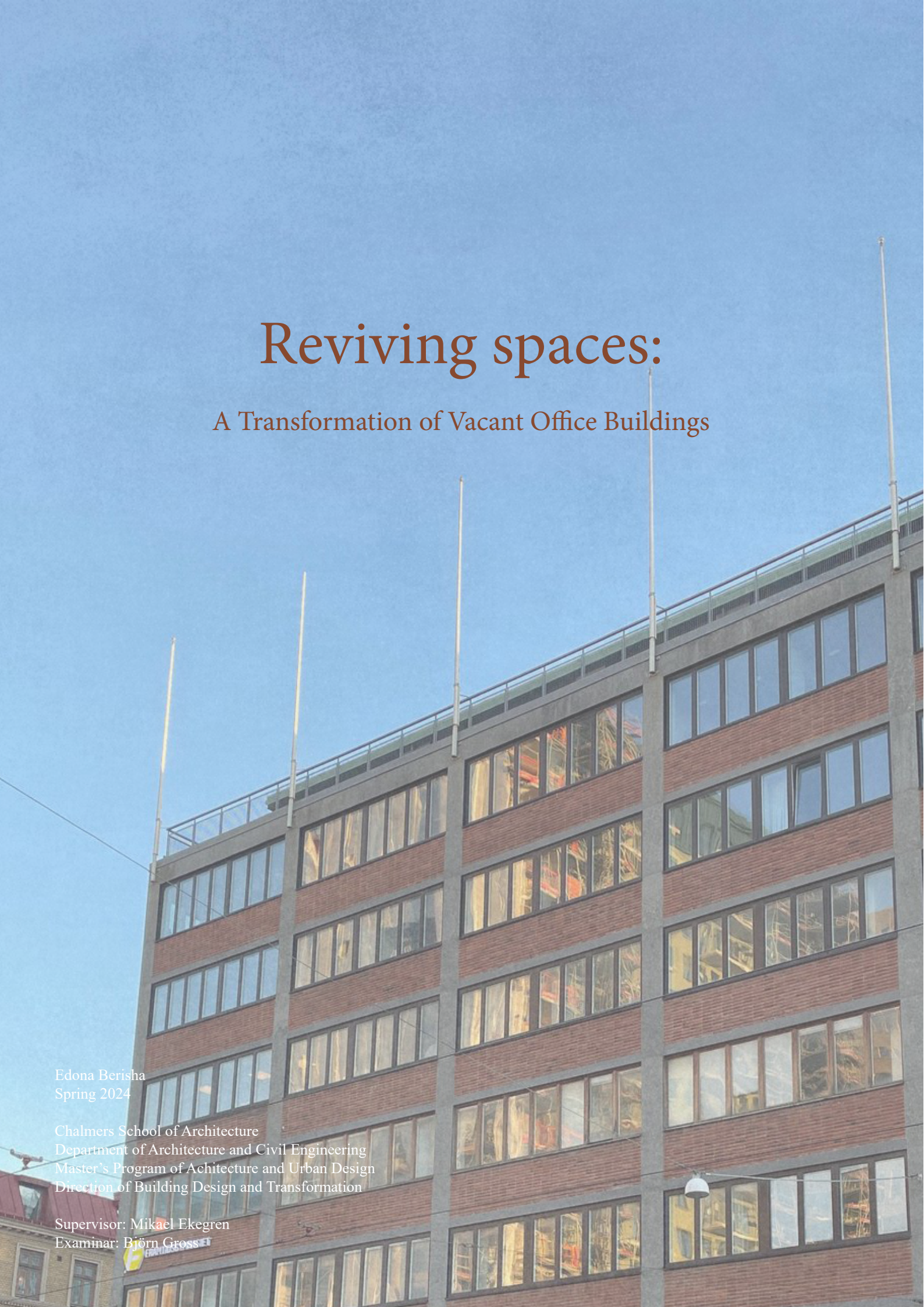
Reviving spaces:

A Transformation of Vacant Office Buildings



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ABSTRACT

The construction industry is today confronted with a spectrum of challenges, such as climate change, strict building regulations, high material costs and expensive housing. These factors have led to complex requirements for constructing buildings that are environmentally and socially sustainable, economically feasible that meet long-term needs.

As new residential buildings are built everyday, there are some existing buildings that remain underutilized for a variety of reasons. This phenomenon has become particularly evident in urbanized areas, where office environments, as a result of the pandemic and the increasing trend of remote work, are now in the shadow of their former use. Here a complex challenge arises: how can we revitalize these underutilized buildings and contribute to solving these challenges?

A potential solution is the conversion of office spaces to housing, however it is not that simple. Above all, it concerns cost limitations and creative design solutions in order to be able to offer qualitative housing as a result. While some of these office buildings may be practically impossible to convert into residences, there is a significant amount of buildings that bear advantageous characteristics such as central locations, panoramic views and an adaptable architectural structure that is well suited for residential purposes.

This thesis aims to explore the potential for the conversion of an office building in Gothenburg into qualitative apartments through sustainable means.

The study will include subjects as site- and building analysis, design and construction solutions, governmental regulations as well as analysis of reference projects.

Keywords: Gothenburg, transformation, office, housing

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INTRODUCTION

PURPOSE

A lot of apartments that are available in Gothenburg are too expensive, especially newly built residential buildings in areas where the income is lower than average. In 2021 there were 5365 new housing units that were built and by 2030 around 4000-5000 housing units will be built (Adin, 2022). Although there are apartments in the market, the waiting que for apartments in the center of the city is up to 17 years, while in the northeast parts of Gothenburg (Hammarkullen, Lövgärdet, Gamlestaden, Hisings Backa and Utby) there were still empty newly built apartments 6 months after the move-in date (Adin, 2022). There is a big demand for apartments in the city center. A solution is to design apartments in commercial buildings in the city center that are not fully used.

In the big cities of Sweden it has become clear how much the vacancy of office buildings has increased since the pandemic. In Stockholm the vacancy increased to 5% in the inner cities and 20% in Kista, which is the biggest office area outside of the capital (Hellekant, 2021). The situation was better in Gothenburg, but Malmö is struggling with around 10% vacant office spaces in the city center and Västra hamnen. According to Anders Elvinsson, head of consulting at Cushman & Wakefield, the need for office space is expected to decrease in most cities over the next two to thre years.

There is a trend towards reduced profit on office buildings, while vacancies are increasing. Companies are considering reducing office space per employee (Hellekant, 2021).

Elvinsson recommends property owners to plan for measures that increase attractiveness, including modern office buildings with good service and public transport connections, or to consider conversion of office space to other purposes. This points to an upcoming adjustment period within the office property market.

The Swedish Housing Authority has presented a report that highlights the possibility of converting office spaces into homes due to the expected increase in home and remote work (Hellekant, 2021). An important conclusion is that there are no general obstacles to such transformations in planning and construction processes. Instead, feasibility often depends on housing market prices and rents. The financing of these projects is broadly similar to the financing of new housing production, and financial calculations are essential.

Although office-to-residential conversions were previously affected by falling housing prices, the opportunity is now being explored again, including the conversion of centrally located office properties (Hellekant, 2021). The Housing Authority emphasizes that conversions to housing have occurred for several decades and contributed to 11 percent of new housing in Sweden, usually in small-scale projects. This trend is beneficial to property owners and can improve their finances by reducing vacancies. In 2020, the number of conversions from premises to dwellings increased, and over 3,100 new dwellings were created in this way, the highest number since 2007.

PURPOSE

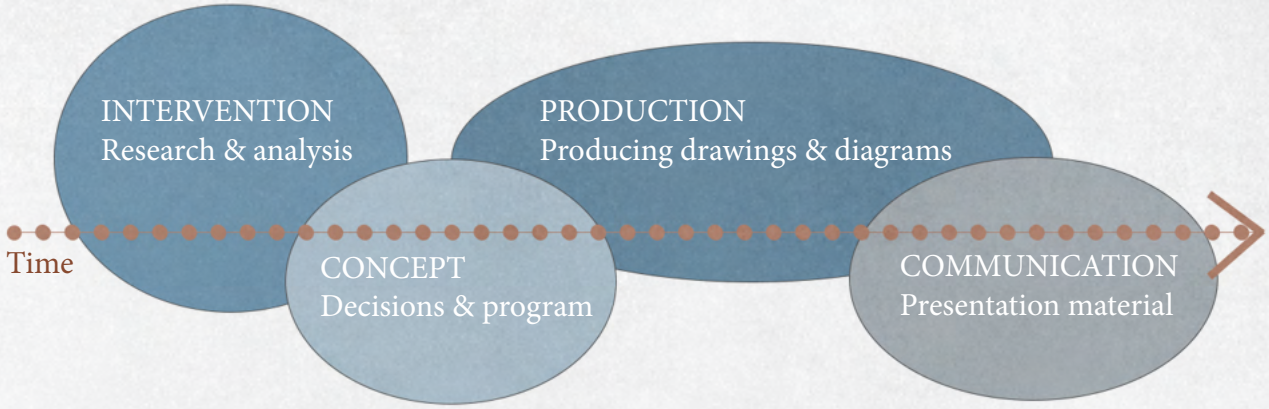
This thesis will contribute to the research about transforming office buildings to housing. There is a need for more types of reports and examples of this subject, especially the process of this transformation. Working with an already existing building it repurposes the vacant spaces and reduces the need for new construction as well as conserves resources. Furthermore, it promotes urban density and contributes to lower carbon emissions due to the closeness to the city and possibility to a well functioning public transport. To research qualitative housing options it addresses the housing crises as well as allowing energy-efficient retrofits that long-term reduces energy consumption and greenhouse gasses. These solutions promote social, ecological and economic sustainability.

Purpose: Finding a sustainable solution to contribute to the research about transformation of vacant office buildings to housing.

THESIS QUESTION

How can a vacant office building be transformed into qualitative apartments studied through the example of Första Långgatan 16 in Gothenburg?

METHODOLOGY



For a nuanced research and analysis there will be site visits included and documents about the building from the city planning office of Gothenburg (Göteborgs Stadsbyggnadskontor) will be analysed. Case studies of successful conversions will be studied. For this project it is essential to obtain an overview of cost-effective and sustainable construction materials and methods suitable for residential use, emphasizing energy-efficient solutions and low-maintenance options.

Furthermore, time will be spent on research about local regulations and statistics about the area to understand demand and rental rates, architectural and design principles for efficient space utilization. To make the project as real as possible there will be a dialogue with architects with experience in conversions of office buildings to housing as well as architects that have designed the buildings in the area that are being built today.

Along the way a design log will be used for documenting the process and two built physical models of different scales for a better understanding of the building. When producing material the programs Autocad will be used as well as Photoshop and Indesign for the layout and final touches.

METHODOLOGY

DELIMITATIONS

Time

This master thesis will take place during the spring term 2024 as well as during the preparation course in autumn, which in total becomes 45 credits (15 + 30).

Context

The project involves visiting the site and examining drawings of the current building to understand its structure. Additionally, there will be analyses of documents outlining future plans for the area to ensure the building's design aligns with the envisioned future landscape. There will not be any urban planning aspects included except studying the site.

Fictive

The thesis is intended solely for exploration purposes and will not be implemented in reality. However, the goal is to ensure its realism to the greatest extent possible. To achieve this, engagement in dialogue with the municipality will be undertaken, and an attempt will be made to strive for a realistic process of a building being transformed into housing.

Economy

Some economic factors will be included such as material decision and rental considerations, however it will not be the focus of the project.

Ecology

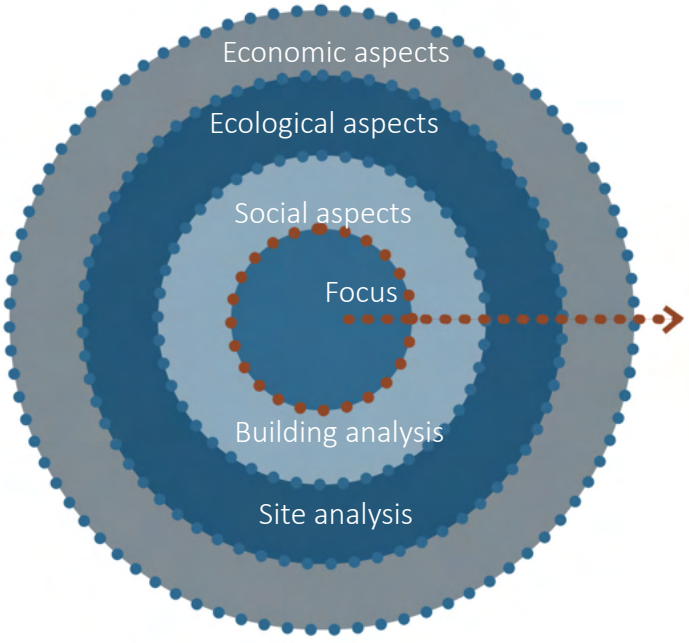
By aiming to utilize much of the existing material in the building for the proposed changes, there will be a reduction of the environmental impact. Additionally, there will be some solutions for cultivation in the common spaces, although it will not be the main focus.

Social

There will be a big focus on the common spaces and the apartment arrangement to enhance social living. Considerable effort will be dedicated to designing plans and features to provide attractive housing options that offer diversity within the area while maintaining a character that complements the existing building.

Regulations

As the project aims for realism, there will be a strong emphasis on meeting the Swedish building regulations (PBL and BBR) as well as standards set by the Swedish Institute for Standards (SIS).



THEORY

RESIDENTIAL QUALITIES

The quality of the architecture of a residence includes aspects such as details, design of rooms, light conditions, views, internal spatial organization and their interaction with surrounding environments such as the yard, the block and the facade and volume of the residential building (Caldenby & Trygged, 2019).

Openness & enclosure

Planning the home to combine openness and enclosure is an advantage (Caldenby & Trygged, 2019). Variation in the characters of the rooms improves the flow of movement, and a well-defined entrance can turn the short passage to the main rooms into a separate room.

Buildings form and facade

A great quality is if the form can achieve lighting from more than one direction into the apartment (Caldenby & Trygged, 2019). Furthermore, by creating recesses in the body of the building, the design and placement of balconies is enabled while ensuring that light from different directions reaches far into the apartments. The balcony's recess also plays a role in the light conditions inside the apartment, which contributes to the light reaching deeper into the building. Other elements such as bay windows, corner windows or French balconies can also provide an interesting light and atmosphere (Granath & Nylander, 2023).

Room form and organisation

Qualitative stairwells emphasize rationality, efficient use of space and access to daylight (Caldenby & Trygged, 2019). Rooms that are in need of more space for installations, such as bathrooms and kitchens, are grouped around the stairwell for easy access and possible future maintenance efforts and upgrades. Increased rationality in housing design is achieved through few and coordinated shafts for kitchens and bathrooms

Furnishable space

It is a good quality for a room to be as furnishable as possible and not let communication areas disturb (Caldenby & Trygged, 2019). Placing a door in a communication area such as halls and passages, against a wall, constitutes a quality because it does not take up floor space for furnishing. If the door opens inwards towards the room, which is a nice touch, and is placed a little further from the wall, it can even provide space for a row of wardrobes. This placement of the door allows the room to be presented and, together with sliding doors in the corners of the room, it enables furnishability in the room.

Space efficiency

Using the space efficiently in a home is an important part of designing housing, a way to create homes where the residents do not have to pay for space that they do not fully use (Granath & Nylander, 2023). From a housing perspective, good surface efficiency is crucial to keeping housing costs down. For example, it is very impressive to create a three-room apartment of 70 square meters.

Circulation and movement

Being able to move differently in the apartment and reach rooms from several directions through circulation contributes to increased flexibility and usability in the home (Caldenby & Trygged, 2019).

RESIDENTIAL QUALITIES

Flexibility

Adaptable and flexible apartments that suit different households and adapt over time enable versatile use and meet varying living preferences (Caldenby et.al., 2020). They allow both privacy and social interaction and provide the opportunity to remain despite changing housing needs, promoting neighborhood cohesion. There are various strategies that can be used when designing adaptable apartments:

Multipurpose rooms:
General rooms that can be used in different ways and have no specific function (Caldenby et.al., 2020). These rooms are usually 12, 14 or 16 square meters in size. Being able to choose between different positions for the living room is also a big advantage.

Parallell rooms:
If rooms in an apartment do not act as walk-through rooms and can be used separately, with the possibility of closing some and opening others for social occasions, this can promote a more zoned plan where privacy can be more clearly defined (Caldenby et.al., 2020). This is particularly beneficial in collective or generational housing. A central hall can be a way to achieve this, despite sometimes being considered as unused space, as it allows the kitchen or living room to be undisturbed compared to when these are one large room, which can work for a family with children who want to be more social, but not as good for a collective.

Variable number of rooms
This strategy involves planning room sizes, window and door placements so that a room can be divided into smaller rooms (Braide, 2023).

It is a quality that is appreciated, as it strengthens the residents' identity and sense of belonging when they are able to influence their own home.

Links:
Apartments where rooms are connected to more than one room increase the opportunity for the resident to decide themselves how the rooms should work together, which enables a more varied use of the home over time, as the home suits more types of households and their housing needs (Braide, 2023). On the other hand, more doors/links can negatively affect furnishability.

Autonomous room:
A room that is separated from the rest of the apartment is a desirable feature, if it is located so that the kitchen, bathroom and entrance can be reached without having to pass through other rooms, such as the living room or bedroom (Braide, 2023). It can function as a separate unit that can either be rented out or used in, for example, health care situations, where access to other parts of the apartment is not necessary. Another advantage is if the room is larger and has a separate entrance.

Walk-in closet with daylight:
A storage space with daylight increases flexibility, as it can be converted into a small study or bedroom for children (Braide, 2023).

RESIDENTIAL QUALITIES

Extra ceiling height

Ceiling heights of at least 2.6 m and higher are perceived as brighter and airier as they allow larger windows and more daylight (Granath & Nylander, 2023).

Balcony

The balcony has three important functions: as a private outdoor space for living, as a replacement for the garden in ground-floor dwellings, and as a design opportunity for the building's facade and volume, helping to define the boundary between indoors and outdoors (Caldenby et.al., 2020).
The balcony has become essential for the social spaces of the private residence and has risen in popularity among speculators (Caldenby et.al., 2020). This is partly due to changing lifestyles that increase the demand for terrace living and partly to the lack of well-arranged communal outdoor spaces. With residential yards being replaced by roof terraces, the balcony becomes an indispensable part of the home. In new small apartments it often disappears completely or is replaced by a French balcony, while new condominiums almost require a balcony to be attractive. The most interesting new balcony projects are characterized by furnishability, room quality and integration with the indoor rooms. They are furnished for residents and guests, with a focus on the same careful design as the indoor rooms. In addition to the surface, factors such as enveloping atmosphere, protection against the weather, orientation, integrity and view are decisive for the experience of the balcony as a significant space in the home.

ASPECTS OF A PROJECT

SOCIAL

In addition to residential qualities, there are other significant factors that should be considered in both new construction as well as renovation and conversion of existing structures. Therefore, an overview has been made to identify important aspects in this area divided in a social, ecological and economic point of view.

Building

For sustainable urban development, it is important to create vibrant urban environments with mixed activities, where active ground floors contribute to life and movement at different times of the day (Granath & Nylander, 2023). This promotes safety and security and creates job opportunities. It is a good quality if common areas in an apartment building convey representativeness, a welcoming atmosphere, and security, with ground floor apartments shielded from view, weather-protected entrances with seating, and stairwells illuminated by natural light. When designing residential buildings, it is also important to plan micro-spaces such as bicycle storage, laundry rooms, waste rooms, and storage units in a way that enhances safety and security, for example, by ensuring visibility from the street, apartments, entrance, courtyard, or stairwell. Social areas, such as meeting rooms, hobby rooms, communal roof terraces, or greenhouses, are a great asset in an apartment building and promote interactions among residents in the building or neighborhood.

Courtyard

A well-functioning residential courtyard should have approximately 1500-2500 square meters of space, including private outdoor areas, paved areas, green spaces, parking spots, walkways, playgrounds, bicycle

Each apartment should have at least 10 square meters of outdoor space/courtyard. The courtyard should be private for residents, promoting safety and a sense of belonging, and offering zoned areas where residents can be partially secluded from other tenants. Qualities of a good residential courtyard include sufficient sunlight, a good balance between green and paved areas, opportunities for gardening, and generous playgrounds for children.

Diversity

A residential building with a mix of different apartment types creates the conditions for a good living environment and social stability (Granath & Nylander, 2023). The diversity means that there are apartments with different numbers of rooms, from one room and kitchen to several rooms and kitchens.

Collective living

Living collectively means that several people who do not belong to the same household share a home, where common areas can be the kitchen, living room and bathroom, while the bedroom is the private room (Boverket, 2023). Since 2016, according to BBR, it has been possible to build these types of housing for people who are not students, as the need has been great for new arrivals and young adults. Reasons for wanting to live collectively are, in addition to financial reasons and a lower climate footprint by sharing resources in the home, to feel community in everyday life and not be socially isolated, both for younger and for older people where it is appreciated to have a private bathroom as well. The bedroom that becomes the individual residential part must meet the design and accessibility requirements of a residence for one person, but can be at least 10 square meters and one bathroom may be

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shared by a maximum of three people. The common spaces must be generous to compensate for not having your own apartment.

However, these social aspects that are strengthened through collective housing come with challenges such as the relationship between private and common, as well as how open to the environment it should be (Cladenby et.al., 2022). The forms of tenure that provide the greatest opportunity for autonomy, reasonable costs, social cohesion and mix are the non-speculative ones, as it turns out that cooperative collective housing in Denmark has a large social mix in the households (age, income, family relationships). Even private ownership can mean autonomy, but have a negative impact on the social mix and cohesion due to housing market prices and the fact that the association does not get an opportunity to influence who the home is sold to.

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Energy efficiency

A third of Sweden's total energy use comes from the building sector, where significant amounts of energy are needed for ventilation, lighting and water heating (Naturvårdsverket, 2023). Through technical measures, such as increasing heat recovery in the ventilation systems, energy use and the environmental impact can be reduced. A popular technical solution includes the use of renewable energy and the installation of solar cells or solar collectors, which directly convert sunlight into electricity and heat water and indoor air.

Energy use can be reduced in various ways. The supply of district heating, for example, enables a more efficient use of energy resources by using energy that is difficult to use directly in individual buildings, such as waste heat from industries (Naturvårdsverket, 2023). A heat pump also offers a lower electricity consumption compared to an electric boiler. Behavioral changes, such as reducing driving in cities, can also contribute to a decrease of energy use.

Builders and property owners can obtain an energy declaration and implement the recommended measures to get tailored proposals for their building (Naturvårdsverket, 2023). In the case of major renovations, it is beneficial to replace or improve windows, walls and ceilings to achieve a lower U-value (heat transmittance), which provides a more pleasant indoor climate. Windows can also be designed to maximize daylight and thus reduce the need for artificial lighting.

Updating heating and domestic hot water systems and purchasing energy-efficient lighting, appliances and electronics are also important measures (Naturvårdsverket, 2023). In order to achieve an approved building, the requirements for energy efficiency must be met, but exceeding these requirements, for example by building passive houses, is beneficial in the long term.

Reuse of greywater is an additional way to save energy. Wastewater from showers, baths, sinks, kitchens and laundry is called greywater (HSB, 2024). Today, a large part of the drinking water is used for showering, washing and toileting and only 10 liters go to food and drink, out of the 140 liters of water we use per person per day. Both waste water and toilet water flow into the same drain, although greywater from showers, baths and sinks actually has great potential to be reused by being separated from toilet water.

Installing a local treatment plant can save large amounts of water, relieve municipal energy and water systems and better capture microplastics that larger treatment plants cannot handle (HSB, 2024). By cleaning and reusing the water from bathrooms, you can reduce water consumption by up to 60 percent and energy consumption by 80 percent in a property. Although it is difficult to change sewage systems in existing buildings, it is possible to introduce these systems in new buildings.

Material and construction process

Of the emissions made up by the construction sector, approximately 55% comes from the heating of buildings, 26% from construction activities (new production/demolition) and 19% from other property management such as renovations and conversions (Boverket, 2018). The materials used in a building make a big difference and therefore it is possible to reduce the climate impact of buildings by increasing the

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use of bio-based materials, such as wooden frames. It counts as bio-based as it is renewable and binds carbon, which does not contribute to increased greenhouse gas emissions. On the other hand, the climate effect is affected by forestry, maintenance, the longevity of the building and material management after demolition, and that methods for handling wood as a carbon sink in life cycle analyzes are missing. Despite these obstacles and uncertainties surrounding wooden house construction, interest in wooden frames has increased and produces lower emissions than concrete and steel.

Concrete is most common in apartment buildings, wood in single-family houses, and steel in larger single-story buildings. Concrete is a building material that contains the binder cement, which contains a large amount of carbon dioxide. In contrast, the Swedish cement industry works to reduce concrete's climate impact by replacing the binder with slag and fly ash.

Steel is a very resistant material where the biggest emissions come from the reduction of ore to iron, where coal and limestone are used. The steel industry is also trying to find new environmentally friendly solutions where hydrogen can be used instead of coal and a big advantage is that steel can be recycled to a large extent. No frame material is the best in all aspects and technical requirements must be met, which requires careful planning when choosing materials, both for the frame, but also for other parts of the building such as insulation (mineral-, stone- and glass wool, wood fiber, straw, etc.) and facade materials (bricks, plaster, wooden panels, boards, sheet metal, etc.).

A way to reduce climate emissions is to reuse building materials in a project instead of producing and buying new ones (Boverket, 2024).

If it is not possible to reuse the next step is to try to recycle, so that the material can be processed again. In 2020, it was estimated that approximately 53% of the non-hazardous construction and demolition material is recycled. Building products that are assembled such as windows, facade elements and door parts are difficult to separate if they are not reused. It is very important to build in a way that makes it easy in the future to take apart the materials and be able to sort it out. A challenge with recycling is the joining and purity of the materials, during the process there is a high risk of materials being mixed, so it is essential that there is a good knowledge of the materials being sorted and that the process is accurate.

Recycling of usual materials within the building sector:

- concrete (crushed concrete can replace natural stone and gravel in some cases, lightweight concrete can often be recycled unless it is old and contains uranium)
- steel (often recycled with the mixing of new ore, but can in many cases be reused)
- wood (not recycled as much, must be clean of paint, glulam works well for recycling)
- gypsum (recycled if it can be kept clean)
- glass (limited recycling possibilities, must be very clean)
- insulation material (mineral, glass, and stone wool is recycled to a limited extent as it needs to be very clean, older insulation may contain freon and CFC gases)
- metals (highly recycled)
- plastic (low recycling rate, better sorting required)
- brick (if it is not recycled, it usually goes to a landfill with other minerals).

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Life cycle analysis (LCA) is a tool used to calculate a building's environmental impact from raw materials to waste (Boverket, 2018). But there is limited knowledge about the climate impact of buildings over their entire lifespan. In addition, there is no direct economic benefit from building with less climate impact, which makes it difficult and expensive for developers to choose climate-friendly methods and materials. The location is also of great importance, depending on transport and access to locally produced material. An LCA for a building therefore gives different results depending on where the building is located. To reduce this problem, the Housing Authority has proposed measures: information on life cycle analyses, climate declarations for buildings to increase awareness, the authority's efforts to reduce climate emissions and criteria for life cycle analyzes in public procurement.

Biodiversity and Green roofing and walls

In order to adapt a building to the climate and strengthen biological diversity, there are various methods that can be applied. A common method is to take care of the amounts of stormwater with the help of green roofs where the water is retained and delayed in the plant bed (Boverket, 2019). The thicker the roof, the more water can be handled, greater conditions are created for vegetation and is more noise-reduced. Another is to dress the facades with climbing plants that can act as both noise-reducing insulation and can reduce urban heat islands in a city due to the plants having a cooling effect in the urban space. Climbing plants are usually an advantage in the facade as they can protect against driving rain and maintain a better energy balance in the building by shading it during the summer and letting the sun's rays through during the winter and autumn. The disadvantages can be that the climbing plants can damage or push through a facade, however with thoughtful planning and maintenance as well as the right facade, it can be avoided.

Planning for green roofs and walls in a building can compensate for the surface the building covers and benefit biodiversity as long as there is knowledge of the species selection and that the vegetation is adapted to the conditions of the site (Boverket, 2019).

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Material and energy efficiency

Which materials that are chosen in a building is heavily influenced by climate adaptation as well as the economy (Boverket, 2018). Financial controls that affect the construction process include, among others, the carbon dioxide tax and the energy tax, which are applied to transport and the use of work machines on the construction site. Therefore, it is essential to strive for a balance between materials and a process that is both economically sustainable in the long term and climate-smart. Many factors must be considered, such as the care and maintenance during the building's longevity. It is therefore important to build in a way and choose materials that are easy to assemble and require minimal maintenance to reduce costs, as well as materials that allow quick and cost-effective repairs. It is equally important to invest in energy efficient designs and installations that in the long run lead to lower costs and less maintenance.

Affordability and marketability:

It is of high importance to plan for a mix of housing types and sizes to accommodate various income levels, including affordable housing (Boverket, 2024). This approach is critical to ensuring that housing is accessible to different groups of people. Municipalities have to ensure a long-term plan for housing that balances different types of housing and ownership forms, thus catering to diverse market demands. Furthermore, aesthetic appeal and high-quality design is important for enhancing the marketability and value of properties (Boverket, 2020). These features play a big role in attracting buyers or renters and can support higher prices for well-designed and well-located homes. They also encourage the development of mixed-use environ-

Transportation and accessibility:

There is a great importance of accessibility to public transportation. The Swedish housing authorities recommend integrating good public transport links to increase the attractiveness of residential areas and reduce transportation costs for residents (Boverket, 2024). Additionally, offering modern amenities such as bicycle storage and electric vehicle charging stations is crucial for meeting the evolving needs of today's residents.

Standardization

With the high costs, it is relevant to find different solutions on how to keep the costs of the newly designed apartments down. A solution is to design in a way that fulfills the criteria to receive support and to design with repetition and standardization that lead to faster and cheaper housing production, which means focusing on a limited number of apartment types and variants of kitchens and bathrooms (Granath & Nylander, 2023).

Apartment size

The sizes of the apartments have decreased over time, where, for example, a two-room apartment decreased from 60-65 square meters in the early 2000s to 40-45 square meters in the late 2010s (Caldenby et.al., 2020). The trend towards smaller housing continued in the 2010s, and in 2019 the government's Committee for Modern Building Regulations proposed changes to build smaller apartments with bedrooms of 4.5 square meters and living rooms of 9 square meters. Rental costs have increased sharply where 90% of the increase is due to political decisions. Production costs also increased 40% from 2010 to 2017 mainly in

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metropolitan areas. An OECD study from 2017 shows that Sweden has the highest housing costs for rented housing concerning disposable income, but the lowest for owned housing.

Support

Support can be granted to build new homes, make extensions, or convert existing buildings into homes, provided they are to be rented out (Boverket, 2024). For conversion projects, the building must have been intended for use other than residential for the past eight years. In Gothenburg, the support is 5,800 crones per square meter of living space (BOA). For apartments with areas up to and including 35 square meters, the highest amount of support is given in each region. For apartments that are larger than 35 square meters but do not exceed 70 square meters, support is given with 50 percent of the highest amount. No support is given for areas over 70 square meters. Common spaces for activities such as meals, socializing, hobbies, and recreation can be supported with 50 percent of the maximum amount. If the energy use corresponds to no more than 56 percent of the Housing Authority's building regulations, the amount of support can be increased by 75 percent of the basic support.

THEORY
CONCLUSION

When designing a building, different types of spatial qualities can be applied and it is essential to start from the existing ones and reinforce them. As offices do not have similar requirements for daylight, they are often built deeper than apartments, which can be a challenge. A good strategy for this conversion is to find an office building that has the right conditions and is worth converting to housing.

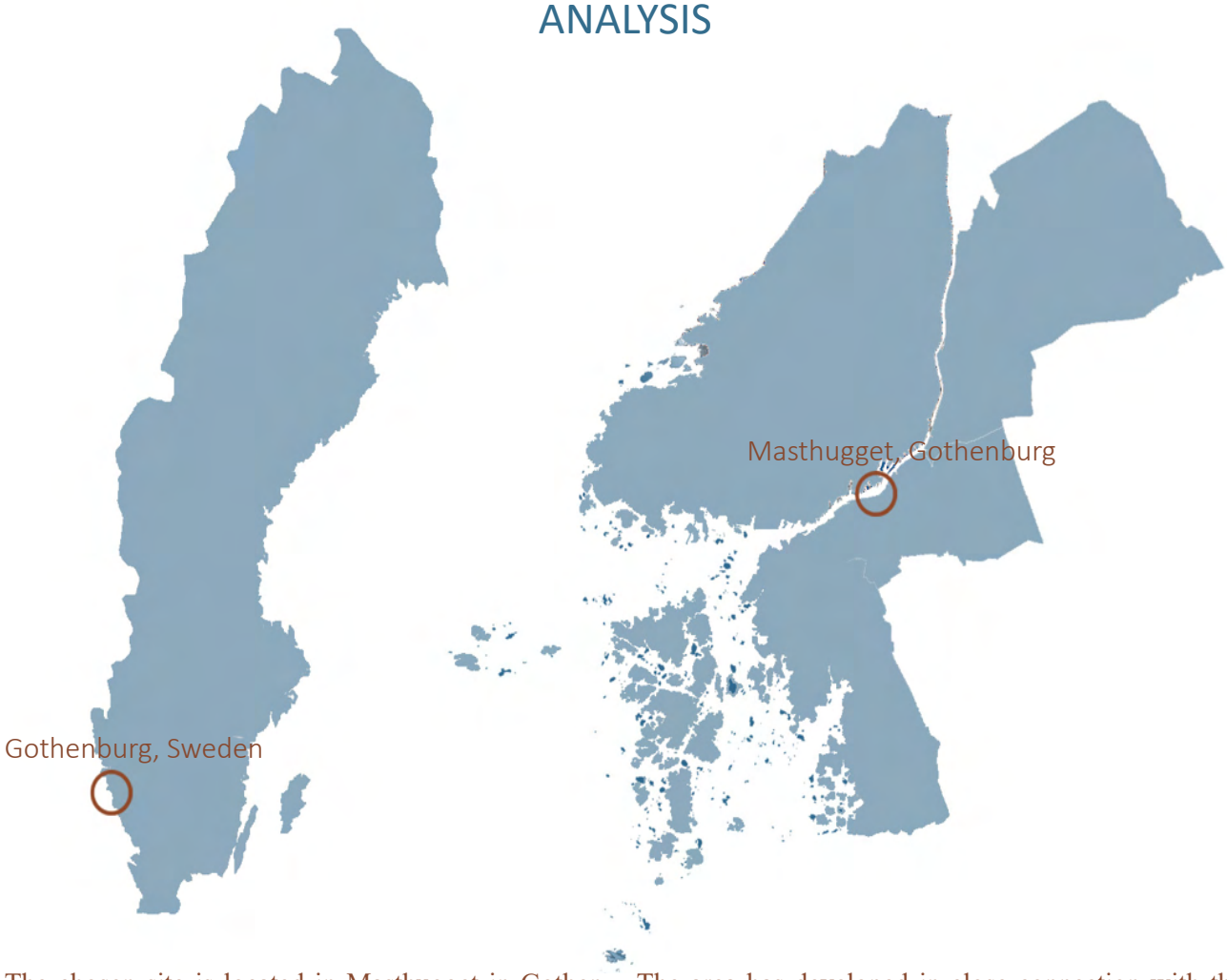
Spatial qualities that can be applied are lighting from several directions and avoiding apartments with daylight only from the north, as it is the direction that gives the worst light conditions. Another is to place the rooms that require the most installations around the shafts and stairwells so that they are grouped in a dark core and facilitate maintenance work, while at the same time providing the social and private rooms with the best light conditions. In addition, the homes must be planned efficiently and offer sight lines. Depending on the chosen building, it is possible to design apartments with parallel rooms or corridors to create more privacy in the home, for example in a collective housing. Implementing strategies for a flexible home means that it can be adjusted over time as needed, however, in many cases, it is most appropriate in condominiums where you are allowed to make more internal changes. Higher room height is also a way to make a small apartment feel more spacious and make room for larger windows. Walkways also provide flexibility in the home and can work well in deeper buildings. Balconies are essential as they compensate for a yard in urban environments and are very attractive when buying apartments.

Other important aspects are the safety of the building and providing places for neighbors to meet and reduce anonymity. Green areas in the yard and outdoor spaces that are zoned are important for creating a feeling of belonging for the residents. Another way to enhance social sustainability is collective living, which is a way for younger people to afford to live in bigger apartments in the city center, even if there are disadvantages with less privacy and shared spaces.

Ecological sustainability is something to strive for. This can be achieved by improving the energy efficiency in converted buildings, for example through renewable energy or by replacing windows/walls/roofs for better u-values. When choosing materials, different aspects must be taken into account, such as the location and whether it is possible to reuse existing materials to minimize the greenhouse gases that are the result of newly produced materials. However, some older buildings may contain materials with hazardous substances. Concrete may contain uranium and insulation may contain CFC gases and freons. Although no material is perfect, wood is to strive for in new constructions as it is more environmentally friendly if purchased locally. In addition to that, the way you build is also important, for example building terraced and in ways that are easy to maintain the material will be beneficial in the long term. A material that is cheap to purchase, easy to maintain, and can be reused afterward is to strive for.
By designing different types of apartments with varying cost levels, the building becomes accessible to more than one group of people. Standardizing apartments can help keep costs down and make the project more financially feasible. It is also important to locate the building close to public transport, grocery stores, and other amenities to make it accessible to all and encourage bicycle use.
Finally, one should design with a focus on increasing the building's value and attracting residents by creating an attractive and sustainable housing option. Rental properties are expensive to build, but by including smaller qualitative apartments and communal spaces, support can be obtained, making them affordable.

SITE AND BUILDING

SITE
ANALYSIS



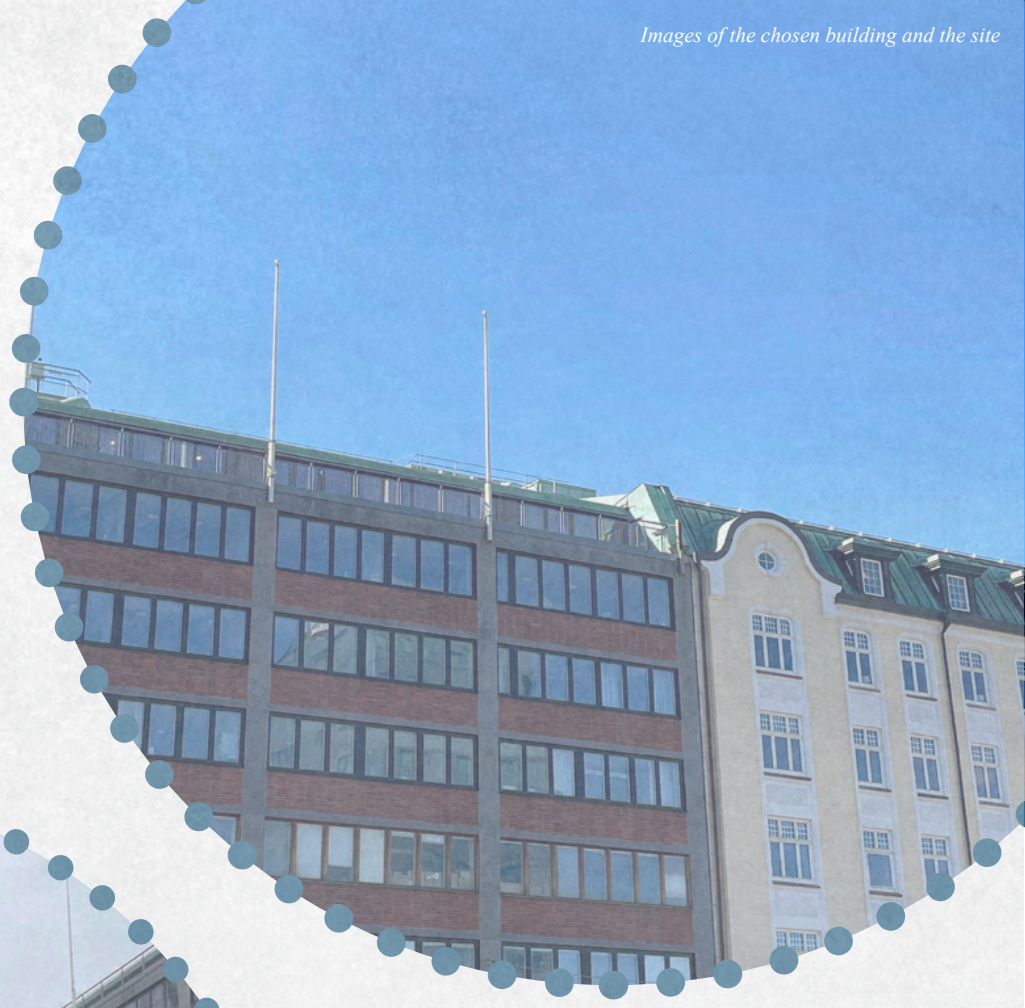
The chosen site is located in Masthugget in Gothenburg on Första långgatan 16 (marked in dark grey in map), which is a central part of the city and lies by Göta Älv (the canal) with closeness to other central parts as Järntorget, Stigberget, Skeppsbron and Masthuggskajen.

The Järntorg area and the northern parts of Masthugget constitute a mixed-use area where a well-balanced blend of residential and commercial activities is found, with buildings from different historical periods (Göteborgs stadsbyggnadskontor, 2018).

The area has developed in close connection with the port activities and has long been a vibrant neighborhood deeply rooted in Gothenburg's working-class culture and popular culture. The slow pace of development in the area's history has resulted in various forms of housing tenures, including condominiums, rental apartments, student housing, and collective housing. **In light of this, the importance of promoting culture, entrepreneurship, and social sustainability is emphasized according to the Cultural Heritage Base, in order to preserve the character of the area (Göteborgs stadsbyggnadskontor, 2018).**

SITE PLAN
1:2000

Images of the chosen building and the site



SITE
ANALYSIS

Typography
Relatively flat at the chosen site with a greater inclination towards the west and south.

Parking
Many parking areas, some are private and some for everyone but with a fee.

Movement
A lot of movement in the area by cars, public transport, bikes and pedestrians due to the services there, stores and because of Järntorget, a transport node.

Infrastructure
Great location and connection to other parts of the city. Roads for public transport, cars, bikes and for pedestrians. Trams and cars are the most prioritized in the area and E45 is a barrier that blocks the connection between the area and water.

Greenery
Mostly in the square Masthuggstorget and in the private courtyards of the residential buildings.

Architecture
Brick dominates among the facade materials, and some of the brick facades are combined with plaster, panels, or sea stone. The buildings are predominantly square and straight in shape, with angular windows without sashes. They typically range between 4 and 7 floors in height, except the newly built office buildings against the E45 and the new residential buildings that are more than 10 floors high.

SITE
ANALYSIS

11 450 FOLKMÄNGD

BEFOLKNING EFTER ÅLDER 2023

Ålder	Kvinnor	Män	Samtliga	%
0	62	72	134	1,2
1 - 5	245	246	491	4,3
6	40	38	78	0,7
7 - 9	115	129	244	2,1
10 - 12	113	145	258	2,3
13 - 15	140	140	280	2,4
16 - 18	119	137	256	2,2
19 - 24	472	401	873	7,6
25 - 29	628	559	1 187	10,4
30 - 44	1 409	1 560	2 969	25,9
45 - 64	1 264	1 271	2 535	22,1
65 - 74	668	582	1 250	10,9
75 - 84	381	293	674	5,9
85-	156	65	221	1,9
Samtliga	**5 812**	**5 638**	**11 450**	**100**

ANTAL BOSTÄDER EFTER AREA 2023
(exkl uppgift saknas)

Kvm	Småhus	Flerbostad	Totalt	%	% Ggb
-40	0	1 761	1 761	25,1	15,7
41-60	0	2 033	2 033	28,9	24,7
61-80	0	1 664	1 664	23,7	27,6
81-100	0	913	913	13,0	13,4
101-120	0	519	519	7,4	7,1
121-	0	135	135	1,9	11,5
Totalt	**0**	**7 025**	**7 025**		

ÄGARKATEGORI 2023

	Småhus	Flerbostad	Totalt	%	% Gbg
Hyresrätt	0	2 630	2 630	37,4	53,7
Allmännyttan	0	541	541	7,7	25,2
Övriga	0	2 089	2 089	29,7	28,5
Bostadsrätt	0	4 395	4 395	62,6	30,1
Äganderätt	0	0	0	0,0	16,3
Tot. bostäder	**0**	**7 025**	**7 025**		

NYBYGGNATION - FÄRDIGSTÄLLDA BOSTÄDER

	2019	2020	2021	2022	2023
Småhus	0	0	0	0	0
Flerbostadshus	0	0	0	38	30
Totalt	**0**	**0**	**0**	**38**	**30**

Table 1. Statistik Masthugget 2023, Göteborgsbladet.

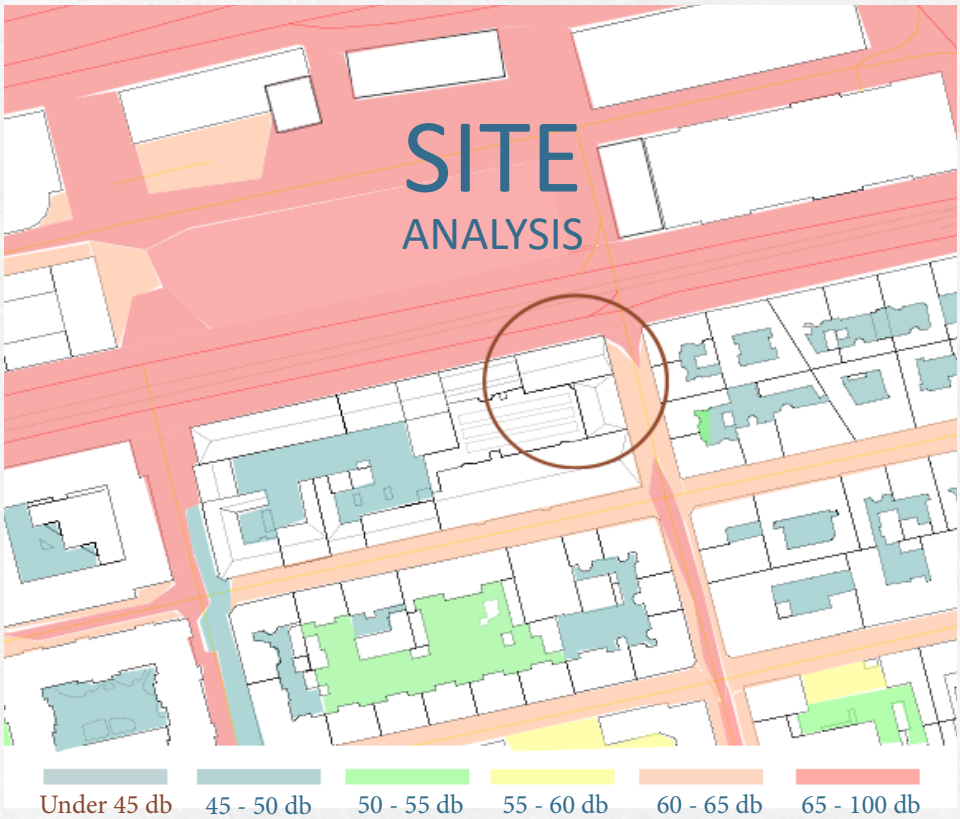


Figure x.Traffic noise equivalent level.

Traffic noise

Most of the noise comes from the big road E45, but also on Första långgatan there is a big amount of noise where approximately 6000 vehicles pass/day (Hultgren, 2012).

According to regulations (Boverket, 2023), noise from rail traffic and roads should not exceed 60 dBA equivalent sound level at the facade of residential buildings and 50 dBA equivalent sound level, as well as 70 dBA maximum sound level, at a patio. For a residence of up to 35 square meters, noise should not exceed 65 dBA equivalent sound level at the facade of the residential building. If the noise levels are exceeded, at least half of the rooms in a residence must face a side where the equivalent sound level does not exceed 55 dBA at the facade, and at least half of the rooms must face a side where the maximum sound level does not exceed 70 dBA between 10:00 PM and 6:00 AM at the facade

The new plan for Masthugget indicates that at least 50% of the total gross floor area (BTA) should consist of residential units (Göteborgs stadsbyggnadskontor, 2018). However, this has been a challenge due to the high noise levels in the area. After investigations, it has been concluded that an acceptable living environment can be achieved through technical solutions and design. Among these solutions are enclosed blocks with inner courtyards and glass-enclosed balconies. Since small apartments may be permitted at higher noise levels, the proposal also includes a large proportion of smaller units, which may affect the demographic composition of the area. Although the requirement can be met, many residences will still be located in a noisy environment. Nevertheless, housing in central locations is essential for managing the reduction in traffic by 2035 (Göteborgs stadsbyggnadskontor, 2018).

SITE
HISTORY

1621
Gothenburg was founded as a trading city, and Masthugget was already a part of the city at that time with port activities connected to the river, as well as some low-rise buildings further inland (Hultgren, 2012).

1647
Masthugget got its name after the production of ship masts that occurred in the area (Hultgren, 2012).

1820s
A new block division the street Masthamnsgatan were created (Hultgren, 2012).

Figure 1. Masthugget 1816

1860s
The area received the four long streets (långgatorna), two cross streets, and Masthuggstorget (square). On the street "Andra långgatan", the first tram line in Gothenburg ran. Due to an increased population, residences were constructed with stone materials and new straight roads replaced the low-rise older buildings (Hultgren, 2012).

End of the 1800s
Järntorget (square) became the rallying point of the labor movement (Hultgren, 2012).

Beginning of the 1900s
The tram line was developed (Hultgren, 2012).

1930s
When functionalism broke through, some block-sized buildings were built in Masthugget with various businesses (Hultgren, 2012).

1960s
The Stena Line terminal was built. Along the street "Första långgatan" some of the stone buildings were demolished to make room for new office

Figure 2. Inzooming of Masthugget 1901

1970s
Oscarsleden (broad busy road) was added (Hultgren, 2012).

1990s
There was no specific planning for the building structure, only the general building regulations. The result was densely built properties with small courtyards (Hultgren, 2012).

2024
There has been a plan for Masthugget for some time now. The street "Första långgatan" will be transformed into a green urban street with wider sidewalks and bike lanes to provide better mobility for cyclists and pedestrians (Göteborgs stad, 2023). New buildings, mostly residential, are expected to be constructed alongside the old ones and are anticipated to be completed by 2030. A new bus stop is planned to be built, along with a park. The area is planned to be very active and attractive.

SITE
FUTURE

The area between Skeppsbron and Masthuggstorget on Södra Älvstranden will be converted from parking lots to an area with high density and good connections to the surrounding area (Göteborgs stadsbyggnadskontor, 2018). The strip from Linnégatan is proposed to be extended towards the water, and the plan is to create socially sustainable living environments for children and young people. The area will consist of 1,320 apartments, trade, offices, hotels, municipal services, two preschools, three parking facilities, cable car station, park and a health center, which is a total of approximately 310,000 square meters (BTA).

Masthuggskajen will contribute to the city's spatial and social integration, with a focus on the children's perspective (Göteborgs stadsbyggnadskontor, 2018).

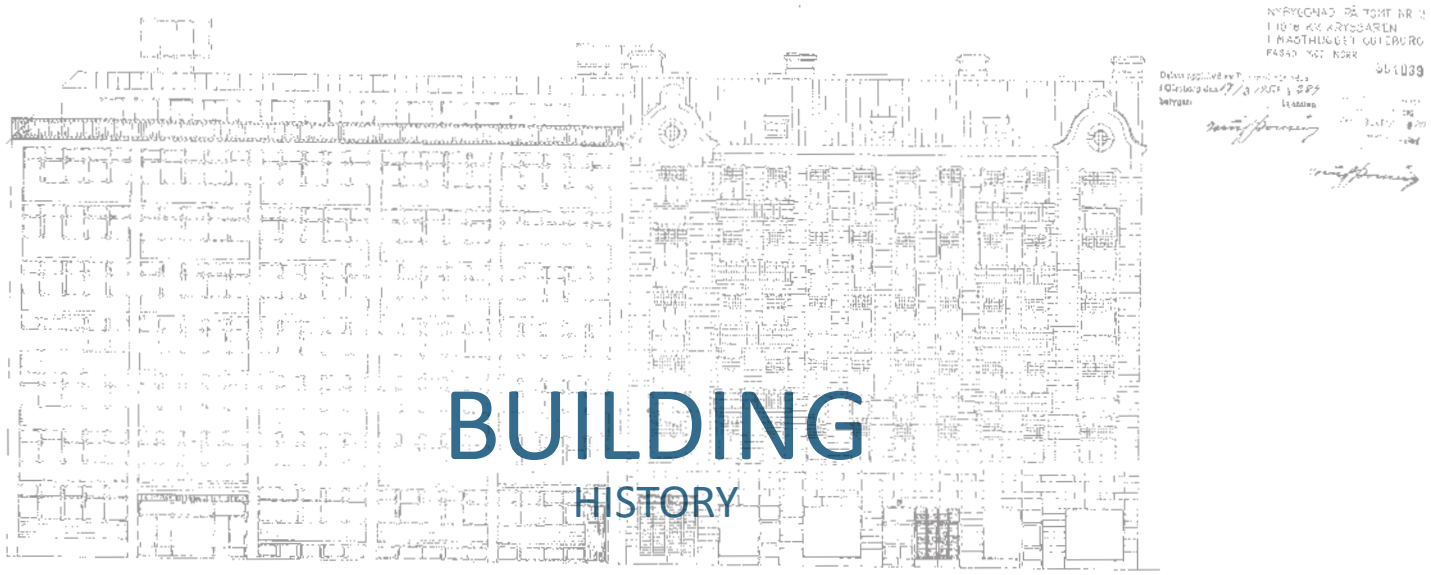
It will be a dense area with its buildings of five to ten floors and high points up to 31 floors around the future park on top of the Göta tunnel. At the quay, a new peninsula will be created and thus a path along the quay that will be connected to Skeppsbron. Cyclists and pedestrians will be prioritized here to strengthen the possibilities of living in the area without a car. The cable car station will be located at Folkets hus and the nearby streets will have new characters with new residential blocks. It is very important for the project to reach the sustainability goals, which have been planned and allowed to take a large place during the design of the detailed plan.

Figure 3. Site plan of new buildings in Masthuggskajen. Reproduced with permission.

Figure 4. Envisioned perspective of Första Långgatan in 2030. Reproduced with permission.

SITE
FUTURE

Figure 5. Envisioned perspective of Masthuggskajen in 2030. Reproduced with permission.



BUILDING

HISTORY

1950-55
Building permit for new construction and application for water and sewer lines. Ventilation system for warehouse, bakery and office building as well as change of windows to windows without mullions. New French balconies and glazed doors added in the east elevation.

1955-57
Changes in ventilation and windows on the 6th floor and top floor as well as extension of top floor. New display windows on the bottom floor and small changes in the office spaces such as rearrangement, addition and removal of walls and some shafts. The 6th and top floor are converted to a restaurant and a new sign on the bottom floor is added.

1960s
Expansion of water and sewer lines as well as small interior changes in entrance floor, such as added walls and new bathroom. Removal of some french balconies and glazed doors, while some of them (floor 1-3) are replaced by similar windows as the other on the facade. On the 6th floor the french balcony with the glazed door is replaced by a big window. Application of new signs (store and office) on the north and east facades.

1970s
Permit for six new 8 m long flagpoles on the top floor terrace, changes of office spaces and windows on some parts.

1981-82
Application of new signs (athletic gym träningsstudio) on the north facade. Conversion to a gym and health shop in the basement and the east facade part of the building on the entrance floor. Expansion of ventilation system for the gym and interior constructions for the gym and health store.

1986
Conversion to shops on the entrance floor and parking garage in the basement as well as office spaces on the other floors (1-7). Facade changes on the bottom floor, such as new display windows all the way. New staircase in entrance floor and rebuilding of service spaces in basement and entrance floor. Rebuilding of floor 1 and 2, removal and addition of walls and rearrangement of bathrooms and kitchen.

1987
Rebuilding of service spaces in basement and entrance floor and HVAC changes in plan 1 and 2. New signs and lighting on the northern facade and interior changes in the 3rd plan, such as removal and addition of walls. Rearrangement of ventilation system and water lines.

BUILDING
HISTORY

2024
The building is in good condition according to the property owner Wallenstam. Some windows are to be changed, especially the 5th floor.

1990-95
As-built documents for the whole building, extension/change of existing installations and ventilation system for shop and office building. Extension/change of existing installations in the entrance floor and building permit for new signs of the services in the building. Updated ventilation system for the office on the 3rd floor and sunshades on the southern and western facade (courtyard facades) as well as lighting on the facades.

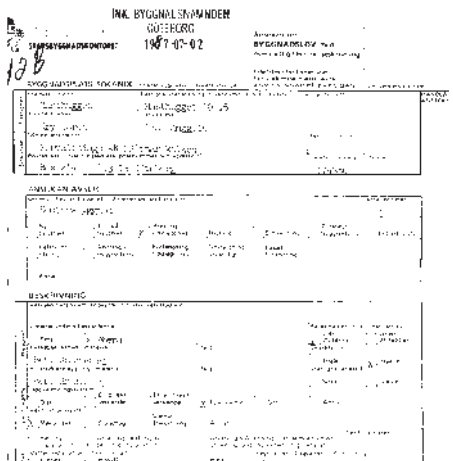
2020
An explosion on the 3rd floor took place where the health center Hagakliniken operated. The building was not damaged, although two people were sent to the hospital and a technical examination of the building was performed to investigate if there were more explosive substances

2003-2010
New sign against Nordhemsgatan and Första Långgatan as well as a change of windows on floor 5&6 and some parts of floor 7. Change of office to health center on the 3rd floor and a ventilation control. New sign for the health care center Hagakliniken.

2012-2018
Change of facade with a new entrance door against Nordhemsgatan. Change of floor 7 to a new office, with updated HVAC. Replacement of windows and measures on the roof (floor 1,2, 4 and roof as well as parts of floor 6). New signs and changes on facade, updated flue and chimney, demolition of old one because of fire safety reasons. Changes in entrance floor and building permit of facade changes and function as well as moved substation. Facade changes in the restaurant, new windows and door. Changed function of venue to hairdresser shop, which needed updated ventilation, fire safety measures, flue and floorplan. Inspection of security and health of the building.

2021
Building permit for facade change and change of use of teaching premises to grocery store Willys as well as added lifts and motor-driven devices and supervision of passenger lifts.

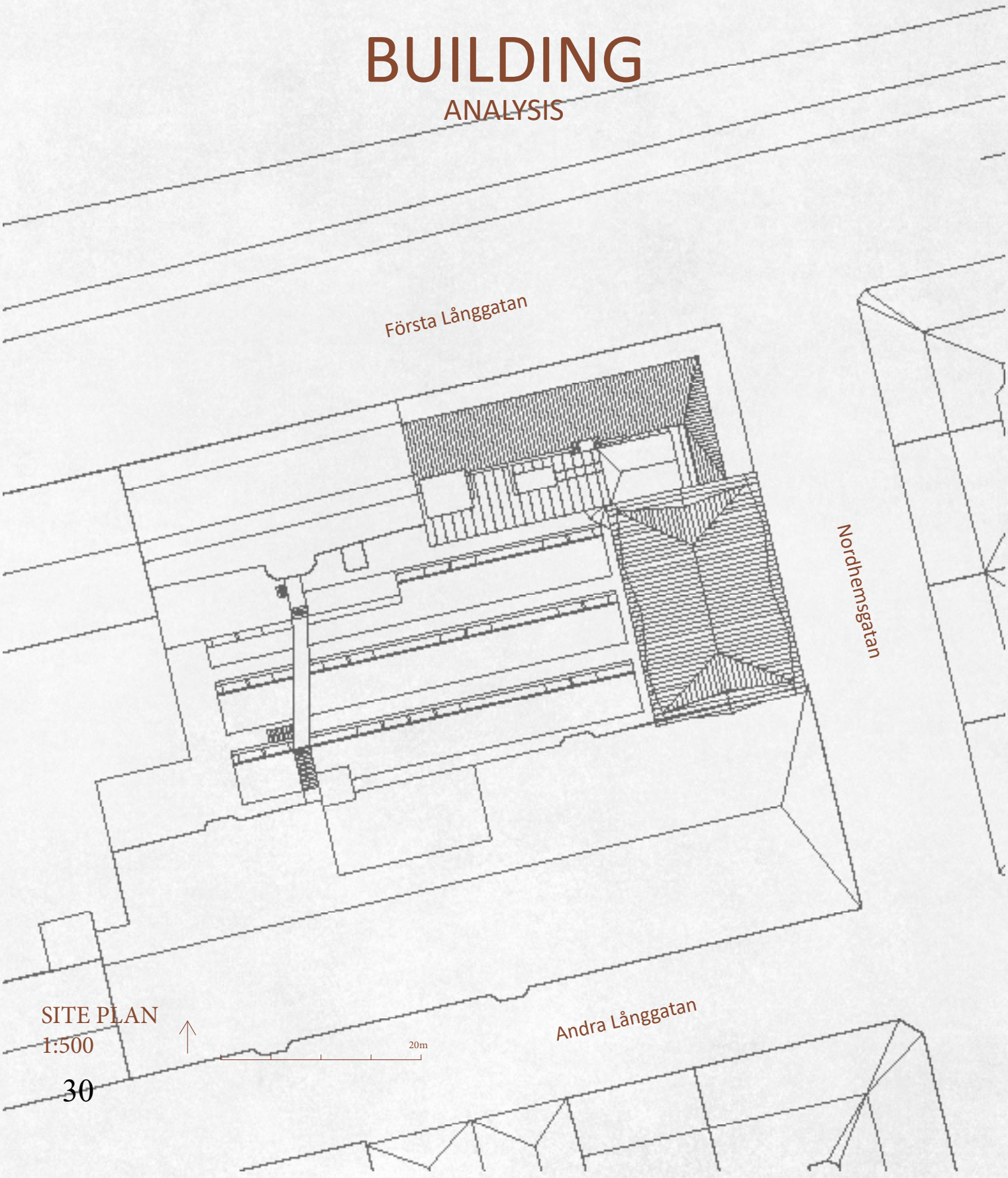
1988
New sign on northern facade and roof over windows as well as a new air cooling unit on the roof. Interior changes in the 7th floor, such as added and removed non bearing walls. New signs on the north and east facade and some interior and HVAC changes in the 1st, 2nd and 3rd floor.



1997-99
Change of plan in office and change of function of the entrance floor to venues for a university and the post office. Changes of ventilation for the post and university venues. Restaurant converted to office on floor 5 & 6 and parts of floor 7. New ventilation unit on the roof and new lighting on the facade.

BUILDING

ANALYSIS



SITE PLAN
1:500

BUILDING
ANALYSIS

The chosen building is used mainly for offices with the exception of the entrance level that is used for stores, where the biggest part is reserved for Willys. The second and third floors are empty as well as parts of the first floor. The floors are very different from each other even if they serve a similar function. The building has a lot of potential since it is one that does not stand out, but still has a lot of qualities.

Qualities

- Location (potential for attractive dwellings with a terrace and common spaces with a great view over the area and river).
- Panoramic windows (a lot of daylight and a great view of the attractive street and parts of the river).
- Materials (the building´s construction with its visible pillars in concrete covered in natural stone and the horizontal concrete division of floors with red brick below the windows).
- Room height (2,6 m with the suspended ceiling that is used today in the office spaces).

Challenges

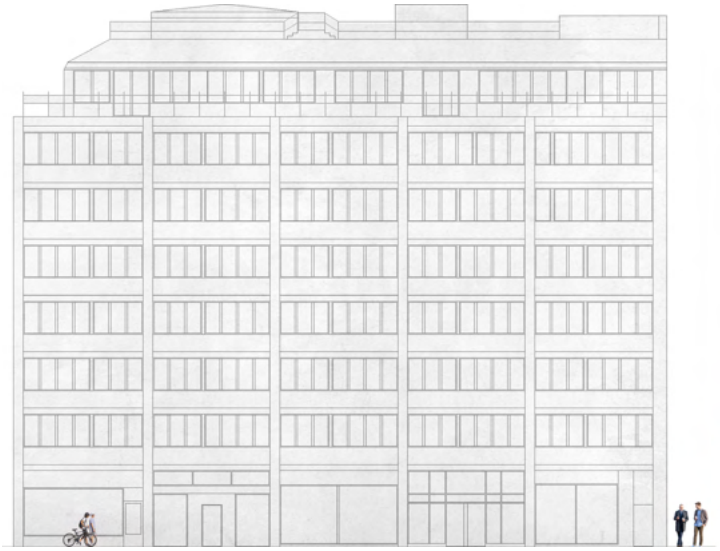
- Location (a very attractive area which results in a lot of noise and regulations to allow qualitative dwellings).
- Depth (the building has a smaller depth than other offices, but is still a little more than 15 m wide which results in a lot of space in the middle without daylight if there is not a corridor in the middle).
- Panoramic windows (the many windows are a strength in the building as well as a challenge since there are not as many access points for walls).

The differences in the windows of the different floors since they have been changed on different occasions to fit the temporary services that have been there).

- Staircases (there are two staircases in the building that are designed for offices that are a challenge to arrange the apartments around).

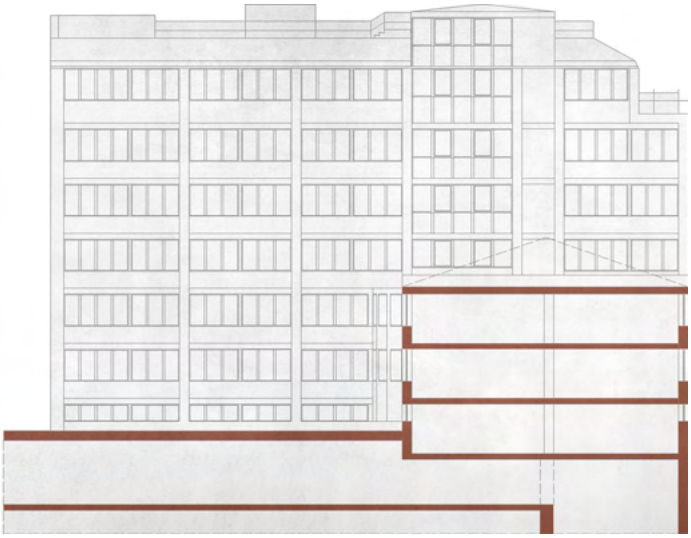
Image of the view from the building´s south facade

BUILDING
ANALYSIS

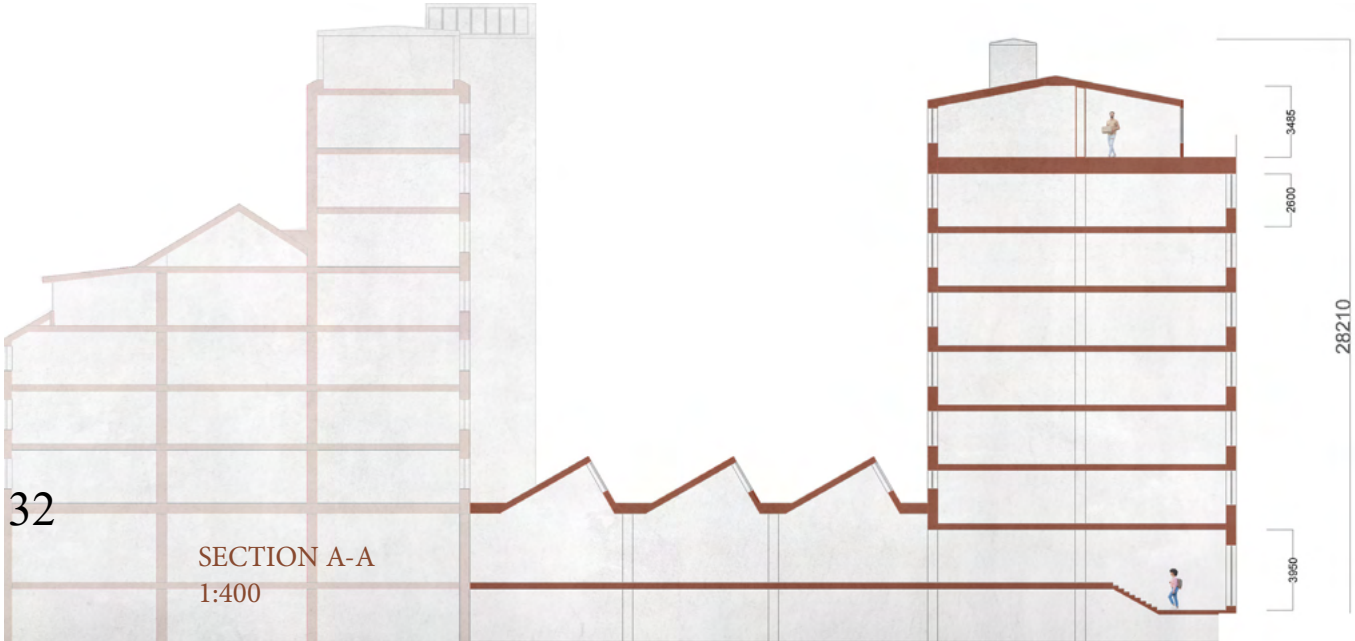


ELEVATION NORTH
1:400

5m



ELEVATION SOUTH
1:400



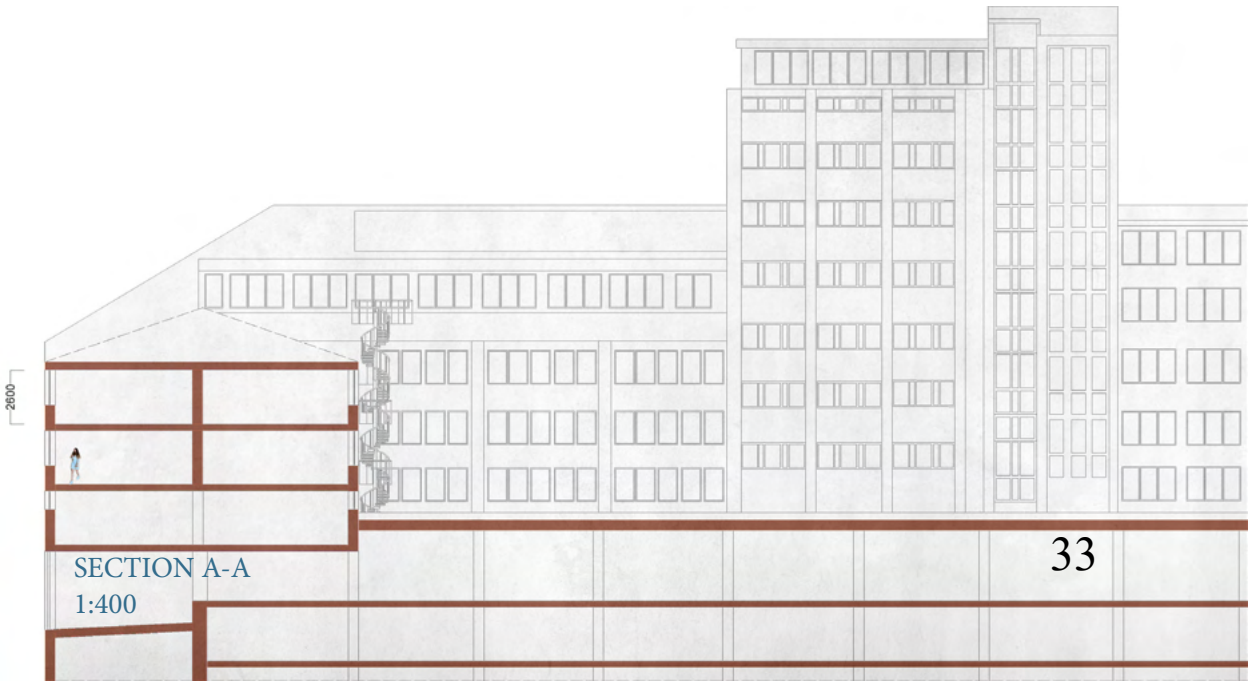
SECTION A-A
1:400

BUILDING
ANALYSIS

ELEVATION EAST
1:400

5m

ELEVATION WEST
1:400



SECTION A-A
1:400

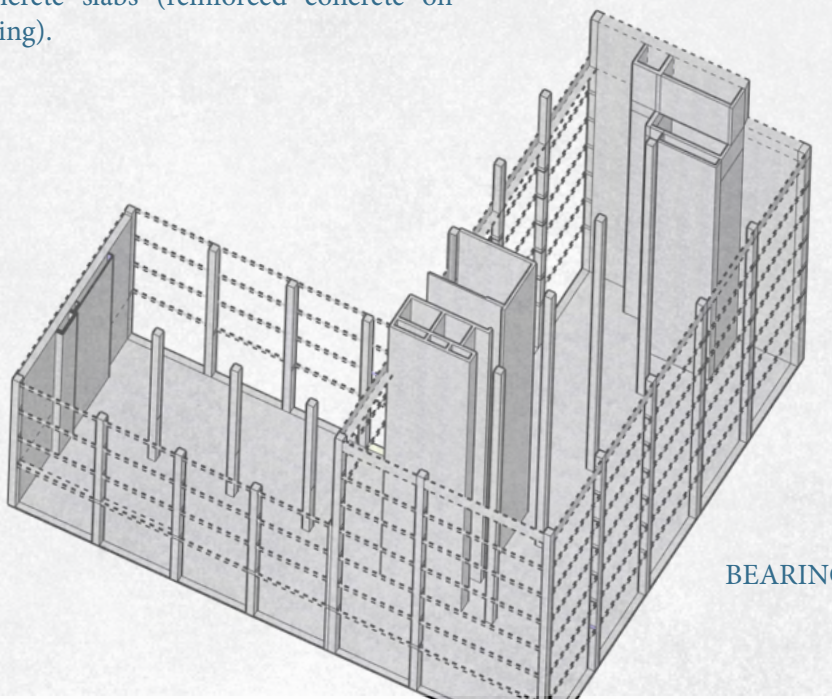
BUILDING
ANALYSIS

The bearing systems of the building are made of concrete, pillars, bearing walls and floor system, and the shafts are located in connection to the stairwells and go all the way up. The interior concrete facade walls are painted white.

Specific list of materials in the building:
- Foundation and walls: 28 cm reinforced concrete on wooden piles
- Framing of joists: 25-30 cm reinforced concrete (the basement is 20-25 cm and the attic 21 cm)
- Interior wall bearing joists: 15-20 cm reinforced concrete.
- Staircase enclosing walls: 15 cm reinforced concrete respective glass concrete.
- Ventilation: sheet + 5 cm reinforced concrete, mechanical
- Interior roof (waste room etc): plaster on reinforced concrete
- Roof truss and external roof: sheet on top of roof truss respective sheet on felt on cantilevered reinforced lightweight concrete slabs (reinforced concrete on courtyard building).

A lot of the material today in the building can be reused such as doors, osb, mineral wool and also the material from the ceiling for insulation in the future interior walls. When demolishing the inner walls to make space for the apartments, these materials will be available for use:

Plan 1: 36 doors, osb, mineral wool, steel frames, suspended ceiling
Plan 2: 16 doors, osb, mineral wool, steel frames, suspended ceiling, linoleum floor
Plan 3: 38 doors, 2 windows, osb, mineral wool, steel frames, suspended ceiling, linoleum floor
Plan 4: 24 doors, osb, mineral wool, steel frames, suspended ceiling
Plan 5: 17 doors, osb, mineral wool, steel frames, suspended ceiling, parquet
Plan 6: 25 doors, osb, mineral wool, steel frames, suspended ceiling, parquet
Plan 7: 14 dörrar, 55 windows, osb, mineral wool, steel frames, suspended ceiling, parquet

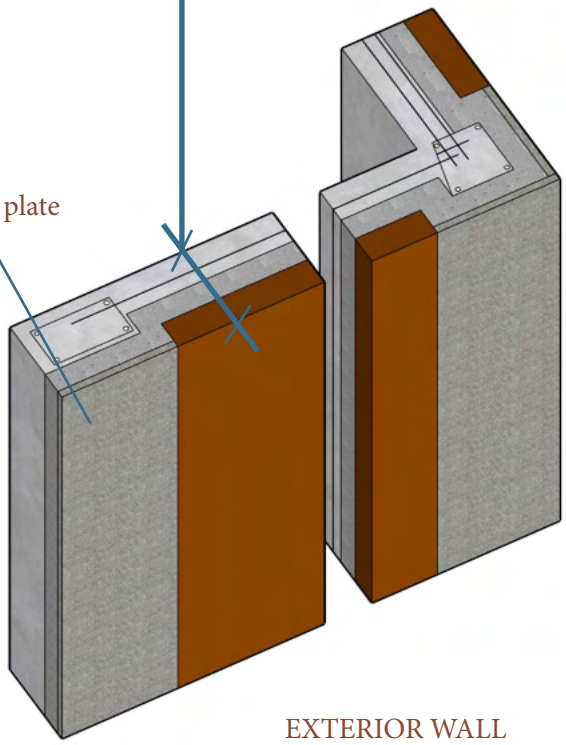


BEARING STRUCTURE

BUILDING
ANALYSIS

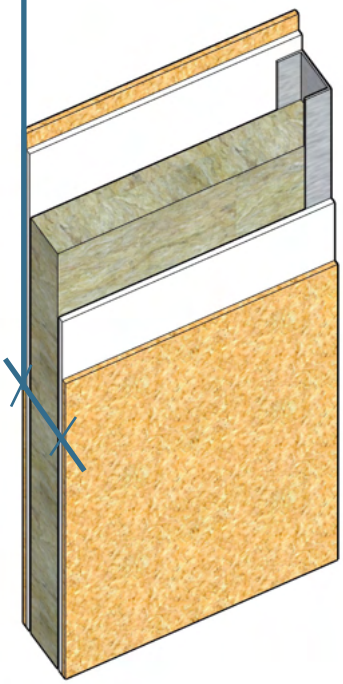
120 Facade brick
100 Lightweight concrete
150 Reinforced concrete

Stone plate

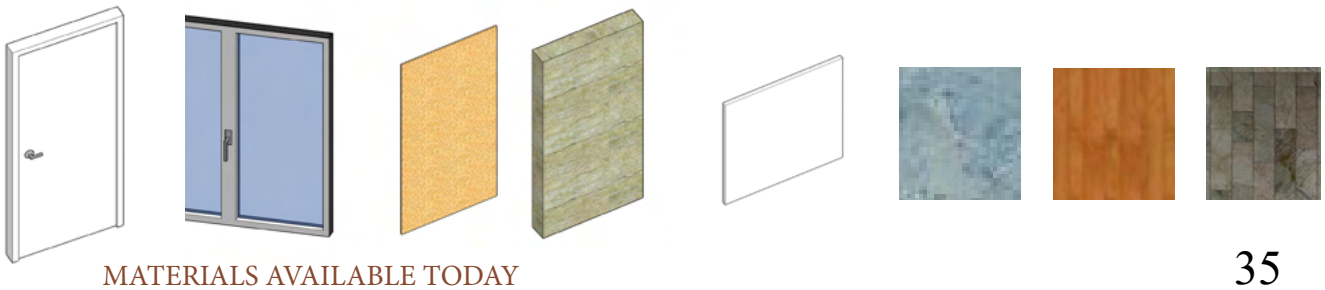


EXTERIOR WALL

12 Osb
13 Gipsum board
70 mineral wool inside of steel
13 Gipsum board
12 Osb



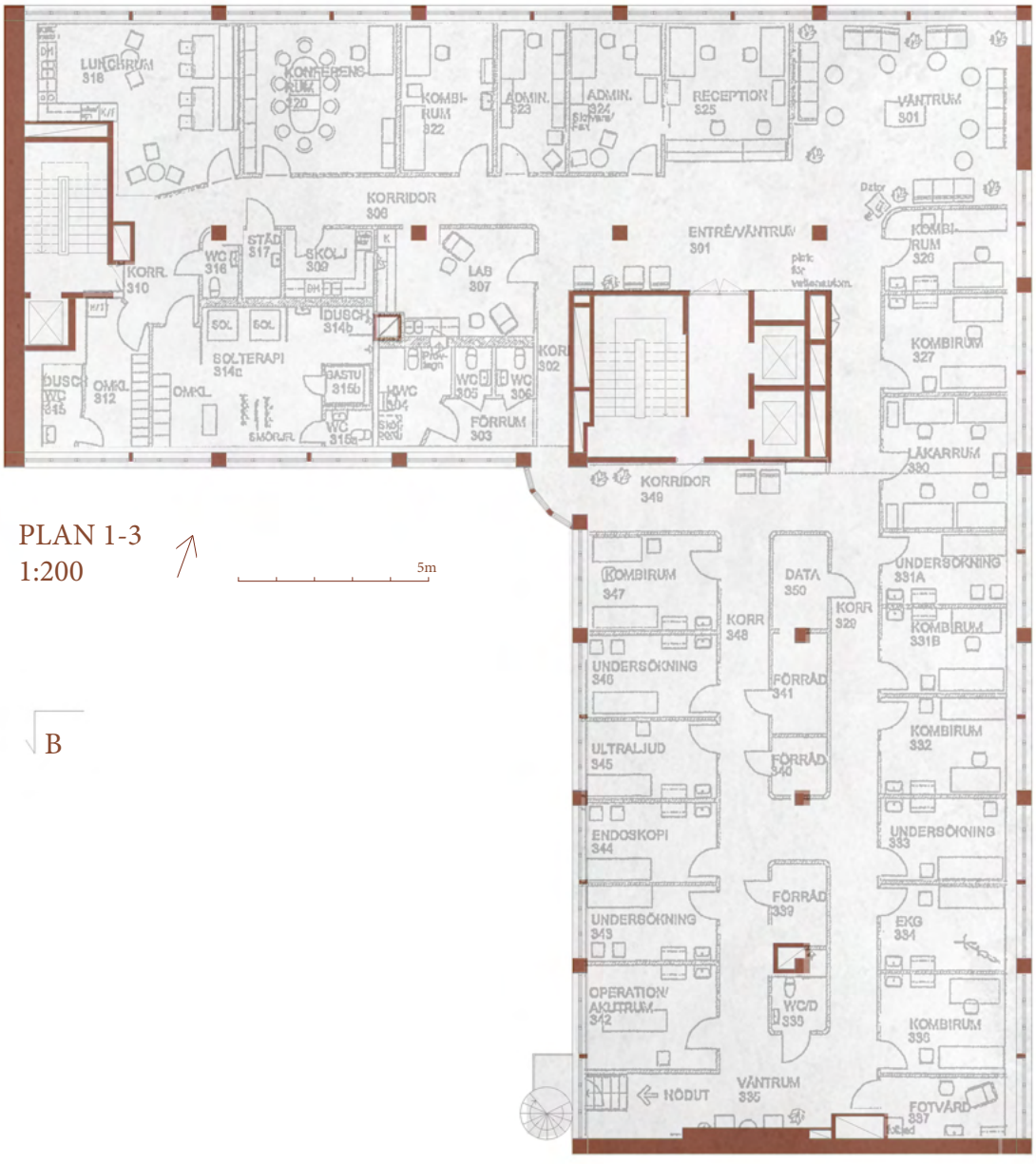
INTERIOR WALL



MATERIALS AVAILABLE TODAY

BUILDING
ANALYSIS

A



PLAN 1-3
1:200

5m

B

B

A

BUILDING
ANALYSIS

Heritage

According to the Swedish national heritage board (riksantikvarieämbetet) the building is not protected as a notable building by the cultural environment law (Miljölagen). However the area is protected as a national interest (riksintresse) for cultural environment according to the Swedish environmental code (Miljöbalken).

The area is occupied by a conservation program (värdefulla miljöer 1985 & bevaringsprogram 1987) that could be managed according to PBL 8:13 in a planning permission stage.

Functions

The first three floors are similar with a few exceptions where the first one has smaller windows on the first floor and the third one has wooden windows with fewer connection points for walls between the windows. The second and third floor also have more space in the small bay window.

The fourth, fifth and sixth floors are similar with some minor changes as different locations on some connection points for walls on the windows and the fourth floor has shorter windows against the courtyard. There are also a few extra small shafts on some floors and an extra stair between the fifth and sixth floor. The sixth floor also has more windows on the west facade.

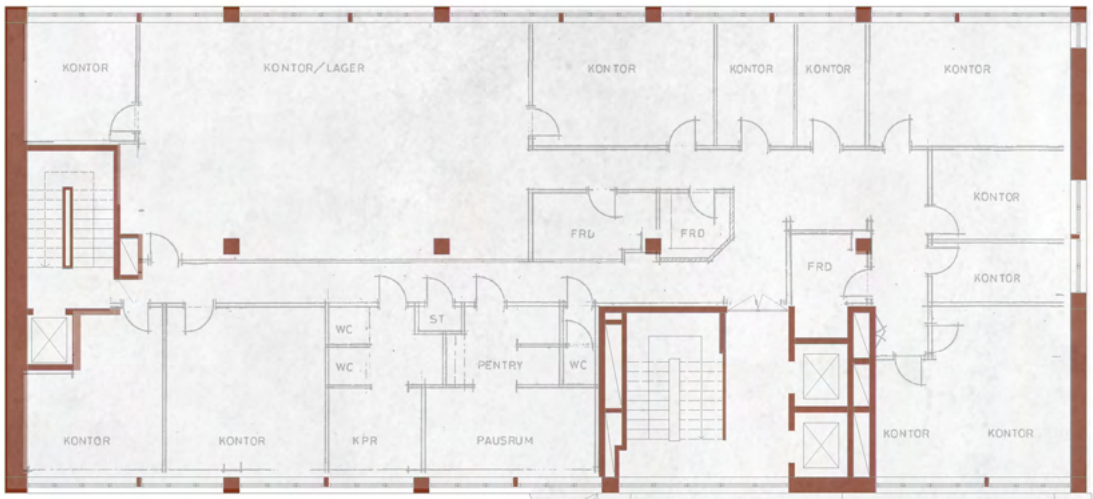
The seventh floor has a smaller volume with a terrace in front which results in the building being experienced as lower than it is from the street view. The walls are smaller on the facade against Första Långgatan and Nordhemsgatan.

There are two stairwells that go all the way up to the highest floor and all the way down to the basement, which makes the existing building accessible for everyone depending on age or disability.

Image of the health care center on the sixth floor

BUILDING
ANALYSIS

A



PLAN 4-6
1:200

5m

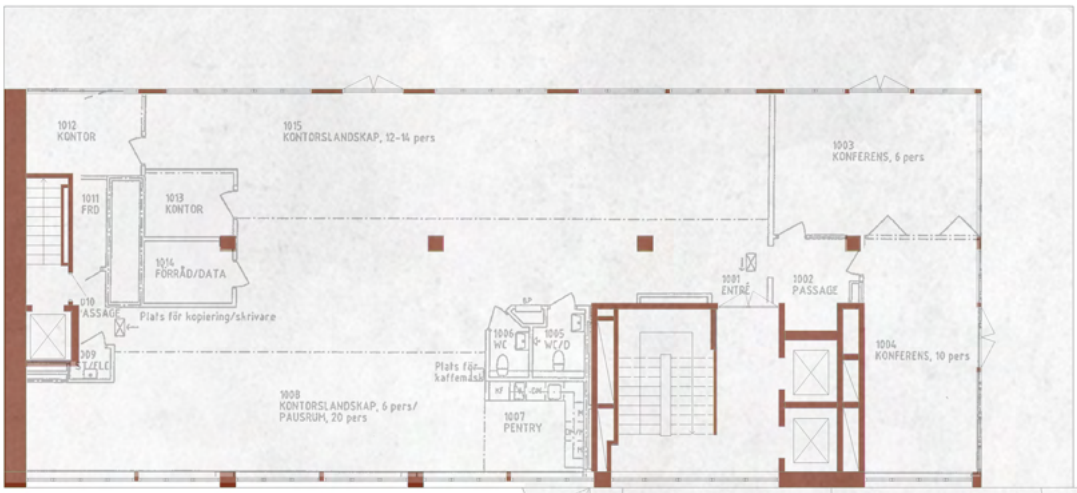
B

B

A

BUILDING
ANALYSIS

A



PLAN 7
1:200

5m

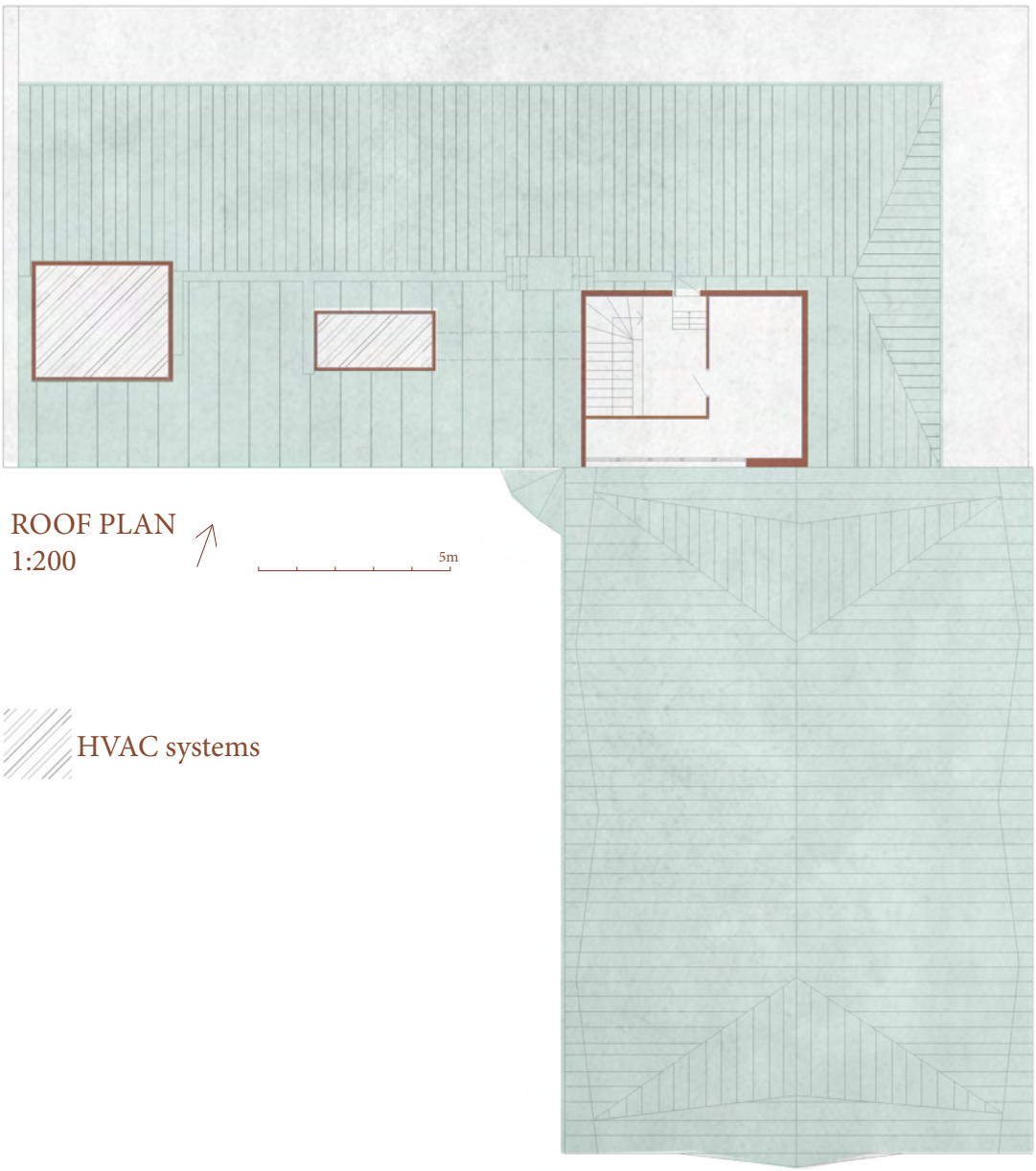
B

B

A

BUILDING
ANALYSIS

A



ROOF PLAN
1:200

B HVAC systems

B

A

BUILDING
ANALYSIS

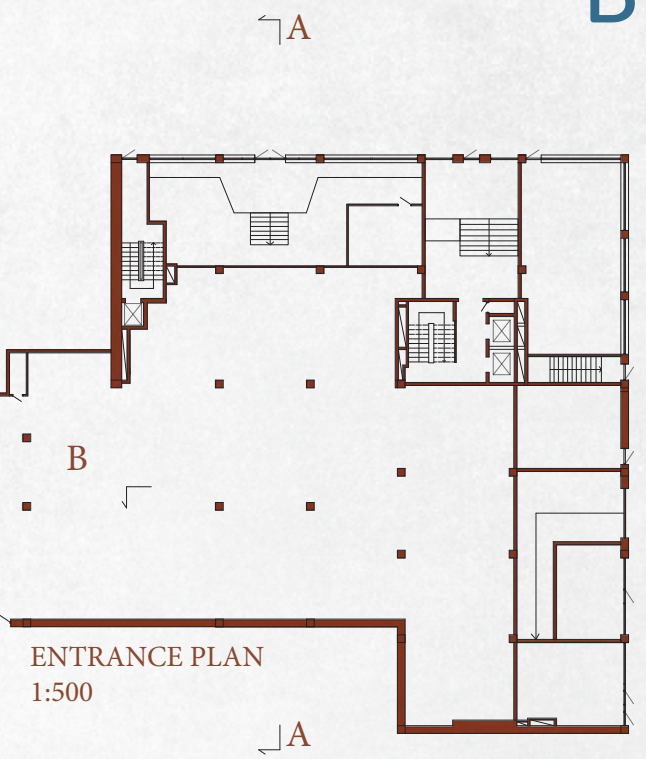
Fire safety

Among other rules there must be two independent escape routes on each floor (Boverket, 2023). In buildings with a maximum of eight floors, a fire-protected stairwell is not required, but stricter rules apply to taller buildings. For residences where the lower edge of the opening is no more than 23 meters above ground level, evacuation can occur through windows or balconies with the aid of the fire department's ladder equipment, provided the fire department can respond effectively, which for this type of building is set at 10 minutes. Additionally, there are regulations concerning fire compartments and the fire rating of the construction, which is usually managed by a fire safety consultant to ensure all details in the building are addressed. Evacuation today takes place on most floors through windows and the smaller stairwell is only used for evacuation.

Första Långgatan 16 is located within 10 minutes of the nearest fire station that is equipped with a mechanical ladder, which means that this requirement is met. In addition, the lower edge of the highest opening is no more than 23 meters above ground level, which is important to maintain, and the building cannot exceed eight floors. The building has no balconies, but all windows can be opened. The apartments are located near the stairwells, except in the lower part of the building, which comprises three floors.

Image of the vacant third floor

BUILDING
ANALYSIS



ENTRANCE PLAN
1:500

HVAC

There is a heating, ventilation and air conditioning system on the roof, however most of the technical rooms are in the basement, where there are also 70 parking spots. The heating system in the building is district heating and the ventilation is mechanical. The ventilation system in the office floors steals a lot of space from the room height and without the suspended ceilings the height of the room is approximately 2,6m. The two stairwells have connecting shafts of generous sizes.

BASEMENT
1:500

SITE AND BUILDING

CONCLUSION

Based on the analysis of the selected building and the area, conclusions can be drawn about what must be taken into account during the conversion of offices to housing in the specific area. As the site is characterized by different forms of housing and cultural heritage, it is essential to preserve the character of the area and promote cultural and social sustainability, which should be the focus of the work.

The new design of the building can be approached with considerable flexibility, as there are no legal requirements for conservation. However, the building is located on a very central street, which can have major consequences if, for example, bay windows or balconies are added. This means that the facade should remain unchanged as much as possible and retain the smooth character, which can be a challenge when creating quality apartments with the possibility of an outdoor space. On the other hand, the building has a location that does not affect the cityscape negatively if it is raised and provides a fantastic view and can therefore be expanded vertically to achieve the requirements for outdoor space and an attractive design.

Due to the good public transport connections and the possibility of social places such as bars and restaurants as well as parks and proximity to the water that will exist in the future, this will be a suitable place for younger residents in particular.

Further conclusions are the importance of greenery as it will be a dense area, which increases the demand for private farms/places for residents with proximity to greenery. Noise is a major challenge for any new housing being planned and will determine the location and size of the apartments to a large extent.

However, other aspects also affect this, such as the pillar structure and where walls can be connected between the windows that occupy a large part of the facade. To achieve economic sustainability in this project it is another argument to highlight the existing qualities of the building, instead of adding too much new.

The building consists largely of concrete, which means that changes must be made with care to not damage the reinforcement in the joists, so the existing shaft should be used as much as possible without having to create new holes. There is a lot of material in the building that is in good condition, as there have been a lot of changes to the interior over the years such as replacement windows and new walls, resulting in the opportunity to reuse materials to a great extent.

Regarding fire protection, an additional staircase or spiral staircase should be installed to ensure adequate escape routes for the apartments furthest from the central stairwell. The building must also not exceed eight floors, because then new rules must be applied that require more space and are economically disadvantageous. Apartments have different requirements than office buildings, which leads to the possibility of removing a lot of the ventilation systems and exposing the concrete on the ceiling, and thus creating more space. In the area, mostly smaller apartments will be added, so it can be beneficial to have a variety and design larger apartments that are suitable for families or collective housing. Today, there are twice as many condominiums as rental apartments, and therefore it can be beneficial to design rental apartments to include people with lower incomes who cannot afford to buy an apartment.

REFERENCE PROJECTS

OFFICE TO HOUSING

Project: Lundgrensgatan 7 (Lorensberg 21:1)
Location: Gothenburg, Sweden
Year: 2023
Architects: Arkitems architects

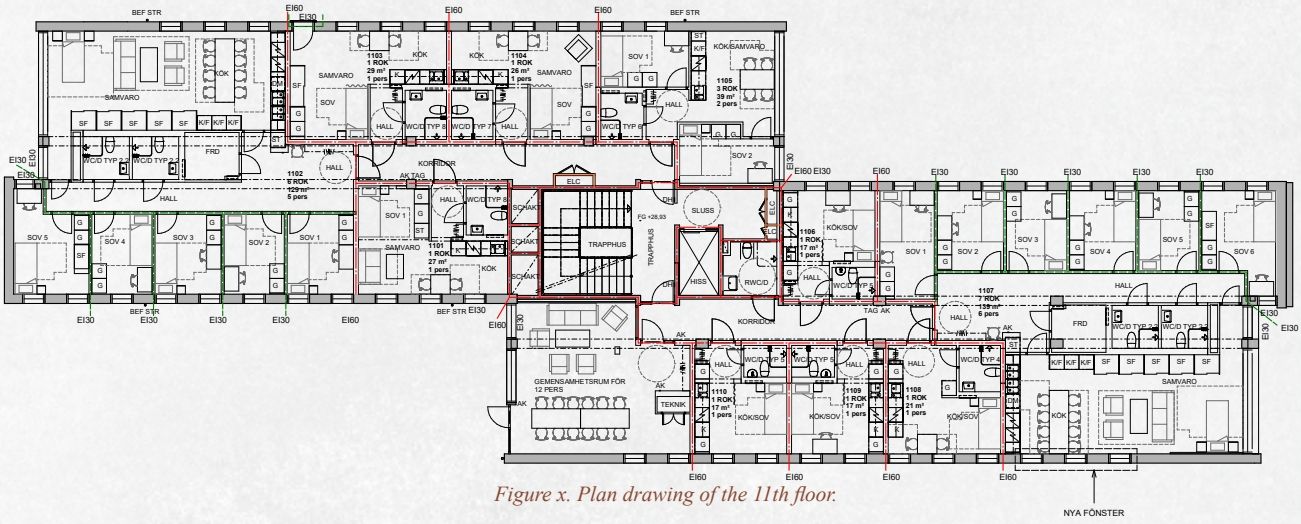


Figure x. Plan drawing of the 11th floor.

Office building transformed to student apartments. In the conversion from offices to residential units, a large Tr2 stairwell has been utilized, connected to two long corridors with smaller one-sided apartments ranging between 17-29 square meters. In the corners, there is a communal living space with smaller bedrooms and a larger common area comprising a kitchen and living room.

Conclusion? The chosen building in Första Långgatan 16 is also seven floors high, which comes with challenges like how to solve the fire safety problem. Since the building has been an office before, some spaces are too huge and difficult to work with, which makes the collective living very relevant in this case since the big spaces can be used by many people instead. This will be applied in the project too to solve these difficult spaces.

REFERENCE PROJECTS

HOUSING

Project: Ciceron
Location: Gothenburg, Sweden
Year: 2023
Architects: Krook & Tjäder

This project in Masthugget is located opposite the selected building at Första Långgatan 16 and is a seventeen-story tower block with a fantastic view and green plaster facade. The entrance opens up to the urban space with its high room height and the rest of the building includes apartments of varying sizes with the largest in the corners, where one of the corners meets Första Långgatan. The largest apartments are two bedrooms with one bedroom on the quiet side and one on the noisy side. The balconies are located towards the quieter sides. During a meeting with a representative from Nordr, the housing developer and client for this project, it was noted that two of the apartments are classified as temporary accommodations due to not meeting the required sunlight criteria.

Conclusion? As the chosen building is on the opposite side of the street, the noise requirements for the buildings are similar which makes this reference an excellent example of how the location and size of the apartments can be planned. Furthermore, the height of the new buildings in the area shows that it would not affect the urban space negatively if, for example, the chosen building were to become higher than today. The sunlight must also be taken into account as there is a risk that the building does not meet the requirements similar to the reference building.

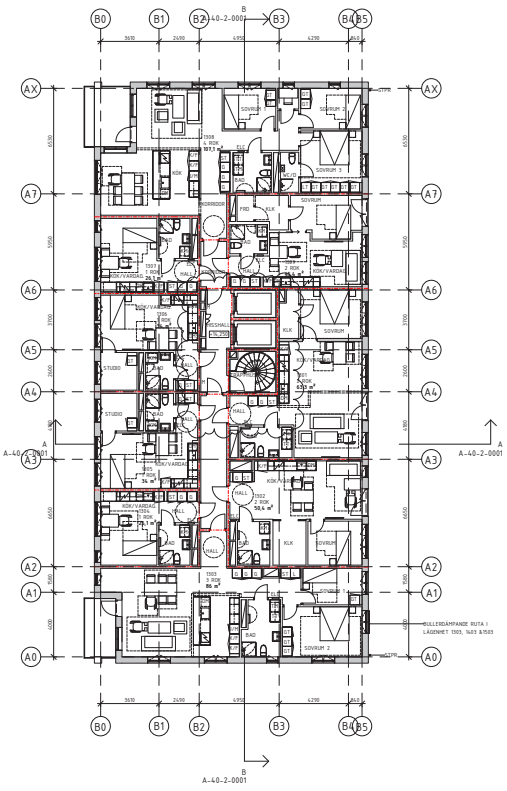


Figure . Plan by NORDR. Reproduced with permission.

REFERENCE PROJECTS

HOUSING

Project: Skeppsgossegatan
Location: Gothenburg, Sweden
Year: 2021
Architects: Okidoki

Figure 6. Interior photo of bedroom and exterior photo of facade by Okidoki. Reproduced with permission.

On the very noisy Skeppsgossegatan located near Oscarsleden, Okidoki built a condominium apartment block in sheet metal with large industrial mullion windows (Okidoki, 2024). The building is five stories high and offers 20 surface-efficient homes where the concrete walls are visible from the interior and match the feel of the exterior industrial facade.

Conclusion? Similar to Första Långgatan 16, this is located in an area with noise exposure and follows an industrial design, both on the outside and inside of the building. This example provides an excellent illustration of how concrete, which is also intended to be included internally, can be integrated and how they have decided to use sheet metal on the facade due to the wind and to maintain it as little as possible because of the difficult plot.

REFERENCE PROJECTS

COLLECTIVE LIVING

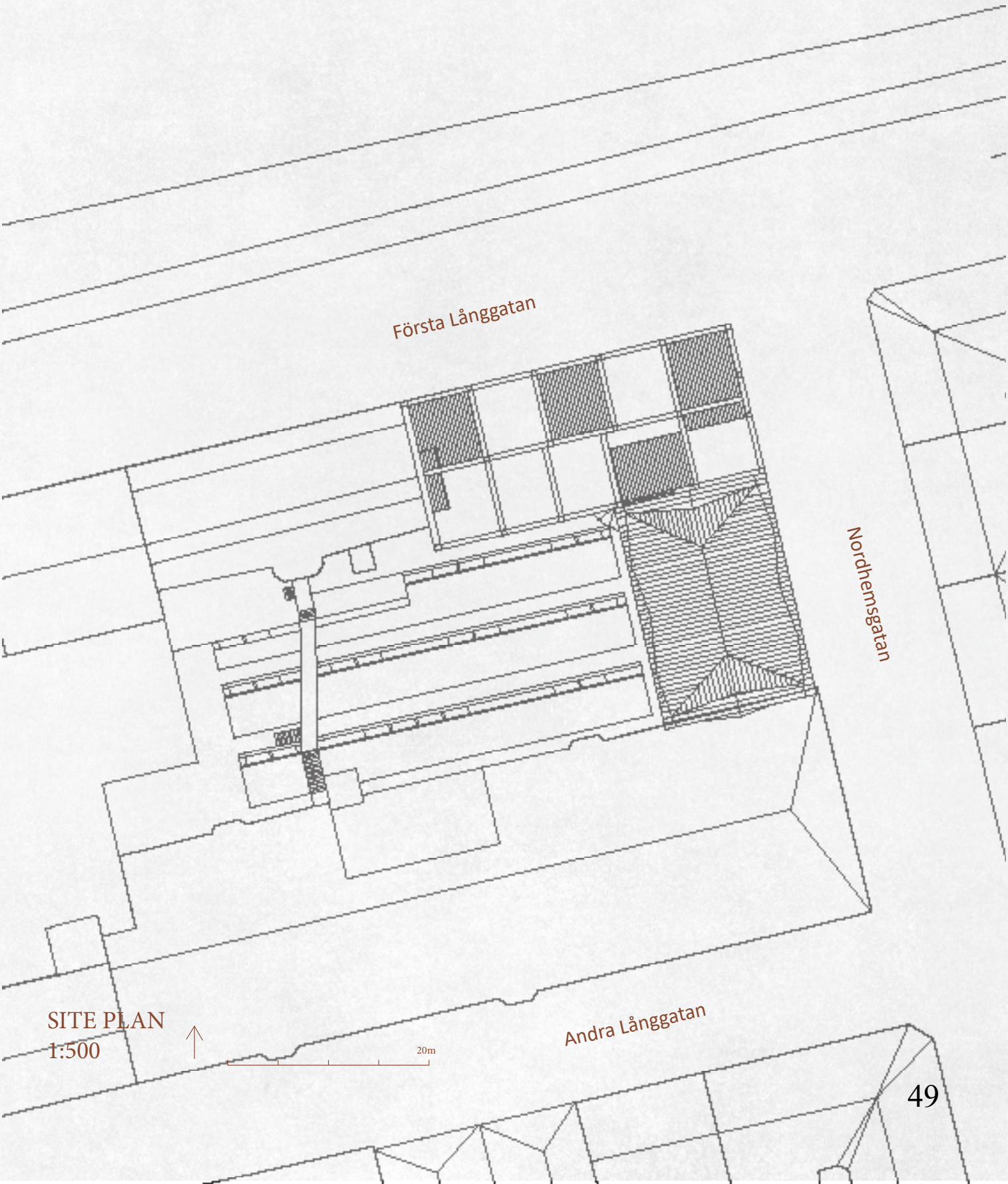
Project: Vindmøllebakken
Location: Stavanger, Norway
Year: 2019
Architects: Helen & Hard

A great example of a co-living project that is beneficial from a social and environmental perspective (Helen & Hard, 2019). It is built on a former office site and made entirely out of wood. The main part of the project is a big indoor courtyard where people can spend time together. There are apartments around it, and everyone shares 500 m2 including different activities. This helps everyone feel like they are part of a community. The living room in the middle of everything is a busy place where people can meet and socialize. When they designed the project, they thought a lot about how to make it easy for people to share and look out for each other. The people who live there even were included in the design decisions, which resulted in them feeling more connected to the place. The project follows a model called "Gaining by Sharing," which is about how sharing can make life better for everyone. It is a team effort between the architects, Indigo Vekst, and Gaia Trondheim, and it shows how sharing can meet people's needs in a way that does not harm the planet.

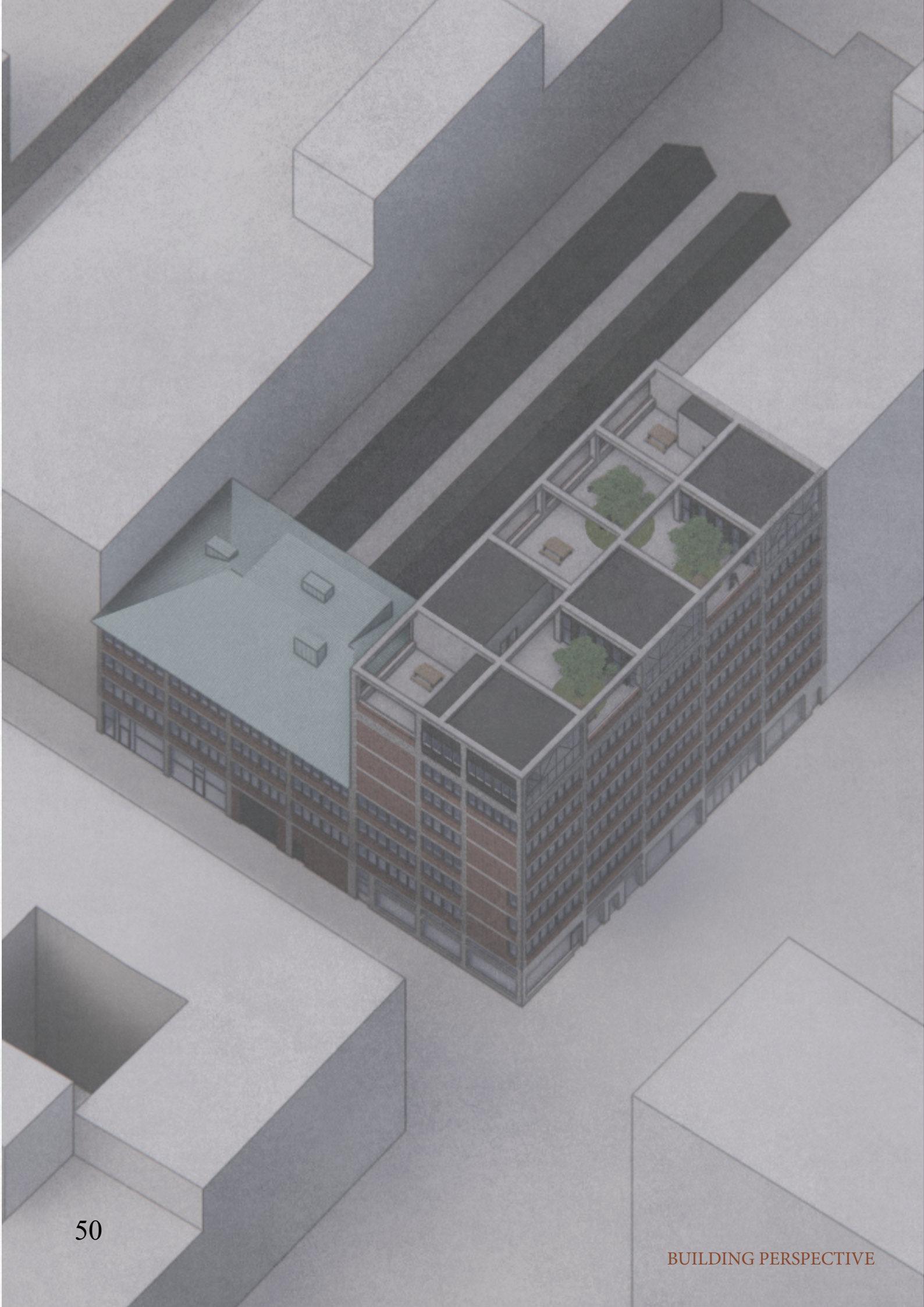
Conclusion? Since a collective living arrangement works well in the location and chosen building, this serves as a good reference point to consider which spaces might be interesting and how much space should be allocated for communal spaces.

Figure 7. Plan and view of the indoor courtyard. Drawing by Helen & Hard and photo by Sindre Ellingsen. Reproduced with permission.

DESIGN PROPOSAL



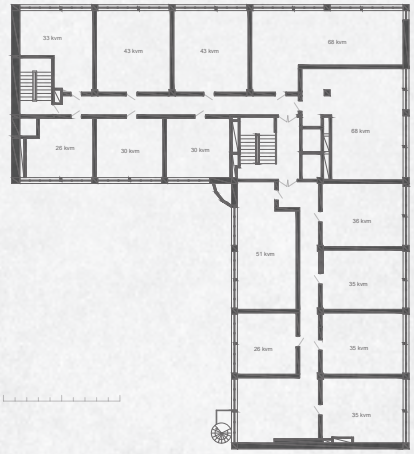
SITE PLAN
1:500



Concept & process

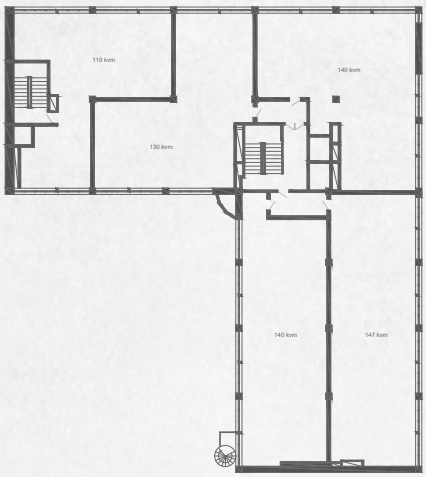
The conclusions made through the theory and the building- and site analysis have served as guidelines and points implemented in the proposal. Based on these, it can be stated, among other things, that social sustainability should be the focus of the project, while the cost should be kept lower as it is an attractive location. Following the qualities and potential of the building that are identified, the concept of the project will focus mostly on:

- Creating diversity by designing different sizes and layouts of apartments.
- Integrating exterior elements into the design to preserve the building's industrial character, highlighting its history as a former office space with a concrete interior.
- Reusing materials from the existing building as much as possible to reduce the costs.
- Creating an outdoor area for the residents on the roof with a great view that compensates the lack of garden and balconies.
- Introducing wood in the project as a contrast to the heavy materials today.

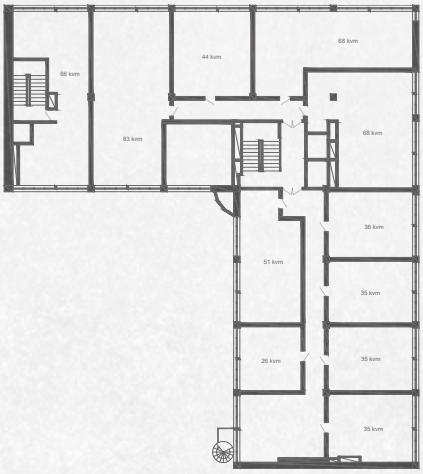


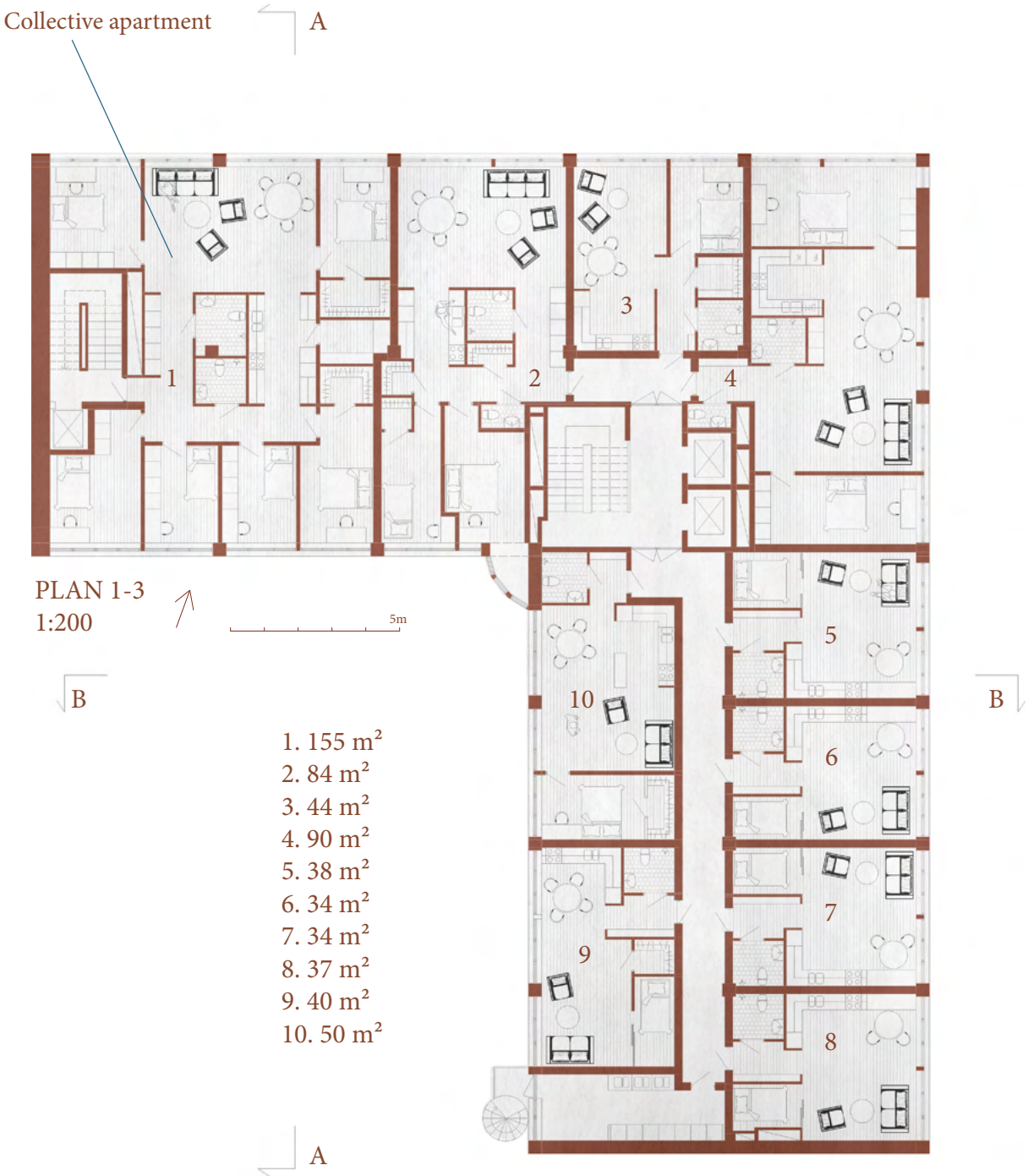
Three different explorations of apartment layouts & sizes

As the first step after choosing a building and analysing it three different approaches have been considered while exploring different apartment layouts in the building. The first one is small apartments, since they are the most attractive ones in the market due to high prices. The second one is big apartments, which would be too expensive for a family, giving them the only option to house collective living to work. The third one is a hybrid, where the smaller apartments are placed in the direction with more sunlight and for the north and noisy side bigger apartments are located to achieve the requirements. After further investigations it was found that the first option is not suited for this location because of regulations not allowing one sided apartments next to a facade that is noisy and the big apartment plan did not give many more qualities than the smaller ones, which made the hybrid the best option to continue with.



The possibility of designing balconies on the south side was investigated, but it was found that it would not add any additional qualities as it would require extensive changes to the facade and block the light entry of the apartments on the first floor. The option of raising the building and placing apartments on the top floor was also considered, but these apartments were not of sufficient quality as the recessed volume on the top floor was not deep enough. In addition, the social spaces on the roof would take up so much space that they would count as an eighth floor, which would require a completely different type of stairwell than those already in place. Therefore, this idea had to be abandoned.





PLAN 1-3
1:200

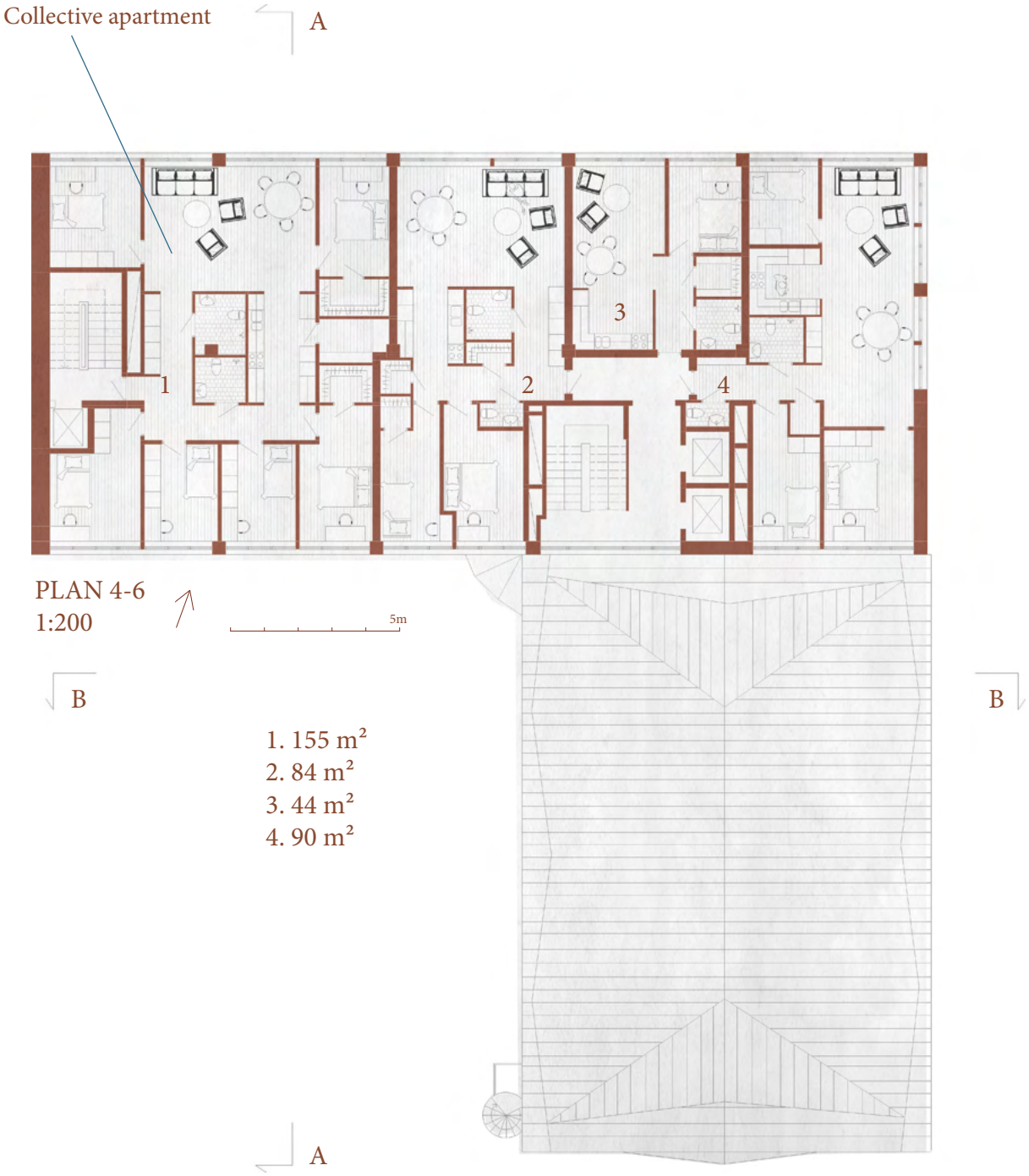
1. 155 m²
2. 84 m²
3. 44 m²
4. 90 m²
5. 38 m²
6. 34 m²
7. 34 m²
8. 37 m²
9. 40 m²
10. 50 m²

Image of the living room in the corner apartments on floor 1-3

Functions

The hybrid solution that was used resulted in four different apartments on the higher part of the building and six smaller apartments on the three story volume of different sizes. Similar to the reference project of the conversion, the most difficult area houses a collective accommodation consisting of six bedrooms, two toilets and a kitchen with associated storage. This collective housing has its own stairwell, while the other residences share the central stairwell. However there is a spiral staircase in case of fire emergency via the common laundry rooms. A part of the wall is removed to make more space for the three common laundry rooms with seating and a door to the spiral staircase is added. In the south facade at the corner, a window is replaced to create a connection point so that one wall can divide two bedrooms. The bay window in the corner opens up to that bedroom to provide more daylight.

Image of a typical bedroom in the building

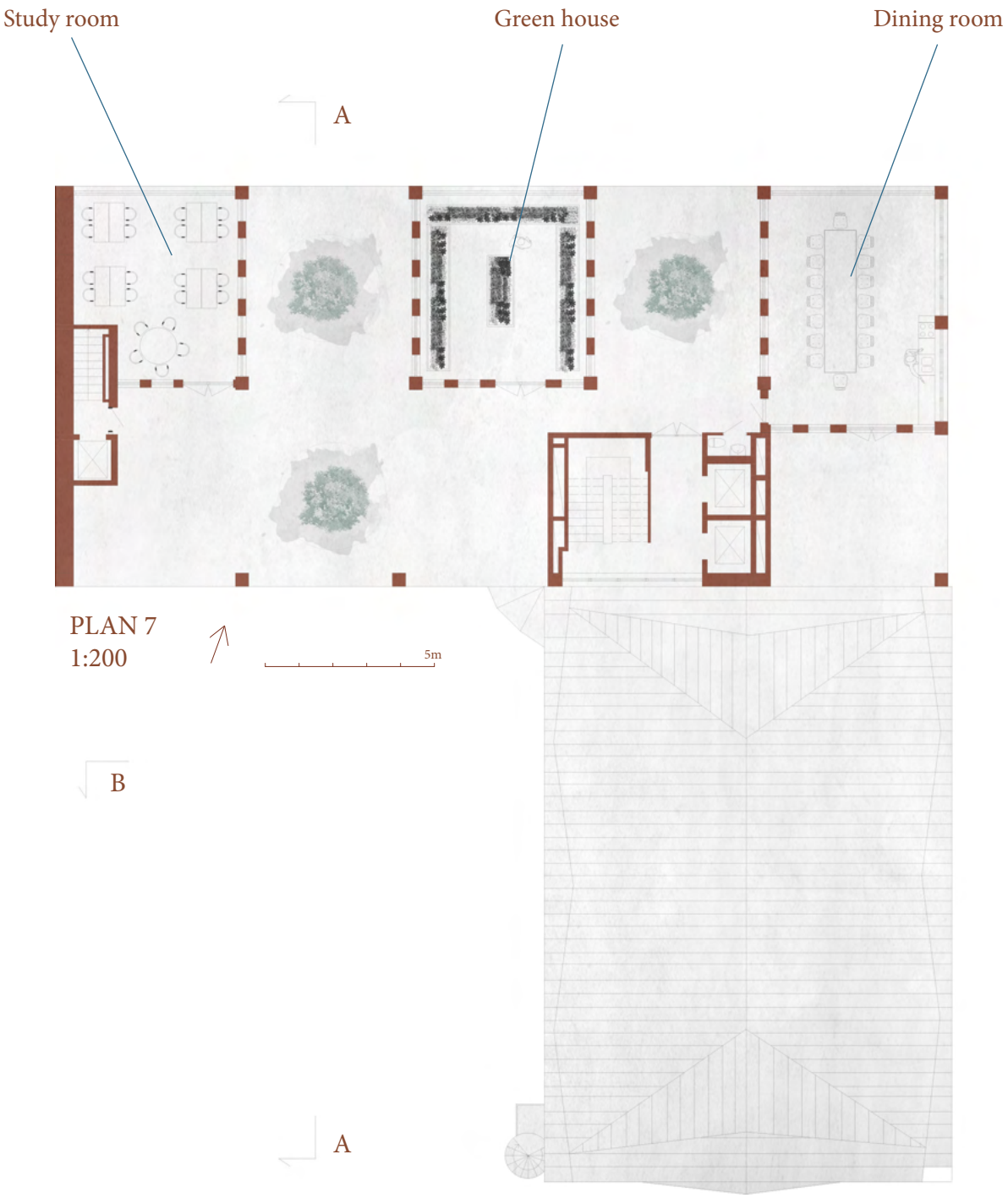


1. 155 m²
2. 84 m²
3. 44 m²
4. 90 m²

Modelimages of the living room in the corner apartments on floor 4-6

Regarding the residential qualities, most focus is put on working with sightlines and openness in the dining area and living room. Since the building is deeper than a usual residential building it is natural to keep all the spaces that need installations in the middle, which means that the kitchen is placed in a darker space giving the dining area more light. In two of the bigger apartments circulation is used, which benefits the collective living and gives a little more privacy with the corridors. There is a lot of storage, especially in the parts where

All the apartments follow the same layout throughout the building except the corner apartment since the window placements are different, allowing standardization to a great extent. The corner apartment is a big two bedroom apartment in the first three floors and is turned into a three bedroom apartment in the upper floors. Like the reference project in the same area the corner apartment is of similar size.

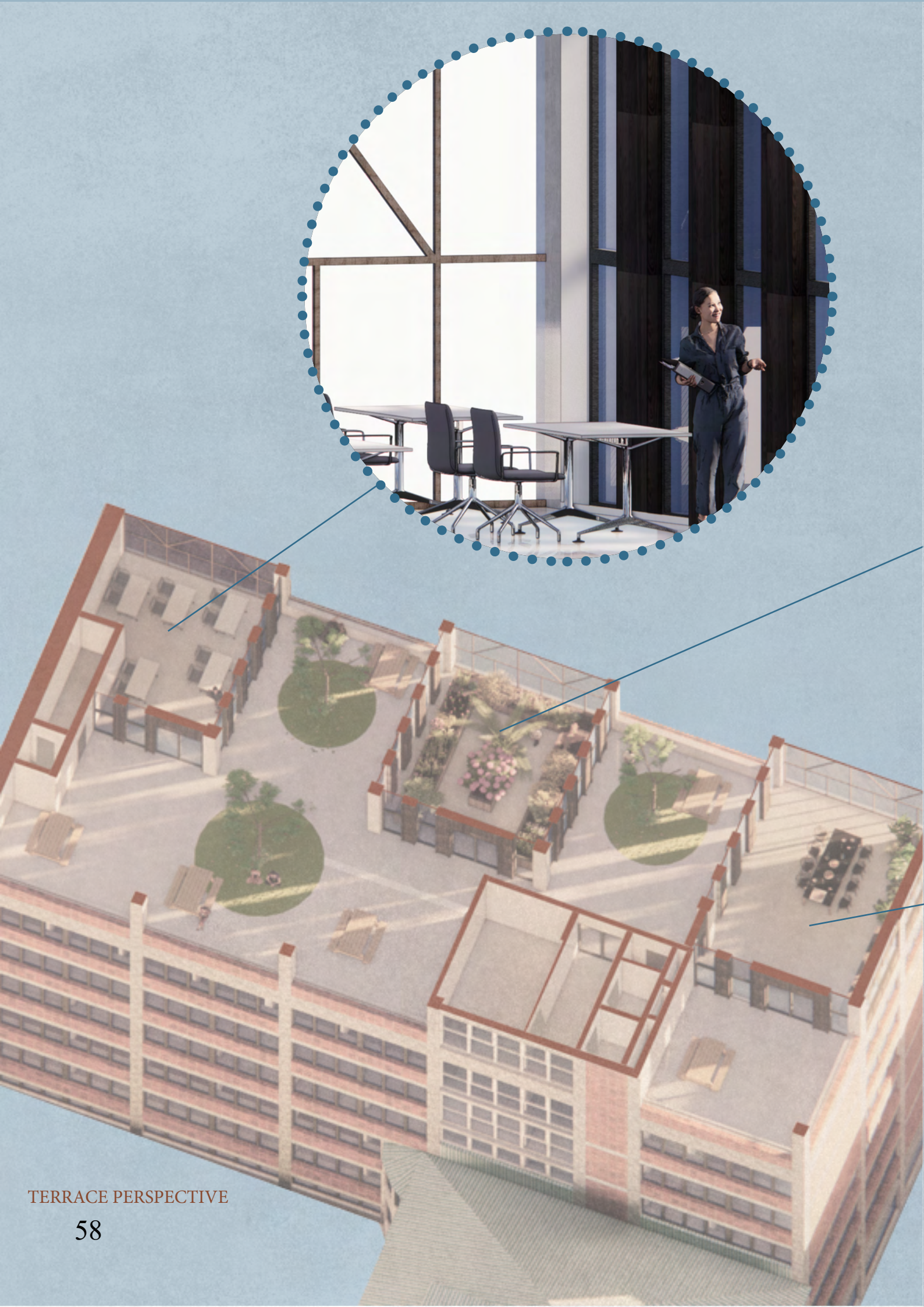


PLAN 7
1:200

After some explorations, the terrace ended up in three volumes containing spaces for activities where the residents can socialize and zoned outdoor spaces for relaxing and taking part in the great view. The existing walls were demolished to give space to an outdoor terrace facing the quiet and sunny south side while the volumes face the north and allow big windows for the view. The volumes are placed all the way out aligning with the existing facade to achieve the best view possible.

As the collective housing reference project a dining room with a small kitchen was chosen in the biggest volume allowing it also for private parties with a private terrace. In the middle, the greenhouse is placed to create green spaces to compensate for a garden and for the residents to plant together. As it is a building for different people, the study room can be used mostly by students and residents living in the smaller apartments.

Modelimages of the dining room on the terrace



TERRACE PERSPECTIVE

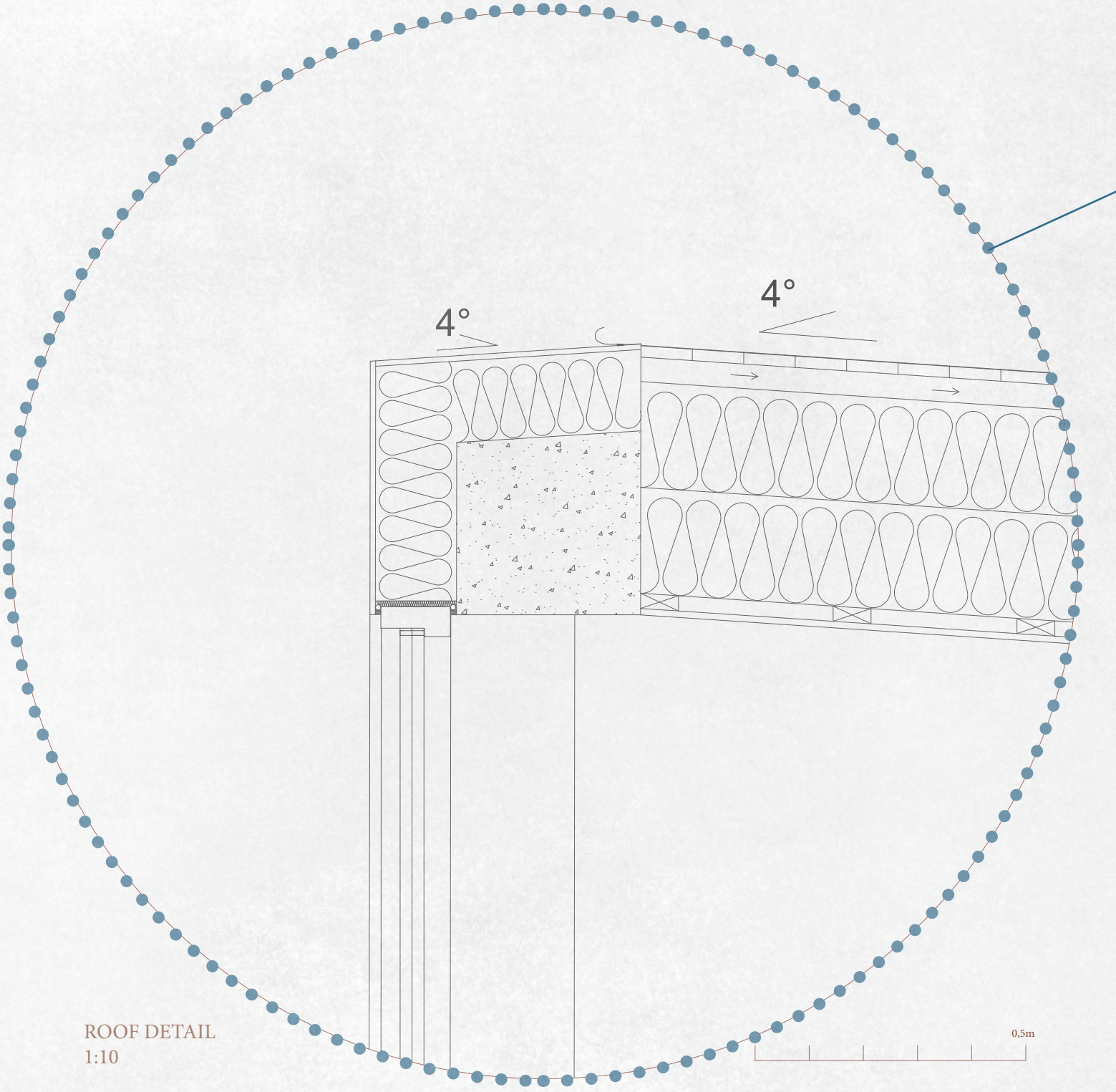
Structure & materials

On the facade, the existing structure is enhanced by continuing the pillars up to the terrace creating a frame that divides the outdoor spaces from the built volumes. The used materials for the pillars are as the existing ones: concrete covered in stone plates, although reducing the concrete as much as possible inside by using insulation material to reduce the costs and climate impact. The new pillars result in the building becoming visually higher seen from street view, although the height remains similar.

ELEVATION NORTH
1:200

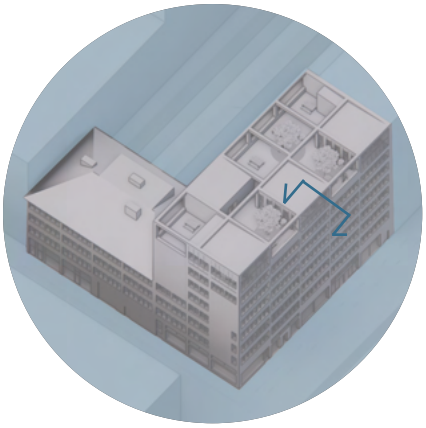
Image of the terrace from the south

ELEVATION SOUTH
1:200

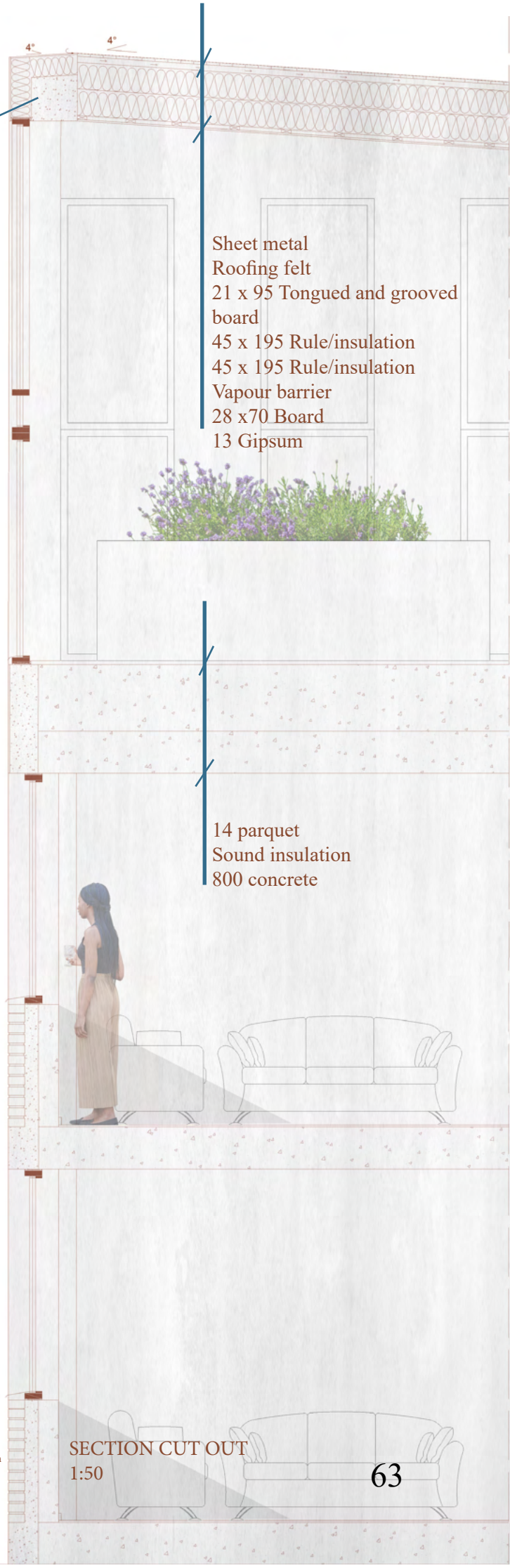


ROOF DETAIL
1:10

By removing the suspended ceiling belonging to the office spaces the concrete becomes visible and an extension of the exterior structure, which preserves the building's industrial character, highlighting its history as a former office space. It creates an interesting character similar to the reference project in Skepsgossegatan, which reminds of apartments in big urban cities like New York. To strengthen the concept, some doors, wall parts, and material from the suspended ceiling can be used for insulation for the new walls, which reduces was Since it was not possible to create a terrace and social spaces on the eighth floor due to fire safety reasons, the existing structure had to be demolished to give space for the volumes and the terrace. However, a lot of materials are reused, for example, the windows, which are instead placed on top of each other on the new volumes. The former doors are also reused and the wooden stud walls allow for simple maintenance in the future in case of complications. The only new windows are the big windows on the northern facade facing Första Långgatan. The wood is introduced to create a warmer atmosphere in contrast

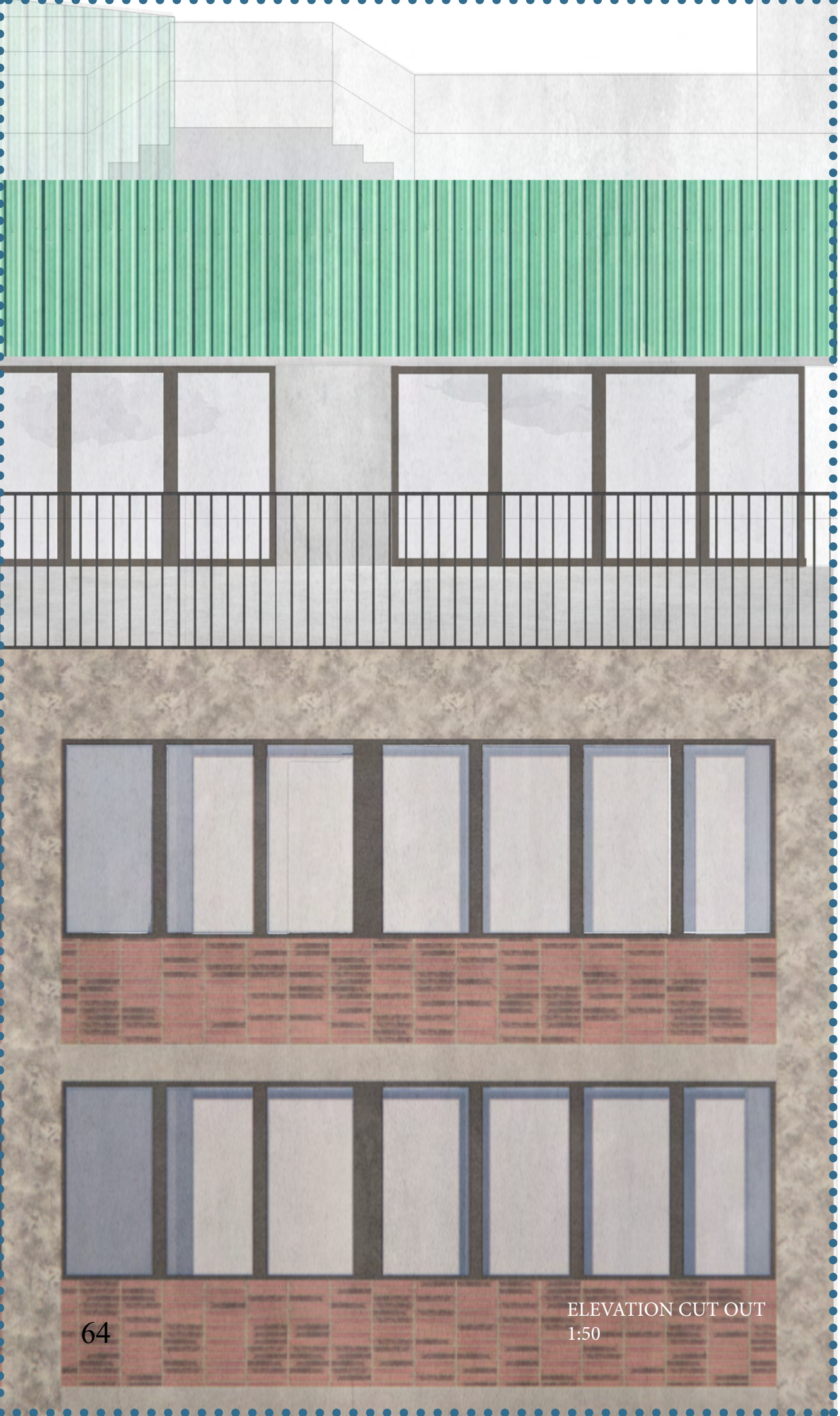


ORIENTATIONMAP



2m

SECTION CUT OUT
1:50



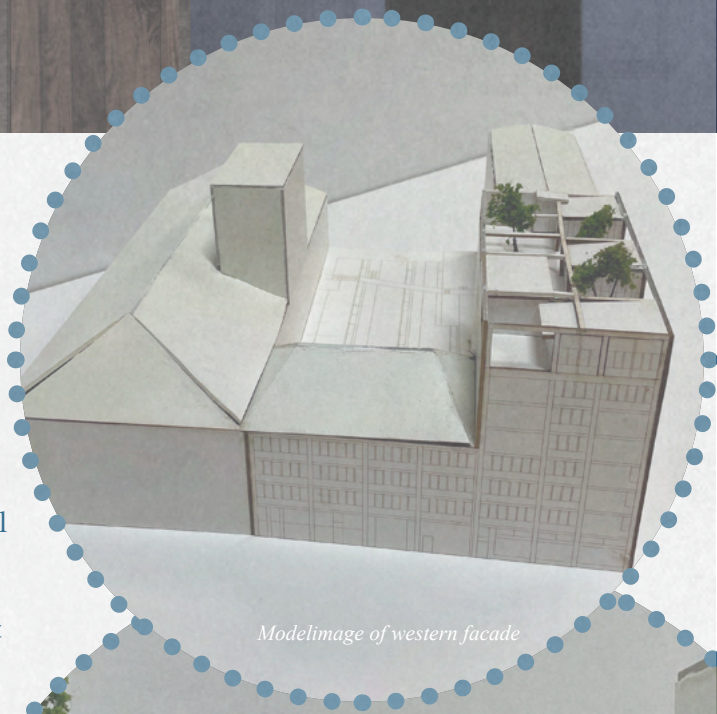
ELEVATION CUT OUT
1:50

ELEVATION CUT OUT
1:50

ELEVATION EAST
1:200

ELEVATION WEST
1:200

Image of the green house wooden facade

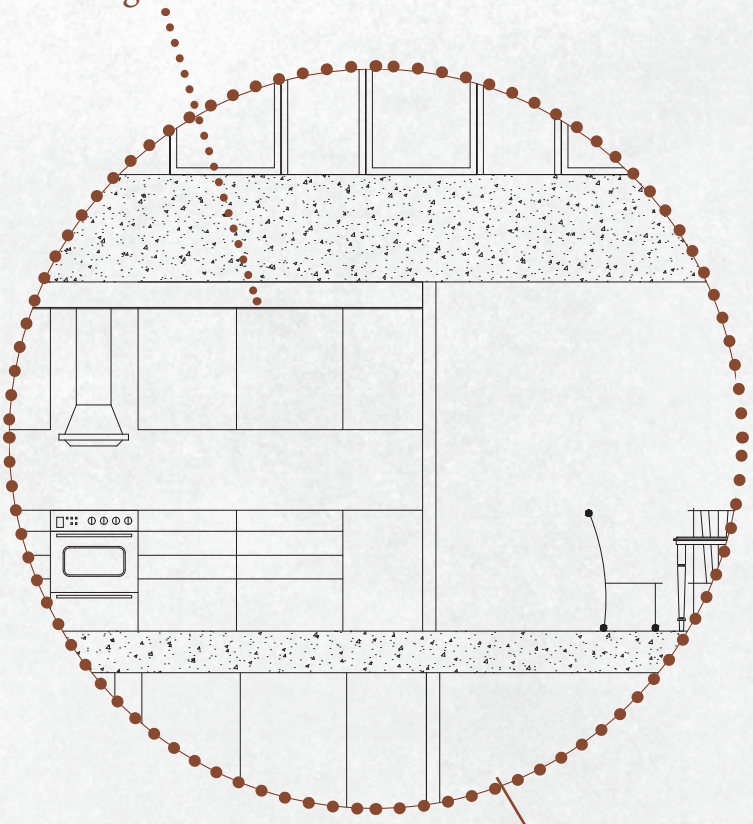


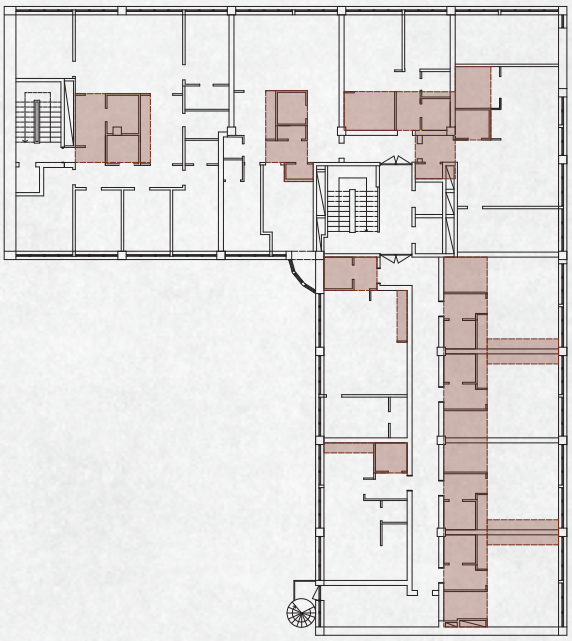
Modelimage of western facade

Since it was not possible to create a terrace and social spaces on the eighth floor due to fire safety reasons, the existing structure had to be demolished to give space for the volumes and the terrace. However, a lot of materials are reused, for example, the windows, which are instead placed on top of each other on the new volumes. The former doors are also reused and the wooden stud walls allow for simple maintenance in the future in case of complications. The only new windows are the big windows on the northern facade facing Första Långgatan. The wood is introduced to create a warmer atmosphere in contrast to the concrete. It is treated with oil to give a darker shade and divide the newly built structure from the old. Instead of railing the old brick walls are kept to continue the same character as the existing building.

Modelimage of eastern facade from the inner courtyard

Visual concrete on the social area, but suspended ceiling in the kitchen and bathrooms.

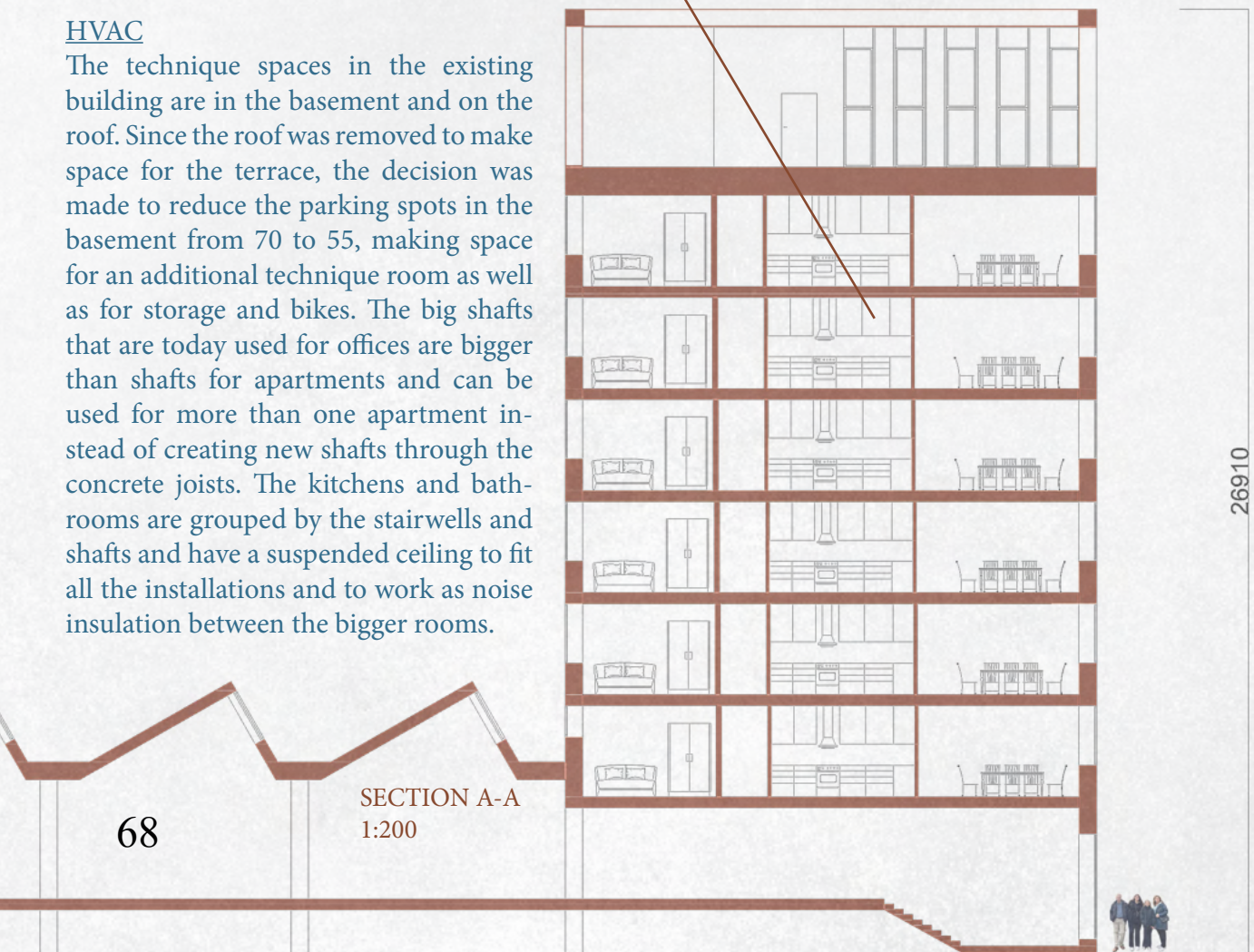




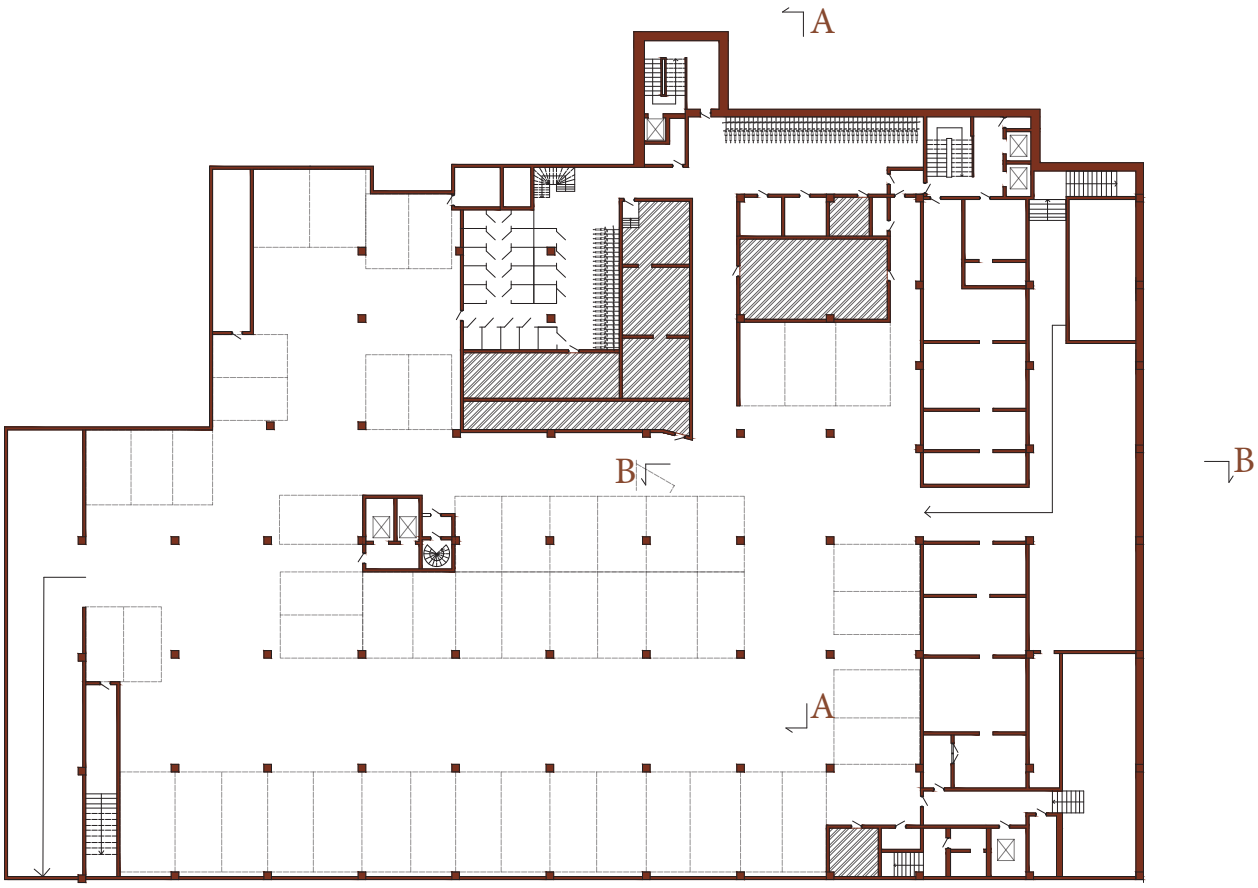
Scheme of lower roof for HVAC system

HVAC

The technique spaces in the existing building are in the basement and on the roof. Since the roof was removed to make space for the terrace, the decision was made to reduce the parking spots in the basement from 70 to 55, making space for an additional technique room as well as for storage and bikes. The big shafts that are today used for offices are bigger than shafts for apartments and can be used for more than one apartment instead of creating new shafts through the concrete joists. The kitchens and bathrooms are grouped by the stairwells and shafts and have a suspended ceiling to fit all the installations and to work as noise insulation between the bigger rooms.

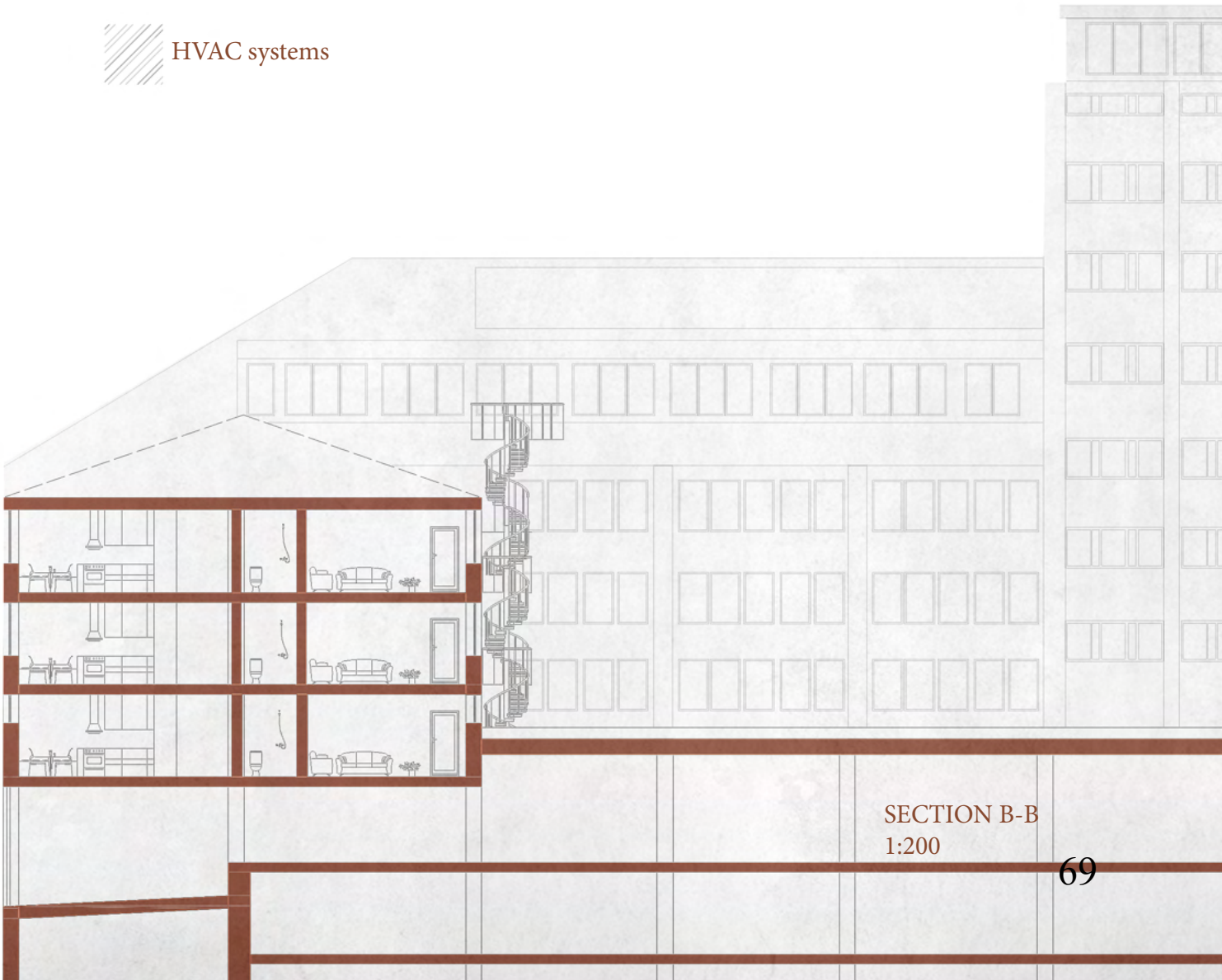


SECTION A-A
1:200



BASEMENT
1:500

HVAC systems



SECTION B-B
1:200

Modelimages of dining room plan and apartment underneath

Social sustainability

A lot of focus has been on social sustainability in the project in form of larger apartments that allow other types of living than the traditional ones, a total of 43 apartments in the building with different types of qualities and shared laundry rooms, as well as a generous terrace floor with three volumes for social activities for the accommodation and zoned outdoor spaces with greenery and seating.

Ecological sustainability

In this project, materials have been reused to a great extent, and wooden structures have been implemented. The use of new concrete has been minimized by replacing it with insulating material. The building includes spaces such as greenhouses and green areas, creating opportunities for cultivation and promoting biodiversity.

Economic sustainability

The apartments are aimed at different target groups and are offered in varying quality and price. The area mainly consists of newly built homes, with a mix of larger apartments suitable for families and collective housing. Rental properties make it possible for people with lower incomes, such as young people, to live here. Most of the apartments in the building have received support, except for the largest. The apartments are standardized, except for one type that changes after three floors, which facilitates construction, but also maintenance as installations are grouped around the stairwells.

Modelimage of the dining room outdoor space

Modelimage of dining room, apartment and outdoor space on he northen facade

DISCUSSION

The main question of this project has been to explore if vacant office buildings can be transformed into qualitative apartments studied through the example of Första Långgatan 16 in Gothenburg. The result shows that it is possible to convert it and achieve some residential qualities that a lot of newly built apartments have, however with a lot of challenges along the way, as the depth of the building creating many dark spaces that are difficult to work with as well as having to follow a specific structure given after the pillar structures of the building. Another challenge is that the building is of concrete and bricks, which leads to difficulties in big exterior changes. The difference in every floor studied has also increased the difficulties in finding apartment layouts that work throughout the building.

If this was to be a realistic project, a lot of measurements would have been needed to consider if this building is even worth transforming. There are aspects of this project that could not be fully explored due to the time limit and competence, for example, if the exterior walls are insulated enough, how old the materials are, and how much can be reused as well as if all the windows offer enough daylight into the rooms. Especially on the first floor of this building, the windows are smaller on the south and east side. This leads to less daylight and can work in the big apartments, since only the bedrooms are placed there, although on the east side the apartments are smaller and one-sided, they only receive light from those windows. Furthermore, the kitchens are placed in the inner core of the building, which can result in not enough daylight as well, especially the ones in the collective apartment as well as the corner apartment on the first three floors. However the windows go all the way up to the ceiling, which maybe achieves the requirements. Further measurements would have been needed.

The apartments ended up with a lot of qualities such as circulation, sightlines, big windows and an interesting character of the interior. However, there are some important qualities that could not fit, such as flexibility and adaptability as well as better measurements for furnishing, since the existing spaces did not allow it. It could also be discussed if the collective apartment should have a bigger social space, which is easily fixable by removing one of the bedrooms. The main reason for it to have six bedrooms is that it is economically profitable.The green areas on the terrace could be further developed, and the trees shown in the perspective images may pose challenges due to wind and height if constructed. They primarily serve a visual purpose and could be replaced with smaller bushes in reality.

Along the project there has been a lot of communication with the municipality with questions about regulations, Wallenstam, the property owners, and with Nordr, which are the customers for one of my reference projects to achieve making the project as realistic as possible. Even if it was very helpful, it became a bigger challenge trying to solve questions to a greater extent than usually during education, such as noise regulations.

In summary, the project was very well executed and detailed, although some parts could have been further developed. The main focus was on the apartments and the social aspects of the building, as well as on preserving and transforming existing elements to enhance the character of the building without compromising its original value, which is evident in the project.

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