

# Touching the earth lightly

*Lightweight Architecture for a Climate Emergency Pavilion*

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Building design and transformation

Chalmers School of Architecture

Department of Architecture & Civil

Engineering

**Master thesis 2024**

Master of architecture and urban design

Supervisor: Isabella Eriksson

Examiner: Björn Gross



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Pavilion*

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Year of publication: 2024

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Department of Architecture and Civil Engineering  
Master's Programme of Architecture and Urban Design (MPARC)  
Master's Thesis Direction: Building and Tectonics

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## Abstract

Climate change poses an unprecedented threat to our planet's ecological balance. Despite growing awareness, global emissions continue to rise. In Sweden, politicians are for the first time actively increasing CO<sub>2</sub>-emissions. Given the urgency of the crises, there is a need for public spaces that both inform people about the dangers of climate change and inspire for change.

This thesis explores how an exhibition pavilion can be designed using a *Touch the Earth Lightly* approach, focusing on minimal environmental impact and harmony with surroundings. The pavilion physically and symbolically represents this concept, serving as a reminder of our responsibility to the planet. Focus is also on creating impactful spaces and atmosphere in a small scale building and how to use the strengths of a site to make it better, adding something that makes the site better than it was before.

The methods used in this thesis have been *research for design* and *research by design*, through an iterative design process. The result is a design of an exhibition pavilion dedicated to the climate emergency located in Röda Sten in Gothenburg. The program of the pavilion aims to give people a place to experience both art and science, but also to give them a platform to share opinions and stories.

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### Special thanks to

*Sophia, for your inspiration and encouragement throughout this journey. Thank you for being such an invaluable part of this process and for believing in me when I doubted myself. Your endless support has truly made all the difference.*

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# Introduction

Aim and purpose

Thesis question

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## Aim and purpose

The topic of climate change and its consequences is highly relevant in contemporary architectural discourse. The building industry is a huge contributor to CO2-emissions. There is also a lack of public spaces informing people about the urgency of climate change.

As we grapple with the pressing need for sustainable solutions, the approach of *touching the earth lightly*, an aboriginal old proverb often adapted by Australian architect Glenn Murcutt, becomes not only a response to environmental concerns but also an intriguing design perspective. It holds the potential to transform the building itself into a narrative - an example of how architecture can be a part of the storytelling. By not only weaving sustainability into the design but also make the building represent the notion of *touching the earth lightly*, it become informative public spaces, engaging visitors in the urgent conversation about our impact on the planet. This thesis will investigate how a building can be designed using this approach.

## Thesis question

How can a climate emergency exhibition pavilion be designed, emphasizing lightweight timber architecture and demonstrating the synergy between sustainable materials, structure, and impactful spatial experiences?

## Objective

An architectural design project in central Gothenburg expressed in drawings, 3d-images and physical models and a booklet supporting the design project.

## Discourse

### *Touching the earth lightly*

*Touch the earth lightly* is a phrase associated with Australian architect Glenn Murcutt and reflects his philosophy toward architecture and the environment. The phrase embodies Murcutt's commitment to sustainable and environmentally sensitive design practices.

The principle of *touch the earth lightly* is described in an interview (Wahlquist, 2016) where he emphasizes on minimizing the ecological impact of buildings on the environment. It encourages architects to design structures that are in harmony with the natural surroundings, using materials and construction techniques that have minimal environmental impact. Murcutt often advocates for an understanding of the local climate, site conditions, and the cultural context in which a building is situated.

In essence, he believes in the importance of responsible architecture that respects and integrates with the environment rather than imposing on it. It reflects a broader commitment to sustainability, conservation, and the idea that architectural interventions should leave a minimal ecological footprint.

Consider the powerful visual impact of embodying the sentiment *touching the earth lightly* in a literal manner within architecture. Imagine a building that not only physically meets the ground with a light touch but also has a minimal footprint, emphasizing its role as a temporary inhabitant that merely borrows the land.

The design becomes a narrative in itself, an expression of the sentiment and notion of *touching the earth lightly*. The architecture, in this case, serves as a compelling storyteller, inspiring people to reflect on the urgency of the climate crisis and motivating them to make a positive change.

This approach can be particularly impactful when designing a temporary exhibition pavilion for the climate emergency. By integrating the idea of *touching the earth lightly* not just ecologically but also physically, the architectural qualities of the pavilion convey a deeper message. It symbolizes a conscious effort to minimize impact, showcasing a harmonious relationship between the structure and the environment it temporarily occupies.

*"Where did that material come from? What damage has been done to the land in the excavation of that material? How will it be returned to the Earth eventually, or can it be reused, can it be recycled, can it be put together in a way that can be pulled apart and changed and reused?" - Glenn Murcutt*

(Wahlquist, 2016).

### *The climate emergency*

We find ourselves on the brink of the Anthropocene, a new geological era defined by human interventions and impact on the planet (Rockström et al., 2023). The relentless pursuit of economic growth and progress have pushed the planet's systems beyond the stable boundaries of the Holocene, the only stable epoch we know that can sustain society as we know it.

The IPCC (2023) reports a global temperature increase surpassing 1 degree Celsius compared to the period between 1850 and 1900. Aligned with the Paris Agreement's objective, it is imperative to limit this rise to well below 2 degrees Celsius, ideally below 1.5 degrees Celsius. This is crucial to safeguard our planet and alleviate the adverse effects of climate change.

Sweden has long been seen as a leading country in the transition for sustainability but there has recently been a shift in policy direction and for the first time the Swedish government is introducing politics that are actively increasing emissions. The government themselves acknowledges the inability of current policies to meet emission targets for 2030 or 2040 (Regeringskansliet, 2023).

The city of Gothenburg is however still dedicated to reach its own climate goal of having near net zero carbon emissions by 2030 (Göteborgs stad, 2023). A new exhibition dedicated to the climate emergency can be both a way to educate the public about climate issues and the ways forward, but also a symbol to show that the city is still committed to its climate ambitions.

## Method

The thesis is formed by a research on design approach, and research by design approach. Drawings, 3d-images and models used as design tools, apart from the theoretical studies.

The first phase is studies of reference projects and literature studies. This also includes studies of the theories and notion of architectural tectonics. The first phase also involves site visits and site analysis.

The second phase is design through an iterative process, using the references and theory as a knowledge base. The work will be communicated and presented through precise architectural drawings, physical models and visualizations.

## Theory and reference projects

### *Building and tectonics*

In architecture, tectonics usually refers to the science and art of construction. It involves not only the practical aspects of building but also considers its cultural and artistic value.

According to Kenneth Frampton, the primary essence of contemporary architecture is frequently found within the space itself, rather than in the individual elements that contribute to and initially shape that space. In this context, a broader concept extending beyond the physical rooms is discussed, one that is formed by the poetics of construction–tectonics. For Frampton, tectonics is part of his broader critique of modernist architecture, where he advocates for an architecture that is rooted in a deep understanding of materials, construction techniques, and the structural logic of buildings. He believes that a building's tectonics should be expressive and contribute to its overall aesthetic and cultural context (Frampton & Cava, 1995).

Deplazes (2013), also emphasizes in his book "Constructing Architecture: Materials, Processes, Structures," the integration of construction and design. While he doesn't focus exclusively on the term "tectonics," he underscores the importance of making the construction process legible and expressive in architectural design. Deplazes believes that the way a building is put together and the materials used should be evident, contributing to the overall architectural language. Deplazes continues to discuss lightweight constructions as the earliest of filigree structures. They did not have solid walls but a framework of branches or bones, and a roof made of leaves or skins. Filigree constructions could be defined as constructions of thin and slender parts, with a lot of void in between as a result.

This void needs to be closed in order to define spaces. This means that the relationship between inside and outside is defined by secondary elements, rather than the load bearing structure.

### *Atmosphere*

What do we mean when speaking of architectural quality?

***"Quality architecture to me is when a building manages to move me. What on earth is it that moves me? How can I get it in to my own work?"***

*(Zumthor, 2006, s.11).*

Zumthor (2006) tries to answer this question with the concept of atmosphere. The moment we enter a building and a room, we get a sensation, a feeling of it. It is the experience of the sound echoing on the walls or the materials you put your feet on. Zumthor considers atmosphere a critical aspect of the experiential quality of spaces. He argues that architecture should extend beyond mere functionality and aesthetics, seeking to create a specific atmosphere that resonates emotionally with those who encounter it.

For Zumthor, atmosphere is a multi-sensory experience, involving not just visual elements but also considerations of how spaces feel, sound, and even smell. He breaks this down into 13 key points that are more or less abstract. They are all however easy to recognize, for example he describes the abstract concept of coherence in a very concrete way:

***"That's when everything refers to everything else and it is impossible to remove a single thing without destroying the whole."***

*(Zumthor, 2006, s.69).*

### *Building for sustainability*

The pursuit of sustainability has emerged as a central concern for architects. They are tasked with not only creating aesthetically compelling spaces but also addressing pressing environmental challenges.

By using wood as the main construction material there is a lot to gain, since wood is one of few renewable construction materials. Producing materials such as concrete, bricks, steel and glass stands for up to 11 % of total global carbon emissions (Armstrong, 2023). This means if architects can evaluate materials based on their environmental impact and choosing the right materials for the project a lot of emissions can be avoided.

Ideally the timber should be locally grown and processed to avoid carbon emissions from shipping the material to the site. Since timber is a very light weight material, it is very efficient for shipping and easier for the constructors to handle on site.

Wood has been used as a building material for thousands of years and has a long tradition in Sweden. There has been a lot of skill and craftsmanship involved in making timber buildings and wooden details in the past. Today timber structures in large buildings are getting more common, but the details and visibility of the craftsmanship is lacking.

Wood has also shown in studies to have positive psychological effects on humans. According to Nyruud and Bringslimark (2009), using wood in interior spaces have some beneficial effects on people and people seem to prefer wood to other materials. The preference seems to come from the fact that wood is a natural material. They also conclude that the coherence and unity of the materials, patterns and colors of a space is important in defining the quality of it and how it affects people.

When cities today are expanding and densifying, they often do so in attractive harbor areas. The problem in many cities, including Gothenburg, has some challenges. One such challenge is soil pollution, often resulting from industrial activities or improper waste disposal. While conventional methods of soil remediation typically involve excavation and replacement with clean soil, there exists an alternative approach, phytoremediation. The term comes from the Greek word Phyto, meaning plant and the Latin word Remedium, meaning restoring balance. Phytoremediation refers to methods of cleaning contaminated soil using plants. The plants clean the soil using different techniques, depending on the type of plant. They can transport, store and even decompose many different kinds of oil, metals and chemicals (EPA, 2009).

Natural sanitation of the soil using plants often take a long time but is at the same time much cheaper. The sanitation cost can in some cases be up to 90 % cheaper than conventional methods of excavation. The amount of time needed varies based on many factors, for example the amount and concentration of pollution in the soil, size and depth of the area that needs to be cleaned and the type of plants that are used for the process. The plants used in the sanitation process can have an aesthetical value and be helpful for wildlife and biodiversity on the site. It is also possible to harvest the plants when the growing season is about to end, in order to use the biomass for bioenergy (EPA, 2009).

Implementing greenery on a site, especially in urban areas, has other benefits than aesthetically, it also affects people positively. WHO suggest that urban environments that have implemented greenery reduces the risk of heart disease as well as has positive psychological effects. (Hunter, et. Al. 2017).

### *Marika Alderton house*

- Glenn Murcutt, 1994

In this project Glenn Murcutt raises the house above the ground and tries in that way to touch the earth lightly, leaving a light and small footprint on the site. He also studied the context and aboriginal history of the site to design both the expression and spaces of the building. The house is located in Northern Australia and has a lot of openable parts and no insulation due to the warm climate. This makes the walls and roof appear very thin. Besides using plinths to rest the house comfortably above the landscape, it also has a thin roof with a large overhang and thin steel beams and columns to make it seem even more delicate and lightweight.

This house conveys the idea of a small building that has been lifted to the site and could be taken away without leaving a trace, thanks to the thin and sparsely placed steel plinths.



Figure 01. Blunck, R. (n.d). Marika Alderton house

*Natural Pavilion*  
- DP6 architectuurstudio, 2022

The natural pavilion in Floriade, Almere, The Netherlands, is a three-story project built using 3.5 m x 3.5 m modules of timber. It is built of 95% bio-based materials and the rest (steel joints and glass) are recycled or reused. The sawtooth roof, also constructed from wood, incorporates skylights to allow gentle northern light to reach the large atrium.

In this project the architects have minimized the ecological footprint and thought about the life cycle of the building. From the start the building was supposed to be disassembled and then rebuilt as an exhibition space in a Dutch nature reserve for three years and later disassembled and rebuilt again to be part of a research institute in Almere. But now it seems the building will remain where it was originally built and used as an office and conference center.

The construction is clearly made visible and shown to the visitor. The wooden modules are creating rooms inside and the upper floors and stairs are hanging from the ceiling using steel rods, giving a very light and filigree structure in the interior.

It's also an interesting project because of the flexibility in spaces, the timber modules and thinking about disassembly and rebuilding. By enabling proper disassembly from the beginning, you make sure the building can either be rebuilt or re-used in other projects in the future. It's also interesting from an *Touch the Earth Lightly*-approach. Is it possible to just borrow the land for a while and not make any long-term negative impacts?



Figure 02. Scagliola, D. & Brakkee, S. (2023).  
Natural Pavilion



Figure 03. Scagliola, D. & Brakkee, S. (2023).  
Natural Pavilion, Detail

*Yusuhara town hall*  
- Kengo Kuma & Associates, 2006

A public administration building with a timber structure aimed to both show and re-introduce the excellence of Japanese wood architecture. (Kengo Kuma and Associates, n.d.)

In this project the lightness of the structure is mostly visible from the interior, with a façade that is partly wooden and partly glazed. The structure is a column and beam system in timber. The columns are made of four thinner ones, instead of having one massive column.

The choice to split the columns in to four creates an illusion of having a smaller column and also gives the room a lighter and airier feeling. Light can penetrate through the construction enhancing the feeling of lightness. The same thoughts are behind the beam structure, which consists of five layers of wooden beams layered to create gaps in between them. Even though the longest spans are 18 meters wide, the roof construction seems to visualize how one can use wood to create a lightweight structure. It is strong and robust but at the same time lightweight and elegant.



Figure 04. Fujitsuka, M. (n.d). Yusuhara  
Town Hall



Figure 05. Fujitsuka, M. (n.d). Yusuhara Town Hall

*Nest we grow*  
 - Kengo Kuma & Associates, 2014

The project is a four-story tall structure intends to bring people and food together in Taiki-cho, Hiro-gun, Hokkaido, Japan. The key structural elements of Nest We Grow are the nine glulam timber columns intersected by pairs of glulam beams. At each floor level, perpendicular pairs of glulam larch timber beams intersect each column, nestling into notches on the columns. The depth of these notches accommodates the beams, creating a secure moment connection. The outer layer of vertical columns holds the façade and don't touch the ground, but rather cantilever out from the structure.

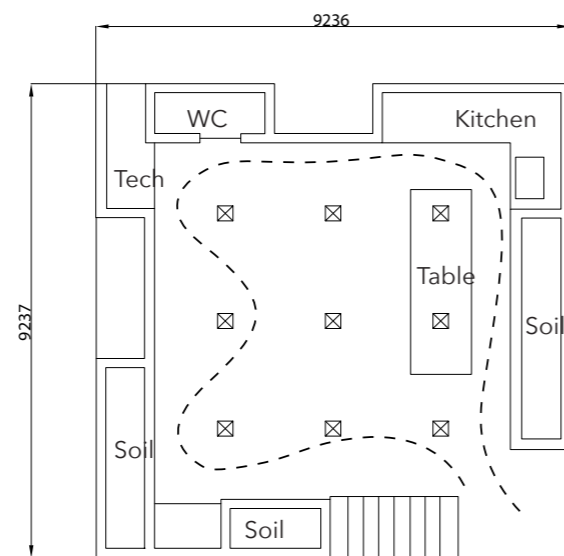
It is covered by transparent plastic corrugated sheets that gives a greenhouse effect inside the structure. It also creates a beautiful diffuse light coming from the interior during the night.

It stands on a concrete slab that help stabilize the structure, but also protects the timber from moisture.

The project is relevant to the thesis because of its perceived lightness and filigree structure. Even though it has a heavy concrete base, it has a lightness to it thanks to the timber structure and what could be seen as a floating or flying cover in transparent plastic. It uses layers of different materials to convey the notion of lightness. It is also a project that is designed to inform and showcase a specific topic, in this case food production and community among people. The building also has a nice flow for movement. The activities are all located near the inner walls, so the visitors move along the inner boundaries of the building creating a logical flow for the activities.



Figure 06. Shinkenchiku-sha (n.d). *Nest We Grow*.



Ground floor of Nest we grow showing the movement between the activities.

*Naturum Store Mosse*  
 - White Arkitekter, 2003

This project is a nature exhibition center, a so called Naturum in Swedish. Seamlessly extending the outdoor experience indoors, the building offers a natural flow for visitors. Despite its simplicity, the floor plan presents captivating sequences: spaces open up only to gradually contract again, playing with light and darkness. The inclusion of a central dark core for functions not reliant on daylight adds an intriguing dynamic to visitor exploration. The size (300 m<sup>2</sup>) and functions of the building was of great importance in the initial investigation of what an exhibition space could have.

The building is entered via a wooden deck going through the landscape, making visitors experience the nature on the way to the Naturum. The building itself is also raised above the ground, carefully to not disturb the nature too much.

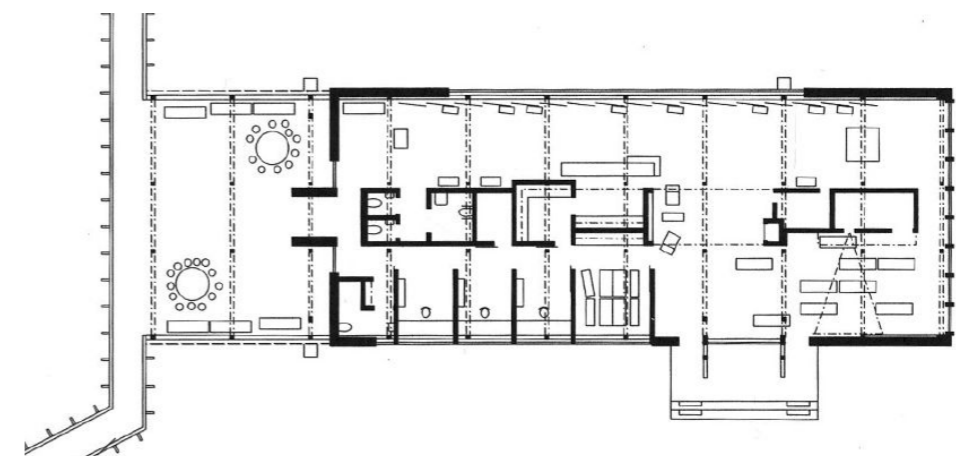


Figure 07. White Arkitekter (n.d). *Plan of Naturum Store Mosse*.

## Delimitations

This thesis will result in a proposal for an exhibition pavilion of art and science, dedicated to the climate emergency. It will focus on architectural qualities from using a timber construction and emphasizing a lightweight design. Economic aspects of this project will not be studied.

The thesis will not delve into assessing the extent to which architecture can directly enhance public awareness of climate issues. Instead, the thesis suggests a design as one potential solution among many for promoting awareness through architectural means. The primary emphasis and concluding discussion will revolve around the architectural qualities of the proposed building design.

## Reading instructions

The first part of the thesis introduces the framework and the discourse. It also gives the reader a presentation of the background to the problem of climate change and the notion of *Touching the Earth Lightly* as well as the theoretical background used as a basis for the design work. The theory includes studies of reference projects and literature.

The second part presents the final design proposal using drawings and images. The context and background of the site where the design proposal is supposed to be located is also presented.

The concluding part is a reflection of the thesis and discusses the design proposal in relation to the discourse, research question and process.

# Design proposal

Context and site

Climate emergency pavilion

## Context and site

### *Introduction to Röda Sten*

The site is located in Röda Sten, Klippan by the Göta Älv river in Gothenburg, West of the city center. As a recreational area it's well visited by both locals and tourists. It is very popular for walks along the river front during the summer and the art gallery that already exists on the site is a popular place to visit all year round. In summertime, both organized and spontaneous events and gatherings are often happening on the empty plot next to the art gallery. An old foundation for a demolished oil tank is used as a skateboard park.

The site used to be a harbor and industry area but much of the industry was demolished in the later part of the 20th century.

The proposed plot sits on top of artificial landfill raised about 2 meters above sea level and is very flat, a strong contrast to the hilly Sjöbergen to the South.

The latest approved detailed development plan of the area is from 1964 and indicates that the area closest to the water is for industrial purposes. A program for a new development plan for the area was approved in 2009, describing the area as an important meeting place for culture and other recreational activities today. The city further wants the area to be developed as a hub for culture and activities (Göteborgs Stad, 2009).



Site plan showing the plot in Röda Sten Scale 1:5000 (A4)

## Röda Sten konsthall

The site already has an established art gallery, Röda Sten Konsthall. The gallery features contemporary artists and artworks, as well as lectures and workshops. Röda Sten Konsthall is housed in a former boiler house built in 1940, initially serving as a heat center for nearby industries. Both inside and outside the building, traces of 1980s and 90s rave parties and the graffiti artists who occupied the premises after the heating plant closure are still visible.

In the early 1990s, Röda Sten Konsthall faced the threat of demolition. A collaborative initiative took shape when individuals joined forces to establish an association aimed at preserving the building.

This association gained support and started activities and exhibitions in 1996. The building underwent an extensive renovation in 2000. Today, the non-profit organization Röda Sten Kulturförening operates Röda Sten Konsthall but once again the gallery faces threats to its existence. According to its manager Mia Christersdotter Norman, the gallery has had financial problems for years and barely survived through temporary financial support which has now ended. They have had to cut down on their opening hours and staff and it's unclear how and if the gallery can continue to exist in the near future (Andersson, 2023).



*Southern facade of Röda Sten art gallery.*



## Selection of the site

The exposed position along the river reflects the vulnerability of our planet to climate challenges. This site was chosen for being in between nature and city, its closeness to the elements and being somewhere in between the urban development and the old harbor industrial area. An exhibition that wants to be frequently visited needs to be somewhat easy to access and Rödasten in Klippan is just 3.5 km from the old city center of Gothenburg with easy access by public transport. Another important aspect was that the new building should be constructed on unused land, avoiding destroying valuable existing spaces. It should enhance the site's value, ensuring that the addition improves the area beyond its previous state.

Moreover, the site offers visitors a thought-provoking view of the oil terminal on the opposite side of the river. This represents the very problem, our dependency on fossil resources.

Further away, one can even see parts of Skandiahamnen, Sweden's largest shipping container port. This serves as a visual metaphor, encouraging contemplation on the interconnectedness of human activities and their environmental consequences.

Placing a new exhibition pavilion dedicated to both art and science next to the established contemporary art gallery, Rödasten konsthall, not only solidifies but also amplifies Rödasten's status as a cultural and recreational hub. The synergy between the new pavilion and the art gallery enhances the overall cultural landscape, and gives the visitors an even more dynamic experience and hopefully could have an impact in the future of Rödasten konsthall by making the gallery and area more attractive and recognized.

Additionally, the adjacency to Rödasten enhances the pavilion's visibility and accessibility. Visitors drawn to the art gallery are naturally introduced to the new pavilion, creating a seamless transition between artistic exploration and environmental awareness.



Picture showing the view of the oil terminal from the site.

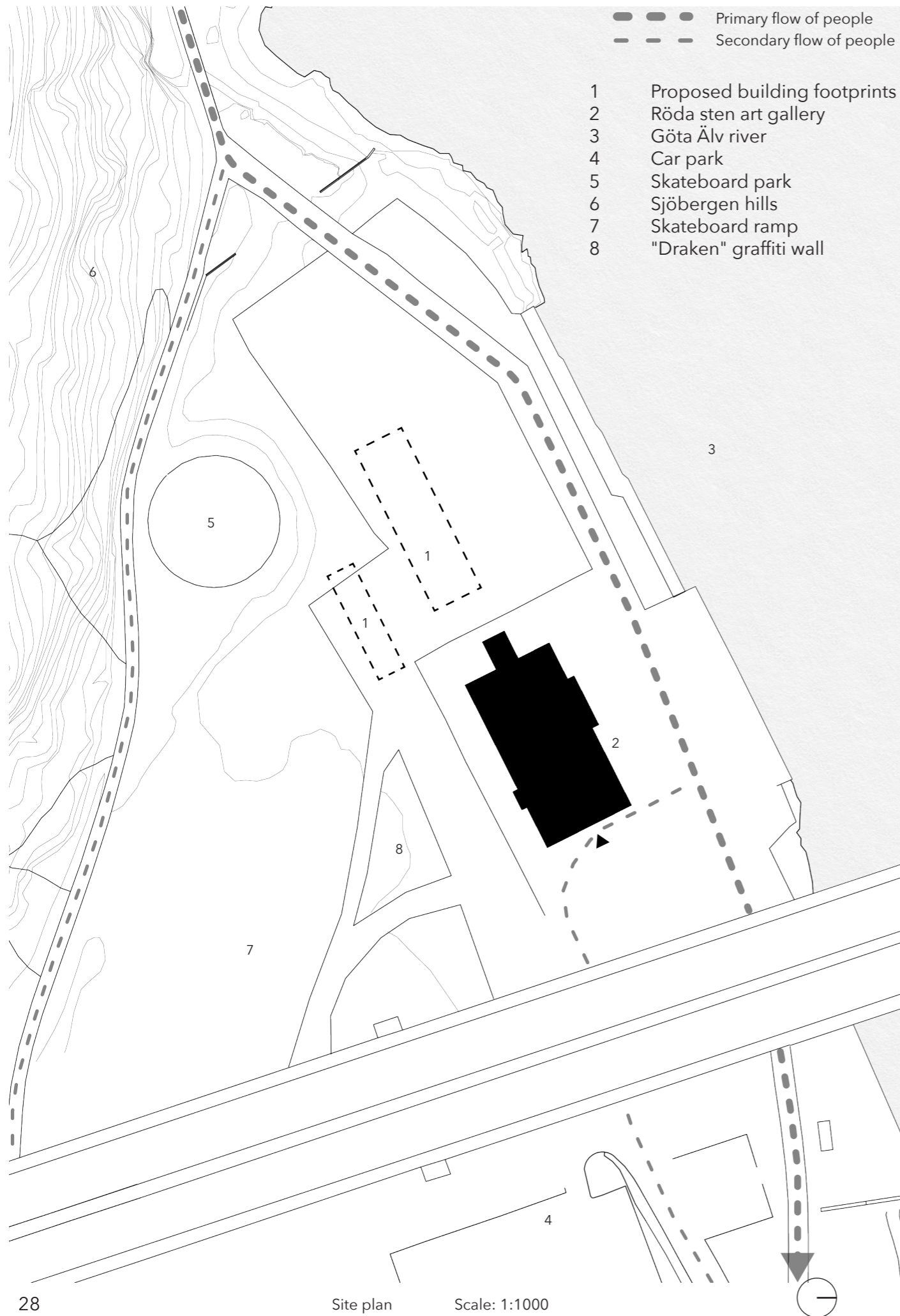
## Site analyses

The main road to the site is a pedestrian and bike path along the water front connecting the rest of Klippan with Rödasten. The path continues West to Nya Varvet and Kungssten and seems to be quiet busy. There are also a few smaller paths leading up to the green and hilly Sjöbergen to the South. There are several parking spaces for cars near the site but public transport stops (tram, bus and ferry) is only about ten minutes away by walking. The Älvsborg bridge runs across the river just East of the site and generates a lot of noise.

The site is mostly flat with about one meter height differences in the South around the skateboard park, compared to the graveled area. The site is only two meters above sea level at the most and flooding during heavy rain or storms is a concern.

Around the site there are a few sculptures, skate board ramps and railings, a graffiti wall, and benches with tables.

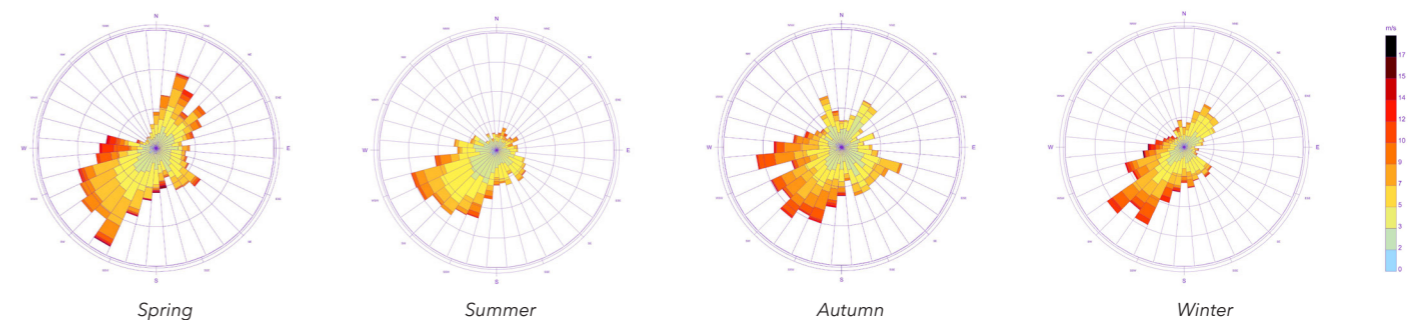
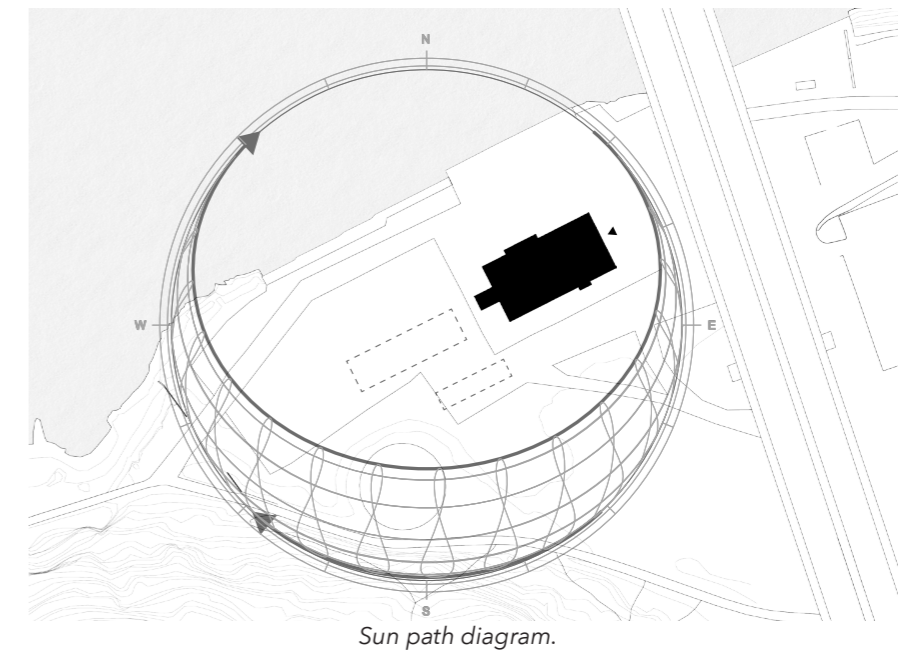
The soil on the site is believed to be polluted from previous industry in the area (Göteborgs stad, 2009) but no investigation to confirm this has been done. According to Sveriges Radio (2006) the site is in third place of the potentially worst polluted sites in the municipality. While it isn't dangerous to be in the area, there is a high risk of pollution spreading to the water and if any building development should happen in the area, the soil should be tested for pollution.



### Weather and climate

The site is rather exposed to the elements and often experiences strong winds. The winds are strongest from September to February, represented as Autumn, Winter and Spring in the diagrams. The wind is mainly coming from the Southeast but there is also a lot of wind coming from the Northeast, especially in the Winter and Spring. During the summer months the wind speeds decrease and mainly comes from Southwest. The vegetation covered hill to the south help soften the winds coming from that direction. Weather data collected from [climate.onebuilding.org](https://climate.onebuilding.org) (2024).

The sun path diagram shows how the sun moves during the year, with the upper arrowed path illustrating how the sun moves in the summer solstice and the lower arrowed path during the winter solstice. During the winter the site will have trouble getting much sun, because the hilly landscape to the south blocks the sun's low angle. However in the summer sunlight will reach the site from many directions during a long period of the day.



Wind speeds and directions throughout the year.

### Concept and design strategies

The following concepts and design strategies are derived from the theoretical research, studies of reference projects and site analyses.

The first strategy is to build upon the existing concept of Rödå Sten; experience art and culture, and at the same time encourage meetings and discussions between people. The second strategy is to use the design and architecture as a reference or manifestation of the climate emergency by using the following concepts:

#### Lifting the design off the ground

Showcasing the fact that the pavilion is only borrowing the land for a while by lifting it above the ground.

#### Filigree timber structure

Utilizing wood in a filigree manner not only gives a sense of lightness to the structure but also establishes a distinct identity. Split beams and columns accentuate this lightweight quality while creating an interplay of light and shadow. Additionally, the visible structure serves as a unique feature, enhancing the place's identity and character.

#### Interior and exterior movements

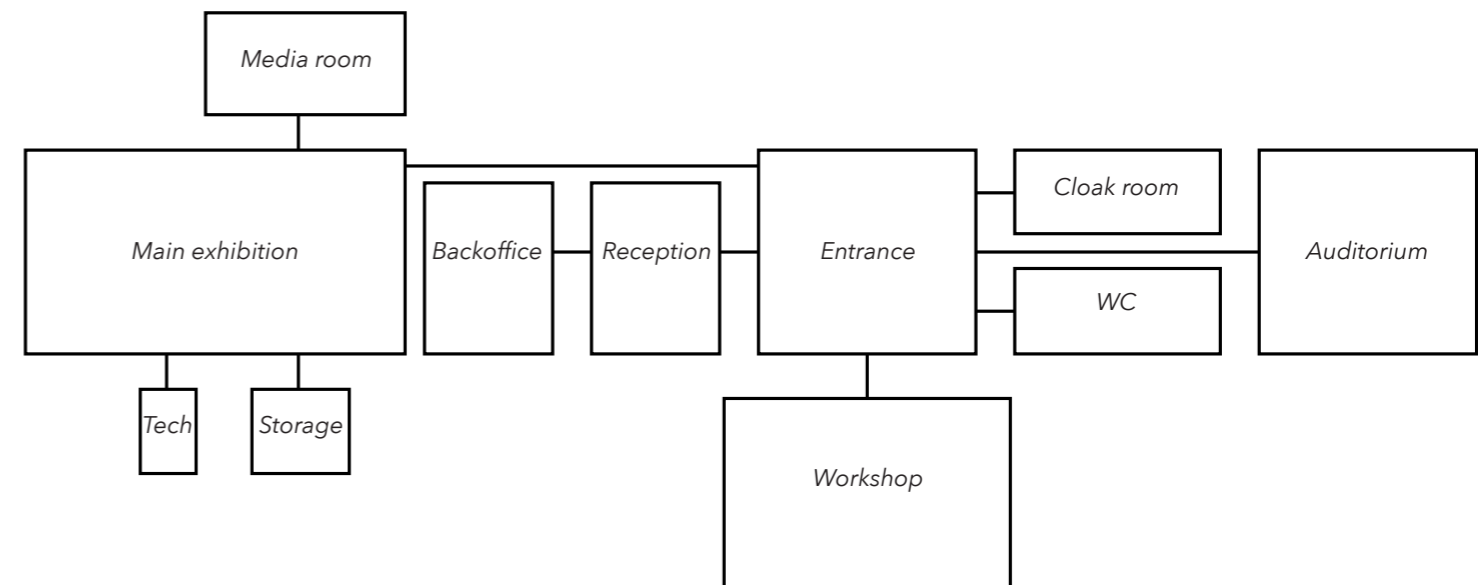
Simple and logical movement connectivity between interior and exterior spaces offers dynamic visual experiences.

#### Biodiversity and community

Incorporating green space within the design creates a beautiful landscape while also promoting biodiversity. This not only contributes to environmental sustainability but also provides opportunities for interaction and collaboration among people.

### Space program

Room	area
<b>Entrance</b> <i>Reception</i> <i>Technical</i>	<b>62 m<sup>2</sup></b> 7 m <sup>2</sup> 1 m <sup>2</sup>
<b>Cloak room</b> <b>WC</b>	<b>9 m<sup>2</sup></b> <b>10 m<sup>2</sup></b>
<b>Main exhibition</b> <i>Media room</i> <i>Storage</i>	<b>176 m<sup>2</sup></b> 20 m <sup>2</sup> 6 m <sup>2</sup>
<b>Auditorium</b> <b>Waiting &amp; gathering space</b>	<b>60 m<sup>2</sup></b> <b>32 m<sup>2</sup></b>
<b>Workshop</b>	<b>110 m<sup>2</sup></b>
<b>Staff backoffice</b> <i>Office space</i> <i>WC</i> <i>Kitchenette with table</i>	<b>19 m<sup>2</sup></b>
<b>Total</b>	<b>478 m<sup>2</sup></b>



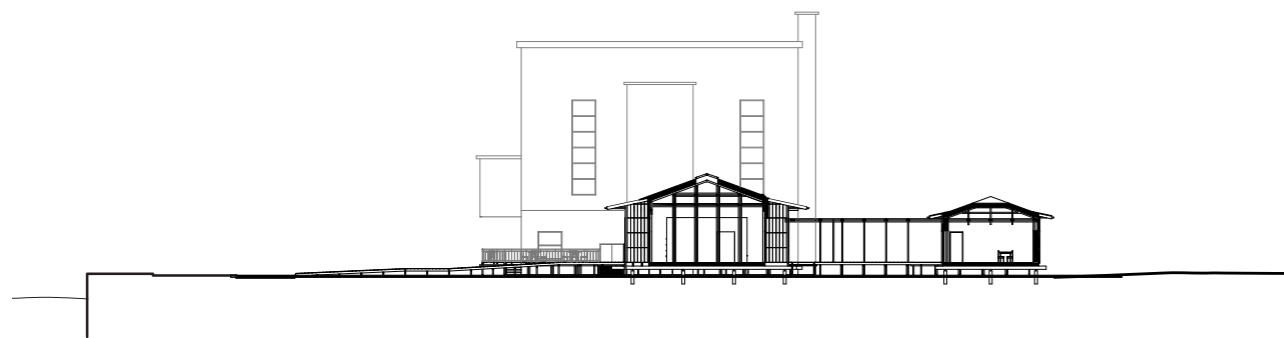
# Climate Emergency Pavilion

## *Introduction to the proposal*

The pavilion is a semi-temporary building that will raise awareness on the climate emergency through art and science. Its purpose is also for people to meet and create discussions. According to the 2018 IPCC report (IPCC, 2018), the world needs to be carbon neutral in 2050 to keep the mean temperature change below 1.5 degrees, so the pavilion will be open until then as a reminder to the public. After that the building could be taken away or continued to be used.

The pavilion is a freestanding extension to Röda Sten art gallery and the idea is for it to be used in a collaborative way, but it could also be used independently. The buildings are connected through wooden decks. Visitors from Röda Sten art gallery could have a coffee or lunch break in their café and use the deck to sit outside, surrounded by the garden and look at the outside exhibition. Then they can easily enter the new exhibition pavilion to learn more about climate change and the environment.

The site will be an experiment of using phytoremediation to clean the polluted soil. The pavilion and mostly its workshop will work with Röda Sten art gallery to support this process and document it. The sanitation process will take many years and even though it's not sure to succeed in cleaning all of the soil, it's supposed to provoke thoughts about our use of land, how we use attractive areas near the water for industry and how we leave environmentally toxic left overs. Visitors can be a part of the cleaning process by planting seedlings and seeds in to the soil during spring time.



Landscape section  
Scale 1:500 (A4)



Site plan  
Scale 1:1000 (A4)

1. Main building
2. Workshop
3. Röda Sten art gallery
4. Graffiti walls and skate park
5. Skate park





*Approaching the site.*

## *Appearance and expression*

The pavilion is supposed to have a light footprint, just lightly touching the earth. It is to feel like the building could be lifted away tomorrow and leave no trace, it's merely borrowing the land for a while. To make the design feel like it's part of the landscape and not stand out too much, the design is divided into two volumes and they are both low and thin. The main building is the larger one and contains the main exhibition space as well as an auditorium. The smaller building has a workshop space and is more flexible in its use.

The basic form of the pavilion is taken from the footprint of the existing brick building on the site, and then divided into two volumes creating interesting spaces in between them. These in-between spaces will be used as an outside sculpture park as well as a seating areas for coffee and food.

Both volumes are lifted off the ground, resting on concrete plinths to visualize that the building touches the earth lightly. It also ensures that the foundation uses as little concrete as possible. The appearance is influenced by Asian traditional architecture with its two roof pitches and use of burned wood as a façade material.

## *Inside the pavilion*

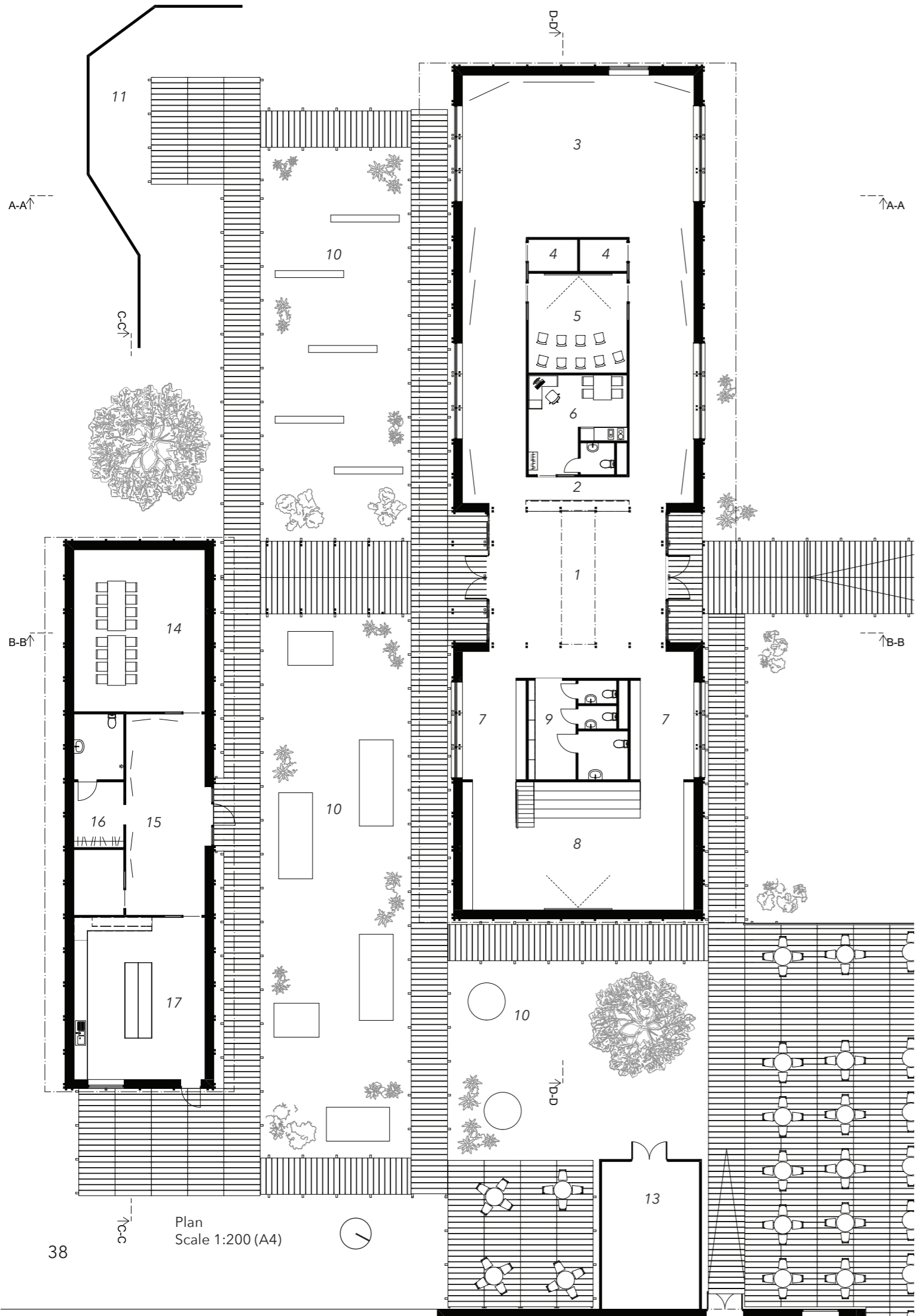
The visit begins when entering the area and the walking path leading up to the building. The visitor will experience the landscape walking on top of it since the path is lifted up above ground. When entering the pavilion there is a reception desk and on one side is the main exhibition and on the other, there are gathering spaces and an auditorium. In the middle is a core of supporting functions, like storage, back office and toilets.

The smaller workshop building is more flexible in its use and could be used in different ways, both for open events and for scheduled classes or groups.

There are important sightlines highlighting different views. For example, the river and the oil terminal on the opposite side of it is visible to the North reminding the visitors of the very problem, our dependency of fossil fuel, and the contrasting lush green hill is visible to the South.



*Sightline from the entrance; the beginning of the exhibition.*



**Main pavilion:**

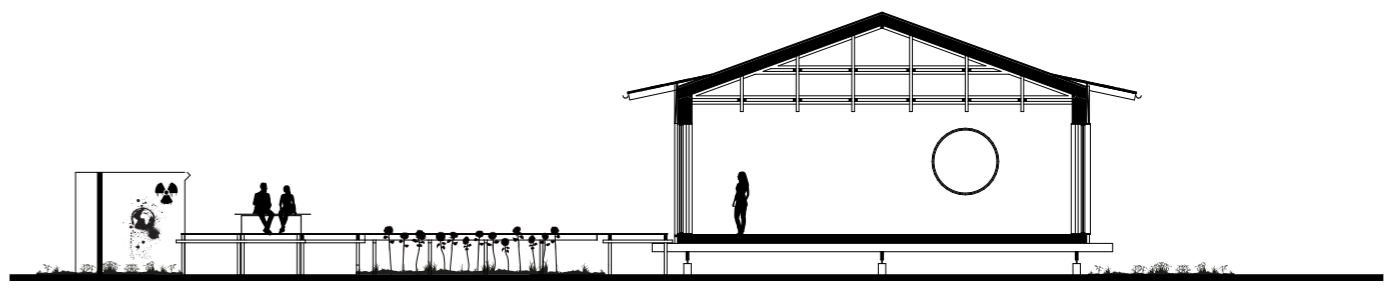
- 1. Entrance
- 2. Reception
- 3. Exhibition
- 4. Storage
- 5. Media room
- 6. Backoffice
- 7. Gathering space
- 8. Auditorium
- 9. Cloak room & restrooms

**Outside spaces:**

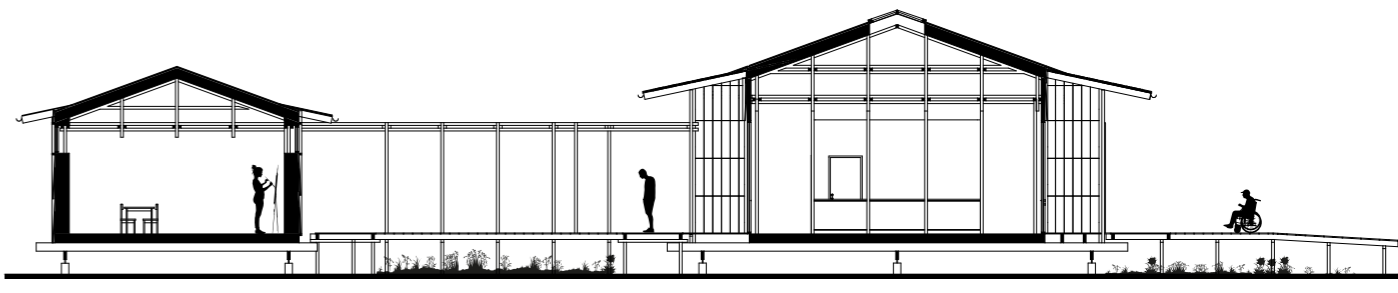
- 10. Sculpture park & mixed flower beds
- 11. Graffiti wall
- 12. Sculpture park
- 13. Storage

**Workshop:**

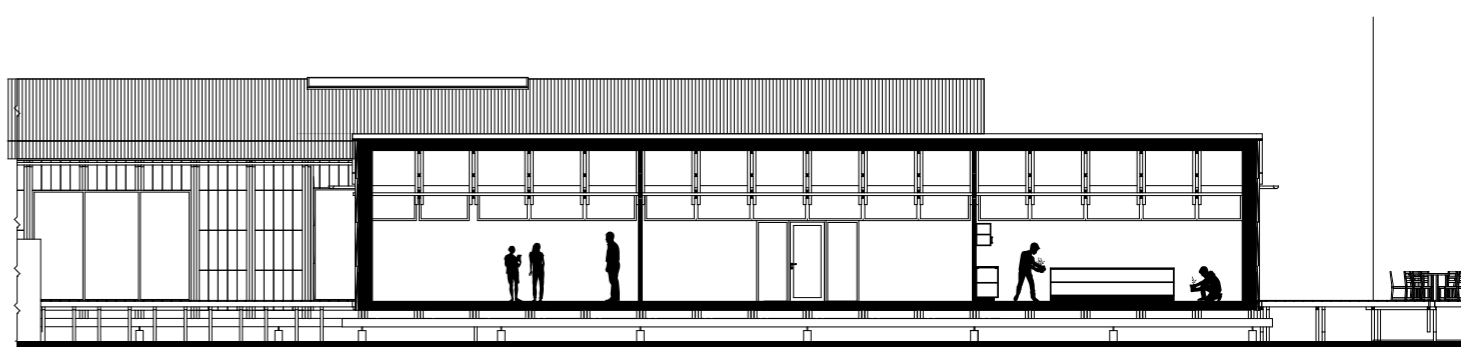
- 14. Meeting room
- 15. Storage & toilet
- 16. Entrance & art studio
- 17. Makerspace



Section A-A  
Scale 1:200 (A4)



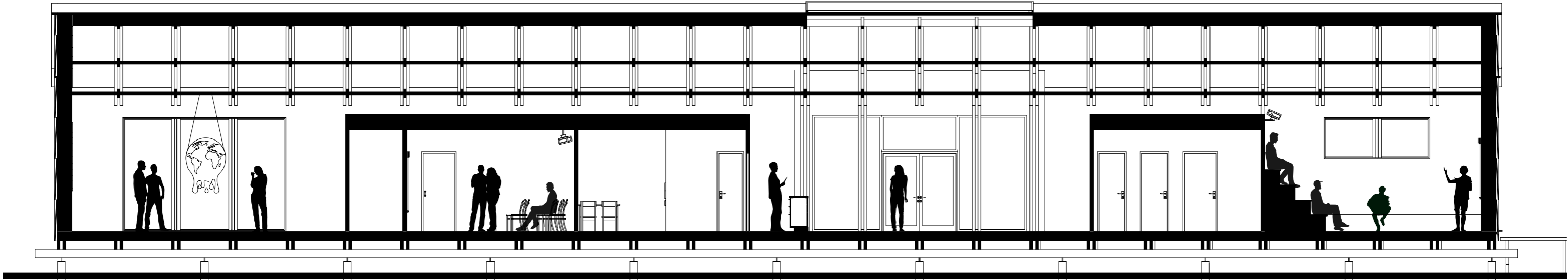
Section B-B  
Scale 1:200 (A4)



Section C-C  
Scale 1:200 (A4)



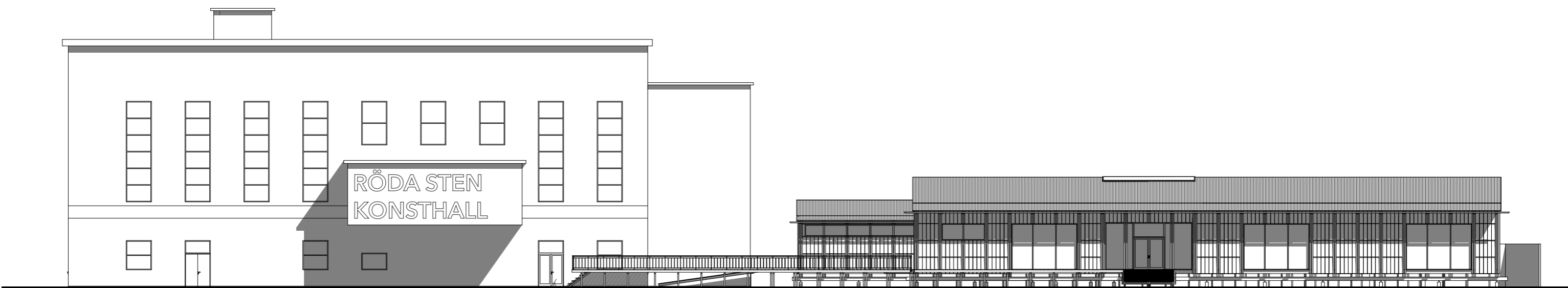
Main exhibition with view of the oil terminal.



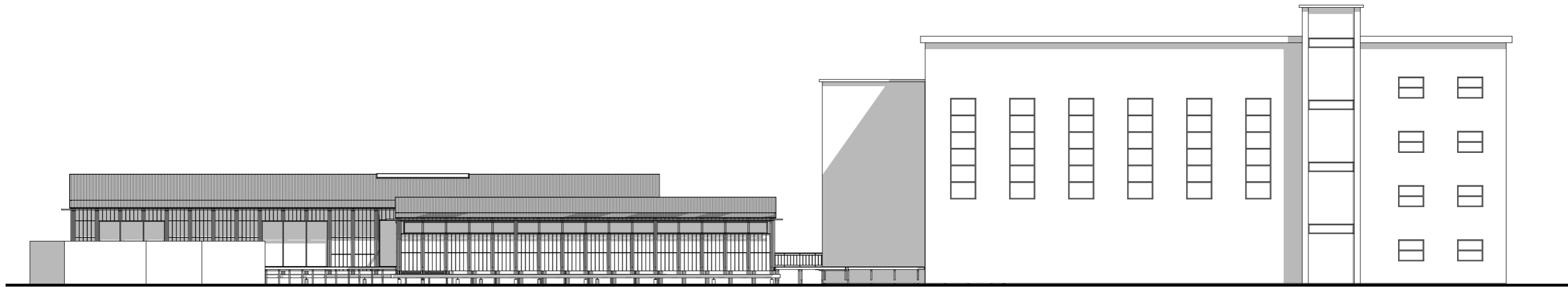
Section D-D  
Scale 1:100 (A4)



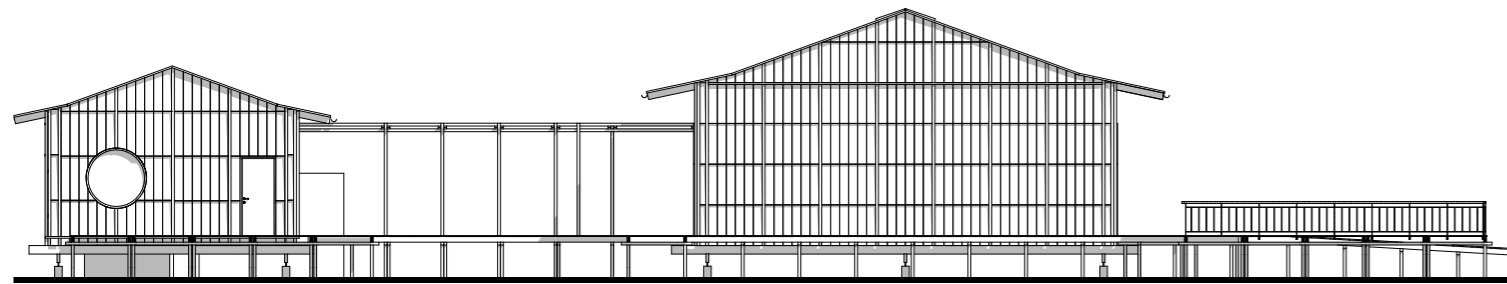
Entrance view, with light coming down through the skylight.



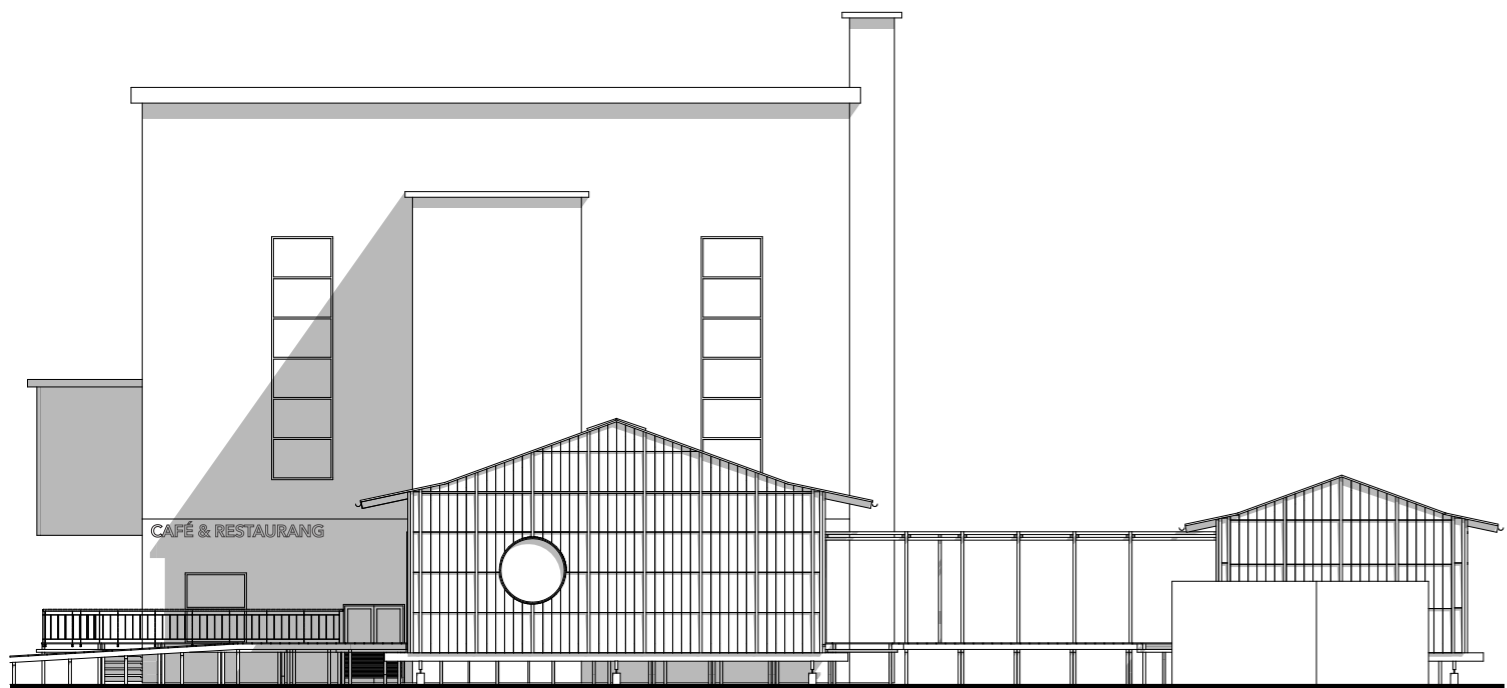
Elevation towards North  
Scale 1:200 (A4)



Elevation towards South  
Scale 1:200 (A4)

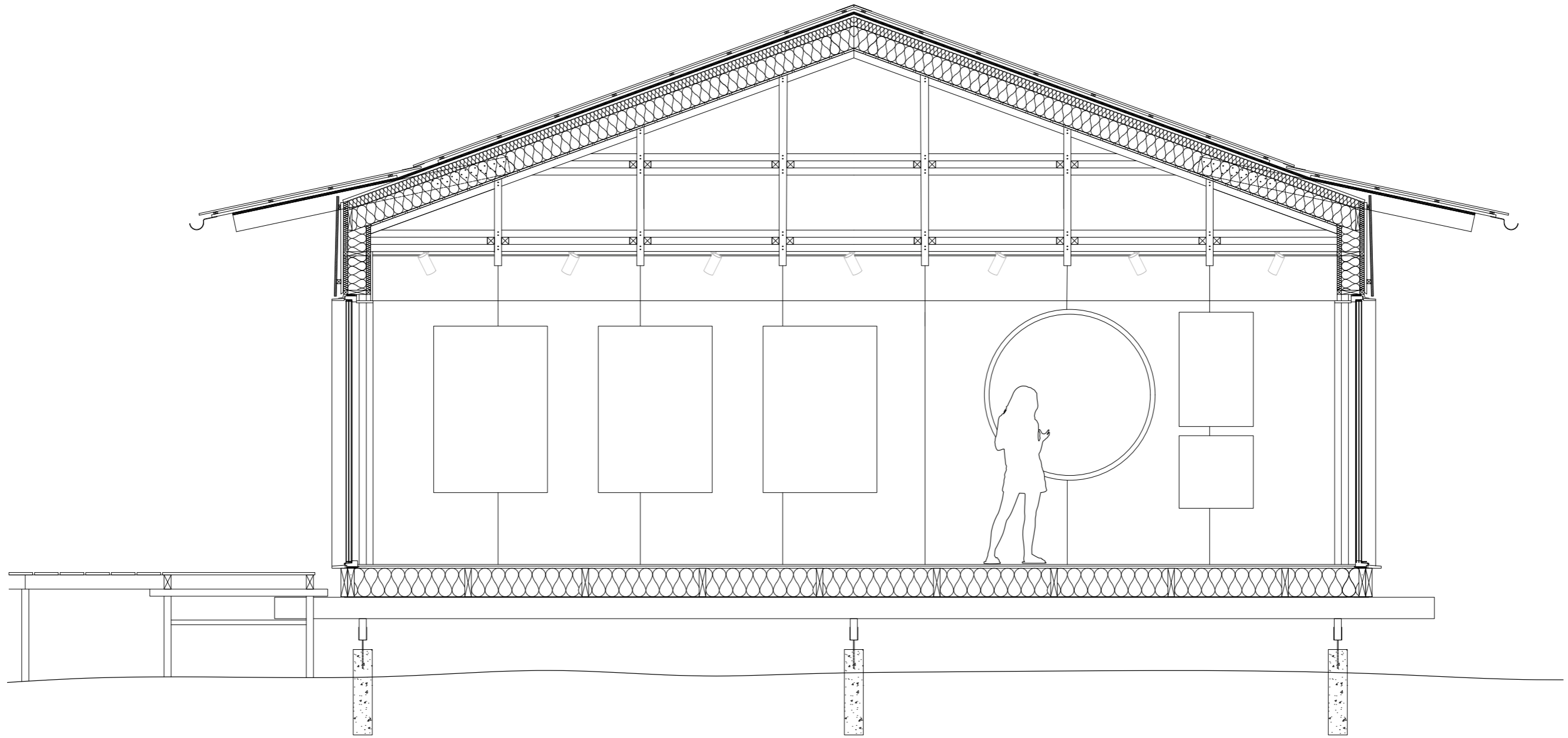


Elevation towards East  
Scale 1:200 (A4)



Elevation towards West  
Scale 1:200 (A4)





Detailed section A-A  
Scale 1:40 (A4)

### *Timber structure*

The structure of the building is made of Swedish timber used in a way inspired by Japanese reference projects. The use of slender beams and columns that are split into two create an airy feeling and open atmosphere. The structure is mostly prominent in the ceiling with the 1,5 by 1,5-meter grid like roof trusses that are connected by beams in two directions and timber connectors in a vertical direction. The ceiling is the main architectural expression of the design. The structure is also visible on the outside as the beams and columns are represented on the exterior wall.

The visible structure is jointed without screws, nails or glue, in order to not have any disturbing elements in the wooden structure. Instead, traditional joining methods and pegs have been used to put focus on the woodcraft.



Figure 08. Tree (n.d). *Shou sugi ban* pinewood, burned and oiled with linseed oil.

### *The foundation*

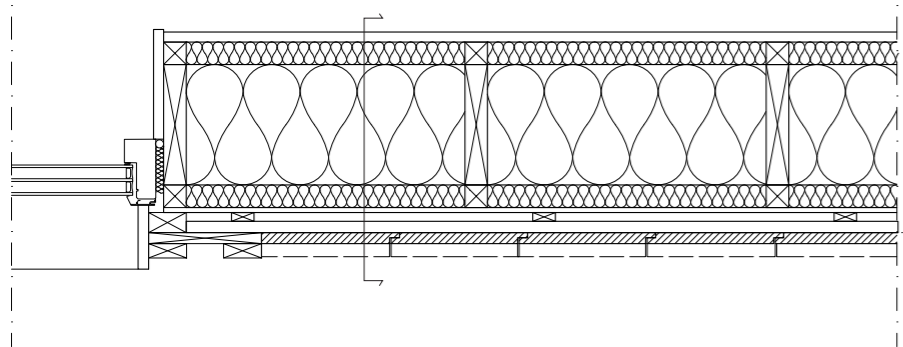
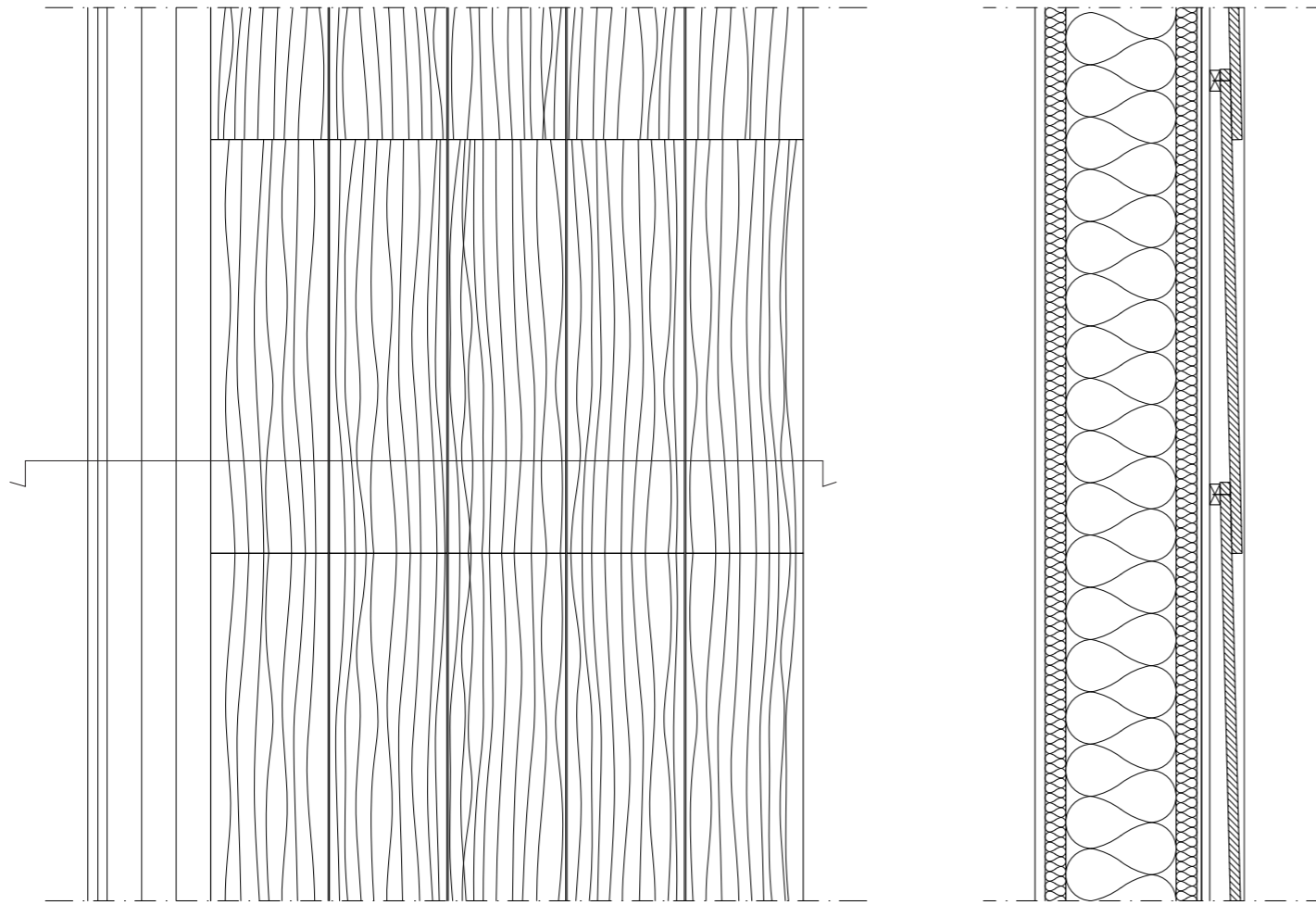
The plinth foundation is made of concrete plinths, 200 mm by 200 mm thick and 800 mm high, with at least 600 mm below ground to ensure stability and avoid frost damage. Steel pipes are cast in the plinths to hold up the 220 mm by 75 mm timber beams that the buildings are resting on. The floor height above the ground is about 1100 mm. The wooden deck can use thin screw piles that dig in to the ground with no need for concrete.

### *The façade*

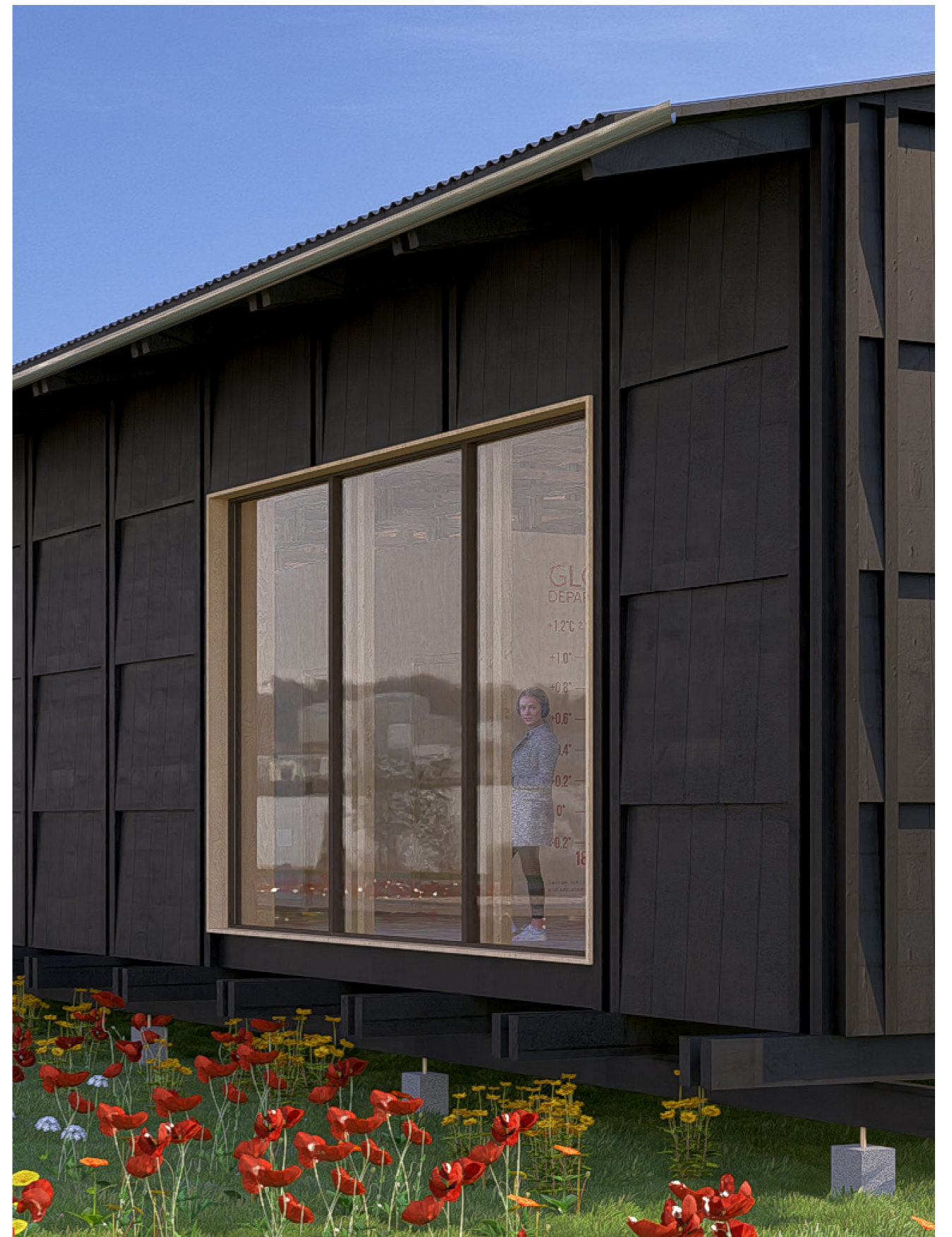
Yakisugi, also known as shou sugi ban outside of Japan, is a traditional method of protecting the surface of timber sidings originating from Japan. The method involves burning the timber with temperatures reaching between 250 °C - 400 °C, letting the outer 3-4 mm of the wood charred. The charred timber is protected from rot, mold, UV-radiation and even to a certain extent fire. This is an environmentally friendly way of treating the wood because there is no use of toxic impregnation or chemicals. It also creates an interesting aesthetic to the timber, since the charred timber gets a unique pattern and look. The wood can be left with a very black, charred and expressive surface or brushed and treated with linseed oil, for a smooth and lighter appearance (Gottschlich, n.d.).

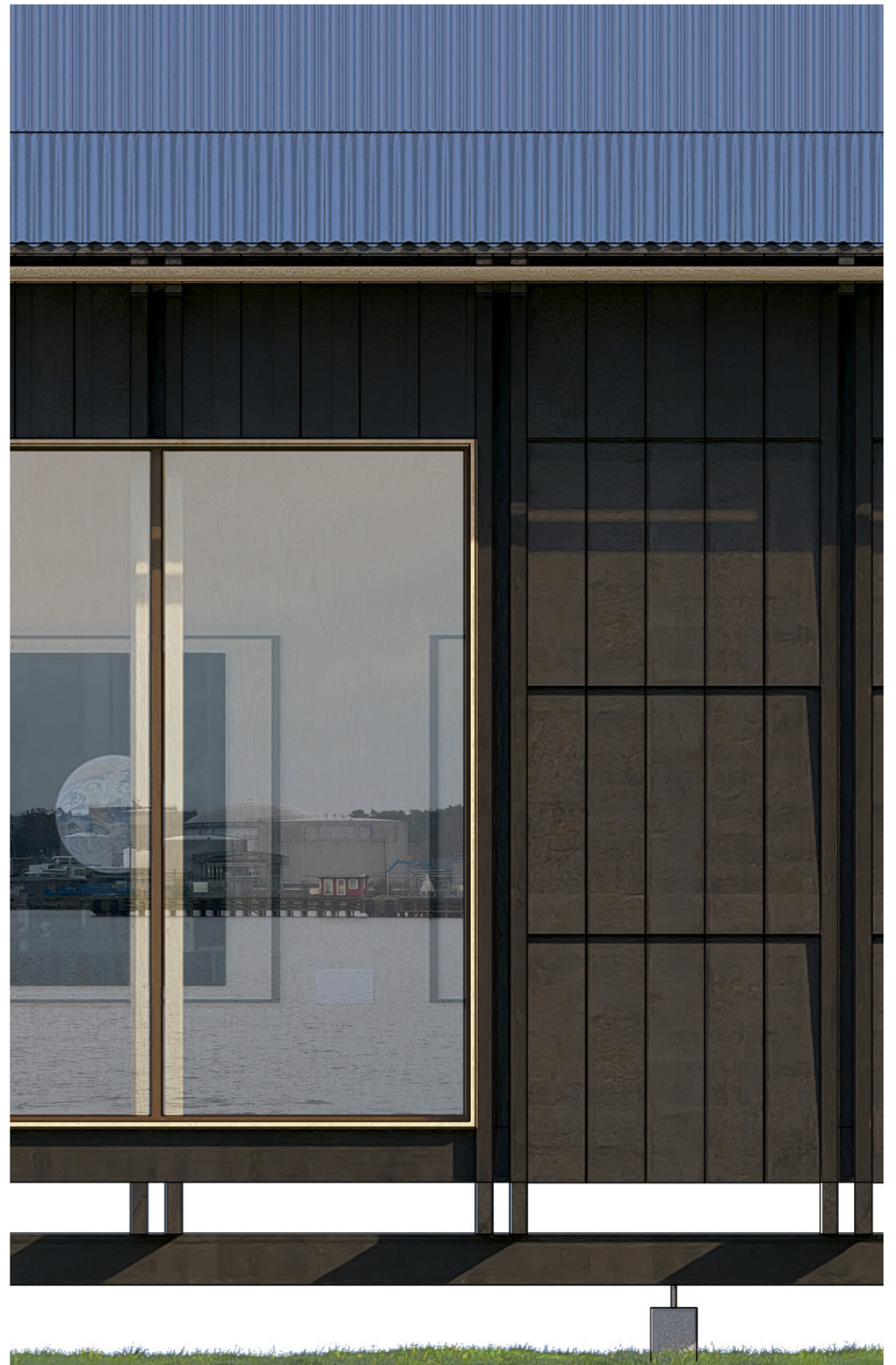
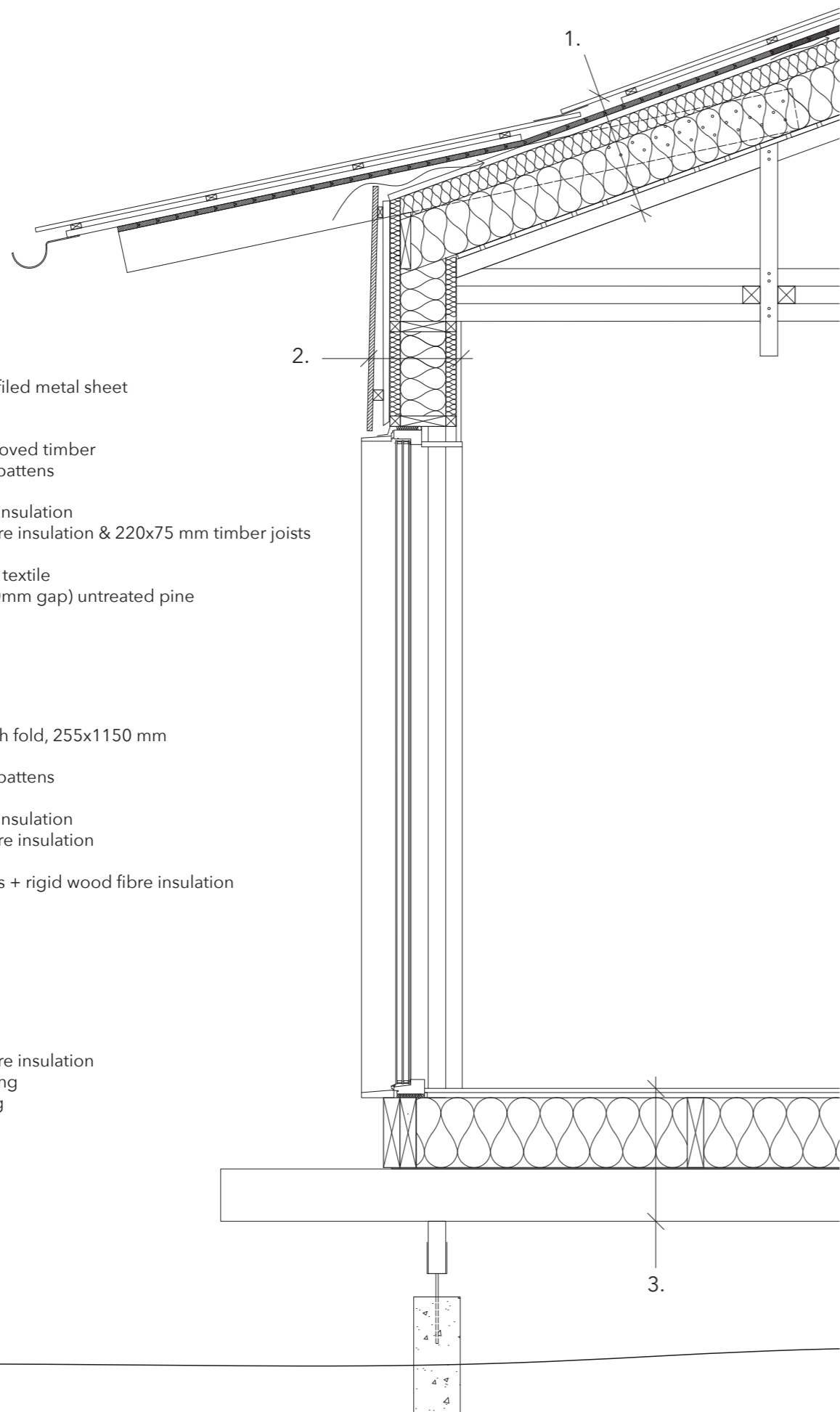
The traditional wood used in in Japan is Japanese cypress but now there are manufacturers around the world using other types of wood like spruce or pine.

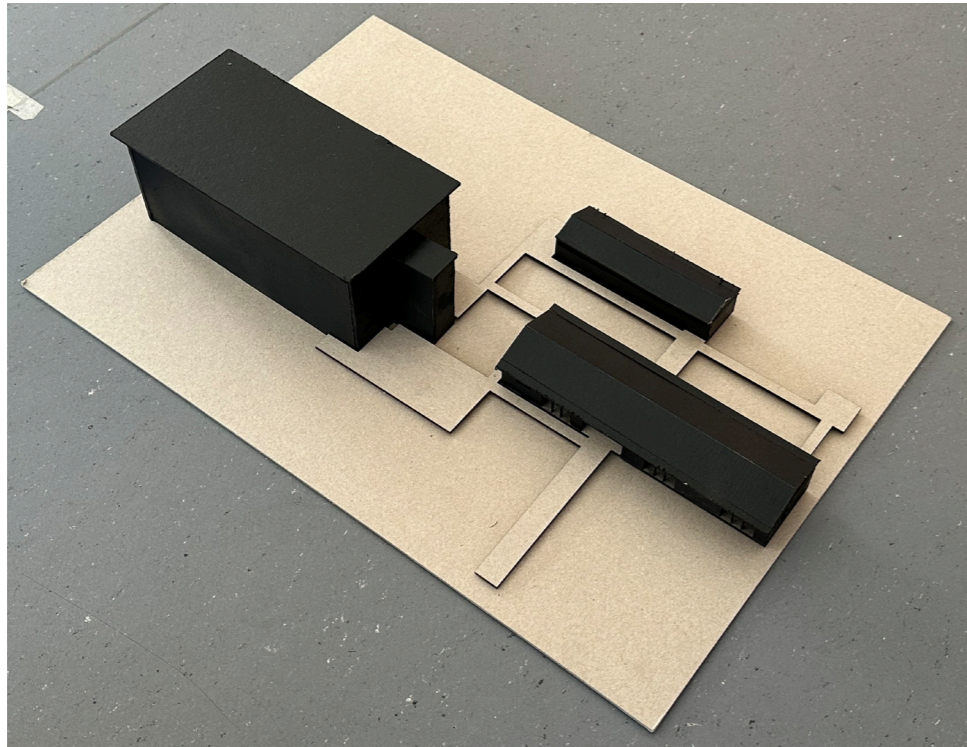
The site and the existing brick building is very rough and raw, both in the history and culture but also the exposed climate of the site to the elements. It's extremely exposed to wind, moisture and risk of flooding. To reflect on this, the use of yakisugi was chosen as it is a technique of exposing the wood to extreme temperatures in order to protect it. It creates a rough and expressive surface, and the dark color will also connect to Röda Sten art gallery and make it stand out in the landscape. The wooden panels will be tilted and overlapped to create an interesting façade with a lot of contrast of light and shadow.



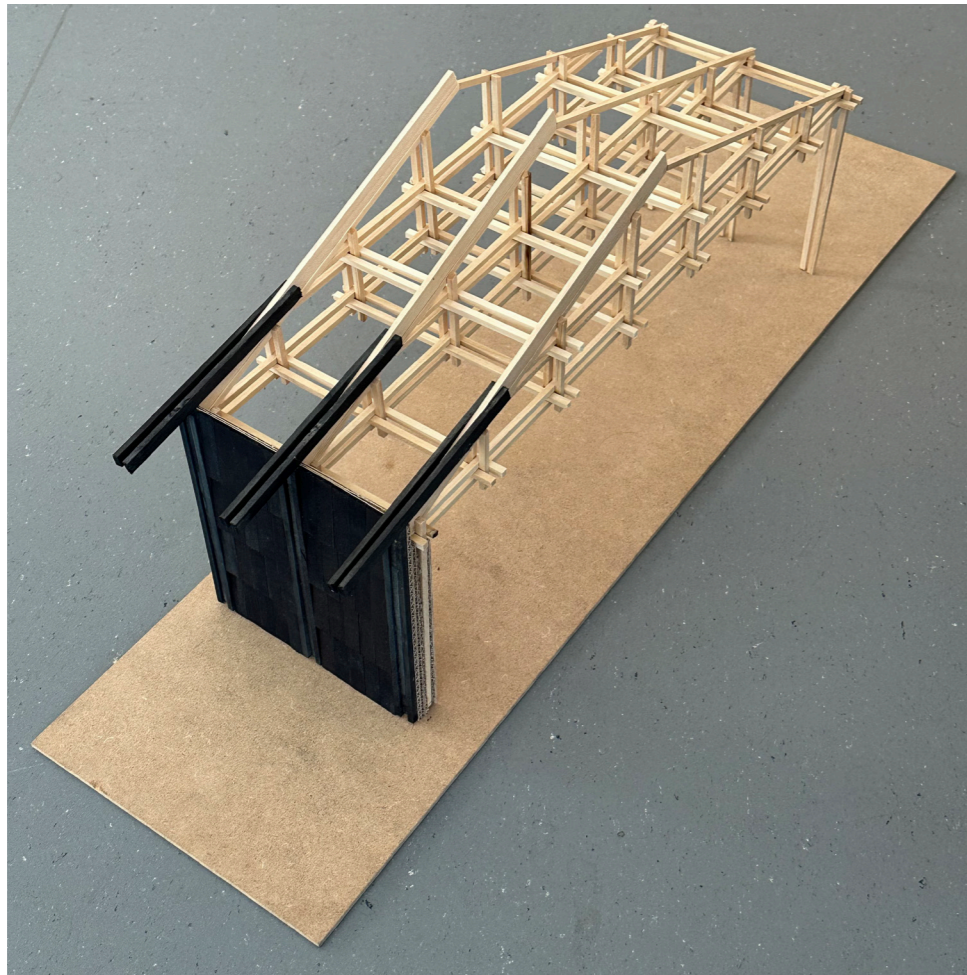
Details facade structure  
Scale 1:15 (A4)



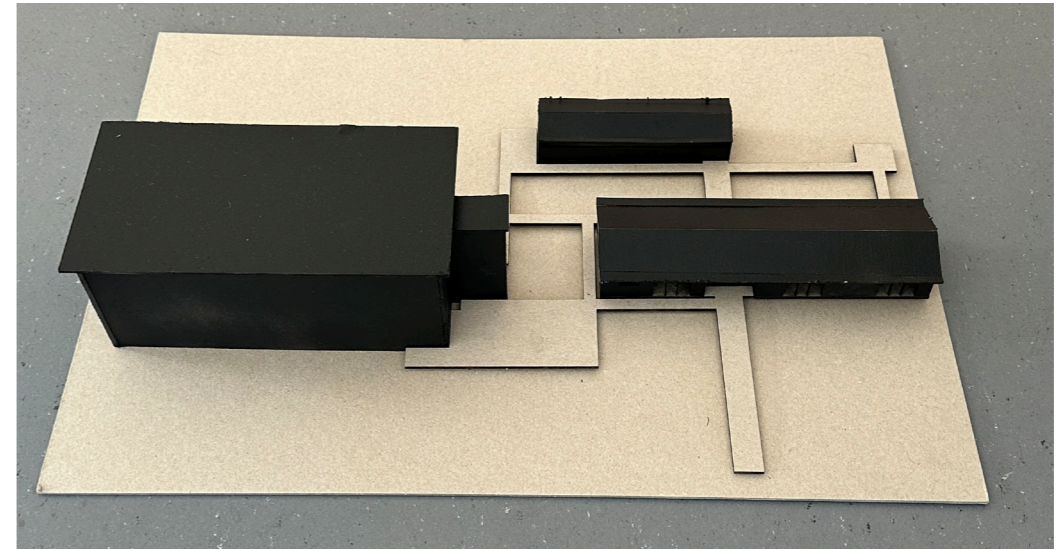




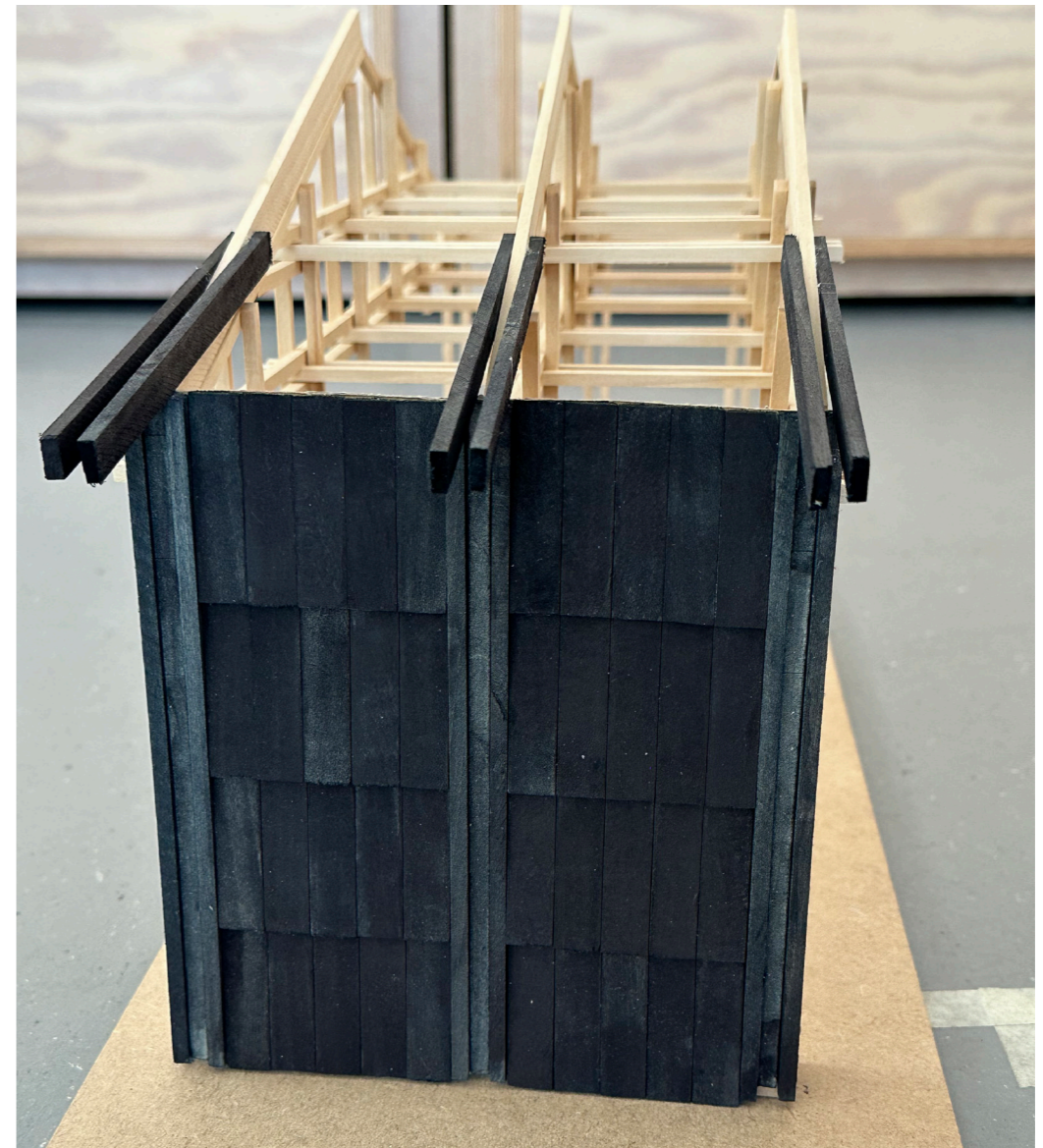
Site plan model  
Scale 1:200



Structure model  
Scale 1:20



Site plan model  
Scale 1:200



Structure model, facade study  
Scale 1:20

# Discussion

Reflection

## Reflection

This master thesis aimed to answer the question of how a climate emergency exhibition pavilion can be designed, emphasizing lightweight architecture and demonstrating the synergy between sustainable materials, structure, and impactful spatial experiences. I explored this primarily by using slender timber structures, lifting the design off the ground, and activating the site by creating protected outdoor spaces and blurring the boundaries between interior and exterior.

The initial exploration highlighted the challenge of balancing an ambitious program with the aspiration for lightweight architecture. Reference projects provided inspiration, but initial attempts to achieve a sense of weightlessness through slender structural elements fell short. While the structure felt lightweight, it did not convey the intended lightness of touch upon the earth.

I struggled with how the new design related to the site and the original brick building. I attempted to connect the new proposal to the existing art gallery on-site using wooden decks, exploring how they could collaborate functionally. However, considering the differences in style and aesthetics, it might have been better for the new proposal to stand on its own.

The decision to limit the program and transition to a single-story pavilion was important. This shift enabled a more focused exploration of lightweight architecture and demonstrated the concept of touching the earth lightly. Elevating the pavilion above the ground reduced its physical impact and disturbance of the site. In hindsight, the process would have benefited from having one or several reference projects more aligned in size and expression with the desired outcome. At the same time the outcome was not clear in the beginning and many iterations of the design were drawn.

The exploration of timber construction, inspired by Kengo Kuma's Japanese projects, was particularly interesting and resulted in an expressive and decorative ceiling. Kuma's use of timber construction as art is inspirational, suggesting further investigation into interlocking beam structures and joining techniques to enhance architectural quality. Wood construction is becoming increasingly popular in larger projects, making this exploration both relevant and valuable.

The thesis began with the recognition of the ongoing climate crisis and the insufficient response from politicians. As architects, we can create spaces that might make a difference. Designing an exhibition pavilion for the climate emergency felt timely and appropriate. While one could argue that the most sustainable action is to utilize existing resources rather than constructing new ones, this thesis focused on an architectural expression that embodies the concept of touching the earth lightly.

The unplanned use of the entire site as a phytoremediation experiment evolved from the pavilion design, providing both a narrative and a motivation for the elevated structure.

I realized that how the building actually touches the ground on its plinths is an important part of the overall design. It's not enough for it to simply be raised above the ground; there should be architectural care behind it. Despite spending a lot of time on this aspect, I feel that the plinth foundation and lower part of the design would have benefited from more iterations and exploration.

Additionally, one part of the pavilion's program fell short: the space for debate and discussion. The auditorium became rather small for open discussions, and perhaps this could have been better solved.

The design proposal met many of my expectations regarding expression and function, and the design process has been one of the most rewarding experiences yet. In conclusion, I hope this master thesis contributes to the discourse on how architects can address important issues like the climate emergency by using architecture as a device for storytelling and creating a narrative. By embracing the philosophy of a light footprint, we can lessen impact on sites while also making it an integral part of the design.

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Published

Online resources

Images

Student background

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## Images

*Photographs and illustrations not listed belong to the author.*

Figure 01. Blunck, R. (n.d). Marika Alderton house [Photograph]. Retrieved from <https://www.atlasofplaces.com/architecture/marika-alderton-house/>

Figure 02. Scagliola, D. & Brakkee, S. (2023). Natural Pavilion [Photograph]. Retrieved from [https://www.detail.de/de\\_en/recycling-pavilion-in-almere](https://www.detail.de/de_en/recycling-pavilion-in-almere)

Figure 03. Scagliola, D. & Brakkee, S. (2023). Natural Pavilion, Detail [Photograph]. Retrieved from [https://www.detail.de/de\\_en/recycling-pavilion-in-almere](https://www.detail.de/de_en/recycling-pavilion-in-almere)

Figure 04. Fujitsuka, M. (n.d). Yusuhara Town Hall [Photograph]. Retrieved from <https://kkaa.co.jp/en/project/yusuhara-town-hall/>

Figure 05. Fujitsuka, M. (n.d). Yusuhara Town Hall [Photograph]. Retrieved from <https://kkaa.co.jp/en/project/yusuhara-town-hall/>

Figure 06. Shinkenchiku-sha (n.d). Nest We Grow [Photograph]. Retrieved from <https://archello.com/project/nest-we-grow>

Figure 07. White Arkitekter (n.d). Naturum Store Mosse. [Drawing]. Retrieved from <https://whitearkitekter.com/se/projekt/naturum-store-mosse/>

Figure 08. Tree (n.d). Shouji sugi ban pinewood, burned and oiled with linseed oil [Photograph]. Retrieved from <https://tree.nu/produkt/shou-sugi-ban-karnfuru-brand-och-linoljad/>

## Student background

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