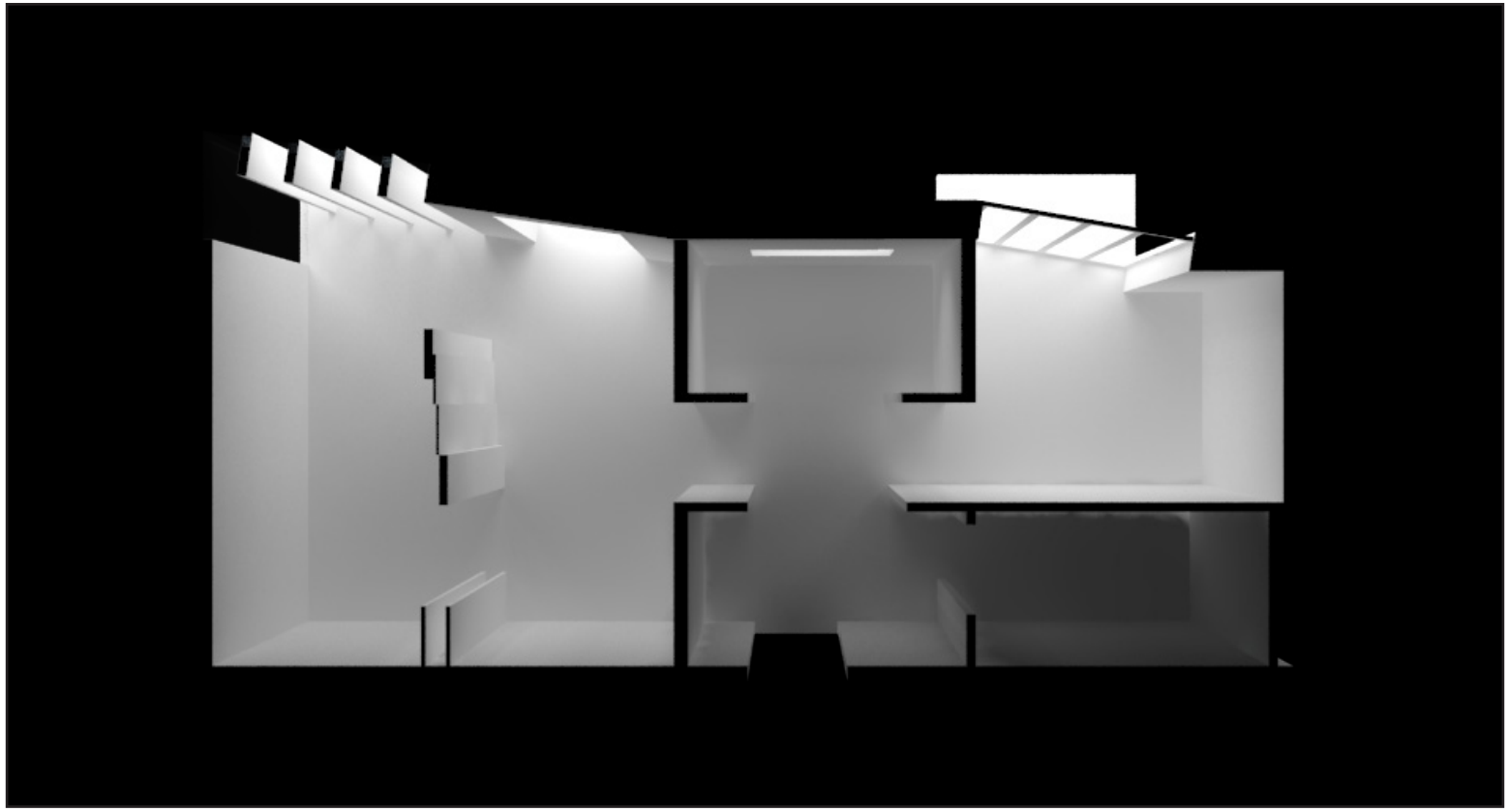

Dwellings for Young Adults

The Contributions Of Daylight And Shared Space To Compact Apartments

Tung Phan
Tutor: Anna Braide Eriksson
Examiner: Ola Nylander

Department of Architecture and Civil Engineering
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Spring,2017

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CHALMERS

My sincere gratitude
to my tutor Anna for all the tremendously inspiring supervising sessions that made this journey an enjoyable one
to my examiner Ola for the constructive criticism
to all my friends for keeping me company during the whole period of this project
to my dad, my mom and my sister for being exceptionally supportive as always
and to Thanh for everything

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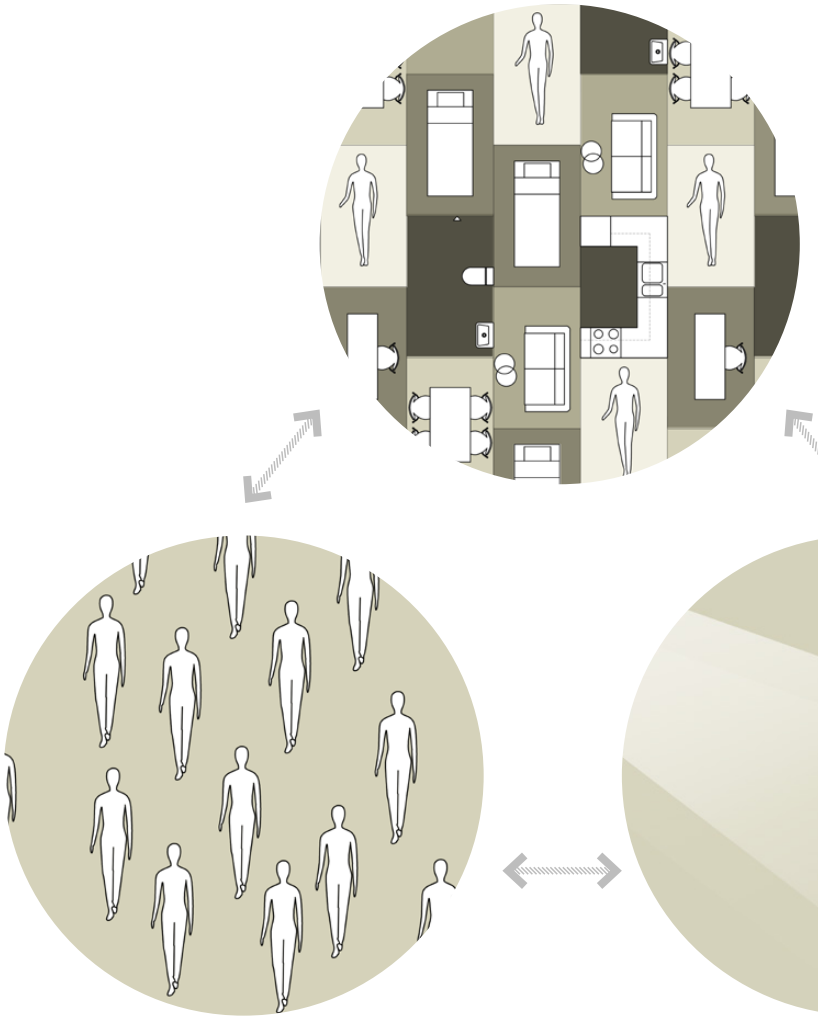
INTRODUCTION

EFFICIENT USE OF SPACE IN SMALL SIZED APARTMENTS



SOCIAL INTERACTION

DAYLIGHT

ABSTRACT

This master thesis works with a housing complex for young adults, which is also a housing project developed by Riksbyggen at Lindholmshamnen in Gothenburg. The Master thesis project has ,as a precondition, the master plan with predefined settings for the envelope and the building volumes.

The goal for the master thesis project is to develop design solutions for affordable and yet qualitative dwellings. Consequently, the project aims to understand how the design of small dwellings can become more qualitative by working with day light conditions and floor plan design. As an additional quality, common space makes a critical complement both as a provider of social dimensions as well as spatial qualities. Three parameters are examined throughout the design as key points to assess the quality of the living conditions, which are compact dwellings, light qualities and common space qualities.

The notion of compact layout is researched in depth by investigating the relationship between storage wall and free space. The possibility this pair opens up to is not only the condensation of space but also the neutral area that enhances the adaptability quality of the apartment . Day light qualities and common space qualities are two elements brought in to compensate for the limited square meter of the compact dwelling layouts. These three froms a trinity that frames the essence of this thesis work.

The target group is explored through the introductions of three household types: single, couple and co-living based on the lifestyle of the age group from 18 to 30. There is a special focus on inhabitants at the end of this age spectrum, who possibly get married and then have their first kid. The design interprets this circumstance as the need to have one more bed in an apartment initially designed for a couple.

Regarding methodology, first and foremost, it is necessary to understand the aim for Swedish design and the norms and standards practiced within housing planning. Literature about Swedish housing is studied as well as norms and standards. Flexible and adaptable housing design is also studied. The methodology consists of studies of reference projects, sketching and drawing, and light studies in digital models to develop light qualities in the dwellings.

The Housing situation in Sweden

Sweden has been suffering from the on-going consequence of housing shortage for quite a long time. But there was a period of time when the situation was known to be much more optimistic. As part of the Million program between 1965 and 1975, more than a million homes were newly constructed to "remedy what was then considered an acute shortage of housing. Its goal was to rapidly produce a large number of affordable housing units for the Swedish middle class while preserving nearby open space, improving traffic safety and encouraging residents to walk, ride bicycles and use transit" (C. P. Zilliacus,2013). However, due to the increasing privatalization afterwards, the amount of rental housing has been declining dramatically until today. The issue came in parallel is the affordability factor, which as a result no longer limits the issue to merely a shortage in housing, but rather an afforable housing crisis and it is deepening. "In the last 12 months, prices have risen 11 % on average in Sweden according to Svensk Mäklarstatistik. The average square meter price for an apartment in Sweden was 38 079 kronor. In central Stockholm the average square meter price was 88 344 kronor." (Business Insider Nordic, 2016). This problem associated with housing prices and costs certainly plays out to be a difficult obstacle for people from all age group to find an apartment. However, it goes on worsening the young adults' chances on the housing market the most due to their financial status.

Riksbyggen's pilot project

This thesis is carried out in accordance with an ongoing project developed by Riksbyggen at Lindholmshamnen in Gothenburg.
The housing building is deemed the pilot project for a target group of people from 18 to 30 years of age, who are having their first jobs. Riksbyggen aims at providing affordable apartments for these people, which is a rare occasion in the Swedish housing market today. "In a preliminary overview 11600 sqm BTA is calculated to result in 200 apartments with the size of app 35 sqm. Street level of the building volume shall accommodate shops and offices. Basement shall accommodate parking (supplying parking for the city district)"(Chalmers, 2017)
Within the scale of a student thesis, Riksbyggen takes part in as a dialogue partner whilst the student takes on the responsibility to investigate sustainable solutions towards the aforementioned goal. However, the outcome is expected to be a conclusion and reflection from the student's working process, not necessarily have to tackle "real-project issues" from Ryksbyggen's project.
The project came with a set of preconditions some of which will be taken as the preconditions for the thesis. This will be elaborated in the proposal section.

Purpose

The purpose for me with this work is to take the opportunity to develop a design that can be tried out towards the existing market conditions, in a real project context. Hopefully this master thesis project can be a source of inspiration for the developers and architects involved in the project. However, the focus is primarily on the learning experience throughout the whole master course and the wealth of knowledge coming from different professional experiences as well as cultural backgrounds that both the student and the developers might benefit from.

Why me

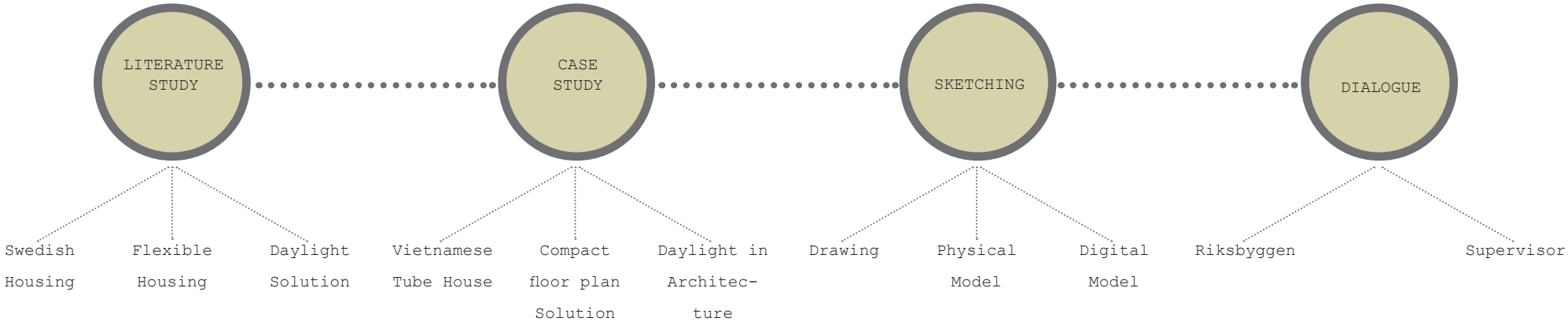
The reason I select this subject is ,first of all ,my personal interest in housing design. The idea of an architecture that has to be multifaceted and flexible enough to serve people's life in 24 hours per day is what I find challenging when it comes to design work. Additionally, I have taken all the studios within the housing track in Master of Architecture and Urban Design program at Chalmers and also had been working as a freelancer in housing project at the same time. Therefore, having this as my master thesis is a natural following- up. As an international student, working in close relation with a Swedish company is my aim to have a fuller understanding about the profession in a foreign country. And as a practicing architect who has worked in the industry for several years, I understand and have always been drawn to the unique thrill of placing the design under the reality microscope. I find this being a catalyst that helps us architects come up with the best proposal.

DELIMITATIONS/TYPOLOGY/METHODOLOGY

The project's main focus points are the apartment unit, the common areas and how daylight element will be incorporated into these spaces. Detailed drawings will be provided to support these 3 elements. That includes detailed floor plans, sections and 3D illustrations which will fully explore to the detail level of furnishing. As for other parts of the building, for example average floor or ground floor, the thesis will only present in a schematic way in order to highlight the functions and most importantly explain how the courtyard is integrated with the building. Exterior cladding will also be considered as it is related to the window and balcony placements of the apartment units. However, there will be no in-depth research regarding materiality, as well as construction method for the building.

This thesis is a research-for-design project. The proposal will be a collective outcome of a working process including reading literatures, looking into case studies, trying out ideas by sketching, building physical models as well as digital models. Although there will be conclusions from the project that can open to further investigations in many other tracks, the work mainly aims at delivering a design under the influence of the aforementioned series of study and also responding to Rikbyggen's program of bringing students into the development of this housing building.

The methodology involves steps as below



RESEARCH QUESTIONS

What solutions can be implemented into the project to give satisfying answers to the affordability question?

How would these implementations serve the target group?

How would the proposal work in the future?

CASE STUDY

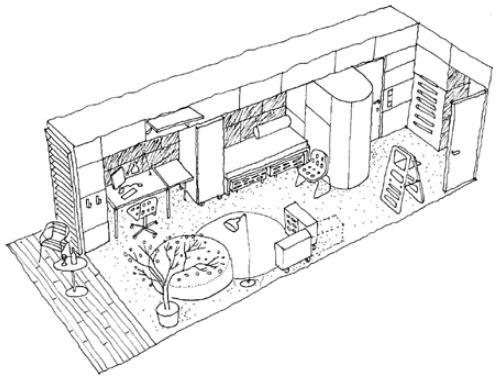


Figure 1. Axonometric sketch of room module
(Lundgaard & Tranberg Architects, 2014). CC-BY.

Figure 2. Inside one room module
(Jens M. Lindhe, 2014). CC-BY

Figure 3. Exterior view
(Jens M. Lindhe, 2014). CC-BY

TIETGEN DORMITORY

Architects: Lundgaard & Tranberg Architects
Location: Rued Langgaards Vej 10, 2100 Copenhagen, Denmark
Area: 26515.0 sqm
Project Year: 2005

This project works with really small apartments for students. Kitchen is one of the shared facilities, not available in the private studios. The solution the architects came up for the rather long and narrow private space was pushing all the built-in furniture to one side , the other was used for loose furniture which gave the students the possibility to arrangement the layout on their own.

This part of the project inspired me to think about separating built-in furniture and loose furniture in a way that would provide the dwellers with the freedom to decide their furnishing option. This also links to the notion of adaptability quality of an apartment

Unite d' Habitation

Architects: Le Corbusier
Location: : Boulevard Michelet, 13008 Marseille, France
Project Year: 1952

Figure 4. Corridor(Guzman Lozano, 2010). CC-BY.

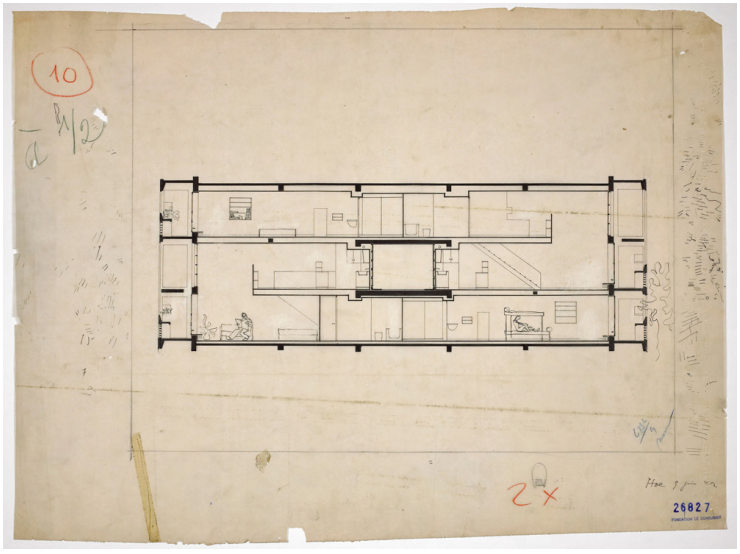


Figure 5. Apartment Section(Amy Frearson, 2014). CC-BY.

Figure 6. Exterior Photo(Catrina Beevor, 2014). CC-BY.

This high rise was designed to house 1600 residents on 18 floors. At the time, this project offered one of the most innovative solutions to social housing architecture which was the introduction of a form of double-stacked apartments. What I have taken with me from the design is not only the spatial solution but also the economic solution . By merging two floors and having the apartments run across the whole depth of the building, the dwellers gain more living space and cut off the square meter of public corridor. This apartment also presented nice lighting solution when it comes to middle corridor with very limited daylight intake.

Figure 7. Site Plan (VTN Architects, 2012). CC-BY.

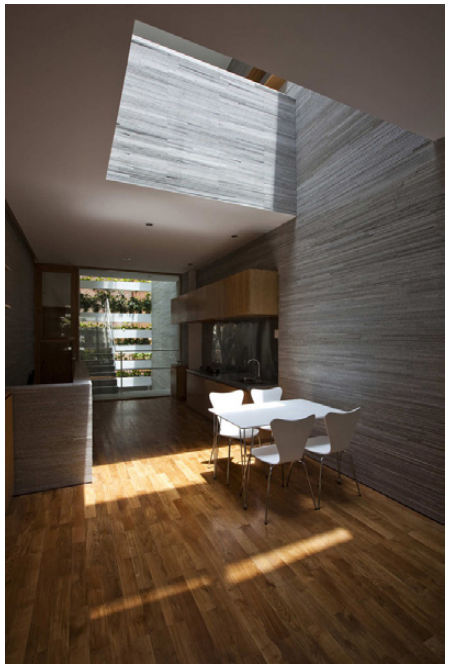


Figure 8. Skylight above dining area (Hiroyuki Oki, 2012). CC-BY.

Stacking Green

Architects:Vo Trong Nghia Architects
Location: : Saigon, Vietnam
Area: 215 Sqm
Project Year: 2011

Figure 9. Skylight in bathroom (Hiroyuki Oki, 2012). CC-BY.

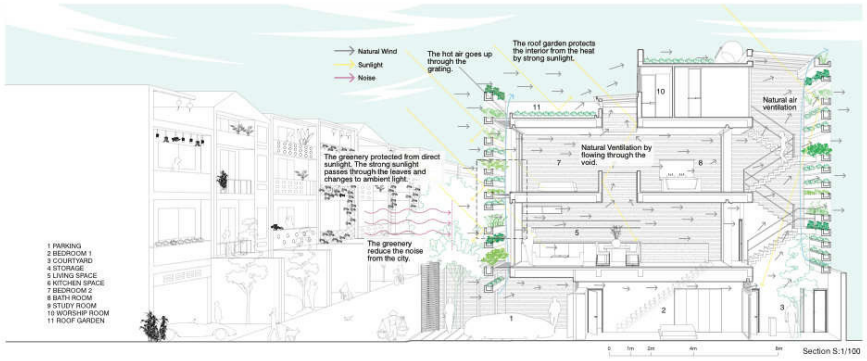


Figure 10. Sectional Diagram (VTN Architects, 2012). CC-BY.

The project is a private tube house with the measurement of 4m wide x20m depth. This proportion is very popular in Vietnam due to the way the plot is divided before being sold to the owner. Most of the time the house does not have access to daylight on more than 2 facades as it borders the other houses on those sides. This design from VTN firm exemplifies one common answer to this disadvantageous precondition which is implementing skylight to the desired space. I aspired to study this vertical daylight treatment and test it with the proposal in thesis.

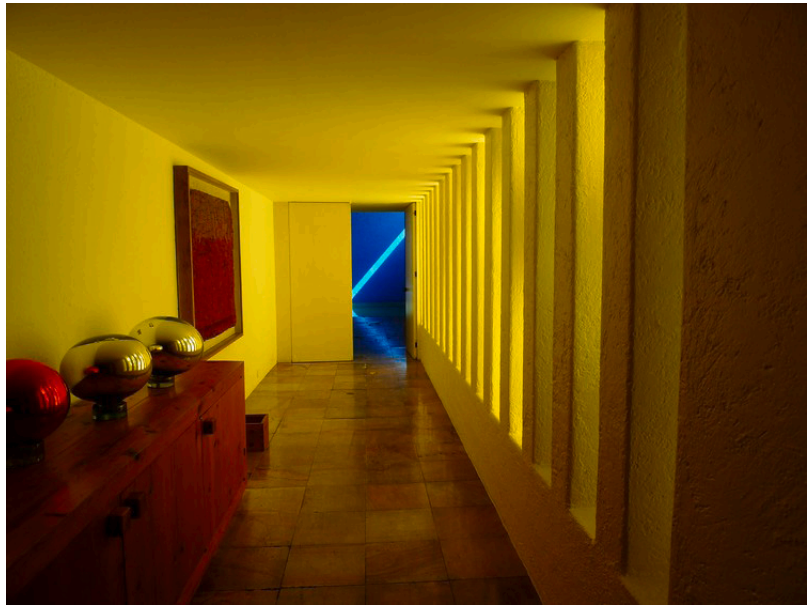


Figure 11. The corridor (Pov Steve, 2012). CC-BY.

Figure 12. Diffused light through the louvers (Zuzanna Dudzicka, 2014). CC-BY.

Casa Gilardi

Architects:Luis Barragan
Location: : Tacubaya, Federal district of Mexico
Area: 360 Sqm
Project Year: 1976

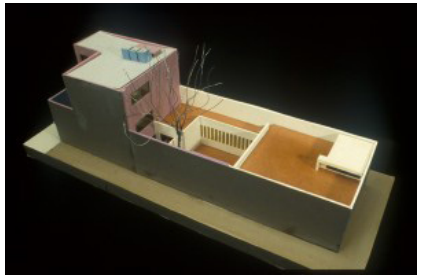


Figure 13.Physical Model of the house (Zuzanna Dudzicka, 2014). CC-BY.

This house was the last building by Luis Barragan. At first the architect did not agree to take on the project until he got inspired by the jacaranda tree around which the house was built. The house is still until today very well known for carrying the late architect's trademark usage of vivid, primary colour mixed with the Mexican vernacular. However, the aspect that I found interesting while studying the design is how daylight was brought into the house . It seems to me in Luis Barragan's architecture, openings are less about framing a perfect view outside but more about taking in the natural light to discover different moods of the interior. Taking the passage along the garden in this house for example, it works very discreetly with diffusing daylight through an array of slits to give nuances to the walkway. These slits make perfectly good use of the thick wall. At some viewing angles,the depth of the wall visually eclipses the outdoor view completely but still gets brightened up in contrast with the dark inner facades.

Figure 14. The sequential character of daylight in the building (Fernando Guerra, 2016). CC-BY.

Figure 15. Light and Darkness(Fernando Guerra, 2016). CC-BY.

The Therme Vals

Architects:Peter Zumthor
Location: : : Graubünden, Switzerland
Project Year: 1996

This project is a spa/hotel complex built over the thermal spring. The architect wanted to create a form of cave or quarry-like structure. As most of Peter Zumthor's designs, this space is also impressively informed by light and darkness. I've always been fascinated by how the architect equally looks at these two elements and cleverly let them work together to produce a synergy that brings a uniqueness to the atmospheric design. The level of light varies throughout the space in this design when it flows seamlessly around all the solid volumes with the purpose to guide the bathers to predetermined points by themselves.

I was inspired to investigate the way light and darkness lead people through the space and only give them the brightest level of light if the space really needs it.

DESIGN PROPOSAL \ floor structure

SITE INTRODUCTION \ site plan 1:2000

Figure 16. Urban situation(Google Earth, 2017). Adapted by Tung Phan

The situation of the block is quite unique

It stands rather front and center in an area invigorated by the harmony of nature, urbanisation and industrialisation.

There are vast green space and water in close proximity. And on the way to those amenities, people will pass an old factory house, catch a glimpse of a very high-tech university or encounter one of the highest towers in Sweden.

From a typology perspective, the block closes itself off from those surroundings. It concentrates towards an introverted courtyard and opens up to the South where it shares an internal walking and cycling area with other housing blocks.

The building is situated in Lindholmshamnen and belongs to a new area developed as a green, walking-encouraged zone for the district.

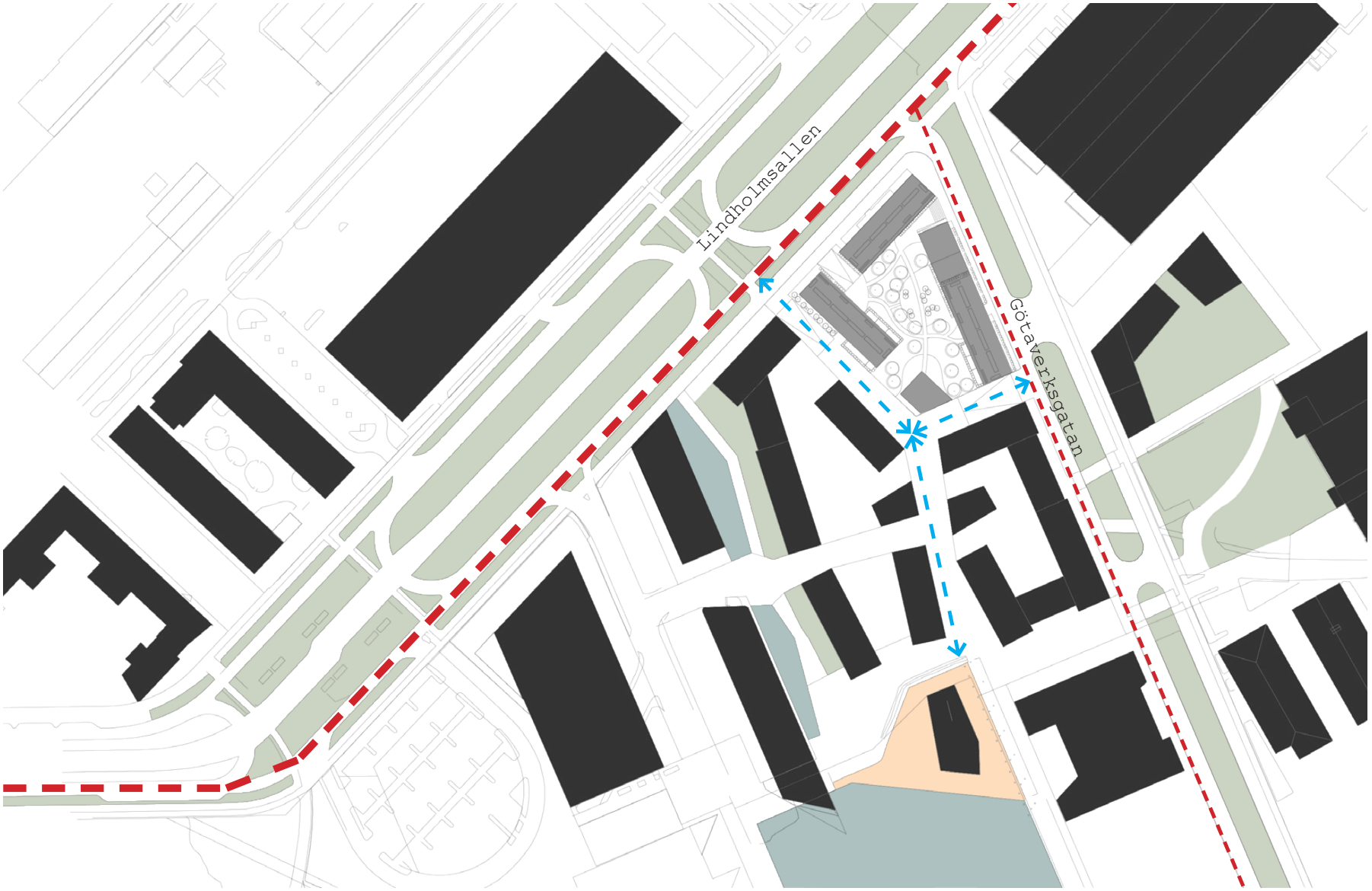
It sits at the corner of two big streets-Lindholmsallen and Gotaverksgatan. The former is the future location for Karlavagnstornet which is on the opposite side of this building.

Public transport is in the vicinity of the Northern and Eastern sides. On West and South, the building faces smaller internal paths for pedestrians.

These paths lead to a harbor with an open square developed for gatherings by the water. Small greeneries are scattered along the way. More sizable one can be found on the other side of Gotaverksgatan.

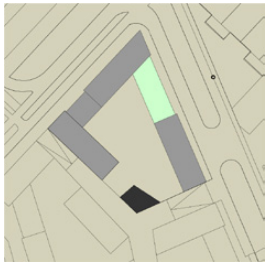
Main traffic flow

Internal flow
for bikes and pedestrians



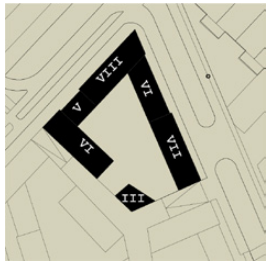
PRECONDITIONS \ from Riksbyggen

The target group
The target group consists of people from 18 to 30 years of age who might have just had their first jobs.



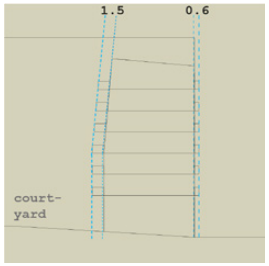
The design program
A 4-floor high volume entirely functions as a green house, placed at the intersection of 2 main streets.
At the South corner of the plot, a 3-storey villa is situated.
Commercial functions can be incorporated into entrance level of the residential volumes.

The building footprint
The volumes run along the plot boundary and cover the courtyard in the middle. Each volume is approximately 12m deep.

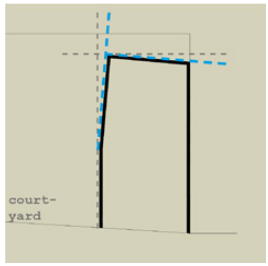


The height
There is no restriction regarding the building height, only the number of floors was predefined

Access to building
It should be possible to reach the courtyard from the street level

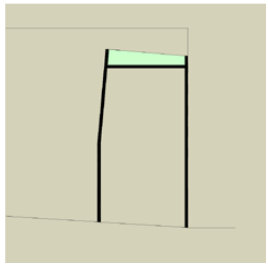


Balcony
Balcony facing the streets can not overhang more than 600 mm
Balcony facing the courtyard can protrude up to 1500 mm



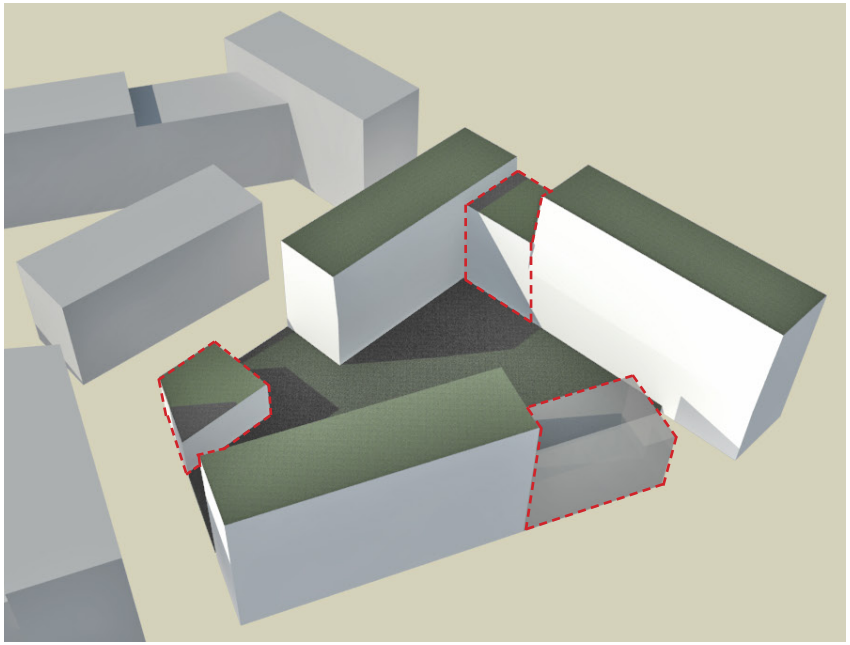
The slanted roof and facade
The facades inside the courtyard start to lean outwards from level 3. The angle is app 5-9 degrees.

The roofs also tilt similarly.

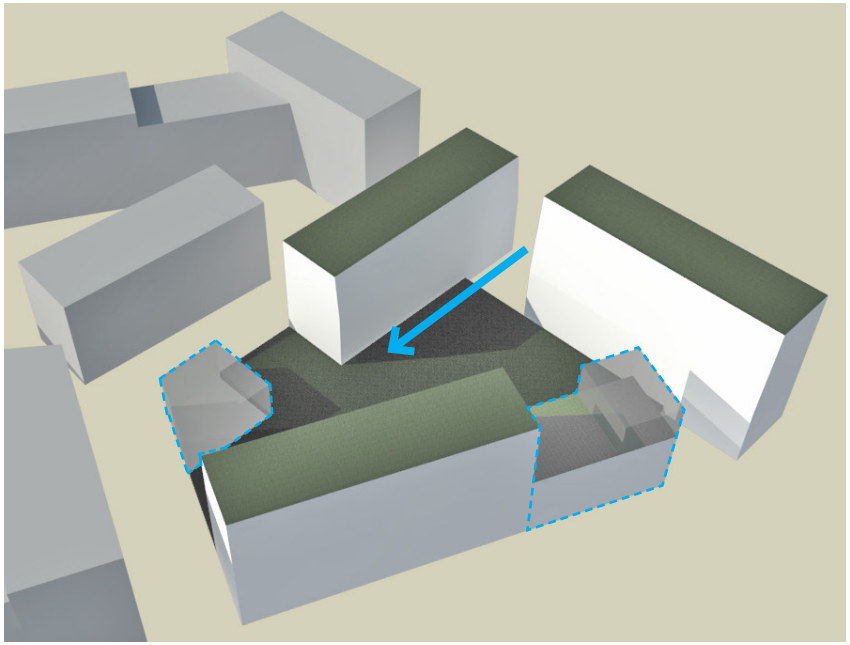


Green roof
The building has sedum roof. All technical installations (ventilation, lift,...) are not visible on this level

PRECONDITIONS \ adjustments



Original volume



Adjusted volume

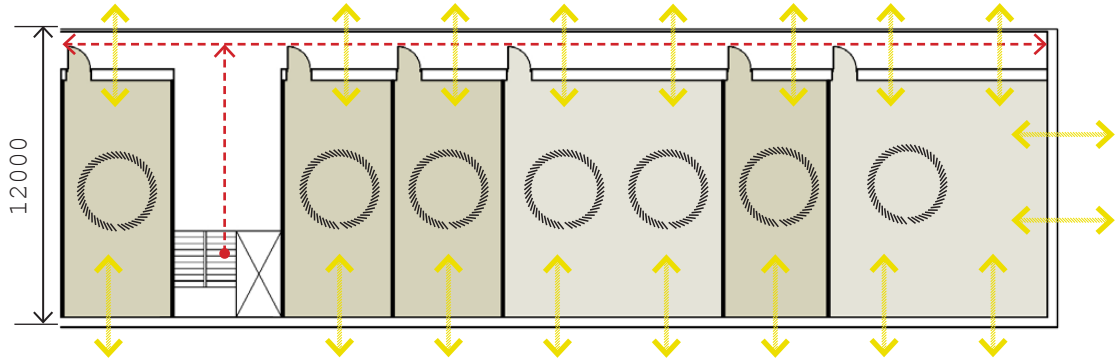
The new volume loosed the 4-storey greenhouse and replaced it with 3-storey residential volume on top of which a much smaller greenhouse is located. As the entrance floor of this new volume will be a cafe, people visiting for a drink can take the elevator up to this greenhouse.

The smallest residential volume on Lindholmsallen was deleted. Doing this enables better light situation for the adjacent blocks. This removal also gives the courtyard a more welcoming vibe to the public. The purpose is not only to turn the courtyard into a livelier place with more people engaging in conversations or taking a walk but also to keep the public function on ground floor activated.

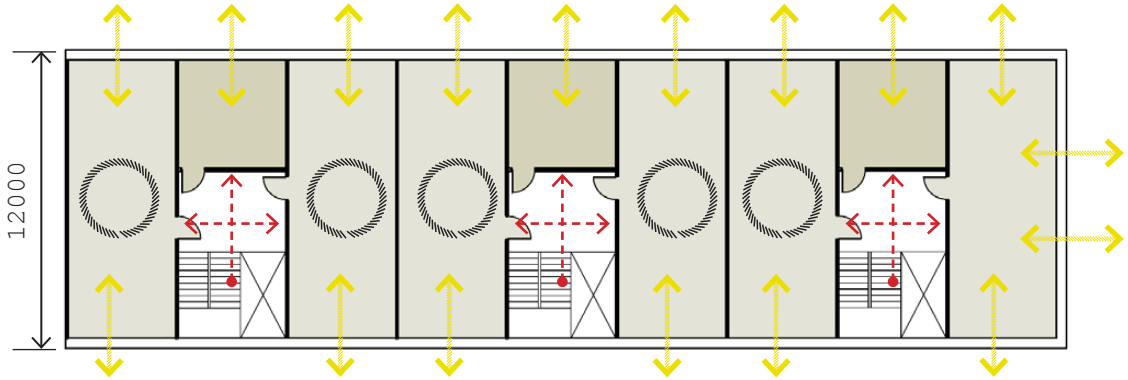
The villa at the Southern corner of the plot was also replaced by a public function volume. This very well-lit spot was transformed into a part greenhouse, part workshop that can be rented by the public. It is also suitable to have public function in this corner since the location is very central to the whole internal area of new residential buildings.

FLOOR STRUCTURE \ analysis

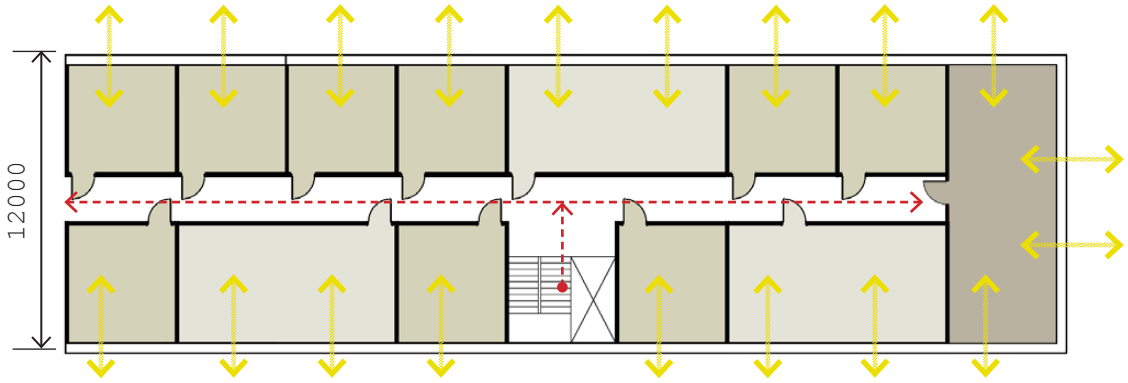
3 types of corridors were examined before being implemented into the project



OPTION 1 / Access Balcony



OPTION 2 / One lift lobby with multiple entrances



OPTION 3 / Middle Corridor

Smallest apartment unit

Public flow

Dark spot

Daylight and view

OPTION 1 / Access Balcony

Although usually viewed as the ideal structure that allows the apartments to reach both sides and thus receiving the best daylight situations, in this particular project, the access balcony typology suffers from several drawbacks due to the 12m width of the volume.
The middle space of the apartment is always a dark spot, due to the long proportion of the unit
The smallest apartment, for single tenant, is approximately 43 sqm, which is too much space for a normal studio, let alone in a project that asks for affordability quality.
The access balcony is a public passage, which means the facade on this side has to deal with low level of privacy and noise issue

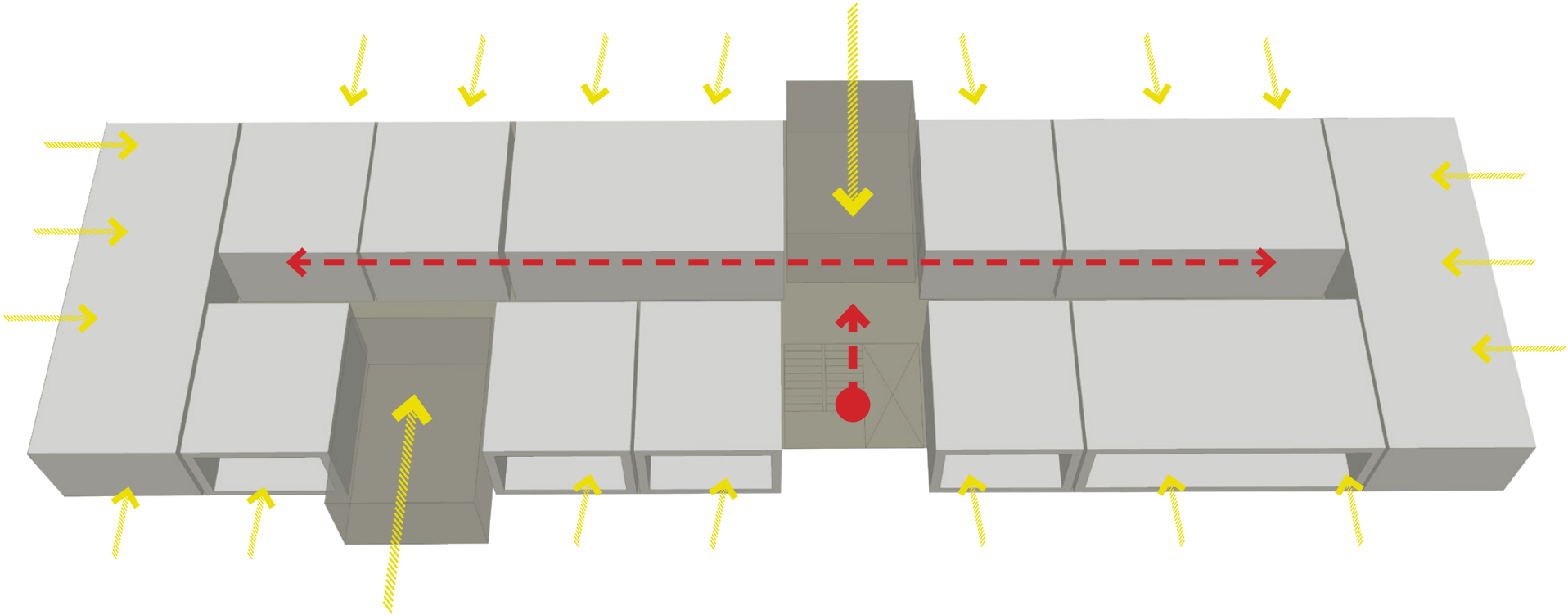
OPTION 2 / One lift lobby with multiple entrance

This option demands a considerable number of vertical communication core. In average, 3 to 5 entrances go with a set of staircase and lift. This increases the construction cost compared to other options.
In terms of future development, having more cores equals less opportunity to adapt the building to other functions.
There is only one qualitative single unit per core, with 2 larger apartments for a minimum of 2 dwellers. Considering the target group of people from 18 to 30, especially at the start of this age spectrum, most people would have single unit.
As for the larger apartments, the situation is similar to option 1 with dark spot in the middle

OPTION 3 / Middle Corridor

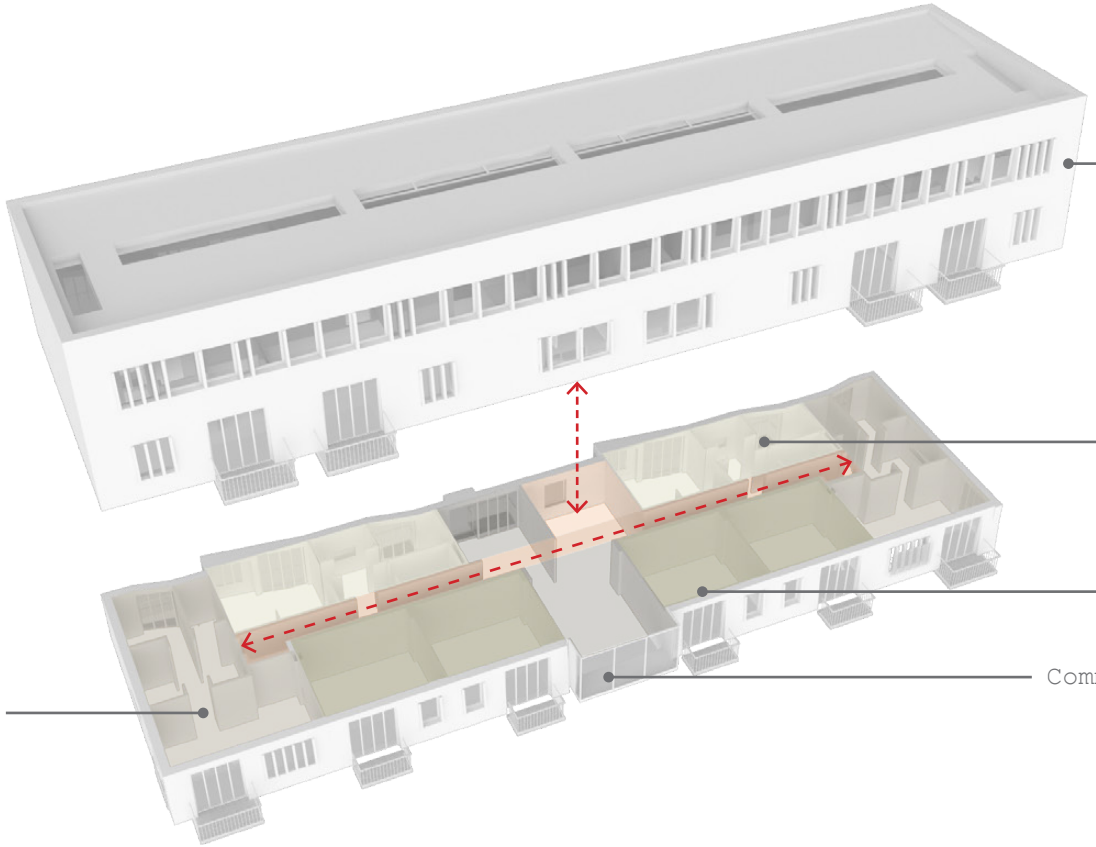
This option does not suffer from the exceeding number of communication cores
All apartments have long facades towards daylight
The fact that the apartments are not deeper than 5m helps daylight get into the furthest end of the apartment. Therefore, there are no dark spots in all units.
The middle corridor can be blocked from natural light in this arrangement.

FLOOR STRUCTURE \ conclusion



The project works with middle corridor typology and replaces some of the dwelling units with rooms for common activities.
The purpose is to give dweller extra shared space in compensation to their own limited living space. It is also deemed as an opportunity to promote social interaction within the community of tenants on the same floor. The placement of these rooms are taken into consideration in order to keep them activated and give vitality to the middle corridor consequently.
Additionally, the transparency design of the rooms will enable day light to penetrate deep into the walkway.

THE HOUSEHOLDS



Based on the target group, the thesis explores 3 main types of households that are common with people from 18 to 30 years of age: single, couple + and collective living.

One type of single apartment, two types of couple apartment and two types of co-housing are examined throughout the project.

Regarding the placements, they are all positioned the same way in three volumes. The corridor is bookended by the larger type of couple apartment while the other one stays at the outer edge of the building. Single apartments always take the courtyard side where the slanted facade is. And on two top floors of every volume are the 2-storey co-housing apartments.

ENTRANCE LEVEL \ introduction

Outdoor seating area of coffee shop-meeting point between dwellers and public

The volumes facing high-traffic streets house public functions such as cafe and shops.

Apartment units are situated at the more private and calmer parts of Ground floor.

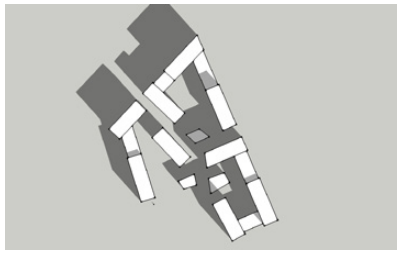
However, the more important features that the project aims to stress on are the functions that promote social interaction. They are semi-public facilities designed to be meeting points between the dwellers and the public. This idea is strengthened by the design of the courtyard which makes use of the sun situations to offer people well-lit outdoor seating areas.

Besides economic purpose, it helps keep the common space activated.

Due to major height differences between the courtyard and street level, lifts, stairs and ramps are available at entrance points.

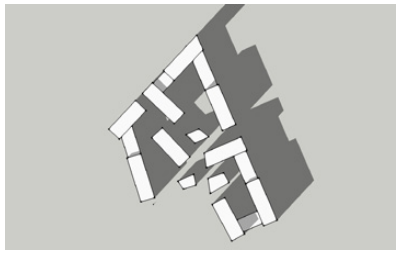
Sun study was carried out in order to identify the best spot for outdoor activities in the courtyard.
This North-East part of the courtyard was then designed to be an outdoor seating area connected to the cafe on Gotaverksgatan which can be accessed by both the public and the inhabitants. This is one of the meeting point on ground floor

ENTRANCE LEVEL \ sun study

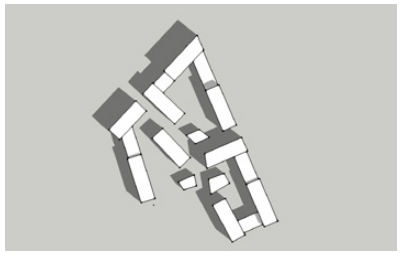

March 21st \ 10 am


March 21st \ 12 pm

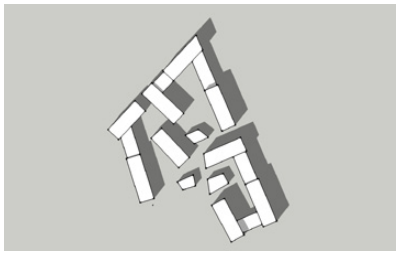

March 21st \ 2 pm


March 21st \ 3 pm


March 21st \ 4 pm


June 21st \ 10 am


June 21st \ 12 pm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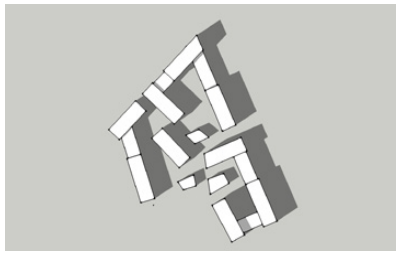
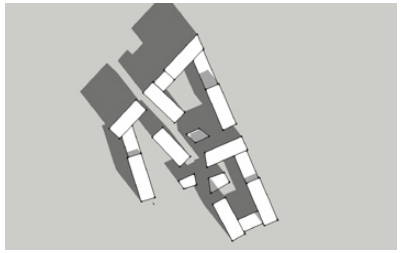
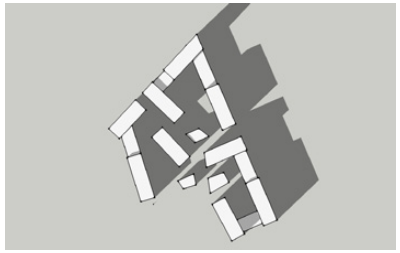

June 21st \ 3 pm


June 21st \ 4 pm


Sep 21st \ 10 am


Sep 21st \ 12 pm


Sep 21st \ 2 pm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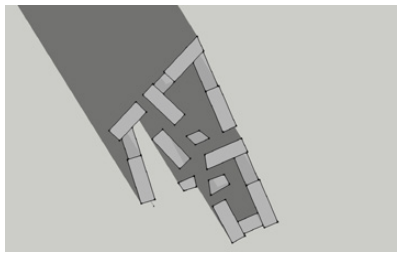
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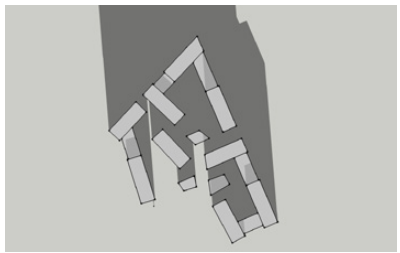
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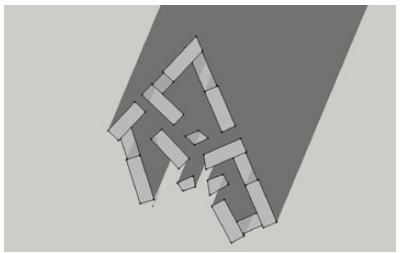
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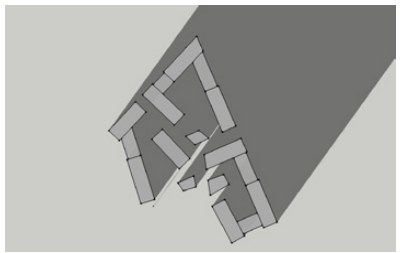
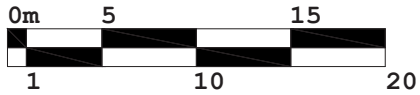

Dec 21st \ 3 pm


Dec 21st \ 4 pm


+1.7
+1.7
+2.8
II
+2.8
+1.9
+2.8
I
IV
+1.7
+1.3
+2.8
+2.8
III
+1.4
+2.8

ENTRANCE LEVEL \ floor plan 1:500



Apartments

Couple apartment

Single apartment

Corner apartment

Semi-puplic

Coffee shop. The outdoor area of this place is in the courtyard and for both public and dweller

Hall. The big room can be rented out to the public but can be used by the residents as well

Workshop. The glass house is supposed to be a venue for activities involving everyone in the area due to its very central location

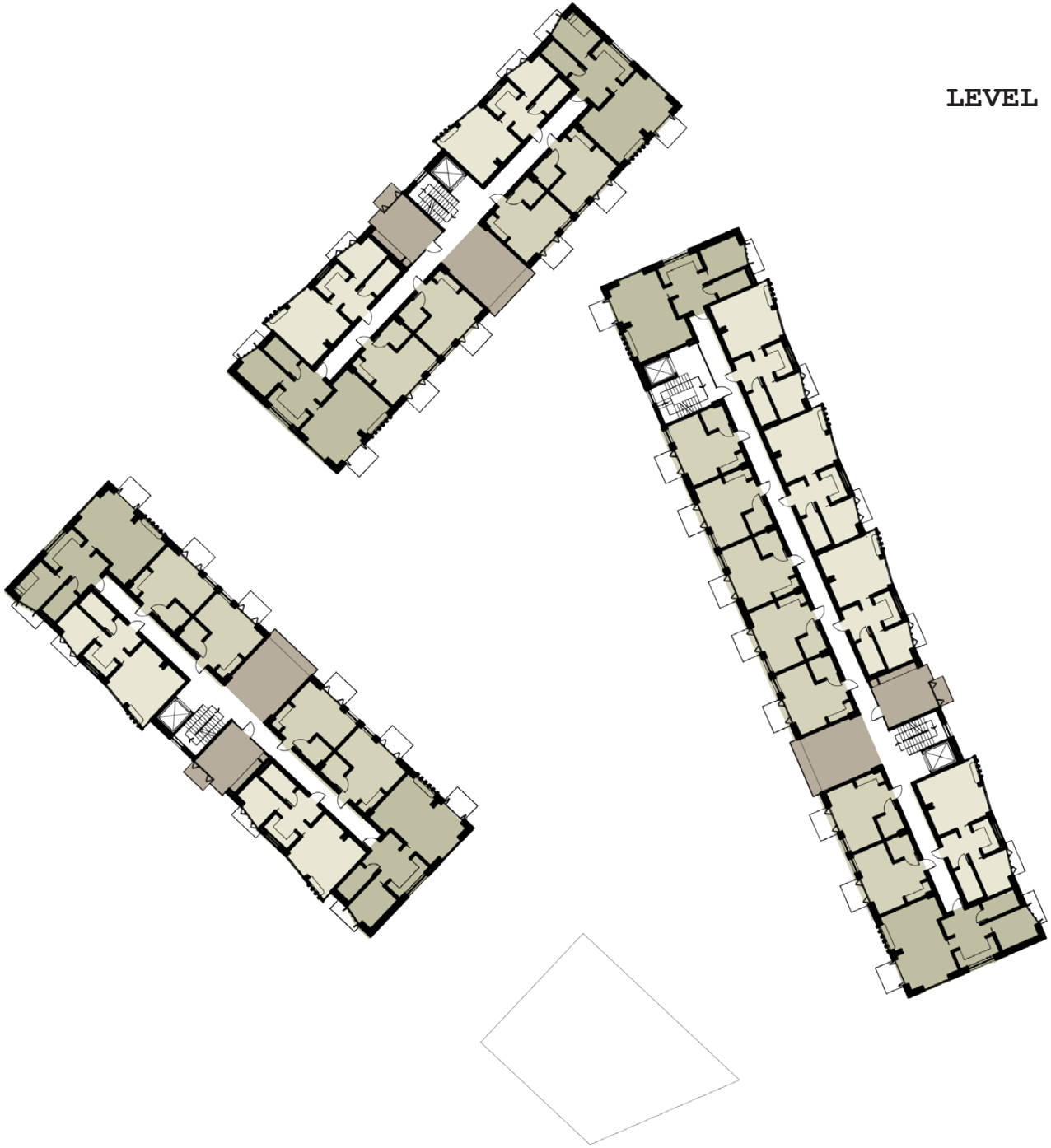
Puplic

Retail

Landscape

I, II, III Squares

IV Outdoor seating area for both cafe customers and residents



LEVEL 1, LEVEL 2 \ floor plan

1:500

0m 5 15

1 10 20

Couple apartment

Single apartment

Corner apartment

Common space

LEVEL 3 \ floor plan 1:500

0m 5 15

1 10 20

Couple apartment

Single apartment

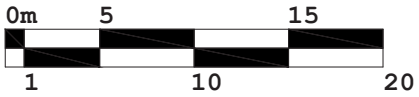
Corner apartment

Common space

Greenhouse open to public

LEVEL 4 \ floor plan 1:500

LEVEL 5 \ floor plan 1:500



Couple apartment

Single apartment

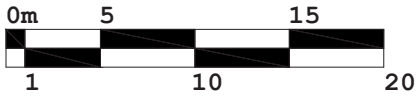
Corner apartment

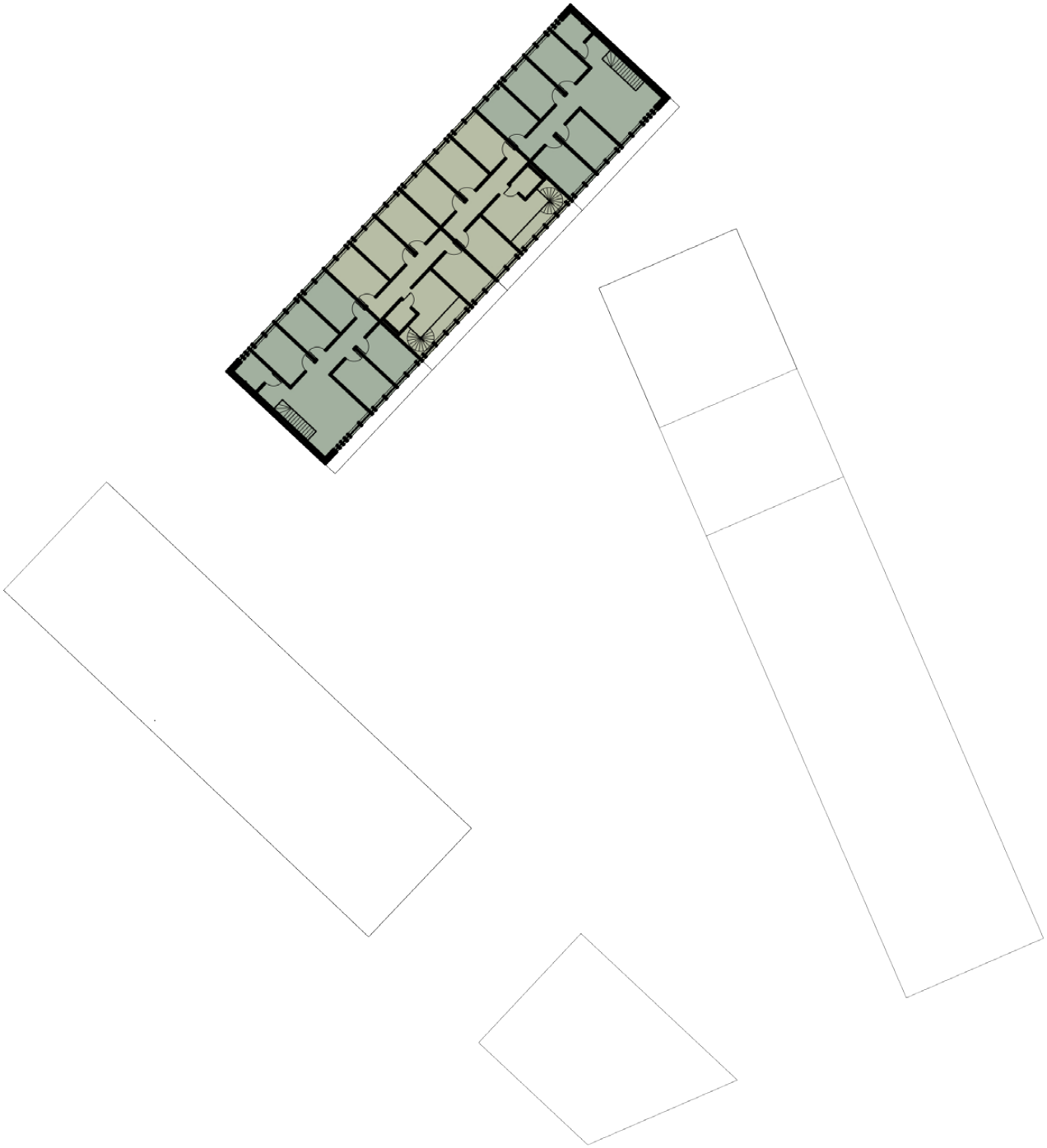
Common space

Co-housing 1

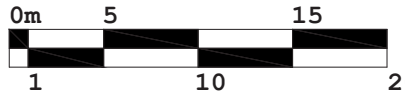
Co-housing 2

LEVEL 6 \ floor plan 1:500





LEVEL 7 \ floor plan 1:500

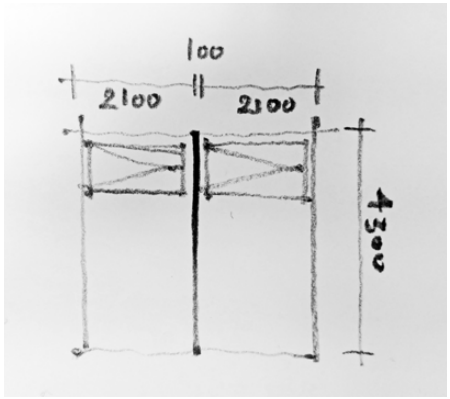


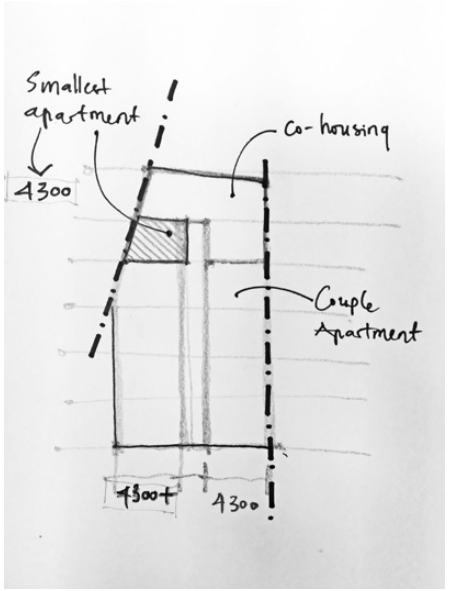
Co-housing 1

Co-housing 2

DESIGN PROPOSAL / apartment unit + common space

APARTMENT UNIT / size and placement





The size

In order to maximize the potential of adaptability quality, the size of each apartment was developed upon a basic square of 4300 x 4300 mm. The single apartment eventually took this size as the smallest unit in the building.

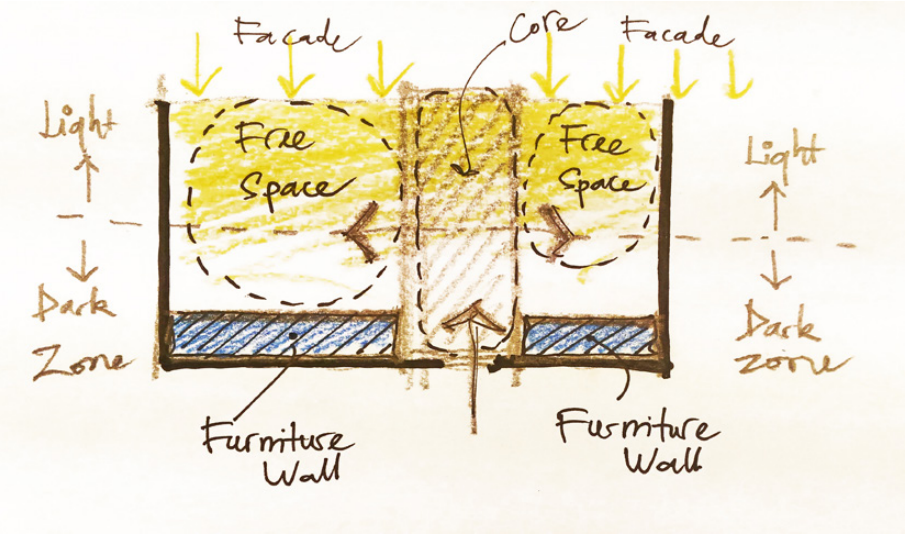
The measurement of the square is a conclusion from several testings with furniture to make the unit able to house more than one dweller if needed. 4300 mm comes from the arrangement of two single beds and a wall in between, which allows a single room to turn into a double one in extreme cases.

The placement

The slanted facade made a huge impact on the placement of each apartment type. Apart from the co-housing type always staying on top floors, the apartments right underneath, on the slanted side, have the shortest depth. As these apartments go down, their depth extends and they grow bigger in size. Based on that observation, the ones underneath the co-housing apartments were decided to be single apartments with the shortest depth of 4300mm. The ones on lower floors will benefit from the depth extension and effectively, there will be more sqms added to them, which is valuable for the limited area of these apartments.

The single units taking the courtyard side left the street side for the couple units.

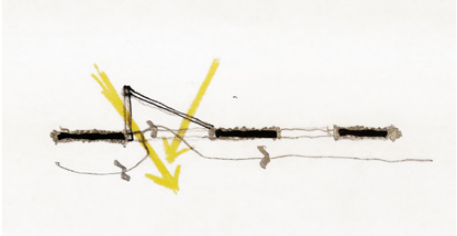
APARTMENT UNIT / efficient use of space

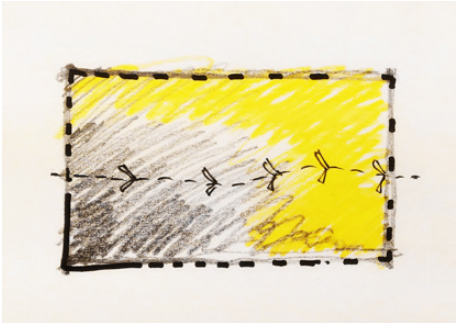


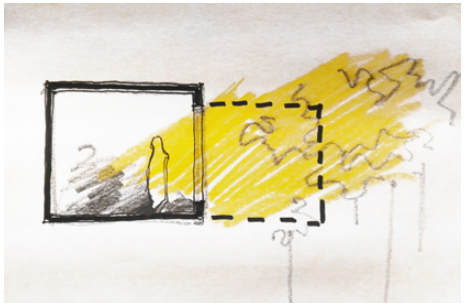
As the units all stretch along the facade and have their longer edge on this side, it is important to position the entrance so that the sqm won't be wasted just for walking from space to space. In order to provide a satisfying answer to this, the entrance was placed in the middle with the communication/service core from which the dweller can reach other areas of the apartment.

When it comes to furniture arrangement, the idea still connects strongly with the ambition to fully explore the adaptability capacity of the unit. Cabinets were all placed along the walls to create a system of storage wall. And by doing this, the apartment gained more free space which could fit a handful of different furnishing scenarios. The proportion of the free space was also taken into consideration as the more square it is, the more adaptable it gets. Additionally, a set of sliding panels was concealed in the furniture wall and could be pulled out to divide one big space into smaller rooms.

APARTMENT UNIT / daylight







Daylight element was taken into account to enhance the living condition of the apartment. But not limited to visually enlarging the space, the attempt was also to consider the different functions of each space, which don't ask for equal amount of daylight, and design the openings accordingly.

From this point of departure, the investigation was then furthered by implementing three ways of working with daylight into the floor plan.

Multi-directional

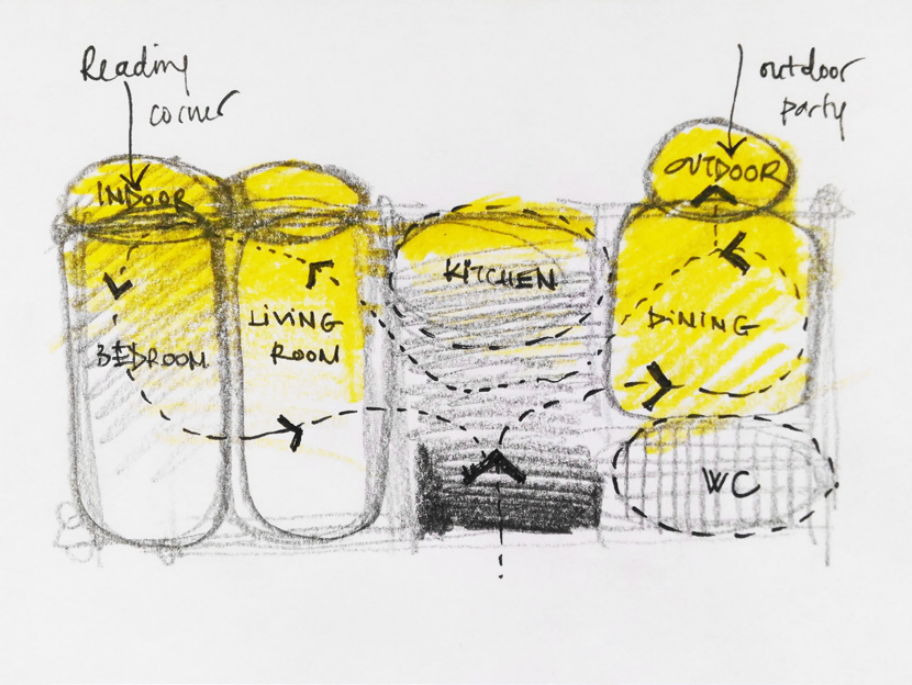
Adding an extra volume that protrudes from the facade provides an opportunity to make use of daylight coming from more than one direction.

Sequential

Daylight comes in different areas with different levels of intensity not only to match with the requirement of each room but also to create a sequence of itself throughout the space. How it brightens up then shimmers or dims out to pitch dark nuances the apartment.

Enlarging space

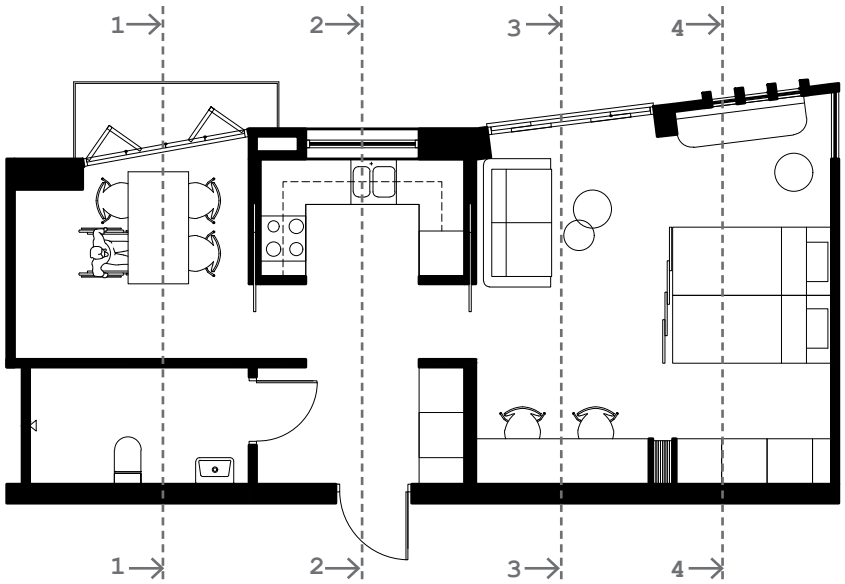
The room gets expanded and the boundary between indoor and outdoor becomes blurred by the possibility to open out totally to the balcony



An early sketch of couple apartment layout investigating the different levels of daylight intake corresponding dining room, living room and bedroom. The idea of having a sequence of light and shadow throughout the apartment was also examined here, which was strengthened by having the indoor space reach out of the facade to get exposed to light from multiple directions, or enlarging the dining area by giving it the possibility to transform into a semi-outdoor space if needed.

COUPLE APARTMENT / floorplan 1:100

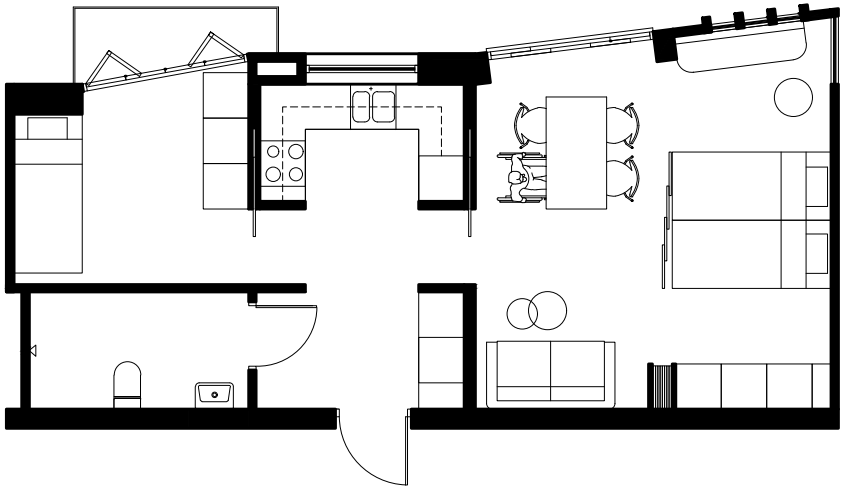
Area: 50 sqm
No of people: 2-3



The apartment is built around a core in the middle, from which the dwellers can reach the dining room, living room and bedroom through a passage in between the kitchen and the hall. It is possible to shut it out from the other areas by closing the recessed sliding doors from the kitchenette's 150 mm thick walls.

The living room and bedroom both belong to one entire continuous space. A system of sliding panels can be used to separate them if necessary. During the daytime, only a few panels are pulled out, just enough to partly conceal the bed and retain the spaciousness of the room. By doing this, the living room also makes good use of the daylight coming from the bedroom window. This part of the apartment is adorned by the reading corner which can turn into a totally private spot with the help of sliding panels closing it off from the living room.

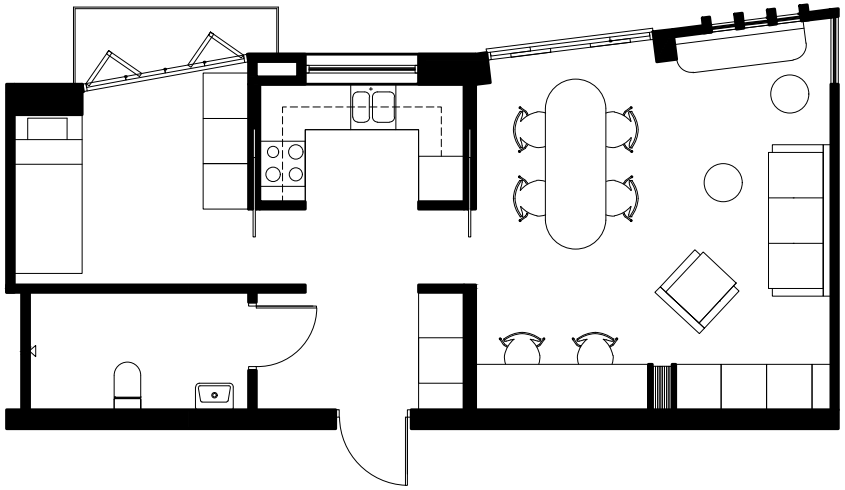
The dining room takes the smaller side and can become a semi-outdoor space by merging itself with the balcony when the folding doors are opened completely. It is worth mentioning that the role of this balcony is intentionally more towards enlarging the room than providing an extra outdoor seating, due to the depth constraint of 600mm counting from the facade.



It is possible to move the dining table to the living room and use the former dining room as an extra bedroom. This furnishing option can be of use in 2 scenarios:

The couple needs to rent out a room

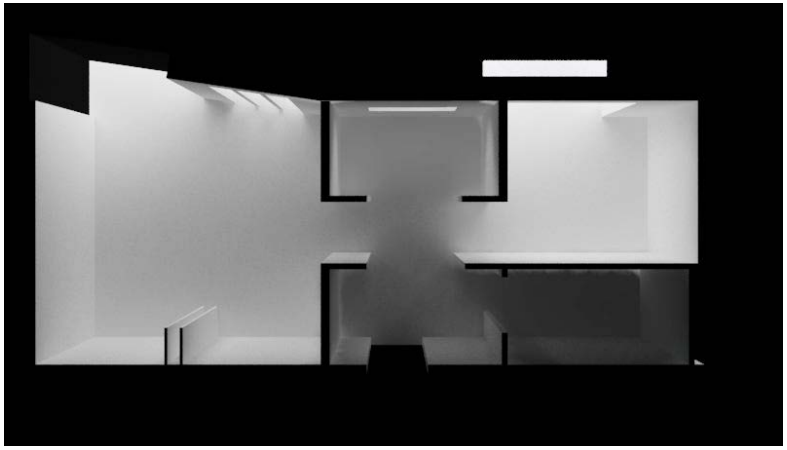
The couple have a baby and need extra space while looking for larger apartment

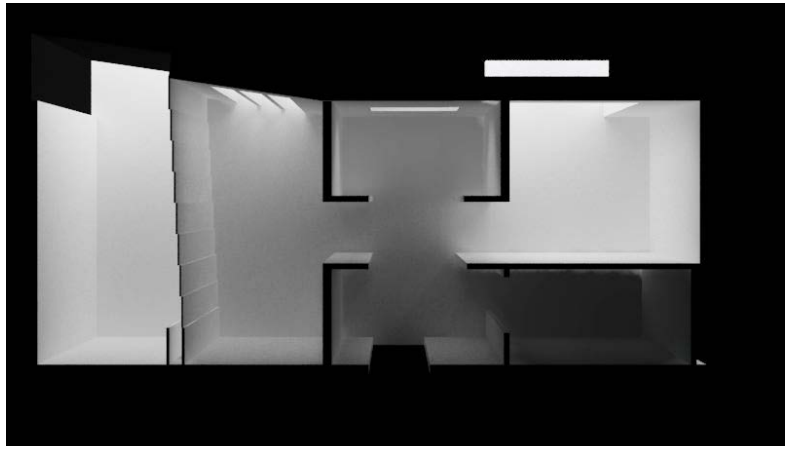


The apartment can also be furnished as an office or a small library. With the sliding panels assisting, the large space can always perform as an open office or as a separate lounge and a working space.

COUPLE APARTMENT / light study on floor plan

After the basic floor plan was set, the design process moved forward with studying how the daylight would enhance the defined functions in order to understand the adequate amount of daylight serving each room. This study was carried out in accordance with the aforementioned daylight design principles, as well as the initial concept sketch of the space in section “Apartment unit/daylight”



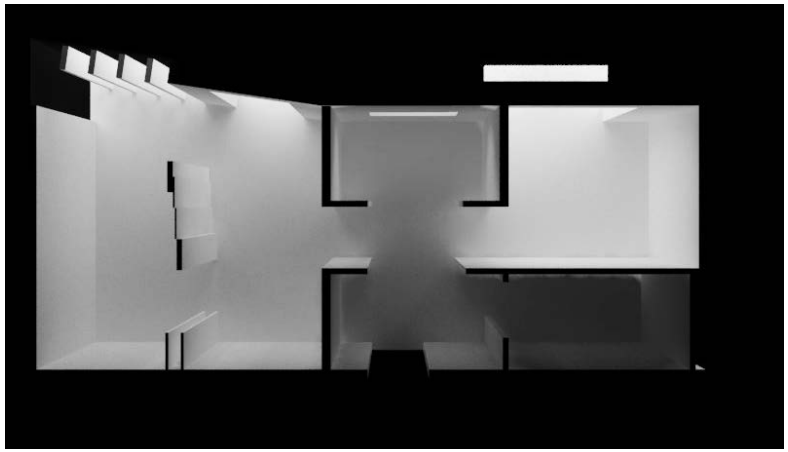


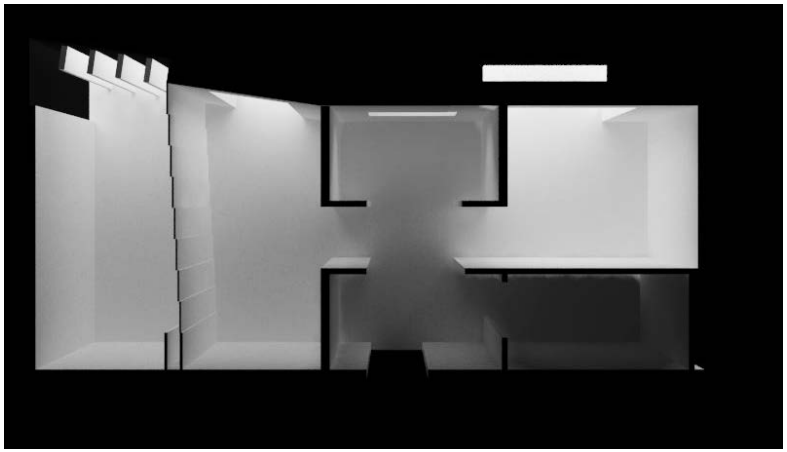
Iteration 1

The apartment gradually unravels itself more as the navigation gets closer to the furthest corner of the space.
The sequence of light begins with very limited amount of daylight coming through the kitchen cabinet in the entrance hall. After passing the relatively dark corridor to enter the dining room, the space fully brightens up, giving a drastically contrast atmosphere in comparison with the previous room. On the living room side, there is one more level of light intensity introduced before getting to the brightest spot. This is facilitated by the use of slits which moderate light and diffuse it subtly into the living room.

Next, an ample amount of light comes through the protruded corner, finishing the daylight progression.

However, when tested with completely separating the living room from the bedroom by closing the panels, this option exposes its weakness. The sleeping space turns into the best sun-lit area in this case whilst the living room is the obvious better choice and functionally needs more lighting





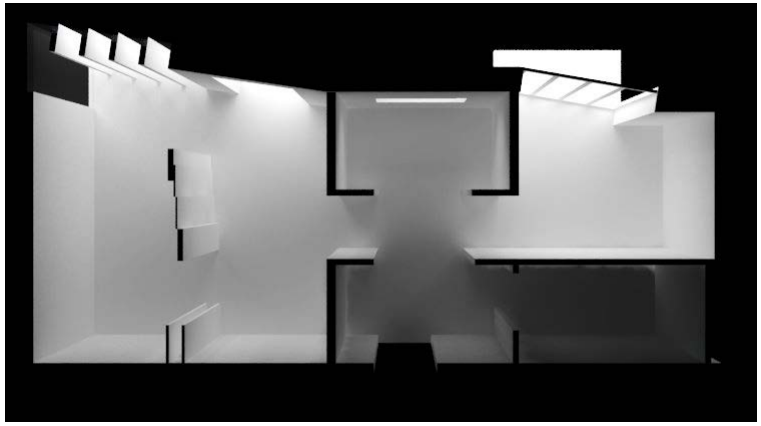
Iteration 2

Learning from iteration 1, this option swaps the large opening to the living room and applies the slits to one facade of the reading corner. The narrower facade of the corner stays the same as in the previous study. This option prove to work well with both merging and dividing the space.

Iteration 3

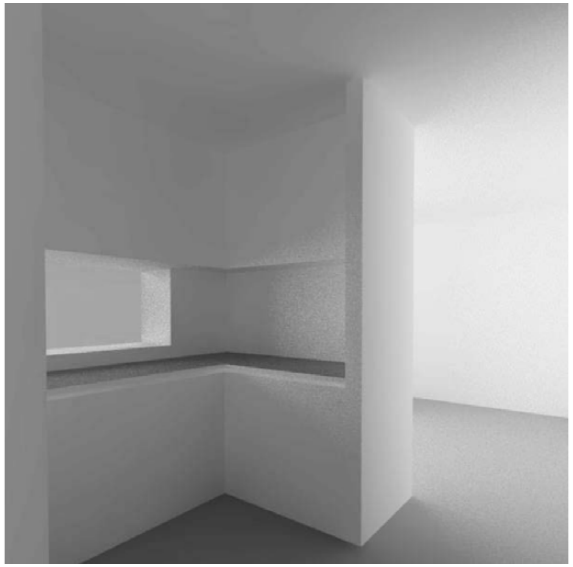
The third and final iteration aims to fully explore the dining room's light situation, taking into account its other furnishing layout as a bedroom.

The length of the niche, where the long edge of bed is supposed to be, gets shortened, further away from the original facade. This adjustment enables more light into the opposite side of the bed and simultaneously attenuate the light level for the bed niche.

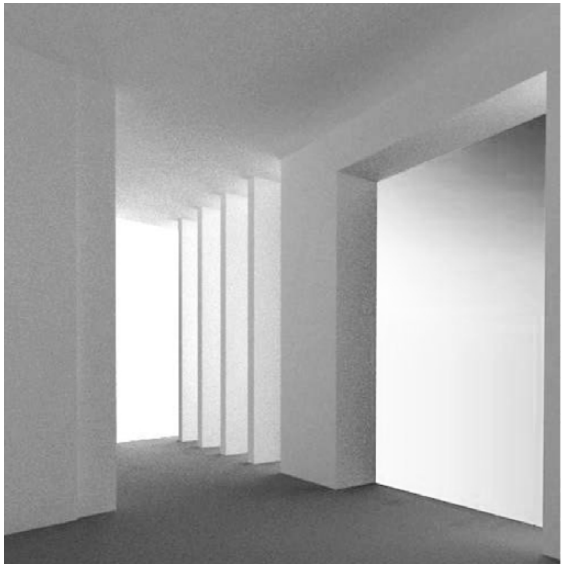


COUPLE APARTMENT / light study in 3d perspective

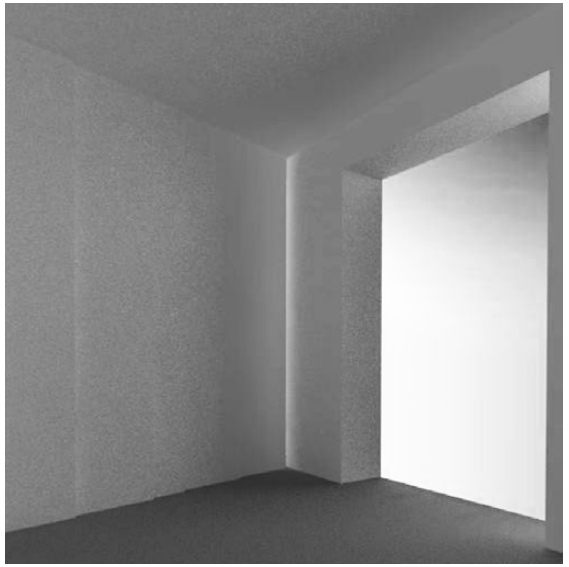
The outcome of the light study on floor plan was tested in 3d model. The windows at this stage were only shown as openings on walls. The purpose was to have a fuller understanding of the way light and shadow affected the space



Kitchen towards Dining



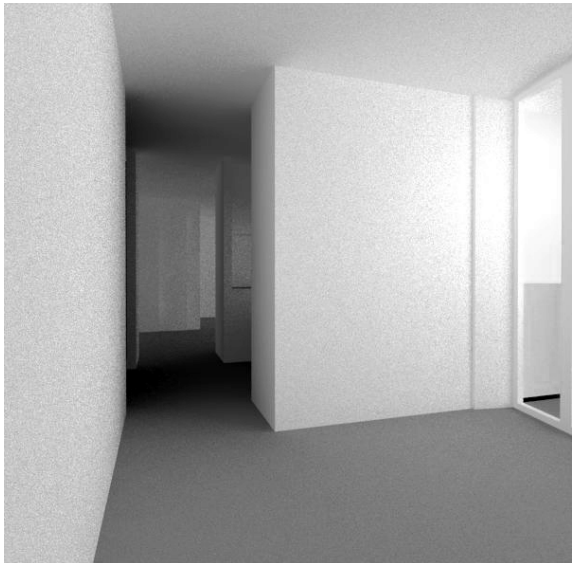
Living room/panels opened



Living room/panels closed

Dining/Folding doors closed

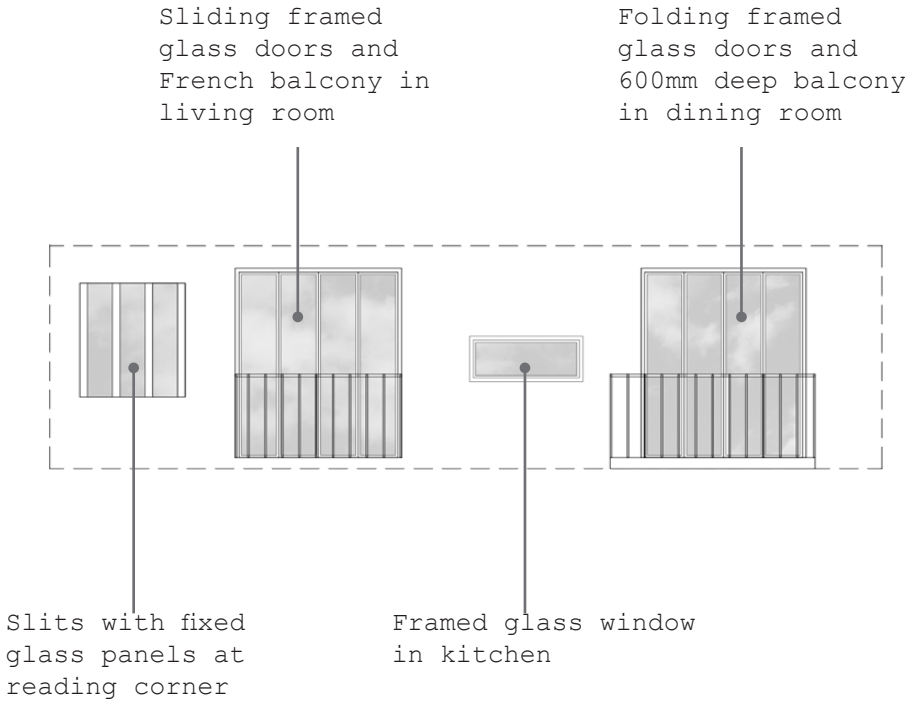
Dining/Folding doors opened



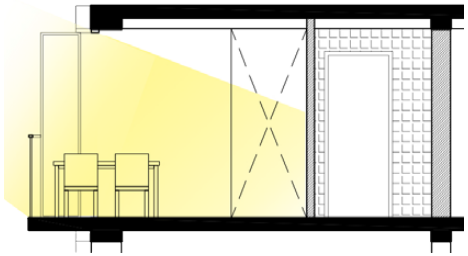
Dining towards living room

COUPLE APARTMENT / facade 1:100

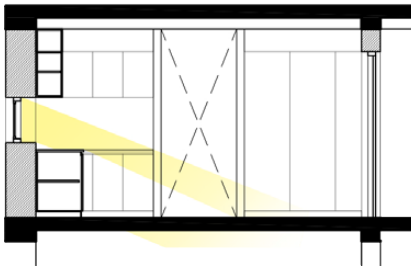
The openings on facade continued to be developed into functional doors and windows up to the level of details shown on facade drawing below.
All study outcomes of couple apartment went on to be implemented to the other types of apartments in building.



COUPLE APARTMENT / sections 1:100

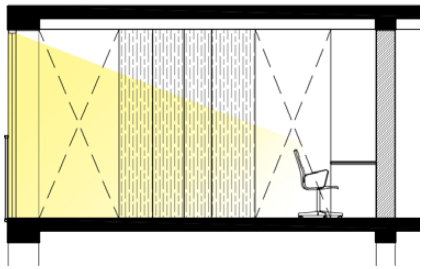


1-1

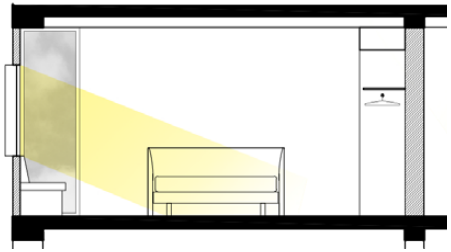


2-2

COUPLE APARTMENT / sections 1:100



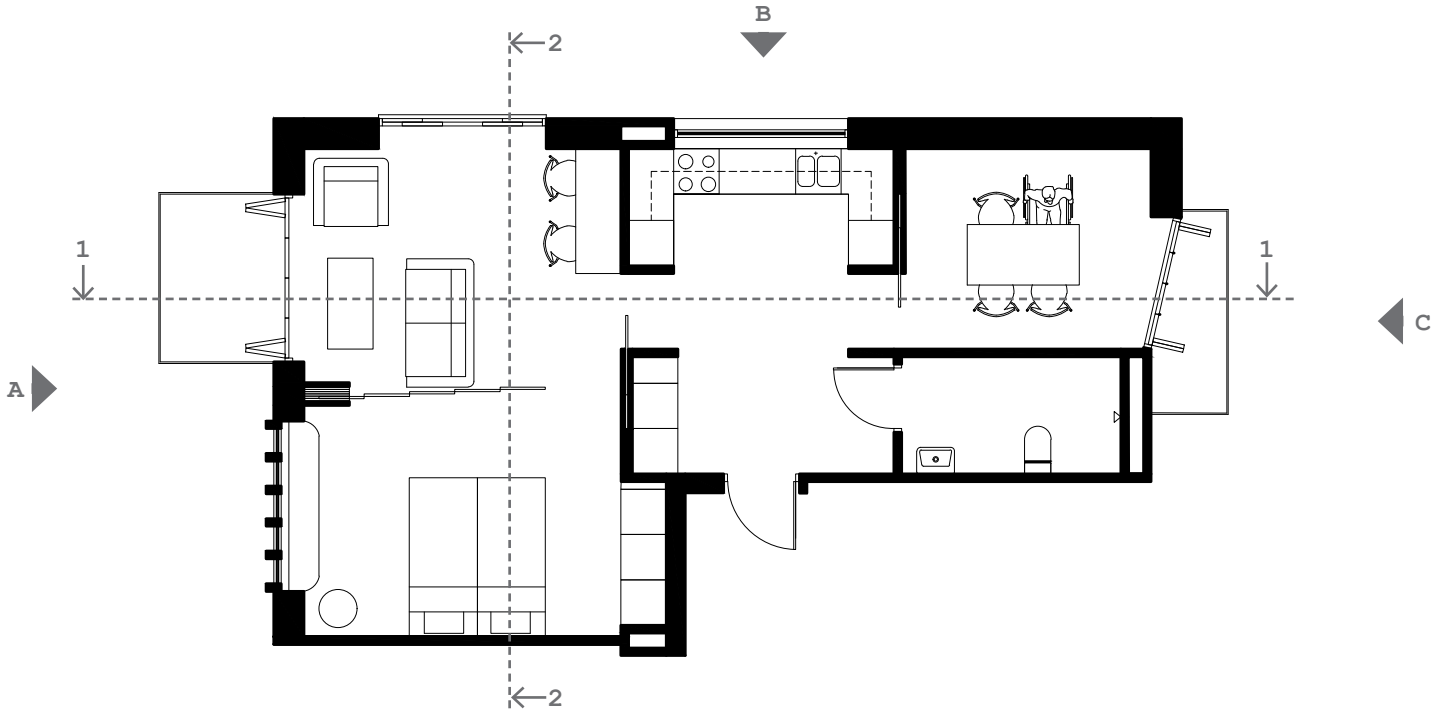
3-3



4-4

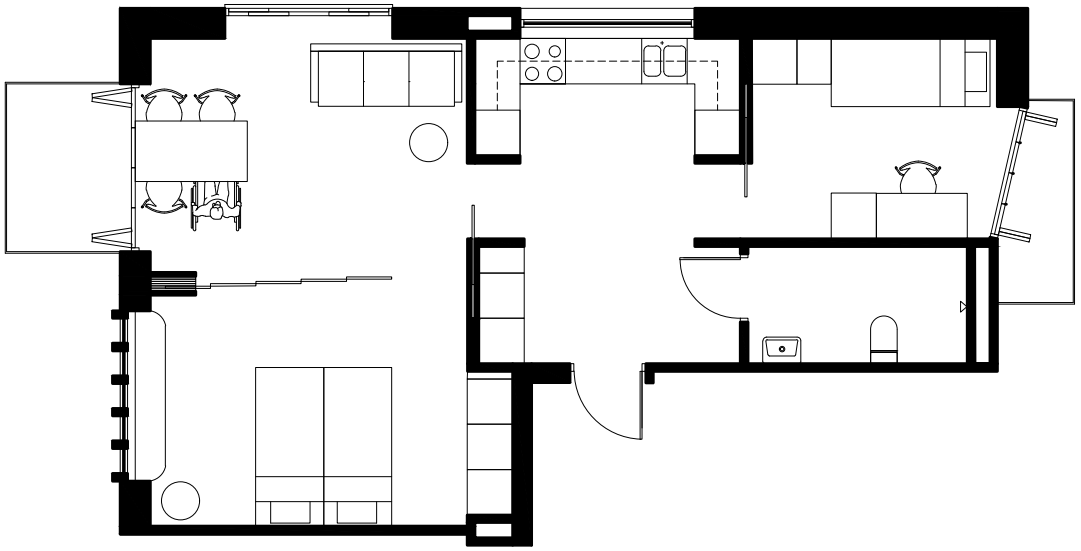
CORNER (COUPLE) APARTMENT / floor plan 1:100

Area: 57 sqm
No of people: 2-3

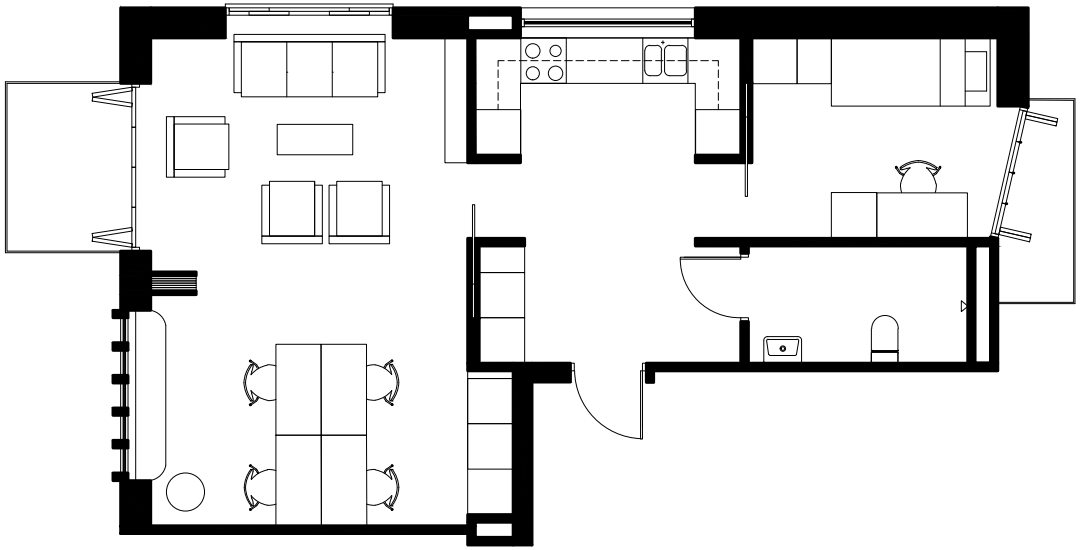


The corner apartment is basically a larger version of couple apartment. The most notable strength of this unit is the generosity of daylight amount it receives thanks to the availability of three facades. Other than that, it shares many similarities with the previously presented unit, from the arrangement of space, the possibility to adapt to different scenarios of dwelling to the way it works with daylight through the forms and the placement of doors and windows

CORNER APARTMENT / floor plan 1:100



This layout shows the possibility to add on more bedroom into the apartment by moving the dining table to the living room.

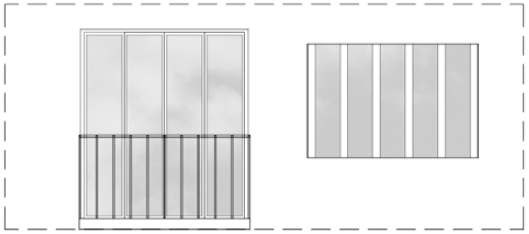


This layout shows the arrangement of a home office with a small bedroom.

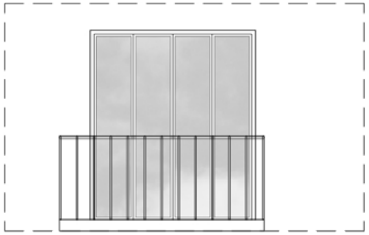
The scenario can happen with a person taking this apartment and having his/her own workplace in house. And there is room for colleagues to come and work on a daily basis.

Another situation is that the only owner of the place renting out the big part of it.

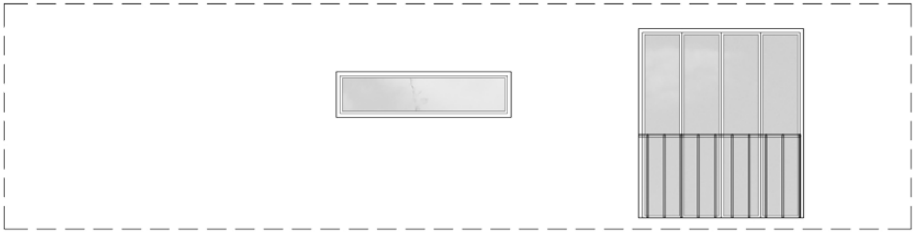
CORNER APARTMENT / facades 1:100



A

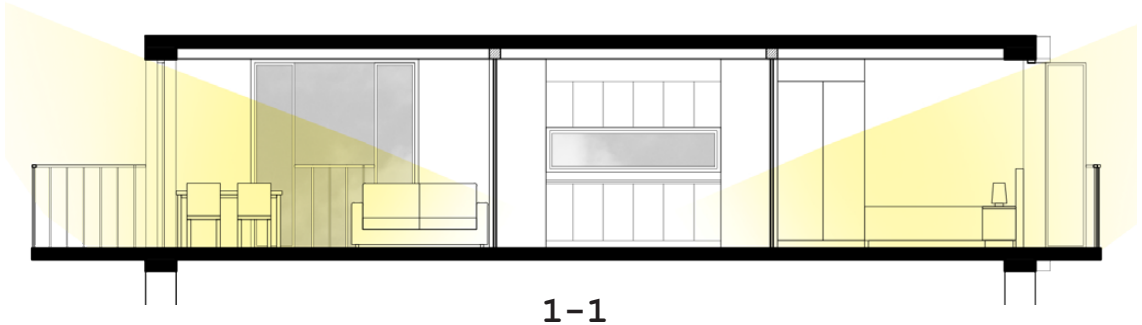


C



B

CORNER APARTMENT / sections 1:100

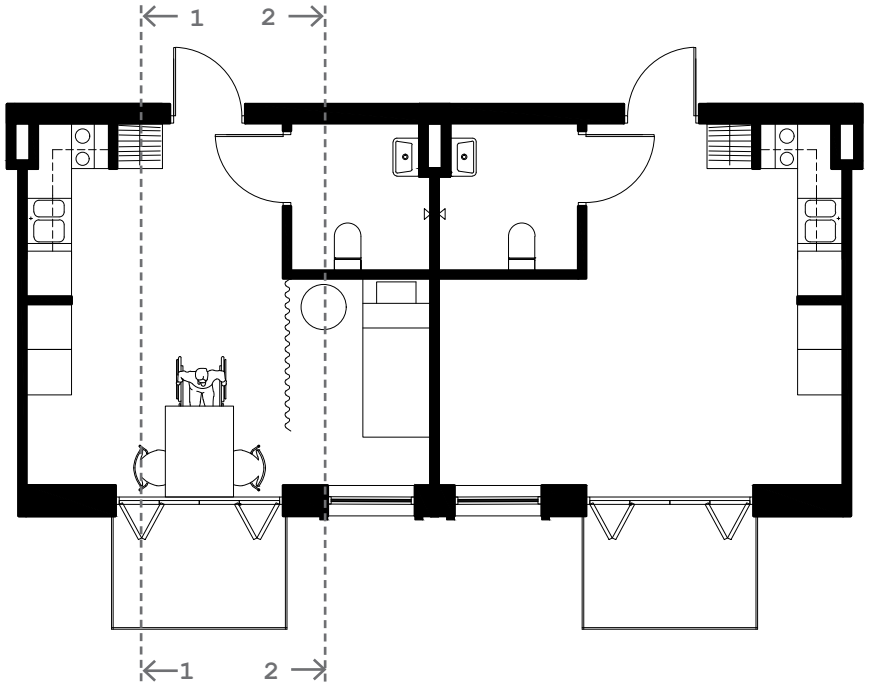


1-1

2-2

SINGLE APARTMENT / floorplan 1:100

Area: app 25 sqm
No of people: 1



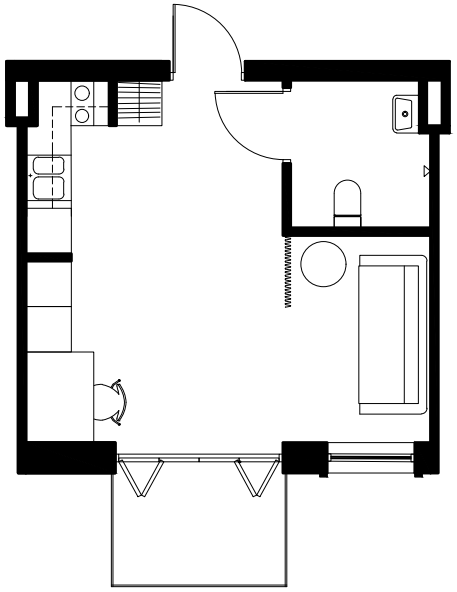
The length of each single unit equals half of that of couple unit. This enables the possibility to merge two units in the future.

Within only 25 sqm, the initial attempt was still to give the dwellers a private and a public zone. This idea was then translated into the final design as a niche/ alcove to place the bed. There is enough space left to have a night stand after closing the curtain, separating the sleeping area from the rest of the apartment.

The storage wall was carefully calculated to have enough length for clothes rack in the hall, kitchen-ette, wardrobe and space to put a table to be used as a working desk or pulled out as a dining table.

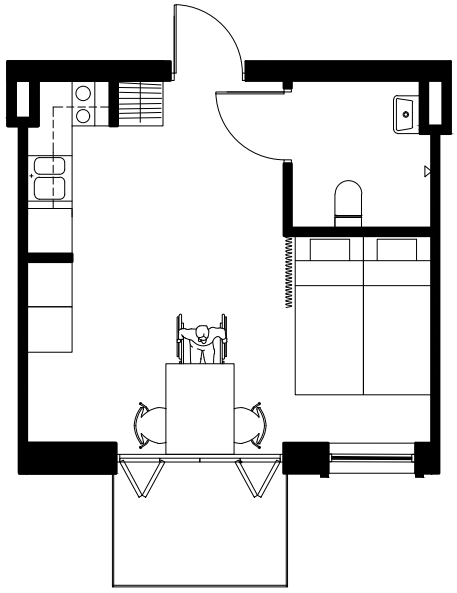
Due to facing the courtyard, the apartment is allowed to have a 1500mm deep balcony which is enough for an outdoor dining. It is also possible to open the folding doors completely to have the room enlarged.

SINGLE APARTMENT / floorplan 1:100

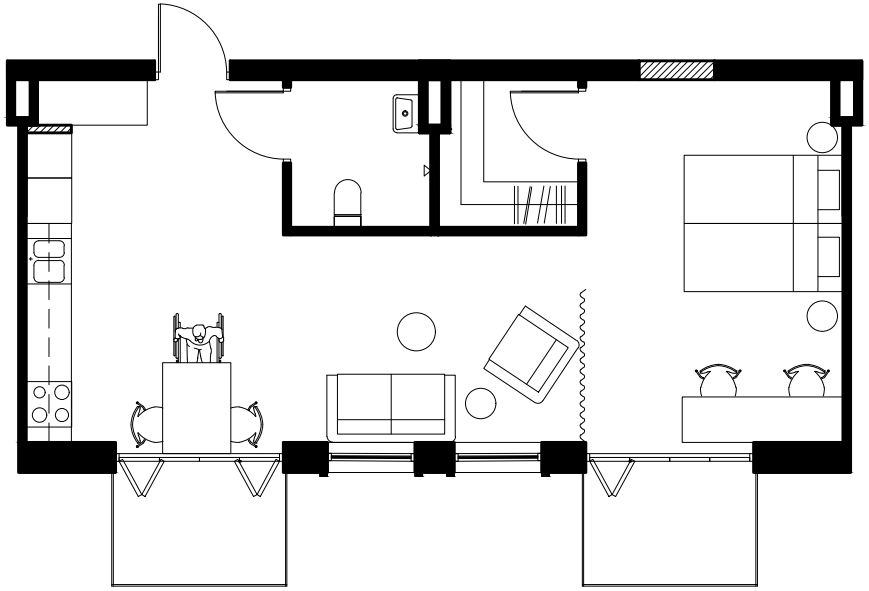


By using sofa bed and utilizing the character of the niche, during daytime, the apartment can have a rather spacious lounge setting.

If closing the curtain, the niche can become a nice and well-lit private space

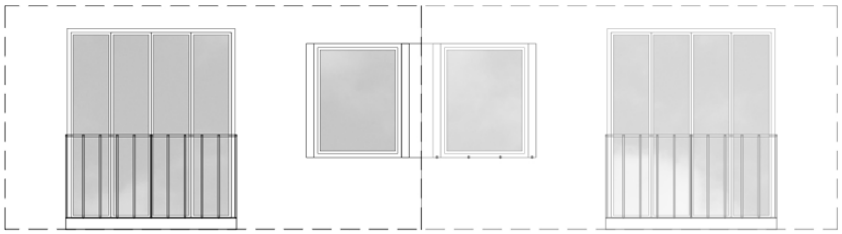


In extreme situation, the apartment still works with adding one more bed.

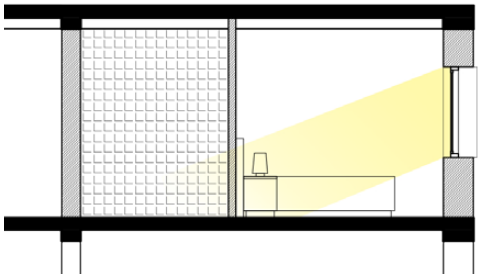


This layout shows an example of merging two single units into a couple apartment.

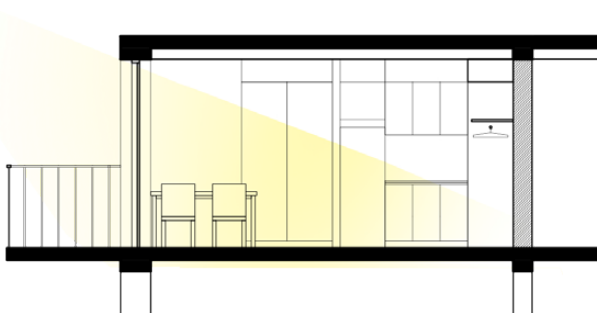
SINGLE APARTMENT / elevation 1:100



SINGLE APARTMENT / section 1:100



2-2



1-1

Couple Apartment
View from living room towards reading corner

Corner Apartment
View from living room towards kitchen and dining room

CO-HOUSING / design principle

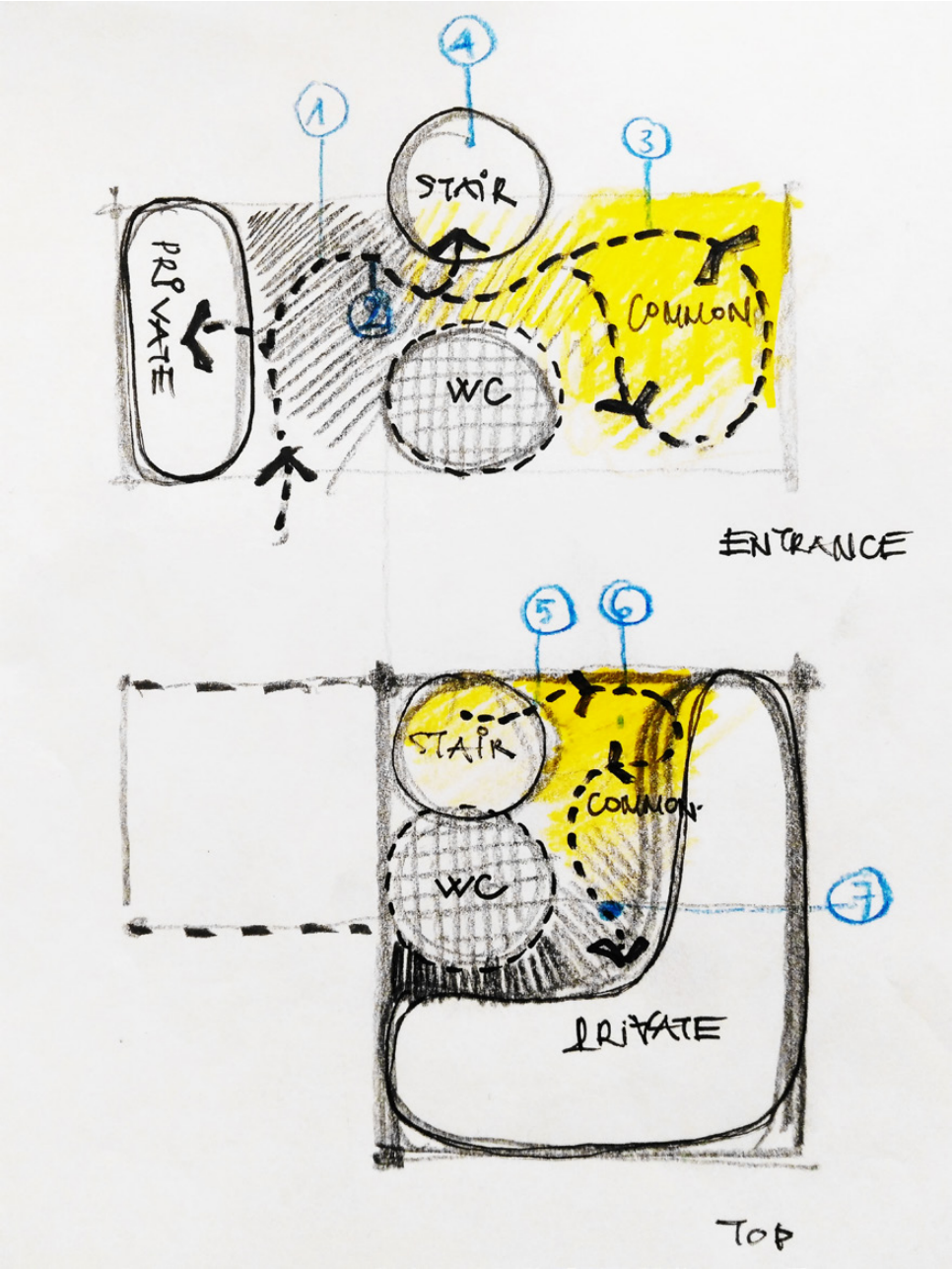
The building has 2 types of co-housing units corresponding to their location on the same floor: middle and corner.

They both share the similarities in the design goals with the apartments on lower levels regarding efficient use of space and the 3 elements of daylight. However, with the distinct character of a collective housing unit, where the dwellers might be total strangers,in order to make the household work, more effort needs to be put into making the private rooms comfortable, and also adaptable to last in the long run.

Additionally, the common space also has to equally add to the living condition otherwise it will easily become deserted.

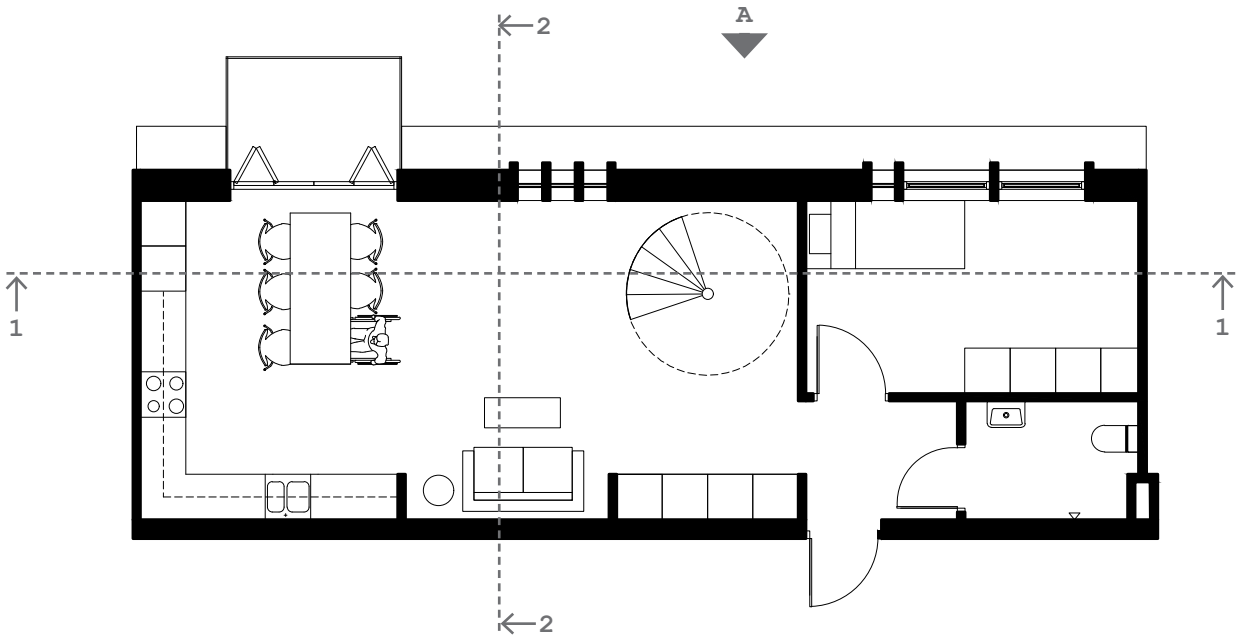
Last but not least, being on top floor is an opportunity to work daylight vertically through the design of skylight.

The sketch next page is an early investigation on the co-housing floor plan in regards to the movement in the apartment,the correlation between private zone and common zone and how daylight would inform the space. It was developed based on the outcomes from researching and designing the couple apartment.


4
1
3
STAIR
PRIVATE
2
COMMON
WC
ENTRANCE
5
6
STAIR
COMMON
WC
7
PRIVATE
Top

CO-HOUSING 1 / entrance floor plan 1:100

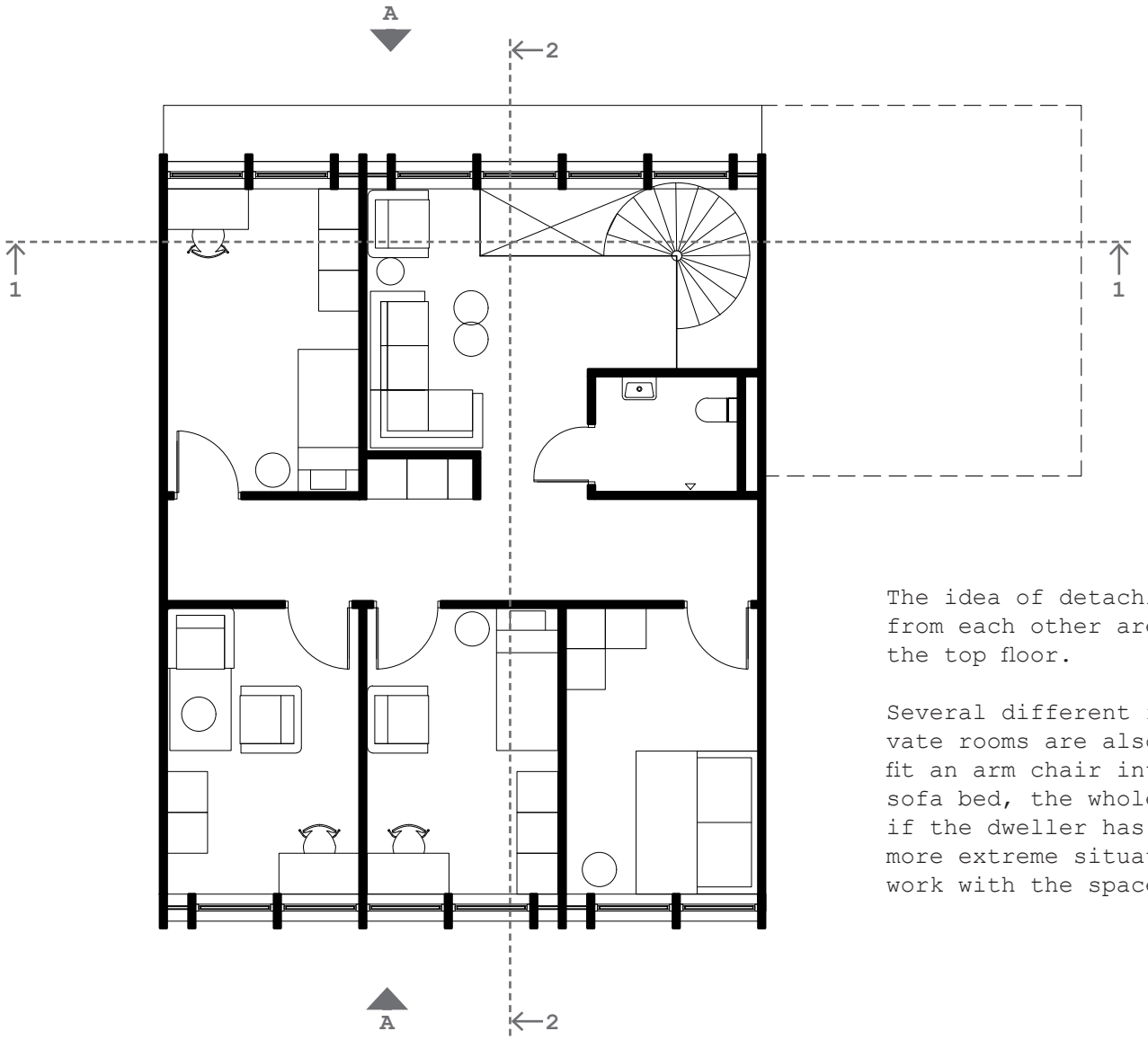
Area: 130 sqm
No of people: 5



On entrance floor, there is clear separation between common space and private space. The private room and the kitchen/lounge takes opposite sides of the spiral staircase. This arrangement enables the dweller to get to his/her own room straight from the entrance hall. Besides, other people coming to the kitchen from upstairs don’t have to pass the room everytime.

Regarding daylight treatment, much similar to the other apartments, the apartment will not impress people with an ample amount of daylight from the start but rather lead them bit by bit, from shadowy,shimmering environments to the fullest expression of light,which is in this case the dining area that can be extended to the balcony

CO-HOUSING 1 / top floor plan 1:100

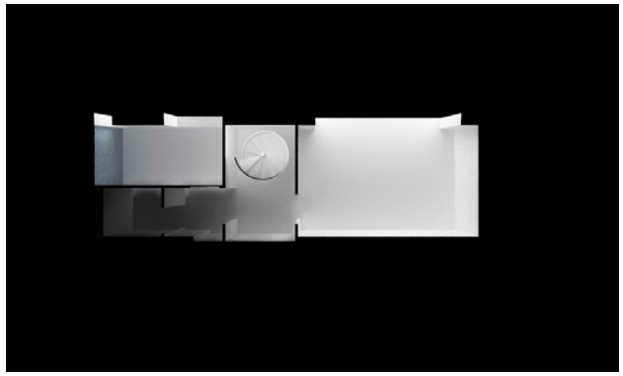
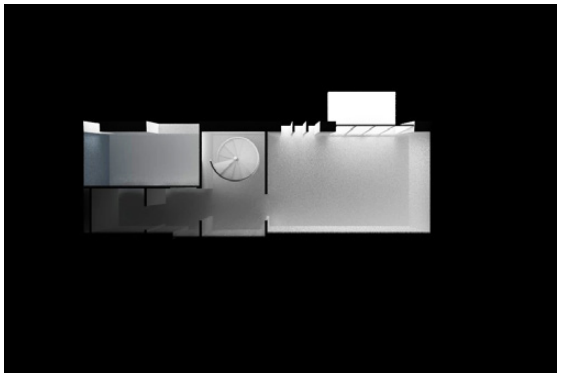
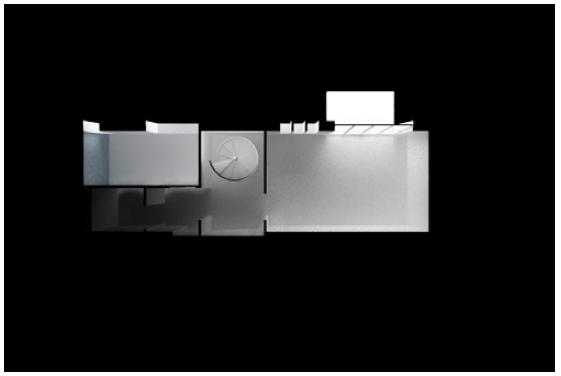


The idea of detaching public and private elements from each other are demonstrated clearly here on the top floor.

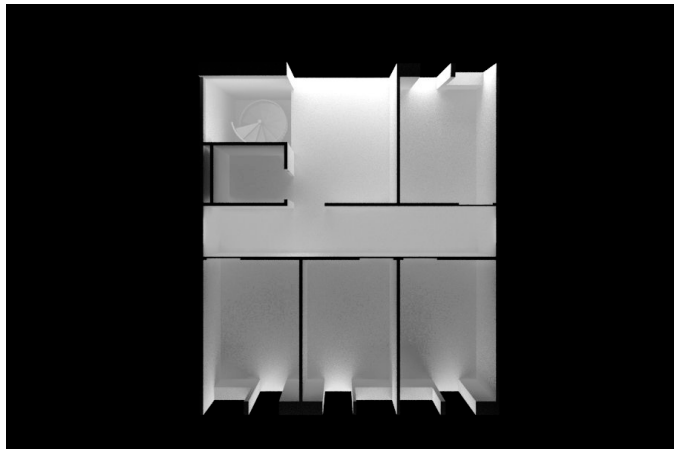
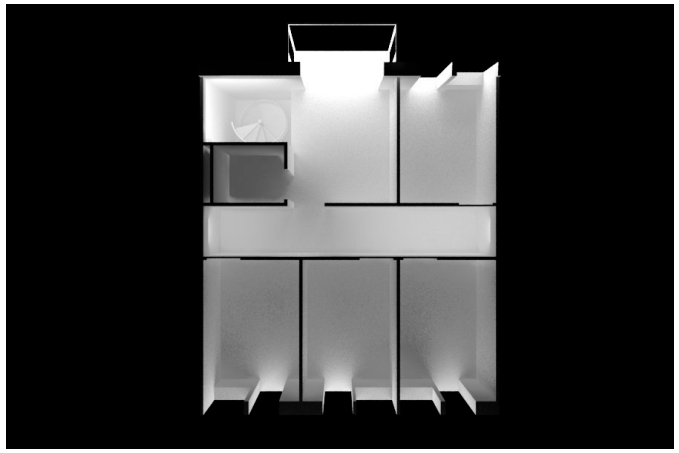
Several different furnishing layouts for the private rooms are also presented. It is possible to fit an arm chair into the room. By using a single sofa bed, the whole room can have a lounge setting if the dweller has friends coming by. And in a more extreme situation, a double sofa bed can also work with the space.

CO-HOUSING 1 / light study on floorplan

This study is on how the daylight would enhance the defined functions in order to understand the adequate amount of daylight serving each room. It was carried out in accordance with the aforementioned daylight design principles, as well as the initial concept sketch of the space in section “Co-housing/design principle”. It is to be noted that the floor plans used in this light study were not the final design, they were older versions with similar arrangement of space

The iterations of entrance floor show the research towards giving nuances to the common area, instead of showering it with a maximum amount of daylight.

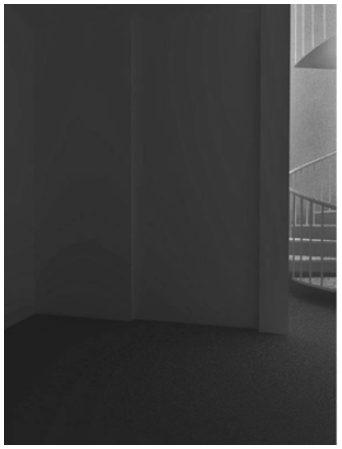



The testing with top floor shows the idea of having the corridor in the private zone lit of by opening a skylight along the walkway. It also indicates the attempt to give the common space the best light situation or at least a different experience from the one on the entrance level by adding a bay window to the volume

However, the final option was a third iteration where the void of the staircase was extended into the upstairs common space to have it connected to the dining area downstairs and also by doing this, the entrance level can also benefit from the skylight above the staircase. This is shown in both section 1-1 and 2-2

CO-HOUSING 1 / light study in 3d perspective

The outcome of the light study on floorplan was tested in 3d model. The windows at this stage were only shown as openings on walls. The purpose was to have a fuller understanding of the way light and shadow affected the space

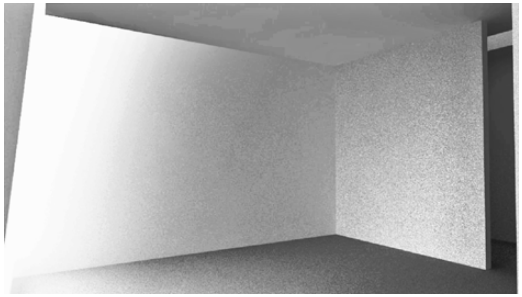


The entrance does not have direct sunlight

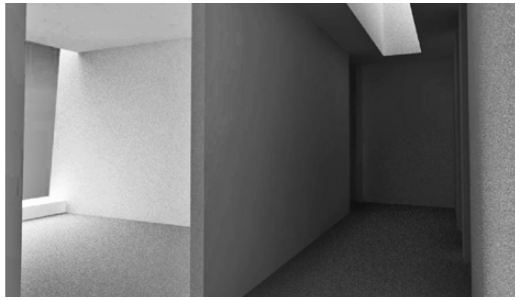
Moving towards the dining area, the path is highlighted by skylight over the spiral staircase

The first encounter with an ample amount of daylight if taking the stair up to top floor

The situation if going pass the stair to enter the dining area, the space fully opens up itself



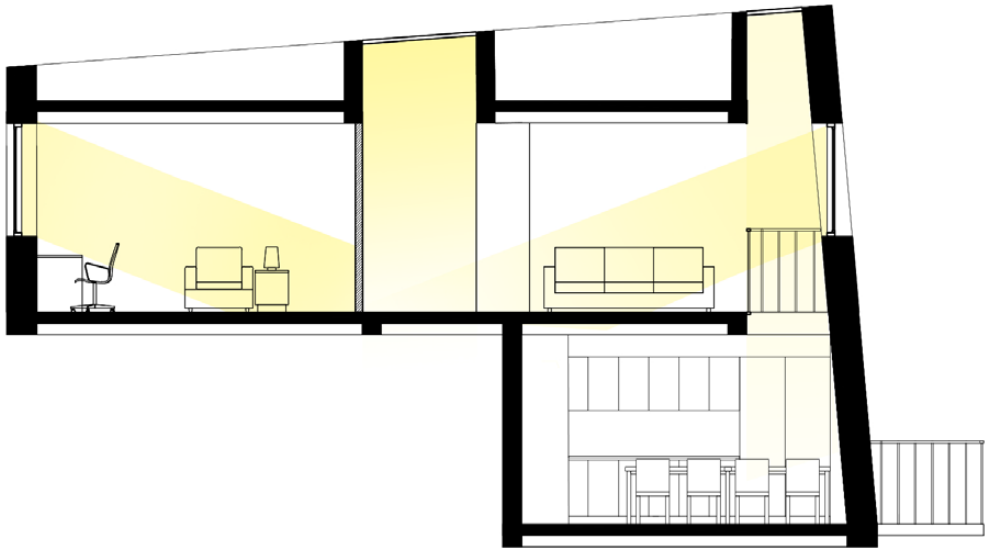
The upstair common area is well lit by both large window and skylight. A hint of the corridor in the private zone is shown at the end of the space



Corridor is lit up by a narrow skylight. The aim is not to bring a lot of daylight into to this area as it should still have a more subtle atmosphere than the common space

The final layout of the apartment, as shown on previous pages, doesn't break the space into as many small sequences of light and shadow as studied here. As the design sought to balance out the light impact and the social interaction within the dwelling, the dining area was enlarged by adding the balcony and removing the partition between the stair and the room to achieve a more qualitative space to get more people engage in the space

CO-HOUSING 1 / section 1:100

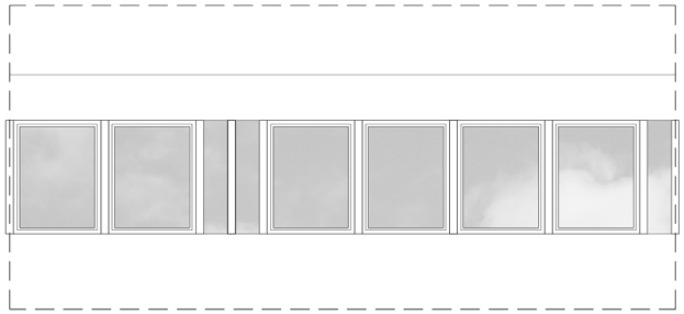


These sections highlight the use of skylight to adorn the space in the apartment.

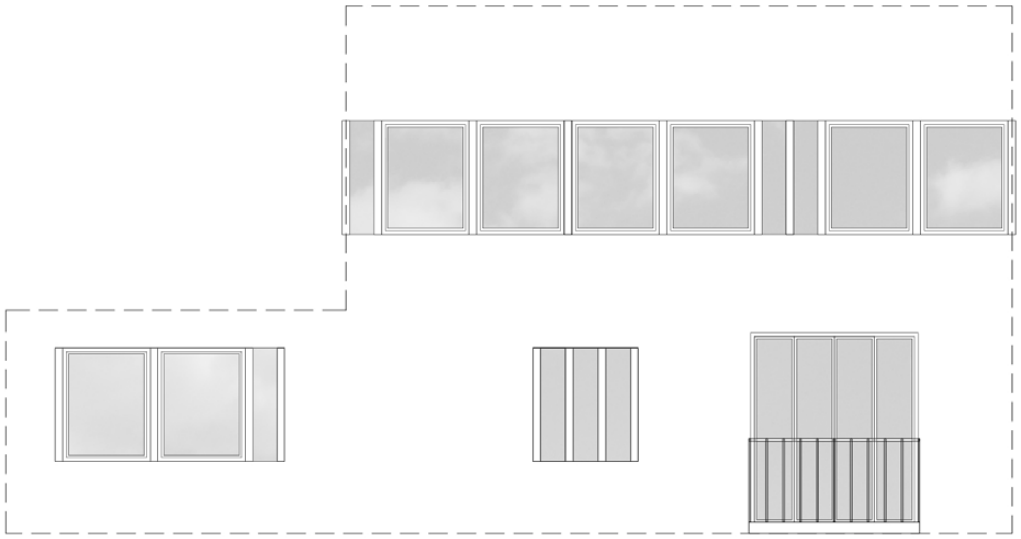
Section A-A also illustrates the connection established between two floors by having a thin void above the dining area.

As opposed to the light test in perspective where the idea of having a huge facade opening for the upstair common space had been introduced, it was eventually decided to give this area a set of regular windows like other rooms (shown in section B-B) due to adjustments regarding the design of the whole building facade. But by doing that, the openings on the ceiling became more of a unique, special feature since it didn’t have to compete with a special facade design

CO-HOUSING 1 / facade 1:100



B

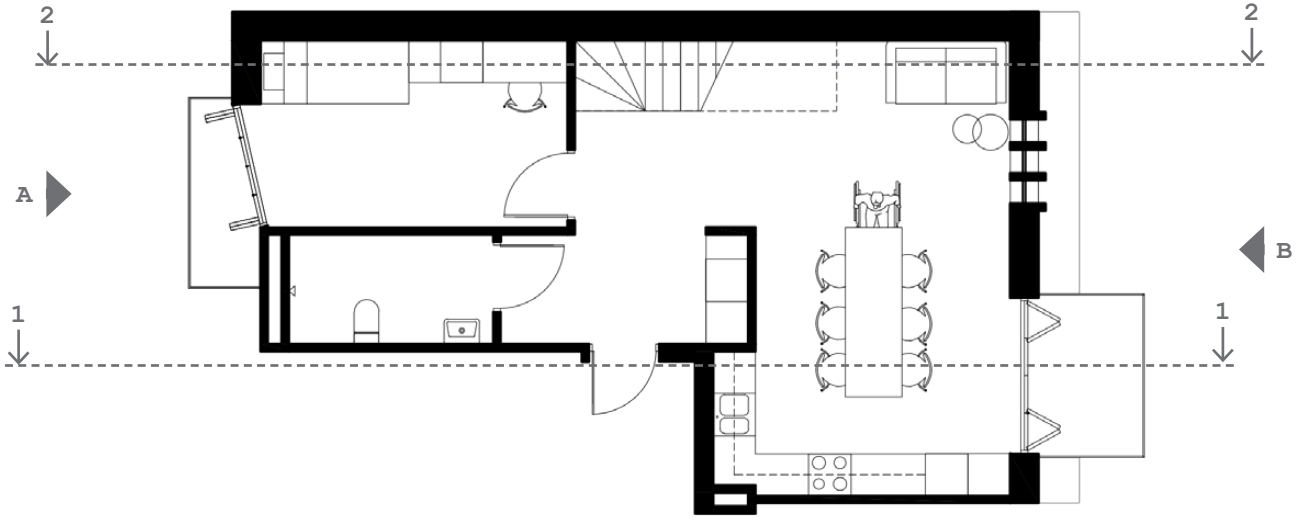


A

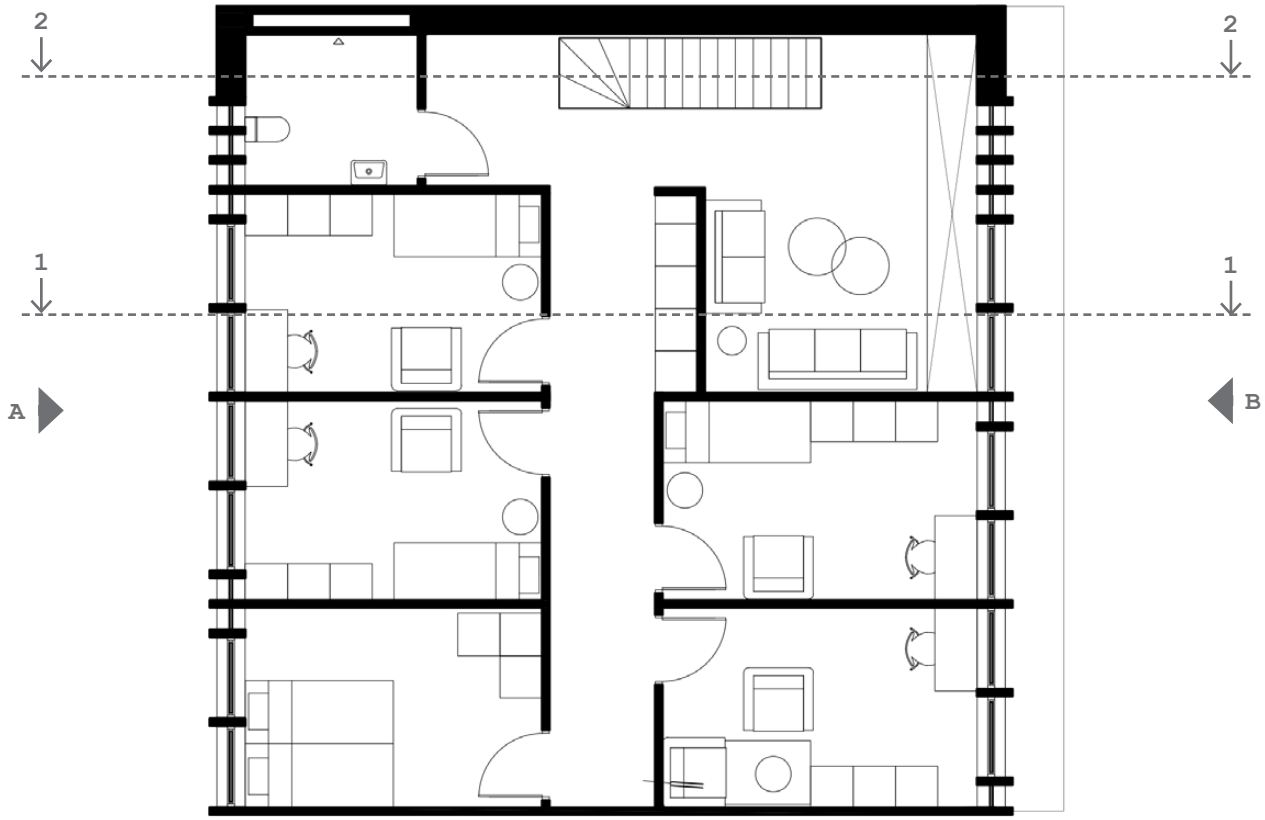
The facades comprise the same types of windows and doors as ones on the lower floors. This keeps the expression of the entire building facade cohesive

CO-HOUSING 2 / entrance floor plan 1:100

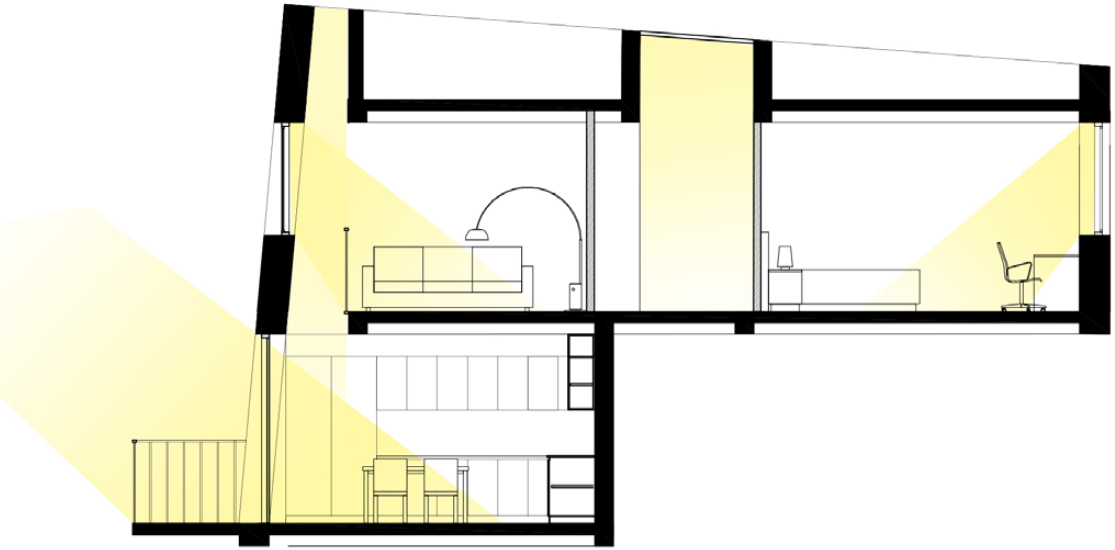
Area: 130 sqm
No of people: 6



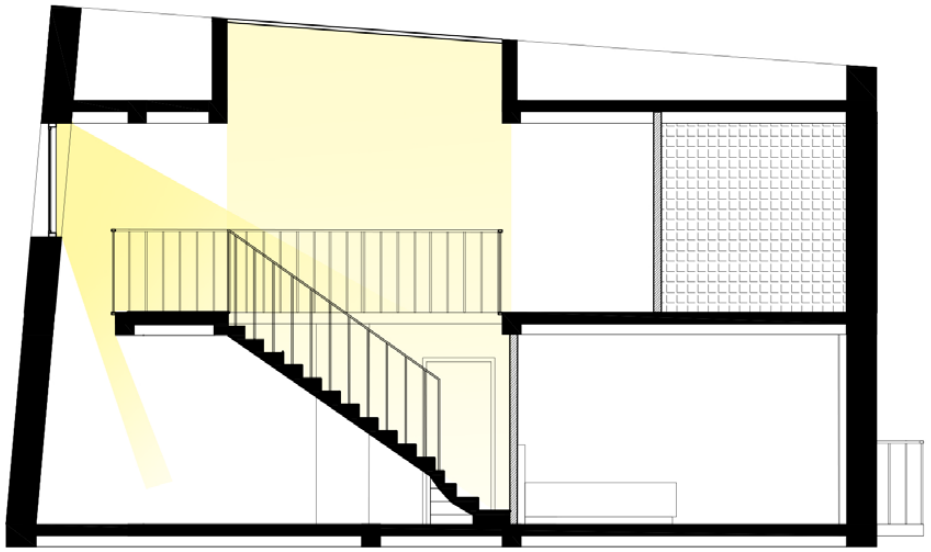
CO-HOUSING 2 / top floor plan 1:100



CO-HOUSING 2 / section 1:100



1-1

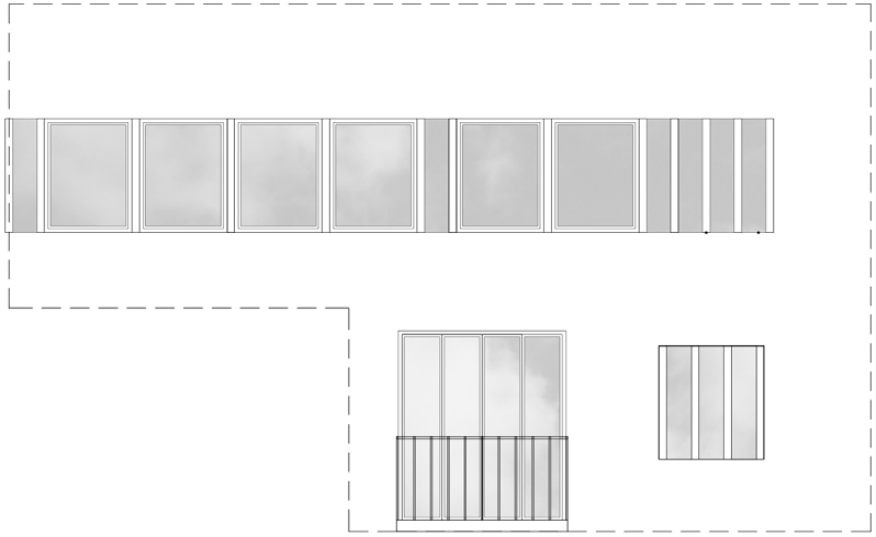


2-2

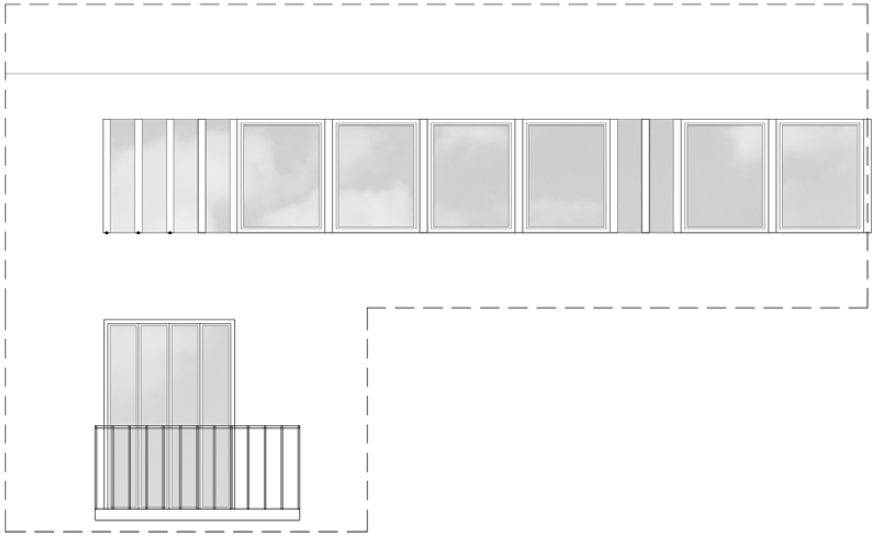
0m 2 6

1 4

CO-HOUSING 2 / facade 1:100



B

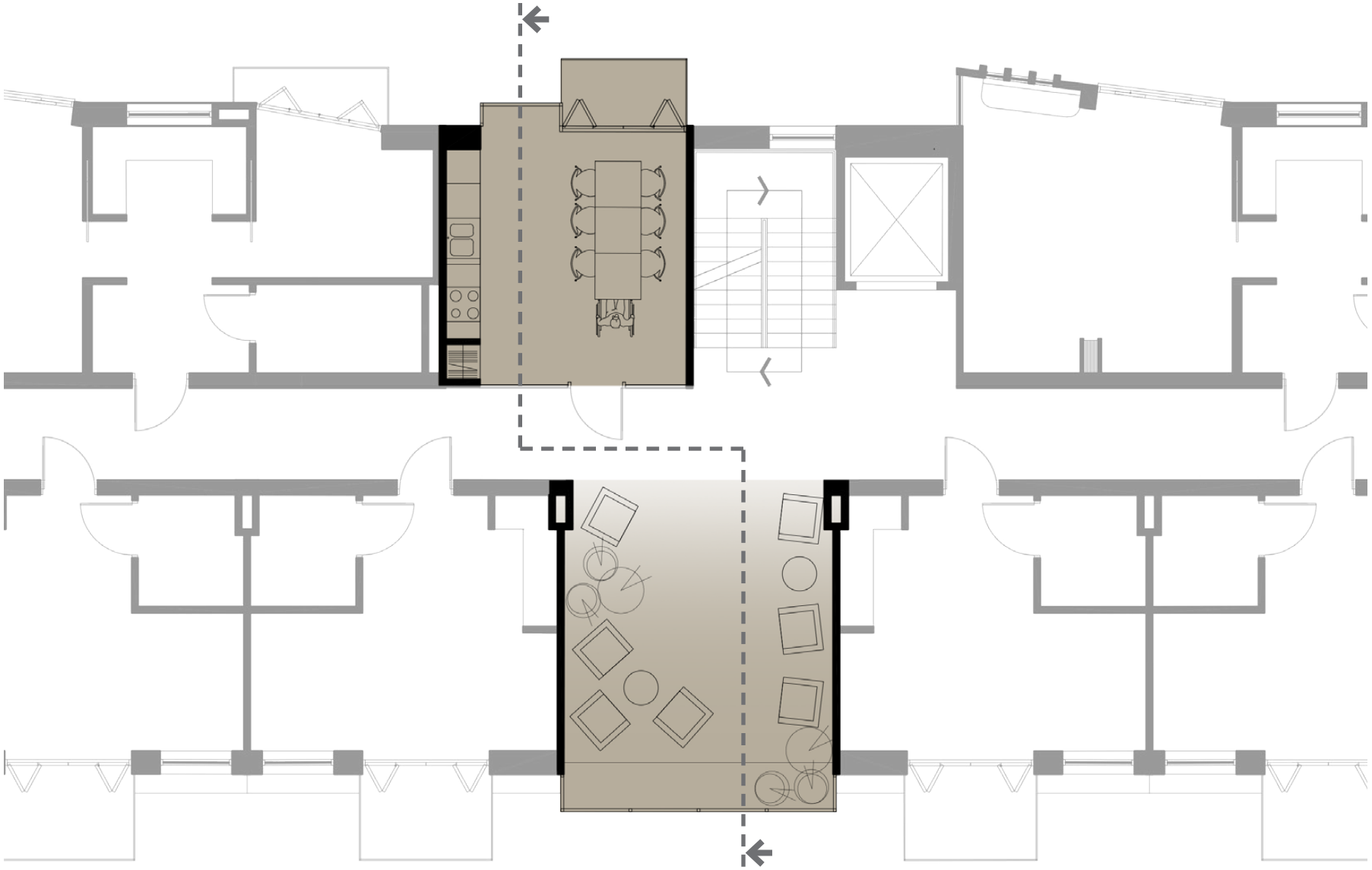


A

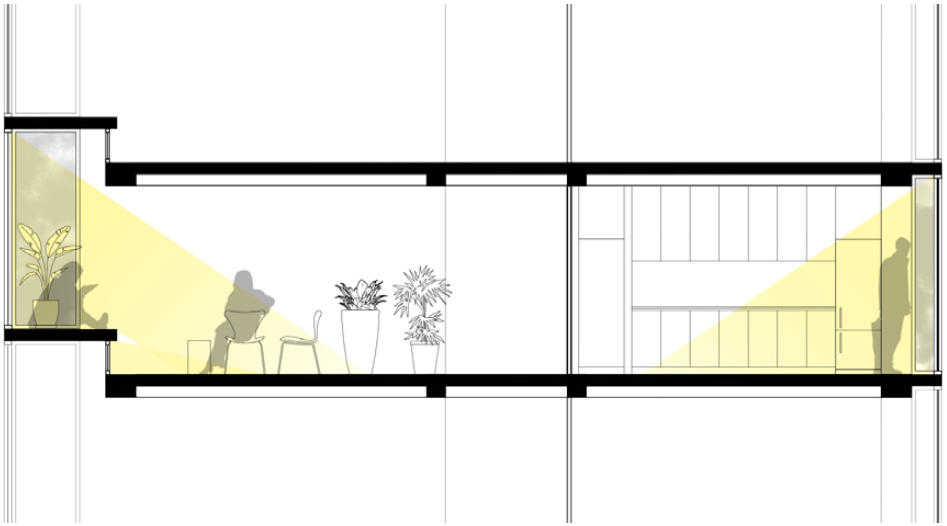
Corner Co-housing
View on common area looking towards the skylight above the stair

Middle Co-housing
View in Lounge/Dining Area looking towards the brightest spot of the space

COMMON SPACE / floor plan 1:100



COMMON SPACE / section 1:100



The section shows the idea of opening up one common room to the corridor to enliven it. Conversely, the other is always closed off but still retains the visual connection with its surrounding.

Both rooms have full height side glass panels to intensify the levels of daylight intake

Every residential floor has 2 indoor common rooms which have the same location throughout the building. These spaces function as the compensations for the limited area of the apartments. They are placed close to the communication core in order to maximize the chance of people passing by, thus motivating the dwellers to take part in activities together.

The room facing the courtyard is an open space. It is a place to sit down, read books or have a cup of morning coffee. People can go here just to enjoy their own company. The space is not pre-furnished. It is supposed to be filled up with the residents' own furniture and plants. People are encouraged to personalize the space as much as they would want to and consider this their second apartment.

The other room with view out to the city is an enclosed space which people can book to organize a large party that exceeds the capacity of their own apartments. This room comes with clothes rack, kitchenette and storage.

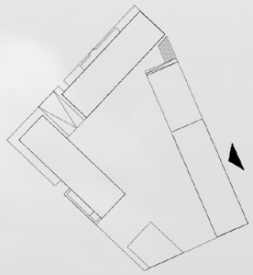
These rooms work with facades that benefit from a high level of transparency. They are also able to take in daylight from multiple directions thanks to both bearing the resemblance of a glass box protruding out from the building.

COMMON SPACE / perspective

The perspective shows an example of how the open common space could work. In this scenario, it benefits from an eclectic collection of furniture from different owners.

The dwellers also leave different kinds of plants to adorn this well-lit space.

In terms of materiality, the design strives for a cozy atmosphere from the use of wood that can additionally evoke the sense of intimacy. The reflective material of the ceiling help brighten the space more and transfer more light into the corridor.



Couple apartment

Single apartment

Common space

Co-housing 1

Basement


0m
5
15
1
10
SECTION 1:200

0m 5 15

1 10

ELEVATION 1:200

CONCLUSION

In response to the Design Questions:

What solutions can be implemented into the project to give satisfying answers to the affordability question? How would these implementations serve the target group?

The design proposal tackles the affordability question by offering small-sized apartments as the point of departure, which to some extent guarantees a relatively lower price for the target group . The enhancement to this condensed living situation is made by the exploration of daylight qualities and also, social interaction qualities through the introduction of various forms of common spaces. The booklet has presented every type of the apartment units developed from the core idea of boosting the adaptability quality of the space. This enables the possibility to fit different ways of dwelling and numbers of dwellers despite the small living space. The thesis does not touch upon the life style of the target group. However, some design elements of the floor plan do come from the author's understanding of this aspect. For instance, the idea of merging the living room and bedroom stem from the observation that the young adults almost spend very little time in their bedrooms except for the night time. Therefore, this design actually utilises the sqm of the bedroom during the whole day.
The research process of how daylight works as the feature of the apartments is also available in this book. Not only does the 5-meter-deep rooms get enlarged visually by the implementation of variations of doors and windows but they also perform better as separate functions such as living room, bedroom, dining room etc. thanks to the facade openings' being tailor-made for the specific purpose of each room. Common spaces are available on entrance level in the forms of hall, workshop, outdoor seating area which motivates mingling between the residents and the public. Going up to residential floors, these spaces become more private dedicated to the community of dwellers on each floor only. The purpose is to give the young adults the chance to go out to some other rooms that are very close and on the same level with where they live. They can merely come to the open common areas wanting to change environment, have closer contact with daylight (in the case of apartments located in North-East) and then meet their neighbours there. Even without having conversations, the visual contact helps establish a sense of belonging.

How would the proposal work in the future?

The choice of working with middle corridor is partly based on the goal of having the building functional in the long run as mentioned in the floor structure analysis. The current setting of floor structure can be blown up and replaced by other functions such as office or library.
Moreover, the adaptability quality of the apartments is also intended to best serve different demographic situations.

Areas within one volume:

Number of dwellers per level: 16
Gross Area (Level): app 437 sqm
Rentable Area (Residential) per level : 318 sqm
      Rentable Area (Residential) per level per dweller: 19,87 sqm/person
Common spaces (Level): 45,3 sqm
        Common spaces (Level) per dweller: 2.8 Sqm/person

The calculations indicates that the size of common spaces provided to dwellers on each floor is justifiable. By adding 2.8 sqm of *Common spaces (Level) per dweller* to the *Rentable Area (Residential) per level per dweller* , the area for each dweller totals 23 sqm, which is relatively a very condensed living space for a person.

Further Investigations:

The social interaction theme can have more in-depth research related to the lifestyles of young adults and the space then can be designed accordingly. The project as for now focuses on ground floors and extra common spaces on each level to enhance the sense of community. However,it is also important to examine throughout the whole volumes vertically and horizontally to identify spots that might suit the aim of motivating people perhaps just to have a small talk with each other such as the area in front of staircases and lifts. The idea of using laundry room as a meeting point between dwellers is also an interesting approach that at the same time offers an argument for using the building sqm economically and efficiently.

As for the daylight theme, working with middle corridor causes difficulties in evenly distributing daylight to the apartments on two sides of the corridor. At some locations for instance the North-East side of the volumes, the units might still benefit from daylight but actually they do not receive direct sunlight. Certainly the issue of lacking direct sunlight is not only limited to visual aspect but also related to energy efficiency as those apartments will need more heating compared to the others. One feasible solution is to use that side for single apartments. Due the minimum size, it would cost less to keep the space heated in comparison with larger apartments.

REFERENCE LIST:

Figures: *All images by the author except where noted as below*

Lundgaard & Tranberg Architects (2014). *Axonometric sketch of room module* [Online Image]. Retrieved from http://www.archdaily.com/474237/tietgen-dormitory-lundgaard-and-tranberg-architects/52f304fee8e44edab6000067-tietgen-dormitory-lundgaard-and-tranberg-architects-sketch

Jens M. Lindhe (2014). *Inside one room module* [Online Image]. Retrieved from http://www.archdaily.com/474237/tietgen-dormitory-lundgaard-and-tranberg-architects/52f3044fe8e44eb12300006b-tietgen-dormitory-lundgaard-and-tranberg-architects-photo

Jens M. Lindhe (2014). *Exterior view* [Online Image]. Retrieved from http://www.archdaily.com/474237/tietgen-dormitory-lundgaard-and-tranberg-architects/52f30493e8e44edab6000062-tietgen-dormitory-lundgaard-and-tranberg-architects-photo

Guzman Lozano (2010). *Corridor* [Online Image]. Retrieved from http://www.archdaily.com/85971/ad-classics-unite-d-habitation-le-corbusier/5037e7c828ba0d599b0003b0-ad-classics-unite-d-habitation-le-corbusier-photo

Amy Frearson (2014). *Apartment Section* [Online Image]. Retrieved from https://www.dezeen.com/2014/09/15/le-corbusier-unite-d-habitation-cite-radieuse-marseille-brutalist-architecture/

Catrina Beevor (2014). *Exterior Photo* [Online Image]. Retrieved from https://www.dezeen.com/2014/09/15/le-corbusier-unite-d-habitation-cite-radieuse-marseille-brutalist-architecture/

VTN Architects (2012). *Site plan* [Online Image]. Retrieved from http://www.archdaily.com/199755/stacking-green-vo-trong-nghia/5004e37a28ba0d4e8d000bcf-stacking-green-vo-trong-nghia-site-plan

Hiroyuki Oki (2012). *Skylight above dining area* [Online Image]. Retrieved from http://www.archdaily.com/199755/stacking-green-vo-trong-nghia/5004e34128ba0d4e8d000bbf-stacking-green-vo-trong-nghia-photo

Hiroyuki Oki (2012). *Skylight in bathroom* [Online Image]. Retrieved from http://www.archdaily.com/199755/stacking-green-vo-trong-nghia/5004e34b28ba0d4e8d000bc1-stacking-green-vo-trong-nghia-photo

VTN Architects (2012). *Sectional Diagram* [Online Image]. Retrieved from http://www.archdaily.com/199755/stacking-green-vo-trong-nghia/5004e37728ba0d4e8d000bce-stacking-green-vo-trong-nghia-section

Pov Steve (2012). *The corridor* [Online Image]. Retrieved from http://www.plataformaarquitectura.cl/cl/02-123630/clasicos-de-arquitectura-casa-gilardi-luis-barragan/pov-steve-7

Zuzanna Dudzicka (2014). *Diffused light through the louvers* [Online Image]. Retrieved from http://atlasofinteriors.polimi-cooperation.org/2014/03/19/luis-barragan-casa-gilardi-mexico-1976/

Zuzanna Dudzicka (2014). *Physical Model of the house* [Online Image]. Retrieved from http://atlasofinteriors.polimi-cooperation.org/2014/03/19/luis-barragan-casa-gilardi-mexico-1976/

Fernando Guerra (2016). *The sequential character of daylight in the building* [Online Image]. Retrieved from http://www.archdaily.com/798360/peter-zumthors-therme-vals-through-the-lens-of-fernando-guerra/580fb450e58ecefd67000091-peter-zumthors-therme-vals-through-the-lens-of-fernando-guerra-photo

Fernando Guerra (2016). *Light and Darkness* [Online Image]. Retrieved from http://www.archdaily.com/798360/peter-zumthors-therme-vals-through-the-lens-of-fernando-guerra/580fafdce58ecefd67000082-peter-zumthors-therme-vals-through-the-lens-of-fernando-guerra-photo

Google Earth (2017). *Urban Situation* [Online Image]. Retrieved from https://www.google.se/maps/@57.7065806,11.9294398,2067m/data=!3m1!1e3

Texts:

C. P. Zilliacus. (2013). *A million new housing units: the limit of good intentions*. Retrieved from http://www.newgeography.com/content/003811-a-million-new-housing-units-the-limits-good-intentions

Business Insider Nordic.(2016). *New rules caused the sharpest decline in Swedish housing market since the financial crisis*. Retrieved from http://nordic.businessinsider.com/new-rules-caused-the-sharpest-decline-in-swedish-housing-market-since-the-financial-crisis-2016-6

Chalmers. (2017). *Dwellings for young adults*. Retrieved from http://www.chalmers.se/en/departments/arch/education/Master's-Thesis/Thesis%20Topic%20Suggestions/Internal/ Pages/Dwellings-for-young-adults.aspx