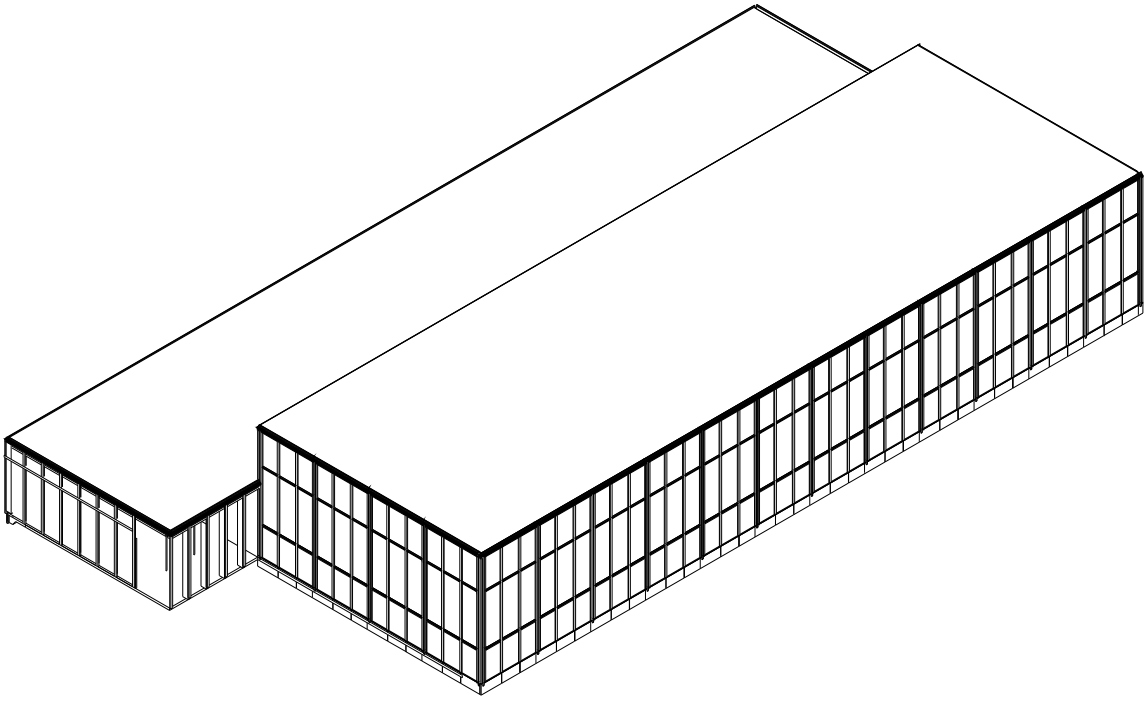
MOSSENBADET



Jonatan Svensson

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Department of Architecture and Civil Engineering
Tutor: Mikael Ekegren
Examiner: Björn Gross

MOSSENBADET

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Year of graduation: 2020

Chalmers School of Architecture
Department of Architecture and Civil Engineering

Master's Programme of Architecture and Urban Design (MPARC)
Master's thesis direction: Building and Tectonics

Tutor: Mikael Ekegren
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ABSTRACT

In the increasingly sedentary existence that has become a reality in the post-industrialized society, places of regular physical activity can play a significant role for the individual and public health. In this thesis, a proposal is given for a building with a focus on physical activity - a swimming facility at Mossens idrottsplats in Johanneberg, Gothenburg.

The thesis focuses on engineered wood as a building material and investigates how it can be used in a building of this type. The thesis explores how a wooden frame can act both architecturally and structurally. The studies are partly performed through 3D-modelled mock-up representations of facade segments. The work has been influenced both by built reference projects as well as by artistic representations of space. The thesis explores the rhythm of the wooden structure and how it can be used both architecturally in the facade expression of the building and as an organizing element of the interior design.

The plot is a rectangular, flat, gravel covered area that today lacks a clear function. The site is a void in the urban structure, as it can neither be sorted into the category built, green space or nature and it has a lot of potential to be developed. On the sides, the plot is framed by slopes, forest and open space. The surrounding areas are themed around physical activity, through a sports ground with tennis courts and jogging tracks in the forest. The building in the proposal builds on this theme through support functions for the existing facilities and adds a new function in the form of a swimming facility.

Keywords : swimming facility, engineered wood, sports centre, glulam

TABLE OF CONTENTS

AUTHOR'S BACKGROUND

Jonatan Svensson

2018-2020
Chalmers University of Technology

Architecture and Urban Design - MSc		
Sustainable development and the design professions	*7.5*	*ECTS*
Healthcare architecture	*22.5*	*ECTS*
Architectural competitions	*4.5*	*ECTS*
Urban Planning & Design Theory - Dealing with Inequalities	*5.3*	*ECTS*
Housing inventions	*22.5*	*ECTS*
Masters thesis preparation course 1	*4.5*	*ECTS*
Masters thesis preparation course 2	*3.0*	*ECTS*
Planning and design for sustainable development in a local context	*22.5*	*ECTS*
Independent Courses		
From concept to existing building	*12*	*ECTS*
BIM: Building information modelling	*3*	*ECTS*

2018-2020
Wingårdhs Arkitektkontor AB
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2014-2017
Chalmers University of Technology

Architecture & Engineering - BSc	180	ECTS
Independent Courses	16,5	ECTS

BACKGROUND

AIM

The aim of this project is to explore the topic of designing a swiming facility using a laminated timber structure. The project also aims at investigating how to form a large building and creating a rythm that is appropriate on the chosen site of Mossens Idrottsplats. The ambition is to create a building that expresses the properties of it's material at the same time as it promotes a healthy lifestyle and fits well into its surroundings. Working carefully with the details of the construction and the facade is also important to achieve the desired expression.

RESEARCH QUESTION

How can a glulam timber structure be used, not only constructivly but also architecturally in the design of a swimming hall?

DELIMITATIONS

This thesis is focused on the building as structure and architecture, its location in the city and its function. The work has overlooked the city's (possible) plans for the area. Today, the site investigated is partially occupied by a preschool in a temporary building, which is also left without consideration and is therefore not assumed to exist in the work on this project.

METHOD

The method used in this project is research by design, which includes sketching, drawing, many iterations and analysis of the sketches and drawings. This means that several design studies have been done to evaluate certain design choices. The studies are based upon both quantity and quality, weighing both theoretical and qualitative aspects to be able to make the choice best suited to fulfill the aims and goals of the project.

READING INSTRUCTIONS

This report is mainly structured in a chronological order. The chapter "Background" describes starting points, such as the local context, reference projects and theoretical references.

Furthermore, the chapter "Process" consists of a space program developed for the project, followed by iterations and investigations made during the design process.

These chapters then end up in the "Design Proposal" where the project is summarized in drawings and illustrations and concluded in "Disscusion". This structure means that the report should not necessarily be read from beginning to end; it may instead be good to scroll between chapters to see the design proposal and then see the process for example.

BACKGROUND

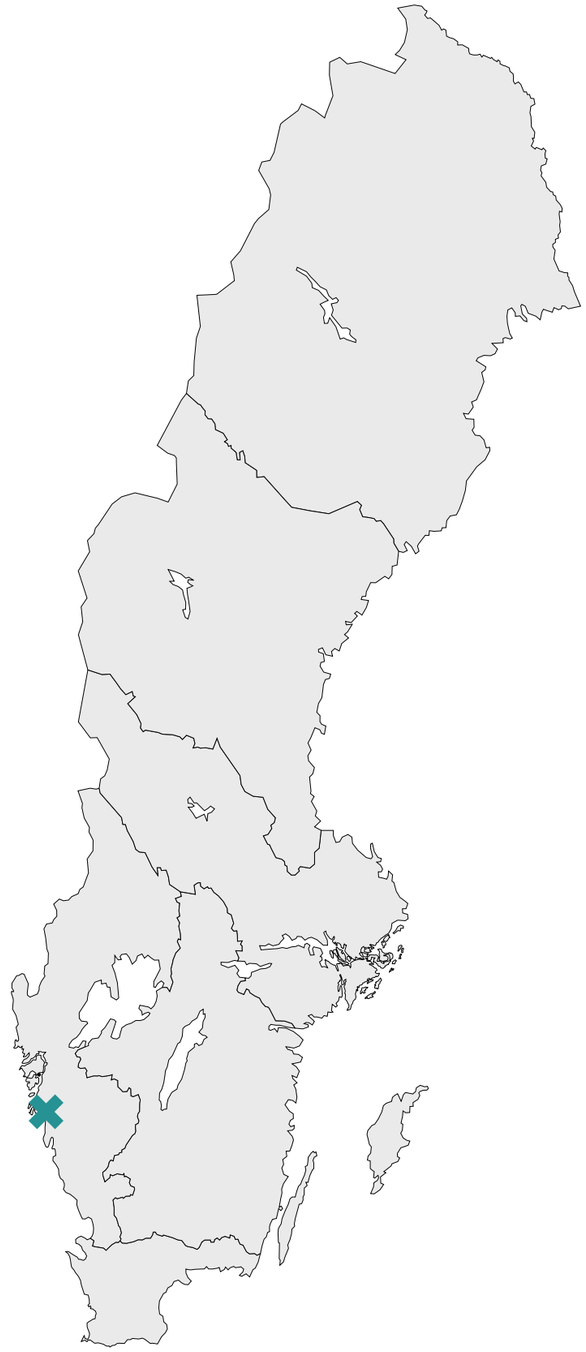
Physical inactivity is a global problem and threat to human health and well-being. About a quarter of the world's population is physically inactive, about the same level applies to residents in Sweden. Through physical activity, it is possible to counter several of the risks associated with physical inactivity, such as impaired mental and physical health and reduced quality of life. (Guthold et al., 2018)

Something that has proven to make us more active is the availability and closeness of sports facilities. There is a strong link between available sports facilities and exercise habits, which applies to both children and adults. A rich selection of sports facilities has proven to lead to more active people. (Faskunger & Sjöblom, 2017)

There are not very many public swimming facilities in Gothenburg which means that most people live quite far from one. The area of Mossens Idrottsplats provides spaces for many different sports activities, but not swimming. There is also an open area that is not used, where a swimming facility would fit perfectly. There are several sports clubs in the area that have a big need for places to change and shower and the buildings for that today are old and small, so that is something to include in the project as well.

Designing large buildings using laminated timber structures is not uncommon, but most of them are usually covered with other materials on the outside and today it's also very common to use a steel structure instead of wood. Due to the low climate impact of wood compared to other construction materials, and the softness and warmth of the material it's an obvious choise. The wood deserves to be shown and seen in the constrution to create an honest building. This project will therefore create a building where the laminated timber construction is visible and prominent.

ANALYSIS



Location in Sweden. 1:7 000 000 (A4)

EXISTING SWIMMING FACILITIES

Location in Gothenburg and in relation to other public swimming facilities. 1:100 000 (A4)

Swimming facility	Pools
Kärra simhall	25 m pool Educational pool
Angered Arena	25 m pool Educational pool
Hammarbadet	25 m pool
Lundbybadet	25 m pool Educational pool
Valhallabadet	50 m pool 25 m pool 2 educational pools
Frölundabadet	25 m pool Educational pool
Åbybadet	50 m pool 25 m pool 2 educational pools

SURROUNDING AREA

Illustration showing the surrounding area and nearby hubs for public transport 1:10 000 (A4)

Site
Main road
Bicycle path

1 Chalmers
2 Johanneberg Science Park
3 Student housing
4 Office buildings
5 University of Gothenburg

Public transport hub	Trams*/buses	Walking distance to site
Pilbågsgatan	3/0 lines	250 m 3 min walk
Sven Hultins Plats	0/1 line	400 m 5 min walk
Chalmers Tvärgata	1/1 lines	750 m 9 min walk
Dr Fries Torg	1/0 line	750 m 10 min walk
Chalmersplatsen	5/4 lines	850 m 11 min walk
Korsvägen	7/11 lines	1730 m 24 min walk

* Trams includes shuttle buses (lines 16, 17, 18, 19, 25, 50, 52 and 60) that has tram-like traffic

THE SITE

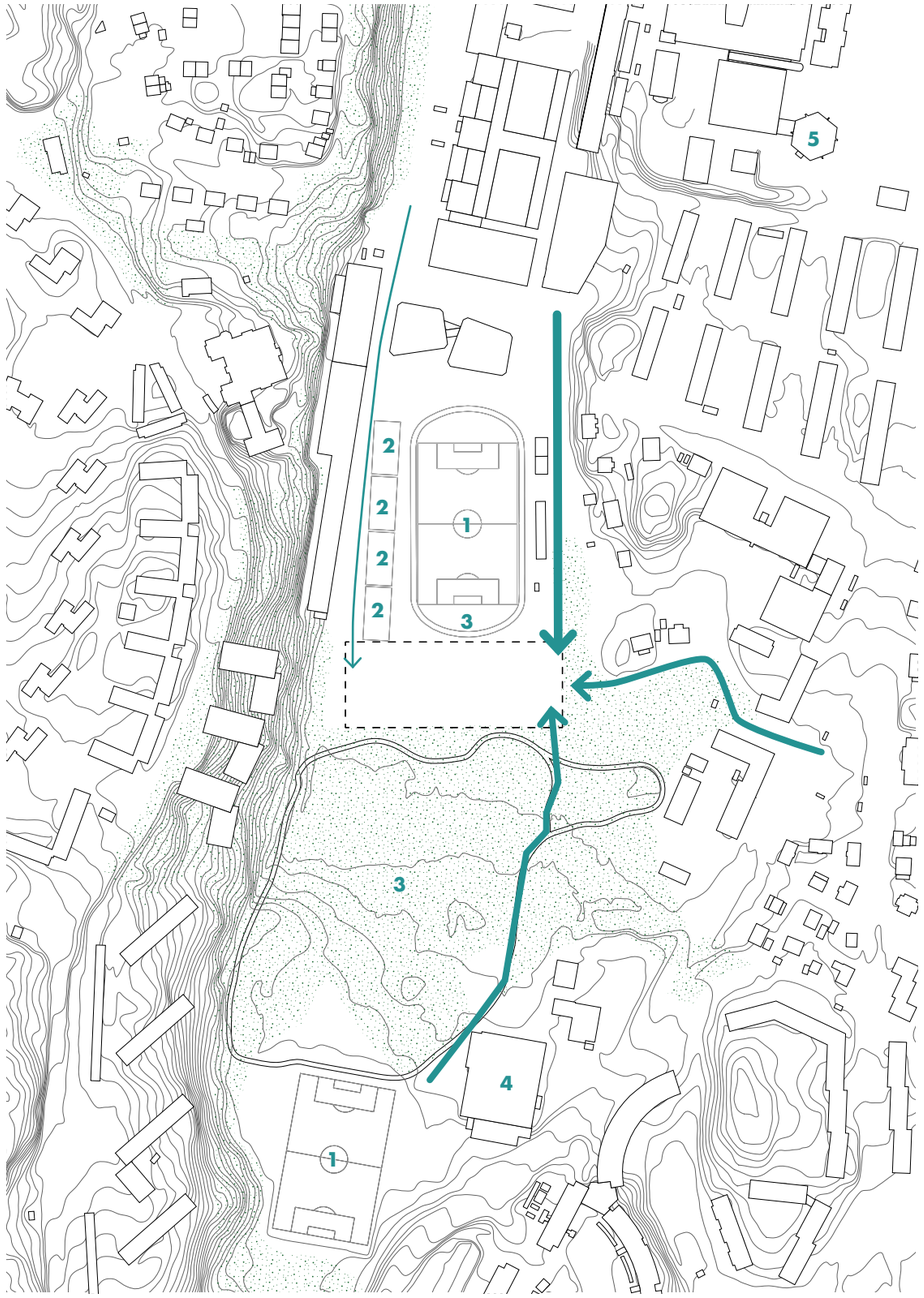


Illustration showing the site, nearby sports facilities and communication flows 1:4 000 (A4)

Green area
Access to the site
(the wider the line, the bigger the flow of people)

1 Football pitch
2 Tennis court
3 Track and field
4 Fysiken (fitness centre)
5 Klätterlabbet (bouldering gym)

Photo from the site

Photo from the site

Photo from the site

Photo from the site

BUILT REFERENCES

Figure 1: Swimming Pool Allmendli, exterior. *(Schulschwimmbad Allmendli Erlenbach - Illiz Architektur, n.d.) Photo by Hertha Hurnaus. Used with permission.*

Figure 2: Swimming Pool Allmendli, interiour. (Swimming Pool Allmendli / Illiz Architektur, 2016) Photo by Hertha Hurnaus. Used with permission.

Swimming Pool Allmendli
illiz Architektur
Erlenbach, Switzerland
Built 2016

An old military bunker was converted into a swimming pool for school children. Entrance, changing rooms, technical spaces and water volume are located in the partially underground entrance floor. A narrow staircase is reached to the bath which is located on the upper floor. (Schulschwimmbad Allmendli Erlenbach - Illiz Architektur, n.d.)

The clear and simple division of functions between the two floors gives an upper floor that is uncluttered and focused on the bath itself.

The transparent facade provides generous amounts of daylight and also takes in the surrounding landscape. The strong pillars emphasize the lightness of the glass and this together means that the boundaries between indoors and outdoors are blurred. The clear tectonics with exposed pillars and beams in concrete communicate the building's structural logic while acting space-shaping.

Figure 3: Indoor swimming pool 2 Photo: Daniel Martinek, ovaverva.ch (Photos OVAVERVA - Hallenbad, Spa, Fitness Und Outdoor Aktivitäten, n.d.)

Figure 4: OVAVERVA Pool Spa Sports Center St Moritz Photo: Daniel Martinek, ovaverva.ch (Photos OVAVERVA - Hallenbad, Spa, Fitness Und Outdoor Aktivitäten, n.d.)

Ovaverva Hallenbad
Bearth & Deplazes and Morger + Dettli
St. Moritz
Built 2014

Ovaverva is a pool, spa and sports facility open to the general public. The space program is large and complex, containing several pools but also a lot of other functions. The entrance is located at the ground floor which also contain functions like reception, gym and changing rooms. Mechanical spaces are located at a hidden 2nd floor and the pools are at the third floor. (Project Details OVAVERVA, n.d.)

The pool floor is especially interesting because of it´s spatial treatment of the floor plan. The floor is compacted designed an contains a lot of different pools. By adding functions in different "boxes", which are decoupled from the facade, the floor is divided into many different spaces. The spatial division is further enhanced by varying ceiling heights. The plan enables many functions to be combined without interfering with each other and at the same time provides exciting spatial connections between its various parts.

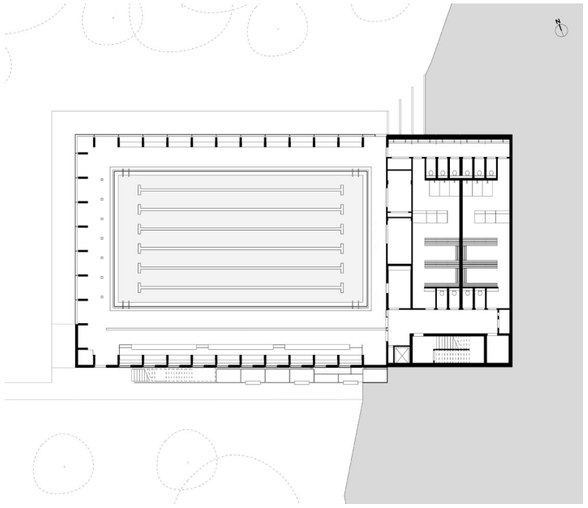


Figure 5: Lower Ground Floor Plan by Hawkins\Brown. (ArchDaily, n.d.) Used with permission.

Figure 6: City of London Freemen's School Swimming Pool. Photo: Jack Hobhouse. Used with permission.

City of London Freemen's School Swimming Pool
Hawkins\Brown
Surrey, United Kingdom
Built 2017

A 25 meter pool in a building made of glulam and CLT-elements which are visable on the inside and with sheet metal clading on the exterior. The facility is located in a slope whith entance on the upper floor and bath downstairs on the lower ground floor. (Hawkins\Brown, n.d.)

Like the Swimming Pool Allmendli the pool space is decluttered focused around the main function. The pool is visualy connected to the green sourroundings on three sides of the building. The pool with its straight swimming lanes and rectangular shape has a clear direction that is partly supported by the room's shape, but with the exception of the ceiling.

The glulam frames that make up the room create a sloping ceiling which highest point is slightly offseted for each frame, creating a diagonal roof ridge through the room. From pictures the diagonal is perceived as somewhat contextless and disturbing by the author, which in turn supports an assumption that the elements of a room should strive in the same direction as the pool and its swimming lanes. According to the architects, on the other hand, this diagonal creates a "visually dynamic space". (ArchDaily, n.d.)

ART REFERENCE

Figure 7: Vinciarelli, L. (1989). *Water Enclosure II* [Painting]. Retrieved from *Clear light : the architecture of Lauretta Vinciarelli* (p. 70). Copyright 2015 by Oscar Riera Ojeda Publishers Limited. Used with permission.

Figure 8: Vinciarelli, L. (1989). *Water Enclosure III* [Painting]. Retrieved from *Clear light : the architecture of Lauretta Vinciarelli* (p. 71). Copyright 2015 by Oscar Riera Ojeda Publishers Limited. Used with permission.

A source of inspiration for this project is the work of the Italian artist and architect Lauretta Vinciarelli (1943-2011). Her images represent space and landscape, sometimes more explicitly and sometimes in a more abstract form. For this project, the works that are more explicit in their spatial expression have been an inspiration in the architectural design. Her work can, among other things, be seen as studies in light and space. Some elements are recurring in these works of art such as elongated spaces, tectonic structures and water surfaces.

In this project, the series "Water Enclosure" and "Water Enclosure Study" have been inspirations, which are reproduced in the book "Clear Light - The Architecture of Lauretta Vinciarelli". The two series are studies with water surfaces, pillar structures and light inlets. Walls and pillars render rooms that have a clear direction in harmony with its water surfaces. By studying the images with such a clear direction you almost fall into it, it is clear how you, as a visitor in this world, would be led to follow this direction of spatial movement.

Repeated building elements such as beams and pillars are a recurring feature of the series. Through repetition and longitudinal division of space, the elements build up a rhythmic ensemble, which in part gives the images depth but also perceived architectural quality as the room becomes richer, more interesting and more tangible.

The space-shaping effect of a pillar structure becomes evident in these images, and this together with the rhythmic properties of such are brought into this thesis project.

PROCESS

SPACE PROGRAM

The first step in establishing a space program was to clearly define the purpose of the building. As the aim of the building is to encourage physical activity, regular excessing and improved well-being to the general public the space program objectives were defined.

The facility should primarily provide exercise swimming to the public. Furthermore, there should be the possibility of training for swimming sports associations, swimming school and water training. There should be the opportunity to have local competitions but no major competitions. Several of these activities should preferably be able to take place simultaneously.

In addition to serving as a swimming facility, the building will serve as a hub for surrounding sports facilities (football pitch, running track, tennis courts) and provide them with some support by, for example, providing changing rooms and parking spaces that can be used by those using these facilities.

Pools and water surface area

From this objectives pools sizes and numbers could be considered. The choice is between the pool length of 25 or 50 meters, In this way, the pool can be used for competitions. In order to achieve good flexibility between different activities, an economical alternative is to invest in a divisible pool with a length of 50 meters, which allows for 2 x 25 meters. Then, for example, there can always be the opportunity for public swimming even while training activities are going on. (Svensk Simidrott, n.d.)

A smaller pool provides opportunities for water training and swimming school. Such a pool should be rectangular and at least 12.5 x 8 meters. By being able to adjust the depth, the same pool works for children and adults. (Svensk Simidrott, n.d.)

The water surface area is the foundation to calculate sizes for other functions in a swimming facility according to Architects' Data (Neufert et al., 2019).

Changing rooms
Three different categories of changing rooms are present in this project to achieve flexibility and symbiosis with surrounding functions, and to achieve a standard that can handle visitors with special needs, in line with what is expected of a newly built facility.

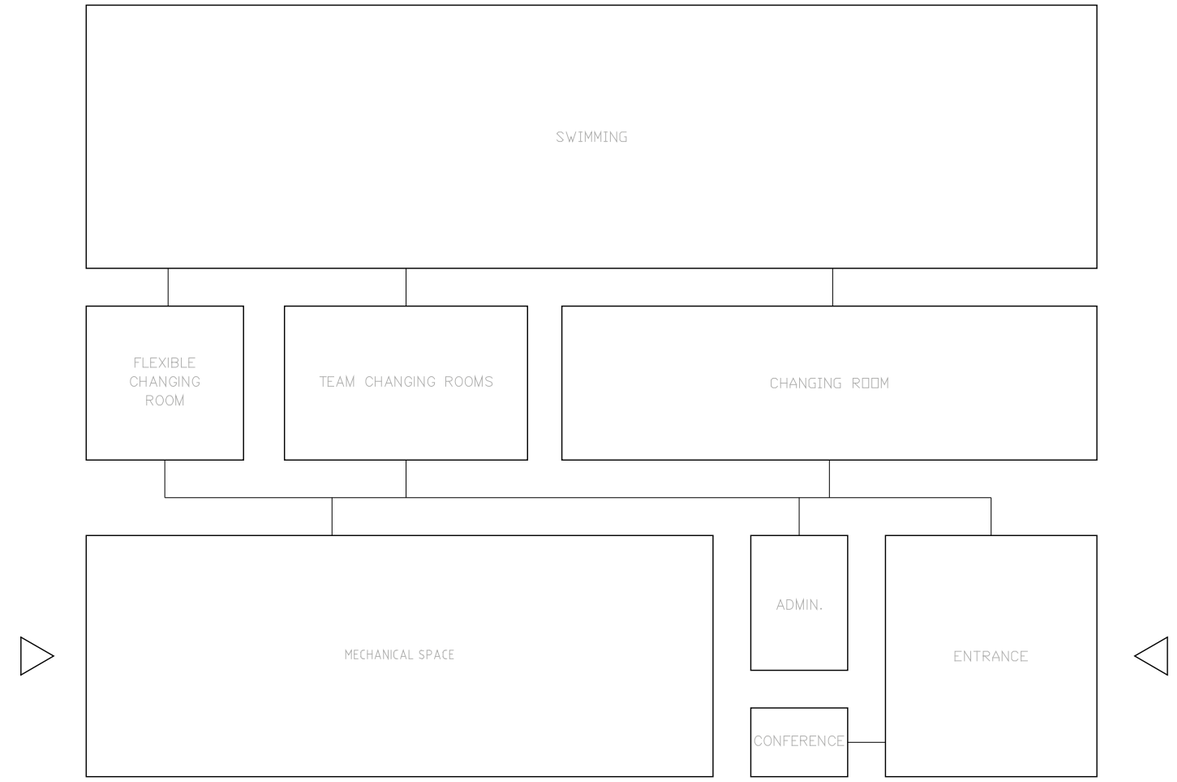
Bath changing rooms - Two changing rooms that mainly serve the bath. Each of the changing rooms are equipped with 240 lockers. The number of lockers are calculated based on Architects' Data, which suggest 0,08 - 1 changing place per sq meter of water surface and a ratio 1:4 between changing places and cloth lockers. (Neufert et al., 2019)

Team changing rooms - These changing rooms are not primarily intended for the general public, but instead for groups such as teams and sports associations. These changing rooms are intended to serve the bath but also outdoor sports facilities such as football-players, which means that these must be prioritized in close proximity to the entrance. These changing rooms are designed based on the size of a team with up to 25 people.

Flexible changing rooms - Something that has become more common in recent years is changing rooms that allow individual space for changing and showering. Such a function provides space for those who do not feel comfortable with the traditional division into two changing rooms, persons in need of an accompanying assistant and for trainers and staff.

Mechanical spaces
Swimming pools require a large area for technical functions and storage.Treatment of the water requires spaces for water purification, with associated storage of chemicals and space for testing the quality of the water. Passages around the pools are needed for inspection. The inspection passage also makes it possible to place cables and pipes for future installations in the swimming pool. The more people who are in the pool, the less space there is for the water. To handle this, a surge tank is needed that equalizes the water level. The size of this tank is directly proportional to the number of people that can swim in the pool.

Furthermore, space is needed for HVAC, cleaning and garbage disposal.



Illustrated space program

Quantity	Space	Size [m2]	
1	**Entrance**	**119**	
1	Wind lobby	4	
1	Lobby	90	
1	Reception	10	
1	Backoffice	5	
2	WC	5	
1	**Bath**	**1185**	
1	Dividable Pool 20,4 x 50 m	1020	
1	Educational pool	100	
1	Staff room with overview	10	
2	Equipment Storage	20	
1	Cleaning Storage	15	
2	**Changing room**	**158**	
1	Chaning room with lockers	110	(160 Lockers)
1	Showers	18	(7 Showers)
1	Sauna	10	
3	WC	5	
1	Cleaning storage	5	
3	**Team changing room**	**45**	
1	Chaning room with lockers	30	(20 Lockers)
1	Showers	10	(5 Showers)
1	WC	5	
1	**Flexible changing room**	**136**	
1	Lobby with cloth lockers	25	
3	Individual changing/shower rooms	4	
1	WC	99	

1	**Administration**	**60**
1	Office	20
1	Staff room	20
1	Cloakroom	5
1	Storage	10
1	WC	5
1	**Conference**	**25**
1	Conference room	20
1	Kitchenette	5
1	**Mechanical space**	**655**
1	Surge tank	50
1	Water treatment	50
1	Water sample taking	5
1	Chemical storage	20
1	Storage/Workshop	30
1	Inspection Passage	420
1	Mechanical room (HVAC)	50
1	Cleaning storage	5
1	Recycling room	25

TOTAL 2390 m^2 + Circulation

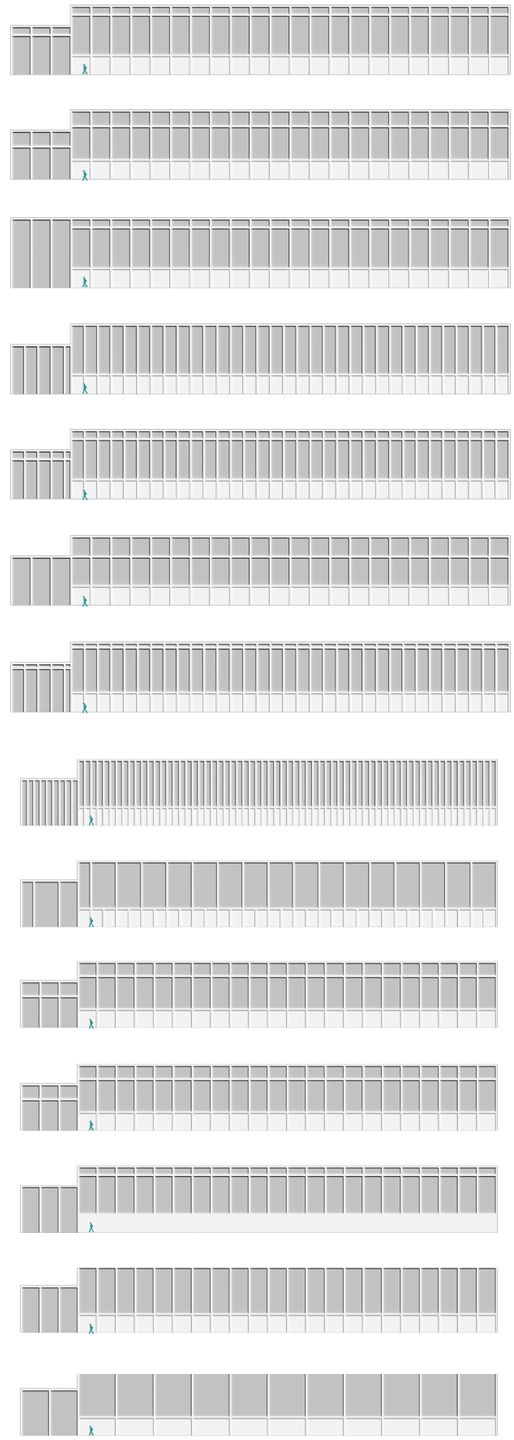
FACADE STUDIES

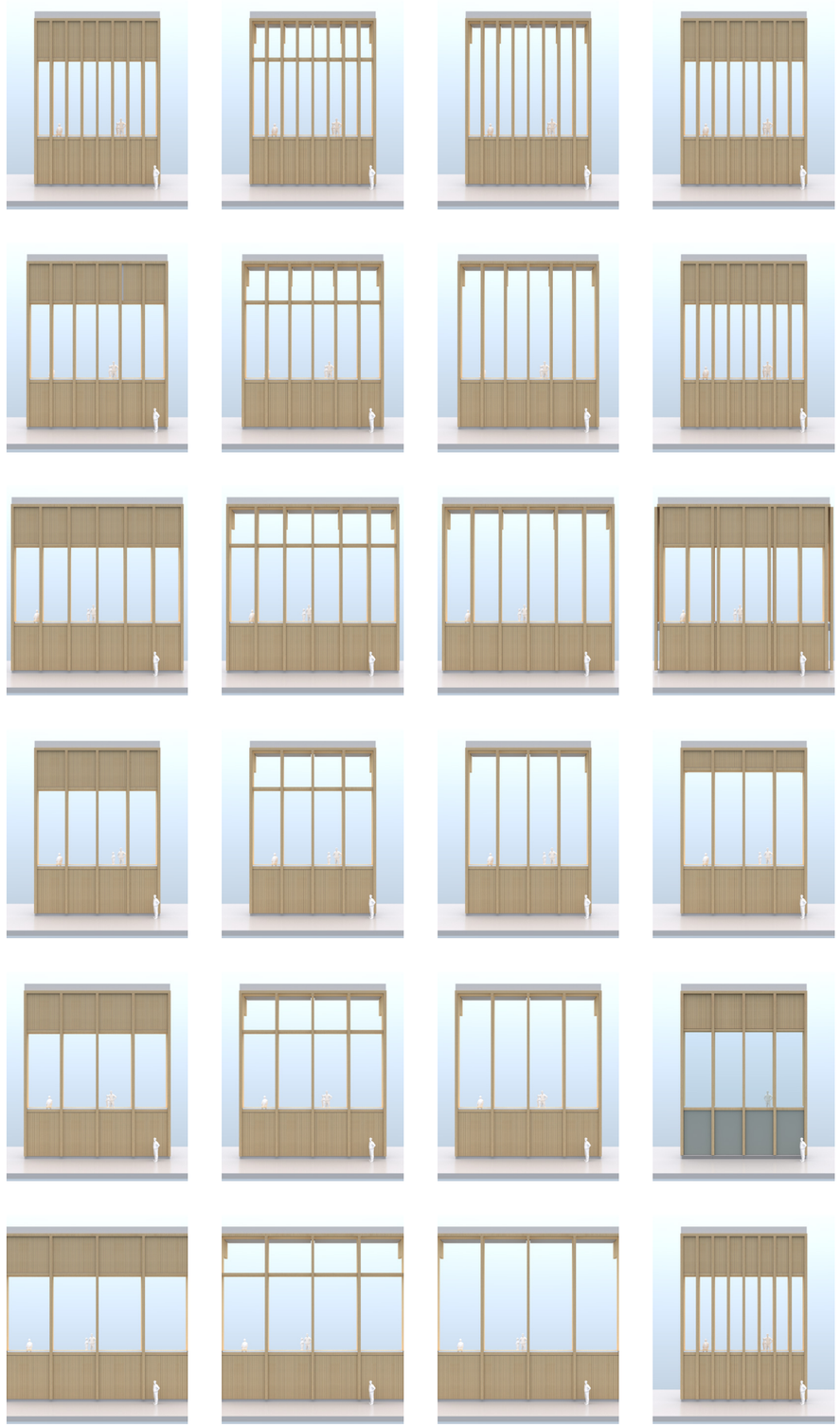
The large plan dimensions and the volumes location in the short end of an open area make its northern facade more exposed than the other sides of the building. With the ambition to visually break down this long facade, a number of series of facade studies, focused on the longitudinal division, were conducted on this facade.

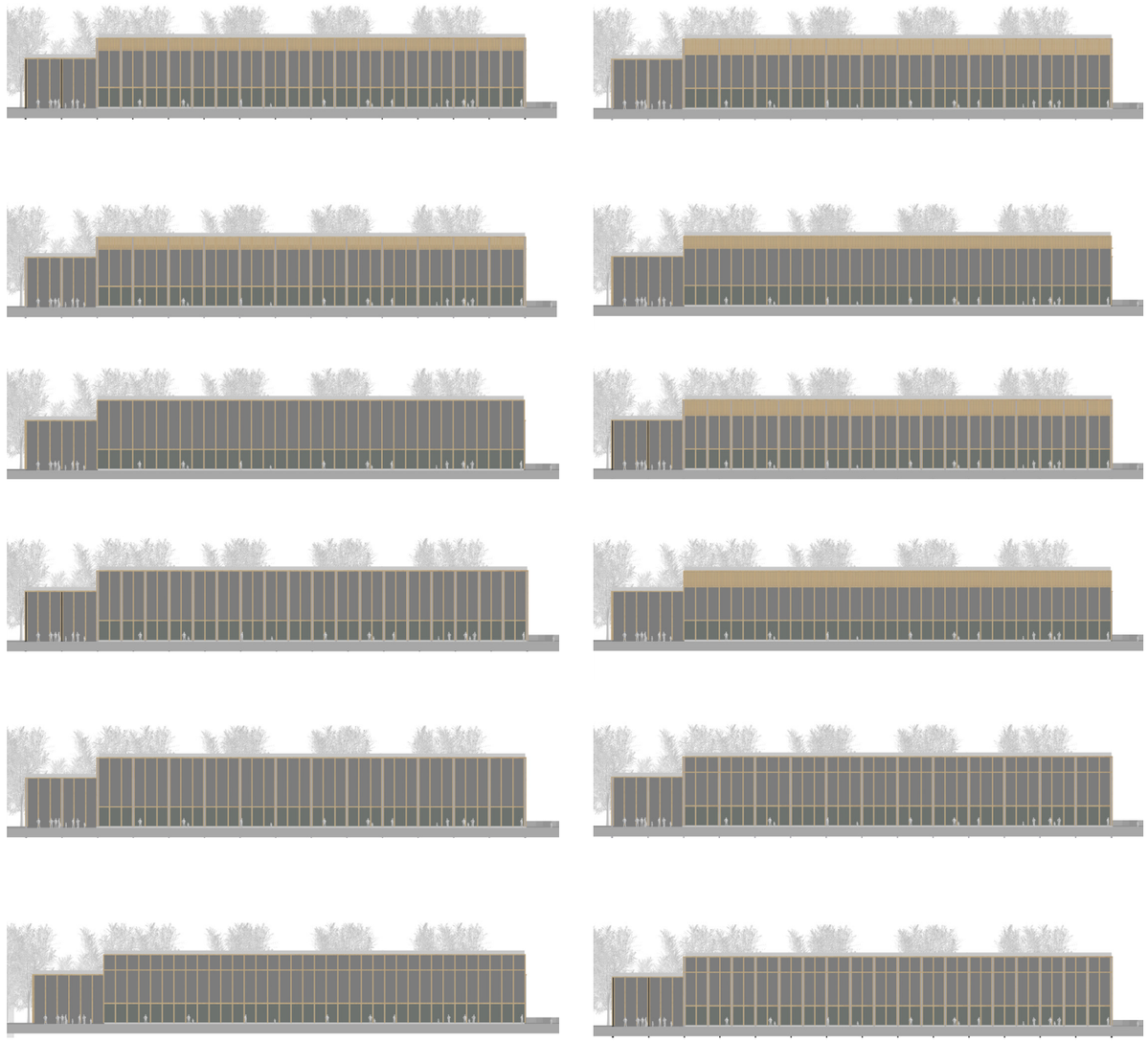
In the first study, the entire facade was viewed with a variation in the density of the vertical elements, and elements of horizontal divisions were also tested. The aim was to achieve verticality in the facade expression and at the same time a dissolved and permeable enclosure around the pool level. The study showed that verticality clearly decreased with increased distance between the vertical elements, while the dissolution of the enclosure increased.

In a later study, investigations were done on a smaller part of the facade to create an understanding of the human perspective in relation to this facade. This study also tested a hierarchy in the longitudinal division, in a primary and secondary division.

In a third study, knowledge from the previous studies was combined.

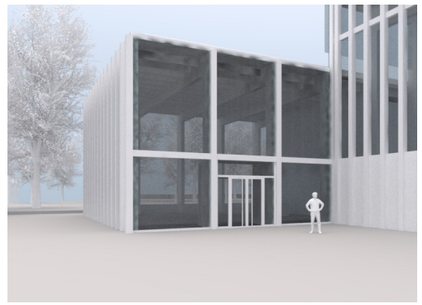
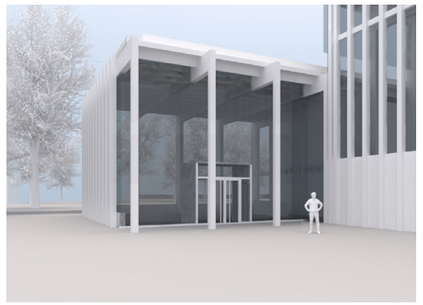


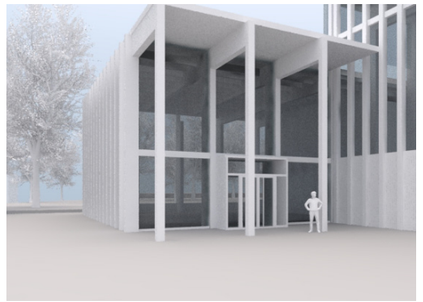
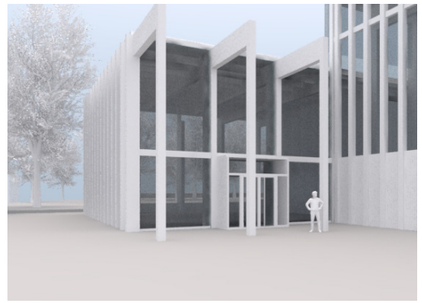
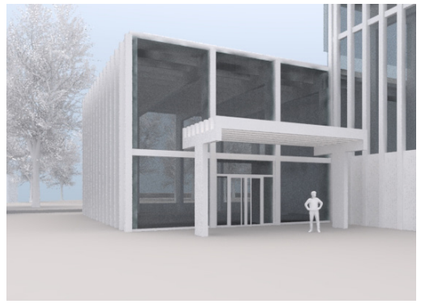
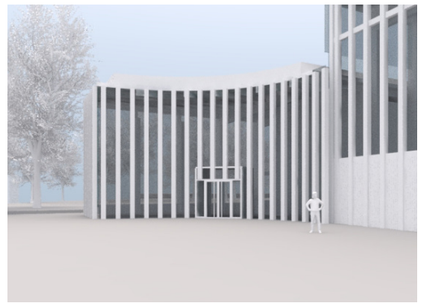




ENTRANCE STUDIES

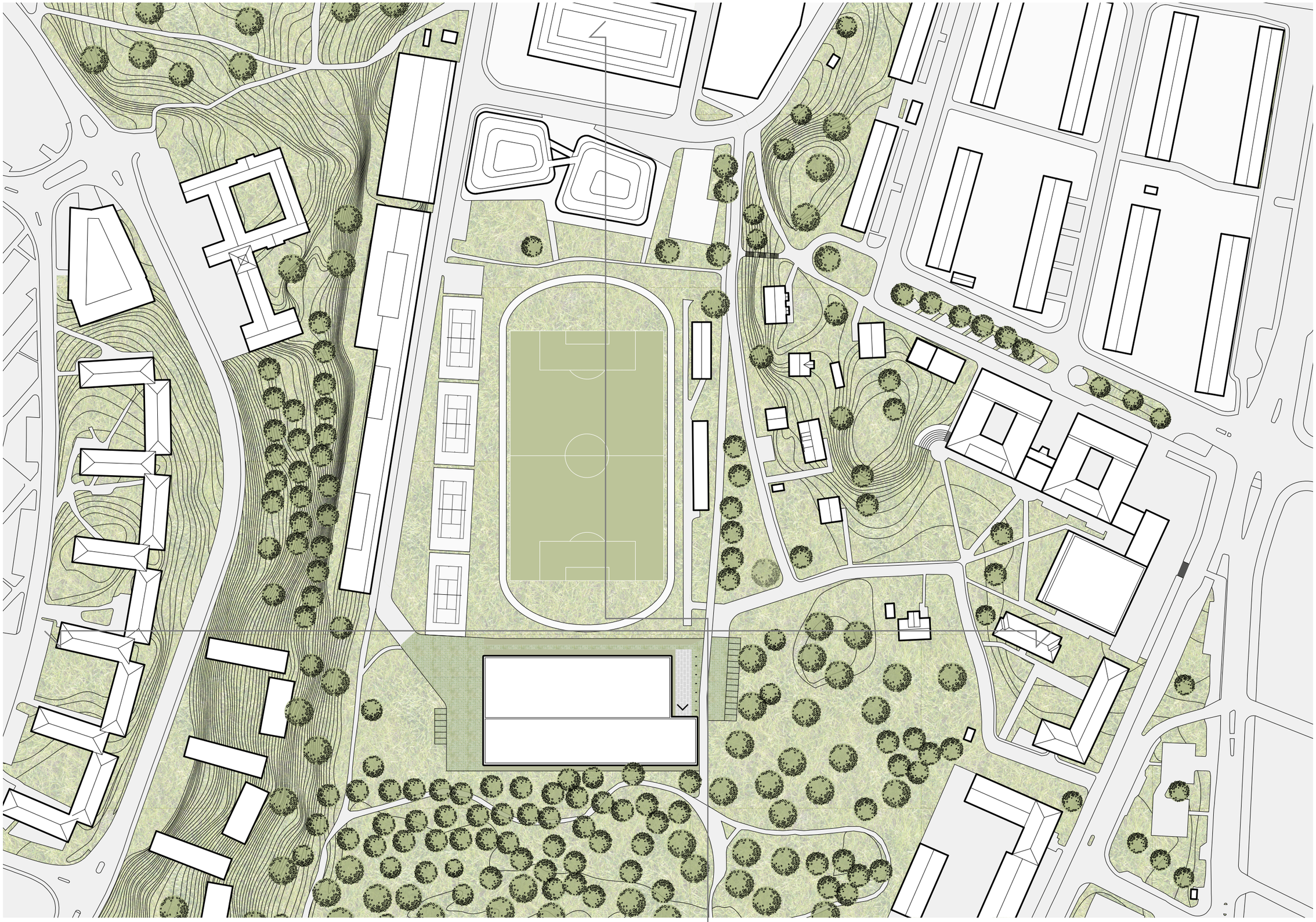
By placing the two volumes offseted from each other, an entrance space is created at the short side of the main volume. How this space can connect to the building was studied through a series of alternatives. The conclusion was that it was advantageous that the volumes be kept in their pure form instead of expanding from one volume to create the entrance. This can be done by creating an arcade inscribed in the grid that the building's glulam structure already creates.

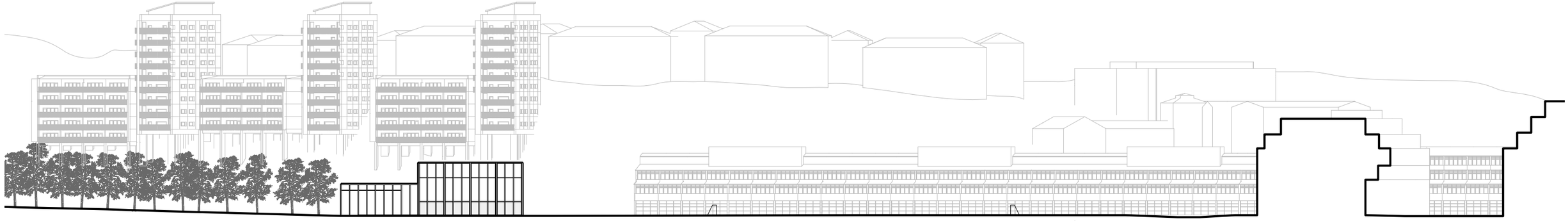






DESIGN PROPOSAL

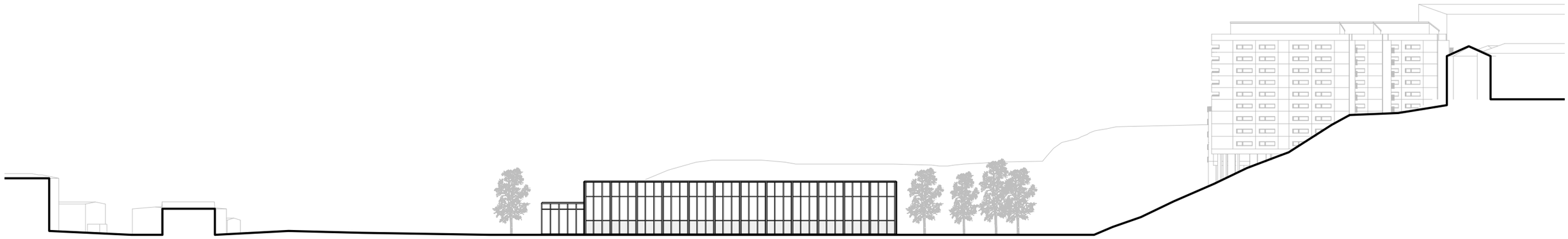
DESIGN PROPOSAL

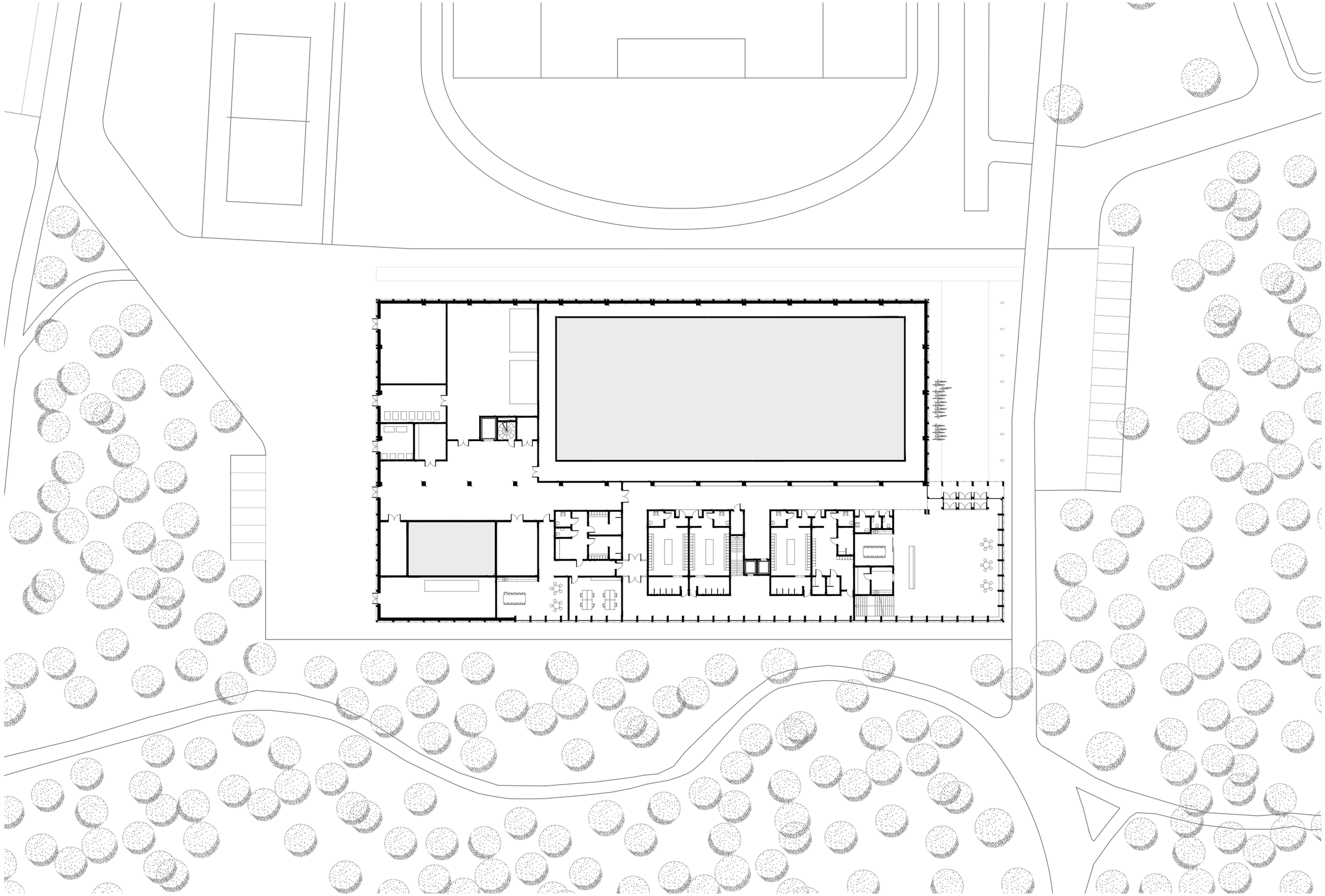


Site plan 1:1500 (A3)

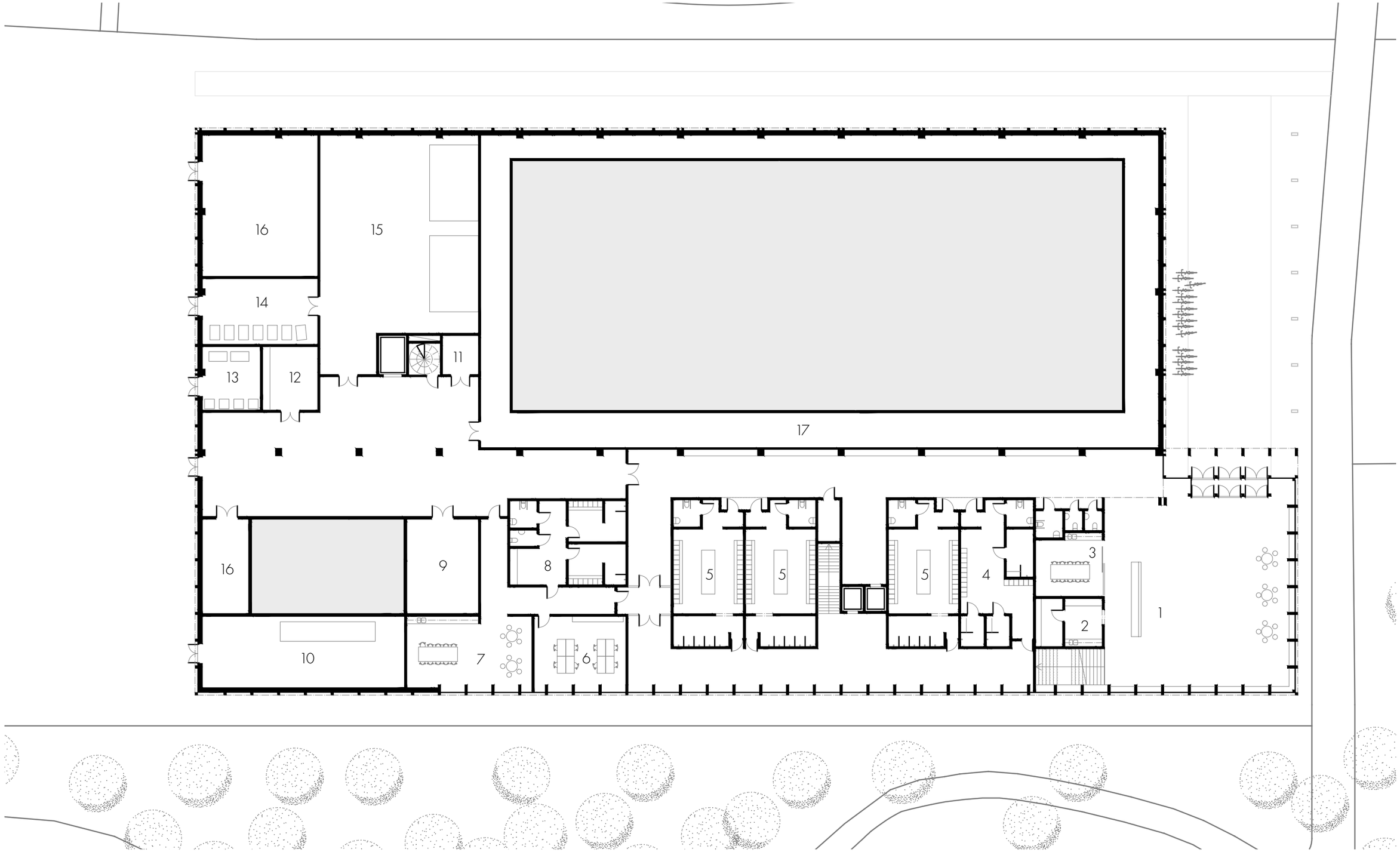


Site Section 1:1500 (A3)



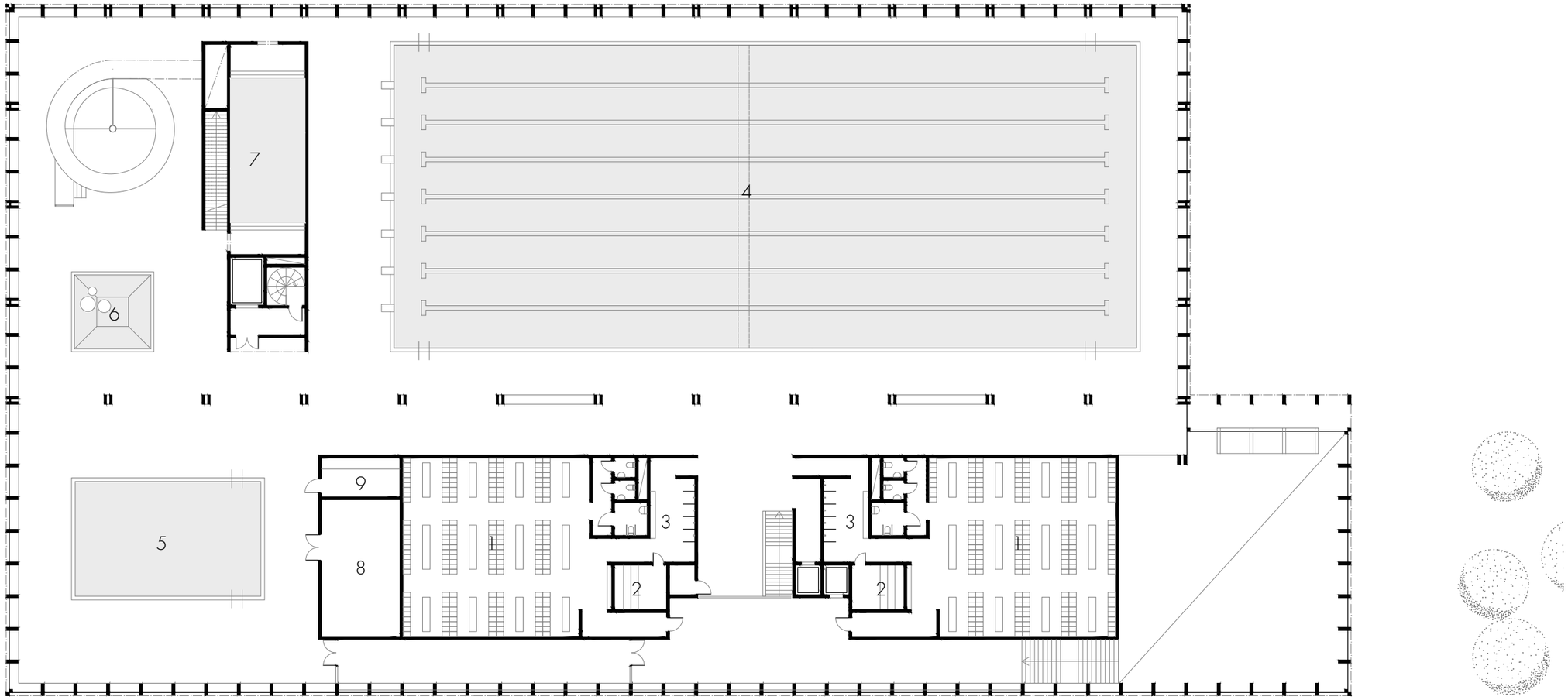


Ground floor 1:500 (A3)



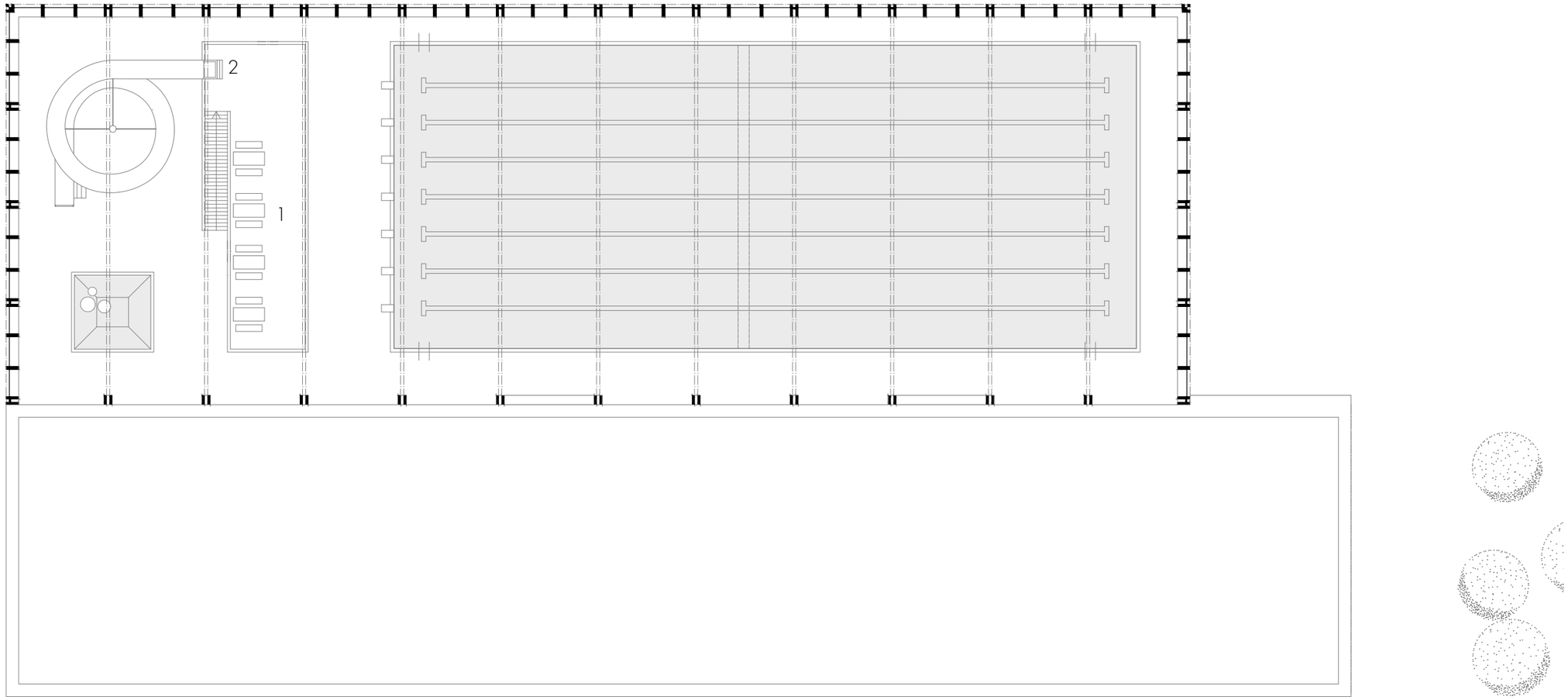
Ground floor 1:300 (A3)

1. Reception
2. Backoffice
3. Conference room
4. Flexible changing room
5. Team changing room
6. Offices
7. Staff room
8. Staff changing room
9. Mechanical room for adjustable pool floor
10. Electrical room / HVAC
11. Water testing
12. Cleaning storage
13. Recycling room
14. Deliveries / Chemical storage
15. Water purification / Surge tank
16. Storage
17. Inspection passage



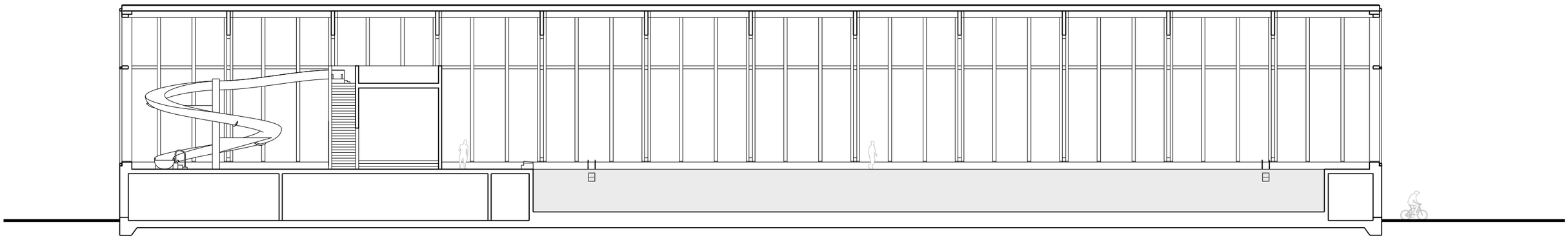
1. Locker room
2. Sauna
3. Showers
4. 50 m Dividable pool
5. Pool with adjustable floor
6. Children's pool
7. "Cave"
8. Storage
9. Lifeguard

Upper floor 1:300 (A3)

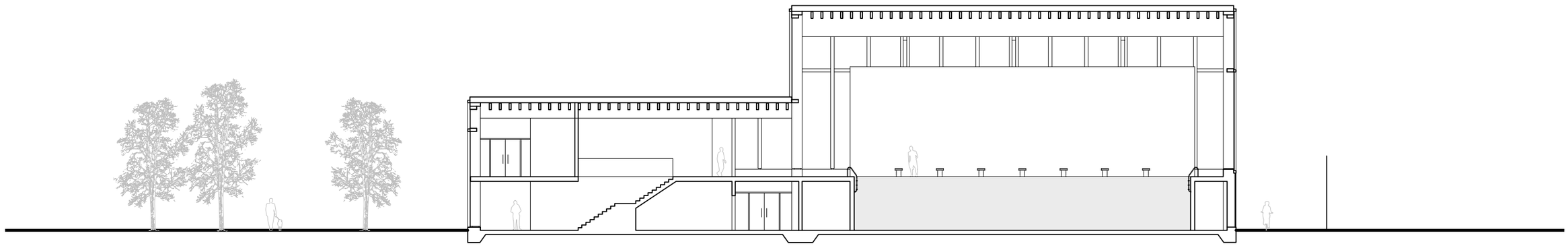


1. Viewing platform
2. Waterslide

Top floor 1:300 (A3)



Section 1:250 (A3)



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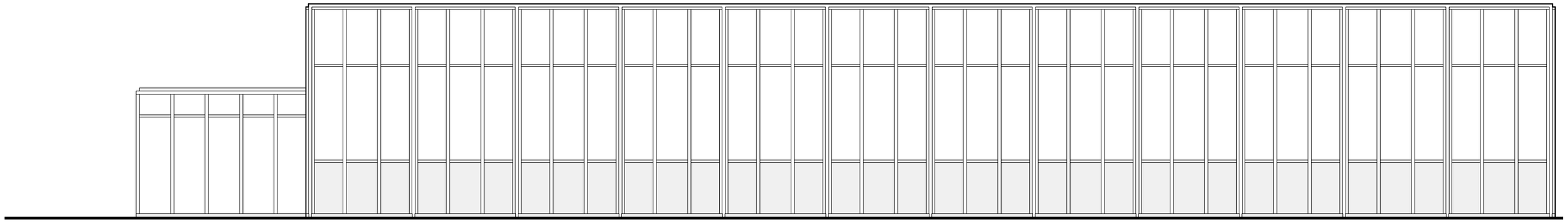
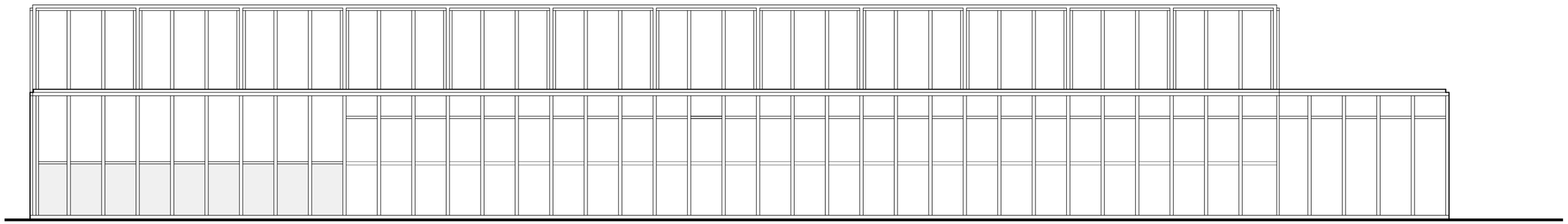
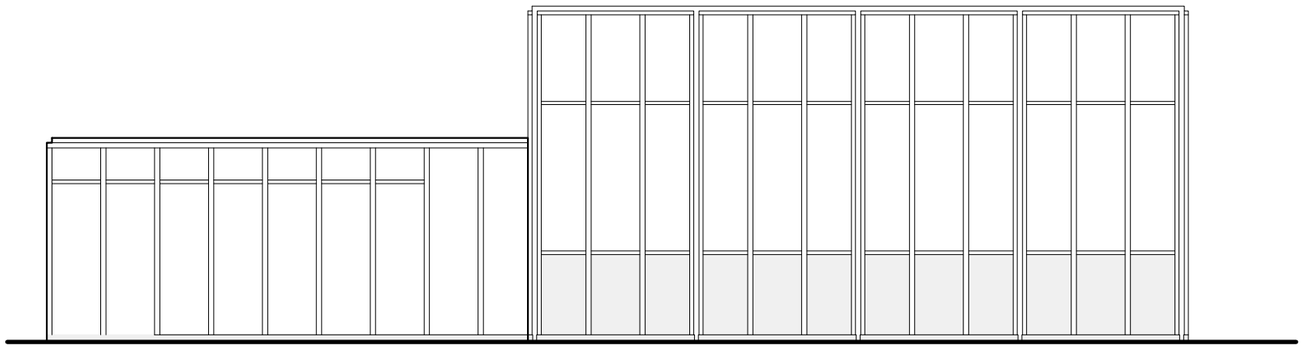


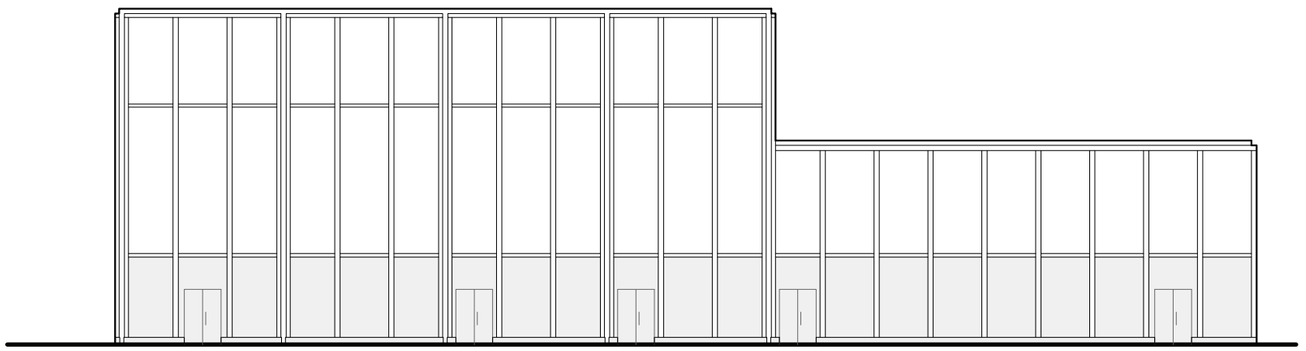
Elevation North 1:250 (A3)



Elevation South 1:250 ((A3)

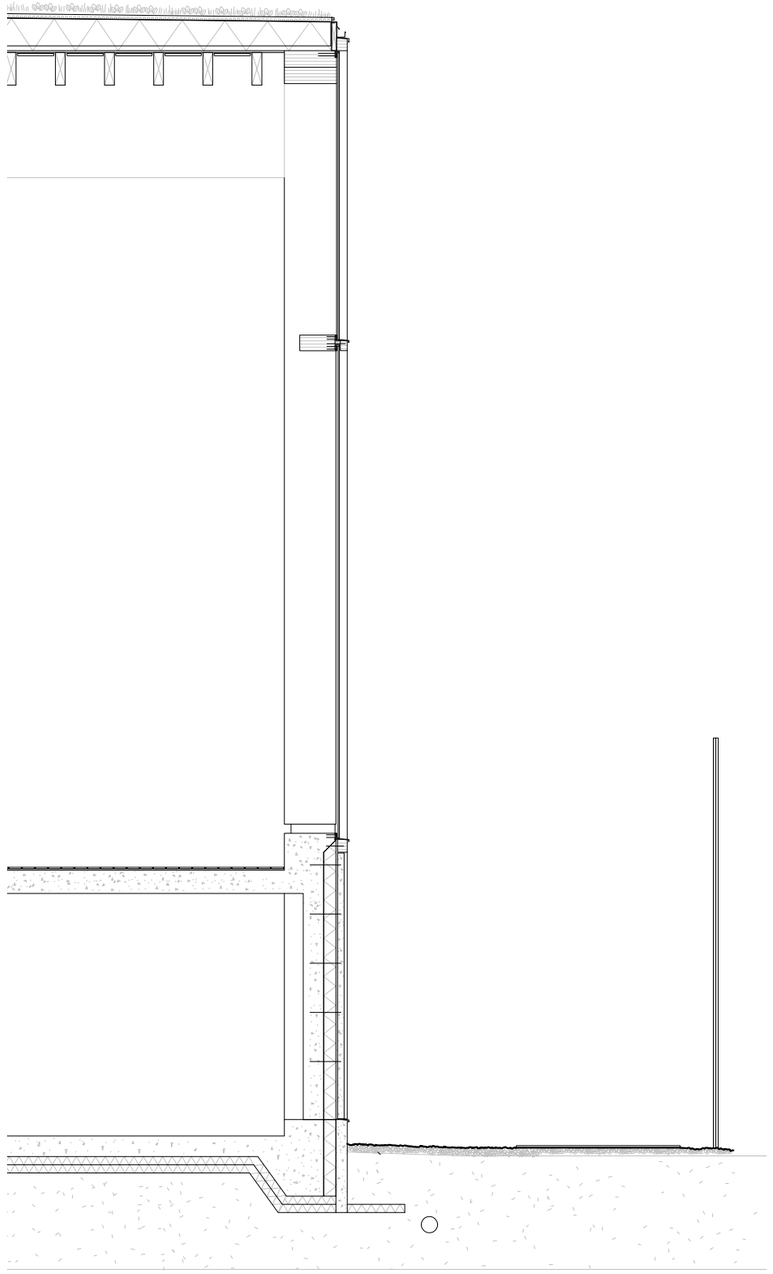


Elevation West 1:250 (A3)

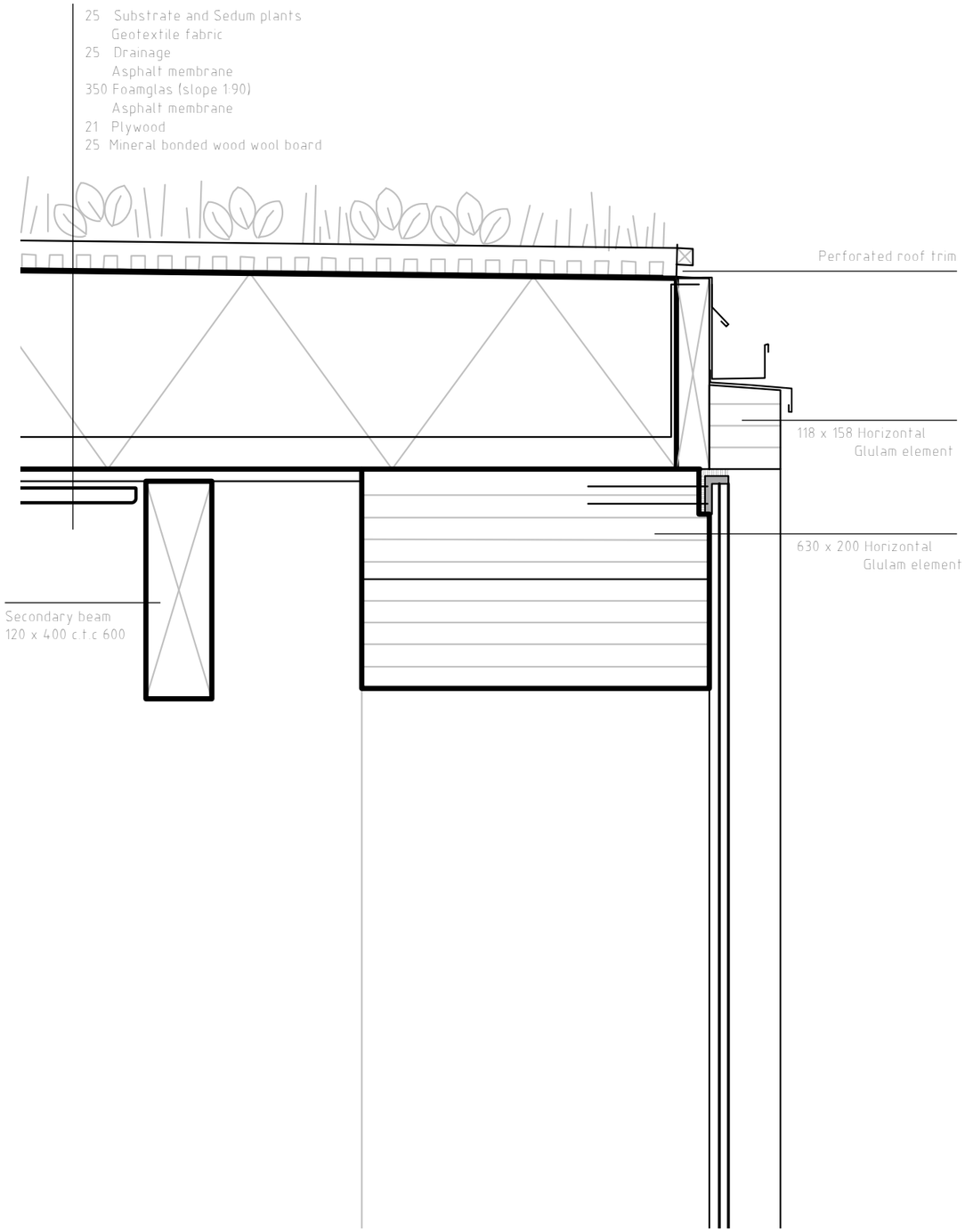


Elevation East 1:250 (A3)

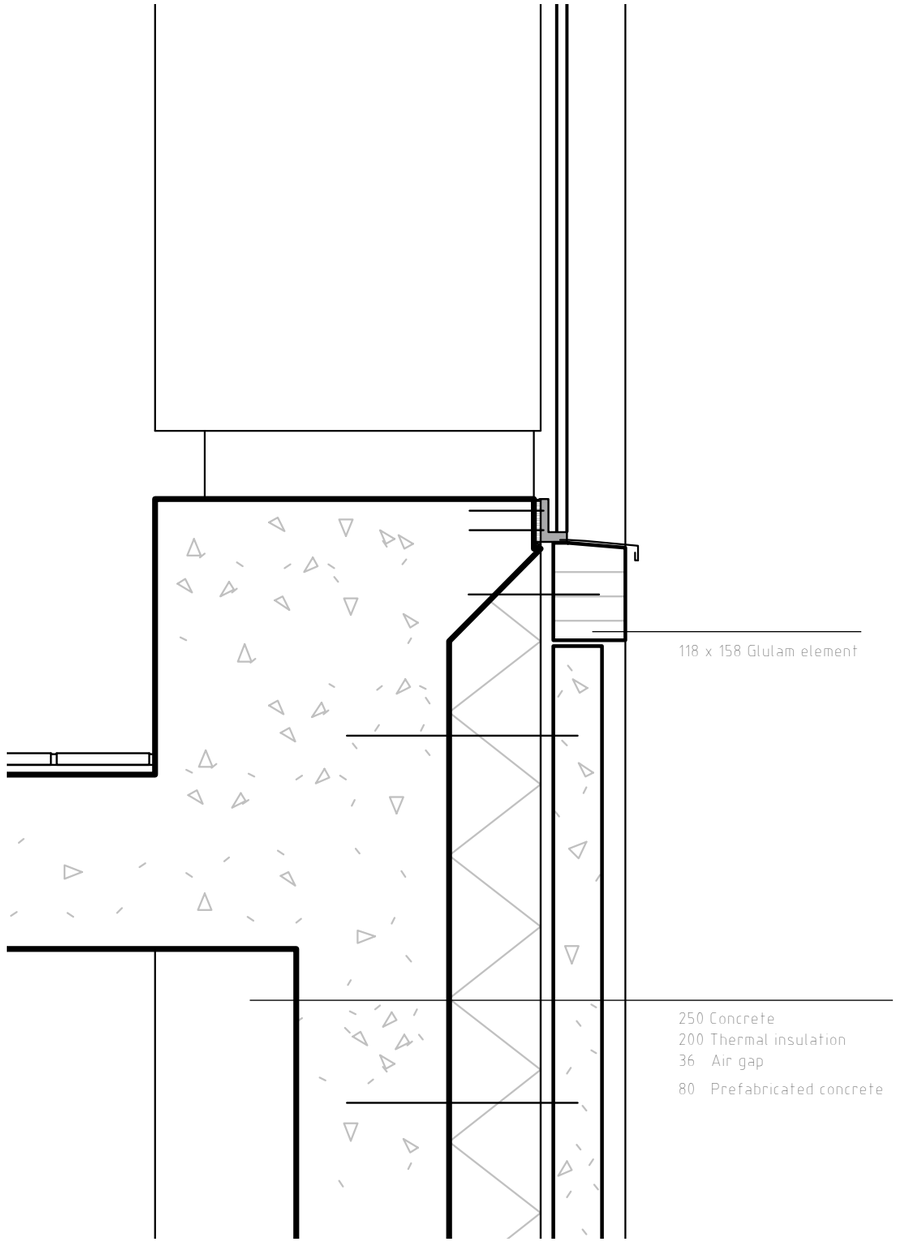
Elevation 1:75



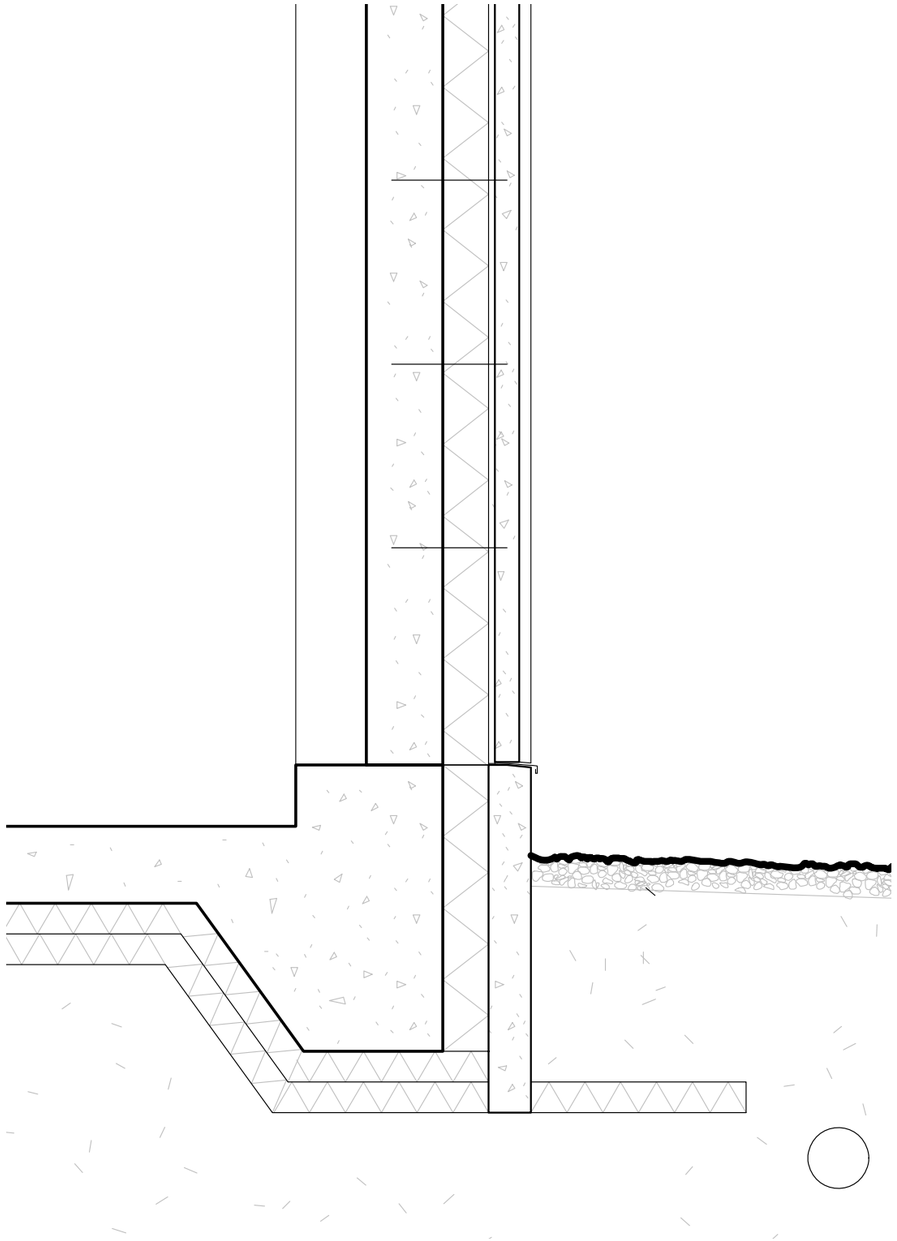
Section 1:75 (A3)



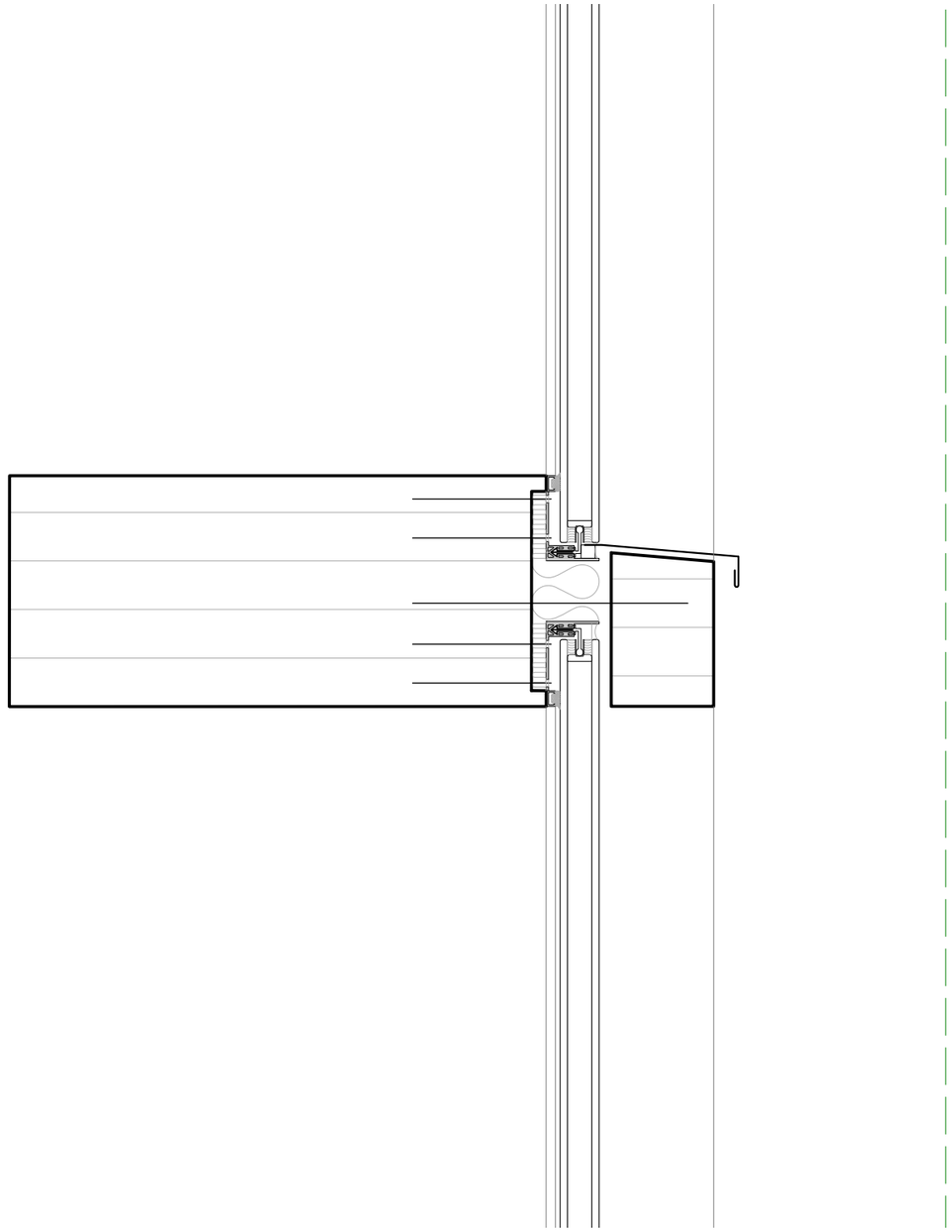
Roof detail 1:20 (A3)



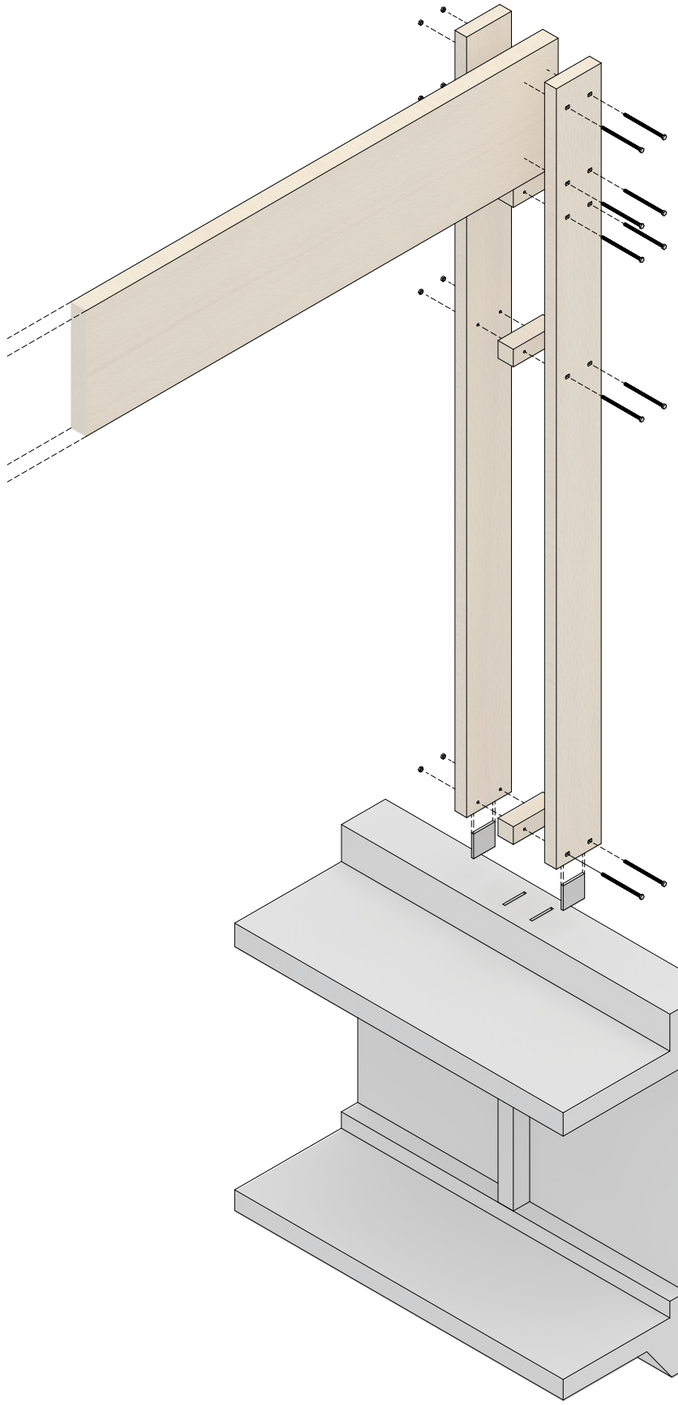
Wall - Slab intersection 1:20 (A3)



Base 1:20 (A3)

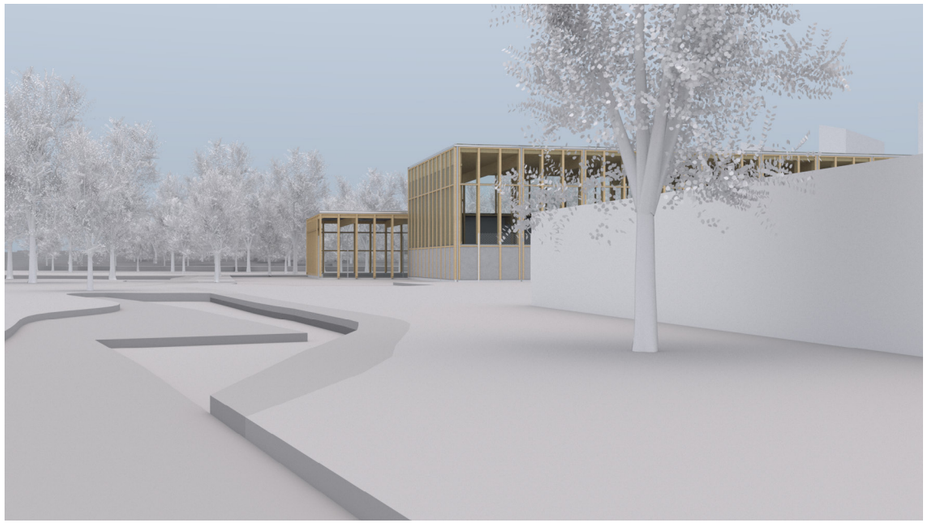


Glass mounting 1:5 (A3)

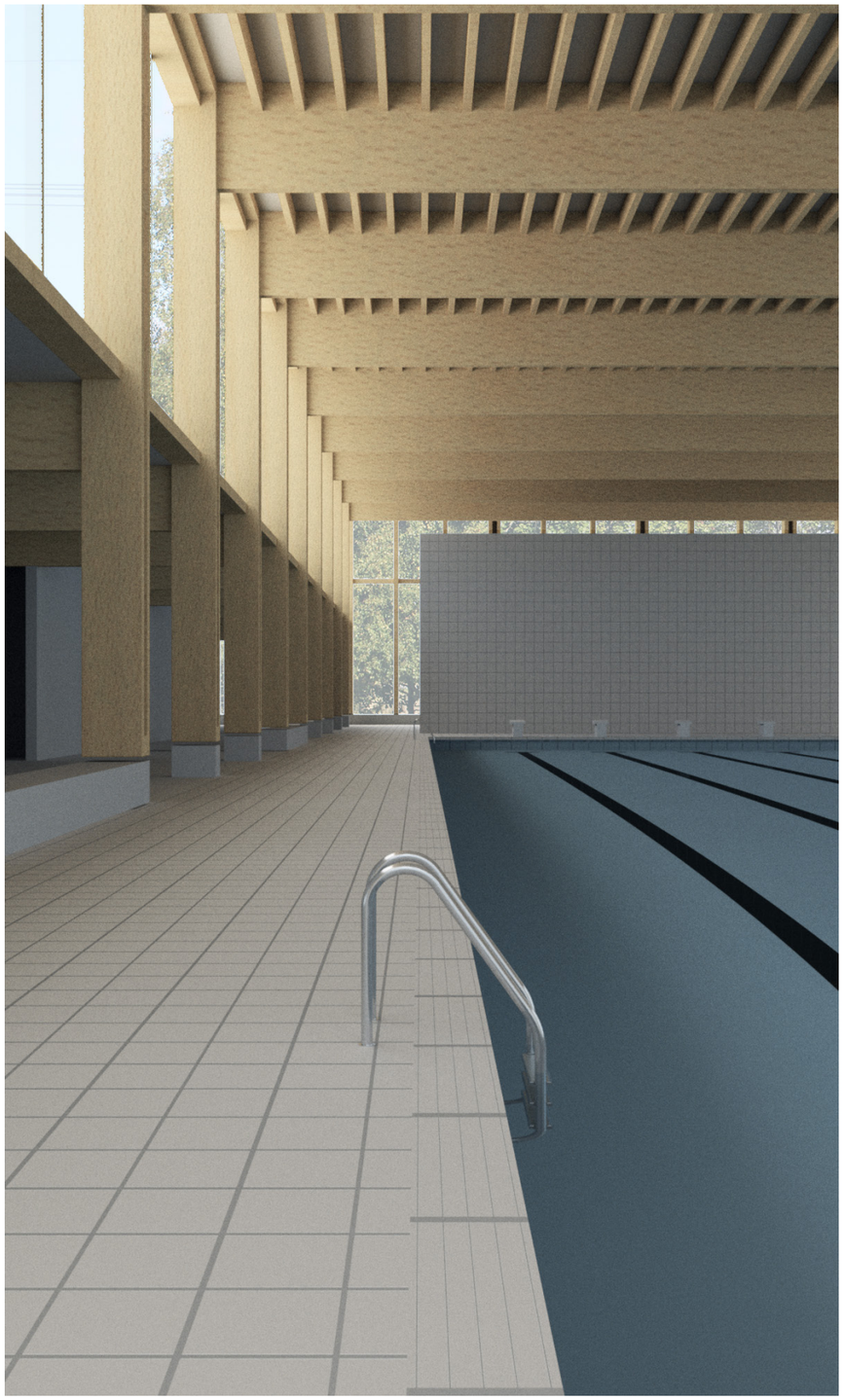


Exploded axonometric view, load bearing structure

North east aerial view



North east view



Interior Perspective

Interior Perspective

Facade model

Facade model

DISCUSSION

In this project, a swimming hall has been designed with a pool that is 50 meters long, which has been a driving force for a building volume that is large and long. In the project, studies have been conducted on how such a volume can be treated and divided in to smaller unites. Through repetitive elements, the long facade and the interior space have been divided into smaller units that are closer to the human scale. In the project, the building's own frame has been the starting point for such a division, which has given a building design where the glulam frame has become more than just a constructive necessity to be part of the conscious architectural expression. The subdivision through the structure gives the building's expression a special rhythm, where the rhythm of the building is an expression of the rhythm of its underlying structure.

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