

*Small Scale, **Big** Dreams.*

An investigation of design strategies for maintaining qualities in compact rowhouses.



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Abstract

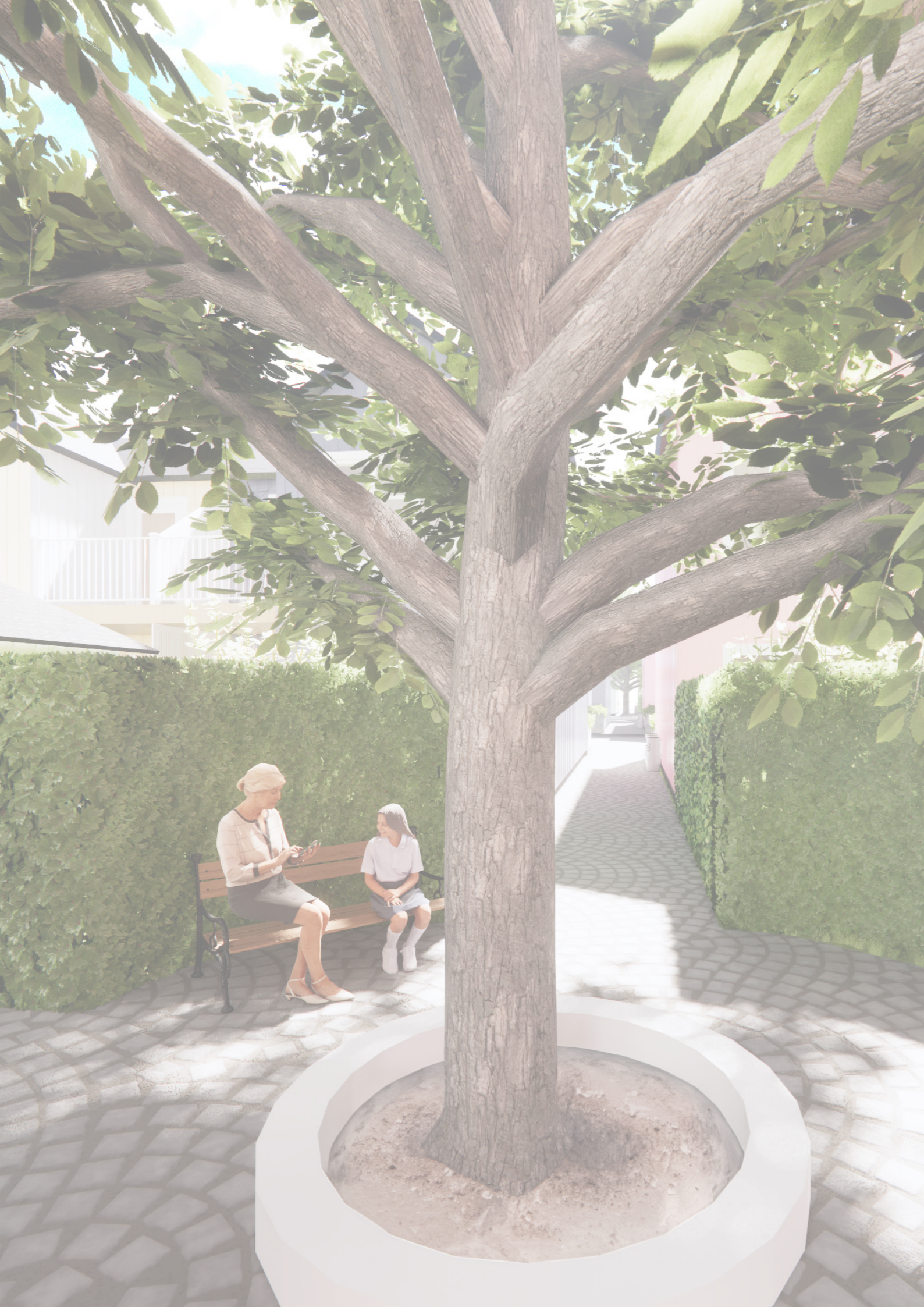
Today, the demand for small housing is on the rise. 7 out of 10 swedes are dreaming of living in a small house even though only 20% of newly constructed housing consists of this typology. In addition to this, it is now more expensive than ever to purchase a small house and property in general. This thesis is discussing the need for more affordable small housing and suggests that one way to achieve this is to design row houses with a smaller dwelling area in order to make them more affordable for consumers, while at the same time maintaining and enhancing residential qualities.

The purpose of this thesis is to investigate and display how different architectural qualities could be interpreted as design strategies to be used as a framework for how row houses could be designed on a dwelling area of 90 sqm, without compromising with the qualities of a row house. This is done in order to draw attention to the fact that a reduction of space, as a consequence of making housing more affordable is not synonymous with a reduction of architectural and residential qualities.

The thesis consists of three phases, the theoretical studies, the design strategies and the design proposals. In the theoretical studies phase, research on the topic has been conducted through literature, articles and case studies. This research has supported and set the framework for the design strategies in the second phase. These design strategies have then been used as the framework for the design proposals in the final phase.

The result consists of a row house proposal with a dwelling area of 90 sqm where the essential qualities have been preserved and enhanced. This proposal was then compared with the existing row houses on Eriksbergsplatån to determine the qualitative gains and losses in relation to a row house with a larger dwelling area of 152 sqm. The comparison concludes that the two proposals share many qualities despite the difference in size, while the new proposal is more affordable and is enabling more residents to reside in the same area.

Keywords: row house, qualities, affordability



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Background and context

The housing market has only known one direction throughout history, and that is upwards. The general market value per square meter in Sweden from 1996 compared with 2023 has seen an increase with more than 850% (*Statistiska centralbyrån, 2023*.) which in comparison with an inflation rate of 57,5% from the same time period describe a narrative that property is not as accessible as it has been in the past (*Statistiska centralbyrån, n.d.*).

At the same time as the housing prices are rising, so is the demand for small housing. A national poll from 2017 show that 7 out of 10 swedes have a dream of owning their own small house where 48% of the participants would prefer to live in close proximity to an urban area (*Landshypotek, 2017*). Studies by SCB shows that households in the age group of 35 to 44 year olds that are currently residing in small housing, which are the main group that desire to own a small house, has declined since 2010 throughout Sweden (*Mäklarsamfundet, 2023*). This further supports the narrative of small housing being less accessible as the primary target group of this typology is declining over time.

At the same time as the demand for small housing is rising, small housing only makes up 20% of the total new production of housing in Sweden. This number bleaks in relation to the rest of Europe where 40% of new productions consists of small housing (*Trä- och möbelföretagen, n.d.*).

The rising demand in contrast to the rising property prices creates a fracture in the market where people want to live in small houses, but might not be able to afford it. In order to meet demand as well as enabling housing to the people, housing needs to become more affordable.

Small housing is an umbrella term that consists of many typologies such as small villas, pair houses and row houses. These typologies are typically sharing elements such as walls, which in turn makes them easier to build at a larger scale. In order to increase the production of more affordable small houses, the row house typology provides an excellent framework, since it has historically been constructed in large numbers at a time.

The row house is a residential typology popular all around the world. The row house was a popular typology in England during the industrialization and was primarily used as residences for workers in the industry (*Pfeifer & Brauneck, 2007*). In Sweden the construction of row houses blossomed in the 1950s due to their efficient use of space when the cities expanded (*Grundeus, 2021*). The row house typology is still being constructed today, although the prices of row houses are increasing, making them a dream home for many rather than being accessible to the public.

Discourse

One of the main factors determining at what price a housing unit is sold for is the square meter price. In order to meet the demand for small housing, one way would be to develop design strategies with the purpose to influence the design of row houses on a small dwelling area in order to keep costs down, while at the same time maintaining and enabling as many residential and architectural qualities as possible.

This strategy is discussed by Ola Nylander and Kjell Forshed in their book "åtta små hus", where the authors states that reducing the dwelling area of a residence in favor of preserving residential and architectural qualities could actually benefit the residence economically over time as well as reducing the residences initial production cost (Nylander & Forshed, 2003). Making it a design strategy worth investigating and implementing in a row house.

The topic of maintaining and enhancing residential qualities in row houses with small dwelling areas are of importance, particularly in the current housing climate. The current housing shortage has contributed to prioritizing the construction of smaller apartments where the qualitative features are often reduced in favor of building cheaper and faster. This leads to housing with low quality solutions which in turn results in less flexibility, furnish ability and overall quality of living (Görfelt, 2023).

While downsizing the dwelling area of a residence is an argument for making housing more accessible to the general public, the residential qualities must be taken into consideration when designing small housing.

Contribution

This thesis' primary contribution to the field of architecture is to draw attention to the fact that a reduction of space, as a consequence of fulfilling the aim of making housing more affordable, is not synonymous with a reduction of architectural and residential qualities. This thesis aims to provide design strategies of how row houses could be designed on 90 sqm without disregarding the qualities that make this typology desirable. This is achieved by presenting relevant design strategies related to small row houses, as well as utilizing these in a row house proposal with a dwelling area of 90 sqm.

Aim

The aim is to present a row house proposal with a small dwelling area of 90m². The objective is to increase the accessibility for more households to live in the row house typology.

Purpose

The purpose of this thesis is to investigate how row houses could be planned and designed in a way that keeps the dwelling area small without losing the major residential qualities of the row house. This will aid in the cause of making row houses more affordable and thereby making row houses more accessible to the general public.

The ambition is to display how different architectural qualities could be interpreted as design strategies in order to be utilized as a framework to aid the design process of row houses with a small dwelling area. This is done in order to show that it is possible to unify architectural qualities and affordability from a customer's perspective.

The thesis will result in a row house design with a dwelling area of 90 sqm that will be compared with the row houses on the selected site of Eriksbergsplatån in Gothenburg. This will show a glimpse of how price compares to qualities and which qualities are both gained and lost when the size of a row house is reduced.

Reading instructions

The thesis is divided into 6 chapters presented in three phases. The chapters are divided into Introduction, research, case studies, the site, design strategies, design proposal and discussion.

The first phase consists of the framework of the thesis related to background, discourse and theoretical research.

The second phase consists of site and case studies that together with the research in the previous phase ends in a couple of design strategies based on this research.

The third phase presents the design proposal and displays the different qualities acquired. The third phase ends with a discussion that concludes and reflects upon the thesis.

The first research question is presented and answered in the chapter design proposal

The second research question is analyzed throughout phase 2 and 3 and later answered in the comparison in the design proposal chapter.

Research questions

- In what way could a rowhouse be designed on a dwelling area of 90m² in order to keep costs down without losing their residential and architectural qualities?
- What are the qualitative gains and losses of a row house designed on 90m² in comparison with the row house area on Eriksbergsplatån?

Method

The thesis consists of three different phases where different methods have been applied.

Theoretical studies

The theoretical studies start with research for design where architectural qualities are researched through literature studies. The literature studies were conducted through books, scientific reports and online sources. This research would shape the framework of architectural qualities that would later on support the design strategies in the second phase of the thesis.

Design strategies

The design strategies phase is based on research on design where the research of architectural qualities in the previous phase aided in analyzing case studies to determine how existing row houses on 90 sqm utilizes architectural qualities. The case studies consisted of row houses on 90 sqm as well as the site of Eriksbergsplatån and its designated row houses. The second phase results in a few design strategies that would aid in the research by design in the last phase.

Design

The last phase utilizes the design strategies in the previous phase through research by design. In this phase the design strategies guide the design of the final proposal. The design proposal consists of a row house with a dwelling area of 90 sqm where the design strategies have been utilized in order to preserve and enhance as many qualities as possible. The proposal is presented throughout the chapter and ends in a qualitative comparison with the already existing row houses on Eriksbergsplatån in order to determine the qualitative gains and losses of the newly proposed row house.

Theory

The theory of the thesis is divided into different fields of research. The fields that have been researched revolve around; economy and statistics related to the housing market, architectural qualities, case studies, current legislation and rules related to BBR and space in relation to architectural qualities.

The majority of the statistics has been gathered through official Swedish databases such as Statistik Myndigheten (SCB) as well as printed books that describe statistics related to row houses. One of these books is called "Row Houses: A Housing Typology" (Pfeifer, G., & Brauneck, P. 2007).

Economics related to architecture and construction is researched in order to determine what aspects need to be included when determining the affordability of a row house. The literature related to this is mainly based on printed literature made partially by CBA professors at Chalmers. The literature that are being presented are "Ekonomi för arkitekter: Introduktion till lönsamhetskalkylering och fastighetsvärdering vid planering och byggande." (Lind, H. 2012) and "Åtta små hus: Erfarenheter av ett bostadsprojekt i Vadstena." (Nylander, O., & Forshed, K. 2003).

The major part of the thesis consists of research regarding architectural qualities and their significance to ensure good residential qualities of a row house. For this many printed and digital sources have been taken into account to achieve a broad spectrum of architectural qualities related to row houses. The major source for this research is "MAB: Manual för analys av bostäder" (Granath, K., Nylander, O. 2021). MAB is a scientific tool written by researchers at CBA. The tool is used to ensure residential qualities based on 28 different qualities related to three themes; functionality, spaciousness and atmosphere.

Other sources related to architectural qualities that are researched are "RIBA: A case for space" (Roberts - Hughes, R. 2011), "Åtta små hus: Erfarenheter av ett bostadsprojekt i Vadstena." (Nylander, Forshed. 2003) and "Row Houses: A Housing Typology" (Pfeifer, Brauneck. 2007).

The Swedish standards and regulations relating to architecture and construction have been researched through BBR (Boverkets byggnadsregler) which is the guidelines every Swedish architect needs to follow in order to ensure essential qualities and required measurements of a residence.

Delimitations

This thesis will be based in Gothenburg Sweden, which implies that Swedish standards and regulations will be applied to the final design proposals.

The focus on 90 sqm is based on a reduction of space compared with the standard size of modern Swedish row houses. According to real estate brokers at Fastighetsbyrå, the dwelling area of newly constructed row houses in Sweden ranges between 113 - 120 sqm. The decision of designing a proposal on 90 sqm is based on a reduction that would still be sizable enough to host the critical functions of a row house, while at the same time being small enough to be more affordable.

The economical calculation in the end of the thesis will be based on a speculated market value price per square meters. This speculation will be based on the current market value price of the row houses at Eriksbergsplatån. A speculated cost of construction will also be implemented in order to calculate the difference between the cost of construction and market value.

Relevance for sustainable development:

When row houses and residences in general are being downsized there are multiple sustainable aspects gained in the process. On the topic of ecological sustainability, a downsized row house proposal requires less material to be constructed, which if paired with a wood based construction will result in a lower ecological footprint, compared with other building methods. Another aspect related to ecological sustainability is that a smaller residence requires less energy related to heating. This also nurtures economical sustainability since the cost of electricity is greatly reduced which relieves the financial burden of the residents (Jönköping University, 2022).

Social sustainability increases by downsizing row houses. By downsizing row houses they become more affordable, which broadens the possibility for different groups of people to inhabit an area that otherwise would not be able to afford it. By downsizing rowhouses, more row house units are able to be placed in the same area, which in turn increases the amount of people living in the area. An increase of people to an area raises the possibility for additional social functions to arise such as schools and communal spaces.

Research

First phase

Residential qualities to consider

In order to determine what qualities that are in need of preservation when downsizing a row house, residential qualities need to be examined. One way to determine this is to examine what qualities are currently missing in housing with a below-average area. (Roberts - Hughes, R. 2011)

RIBA - A case for space written by Rebecca Roberts Hughes provides an excellent example on how residents experience the space in their dwellings. According to RIBA, the average 2 story row house containing 4 rooms with 5 residents in England has an area of 100 sqm. In a poll conducted by RIBA residents experienced troubles regarding a few categories. (Roberts - Hughes, R. 2011)

- 69% of residents in fully occupied homes said that they do not have enough storage for their possessions.
- 58% doesn't have enough space for furniture they own
- 65% said the amount of space in the home limited the choice of furniture layout.
- 34% said they didn't have enough space to have friends over for dinner
- 48% do not have space to entertain visitors at all.
- 48% of people in fully occupied homes felt that they could not get away from other people's noisy activities. (Roberts - Hughes, R. 2011)

Note that the statistics conducted in this poll is not limited to row houses alone, but it grants an idea of what many residents experience as residential qualities already in need of attendance.

This poll suggests that there are currently problems related to:

- Storage
- Furnishable space
- Social space
- Parallel use

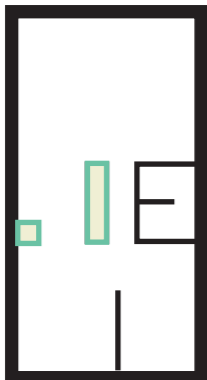
In addition to this there is also an importance related to flexibility within the row house. Since dwelling situations change over time, the row house needs to be adapted to meet the needs of a changing life-situation. In this segment the autonomous room is lifted, since it enhances the ability to add a bedroom, work space, gaming room etc. Thereby making it a quality to take into consideration. (Pfeifer & Brauneck, 2007)

As a way to find qualities to preserve I have chosen to use Manual för Analys av Bostadskvaliteter (MAB) as a guide. MAB is a tool used to ensure residential qualities in a residence. This is relevant to my thesis since it emphasizes many of the qualities that are in need of preservation when it comes to housing. The manual describes 28 different residential qualities related to the themes: functionality, spaciousness and atmosphere. Each category comes with sub-categories with certain requirements to ensure residential qualities. (Granath, Nylander, 2021).

Step 1: Functionality

Surface efficiency

This category ensures that the usable surface of the row house is used effectively in order to keep costs down. A smaller footprint in relation to the number of rooms is generally more favored than a larger footprint. (Granath, Nylander. 2021).



Technical rationality

This quality is related to the inclusion and placement of technical shafts in the residence. Exhaust, intake, water & sewage shafts are organized and built in a way that creates decent spaces within the residence. For a residence to reach the quality of technical rationality these technical shafts must be determined in the early planning stage of the residence. The 3 mentioned shafts must be included as well as a 4th if the residence hosts a guest bathroom (Granath, Nylander. 2021).



Furnishable space

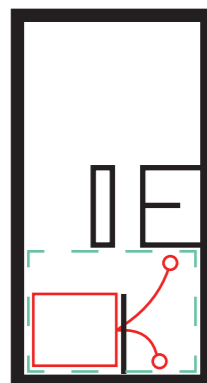
This quality determines the amount of free furnishable space that is not disturbed by doors or communications within the residence. The sum of the free furnishable space must make out at least 50% of the total livable area in the residence. (Granath, Nylander. 2021).

Aging - in - place

This quality ensures that the residence is equipped with the possibility for continued living when the residents reach an older age and residential healthcare. Aging-in-place is divided into three sub-categories.

- Bedroom capacity
- Spatial proximity
- Functional autonomy

In order to achieve aging-in-place, a residence is required to have at least one bedroom with the dimensions 3000x3100mm, the distance between the bedroom, bathroom, storage and entrance can not surpass 6 meters, and the communications needs to be placed so that nursing staff won't disturb the kitchen, living room or the healthy partners bedroom (Granath, Nylander. 2021).

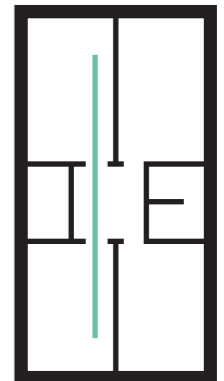


Step 2: Spaciousness

Spaciousness is a quality related to the experiences of space within a residence. Spaciousness is divided into 4 categories.

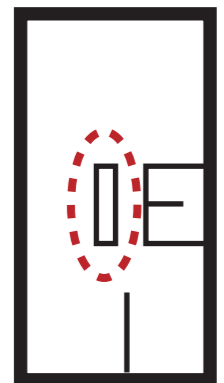
Axiality

Axiality is a quality that enriches the experience of the rooms and enables movement through the residence. To fulfill the requirements of axiality there must be at least two axialities that reach through three separate rooms where two rooms could be connected to the outside (balconies). The axiality could have an angle of maximum 15° (Granath, Nylander. 2021).



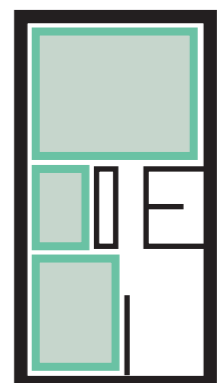
Circulation and movement

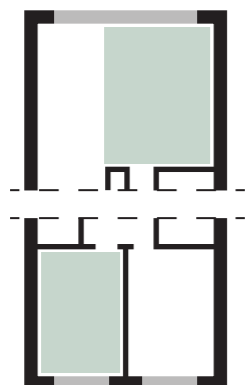
The ability to move in different ways around the residence is a quality. The ability to circulate through rooms enriches the experience and flexibility of the rooms. The quality requires that there is at least one definite possibility for circular movement in the residence. This includes circulation through rooms inside and through outdoor spaces connected to the residence (Granath, Nylander. 2021).



Shape of the rooms

There is a quality to simple shapes of a room that includes built-in solutions for storage and technical shafts. Simple shapes with fewer corners are also a desired quality. This is restricted to living rooms, bedrooms, common rooms and kitchens. The requirement is that these rooms are defined by a rectangular shape (Granath, Nylander. 2021).



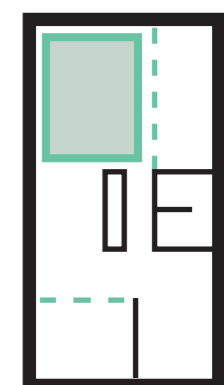


Flexibility

This quality ensures that a residence is able to adapt to different changes in lifestyle. Flexibility is divided into five categories. The flexible residence fulfills at least three out of the five categories. (Granath, Nylander. 2021).

Parallellity

The different rooms in the residence should be independent for different kinds of use. Activities in the kitchen for example should not affect these kinds of rooms. These rooms enable multiple activities in a residence at the same time without disturbance from other activities (Granath, Nylander. 2021).



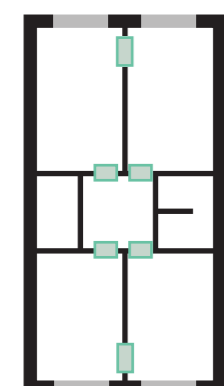
Autonomous rooms

An autonomous room is an independent room placed maximum 4m from the entrance which enables possibilities for rental or generational living. The size of the autonomous room should be 3,000 x 3,100 mm and have connection to a bathroom (Granath, Nylander. 2021).



Varied number of rooms

A flexible residence should be able to vary the number of rooms by putting up a wall. These rooms should have access to Daylight and have an area of at least seven square meters (Granath, Nylander. 2021).



Connection between rooms

There should be two or more connections between rooms in order to enable different uses. One of the rooms should have more connections works with outdoor spaces as well (Granath, Nylander. 2021).

Step 3: Atmosphere

This category is related to daylight access as well as the relation between in and outdoor spaces related to the residence.

Facade directions

The residents should have Windows in two different directions this ensures daylight during different times of day this gives different types of daylight during the seasons which is a requirement. (Granath, Nylander. 2021)



The balcony

This is a quality as it creates a private outdoor space. There should be at least one balcony in the residence. (Granath, Nylander. 2021)



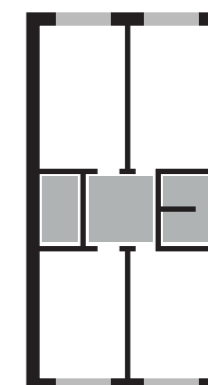
Designed daylight

The residences have architectural elements that enable daylight intake. These architectural elements could consist of cornered windows, French balconies, bay windows or balconies. There should at least be one of these elements in the residence. (Granath, Nylander. 2021)



Dark areas

Dark areas are referred to spaces behind closed doors with no access to daylight. The dark areas should not exceed 15% of the total livable area. (Granath, Nylander. 2021)



The row house garden

The row house garden has a few notable distinctions in relation to a traditional villa garden or courtyard. Since row house areas are generally densely packed, the garden is often relatively small. The general size of Swedish row house gardens are about 100m² (Kvant, 2003), which in itself creates some restraints on what can be done on a garden area such as this. Although a small garden has a set of challenges to take into consideration, there are certain design strategies that can be implemented in order to ensure qualities.

The size of the garden

The first step is to determine what the size of the garden space is and what the desired functions are. When a garden area is smaller, the main issue is often that people want to make room for as many features as possible, which ultimately ends up in a confused and overwhelming expression. This can be solved by deciding what you want the garden to contain. Small gardens typically have to choose between a cultivation area or a play area for children.

Affinity with the house

One way to achieve a harmonious garden space is to plan the garden with close affinity with the house it is related to. A few ways this can be achieved is by taking elements of the house into consideration when planning the garden, where the goal is to create a garden that is experienced as an extension of the house. By establishing a kinship between the garden and the house, the lines between inside and outside will fade away. These elements can be related to:

- The contours and variation of depth of the house
- Elements in the garden may share materials, colors and styles that matches the house
- An easiness to move between indoors and outdoors
- Big windows with low plinth and glass doors

Eye-catchers and sightlines

One way to create a sense of depth in a garden is by placing strategically placed eye-catchers. An eye - catcher placed on a distance leads residents through a garden as well as creates a place where the eyes can rest, which also creates a sense of harmony. An eye - catcher can be many things. It could be a tree, a statue, but it can also be a free sightline. Which in turn means that an eye-catcher is not only limited to objects. If the eye - catcher is visible from the inside of the house, it also aids in connecting the house to the garden (Kvant, 2003).



What does BBR say about residential requirements?

BBR, Boverkets byggregler (Boverkets building rules) is the Swedish administrative authority for urban planning, building and housing. It is an administrative authority regarding questions about the planning of buildings in Sweden and it makes sure that all new projects follow the associated laws regarding construction and planning of buildings. (Boverket, 2022).

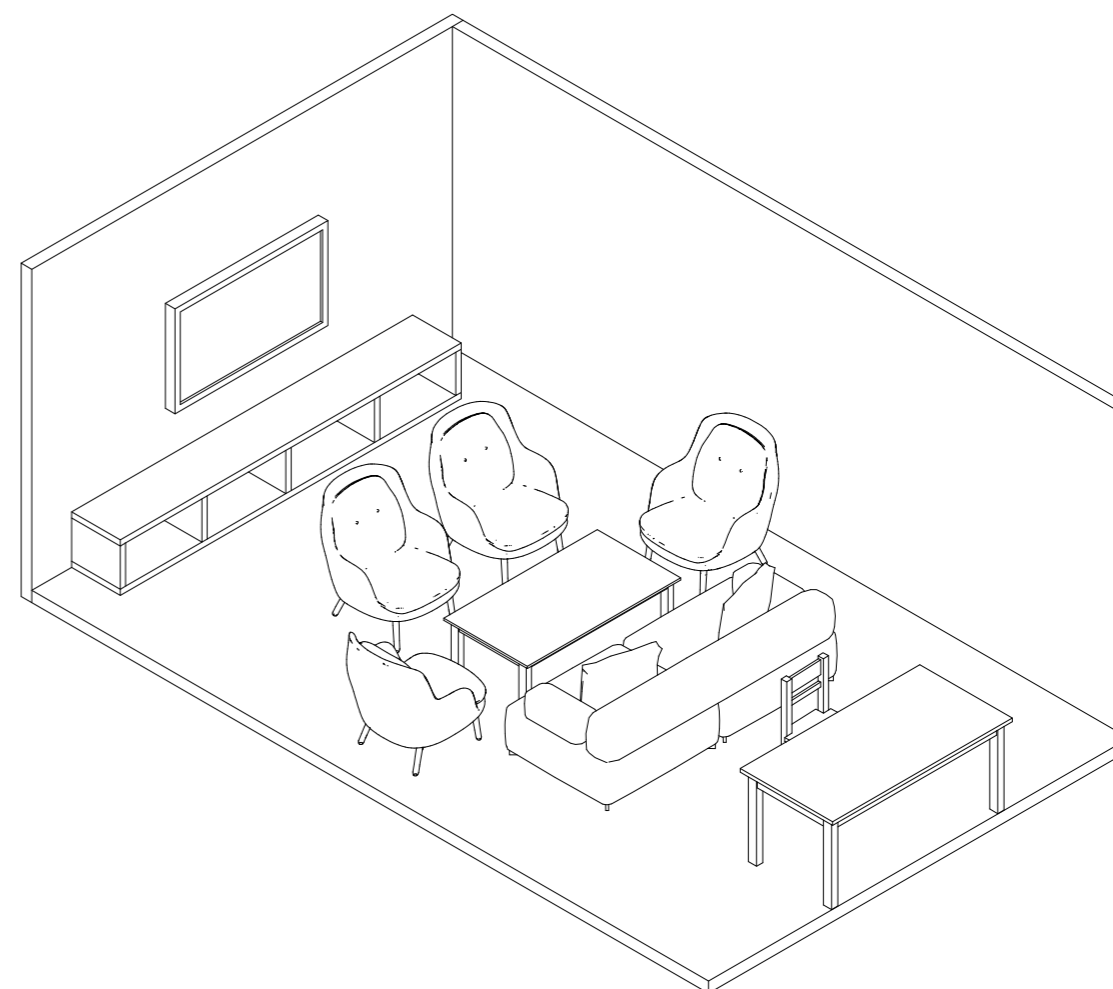
BBR contains the rules which cover the more technical aspects of the building. In this master thesis the main aspect of BBR to consider is regarding chapter 2: Common rules, as well as chapter 3: Accessibility, housing design, room height and operating spaces. These are selected as focus points since they handle requirements that need to be handled when designing a row house. They also set the framework of what is allowed and what is not. This is all done in order to secure qualities over time, creating long lived, sustainable and inclusive housing. Which in itself is a requirement in order to design widely accessible housing.

For residences with multiple floors, only the entrance floor needs to be fully accessible, which is the case with a row house. In order for the entrance floor to be accessible and livable, a few functions need to be considered.

- One bathroom
- A separable space to put a bed
- Possibility of cooking
- Space for meals
- Space for a seating area
- Entrance space
- Space for storage
- Space for washing and drying if a common laundry room is not available/ supplied.
- (Boverket 2023)

Architectural recommendations according to SIS

The Swedish standards institute (SIS) provides a framework of suitable standards regarding interior design, furnishing and other residential functions. This framework provides the architect with tools to determine the right amount and size of residential functions. This standard is optional to apply although most Swedish architects take the standards into regard in order to secure good measurements and residential qualities. The following illustrations showcase recommended furnishing in housing (Swedish Standards Institute [SIS], 2006).



Togetherhness

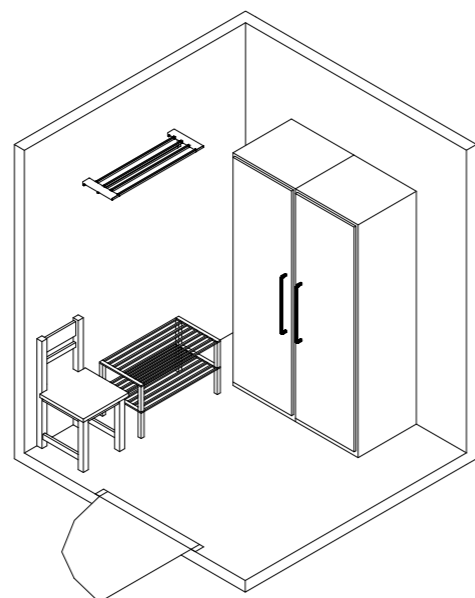
- Socializing
- Sitting (6 seats for a household of 4-5 people)
- Reading (3x bookshelves)
- Listening to music
- Watching TV

Work

- Reading homework (A big workplace, alternative an extra dining table for 4 persons)
- Working with a computer
- Sewing
- Writing

Entrance

- Entrance to the home
- Turn the wheelchair (Diameter of 1300mm)
- Sit to take off and put on shoes
- Store outer clothing and outer shoes (200x600mm per person in the household)

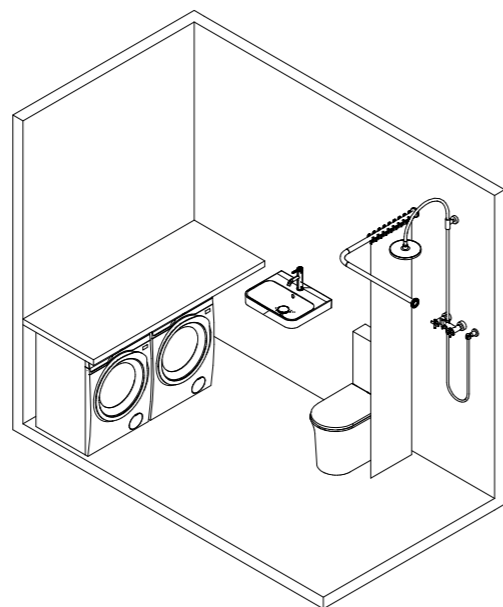


Storage

- Store clothes
- Textiles
- Toys
- Cleaning supplies
- Medicines
- Chemicals
- Etc.

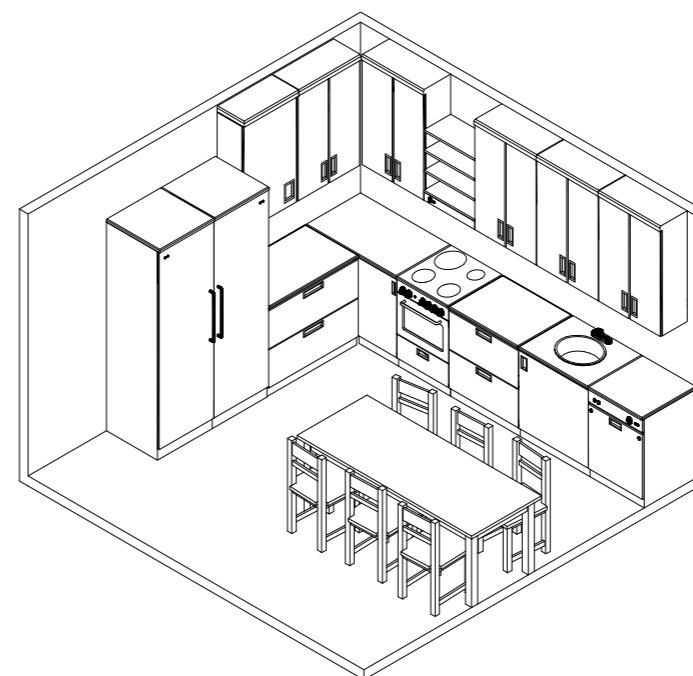
Personal hygiene

- Washing
- Bathing or showering
- Using the toilet
- Helping others with personal hygiene



Laundry

- Wash textiles by hand or machine,
- Dry
- Iron
- Store laundry; the laundry function can, in whole or in part, be transferred to a common laundry room)



Dining

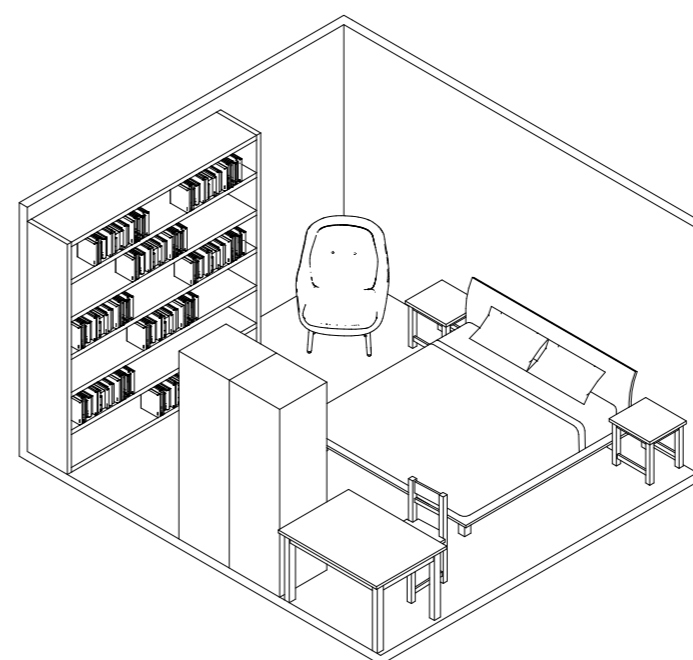
- Table (it should have the number of seats that reflects the number of residents + 2, where one seat must be able to be reached by wheelchair.)
- Eating
- Socializing at the dining table

Cooking

- Cooking
- Baking
- Washing up
- Storing food and utensils
- Sorting waste

Sleep

- Sleeping
- Resting
- Reading
- Spending time with children
- Simple healthcare



Economy for architects

To determine the cost of a project many aspects need to be taken into consideration and may be determined on many different levels. The foundation of the cost calculation is based on some form of "quantity" and a price related to that quantity. The economic analysis of this project will be based on the initial overview calculation that is made in early stages of a project, which is a surface calculation. The surface calculation calculates the amount of money a contractor can make based on the livable area of a residence (*Ekonomi För Arkitekter, 2012*). This delimitation is set due to the fact that the full economic calculation of a project depends and fluctuates a lot in relation to inflation, labor and material cost, etc.

Initially, when talking about the qualities of the home linked to finances, it may seem that these are opposed to each other. Promoting qualities in a home costs money, which is bad if you want to build cheap homes. Ola Nylander and Kjell Forshed believe that this need not be the case and argue for this in the book "*Åtta små hus*".

According to "*Åtta små hus*", Nylander and Forshed argue that it is the wrong approach to save financial resources by cutting down on the qualities of the home, as it has been proven that architectural quality is reflected in the building's financial perspective over time.

This is because architectural qualities have an added value of their own, which makes row houses attractive on the housing market for a long time. The authors compare housing that was built during the 60s in Sweden, when Sweden was in an economic boom and prosperity. Many of the homes that were built during this economically strong period have had to be renovated many times in order for them to remain attractive on the housing market. Something that they believe speaks for fine architectural qualities lasting over time.

In the book, Nylander and Forshed argue for reducing housing costs by reducing the dwelling area and using alternative materials, for example reducing dwelling area from 105 to 90m² and using a wooden structure instead of concrete creates big differences for what price the house will end up at in the end when it reaches consumers. These approaches make housing more affordable for both homebuyers and contractors (*Nylander & Forshed, 2003*).

Case Studies

Second phase



Facade of Koriandervägen. Fig 2.1

Koriandervägen 9D

Location: Höör, Sweden

Area: 90m²

Architect: Kontur Architects

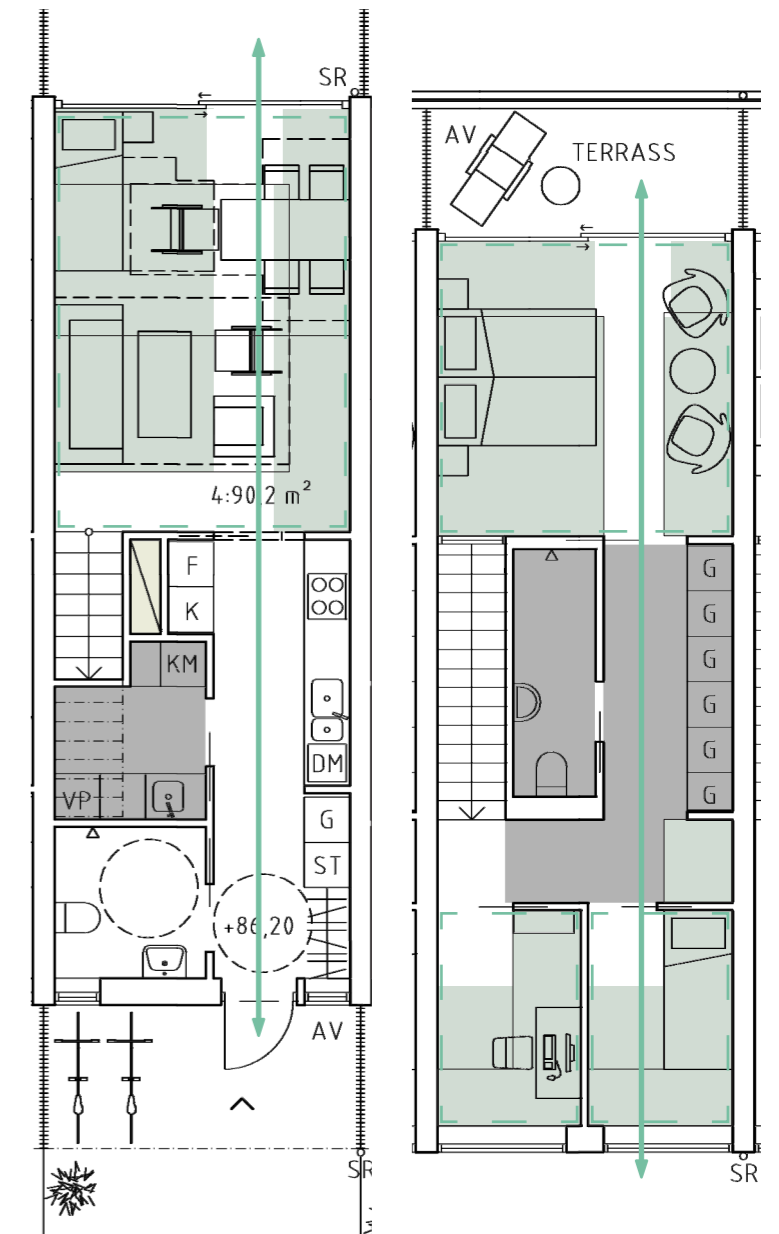
In this example there are many interesting design strategies implemented. The shape of the building is very long and narrow, which as a consequence leads to long communication areas in order to reach the different parts of the residence.

Even though the design utilizes space in an efficient way, many qualities are lost in the process.

For example is the kitchen not able to be separated from the rest of the building. There is no possibility to separate the dining area and the living room. If a living situation would require for there to be a bed placed on the entrance floor, this would take up most space in the living room. The smaller bedrooms on the second floor are minimal in size and would generally not be categorized as separate rooms due to the rooms being 5sqm in area each.

The design has some efficient elements when it comes to utilizing the given space. Even though there are shortcomings related to the placement of the kitchen, this choice of design effectively utilizes the communication stroke, leaving the area fully utilized. The staircase is effectively integrated with the laundry room and the second floor has great possibilities for storage as well as the possibility to shower on the second floor.

The furnishability in this example reached 45%, which in MAB terms does not meet the criteria. But with this loss of furnishable space one has to look at what qualities are gained in its place. The row house gains storage and bathroom/laundry possibilities which are wonderful qualities to have in a small row house.



Entrance floor. fig 2.2

Second floor. fig 2.3





Facade of Rødbedevej Fig 2.4

Rødbedevej 125

Location: Aarhus, Denmark

Area: 90m²

Architect: -

This is an interesting example. Rødbedevej 125 is located in Denmark and does not have to comply with Swedish building regulations, but there are some interesting design strategies here.

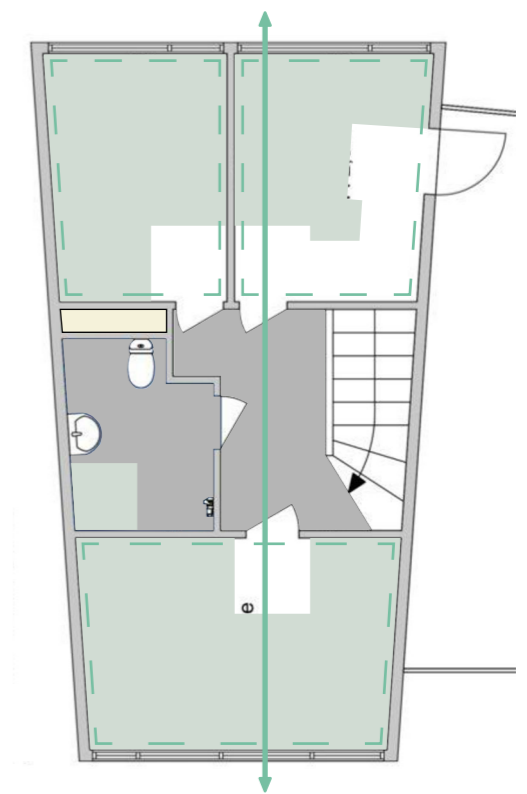
This example works with a different shape to suit the overall concept of the residential area, which leads to odd shaped rooms. The angle of the rooms is not so drastic that it completely impacts the furnishability, but it is noticeable.

In this example The Staircase has been integrated well over the ground floor bathroom.

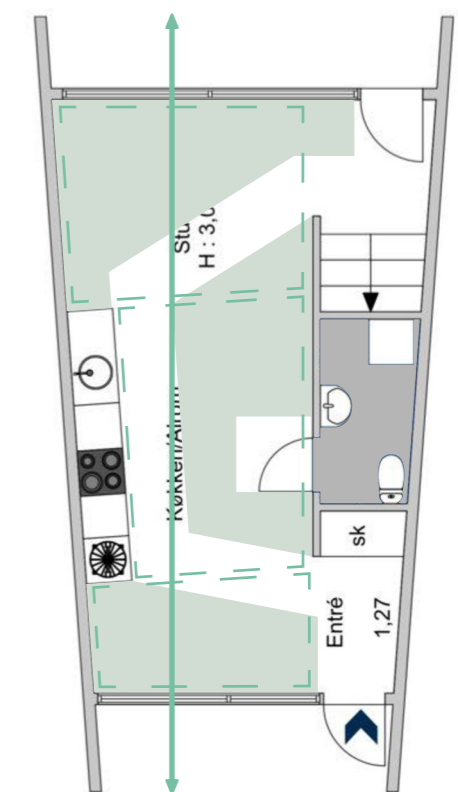
The kitchen is located in a place where the bathroom is faced towards it, which is not ideal, but it provides space for the dining area to be in direct relation to the kitchen, which in turn free space in the north and south parts of the building. Even if it is not utilized in the most effective way.

The second floor has generous bedrooms and also utilizes the roof of the neighboring residence as a terrace. This allows the row house to access light in an additional facade direction, which is a great quality for a row house. This is however not fully utilized in this example, but it raises a question of what qualities that can be unlocked if one works with the shape and functions of the building to gain access to these additional facade directions.

-  Axiality.
-  Furnishable space.
-  Technical solutions.
-  Dark areas.
-  Shape of rooms.



Second floor. fig 2.5



Entrance floor. fig 2.6



The Site

Eriksbergsplatån - Hisingen, Gothenburg





0 50m



Scale: 1:15 000

Eriksbergsplatån

Eriksbergsplatån is a row house area located on the southern part of Hisingen in Gothenburg Sweden. The area consists of 79 three story row houses divided into eight different lanes. The row house-lanes are divided by a low pace street on one side, and a private passage on the other side. The low pace street is decorated with trees that mark out the spaces designated for private parking, providing the area with a small-scale avenue feeling.

The row house-lanes are also connected through a passage that reaches across the lanes. Within these passages the common garbage disposal is located.

Every row house has access to a small private garden with a separated shed that is commonly used as external storage.

Private parking for the residents is distributed alongside the roads that divide the area. The parking areas also provide charging for electric vehicles.

There are many green areas in close proximity to the residential area. There is a small park that is surrounded by functions in the north, as well as a larger park in the south - eastern direction towards Göta älv.



Picture 1. The private passage through the row house lanes.



Picture 2. Private parking on the street outside.



Picture 5. The private passage through the row house lanes.



Picture 6. Common garbage disposal between the houses.



Picture 3. The low pace street through the row house lanes.



Picture 4. The park in close proximity to the row house area.



Picture 7. Charging station for electric vehicles.



Picture 8. Low pace street with a view of Eriksberg .



Astris gata 12

Location: Gothenburg, Sweden
 Dwelling area: 152m²
 Year of production: 2006
 Architect: Liljewalls Arkitekter
 Market value (2024): 57 000 sek/sqm
 Total price: 8 664 000 :-

The row houses located at Eriksbegsplatån range between the areas of 162 - 140 sqm, where the majority of the rowhouses has a dwelling area of 152 sqm.

The row houses on the site are spacious and rich in qualities that are picked out and analyzed in the following pages.

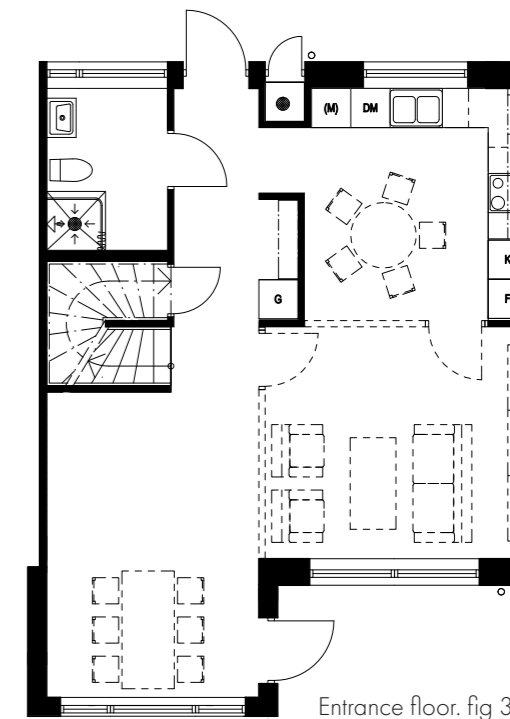
The row houses vary in size where most of the row houses have 3 dedicated bedrooms with an empty third floor. The floorplan suggests that the open third floor can be converted into two separate rooms without any fixed purpose. This adds a flexible element to the floorplan. The flexibility of the upper floor suggests that the two suggested autonomous rooms could be transformed into bedrooms.

This implies that the residence may host 3 - 5 bedrooms. That means that there are around 237 - 395 bedrooms in the area.

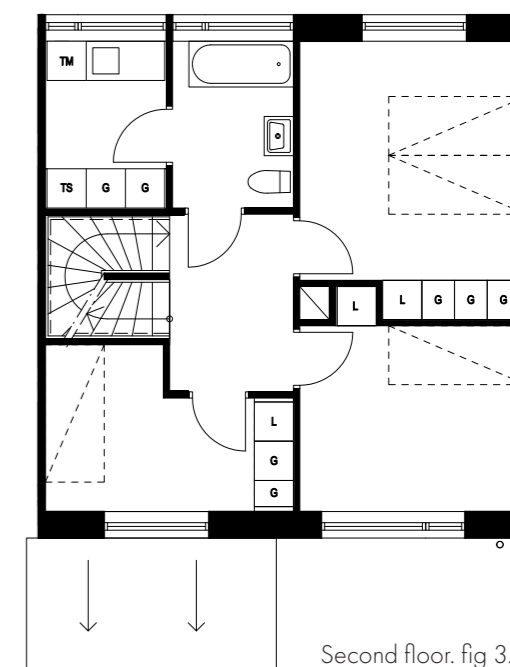
The entrance floor has a similar flexibility where both the living room and the kitchen can be separated to create separate rooms.

There are many noticeable qualities when taking a first glance at the row house. The entrance floor is very spacious with two dining areas presented, as well as a spacious living room.

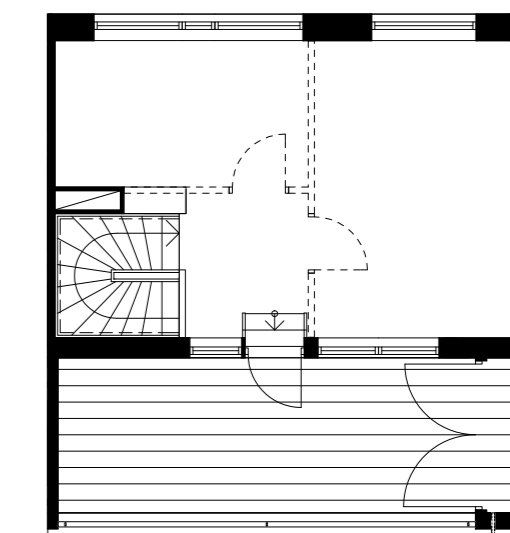
The second floor hosts a spacious bathroom with shower possibilities as well as a laundry room.



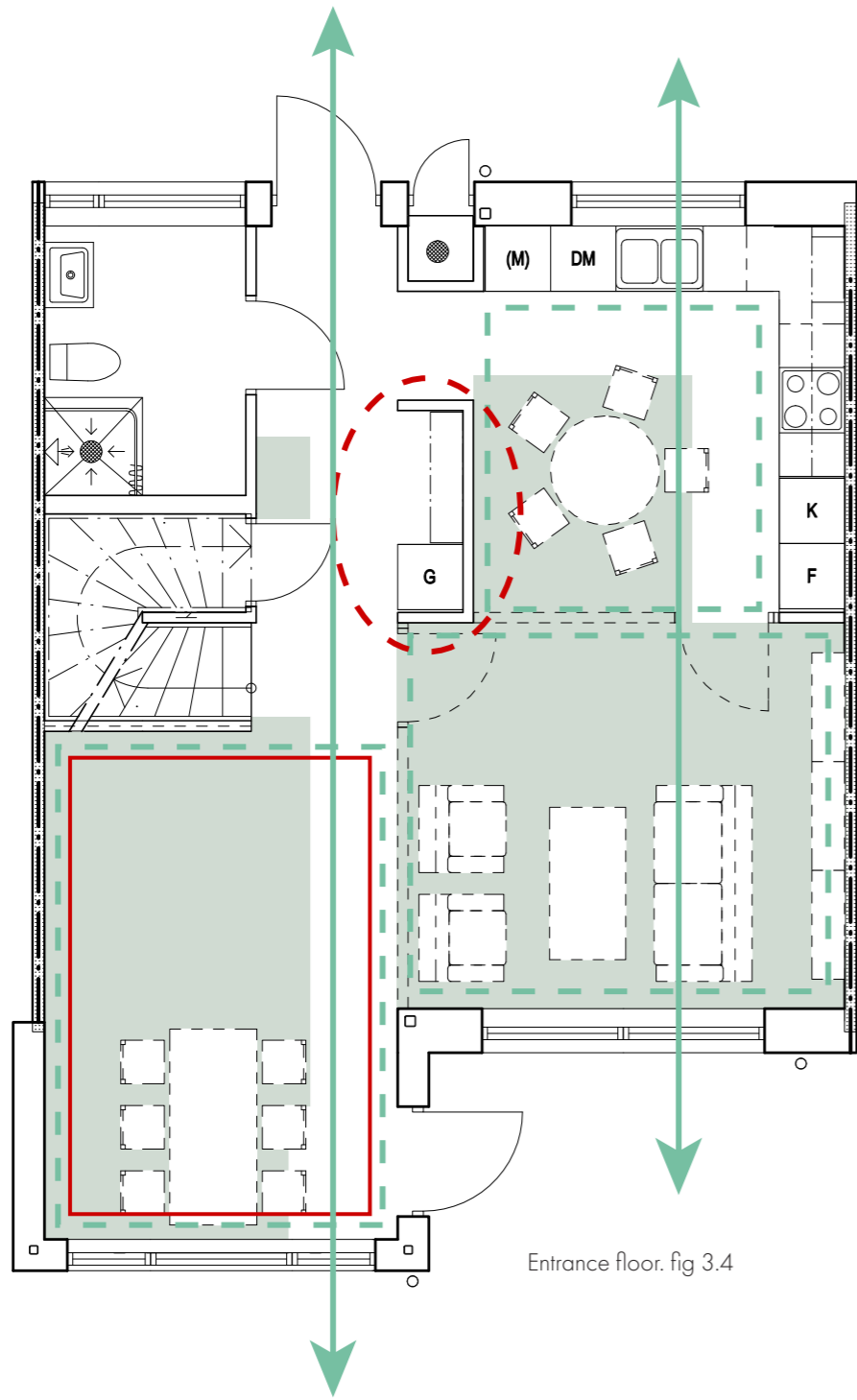
Entrance floor. fig 3.1



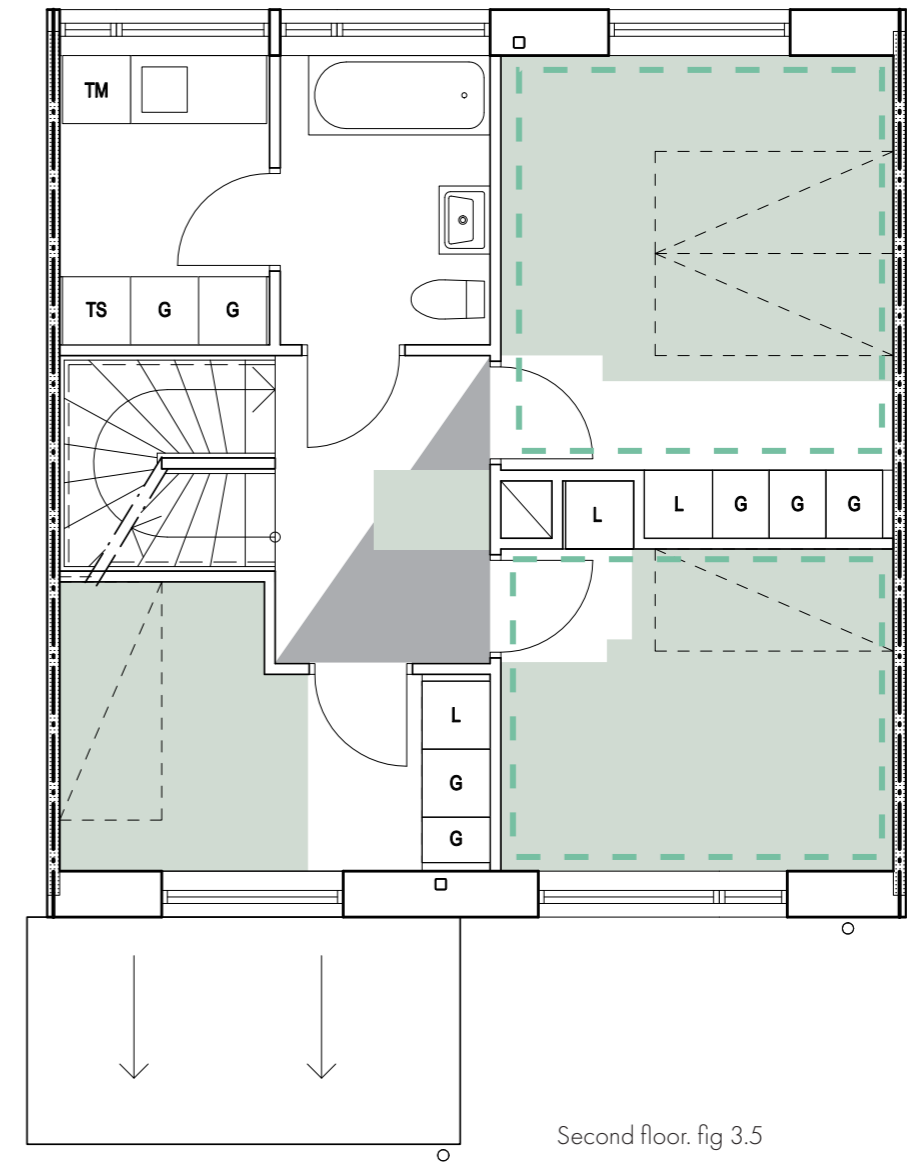
Second floor. fig 3.2



Third floor. fig 3.3

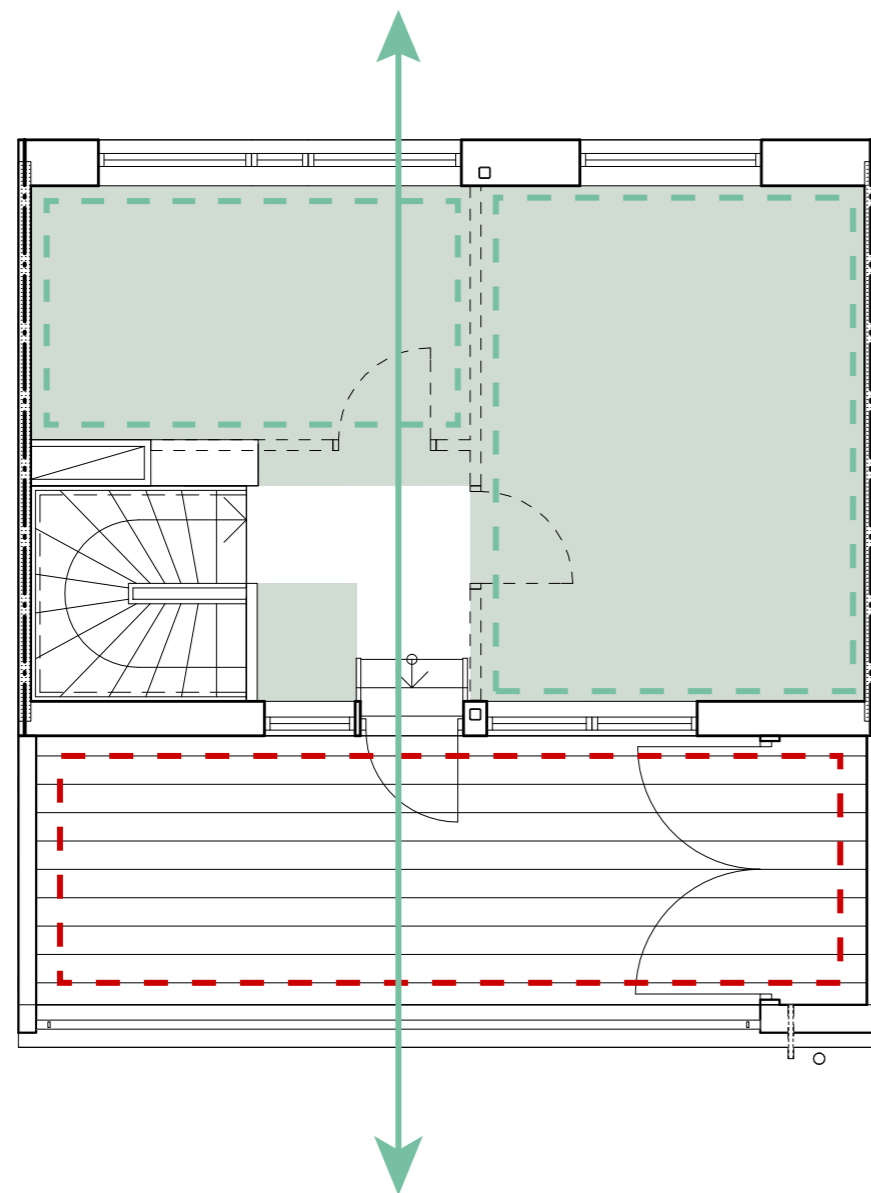


Entrance floor. fig 3.4



Second floor. fig 3.5

- Axiality.
- Dark areas.
- Shape of rooms.
- Furnishable space.
- Accessibility
- Circularity.
- Potential for continued living



Third floor. fig 3.6

Analysis

The row houses contain multiple desirable qualities. Given the large livable area it has 57% furnishable space. This is partially achieved due to the 152 sqm of livable area, but also through a central line of communication through the residence. This enable more furnishable space on either side of this communication-stroke.

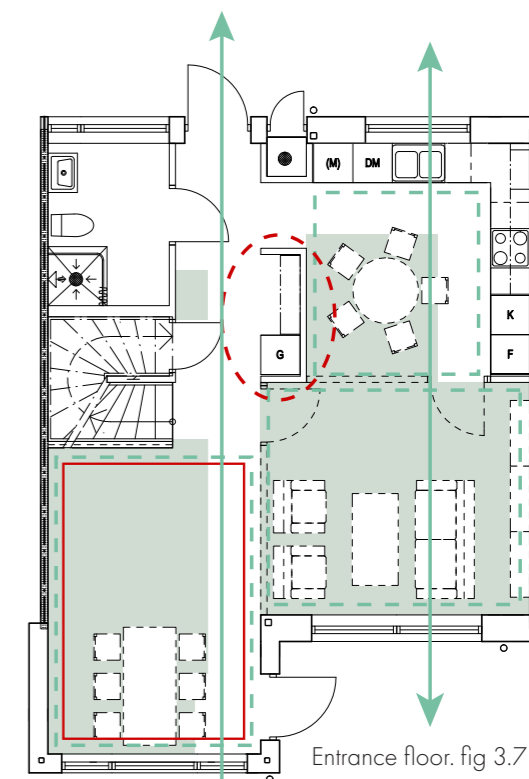
The entrance floor enables multiple qualitative functions such as circulation, axially, simply shaped rooms, the possibility of dividing the rooms as well as potential for residential healthcare.

The second floor hosts three bedrooms, a large bathroom as well as a laundry room. The bedrooms are generous in size with well planned storage. The communication spaces are planned to the minimum, which enable larger rooms in general. The shape of the rooms varies and none of the rooms are able to be divided.

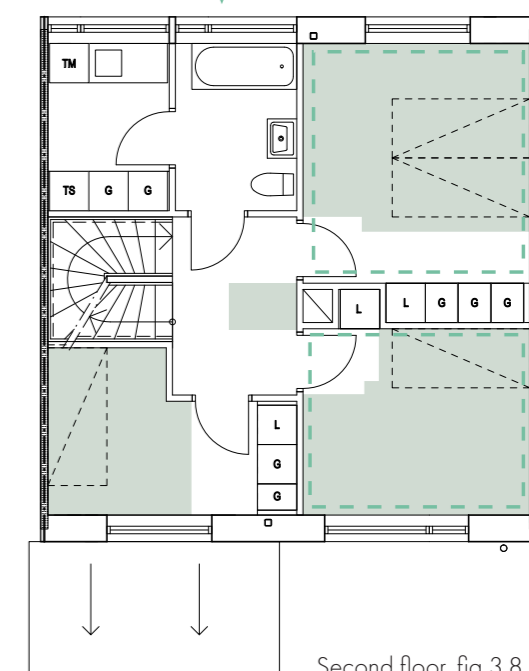
The third floor is open and very customizable. The original plans suggest that the floor could be divided into two rooms, which could serve multiple functions. The third floor also has access to generous outdoor terraces with built in storage.

The general qualities of this row house are deemed as many. The row house has plenty of furnishable space, as well as flexibility and efficient ways of utilizing communications and dead space throughout the row house.

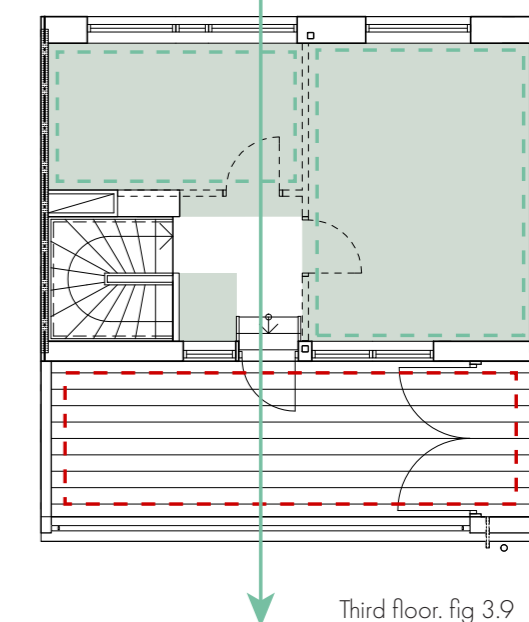
Given the flexibility, many parallel functions can occur at the same time in the residence as well as enable change over time, which both are great qualities for ensuring long livability in the residence. Another great quality is the possibility for residential healthcare on the bottom floor of the row house. A room can be shut off to be used as a bedroom to support healthcare functions, while at the same time enabling a generous living room and dining area.










Entrance floor. fig 3.7



Second floor. fig 3.8



Third floor. fig 3.9

-  Axiality.
-  Dark areas.
-  Shape of rooms.
-  Furnishable space.
-  Accessibility
-  Circularity.
-  Potential for continued living

Design Strategies

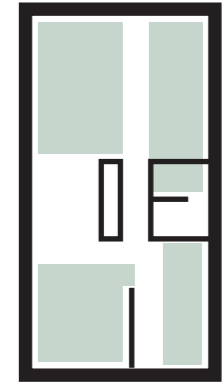
Qualities to consider and how to implement them.

Furnishable space

Furnishable space is especially important in a row house since the furnishable space dictates what a resident can bring into the house in terms of furniture and accessories.

The required amount of furnishable space also dictates the amount of communication space the row house should have, which both works as a creative and challenging delimitation when designing a small row house.

The staircase presents a particular challenge when achieving this quality, since this is a required element for reaching the different levels of the row house. The integration of the staircase is therefore very important when designing a small row house.

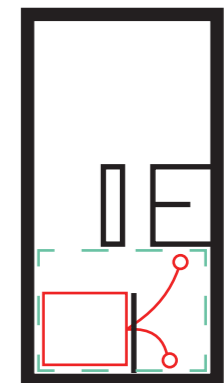


Aging - in - place

Aging in place is an important quality of the small row house since it dictates who is able to live in the residence as well as how long someone can live in the residence.

By enabling aging in place, the row house is accessible to more target groups, which in turn makes the row house more accessible.

Since aging in place is mainly located on the ground floor of the row house, the layout of the ground floor is important. The measurements of the bedroom should be 3000x3100 mm, which require a clear division of the rooms on the ground floor.





Axiality

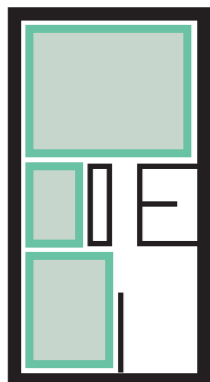
Axiality is important since it enables movement and enriches the experience of the rooms. This is especially important in a small row house where a sense of movement and axiality aids in making the rowhouse feel larger than it is.



Circulation of movement

Circulation within the row house creates the feeling of space, since it creates movement in the residence. This is important in a small row house because it makes the experience of the space larger than what it is.

In a small row house this could be utilized with circulation through the inside and the outside, as well as through the inside.



Shape of rooms

A simple shape of the rooms is a quality when it comes to furnishing a room. This enables better use for furniture as the rooms are easier to furnish.

In a small row house this can be accomplished by planning built-in storage and technical shafts, primarily in the bedrooms on the second floor, as well as keeping the rooms as simple as possible.

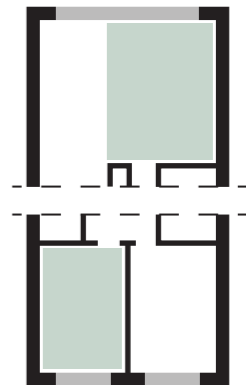
Varied number of rooms

The ability to separate rooms makes the row house flexible and adaptable to different situations of life. By planning rooms in such a way that a wall can be raised to create multiple rooms is a quality that enables the resident to put the pressure on the home and not the other way around. This makes the residence accessible to additional target groups.



Parallelity

The parallel use of functions in a rowhouse is of most importance. Since the main target group of residents in a row house are primarily families with children. By that definition, everyday life contains a lot of noise and movement in a residence. In order to enable privacy, multiple activities need to function at the same time without interrupting one another. This is especially important in our time where Covid-19 has made a home office a necessity. This puts even more pressure on the fact that parallelity is a desired quality, especially in a small rowhouse.



Use of communication space

In order for movement to occur in small spaces, areas of communication are almost inevitable. If these areas of communication could gain a secondary purpose, the space used for communication would be effectivised and utilized for different purposes, thereby utilizing the space to the fullest.



Design Proposal

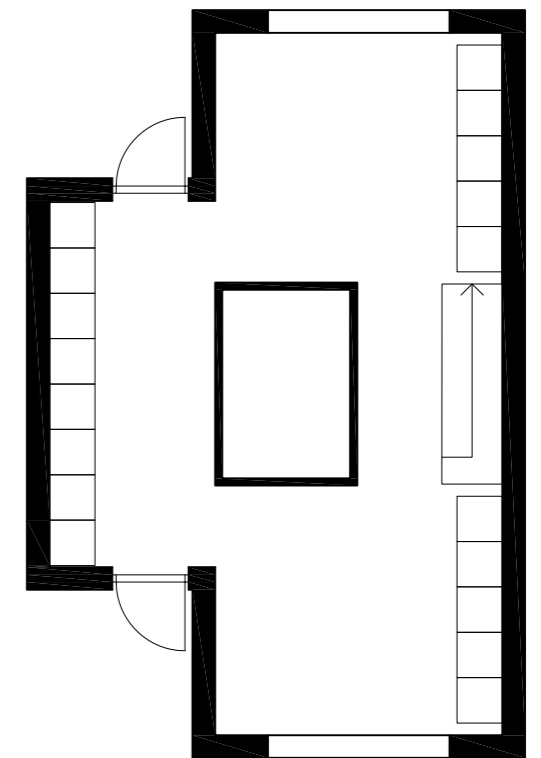
Third phase



The Concept

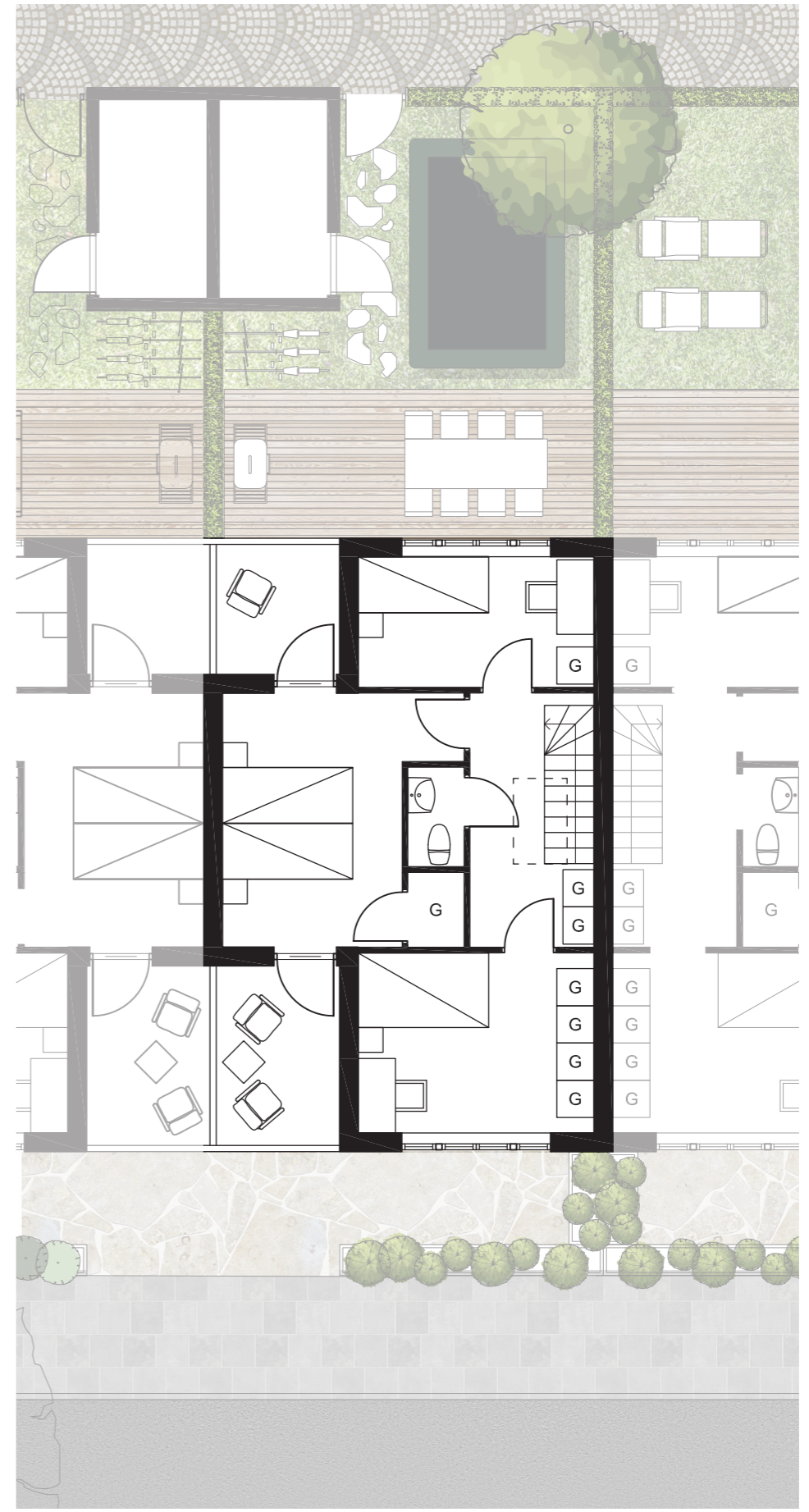
The concept of this row house proposal is based on a division of rooms with a bathroom - core. The long and narrow shape of the row house has been complemented with a western extension in order to create an opportunity for a central entrance, as well as dictating the bedrooms on the upper floor.

The proposal has a great focus on axialities and movement through the row house, which in turn means that there are a lot of communication areas. This communication area has been utilized in order to both host different functions such as storage, laundry and sleeping possibilities in order to make use of the communication areas.



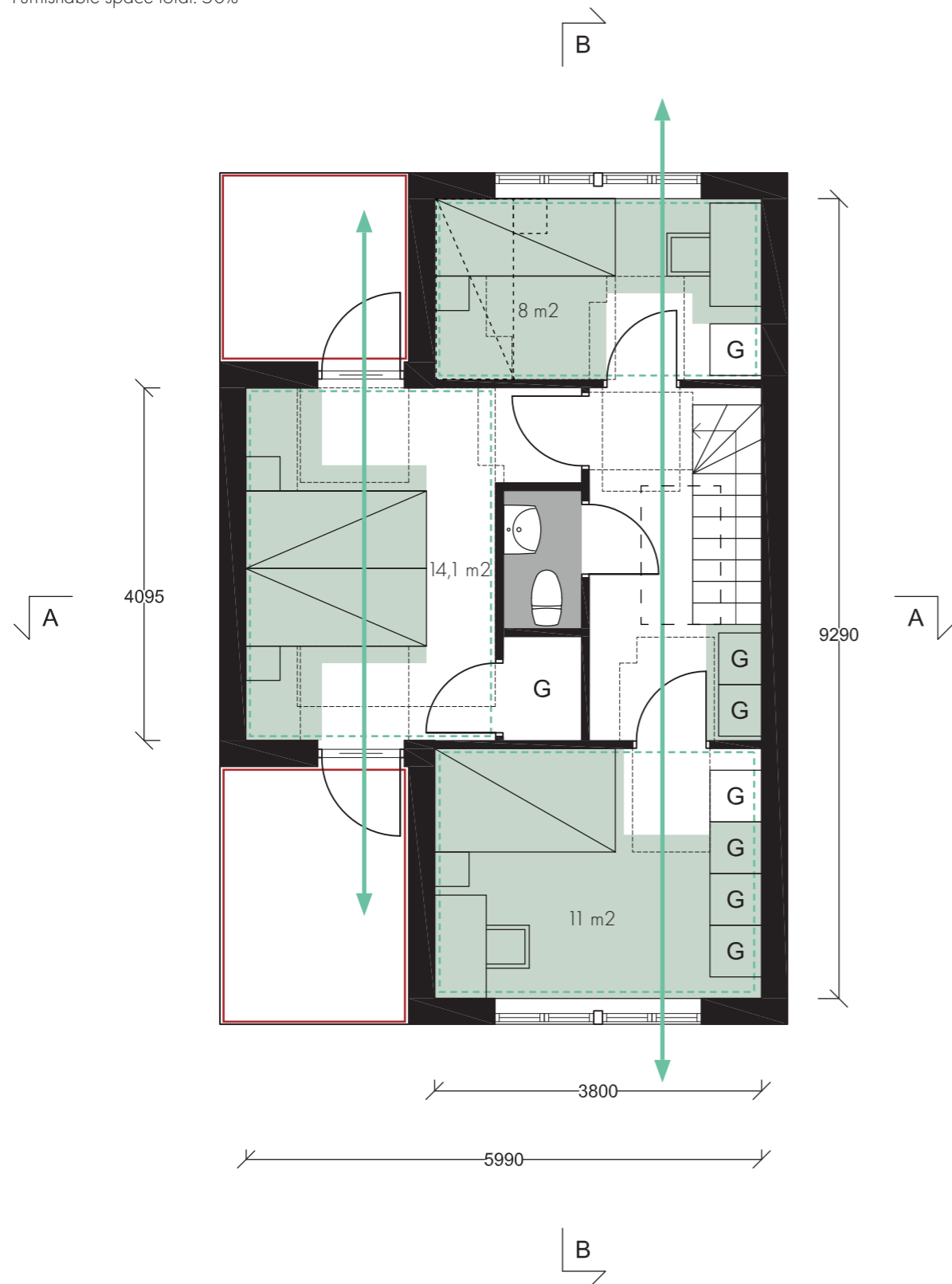


1 5m  Entrance Floor Scale: 1:100



1 5m  Upper Floor Scale: 1:100

Location: Eriksbergsplatån, Gothenburg, Sweden
 Dwelling area total: 90 sqm
 Dwelling area upper floor: 44 sqm
 Furnishable space total: 50%



- Axiality.
- Shape of rooms.
- Furnishable space.
- Accessibility
- Balconies



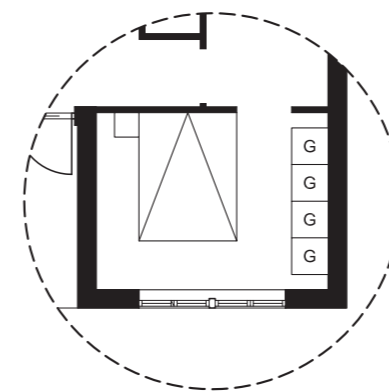
Scale: 1:70

Upper floor

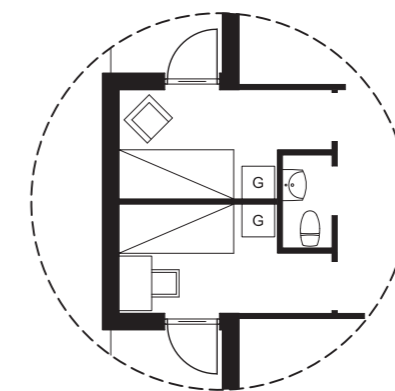
The upper floor is more loosely regulated when it comes to accessibility. Although there are no direct requirements that need to be fulfilled when it comes to accessibility, having somewhat accessible spaces around doors, furniture and communications is a quality of its own. On the upper floor this has been taken into regard by working with limited accessibility, which still takes accessible measurements into consideration. The upper floor is also a bit smaller than the entrance floor. The upper floor has a dwelling area of 44 sqm compared to the bottom floor that has a dwelling area of 46 sqm. In order to achieve this, the walls in the southern end of the western extraction have been moved inwards.

Much like most modern row houses in Sweden, the second floor is more private in nature compared to the entrance floor. The upper floor hosts three bedrooms, a small bathroom and two balconies. The bedrooms are designed in a flexible way where it is possible to vary the number of rooms in order to adapt the row house to different situations of living. The western master bedroom can be shut off with a wall in order to create two separate bedrooms, each with their own access to a balcony. The southern bedroom can be converted into a master bedroom that easily fits a 160cm wide Queen sized bed. The southern bedroom is also prepared with a lot of storage and workspaces. The northern bedroom is the least flexible of all the bedrooms. For the cost of flexibility, it gains the features of having a workspace as well as the ability to furnish a bed of various sizes.

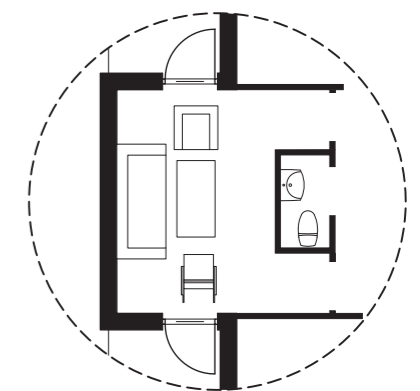
The communication area between the rooms have been effectivised by providing a small bathroom as well as additional storage.



The southern bedroom can be converted into a master bedroom.



The master bedroom can be split into two 7sqm bedrooms



The master bedroom can be converted into a spacious livingroom

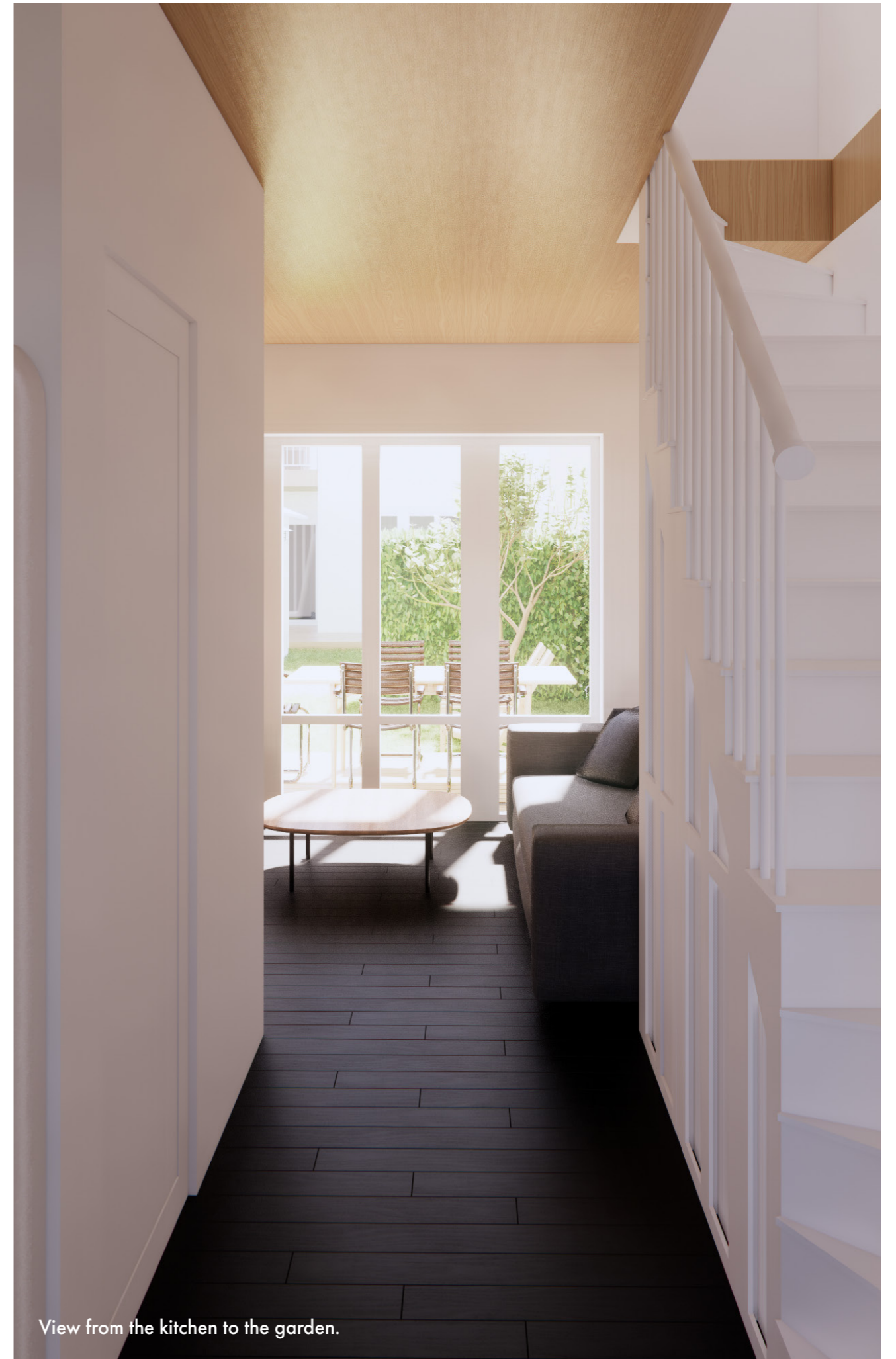
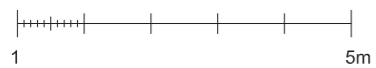


Section A - A

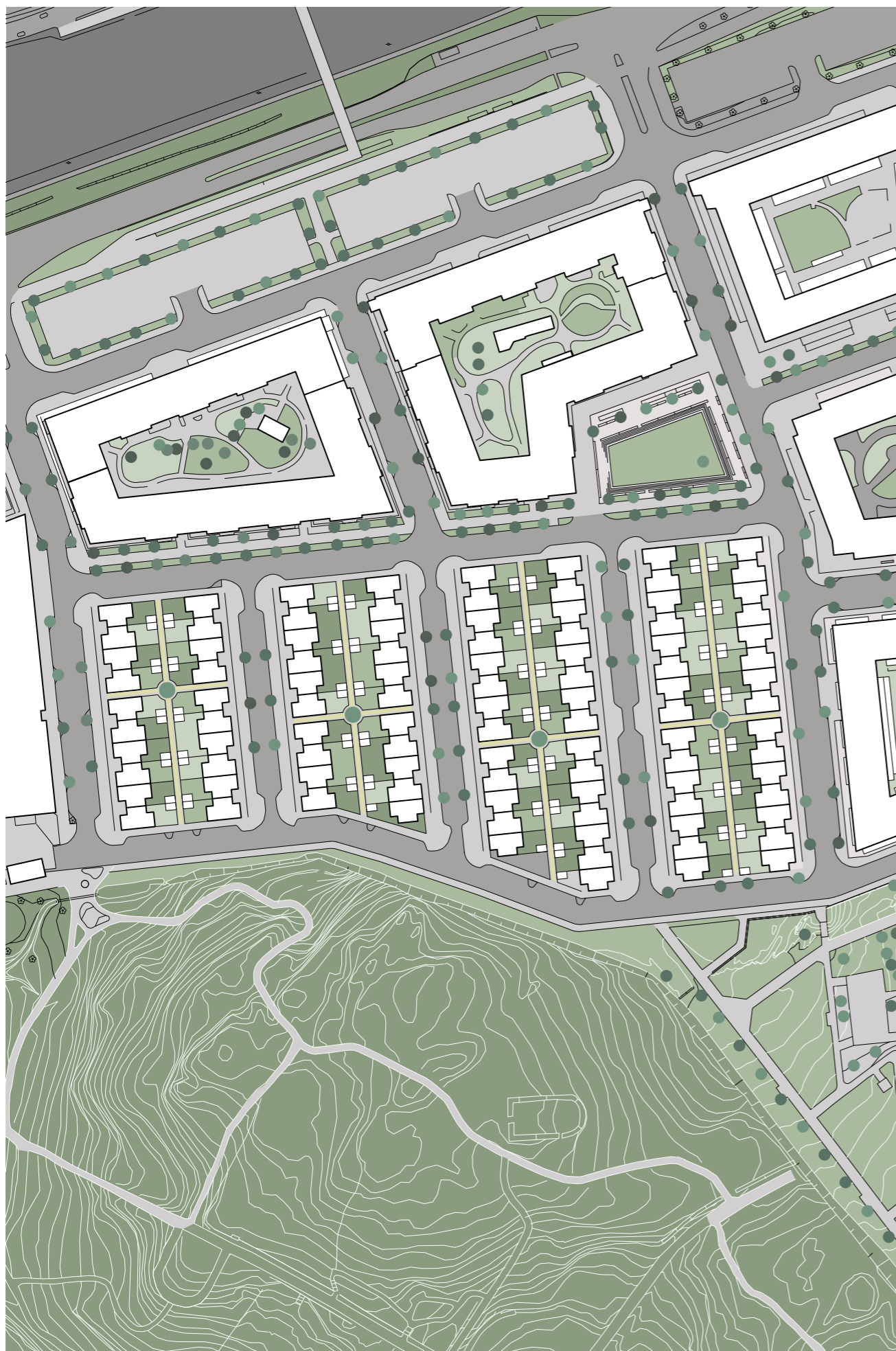


Section B - B

Scale: 1:120



View from the kitchen to the garden.

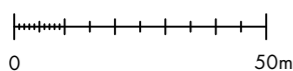


The Site

The layout of Eriksbergsplatån has not been drastically updated compared to the original layout. The structure with private gardens, a shed for storage, a forecourt and the walkways through the areas have remained, because it was the most optimal way of planning a neighborhood such as this, in my opinion. The space for garbage disposal and parking has remained, while the walkway across the area has received a tree in the middle. This subtle change catches the eyes of bypassers and acts both as a private barrier in the more private part of the area, but also as a node on a local level.

The main component that has changed is that there are now 99 housing units in the area compared to the 79 units that the previous layout hosted. The scale of the buildings have been lowered as well, since the row houses in this proposal only contain two floors, while the previous proposal had three floors.

By increasing the number of housing units in the area means that more people can live in the area. One way to calculate how many people that can live in the area could be determined by the amount of dedicated bedrooms the plan layout supports. This row house proposal has in its original layout 3 designated bedrooms, that can be turned into 4 bedrooms. This means that the amount of bedrooms in the area are calculated to 297 and 396 bedrooms respectively.



Scale: 1:15 000

Facades

When more units of row houses occupies the area a couple of challenges arises. One of these challenges is the question of monotony and how that could be handled. My solution to this was to mirror the row houses against each other. This creates an "irregular" expression in the cityscape while at the same time open up the space for balconies. Apart from the mirrored facades, my vision is that the individuality of the row houses will be put in focus by allowing the residents to paint each row house in whatever color they want. This idea has been inspired by the row house areas in Ängården and Majora in Gothenburg which brings a breath of fresh air into a neighborhood where the row houses have a repetitive shape.



What are the economical differences?

The economical difference between the two proposals are hard to determine since there is no true way of knowing what the price of a residence will be until it has been constructed and sold. Many factors determine the final price of a row house. Although there are uncertainties related to a calculation such as this, the difference in price can be speculated.

The current market value of the row houses on Eriksbergsplatån is 57 000:- per square meter (BOA). This would mean that the total market value of one row house is 8 664 000 :- . In order for this to be a fair comparison between the two proposals, the cost of construction would have to be calculated in order to calculate the margin of profit for both proposals.

According to "byggstart.se", the production of a house ranges roughly between 17 000 - 22 500:- per square meter (BOA), where constructing larger buildings tend to keep the cost down compared to building smaller residences (Byggstart, 2024).

For the purpose of this calculation we assume that the cost of production of the current row house is 17 000:- /sqm and 22 500:- /sqm (BOA) for the new proposal. In order for the calculation to be accurate, the cost of production will be increased by 20% to cover the cost of the total row house area (BTA). The cost of production of the new row house proposal is roughly 33% higher, taking the difference in size into regard. Since the cost of production affects the value of the row house, let's speculate that the market value of the new proposal will be 33% higher as well, making the market value of the new row house roughly 75 800:- per square meter (BOA).

Existing proposal

Market value: 57 000:- /sqm (BOA)
Cost of production: 17 500:- /sqm (BOA)

Production cost per row house
 $17\,500 \times 152 \text{ sqm} \times 1.2 = 3\,192\,000:-$

Production cost for the whole area
 $3\,192\,000 \times 79 \text{ units} = 252\,168\,000:-$

Market value per row house
 $57\,000 \times 152 \text{ sqm} = 8\,664\,000:-$

Market value for the whole area
 $8\,664\,000 \times 79 \text{ units} = 684\,456\,000:-$

Total profit:
 $684\,456\,000 - 252\,168\,000 = 432\,288\,000:-$

Profit margin:
171%

New proposal

Speculated market value: 75 800:- /sqm (BOA)
Speculated cost of production: 22 500:- /sqm (BOA)

Production cost per row house:
 $22\,500 \times 90 \text{ sqm} \times 1.2 = 2\,430\,000:-$

Production cost for the whole area:
 $2\,430\,000 \times 99 = 240\,570\,000:-$

Speculated market value per house
 $75\,800 \times 90 = 6\,822\,000:-$

Speculated market value in the area:
 $6\,822\,000 \times 99 = 675\,378\,000:-$

Total profit:
 $675\,378\,000 - 240\,570\,000 = 434\,808\,000:-$

Profit margin:
180%

As previously stated, there are many uncertainties when trying to calculate the value of a row house that is still yet to be built and sold. With a speculated market value based on the general cost of production the profit margins are almost equal. Based on this calculation and profit margins only, it would be more profitable for a contractor to build a row house area containing the new proposals while at the same time being able to host more people in the area.

Comparison

After an analysis of both proposals it becomes apparent that both proposals share many qualities. Both proposals share flexible elements where walls can be raised in order for more rooms to be utilized, thereby making the residences flexible to changes over time. They also share the quality of parallelity where multiple functions can occur at the same time without disturbing each other. In the existing proposal this is achieved due to the flexibility of the third floor, in combination with the spacious bedrooms on the second floor. In the new proposal this is achieved with the flexibility of the general room on the entrance floor as well as the bedrooms on the second floor.

Both proposals share other qualities such as balconies, multiple axialities, circulation, potential for continued living and simple shaped rooms.

Although many qualities are similar between the proposals, there are still a number of qualities that sets them apart. In the existing proposal the entrance floor is able to host a generously sized living room with two possible dining spaces. If one of the spaces would be utilized as a room for aging-in-place, there would still be a dining area and a living room available on the entrance floor. This possibility is not present in the new proposal due to the shortage of space. The upper floor in the existing proposal is able to host a large bathroom with a shower and a spacious laundry room.

These qualitative differences could be related to the difference in furnishable space between the two proposals. The existing row houses have furnishable space up to 57% of the total dwelling area, and the new proposal has 50%. This difference between the two proposals may depend on many different factors. One factor being the quite extensive gap in size between the two proposals, where the existing proposal has a dwelling area of 152 sqm and the new proposal has 90 sqm of dwelling area. This illustrates one of the challenges of designing residences with a small dwelling area. Different qualities affect each other which both limits qualities, as well as providing possibilities for new qualities to arise. One example can be seen on the entrance floor in the new proposal, where the central bathroom core affects the furnishability, while at the same time provides solutions for a clear division of rooms, as well as a possibility for a small autonomous room.

When overviewing the site plan, by applying the newly proposed row houses on Eriksbergsplatån, more housing units can be placed. This means that the number of residents will increase in the area. With the new proposal 99 row houses can be placed in the area compared to the 79 row houses that reside on Eriksbergsplatån today. The increase in residents can be measured by the number of bedrooms that the different row houses possess. The existing row houses have 3 designated bedrooms which can be maxed out to 5 bedrooms in total, if the proposed rooms on the third floor are utilized as bedrooms. The new proposal also have 3 designated bedrooms that can be maxed out to 4 total bedrooms, if a wall is raised in the main master bedroom. The total amount of bedrooms the existing row houses can provide ranges between 237 - 395 bedrooms. The total amount of bedrooms the new proposal provides ranges between 297 - 396 bedrooms.



Discussion



Summary

The demand for small housing is on the rise, while the housing market is more expensive than ever. In order to meet demand and to make small housing more accessible to the general public, the aim of this thesis is to provide an alternative where a row house could be designed on a dwelling area of 90 sqm with the aim of making row housing more affordable without a loss of qualities. The thesis has provided a row house proposal with a dwelling area of 90 sqm where the preservation and enhancement of qualities has been the primary objective through the aid of developed design strategies. The row house proposal was then placed on the site of Eriksbergsplatån and compared with the already existing row houses in the area to determine the qualitative gains and losses.

Conclusion

By applying design strategies tailored towards compact row houses it is possible to acquire qualities almost comparable with a row house with a dwelling area of 152 sqm. While there will be some undeniable drawbacks in the amount of furnishable space and qualities related to the amount of space available in the residence, the proposal aids the architectural discourse that it is possible to design compact row houses where qualities are preserved and enhanced.

Reflection

The design process of this proposal has been an interesting experience. In order to ensure certain qualities in the compact framework of 90 sqm, a concept was adapted early on in the design process. This concept revolved around a bathroom - core that would aid in separating the rooms on the entrance floor to aid the bedroom formation on the upper floor, as well as providing circularity and movement throughout the row house. This strategy had its own qualitative gains and losses. It divided the floorplan in such a way that many desired qualities could be achieved, while in the process replacing potential furnishable space with communication areas. While every utilized square meter is of importance when designing a compact residence, the application of the central bathroom-core provided more qualities and provided a structure to the row house that would not have been possible otherwise.

One interesting aspect of designing a row house on 90 sqm, is the impact of additional space as well as the consequences of reducing space. The design process of the proposed row house required a lot of shrinking and pushing different measurements in order to both secure necessary internal measurements while at the same time keeping the dwelling area small. This can be seen in the measurements of the row house, where even numbers practically do not exist. The process of pushing and dragging measurements got to a point where a measurement difference of 50mm decided if the proposal would work or not. This means that by adding a few extra square meters to the overall project could improve some qualities. For example enabling a shower in the upper floor bathroom. Even though the proposal could be aided by a few square meters, it still shows that it is possible to acquire great qualities without making the residence too big.



The consequences related to downsizing can be seen in the comparison between the two proposals. The existing proposal hosts many qualities such as the ability to both host a room for aging in place and a spacious living room, as well as showering possibilities on the second floor. These are qualities that are not present in the new proposal due to the lack of space in relation to the design of the row house. By downsizing a row house that thrives on qualities such as this, some qualities are lost. I do not believe that this is an argument enough to not consider moderate downsizing in order for row housing to become more affordable, but it is an interesting observation that the amount of livable space provided in a residence dictates the amount of qualities that can be provided in the final result.

On the subject of affordability, one might ask the question if the final proposal succeeded in the aim of making row housing more affordable. This is a question of relevance, since the speculated price reached 6 822 000:- per housing unit. This is a rather large sum for a row house with a dwelling area as compact as 90 sqm. One thing to note in this discussion is that the proposed market value is just a speculation based on the rise of the price of construction. The row house is also placed in a central part of Gothenburg, which would generally raise the price of any residence. If the row house would be placed in another area, the final price would be different. As previously mentioned, the final price of a residence is almost impossible to determine before the residence is sold. The most probable outcome would be that the row house would be cheaper than the speculated price if it was sold today, which would make the proposal more affordable than the existing proposal it is compared with and thereby making the new row house proposal more accessible to target groups that might not have the economical means to purchase, for example one of the current row houses at Eriksbergs-platån.

Further improvements to the project

If additional improvements would be done to the project, one addition I would like to do would be to present the row house proposal to a contractor to receive a more accurate calculation regarding the cost of production as well as a more well grounded speculation regarding the final price of the row house when it would potentially reach home buyers. This would provide more arguments towards the actual affordability of downsized row houses.

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