Living and Learning: A Transformative Journey

Adaptive reuse of The Humanities Library in Gothenburg University into student community and housing

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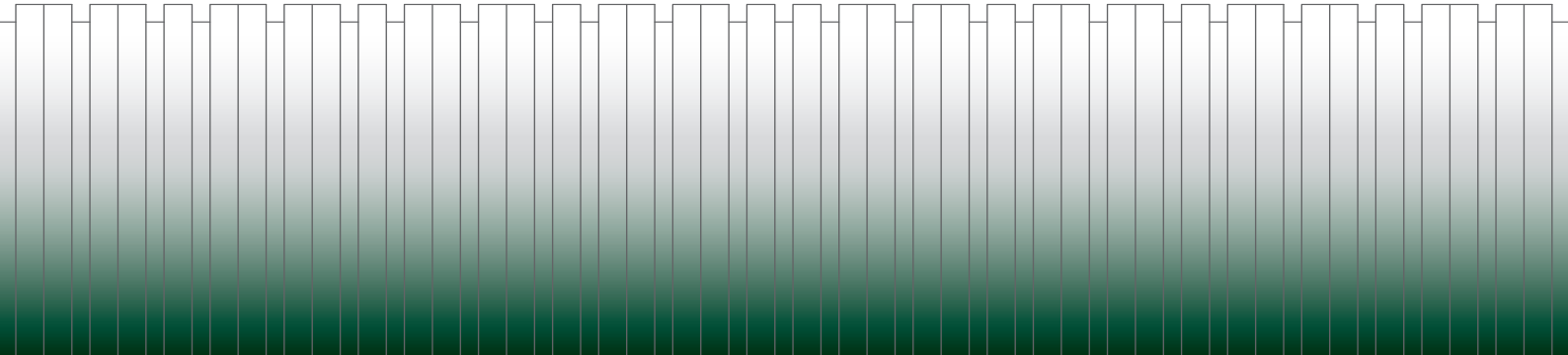

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Abstract

The transformation of an existing structure through adaptive reuse offers a sustainable solution to the growing demand for student housing, while limiting new construction and preserving historical and valuable buildings. This thesis explores the adaptive reuse of the building UB80 in the Humanities Library at Gothenburg University into student community space and housing. The goal is to maximize the building's use and potential by integrating communal spaces with residential spaces that introduce the concept of social sustainability.

The project begins by examining the principles of adaptive reuse and circular economy, exploring case studies of similar transformations and existing examples in the field of community spaces and student housing. It considers the concept of a library as a space for community interaction and knowledge exchange that reflects the story of humanity. The thesis examines the connection between human needs for social interaction, living and learning, focusing on how these three essential elements can be integrated to create a functional and sustainable environment.

User engagement and architectural tools were the main components of the design process, through interviews, surveys, and study visits, along with SDG impact assessment tool. These methods ensured that the project aligns with the needs of the community and meets the concept of sustainability.

This thesis proposes a model for adaptive reuse of a library that balances the preservation of architectural buildings with the creation of functional, sustainable spaces that meet the needs of modern student life and provide balance between living and learning.

Keywords: *Building transformation, adaptive reuse, student housing, preservation, circular economy, Library.*

Glossary

Adaptive reuse
"Adaptive reuse is based on the words 'adaptation' and 'reuse'. The term refers explicitly to changes that involve a functional and a physical component. The change in function does necessarily mean a radical change, but it may be more subtle.
Adaptive reuse as a term is most suitable to name the discipline of working with existing buildings as an emerging field that intersects the more established disciplines of architecture, interior architecture, conservation, engineering, and planning" (Plevoets, B., & Van Cleempoel, K. (2019).

Circular economy (CE)
"An industrial system that is restorative or regenerative by intention and design. It replaces the 'end-of-life' concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models". — Ellen MacArthur Foundation, 2013.

Co-locating
"Co-locating: The practice of placing individuals, teams, or organizations in the same physical location to improve communication, coordination, and collaboration". (Olson & Olson, 2000).

DF
"The daylight factor is defined as the ratio of horizontal indoor to outdoor illumination by daylight under continuously overcast sky conditions, expressed as a percentage" (Sayigh, 2013, p. 23).

HIPAT
"Hierarchy of Isolation and Privacy in Architecture Tool". McCartney & Rosenvasser, (2022).

SDG Assessment tool
Sustainable Development Goals tool is a learning tool that visualizes the results from a self-assessment of how a project affects sustainable development goals. SDG Impact Assessment Tool (2020)
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Social sustainability
A key dimension of sustainable development that emphasizes human well-being, social equity, inclusion, and the ability of communities to function and evolve over time while maintaining social cohesion (Mohamed & Paleologos, 2021; Colantonio, 2007).

SWOT Analysis
"SWOT analysis is a strategic analysis tool for use in context analysis. The acronym refers to the domains it considers: Strengths, Weaknesses, Opportunities and Threats" (European Commission, n.d.).

Acknowledgements

First and foremost, all praise and gratitude to Allah, whose guidance, strength, and blessings have supported us throughout this journey.

We would like to express our deepest gratitude to Paula Femenías, our examiner, who has been with us from the very first steps of this thesis. She believed in our project, offered continuous support, and guided us throughout the entire process. She helped us connect with Akademiska Hus and encouraged us every step of the way. Her trust in our vision, along with her thoughtful guidance, gave us the confidence to move forward with our ideas. We are sincerely thankful for her time, dedication, and support.

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We would also like to extend our warm thanks to Akademiska Hus, especially Sofie Bårdén and Rebecka Gunnarsson, for their valuable contributions. They generously shared their time and knowledge, met with us regularly, and provided insights that enriched our understanding of the site and the real-world context.

We also wish to thank everyone else who contributed their time, ideas, or support to this thesis, whether through interviews, study visits, or encouragement.

Finally, to our families, thank you for your endless support, patience, and encouragement every step of the way. Your belief in us has meant more than words can express.

Authors

In this thesis, you will see a merging of two different programs in architecture. We, the authors, met during the Residential Healthcare studio, where we discovered our shared interest in both residential and social architecture. Combining our skills and interests has allowed us to explore multiple aspects of architecture, including residential, urban, and building transformation.

This work is a collaboration with Akademiska Hus.

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1.

Introduction

Background

Gothenburg, like many other urban areas in Sweden, is facing a significant shortage in housing, and since it is one of the four largest student cities the students are the main part of this. According to the Swedish national union of students (SFS) criteria for safe housing and how long it takes for a student to find housing, Gothenburg has been listed as one of (Röda städer) wich means the red study cities, since it cannot offer students housing during the autumn semester, (figure 1). There is just over 12 000 student residences and both Chalmers and Gothenburg University have 67 000 students in total, 39 000 of them are full time students, (SFS, 2024).

"The lack of student housing means that in some cases people have to give up their place at the city's universities. 29 percent of those considering studying at the University of Gothenburg choose not to go to Gothenburg due to the housing shortage." (Sveriges förenade studentkårer, 2024, p. 16).

This shows that students are struggling to find places to live and highlights an important issue about the shortage of student housing in Gothenburg. The current situation will affect the students' well-being and could impact the overall image of the city, considering that the city of Gothenburg has two of the largest universities in Sweden.

Akademiska Hus, a state-owned company responsible for managing and developing university properties across Sweden, has set a goal to provide around 4 000 student housing units in Gothenburg. Right now, however, it only offers a small number of student accommodations in the city (S. Bårdén, April 2025). This shortage shows how important it is to act quickly, something Anna Alsborger, the Property Director at Akademiska Hus, also pointed out when she said:

"The housing will be an important contribution to reducing the student housing shortage that prevails in the city" (Akademiska Hus, 2023).

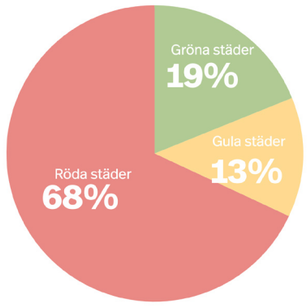
Alsborger emphasis on the importance of new housing developments shows the need to address the problem of student housing shortage in the city and the need to maximize the chances of finding accommodation.

In addition to the housing shortage, the need for social interaction among students is equally important. Social spaces and designing units that encourage socialization within students play an important role in fostering a sense of belonging, enhancing well-being, and promoting academic success. (McCartney, S., Rosenvasser, X.,2022).

According to Akademiska Hus, creating environments that provide spaces for both privacy and social interaction is essential. Shared living facilities for example, give meaningful connections among students and helps in decreasing the feeling of isolation. Social interaction enhances the overall student experience. (Akademiska Hus, 2025).

Having these facts in mind, it becomes essential to explore effective ways to address the shortage of student housing and increase social interaction, while practicing

sustainability and limiting new construction. A possible solution is adaptive reuse, where existing buildings can be repurposed into new uses. This approach reduces the environmental impact of new construction and preserves existing structures. By transforming existing buildings into accommodation and community space, it gives the place additional meanings while preserving its history. Buildings like libraries have a lot of potential, and when thinking about them in a different way, believing that they can be more than just a place for books, and integrating student accommodation within these spaces, it creates a dynamic environment that encourages learning, social connection, and sustainability.



Stad	Färg 2024	Antal campus-studenter
Göteborg		38 340

Figure 1: SFS Bostadsrapport (2024).

Purpose & exploration

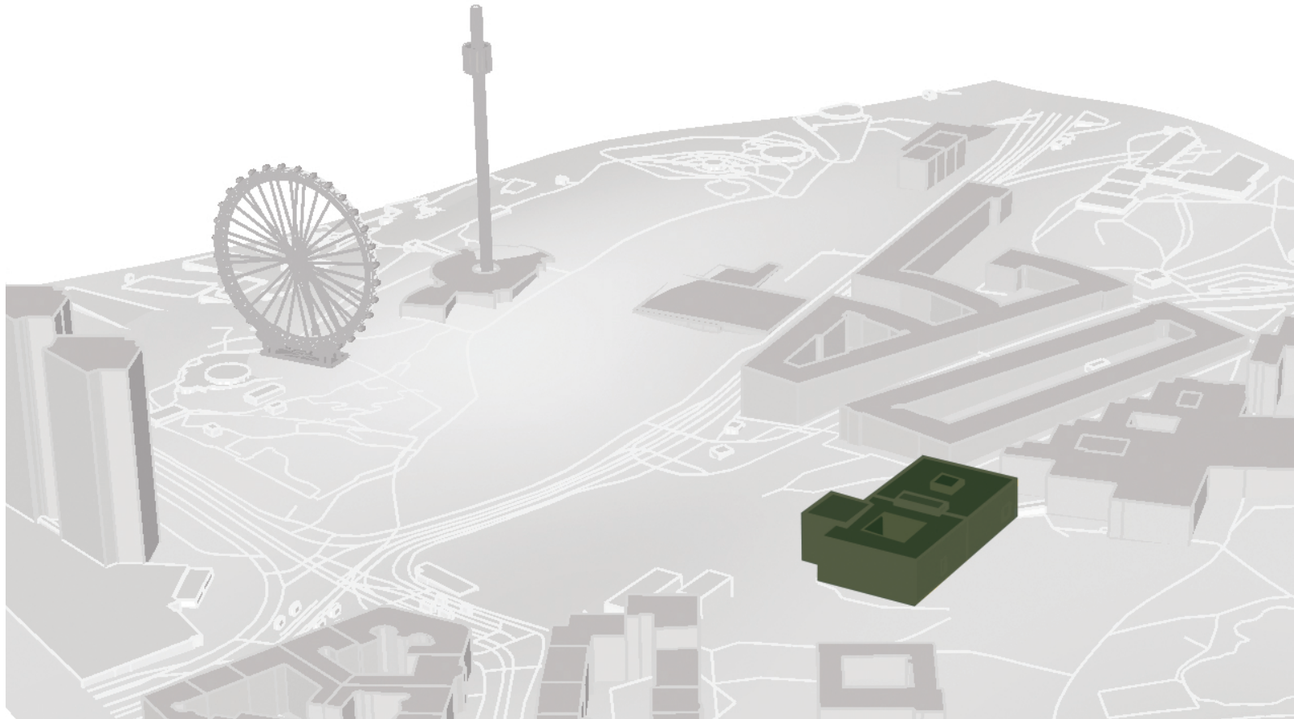
The purpose of this project is to address the growing demand for student housing in Gothenburg while creating a sense of community and engagement among students from different cultural backgrounds.
The project is an Architectural intervention that focuses on the adaptive reuse of the UB80 building in the Humanities library in Gothenburg University. In addition, it explores how libraries can be developed to serve as a place for learning, social connections and as a living environment. The focus is on enhancing the library's value within the community, allowing it to serve students, visitors, and the public in new and meaningful ways. The design will examine the interaction among students, encouraging the library to play a larger and more active role in shaping the community's future. In line with Garcia-Febo's (2018) statement that "most libraries see their value in how they integrate and respond to the community," this project highlights the library's qualities and strategic location to strengthen the social connections on campus and in the surrounding area, making it an important space for learning, community engagement and accommodation. The project emphasizes on community engagement and social interaction. Adapting these spaces for both housing and communal use aims to create a vibrant, multifunctional environment that goes beyond just a library or a living space, but also encouraging cultural and social initiatives within the community. In addition, some of the circular economy practices will be implemented, such as minimizing demolition, reuse of existing material, and generating sources of income for the project and the residents to support the project.
The project is sorted into three levels of hierarchy: the ground public community space, the upper spaces with shared facilities, and private apartments. These levels of hierarchy between privacy and social interaction play as a balance between the feeling of belonging and personal space, allowing students to feel both connected to their community and comfortable in their private living areas.

Thesis question

> How can the Humanities Library at Gothenburg University be transformed into a student community and housing?

SUB-QUESTIONS

- How can the use of large buildings, such as libraries, add more value to the land?
- How can social and private areas be integrated to enhance the student's well-being?



Methods and tools

Throughout this thesis, a mixed approach has been used, combining research and design to develop a deep understanding of the project type and to gain the desired results. Both research for design and research by design have been used in this research (figure 2). Starting with research for design by having connection the building owners, reading and researching for similar case studies, interviews and study visits, to gain a knowledge base. Research by design using different Architectural tools such as Velux, SDG impact assessment tool and HIPAT to analyze and visualize the results to gain better understanding of different aspects of the project, such as sustainability and privacy practices. Context, site and historical analysis were part of the research as well, giving a detailed understanding of the area and the building's history before moving to the design phase. The two phases: research for design and by design, were then both used in parallel to each other to use insights from each phase to adjust based on new findings or design challenges.

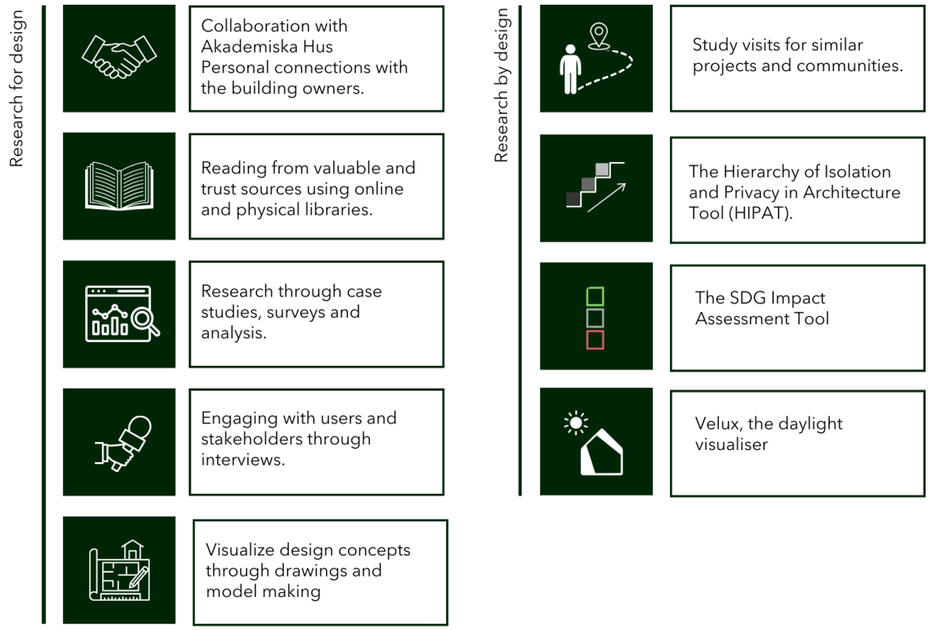


Figure 2: A structured approach to investigate the research aim and questions for the master's thesis.

Collaboration with Akademiska Hus
The thesis used personal connections with the building owners to discuss the possibilities, gain the information needed about the building, and having valuable feedback and discussions with the building developers.

Reading
This method involves gaining knowledge on the subject. By reading existing literature, this helps to understand the current state of research, identify the gaps, and also build a solid theoretical foundation for the thesis.

Research
By exploring similar projects that are related to the master thesis and doing surveys, this will lead to make design choices based on relevant data, which will strengthen the outcome for the master thesis.

Interviews
Doing interviews with users and stakeholders helps to gain detailed and personal insights. It is useful to understand different perspectives and explore some of the complex issues.

Drawing & model making
This method helps to visualize the final findings of the project. It is effective for presenting design ideas in a more readable and understandable way (figure 3).

SDG
The SDG Assessment Tool (Eriksson, M., Ahlbäck, A., Silow, N., & Svane, M, 2020) is employed to evaluate the project's alignment of the sustainability goals, ensuring both environmental and social responsibility are prioritized in the design process.

Velux
The projects uses VELUX Daylight Visualizer, which is a lighting simulation tool to analyse the daylight conditions in buildings. This tool was used to ensure that the living spaces has the desired amount of light and follows the European standards for the daylight factor.

HIPAT
The project applies some architectural and sustainability tools such as the Hierarchy of Isolation and Privacy in Architecture Tool (HIPAT) (McCartney, S., Rosenvasser, X.,2022) to achieve the balance between privacy and social interaction in the design.

Study visits
Different study visits were conducted in the early phase of the research to explore similar projects and gain valuable insights. These visits provided practical examples and helped with the de-sign direction.

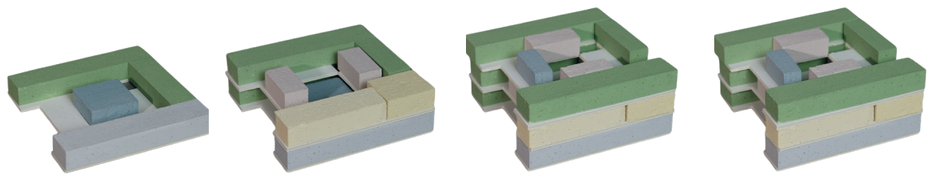


Figure 3: Expiremental model for the buildongs's different functions, zones, shared and common spaces

1st study visit: Olofshöjd

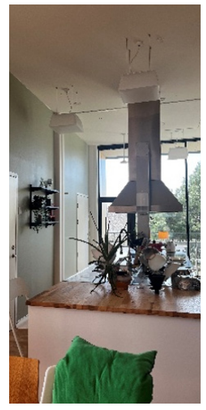
A student housing that is owned by Chalmers Studentbostäder (CSB) and focuses on the concept of shared housing. It provides shared living for students where they can have their own bedroom and toilet, but with shared kitchen. In addition, it includes different activities and community spaces for the students, such as a gym, sewing room, sauna, and barbecue places. These activities improved the social life and interactions between the residents, which were really appreciated by the students according to interviews with some of the students that live there.

2nd study visit: Smedjan (SGS)

A former industrial building that is located in Lindholmen, Gothenburg, and was built in 1946 and transformed into student housing in 2018. The building was a great example of adaptive reuse, and how the spaces were used in an efficient way to accommodate as many residents as possible. However, the place has a lack of social spaces. The building has a big inner space with no light access that was used as bicycle parking, laundry rooms, and storage rooms.

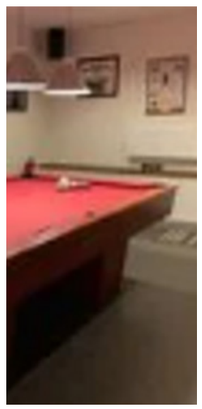
3rd study visit: HSB Living Lab

Within Johannebrg campus, the HSB Living Lab provided a chance to explore innovative solutions in sustainable housing, where various building technologies and materials are tested in real-world conditions. This visit was particularly valuable in understanding how sustainability can be integrated into projects, and how to think outside the box as an architect. The project for example has an open laundry space in the entrance level and flexible furniture spaces.



4th study visit: CSB

Chalmers Studentbostäder (CSB) – Johanneberg: student's accommodations that combine residential areas with social spaces. The project supports both housing and community spaces, such as, multipurpose room that can be rented for student's activities and parties, billiard room, sewing room, and a swimming pool. During the visit and interviews, it was noticeable that most of the spaces were highly appreciated by the students, especially the multi-purpose room. However, other spaces were not as used as the sewing a project rooms, and the main reason was the placing of these spaces as they were in a closed small rooms and hardly accessible.



The iterative process

The project applies some architectural and sustainability tools such as the Hierarchy of Isolation and Privacy in Architecture Tool (HIPAT) to achieve the balance between privacy and social interaction in the design. Additionally, the SDG Assessment Tool is employed to evaluate the project's alignment of the sustainability goals, ensuring both environmental and social responsibility are prioritized in the design process.
These methods and tools ensure a well-rounded investigation of the research aim and questions, and each method complements the others.

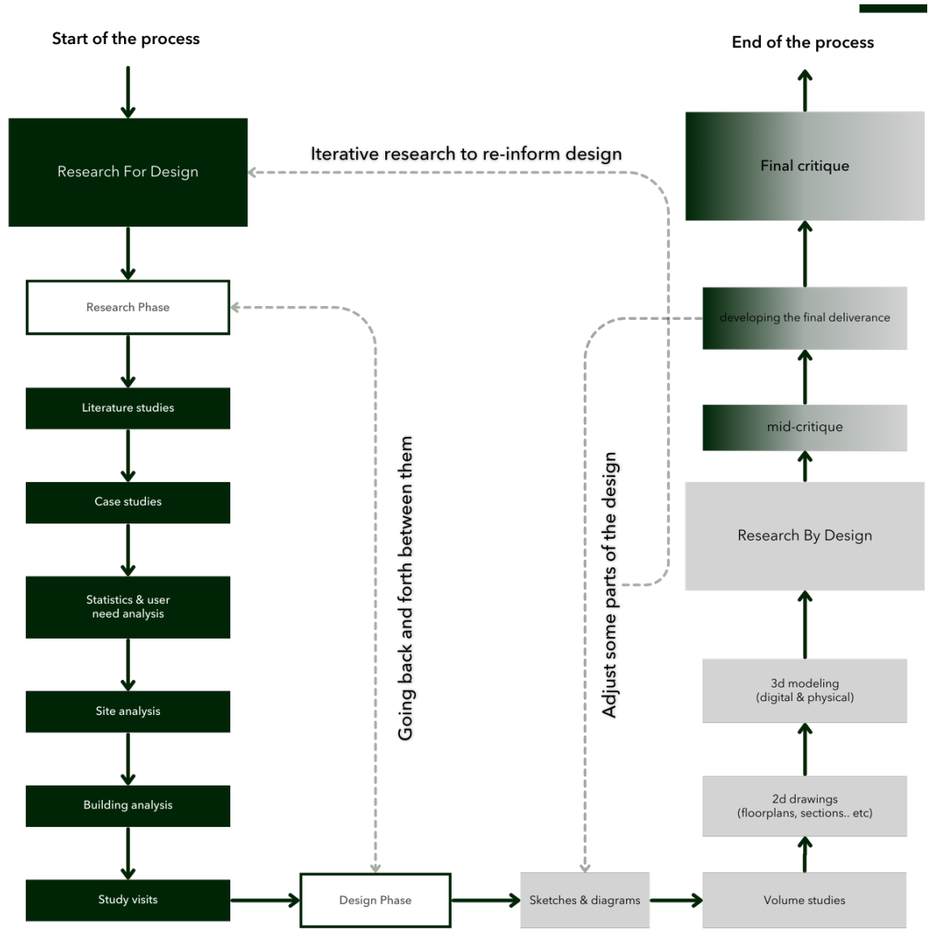


Figure 4: Diagram showing the iterative process during the thesis work.

Workflow method

Since this thesis was a collaborative effort between two students, an organized and transparent workflow was essential. To manage tasks, share updates, and maintain clear communication, Canva boards were used as a digital workspace (figure 5).
The board functioned as a central hub for all stages of the thesis development. Week by week, and day by day (1) was clear and shown on each board. Daily to-do lists (3) were created to break down the workload and assign tasks, while editable checklists (2) helped track progress. Communication drafts, such as interview requests and follow-up emails (4), were also shared through the platform for joint editing. In parallel, design development sheets with color code for each student (5,6) and architectural drawings were uploaded regularly to keep track of the work and show it in a clear way, which also helped to show the work progress in the supervision sessions.
At the bottom of the board, organized tabs (7–10) were used to structure different phases of the work, including the design process, tutoring feedback, calendar planning, and references. This visual and collaborative system allowed both students to contribute actively while staying aligned throughout the thesis process. Additionally, a timeline was followed throughout the whole semester to keep track of the process, combining different methods, research for design, research by design, and research on design.

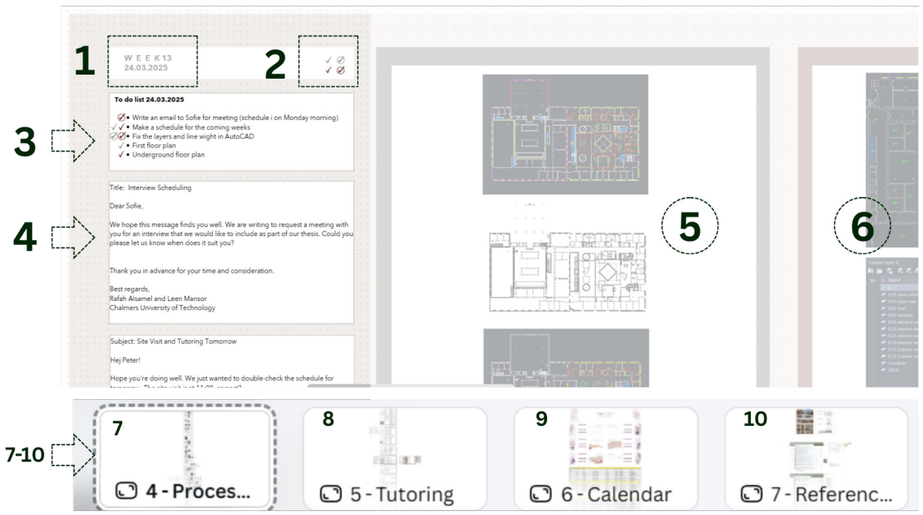
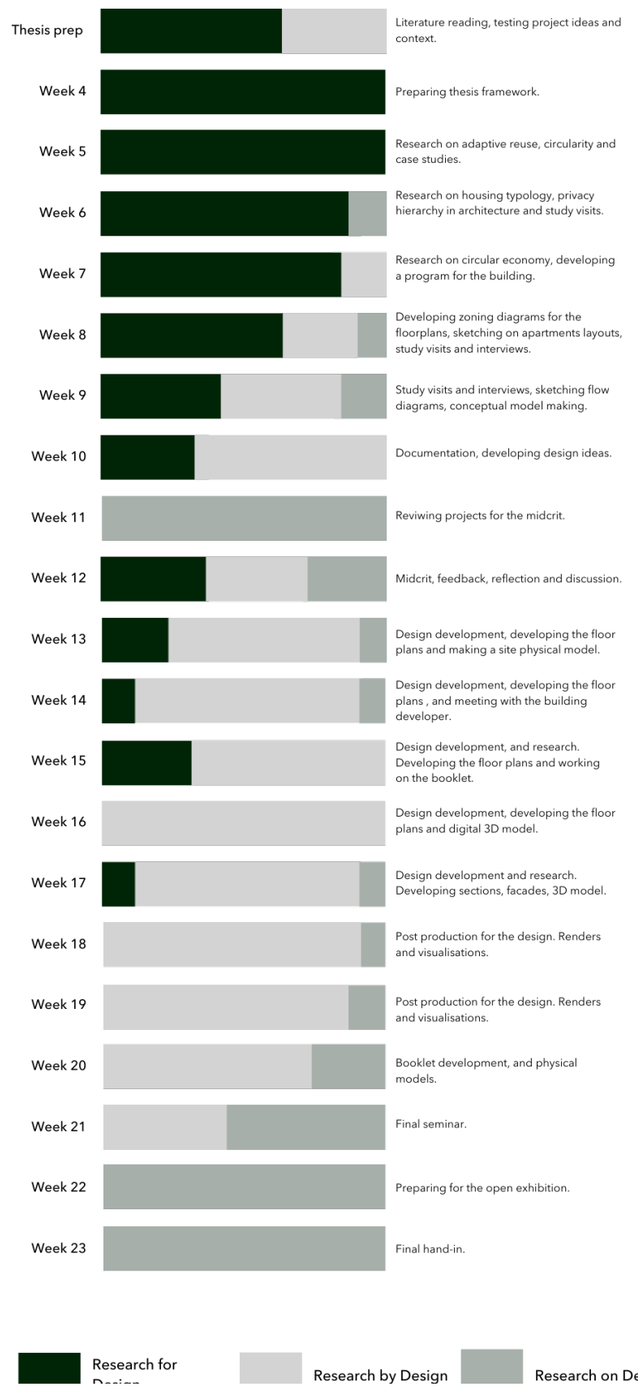
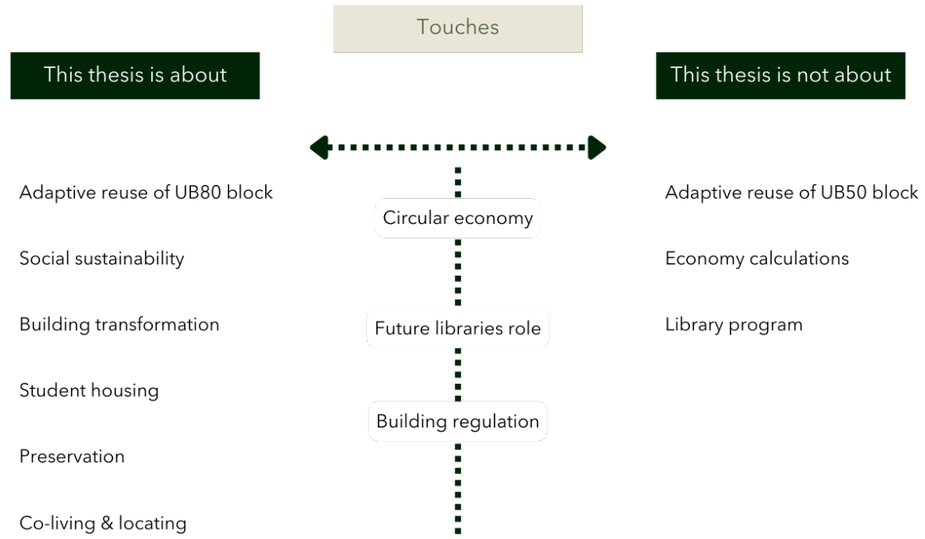


Figure 5: The wrokspace and flow during the thesis process

Timeline



Delimitations



The buildings UB50 and UB80 are two different building blocks with different backgrounds and history. However, both buildings are connected through a hallway since they both have the same function as a library.
This thesis will focus on a transformation proposal for UB80, focusing on converting it into student housing with detailed design elements that enhance its functionality to residents and integrate it into the library to create a community that encourages the social life and interaction between the students. On the other hand, this thesis will not provide any proposal for UB50, and it will maintain its current role as a library.
By highlighting the strengths of both buildings, the approach seeks to create a balance between preserving the cultural significance of UB50 and adapting UB80 to meet the needs of student housing. Through this approach, the thesis aims to serve both educational and residential purposes and provide a balanced environment for living and learning.

2.

Theoretical framework

Adaptive reuse

Cities around the world are facing various social challenges related to sustainable development, such as housing shortages, rising inequality, social isolation, and the lack of communal spaces. These challenges lead to low quality of life, poor mental health, and community disintegration (Oluwatobi Mary Owojori, Chioma Okoro & Nicholas Chileshe (2024).

In the context of sustainable development, social sustainability focuses on creating cities that support well-being, equality and community development. However, many cities are struggling to meet these goals due to limited spaces, aging buildings, and lack of innovative planning strategies. One of the approaches to face these challenges is adaptive reuse, which offers significant social and economic benefits. Adaptive reuse is the practice of repurposing existing structures with new uses while preserving their architectural integrity and cultural significance, which in return will extend the lives of buildings rather than demolishing them, while having a use for these buildings that meet the current needs of society. Adaptive reuse offers a sustainable alternative that conserves material resources and reduces the environmental impact of the buildings (Wong, 2017).

Adaptive reuse can transform old or underused structures into hubs for social interaction, education, and cultural exchange, that meet people's needs and create a stronger community. This strategy addresses social sustainability by preserving cultural identity and creating new opportunities for developing more social infrastructure, and community spaces.

Social infrastructure, like housing, healthcare, education and public services have big impact on people's lives, and having access to these services can be an indication of social progress and can improve the quality of life. Providing more housing projects and communal spaces are very important to face challenges like the housing shortage, specifically student housing connecting to educational access.

Culture and heritage are essential drivers of community sustainability and play a vital role in preserving a sense of place and identity. (Oluwatobi Mary Owojori, Chioma Okoro & Nicholas Chileshe, 2023). To support social sustainability, it is important to respect and protect the history and characteristics of a place. Adaptive reuse is a creative strategy for bracing cultural heritage and enhancing the identity of communities.

Adaptive reuse has recently become more and more important, and it is used as a strategy for urban development, architecture, and conservation. There are many reasons for this shift in approach. First, cities have become more crowded, with less space for new construction. Additionally, there is a greater focus on sustainability and encouragement for repurposing existing structures instead of demolishing them, which is more environmentally friendly and helps maintain the social and cultural value of these buildings. Lastly, the current economic situation makes large fundings for heritage conservation more difficult, so instead, governments are looking for ways to make the most of heritage buildings by turning them into valuable resources that can bring social, cultural, and economic benefits to society. Furthermore, adaptive reuse is not only applied to heritage buildings but also to ordinary buildings and infrastructural, which may lead to new strategies for adaptation in the future (Plevoets, B., & Van Cleempoel, K., 2019).

Camillo Boito (1836–1914) proposed some principles to help architects and restorers adapt buildings by clearly distinguishing between what is old and what is new These principles include: Differentiating between the style of the new and the old, differentiating between construction materials for the new and the old, exhibiting removed old pieces, which could be installed next to the monument, and documenting the work phases by describing and photographing the different phases of the work and placing the document within the building or nearby (Plevoets, B., & Van Cleempoel, K., 2019).

Adaptive reuse throughout history

The concept of adaptive reuse was raised as a new approach in architecture and conservation during the mid-20th century. Before the 19th century, heritage was mostly focused on ancient and medieval buildings. However, after the destruction caused by the World Wars, there was a growing understanding of the value of preserving buildings from other periods, including vernacular and industrial architecture. As more buildings needed preservation, the idea of conservation developed, leading to the 1964 Venice Charter, which emphasized "adaptive reuse" as an essential practice. This means using buildings for socially useful purposes to preserve their historical value, (Plevoets, B., & Van Cleempoel, K. (2019), figure 6.
In the 1960s and 1970s, architects began regularly working with historical buildings, combining conservation and modern architectural ideas. This approach was visible in publications like the 1972 "New Uses for Old Buildings". A key figure in this movement was Radolfo Machado, who coined the term "palimpsest" to describe adaptive reuse. He saw it as a creative act of layering new uses onto existing structures without erasing their history and transforming them in meaningful ways. This concept laid the groundwork for how adaptive reuse would be viewed in the future (Plevoets, B., & Van Cleempoel, K. (2019).

Adaptive reuse for housing

Adaptive reuse for housing involves converting buildings that originally had different uses, into residential spaces. This trend began in the 1970s when old industrial buildings were transformed into apartments. These apartments with their row material and exposed iron became popular and likable by wealthier people. In the beginning, these spaces were lived in by workers in these places, but by the 1970s, developers began buying entire industrial buildings, turning them into apartments, and selling them to the upper class.
Over the years, transforming industrial buildings into housing became popular, and the types of housing have also developed, from traditional apartments to including also student housing, elderly living, and even shared or collective housing. (Plevoets, B., & Van Cleempoel, K. (2019).

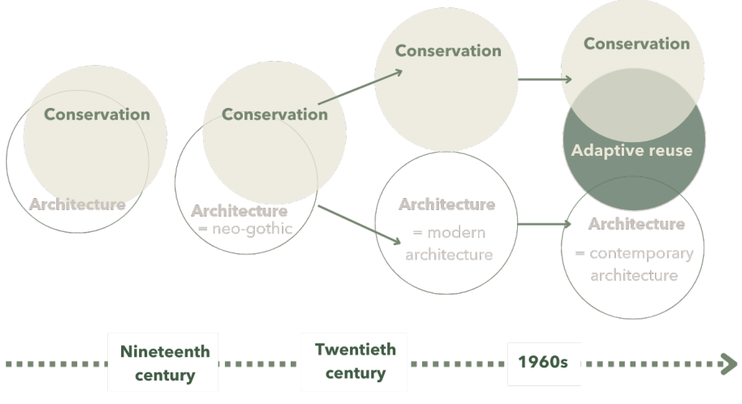


Figure 6: Evolution of adaptive reuse as a discipline.

Circular economy

The circular economy (CE) is an economic model that aims to minimize waste and make the most of resources by replacing the "end of life" concept with restoration. Unlike the traditional linear economy, which follows a "take, make, dispose" pattern, the circular economy emphasizes the continuous use of resources through various strategies (Pomponi & Moncaster, 2017).
In addition, according to the World Economic Forum, 2022, the circular economy (CE) is about using resources efficiently and sustainably to meet the needs of society and the environment. It's a regenerative framework designed to optimize material use and maximize its value throughout lifecycle stages while minimizing waste generation. (World Economic Forum, 2022).
Some of the strategies that could be followed to reach the circular economy are the use of renewable energy, designing products and materials with longevity and to be reused, repaired, refurbished or reassembled instead of being thrown away. Another strategy is to try a new business model that redefines the ownership by providing services instead of selling products (Cheshire, 2021).
In the context of the architecture, engineering, and construction (AEC) industry, the CE involves practices such as disassembly, adaptable building design, and the use of durable and low carbon materials to promote sustainability and minimize waste. By following these different strategies and aspects, the urgent need to shift from a linear to a circular economy and to increase circularity can be addressed, (figure 7). Especially that the construction sector remains the largest consumer of raw materials and a major source of carbon dioxide emissions, according to Pomponi & Moncaster (2017).

In addition, "It is projected that population growth and per-capita income growth will create a doubling in global primary materials use between today and 2060, with increasing urbanisation driving a demand for infrastructure and buildings, and over the next 40 years the world is expected to build 230 billion sq. m in new construction. This growth is projected to drive resource use from 40 billion tonnes to roughly 90 billion tonnes by 2050" (Chesh-

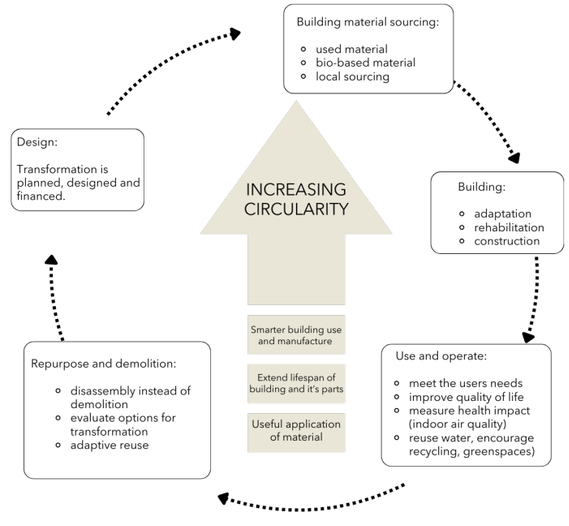


Figure 7: Increasing Circularity

ire, 2021, p. 15), this quote highlights the high demand for transforming exciting buildings as much as possible and keeping their main structure, which will help to reduce carbon dioxide emissions in an effective way and lead to a more sustainable future.
By keeping circular economy in mind while working with the building sector, several practices and key strategies could be applied and involved to achieve circular buildings with structural characteristics that make the buildings survive, these practices include:
1. Material selection and reuse. 2. The choice of structural systems. 3. Resource Efficiency and sustainable building practices. 4. Community Engagement and social sustainability. 5. Design for adaptability.

HIPAT tool

The Hierarchy of Isolation and Privacy in Architecture Tool (HIPAT) (McCartney, S., Rosenvasser, X.,2022) is a visual tool that helps to understand how different spaces in student residence halls are controlled, based on how many people use them and how much authority they have over them. These spaces can include places like kitchens, bathrooms, bedrooms, lounges, dining halls, and other facilities. The tool shows how the number of people controlling a space influences how much social interaction occurs there, which can impact the overall student experience.

HIPAT categorizes spaces into three levels of control: private spaces (controlled by one person), semi-private spaces (controlled by two people), and group spaces (controlled by three to eight people). It also defines secondary spaces as those controlled by a larger group, like a floor or a residence group (about 20 to 40 students), or even the whole building (which can have 150 to 400 students). Public spaces, on the other hand, are open to everyone at the university or even to the public (McCartney, S., Rosenvasser, X.,2022), (figure 8).

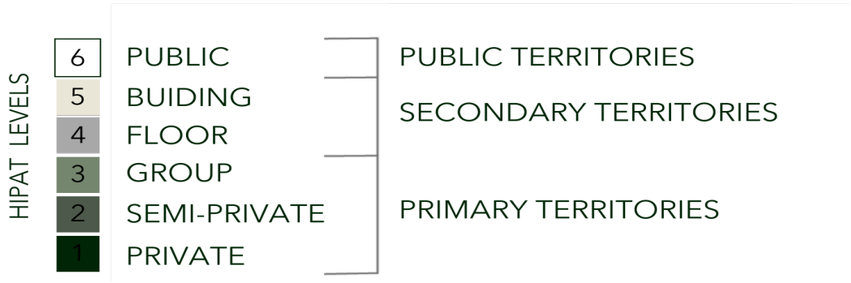


Figure 8: Privacy Levels in the Hierarchy of Isolation and Privacy in Architecture Tool (HIPAT). Adapted from: McCartney & Rosenvasser, 2022.

New student sesidence unit typologies

In the last two decades, the demand for new student residences and the growth of the number of students residence have increased, and throughout the years, the privacy standards within the students have increased, which led to new design strategies and typologies, and universities have developed traditional apartment unit types to be more private for students. These new units have reduced the shared facilities from being shared by an entire floor to being shared with a small group or just two people or completely private (McCartney, S., Rosenvasser, X.,2022).
To analyze the students' spaces and units, the analysis of typologies is required. Architectural typology is the classification of the physical characteristic commonly found in a building. The students' housing typology mainly focuses on three types: traditional, suite and apartment (Table1). The traditional room type is where single or double rooms are situated on both sides of a long corridor, and all the facilities from bathrooms, kitchen and gathering areas shared among these livings on the same corridor. These types have a greater chance for students to meet each other and engage in conversations, which leads to a greater chance of making friends and forming groups. The suite types are private or semi-private rooms with 1 person unit or a group unit. They have bathrooms within the same unit, while the kitchen and living areas are shared with more units. The apartment residence type has a deeper layout, it has shared apartments or individual apartments. In shared apartments, they have group units with the bathroom, kitchen and social areas are within the same unit. In individual apartments, the student would not interact with anyone else ´, since all the facilities are provided within the same unit (McCartney, S., Rosenvasser, X.,2022).
When designing apartments for students, it is important to have a balance between the private and shared spaces. Where social spaces are provided for social interaction, but at the same time having the privacy that each individual needs. This balance would improve the well-being of students and decrease the risk of being isolated.

Table 1: Comparison comparing between types of student's living units adapted from Student Residence Unit Typologies, (McCartney, S., Rosenvasser, X.,2022.

Type of living unit	Description	Privacy level	Social interaction
The traditional room type	Single or double rooms, bathrooms and other facilities are shared within the floor.	Low	Very high
The suite type	Private or semi-private rooms could be as a 1-person unit, two people unit or group unit. Bathroom is withing the unit. Other facilities are shared with more units.	Medium	High
The apartment residence type	One bedroom or multiple bedroom apartments. Includes bathroom and a full kitchen.	High	Low

Case Study: A housing block on top of a local library

Project name: Northtown Library and Apartments
Architects: Perkins&Will
Location: Chicago, US
Area: 65 000 m²
Year: 2019

The project is located in Chicago, US and was completed in 2019. It is a four-story building that consists of a local library, community spaces and 44 apartments for seniors on the upper floors. The project exemplifies the co-locating practice where different facilities with different functions are within the same building structure and located on the same site.
The ground floor has many public spaces and rooms that serve the neighborhood in different olds. The first floor is smaller and includes offices, meeting spaces, laundry, gym and a green roof with pathways and benches. The second and third floors are the housing block. The project aims to provide a new type of community that encourages life-long learning and gives the different generations a chance to meet together, interact and socialize while they are learning and working. It is an example of how architecture plays a main role in improving the quality of life for people from different backgrounds and cultures. The courtyard in the middle with 9 meters height connects the public ground floor with the apartments in the upper floors, which improve the community interaction between the inside and outside, private and public.

Image: Perkins&Will (2019)

Images retrieved from StirWorld. Photographer: © James Steinkamp

Case Study: Transforming office building into student housing

Project name: Student Housing in Elsevier Office Building
Architect: Knevel Architecten
Location: Amsterdam, Netherlands
Area: 11 750 m²
Year: 2015

Another relevant case study for this thesis is the transformation of the Elsevier Office Building into student housing by Knevel Architecten in the Netherlands. This office building was built in 1964 and was vacant for several years, the the municipality decided in 2012 to repurpose the building for student housing, addressing the shortage of student accommodations in Amsterdam.The design approach was to respect the existing facade and renovate accordingly. The layout of the student's apartments was integrated in the building structure. By carefully balancing private and shared spaces, the design encourages social interaction while respecting individual privacy. The ground floor was elevated above street level, and a raised public square was incorporated to enhance the connection between the student entrance and the surrounding area. This new entrance has sheltered letterboxes with benches to create a welcoming public space. Bicycle parking and laundry facilities located in the basement. The project aligns with the goals of this thesis by showing how adaptive reuse can be both a sustainable and social solution to the housing shortage, especially within educational environments.

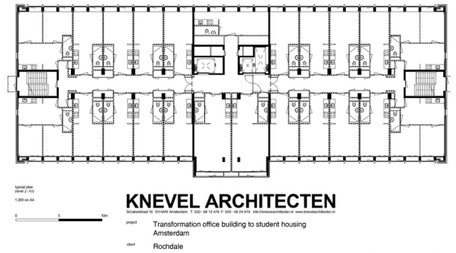
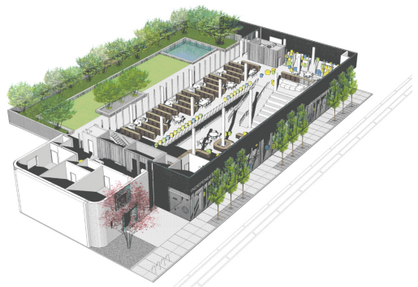


Image: ArchDaily (2022)

Images retrieved from ArchDaily. Photographer: Leonard Fäustle

Case Study: Affordable apartments above a public library

Project name: Independence Library and Apartments
Architects: John Ronan
Location: Chicago, US
Area: 7 618 m²
Year: 2019



This project was completed in 2019 and is located in Chicago, US. It is a six story building that combined a public library in the first two floors, with 44 affordable apartments for seniors in the four floors above the library. It includes different areas for reading, studying and using computer. It has also rooms for lectures, meetings, community events and activities that enhance social sustainability and increase social interaction. There is also a garden terrace on the top of the library where both the residents and visitors can gather. When it comes to the apartments, each one has a colorful balcony that makes the resident feels personal and welcoming.

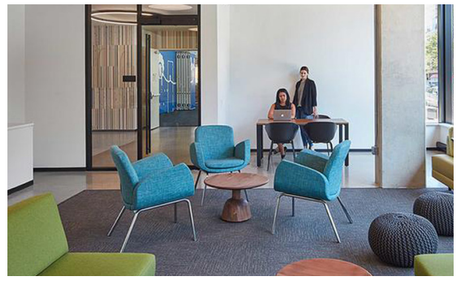
Sustainability was a big part of the design, for example: the project use a smart-sustainable design with energy saving system, green roofs, Stormwater system under the parking lot, and daylighting to save energy.

In general, the project shows an example of how to bring people together and provide them with different services and affordable apartments in a safe environment in the middle of the city.

Images retrieved from John Ronan Architects. Photographer James Florio

Case Study: Co-locating affordable housing and a public library

Project name: Taylor Street Apartments and Little Italy Branch Library
Architect: SOM
Location: Chicago, US
Area: 6 765 m²
Year: 2019

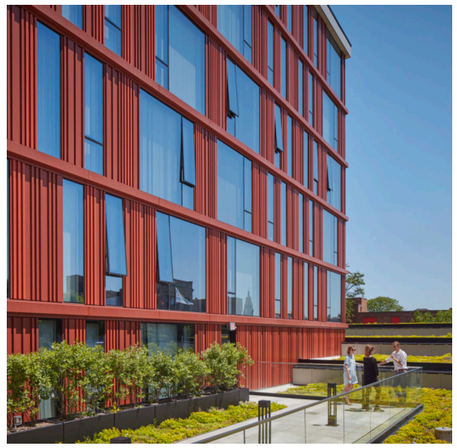


The Taylor Street Apartments and Little Italy Branch Library is Library is an innovative approach designed by Skidmore, Owings & Merrill (SOM) that co-locates affordable housing and a public library.

This co-located facility merges two essential community programs, affordable housing and public library services within a single structure. It is the city's first co-location project developed through a partnership between the Chicago Housing Authority and the Chicago Public Library, making it a model for future integrated public infrastructure.

The building features a public library on the ground floor, serving as a highly accessible community hub, while the upper floors contain 73 rental residential units.This spatial integration optimizes land use and enhances the building's role in the social fabric of the area. By combining educational, cultural, and residential functions, the design offers a social and encourages interaction among the community.

This case study is an example of how adaptive architectural strategies and thoughtful programming can support social sustainability by addressing housing shortages and encouraging community engagement.



Images retrieved from SOM. Photographer: © Tom Harris

3.

Context

Site & building selection process

For this research, the programmatic approach of adaptive reuse was chosen, where it began by selecting a specific function for the building and then identified an existing historical structure that could accommodate this function. This strategy aligns with the programmatic approach described by Fisher (1992) and Powell (1999), which emphasizes the selection of a function first and the adaptation of a building to meet those needs, often focusing more on contemporary architectural interventions than heritage conservation (Plevoets, B., & Van Cleempoel, K. (2019). Selecting a site for a student's housing project that encourages and improves the community and social connections/interactions is challenging and requires consideration of various factors, such as accessibility, proximity to transportation and availability of essential services and facilities. These qualities are mostly available in the city center, which makes it more challenging. Therefore, utilizing an existing building for transformation into student housing is a practical solution, enhancing sustainability by repurposing existing structure, and ensures that the new housing is centrally located, making it more convenient for students. However, selecting an existing building for transformation is a significant challenge that requires careful consideration to ensure it suits its new purpose. The process began by looking into Rivningskarta (Demolition map) in Gothenburg to search for the buildings that are planned to be demolished, (figure 9). Figure (13) shows different building options that have been discovered during the process before taking the final decision.

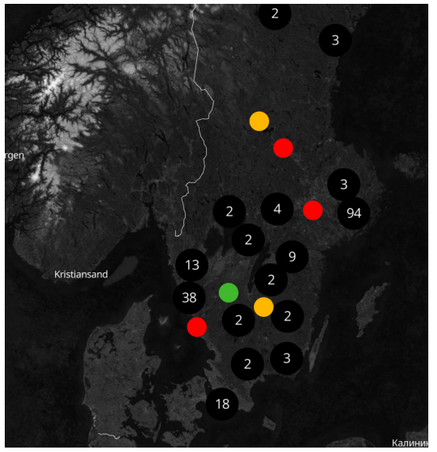


Figure 9: Retrieved from (Rivningskarta, 2025)

Figure 10: Göteborgs Konstmuseum (Rivningskarta, 2025)

Figure 11: Gamla Hovrätten (Rivningskarta, 2025)

Figure 12: Humanistiska Biblioteket (Rivningskarta, 2025)

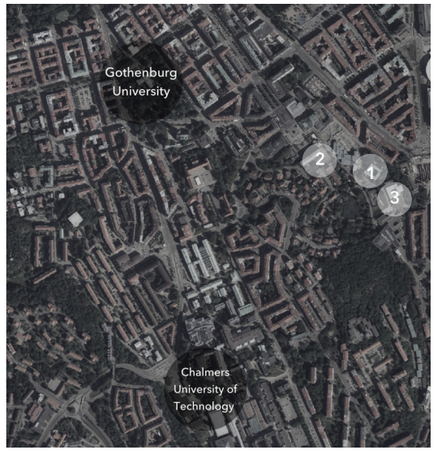


Figure 13: The buildings that been discovered (Image source: Google Maps, 2025)

During the building selection process, it was important to find a building that is close to the campus and would be even better if finding a university-connected building, making it convenient for students to attend lectures and participate in campus activities. Having university-connected halls of residence also allows students to save on transportation cost and time. Another benefit is living with other students from the same university, which makes it easier and encourages them to make friends, meet and interact with one another and improve their social life. These types of residences are in high demand, and they tend to fill up quickly. Durning the building selection, Akadimiska Hus who are the owners for most of the university buildings were frequently contacted to discuss the possibility of transforming the selected building. To conclude the process, one of the university library buildings was an option to test out this kind of transformation. Since many transformation practices into housing are done for office buildings, other types of building, such as the library in this case, will be transformed into student community and housing, to explore the potential success of this type of transformation and evaluate its performance in terms of functionality and community integration. In addition, it will show how this type of transformation will play a role in forming and developing future libraries. These factors will be explored and tested throughout this research. After going through a process for selecting a suitable building for this type of transformation, a building that gave a lot of potential and was well- situated in the city for this type of projects, the humanities library in Gothenburg, Sweden was selected as a case for this study. The Humanities Library (Humanistiska biblioteket) is one of the libraries for Gothenburg university. The library is threatened to be demolished as it is shown on the demolition map (figure 14).

HUMANITIES LIBRARY
RENSTRÖMSGATAN 4
GOTHENBURG

THREATENED

Architect	**Arland Noreen**
Property owner	**Academic House**
Year of construction	**1954**
Category	**Community property**

Stories about the building : One of Gothenburg's university libraries, built between 1951 and 1954 at Renströmsparken. The building was designed by architect Arland Noreen in 1940 and stands on the foundations of the

Figure 14: The Humanities Library threatened in the demolition map (Rivningskarta, 2025)

By mapping out the qualities of the space, key factors were identified that make libraries particularly well-suited for this for adaptive reuse and transformation into student community and housing:

1. Layout Suited for Adaptive Reuse

Libraries are typically featured with open layouts with bookshelves which makes them ideal for adaptive reuse, as the open spaces can be reconfigured to meet new needs with minimal demolition. The removal of bookshelves and other non-structural elements allows for the creation of living spaces and common areas without extensive structural changes (fig.x).

2. Reflecting the Story of Humanity

Libraries are homes for knowledge and culture, reflecting the story of humanity, and this transformation could preserve this narrative and create a living space that continues to inspire learning and community engagement.

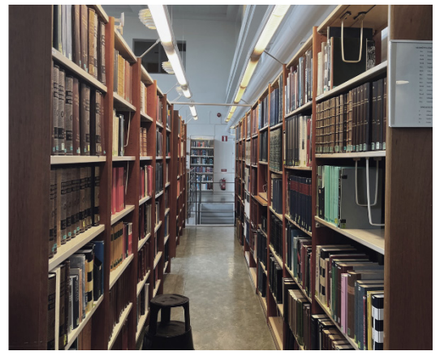
3. Co-locating to Unlock the Value of the Land

Co-locating student housing within a library maximizes the use of the land and the existing structure. This approach unlocks the value of the land by creating a multifunctional space that serves both educational and residential purposes. By integrating housing with a library, we enhance the use of the building and provide students with convenient access to resources and communal spaces.

4. Centralized Location

Libraries are often centrally located within communities, making them easily accessible and well-connected to public transportation and services. This is an advantage for student housing, as it ensures that residents are close to their academic institutions, social activities, and services.

Most libraries see their value in how they integrate and respond to the community. By transforming a library into student housing, we maintain this integrative role and create a space that continues to serve the community in new and meaningful ways.



Context and site Analysis

The selected site is situated in a strategic location within the university campus and well-connected to the public transportation. The site is located within many urban landmarks such as Korsvägen, Götaplatsen, and Gothenburg Central Station. This centrality makes it suitable for student community and housing, providing easy access to academic facilities, city life, and transportation. The surrounding area also offers cultural institutions, green spaces, and daily services, supporting both the academic and social needs of students.

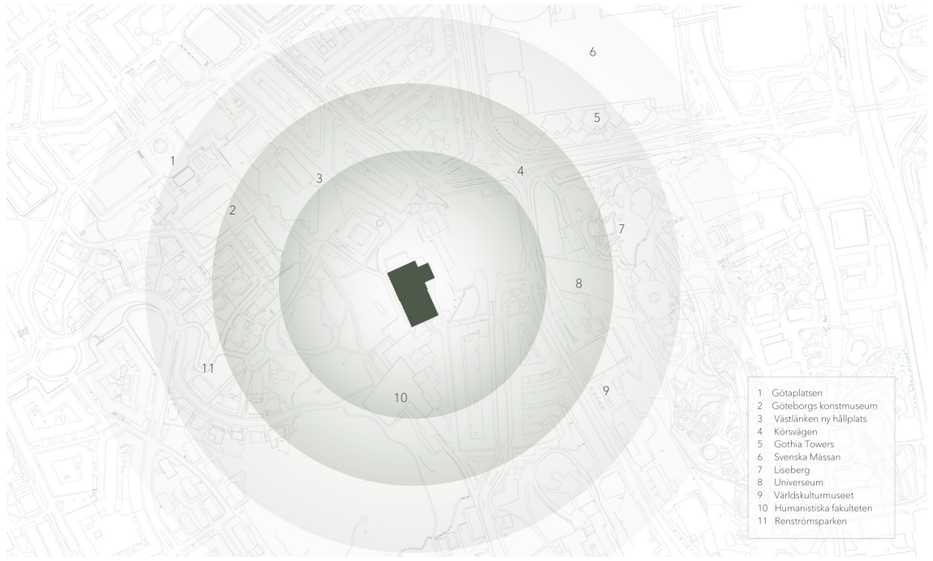


Figure 15: Centralization diagram

Site history

The first building of the library (UB50) was built in the1950th. UB50 was extended to the second building (UB80) in 1984 (Figure 16) in addition to the humanities faculty which was also built in the same year and was connected to both buildings through a bridge.

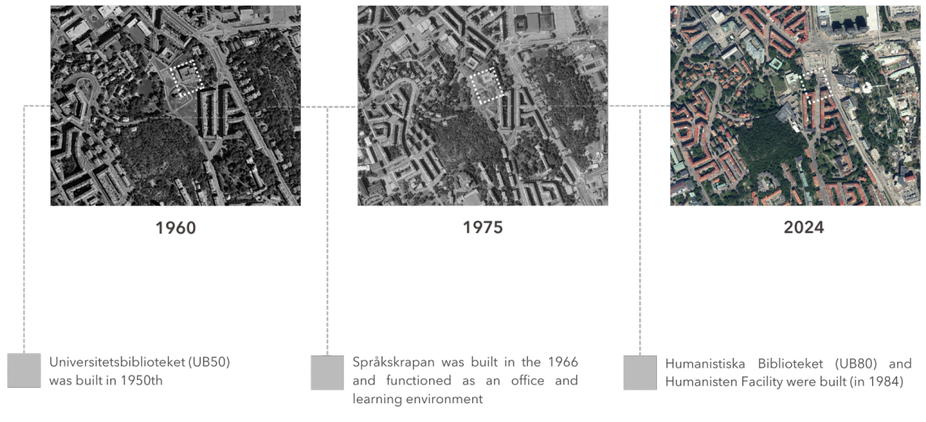


Figure 16: History of the site, (Images retrieved from Google Earth, 2024)

Site analysis

Figure 17: Site analysis

Surrounding Buildings

By looking at the surroundings of the buildings and context of the site, it was noticeable that there is a variety in buildings material and heights, (figure 18).

This will make it more flexible when it comes to material selection of the extensions and the heights.

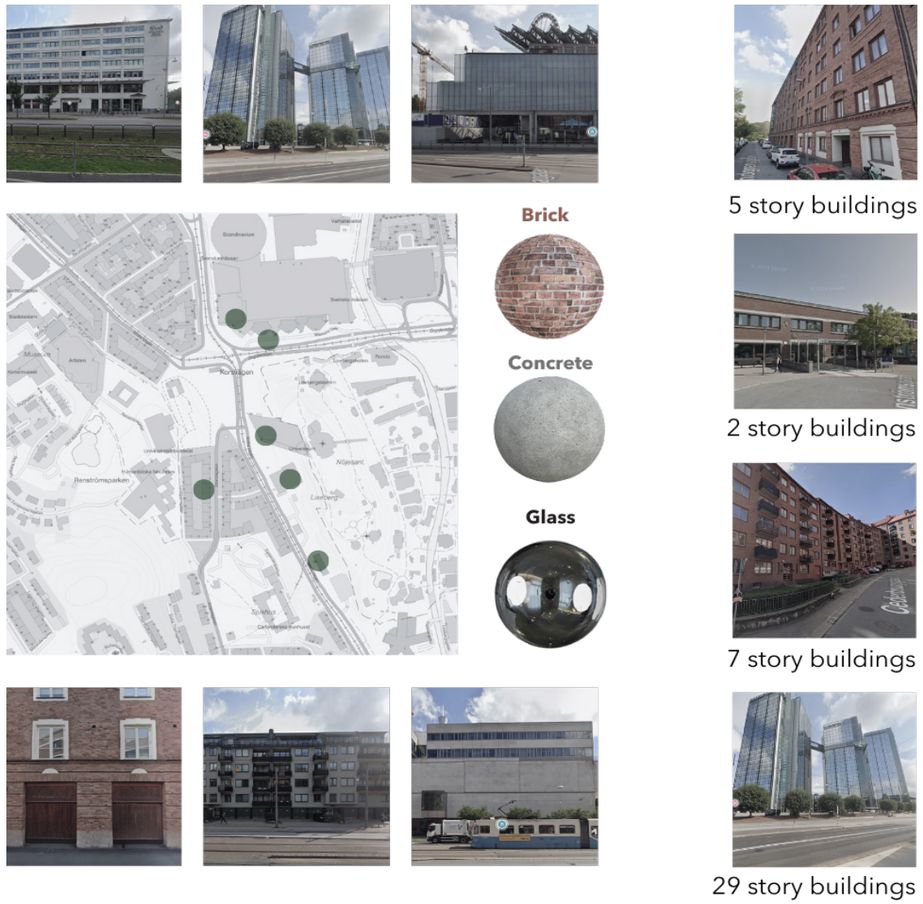


Figure 18: Character and structure of the surrounding buildings. (Images retrieved from Google maps, 2024)

Building analysis

The chosen building is The Humanities Library (Humanistiska biblioteket) in Gothenburg, Sweden, which part of the libraries at Gothenburg University. After looking into many potential sites and buildings, this library as previously shown on the demolition map of Gothenburg is threatened to be demolished. The library is perfectly located on the campus and near public transportation, which is a great quality for student housing. It consists of two blocks; UB50 which was built in the 50th century, and UB80 which was built in the 80th century, (figure 19). UB stands for Universitetsbiblioteket (the university library). This was the library's name before it was renamed to The Humanities Library.

Figure 19: The Humanities Library two blocks (Images retrieved from Google maps, 2024)

Building history

The Humanities library is one of Gothenburg's university libraries. The architect Ärland Noreen designed UB50 in 1940, and it was decided to place it at Renströmsparken in 1947. It stands on the foundation of a memorial hall built for Gothenburg's 1923 anniversary exhibition, (Fasad, 2024). The library is now owned by Akademiska Hus, one of Sweden's largest real estate companies that develop and manage premises for colleges and universities, (Akademiska Hus, 2024). At the time, the library has been considered as the landmark building of the time, when King Gustaf VI Adolf was invited to inaugurate it. Figure (20) shows Noreen's old drawings from 1940, that have been placed where the main entrance was located. In 1984 UB80 was built by Coordinator architect office.

Figure 20: The old main entrance of the Humanities library (Fasad, 2024)

Figure (21) shows the process and the different phases of building the extension for the Humanities Library, UB80 and the connection btween the two blocks.

Figure 21: Historical photographs of the Humanities Library, (source: Humanities library)

After building the extension, the main entrance was moved into UB80. The main entrance to UB50 is now used as a conference room instead (figure 22).

Figure 22: The old main entrance of Universitetsbiblioteket (Humanities Library) before vs now

Demolition Plan for the Humanities library

The Humanities library was initially planned for demolition to make a way for a new university library. This decision was based on the need for modern facilities that could better serve the university's growing student population and academic requirements. An architectural competition was held for this site to build a new library, focusing on the strategic location of the site, (S. Bårdén, April 2025).

This thesis looks into the importance of the building itself, and its historical value, in addition to the strategic location that connects many parts of the city. Despite the initial plans for demolition, this thesis focuses on the preservation of the existing buildings with adaptive reuse, integrating modern facilities while maintaining the historical value.

Site visit

The site visit is an important component of the project, allowing for a firsthand evaluation of the selected buildings and their surroundings. The site visit provided a valuable insight into the physical conditions, architectural features, and contextual elements that will inform the design decisions. Figure (23) represents a collection of photographs taken during the site visit.

Figure 23: Site visit

Building selection

As mentioned before, the site consists of two buildings: UB50 and UB80, and to be able to take a decision regarding working with the buildings, and to see which block fits more to be transformed into student housing, a comparison between them was necessary (Table 2).

Table 2: A comparison between the Humanities library's two blocks UB50 and UB80.

2 Blocks	UB50	UB80
Location	Renströmsparken, Renströmsgatan 4, 412 55 Göteborg.	
Built	1951-1954	1984
Architect	Ärland Noreen	Coordinator arkitektkontor
Floor Area	~ 1 720 m2	~ 1 375 m2
Floors	3 above ground 5 underground	2 above ground 3 underground
Owner	Akademiska Hus.	
Pros	• Daylight • Location/site • Its history • Construction's layout (windows size)	• Daylight • Location/site
Cons	• Deep building • Sun exposure	• Deep building • Construction's layout (windows size)

SWOT analysis

- Centralized location in the city and near both university campuses (Chalmers and University of Gothenburg).
  - Specifically located near Korsvägen, a major transport and cultural hub.
- Surrounded by greenery, offering a calming and attractive atmosphere for students.
- Near cultural and leasure institutions (e.g., Universeum, Liseberg).
- Existing structure suitable for adaptive reuse, minimizing construction waste.

- The building has an old construction, which can limit the addition of several floors on top.
- Deep floor plan results in limited natural daylight in central areas.
- Some outdated systems (ventilation, insulation, etc.) require upgrading.

S W
O T

- Connected to a library and to the humanities faculty, which is an opportunity to bigger human interaction and community engagement.
- The location is near the future railway station (västlänken) which will make the travel to and from the site easier and faster to the rest of the city.
- Demand for student housing in Gothenburg remains high—this project contributes to solving a key urban issue.
- Potential to integrate public-facing services (café, bookstore, exhibitions), improving community engagement.

- The building is threatened to be demolished
- Rising construction and renovation costs may affect feasibility.
- Noise and traffic from surrounding areas: Being near busy roads or construction zones (such as the Västlänken development)

Figure 24: SWOT analysis

4.

Design project

Project description

In today's fast world of technology, the large spaces traditionally dedicated to libraries could certainly serve more than just a place for books. The future physical libraries can be integrated with the students' needs and community engagement. The concept of libraries started with human history, connection and civilization, so libraries are actually offering a dynamic place for community interaction and knowledge exchange, reflecting humanity's collective story.

Understanding how students spend their time during their study period can help shape a space that offers more than just a place for books.

Students need a place to study, to communicate, to be active, and a place to relax and sleep. All these needs can meet in one place by transforming libraries into dynamic, multifunctional spaces that enhance both living and learning experiences.

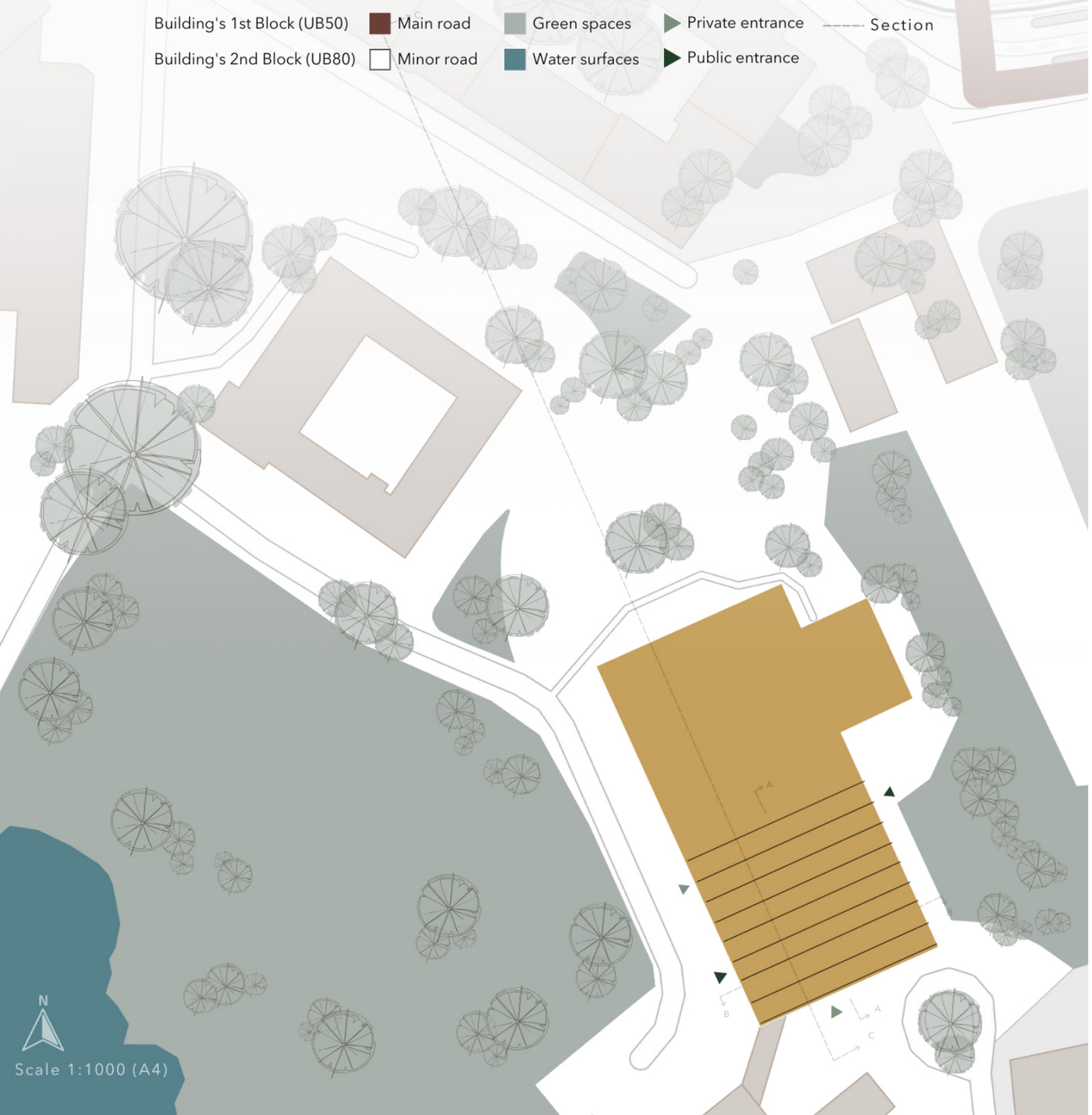
This integration breaks the traditional libraries and goes beyond the conventional learning and living environments, where the library can extend beyond just a reading space and truly embrace the student's learning journey.

One of the main goals of the project is to provide and promote the interaction between academic and social life. The final results will bring together a lot of the students' services, such as the library, lounge, study- and multi purposes rooms... etc. and will be located in the same place next to the Humanities faculty. The building includes different facilities and common spaces, such as a café, courtyard, gym, lounge and flexible study spots, this allows the students to interact with the community and provide them with a balanced environment for living, learning and interaction, which will lead to academic success.

Figure 25: Project main goals

Site plan

The library has a very strategic location where it can connect people with the University and the city, since it is near different cultural institutions around Götaplatsen and Korsvägen, where the future station for the Västlänken train tunnel will be located.



Urban connections

The project aims to strengthen the building's connection with the city by introducing a new main entrance on the previously less active east side, (figure 26). This design move will reconnect the building with the broader urban fabric, especially towards Korsvägen. By creating this new access point, the project improves connectivity with the other side of the city and invites the surrounding public to engage with this strategically located building, making the building more accessible, welcoming, and integrated into its urban context.

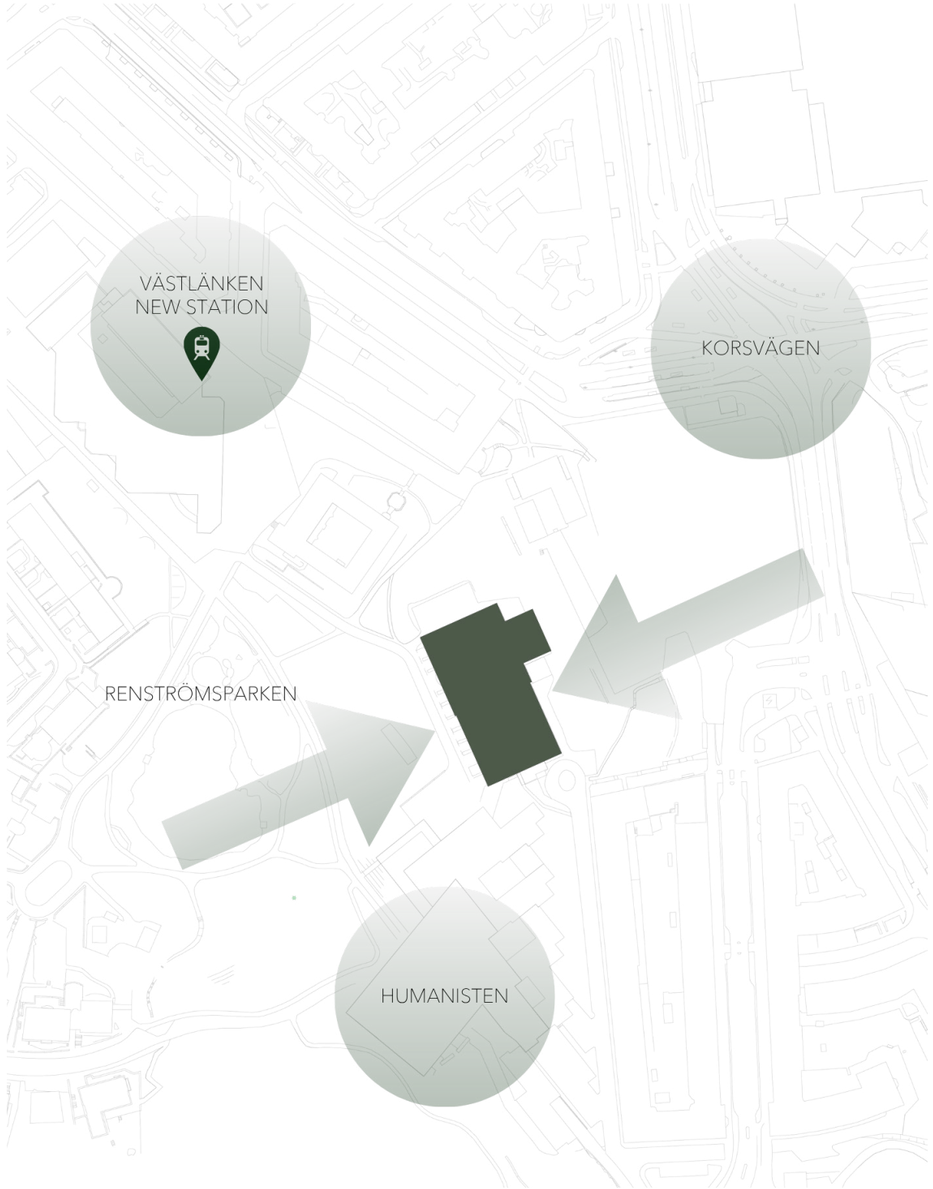
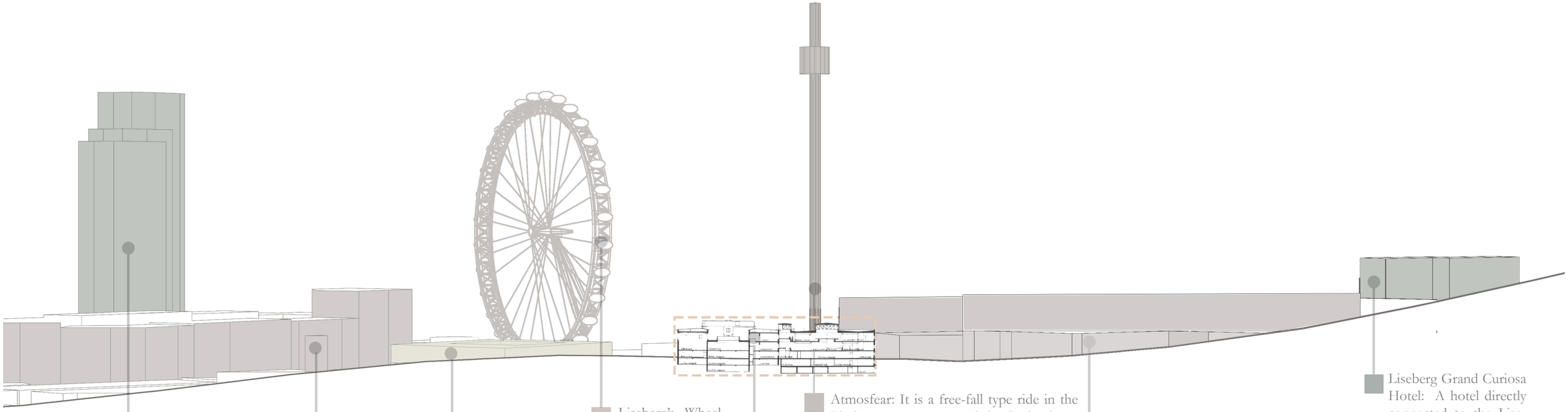


Figure 26: Urban connections diagram

4. | Design project

Site Section



Gothia Towers: A hotel in central Gothenburg. The hotel is located in three towers, they are 75, 82 and 100 meters high respectively. It has restaurants, theatre, and an event venue.

Residential buildings, restaurants and hotels.

Gamla hovrätten: The old court of appeal. Was built in 1947. The building is listed as culturally historically valuable by KBS/RAÄ

Liseberg's Wheel (lisebergshjulet): The wheel is part of the biggest amusement park in Sweden. It gives views over the city of Gothenburg and the park.

Gothenburg University Humanities Library: One of Gothenburg University's 10 libraries.

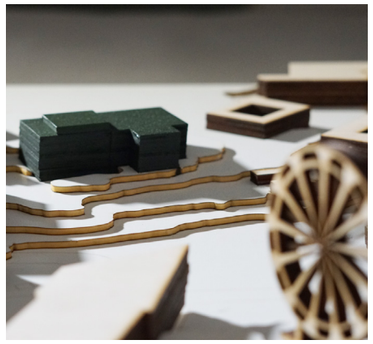
Atmosfear: It is a free-fall type ride in the Liseberg amusement park in Gothenburg. With a fall from 146 meters above sea level.

The Faculty of Humanities: It is the place to teach and conduct research in languages, culture, history, literature and philosophy.

Liseberg Grand Curiosa Hotel: A hotel directly connected to the Liseberg amusement park in Gothenburg.

Figure 27: Site Section, scale 1:500

Site Model



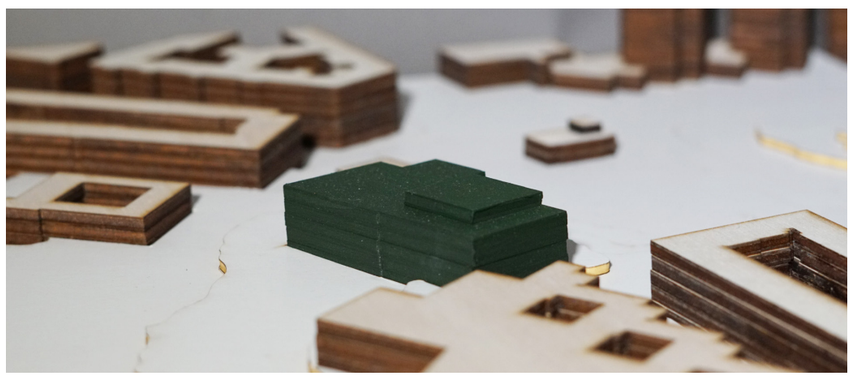
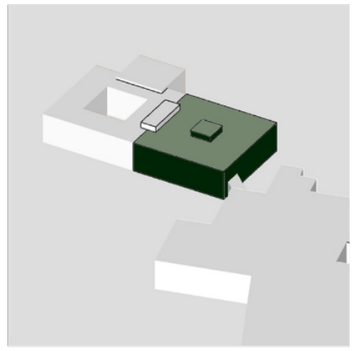
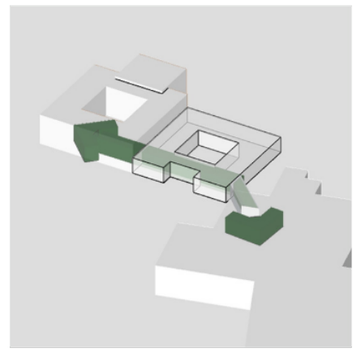


Figure 28: Site model

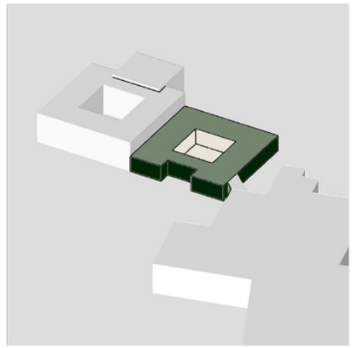
Concept



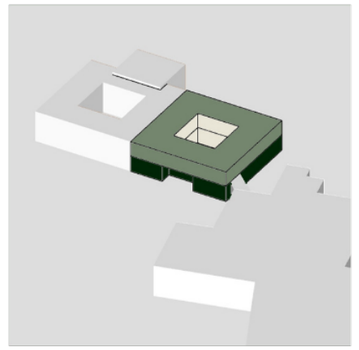
1. Existing building UB80 attached to Library and the humanities faculty.



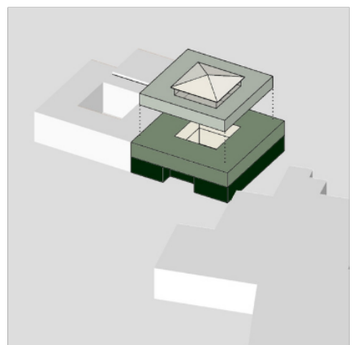
2. Reinforce the connection between the buildings to strengthen the social interaction.



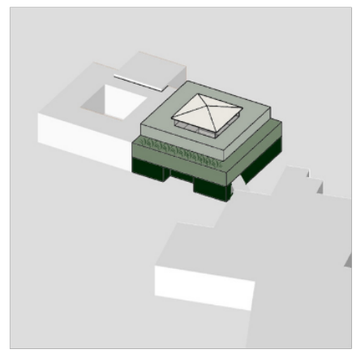
3. Creating the ground floor as a community hub.



4. Starting with the privacy hierarchy in the upper floors providing private spaces in addition to functional common spaces for the residents.



5. Additional floor to providing private apartments.



6. Creating terraces for the apartments in the additional floor, keeping the atrium for light quality and indoor social spaces.

Figure 29: Concept diagrams

Building hierarchy & program

The building design carefully considered the hierarchy of privacy and apartment sizes, using the Hierarchy of Isolation and Privacy in Architecture Tool (HIPAT) that helps to understand how different spaces in student residence are controlled, based on the privacy and authority levels within the project. The hierarchy within the building increases by moving to the upper floors. Starting with the ground floor, which is created as a community hub that connects the three buildings: the UB50, UB80 and the humanities faculty. Emphasizing on the community engagement and social interaction. Moving to the upper floors, the privacy increases as the access to these levels are only from the residence. Moving to the upper floors also increases the apartments size in three distinct types. Apartments type C on the underground floor, which feature private bedrooms but shared living spaces, creating a sense of community among residents. On the first floor, apartments type B, which offer private bedrooms and bathrooms, while still maintaining shared kitchens and living areas to balance privacy with social interaction. Finally, the second floor is dedicated to fully private apartments, providing residents with their own personal space.

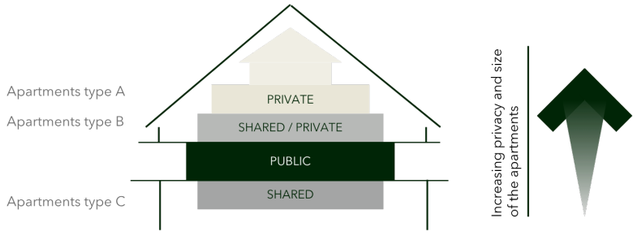


Figure 30: Hierarchy of privacy and apartments size

UB80 program	AREA (sqm)
Floor area	1309
Under ground floor	
Apartments type C	185
Lounge	162.5
Shared living rooms	38
kitchen	26
RWC (5)	16
laundry	18
Fixoteket	26
Gym	95
bicycle parking	18
Storage	157

Ground floor	
Multiporpose room	120
Game spaces	60
Art & Craft	28
Brows & Buy	42
Sitting ares and greenary	177
Café	160
Book store	93
Entrance/mailboxes	36
1st floor	
Apartments type B	565
laundry	30
Shared living rooms	40
kitchens (2)	41
Dining areas	40
Art room	10
Gallery	10

2nd floor	
Apartments type A	479
Study rooms	30
Game spaces	31
RWC (2) & Kitchen	10
Shared living rooms	31
Terraces	260
Roof top	
Sitting areas	300
Cultivation boxes area	65
Courtyard roof	121
Solar panels area	200

Figure 31: Design program.

Apartments Types

The building includes three types of apartments/living units, they different in the level of privacy and shared spaces. Starting with the apartments Type C which are located in the underground floor where they only have a bedroom and everything else is shared, such as the kitchen and living area. This type has the most social interaction among the residents, and it is mostly for the international students who like to share living and integrate with other cultures.
Moving to apartments Type B which are located on the first floor and the residents have their private bedroom with small kitchenette, and bigger shared kitchen and living areas that are located outside of the unit. This type has both the social interaction and the private life for the students, to balance their privacy without feeling of isolation.
Moving to the third type, Type A, where the residents have everything they need, their own bedroom, bathroom, kitchen and living room. To compromise this totally private unit, a shared living area is in the same floor outside the apartments, with shared terraces and study rooms to improve the social interaction.
The form and the structure of the room is based on the existing structure where the goal was to not demolish as much as possible.

Figure 32: Apartments types A, B and C.

Apartments Types:	**Privacy level:**	**Social Interaction:**	
Apartments type C: Shared living, private bedroom with shared bathrooms, kitchen and living areas	Low	Very high	
Apartments type B: Private bedrooms and bathrooms, with shared kitchen and living areas	Medium	High	
Apartments type A: Private apartments with private bathrooms, kitchen and living areas	High	Low ·····	Will be compensated through the communal spaces in the ground floor and the roof top

Interior view from the courtyard in the ground floor

Zoned floorplans

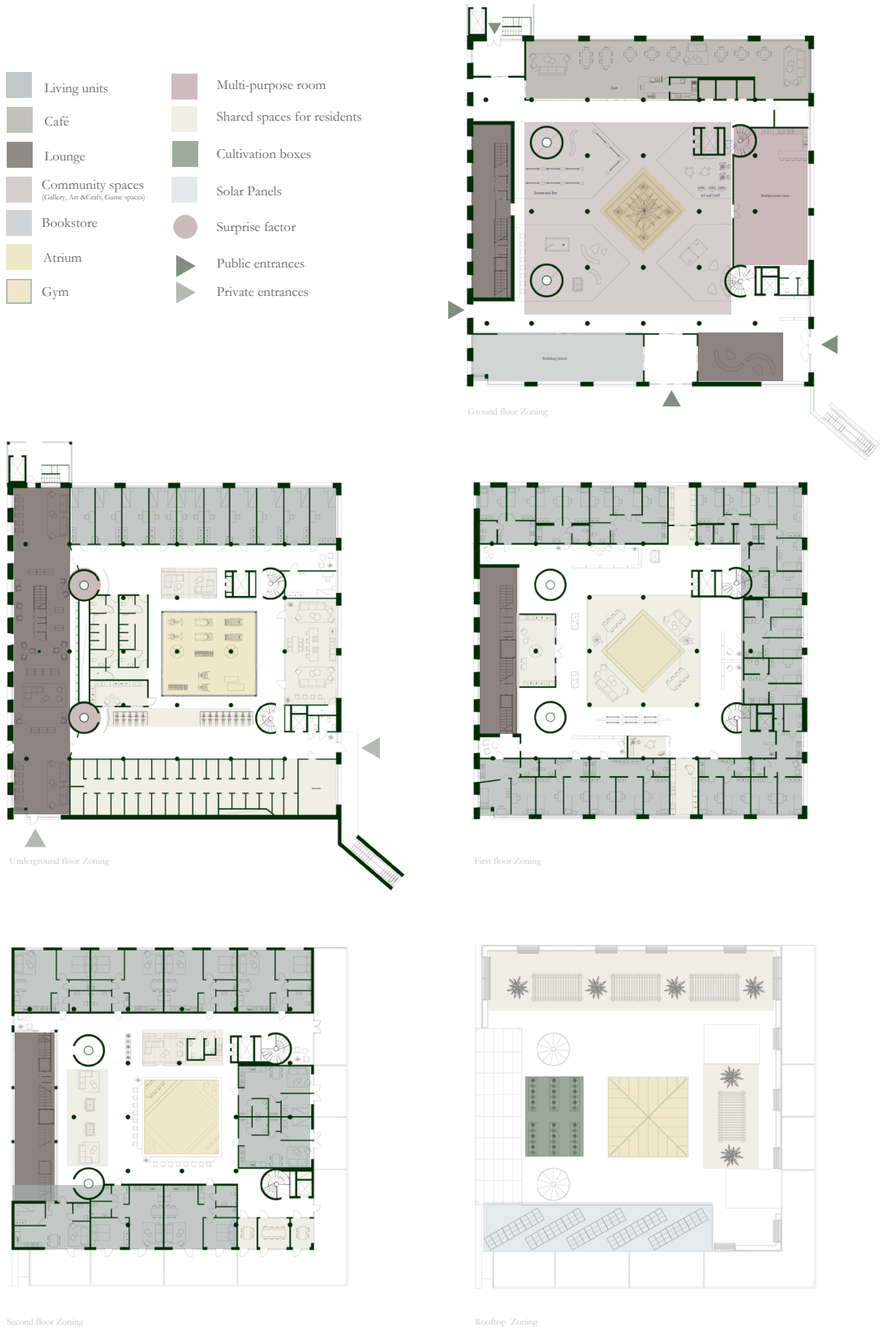


Figure 33: Concept diagrams

Co – locating

By transforming the library into a more than place for texts and books, with a focus on how the future libraries could look like, this gives the library a bigger role and value for the land, which will prevent the land value from changing, on the contrary, it will add more value to the land and the building. When it comes to the co-locating of libraries and housing, Jacobus (2015, p. 27) states that it "seems to fit into a broader trend of unlocking the value of land". By building above the library, the high demand for student housing will be solved in an affordable way. This will not only benefit the students, but also the taxpayers, stakeholders, and the same library facility. To achieve that, different perspectives need to be thought about when it comes to the students, the visitors, and the interaction between them. By rezoning the building in a smart way, the community needs will be granted, more value to the library will be reached and the land will be used to its fullest potential. In a bigger scale, co-locating libraries with housing creates a space that develops the neighborhood and works as a community center that is valuable to the community and its needs.

Additionally, by building student housing that is connected to the library, a lot of benefits will be granted from the students' perspective, such as: they will have easy access to resources and study materials, it reduces the cost for the students by providing them shared resources and services, improve the academic results because it encourages a better use for the academic resources, provide a secure and safe environment for late-night study sessions within the student housing, improve the social life for the students which leads to support collaboration between them, more effective time management and balance between study, rest and social time.

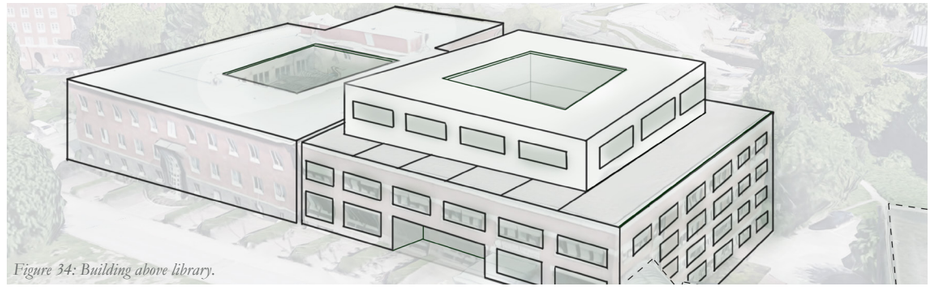


Figure 34: Building above library.

Construction

This project connects the past with the presents by showing an example of how the old meet the new in a sustainable way that preserves and restores the building through adding a one-story wooden extension, with the possibility of adding two more stories in the future if needed. Wood produces 50% less CO2 compared to other materials and helps to balance the levels of indoor humidity. It's also as local and lighter material that requires less structural reinforcement. On the concrete structure of the library, we can attach a certain amount of new levels on top of it with the material of light frame wood. Wood has less weight and UB80 building structure is able to handle the weight of three stories wooden construction (Sofie. B, Akademiska Hus, 2025). That's why the addition on top will be made of a light frame local wooden structure, that can be handled by the old structure, with timber cladding on the facade.

To provide environmentally friendly renewable energy, a solar cell system will be placed on part of the rooftop of the building and will be facing the south, and that is in order to receive the most direct and consistent sunlight throughout the day and Maximize energy production throughout the year.

Relevance for Sustainable Development

By transforming an existing building rather than constructing a new one, the project is reducing the use of material, waste and energy. It can also lower greenhouse emissions. This approach encourages resource efficiency and can lower greenhouse emissions, thereby reducing the carbon footprint associated with housing, and increasing the concept of circularity.

In the goal of increasing circularity, the project aims to reuse material as much as possible and working with local sourcing material that will benefit the locals. This project also seeks to use low-tech architecture as an inspiration for design decisions in different ways, such as: using the local material will minimize carbon emissions by minimizing the need for long distance transportation, placing the apartments within the sun direction to enhance the well-being and get a good day light which will also reduce the need for artificial light, selection of windows type with double or triple-glazed will reduce heat transfer, maintaining indoor temperatures and reducing the need for heating and cooling indoor.
Furthermore, the project aims to support social sustainability by meeting the user's needs and improving the quality of life. This will be done by surveys and interviews with the stakeholders. Plus, improving the indoor air quality by providing enough natural ventilation and natural light.
The thesis will explore sustainable design strategies, such as adaptive reuse and sustainable use of materials. These practices will reduce the environmental impact and improve the health and wellbeing of its users.

Figure 35: Project solutions for increasing sustainabilty

Assessing the design with SDG Tool

The SDG Impact Assessment Tool (Eriksson, M., Ahlbäck, A., Silow, N., & Svane, M. (2020) is a learning tool that visualizes the results from a self-assessment of how a project affects the SDGs, (figure 36).
It aims to get a better understanding of the complexity of sustainable development and the different aspects of the SDGs.
The SDG Impact Assessment Tool gives different topics that can be developed within the master thesis. All these topics are related to sustainability and how can this project be more sustainable. It also shows the impact of the project which makes the study more considerate when making any choices.
The tool also helps with giving strategic choices in the areas with positive impact that could be strengthened further, and the negative impacts that could be minimized.

SDG IMPACT ASSESSMENT TOOL

3 GOOD HEALTH AND WELL-BEING

- Social sustainability by meeting the users needs and improve the quality of life. Providing community spaces for social interaction among the users.
- Improving indoor air quality and natural light.
- Including healthy spaces in the design such as the gym.

11 SUSTAINABLE CITIES AND COMMUNITIES

- Protecting the cultural heritage.
- Reducing the environmental impact of the city.
- Increasing the building's lifespam.
- Safe and affordable housing.

13 CLIMATE ACTION

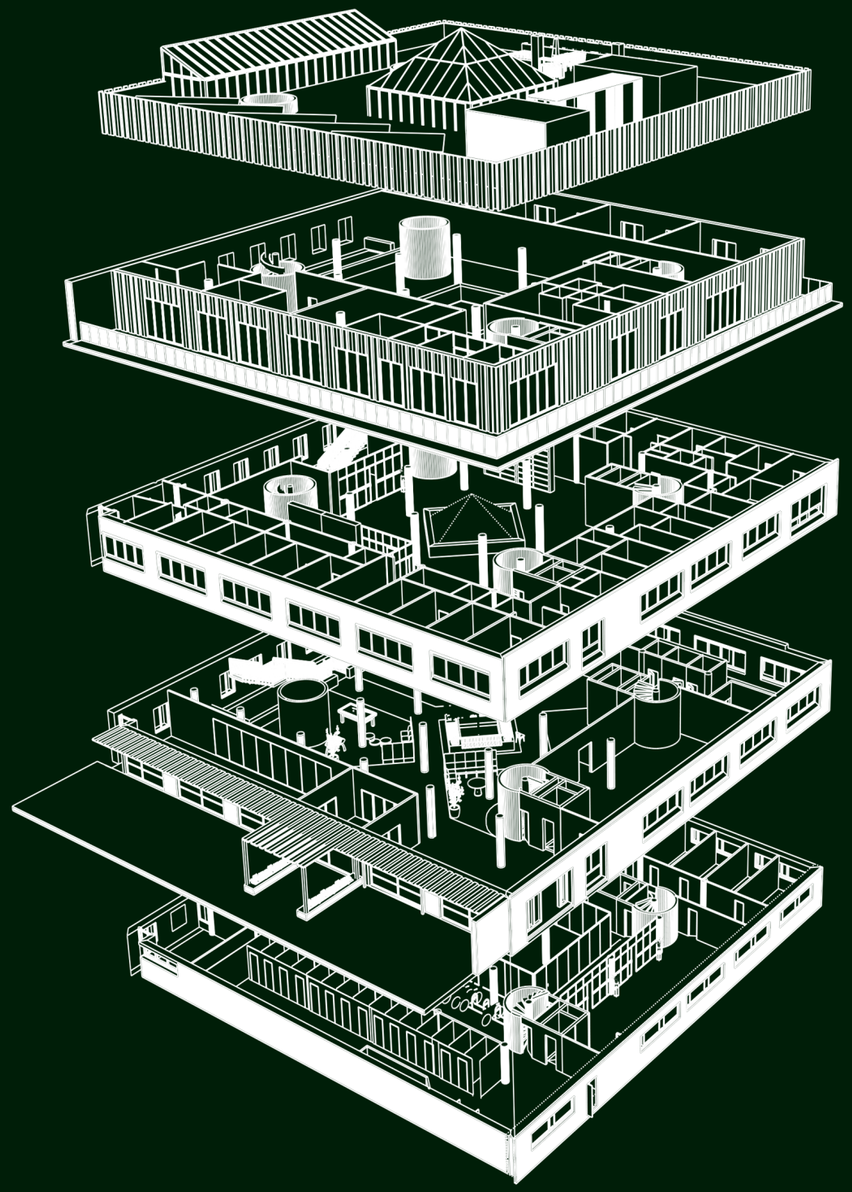
- Decrease the use of material.
- Reduce buildings demolishing.
- Reduce the carbon footprint

Figure 36: SDG topics related to transformation

Circulation withing the building

To enhance the vertical circulation within the building and increase the social connection between the residents, different functions and shared spaces were located on different floors, such as: gym, laundry, bicycle parking, barbecue areas, cultivation boxes, study rooms, and terraces, (figure 37).

Figure 37: Vertical circulation within the building.



Exploded axonometric

Ensuring Safety and Privacy within the building

Transforming a public building into a mixed-use building with semi-private and private areas requires careful planning to maintain the privacy levels for the residence, while involving the community and the public in the same building. To ensure that the residents have their privacy and safety, some of the design strategies were developed within the building.

1. Separate entrances: The design provides separate entrances for the residents, where they can enter the building without interacting with the public visitors. One entrance is through the underground floor from the south side that is reachable from both sides of the city. This entrance leads to the private stairs and elevators that lead to the upper floors directly. Another two entrances that connect the front and the back of the building through the lounge, this entrance can be used by the public but during work hours only.

2. Keys to use the private areas: Access keys or cards are provided for residents to ensure that only authorized individuals can enter these spaces. This system provides a layer of security for the residents, and helps manage the movement within the building, ensuring that public visitors do not enter private zones.

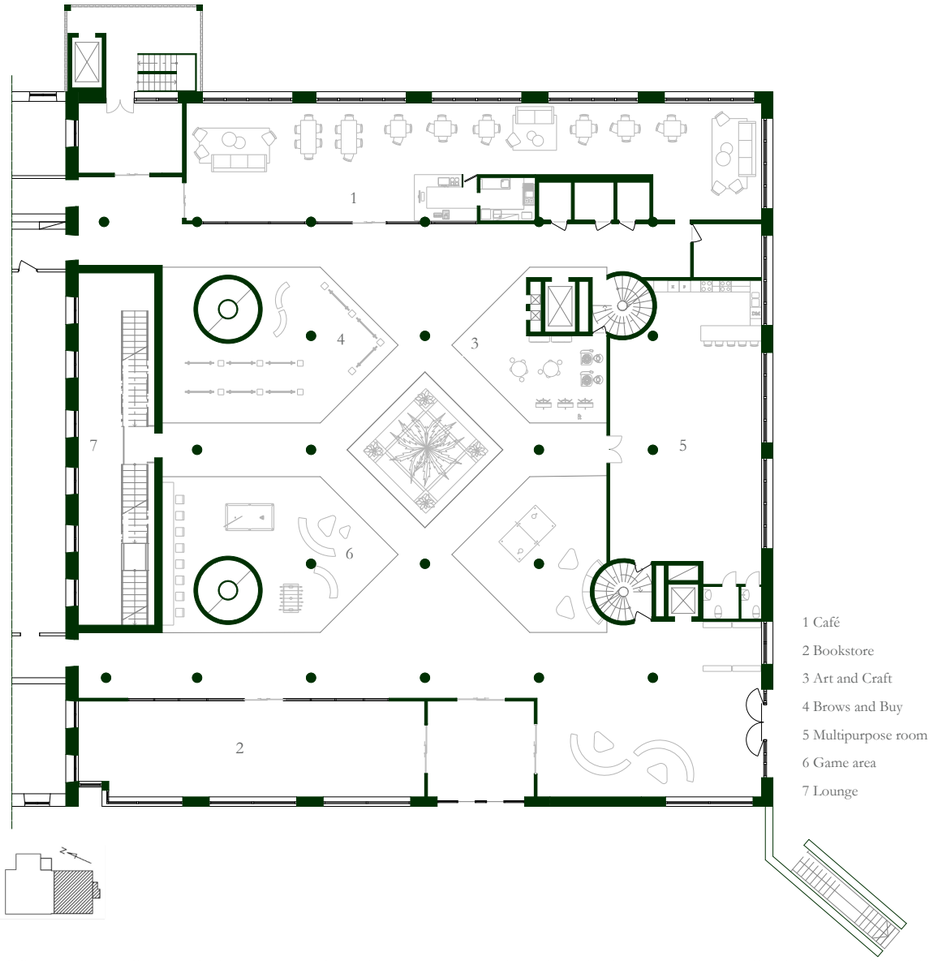
3. Opening hours: Setting specific hours for public areas within the building helps balance the community engagement and the residents privacy. The café has its own entrance from the back (Korsvägen) so it does not interrupt with the other activities either. This approach ensures that each space has its own privacy and entrance, while still benefiting from communal activities and interactions during public hours.

4. The open atrium is glazed on the upper floor: The atrium on the residence floor is kept closed with the glass pyramid to ensure privacy, safety and noise cancellation.

5. The gym is on the underground floor: The gym is designed with glazed walls and artificial lighting all day at the core of the underground floor. This will increase the feeling of safety, where residents can walk around on this floor with its different functions and shared spaces and use the gym with the ability to see each other. This transparency and lighting create an inviting and secure environment, encouraging residents to use these spaces at any time of the day without concerns about safety.

These strategies ensure that the building balances privacy and community involvement, creating an interactive living environment for the residents while enhancing the community and other students' engagement.

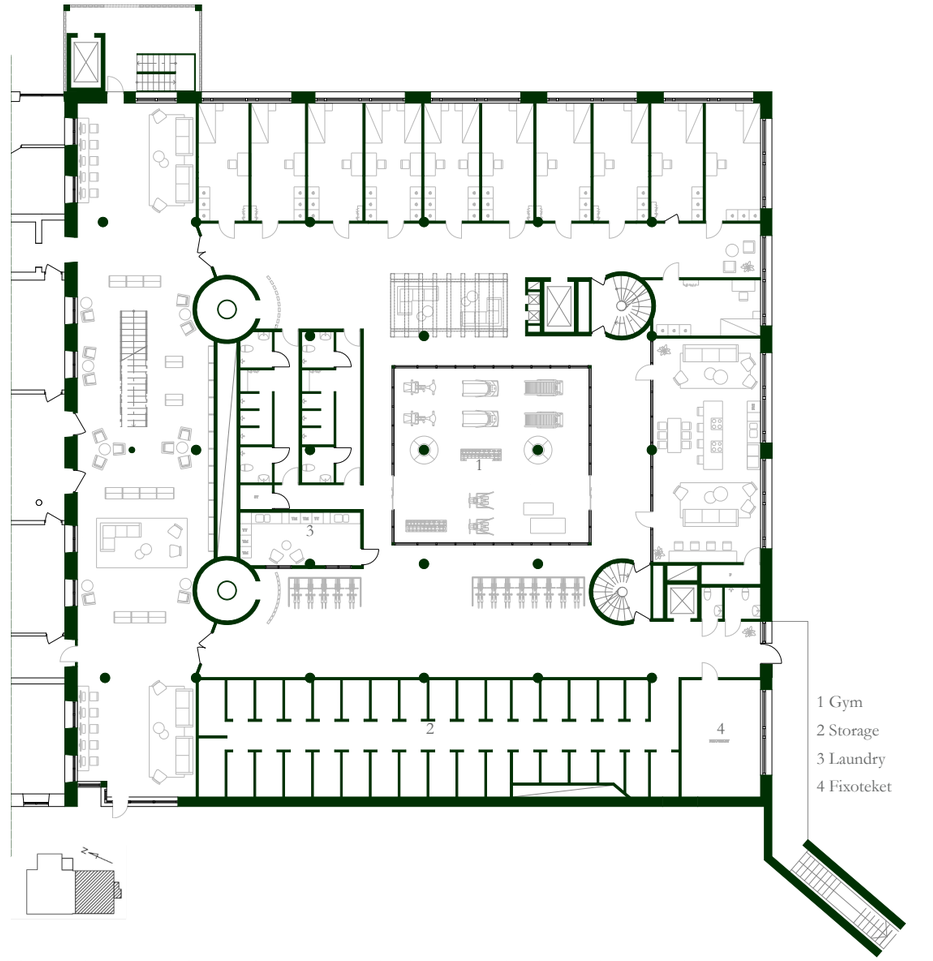
Ground floor, scale 1:300



1 Café
2 Bookstore
3 Art and Craft
4 Brows and Buy
5 Multipurpose room
6 Game area
7 Lounge

The ground floor of the project functions as a community hub, designed for social interaction and creativity. At the heart of the plan is an open atrium surrounded by seating areas, which brings in natural light and acts as a central gathering space.
To the north, a café (1) is positioned with large windows facing the city, offering views and creating a welcoming atmosphere for both students and visitors. Near the entrance is a bookstore (2), which sells academic materials and student essentials. This supports the daily needs of students and generates income to the project that contributes to the economic sustainability of the building.
The art and craft area (3) is dedicated to student creativity, providing space for hands-on work and a browse and buy area (4) where handmade items can be displayed and sold. This feature could help the students with their finances.
A multipurpose room (5) is also integrated into the layout, offering flexible use for events, workshops, or students activities. It can be booked and adapted for a variety of functions, supporting community engagement and social interaction.
For recreation, a game area (6) is included, making the space enjoyable and lively. The ground floor also provides access to a shared lounge (7), offering a comfortable setting places.
Overall, the design of the ground floor prioritizes openness and activity, aligning with the project's aim to create a socially sustainable and engaging student community.

Underground floor, scale 1:300

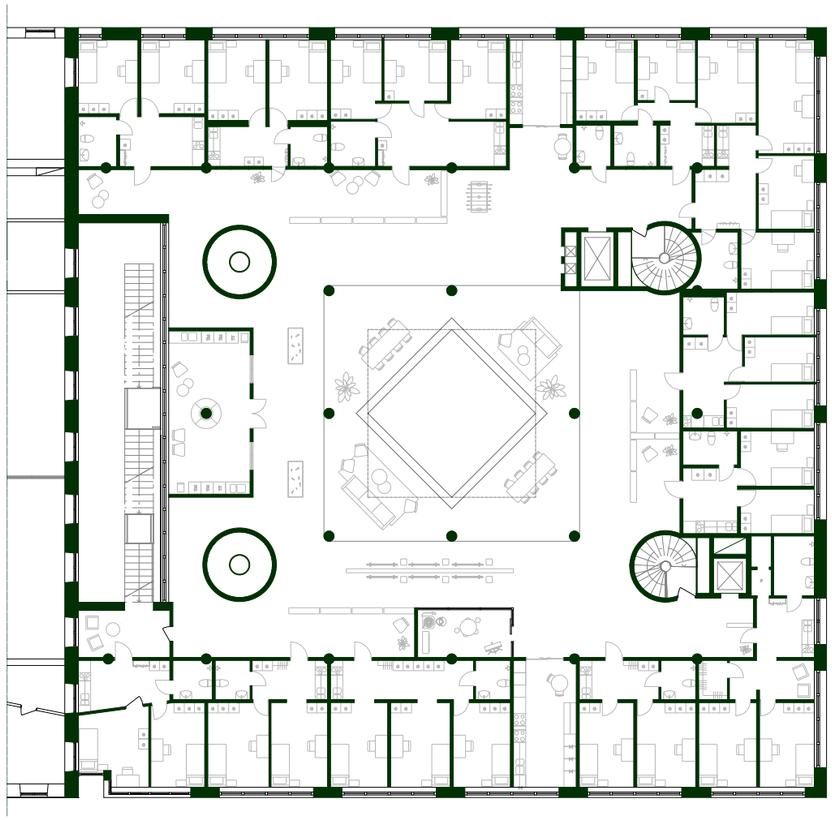


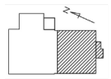
1 Gym
2 Storage
3 Laundry
4 Fixoteket

The underground floor of the project is designed as a shared living environment. This floor has a private entrance for residents, located near the stairs for easy access to the upper floors. The floor is thoughtfully organized to serve both residential and functional needs. The layout includes bedrooms (Type C) arranged along the east side, supported by shared bathroom facilities and communal kitchens and living areas. These spaces encourage a social lifestyle, ideal for students seeking affordability while still engaging in a socially active environment.
A gym is designed in the center of this space, which not only functions as a recreational and health-oriented space but also serves as an architectural extension of the atrium above. This glazed core enhances all-day light feature in the underground level.
Additional services include a bicycle parking area, promoting sustainable mobility for residents, and a Fixoteket room, a creative and practical space where students can repair personal items or bicycles and borrow tools.
Moreover, storage rooms are integrated along the closed west façade, making use of spaces with limited daylight, and providing essential functionality without compromising more active areas.
This floor combines efficient use of space with communal living and sustainability, ensuring that even below-ground levels contribute meaningfully to the student housing experience.

View from the the underground floor showing shared spaces, including the living area, shared kitchen and part of the gym.

First floor, scale 1:300

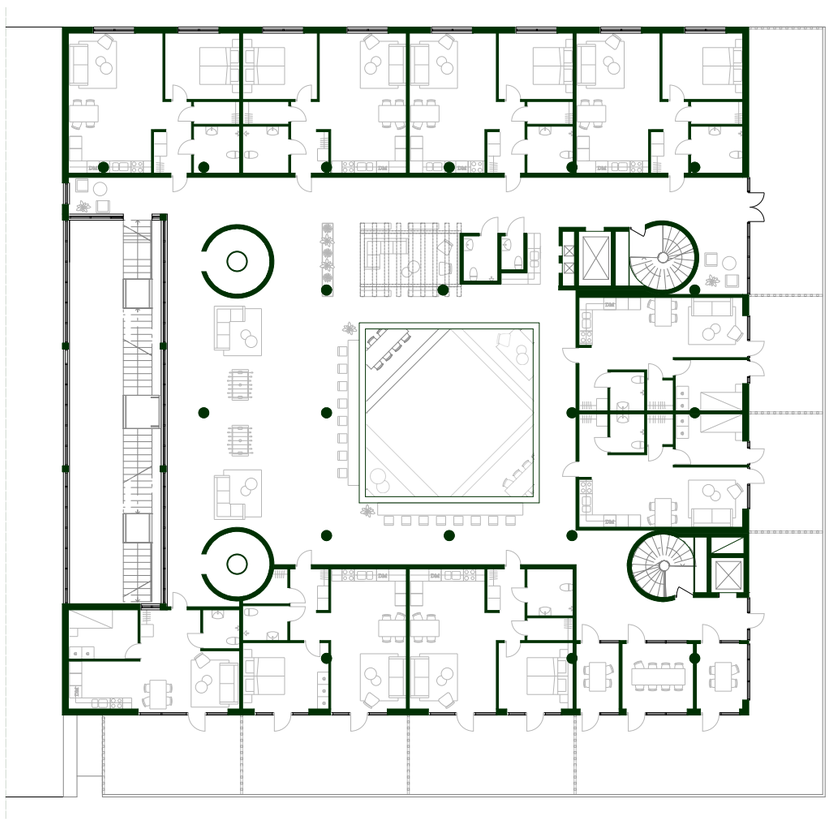


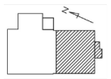


The first-floor acts as a transition from the public nature of the ground level to a more semi-private resi-dential environment, de-signed to balance privacy with opportunities for social engagement. This level fea-tures Room Type B units, which offer a private bathroom and a small kitchenette for quick use, while a bigger kitchen and living areas are shared between the residents in this floor to ensure having social inter-action.
In the middle, residents share a central living space that opens visually to the atrium below. The atrium is glazed at this level, providing daylight while ensuring privacy and sound iso-lation from the public zone beneath.

To encourage community life, the floor also includes a shared laundry room for practical daily use, as well as an activity room where res-idents can gather, and practice their hobbies, with a gallery wall near it, to allow students to display their own artwork, adding a personal and home-like quality to the shared spaces.
Sustainability and reuse are thought in the de-sign through the reuse of bookshelves from the former li-brary. These are used as parti-tions to define the private zones, provide ad-ditional storage, and create indi-vidual entry-ways for each residential unit.

Second floor, scale 1:300

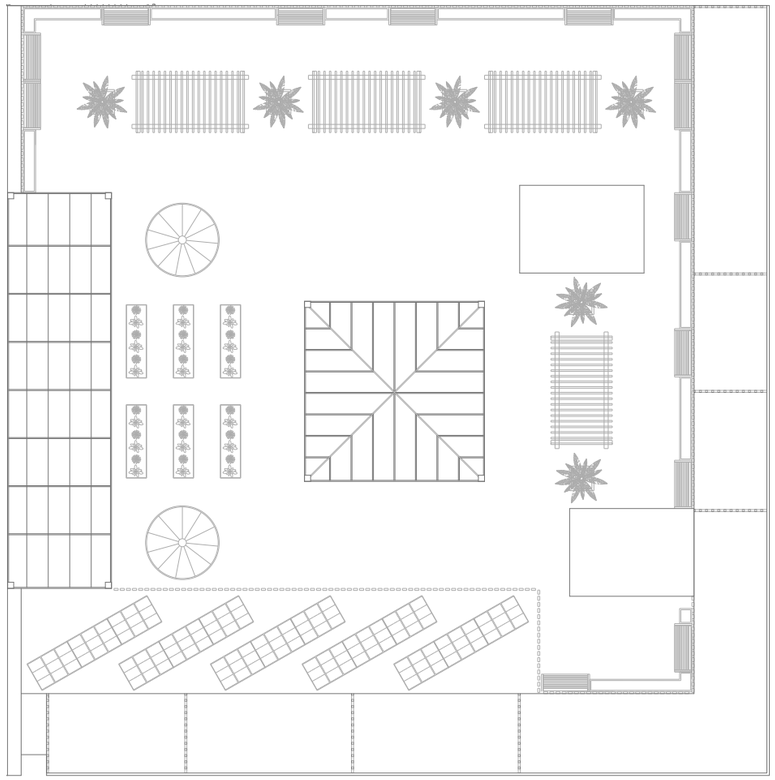


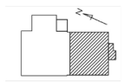


The second floor represents the extension lev-el of the project and is designed with a more private residen-tial units. Architecturally, the floor is stepped back from the building's pe-rimeter, allowing the creation of private bal-conies for individual apartments and shared terraces for communal use. This level con-tains fully private apartments (Type A), each equipped with a personal kitchen, bathroom, and living space.

Despite the self-contained nature of these units, the floor continues to promote social interaction through shared spaces.
Common living rooms and game areas are placed to encourage gatherings and activities. To further enhance connectivity across the building, shared study rooms with access to outdoor terraces are located on this floor. These spaces are accessible to all residents of the building, functioning as an academic and social link between floors.

Roof top, scale 1:300





The rooftop is designed as an outdoor communal space, offering residents a place to socialize, connect with nature, and enjoy the fresh air and city views.
The roof top also contains cultivation boxes, which allow students to grow plants, herbs, or vegetables, promoting environmental awareness, responsibility, and a connection to nature. In alignment with the project's circularity goals, solar panels are installed along the southern part of the rooftop to generate renewable energy for the building. The layout includes seating to create opportunities for casual gatherings, study sessions, or organized events. Through this design, the rooftop extends the building's shared spaces vertically, becoming a communal zone but and a meaningful contributor to the project's social goals.

Scen from the rooftop with the common area and cultivation boxes

Sightlines and visual connections

To better understand the visual connectivity and spatial experience within the project, sightline diagrams have been developed. These diagrams analyze how movement, views, and visibility are organized throughout the building and its surroundings.

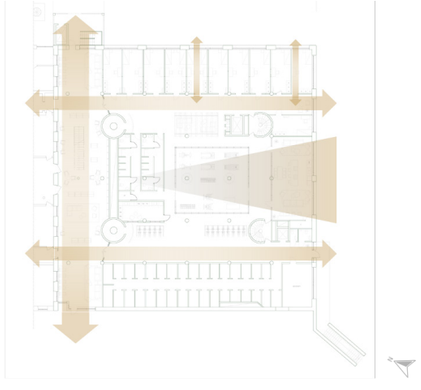


Figure 38: Sightlines and views for the underground floor

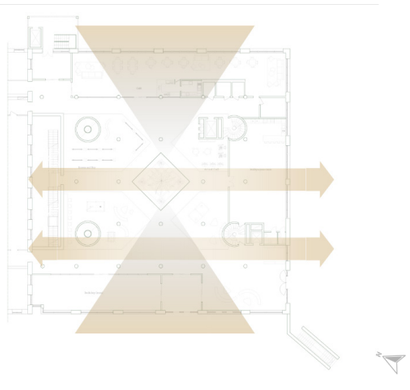


Figure 39: Sightlines and views for the ground floor plan

Figure (38) shows the sightlines and visual connections within the underground floor plan. The diagram highlights the visual access from both the front and back side of the building, creating a sense of openness and strengthen the connection between these sides, allowing the access to the building from the side of (Korsvägen). Upon entering through the lounge area, users immediately meet with extended views toward the openings on either side of the building. These clear sightlines help guide movement through the space with easier wayfinding. The south-east part in this floor plan has setting areas and a shared kitchen, leaving the façade open with glass walls to allow the light to enter the middle of the building.

Figure (39) shows the sightlines and visual connections in the ground floor plan. The design is centered around a central atrium space, allowing for strong diagonal and horizontal sightlines that visually connect key functional zones across the floor. The horizontal sightline running across the plan help guide circulation between the three buildings, UB50, UB80 and the Humanities faculty. The other horizontal sightline within the floor helps guide circulation towards the lounge and the multi-purpose room. One of the visual features is the extended sightline from the café area, which offers direct views toward Korsvägen and Liseberg amusement park. This creates a spatial quality for the café, making it an attractive social place, and it strengthens the building's connection to the city. These outward-facing views bring natural light into the interior and link the indoor environment with the surrounding urban scale, encouraging a sense of connection between the users and the city.

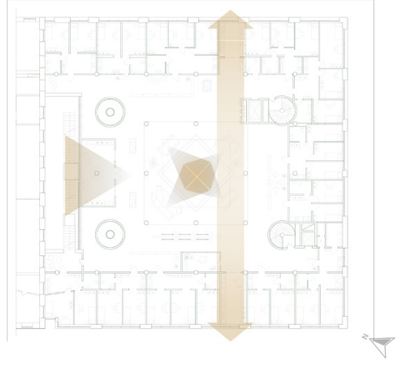


Figure 40: Sightlines and views for the first floor plan

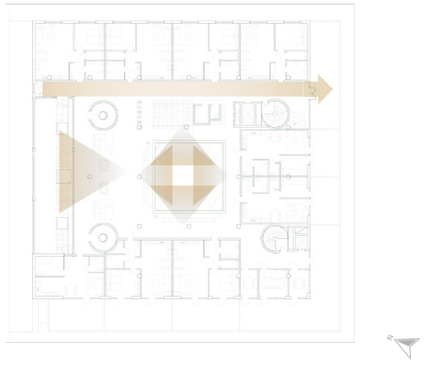


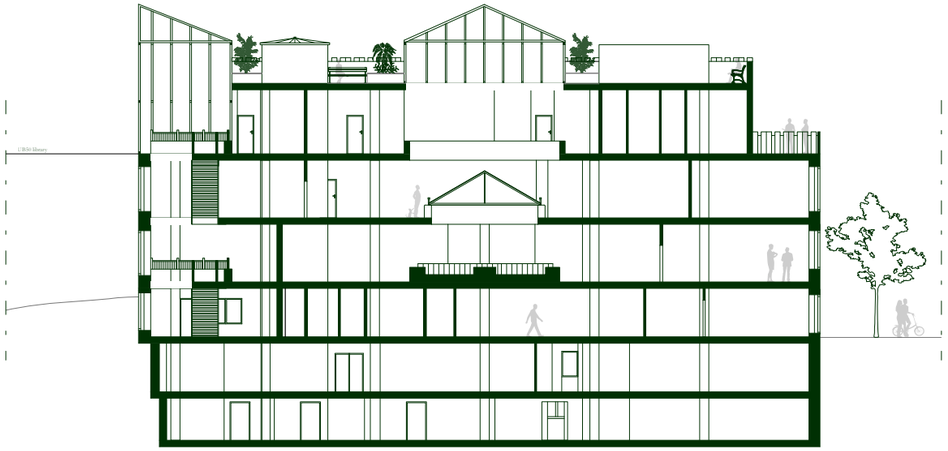
Figure 41: Sightlines and views for the second floor plan

Figure (40) shows the sightlines and visual connections within the first-floor plan. The diagram highlights the visual connection through the common kitchens, achieved through a glazed interior wall, with views to the outside. Additionally, the middle setting areas have direct views into the central atrium, connecting semi-private spaces with the core of the building.

There is also a view from the laundry area into the lounge space, creating a visual link between everyday tasks and social activity. This connection helps integrate routine functions with communal life, supporting informal interaction and a more connected residential experience.

Figure (41) shows the sightlines and visual connections within the second-floor plan. A horizontal connection is created within the space leading to the outdoor shared terraces. The middle area is designed to have a setting place with the views to the atrium showing both the first and the ground floor. A view to the lounge from the game and setting space is created, allowing users to feel part of the larger communal atmosphere while engaging in more relaxed or recreational activities.

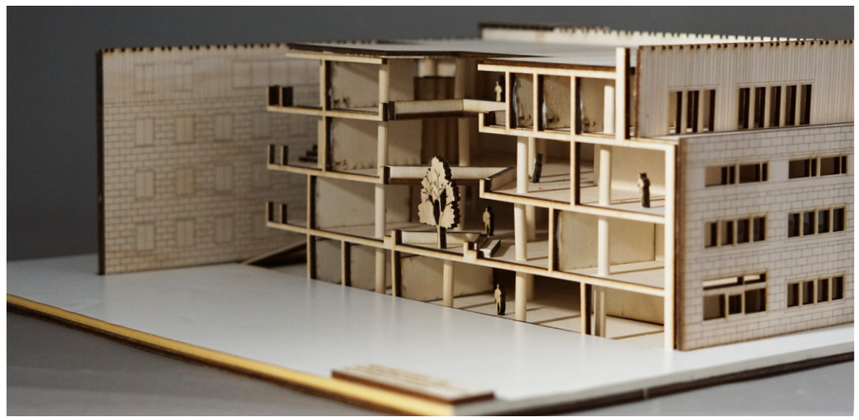
Sections



Section A-A in scale 1:400

Section B-B in scale 1:400

Sectional Model

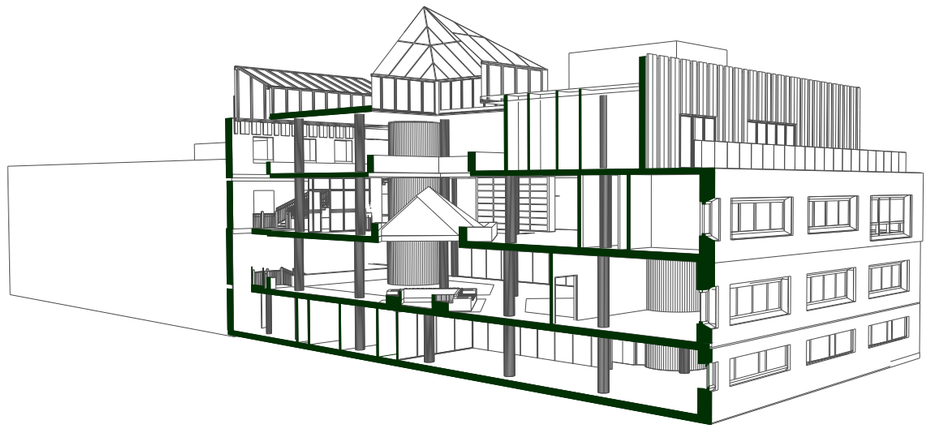


Sectional model

South elevation, scale 1:300

West elevation, scale 1:300

East elevation, scale 1:300



3D section

Circularity Within the Project

One of the core principles of this project is the integration of circular economy practices, starting with the strategy of adaptive reuse. By repurposing the Humanities Library building rather than demolishing and constructing a new building, the project conserves material resources, minimizes environmental impact, and preserves the historical value of the building.
Several elements within the project were also programmed to reinforce circularity:

- **Solar panels**: Solar panels are integrated into the design on the rooftop to generate renewable energy for the building. This helps to reduce the building's environmental impact and supports the project's commitment to sustainability.

- **A café:** Adding a café in the project to generate income for the building and enhance community engagement. It gives value not only for the residents, but also for the public to enjoy the strategic location for the place and the views towards the city.

- **Art and Craft space** (brows and buy): The art and craft idea in the building is for the students, so they can practice their hobbies while generate income with the exhibition (brows and buy) from the public. It is situated close to the café to have easy access to the space.

- **A store:** adding a store to the building on the front facade to help university students and the library by selling books and students' essentials. It also generates income for the building.

- **The rooftop:** The rooftop is a great place for enjoying the summer sun and enjoying the view. The place is well designed and could be rented out during specific hours through the cafe. However, it is regulated so it will not affect the privacy of the residents.

- **Reuse of Bookshelves:** Since the building was a library and has a lot of bookshelves. The project reuses these bookshelves to separate places within the floor plans and in front of the rooms to give privacy for the room entrance.

Figure 42: Reuse of Bookshelves

The surprise factor within the project

To introduce an element of playfulness and the unexpected, the project incorporates spiral slides within the cylinders of the building. Originally, the cylindrical structures in the building served as large ventilation shafts, a necessary feature for maintaining fire safety in a library that housed thousands of books. These oversized ventilation systems were critical to ensure safety in case of fire to a building that contains large number of books. However, with the building's transformation into student housing, the functional requirements have changed. The need for such large-scale ventilation no longer exists, and modern, compact systems can be integrated more efficiently into the building's core. Rather than removing these iconic architectural features, the project embraces an adaptive reuse approach, transforming the cylinders into playful spiral slides. These slides serve as a surprise design element and offer a fun, engaging alternative to traditional circulation methods as stairs and elevators. They also align with the project's vision of creating a lively, interactive environment for students. The idea is inspired by Carsten Höller's installation at the Danish Architecture Center in Copenhagen, where a 40-meter-long slide spirals down through four stories of the BLOX building, offering a joyful and energy-efficient descent (designboom, 2020).

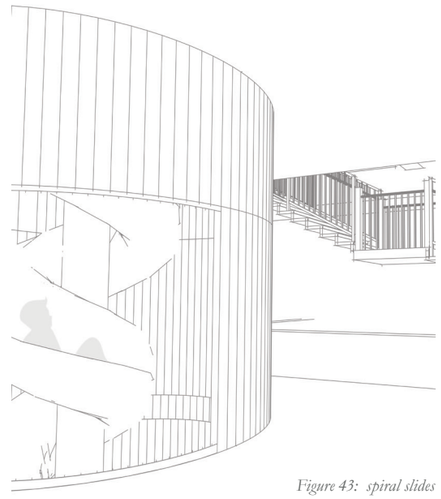


Figure 43: spiral slides

Architectural intervention on the existing building

The extension on the existing building is a wood structure with wood panels cladding on the top of the building. The use of vertical wooden panels introduces a warm, natural material that contrasts softly with the original brick façade, creating a differentiation between old and new. This design decision improves the aesthetic appearance of the building and brings an element of nature into the urban context, aligning with sustainable design values. To further improve the visual language of the extension, an entrance canopy was added at ground level with the same wooden pattern of the extension. This creates a clear for the main entrance. The shelter serves as both a functional and visual guide, welcoming users into the space while maintaining a consistent design language with the rooftop addition.
In line with adaptive reuse principles, the intervention respects the identity of the original structure by preserving its form and materiality, while differentiating the new additions to the building.

Daylight Analysis - using Velux

The daylight factor (DF) analysis illustrates the daylight distribution across the layout, with a particular focus on bedroom units and shared living areas. The simulation results reflect a strong overall daylight performance, with values meeting or exceeding the European standard, which recommends a minimum average daylight factor of 1.0% in living spaces.
The bedrooms, positioned along the outer edge of the building, benefit from direct exposure to natural light. This is reflected in the presence of yellow and orange zones near the windows, gradient shift towards red and purple further into the rooms shows a gradual reduction in daylight, but the overall average remains within acceptable and comfortable levels for residential use.
The central atrium, which is fully glazed, significantly enhances the daylight into the interior of the floor. Surrounding this core, the shared living and dining areas enjoy excellent daylight quality, particularly those directly adjacent to the atrium. The analysis shows the atrium acting as a light well, distributing natural light into inner zones that would otherwise rely heavily on artificial lighting.

In the underground level, the daylight to the middle of the plan is very limited, leaving it as a challenge to work with. This was solved through placing all the functions that do not need daylight are located in the darkest spots, such as storage, bikes parking, shared toilets and fixoteket. In addition to placing the gym with the glass walls and artificial lights in the core of the plan, placing it to act as an artificial atrium to provide all day light to the residents. While the bedrooms with good daylight factor are placed on the east façade of this floor, and living areas to the south.
This strategy supports the user's well-being and contributes to the building's energy efficiency by reducing the need for artificial lighting during daytime hours.

In conclusion, the analysis confirms that the use of a central atrium and well-positioned bedrooms achieves high daylight availability in both private and shared spaces.

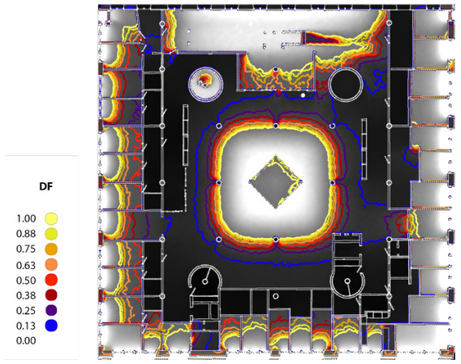


Figure 44: Daylight analysis - First floor plan

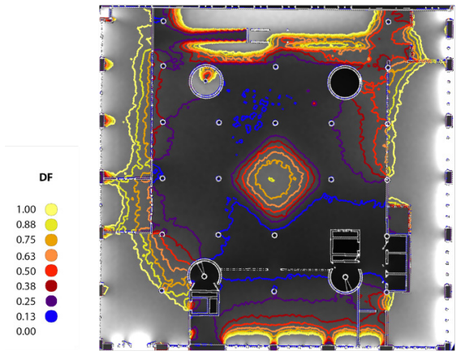


Figure 45: Daylight analysis - Ground floor plan

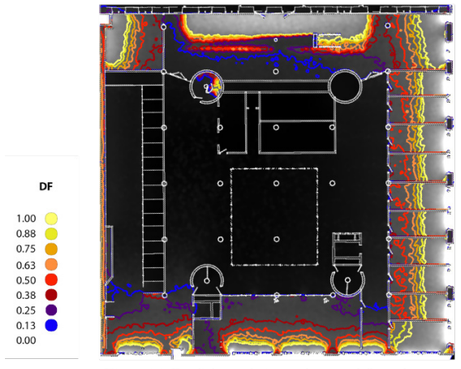


Figure 46: Daylight analysis - underground floor plan

Preserving the existing structure with minimal demolishing

The demolishing plan highlights the project's strategy of minimal demolishing, preserving as much of the existing structure as possible. The original layout of the library, characterized by its open floor plan and flexible spatial organization, provides a strong foundation for adaptive reuse. This openness reduces the need for demolition, as the spatial qualities already support a wide range of new functions, from communal areas to private residential units. Only selected internal walls and non-structural elements are removed to put the new needs. This approach conserves resources, reduces construction waste, and promotes the project's commitment to sustainable and circular design practices.

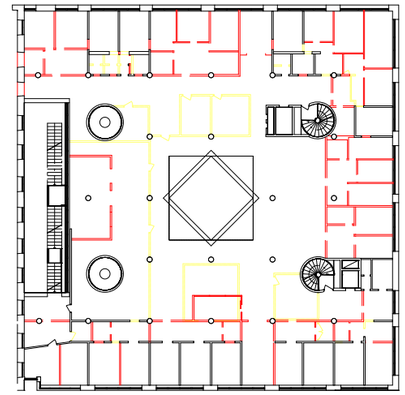


Figure 47: Demolition plan - First floor

Figure 48: Demolition plan - Underground floor

Figure 49: Demolition plan - Ground floor

Existing
Addition
Demolished

5.

Discussion & references

Discussion

Architects often think about building more, creating visually attractive structures to show design skills through towers and large complexes. However, looking into today's environmental challenges, it has become essential to rethink this approach. There is now a growing need to find ways to practice architecture without harming the environment. To be proud as an architect does not mean to build more, but to build smarter, by adapting what already exists to benefit today's needs.

This thesis explores this path through exploring the possibility of transforming a library building into a sustainable student community and housing, showing how existing architecture can be reused to meet today's challenges with creativity, responsibility, and care.

To answer the thesis question, the research followed a combination of architectural analysis, adaptive reuse strategies, and sustainable design methods. The thesis has proposed a spatial strategy that combines private living areas and shared social spaces, with the community engagement, encouraging student interaction while maintaining zones of privacy.

One of the main challenges that were faced during the design process was dealing with the deep floor plan of the library. Originally designed for stacking books in a space with limited daylight access, especially for the interior middle space. To solve this, several architectural interventions were introduced: the use of a central glazed atrium to draw light into the core, carefully placed openings, and the prioritization of daylight in bedroom and shared living areas. As the project focuses on sustainable practices and the minimal amount of demolition, the design process excludes opening the atrium existing to the underground floor, leaving it with a big middle space with low daylight. To compromise this, a gym was designed in the middle space of the underground level, ensuring to have light in this floor to ensure the feeling of safety and security for the residents.

An important aspect of the project's development was the shift in direction around the future of the library. Initially marked for demolition, the building's value was reconsidered through the lens of adaptive reuse. Conversations with stakeholders, including Akademiska Hus, revealed an openness to reimagining the building's purpose. This change in direction reflects a growing recognition of the environmental, economic, and cultural benefits of reuse over new construction. The thesis contributes to this ongoing discussion by offering a sustainable alternative to demolition, while meeting the student's needs.

In conclusion, this project shows that even complex, larg buildings like libraries can be successfully transformed into multi-use, community-driven spaces, when approached with a clear vision, respect for the existing structure, and a strong commitment to sustainable and social design principles.

5. | Discussion & references

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CHALMERS
UNIVERSITY OF TECHNOLOGY

Living and Learning: A Transformative Journey

Adaptive reuse of The Humanities Library in Gothenburg University into student community and housing.

Master Thesis 2025

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