Naturally Connected

Investigating how cohousing can support sustainable living and social belonging in an urban context

Linnea Ringqvist
Chalmers School of Architecture
Department of Architecture and Civil Engineering

Examiner: Ola Nylander
Supervisor: Hilda Esping Nordblom

CHALMERS
UNIVERSITY OF TECHNOLOGY

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Linnea Ringqvist
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Master's Thesis

Chalmers School of Architecture
Department of Architecture and Civil Engineering
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ABSTRACT

We all agree that we need a shift towards a more sustainable way of living. We are confronted with societal challenges due to the overuse of earth's resources and at the same time, we need to face the growing urbanization. The majority of all people worldwide live in cities and the number is constantly increasing. The norm of a sustainable home in relation to the urban context should therefore be questioned.

During the last decades, the living space per person has been decreasing in the city of Gothenburg. We live closer together, but many people lack a sense of community and collaboration in their everyday life. We have to find an approach to support a more sustainable urban lifestyle, a development that must occur on environmental terms. When connecting the city dwellers to each other, by sharing space and resources, an urban lifestyle can support both social health, the connection to place and environmental sustainability. A sustainable change is consequently beneficial for both the environment and the city dwellers.

In the context of an urban home, this thesis investigates the spatial significance of architecture in relation to our daily life and what role the attributes of a home can have on how we live. The focus will be on the community of a cohousing unit and thus the apartment building as a whole. The question is how the architectural design of a cohousing unit can contribute to strengthening the sense of community and a sustainable lifestyle. This will be investigated with a human-centred approach to understand how the home can be designed with attention to both people and nature.

Results show that social and ecological factors can interact to contribute to a more sustainable lifestyle. By using socio-ecological methods together with biophilic design methods, residents' connectedness and social belonging can be further strengthened. The research made on these topics results in strategies used to design a cohousing unit in Gothenburg that aims to adapt to local conditions and increase the feeling of being involved in a context.

Key Words

Cohousing, Sustainable living, Social belonging, Urban context, Connectedness

CONTENT

Figure 1. City (Vidal, 2018)

I. THESIS FRAMEWORK

STUDENT BACKGROUND

Author
Linnea Ringqvist

School

Master
Architecture and Urban Design
Chalmers University of Technology
Gothenburg, Sweden

Exchange
College of Architecture and Urban Planning
Tongji University, Shanghai, China

Bachelor
Architecture
Chalmers University of Technology
Gothenburg, Sweden

Work

D Office Arkitekter, Gothenburg

Relevant courses

Matter Space Structure: Wet Wood (studio)
Spring 2020
About: wellbeing in relation to nature, the inner grains of the wood, experience based design

Principle and Methods of Landscape Ecological Planning (course)
Fall 2019 Shanghai
About: ecological sustainability, human health, urban ecosystem

Future visions for healthcare, housing and work: Housing inventions (studio)
Spring 2019
Key words: joint building venture (cohousing), proximity to nature, wood, rational system

THESIS BACKGROUND

Problem statement

Background

We have come to the point where our future depends on sustainable change. As stated in the report by the World Commission on environment and development (1987), sustainable development must occur on environmental terms. This challenges how we measure values in the home, and how we can change the way we live in the cities to a more sustainable lifestyle. Environmental and sustainability issues must be considered at an early phase in the development of a building or an area (Edman, 2020) and according to Westholm (2020), cohousing can work as a solution to rush the ecological development in society. This is steering to further research on how the dwellers can be co-actors in a cohousing solution, and in what way the home can be planned in alliance with nature.

The City of Gothenburg has a goal to be recognized as a green city in the year 2021 (Göteborg 2021, 2020). This thesis investigates if this can be more showcased in new housing development in the future.

The norm of a sustainable home

Hagbert (2020) clarifies that the typical sustainable home often is visualised as two conflicting scenarios; either it focuses on technical solutions, although the appearance of the buildings (as in floor plans and layout) still looks like a conventional house. Or in other contexts, the sustainable home is presented as the extreme opposite, as life in an eco-village. But what if we could challenge the way we think of a sustainable home? The approach in this thesis proposal is that we could benefit from both of these scenarios. As declared by Hagbert (2016), we need to see the dwellers as co-actors and look closer at the difference between effective and affective approaches. If we want to encourage and form conscious citizens, the built environment has to reflect that.

"There is a neurological and physiological necessity to engage the environment."

- (Kellert, 2008, p76)

PURPOSE & AIM

Purpose and aim

What?

To design a residential house in an urban context that connects the residents with each other and strengthen the mental connection to the place. The aim is to use a human-centred approach to find a sustainable solution for residents' social health that also goes hand in hand with ecologically sustainable development.

Why?

How we build have a great influence on how we live. Therefore, the focus is to find solutions that can promote a shift towards a more sustainable lifestyle. By looking at the resident as a part of a cohousing unit, social sustainability can go hand in hand with environmental sustainability and the anticipation is to show that this will be beneficial for everyone, both the residents and the city as a whole.

Whom?

As the approach is to see the dwellers as co-actors, the program of the house is set by a survey and by the needs expressed by the respondents. This will be recognized not only by the apartment size but also by the shared areas of the cohousing unit. The aim is to design a cohousing unit for these people, where they can live together within an urban context.

RESEARCH QUESTIONS

How can the architectural design of a cohousing unit contribute to strengthening the sense of community?

How can a cohousing community contribute to support an ecologically sustainable urban lifestyle?

How can nature-based design strategies be used to further strengthen social values?

?

METHOD AND PROCESS

Method

How?

By exploring different design options combined with research on subjects related to sustainable development with a human-centred approach. Limited to architecture and connectedness, the focus is on cohousing, social community and biophilic design.

Research for design

Literature studies on cohousing in a historical context and the situation today, as well as the relation to social and ecological sustainability.

Research on design

Case study on reference projects in the urban context. The investigations and conclusions are made from information found online, printed documentation in texts and by looking at pictures and drawings.

Research by design

A process with sketches, models and explorations in both digital and physical format. The design strategies are used as guidelines and the design proposal is seen as a base for discussion and reflections.

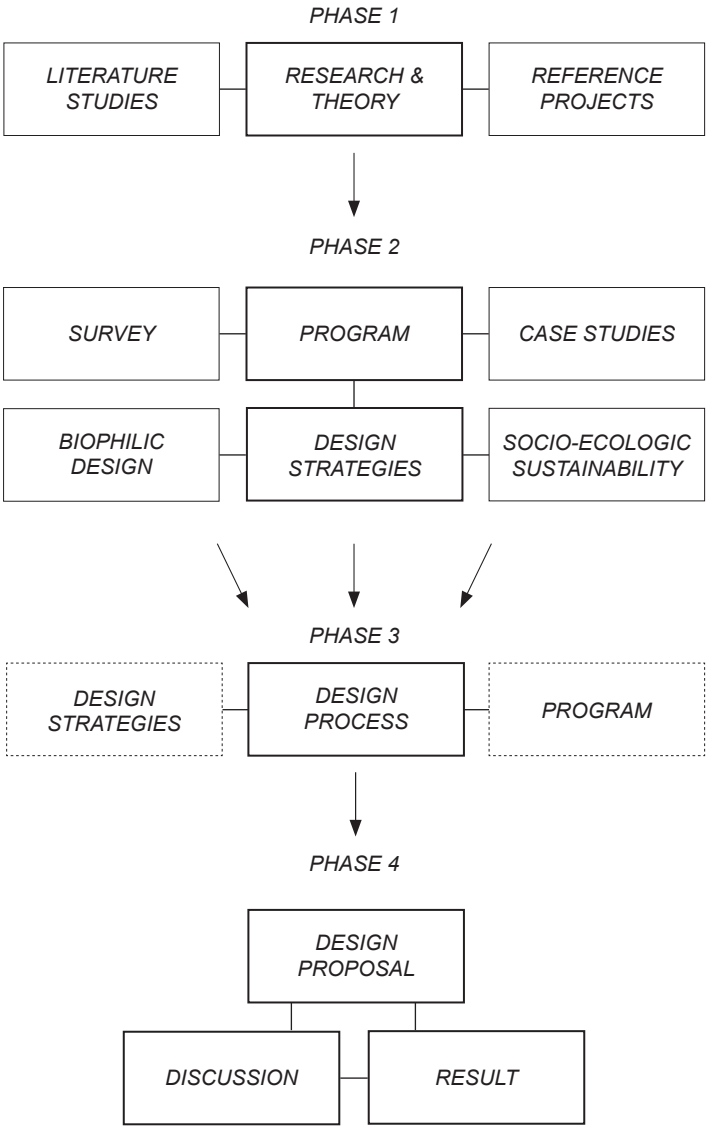
Delimitations

The investigations will be based on the geographical context of Sweden when it comes to environmental adaptations, regulations and guidelines. As the focus is mainly on the social and ecological context, questions of the economy or economic profit will not be crucial factors in decision-making. However, the methods used could suggest long-term advantage also when it comes to economical issues. As the aim is to look into spatial qualities with a human-centred approach, the focus will not be on issues related to the phase of the process in the context of governance or regulations. Neither will investigations on technical solutions for environmental design be in focus.

Process

How?

In the first part, the concentration is on theory and research. The second part will consist of a mix of research, analysing and design. A survey is made to add a foundation to the program and the design of the cohousing unit. The third part will mainly consist of design and reflections. The fourth and final phase is to conclude the design proposal, result and discussion.



II. ACADEMIC FRAMEWORK

INTRODUCTION & CLARIFICATION

Sustainability

Sustainable development, defined by the Brundtland Rapport, is *"the development that meets the needs of the present without compromising the ability of future generations to meet their own needs"* (World commission on environment and development, 1987). Further, it is used as an overall term to the three dimensions of sustainability; ecological sustainability, social sustainability, economic sustainability, which both interact and support each other.

Socio-ecological sustainability

As described by Tunström et al. (2015), this refers to the discourse about how social concerns can be combined with ecological sustainability and, most importantly, support each other.

Connectedness

Connectedness relates to people's desire to be involved in a context, but also the basic affiliation to nature, which is the theory underlying the concept of Biophilic design (Seymour, 2016).

Biophilic design

The term biophilia is based on the theory that humans have a fundamental desire to connect with nature. Biophilic design is the strategy used to reconnect humans and nature, which is supported by the positive effects that it can have on both inhabitants and the environment (Wijesooriya & Brambilla, 2020).

Collective

The term collective is a more general term used for different housing types, of which cohousing is included. The different kinds are described further in *Theory part I*. A collective house originally refers to the collective organisation of a house, which intended to reduce the burden of housework. (Vestbro, 2000). The ownership of a collective house can be of different kinds, such as condominiums, rental tenure, or cooperative rental tenure (Vestbro, 2014).

Cohousing

The expression describes a building or area with private homes gathered around additional shared spaces. The occupants are usually also engaged in the planning process. The term is originally from the Danish bofaellesskab (Vestbro, 2000) and the residential buildings are characterized by increased opportunities for social contact and cooperation between the inhabitants (Boverket, 2021). This is first and foremost the model explored in this thesis and will be examined further in *Theory part I*.

Joint building Venture

When a group of people, who aim to establish an owner-occupied home, are in charge of the building process and the financing of the project it can be referred to as a *joint building venture.* The building can be planned as a cohousing unit with shared facilities, but it is not always the case (Seemann et al., 2019).

Clarification

In this thesis, the expression cohousing is generally used. However, the area of collective houses is an area more established historically and therefore sometimes referred to in the historical context. Most projects analysed in the case study are also defined as joint building ventures. The focus is on the cohousing unit as a finished product, and the fact that the occupants have participated in the process and hence also have had an influence on the final result.

THEORY PART I. *COHOUSING*

Historical Context

Collective housing and cohousing

Networks of social relations have always united people in different groups, based on for example mutual ambitions, shared tasks, responsibilities, or recreation. Collective thinking has included both the idea that practical solutions would comfort everyday life and the idea of political utopias (Vestbro, 2000). These utopias can be categorised as three different ideals: the ideal of the garden city, the machine age culture and the perception of the ideal home (Vestbro, 2010). When looking into these different types of collective housing that has emerged, Vestbro (2000) further categorise them as five main models;

1. The type with the central kitchen

Including three subcategories, which are the collective house;
A. With services through employed staff
B. Based on communal work (15-50 apartments)
C. With common facilities for the elderly mixed with a cohousing unit

2. Danish cohousing (Bofaellesskab)

This house derives from the ambition to create a stronger sense of community

3. Service block or integrated service

Housing areas with housework, care, and communal participation

4. Special categories

E.g. elderly people, students or residents with various types of dysfunction

5. The commune

People living within a one-family unit or a single-family household

The "collaborative housing movement"

What distinguishes cohousing from collective housing is described as the models that have established self-organization and thus also self-governance (Hagbert et al., 2020). These examples additionally create a stronger sense of community, rather than only focusing on reducing the burden of housework (Vestbro, 2000). Finally, cohousing implicates a spatially organized setting with individual homes arranged in a rational and more or less collective matter (Hagbert et al., 2020). Further focus will thus be on the first and second type described above. These models correspond to the framework of the thesis, a cohousing unit for all age, which also should consist of one cohesive unit that can fit into an urban context.

Why isn’t cohousing more common?

Resistance and political influence

Starting in the early 20th century, we can see different initiatives of collective living in Sweden. Engelius (2018) describes that the planning of new households was seen as methods to influence society or to support people. Different approaches were introduced and intense debates were ongoing about collective living. Functionalists and socialistic utopians believed that new types of living could contribute to a rational and democratic human. The advocates argued that this was a solution to a modern lifestyle in the cities. This meant for instance that both parents should have the possibility to work, and employed staff would therefore work in the building to make the daily chores.

Opposition came from many directions; conservative, bourgeois and even socialists (Engelius, 2018). The ideas of how we should live were established in the patriarchal society. Many men simply wanted a housewife to do housework for them (Vestbro, 2010). Some critics said that a home outside the city with a garden was better for children (Engelius, 2018) suggesting that a home in the city wasn´t a good choice for families or single parents to even consider.

Strive for equality and solidarity

During the second half of the 20th century, collective living was more discussed again and attracted people inspired by solidarity and feminist movements (Vestbro, 2010). They wanted to reach equality between people by collectively organized housing and work. At the same time, the demand for homes adjacent to the city, without long travel distances, arose due to the rapid urbanisation. Many families lost connections to relatives or other traditional social networks and looked for new housing alternatives appropriate for families (Engelius, 2018). Many new collective homes were built in the 1970s in close connection to the cities. For single parents, the collective house was (and is still) an advantageous choice thanks to access to the service as well as support from the community, resulting in strengthened social security (Grip et al., 2019).

Historically and to this day, the movement clearly challenges the nuclear family and what people think a home should be like. Vestbro (2014) claims that resistance from patriarchal society could still be an explanation of why there are few cohousing solutions in the housing market yet today. There are only about 50 collective houses in Sweden today (Kollektivhus NU, n.d.), which is an extremely small amount in proportion to the total housing stock that consists of more than 5 million homes (SCB, 2021a). Despite the different types of collective living recognized in Sweden, the movement is still strongly associated with the typical collective house connected to a political stance that many have prejudices towards (Engelius, 2018). There is also an overall lack of information among the public (Grip et al., 2019; Vestbro, 2010). Even media plays a role, as this type of living historically have been presented as bohemian and even sometimes immoral (Vestbro, 2010).

Residents as Co-actors

From collective to self-work

The first example was a functionalistic collective house in Sweden that was intended to simplify housework through a rational lifestyle. This type of model had a central, shared, kitchen and common childcare and arose with the ambition to support women to start working (Engelius, 2018). However, cooperation between the dwellers was not in focus since the workers did all the work (Vestbro, 2010). Later, an approach with attention to shared work and community thinking was introduced. Among the occupants, the desire for community proved to be as important as the practical motives, like e.g. reduced housework (Vestbro, 2010). Vestbro (2014) argues that this can be related to the increased amount of single households and social isolation. He establishes that the aim of creating a community through cooperation was achieved, which is also well described by Grip et al. (2019). Moreover, studies show increased safety and a positive environment for the children (Grip et al., 2019; Vestbro, 2014).

In this self-work model, working groups are responsible for cooking but also the maintenance of common spaces that help to reduce housing costs, like gardening, cleaning of communal rooms, snow-clearance or minor repairs. This self-governance can be a source for struggles, like conflicts over meals or difficulties in recruiting residents that agree to the established conditions (Vestbro, 2010). Nevertheless, common meals contribute to less energy consumption through larger purchases (fewer shopping trips) and less use of private stoves. Energy can also be saved by shared laundry machines or other devices that can be shared, as well as by recycling or exchanging items to reduce waste (Grip et al., 2019; Vestbro, 2012).

Self-administration

In other countries, especially in Germany, the cohousing community are more connected to a movement where the occupants work as their own house developer, which is referred to as *joint building ventures*. There are initiatives from both the municipally and organizations and the city often rewards good ideas that benefit the society with land allocations. In that way, the surrounding residents are committed early in the process and the projects are rarely appealed against (Seemann et al., 2019). These joint building ventures can be seen as a movement of innovative homes where the outcome actually correspond to the concrete request. One common concern is that the apartments will be too much adapted to a specific user, but experiences indicate that these apartments usually are worth more than a conventionally built apartment available on the market. It is also common that communities invest in ecological construction or low-energy houses (Broms Wessel & Hedström, 2016).

Even if the main purpose of these projects is to create homes adapted to the occupants' own conditions and needs, the driving force can differ. For some, it is basically about creating a home together, others want to focus on a shared vision like an ecological construction (Föreningen för byggemenskaper, 2021). A building community may lead to a cohousing unit and residential collaboration, but this is not necessarily the aim (Boverket, 2021). However, what has been stated by the

many examples in Germany is that it actually contributes to a deeper commitment to both building and place, i.e. the surrounding area. The social involvement among occupants and the interrelation of the existing neighbourhood are concerns that support social sustainability (Seemann et al., 2019).

Although the examples of joint building ventures are few in Sweden, there are examples of when members of a cohousing unit participate in the process. Vestbro (2014) describes that the first example was shaped in 1987 when a group of seniors started to think about how they wanted to live when they grew older. They planned the house together with a municipal housing company and it was finalised in 1993 and named *Färdknäppen*. The residents' participation contributed to their satisfaction as well as pride towards their home (Hagbert et al., 2020).

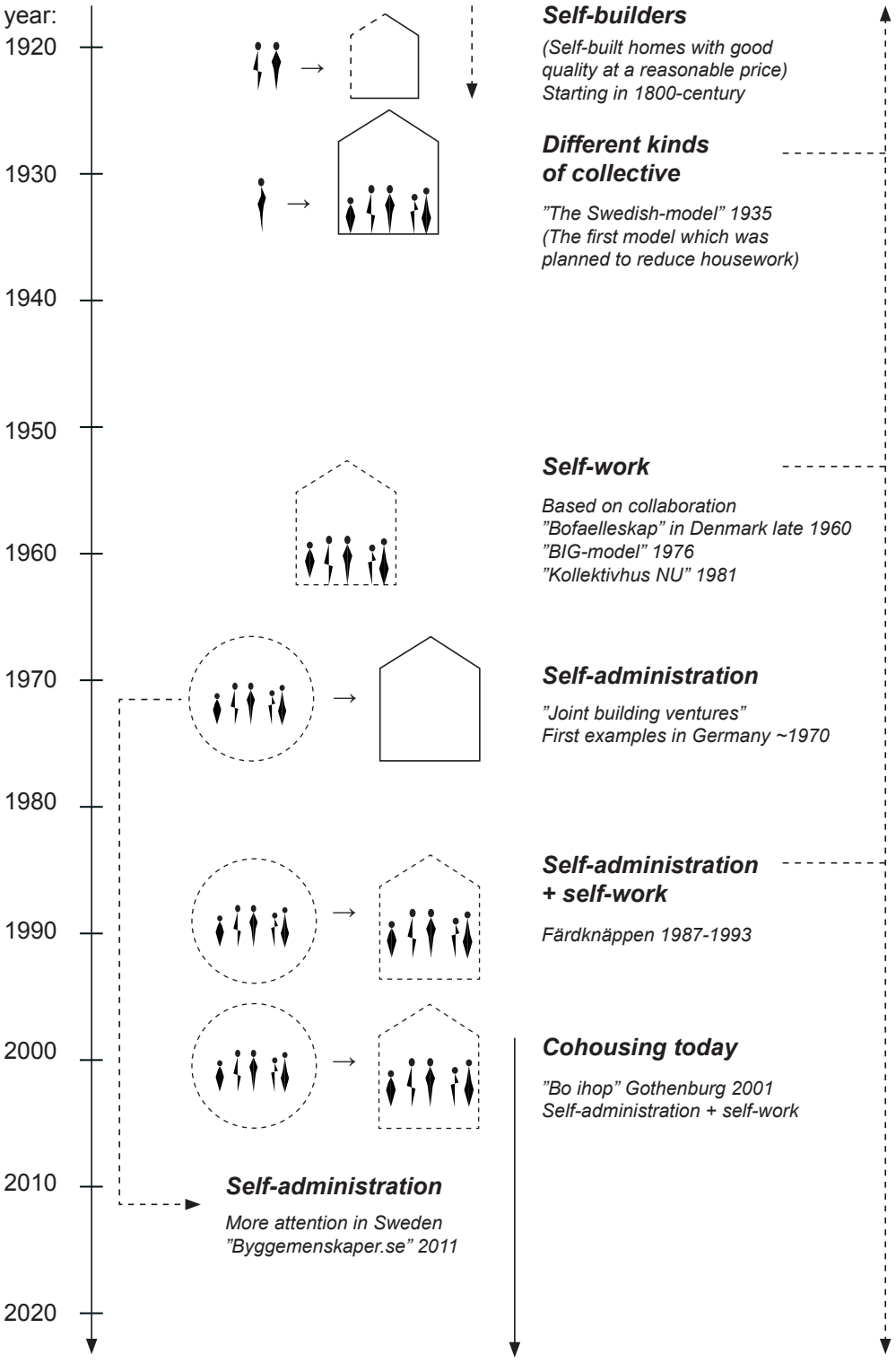
Self-builders

When looking at the resident as a co-actor, the movement of self-builders should also be mentioned. This started as a political movement aiming to encourage people to build their own private homes and at the same time improve their living conditions. It started in the late 19th century when Sweden had a large housing shortage. Many of the new homes in the cities were built by private businesses trying to maximize their own profit. Many apartments were therefore dense and crowded resulting in poor quality and dark rooms. The movement had a clear social agenda and according to Broms Wessel & Hedström (2016), it started a shift from a private housing policy to a state housing policy. This movement was called *Egnahemrörelsen* (literally *"own home movement"*) and it happened parallel to the garden city movement, with the idea that "ordinary people" should afford a house with two rooms, an own kitchen, basement and a garden at the same price as two rooms and a kitchen in the city. Two associations, *Egna Hem* and *AB Stockholms Trädgårdsstäder* were created in Sweden, with the common ambition to provide work for the unemployed (as they would participate and build themselves), at the same time as more residences, with better quality, would be created (Broms Wessel & Hedström, 2016).

Summary

The different collective houses (or cohousing) examples explained above are divided into three topics; self-work, self-administration, and self-builders. These topics describe in what way occupants mainly work as co-actors and can be seen as models established when moving forward in the thesis. This describes in what way a community is created, as a sense of community, but also in practical terms. What is validated is that when cooperation is created, as in daily chores or self-administration, the sense of community is strengthened.

Collective house and the residents as co-actors



In Sweden today

Growing interest

Since about ten years ago, interest in cohousing has increased again. In a similar way as before, personal concerns and societal trends encourage attention. Like interest in social contacts or questioning of gender roles (Seemann et al., 2019). Additionally, the request for a more environmentally friendly housing alternative is more noticeable today (Grip et al., 2019; Seemann et al., 2019; Vestbro, 2014).

"Forskargruppen Bo i Gemenskap"

The research group *Living in Community* (*Bo i Gemenskap [BIG]*) was formed in 1976 by a group of women that wanted to encourage cooperation in collective housing. They considered this fundamental to create a feeling of community, which also would create a better environment for children, better resource management, and last but not least, support an enjoyable life (Bo i Gemenskap, n.d.). The group was an important driving force when establishing the collective based on self-work around the 1980s. They initiated an instruction for this type of cohousing, specifying for instance that a number of 15 to 50 households was an optimal size. Each household should accept a size reduction of their individual apartments with 10%, which would generate space for common premises without raising rental costs (Vestbro, 2014).

"Kollektivhus NU"

The national association for collective houses in Sweden (Kollektivhus NU), aims to support various forms of community housing and thus increase the choices in the Swedish housing market. Supported by the association, a guiding program has been created as a framework when developing a collective house. In the program, it is stated that even though there are many different types of collective housing, the common kitchen and dining room is usually the core of the house and the most essential room for the social community. The community is based on activities that are carried out together, to nurture hobbies and socialize, but joint dinners are usually the most fundamental activity. Furthermore, a fundamental principle is that the size of each apartment is reduced by 10-15% (Blomberg & Persson, 2019), as introduced by the BIG-model. Personal contact with Kerstin Kärnekull who are active in the association was of great help and inspiration at an early stage in this thesis.

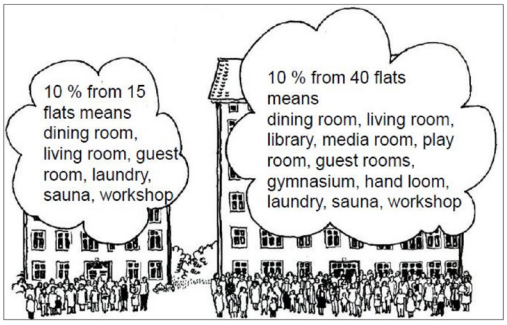


Figure 2. [The BIG-model] (Blomgren Larsson, n.d.)

"Föreningen för Byggemenskaper"

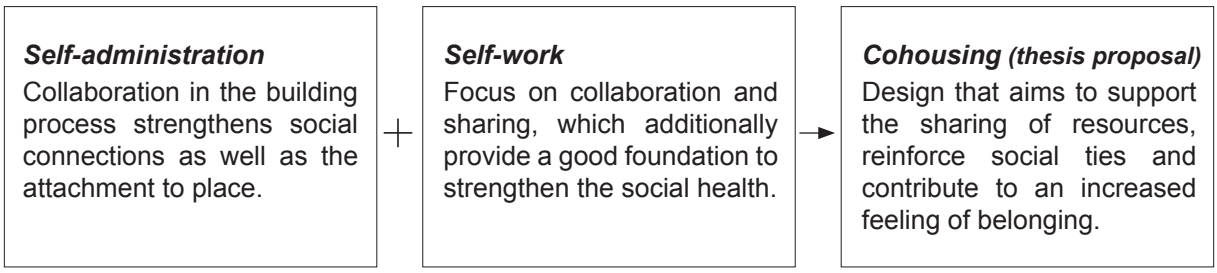
It is not very common for building communities to work as house developers in Sweden. But there is increased support to encourage this kind of self-administration today. A Swedish association was created in 2011 to support this type of independent groups. *The building community association (Föreningen för Byggemenskaper)* have the aim to contribute with knowledge, to support the formation of the communities and the implementation of the projects. Moreover, hoping to motivate the municipalities to contribute to societal development (Föreningen för byggemenskaper, 2021). Personal contact with John Helmfridsson was of help to get a broader understanding of the situation today.

"Boihop"

When concentrating on Gothenburg, the association *Boihop* (literally "*live together*") is established to support cohousing as rental apartments that many can afford. The website describes their alternative as an *"environmentally friendly and fun life in a rental apartment and in community with others"*. The members of the association partake in different information meetings and study circles when planning the house. To organize the construction, the association works in collaboration with different actors in the building process (Boihop, n.d.). In this way, the residents do not need to financially support the construction, but they still participate in the planning of the project in order to have it built with their own ambitions in mind. The occupants moving in will rent from the property owner, usually the public housing company (Boihop, 2016). Inga Alander has been kind to support with both knowledge and practical help in this thesis.

Summary

More collaboration between occupants and developers of cohousing units has been established in Sweden. This can be seen as inspiration from many directions, as the process of Färdknäppen, the movement of joint building ventures, as well as the model created by BIG. There is more support for residents to participate in the design process, which means that they can adjust both apartments and common spaces with their own ambitions. This can be seen as a model of self-work combined with self-administration and defines a good example of how the residents can be co-actors of their home environment. Further, it can be stated that the previous examples of this model, as well as the examples of joint building ventures, show a result where the residents are more connected to their own home, their neighbours, as well as the surrounding area, even before moving in.


Self-administration
Collaboration in the building process strengthens social connections as well as the attachment to place.
Self-work
Focus on collaboration and sharing, which additionally provide a good foundation to strengthen the social health.
***Cohousing** (thesis proposal)*
Design that aims to support the sharing of resources, reinforce social ties and contribute to an increased feeling of belonging.

Moving forward

Boihop

When setting the framework for this thesis, the choice was made to focus on the model used by Boihop and additionally on a site in the city of Gothenburg. The association Boihop frequently works to find a plot of land for their members and they are specifically looking for a site in the west of Gothenburg (Boihop, n.d.), but there is a lack of locations available for this type of house in central areas. Therefore, this thesis and the site presented can work as a suggestion. Moreover, it can be seen as an exploration of how well this site suits the members and their visions.

Principles from Boihop

The association Boihop expresses that it is important that the residents agree to the fact that this type of cohousing is based on a working community. That means that everyone will participate in the agreed assignments, such as the preparing of common meals, the administration of the house, as well as community and work planning meetings.

On their website, Boihop explains how they work for social, economic and ecologically sustainable housing. First of all, when all members share an interest in maintaining the community, the feeling of community will be strengthened, hence the social sustainability. Compulsory and voluntary common tasks result in everyday social contact. Sustainable development is also based on reduced private space in favour of common space, as well as cooking together, growing vegetables and sharing common premises or tools etc. This type of shared resources will reduce general consumption, which also benefits the private economy. Instead of private cars, access to carpool and shorts distance to public transport are important. Boihop also wants to contribute to ecologically sustainable construction development. With resource- and energy-efficient methods, as well as buildings with quality, renewable energy sources and efficiency in focus (Boihop, 2016).

Projects and sizes

The projects that are analysed and summarized on the following page are extracted from the program of Blomberg & Persson (2019). The apartment sizes are compared to the existing housing stock in Sweden to get a deeper understanding of the current situation and the differentiation between cohousing and regular apartments. The amount of shared space varies from around 200m^2 to as much as almost 450m^2 as seen in table 1.

PROJECT:	Regnbågen	Prästgårdshagen	Kombo	Sofielund	Tre portar	Kupan
APARTMENTS (UNITS):	20	33	43	45	52	52
SHARED AREA:	315m^2	309m^2	237m^2	418m^2	283m^2	442m^2

Table 1. Size and shared areas of examples in Sweden. Extracted from Blomberg & Persson (2019).

Housing stock in Sweden

The apartments sizes are generally smaller in Gothenburg than in Sweden overall. Further, the statistics from 2011 and up to now show that the size has decreased during the last decade. The size of the apartments of existing cohousing examples varies, but they are in general smaller than both the apartments in Sweden and Gothenburg, which can be seen in table 2.

APARTMENT SIZE	SWEDEN *average m² (SCB, 2021a)*	GOTHENBURG *average m² (SCB, 2021b)***	SWEDEN 2011*** *average m² (SCB, 2021b)*	COHOUSING**** *range m²*
1 rok*	40m²	40m²	36m²	26-47m²
2 rok	59m²	58m²	54m²	48-60m²
3 rok	78m²	77m²	77m²	61-74m²
4 rok	98m²	96m²	96m²	76-107m²
5 rok	123m²	121m²	118m²	99-109m²
6 or more rok	172m²	172m²	144m²	117-131m²

Table 2. Comparison of apartment sizes in Sweden

68 m²

Average apartment size in Sweden (SCB, 2021a)

42 m²

Average living area per person in Sweden (SCB, 2021c)

16 m²

Average living area per person for partners with three or more children in rental apartments (SCB, 2021c)

115 m²

Average living area per single women age 65+ living in their own detached house (SCB, 2021c)

Conclusion

Statistics show that there is a big difference in living space per person and how it is distributed. Especially when comparing single women older than 65 living in their own detached house and partners with three or more children in rental apartments. In a cohousing unit, where each person has access to a big amount of shared area, the inequalities will be smaller and the amount of space available are used in a more efficient way.

* *rok* = room and kitchen
The number of room(s) is counted excluding the kitchen according to Swedish standard

** *(SCB 2021b)*
Statistics were not included in the SCB database online but specifically requested by personal contact 2021-03-31

*** *New built apartments*
Apartment buildings in Sweden built after 2011

**** *Range of apartment sizes (Blomberg & Persson, 2019)*
The sizes collected from existing cohousing projects has no average size, instead, the range of sizes are documented in table 2.

THEORY PART II. *THE SUSTAINABLE COMMUNITY*

A sustainable community

Social sustainability

As stated by Tunström et al. (2015) there is no clear definition of social sustainability. It must be defined by context since it depends on both time and place. Nevertheless, considerations that often are referred to are wellbeing, feeling of community, a functioning everyday life, quality of life and balance between work and leisure. Furthermore, when talking about a residential area, the sense of feeling at home and affinity with the place ought to be provided (Tunström et al., 2015).

The community

In the field of environmental psychology, place attachment suggests that people can feel a sense of rootedness toward certain places. This can also be mentioned as a sense of place (Gillis & Gatersleben, 2015). Tunström et al. (2015) present that a community can either be linked to a place and the inhabitants of that place, or to a group or association not connected to any specific place. In both cases the feeling of sharing the same values are significant, and we often associate the feeling of community with a sense of wellbeing and security. Social sustainability in connection to a specific place can also be seen as questions of access to different services, including public places, green areas, workplaces and education (Tunström et al., 2015). When examining the relationship between cohousing and health, results show increased social support, a sense of community, reduced social isolation as well as physical, emotional and economic security (Carrere et al., 2020).

Nature connections can also help to strengthen social health, i.e. the relationship to others. According to Seymour (2016), many studies on the relationship between people and green places indicate that access to green space can strengthen social communities. This is explained further within the direction of socio-ecological sustainability in the following pages.

“As studies have shown, the presence of green space can promote social cohesion and group-based activities, aspects that are crucial for maintaining social ties, developing communities, and increasing individual’s well-being”

- (Seymour, 2016, p6)

Socio-ecological sustainability

Introduction

Tunström et al. (2015) present the direction of social ecology as a holistic approach to how ecological sustainability can be linked to social considerations. Or rather, as the other way around, on how social concerns can be combined with ecological sustainability. The focus is mainly on local urban development and involves factors as social integration, security and wellbeing. It is based on the fact that we are confronted with societal challenges due to the overuse of earth's resources, which we cannot solve with solely technology or urban planning alone.

Examples of how to promote such development are characterised as support of different activities or specific behaviours. Examples could be to create shared and non-commercial spaces, reduce environmentally harmful consumption or support a cycling culture. As well as to co-produce urban development and comprehend citizen participation through environmental pedagogy. These are all strategies that can be used when developing a cohousing unit.

Human – Nature Connection

In natural environments, human wellbeing can be strengthened. Nature plays an important role in all human life, and we could benefit from bringing this closer to our everyday life in the cities. Kellert (2008) gives real-life examples of how the built environment has affected human wellbeing. Either it is by getting the residents out into the open air or just by having a piece of nature to look at, nature can support our mental resilience (Williams, 2017). With thoughtful architectural solutions, the building can help to strengthen the connection to nature even in urban surroundings, further resulting in an increased environmental awareness as well as improved mental health and wellbeing (Wijesooriya & Brambilla, 2020).

Seymour (2016) looks at the human-nature connection and health from an interdisciplinary perspective. Stating that characteristics as biophysical, biotic, and cultural interaction are subjects concerned when relating human and ecosystem health (Seymour, 2016). The implementation of this can be with nature-based activities or design that is more in balance with nature, as portrayed by the biophilic design theory.

Biophilic design

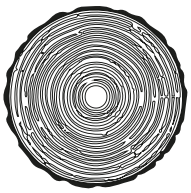
The nature connection can be strengthened and experienced through attributes of biophilic design. Kellert (2018) describes 24 attributes, organised into three basic categories. These categories are mentioned as the basic elements of biophilic

design. Those are; *the direct experience of nature, the indirect experience of nature* and *the experience of space and place* (Kellert, 2018). These elements can be considered useful in both building and environmental design. They work best as features together and Gillis & Gatersleben (2015) points out that it is, therefore, difficult to classify the effects of the different attributes one by one. Extracted from Kellert (2018), the basic elements of biophilic design follows;

1.

The direct experience of nature

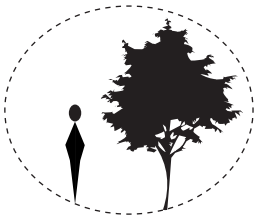
Light
Air Water Plants Animals
Weather
Natural landscapes/ecosystems
Fire



2.

The indirect experience of nature

Images of Nature
Natural materials
Natural colours
Simulating natural light and air
Naturalistic shapes and forms
Evoking nature
Information richness
Age/change/patina of time
Natural geometries
Biomimicry



3.

The experience of space and place

Prospect and refuge
Organized complexity
Mobility and wayfinding
Transitional spaces
Cultural/ecological attachment to place
Integration of parts to wholes

The three elements of biophilic design

As the direct and indirect experience of nature is limited in urban surroundings, the last element can be particularly important in this context. Included in this element are the attributes *prospect and refuge, organized complexity, mobility, transitional spaces, cultural and ecological attachment to place,* and *integration parts to create wholes* (Kellert, 2018). Common for these attributes is that the spatial setting is in focus, it considers the ecological context and also how people manage and organize their environmental circumstances (Kellert, 2018). When analysing it further, this connects in many ways to the planning of a cohousing unit.

As described in the introduction, the sense of feeling at home and affinity with the place must exist in order to achieve social sustainability. In this context, biophilic design strategies provide attributes that strive to connect residents to the natural world, but also to the social context that's involved.

Green infrastructure and ecosystem services

Urban context

Kaplan (2001) specifies in her article what role nature views play in dwellers satisfaction with their residential context. The result indicates a crucial role in participants' satisfaction with their home. As stated earlier, contact with nature and natural landscapes are limited when designing a home in an urban context. Therefore, green infrastructure should also be considered in addition to biophilic design strategies. Pérez & Perini (2018) highlights that in order to understand the importance of green infrastructure, it must be put in context to ecosystem services. In this way, it can also be analyzed what role the green infrastructure has connected to social values.

Ecosystem services

There are four main categories of ecosystem services: supporting, provisioning, regulating and cultural services (Pérez & Perini, 2018). The cultural services are the category mainly connected to social values and is described as non-material benefits that people receive through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences. Pérez & Perini (2018) further clarifies that green roofs are beneficial in relation to health and wellbeing, good social relations, and social cohesion. Likewise, green walls also have social benefits, which can be connected to carbon reduction, better urban hydrology, biodiversity, habitat creation and reduction of urban heat islands (Pérez & Perini, 2018). One of the concerns to strengthen the human-nature connection is thus to enhance these ecosystem services (Seymour, 2016).

Implementation

In the collective house Sofielund (analysed in the case study), greenery in and around the building was an important aspect in the design process. The cultivation was divided into three categories, depending on how they are used;

- For food and medicine (vegetables and herbs etc.)
- As enrichment of the area's biotope or increase of the green area factor (environments for birds, insects or fungi, etc.)
- As beauty and entertainment (flowers and greenery for enjoyment)

(Föreningen Kollektivhus i Malmö, 2010)

Pérez & Perini (2018, p277) expresses that *"reintroduction of vegetation in cities in most surfaces can be seen as a reconciliation with nature and to be close to nature".* They further conclude that green roofs can provide garden space, growing space or amenity space that provides fundamentals for a good life, security, or simply a social space that can be enjoyed by the inhabitants.

III. REFERENCE PROJECTS & SURVEY

Case study

Cohousing references

Figure 3. [Scarwafa Cohousing] (van der Kooy, n.d.)

Figure 4. [Urbana Villor] (oskarnorelius.blogspot, n.d.)

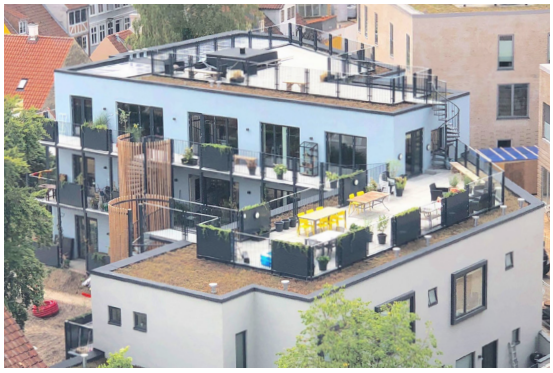


Figure 5. [Byfællesskabet] (Byfællesskabet, n.d.)

Figure 6. [Nanterre Cohousing] (Schelstraete, n.d.)

Figure 7. [R50-Cohousing] (Alberts, n.d.)

Figure 8. [Sofielunds Kollektivhus] (Lukac, n.d.)

Summary and conclusion case study

Introduction

Additional studies have been made on six cohousing projects within an urban context. The projects have been chosen due to their focus on participatory processes. The investigations focus on the program, spatial qualities and functions, as well as a potential focus on sustainability. The range of sizes makes it possible to investigate the differences in the program and relate specific qualities to the size itself. The full case study can be read in Appendix 1.

Places for community

The following list derives from analysing all projects and summarizing all spaces that were established for shared usage, but also what kind of community activities and shared resources that were described. Schematic drawings show the various location for the shared space within the buildings.

Indoor:
Kitchen
Dining room
Restaurant
Cafe
Living room
Social room
Party room
Multi-purpose room
Meeting room
Business premises
Store/shop
Music room
Movie room
Media room
Scene
Game room (table tennis and billiards etc.)
Play room/Play corner for children
Workshop (wood, DIY etc.)
Atelier
Library
Loom room
Exercise room
Gym
Sauna
Winter garden

Outdoor:
Rooftop/Shared terrace
Yard/Garden
Vegetable garden
Play area

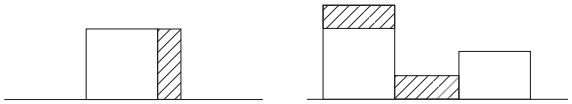
Community activities:
Cooking
Cultivation/farming
Crafts
Culture
Music
Training
Courses
Playing
Games
Boules

Shared resources:
Bicycle pool
Carpool
Guest room/apartment
Office
Meeting room
Business premises
Store
Laundry room
Drying room

Additional rooms for collective use:
Toilets
Cleaning central/room
Storage (shared storage for community use)
Generous entrance area (central “square”)
Storage (bike, garden tools, strollers, *wheelchairs* etc.)

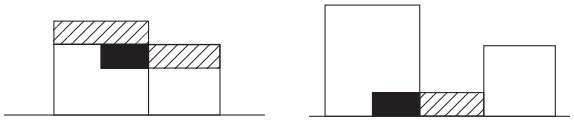
Summary

The references had a range from 3 to 45 units and it is obvious that the amount of shared area increases with the number of units. However, within the smaller units, the outdoor area plays an important role as space for the community to meet. The illustrations below show a schematic arrangement of the shared and private spaces within the cohousing units, more specifically the six examples in the case study.



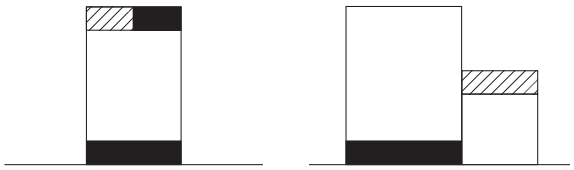
Small scale (~1-8 units)

With limited shared space, mostly outdoor on the rooftop or in between buildings, which limits the usage of common activities to season or weather.



Medium scale (~9-15 units)

With shared space indoor and outdoor. The shared spaces are mostly limited to one location. The gathered shared space results in easy access and a clear distinction between the shared and private spaces.



Large scale (~15-50 units)

Shared space indoor and outdoor in various locations. On one hand, different spaces can have different usage depending on location in the building, time or activity. On the other hand, some spaces can be less accessible and thus used in a less spontaneous way.

The usage of shared spaces

In the cohousing examples with one volume, the shared spaces are easy to access within the volume which can encourage more spontaneous meetings. The shared outdoor space is however limited to the rooftop level. In the buildings with two levels, it is easy to access shared spaces both indoor and outdoor. The examples with separate volumes have more shared outdoor space as an enclosed area between the buildings. However, two separate volumes can result in less access to shared areas indoor, when occupants have to go out to access the other building.

SCHEMATIC ARRANGEMENT

Private space - apartments *Shared space - indoor* *Shared space - outdoor*

SURVEY

Co-actors

The survey

Further contact was made with the association, and a survey was sent to their members. The reason for the survey was to give a deeper understanding of how the interest in cohousing in Gothenburg looks like. More precisely, the aim is to ask the members about their personal thoughts, not only in regards to the choice of location but also as overall visions. This describes how members wish their cohousing unit to be, even if it is only in a general sense. An overall conclusion of the survey is presented on the following pages. The full survey can be read in Appendix 2.

The survey was divided into five sections;

1. General information

Focus on the personal information, family situation and desired apartment size.

2. The home as a cohousing unit

This section concentrates on the reason why members have an interest in collective living and what type of house they are looking for (such as specific categories or age)

3. Sustainability

To get an overview if any of the three pillars of sustainability is extra important to the members, as well as their expectations on their future home.

4. Choice of site

Describes the theoretical site chosen for this master´s thesis, and questions in what way the site correspond to the members own wishes.

5. Shared rooms, outside areas, and resources

The respondents choose between different rooms that they wish to share with future neighbours.

The process of the survey

It was sent to the group of members through email (44 members) and posted in a private group on Facebook called Föreningen Boihop Göteborg (253 members). The group on Facebook is for Boihop members but also for people with a general interest in the association.

A total of 19 people answered the survey. There was an interest among 12 people to live in a cohousing unit planned for a mix of ages at the proposed location in Majorna, which will be included in further studies. Ultimately, the survey is used as a base and framework for the program of the building and the design proposal. However, further contact with the members was not possible in this thesis due to the time limit.

Summary Survey

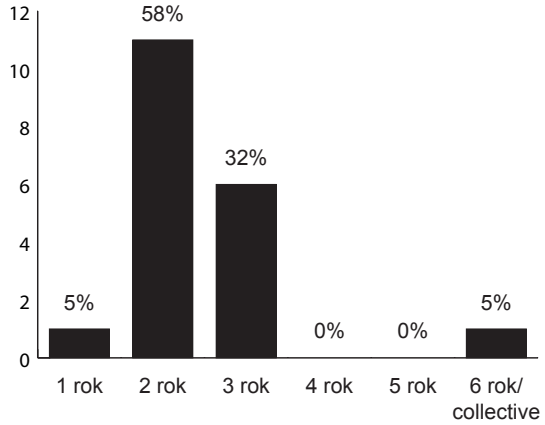


Figure 9. Apartment sizes

1. General information

The people answering were of age 49 or older. Twelve people consisted of single households and six was a family or group of two people. One person wanted to share a big apartment with more people, depending on other circumstances.

As a result, the apartment size requested was mostly 2-3 room apartments. The majority wanted an apartment with two rooms and a kitchen, and almost one third wanted an apartment with three rooms and a kitchen.

All respondents except one were okay with the fact that this type of accommodation would result in less private apartment space.

”There is an inbuilt interest in others that we share certain things, that there is always someone to talk to, the feeling that people care”

- (Respondent 18, age 59)

2. The home as a cohousing unit

The most common answer to why the members have an interest in cohousing was of different social factors. To be a part of a community, reduce loneliness and be able to do daily activities with others. It was also important to be in a community where you can help each other in a way that reduces the daily work and costs of each household. The ecological factor was also mentioned, to be able to share things and spaces. Lastly, two persons pointed out that it was also as important to be able to have your own private space.

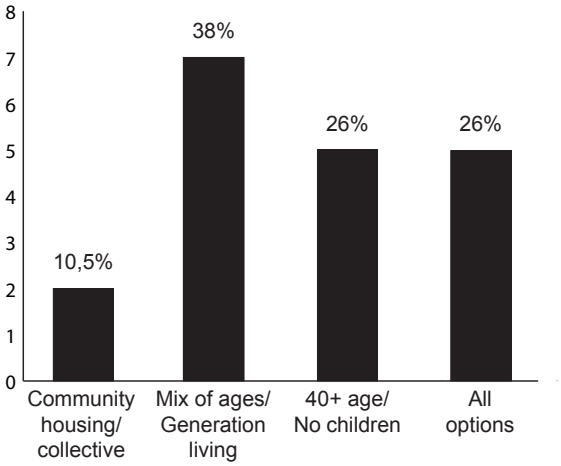


Figure 10. Cohousing categories

Most people expressed that they wanted to live in a house with a mix of ages or generations. Five people wanted to live in a collective house planned for seniors without children living at home. Five answered that all different options were interesting. Two people answered that they were looking for a community house or collective house with no special category.

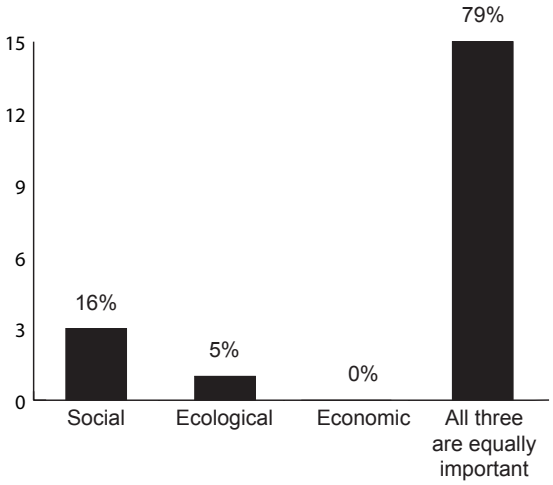


Figure 11. Most considered aspect of sustainability

3. Sustainability

All the respondents answered that sustainability was an important factor for them and that they expect that this kind of living will support a more sustainable lifestyle.

When selecting which of the three aspects of sustainability is most important to consider in their future choice of cohousing home, three respondents answered the social aspect, one ecological, and fifteen that all three are equally important.

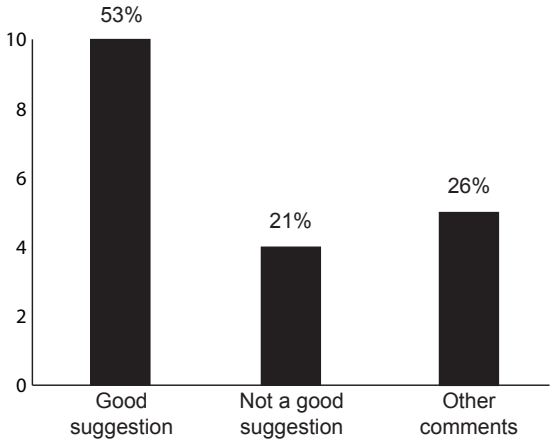


Figure 12. Comments on the site in Majorna

4. Choice of site

The majority answered that the suggested site suited their wishes well.

Four people expressed that the site was not exactly what they would wish for, which of two wanted a less central site, one a more central, and one more nearby nature.

The rest did not add any comment on the site but explained that important parameters for them were access to green areas, as well good access to service and public transport.

5. Shared rooms, outside areas, resources & activities

The respondents chose from a list of suggested shared rooms (for socialisation) and outside areas. To limit the answers to the most important ones, they were asked to choose five options. It was also possible to add your own suggestions.

In the same way, a list of shared resources or shared activities was presented. Figure 13 and 14 present the options that were chosen more than 5 times, that is, the suggestions that most people want to share with their neighbours in a cohousing unit.

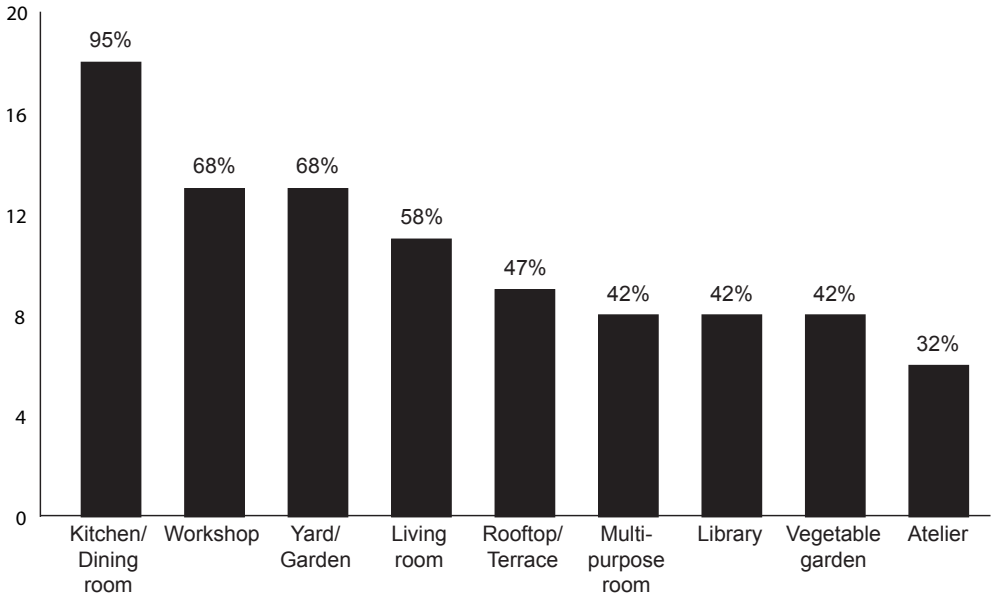


Figure 13. Shared rooms and outside areas

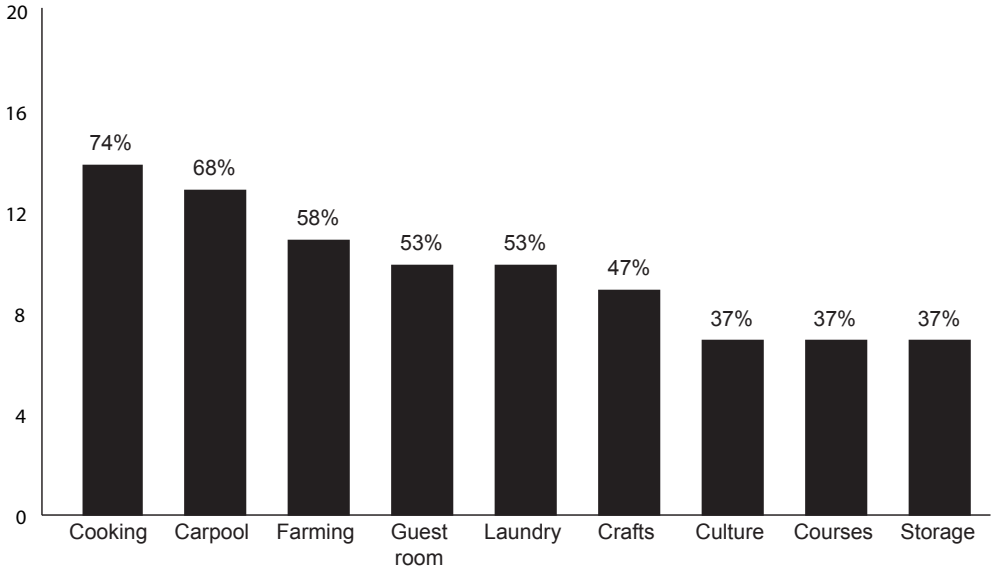


Figure 14. Shared facilities and activities

To be involved in a context

Ultimately, when analysing all the answers, it is clear that one main aspect of the respondents' interest in cohousing is to be involved in a context. This is what many believe can contribute to a more social, ecological and economic sustainable lifestyle.

IV. URBAN CONTEXT

SITE

Figure 15. [Satellite map with site location] (hitta.se, n.d.)


HISINGEN
GÖTA ÄLV
OSCARSLEDEN
STIGBERGET
MAJORNA
SLOTTSKOGEN
0 50 250m
1:10 000

Majorna 201:1

The site is located at Kommendörsgatan in Majorna, Gothenburg, next to Musikens hus and existing apartment blocks. On the north side, the area is bordered by the road Oscarsleden and the river Göta Älv, with the adjacent harbour areas. The property Majorna 201:1 has a total area of 2 489 square meters and it includes both Musikens hus and the parking lots surrounding it. The distance to Gothenburg Central station is around 3,5 km. In the south, within one-kilometre reach, the city park Slottskogen is located.

HISTORICAL CONTEXT

History Majorna & Stigberget

The area around Majorna and Stigberget has a strong connection to the shipping and shipbuilding history that took place around the harbour area of Gothenburg. Many preserved buildings have a historical value that is explained in the conservation program made by Stadsmuseet in 1999. Starting around 1660, residential houses for seafarers was built around the shipyard's facilities. The buildings, made of logs in one to two storeys, expanded along Pölgatan and Allmänna vägen that was the main road (Stadsmuseet, 1999). Some of the old log houses are still preserved along Pölgatan, surrounded by greenery in the garden Söderlingska Trädgården.

Governors' houses and wooden buildings

At the end of the 19th century, the road Karl Johansgatan was created and some old houses were demolished and new houses called Landshövdingehus (Governor's house) was added. The characteristic house combines stone or brick on the first floor with the upper floor in wood due to fire regulations. The appearance and details vary depending on which decade it is built. The wooden facade is either made with cover strip panels or smooth panels. Houses from the 1920s have a classicist style, with decor and motifs, while younger houses usually lack decor and are often characterized by functionalism (Stadsmuseet, 1999).

Majorna's Elementary School for Girls

The building that today is called *Musikens hus* (Literally *The music's house*) is a former elementary school for girls that was built in 1888 (Stadsmuseet, 1999). The building has its front facade towards Djurgårdgatan and the former schoolyard was located towards Kommendörsgatan in the southwest. The building is considered to be well-preserved both exterior and interior, except changes made on the roof when extending the top floor (Stadsmuseet, 1999). The facade is made of patterned masonry in red brick with a rich decoration. The connection to Musikens hus will be important when designing the building on this site.

Surrounding buildings

The blocks surrounding the site have mixed building heights, from one to eight storeys high. There is also a wide variation within each block. However, many of the older buildings in the surrounding area are Governor's houses, with a plinth of stone, brick or concrete and upper floors in wood. Many blocks have the same eaves height, while the plinth height varies to meet differences in the street level. The first floor is elevated up from the street, to avoid passengers looking in. The buildings at Allmänna Vägen are of a smaller scale, while the highest buildings are located on north side of Karl Johansgatan.

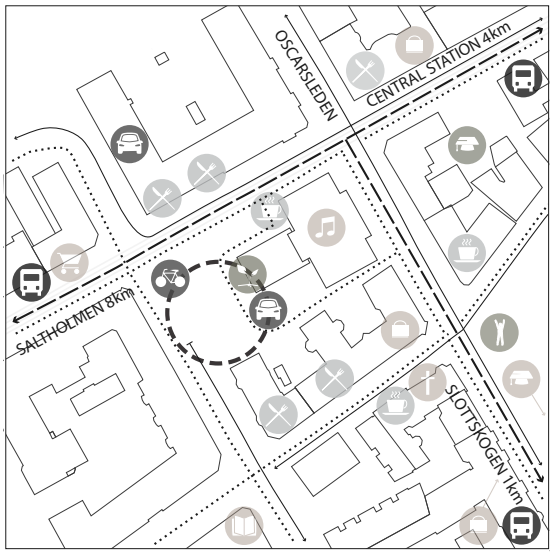
SITE ANALYSIS

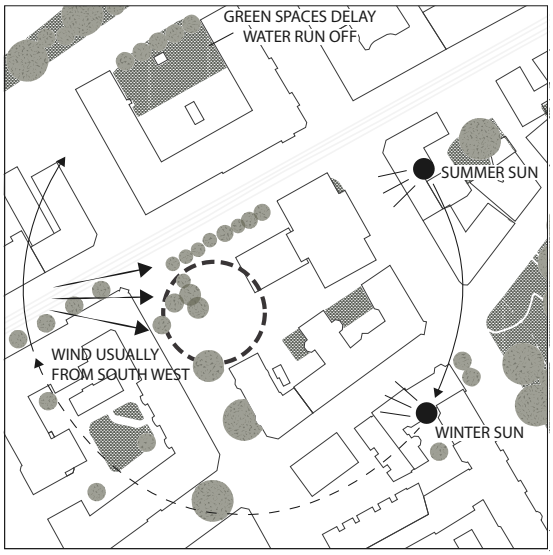
Service & Movement

Access to food, cafés, restaurants, and culture are in the immediate area. A public play area is located in the park 200m away. There is a bike pool (Styr och Ställ) adjacent to the site and car rental in the next block. The site is easy to access by bike or walking, but also by car or with public transport. The tram stop Kaptensgatan is only a 200-meter walk and to Stigbergstorget it is 250 meter. There is also a bus stop at Djurgårdsskolan at a 250-meter distance. On the southwest side, there is no car traffic passing due to the dead-end street.

Micro-climate & Greenery

The proposal will be located in the northwest part of the block, which results in less sun in the morning and more in the evening towards the street-side of the building. The trees in the north and the building parallel to Kommendörsgatan may protect from westerly winds. There is not much greenery in the existing neighbourhood, however, there are a few trees located in connection to the roads. The trees in the north are framing the site and the area around Musikens hus. Overall, there is a lot of hard surfaces and asphalt.





Food *Service/culture* *Walk/bike* *Tram/bus*

Transport *Activities/farming* *Car* *Tram/bus stop*

Summary of site conditions

As an infill project in the urban context, the location is well suited for a small-scale cohousing unit. The site offers good public transport, work opportunities, access to education, restaurants, culture, city parks and other meeting places. The car parking will be relocated or preferably updated to a car pool when designing the proposal. In the same way, the trees on the north side need to be respected or relocated.

Site

Location

The location where the building is to be placed will be next to the existing neighbourhood, where the facade ends, kind of abrupt, with a closed and painted facade. The building will work as an extension of the block, in the same direction as the houses on the opposite side of the road.

Surrounding

The surrounding area consists of mixed building typologies and a mix of old and new buildings. Many buildings have a historical value that needs to be observed when developing new buildings (Stadsmuseet, 1999). The meeting between the old and new is often subtle and the new buildings adapt to the context in shape and size.

Facades

Older buildings

Many of the older buildings have a symmetrical or repetitive appearance. The first floors are usually more ornated and the top floor has a simpler appearance. The windows have the same distance and size, which came from the principle of building rationally.

Newer buildings

The size and location of windows and balconies vary more compared to the older buildings. The facades towards the street have both balconies and bay windows. The first floor is usually distinguished from the upper floors, like in the old Governor's houses.

V. DESIGN PROCESS

FROM RESEARCH TO DESIGN

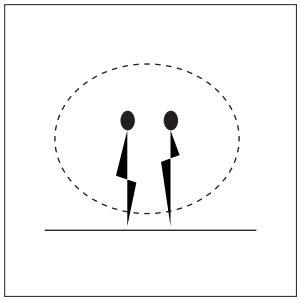
Framework

Principles from cohousing and community research

The model described as a mix of self-administration and self-work are used as a framework for the thesis. In the self-work model, a dominant focus is to support social interaction between the occupants by designing for social activities (as cooking, workshops etc.) and socio-ecological activities (as farming or recreation). These spaces, including the outdoor space, should also be easy to access. Social interaction can also be supported when creating visual contact between shared rooms, by using glass and sightlines. The common areas should also be designed in a flexible way so that they can be used for different activities at different times.

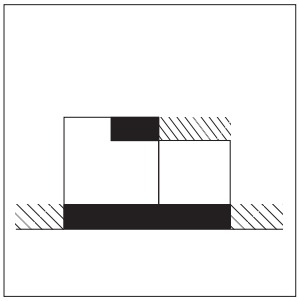
What's important is also to find a balance between the shared and the private space. This is done with clear boundaries and by analysing in what way spaces are influenced by different locations in the building. It includes both the arrangement of apartments but also within the unit as a whole. Some shared spaces in the cohousing unit can be in connection to the public street and experienced as more public. But there is also a need for a more isolated space for the occupants which will be located more integrated into the building. The apartments will be the most private space, but still with close access to the shared spaces. This creates layers of private, shared and public space.

COOPERATION



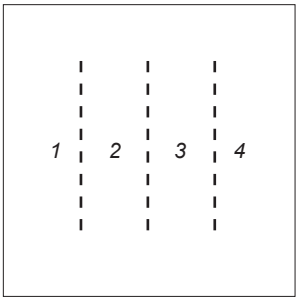
Cooperation both as self-work self-administration to strengthening social ties. The shared space has to be easy to access and located in connection to communication areas.

SHARED SPACE



Locate the different shared areas in connection different outdoor space to promote socio-ecological activities and strengthen the connection to the site and the surrounding.

PRIVATE VS SHARED



Find a balance between shared and private. Sight lines and clear boundaries are important design strategies

The design process divided into three scales

1. Large Scale: Local context

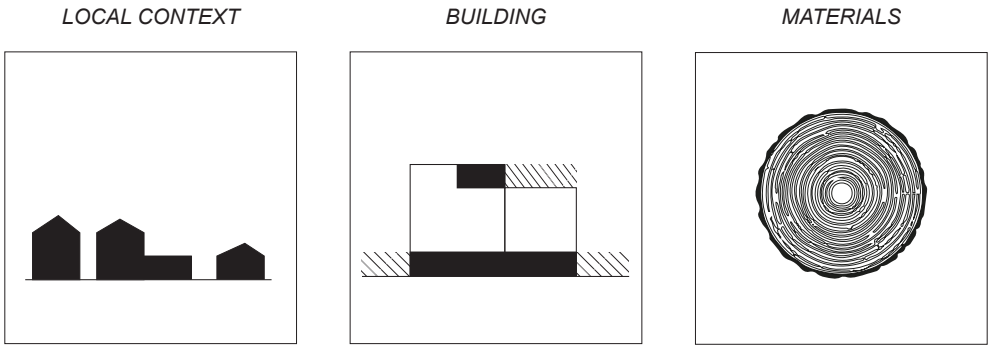
The cultural and ecological attachment to place is important when deciding the placement and framework of the building. How it adapts to local weather, the movement and accessibility of the surrounding, as well as historical and cultural values of the site. Biophilic attributes connected to this are: *Light, Weather, Natural ecosystems as well as Cultural and ecological attachment to place*

2. Medium Scale: Building

Within the cohousing unit, the principles from cohousing and community research are in focus. In addition, the social community can be strengthened in natural environments and natural activities, hence greenery and outdoor space are important parameters. Biophilic attributes connected to the building scale are: *Prospect and refuge, Organized complexity, Mobility and wayfinding, and Transitional spaces*

3. Small Scale: Materials

This includes both the direct visual connections to nature, but also the indirect. At this level, the materials, details, colours and textures are in focus. The connection to the surrounding as well as the biophilic design strategies is central. The attributes are: *Natural materials, Information richness, Natural colours and Patina* of time



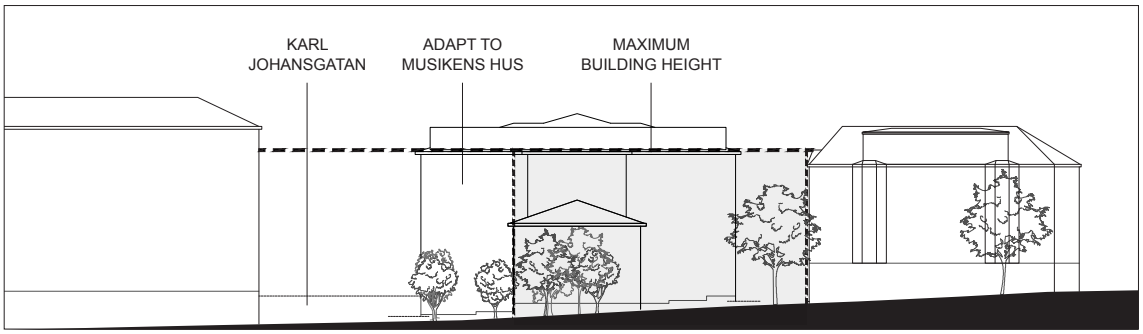
LOCAL CONTEXT

1. Light
2. Weather
3. Natural ecosystems
4. Attachment to place

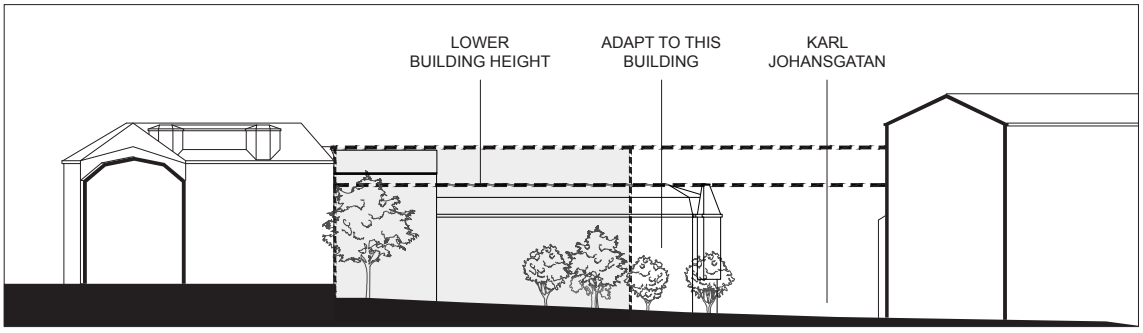
LOCAL CONTEXT

Heights

The examples below show two sections on the site seen from west and east. The conclusion was made to limit the height to five storeys, and in that way adapt to the eave height of Musikens hus. Later, the choice was made to further adapt the heights and partly lower sections of the building. In the same way as the buildings on the opposite side of the street, the heights will follow the slope and become lower towards Karl Johansgatan. The extension of the building follows the line where the lowest part of Musikens hus ends. This choice is explained further on the next side.



Landscape section seen from west



Landscape section seen from east

Volume studies

Different volume studies were made both digitally and on a physical site model. They were explored by how they adapt to the street and the surrounding area. The size of the volume will set the framework of the scale of the building. The choice was made to continue with volume number 2 (see page 50). In this way, a rectangular plaza is created in front of the building. A clear boundary towards Musikens hus will also create a more enclosed yard. Some trees will have to be removed, but the alley of trees next to Karl Johansgatan is saved.

Adapt to the surrounding

Volume studies

Volume 1-3

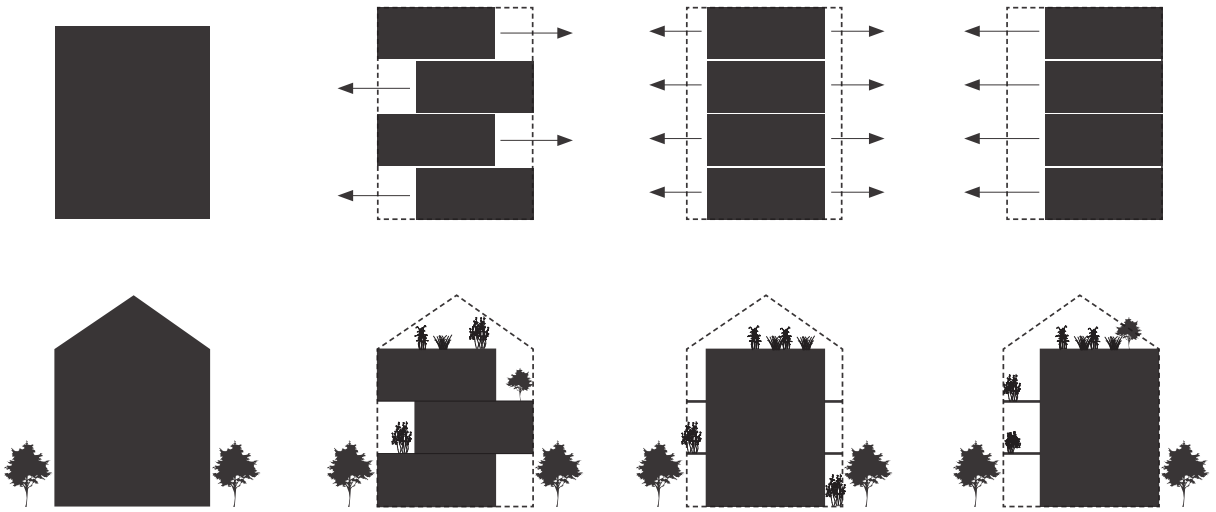
The first volume adapts to the trees on the site. There is still much outdoor space left empty but no clear boundaries when it comes to enclosed outdoor spaces. The second volume extends to the same position as the lower part of Musikens hus and adapts to the tree alley parallel to Karl Johansgatan. The third volume extends all the way to the street, which results in that the alley of trees are partly lost and fewer trees are saved overall.

Volume 4-6

The same volumes were turned as a test to connect to the existing block. This opens up to create a plaza next to Musikens hus and creates a closed yard in connection to the existing yard. The choice was made to not consider this option since it takes away the private yard for the existing apartments. It also results in more shadow on both the existing yard and the apartment building.

Sketches and reflections

Building concept



1. No outdoor space

No balconies or terraces can result in less access to outdoor space and less space for greenery. This will reduce the contact with the surrounding area, as well as less experience of local weather and ecosystems.

2. Various locations

Outdoor space located in various locations of the building. Each space can be useful in different ways and accessed from different parts of the building, but this example generates a more complex construction which is not advantageous for a cohousing unit.

3. Two or more sides

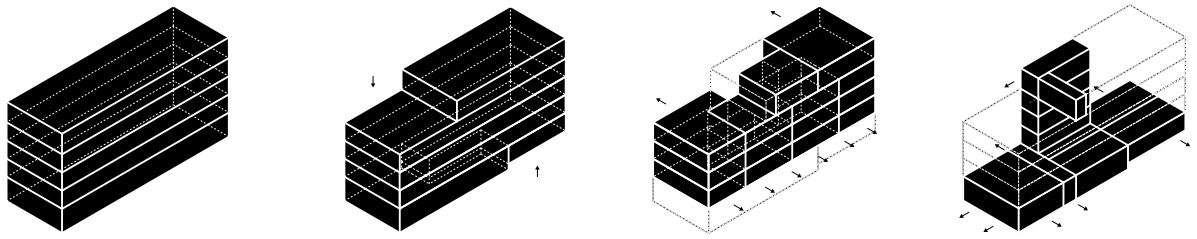
Outdoor space located on two or more sides. In this example, the size of each side becomes smaller. This can be a space with positive effects on the access to the outside, but a less useful place to stay since it is too narrow.

4. One side

Outdoor space on one side. In this proposal, the outdoor space is located in the southwest where a bigger space is created with space for both greenery and some furniture. This is also positive in regards to light, as big windows can be placed on the northeast facade.

Result in volume

The choice was made to continue with the last alternative where most of the outdoor space is focused to one side, in this case, the southwest. In this way, the private balconies get access to most sun and at the same time help to shadow the hot summer sun. The shared spaces are located on the entrance floor with connection to the surrounding in different directions.



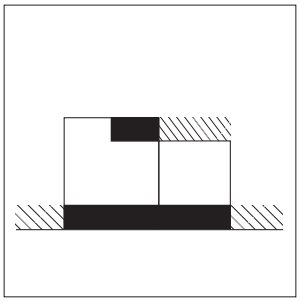
First volume

Adapted volume

Private apartment space

Shared space (within the building)

BUILDING



1. Prospect and refuge
2. Organized complexity
3. Mobility and wayfinding
4. Transitional spaces

BUILDING

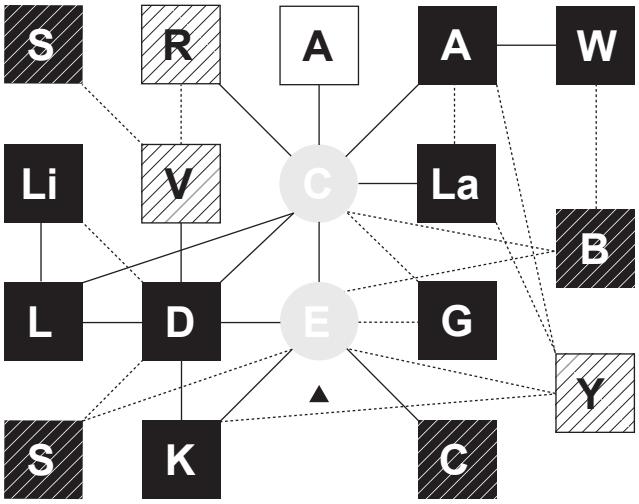
Program

Program from survey

K	*Kitchen*	A	*Ateliér*	R	*Rooftop/Terrace*
D	*Dining room*	G	*Guest room/apartment*	V	*Vegetable garden*
W	*Workshop*	La	*Laundry/Drying room*	Y	*Yard/Garden*
L	*Living room*	S	*Storage*		
M	*Multipurpose room*	B	*Bicycle storage*	C	*Central communication Staircase/Elevator*
Li	*Library*	C	*Car pool*	E	*Entrance*

Space syntax

The communication area leading from the entrance of the building to the apartments becomes an extra important area for the cohousing building. This works as the core of the building and the link between all the shared spaces.



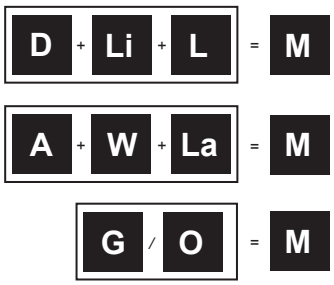
SCHEMATIC ARRANGEMENT

Private space (apartments) | *Shared space (indoor)* | *Shared facilities (indoor/outdoor)* | *Shared space (outdoor)*

Shared space

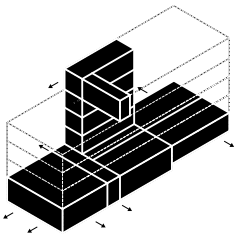
Multipurpose rooms

To program the shared areas with more activities, one strategy is to create rooms with more than one purpose. The second strategy is to place rooms with similar activities next to each other with big openings and visual contact. In that way, spontaneous contact can be achieved. These areas can also be more flexible and used for more activities during more hours of the day, as a multipurpose room.

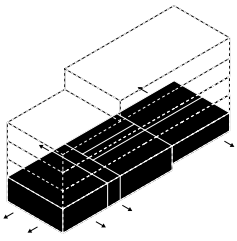


Building arrangement

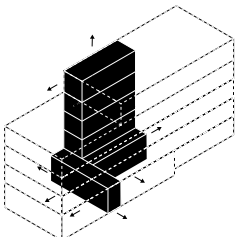
To achieve good access within the shared spaces, they are mainly gathered in one location, which is the entrance floor. It is easy to access from the street and gives possibilities for different outdoor locations. The staircase is an important place for daily communication and is therefore located next to the facade to get access to daylight, however, it is directed to the northeast so that the apartments can have the most sunlight. On the top floor, the shared terrace is easy to access from the communication.



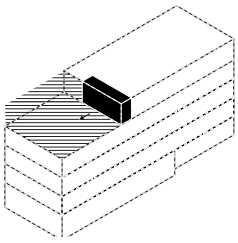
All shared spaces



Entrance floor



Communication

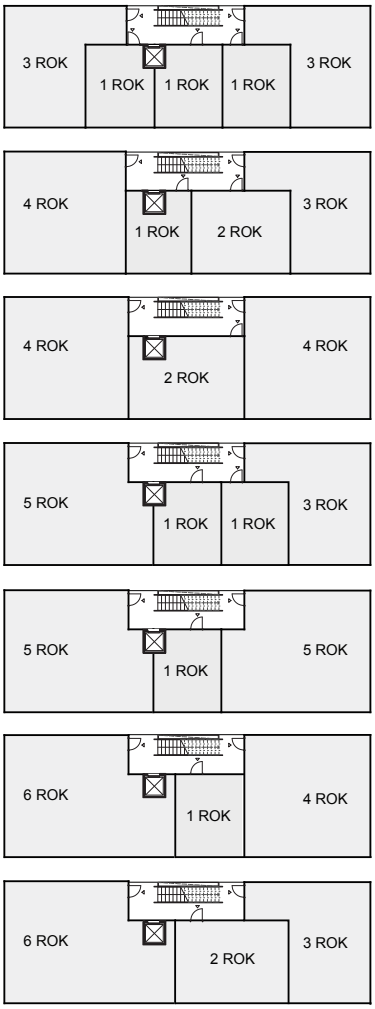


Top floor/roof top

Apartment space

Rational floor plan

Testing alternative floor plans within a rational system. The staircase solution proposed can have access to up to 5 apartments from each level. In this way, the floor plan can adapt to changing needs that may occur during the design process of the building. The rational system of the upper floors can be built with a CLT construction.



Apartment size

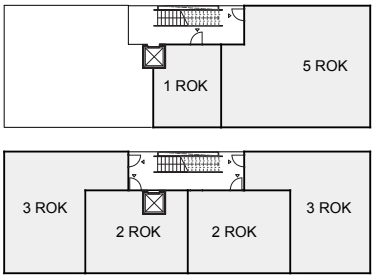
Each apartment is reduced in size by 10% compared to the average square meter of new-built apartments in Sweden. Compared with the average size of all apartments in Sweden, the size is reduced by almost 15%. The result, shown in table 3, has been calculated with the statistics showed earlier in Table 2.

APARTMENTS	Apartment size (reduced 10%)	Distribution (program)
1 rok*	30m^2	1 x 30m^2
2 rok	48m^2	6 x 48m^2
3 rok	70m^2	6 x 70m^2
4 rok	86m^2	0
5 rok	104m^2	1 x 104m^2
6 or more rok	130m^2	0

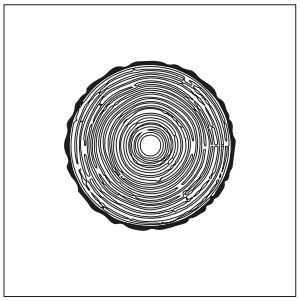
Table 3. Size and distribution of the apartments

Distribution

The apartments included in the proposal consists of mostly apartments with 2 or 3 room and kitchen, which is a result from the information collected in the survey. A standard floor plan consists of four apartments. On the top floor, one big and one small apartment are located. In total, 14 apartments are included in the program, distributed according to table 3.



MATERIALS



1. Natural materials
2. Information richness
3. Natural colours
4. Patina of time

MATERIALS

Details and materials

Pictures from the surrounding area

Details

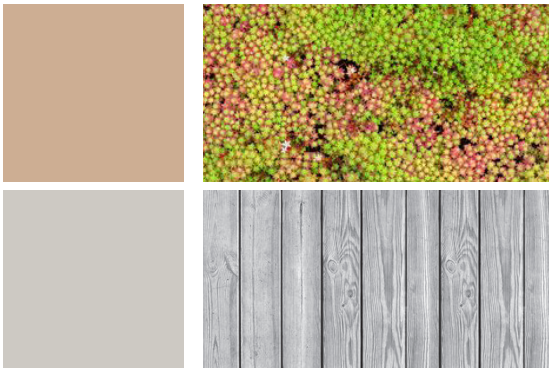
Details and expression from the surrounding area inspire the design process. The Governor's house is an important inspiration, as well as the details of Musikens hus. Different depths in the facade create shadows and frames the windows.

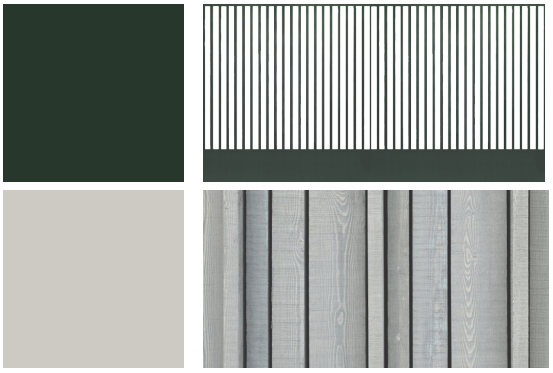
Materials and colours

The use of materials and colours are inspired by the surrounding context. The first floor is made of brick and the upper floors in wood to connect to the historical context. The plinth in concrete meets the differences in street level.

Proposal

Details, colours and materials used





Facade details

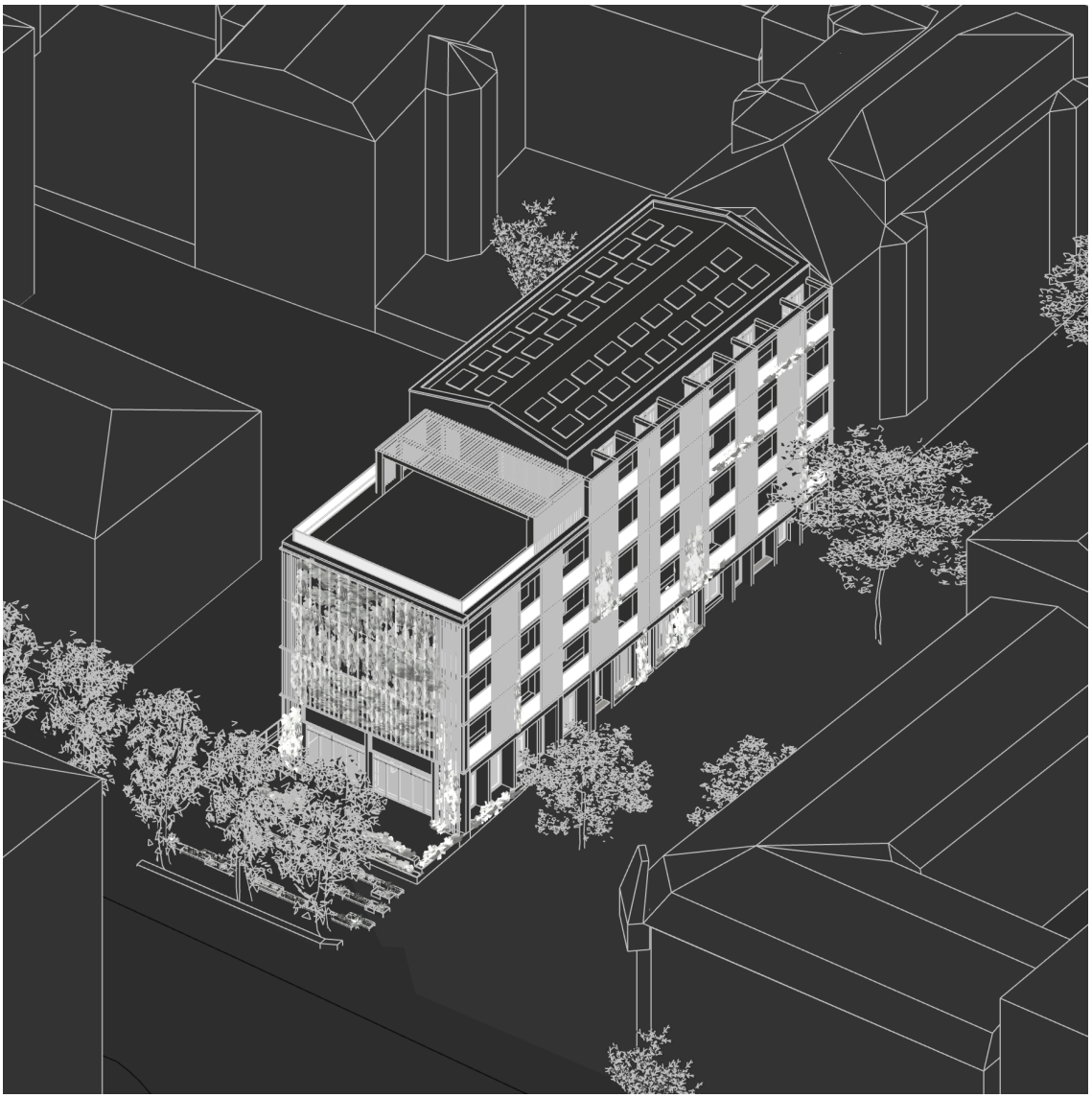
Brick with pattern masonry in colours that go from light grey to dark and almost black. The second and upper levels have a wooden facade, with more variation on the lower floors and less on the top floor. This also creates differences in shadows and information, where the most information is closer to the street level.

Colours and materials

Natural textures with variation in grey nuances and dark green as complement colour. The greenery on the facade will create an additional layer of green colours and strengthen the nature connection. The wood has visible grains and a natural finish, which will change with time and create a patina over years.

VI. DESIGN PROPOSAL

COHOUSING PROPOSAL



Rooms

1. *Entrance square/communication area*
2. *Cleaning storage*
3. *Dining room*
4. *Library*
   (alternative: children room and game room)
5. *Kitchen*
6. *Exchange room*
   (alternative: exhibition room or office)
7. *Storage*
   (alternative: storage for furnitures to dining room)
8. *WC/shower (with children changing table)*
9. *Office/Guest room*
10. *Atelier/Laundry*
11. *Workshop (with dog shower)*
12. *Waste*
13. *Bike storage (additional storage for wheelchairs)*

0 1 10m 1:300

Design result

Introduction

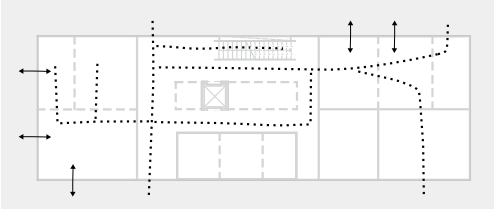
The house extends along Kommendörsgatan and ends with a terrace towards the vegetable garden. The yard is connected to the area around Musikens hus. The different layers of public, shared and private space will be described step by step in the following pages.

Four layers of public vs private

1. The surrounding area

- The public street
- Carpool
- Bicycle pool
- The yard
- Vegetable garden

To support movement on the site and access to the house, there is one entrance on both sides of the building. There is also further access to outdoor space from the different shared areas on the entrance floor.

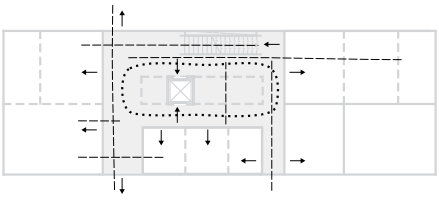


The yard and the vegetable garden are located in a partly enclosed area, but still accessible for the public. However, the terrace is made more private when located at a higher level than the street.

2. Communication areas

- Entrance square (1) including:
- Seating
- Information wall
- Postboxes
- Staircase
- Elevator
- Cleaning storage (2)

The communication area in the middle of the building has a circular movement and visual contact between the different shared rooms. The entrance towards Musikens hus can be used to directly access the staircase without passing the dining room to support personal integrity.

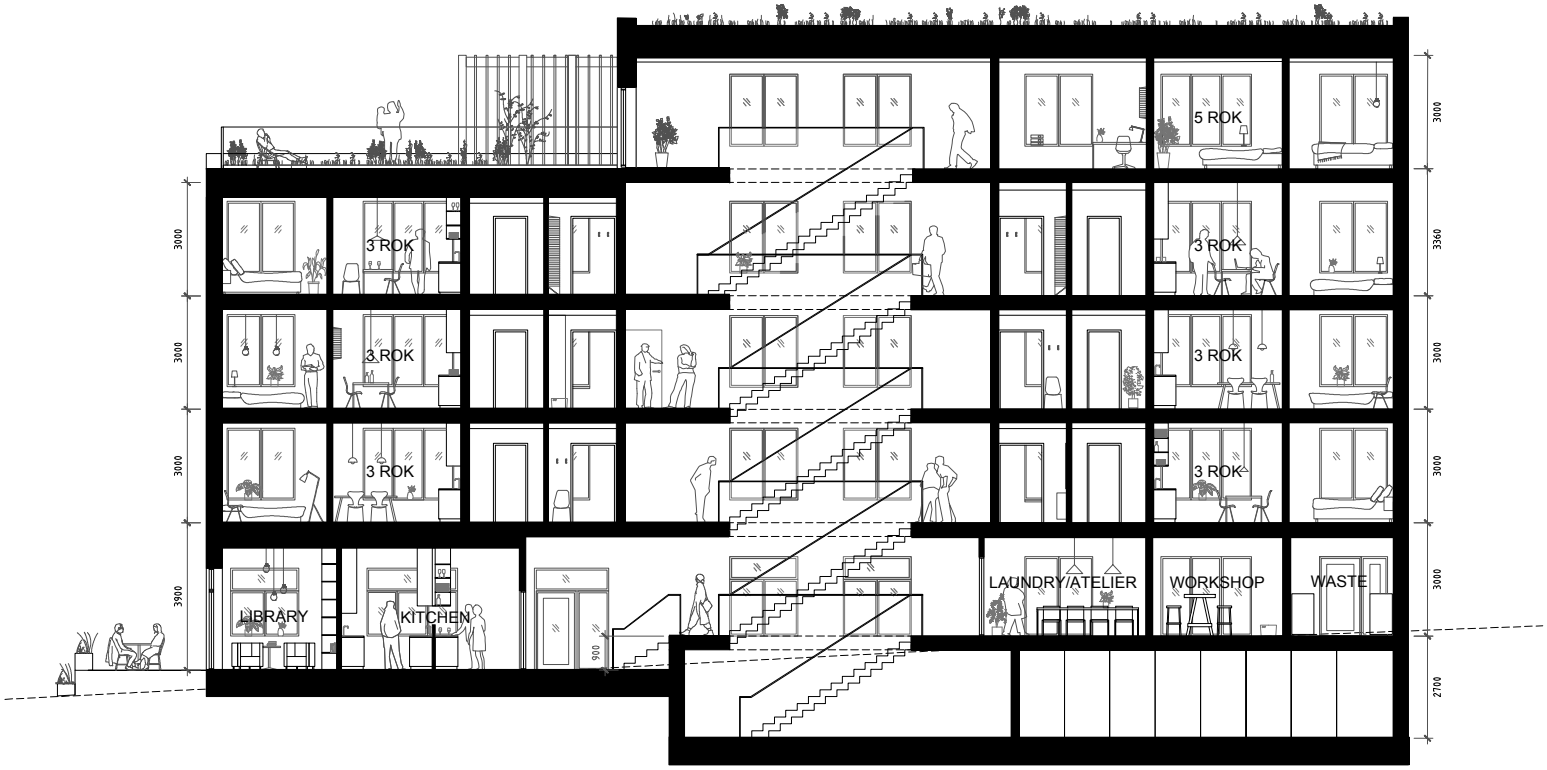


Main movement

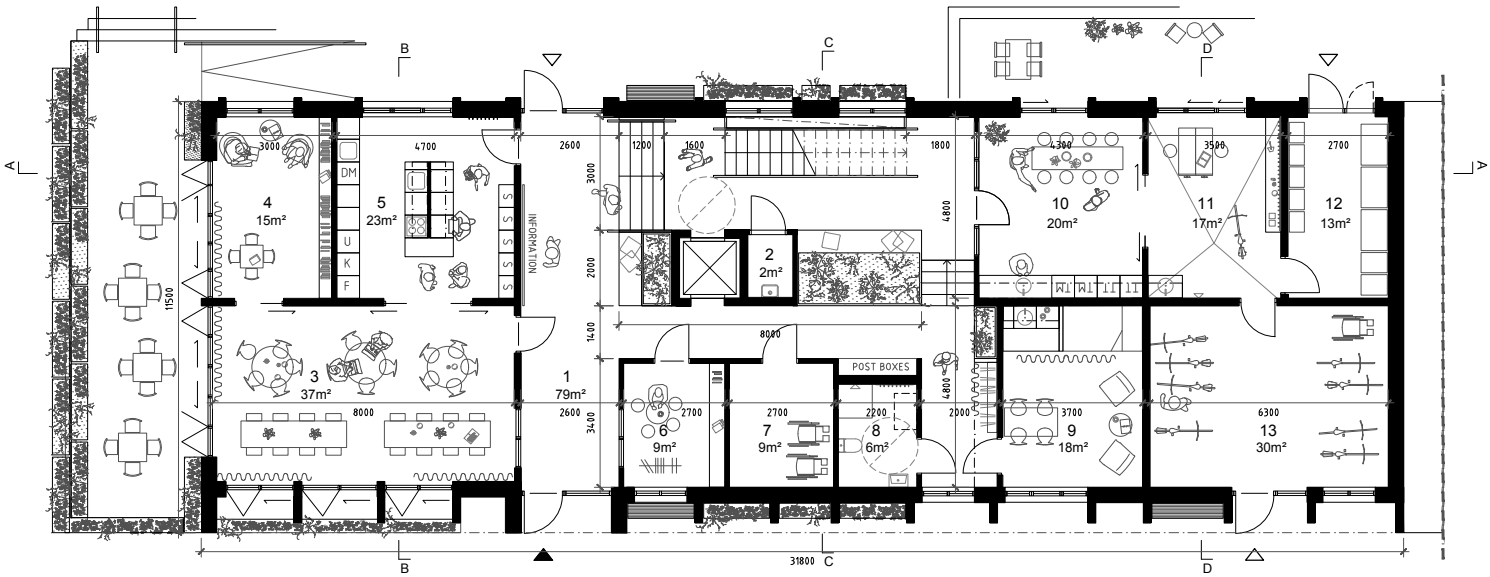
Connection between rooms/outdoor area

Sightlines

Section A-A



Entrance floor



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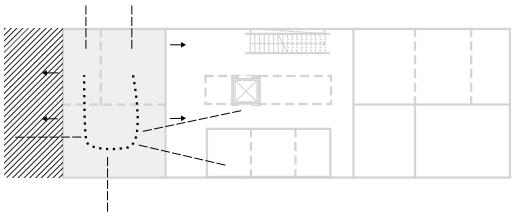
3A. Shared space for socializing and leisure

- Dining room (3)
- Library (4)
- Kitchen (5)

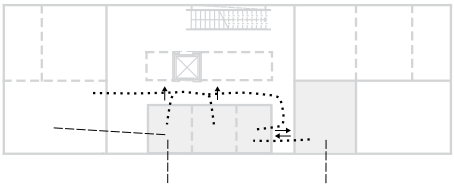
On the entrance floor, in contact with the public street, the dining room, kitchen and library are located. The close connection to the entrance of the building creates daily contact with passengers. The ceiling height is higher. Views and outdoor space towards the northwest and the evening sun. The library can also be used as a play area for children, where the parents can have visual contact from the dining room.



3C. Shared space and facilities

- Exchange room (6)
- Storage (7)
- WC/shower (8)
- Office/Guest room (9)

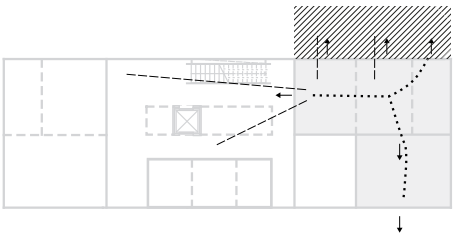
A storage room for wheelchairs or strollers and a shared toilet are located in close connection to the entrance and the dining room. The guest room, or office, are located with a close connection to the shared toilet. One additional room to support the shared resources is located next to the entrance. This is a room for exchanging old stuff, doing small exhibitions or it can also be used as a small office.

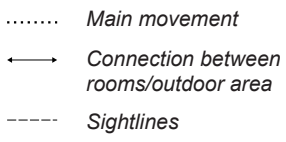


3B. Shared space for chores and interests

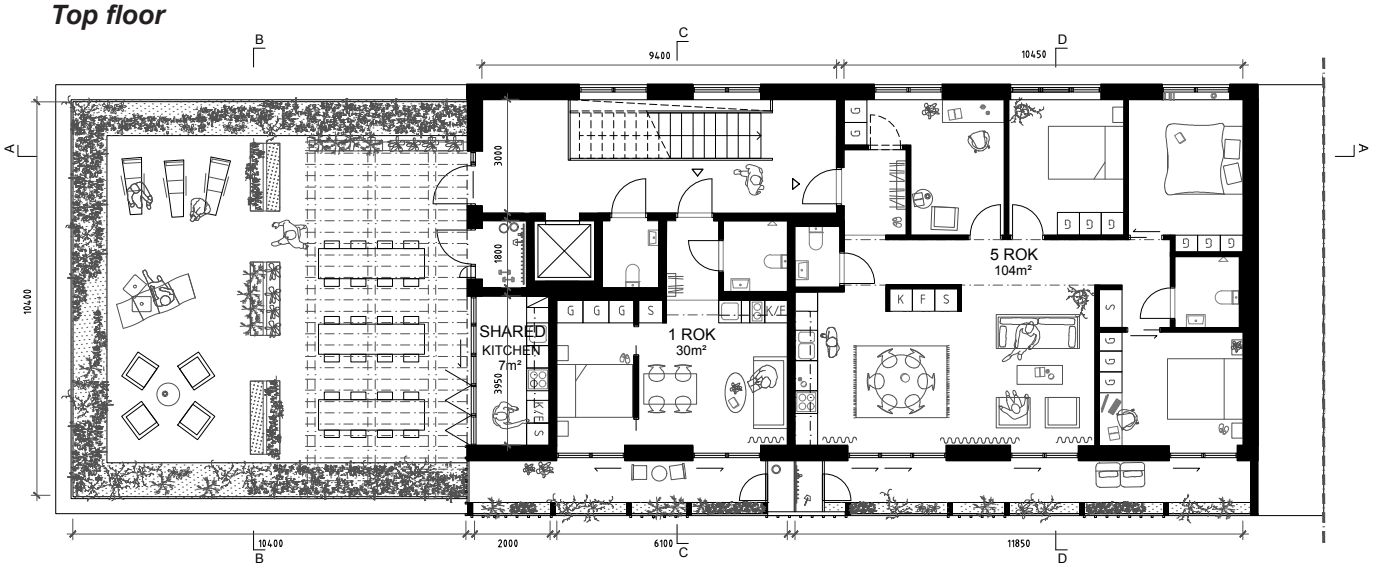
- Atelier/Laundry (10)
- Workshop (11)
- Waste (12)
- Bike storage (13)

Located at the entrance floor, but directed towards the more private side of the building, still with a close connection to the central staircase and direct access to the yard. There is a possibility to reach the bike storage from the workshop and take a shortcut to the street.

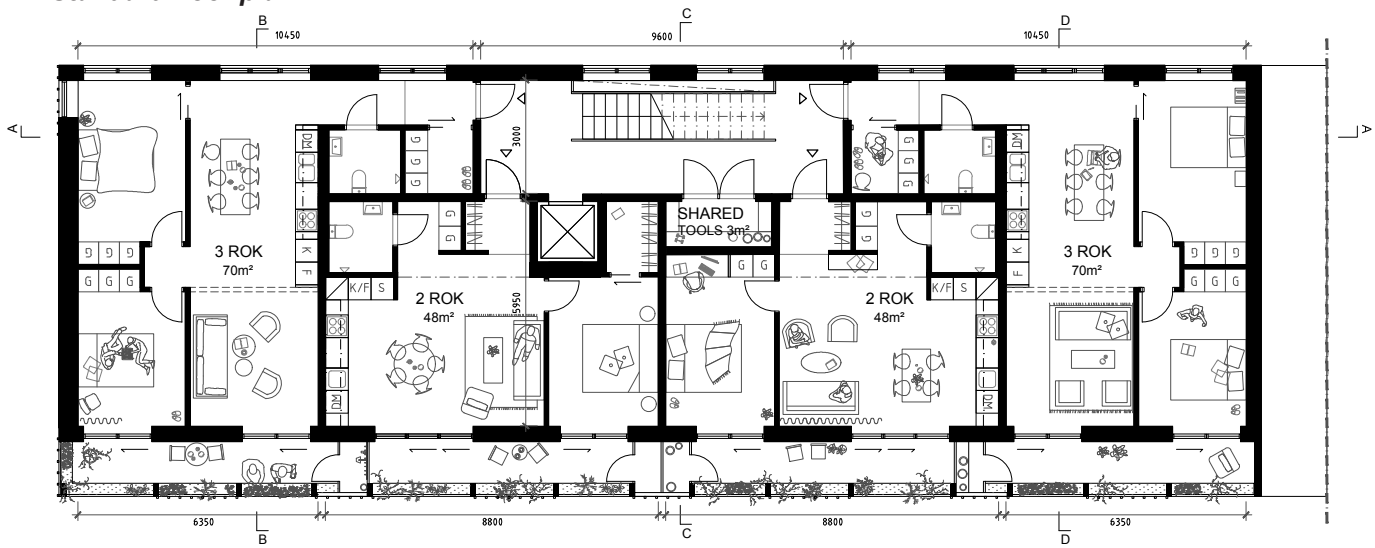




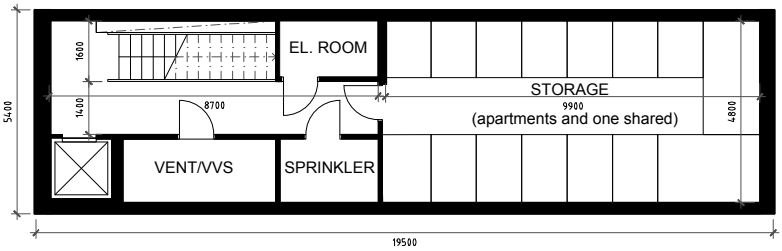
Top floor



Standard floor plan



Basement

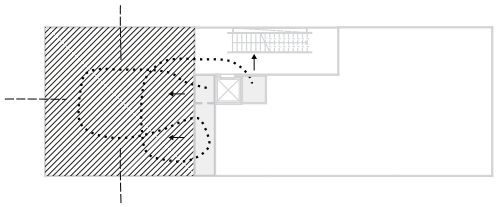


0 1 5m 1:200

3D. Shared space on the top floor

- Rooftop
- Outdoor kitchen
- Storage
- Shared WC

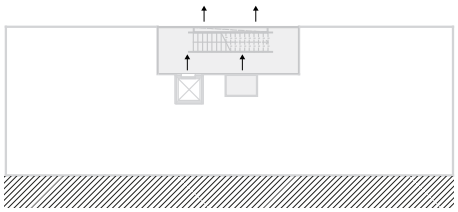
The shared spaces on the roof is an area with less contact with the public but with easy access from the central staircase. The outdoor kitchen and a shared WC is located in close connection to the rooftop terrace in order to increase the usage of this space.



3E. Shared space on apartment floors

- Shared tools

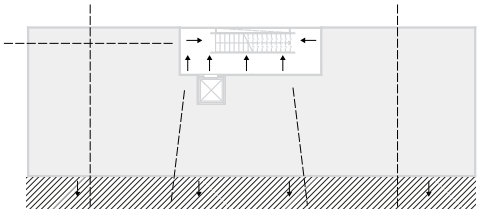
In connection to the apartments on the different floors, a room for shared tools are located. This is a room where the occupants can share for example cleaning tools like a vacuum cleaner or large kitchenware with the closest neighbours.



4. Private space

- Apartments
- Private balcony

Apartments are located on the second to the fifth floor. There is no apartment on the entrance floor in order to separate the shared and private. The private balconies are located towards the southwest to get the most sun during the day and the evening.

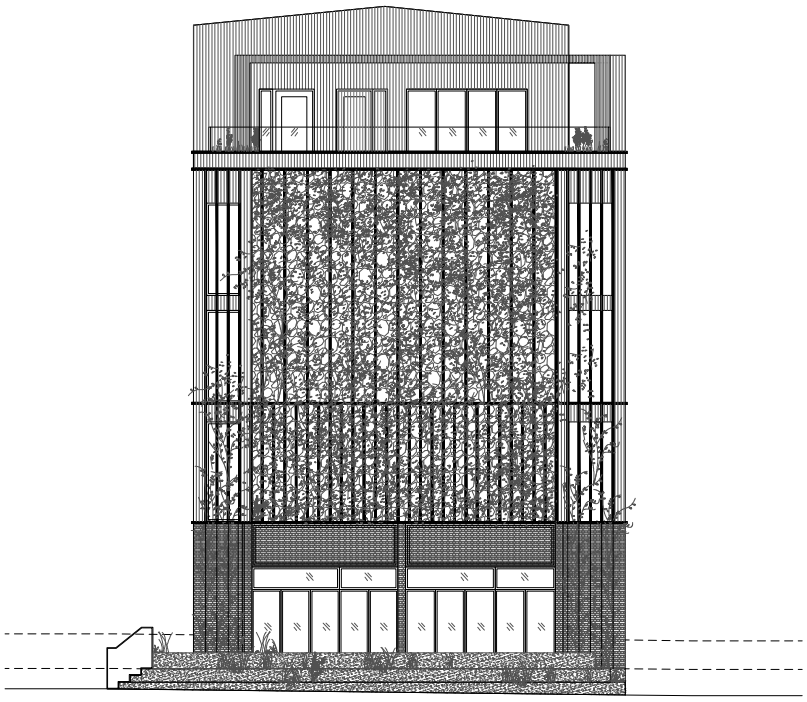


The apartments have an open floor plan, with an open connection between the kitchen, dining area and living room. The size of a standard apartment is reduced by 10-15%. The bedrooms are generally the same size, hence there are no smaller bedrooms intended to be e.g. the children's room. By using a size of bedroom that is big enough for two people, it can be changed and used for other purposes, as a living room or an office space together with a single bed. In this way, the apartments aim to achieve further flexibility.

Main movement

Connection between rooms/outdoor area

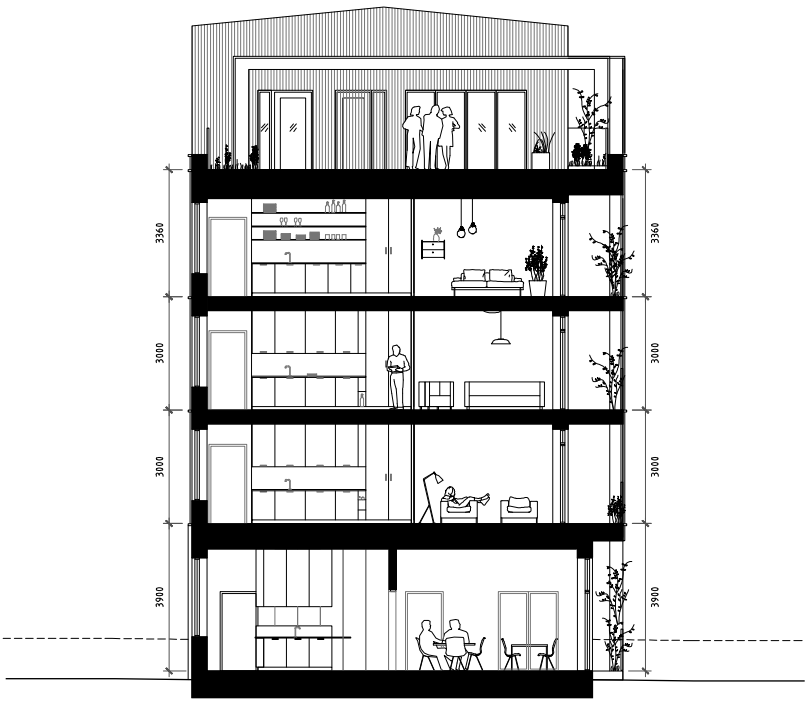
Sightlines



Facade Karl Johansgatan

The facade towards the north is the facade that is the most visible from Karl Johansgatan where the tram and the most people passes by. It is in that way an important element in the city. On the entrance floor, big windows display the dining room and the library, which create a visual contact with the most social room of the cohousing unit and the public street.

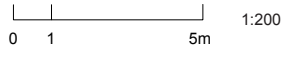
This facade is also in the direction towards the big road Oscarsleden and the conclusion is therefore that it can be exposed to noise and pollution. The apartment floors will thus be arranged as a green facade, which will work as an aesthetic experience, but also assist with carbon reduction and better biodiversity.



Section B-B

In the north part of the building, the kitchen, library and dining room are located next to each other with big openings and easy access. The rooms have a higher ceiling level to enhance the spaciousness. On the rooftop, a pergola and greenery frame the open space to create a more enclosed feeling.

The bigger apartments, with three rooms and a kitchen, are located at both ends of the building. They are arranged with an open floor plan and light from two directions. All apartments have access to the balconies in the southwest.

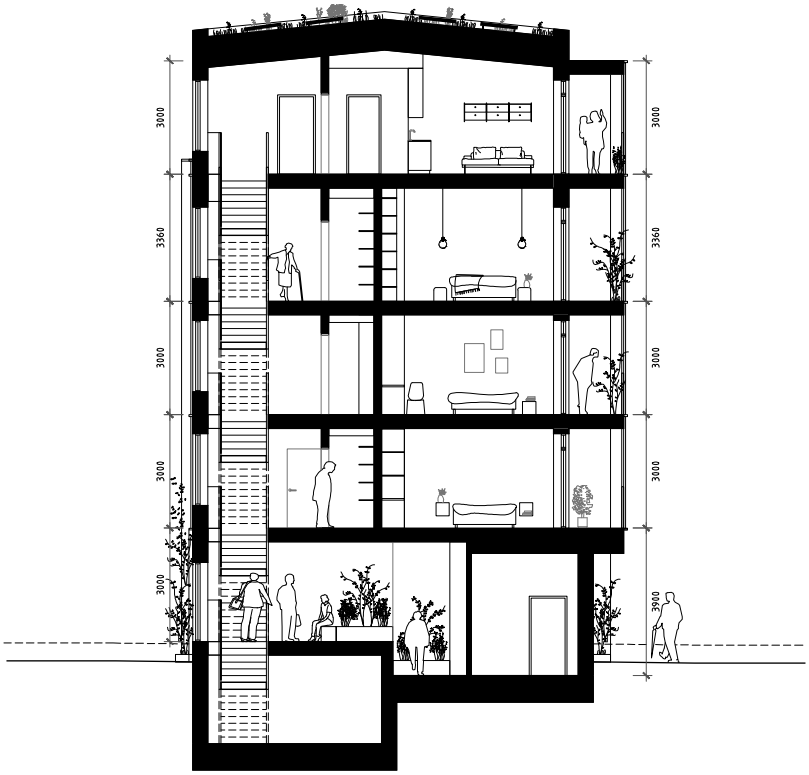


Dining room

The shared dining room has doors that are possible to open up towards the terrace. In that way, the dining area can extend to the outside, resulting in a continuous transition between the inside and outside.

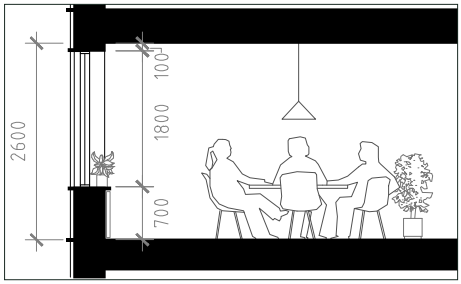
View from entrance

When entering the building there is visual contact with the dining room and the kitchen. On the right side, the exhibition area is visible, as well as a glimpse of the elevator. You can also see through the other entrance towards Musikens hus.

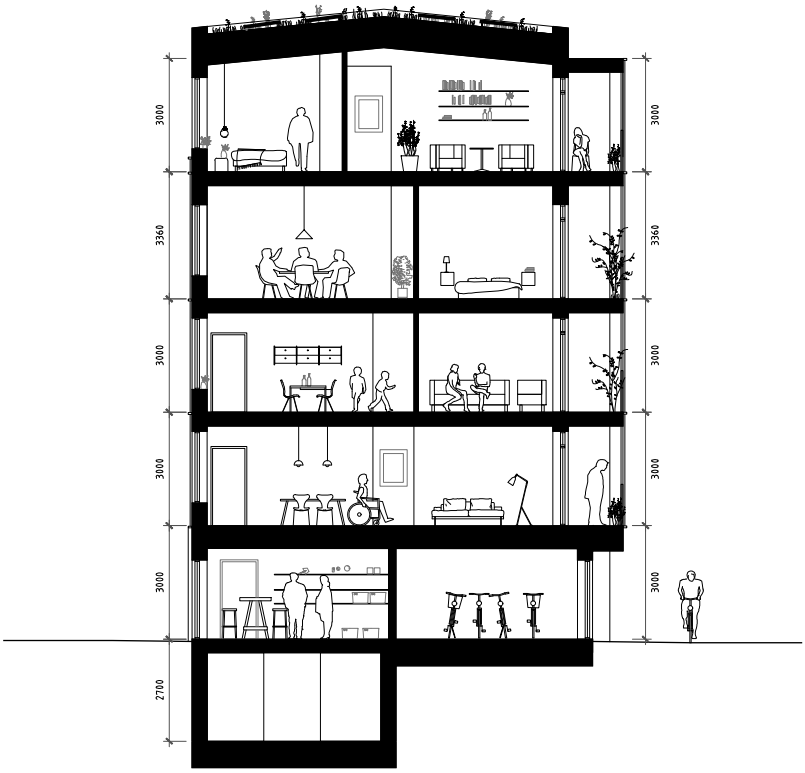


Section C-C

In the middle part of the building, the area where the staircase and elevator are located, there is visual contact between the different shared rooms and circular movement. The movement is also arranged around a plant box with greenery and benches. The windows towards the northwest are big in size to let in daylight and strengthen the visual connection to the yard and Musikens hus.

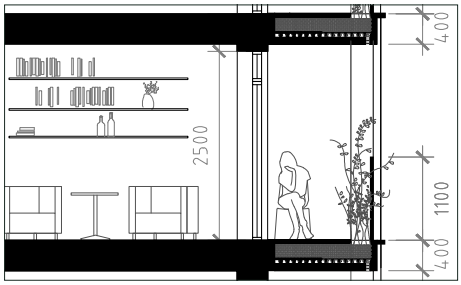


Section showing window towards northwest



Section D-D

The different levels on the entrance floor create a variation of enclosed and open space. The south part of the building adapts to the higher street level to support easy access and movement. This creates a more enclosed space where the shared facilities as laundry, atelier, workshop and bike storage are located. Towards the southwest, the balcony construction and greenery generate shadow and the sliding doors create easy access.



Connection to balcony and its greenery

0 1 5m 1:200

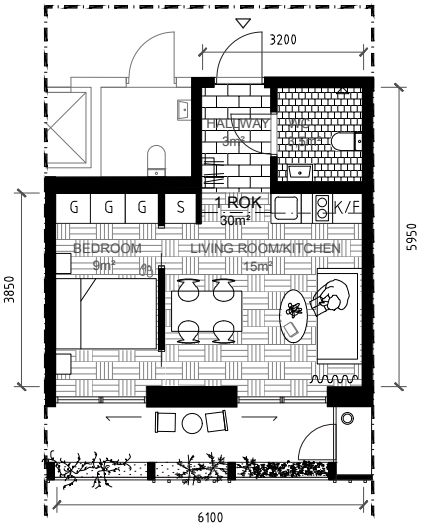
0 1 2,5m PART OF SECTION 1:100

Entrance area

A circular movement is created on the entrance floor, with levels that adapts to the surrounding area.

View from Kommendörsgatan

The southwest facade along Kommendörsgatan, where the main entrance and the dining room are located.



1 room and kitchen

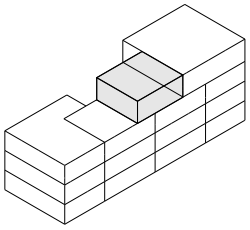
Age 59
30m² (Total living area 247m²)

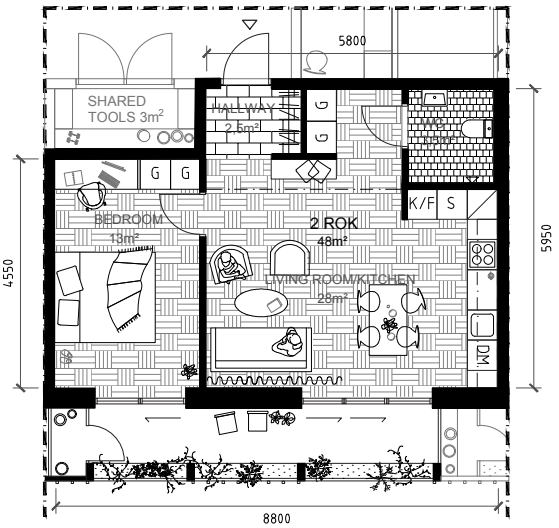
Wish about the site:
”That there is a “close to nature-feeling”, elements of nature in the environment.”

Sustainability:
All three are equally important.

Want to share (rooms):
Kitchen
Dining room
Library
Sauna
Yard/garden

Common resources/activities:
Craft
Bicycle pool
Carpool
Education/courses
Laundry





2 room and kitchen

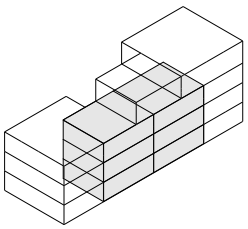
Age 64 (Living with one more person)
48m² (Total living area 265m²)

Reason for interest in cohousing:
“Opportunity for a social life in the living environment”

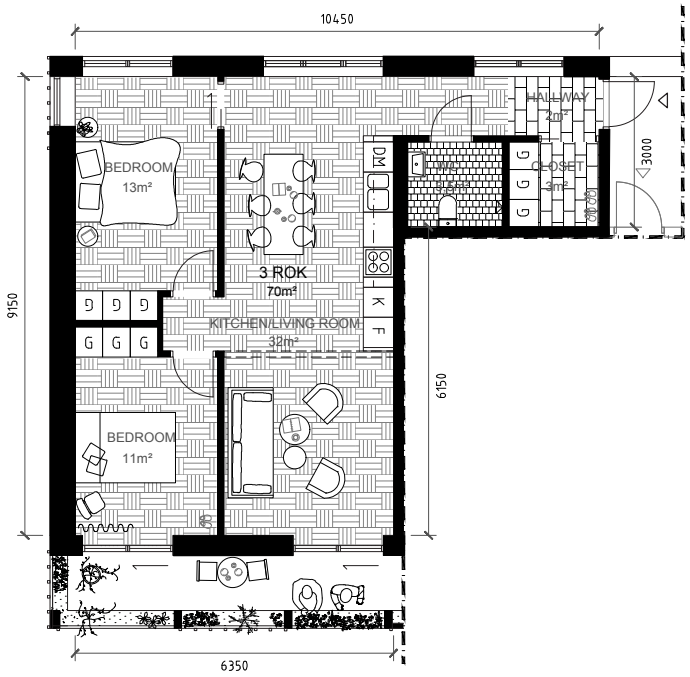
Sustainability:
Ecological

Want to share (rooms):
Kitchen
Living room
Workshop
Rooftop/common terrace
Yard/garden

Common resources/activities:
Crafts
Carpool
Guest room/guest apartment
Laundry



0 1 5m 1:150



3 room and kitchen

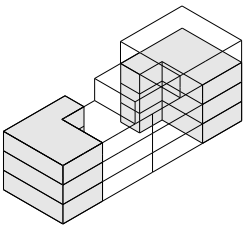
Age 79 (Living with one more person)
70m² (Total living area 287m²)

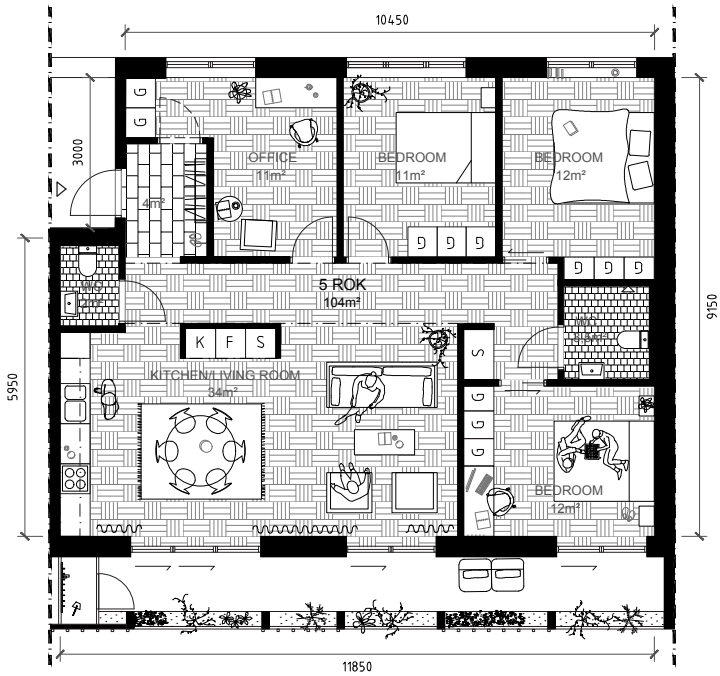
Reason for interest in cohousing:
"To meet people in joint work, to be close to meeting"

Comment on sustainability:
All three are equally important

Want to share:
Kitchen
Dining room
Living room
Workshop
Roof terrace/shared terrace
Yard/garden

Common resources/activities:
Cooking
Crafts
Music
Exercise
Courses/education





5 room and kitchen

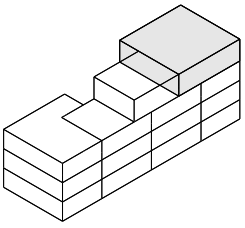
Age 50 (Living collective with 4-7persons)
104m² (Total living area 321m²)

Reason for interest in cohousing:
"Economically and socially superior. It is important to still be able to be private."

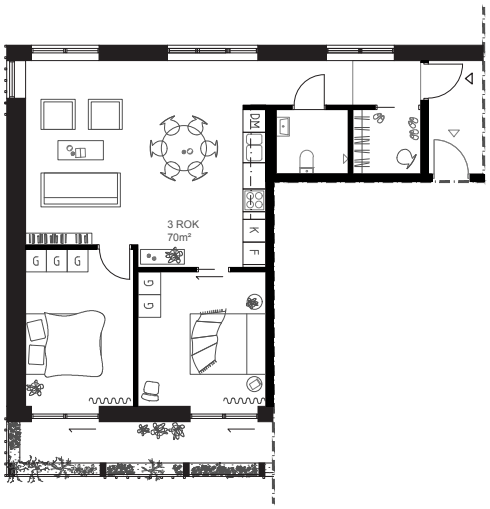
Comments on the site:
Sounds interesting!

Want to share (rooms):
All suggestions

Common resources/activities:
All suggestions



0 1 5m 1:150

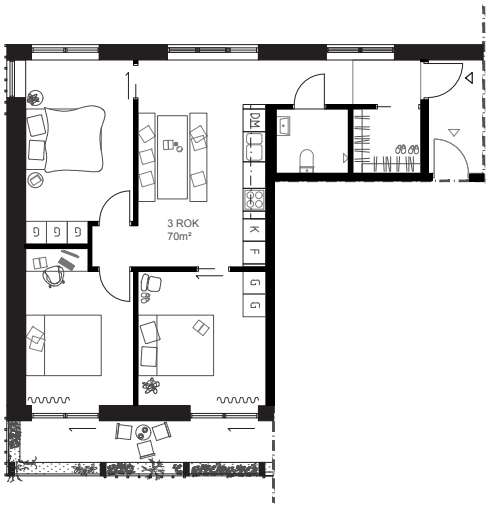


Alternative A (apartment 3 rok)

The first example shows that it is possible to change the arrangement within the apartment to create a more open social space for living and dining. Two equally big bedrooms are placed with access to the balcony.

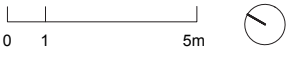
Alternative B (apartment 3 rok)

It is possible to arrange the living room as a separate room, to achieve more private rooms and enclosed spaces. The second bedroom is organised as a workspace with a desktop.



Alternative C (apartment 3 rok)

With three bedrooms this apartment can be suitable for couples, students or families that want to live together in a collective way. All bedrooms can fit a double size bed and the kitchen is used as a common social space.



Balconies

All of the apartments within the building have access to the balconies towards the southwest.

Roof top

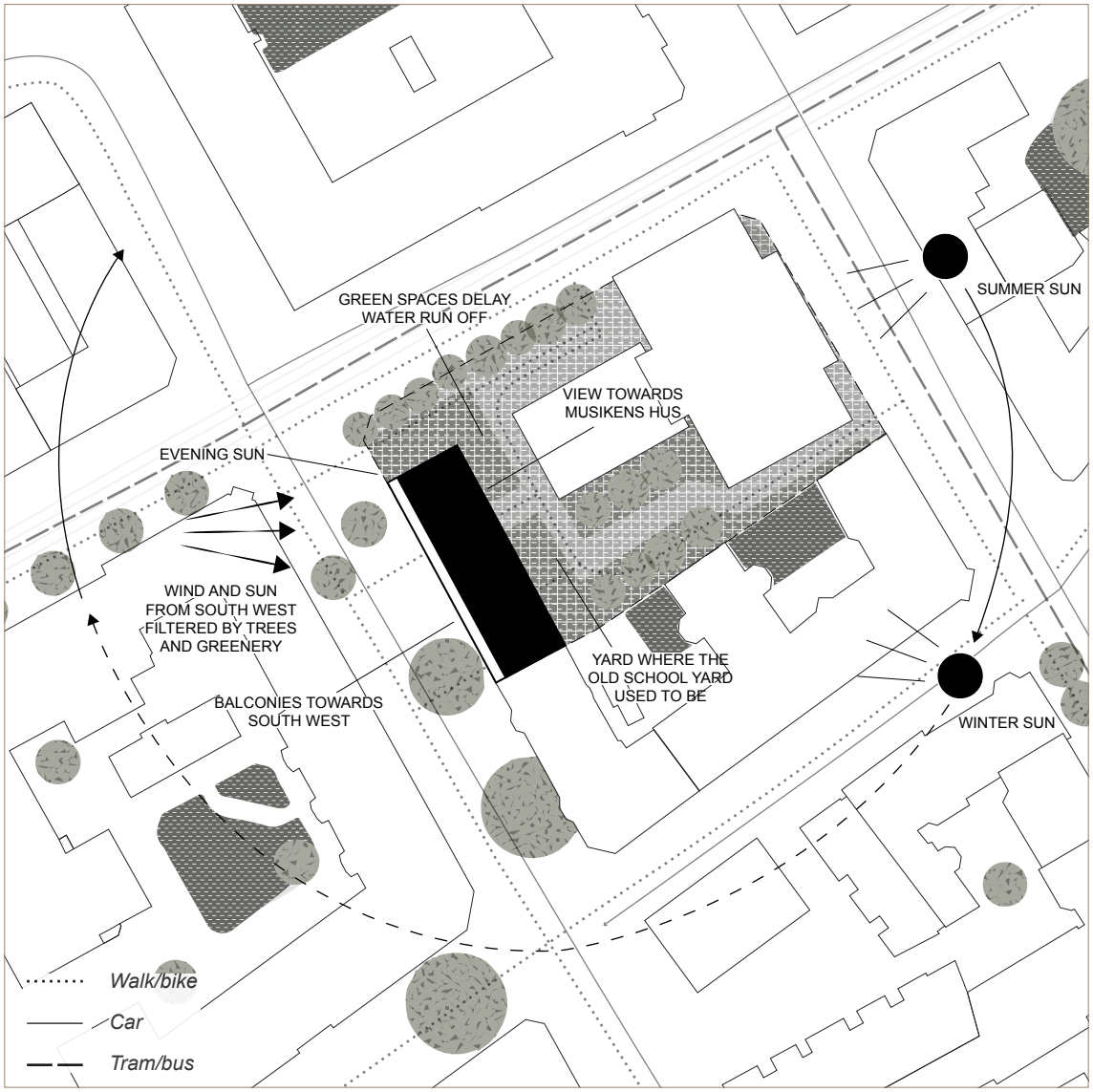
The pergola on the rooftop creates an enclosed feeling when entering the terrace in connection to the outdoor kitchen.

Facade towards southwest

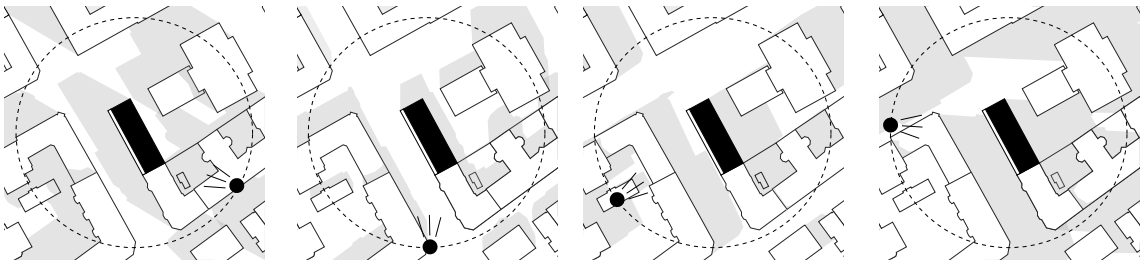
Facade towards northeast

0 1 5m 1:200

Building in local context



Sun studies on 20 Mars (vernal equinox)



9:00 *12:00* *15:00* *18:00*

0 5 25m SITEPLAN 1:1000

SUMMARY & RESULT

Summary in numbers

Total building area: ***1530 m²***

Total shared space: ***128 m²***
(For socialisation: Dining room, Library, Kitchen, Atelier/ Laundry, Workshop, Outdoor kitchen, Exchange room)

Total shared facilities: ***89 m²***
(Cleaning storage, Storage, WC/shower, Office/Guest room, Waste, Bike storage, Shared tools, Shared WC)

Basement: ***94 m²***

Total apartment space: ***842 m²***

Less apartment space compared to conventional apartments;
built after 2011 ***- 98 m²***
in Gothenburg ***- 129 m²***
in Sweden ***- 143 m²***

28 people

Included in the design proposal, which of 22 people are from the survey

217 m²

Amount of shared space and facilities available for daily use within the community

247-321 m²

Total living area per household. (15,5m² average shared area per household)

Result design proposal

Layers of private, shared and public

The social spaces are mostly gathered on the entrance floor, which at the same time results in private apartment space with less insight located on the upper floors. This is a positive effect that the design of a cohousing project can offer in an urban context. More shared areas on the entrance floor can open up towards the public space and the city as a whole. This creates more activity, especially during the evening, when the community is gathered in the dining room or other shared spaces in connection to the street. This kind of activity can be beneficial for the city as a whole.

The total area of the shared space is based on the area gathered when reducing the apartment space. Therefore, the area is limited and the choice was made to use less shared space on the rooftop. This was in order to find a balance between the most attractive and appealing locations for the shared space and the apartment space. In this case, the choice is made to focus the shared space to the entrance floor to use the more private, top floors for apartments.

When designing the layout of the apartments, a more rational system was adapted. The area that is reduced in each apartment is in general mostly the kitchen and the living room, i.e. the social rooms within the apartments. This corresponds to the fact that there are shared areas within the cohousing unit that will be used as a social space. The open floor plan and generally the same standard sizes of bedrooms have been used as a way to still achieve spaciousness and further flexibility.

VII. DISCUSSION & CONCLUSION

DISCUSSION

Discussion design proposal

The scale of the cohousing proposal is an important factor for the result. More specifically, the total amount of shared spaces are depending on the number of units that are included in the program. In this case, the information gathered in the survey was one of the reasons to limit the program to 14 units. The analysis made on the conditions of the site was another reason. As explained in the result, the shared space is mostly limited to one location; the entrance floor. In a bigger house with more apartment units, the shared space could favourably be divided into two or more areas. For example, more shared space indoors in connection to the rooftop could further increase the usage.

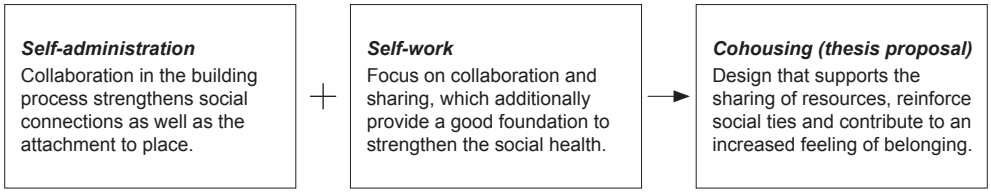
There is an overall challenge in how to adapt to a specific program and a specific site, and at the same time achieve adaptability and change over time. For example, the entrance floor is to a great extent adapted to both the site and the wishes from the community concluded in the survey. The focus was on strengthening the community and at the same time the attachment to place. It is easy to access from the city and connects to the movement on the site. It further aims to create different feelings of spaciousness and enclosed space in combination with the different usage of the shared spaces set in the program. However, it is a layout with different levels and with more specific solutions that may lead to a space that is more difficult to adapt to change over time.

At the same time, when locating the shared rooms on the entrance floor, there is also a better opportunity to use these spaces for rent, which makes them more adaptable for changes than if they were located on the top floor. This will further enhance this area as something shared between the cohousing unit and the city. At the same time, it leads to more private apartment space with less insight located on the upper floors.

The conclusion is made that it can be a challenge to meet the special needs of the dwellers and at the same time attain decreased apartment sizes. In this way, a rational system might help in order to set a framework. This was a result of finding a rational system to the design process, which is a question of time (and in another context also money). In this case, all detailed wishes from the members to create individualised apartments was not the foremost focus. However, research indicates that specially adapted apartments are both valuable in the housing market and for the occupant themselves, this would have been done more thoroughly if the time existed. The architect has an extra important role when creating a framework to handle the challenge, and perhaps contradiction, with individually tailored apartments and an effective floor plan to solve both challenges in a good way.

Theory and survey

The theory concluded in this thesis support the conclusion that when looking at the dwellers as co-actors, social sustainability can be strengthened. Collaboration in the building process strengthens social connections within the unit and the future neighbours, as well as the attachment to place. In the same way, collaboration in everyday life such as in a self-work model additionally provides a good foundation to strengthen social health. The suggestion is therefore to support both methods of self-administration and self-work.



The survey was used as a method to include the members of Boihop in the design proposal, which hopefully contributes to a more realistic process and knowledge of how this can be done. The survey can be seen as a first step when recruiting a group of members that wish to be involved in certain projects. Further contact with the members was unfortunately not possible due to the time limit, thus the process lacks the aspect of involving the occupants in a more comprehensive way. The collaboration between occupants is missing when no meetings are held where the members can meet each other. With a more recurring communication, there is also a probability that the design proposal of this thesis would have been influenced differently.

The conclusion from the theory is that recurring communication and collaboration between occupants are beneficial. The suggestion is therefore that this should be applied in future cohousing projects. It is stated that there is a good foundation with associations that support this kind of process in Sweden today. The associations possess both great knowledge of developing cohousing projects and are important actors in supporting collaboration in the building process. With help from Boihop, the first selection was already made to a target group with an interest in cohousing projects and this way of living. It is clear that the main problem and resistance is still the lack of knowledge in the society, and in some cases to provide land to build on.

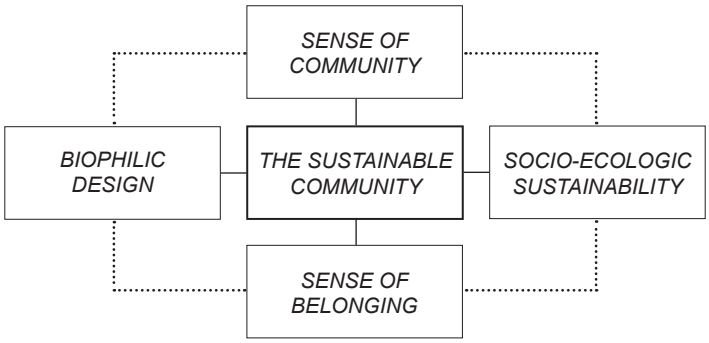
CONCLUSION

The role of the architect

From the result of the survey and the research made, it is clear that there is a genuine interest and desire to be involved in a context. The architecture and the available housing stock should be able to support this demand and the sustainable lifestyle it can obtain. The role of the architect will thus also be important in this development.

The design of the cohousing unit is in its first appearance not very different from a conventional apartment house. But the proposal shows that there is an increased need to focus on both apartments as the area is smaller, but perhaps most importantly the layout of the common areas. This is where the daily social contact will take place and where the community will be strengthened. The communication area and the staircase can also be extra important since it is used to reach the shared spaces. It should be easy and enjoyable to leave your own apartment and in that way support spontaneous meetings. The role of the architect will not be less important, as many might think, only because the dwellers are more included in the process. On the contrary, the importance of architectural design is significant.

The conclusion is, that if we collaborate more, we can support a more sustainable lifestyle. The design, in this case, aims to support the sharing of resources, reinforce social ties and strengthen the feeling of being involved in a context. It further aims to strengthen the mental connection to place which can contribute to an increased feeling of belonging. These are all examples of how social and ecological sustainability can be used to support each other. This proves that socio-ecological sustainability can be supported in a cohousing solution. By using biophilic design methods, the architecture of the home strives to further strengthen the mental connection to a place which can contribute to an increased feeling of belonging, as the sense of feeling at home. A value that is considered important for social sustainability and results in the residents being naturally connected.



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LIST OF FIGURES

Figures not noted are original by the author.