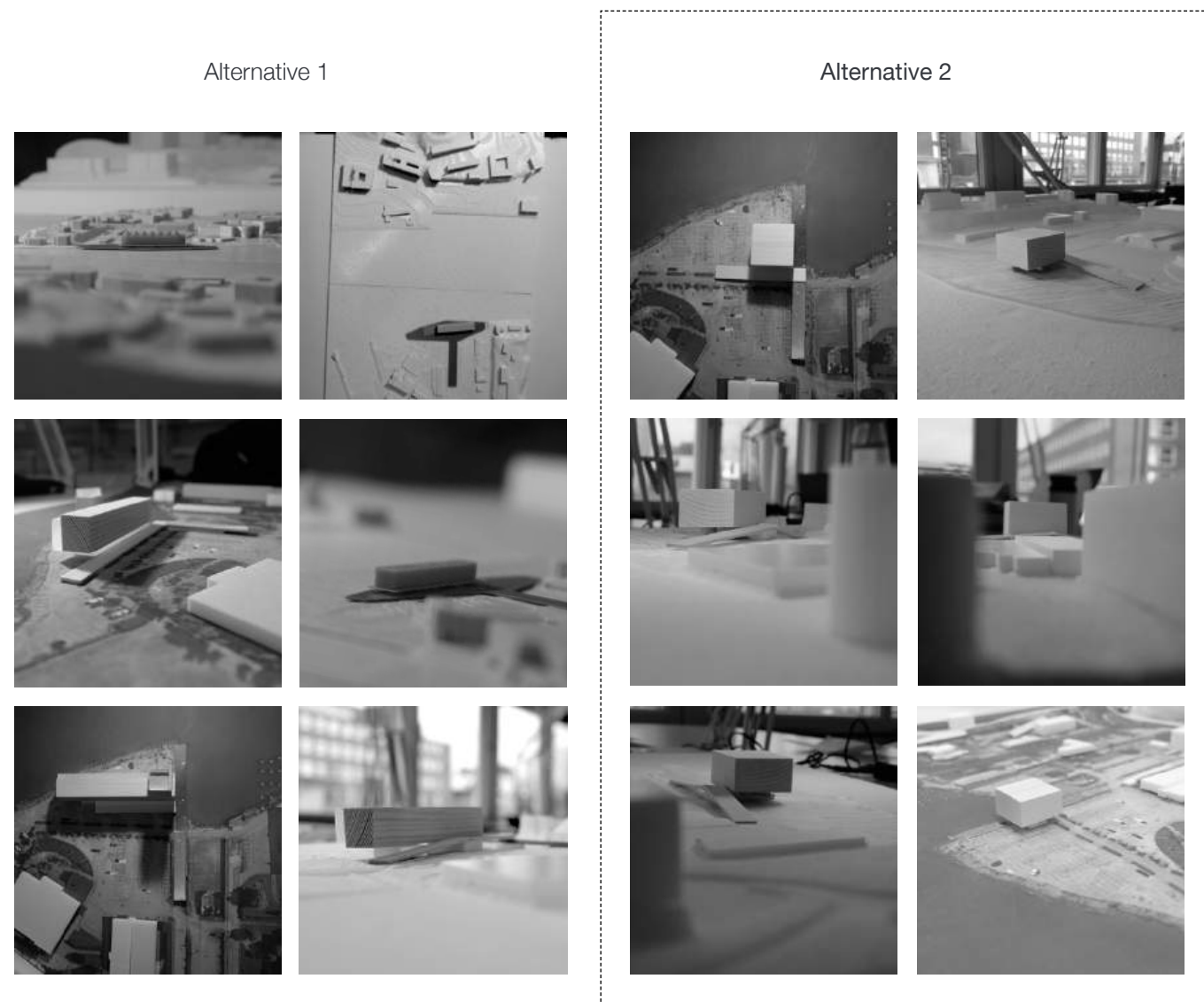


Figure 35 Diagram, qualitative evaluation.

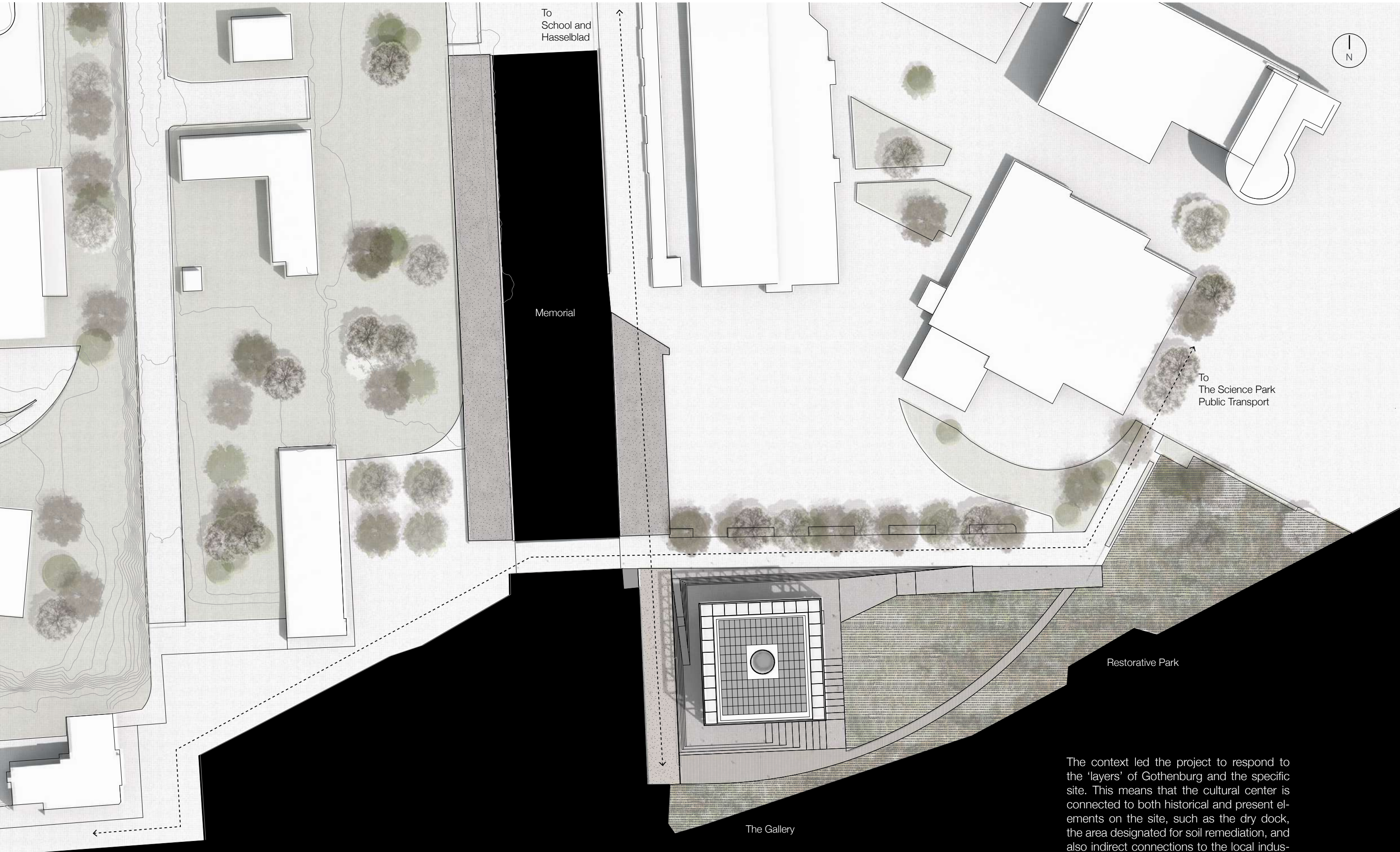


Based on its stronger alignment with the synthesis criteria for the Research for Design Phase and the design principles, the second alternative was selected, not simply as a comparison with the first impression alternative, but as an evolution of the concept in terms of comprehensiveness. The following part presents the development of the second alternative, starting with the site plan and its components in connection with the place.









To  
Eriksberg and Rivercity Connection

Memorial

To  
School and  
Hasselblad

To  
The Science Park  
Public Transport

Restorative Park

The Gallery

The context led the project to respond to the 'layers' of Gothenburg and the specific site. This means that the cultural center is connected to both historical and present elements on the site, such as the dry dock, the area designated for soil remediation, and also indirect connections to the local industry, such as Hasselblad, which aligns with the project's theme. Additionally, as a viewpoint, the project initiated a dialogue with significant elements of Gothenburg's landscape.

Figure 37 Site plan



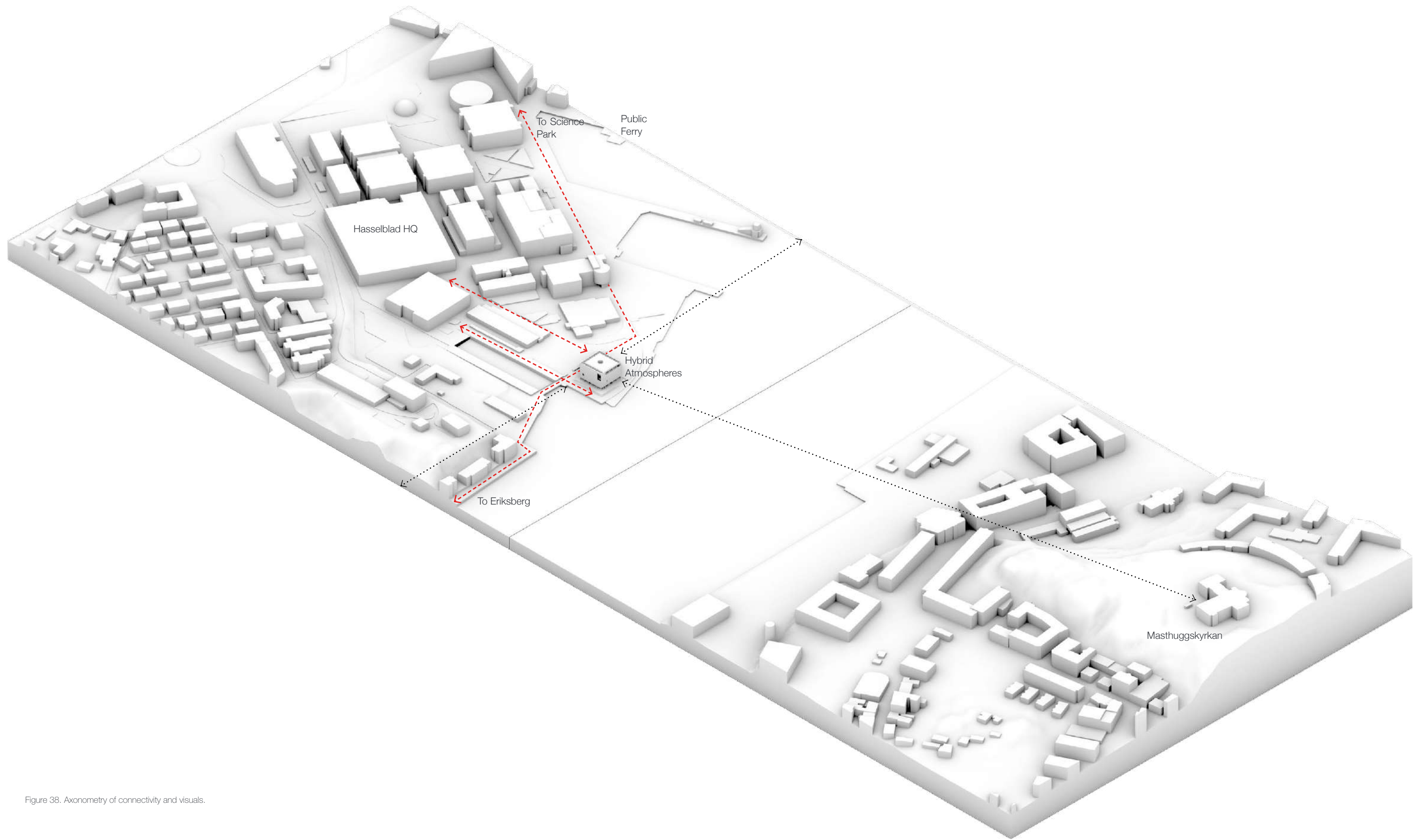


Figure 38. Axonometry of connectivity and visuals.



After defining the site components, the design process continued with the development of the building, focusing on the aim of the thesis, which is to explore the relationship between atmospheric qualities and sustainability. In this sense, the concept of interacting with daylight as a solar resource and biogenic materials began to take shape through the idea of a light catcher, lenses, and atmospheric images inspired by the work of Hasselblad. Additionally, the use of wood, as a memory of the linden trees that once populated the island, serves as both a biogenic material and a carbon storage. The interaction between lenses and wood marked the beginning of the materiality and the exploration of working with atmospheres through the use of light.

On the other hand, regarding social sustainability and activities, the building serves as a symbol of the intersection between history and the location of the former shipyard. Its future activities will help revitalize the riverside, both during the day and at night, and throughout the year, from summer to winter protecting visitors. Additionally, its exceptional location for appreciating Gothenburg provides a relevant argument for a public building that can showcase the city's assets.

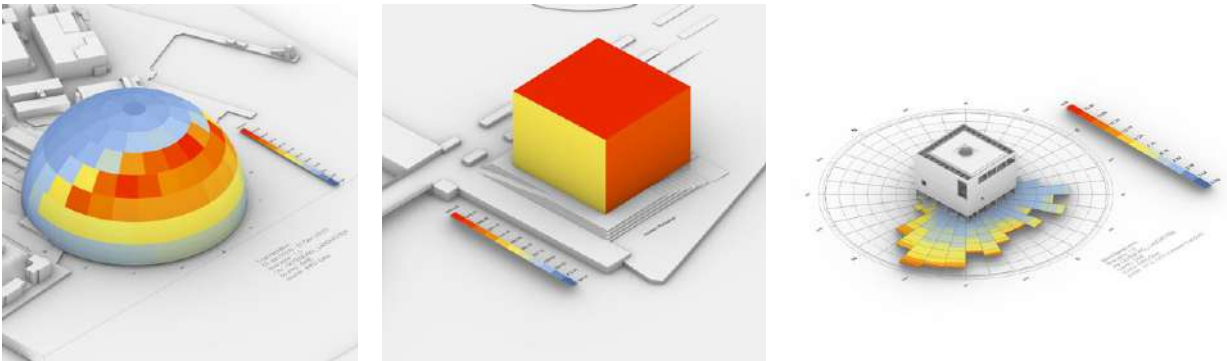
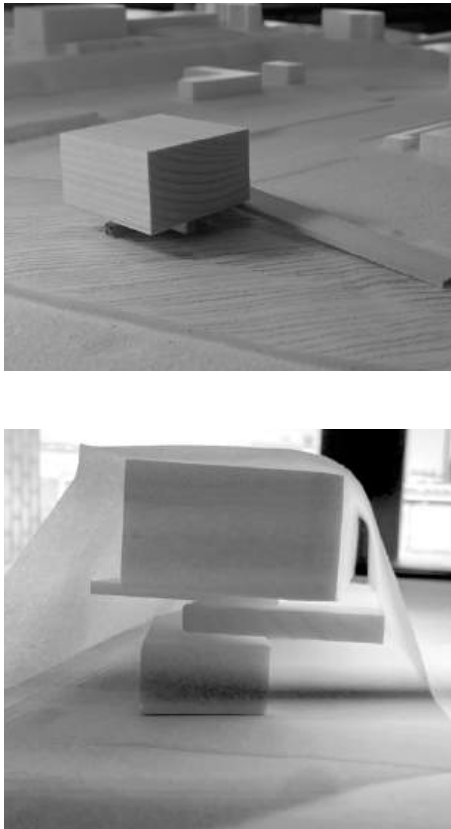


Figure 39 Solar and wind graphics. Grasshopper, ladybug.

The interplay between the location's advantages in receiving solar radiation and the building's form reveals that the roof surface holds the greatest potential, with an estimated 970 kWh/m<sup>2</sup>/year. This is the primary reason photovoltaic panels were placed on this face. Additionally, the south, west, and east façades receive more than 500 kWh/m<sup>2</sup>/year, making them suitable for energy harvesting as well.

Beyond energy generation, these facades also offer strong potential for passive solar heating, which is balanced by cross-ventilation primarily coming from

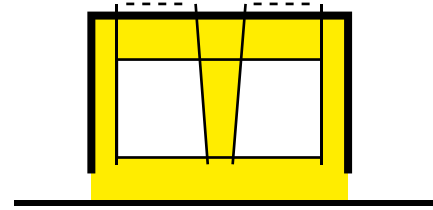
the southwest. In this context, the use of translucent glass—serving as an architectural analogy to lenses—proved beneficial for regulating and diffusing natural light, reducing glare, and enhancing indoor comfort. Furthermore, it provides effective protection against the site's harsh climatic conditions for visitors and for the interior wooden material.

The following part represents the intersection between sustainable and experience based design strategies that shaped the project and are on the same direction as the design principles.

## Sustainability Based Design Strategies

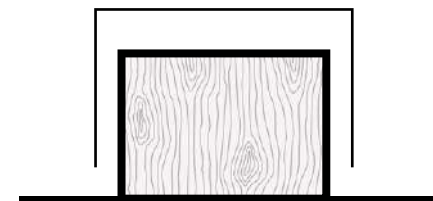
### 1. Light Catcher

The building acts as a light collector, with a translucent cladding that diffuses natural light, avoiding glare. The photovoltaic panels on the roof and the translucent facade work together to collect and save energy.



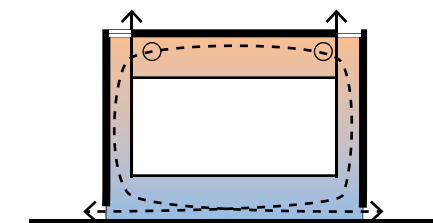
### 2. Bio-based material

The majority of the building is constructed with locally sourced spruce and pine, grown using responsible forestry practices, minimizing the carbon footprint and promoting sustainability.



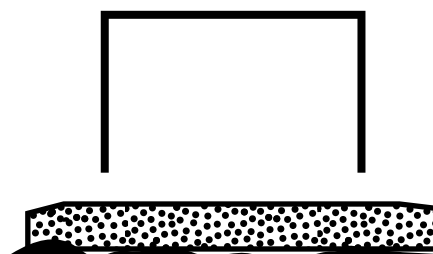
### 3. Compact Building and Climate layer

The compact design reduces heat loss, while the peripheral atrium moderates temperature fluctuations and allows for natural ventilation via a stack effect and temperature recovery system.



### 4. Raised Platform and Bioremediation

An elevated platform, working together with the restorative park, uses phytoremediation to restore contaminated soil and raises the building to manage flooding risks. It aims to enhance biodiversity and improve soil health.



## Intersections

The translucent facade serves both to create an atmospheric interior experience and to save energy

Locally sourced wood is a carbon reservoir and renewable resource that not only provides a warm atmosphere but also offers vivid texture, connecting with the restorative park landscape and the historical linden trees on the island.

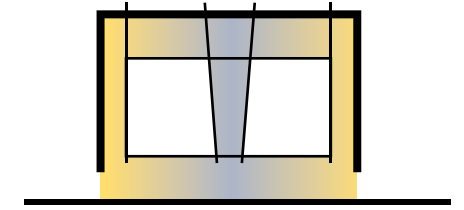
A void between the cladding and the interior creates a qualitative intermediate space, enhancing the dynamic scale and providing a distinct microclimate.

The art exhibition and the Restorative Park revive the activities of the area, while also contributing to environmental and social sustainability.

## Experience Based Design Strategies

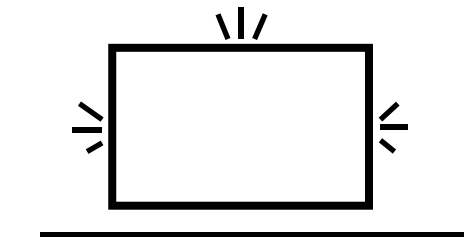
### 1. Light experience

The building creates a light experience transitioning between brightness and shadow, with diffused light flowing through the lens-like facade, merging both atmospheres.



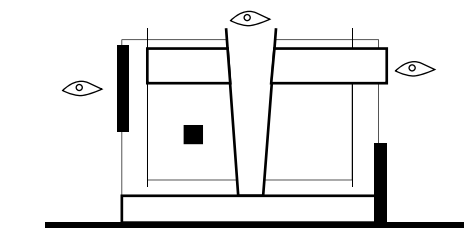
### 2. Public Landmark

A public landmark designed to activate a site with privileged views, rich history, and art accessible to everyone. A place to experience the images and values of Gothenburg.



### 3. Viewer

The building functions as a viewer, offering a perspective on the details and values of Gothenburg, allowing visitors to engage with the surrounding cityscape.



### 4. Art Exhibition and Photography

The interior provides an art and photography experience, blending architectural and photographic concepts such as; contrast, depth of field, nouns, thirds, foreground, background, bright and shadow; creating a dynamic visual journey.

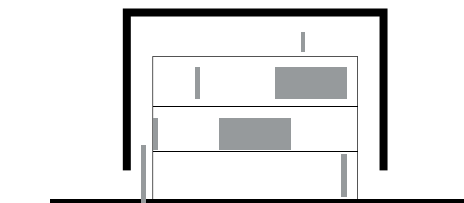


Figure 40. Design strategies and intersection between sustainable and experience based approaches





In parallel with the architectural design strategies and aligned with the goal of revitalizing the deteriorated space, the project was developed as a gallery-museum. It seeks to reconnect with Gothenburg's riverside activities and provide citizens with a vibrant public area. Framed around themes of light, nature, photography, and the city's unique identity, the project establishes a strong cultural and spatial link to the urban fabric of Gothenburg.

The Building

Gothenburg Gallery-Museum is a public building for the exhibition of images of Gothenburg, both, real views of the surroundings through its windows as well as photographs. The images aims to show the best of Gothenburg in a temporary exhibition and a permanent exhibition for Hasselblad. The program was developed in response to conditions identified during the site analysis and discussions with stakeholders in Lindholmen.

The Lindholmen area has a rich history of entrepreneurship and successful companies, making it a valuable asset for Gothenburg. Starting with activities related to the river and sea, such as shipyards. Today, it hosts over 300 diverse companies that have shifted toward a more creative and sustainable approach. This evolution symbolizes Gothenburg's potential and aligns with the ambitions of the riverside project. As a representation of this asset and connexion with Gothenburg images, the atmospheric experience of space and light, the project holds a permanent exhibition for Hasselblad, one of the world's leading photography companies who notes, *"...Since we in Lindholmen do not have a proper showroom, having a place near our HQ to showcase Hasselblad cameras and photography would be amazing."* Additionally, media producers like Studio Jox Film Production see value in mixing new development intentions with historical films of Lindholmen, suggesting that exhibition spaces could provide opportunities to showcase creative works made "in-house" for the public.

On the other hand, the project's remarkable location offers a unique opportunity to appreciate the "images of Gothenburg", the real ones, through the building's lenses or windows.

The Program:

Exhibition.

Permanent exhibition	
Hasselblad	300 m2
- Temporary exhibition areas	350 m2

View point and facilities

Top floor panoramic view.	350 m2
Cafe/book:	120m2
Workshop:	100m2
Shop:	.60m2

Services facilities and common spaces

Foyer	.150m2
Services	100m2
Staff and storage	100m2
Technical rooms.....	120m2
Circulation.....	400m2

Building Total Area	2150m2
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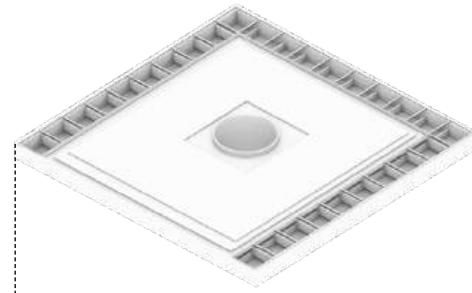




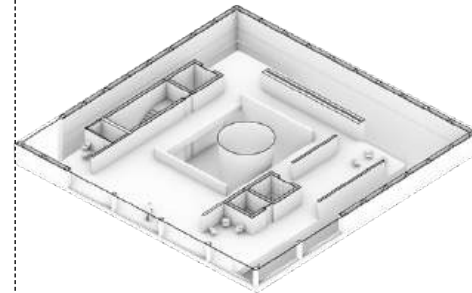
Figure 41. Gallery Museum Perspective from River Göta



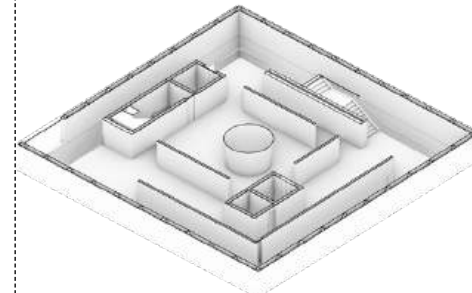
Roof  
-Skylights  
-PV Panels



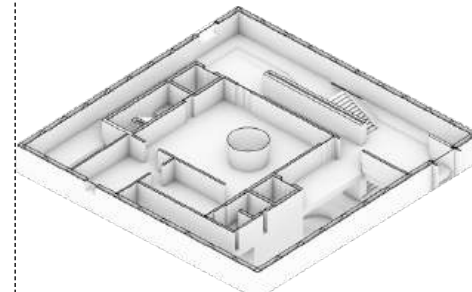
Third Floor  
-Viewpoint



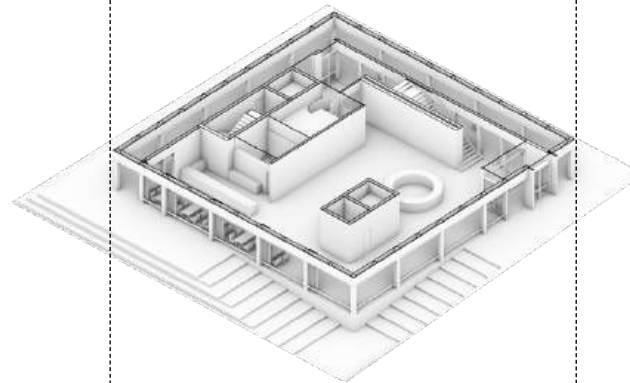
Second Floor  
-Temporary Exhibition



First Floor  
-Permanent exhibition (Hasselblad)  
-Gothenburg view frames



Ground Floor:  
-Entrance  
-Foyer  
-Cloakrooms  
-Office  
-Café  
-Shop



Basement:  
-Technical Rooms.  
-Toilets  
-Storage

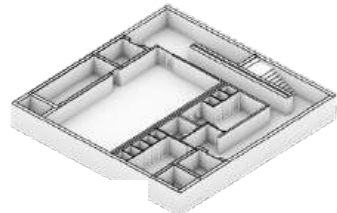


Figure 42 Axonometry floor plans

Memorial

Dry Dock Bridge

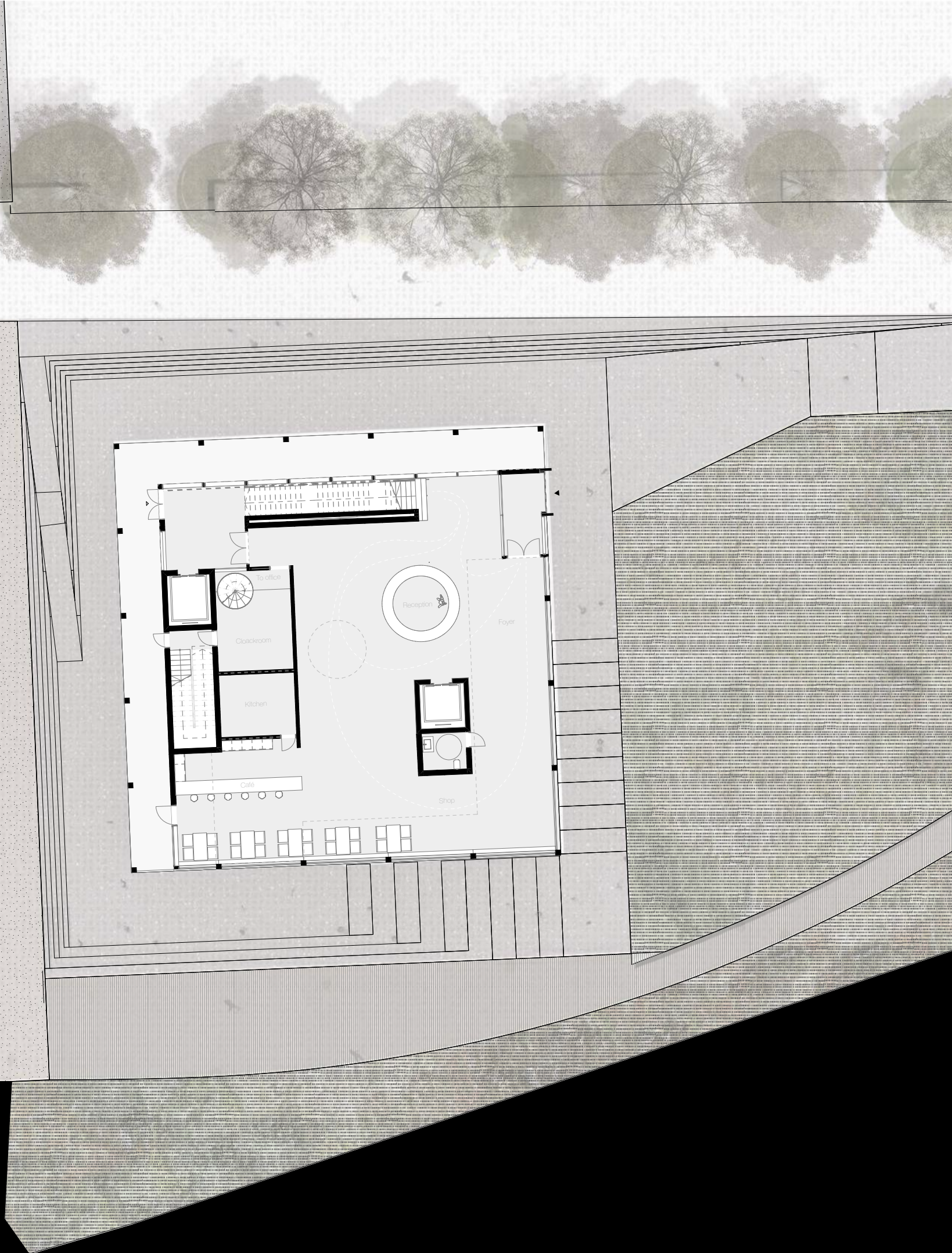


Figure 43 Ground Floor and surroundings



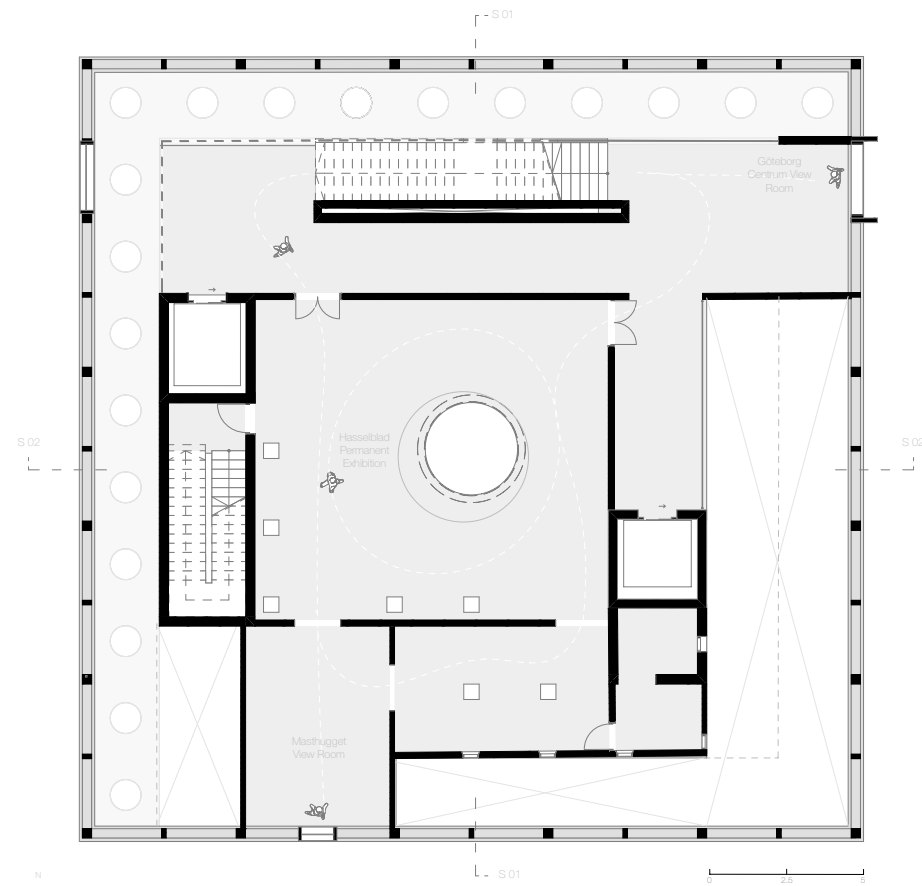


Figure 44. First floor plan. Permanent exhibition.

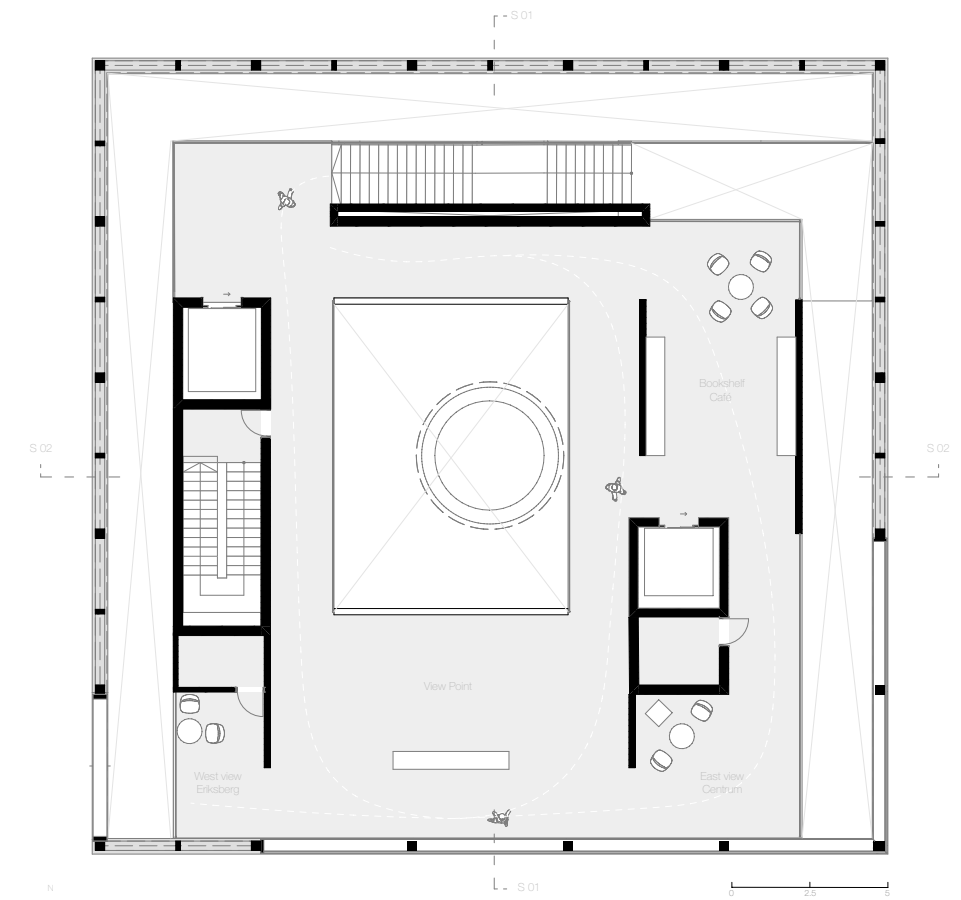


Figure 46. Third floor plan. View point..

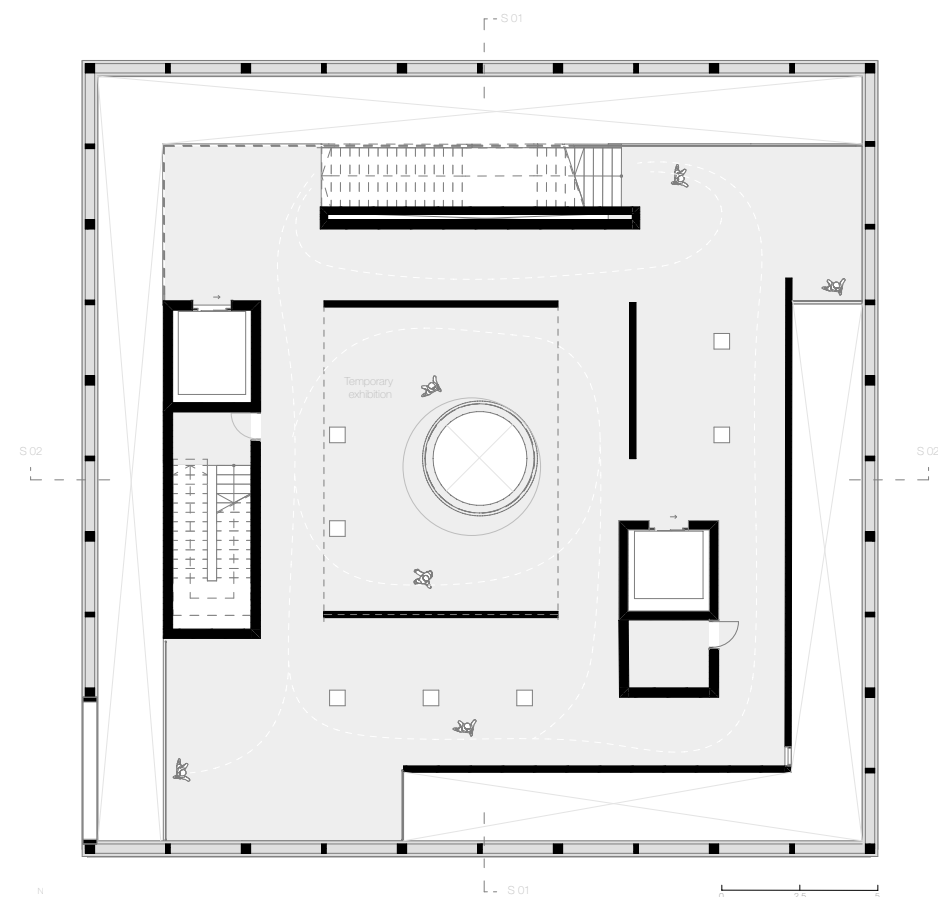


Figure 45. Second floor plan. Temporary exhibition.

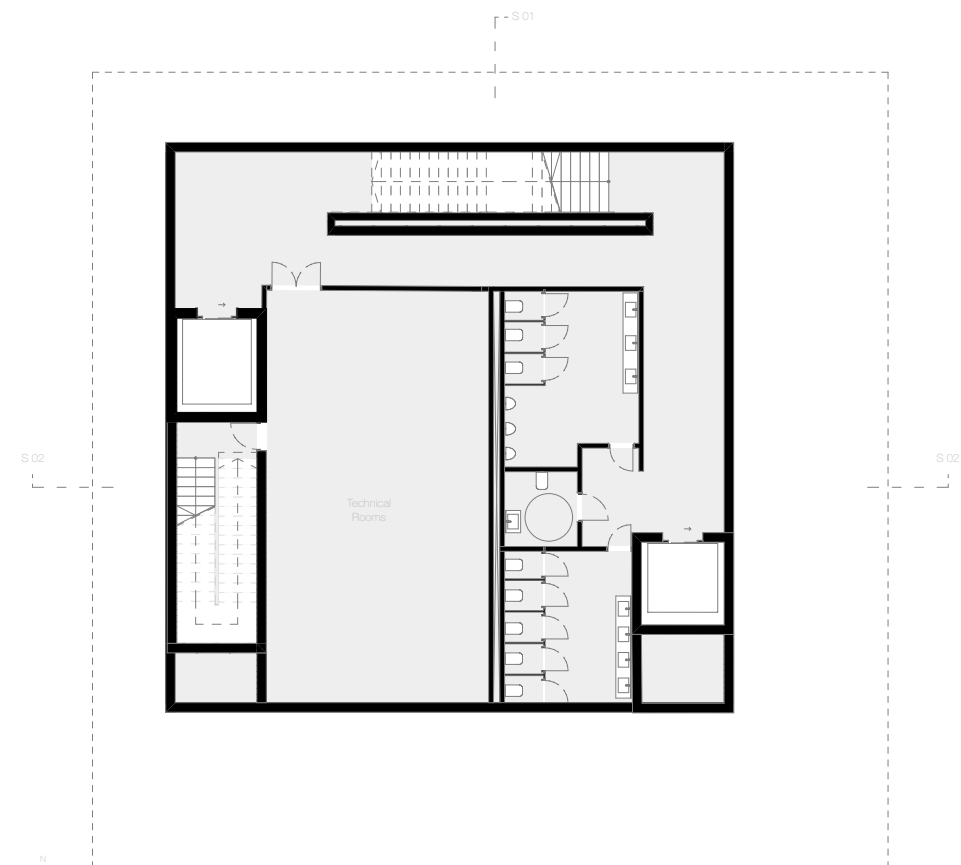


Figure 47. Basement floor plan.





Figure 48. Ground floor perspective





Figure 49. Entrance and Foyer 3d representation

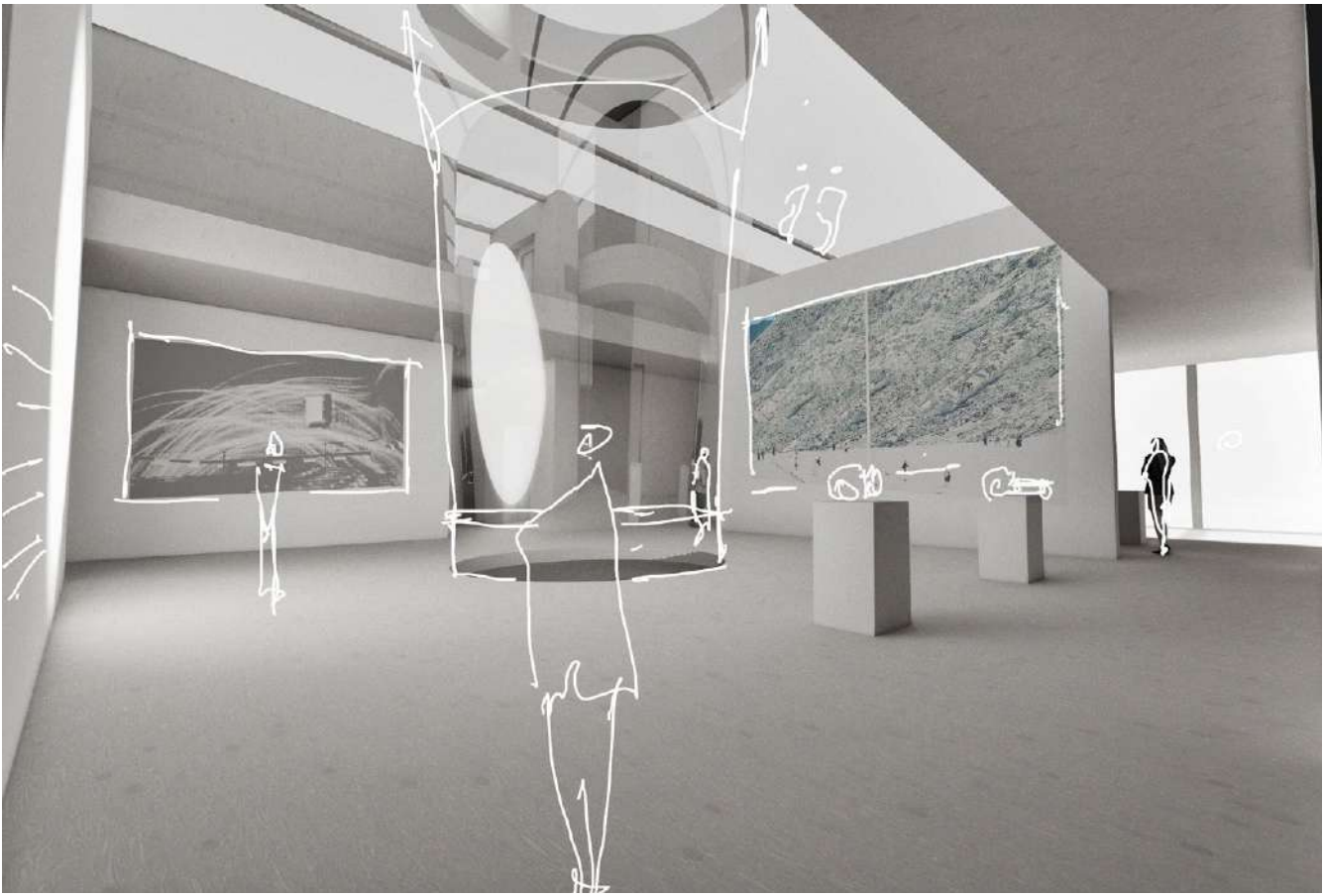


Figure 51. Temporary exhibition 3d representation



Figure 50. Circulation 3d representation



Figure 52. Masthugget room 3d representation





Figure 53. Front Elevation

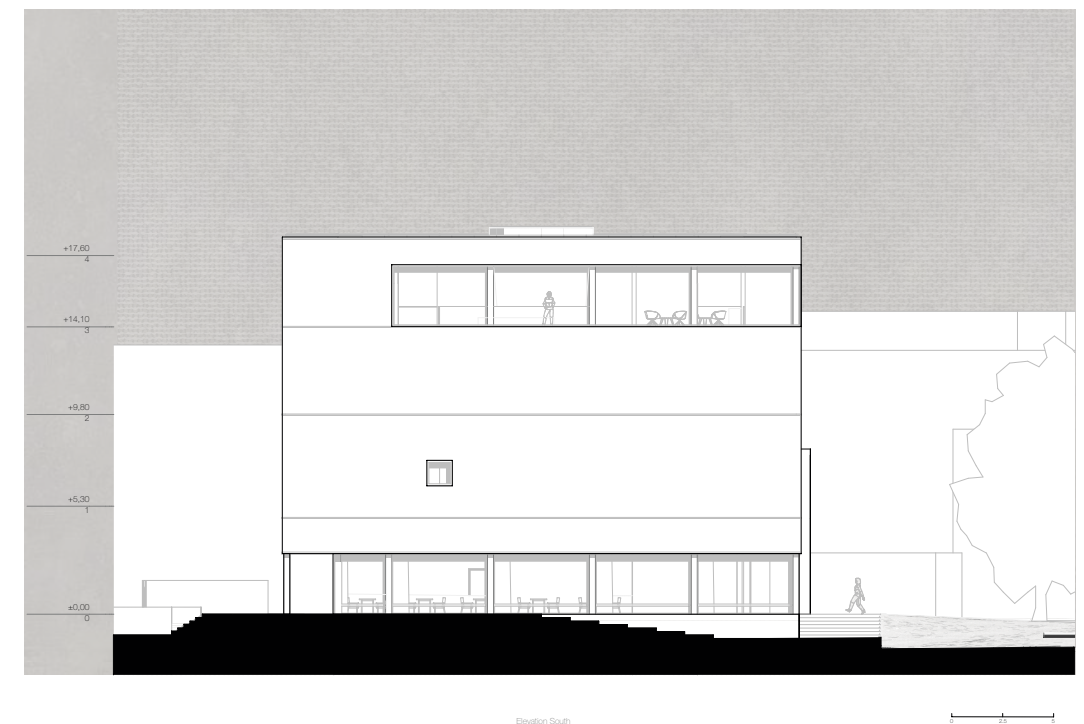


Figure 55. South Elevation

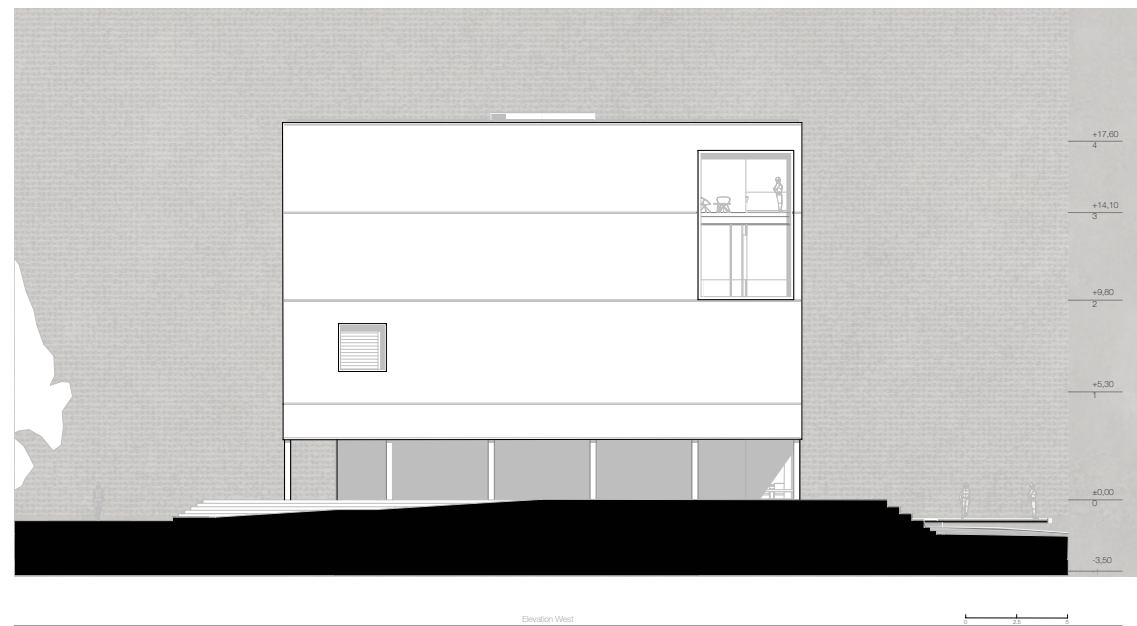


Figure 54. East Elevation

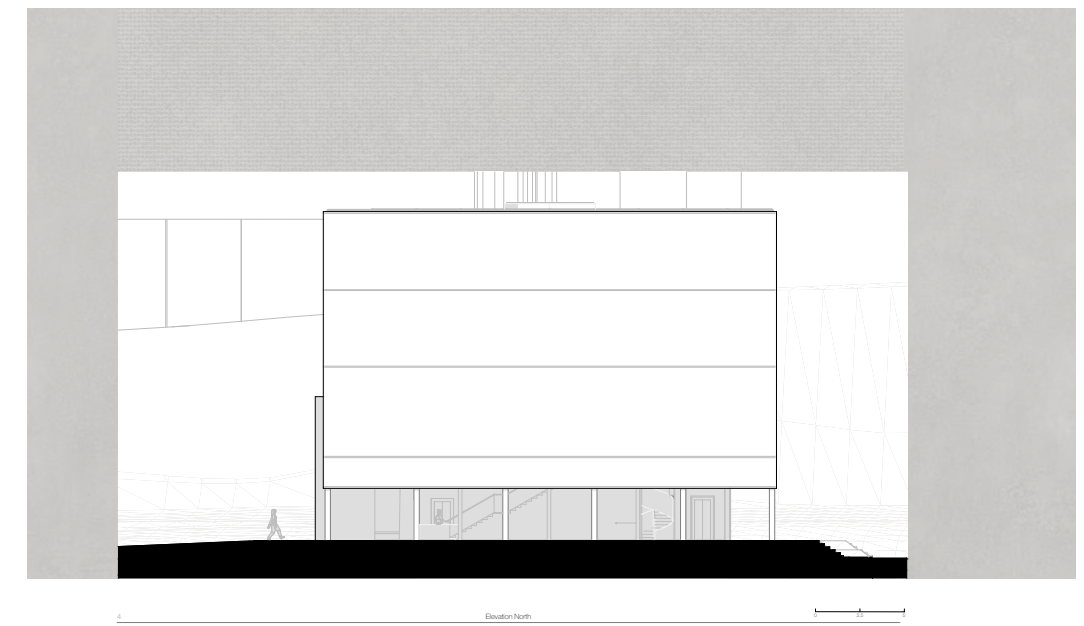


Figure 56. North Elevation



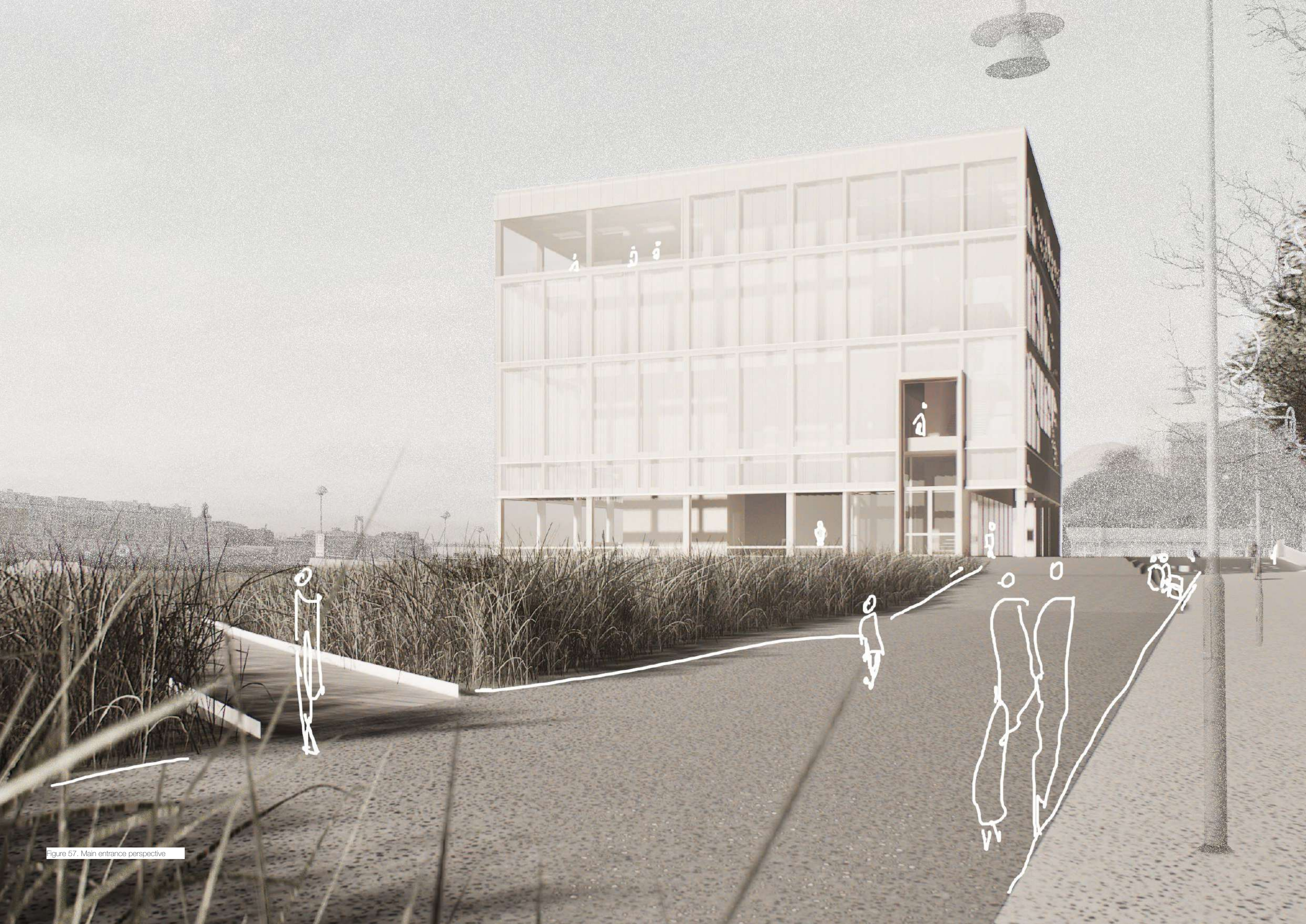


Figure 57. Main entrance perspective





Figure 58. Section S-01

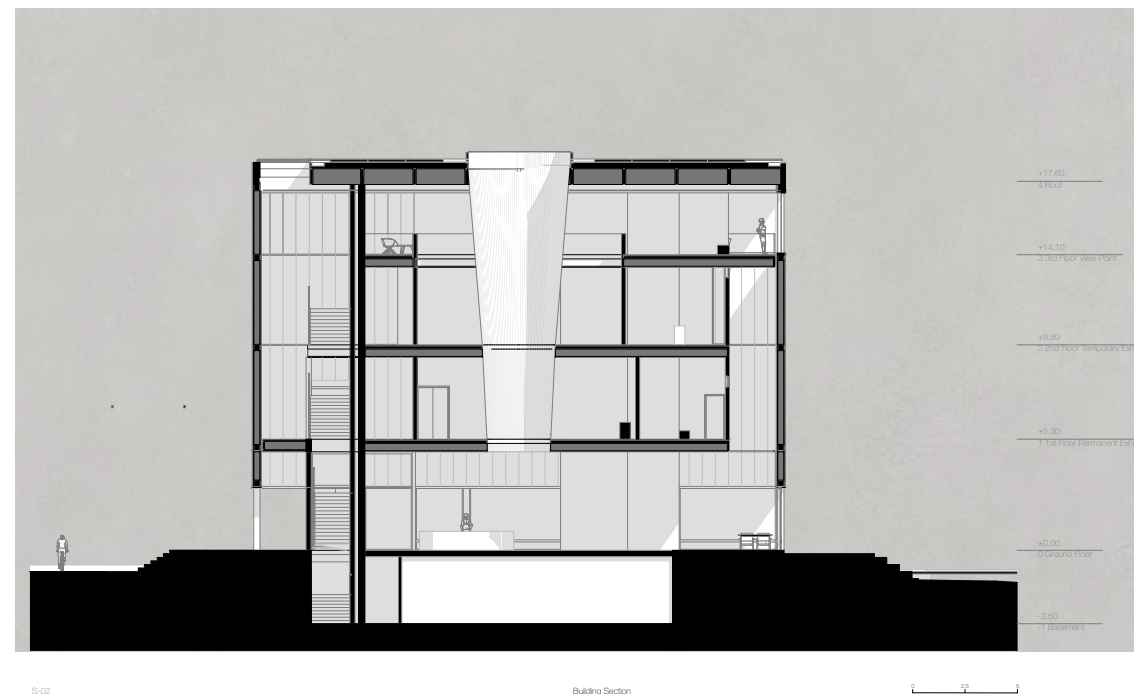
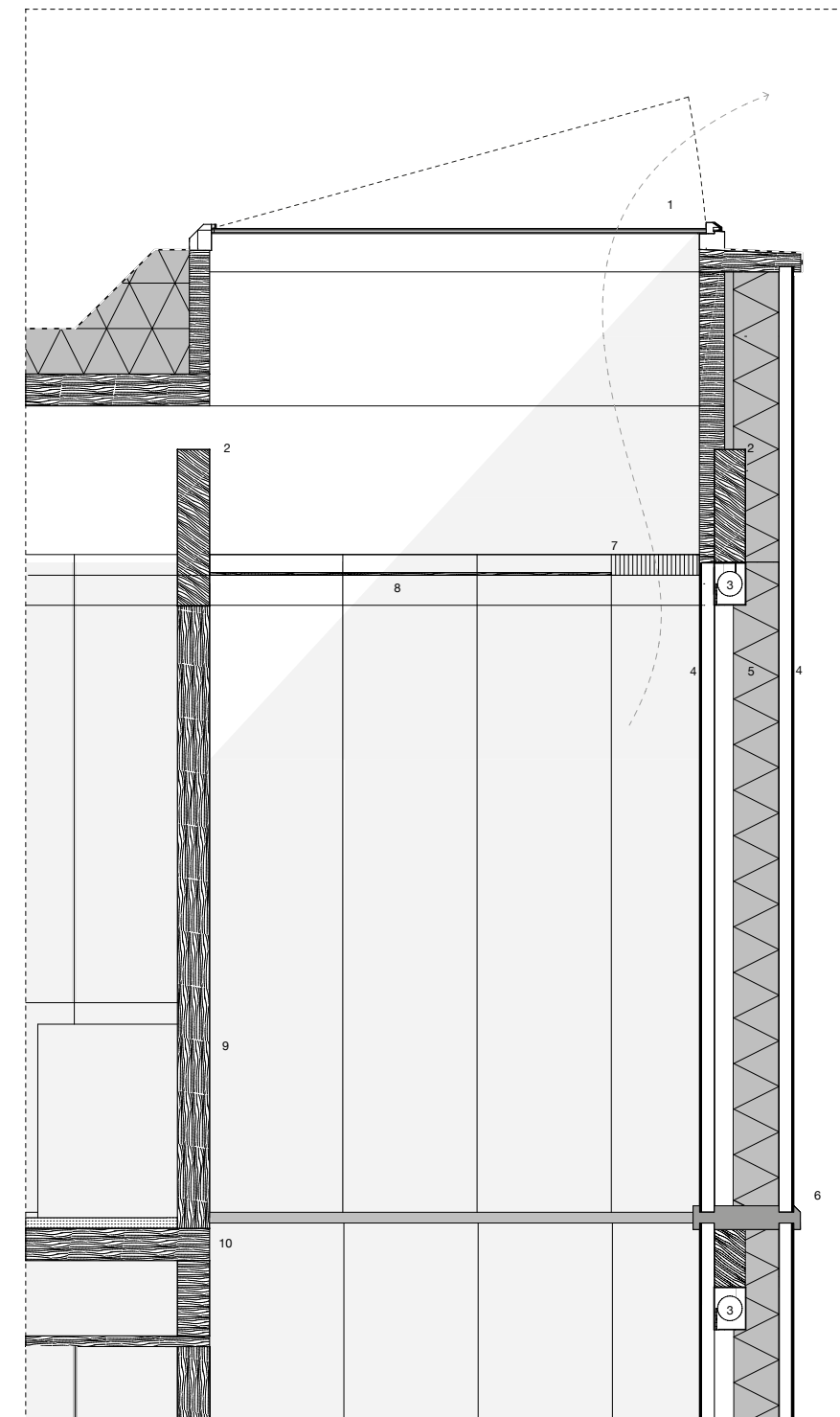


Figure 59. Section S-02



- Detail Section 01.
1. Operable Skylight with Laminated Safety Glass
  2. Glue-Laminated Timber (Glulam) Beam
  3. Retractable Fabric Solar Control Screen
  4. U-Profiled Translucent Glass Panel. Sandblasted Internally. Reduce iron-oxide content. (70 x 600 mm)
  5. Recycled Glass Fibre Thermal Insulation
  6. Timber Frame with Aluminium Cladding
  7. Stainless Steel Ventilation Grating (for Stack Effect Airflow)
  8. Laminated Translucent Safety Glass Panel
  9. Cross-Laminated Timber (CLT) Wall Panel
  10. Cross-Laminated Timber (CLT) Slab Panel

Figure 60. Detail Section 01





Figure 61. Section Perspective

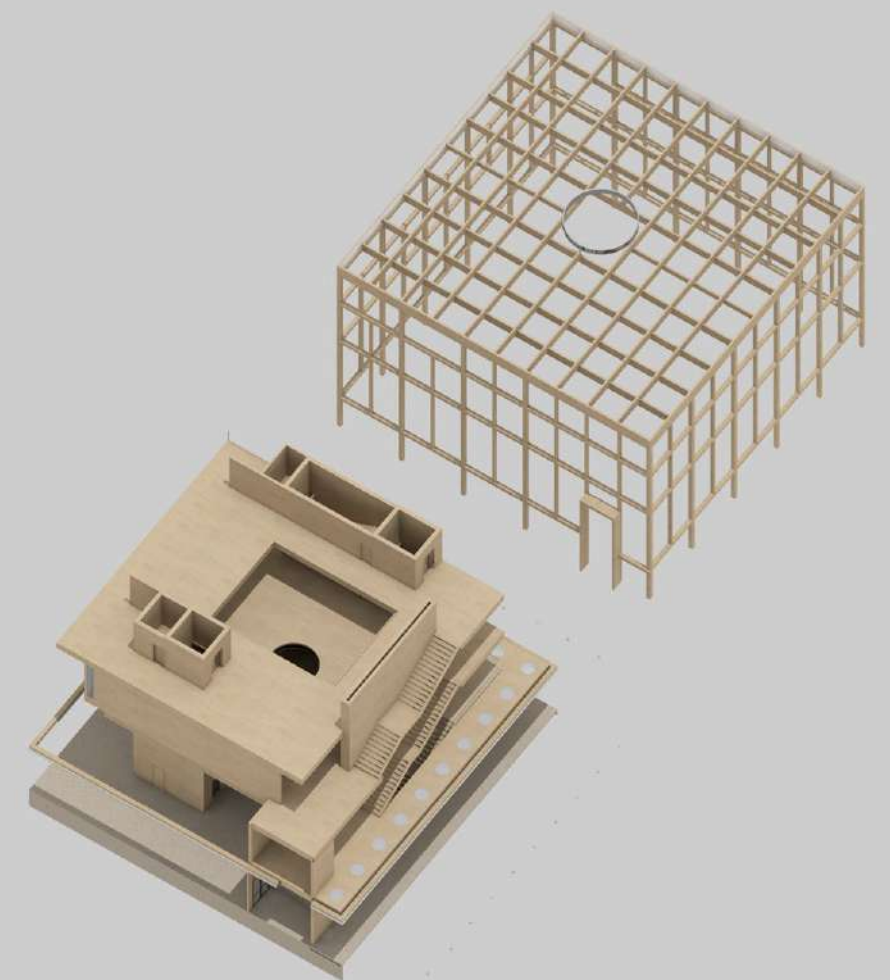


Figure 62. Structure Axonometry

In terms of materiality and structure, the project is primarily composed of timber and glass. The structural system consists of two components, mass timber and wood framing. Mass timber is used for the core walls, where the main structural support is provided by the vertical circulation shafts. This allows for open floor plans throughout the building. Wood framing is used to support the glass cladding, creating a lightweight envelope. The roof beams serve as the intersection point between these two systems, integrating structural performance with material expression.



For the lighting study, two main factors were defined. First, the building was designed to function as a light diffuser from the facade toward the core, addressing the need to protect the photographs exhibited inside as well as to create comfortably illuminated areas around. This strategy responds to the logic of illuminated perimeter circulation spaces and interior exhibition areas with low or diffused lighting.

Secondly, it was identified during the design process that the building and its translucent skin could also serve as a source of light and activation in an otherwise dark and neglected area. This feature allows for enjoyment of night views of the city of Gothenburg and

the riverfront, while also establishing the building as a positive urban landmark.

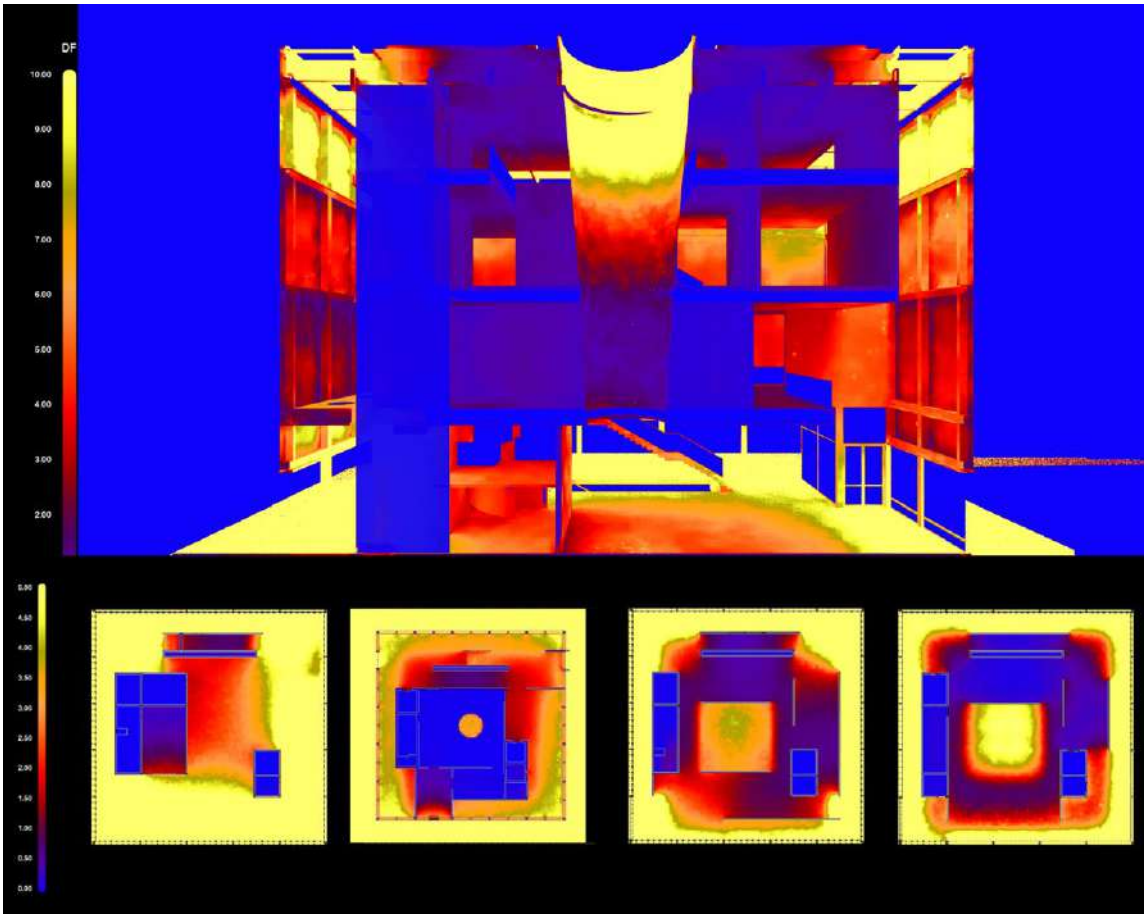


Figure 62. Daylight factor. Velux

Process of experimentation with form and light

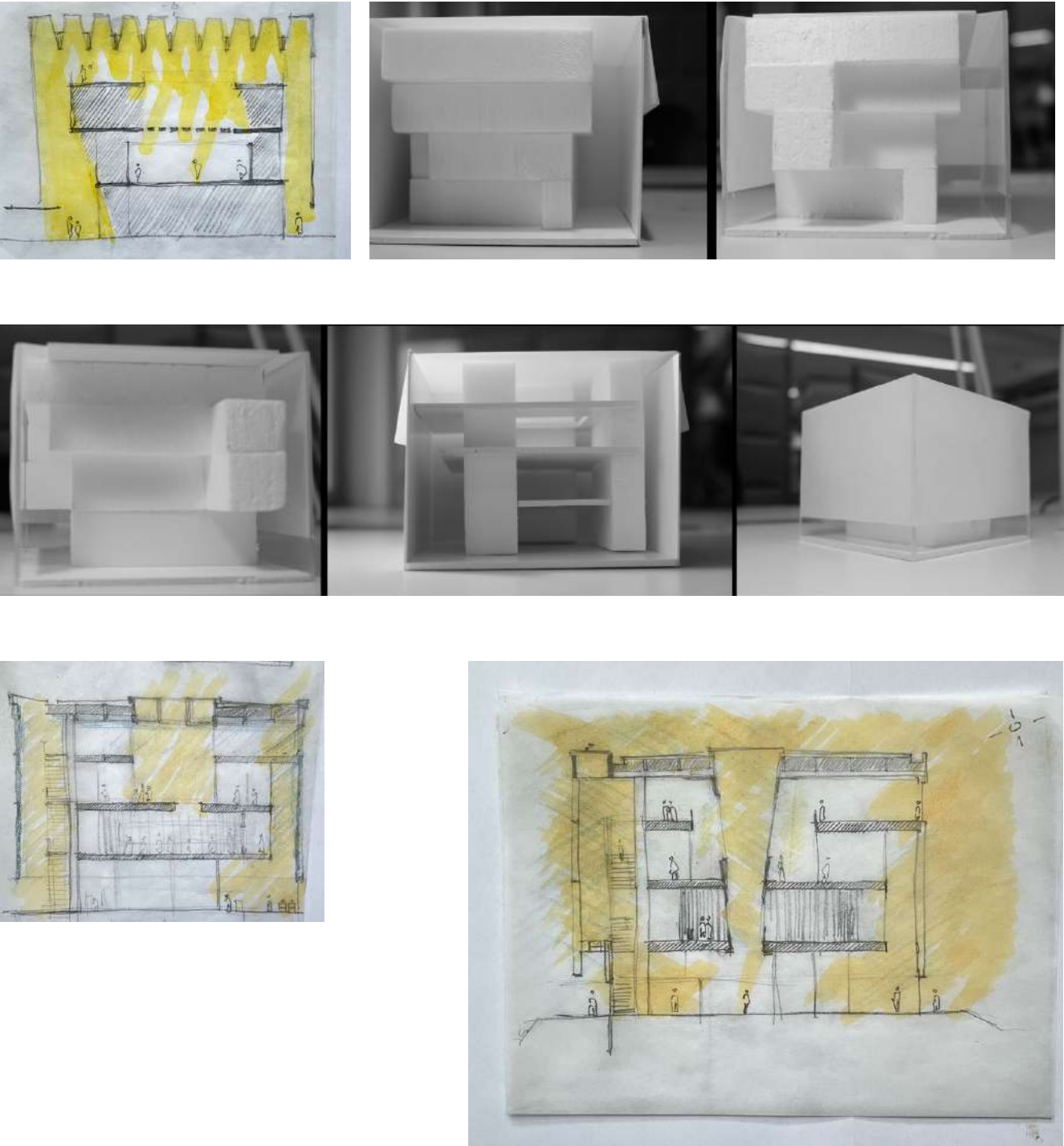


Figure 63. Daylight Sketches and models



Restorative park

Instead of asphalt and the existing parking lots along the river's edge, a phytoremediation is proposed to restore the soil, recover biodiversity and mitigate the area's resilience to flooding. This solution offer an effective way to restore the ecosystem while transforming the space into a healthier, more aesthetically pleasing environment.

Regarding the remediation of the area, Prša Gazilj (2023) concludes that phytoremediation techniques can effectively address contamination in the Lindholmen area. The study focuses

on the stabilization of heavy metals and organic contaminants through the use of plant species suitable for phytoremediation, including ryegrass (*Lolium perenne*), fountain grass (*Pennisetum sinense*), alfalfa (*Medicago sativa*), poplars, and willows. This landscape integrates harmoniously with the proposed architecture, allowing nature to continue through the texture and warm ambience of the wooden material and the interplay of water with the translucent facade.



Figure 64. Access to the Restorative Park



Figure 65. The café area and its material interface with the Restorative Park





c. Research on design

Discussion and reflections

Figure 66. View from Masthugget



Discussion and reflections

As a final discussion, eight points are presented that summarize the results of this work from a reflective perspective.

1. The artistic process

Qualified atmospheres that enhance the human experience of space can be achieved through a sensory approach to architecture, which is closely connected to the artistic dimension of the profession. Therefore, achieving high-quality architecture with inspiring atmospheres, as well as optimized and rationalized design solutions, requires an artistic process that is deeply connected to the context.

2. The sense of the place

The integration of architecture that is both qualified and environmentally respectful depends primarily on the characteristics and 'deep layers' of the site.

3. The influence of the context and social variables

Context and social variables play a key role in defining the potential for connecting architectural elements to the transition toward ecologically responsible design. These contextual factors also determine the analytical variables used in optimization processes.

4. The use of architectural components that respond to experiential quality and good performance

Balancing rationalization and sensitization in architectural design is essential. For example, in this thesis, daylight was improved through the use of a translucent cladding system, which reduces the need for artificial lighting and glare, while contributing to an inspiring interior atmosphere. As well, bio-based materials such as timber reduce carbon emissions and add value through texture, acoustics, and thermal comfort.

5. Shift the design focus from hard and impermeable surfaces to green and permeable ones

The site analysis revealed that Lindholmen is an environment that has been almost entirely modified by human activity, highlighting a lack of integration with natural systems. This thesis proposed a shift in the urban fabric—from prioritizing concrete and solid surfaces to embracing green, permeable sur-

faces as primary design elements. This approach aims to restore the environment and create more inviting, human-centered public spaces.

6. Balancing environmental and social needs is essential for achieving real sustainability

Achieving a balance between environmental and social sustainability was a key challenge that the project had to negotiate. On one hand, leaving the soil exclusively for phytoremediation and depaving the existing parking lots supported ecological restoration. On the other hand, the social revitalization of the area—particularly in this climate—required a more engaging approach. The inclusion of a public facility that offers shelter and promotes knowledge about the site emerged as a more powerful strategy for fostering community involvement and awareness.

7. Connecting fundamental design principles and concepts from the early stage of the design process

8. Human needs as priority

This thesis proposes a design process divided into three stages: research for, by, and on design. However, the majority of the work focuses on research by design—learning by doing—and applies a primarily phenomenological approach. Throughout the process, it became evident that considering architecture solely from an optimization standpoint could lead the project to a different outcome. This means that the order and integration of phases, as well as the theoretical approach, are fundamental inputs that can guide the project toward one final result or another. The key takeaway was the need to clearly define human and experiential inputs and, secondarily, to integrate them with an evaluation process.

The design process applied in this project is just one of many possible approaches. Therefore, this work contributes to the construction of knowledge within the framework of sustainable and phenomenological design, rather than presenting a standalone solution.

The resulting project is the product of the iteration of nine criteria, which emerged from the synthesis of the first phase: research for design. It also includes four design principles that were articulated alongside these criteria. Later, during the research by design phase, these were further consolidated into four criteria based on sustainable design and four criteria based on experiential design. This system and the

applied methods led to the final project and demonstrated that it is possible to integrate both qualitative and sustainable aspects in the design of a cultural center in Sweden, focused on revitalizing a key area in Lindholmen and Gothenburg.

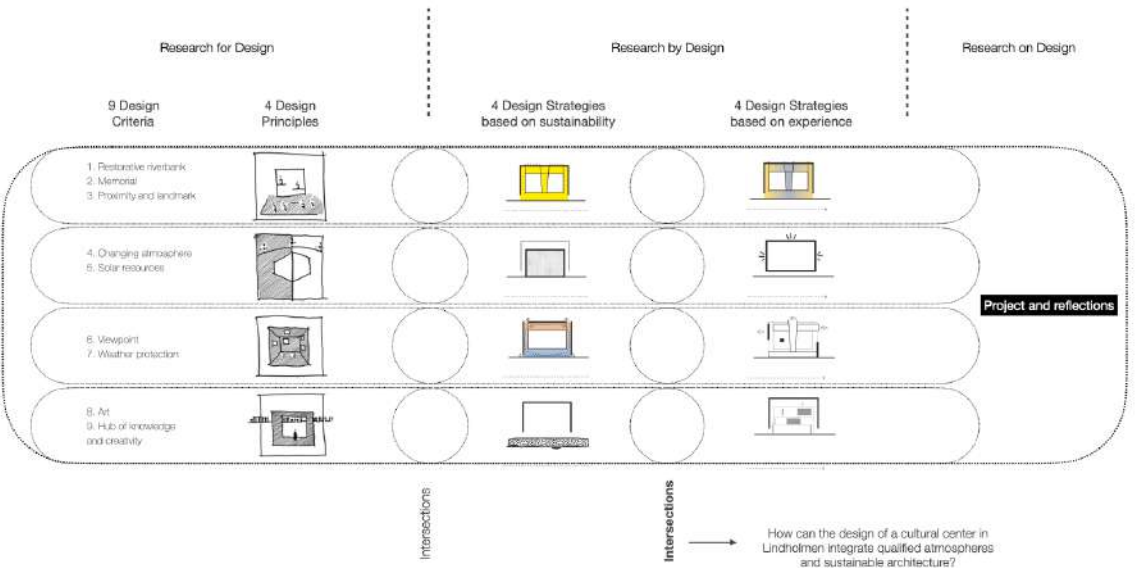


Figure 67. Research Background and Structure: Connection between the three phases



Figure 68. Viewpoint: Framing view of Masthugget





Figure 69. Northern facade perspective





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Figure 70. Thesis Exhibition at Chalmers