

A library

serving the Gothenburg community



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Building and Tectonics

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I.
BACKGROUND

STUDENT BACKGROUND

1994	Born in Prizren, KOSOVO
2008 2013	ITG SANDRO PERTINI, PORDENONE <i>Surveyor High School</i>
2013 2016	UNIVERSITA DEGLI STUDI DI UDINE, UDINE <i>Bachelor's Degree of Architecture</i>
2021 2023	CHALMERS UNIVERSITY, GOTHENBURG <i>Master's Programme in Architecture and Urban Design</i> <i>Residential healthcare</i> <i>Housing Invention</i> <i>Healthcare architecture</i> <i>Vernacular architecture</i> <i>Sustainable development and the design professions</i>

ABSTRACT

This master thesis investigates wood, a material that in recent years is becoming relevant in contemporary architecture. For a long time in history wood was the main building material, but with the advent of reinforced concrete this material has been almost forgotten. In recent years, however, the characteristics and merits of this environmentally friendly construction material have been rediscovered.

My primary focus for this study is to utilize new wooden components as a central element in the design of a building. Through this process, I will conduct a comprehensive investigation of these innovative materials, assessing their viability and effectiveness in construction.

The outcome is to design a free standing public building, a library, which has wood as main material in its design. The project area is located on a parking lot next to the historic Feskekörka building, an icon of the city of Gothenburg. The site is located in a central area of the city, close to the historic center and the canal that surrounds the Inom Vallgraven area.

The goal of this thesis is to answer the research question by designing a building that harmoniously interacts with its environment, contents, and users. By utilizing new wooden components, I aim to create a sustainable and functional structure that enhances the user experience and effectively accommodates the building's intended purpose.

Research questions:

How can new timber elements influence architecture ?

In what ways can the use of modern timber elements create a more expressive and cohesive spatial experience?

AIM

The objective of this master thesis is to provide a comprehensive investigation into the use of new wooden elements in construction. The study aims to explore and analyze the unique characteristics of these innovative materials that have significantly contributed to the surge in popularity of timber construction on a global scale.

The primary focus for this study is to utilize new wooden components as a central element in the design of a building. Through this process, I will conduct a comprehensive investigation of these innovative materials, assessing their viability and effectiveness in construction.. The findings of this study will offer valuable insights into the applications and potential of these new wooden elements in modern construction, as well as their impact on the architectural practices of the future.

THESIS QUESTIONS

How can new timber elements influence architecture ?

In what ways can the use of modern timber elements create a more expressive and cohesive spatial experience?

METHOD

The thesis will be a research by design project, with a strong interaction of drawings, physical models and visualizations. In the initial phase, built projects will be studied, studying the idea of the architects and the details that characterize each project.

An investigative study of the site was conducted with a site visit, photos. In a second phase, the two freestanding buildings along the canal will be studied.

DELIMITATIONS

This master thesis project aims to create a freestanding building having wood as the main material. The thesis does not aim to reinvent the library or its functions within it. The project is not going to investigate the library program and does not aim to become a model for a building with this function.

Theoretical background

The introduction of new wooden elements has provided a significant boost to the use of wood in construction, even in the development of large-scale public buildings. The increasing popularity of timber construction is largely due to a growing interest in sustainable and bio-based construction solutions that use resources efficiently, which has been driven by concerns about climate change.

Classic modernism favored concrete and steel, causing timber to be viewed as a building material for lower and sometimes temporary structures due to competition from new, widely available, non-flammable materials. However, since the beginning of the new millennium, timber construction has undergone a fundamental shift, due to a range of technological innovations.

Amidst the worldwide concerns regarding global environmental development and global warming, there has been a growing emphasis on the use of timber in multi-story constructions, particularly in Europe. The first projects were initiated in Bavaria and Austria during the 1990s. Subsequently, with technical advancements and an increasingly favorable legislative environment, new height records have been set for timber constructions.

Today we find various products with interesting characteristics, among them the best known are cross-laminated timber (CLT) and glued laminated timber (glulam).

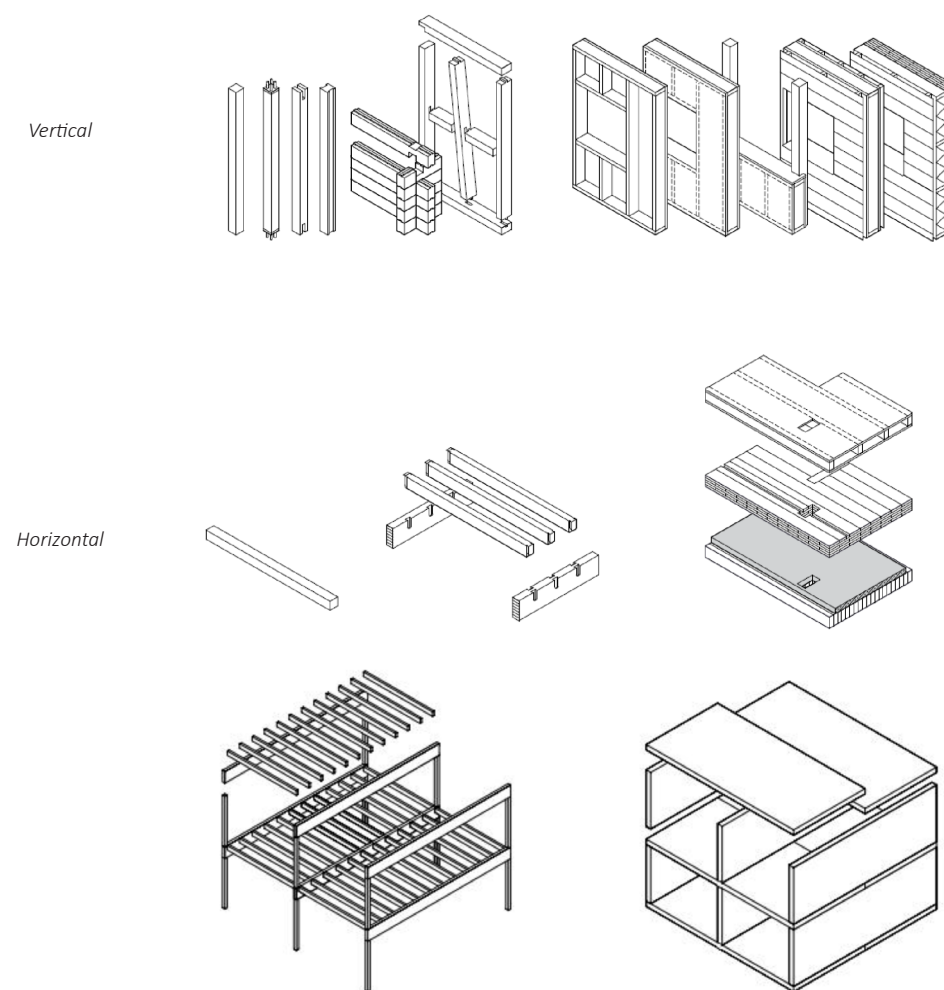
Cross-laminated-timber (CLT) is a prefabricated solid wood panel made of several layers of dimension lumber, stacked cross-wise and glued together. It is known for its high strength, dimensional stability, and fire resistance, making it an ideal material for building construction.

Glulam Glulam (Glued Laminated Timber) beam, on the other hand, is made by gluing together several smaller pieces of lumber to form a larger, stronger, and more dimensionally stable beam. It is used as a structural element in building construction and has the advantages of being lighter and more flexible than traditional timber beams while still maintaining high strength and stiffness.

CLT and glulam have revolutionized architecture by broadening the applications of wood as a building material. They have allowed for the creation of larger and taller wooden structures with greater structural stability, acoustic and thermal insulation, and fire resistance. This has led to the emergence of new and innovative architectural designs, particularly in the realm of sustainable and eco-friendly construction. With their unique properties and aesthetic appeal, CLT and glulam have enabled architects and builders to create structures that not only meet the highest technical standards but also provide a warm and inviting atmosphere for occupants. Overall, these elements have opened up new horizons in the use of wood as a sustainable and versatile building material.

Linear elements

Planar elements



II.
BUILT REFERENCE

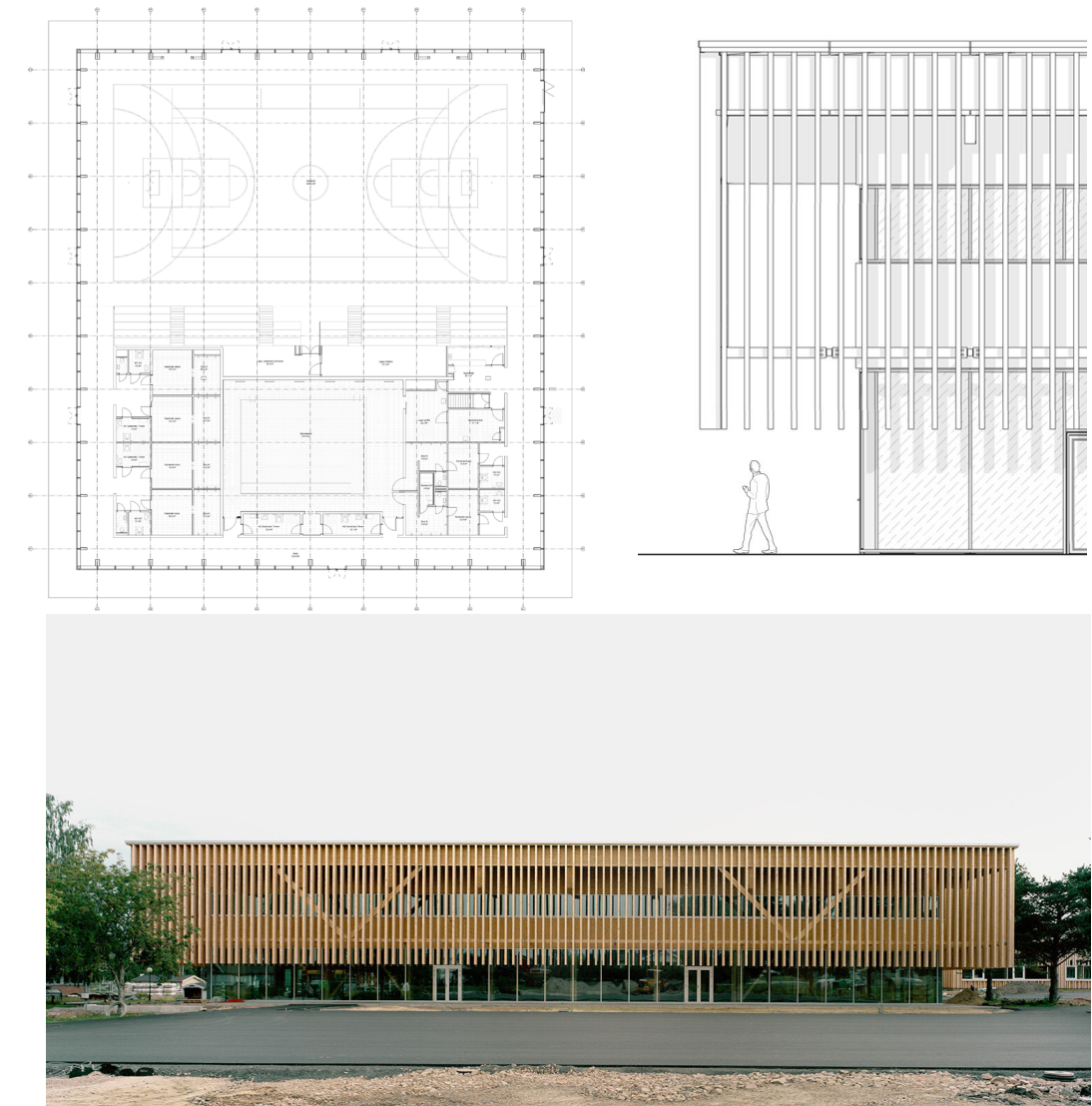
AKTIVITETSHUS Våler, Norway.

The activity home in Våler, Norway is the outcome of an open competition that culminated with this winning proposal by Tulinius Lind office. The project consists of an activity center and a new school with after-school care of a total of 10,000 m².

In order to play a crucial role in the growth of Våler, the facility must serve as a clear focal point and meeting place for all generations in the city. The activity center, which includes a multipurpose hall, a swimming pool, a library, and a music school, is open to both the school and the rest of the community of Våler.

The proposal presented by the Danish studio Tulinius Lind stands out due to the desire to use wood for the construction of these public buildings. The presence of wood is noticeable from the outside of the project, the building's outside facade adheres to a precise grid.

The ground floor front is entirely glazed, while the second level is more enclosed but still works with a horizontal glazed facade. The exterior of the building is clad with vertical wooden elements that provide external sun protection.



NOTE: Aktivitetshus in Våler, Norway. Tulinius Lind

ÖIJARED RESORT

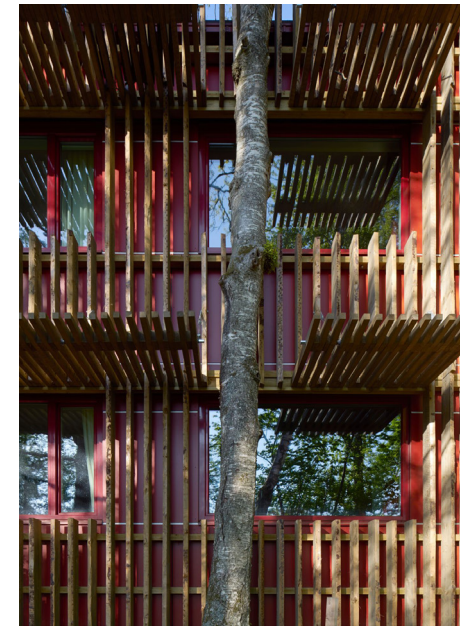
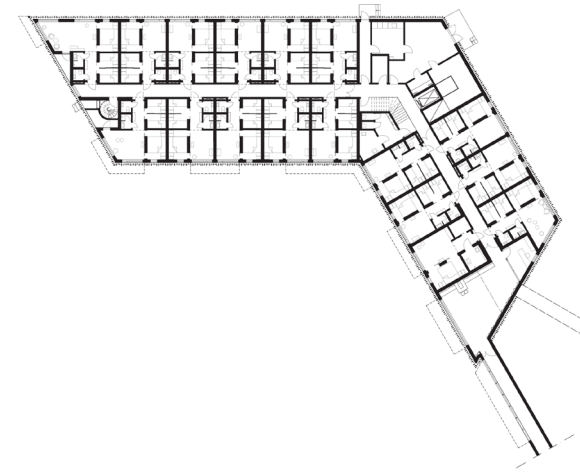
Floda, Sweden.

Öijared Resort is a stunning architectural project that was designed by Kaminsky Arkitektur in 2014. Its unique and modern shape creates a harmonious space that seamlessly blends with the surrounding natural landscape, providing guests with six different breathtaking views from within.

The new addition features 34 rooms, a conference room, lounge and offices. The design is inspired by the picturesque countryside, with natural materials like wood and stone creating a warm and inviting ambiance.

The facade is constructed using locally sourced timber from the Öijaredshalvön. This unique design blends seamlessly with the natural surroundings and allows the trees to continue growing undisturbed, creating a harmonious connection between the building and the forest.

In summary, the new hotel addition at Öijared Resort is a harmonious blend of modern design and natural elements, creating a unique and memorable experience for guests seeking a serene escape from the bustle of everyday life.



NOTE: Öijared resort in Floda, Sweden. Kaminsky Arkitektur

III.
CONTEXT

SITE ANALYSIS

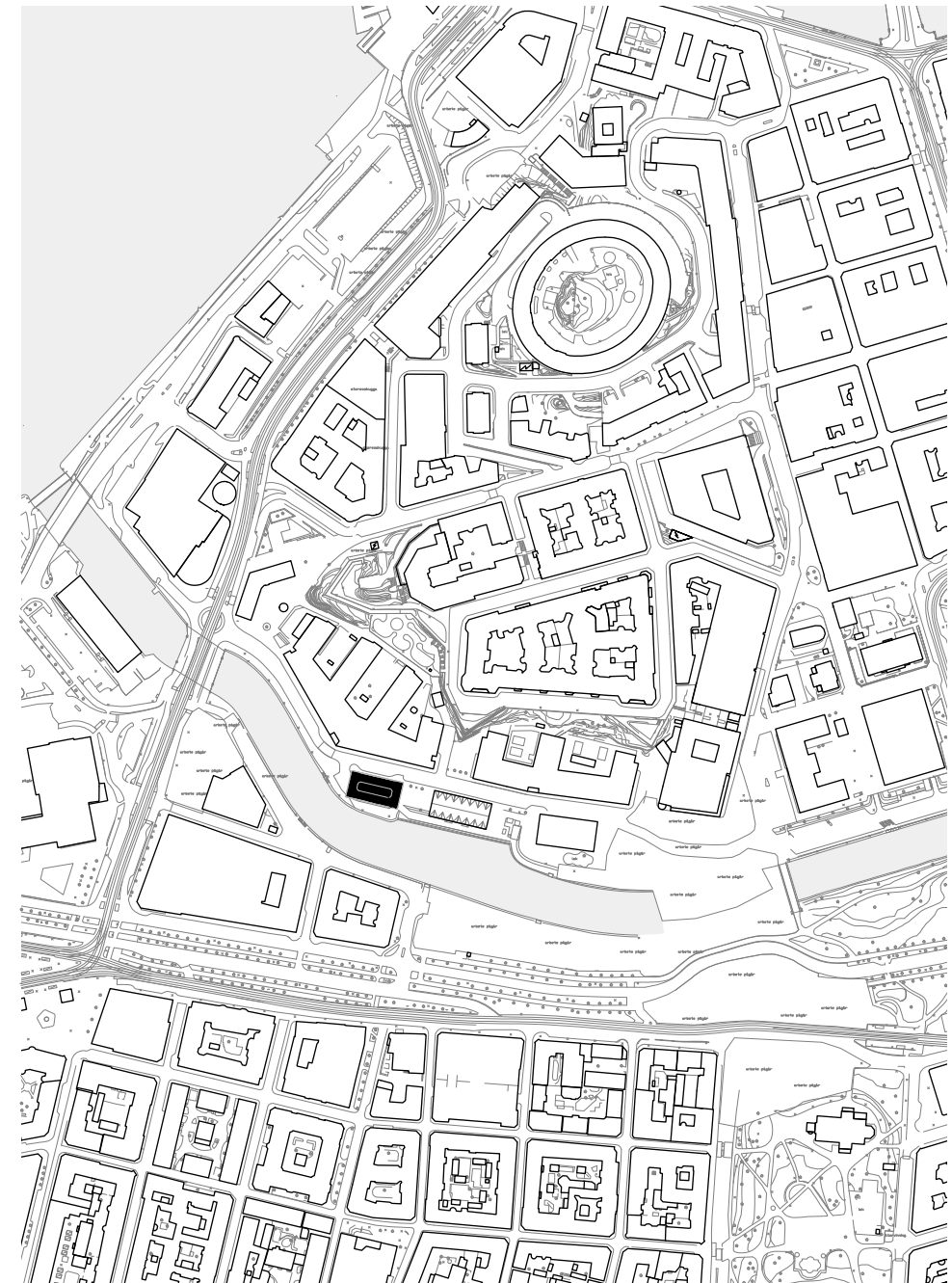
The site for this project is located in the Swedish city of Gothenburg, beside one of the city most recognizable landmarks, the historic Feskekörka building. The area is located along the canal that goes through the Vallgraven neighborhood, close to the city center.

There are two other significant buildings facing the canal, both of which are influenced by the era in which they were built.

Feskekörka, the first building next to the site, is a one-of-a-kind structure with a strong presence, built with bricks and large openings facing the canal. The structure was constructed in 1874 and has subsequently evolved into Gothenburg's largest fish and shellfish market.

Fisketorget 2 is the other main building along the canal, located on the east side of Feskekörka. A building built in the 1980s with interesting architectural characteristics of the time. The exterior of the building is built of concrete pillars that generate a unique rhythm with several openings from the outside.

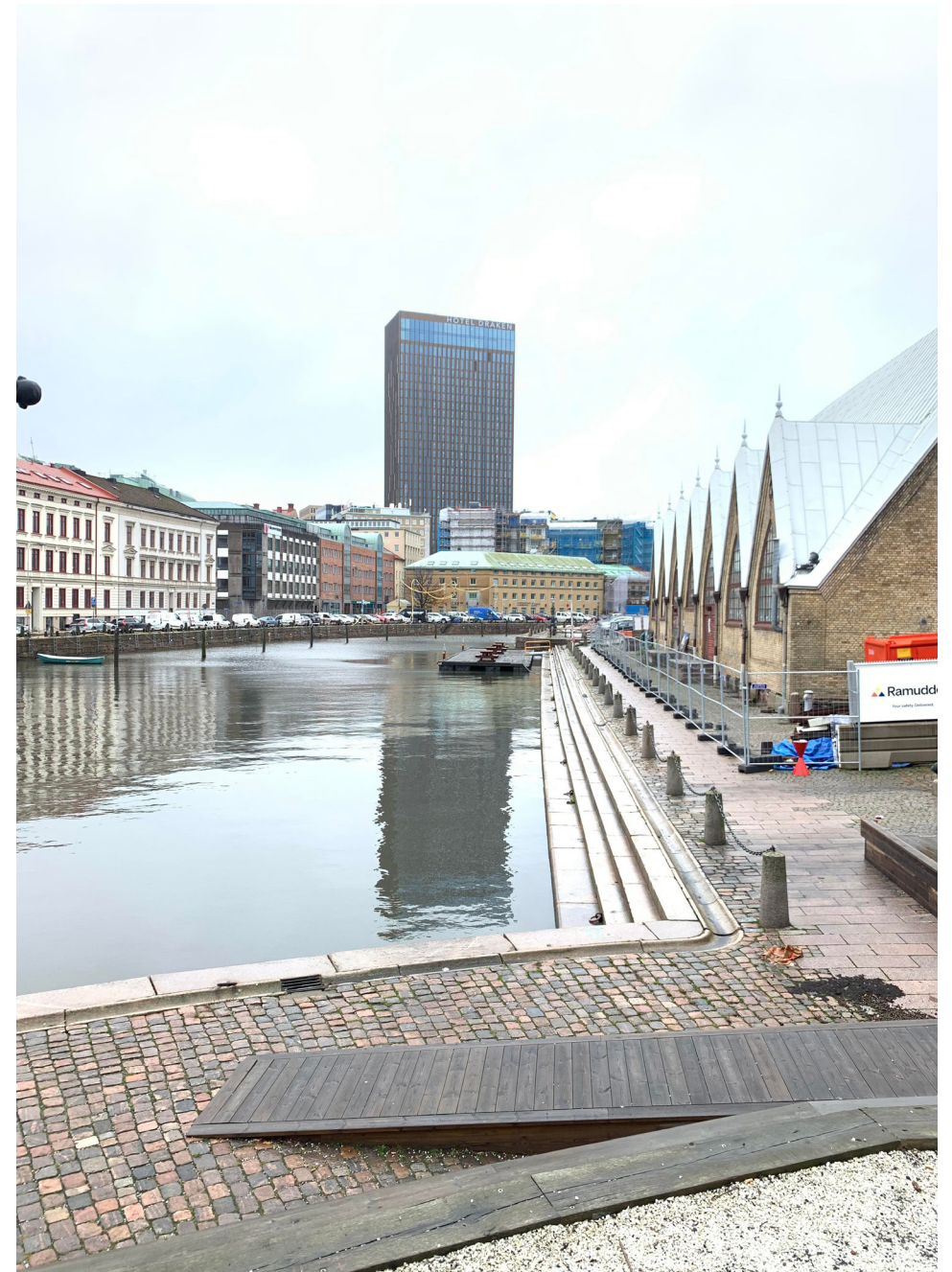
Both of the buildings along the canal are unique in their category, representing the architectural traits and key materials of a certain time period. The purpose of this master thesis is to design a public building that represents contemporary architecture and materials



SITE 1:2000



SITE VISIT: views of the site



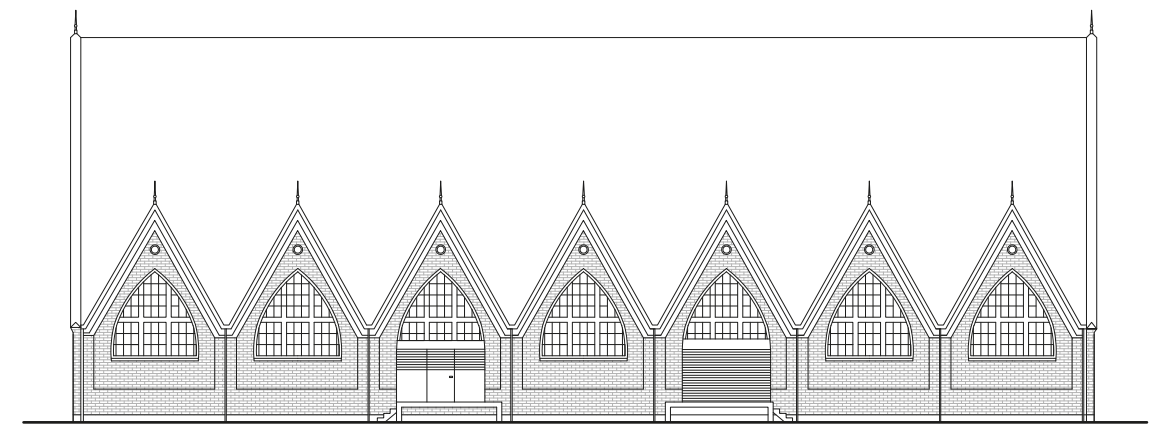
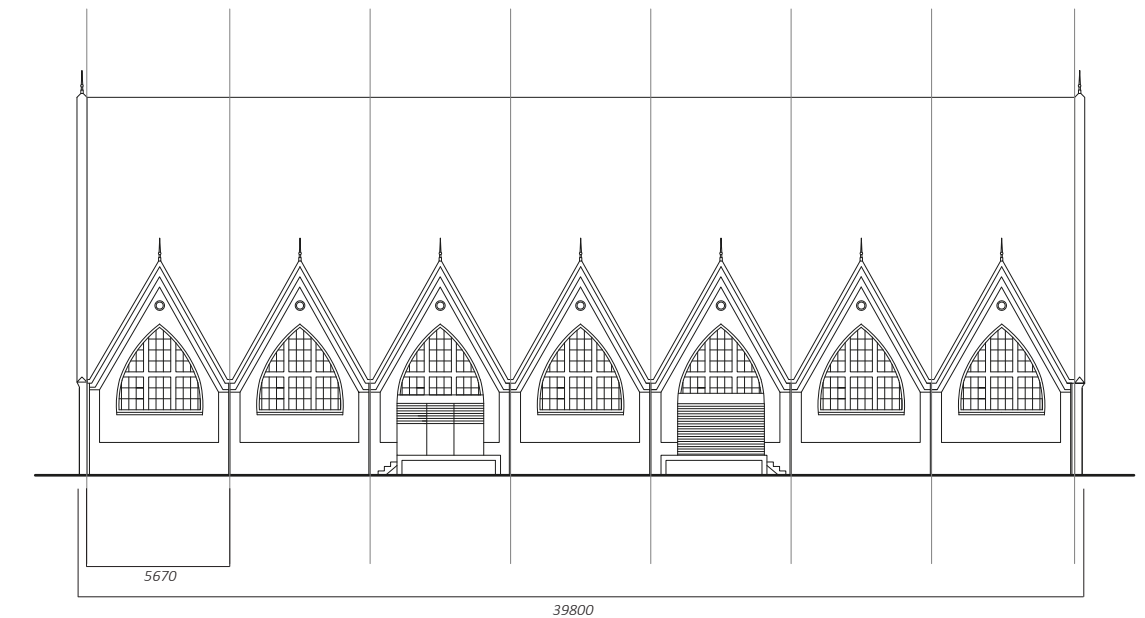
SITE VISIT: view of the site

Feskekörka, 1874

Feskekörka, also known as the Fish Market, is one of Gothenburg's most famous landmarks. Designed by the city architect Victor von Gegerfelt and completed in 1874, the building is a stunning example of national romantic architecture combined with a bold form experiment.

Originally, Feskekörka was built to house several smaller departments in a clear central space. However, over time, the building's purpose has shifted, and in the 1950s, the departments were moved to the sides of the building, creating a spacious aisle in the center. Today, Feskekörka serves as a bustling marketplace where vendors sell fresh seafood to locals and tourists alike. The facades' rhythm is quite apparent and symmetrical. The facade is composed of yellow brick with an English cross bond, while the bottom part is made of limestone.

Interestingly, Feskekörka's architecture is inspired by Gothic churches, with its pointed arches, high ceilings, and beautiful stained glass windows. The building's name, which means "fish church" in Swedish, is a nod to its design and its function as a place of commerce.



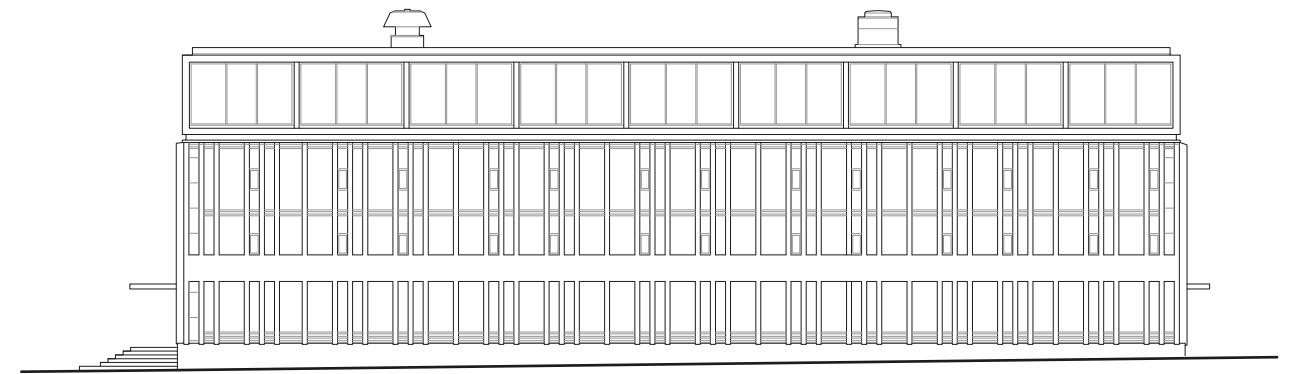
South facade
SCALE 1:300

Fisketorget 2

The building next to Feskekörka is a stunning example of filigree construction. Built in the 1960s, this office building features a facade of slender concrete pillars that are profiled to create an elegant appearance. The rhythm and spacing of the pillars create a striking contrast to the solid, imposing presence of Feskekörka.

One of the most interesting aspects of this building is the way in which it allows glimpses of its interior through the concrete pillars, which are filled with glass as a secondary material. The uneven pattern of the pillars creates a dynamic and vibrant appearance, making it an exciting building to walk by.

Overall, this office building is a beautiful example of how modern architecture can harmonize with historic structures. Its filigree construction and use of glass create a sense of lightness and transparency that is a striking contrast to the solid stone of Feskekörka. Together, these two buildings create an intriguing and dynamic streetscape.



South facade
SCALE 1:300

IV.
PROGRAM

SPACE PROGRAM

<i>LOBBY</i>	
<i>receptiondesk</i>	<i>8</i>
<i>loandesk</i>	<i>8</i>
<i>ADMINISTRATION</i>	
<i>storage 2</i>	<i>14</i>
<i>copy area</i>	<i>5</i>
<i>staff breakroom with pentry</i>	<i>15</i>
<i>toilet 2</i>	<i>22</i>
<i>TECHNICAL SPACE</i>	
<i>ventilation</i>	<i>140</i>
<i>shafts</i>	<i>3</i>
<i>Elevator</i>	<i>4</i>
<i>BOOKHALL</i>	
<i>books</i>	<i>240</i>
<i>magazine, newspaper</i>	<i>50</i>
<i>children 'area</i>	<i>230</i>
<i>Reading area 5</i>	<i>215</i>
<i>DIGITAL STATION</i>	
<i>Computer station</i>	<i>140</i>
<i>print and copy service</i>	<i>5</i>
<i>GROUP ROOM</i>	
<i>Study rooms 2</i>	<i>8</i>
<i>Meeting room 2</i>	<i>15</i>

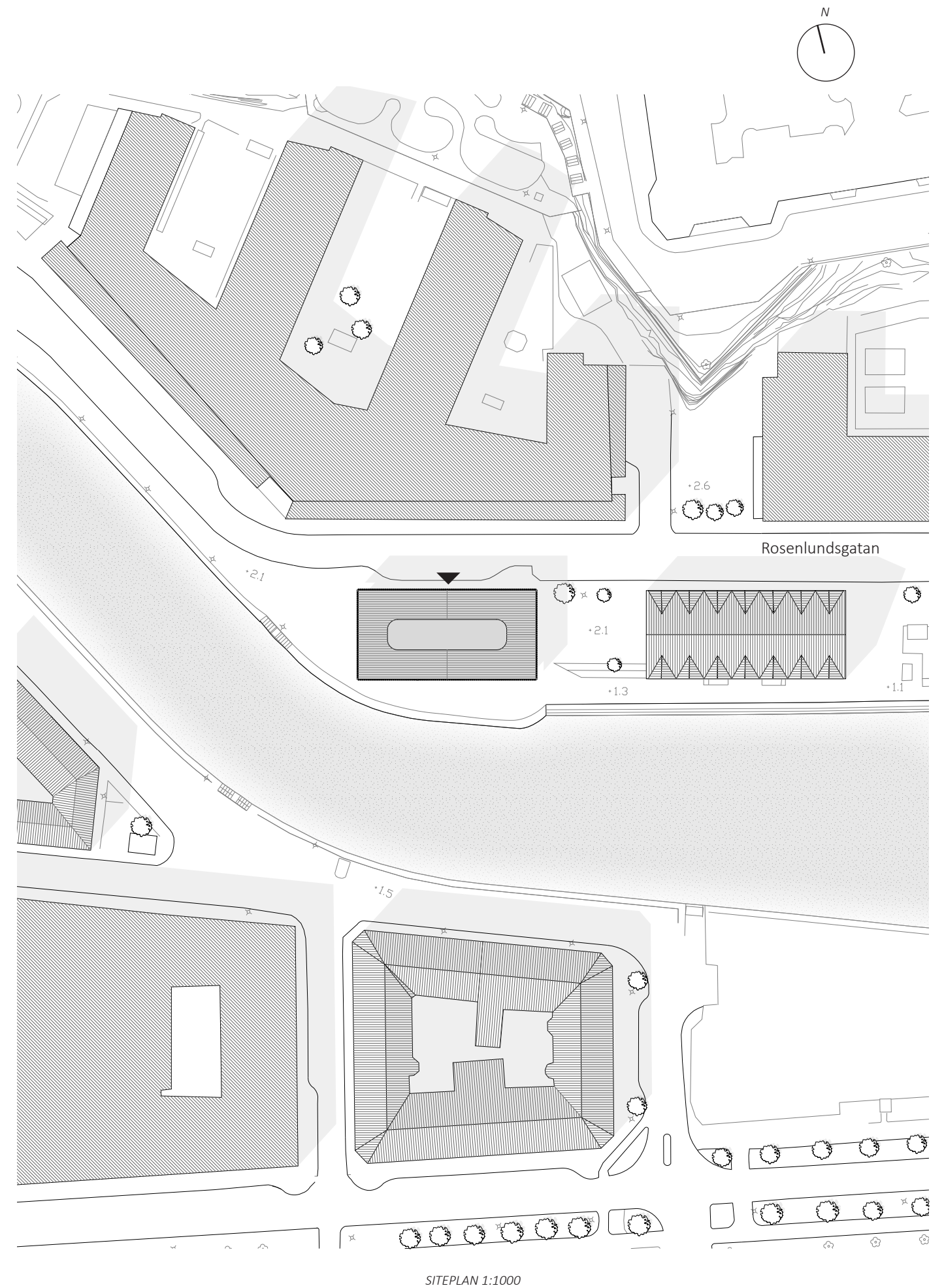
Ca grossarea: 1630 sqm

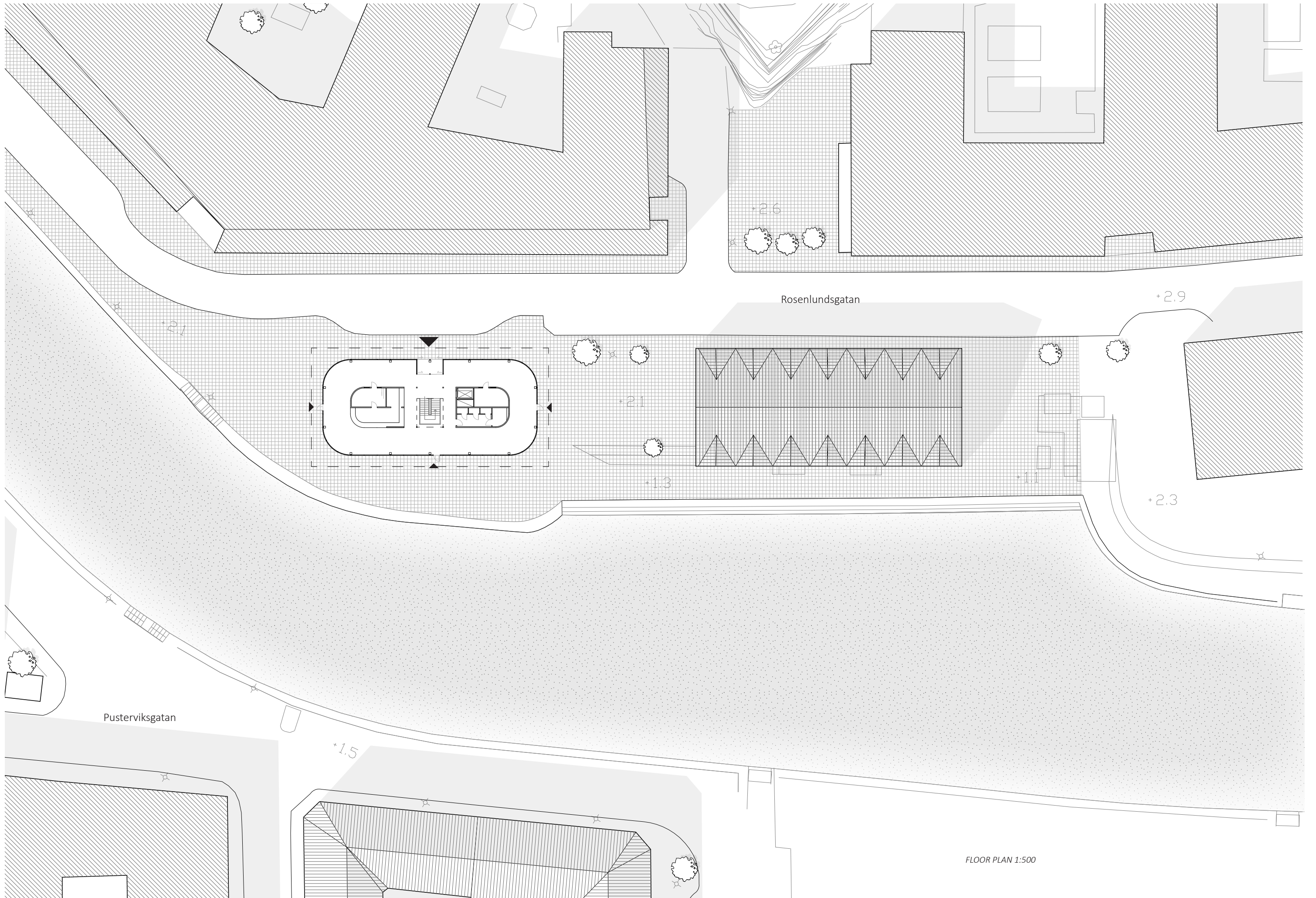
V.
PROPOSAL

Proposal

The new building at Rosenlundsgatan will be the third standalone structure in the area, joining Feskekörka and Fisketorget 2. Its design and features will be inspired by the proportions and characteristics of the existing buildings, creating a cohesive look. The new building's alignment with Feskekörka, facing Rosenlundsgatan, has resulted in a cohesive layout that enhances the urban landscape of the area.

The site of the new building is situated in a corner between the river, Rosenlundsgatan and Feskekörka, creating a unique challenge in terms of its orientation, as it attempts to face multiple directions simultaneously. The design of the new building takes into account the complex orientation of the site, resulting in a unique shape that features a two-meter setback on its ground floor. This intentional design choice has created additional space outside of the building, ultimately enhancing the pedestrian experience and creating a more inviting atmosphere in the area.





FLOOR PLAN 1:500

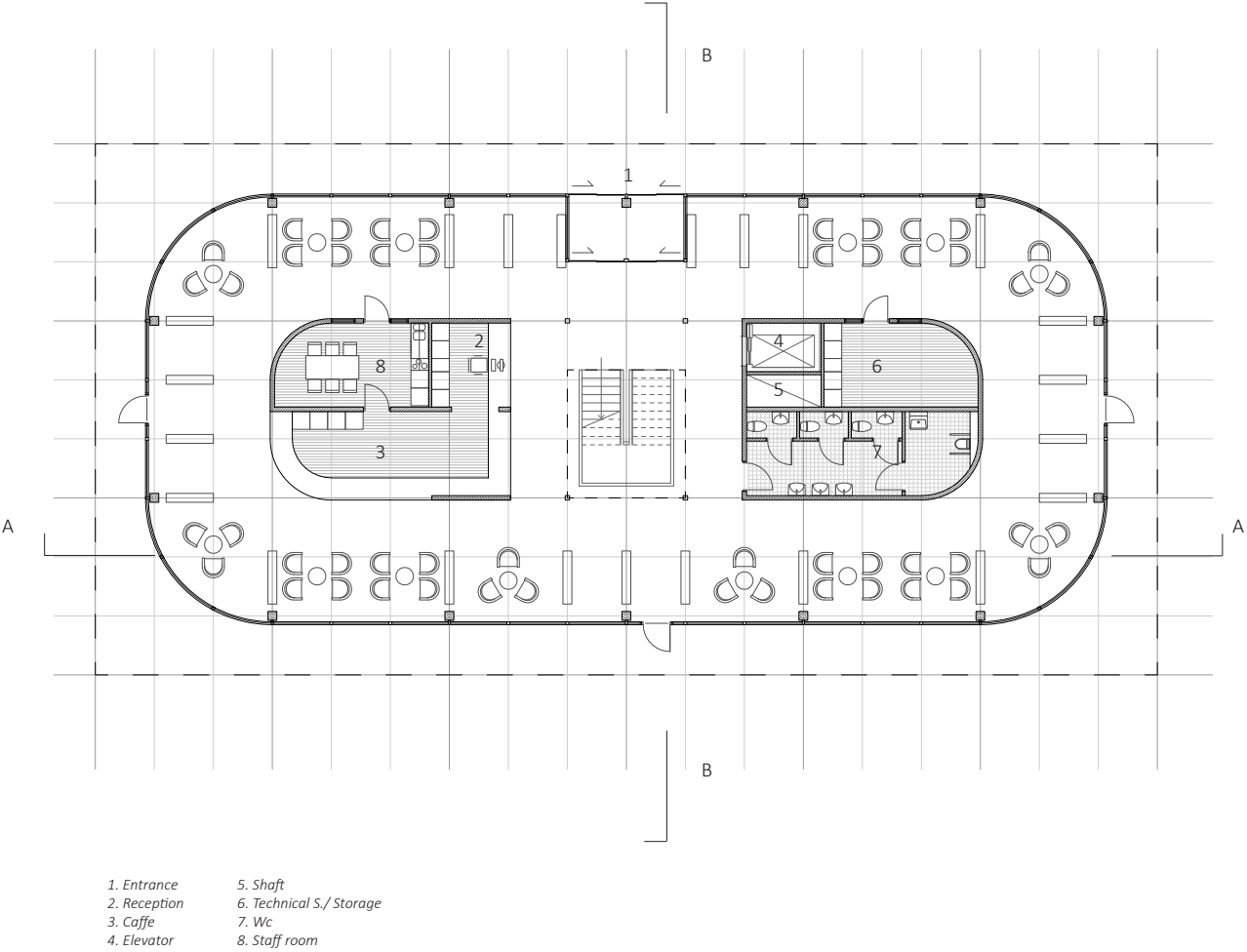
FIRST FLOOR

Proposal

The new building has been thoughtfully designed to ensure that it can function effectively as a library. The central core of the building, which is a dominant feature, houses all the essential functions and rooms required for the library's operation. This massive central core has been designed to be both functional and visually striking.

The surrounding reading zones have been arranged around this core, creating an inviting and dynamic space for visitors to read and study. The reading zones are designed to cater to different needs and preferences of visitors.

The design proposal is based on a well-defined 6x6m grid that provides the basis for the main structure and internal divisions. The central core is made with clt walls and serves to stabilize the structure against horizontal stresses applied to the building.



FIRST FLOOR 1:250

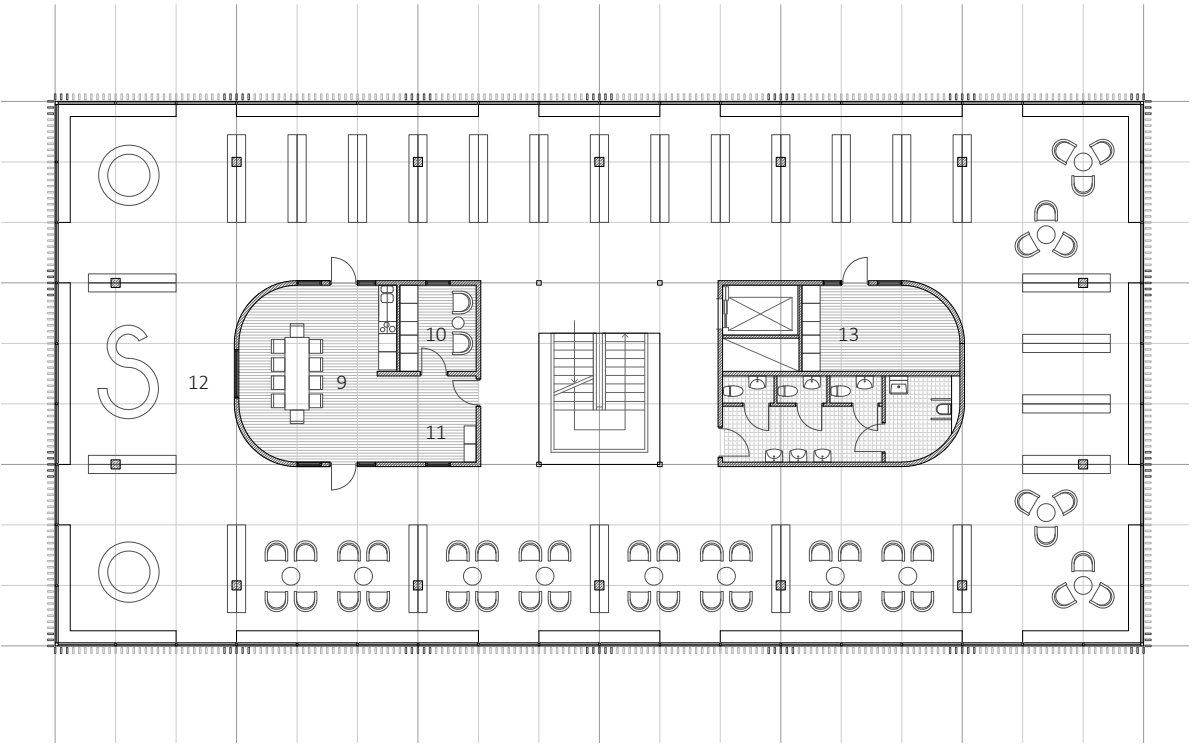
SECOND/THIRD FLOOR

Proposal

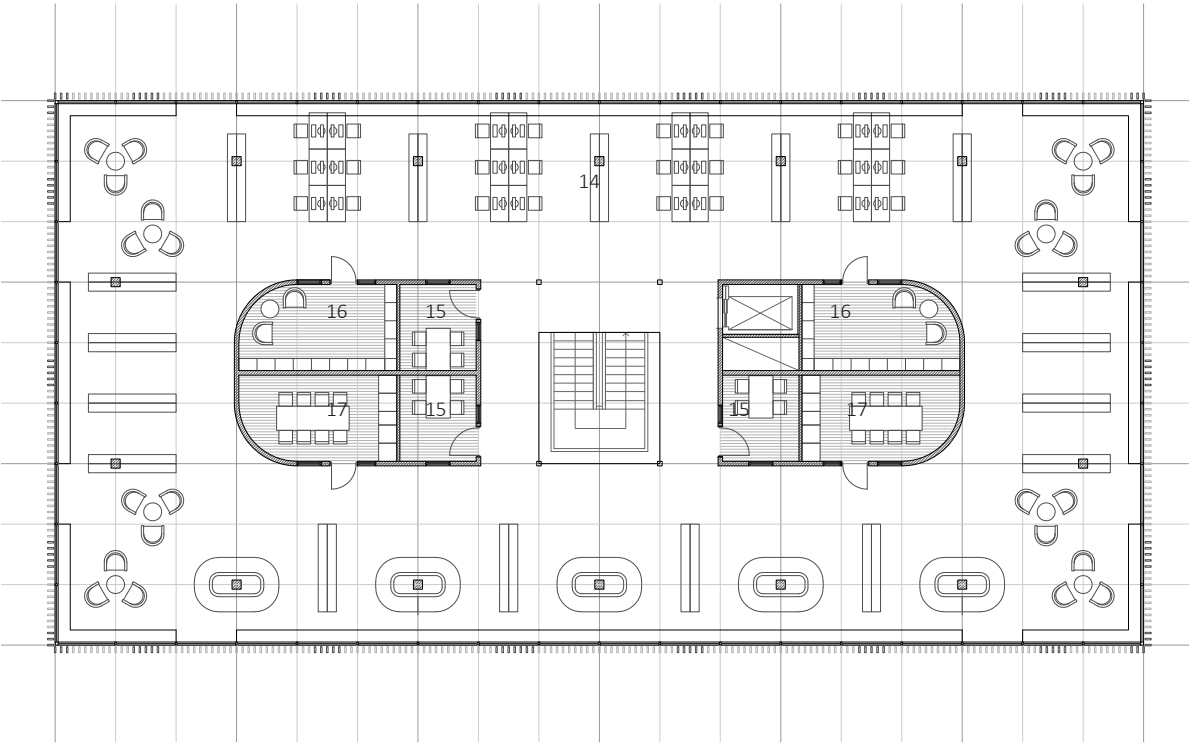
The upper floors of the building can be accessed through the central staircase or the lift, conveniently located near the main entrance. WAS one moves to the upper floors, there is a noticeable and significant change in the layout and design of the internal spaces. The external facade expands by two meters, providing additional space to the entire rooms and creating an airy, more spacious feel. This expansion also leaves the pillars free, resulting in unique and interesting spaces around the central core.

Within the central core, there are several rooms designed for different functions. Upon arriving on the second floor, to the left, one can find a suite of rooms for visitors with children. The largest of these rooms is equipped with a pantry and a central table, providing ample space for visitors to sit, relax, and socialize with others. To the right of the central core, there is a spacious storage room and a set of restrooms available for visitors' use.

On the third floor, visitors can find several rooms intended for studying, with each room varying in size to accommodate different group sizes. In addition to these study rooms, there are two spacious book halls for visitors to explore.

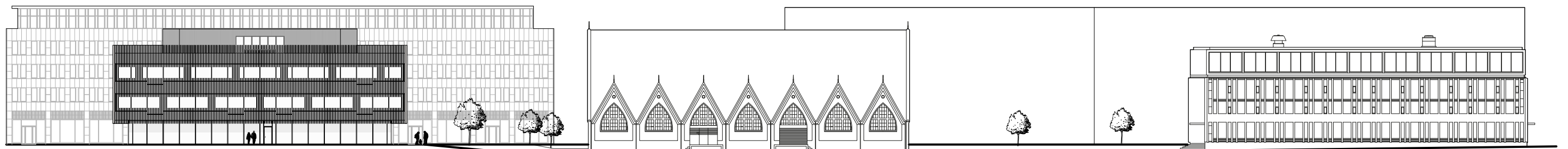


SECOND FLOOR 1:250



- 9. Children room
- 10. Breastfeeding room
- 11. Stroller area
- 12. Children area
- 13. Storage
- 14. Computer Station
- 15. Study room
- 16. Book hall

THIRD FLOOR 1:250



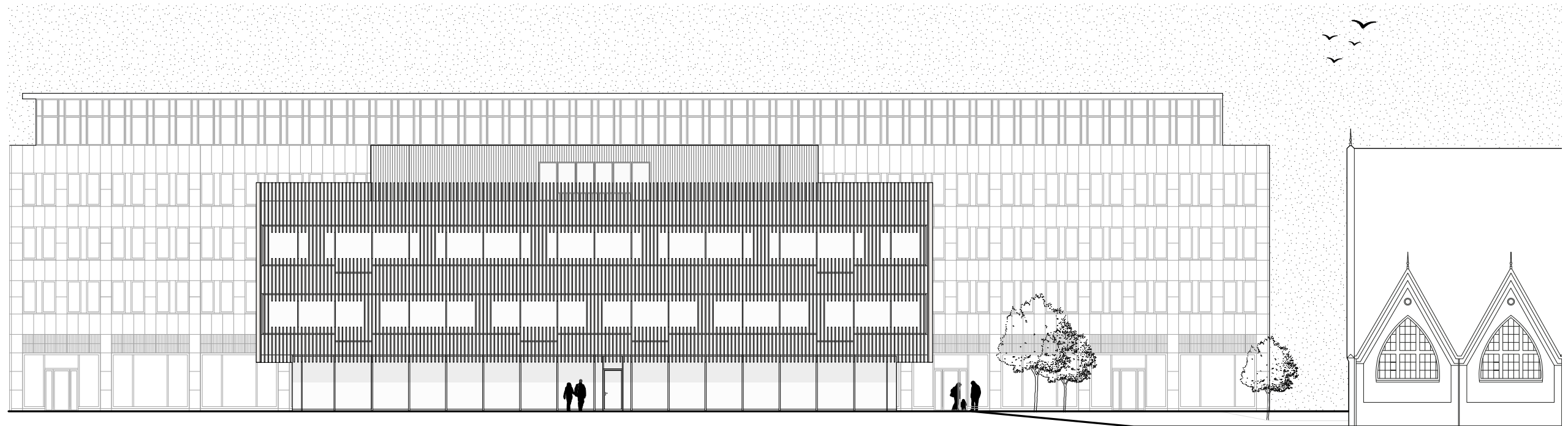
Proposal

Feskekörka

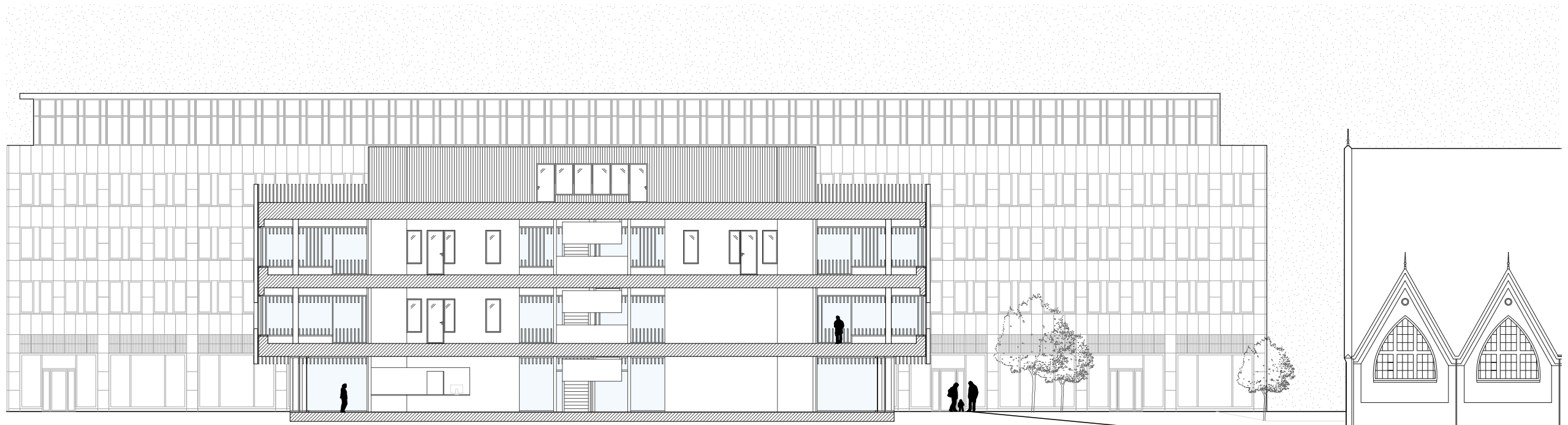
Fesketoget 2



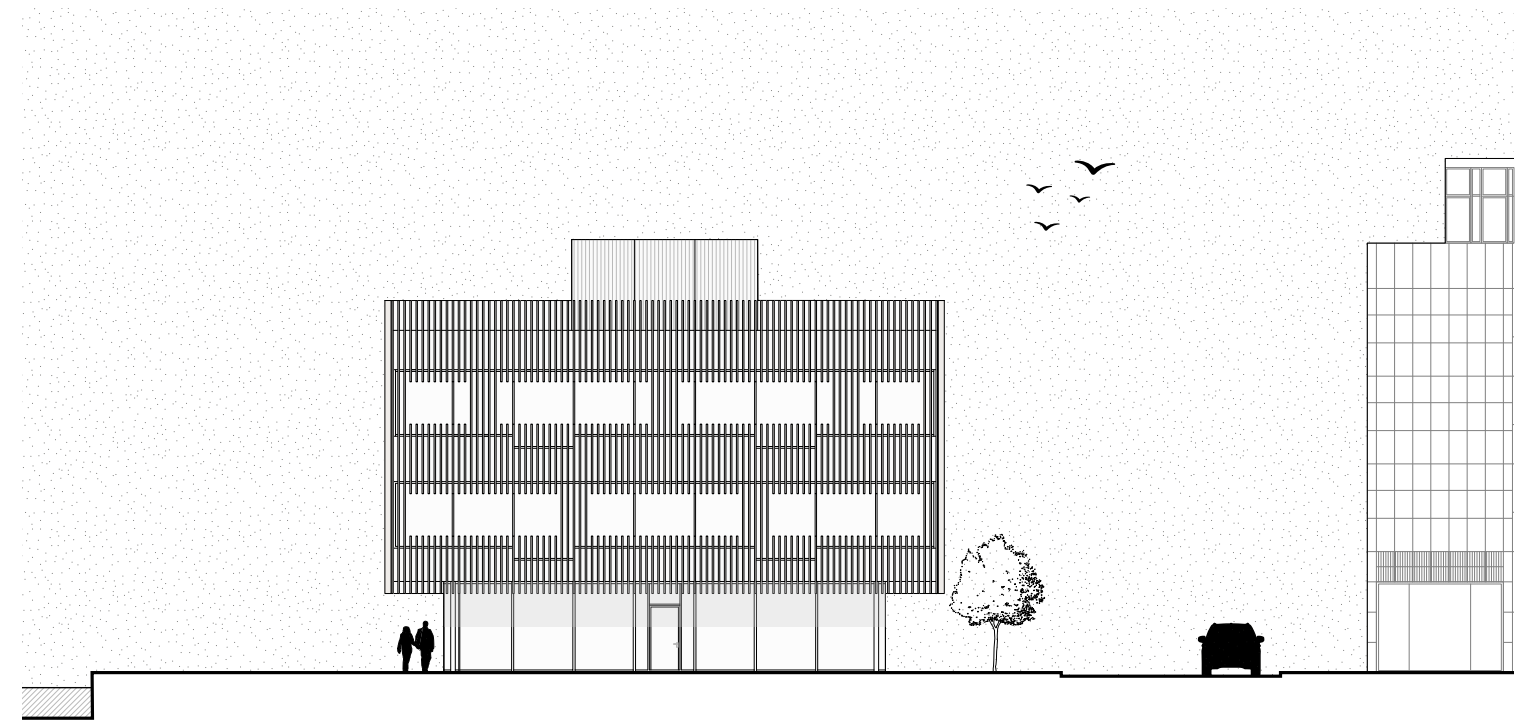
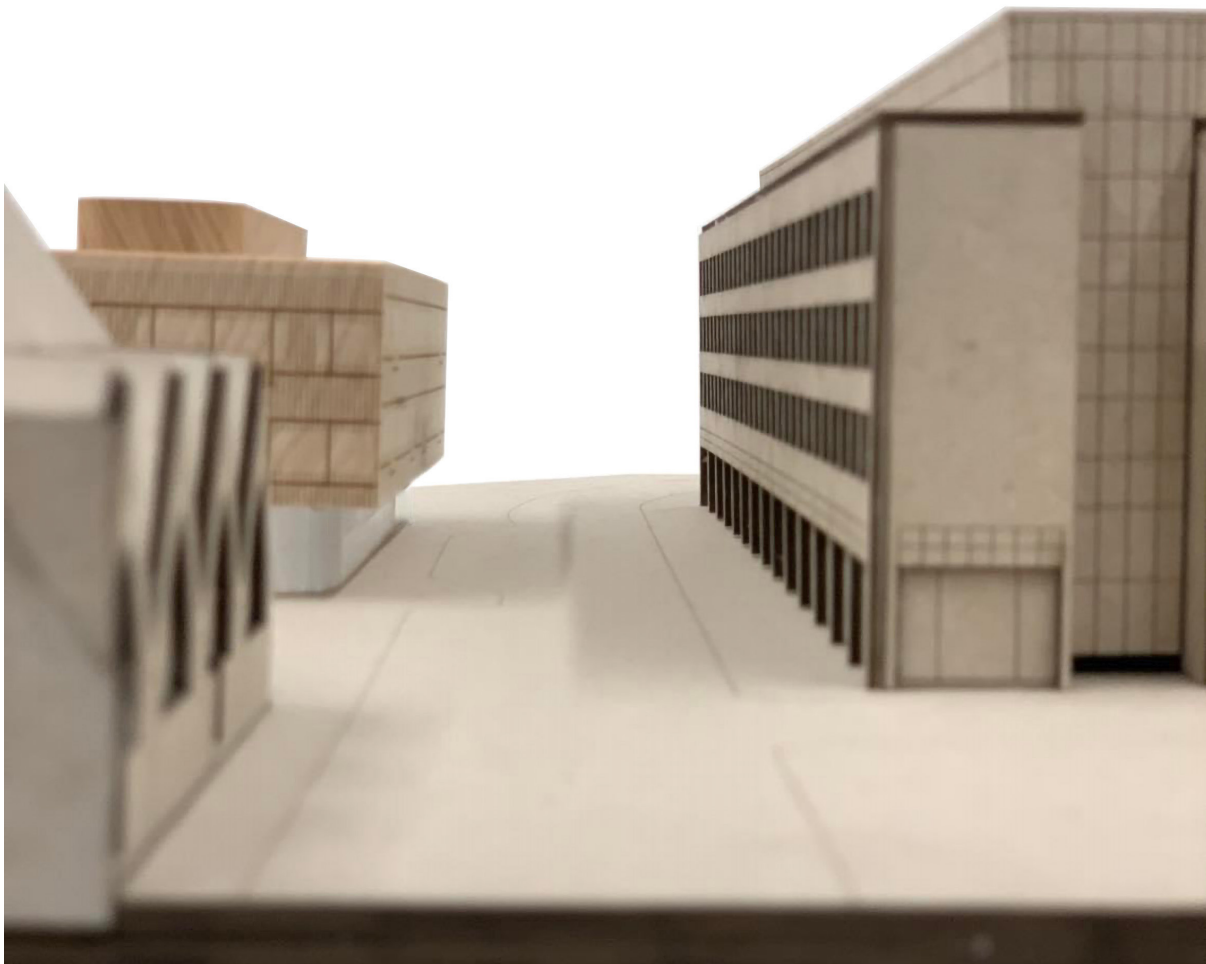
*Elevation Roselundsgatan
SCALE 1:500*



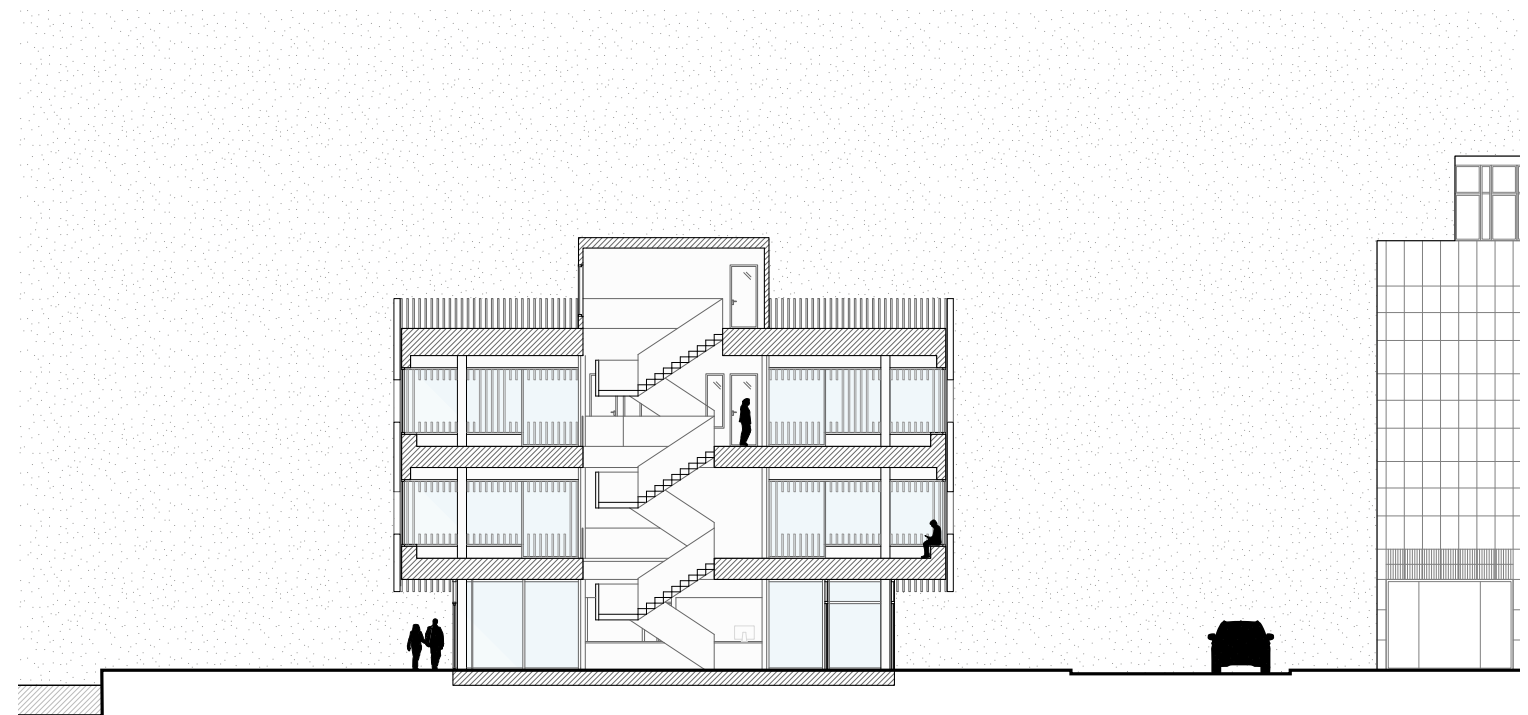
SOUTH FACADE 1:250



SECTION AA 1:250

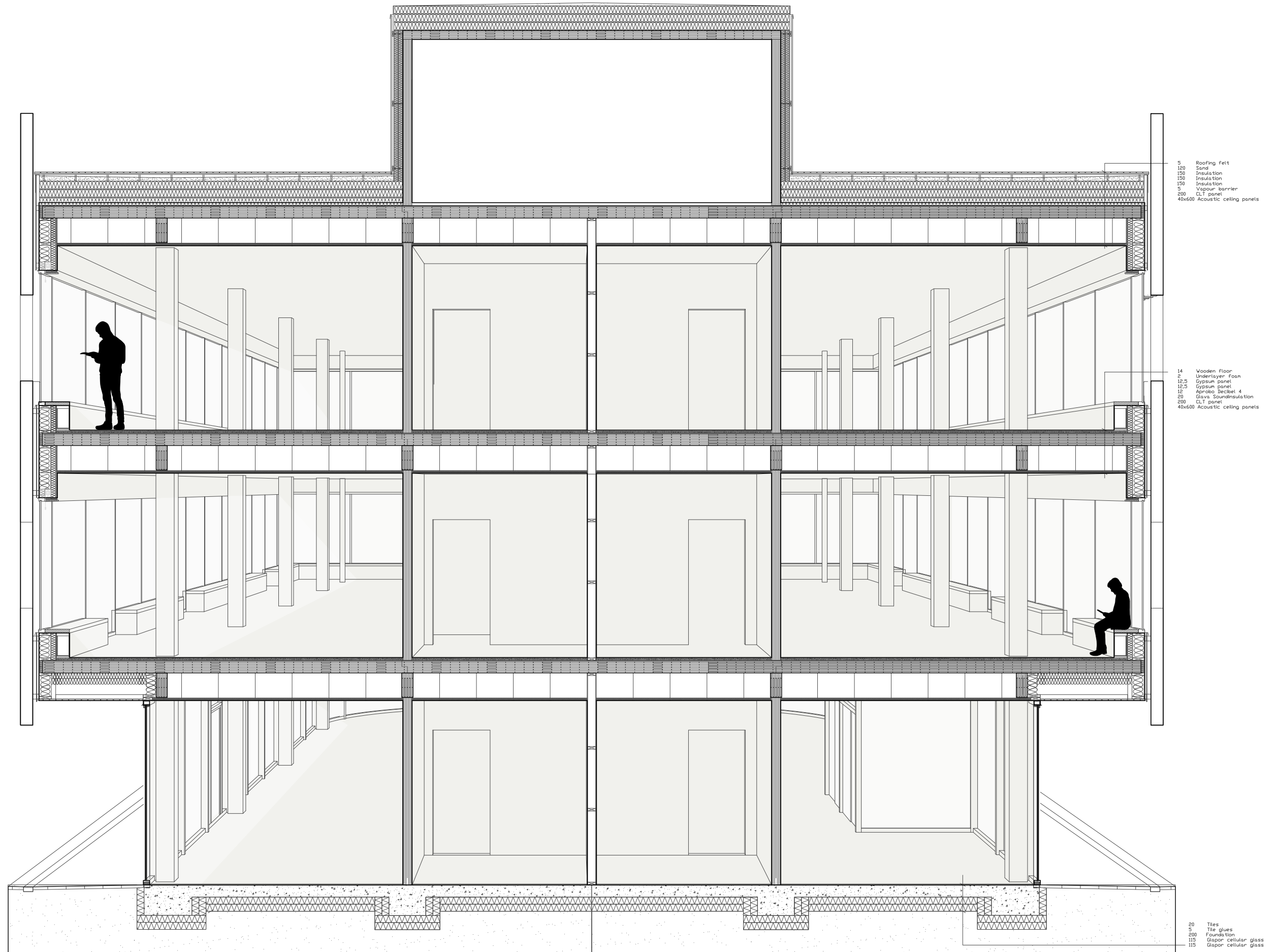


EAST FACADE 1:250



SECTION BB 1:250





Section detail
SCALE 1:60



Facade detail

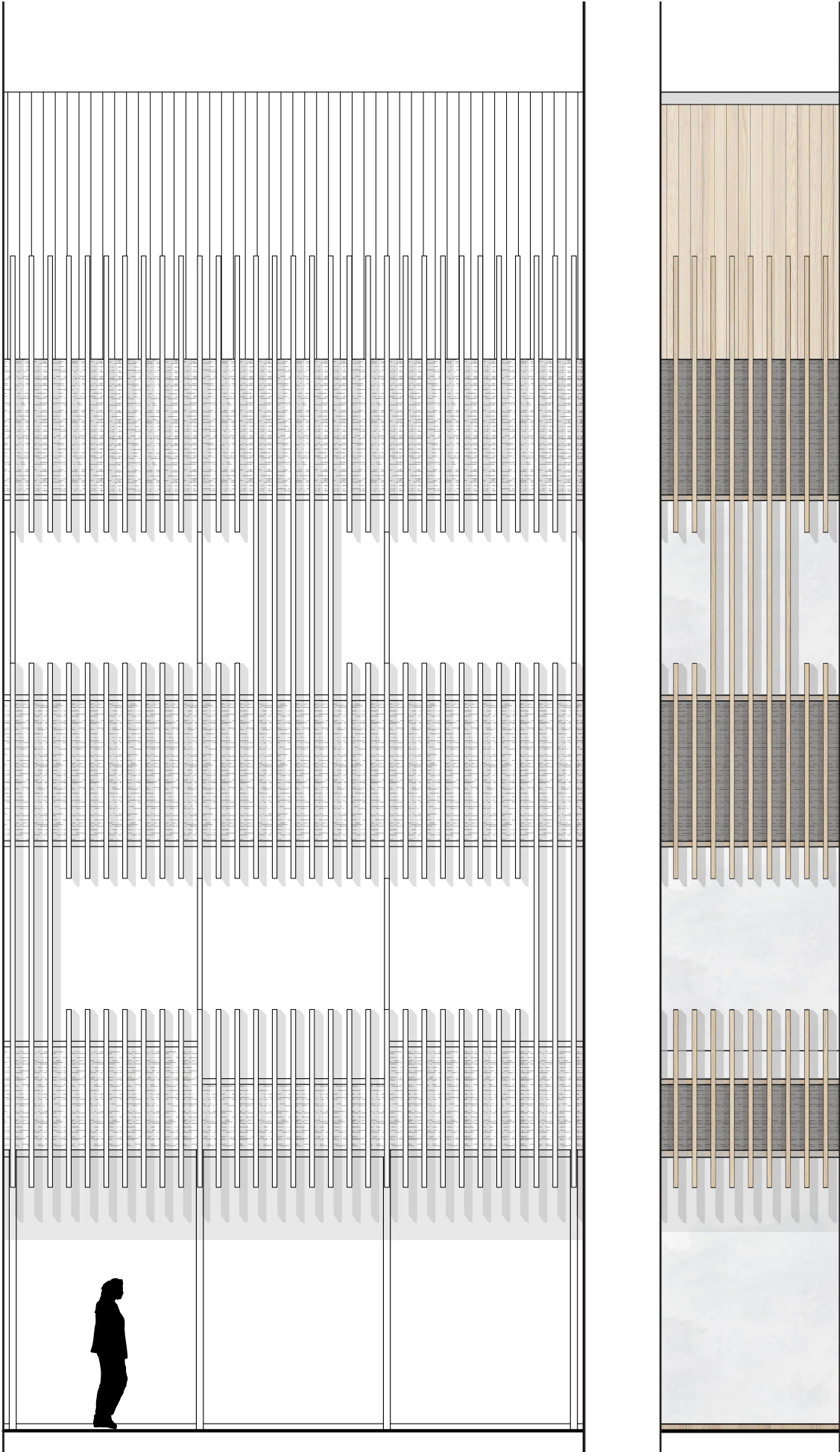
The building’s facade is composed of vertical CLT elements, measuring 200x50 and spaced 200mm apart. These elements are prominently featured on the exterior, creating a striking and visually appealing design. This arrangement provides adequate sun protection during the day, while also creating a unique interplay of light and shadow in the evening.

The building’s facade is intricately connected to the floorplan of the different levels, resulting in a sense of dynamism and movement both in the exterior expression of the facade and in the interior design of the building.

- 14 Wooden floor
- 2 Underlayer foam
- 12,5 Gypsum panel
- 12,5 Gypsum panel
- 12 Aprobo Decibel 4
- 20 Glava Soundinsulation
- 200 CLT panel
- 80 Insulation
- 80 Insulation
- 2 Vapour barrier
- 20x60 Wooden panel

- 20 Wooden panel
- 40x80 Timber frame
- 220 Storage
- 12,5 Gypsum panel
- 125 Gypsum panel
- 80 Insulation
- 150 Insulation
- 2 Vapour barrier
- 40x80 Metall profile
- 10 Cement fiber board
- 200x50 Gluelam element

Facade detail
SCALE 1:30



Facade elevation
SCALE 1:60

CLT detail

- 5 Roofing felt
- 120 Sand
- 80 Insulation
- 80 Insulation
- 2 Vapour barrier
- 200 CLT panel
- 200x400 CLT beam
- 40x600 Acoustic ceiling

- 14 Wooden floor
- 2 Underlayer foam
- 12,5 Gypsum panel
- 12,5 Gypsum panel
- 12 Aprobo Decibel 4
- 20 Glava Soundinsulation
- 200 CLT panel
- 450 Instalation shaft
- 200x400 CLT beam
- 40x600 Acoustic ceiling panels

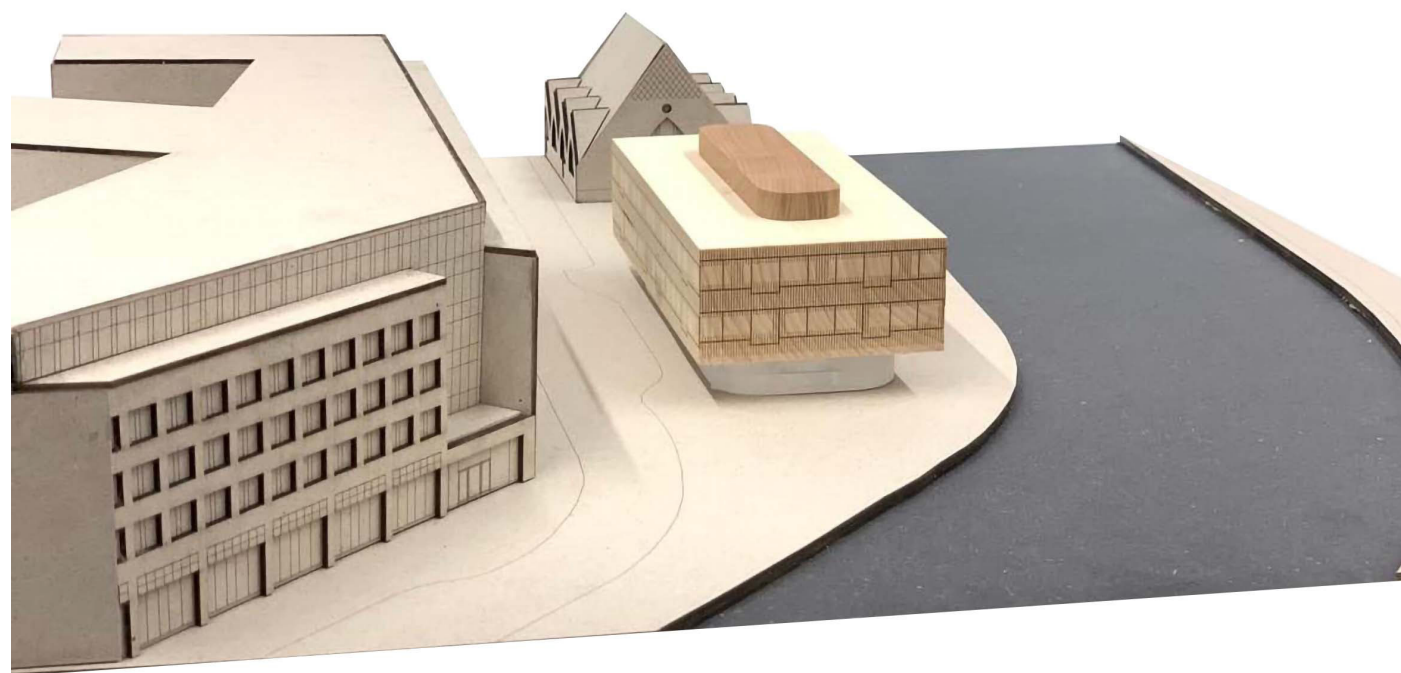
- 20 Tiles
- 5 Tiles glue
- 200 Foundation
- 115 Glapor cellular glass
- 115 Glapor cellular glass

CLT Connection detail
SCALE 1:30





VI.
REFLECTION



Reflection

The purpose of this study is to utilize new wooden components for the design of a free standing public building. The goal of this thesis is to answer the research question by designing a building that harmoniously interacts with its environment, contents, and users. By utilizing new wooden components, I aim to create a sustainable and functional structure that enhances the user experience and effectively accommodates the building's intended purpose.

A three-storey library was designed as a result, with the ground floor showcasing the building's internal function through full glazing. The project utilized a central core made of CLT and pillars made of glulam, which surround the core. The entire structure is clad with vertical wooden elements, providing sunshading and dynamics to the building.

The rapid development of timber as a construction material raises questions about the sustainability and feasibility of continued progress. However, recent examples have shown that timber meets all modern building requirements, and the perception of its flammability as a hindrance to constructing multi-storey buildings is outdated. It is evident that timber has earned its place among the current material canon in construction, and its longstanding tradition as a building material for tall and urban structures could be continued into the future.

The implementation of new timber elements has a significant impact on architecture. Through their use, architects can create more dynamic and expressive spaces that are integrated with the environment and provide a more cohesive user experience. The integration of modern timber components in architecture provides new opportunities for creativity and innovation, enabling architects to push the boundaries of traditional design.

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Images

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