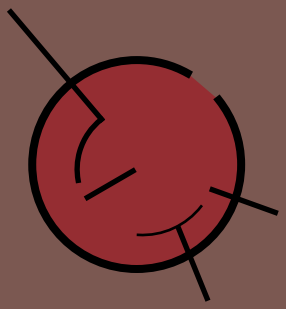
POST-PANDEMIC LIVING

HOUSING DESIGN FOR POSSIBLE NEW RESIDENCE MODE



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CHALMERS SCHOOL OF ARCHITECTURE

Master's Thesis in Architecture and Urban Design
Department of Architecture and Civil Engineering
Chalmers University of Technology

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ABSTRACT

Globally, people have switched to distance working in circumstance of COVID-19 and spend up to 24 hours at home. In the field of residence architecture, there is the need for transformation to adapt to diseases, as well as a foreseeing trend of working from home even after pandemic. Yet problems exist both physically and mentally.

The paper aims to define a healthy dwelling environment that supports the possible new residence mode. Conclusions are drawn regarding the changes and demands in aspects of functions and spaces after the pandemic.

The thesis is structured by three research questions:
1. What will be the changes or demands regarding scale and function for post-pandemic dwellings?
2. What kind of floor plan layout meets the need for post-pandemic living?
3. How to accommodate the 24-hour daily routine life in a limited area and ensure psychological well-being?

Literature and reference cases study contribute to the theory part of the research. It's further examined by designing a housing project in Majorna (Gothenburg) which strives for a healthy domestic environment.

Several housing quality factors are identified:
a. An apartment should be at least 50 m^2 and better larger than 60 m^2 as a minimum area even for the smallest household. It should include at least two and better three or more rooms.
b. A separable open kitchen with sufficient space is an ideal plan to meet different needs. It's good to have a dirt zone with cleaning facility at the entrance. Having an independent working space will be a growing need. Having private outdoor space is crucial. Loggia and mix type will offer the better integration compared to projecting balcony.
c. Open-plan offers many good qualities while causing problems. Appropriate division method can prevent acoustic interference and enable parallel activities. Zoning and circular movements are ways to keep a balance between openness and division.

The thesis hopes to contribute as an inspiration for designing future housing considering the potential new living pattern we are heading towards to.

KEYWORDS

COVID-19, post-pandemic, apartment housing, work from home, healthy home

CONTENTS

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Figure 1. Photo of the Site for Thesis Project

I

ACADEMIC FRAMEWORK

Chapter I gives an overall introduction for the thesis, including backgrounds, aims, research questions and others. It's a guide that builds the structure and presents the framework of the thesis.

Justification
Purpose
Aim
Research Questions
Delimitations
Methodology
Reading Instructions

JUSTIFICATION

The outbreak of COVID-19 since January 2020 makes a tremendous shift on people's life and behavior. Social distance and continuing lockdown give a sudden pause on the active urban life and people are forced to fit in the extreme situation in a quick response. While there are discussions on lasting changes for post-pandemic like healthcare, economy and environment, the experience shared by the majority is the global switch to "working from home" and being locked down at their residences for long periods. People stay longer at their homes and start to see more closely at their dwelling places.

Much of modernist architecture can be understood as a consequence of handling or fear of disease, such as Aalto's choices of material and design in Paimio Sanatorium which followed the medical need of patients. As tuberculosis shaped modernism, so will COVID-19 cast influence on architecture's near future. (Chayka, 2020)

We see a massive construction in housing as well as the burst of population. In Sweden, the population has grown rapidly since 2006 with an increase of nearly 940000 people in 10 years. It is expected that the trend will keep going. In 2020, 51550 new dwellings started construction, which is 6% more than 2019. (SCB, n.d.) However, the built homes haven't been at the same rate as the population growth for a long time. The shortage of dwellings calls for continuous construction in the market.

Along with the prosperous development, there has been changes and new trends even in such a traditional field like housing. Densification and minimization are perhaps the hottest topic because of the boost of population, especially in downtown areas. There has long been criticism on lowered housing quality resulted from compact living, but most have to accept the stream. Whereas, the burst of COVID-19 brings some fresh air to the old subject. Even the future is unknown, we see a very possible turning point accumulated from many social factors: technology development, desire for easier life, feasibility in job market, etc. A large shift to a new living mode is very expectable and the movement should be paid special attention to by the developers, planners, architects and end-users.

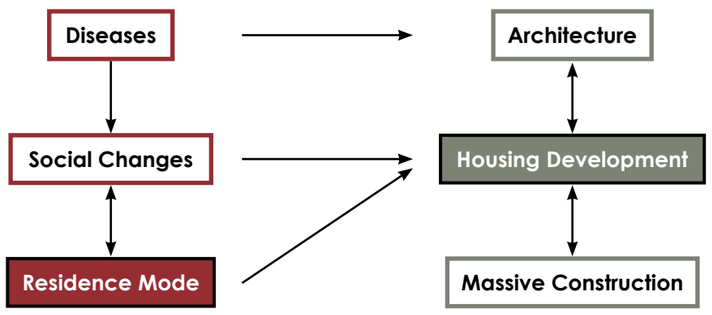


Figure 2. Thesis Background and Justification

PURPOSE

The evolution of living environment is an inevitable session. Housing has undergone continuous development along with the changing of social condition. Family composition, activities, technology and other facts all contribute to the transformation. Likewise, the adaptation of domestic space towards diseases is long overdue.

With the rapid change in 2020 due to the new global disease, enormous attentions on the importance of domestic space are raised again since everyone is spending extremely much more time, or even all their time at home. The parameter is small but influential. Studies have shown impact on mental and physical health due to the lockdown. Psychological responses such as fear, anger, anxiety, boredom and frustration go along with the decrease in daily physical activity. Long-term effects can last for up to three years after being quarantined. (Amerio et al., 2020; D'Alessandro et al., 2020; Serafini et al., 2020) How to maintain healthy in such a current situation and in a similar scenario in the future, is related to and concerned by each one of us.

There are discussions worrying that the lockdown and social distance will last for a long time before effective and massive medical treatment. On the other hand, statistics (Lister & Kamouri, 2020a, 2020b) show people's willingness to work more from home and there are already cases (Whittle, 2020) of doing so. It indicates a possible new living and social mode even after COVID-19. With this said, we must commit to healthy living environments that are friendly and flexible enough to handle the possible future, which is also an attempt for improvement of overall housing design.

AIM

The thesis aims to propose a residential building project in Majorna, a district of Gothenburg. It strives for a sustainable domestic environment, which maintains the mental health of habitants in a new residence mode after pandemic, by fulfilling the demands of dwelling in aspects like space and function. It concludes some of the needs and possible changes in housing design after COVID-19.

RESEARCH QUESTIONS

1. What will be the changes or demands regarding scale and function for post-pandemic dwellings?

2. What kind of floor plan layout meets the need for post-pandemic living?

3. How to accommodate the 24-hour routine life in a limited area and ensure psychological well-being?

DELIMITATIONS

The detailed preference and data in housing design differ in various context. While the design locates in Gothenburg and follows the Swedish context in regulations and others, the research also gathers information and statistics from a more general background, mainly in European region. The discussion is limited within apartment housing, instead of villas, studio types or others. Economic issue and detailed construction methods are not discussed.

METHODOLOGY

The thesis involves three methods: research for/on/by design. It is an iterative process with constant modification and completion between each section. There are three main phases including background research, context study and project design. During the thesis period, they were developed simultaneously or partially in parallel.

Phase 1. Background Research

This phase includes both research for design and research on design. It provides a theoretical foundation for further design work. Researches and literature related with housing design and domestic living during COVID-19 are studied. There is also analysis on floor plans to collect references that respond to the theories and to find inspirations.

PHASE 2. Context Study

The second phase focuses specifically on a chosen site. It' s a process of research for design. Housing tendency in Sweden known by reference study is also included in this phase. It aims to build a knowledge base for a real context and to prepare for the next phase.

PHASE 3. Project Design

This phase involves research by design. During which there is iterative design exploration and experiment on volume, floor plans and others. It is based on the previous investigation and aims for a project that is benefit for inhabiting health.

READING INSTRUCTIONS

This thesis booklet has five main chapters which follows the logic progression of the research phases. The current chapter is an overall introduction of the academic framework. The next chapter presents the background research related to the topic. It includes both the theoretical investigation and reference study. Chapter III gives a thorough analysis on the context of the site chosen for this thesis. It is a starting point for the design work. The fourth chapter is a test process before the final proposal and illustrates how the design develops. In chapter V, there is the final design proposal in details, which results from all the previous steps.

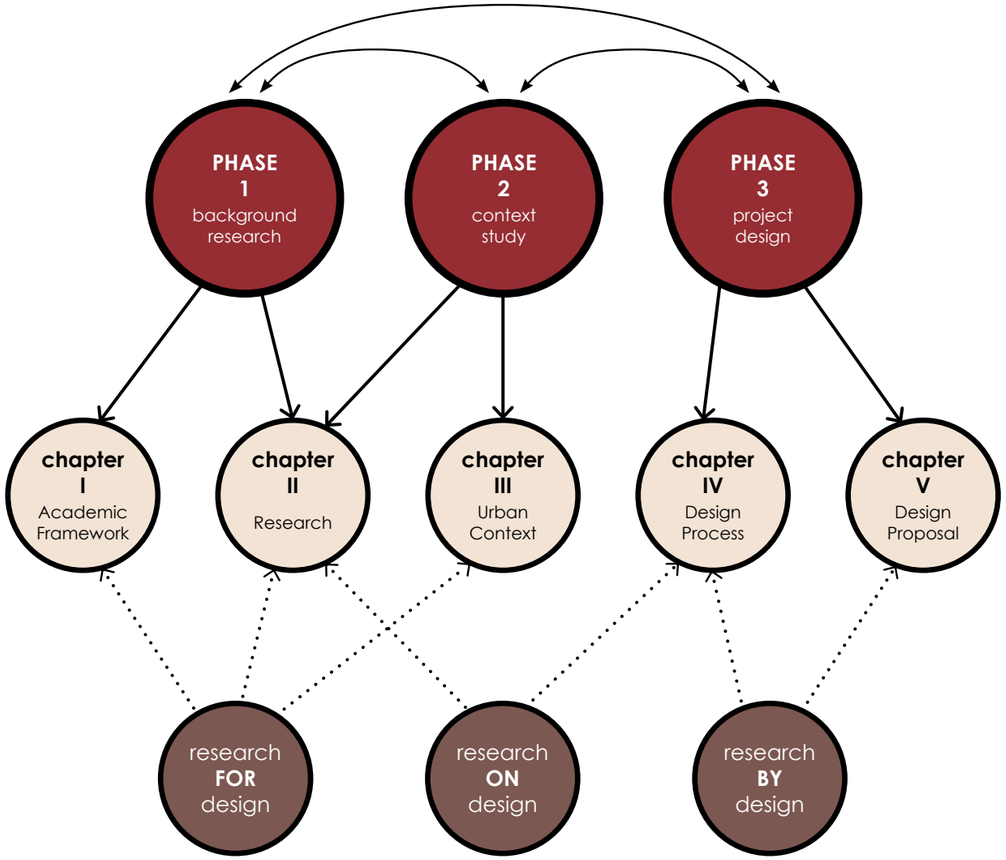


Figure 3. Thesis Structure

II

RESEARCH

Chapter II collects information by literature review and projects study. It aims to answer the research questions and provide support for the design project in chapter IV and V.

Housing Quality
Fundamental Index
Function Spaces
Spatial Structure
Households

HOUSING QUALITY

Poor housing is correlated with increased risk of depressive symptoms during the COVID-19 lockdown. (Amerio et al., 2020) So far, there has been limited amount of studies focusing on the design of real estate under the background of corona virus.

An online survey based in Italy and carried out during the pandemic revealed the parameters that cause moderate-severe and severe depressive symptoms. (Amerio et al., 2020) They are small living area, poor views, unusable balcony, and a scarce indoor quality. Poor indoor quality includes little natural lightning and acoustic comfort. Inadequate privacy during phone calls is reflected frequently from individuals who bear depressive symptoms. Earlier study also found that inadequate daylighting and poor window views can increase the possibility of getting depressed by 60% and 40% respectively. (Hoisington et al., 2019) It was concluded that housing design strategies should focus on larger and more livable living spaces facing green areas. (Amerio et al., 2020) Furthermore, poor housing condition and depressive mood will lead to bad working performance, which even worsen the psychological health and they end up in a vicious circle.

Besides the subjective measurements and facts, objective attitudes towards housing choice along with the development of disease are worth considered. Attention to healthy home is once again being paid among people. In the end users' point of view, what they value the most also reflects the potential change or guideline for future healthy homes. Zarrabi, Yazdanfar, and Hosseini (2021) investigated the residential preferences and priorities of choosing a housing unit in Tehran after the release of COVID-19. 25 indicators were listed under three main dimensions: mental health, physical health and socio-economic lifestyle. The three dimensions were first categorized into five indexes. The result showed that the top-ranked indicators are natural light, view, interior acoustic and (semi-)open space (terrace). Mental health parameter is the most concerned by the residents in all income groups.

In fact, there has been numerous studies on how different aspects affect the health of residents before COVID-19. Many elements are associated with housing quality, from neighborhood environment to material usage for single room. To be more specific and structured, three dimensions are considered and discussed in this thesis as the relevant elements that determine the housing quality. The sub-factors are also selected because of relevance based on researches.

The three dimensions are:

a. Fundamental Index - Scale and Interrelation
b. Function Spaces - Facilities and Emerging Needs
c. Spatial Structure - Openness and Division

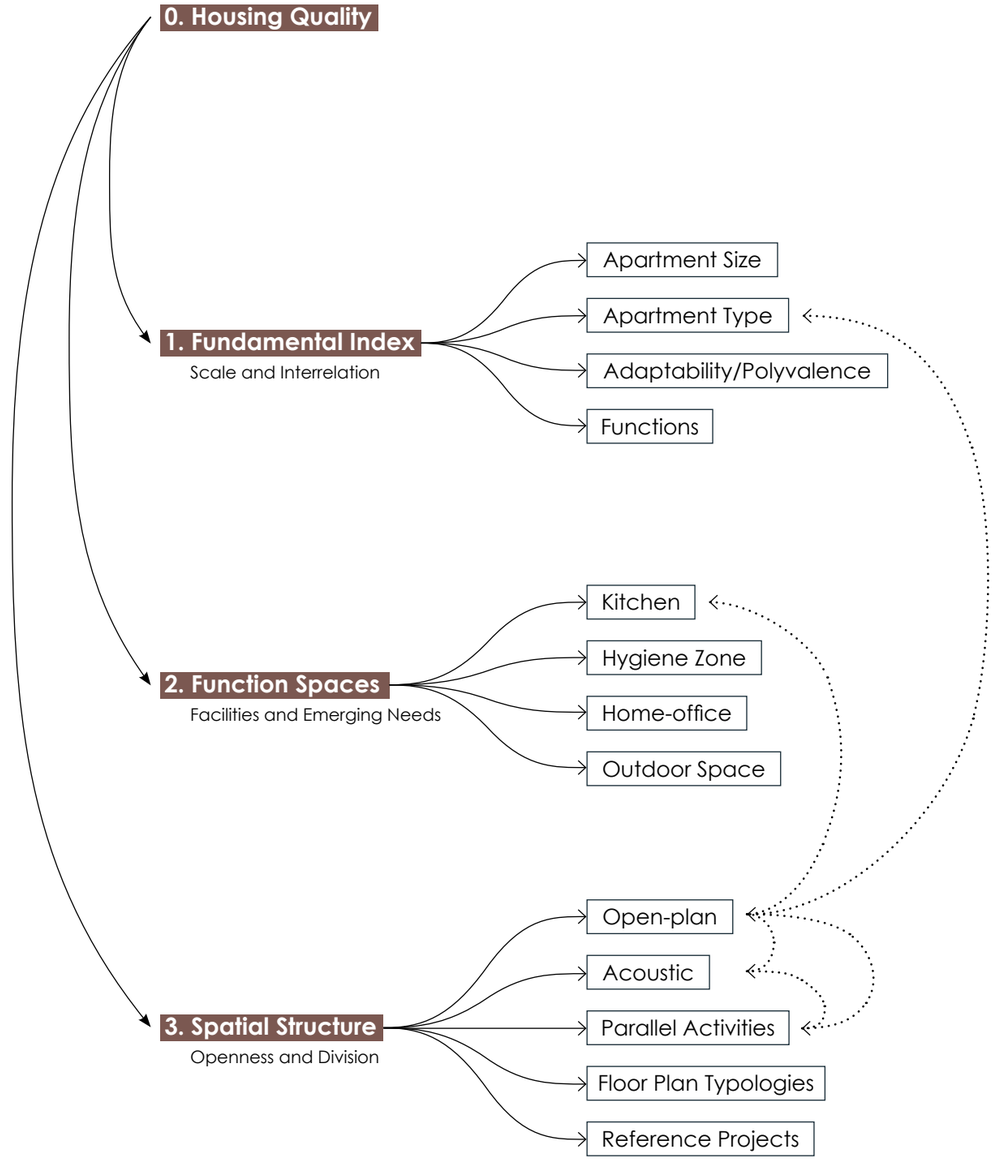


Figure 4. Three Dimensions for Housing Quality

FUNDAMENTAL INDEX
/SCALE AND INTERRELATION/

Apartment Size

How much space do we need? Do we have adequate places in our homes? Sufficient area in home is a fundamental aspect. Inadequate space has direct association with negative health outcomes. (D' Alessandro et al., 2020) Data collected from Italian students reported that people living in apartments smaller than 60 ㎡ are more likely to suffer from mental disorder during the pandemic. (Amerio et al., 2020) A Finland based study noted that even for the smallest household, in other words solo dwellers, 30 ㎡ is a minimum floor area while they should have at least 50㎡ of living place to overcome the shortage of space. It was concluded that it is not reasonable to compare the dwelling density between different household types simply because small households lack the opportunity to share domestic spaces. (Tervo & Hirvonen, 2019)

It' s interesting to notice that according to Boverket (National Board of Housing, Building and Planning in Sweden), dwelling regulations and recommendations are given based on BOA (residential area defined in Swedish Standard). The dividing standards are separately 35 and 55 ㎡. (Boverket, 2011)

In Sweden, 55% apartment habitants live in spaces between 51-80 ㎡, followed by 31-50 ㎡ and 81-100 ㎡ with 18% and 17% respectively. The average dwelling size is 68 ㎡ in Sweden. The distribution shows the similar pattern in Gothenburg but the overall housing areas are smaller. Apartments larger than 70 ㎡ take a smaller percentage while those below 60 ㎡ are counted more when compared to the national statistics. (SCB, n.d.)

Housing with an area of 51-60 ㎡ presents the fastest growth in the latest 7 years. Housing sizes tend to be smaller. The average living area for newly built apartments is 58㎡ in Sweden. (SCB, 2020b) For the same type of dwelling, the size decreased significantly in over 50 years. The one-room apartment is averagely 39 ㎡ today but 47 ㎡ in 1980s. (Bulthuis, 2020)

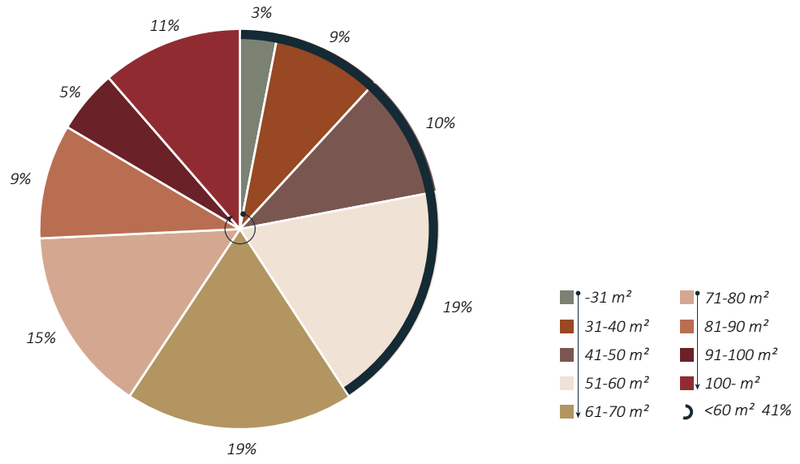


Figure 5. Apartment Size Distribution in Gothenburg, 2019, data from (Göteborgs stadsledningskontor, n.d.)

Apartment Type

Apartment type means how many rooms one has in their dwelling. In Swedish context, room refers to a space that has a floor area of at least 7 ㎡ and has direct daylight. Kitchen and bathroom are not included. Likewise, a dining area adjacent to kitchen and kitchenette is not counted when they are merged together and specified as a kitchen. (SCB, 2016)

Apartment type is another critical concept apart from floor areas when evaluating a residential space. It indicates how many zones are already defined within a floor plan and how spaces can be used.

In the study on solo dwellers in Finland, 44% regarded three-room apartment as their ideal dwelling and 38% went for two-room. It stated that the number of rooms and total area are not necessarily comparable since people from different age groups show a similar satisfaction with amount of rooms but variation on square meters. The finding indicated a potential demand for various sizes in the same apartment type. One-room apartment is most unpopularized among the respondents. Instead of having a spacious one-room dwelling, people prefer to have more rooms. (Tervo & Hirvonen, 2019) That is to say, even with an alike area, the layout will vary on the number of rooms and people then have preference depending on this.

Apartment type is highly relevant with the concept of open-plan, which is often mentioned in the new housing projects these days. It will be further discussed later in this thesis.

In Sweden, two-room apartment is 36% among the market as the most common type with an average area of 57 ㎡ and three-room apartment follows with 31%. The market in Gothenburg shows almost the same sample. One-room and two-room apartments are defined as small apartments. There is an increasing trend for constructing small apartments. (SCB, 2020b) In central parts of the big cities, there are more small dwellings with the number of 60% in central Gothenburg, while the proportion is 56% in whole Gothenburg.

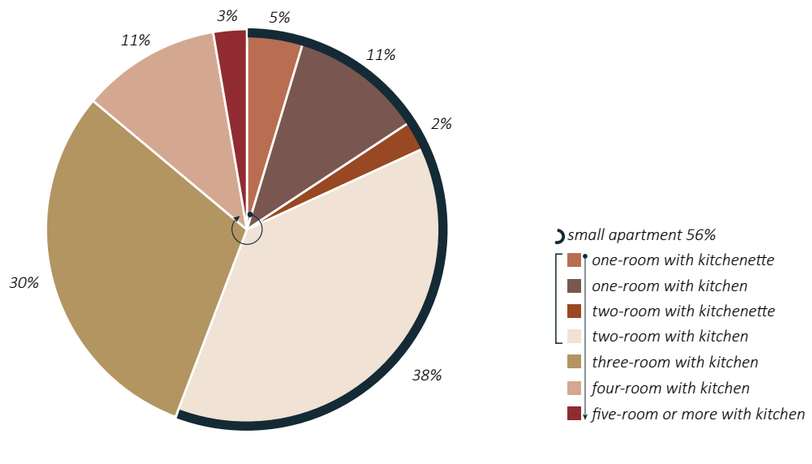


Figure 6. Apartment Type Distribution in Gothenburg, 2019, data from (Göteborgs stadsledningskontor, n.d.)

Adaptability/Polyvalence

Adaptability, more frequently mentioned as polyvalence, is given the notion of the ability to adapt to changes and unpredicted needs. It means that the architecture can be used in different ways without structural interventions and relates primarily to the interchangeability of activities between rooms. Leupen (2006) pointed out that rooms larger than 16 m^2 have the potential to accommodate any basic activity. The number of large rooms and the relationship between all the rooms will have influence on the extent of polyvalence.

He identified five models for the spatial organization. The degree of polyvalence increase going from graph a to graph e. In chain model, the floor plan is the least polyvalent because all the rooms are connected in a single linear way. While in the grid model, one has many choices in terms of route selection, which gives high independency to the rooms. It's the most polyvalent type.

Since the burst of COVID-19, we witnessed rapid and unpredictable changes in many aspects of our daily life. Appropriate room size and housing structure can be beneficial to the inhabitants since unreasonable living spaces can pose obstacles to the full use of rooms. Internal flexibility and good accessibility is necessary to allow adaptability to changes and satisfy various needs. (D' Alessandro et al., 2020)

In regard to the necessity of accommodating more activities in individual housing, D'Alessandro et al. (2020) also mentioned that on a higher level, it is crucial to plan and program the neighborhood functional mix. It aims to provide a qualified life at a short distance. The need is highlighted by the lockdown.

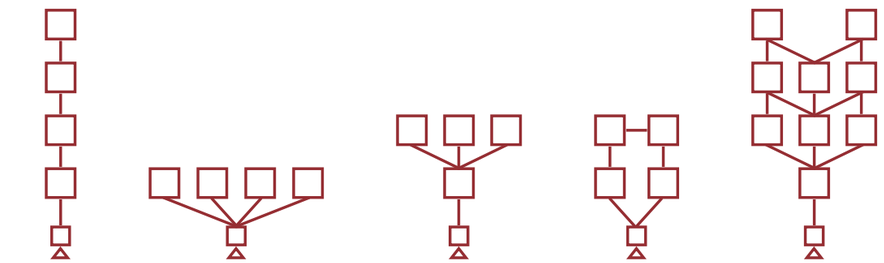


Figure 7. Five Basic Models of Spatial Organization with Different Polyvalence (Leupen, 2006)

Functions

We need the general knowledge of what functions our homes accommodate. Actually, during the time of a lockdown, we may assume that almost all the daily activities are done in the dwelling except the necessary supplement like grocery shopping, which may even be accomplished online these days. We thus see a maximum bearing capacity of the residence.

Leupen (2006) listed six basic activities: sleeping, get together, eating, cooking, bathing and working. According to Swedish regulation (Boverket, 2011), dwellings should be equipped for the long-term use. It stresses eight activities and fitting requirements including personal hygiene, social contact, sleeping, cooking, dining, entrance for outdoor clothes, laundry and storage. We can conclude that the functions we should take into consideration in our living spaces are: entering zone, getting together, cooking, eating, working, sleeping, personal hygiene, laundry, storage.

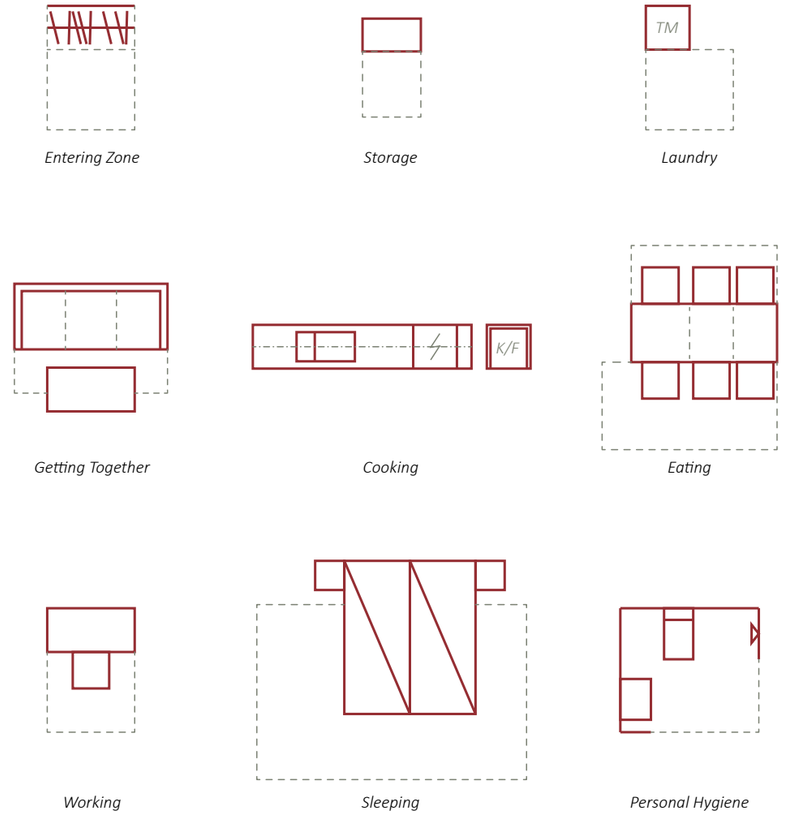


Figure 8. Basic Functions of A Home, measurement from (SIS, 2006)

FUNCTION SPACES
/FACILITIES AND EMERGING NEEDS/

Kitchen

Kitchen type is crucial in an ideal floor plan in similar apartment types and the tendency grows as the apartment size decreases. (Tervo & Hirvonen, 2019) It was once a purely servant function in the family associated with mess that is put behind the screen. With the alternation of social relationship and others, we see it more included as a central character in life.

The positive attitude towards open kitchen results from its transformed purpose like socialization, relaxation and recreation. When working from home get started, many people choose to stay at or keep close to the kitchen area. (Nielsen, 2020) Apart from lacking spaces in elsewhere rooms, an important reason lies in the sense of public and the culture of having breaks and snacks during working. It is partially an extension from the office culture we have today.

Kitchen is a cooking area larger than 7 m^2 and has direct or indirect daylight. It's also counted as a kitchen if a kitchenette with a dining room fulfills the former conditions. Otherwise, it's a kitchenette. (SCB, 2016) In the Swedish market today, it is favored by many to have an open floorplan with a kitchen island because of space it offers for social activities. The straight and L-shaped layout are favorable options agreed by stakeholders. (Ollár, Femenías, Rahe, & Granath, 2020)

However, it's also proposed that the open plan setting is a result of compact living, which in one sense lowers the living quality. A speculation was made that end-user would prefer a separate kitchen (for the same price compared to open kitchen). A neutral solution is by using kitchen island, moveable walls or bar segment to divide space visually. (Ollár et al., 2020) Tervo and Hirvonen (2019) noted that the welcome of open kitchen may be led by the fact that it is architects and developers who popularize the fashion, but not necessarily valued by habitants. Their study in Finland on solo dwellers showed the preference for open kitchen or separate kitchen with dining table was respectively 56% and 38%, that both took a large proportion.

Under the COVID situation, there is a growing need for more storage including food storage. Meanwhile with the longer time one spends at home and for cooking, many basic functions that were simplified previously may come back again, thus raising the question that if people's attitude towards open kitchen will be different. Zarrabi et al. (2021) found, however, that in Tehran, a closed kitchen is the least concerned from the residents' perspective, which indicated a limited influence from the virus. But still, keeping the center for healthy food clean and sufficient is necessary. It is also important to provide proper daylight in the kitchen. (Ollár et al., 2020) A separable open kitchen with sufficient space is an ideal plan to meet different needs.

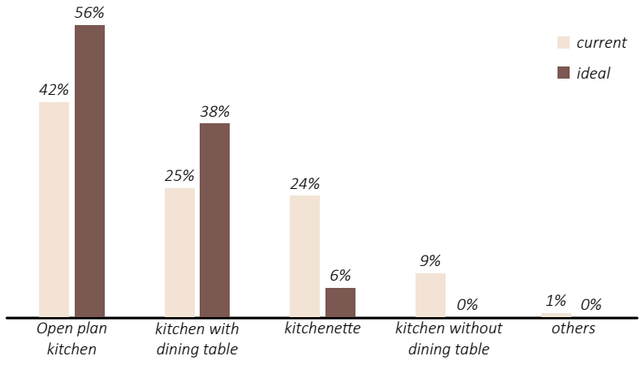


Figure 9. Solo respondents' current and ideal kitchen types (Tervo & Hirvonen, 2019)

Hygiene Zone

Among the long-term effects of the current virus, vigilant handwashing and cleaning can be one of the behavioral changes after the pandemic. (Serafini et al., 2020) People can get infected by touching a contaminated surface before touching their own eyes, mouth or nose. (WHO, 2020) Therefore, there is increased need for people to keep their homes clean and free of germs. An entryway where people can take off their shoes and put down stuff they bring in, is required more. In other words, it's a dirty/buffer zone before entering the clean home. It would be ideal if bathroom or toilet is closed to the entrance.

Moreover, there is the potential need for a separable zone within the dwelling which can minimize the cross movement in case of having a quarantined member. It was usually seen as a part that the host can rent out or have a guest to stay. In circumstances of COVID-19 or other later diseases, the space can positively serve as a hygiene zone to ensure an ordered life within limited area.

Home-office

A quick shift to working from home is the most significant change since the burst of COVID-19. Office group and students are forced to do remote communication. Advantages like less multi-hour commutes and more freedom to arrange the time as well as economic savings and higher productivity (Lister & Kamouri, 2020a) indicate the feasibility of the mode. Problems are apparent however, with complaints on blurred line between home life and work life. (Sharma, 2020)

People have come up with various ideas on how to quickly integrate the working place into homes, such as occupying dining table or using bedroom and living room. There is already the concept of merging small home-office with private garden. The main purpose is to provide the feeling of leaving the house to work due to the loss of commute. (Bahadursingh, 2020)

Even before the wide-spread of new working mode, according to research from Tervo and Hirvonen (2019), there was already the demand to put extra spaces for work place. It ranked the second-high need for multi-people households and the fourth (quite close to the second and third) for solo dwellers. It drew the conclusion of the needed line between otherwise overlapping domestic realms characterized by usage, because solo dwellers have full control of the places which indicates the irrelevance between having work space and the need for preventing interruption by others. For one thing, it's necessary to be able to reside in different spaces (when shifting between work and life. For another, with all the online video meetings and perhaps future virtual technology, people will need a separable room for privacy and acoustic reasons, especially when more than one resident is present at home.

Zarrabi et al. (2021) found that among the five indexes (space, structure, mental comfort, workplace, self-sufficiency), workplace related indicators were on the whole the least priority and the pattern was the same among residents with different employment status. They were however higher than concern for closed kitchen when individually ranked.

Outdoor Space

The intention of avoiding meeting others during the lockdown highlights the value of having private outdoor spaces. People are positively influenced when being exposed to natural environment 20-25 minutes. (D' Alessandro et al., 2020)

As for the apartment, the most common chance to get accessed to nature is by having a balcony. Still being as part of the dwelling but allowing everyday life left behind, this definition for balcony is even more evident and suitable during the pandemic period. Balcony was recognized as one of the fundamental elements of architecture in Venice Biennale 2014. (Koolhaas, 2014) Ever since the existence of balcony being used initially as a ceremonial structure, the functionality and appearance has transformed during time.

An international online survey was carried out in April 2020 focusing on research about balcony under the background of the burst of COVID-19. (Litsardaki, 2020) A majority of people were habited in European countries, especially in Greece, but every continent was represented. 60% mentioned that they started using their balconies more frequently than before and only 1.8% had the opposite answer. More than 500 out of 721 felt that having a balcony has/would have been an advantage to their well-being during the pandemic. Activities that were not considered before like exercising, working and studying were engaged on the balcony during pandemic. As one of the main indicators that affects mental health, people will also pay more attention to the balcony (outdoor space) when moving to a new home after the crisis. (Zarrabi et al., 2021)

The form of a balcony, which in broader sense meaning an outdoor space in housing in multi-storey building, has undergone a series of development. Hao (2019) mentioned three typologies: balcony, loggia and mixture, which is an in-between type. Balcony, in stricter sense, is a platform projecting from the wall of a building. Loggia has become quite welcomed with the definition saying: a covered area on the side of a building, especially one that serves as a porch. Loggia is an outdoor area which has the chance to have either physical or visual connection with interior on three directions. Kaltenbach (2006) pointed out the reason more people would prefer a loggia is that the diminishing distances between buildings lead to a desire for private realm removed from prying eyes, as well as the rediscovery of a smooth urban façade. In addition, a recessed space will not cast shadows on the façade.

In the thesis by Hao (2019), private balconies are categorized into three when defining spatially: in the beginning, middle or end. The middle type refers to the balcony accessible from more than one space and is thus a part of the dwelling circular routes. The outdoor space transformed from a traditional fringe asset to a crucial element which can highly control the household life. Meanwhile, with many cases of this type that getting linked with the public areas, there are also examples that neighboring both public and private zones in the family. Balconies, in this circumstance, serve as an actively usable buffer zone compared to corridors.

Furthermore, survey (Litsardaki, 2020) showed that although most people still consider balconies as private or semi-primate space, 63% reported that they started to perceive balconies as a substitution of outdoor public space because of COVID-19. As characterized above, projecting balcony presents a stronger sense of having communication with the outside world. In contrary, loggia has closer connection with indoor family life. The properties are originated from their forms. The mixture type, hence carries the characteristic of both typologies.

Loggia started to appear a lot in Swedish housing in 1960s and was built as many as balconies in 1980s-1990s. (Hao, 2019) Today in Gothenburg, people can see a lot of small and projecting balconies in the streets. Today, we see some tendencies in post-millennial period in Swedish housing, which one of them is the development of new balconies. (Granath, 2021) The size becomes extremely large and even more than a normal room. The form follows the loggia instead of a traditional balcony. Some can even be closed up and have a stable climate. The outdoor space, in this case, reaches premium quality.

Litsardaki (2020) pointed out that it is time to discuss the proliferation of balconies resulted from the disease we are going through. Balconies should be conceived as spatial manifestations and the same opportunities go for porches, patios, terraces and rooftops.

Being possible to grow plants at home offers the chance to practice leisure activities and it is beneficial physically. Gardening is proved to be able to increase life satisfaction and it contributes to other psychological health. (D' Alessandro et al., 2020) Many people will practice gardening on their balconies. In meantime, as already mentioned, natural light and good view are mostly concerned by residents. (Zarrabi et al., 2021) Researches indicated that interacting with or just looking at natural environments may improve attention and reduce stress. (Amerio et al., 2020) When private outdoor spaces are visible from interior, residents have the possibility to build their own nice garden to look at if the surrounding city has limited natural view.

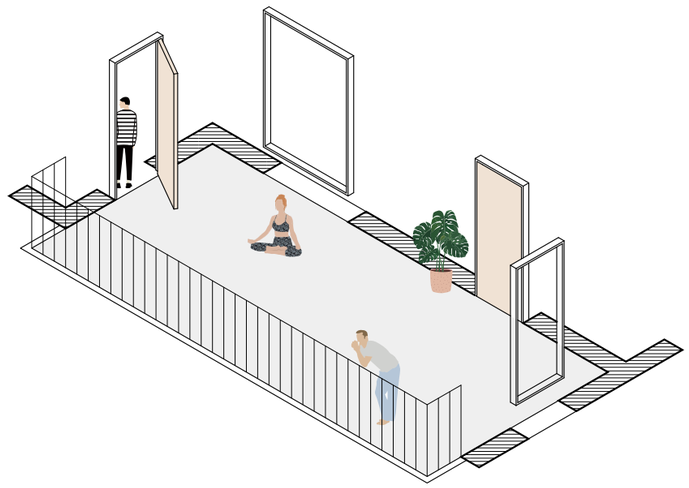


Figure 10. A Mix Type Balcony

SPATIAL STRUCTURE
/OPENNESS AND DIVISION/

Open-Plan

Alfirevic and Alfirevic (2016) listed three levels of plan openness: a) “closed” plan: all rooms are differentiated as separate spaces, b) “half-open”: trends of certain rooms being integrated into one flexibility or partially, c) “open” plan: tendency that large number of rooms are brought together into one and achieve “absolute” all-in-one space.

Open-plan, in wider sense, is a form that can be further categorized into more detailed concepts. (Alfirevic & Alfirevic, 2016)

Inspired by Japanese architecture and sliding dividers, the application of flexibility appeared in early 1900s when architects introduced flexible partitions to erase space boundaries. Flexibility (flexible-space) was adopted as an option of occasional change of space by removing sliding dividers and was used officially in architectural glossary in 1950s. It later influenced and developed other two principles: fluid-space and all-in-one-space (open-plan in stricter sense).

Frank Lloyd Wright’s “Prairie” style in early 1900s helped give open-plan (fluid-space) a visual vernacular. (Mull, 2020) It created the impression of the continuous connection and the circular flow between rooms. Brick Country House by Mies in 1923 is a typical example for the application of fluid-space.

All-in-one space, open-plan in stricter sense, stands for the integration of spaces into a larger unit, reaching which by neutralizing borders both spatially and functionally. It can be further divided into internal and external openness, which indoor rooms or both indoor and outdoor are connected physically and visually. The early hints on all-in-one-space mainly dealt with the combination of served spaces (definition from Louis Kahn) such as living room, dining room and even library. In 1960’s, kitchen started to get integrated with the dining and living units and perceived as a core in the family, indicating this original servant space being transformed into a mixture. Glass House by Philip Jonson made an extreme case of all-in-one-space plan in which only the bathroom was separated as independent closed block.

The tendency for building open-plan housing meets the need like better communication and multi-tasking. More places can have good daylight. It may also better suit to the potential change within household. (Ogundehin, 2020) It is specifically stressed in small apartments to create optimal space instead of the traditional crammed places. In other words, the open concept is in a way a compromise towards compact living space. (Ollár et al., 2020)

However, negative aspects like a lack of visual privacy and a more likely messing situation will take place. Smell and sounds from kitchen will spread out easily. (Harrison, 2016) These can be concluded as sense noises. Storage spaces are also cut off. Meanwhile, loss of the chance to move to a different room is harder to bear because of the shut-down of restaurants, café and stores.

As already discussed, we have seen a favor for open-plan among many, especially towards the arrangement of kitchen. Despite the growing popularity, the market now senses a trend of people moving to homes with more rooms and doors after the pandemic. (Wallender, 2020; Zillow, 2020) It doesn’t mean a complete vanish and retreat of open-concept, but a balance in between may be the best solution.

Acoustic

Acoustic can influence people’s mental health. It is ranked high as an indicator that will be cared a lot by residents after pandemic. (Zarrabi et al., 2021) As mentioned by study (Chayka, 2020), acoustic divisions have become important when the family is forced at home all day long. Home office/classroom will be a problem in a multi-member family if there is not enough separable spaces in dwelling. Noise from cooking and living may become a nightmare in certain circumstance.

Likewise, a Turkish study (Kulak & Bayazit, 2019) on acoustic interference in dwelling said that people’s expectation for comfort level increases with new generations. Aural comfort is paid more attention compared to visual and thermal comfort. The most annoying airborne noise is loud speech and shouting. 54% participants involved in the study considered themselves sensitive or overly sensitive to noise.

Parallel Activities

Closely related with open-plan space and acoustic interference, having parallel activities in a multi-people household is a common living situation. While one’s normal daily routine mostly overlaps with others’ in morning time and after work period, COVID-19 lockdown limits almost all the stories at home. The individual daily routine may even change a lot because of the increasing freedom for one to control their own life and the decreasing fixed scheduled plans. Interference between the parallel activities becomes evident when they are carried out in the same space.

By listing some basic activities and their relationships in daily routine, we can have an easy understanding of the need for division in certain circumstance. The activities are based on the basic functions in a home by taking away the ones that are not involved a lot with people’s presence or already independent functions like storage, laundry and entering zone and hygiene space. Relaxing/entertainment is added representing a casual situation including exercising, playing games or reading books. The overlapping of two activities are ranked under three levels from a to c, indicating if activities can happen in the same space. B is a neutral status depending on the exact activity. If not counting sleeping, since it’s mostly independent as well, b and c where a division may be needed still take a larger proportion. It should be noted that, a and b can fall to b or c in specific scene. The method takes reference from Alfirevic and Alfirevic (2016).

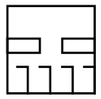
		sleeping	working studying	relaxing entertainment	eating	cooking	getting together
getting together	*c*	*c*	*b*	*b*	*a*	*a*	*a*
cooking	*c*	*b*	*b*	*b*	*a*	*a*	*a*
eating	*c*	*b*	*b*	*b*	*a*	*a*	*a*
relaxing entertainment	*c*	*b*	*b*	*b*	*b*	*b*	*b*
working studying	*c*	*b*	*b*	*b*	*b*	*b*	*c*
sleeping	*a*	*c*	*c*	*c*	*c*	*c*	*c*

a. can happen in same space
b. may happen in same space
c. cannot happen in same space

Figure 11. Ranking on Parallel Activities

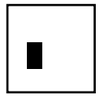
Floor Plan Typologies

In the book from Heckmann, Schneider, and Zapel (2017), nine floor plan logics are classified. Three of them listed below are most relevant with the thesis work. They are also interrelated to some extent.



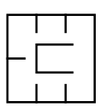
Zoning

The floor plan clearly separates the different functional areas: common living area and private zone. It is often the kitchen or bathroom core that helps to divide the apartment plan. Different zones may show different characteristics, either more open or closed up. The plan can create a clear structure in terms of functions distributions and can separate the individual and communicative parts.



Dividing Elements

The plan visually reads like a large open space with prefabricated dividing elements such as installation core or wall pieces. The spaces always appear generous and open despite the real dimensions. The cores guide the movements of the inhabitants and usually allow the circular route. It is always connected with the flexible and fluid space but can still ensure the independence of the surrounding areas. Compared to using living room as circulation center, which I may define as a bright core, the dividing elements logic can be interpreted as dark core. It keeps both the integrity of space and the possibility for division within the apartment.



Floor Plan with Circular Path

The logic is characterized by taking path through the apartment. Each space or room can be reached via two or more path to create functional and spatial relationships in between. The diverse choices of paths allow rich experience and it appears to be more varied than it actually is. Both a solid core with kitchen and sanitary facilities and a room can be placed in the center in terms of different manner of having a circular route.

Reference Projects

12 projects are studied and considered as reference projects. They are filtered out because of their relevance in spatial structure or functional layout. Certain indexes are specifically looked into. (See appendix for detailed analysis of the reference projects.)

The indoor area and size of the private outdoor space are listed and put the projects 1-9 in order from smaller apartments to larger ones. The apartment type is according to Swedish definition and the type of outdoor space is marked out. The floor plan typology refers to the most related concept defined by author thus there may be different explanation. The texts include mainly three parts: 1. explanation on the overall concept and spatial layout 2. analysis on visual and physical relationship within the dwelling 3. judgement on kitchen and outdoor space, as well as the independency of rooms, plus other pros and cons within the project.

While project 1-9 are all located outside Sweden in Europe, project 10-12 are in or near Gothenburg. They were all constructed in the latest 20 years and represent a trend of Swedish housing, especially in Gothenburg region. Project 10 sits just 400 meters away from the site chosen in this thesis. Project 11 and 12 are the most up to date works and share some common characteristics.

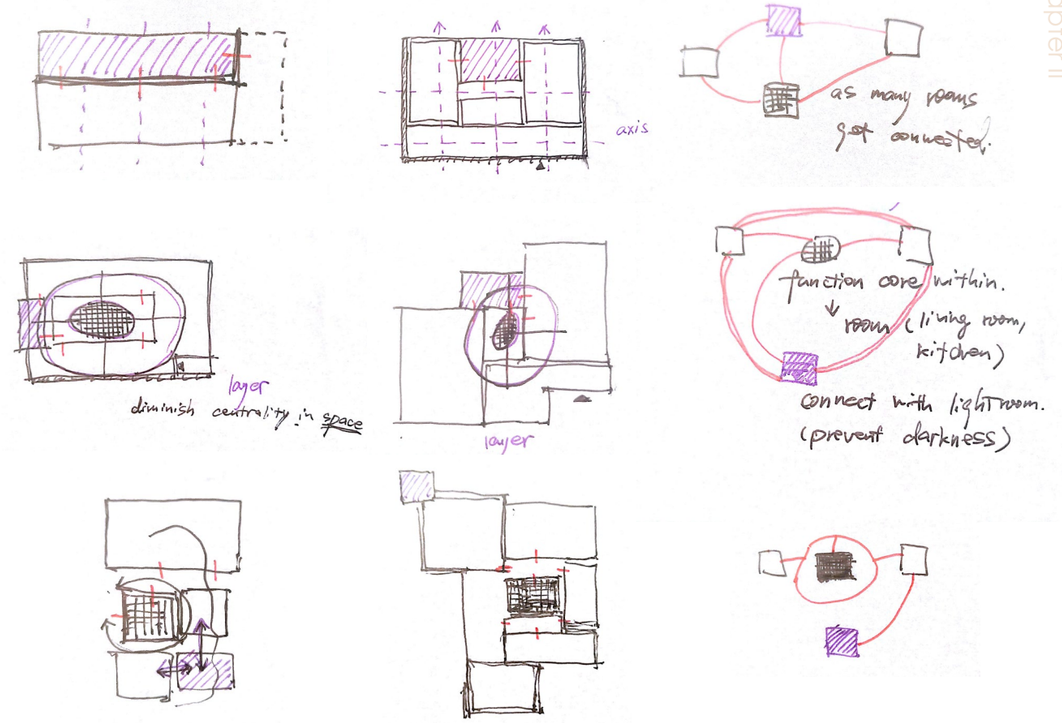


Figure 12. Sketch of the Reference Projects

HOUSEHOLDS

In Gothenburg, the largest group regarding household type is solo dweller, counting for 44%. Couple with and without children are similar in proportion taking 1/5 respectively. These three types account for 83% among all types of households. Meanwhile, statistics show that, among the couples with children, two-children families account for 47%, followed by one-children families with 36%.

In order to fulfill the most extensive market needs and offer the most possibilities in variety, three typical types of household composition are specifically paid attention to in this thesis. They are: solo dweller, couple without children and couple with two children. By which, the most common demands from the end-users can be represented and responded. The latter two will later be tested in the proposal of the design project.

As the already mentioned importance of considering parallel activities in the future living mode, we need an easy understanding of some typical scenes we can expect in daily life. Deilmann, Pfeiffer, and Kirschenmann (1973) analyzed some common family types by illustrating the relation of people, activities and their relevant space requirements. They are not covering all the possibilities, but towards an elucidation of varying modes of living that a dwelling could have to accommodate. In other words, it presents the parallel activities in real life in a more specific way and starts to build connection with housing space.

Six categories are used here to describe the general daily activities.
Working and studying. **R**elaxing, including doing yoga, playing video games, watching TV, reading, etc. **E**ating meals or taking snacks. **C**ooking. social **A**ctivities, having guests at home or getting together with family members. **S**leeping.

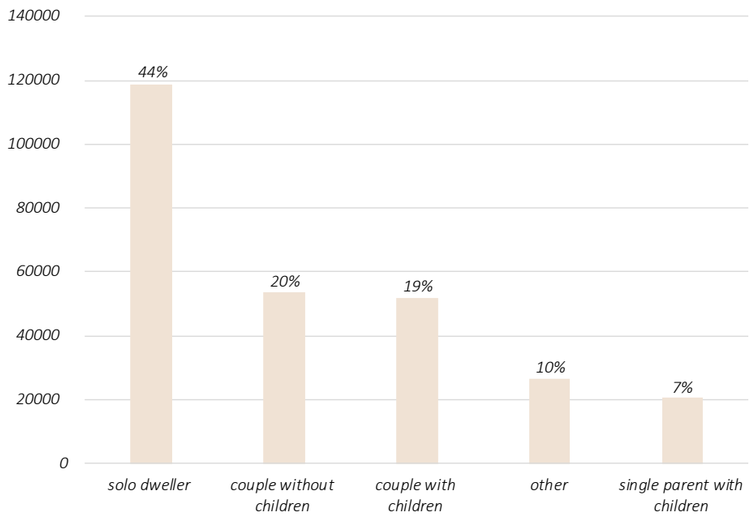


Figure 13. Household Type Distribution in Gothenburg, 2019, data from (Göteborgs stadsledningskontor, n.d.)

The following chart lists the possible activities each family member may do during a day. It doesn't cover all the scenes, but only serves as an example. During each period of time, one of the possible combinations is selected. No specific floor plan is related at this stage, but the status of certain activity can be hypothesized.

○ *need to be independent or closed room*
● *can be disturbed*
C *can be in open space*
● *don't want to be disturbed*

a. Solo Dweller

8	Morning	12	Noon	13	Afternoon	17	Evening	20	Night	24
	W		E		R		C		S	

In a normal routine day, solo dweller can have various activities by themselves without worrying being disturbed. They cover all the five categories except for social activities. Thus, an ideal living environment would be having enough and different spaces to accommodate their life.

b. Couple without Children

8	Morning	12	Noon	13	Afternoon	17	Evening	20	Night	24
	W E		E R		W A		C A		R S	
	W R		E S		W A		R E		R W	
	W+W		R+E		W+A		A+R		R+R	

When more than one person at home, possibility for independency is important. There is also the need for close connection under certain circumstances.

c. Couple with 2 Children

8	Morning	12	Noon	13	Afternoon	17	Evening	20	Night	24
	W E		E R		W A		C A		R S	
	W R		E S		W A		R E		R W	
	W A		E W		S A		R A		R S	
	W S		E R		W R		W E		R C	
	W+W+W+W		R+E+W+E		W+A+A+R		C+R+R+A		R+R+S+R	

In a big family, flexibility and adaptability of housing space is crucial. The combination of necessity varies in everyday life. The possibility to both divide and integrate for various usage can ensure a healthy life for all in the household.

III

URBAN CONTEXT

In Chapter III, there are investigations and researches on the site selected for the design project. They are collected by literature review and on site visit. It's introduced following the scale from large to small, and ends up with a summary of the challenges on the site.

Majorna
Site
Summary

MAJORNA

Location of Site

The selected plot is within the district Majorna, west to and approximately 3 kilometers away from the center of Gothenburg city. It is on the edge of Majorna, neighboring with Stigberget.

According to area division from the municipality, the index of the chosen site is base area (basområden) “06”, primary district (primärområden) “103 Majorna”, intermediate zone (mellanområden) “Majorna-Stigberget-Masthugget”, district committee (SDN) “135 Majorna-Linné”. Starting from 1 Jan 2021, the division of district committee is no longer in use and is replaced by urban areas (SO), which refers to “Centrum” for this project. (Göteborgs Stad, 2021) The name Majorna mentioned below is at the level of primary district.

Figure 15 (next page). Satellite Map of Site Location

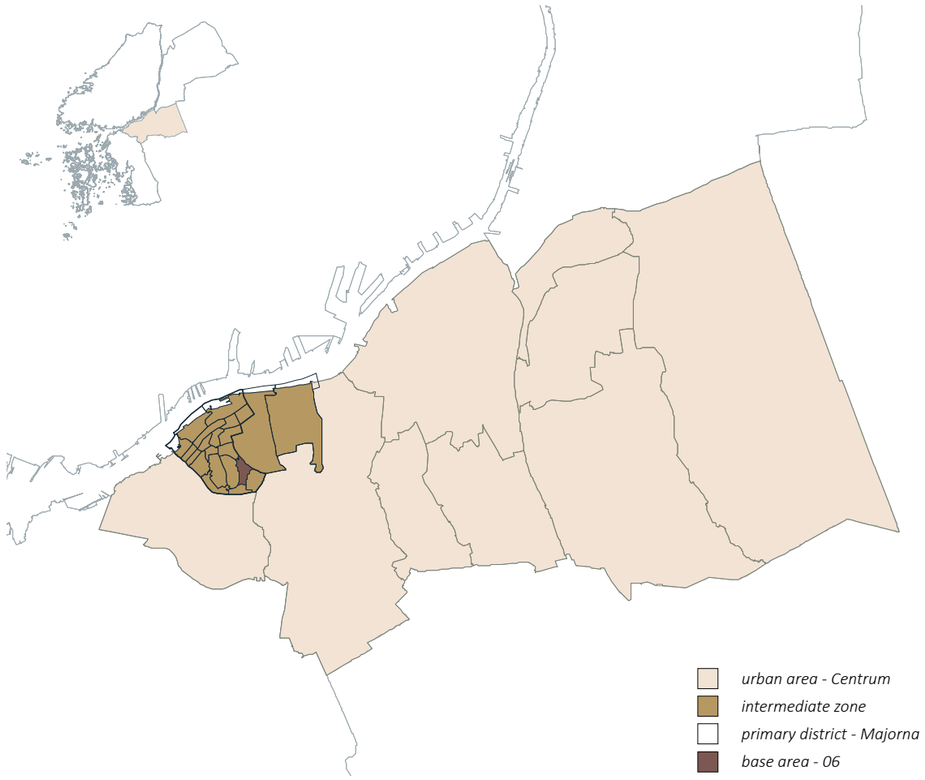


Figure 14. Site Location In City Zoning, data from (Göteborgs Stad, 2021)

MAJORNA

Sketch of the District

Majorna is an old district with its own characteristics. Dating back to as early as 1360s when Älvsborg Castle was built as the very first sign of Majorna, the area has then gone through an enduring history. It was previously a working-class neighborhood and finally turned into a culture-rich and mixed district with restaurants, bars and boutiques. Along Karl Johansgatan, one senses the active urban life with busy transports and various public functions. The waterfront of Göta älv is an important port for Stena Line and an area with much fish business. The inner part with high density residential buildings creates an energetic but quiet atmosphere. The street scales are suitable for a nice walk.

The site locates at the foot of and east to Gråberget. It’s in the valley area between Gråberget and Stigberget. Both ends of Såggatan locates separately a playground.

As often described as “a city within a city”, Majorna has a fully-functioning local life. The site is supported by a well-built neighborhood. Education institution, restaurants, grocery stores and recreation parks are all within 1 km reach. There is also Majorna’s Library and Maritime Museum as a part of the culture facilities. There are quite many small shops in topic of crafts, café, music and others.

The nearest public transportation station from the site is Gråberget, which is 450 meters away. Within a walking distance of 600 meters, there are 4 stations. The nearest big station Kaptensgatan on Karl Johansgatan, which is a part of the main transport system that connects the city, is 700 meters away. Compared to other parts of the city, people in Majorna travel more with public transportation, bikes or on foot. It’s an average percentage with the usage of car, public transportation and walking, with respectively 30%, 24% and 22%, followed by 17% of cycling. (Trafikkonteret, 2006)

Figure 16 (next page). District Mapping 1:5000

MAJORNA

Numbers and Plans

In the district Majorna, there are approximately 10800 residents, in which 43% are between 18-44 years old and 23% are 45-64. The population change since 2015 varies each year but shows a positive trend in general.

Apartment housing is the most common living unit within the district, with up to 97%. Among the nearly 6000 households, small households with 1 or 2 people account for 53.6% and 26.6% respectively. The average number is 1.8 people per household. In Gothenburg, the average number of people per household is 2.1, with 43,8% 1-person household and 2-person type taking 27.6%. (Göteborgs Stad, 2019) Thus, the difference of small household is as much as 8.8%.

Accordingly, 65% of apartments in Majorna have an area between 41-80 m². Nearly 50% of all apartments are 2-room type, followed by 23% of 3-room, 18% 1-room and 9% 4-room or larger. Small apartments in Majorna take higher proportion compared to the distribution in Gothenburg by 5%. With the same percentage of apartments between 61-70 m², Majorna has more dwellings under 60 m² by a difference of 6%. The construction of housing in Majorna is relatively slower compared the overall development of Gothenburg, especially in the recent 20 years. (Göteborgs stadsledningskontor, n.d.)

Majorna is defined as intermediate city, or west extension for inner city, according to the development strategy of Gothenburg. With an estimation of 30% population growth in 2035, there is the necessity and potential for densification in the intermediate city. It is expected to have 700 new homes built until 2022 in the west of city and a potential for 2500-3000 more after 2022. (Göteborgs Stad, 2014) There are already undergoing programs like BoStad 2021, which aims to provide 7000 new homes for the city. Construction in Godhemsberget and Fixfabiken are the two closest BoStad 2021 projects around Majorna and the one in Eriksbergs is right opposite the river. (Göteborgs Stad, n.d.)

Figure 17. Bostad 2021 programs around Majorna

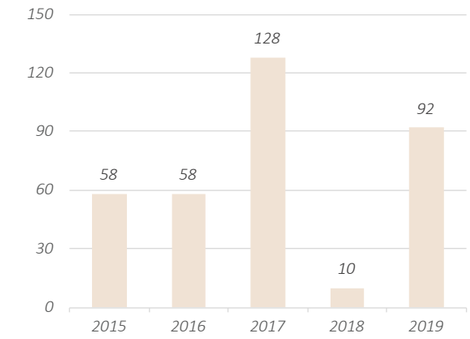


Figure 18. Increase of Population in Majorna, 2019, data from (Göteborgs stadsledningskontor, n.d.)

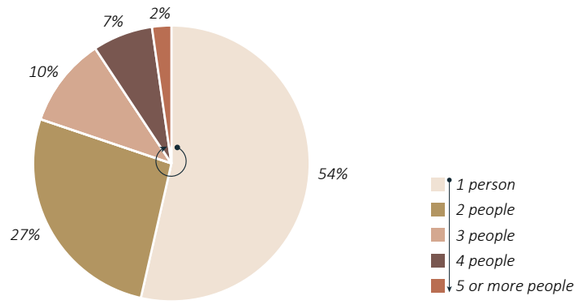


Figure 19. Household Size Distribution in Majorna, 2019, data from (Göteborgs stadsledningskontor, n.d.)

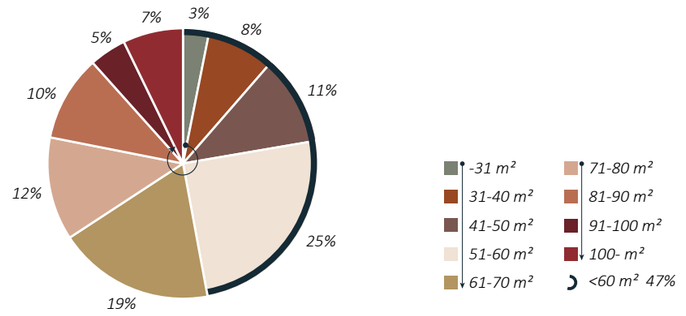


Figure 20. Apartment Size Distribution in Majorna, 2019, data from (Göteborgs stadsledningskontor, n.d.)

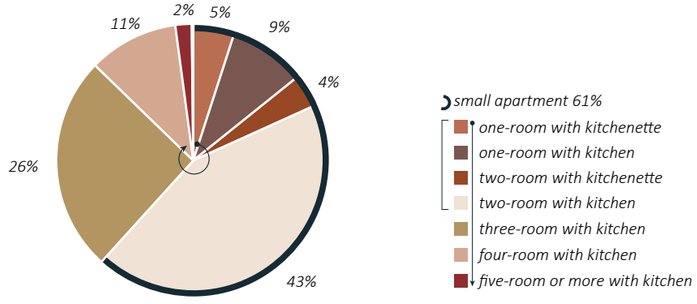


Figure 21. Apartment Type Distribution in Majorna, 2019, data from (Göteborgs stadsledningskontor, n.d.)

MAJORNA

Numbers and Plans

Specifically on the site, there has already been investigation and planning program for Gråberget since 2011. The goal is to complete 300 new homes and the principle is to first build on the used lands. The picked plot is one of the possible places (plot 8) for future construction with an estimation of 20-25 new apartments. (Göteborgs Stad, 2011)

So far, there has been workshops and investigations in the whole area and also recommendations on the plot. (Göteborgs Stad, 2011) From a workshop with 20 people living in the area, it was pointed out that greenery is a great asset at Gråberget but some staircases are now in poor condition and they are not accessible by bikes or prams. There are many small apartments today and it would be good to plan larger apartments for families with children.

An overall conclusion for plot 8 mentioned that having buildings can enhance the experience of security along Såggatan and can be a positive addiction to the street environment. New buildings should relate to the landshövdingehus in terms of scale, height and structure. It would be good to have stores or business premises on the ground floor. Parking and patios will be difficult to arrange due to the terrain and parking should not be on the ground floor facing the street.

A consultant report stated that construction means a significant deterioration to the environment. It' s hard to have any yard and the house will both shade and be shaded by existing houses. The large traffic on Såggatan has already given problems for people in landshövdingehus and it would become worse when the nature is replaced. Being in the valley area, there is impact from bad air, thus greenery is crucial here to improve air quality.

There are also comments received from people in the area. To sum up, people are mostly negative towards the new construction program on plot 8. Concerns mainly are in the environmental perspective.

Figure 22. Workshop Photo (Göteborgs Stad, 2011)

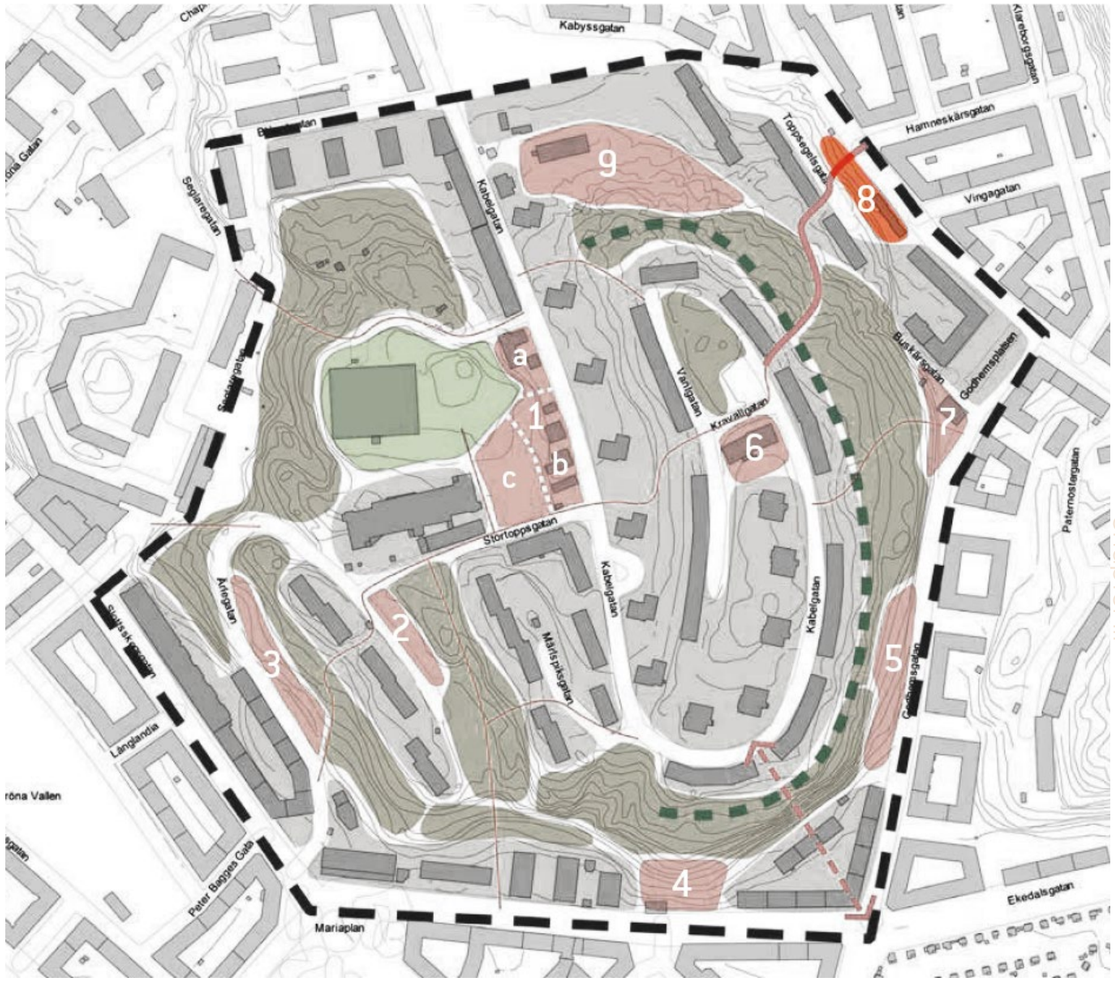


Figure 23. Map of Program for Gråberget (Göteborgs Stad, 2011)

SITE

Site Investigation

The chosen site is occupied by the 1-storey garage and partially steep natural hill in height of approximately 9 meters. The garage contains 13 parking spaces and 8 more in the small garden facing the hill. The square plot north to the building is a recycling station for the neighborhood. There is a walking path connecting Såggatan and Kabelgatan on Gråberget. Toppsegelsgatan, which reaches the two blocks on hill, is also available for cars. Såggatan in front of the site is a two-way street where cars and cycling are allowed without separation. The investigation from municipality shows that constructing new living blocks can improve the safety experience of Såggatan. (Göteborgs Stad, 2011)

Compared to other streets within the neighborhood area, Såggatan is one of the main stream connecting Karl Johansgatan and Slottsskogen. The majority of people enter the site from three main directions, north and south along Såggatan, plus west from Gråberget.

The high density of buildings and steep terrain block much of the sunlight on ground level in winter time while in summer, it's a sunny plot that has close connection with nature and the lovely neighboring houses.

Figure 26 (next page). Site Plan with Current Situation 1:1000

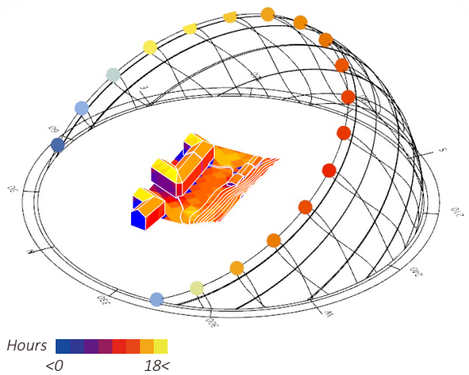


Figure 24. Solar Hour Analysis on June 21st

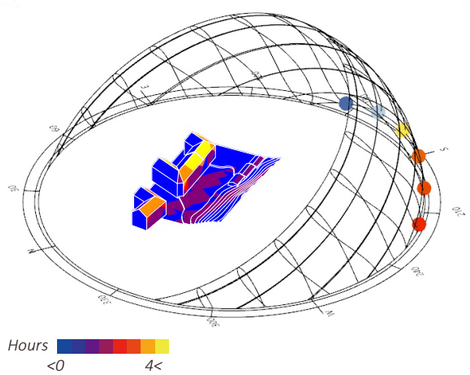
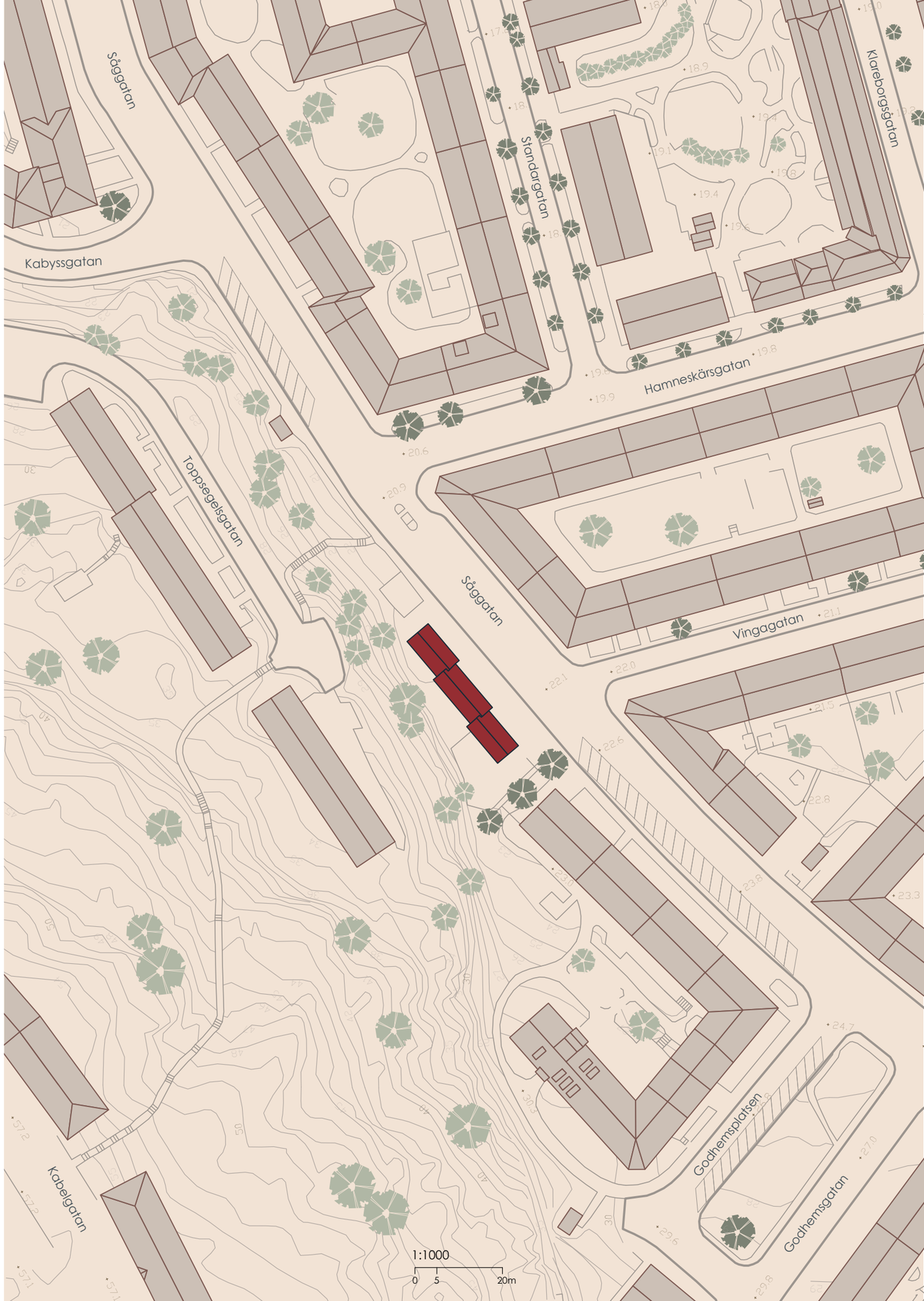


Figure 25. Solar Hour Analysis on December 21st



SITE

Local Context

The site lays within the area of national interest: Majorna 20-23:C. Most were built during 1880-1930 and in the form of landshövdingehus, which is a type of three-storey apartment building with stone structure on ground floor and wood on upper floors. (Göteborgs Stad, 1999) In the 1970s, there was proposal of demolishing the old working-class buildings but refused by local people. As an alternative, they were kept and renovated. (Familjebostäder, n.d.)

Today, the site is surrounded with buildings from the first half of 20th century. They can be generally divided into two groups: built before and after 1940. The buildings facing the site and sitting in the valley area between Stigberget and Gråberget, were mostly built from 1900s to 1930s. They are all in the form of landshövdingehus. Those on the mountains, which either locate on the back or overlook the site from a distance, were raised between 1940s to 1960s. They show a more modern style with continuous usage of material on the façade. With no further construction since then, it has been another half century. Most buildings have a smooth façade and their own garden.

Figure 27. Year of Construction of Surrounding Buildings

SITE

Local Context

Figure 28. Photos of the Chosen Site

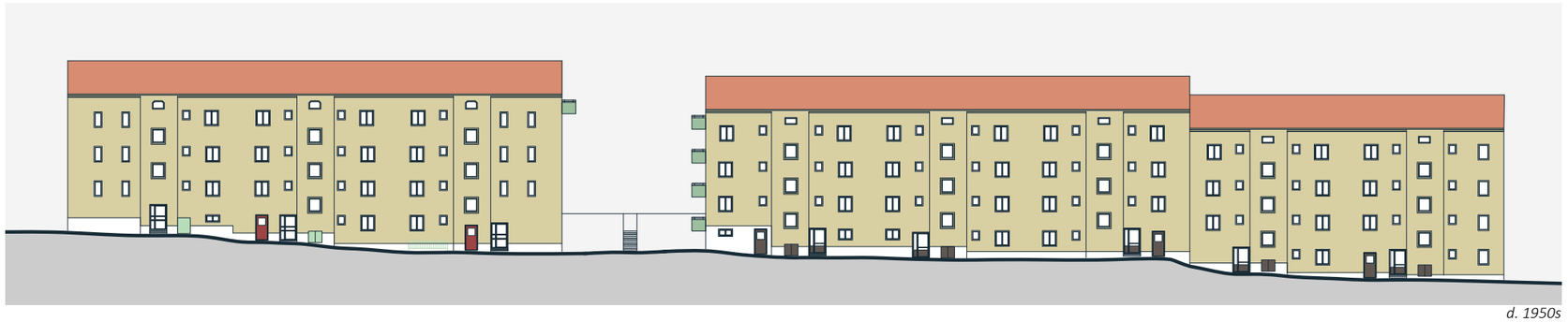
Figure 29. Photos of Surrounding Buildings before 1940

Figure 30. Photos of Surrounding Buildings after 1940

a. 1930s

b. 1930s

c. 1930s



d. 1950s

e. 1960s

SITE

Local Context

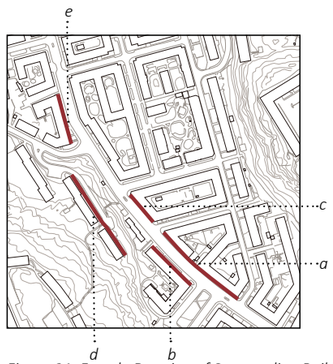


Figure 31. Facade Drawing of Surrounding Buildings 1:500

SITE

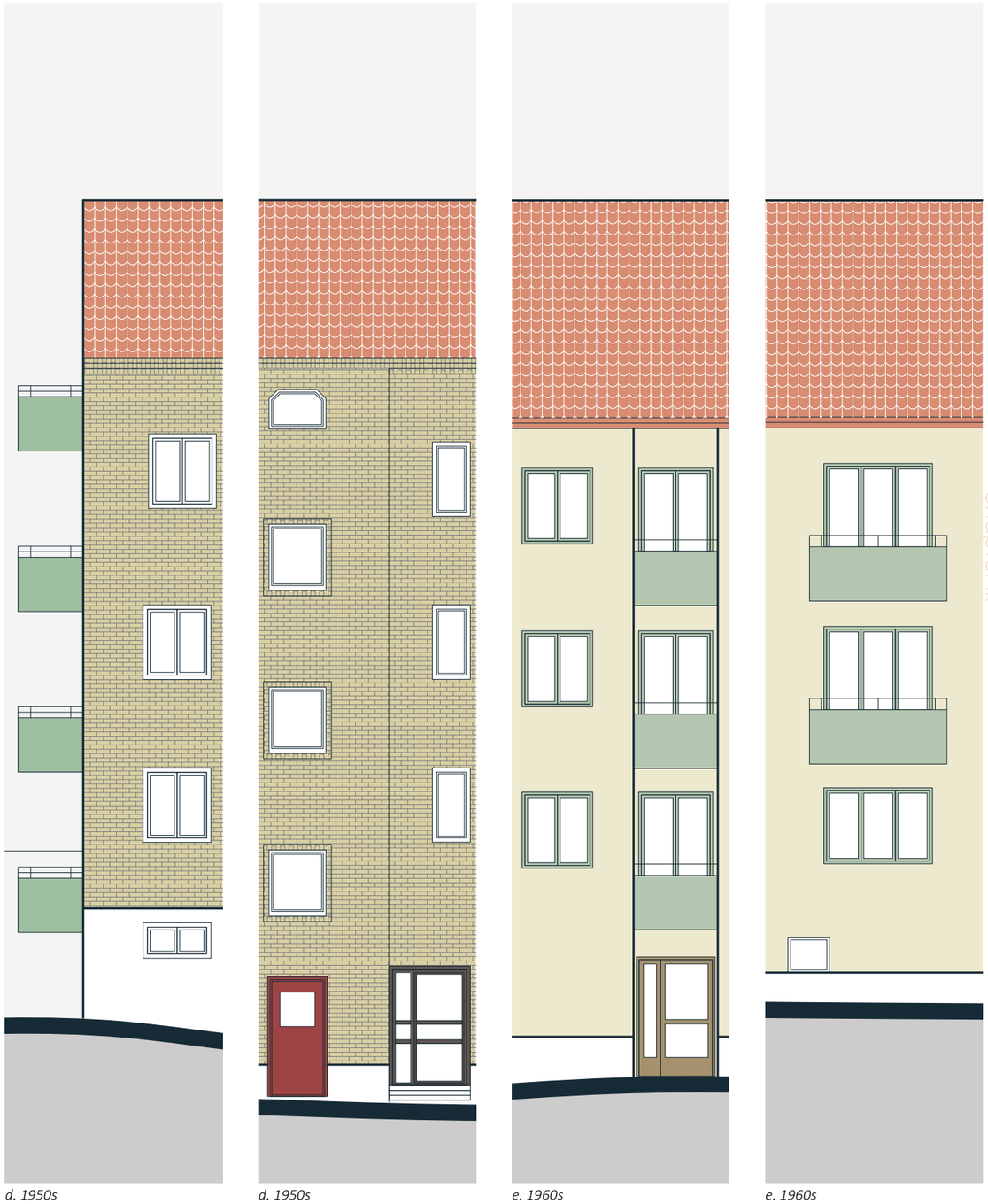
Local Context

a. 1930s *a. 1930s* *b. 1930s* *c. 1930s*

Figure 32. Detailed Facade Drawing of Landshövdingehus 1:100

SITE

Local Context



d. 1950s *d. 1950s* *e. 1960s* *e. 1960s*

Figure 33. Detailed Facade Drawing of Mid-twentieth Buildings 1:100

SUMMARY

The site locates in a culture-rich district with easy access to public transportation. The surroundings are high density residential blocks built in the last century. While having many in traditional style called landshövdingehus, there are also relatively modern buildings. The site sits along one of the main streets in Majorna. It’s adjacent to both a lovely neighborhood and a wonderful natural environment with rich terrain. Around the spot exists playgrounds, schools and mountains. Today, people can reach the site from three main directions.

Compared to Gothenburg city, Majorna has smaller households as well as smaller apartments. They are interrelated to some extent.

By summarizing from the site analysis and previous investigations from the municipality plan (Göteborgs Stad, 2011), several challenges can be identified before the design.

CHALLENGES:

1. Small site. The site is limited in space thus hard to fit a garden.

2. Parking shortage. The district lacks parking spaces nowadays. Furthermore, there is originally more than 13 parking lots on the site, Replacing the old garage will cut these away.

3. Natural View. The site has a nice green slope that can be appreciated from the street. Having new buildings will block the view and cut the connection with the natural environment.

4. Noise. Being in the valley area, construction of new building may worsen the neighborhood quality and cause the problem of enhancing the noise from the street.

5. Access to Gråberget. Today, the street is connected with Gråberget by a walking path. Placing a new project may cut the connection or hide the way.

6. Sunlight. With the dense buildings and steep slope, solar exposure is extremely limited today in winter. Constructing higher structure will make it even worse on the street side.

Figure 34 (next page). Axonometric Drawing of the Original Site

IV

DESIGN PROCESS

Chapter IV shows the experiments and design process of the project. In the end, there is analysis on the final design including main design strategies, summary for the program, function distribution and flows.

Volume Study
Section Study
Solar Analysis
Generation Process
Inspirations
Design Strategies
Program

VOLUME STUDY

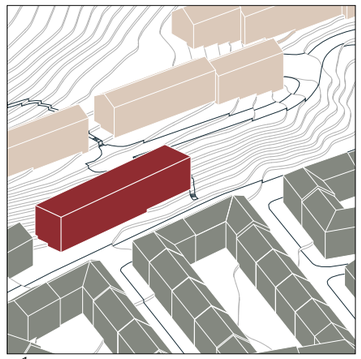
a. One-Block

A complete volume standing along the street. It can be divided in different form but always being a continuous block. Thus, divisions can appear on facade design or simply indicated from the shape.

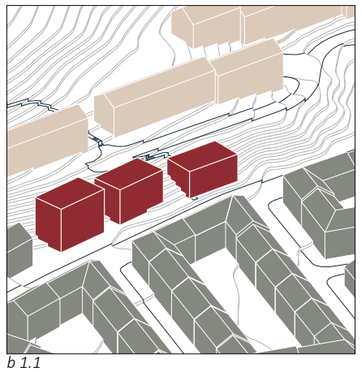
b. Multi-Blocks

A series of blocks are aligned along the site. Each living block has a distance from each other, thus leaving a gap in between. The blocks can either be facing east and west, or turn 90 degrees and face each other.

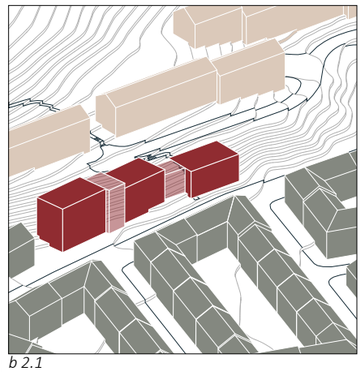
In b2, different types of connection among the individual blocks are tested.



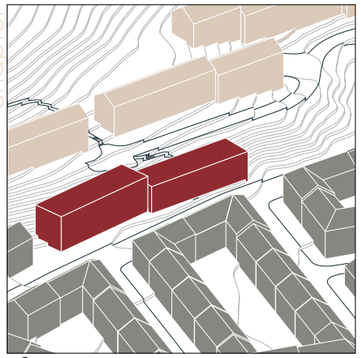
a 1



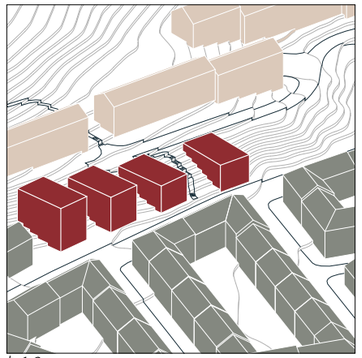
b 1.1



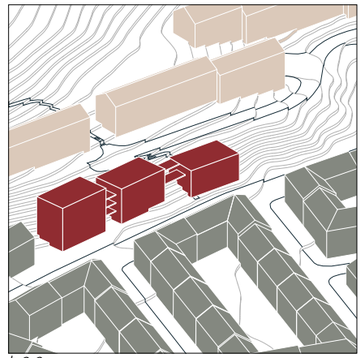
b 2.1



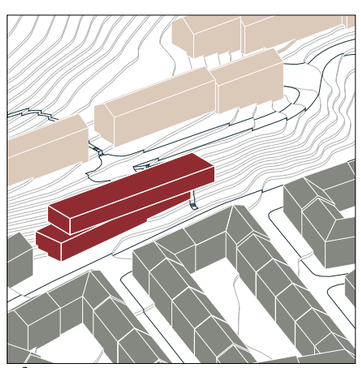
a 2



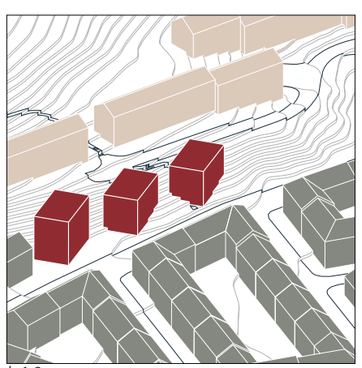
b 1.2



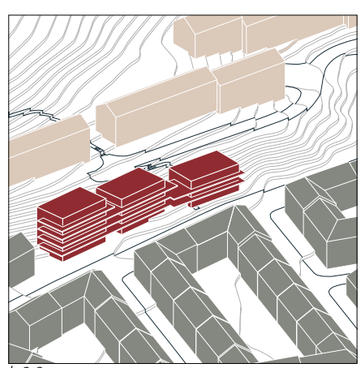
b 2.2



a 3



b 1.3



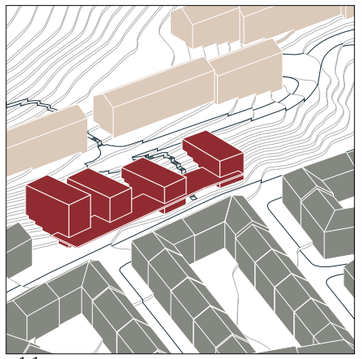
b 2.3

Figure 35. Volume Study

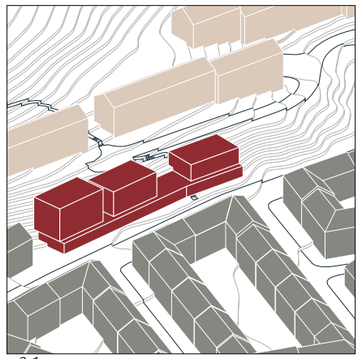
c. Mixture

The typology takes reference from both a and b. Apart from the living blocks being separated blocks, there is a continuous base on ground level with an accessible space left on its roof. It provides a second public level for the neighborhood and offers connection between the upper hill and the street.

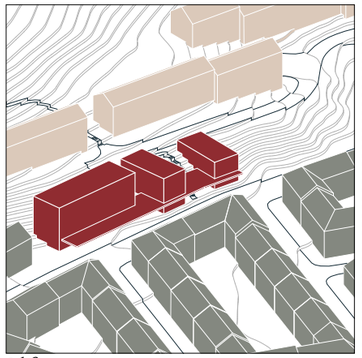
In c1, a board-like structure connects the blocks, while in c2 it is more clearly divided with up and down zones.



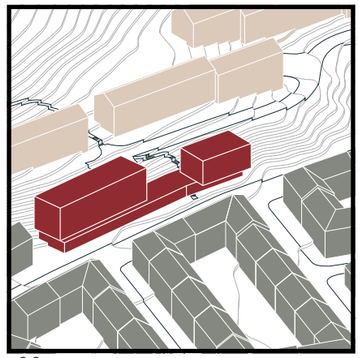
c 1.1



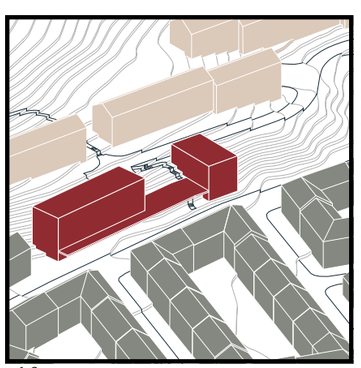
c 2.1



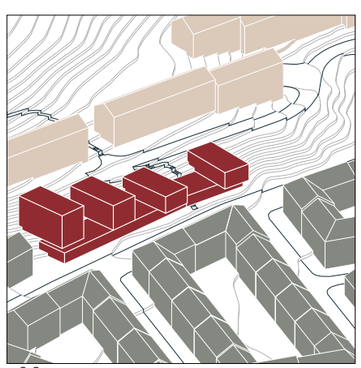
c 1.2



c 2.2



c 1.3



c 2.3

GENERAL CONCLUSIONS

The study uses a general size for the blocks. Most have a basic width of 12 meters. It is 10 meters in c1.1 and c2.3. The length for smaller blocks are all 20 meters and 40 meters for most larger ones. a1 and a2 are 60 meters and 35 meters in c1.2. The height varies from 3 floors using 10 meters and 5 floors using 16 meters.

a.
O Keeps good integrity. Use limited change but still fit in the context.
X Block the view of the hill and may cause noise problem on the street.

b1.
O Remain the view connection between the street and the hill. Minimize the potential noise problem. Bring new pattern to the local context but remain a similar design language.
X Lose the integrity. The distance between the blocks in b1.2 is too narrow.

b2.
O The partition dissolves the oppressive feeling of the big volume. The connections enhance the integrity.
X No specific need for the connection, especially for b2.2. In b2.3, the outdoor terraces are too invasive to the street. There is still the problem with noise in b2.1.

c1.
O It has the good aspect from both a and b. In c1.3, the arrangement of the blocks is more reasonable for keeping a large square and ensuring the quality of housing.
X The scale of having a platform feels not suitable on this site.

c2.
O A balanced solution to meet the needs on the site.
X How the spaces on the public terrace can be efficiently used needs to be carefully studied.

c1.3 and c2.2 are selected for further study.

SECTION STUDY

The project is facing a steep hill on the west side. The floor height is 3.5 meters on ground floor and 3 meters on upper floors. The overall principle is to least destroy the original landscape, meaning less digging. It can be told from the sections that the ground floor will be covered by the terrain on the west, which is not suitable for fitting apartments. As for the small building in the twist version, only half of the volume is available to include one apartment.

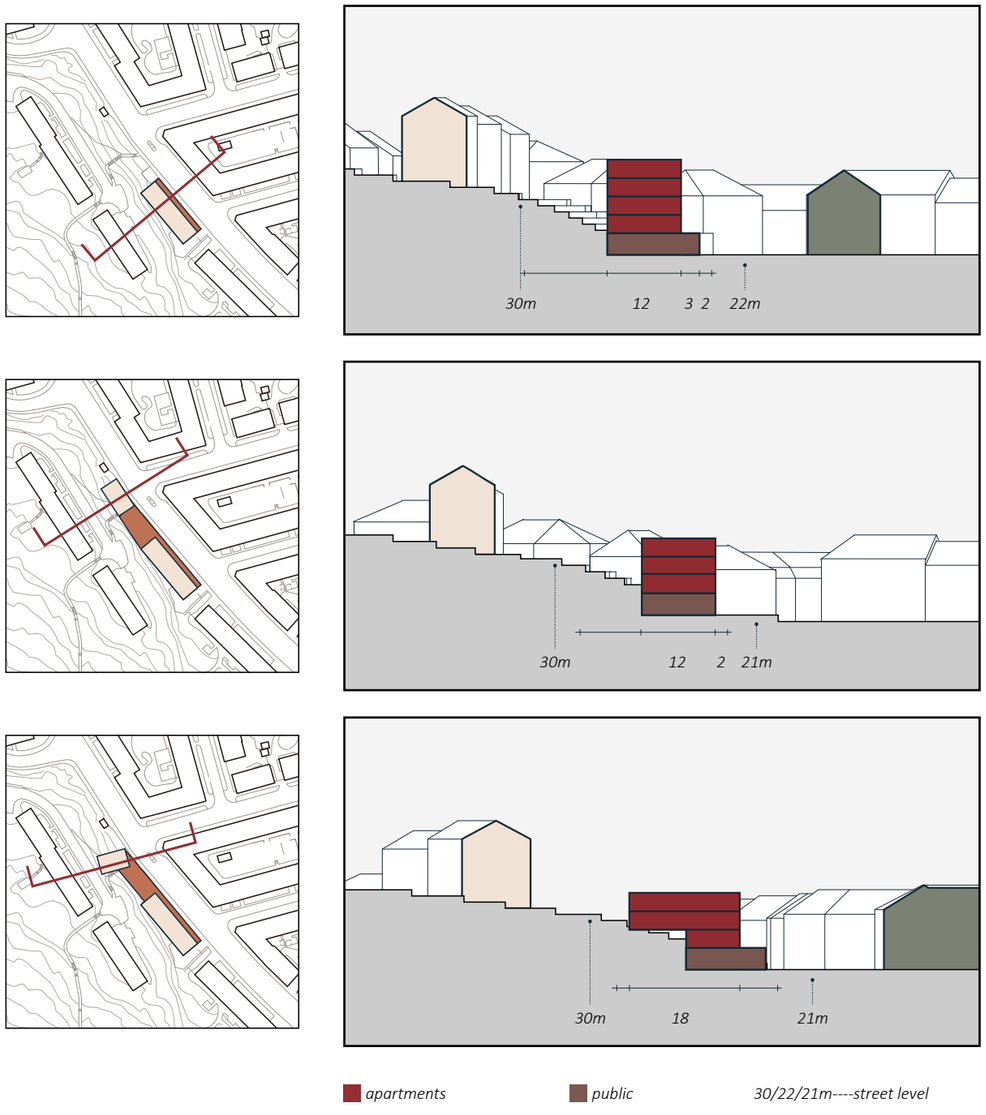
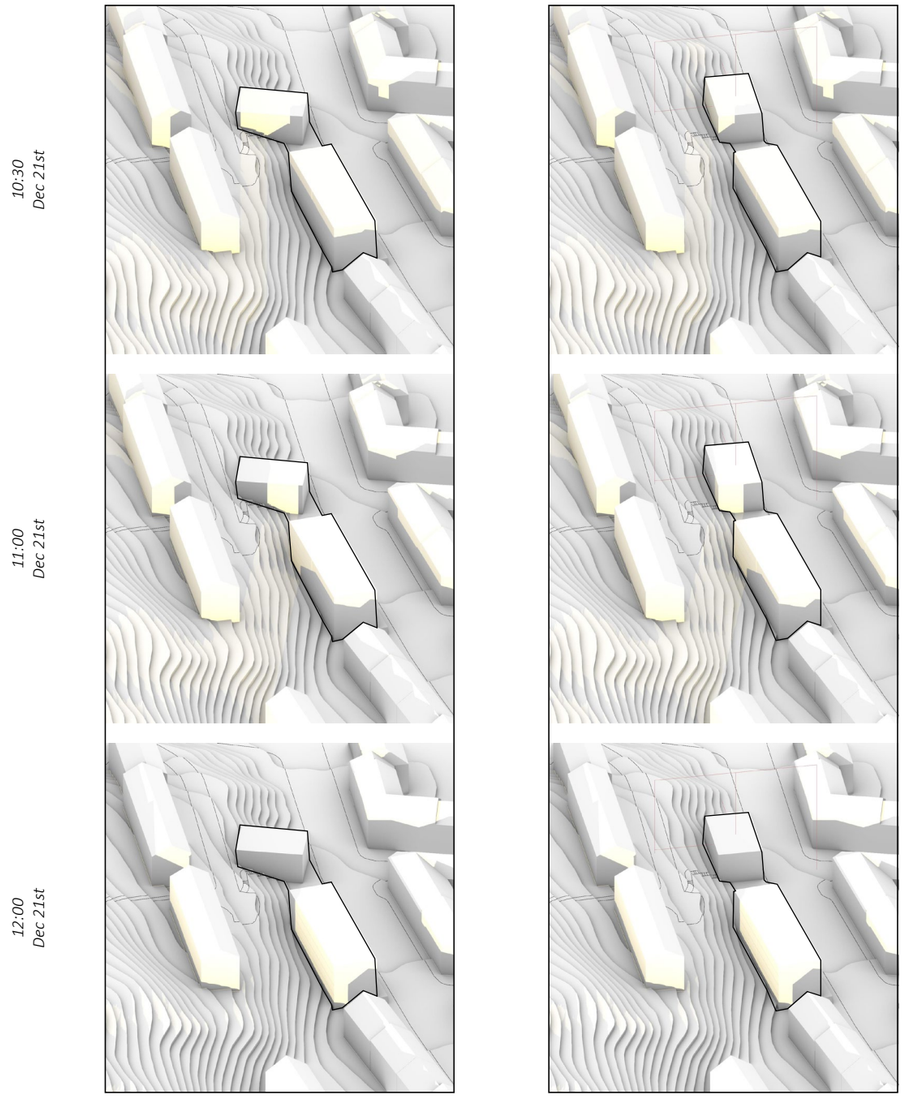


Figure 37. Section Study

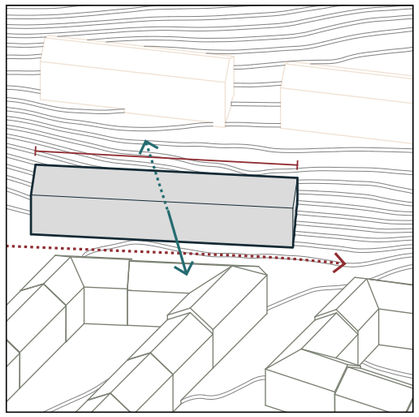
SOLAR ANALYSIS



The figure shows the solar situation in the darkest day of the year. The whole west façade above the ground floor of the long volume can have a short period of sunlight during noon time. The short volume in twist version can be exposed to better sunlight facing south. The analysis also examines that all the apartments can receive sunlight even in the darkest day. The west façade of the long volume and the south façade of the short volume will be main side in each apartment.

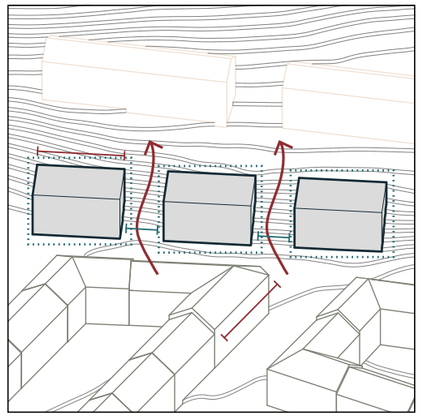
Figure 38. Solar Analysis

GENERATION PROCESS



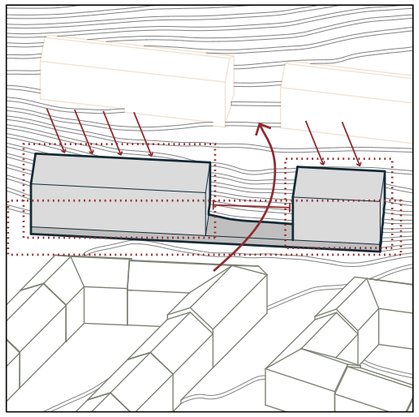
O
1. align with city structure and landscape
2. volume scale fits the neighbourhood

X
1. block the natural view and connection

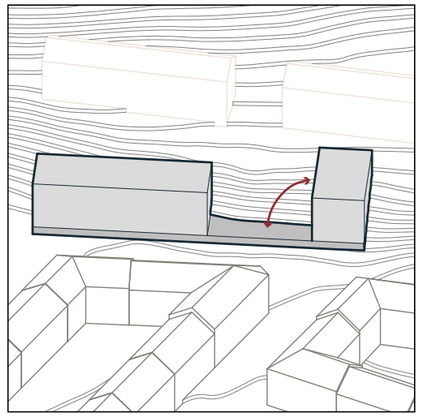


O
1. gaps available for view and connection
2. separation responds to local context

X
1. distance between is limited
2. volume pattern is too separated



O
1. more complete space between volumes
2. good view and physical connection
3. both separated and integrated
4. sunlight for all apartments



O
1. closer connection between the apart-ment building and the platform

Figure 36. Generation Process

INSPIRATIONS

Strömmensberg
The case shows the division of upper residential block and lower business part. A similar neighborhood with the site.

Godhemsberget
A project 400 m south to the site with good floor plans and neighborhood environment. Locate on the mountain. The inner small garden towards slopes creates a quiet and nice entrance for the residents.

Bergskroken
Housing with high quality outdoor loggia. They can be closed as indoor rooms or totally open up being a private garden. Sliding wooden panels on two facades forms interesting patterns and provide protection from over-strong sunlight.

Rosendahl
The outdoor loggias are well integrated into the volume. The areas of the outdoor spaces are large. However, the triangle shape naturally creates a centered activity zone facing the indoor living room.

Figure 39. Pictures of the Inspiration Projects

DESIGN STRATEGIES

Volume

1. base block + platform: A base volume at the street level provides public functions and entrances for residents. It offers a platform on the upper level, which is an activity and relaxation square being separated from the street level. The platform connects the city and Gråberget. It also has good sunlight.

2. partition and integration: Apartment volumes respond to the characteristic of landshövdingehus by dividing into smaller parts. It can be indicated from both the volume arrangement and façade design. The separation keeps the visual connection with the natural hill. The base block that connects the upper buildings ensure the integrity of the whole project.

3. follow the city pattern: The buildings are aligned with the streets. The twisted small building also follows the orientation of the opposite building. The façade has vertical characteristic, which is correspondent to neighborhood buildings. The division of the base block and upper building responds to landshövdingehus.

Floor Plan: Four Principles

The plans aim for larger apartments that can accommodate two or more people, which will be perfect for families with children. Four design principles guide the floor plan generation. They are concluded from the previous research, thus ensuring the apartments to be healthy homes that can carry a 24-hour routine life.

1. private outdoor space
2. openness + division
3. circulation
4. hygiene zone

Figure 40 (next page). Flow and Function Distribution Analysis

PROGRAM

Total Area: 2700 ㎡
Playground: 185 ㎡

Total **Apartment** Numbers: 21

apartment A*6: 96+20+7.5 ㎡
apartment A1*2: 96+20+28 ㎡

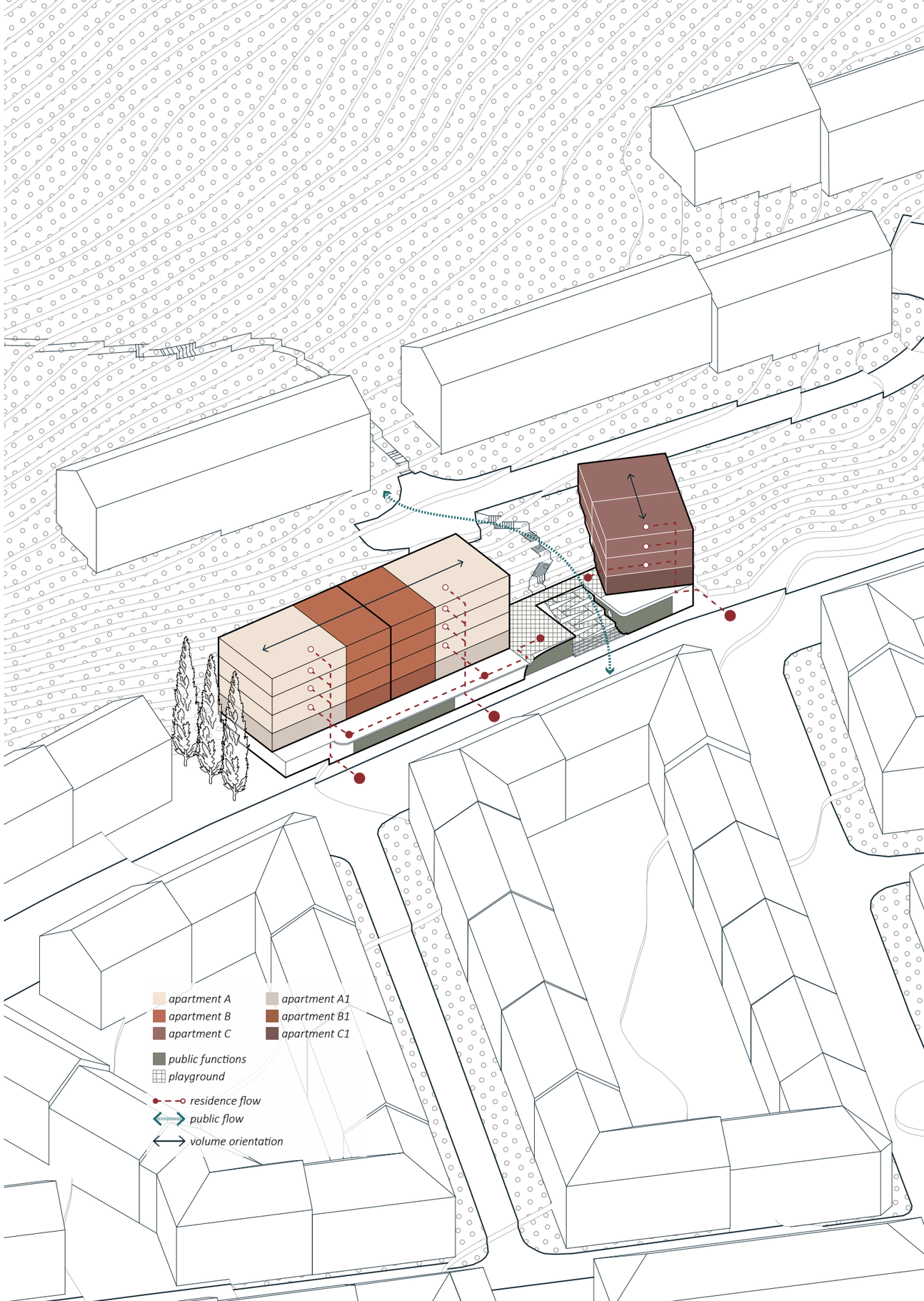
apartment B*6: 70+17+2.6 ㎡
apartment B1*2: 63+17+18 ㎡

apartment C*4: 73+16+4.8 ㎡
apartment C1*1: 73+30 ㎡

（interior+loggia+balcony）

Residential Functions:
car parking: 13
bicycle parking: 13
storage
laundry

Public Functions: 225 ㎡
garbage station: 40 ㎡
gym: 40 ㎡
restaurant: 78 ㎡
boutique: 67 ㎡

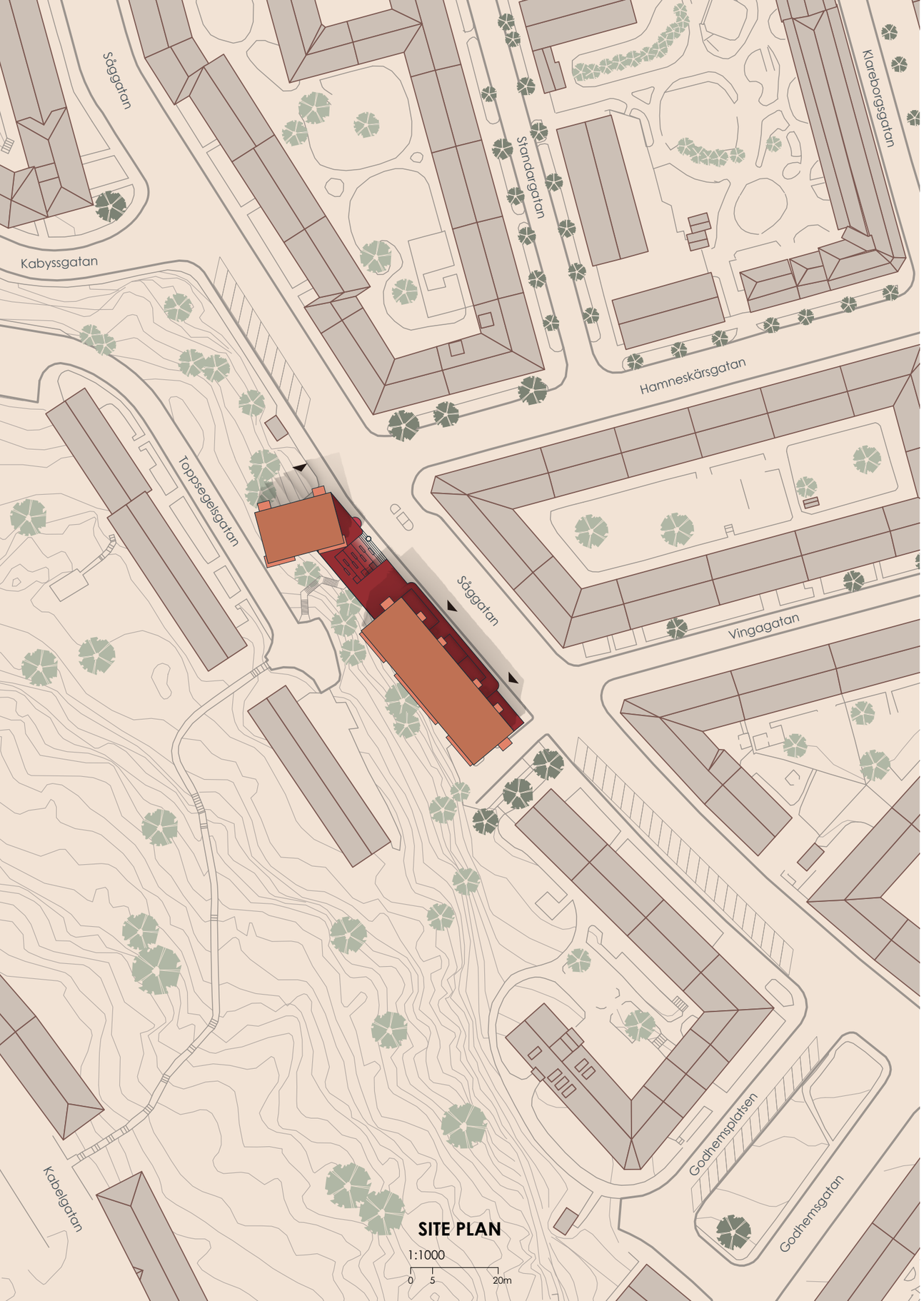


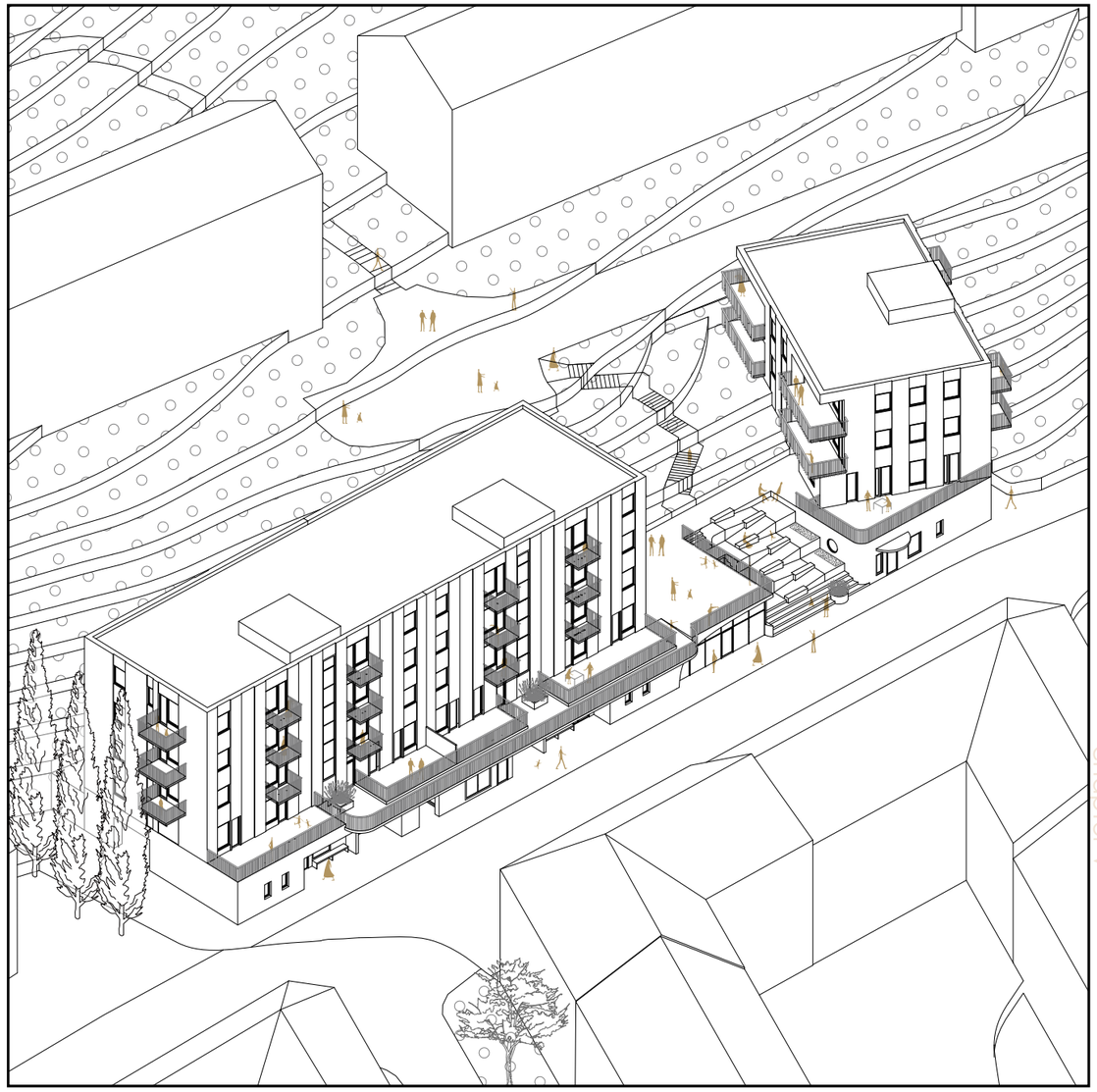
V

DESIGN PROPOSAL

Chapter V presents the materials of the final project design. It responds to the theory research in chapter II and the site investigation in chapter III.

Site Plan
Floor Plans
Section
Facades
Apartment Plans
Perspectives





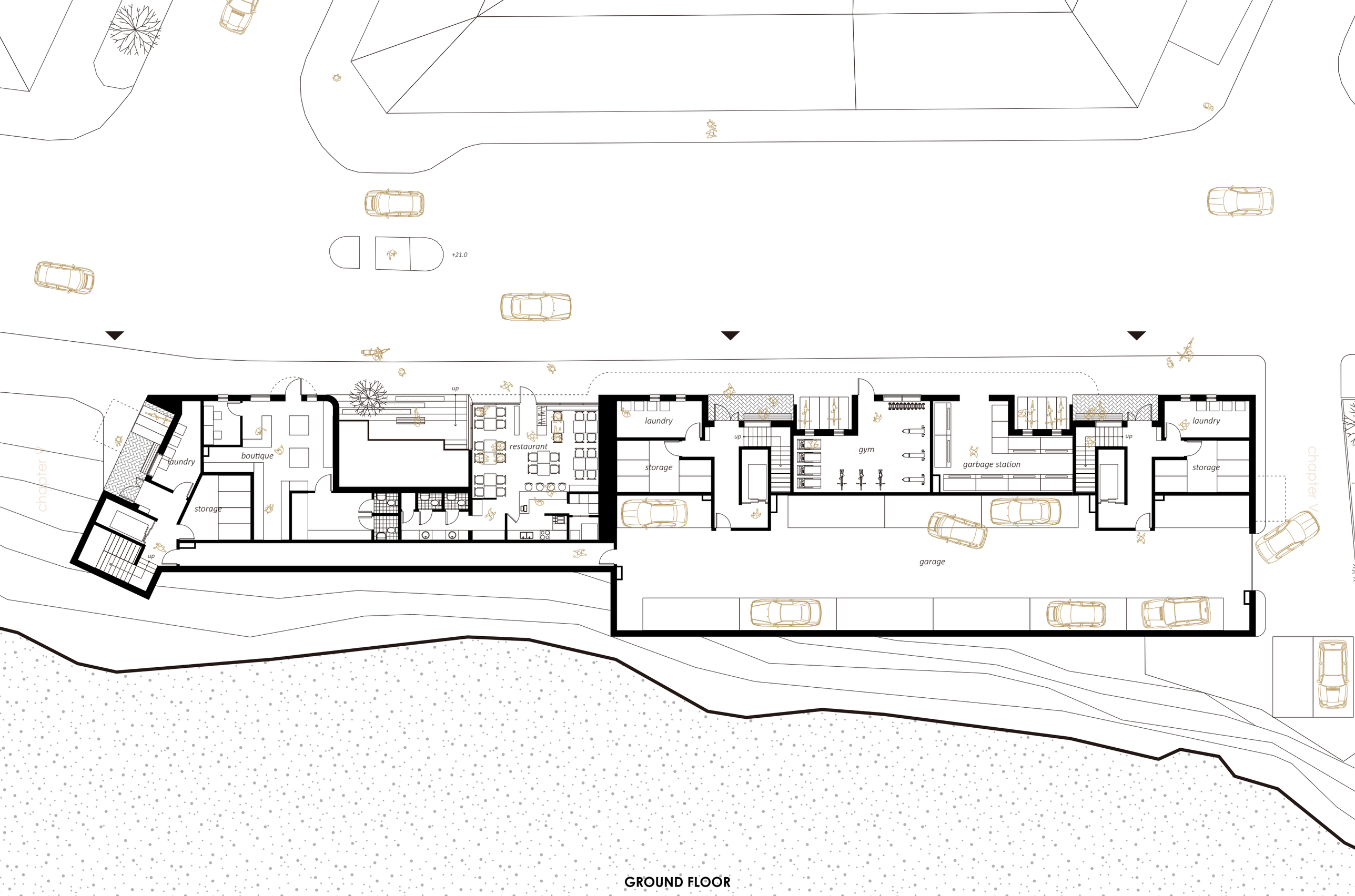
Site Plan and Ground Floor

The main building aligns with Såggatan and the small building aligns with Hamneskärsgatan. Entrances for the living units are along Såggatan with a niche space. A stair from Toppsegelsgatan goes down to the public platform and is further connected with Såggatan via the big staircase.

The private gardens, balconies and loggias are facing towards the public areas at different parts and create active atmosphere. 13 parking spaces are kept. The garbage station replaces the original recycling station on the site and is still opened to the neighborhood.

The two business premises (restaurant and boutique space) show two different characteristics , but both have visual connection with the big stair.

Figure 41 (page 64-65). Concept Model Render
Figure 43. Axonometric Drawing of the Project



GROUND FLOOR

1:200

0 1 4m

down
up
+24.5
playground
+24.3
down
up
up
down
up
down
+30.0
70
71

FIRST FLOOR

1:200
0 1 4m

First Floor

A normal stair provides a quick path between the street and the mountain. People can rest and move around at the slopes with benches. The platform has facilities for entertainment. The stair, slopes and platform form a public garden for the residents and a playground for the neighborhood, responding to Karl Johanstorget and Majvallen on two ends of Såggatan.

There are second entrances on the first floor for the residents. For people living on this level, they will have a large private outdoor garden attached to their apartments. They can be entered directly from the pubic platform.

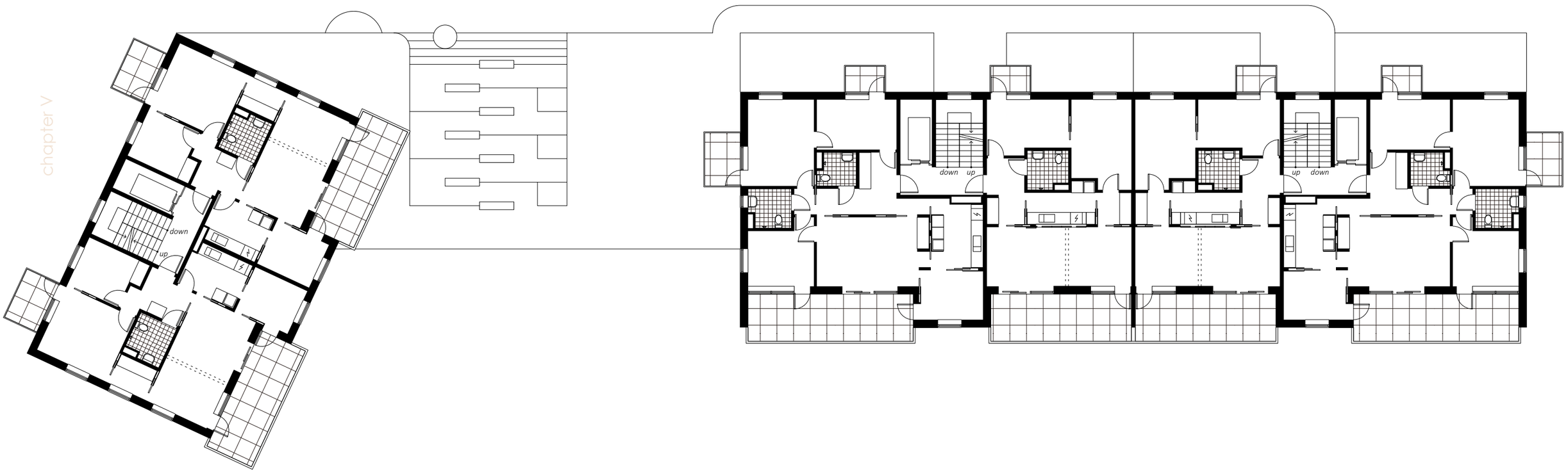
The apartment in the small building on the first floor is named C1. The larger apartment in the long building is named A1 and the smaller one as B1.

Standard Floor

The small building includes one living unit and the long building includes two symmetrical living units. Each living unit has a stair well in the middle along the street side with two apartments distributed side by side on each floor.

The apartments in the small building are named C. The larger apartments in the long building are named A and the smaller one as B.

For the whole project, there are 6 different apartment floor plans following 3 floor plan logic. Apartment A, A1 and B will be presented in detail later. C is the same logic as A, B1 is the same logic as A1, C1 is the same logic as B.



STANDARD FLOOR

1:200

0 1 4m

Section

The ground floor is 3.5 meters high and the upper floors are 3 meters high. The project is 5-storey high and partially 4-sotrey, with a simialr scale as the surrounding buildings. For people walking along Toppsegelstagatan, the project building is 1 to 2-storey higher.

The facade of the big building is pushed in away from the street to reduce the oppressive feeling. The outdoor space on the first floor creates more connection between the residential building and the street below.

The niche space of the entrances widens the pedestrian sidewalk.

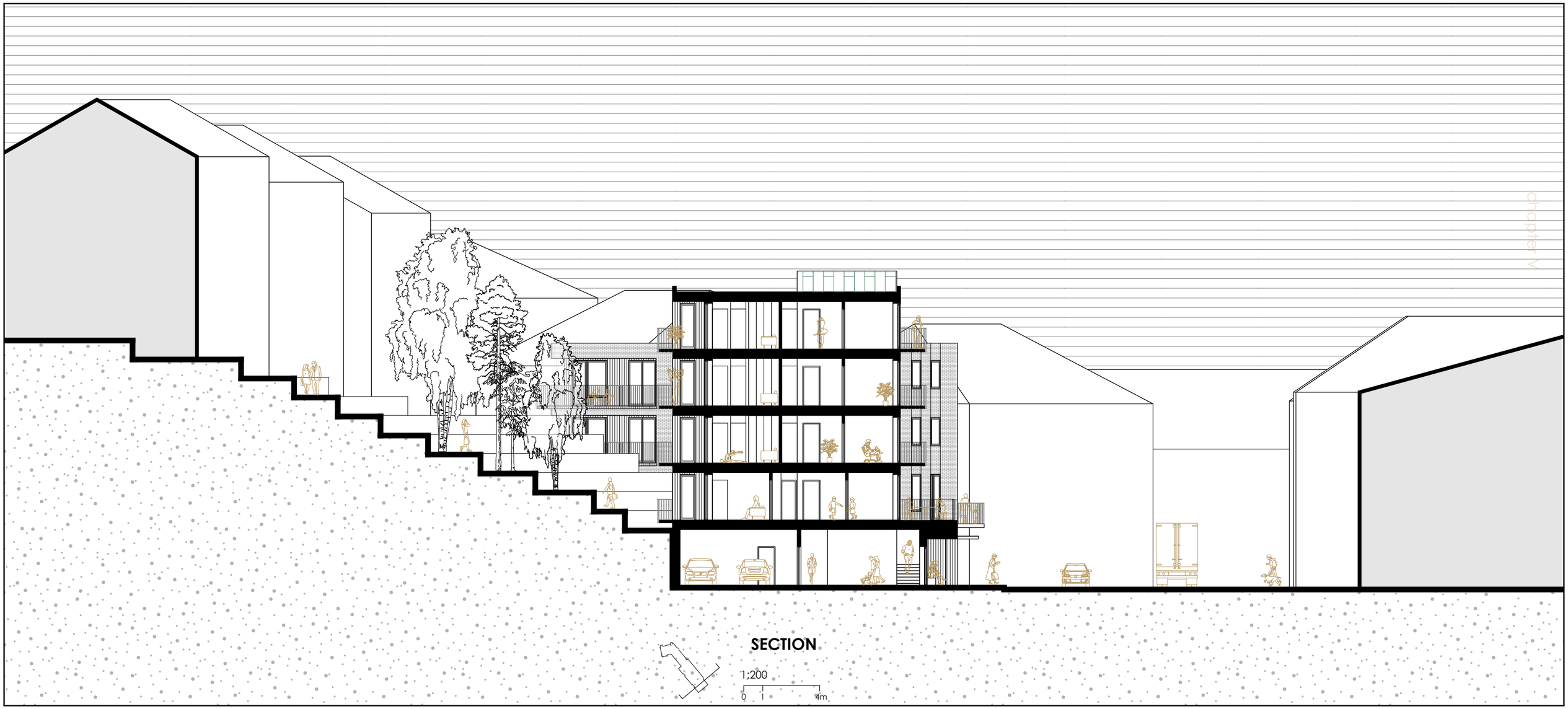
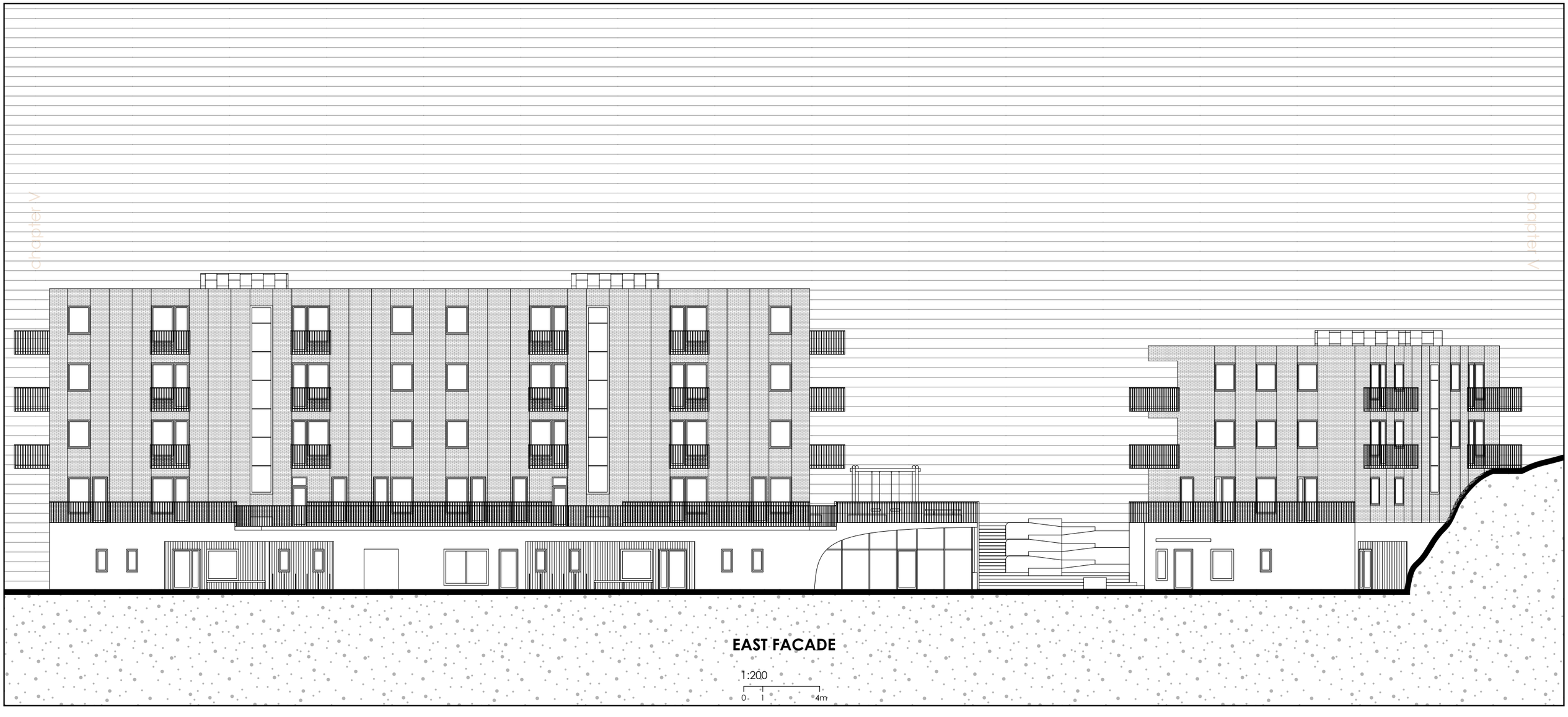


Figure 48. Comparision with Neighbouring Facade 1:500



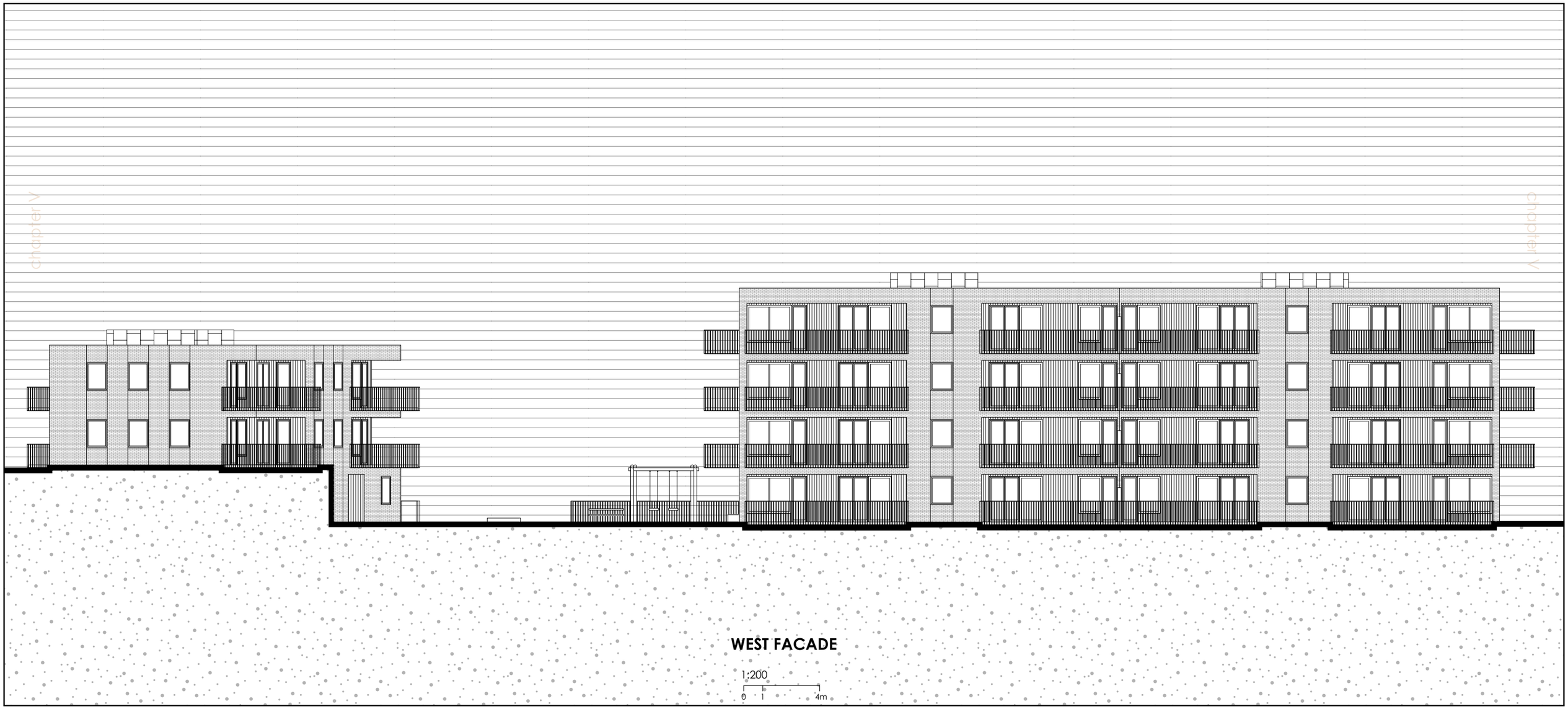
East Facade

The street facade has a more closed identity. It is divided into two vertically, responding to the characteristic of the neighboring landshövdingehus. It also has similarity in scale and color. The facade of the living units shows vertical characteristic.

Round corner elements are used both in facade and plans at public spaces to soften the space.

East Facade

The facade facing the mountain is more opened up with big loggias. The connection between the residential outdoor spaces and the palyground helps to make the public area more active and safe under watch.



WEST FACADE

1:200

0 1 4m

Figure 51. Detailed East Facade 1:100

Figure 52. Detailed West Facade 1:100

APARTMENT A

96+20+7.5 m²
5 rooms + kitchen

The common rooms are connected together in one corner and the private rooms are inter-related by themselves. All the rooms can get access to the outdoor private space. The loggia can be closed up as an extra room.

With the floor plan logic, the interior space can be easily divided into two zones with fairly good quality. The resident has much freedom to decide the openness of between rooms.

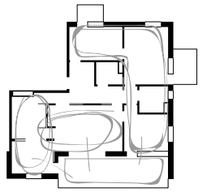
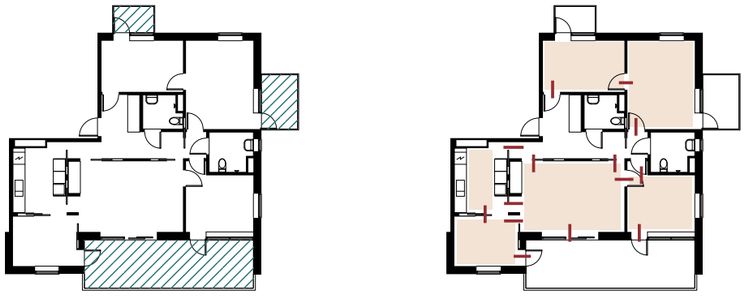
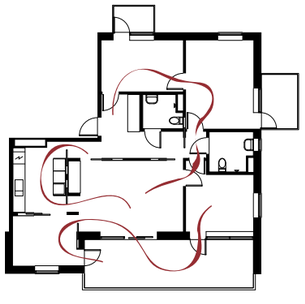


Figure 53. Concept Sketch A

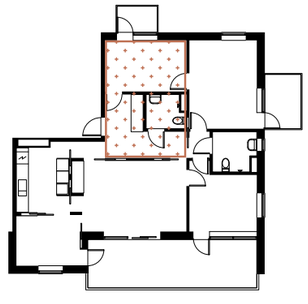


1. private outdoor space

2. openness + division



3. circulation



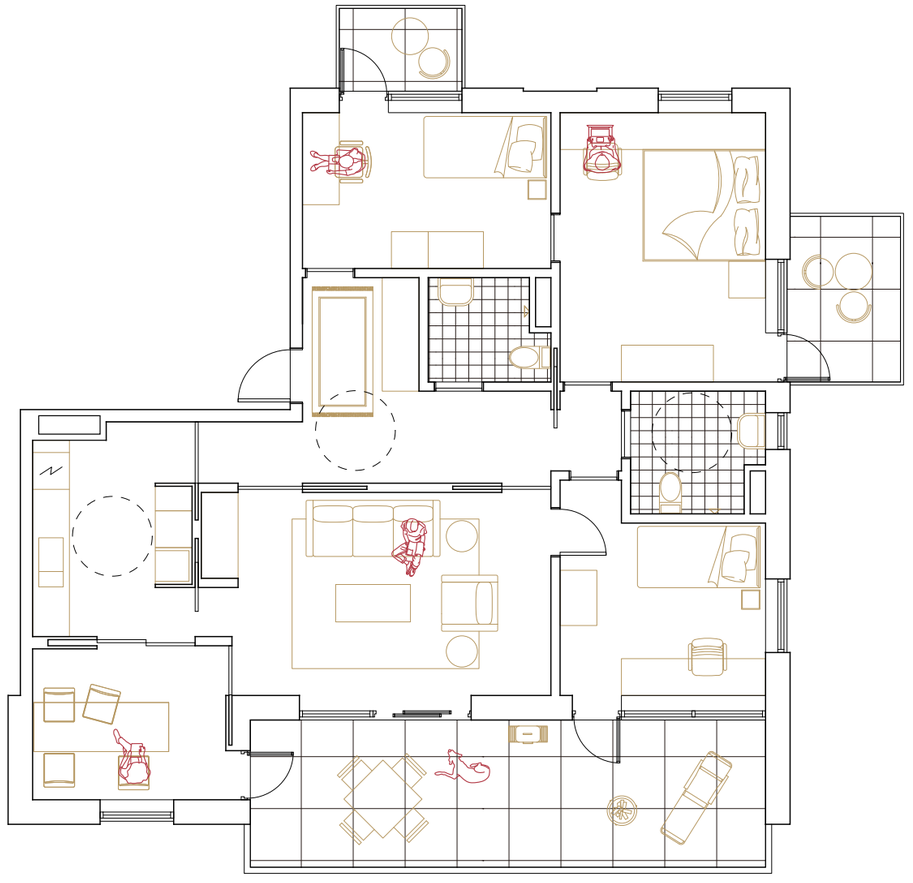
4. hygiene zone

Figure 54. 4 Principles in Apartment A

couple with 2 children

W+W+W+W　R+E+W+E　W+C+A+R　C+R+R+E　R+R+S+R

The scene shows a normal working day when all four people in the household need an independent room. There are more choices than the presented one.



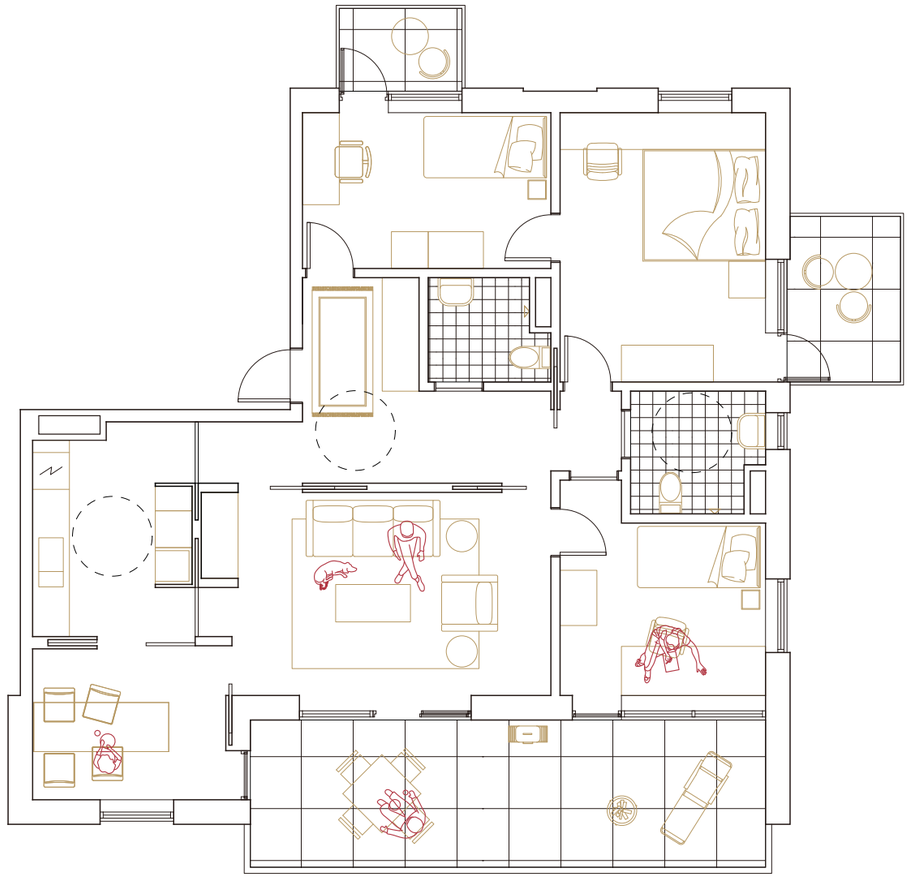
apartment A

1:100
0　0.5　2m

couple with 2 children

W+W+W+W R+E+W+E W+A+A+R C+R+R+E R+R+S+R

The scene gives example on how the family members can reside in different rooms for their own activities but still have limited visual connection between each other.



apartment A

1:100

0 0.5 2m

couple with 2 children

W+W+W+W R+E+W+E W+A+A+R C+R+R+A R+R+S+R

The scene explains how the apartment can be divided into two main zones. The kitchen, dinning space, living room and loggia are totally opened to each other and create a large active area. The three private rooms are connected together but closed up towards the common rooms,thus having good privacy.

apartment A

1:100

0 0.5 2m

APARTMENT A1

96+20+28 m²
5 rooms + kitchen

With a garden accessible from the outside, the kitchen is put in the middle to provide more possibilities on how to use the rooms. Both rooms next to the kitchen can serve as dinning space. The northern part connected with the garden can be a more public area than the southern part with the living room.

The apartment can be opened up from north to south following two axes.

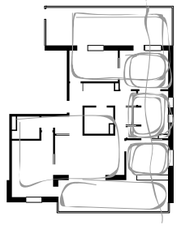
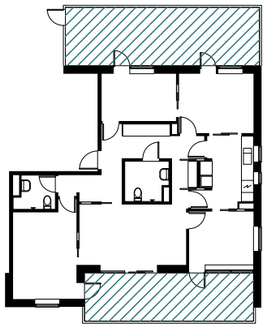
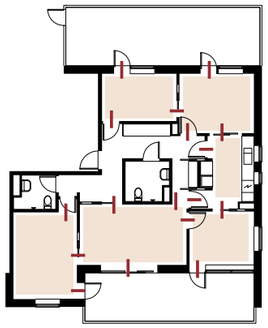


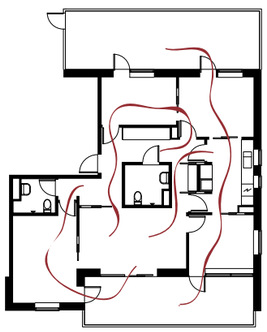
Figure 58. Concept Sketch A1



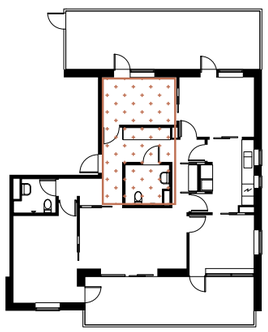
1. private outdoor space



2. openness + division



3. circulation



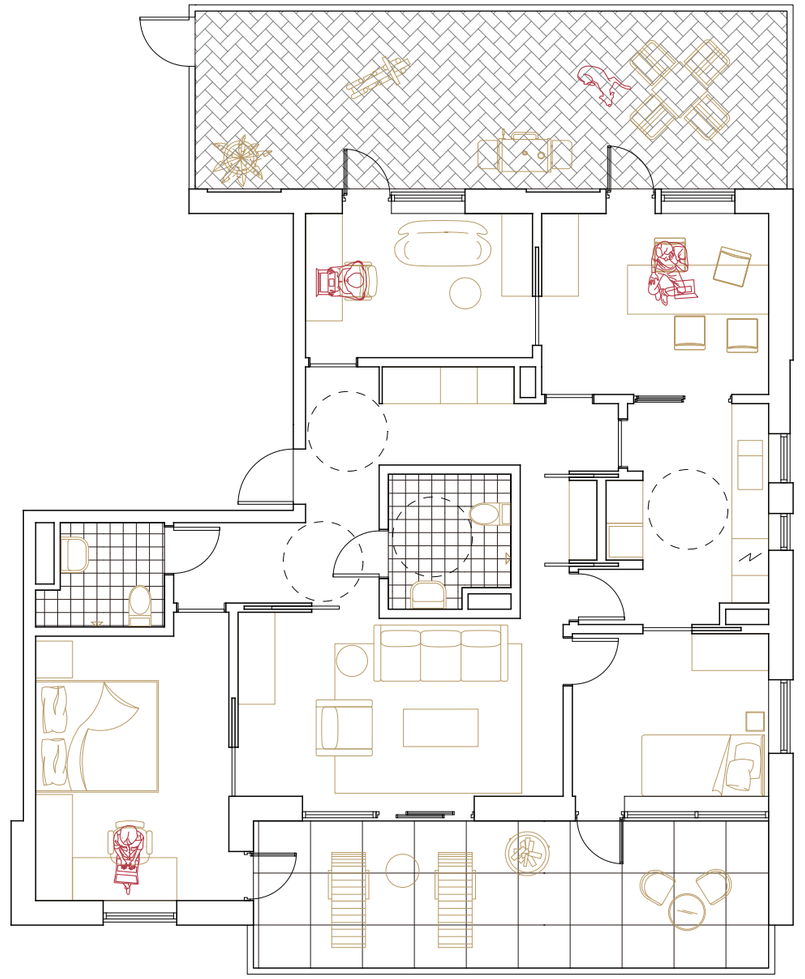
4. hygiene zone

Figure 59. 4 Principles in Apartment A1

couple with 1 child

W+W+W W+E+S W+W+R R+A+R R+R+S

The scene shows a normal working day when all members in the household need their own independent room. There are more choices than the presented one. All rooms are connected directly with a large outdoor area.



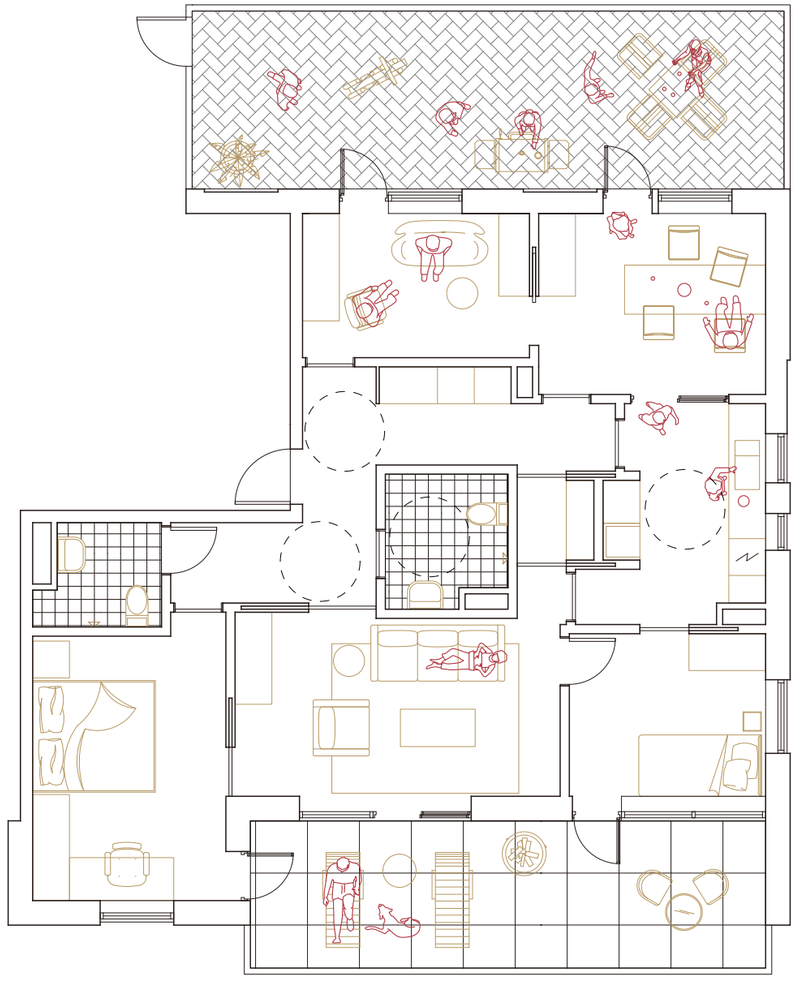
apartment A1

1:100
0 0.5 2m

couple with 1 child

W+W+W | W+E+S | W+W+R | R+A+R | R+R+S

The scene presents how the apartment can be divided into two and using the garden as a central social area. The two rooms next to the garden are used as a second living room, together with the kitchen.



apartment A1

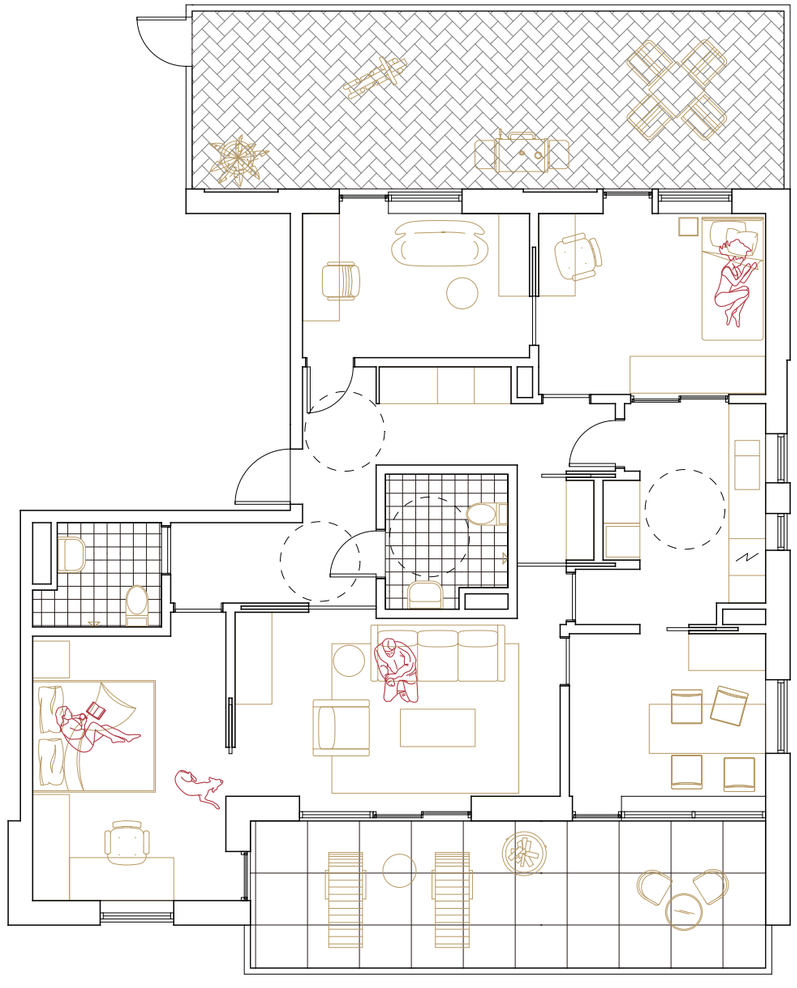
1:100

0 0.5 2m

couple with 1 child

W+W+W | W+E+S | W+W+R | R+A+R | R+R+S

The dinning area is changed in this furniture plan. Dinning table is put in the room next to the loggia. The door between the kitchen and the northern room is blocked by cabinet.



apartment A1

1:100

0 0.5 2m

APARTMENT B

70+17+2.6 ㎡
4 rooms + kitchen

In this floor plan, the kitchen is placed in the middle facing the common space with visual connection via the sliding windows. The common space can be a complete large room or divided into two. The sliding window can control to which room the kitchen is opened towards to.

All the other rooms are directly connected together without passing through the kitchen. The apartment can be opened up from north to south following two axes.

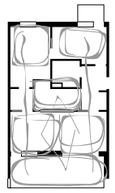
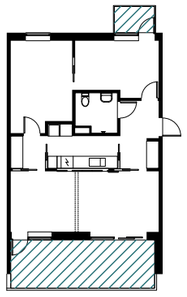
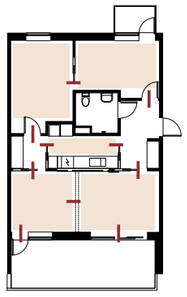


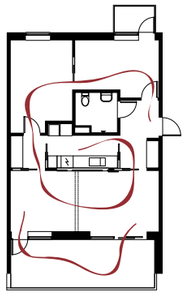
Figure 63. Concept Sketch B



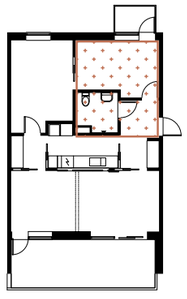
1. private outdoor space



2. openness + division



3. circulation



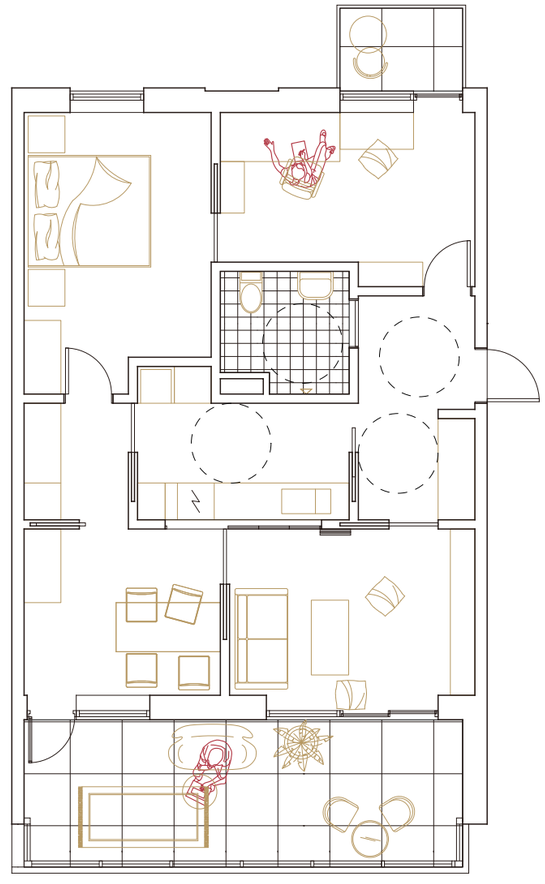
4. hygiene zone

Figure 64. 4 Principles in Apartment B

couple without children

Ⓦ+Ⓦ　Ⓡ+Ⓔ　Ⓦ+Ⓐ　Ⓐ+Ⓡ　Ⓡ+Ⓡ

The scene shows a normal working day when the couple needs their own independent rooms. It also demonstrates the situation when the loggia is closed up as an extra room with stable climate. The apartment can be vertically divided into two-an inner part and outer part, connected via the kitchen and the loggia.



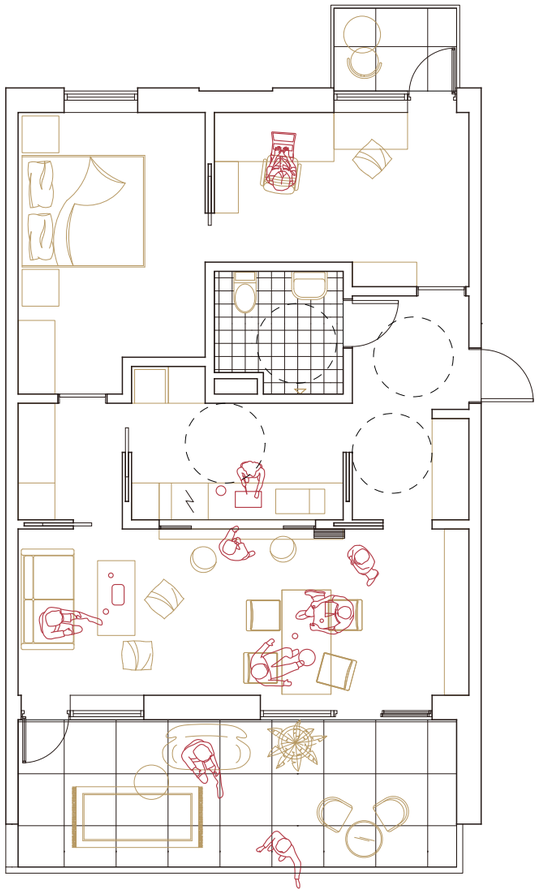
apartment B

1:100
0　0.5　2m

couple without children

W+W R+E **W+A** A+R R+R

The scene perfectly shows how the kitchen can be actively used in connection with the common space. In this scenario, the common space is treated as one room. The northern part can be closed up as a quiet zone.



apartment B

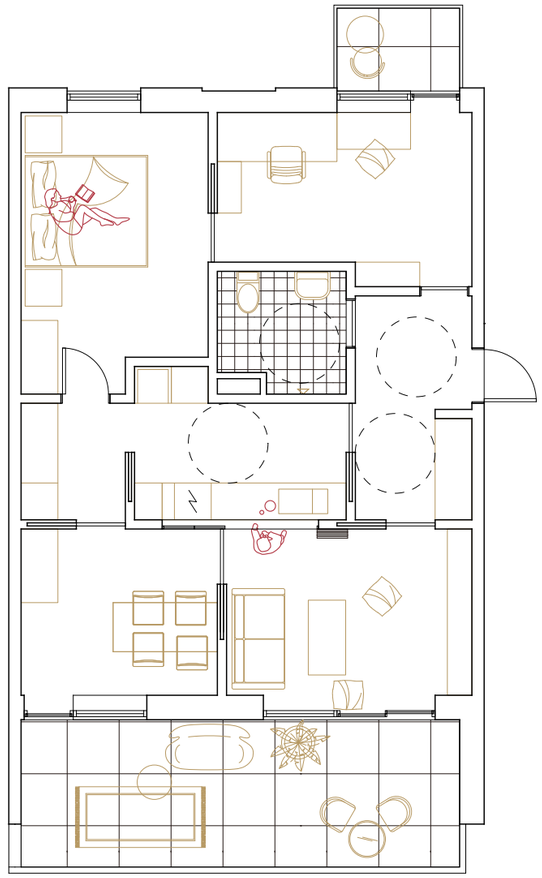
1:100

0 0.5 2m

couple without children

W+W R+E W+A A+R **R+R**

The scene presents the scene when the kitchen is partially opened to living room. With our living culture much around food today, having the kitchen in the middle can enable the convenience from all different rooms.



apartment B

1:100

0 0.5 2m

Figure 68. Looking North along Såggatan

Figure 69. Looking South along Såggatan

Figure 70. Public Stair during Daytime

Figure 71. Entrance in the Evening

VI

DISCUSSION

In this chapter there is discussion on the thesis topic by giving conclusions to the research questions. There are also some more words as a reflection towards the thesis process and the topic.

Conclusions
Reflections

CONCLUSIONS

The thesis got its root from the undergoing COVID-19 disease, which is still a serious global issue at the time when the thesis ends up. It brings tremendous shift in social activities like social distance and working from home, and leads to extensive discussion in architecture filed from urban planning to interior design. Although it was the virus that pulled the trigger of reflections and explorations on a possible new social and residence mode, such scenario has long been imagined and was already partially under practice even before the pandemic. This provides value and concrete support for the thesis topic. The paper looks specifically into the floor plan design of apartment housing which is one of the most influenced field and the most constructed type.

My thesis started by defining housing quality in three dimensions. The research questions are also formulated around the factors in housing design that contribute to healthy post-pandemic living. Conclusions are mainly drawn through literature study. Generally speaking, to keep physical and mental health, enough space, flexibility and adaptability are leading guidelines.

For the fundamental parameter, an apartment should be larger than 60 m^2 and or 50 m^2 at least regardless the household type. Two rooms and better three or more should be ensured within dwelling instead of leaving large open rooms. In regard to the function spaces, a dirt zone close to the entrance will become a growing need. A separable open kitchen is a good solution to balance different usage mode and sufficient room for working at home is definitely important. The most crucial function space in apartment is a high-quality outdoor space. It means having large area and can be well integrated with the indoor spaces by allowing more than one access both visually and physically from different rooms. Spatially, fluid-space and flexible-space can make a good balance between openness and division based on the needs. Zoning and circular movements are typical floorplan typologies that can better fit the living trend.

The second part of the thesis is a project-oriented process. The project aims to apply the previous research conclusions and design a residential building that provide a healthy living environment. There are four main principles guiding the apartment design: 1. high-quality private outdoor space 2. balance between as much division (rooms) and as much openness, including the concern for kitchen 3. circulation within the apartment 4. hygiene zone close to the entrance.

The design proves the possibility to fulfill the demands in limited area and create special quality for the apartments. It is an example and inspiration for future housing design that aims to provide better living spaces.

What's more, the project proposes a possible plan for the selected site. It is a spot with great controversy for constructing new buildings because of its strict surrounding limitation. The design pays attention to the challenges and tries to answer the considerations. It strives to provide extra quality for the neighborhood while having nice apartments.

REFLECTIONS

During the thesis process, I managed to make up a basic structure for understanding and analyzing a healthy home and a good quality apartment. The structure can be improved with more detailed investigation in each part. However, it is not the only way to deconstruct the design compositions.

What worth noticing is that, none of the concepts or ideas mentioned in the thesis are totally new. Many have been proposed or realized for a long time. Just like the situation of working from home was long been mentioned even before 2000, investigation in housing design has almost covered the maximum range. Apart from the pioneer experiments we are still looking at today, the practical practice in housing is mostly operated within a frame. Nevertheless, healthy home and good quality in dwelling is not well-realized in all projects as expected. Not all the important factors are taken for granted and carefully treated in the market because of various reasons. As we are now forced to a very different living mode globally, the spotlight should come back to housing design again and we must treat it as what we do with museums and offices. Thus, my paper can also be interpreted as a rough summary for the parameters that ensure a good living space.

With this said, it should also be explained that the findings regarding post-pandemic living don't stand with or against tradition or modern housing design. The paper makes a list to check if an apartment is eligible for new living mode. As long as the essential factors are covered, it is a dwelling that can meet the future changes. In my process of researching reference projects, it's exciting and interesting to see that many outstanding projects built in the last century have already reached a standard fulfilling the thesis results.

Because of the time limitation for thesis, I chose to investigate only the apartment design. However, under the topic of post-pandemic living, there are a lot more to study if considering from the community perspective. There are even possibilities to merge community and private apartment to some extent with brave ideas. This is the part I missed and on purposely avoided during my process since its complexity. It would be interesting to see answers and findings in community level in larger residential projects.

In all, it's astonishing to still see the endless potential in housing design. We, as architects, have the responsibility to make progression in residence market and strive for better living quality of average people. The experience I gained in research and the conclusions I came up with will be great assets to me for my future practice and development.

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APPENDIX

The appendix includes analysis of the reference projects mentioned in chapter II on page 29. There are 12 projects in which the last three are projects in Sweden.

Polyvalent Housing
Weiße Siedlung Seeberg
Mehrfamilienhaus
Garthestraße 8
Mauenheimerstrasse
Paltramplatz
Wohnüberbauung Station Illnau
Kornhalde
Hagenbuchrain
Godhemsberget
Bergskroken
Rosendahl

Polyvalent Housing 1

-AKVS architecture

-Russia | 2018

-Size: **70 m² (9 m²)**

-Apartment type: 2 rooms + kitchen

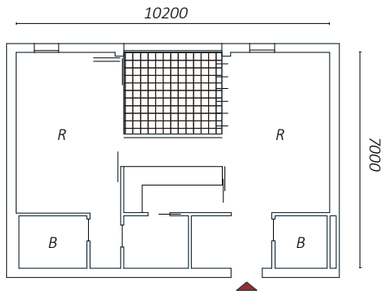
-Outdoor space: 1 closed loggia

-Floor plan typology: open-plan

R-room, B-bathroom

Outdoor Space Evaluation
- *actively involved in flow*
- *seen from more than one space*

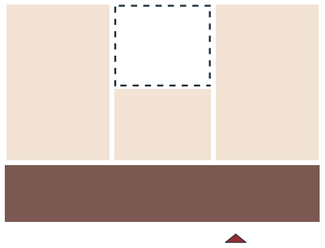
1/200
Floor Plan
Abstract Spatial Layout
View and Flow

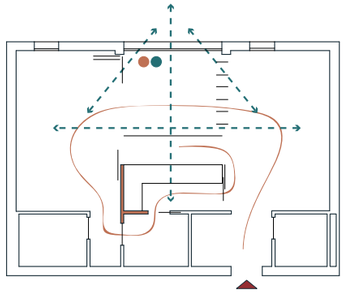


The layout has a clear axis and division between servant space and served space. It is a typical flexible-space apartment. With the help of sliding and moveable doors, the floor plan can turn either into an all-in-one-space situation or a more closed up layout. The parallel arrangement of bedroom, kitchen and living area enables the communication between these daily used rooms.

The storage space behind the kitchen creates an interesting circulation between the public living area and the private bedroom area when the boundary of the bedroom with kitchen and loggia is closed. Living room, kitchen and loggia are all related with entrance.

Three independent rooms, including the loggia room, can be divided when all doors are closed. The kitchen can also be relatively independent with enough space to stay and work. It can have direct connection with loggia. The loggia in the middle serves as a buffer zone between different spaces and its big area is available for all kinds of activities, which is flexible for various needs. It is actively involved in the experience of apartment both visually and physically on three sides. However, in the proposed plan, the loggia is actually a closed-up type, which can be interpreted as a deep indoor room with big windows, it to some extent lose the experience of being outdoor and the user may eventually treat it as a normal room. It is the movable walls that most personalized the project.





Weiße Siedlung Seeberg 2

-Oswald Mathias Ungers

-Cologne | 1967

-Size: **70+7 m²**

-Apartment type: 3 rooms + kitchen

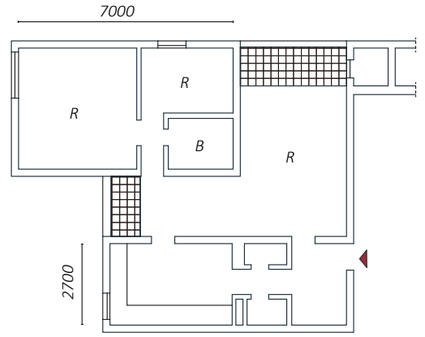
-Outdoor space: 2 loggias

-Floor plan typology: zoning

R-room, B-bathroom

Outdoor Space Evaluation
- *actively involved in flow*
- *seen from more than one space*

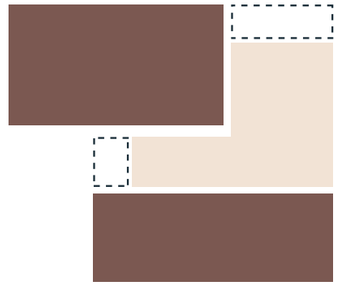
1/200
Floor Plan
Abstract Spatial Layout
View and Flow

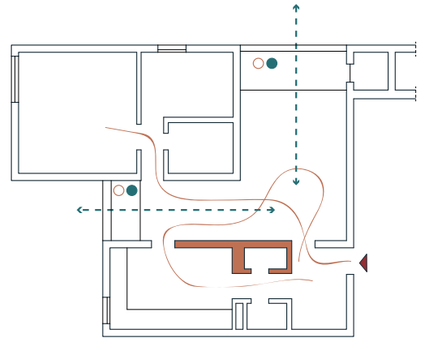


The floor plan is arranged under the logic of zoning. As a built project developed from his earlier idea of Neue Stadt, the principals are preserved which private rooms form their own blocks and surround a central open living space. In this project, the common space has access to outdoor on both directions. Three zones defined by the two blocks have different openness: closed-up, half-open and open.

There is a small circulation between living room, kitchen and entrance. The private room is a dead end but has its own little lobby. There is almost no visual conversation between rooms. Entrance is connected with both the kitchen and living room.

The layout enables the clear division of different zones. All rooms including the kitchen can be independently closed. The private rooms can be well separated from the rest of the apartment. There isn't much flexibility to rearrange the rooms. The L-shaped living room is, however, not that efficient and easy to further divided even it has a clear orientation on two directions. The kitchen is available for a small dining table. Neither of the two loggias is a part of the circulation. Nevertheless, they both can still be seen from respectively kitchen and entrance besides living area.





Mehrfamilienhaus **3**

-Atelier 5

-Urtenen | 1964

-Size: **73+7 m²**

-Apartment type: 5 rooms + kitchen

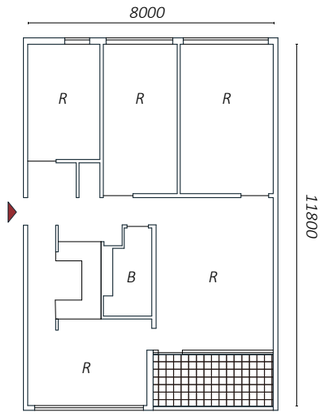
-Outdoor space: 1 loggia

-Floor plan typology: zoning/dividing elements

R-room, B-bathroom

Outdoor Space Evaluation
- *actively involved in flow*
- *seen from more than one space*

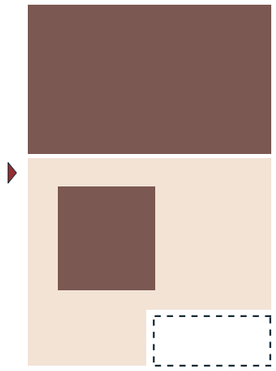
1/200
Floor Plan
Abstract Spatial Layout
View and Flow

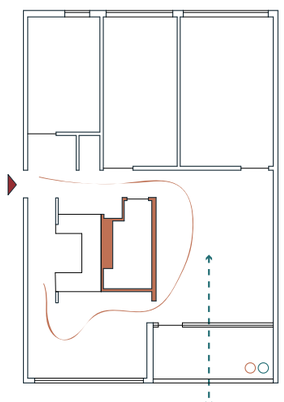


The apartment applies the typology of zoning with a dividing element formed by bathroom and kitchen. The plan is divided into private rooms part and open plan part. The central core helps to further separate the open space into two and also from the entrance.

The circulation route is only around the central core and it connects the public areas. The private rooms are all directly facing the open space but only one room can see the two open rooms and the entrance. The most daily used living room is well detached from the entrance while kitchen has a closer relationship.

Apart from the already independent rooms, the open place can be well closed up as two main rooms. Only one of them is connected with kitchen. The kitchen cannot fit another dining place but has the chance to use one wing as a bar area and stretches into the neighboring room. The loggia can only be seen and reached from one open room. It is in the end of the apartment and is not an active part in the movement of the inhabitants. Graphically, the loggia is also an element that helps to divide the open space and enables two different experiences for the open space.





Garthestraße 8 **4**

-Oswald Mathias Ungers

-Cologne | 1957

-Size: **85+5 m²**

-Apartment type: 4 rooms + kitchen

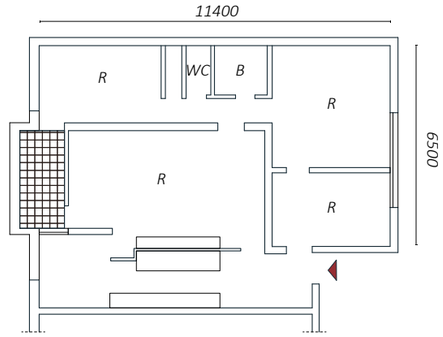
-Outdoor space: 1 mixture

-Floor plan typology: circular path

R-room, B-bathroom

Outdoor Space Evaluation
- *actively involved in flow*
- *seen from more than one space*

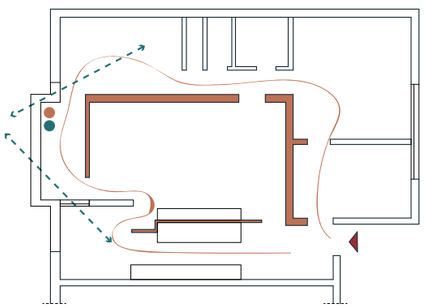
1/200
Floor Plan
Abstract Spatial Layout
View and Flow



The floor plan is a typical type focusing on internal circulation within the dwelling. A series of rooms is arranged in a row behind the central living space with openings between them. All rooms have more than one door to enter and they create different circular routes. The common living space stands in the middle but not directly facing all the single rooms, thus generating a well-defined spatial sequence and a rich movement experience.

The circular flow depends on passing through different rooms. but still remains a wealthy space for furnishing. Kitchen and living room are closely connected with the entrance.

All rooms can be independently closed up and being away from the supervision from the central room. Kitchen and living room, as two public function zones, are linked via dining area. It indicates the potential connection but still keeps the good separation. The half sticking out loggia is visible from three directions but does not try to play as a leading role. Instead it acts like a hidden garden in the apartment with high independency. However, it’s still highly involved in the circulation. It provides access from both the living area and a private room, which makes the loggia a buffer zone. The mixture type of loggia keeps the privacy and protection, and offers good view as well as closer interaction with outdoor that one may have on a traditional balcony.



appendix

Mauenheimerstrasse **5**

-Oswald Mathias Ungers

-Cologne | 1959

-Size: **90+8 m²**

-Apartment type: 3 rooms + kitchen

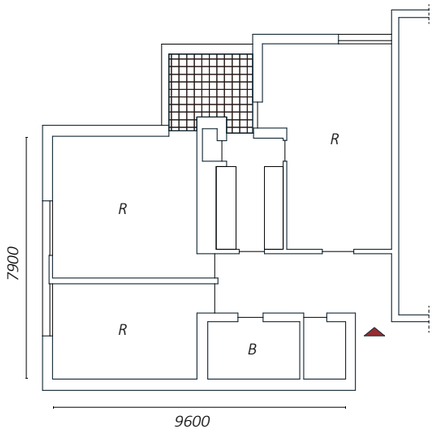
-Outdoor space: 1 loggia

-Floor plan typology: circular path/zoning

R-room, B-bathroom

Outdoor Space Evaluation
- *actively involved in flow*
- *seen from more than one space*

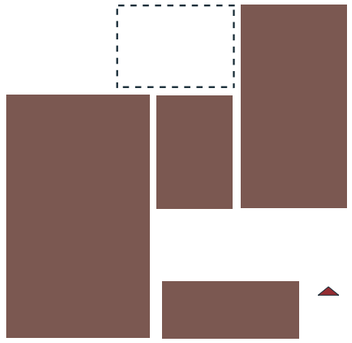
1/200
Floor Plan
Abstract Spatial Layout
View and Flow

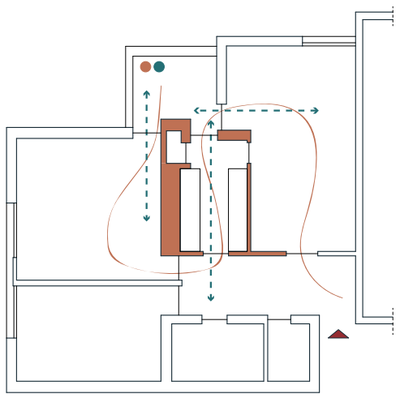


By placing the gallery kitchen in the middle which serves both as a solid core and a path, the plan is evenly divided into different zones and rooms. Graphically, the entrance, kitchen and loggia are aligned as an axis. The entering space is a corridor that connects all the rooms while some of them are further connected with each other on the other end.

The rooms don’t have visual connection between each other. The living room has a relatively closer relationship with kitchen with limited visual communication and ease of access. There are different routes within the apartment.

The overall plan is neutral in space and layout. The main rooms are separated but connected through the loggia. All the rooms are independent. The common living area is away from the center as a general room. Thus, there is a clearly defined the zones and living room is no longer treated as a main character in daily routine. Since the kitchen cannot fit a dining table, this function is merged into the living room as most modern plans. The corner loggia is actively used both physically and visually. It enables a maximum outdoor experience apart from a traditional balcony.





Paltramplatz **6**

-Delugan Meissl

-Vienna | 2002

-Size: **95+10 m²**

-Apartment type: 5 rooms + kitchen

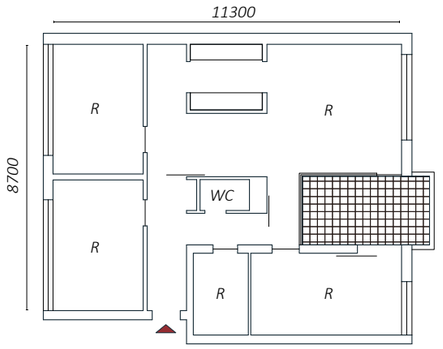
-Outdoor space: 1 mixture

-Floor plan typology: dividing elements

R-room, B-bathroom

Outdoor Space Evaluation
- *actively involved in flow*
- *seen from more than one space*

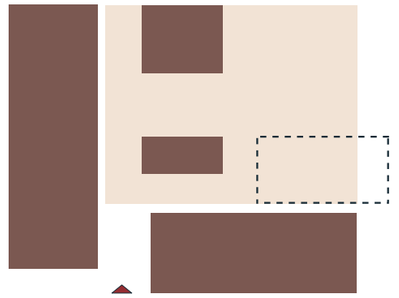
1/200
Floor Plan
Abstract Spatial Layout
View and Flow

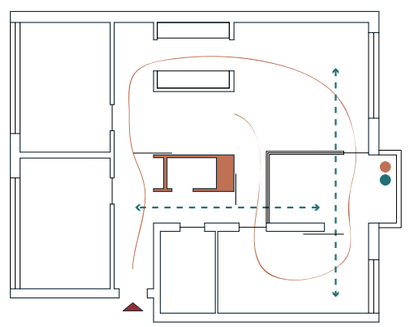


The floor plan adopts the typology of dividing elements. Two wings placed in 90 degrees surround a central living place. The open space is divided by a solid block and a gallery kitchen that one may pass through. The middle element helps to separate the entrance from the main daily area including the kitchen. A loggia appears in the middle on one edge of the apartment, but it is on the corner of the open space.

From the open area, almost all things happening in the apartment can be seen. The space layout is relatively clear but the circulation offered by different elements still gives more interesting experience within the dwelling.

All the private rooms are facing directly towards the open zone and two are visually connected with it. The loggia even further provides a separation for one of the two rooms, thus making it more independent. There is, however, too much corridor space that can’t be effectively used. The loggia is maximum transparent towards the open space in order to bring in more light and visual connection. The large area makes it an important connection between the living room and a private room. It stands like a buffer zone in between and blocks much acoustic impact. While with a deep depth into the indoor area, the loggia still sticks out of the façade, which makes the outdoor space more effective and shows the intention of bring people out to this place.





appendix

Wohnüberbauung Station Illnau 7

-Guignard & Saner Architekten

-Zurich | 2010

-Size: **100+10 m²**

-Apartment type: 4 rooms + kitchen

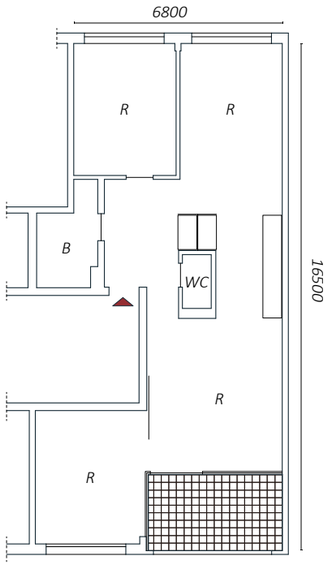
-Outdoor space: 1 loggia

-Floor plan typology: dividing elements/open-plan

R-room, B-bathroom

Outdoor Space Evaluation
- *actively involved in flow*
- *seen from more than one space*

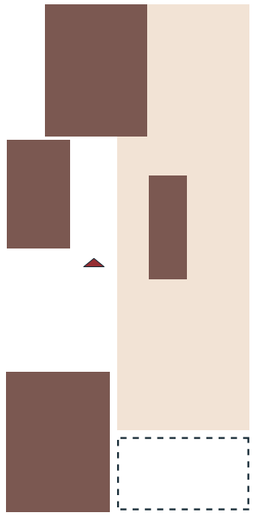
1/200
Floor Plan
Abstract Spatial Layout
View and Flow

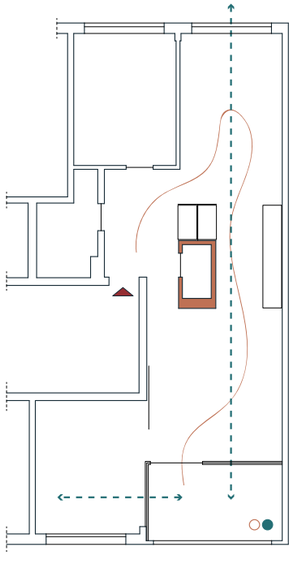


The project has a deep and slim apartment compared to regular floor plans. It uses the diving element with kitchen and hygiene facility to break up the long shape into two. Outdoor loggia sits on one end of the open space. The individual rooms are arranged also on two ends and closely attached to the open space.

There is a small circulation around the dividing element. It connects the living space, kitchen and entrance.

Two private rooms give the basic independency for usage. There is also the chance to add doors in the circulation route, thus making the open space into individual rooms but being flexible enough to be merged again. By putting the kitchen in the middle, all rooms can enter this function with an even distance. The loggia in only accessible from one open room but visible from two rooms. Thus, it may not be actively used. However, the continuous flow across the deep room can to some extent ease the situation. The form of loggia, in this circumstance, has more advantage than a traditional balcony, since the outdoor space will be seen as a closely related part stretching out from indoor. Its large transparency towards both the living room and private room offers good view, but may also bring more interference to the individual room.





Kornhalde 8

-G. Raichle, Dieter Raichle, R. Götz

-Esslingen | 1970

-Size: **105+8 m²**

-Apartment type: 5 rooms + kitchen

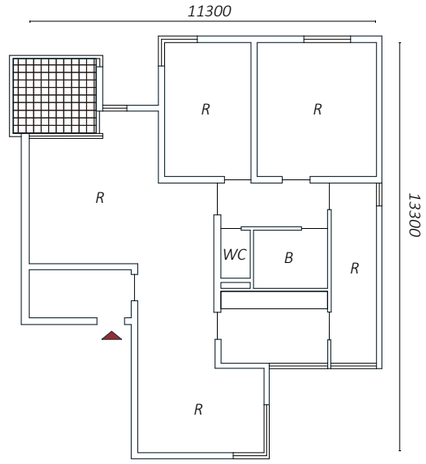
-Outdoor space: 1 balcony

-Floor plan typology: zoning/circular path

R-room, B-bathroom

Outdoor Space Evaluation
- *actively involved in flow*
- *seen from more than one space*

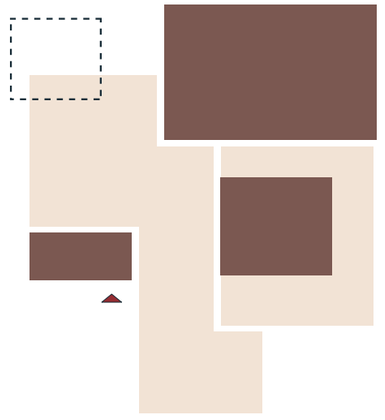
1/200
Floor Plan
Abstract Spatial Layout
View and Flow

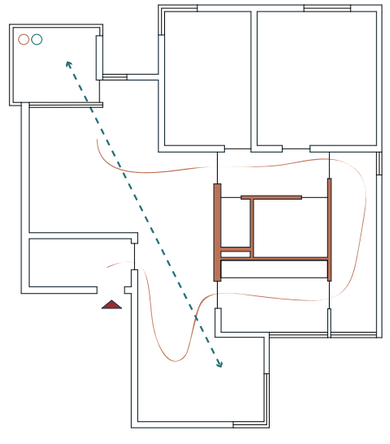


The apartment clearly defines the different zones. The main open space is arranged in Z shape to indicate different parts. A center core with all the fixed facilities create a circular path in the apartment. The entrance has its own room which can be closed up to the main living area.

The common space can be seen through within itself but also has some privacy due to the shape. It can be easily further divided by the inhabitant. No other rooms are visible directly from the open space. The circular path goes through one room, the kitchen and the entrance for two rooms.

All rooms, including the common space is independent. They can be well separated but still having a rich experience because of the circulation. The slim room behind the central core is suitable for a working place or a hobby room. The kitchen can fit a dining table. It can well serve the common area and keep closed when needed. When the doors are open along the circular route, the interior has a high integrity. Otherwise, every room can be visually and acoustically isolated from the others. The balcony is at the end of the open space and not included in the main flow within the apartment. It however provides a nice spatial extension for the common space and the area is moderate.





Hagenbuchrain 9

-Bunzli & Courvoisier

-Zurich | 2005

-Size: **120+8 m²**

-Apartment type: 3 rooms + kitchen

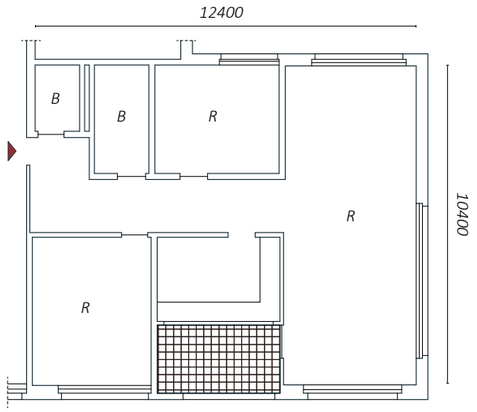
-Outdoor space: 1 loggia

-Floor plan typology: corridor

R-room, B-bathroom

Outdoor Space Evaluation
- *actively involved in flow*
- *seen from more than one space*

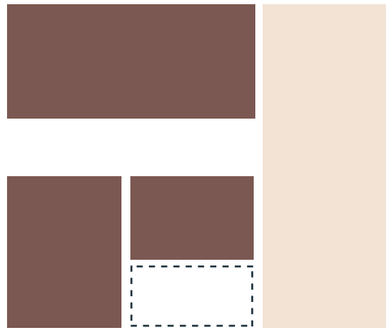
1/200
Floor Plan
Abstract Spatial Layout
View and Flow

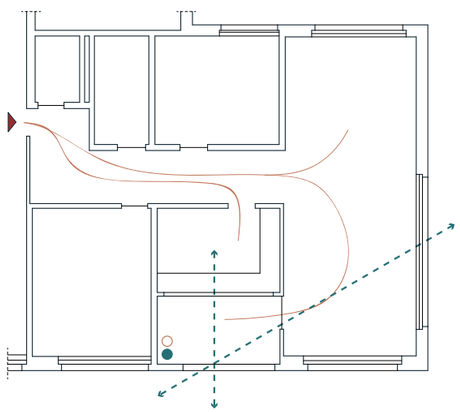


The project has a simple layout on the whole. Rooms are distributed on two sides of a corridor. The main common area is in the end of the sequence taking the whole length of the apartment. There is no circulation in the plan. The corridor that connects all the rooms are wide in size.

All spaces except the loggia can be entered without passing another room. However, it's already visible if the kitchen opens the door and one passes by. The living space is divided into two indicating by the corridor.

The plan doesn't have much flexibility. The closed rooms have rich area and are not opened directly to the open space. There is thus the opportunity to further close up the open living area. The kitchen is placed in the middle of the floor plan with space enough to fit a dining table. It is facing the outdoor loggia in full scale with a nice visual connection. The loggia is physically opened to the open room and can be partially seen from there. As kitchen is becoming more and more commonly used these days, the loggia in the front will also be seen frequently by the inhabitants. This will enhance the importance of this outdoor area and promote the communication among kitchen, living room and outdoor garden even they are not having an actual circulation.





Godhemsberget 10

-KUB arkitekter

-Gothenburg | 2005

-Size: **88+24 m²; 116+24 m²**

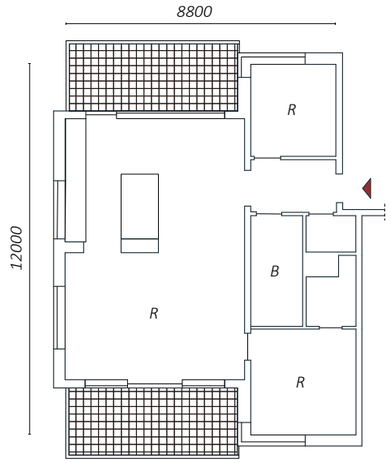
-Apartment type: 3 rooms+kitchen; 4 rooms+kitchen

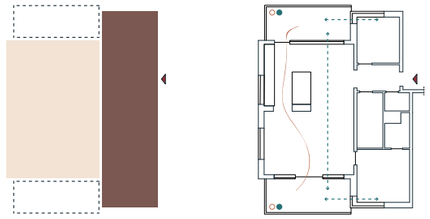
-Outdoor space: 2 balconies

R-room, B-bathroom

Outdoor Space Evaluation
- *actively involved in flow*
- *seen from more than one space*

1/200
Floor Plan
Abstract Spatial Layout
View and Flow

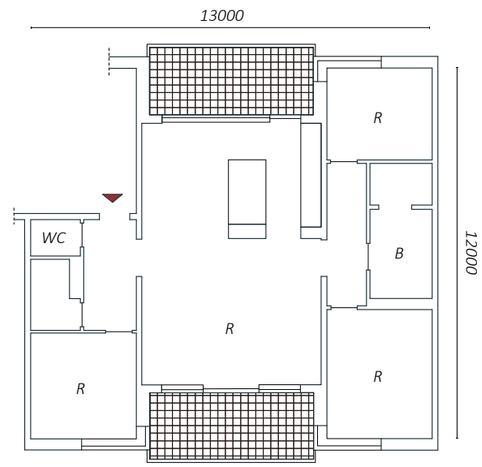


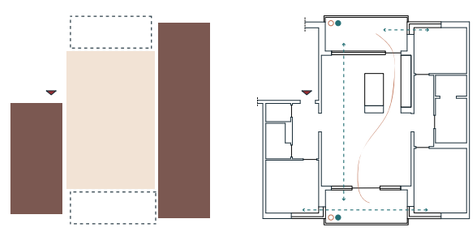


The project locates in the district of Majorna in Gothenburg and is 400 meters south to the chosen site for this thesis. It won the Swedish Architects' Housing Prize in 2005. The project is built against a mountain slope. The long and narrow courtyard gives a surprisingly calm environment for the building entrances. The concrete elements on the façade use prefabricated construction and are designed with the pattern that presents a clear and independent architecture character.

The basic building plan has two apartments per floor. Both are in the same design logic and just a difference on the size. The apartments have a generous area. They are clearly divided into compact and open zones. The open zone includes living room, kitchen and dining area. There are balconies on both ends of the open zone and together form a consistently bright social space.

The balconies can be seen not only from the open area, but also from the neighboring private rooms from the corner. They are not a necessary part of the main interior, but because of the generous area and spatial form, they still can be effectively appreciated by the inhabitants. The kitchen adopts the type of gallery kitchen and with one central open operating table within the room. In the bigger apartment with 3 rooms, none of the individual rooms are facing directly to the common room.





Bergskroken 11

-Wingårdh

-Mölndal | 2018

-Size: **75+39 m²; 61+22 m²**

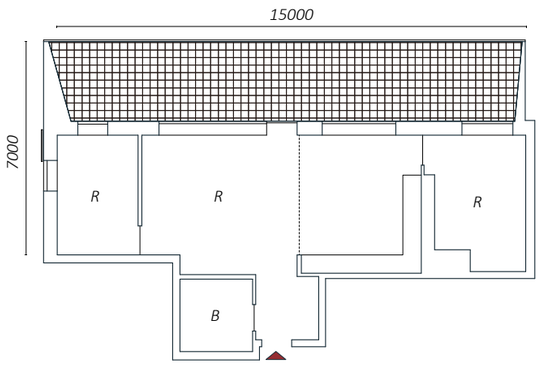
-Apartment type: 3 rooms+kitchen; 2 rooms+kitchen

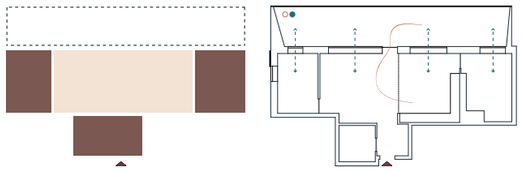
-Outdoor space: 1 loggia

R-room, B-bathroom

Outdoor Space Evaluation
- *actively involved in flow*
- *seen from more than one space*

1/200
Floor Plan
Abstract Spatial Layout
View and Flow



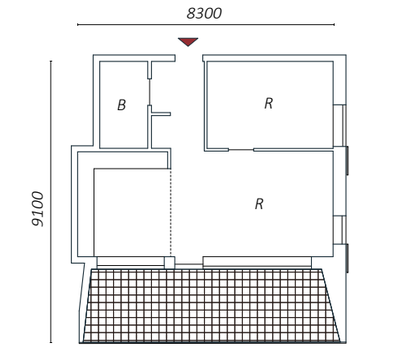


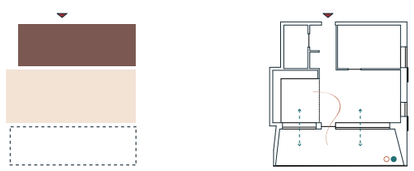
The project is characterized by the prominent outdoor quality in each apartment. There are apartments ranging from 1-room to 5-room. The big loggias are facing either southeast or north west.

For most apartments, the layouts are arranged in a horizontal direction facing the main outdoor area. The entrance is closed to the bathroom. The predominant space is the common area consists of living room and kitchen. Private rooms are then put around the central area.

The flow within the dwelling is simple with no circular movement. The loggia is only accessible from the living room. However, All the rooms that are next to loggia can see the open place. The common area is always next to the outdoor area. With the popularity of open plan, kitchen and living room are merged together. However, it is easy to separate them and the proposed plan does give the choice if the dwellers find it necessary. The kitchen is big enough for a dining table.

Compared to the indoor area, the apartments have an extraordinary outdoor loggia, counting for one-third to more than half of the indoor space. By taking the whole façade of the apartment, it introduces superb view and light to the interior. The privacy of indoor is better protected and all inhabitants can experience a comfortable private garden even in a multi-storey building thanks to the generous area and high-quality design of the material usage. It is able to carry out all kinds of activities. Furthermore, it' s possible to close up the loggia with delicate frameless glass so making the more friendly in winter time.





Rosendahl 12

-KUB arkitekter

-Mölndal | 2018

-Size: **84+22 m²; 65+22 m²**

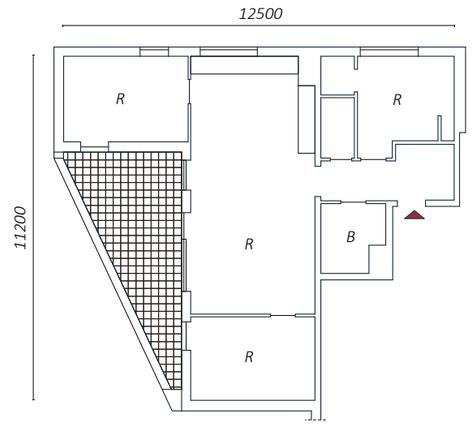
-Apartment type: 4 rooms+kitchen; 3 rooms+kitchen

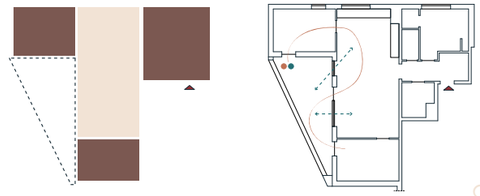
-Outdoor space: 1 loggia

R-room, B-bathroom

Outdoor Space Evaluation
- *actively involved in flow*
- *seen from more than one space*

1/200
Floor Plan
Abstract Spatial Layout
View and Flow

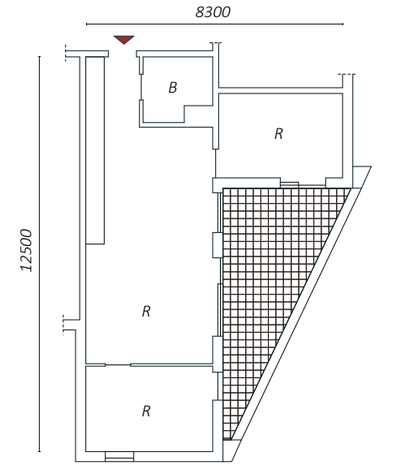


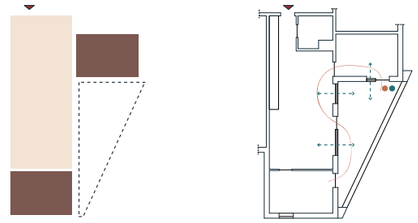


The project building is in the shape of trapezoid. Each floor has five apartments ranging from 1-room to 4-room housing. They all have a private loggia. The outdoor spaces are perfectly integrated in the main volume thus presenting a smooth building block.

The apartments have a central common living space with an open idea of merging kitchen and living room. The main unit type has an L-shaped form, which allows maximum of rooms around the outdoor loggia.
The main living area has much view connection with the outdoor space. All rooms that neighboring the loggia have access to it, thus creating a circulation around the private garden, which enhances the overall quality of the outdoor space.

The outdoor place has a large area and is in the shape of triangle. Compared to the project Bergskroken, which has a similar loggia area in some units, the space may visually feel even larger. The space is emphasized and bigger at the corner of the L-shape, where is most closely connected with the indoor common area. It allows for more possibilities for furnishing. Unlike Bergskroken where having vertical railings down to floor, there is a short wall of approximately 500mm on the façade of the loggia and glass railing on the above in Rosendahl. In comparison, the former indicates a more outgoing attitude while the latter suggests an inward trend.





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