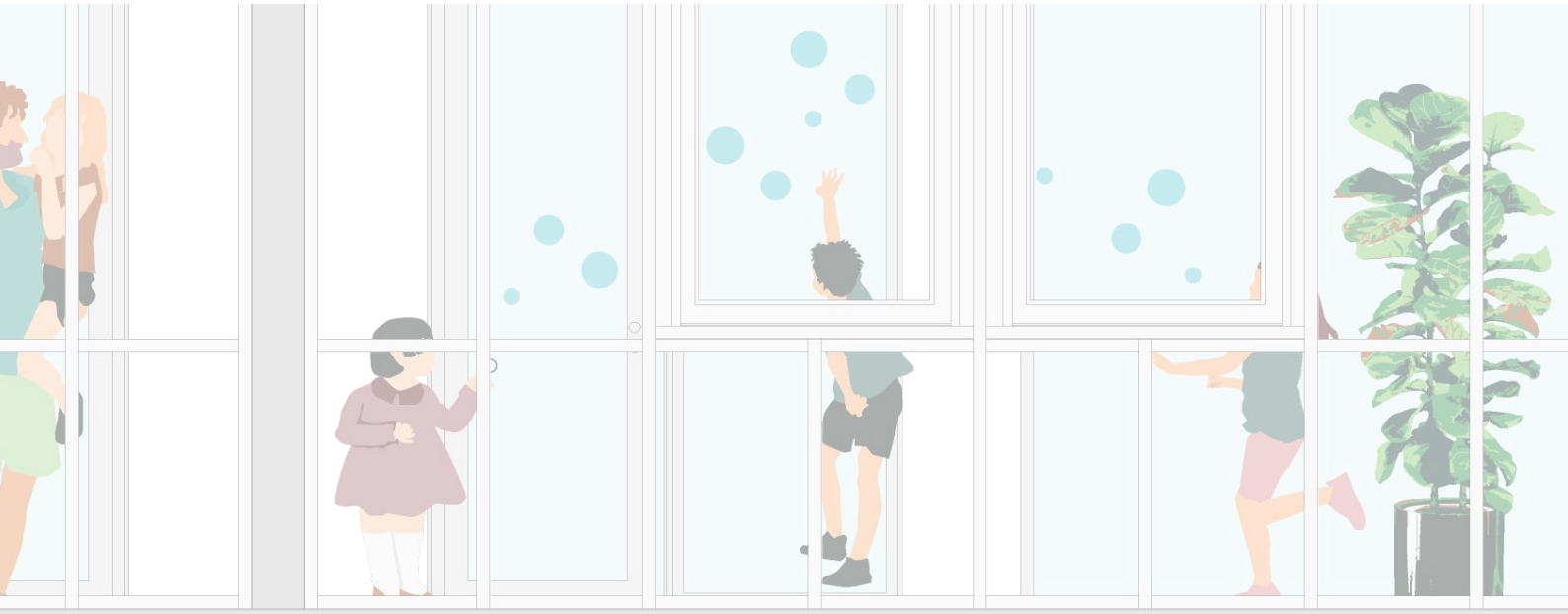

# Urban Residence Response to Covid-19

## Apartment building redesign to decrease secondary transmission risk and maintain life satisfaction


**Yunbai Shi**
Architecture And Urban Design

**Xue Zeng**
Architecture And Planning Beyond Sustainability

Chalmers School of Architecture
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Examiner: Göran Lindahl
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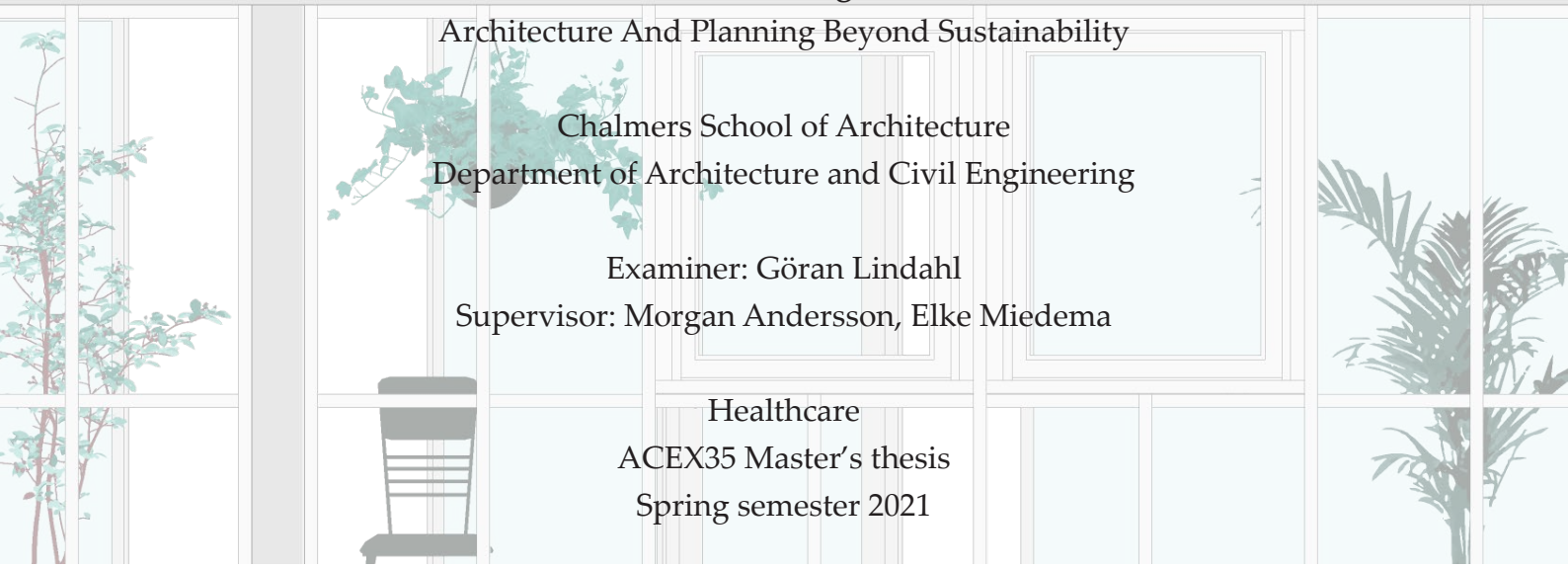


Healthcare
ACEX35 Master's thesis
Spring semester 2021


CHALMERS
UNIVERSITY OF TECHNOLOGY

Spring 2021

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## ABSTRACT

During the pandemic of Covid-19, the residential building is a critical part of the quarantine life, where people stay in for the longest time. The frequent close contact within households and sharing common space in residence leads to concerns about disease transmission in residential buildings. Meanwhile, the function of housing as a building type has been profoundly changed by the current state of remote working and studying. Furthermore, quarantine life with limited outdoor activities also brings the problem of social isolation and mental stress. The built environment of a residence can strongly impact people's daily life and health conditions. Such leads to how people could be satisfied with their domestic life while avoiding secondary transmission in residence.

This thesis investigates the infectious disease and remote working situation impact which spaces and behaviors the most in both apartments and apartment buildings. The project locates in Gothenburg's context. The research includes a literature study, a case study on spatial strategies, and questionnaires focusing on residents' experience. The research specifies districts with the highest infected cases reported and targets the apartment building within the most populated area as the subject.

The study leads to a redesign of existing living spaces, aiming to decrease the risk of secondary transmission of COVID-19 in the apartment building and maintain the dwellers' life quality in pandemic outbreaks and remote working conditions. The design responds to the COVID-19 restrictions on the building scale and creates a safer common area in residence. When, on an apartment unit scale, it answers how the households can live with multiple people working at home or with an infected person in the same apartment. The design is a resilient and adaptive solution for residence coping with the pandemic.

Suppose the concluding design approach visualizes how it may reduce the spread of the virus in Swedish households. This may inform future Swedish building regulations and industry standards. This knowledge can be valuable for further research on pandemic-respond architectural design.

Keywords: Covid-19, Secondary transmission, Apartment building, Redesign, Remote working

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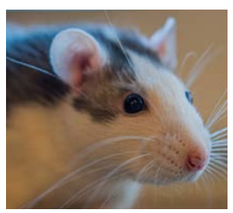
Soya



Tofu

# CONTENTS





# INTRODUCTION



## BACKGROUND

At the beginning of the year 2021, Covid-19 has caused over 98.2 million reported cases and over 2.1 million deaths globally since the pandemic start. (“Weekly epidemiological update - 27 January 2021”, 2020) Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a novel coronavirus that contributes to the coronavirus disease pandemic in 2019 (Covid-19). It began in December 2019 with a few unknown pneumonia cases in Wuhan, Hubei Province, China, and then rapidly spread to several other countries. Then the World Health Organization (WHO) announced it as a pandemic on March 11, 2020. (“Timeline: WHO’s COVID-19 response”, 2020)

The most common symptoms of Covid-19 are fever, dry cough, and fatigue. Severe symptoms include shortness of breath, loss of appetite, confusion, persistent pain or pressure of chest, and high temperature (above 38°C). (“Question and answers hub”, 2020) Covid-19 spreads quickly from person to person. It spreads by close contact, airborne transmission, and contact with contaminated surfaces. The number of less infectious droplets and particles produced by COVID-19 patients becomes concentrated in enclosed spaces with inadequate ventilation and sufficient to transmit the virus to others. People can become infected with Covid-19 by being in the same area with a Covid-19-infected person at the same time or by entering the same space shortly after the patient leaves. (“COVID-19 and Your Health”, 2020)

There is no effective cure for Covid-19 at present, and prophylaxis is an effective strategy to stop the virus’s mass transmission at this stage. Preventive measures include:

- Keeping distance
- Avoid crowded indoor spaces
- Home isolation
- Wash hands
- Cover mouth and nose with a mask
- Cleaning and disinfection

## AIMS AND PURPOSES

This thesis is written by Yunbai Shi and Xue Zeng. Yunbai got her bachelor's degree in architecture in 2019 and continued pursuing graduate studies in architecture and urban design at Chalmers University of Technology. Xue also studied a bachelor of architecture in China and is now studying Architecture and Urban Planning Beyond Sustainability at Chalmers. Both the authors experienced the outbreak of SARS in 2004. Now the Covid-19 situation brought back the memories of disease, lockdown, and home isolation and leaves us to envision a post-pandemic future in which humanity may need to coexist with epidemics from now and then.

Furthermore, living in Gothenburg—where the risk of infection is very high, the authors are concerned about the development of the disease. Many people have ambition to follow the preventive measures, but since they have been urged by the government to stay more at home, where new needs must take place—office, school, gym—limitations in the home have contributed to frustration and anger over the life situation, which made compliance with the preventive measures more difficult; people need to get out and feel distance from the home's limitations. When more activities take place in the home and people spend more time there, the household becomes extra vulnerable if someone get sick in it.

At the beginning of 2021, Sweden remains in an abnormal state. The spread of the virus that causes Covid-19 disease remains high, and care remains intense. Therefore, at a press conference on January 21, the government announced a further expansion of the national restrictions. ("Förlängningar av nationella restriktioner", 2021) Restrictions include increasing the proportion of people working from home and combining distance learning with local teaching, keeping outdoor activities at a distance, and eliminating unnecessary public events in municipalities. The research focuses on the current pandemic development by exploring and reflecting on the pandemic's current prevention and treatment.

This thesis examines architecture's ability to facilitate the management of an ongoing pandemic through functional and spatial rearrangements. The authors wish to utilize their architecture expertise, finding out how architectural design can respond to their concern.

The thesis focuses on the performance of apartment buildings during the pandemic. Governments have adopted home quarantine guidelines to curb the spread of the disease in the current pandemic situation. Moreover, since a large percentage of Covid-19 positive cases are of mild symptoms (Wu & McGoogan, 2020), many patients are required to be isolated at home rather than hospitalized. Studies on infectious diseases indicate that household transmission is an essential route of pathogen spread, which is riskier than community transmission because of the frequent close contact among the members living within the same unit. (Goeyvaerts et al., 2018) Research on SARS-CoV-2—the virus that causes Covid-19 disease—also shows a high risk of household transmission(Li et al., 2020; Wang et al., 2020; Dutta et al., 2020). Therefore, how to avoid infections in households has become an issue of concern.

As a typical residential building type in the urban context, apartments usually have a higher occupant density than single living houses (Hopkin et al., 2019), increasing the contagious disease's secondary transmission risk. In addition to being in one apartment, shared spaces in apartment buildings also involve infectious risks. Such places, including the entrance, corridor, elevator, laundry room, and others, are the ones that the dwellers inevitably go through while moving in the residential building. The direct and indirect contacts among neighbours in the shared space may lead to a rapid spread of the disease in the entire building.

Furthermore, social distancing and quarantine requirements and the situation of remote work and study extend people's duration at home. It leads to less accessibility to outdoor space, which can have a negative impact on both physical and mental health. Meanwhile, it also challenges the traditional recognition of residential buildings and unveils new possibilities.

The pandemic and its negative effects may continue for a period of time rather than a temporary situation, and similar cases will likely reoccur in the future. This study takes the current pandemic prevention as context and provides support for similar predicaments that may occur in the future.

The question in this thesis is: How to avoid further transmission of virus in residence and still keep the dwellers' satisfaction to life in their work/study from home period?

## DELIMITATION

The fundamental research includes three parts. The first part is site analyses. The study's context will focus on the Västra Götaland region, and the research group will collect the region's general statistics of household and population. The research area chosen will be the most exposed site by Covid-19. Based on the most exposed area, the research will explore the most common type of household.

After comparing the general household and population statistics, the research group will decide the target house type. The second part is the interview and the case study. The interview will investigate which spaces and circumstances in the building are the most critical for spreading the virus when having one household member affected by Covid-19 and let the residents share their experience about the study/work at home. The case study will show different design solutions and projects for preventing virus spread.

In the end, critically analyze these parts and redesign the target house type to help residents keep life quality during the study/work at home and avoid further virus spreading. The further discussion should set the conclusions in a larger, societal context, reflecting on the implication of the design in an urban environment.

**Figure 1**
*Stuck at Home (Illustration by Xue Zeng)*





## METHODS

This thesis has used a case study to see how other designers have tackled the challenge with Covid-19, questionnaires to make people's experiences and wishes during the pandemic visible and a quantitative research to draw a picture of the general household size and type in Gothenburg.

### Case Study

The case study is a research strategy to explore events and provide research evidence by multiple resource investigation. The case study can combine the theory with examples. (Martin & Hanington, 2012) The case study shows different design solutions on treatment of the pandemic. We will present them and identify the design strategies they have used, and then compare our selected building with that strategies to identify weaknesses and strengths in the existing layout. These strategies become a guidance in the design.

### Questionnaires

Questionnaires are survey tools to collect written self-report information and reflections from individuals (Martin & Hanington, 2012). Due to the social distancing situation, we use online questionnaires to collect general dwellers' information without physical contact. The participants are people who 1) live in apartment buildings and 2) work or study from home due to the Covid-19 pandemic. The survey contents include the participants' current living conditions and perceptions of how the pandemic has changed their domestic lives. The responses from the questionnaires will become a guidance on what to focus on in the design stage.

### Quantitative Research

Quantitative research focuses on gathering numerical data and generalizing it across different populations or explaining a particular phenomenon(Muijs, 2011). The quantitative research helped us identify common house types, house sizes, and household structures in the Gothenburg area during the data collection phase. The GIS tools identify densely populated regions in the population distribution data and determine site selection. Common house sizes and types will be used as a reference in later studies to select site-specific dwelling types for combination with common family structures.

# THEORY

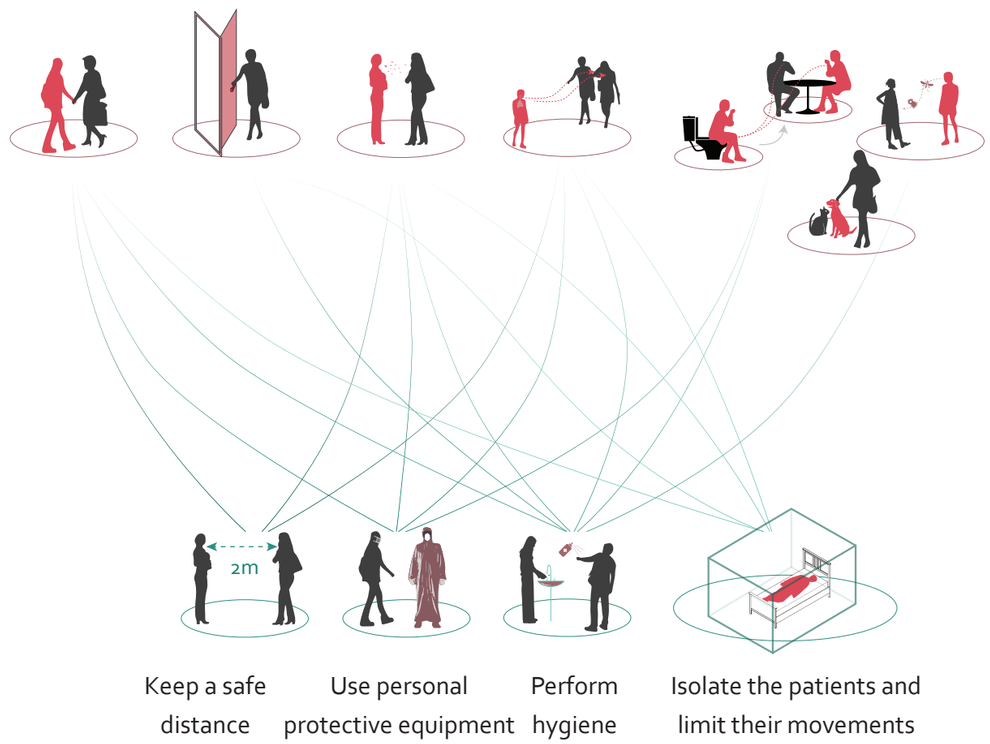




## DISEASE TRANSMISSION AND PRECAUTION

The six different ways of disease transmission are transmission by direct contact, indirect contact, droplet, airborne, fecal-oral, and vector-borne ("FAQ: Methods of Disease Transmission", 2021). The precautions that people can conduct in normal life include keeping a safe distance, using personal protective equipment, performing hygiene, and isolating the patients ("Transmission-Based Precautions", 2016; "COVID-19 and Your Health", 2021). Studies show that the possible COVID-19 transmission modes include direct, indirect, or close contact with the infected people via droplets, airborne or fomite contaminated by droplets("Transmission of SARS-CoV-2: implications for infection prevention precautions", 2021). Therefore, the precautions shown in figure 2 can be effective for reducing transmission risk.

**Figure 2**
*Infections Transmission Types and Precautions.*



# CASE STUDY

This part is a description and summarize of the relevant design projects or research cases. The evaluation for each project and case will reflect its proposal and design solutions and then discuss what kind of design solution or strategies can fit our research context.

The selection of cases follows the directions below,

- All of the cases come from housing projects. During the pandemic period, the residence must provide space and facilities for people with mild symptoms while undertaking living functions and activities. Households lack solutions to control the spread of disease compared to hospitals regarding space arrangement and facilities. These cases focus on improving the households' ability to prevent the virus from spreading.
- Cases are meeting the daily needs of healthy people during the pandemic. Residents try to follow the restriction and move most activities from the outdoor, workplace, and entertainment places to household, which means homes need to contain new functions and rearrange the space. The selected cases attempted to re-divide existing spaces according to new requirements or to create new spaces.
- Impact on future residential life. The pandemic period is temporary, but it has changed people's habits and ways of living. In the short term, these cases help people relieve the inconvenience and stress of having a limited range of activities due to the pandemic. In future life planning, these cases consider increasing the resilience of the living environment to unpredictable risks and enriching life solutions.





## A. Healthy native housing from Mass

This project is a long-term housing development plan for the Indian local community(MASS Design Group, 2021). Mass wanted to set up a phased design approach to help local communities address the public health risks of the Covid-19 pandemic. In the future, it could progressively help local communities improve their housing deficit and the quality of their housing.

There are three steps in their development phases:

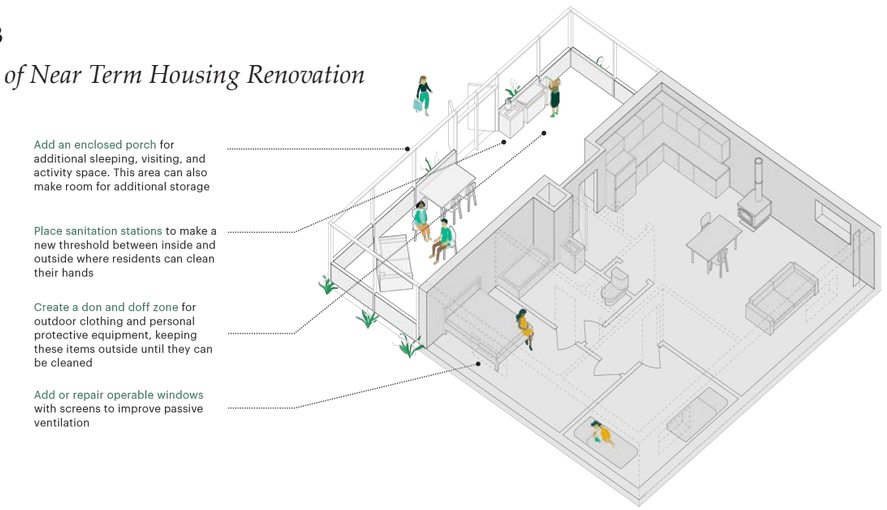
- Design and adapt the layout and facilities of existing housing to the current conditions of the pandemic.
- Develop and redesign the existing facilities to improve the livability during the pandemic. The development will also influence the future residential health requirements of the community.
- Use the current situation as a starting point, the community began to build sustainable planning structures and stable economic support to help the community recover and develop.

The design solution of Mass:

- Keep a safe place between the patient and other household members.
- Create zones to isolate the virus from the outdoors to the indoors.
- Provide a wide range of flexible housing models, and improve infrastructure to make communities more resilient more robust against unpredictable risks.

**Figure 3**

*Proposal of Near Term Housing Renovation*



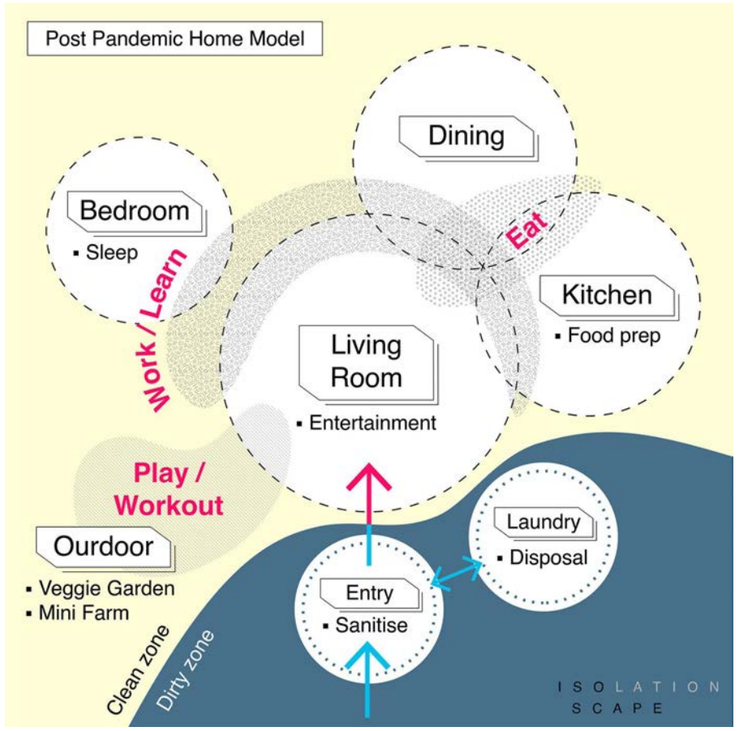

*Note:* Proposal of the near term housing renovation diagram. From *Healthy Housing for Native Communities,* by MASS Design Group, 2021. (https://massdesigngroup.org/sites/default/files/multiple-file/2021-01/MASS%20Design%20Group_Healthy%20Native%20Housing.pdf),. © MASS Design Group (2020).

## B. ISOspace exploration for the home new arrangement

Ng (2020) made a redesign for her home to fit whole family members' activity requirement while working/studying at home during the pandemic.
Her design solution focuses on the how the spaces of the home become definite functions to distinguish quiet and loud zones and avoid taking viruses from outside to the home:

- Use the existing quiet space to arrange a place to work and study at home.
- The open space of home becomes function-multiple for loud-activity
- The storage place becomes a quieter and more soundproof meeting place.
- Distinguish the dirty zome and the clean zone.

**Figure 4**
*Post Pandemic Home Model*



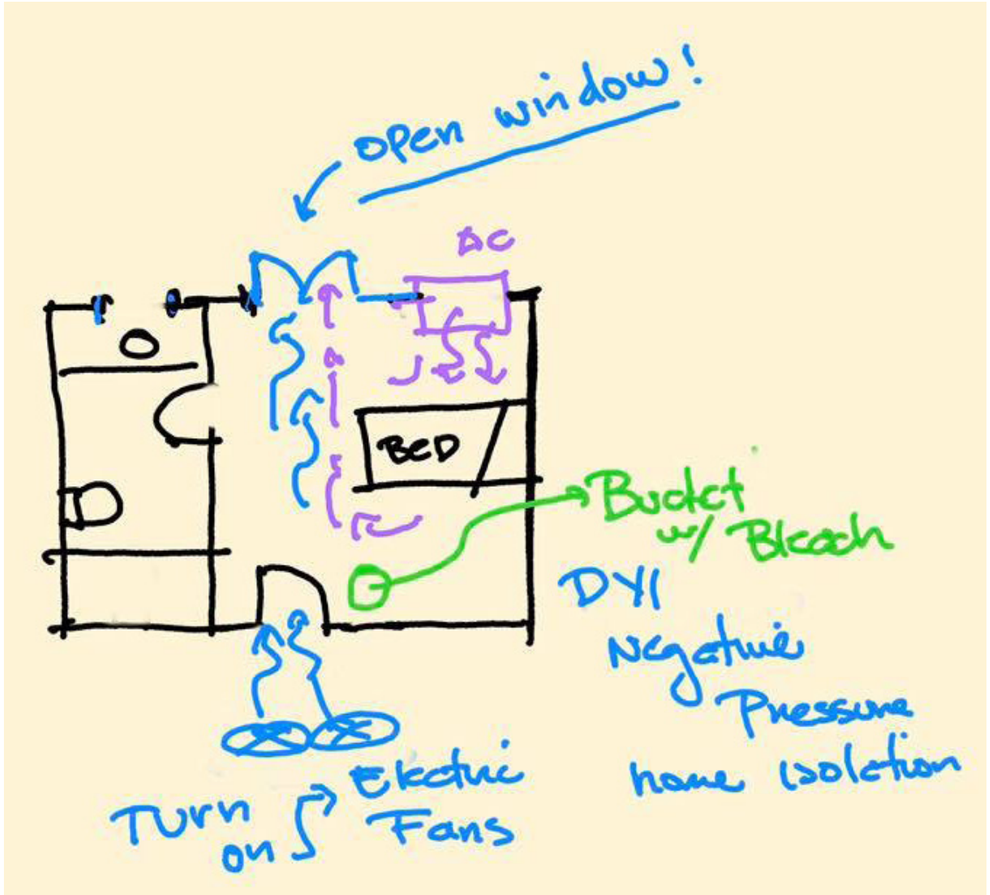

*Note:* Post Pandemic Home Model Diagram. From *ISOscape: Building a resilient home,* by Jaslyn NG, 2020. (https://www.linkedin.com/pulse/isoscape-building-resilient-home-jaslyn-ng/?trackingId=KXJl82GmrqIqTs5Mcm74LA%3D%3D),. © Jaslyn NG (2020).



## C. DIY home isolation room for Covid-19

When people have mild symptoms, they need to have home isolation to wait for healing. Lichauco (2020) shared a home isolation room sketch that used the ventilation techniques from medical institutions: negative room pressure.
The virus can stay in the air for a long while; the patient's room needs to use negative pressure to prevent the virus from spreading. The isolation room design lets the indoor air leave from the window and not flow to other clean rooms.

**Figure 5**
*DIY Negative Pressure Isolation room*




*Note:* DIY Negative Pressure Isolation room Diagram. From *DIY HOME ISOLATION ROOM,* by Dan Lichauco, 2020. (https://www.facebook.com/dan.lichauco/posts/10156641533297237),. © Dan Lichauco (2020).

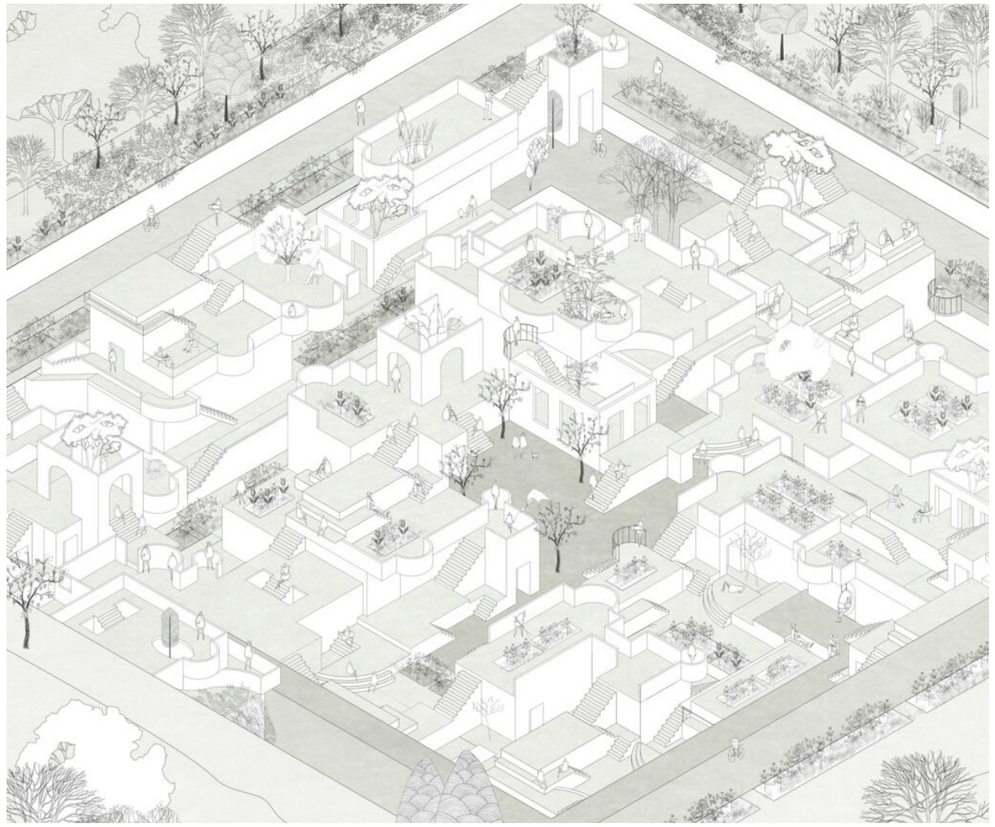
## D. Balcony as the New Homescape

The pandemic limits people's activity, and the balcony provides a more safe solution to people's social c ommunity. (Shaban et al., 2020) These designers present the idea about the balcony extension function in the future:

- The balcony can become a new social place; people can use the balcony to make new community connections.
- The balcony can be an extension area on the building faced, connecting balconies can provide more activity area.
- It is a new opportunity to create a city farm on the balconies, and the community can use this new farmland to reach self-sufficiency.

**Figure 6**

*Communal Balcony to Avoid Social Isolation*



*Note:* Image of the Communal Balcony Design. From *Social Self Isolation*, by Raya Shaban, Yasmina Abou Joudeh & Mateo Llosa, 2020. (http://www.koozarch.com/abstractions/social-self-isolation/),. © Raya Shaban, Yasmina Abou Joudeh & Mateo Llosa (2020).



## E. New Installation at the Hallway

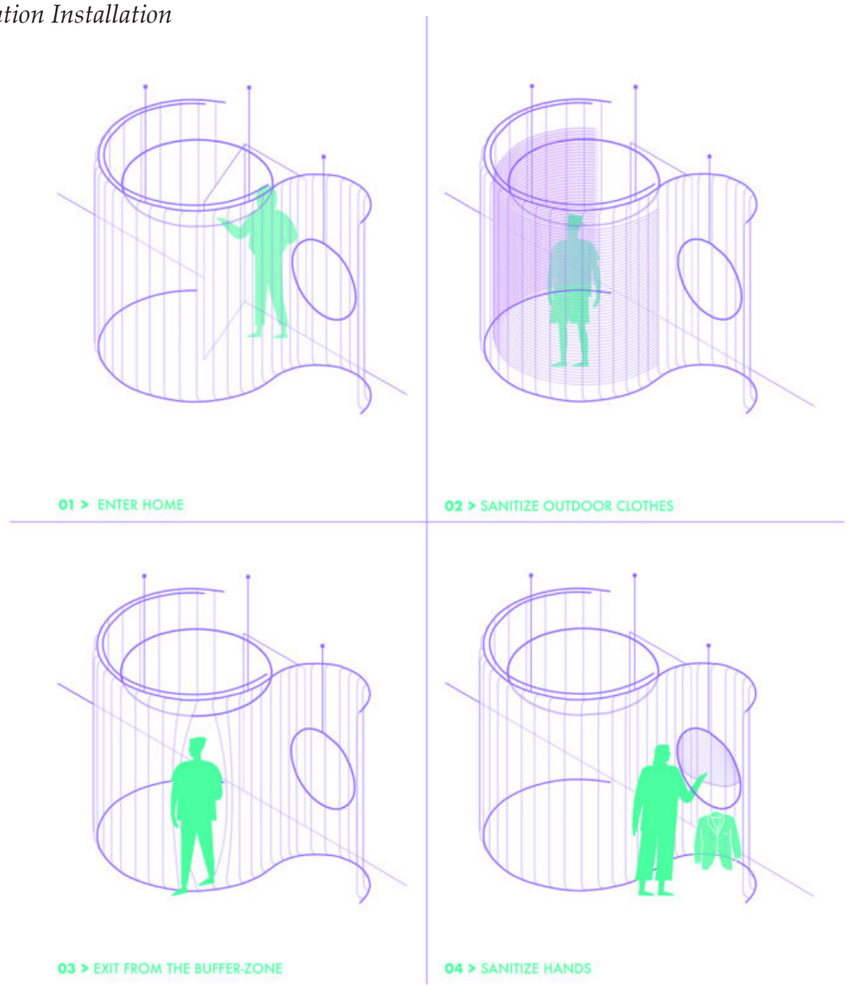
Considering that viruses stay on the surface of objects for some time, disinfection before entering indoor spaces becomes a new step during pandemics.

The design in-SOAP(S P A Z I O - X, 2020) makes furniture rearrange the hallway space for residents to avoid directly putting their stuff from the outdoor area. Their design solution is:

- A light structure at the threshold allows for sanitation.
- A led light informs users of the correct amount of time necessary for disinfection.
- A PVC transparent membrane is a light structure hanging on the ceiling to separate the indoor and outdoor areas.

**Figure 7**

*Sanitation Installation*




*Note:* Axometric Diagram of the Sanitation Installation. From *in-SOAP*, by S P A Z I O - X, 2020. (https://spazio-x.com/inSOAP),. © S P A Z I O - X (2020).



Urban Residence Response to COVID-19

## F. The Redesign for the Hallway

Another health group (The HPA Saúde Group, 2020) has a similar concept to separate homes to potentially contaminated and decontaminated areas.

- The outdoor clothes and shoes have a place to sit beside the entrance.
- Create the hand wash area that can let the residents clean their hands before going to the indoor area.

**Figure 8**

*New Arrangement of the Porch*


*Note:* New arrangement of the Porch. From *Avoid taking the virus home!*, by The HPA Saúde Group, 2020. (https://www.grupohpa.com/en/general-recommendations-covid-19/avoid-taking-the-virus-home/),. © The HPA Saúde Group (2020).

## Conclusion of Case Study

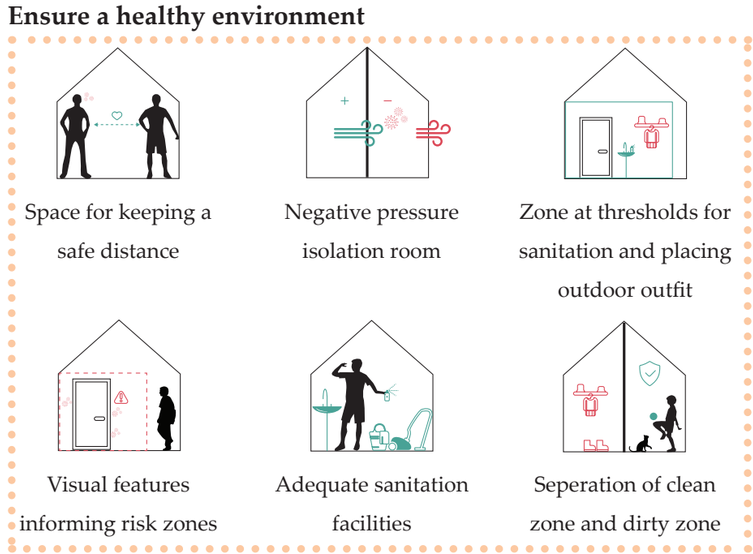
The reference projects listed above have varied focuses. While reimagining architecture in the pandemic context, the diverse proposals are responses to the transforming needs of architecture. The mentioned design strategies fall into the following four aspects:

- Ensure a healthy environment, which includes strategies that decreases the risk of virus spreading and secondary transmission.
- Maintain life quality while isolating at home and working remotely, which means arranging the new functions into the existing home space.
- Keep social connection, providing ways of meeting other people in a low contamination condition.
- Plan for the long term, including the strategies that consider a resilient future.



**Figure 9**

*Conclusion of Case Study*



# QUESTIONNAIRE

The questionnaire provides several questions aimed at people who 1) live in apartment buildings and 2) work or study from home due to the Covid-19 pandemic. This research will use these answers into how dwelling can function more easily for homework and studies and how dwelling can be adapted to reduce the spread of viral diseases in the future. The data is collected from 20 anonymous participants in February 2021.

## Size of the residence and the number of the household member

The classification of the living area's size is based on the statistics provided by Statistics Sweden. The research size includes from under 31sqm to over 100sqm. The charts shows the distribution of respondent numbers on apartment sizes and household sizes, and the number of children in the household.

**Figure 10**

*Respondents' housing situation*


Author's illustration from the questionnaire responds in the appendix.

**Figure 11**

*Number of children*


Author's illustration from the questionnaire responds in the appendix.



## Residence comfort

**Physical activity:** To avoid infection and work/study at home, respondents tend to decrease the gym training times and turn to outdoor walking or home training. Some respondents used the commuting time for exercise; after working at home, they switch to indoor exercises during lunchtime.

**Social activity:** The indoor activities mostly move to the outdoor. And respondents now only meet the closest friends and families. The physical presence switches to online meetings.

**Mental health:** Some respondents feel stressed while working/studying at home. Working/ studying at home blur the boundary between the home and the office; respondents unconcernedly work/ study extra time. The respondents get lower efficiency because of the limited working equipment types and lacking communication with colleagues.

Some of the respondents choose to divide workspace and living space in their home to release the stress. Other respondents try to add more outdoor activity or workouts between the working period.

**Perception of dwelling:** The home becomes the most respondents' main active area; this situation makes them feel cramped at home. The principal reasons include the need for additional workspace, the storage place for extra equipment, and the long hours of home

**Figure 12**

*Respondent's personal space*

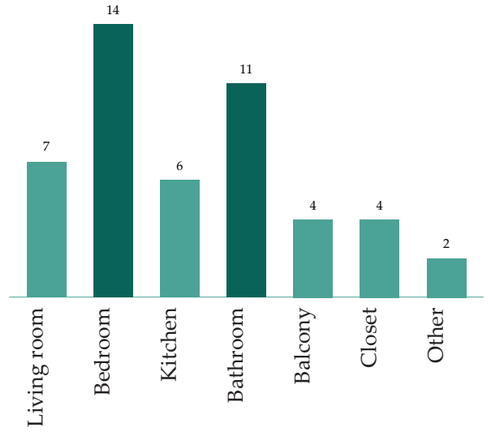



**Figure 13**

*Homeplace for study/work at home*


Author's illustration from the questionnaire responds in the appendix.

living and limited indoor activities.

**Private space:** For some respondents, it is hard to have a private place to work without disturbance, especially when sharing the apartment with their partner or roommate. The current situation drives them to utilize existing living space to work and study. The respondents who hope to redesign their dwelling freely want to create an individual workplace, the multiple activities area, and the open space with a good view, for example, a balcony.

### Function Transformation in the Dwelling (Renovation, furniture, or equipment)

**Purchase and adjust the equipment:** Some respondents choose to renovate the working area and purchase new equipment to improve the homeworking efficiency. The layout of the room made new rearrangement to make more space for the new furniture.

### Common areas

**Property owners' solution for the pandemic:** A few of respondents' property owners provide solutions to avoid pandemic spreading; some clean the stairwell and public corridors.

**The use of common areas:** Respondents felt worried that the resident building's common spaces can spread the virus. The entrance hall, elevator, and stairwell are hard to avoid congestion. The laundry room's contact surface is also considered as risky.

### Living in Household Exposed to COVID-19 (Optional)

**Respondets' experience:** Those who had Covid-19 in the household state that they handled waste as usual, ie. no special treatment for the infected person. None of the respondents give specific details in how they avoided further spread of the virus in the household more than saying they followed society's restrictions and guidelines.

### Conclusion of Questionnaire

Respondents' answers indicate that they are adjusting their activity schedules in compliance with the restrictions. They also rearrange their home space, hoping that the existing living space will include more new functions that were not part of the home before the pandemic, including an office or preschool. However, as previously feared, respondents could not reorganize existing spaces in their homes to accommodate all family members in a short period due to the sudden restriction requirements. Also, because most family members' activities take place at home, respondents have difficulty adapting to changes in the size and function of their personal space. Thus, they are tend to become frustrated and even wish to move into a new house.

The questionnaire shows respondents' experience while work/study at home. The feedbacks reflect problems of following aspects, shown in figure 14.

- The response indicates the residents have concerns about both physical and mental health issues. The concerns include the risk of getting infected, the fear of the infectious disease, and mental stress.
- The residents face a new situation where more activities happen in the home space, and the existing housing is not ready to arrange all these activities well.
- There is a conflict between the social distancing restriction and the people's desire to meet others.



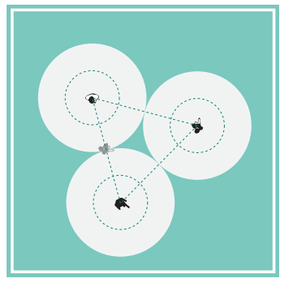
**Figure 14**

*Feedback from questionnaire*

# CONCLUSION OF THEORY

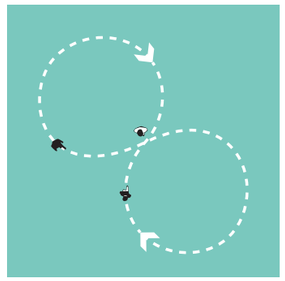
How the aspects of avoiding infection are performed mentioned in the disease transmission chapter and case studies are shown in Figure 15. These strategies are spatial treatments of the the infection, divided into eight steps(“COVID-19 and Your Health”, 2021; MASS Design Group, 2021; Lichauco, 2020; S P A Z I O - X, 2020; The HPA Saúde Group, 2020). These strategies are about decreasing unnecessary meeting of crowds in the pandemic period, separating healthy from sick people, then offering a good facility to speed up the recovery process. The circulation of people is rearranged spatially to establish distance and thus avoid congestion. Finally, a facility needs to be offered for healthy people to reach and help the patient where cleaning of dirty surfaces is easy to maintain and hygienic.

**Figure 15**
*Architectural Strategies*



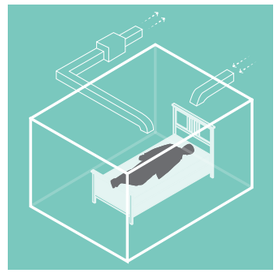
**Space**

Social distancing protocol (“COVID-19 and Your Health”, 2021) requires to provide enough space in common area for distancing and free movement.



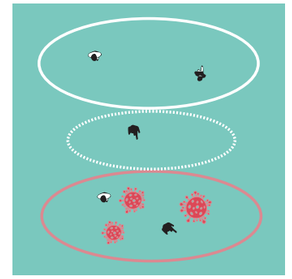
**Flow**

To avoid crowds(“COVID-19 and Your Health”, 2021), create alternative flows to reduce unnecessary meeting, and seperate the infected from others.



**Isolation Room**

Provide isolation room for the infected(MASS Design Group, 2021; Lichauco, 2020), and use negative pressure system when necessary (Lichauco, 2020).



**Zones**

- Divide clean zone and dirty zone (MASS Design Group, 2021).
- Create anteroom for sanitation(MASS Design Group, 2021; S P A Z I O - X, 2020; The HPA Saúde Group, 2020).

**Ventilation**

Ensure good ventilation at the patient’s area and high meeting frequence space (MASS Design Group, 2021).

**Surface**

The concerns about surfaces(“COVID-19 and Your Health”, 2021) requires to use seamless, durable, easy-to-clean material, and antimicrobial material when necessary.

**Window**

- Provide view to the outside, especially in the patient’s room.
- Place high-frequency used furniture near window (MASS Design Group, 2021).

**Supply**

- Provide enough sanitation facilities in common area.
- Include more space for sanitation and storage in the residence(MASS Design Group, 2021; S P A Z I O - X, 2020; The HPA Saúde Group, 2020).

# CONTEXT





## SITE

Three steps lead to the site selection: 1) Specify the district with the highest reported infected cases in Gothenburg. 2) Find the most populated residence in the selected district. 3) Delineate the common types and size ranges of housing in Gothenburg.

### Site Analysis Phases

The site analysis includes two phases. The first phase is a comparation of the growth rates of Covid-19 cases in each Gothenburg district, and select the district with the highest reported cases. From the most exposed district, GIS data is used to find the most populated area and residential building within it.

Next phase is to collect statistics of dwelling type, dwelling size, and household constellations in Gothenburg to get a general quantitative knowledge of the households. Such data draws a picture of the range of the most common dwelling sizes and household sizes in Gothenburg.

These two phases will target an apartment building that has a typical household size in a high density area. The study will further include the dwelling configuration, and local context, providing solid evidence for the later renovation of the apartment building.

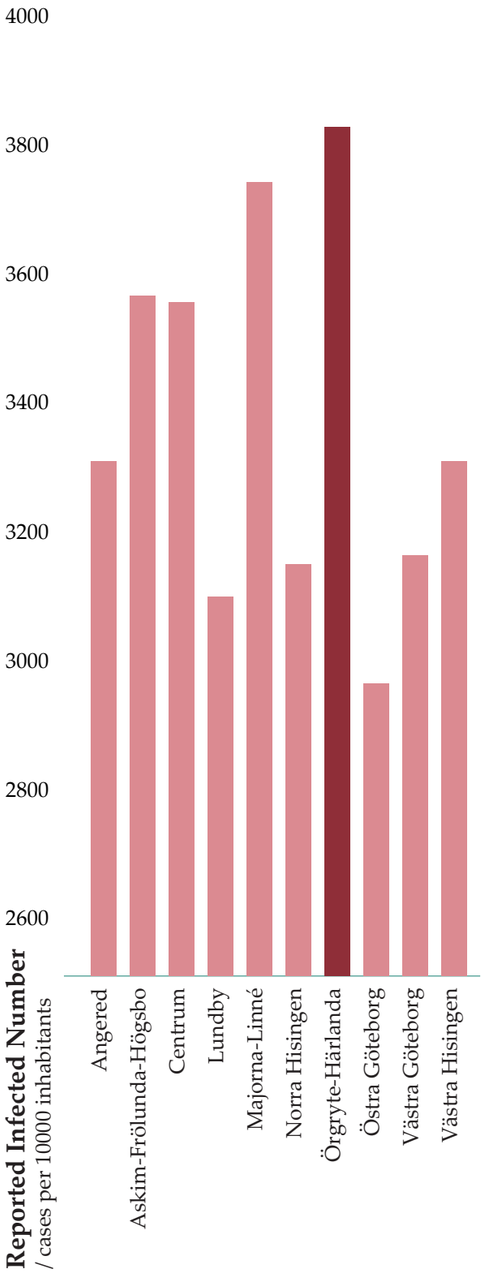
### Districts of concern during Covid-19

Göteborg Örgryte-Härlanda have the highest infected cases per 10 000 inhabitants reported during the period from week 23, 2020 to week 2, 2021 (see figure 16). This disctrict is therefore the most concerned one and will be the district of choice in this research.

It is worth noting that the reason for the high rate of infection is complicated. The district with highest reported cases is also influenced by the closeness to the city center, education level, and access to testing and reporting their health condition because of the high occupancy of local dwellers without a language barrier. However, the research focuses on risk factors of household transmission, which has been proved as a high risk of secondary transmission route.

**Figure 16**

*Reported cases of Covid-19 per district in Gothenburg*



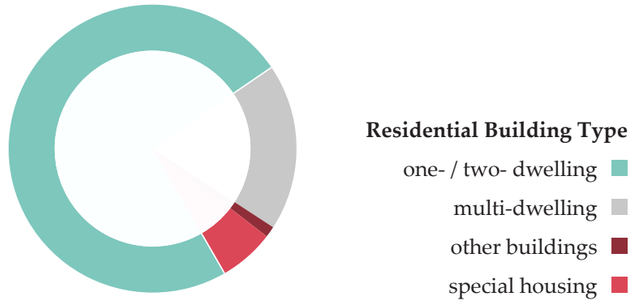

*Note:* Gothenburg reported infected case number in each area from week 23, 2020 to week 2, 2021. Data retrieved from: https://www.folkhalsomyndigheten.se. Processed.



## Apartment and Household Size

**Figure 17**

*Apartment and Household Size*



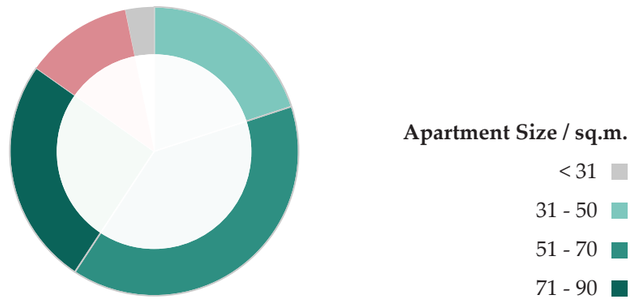

Number of dwellings by region, type of building and tenure (including special housing). Year 2019

**73.8%**

A large percentage of 73.8 % of the total number of households in Gothenburg are located in multi-dwelling residential buildings.

**84.8%**

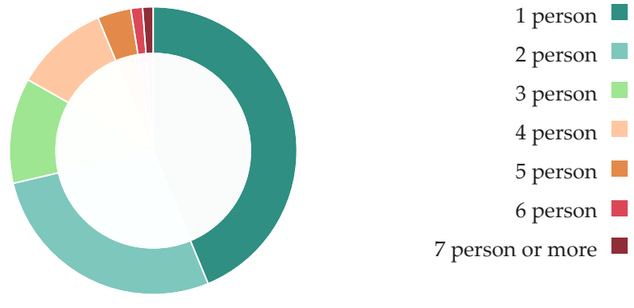
The majority of apartments in Gothenburg are between 31 and 90 square meters in size, accounting for 85% of the total number of apartments.




Number of dwellings by region, type of building and useful floor space. Year 2019

**36sq.m.**

The average living space per person in Gothenburg is 36sq.m. ("Smallest living space per person in cities", 2020), which is used as a reference for the general apartment size.



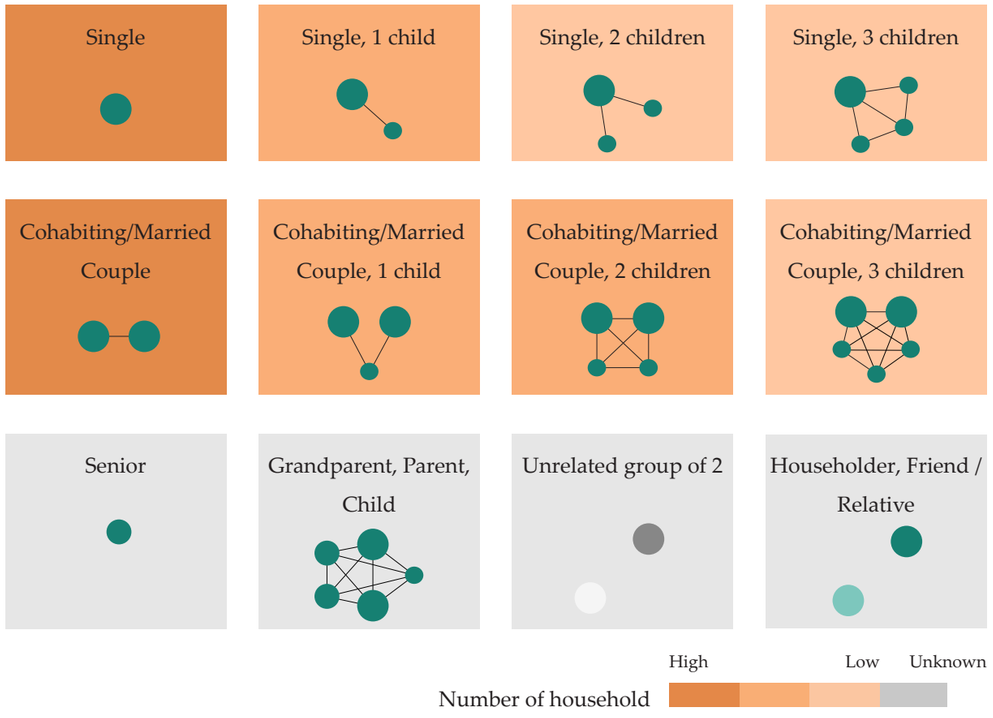

*Note:* Number and percentage of persons and households by region and household size. Year 2019. Data retrieved from: https://www.scb.se. Processed.

## Household Composition

As an essential risk factor for household transmission of infectious diseases, determining household crowding depends on how many people share the same housing and their age, gender, and relationship. (*WHO housing and health guidelines*, 2018) Research by Li et al (2020) also indicates that the household contacts' age and relationship influence the risk of SARS-CoV-2 transmission within a household (Li et al., 2020). No matter what the household type is, the essential way to reduce secondary household transmission is to isolate the patient from the other members strictly. Understanding the common household constellations provides a direction for designing domestic functions and flows.

**Figure 18**

*Common Household Compositions*



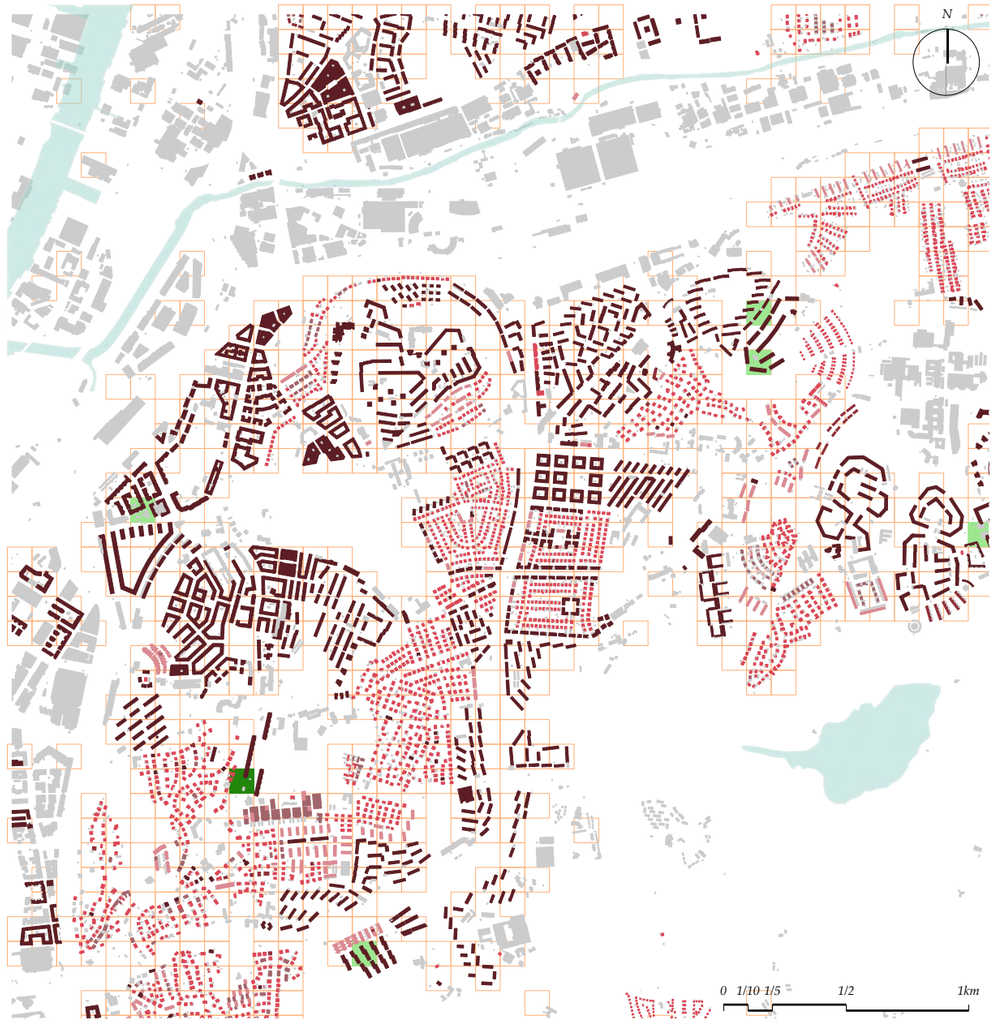

Number of households and persons by region, type of household (rough division), number of children, youngest child, observations and year. Year 2019. Data retrieved from: https://www.scb.se. Processed.



## Selected Site

**Figure 19**

*Örgryte-Härlanda Dwelling and Population Map*




Örgryte-Härlanda has the highest Covid-19 cases reported in Gothenburg. Selected building is located in the area with highest population in the district.

*Note:* Population (green area in the map image). © Statistiska centralbyrån (2018) GSD-Property map topography, vector, scale range 1: 5,000 - 1:20,000 © Lantmäteriet (2020). Processed.

# BUILDING

The selected building is located in the most populated area of Örgryte-Härlanda. The building is a residential with tenancies. It was built in 1965, together with two other residential buildings on the site. Typically for its time, the three houses were built on a leveled surface where original vegetation was cleared to build new buildings and housing yards. The buildings are parallel to each other at straight angles to each other around the open courtyard. The building is a residential high-rise, a common housing type during the 60s and 70s in Sweden.

The building has a concrete frame, a cast-in-place bookshelf frame with load-bearing transverse partitions. The cast-in-place frame has been supplemented with various prefabricated elements.

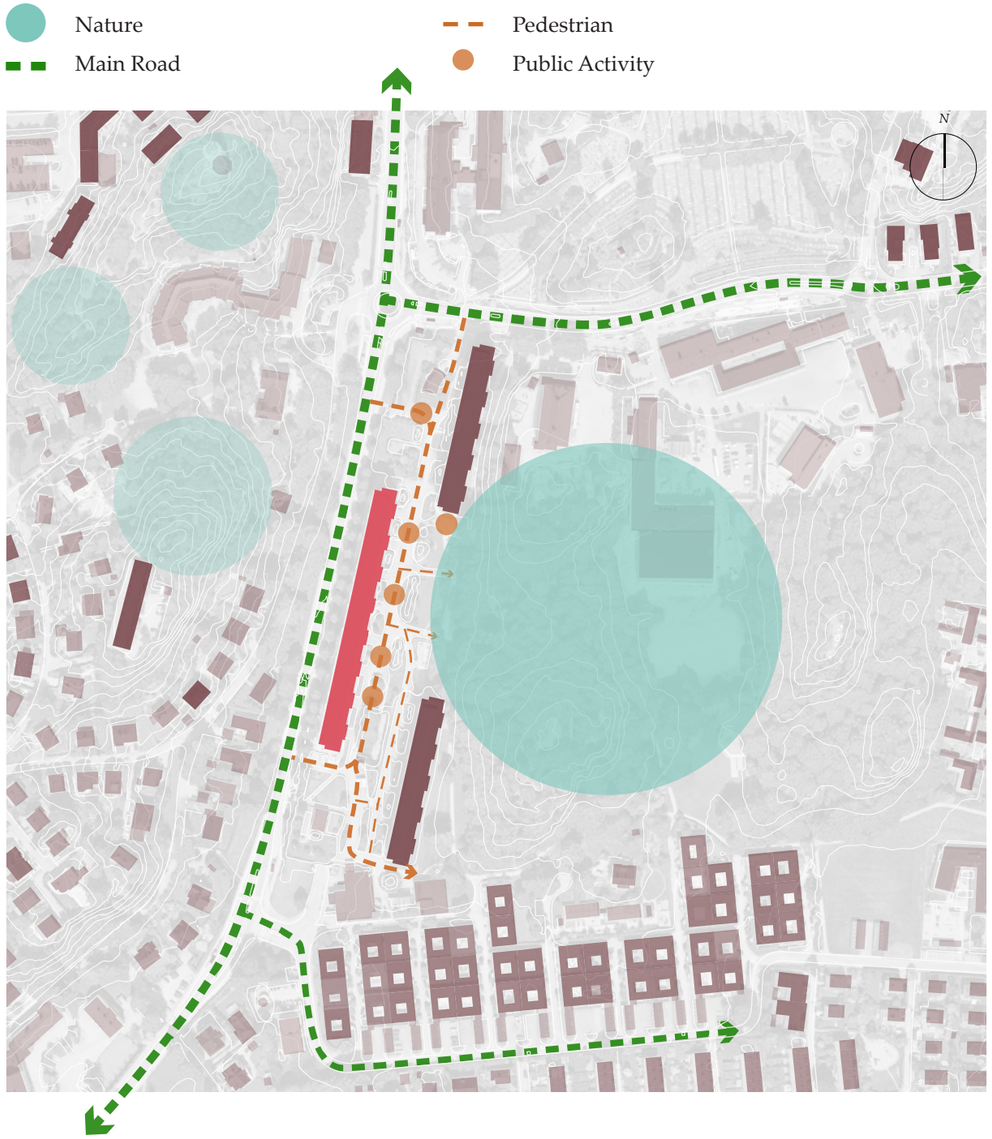
**Figure 20**

*Selected building in the most populated area*

*Note:* Perspective of the site, map data© Google (2021). Processed.

**Figure 21**

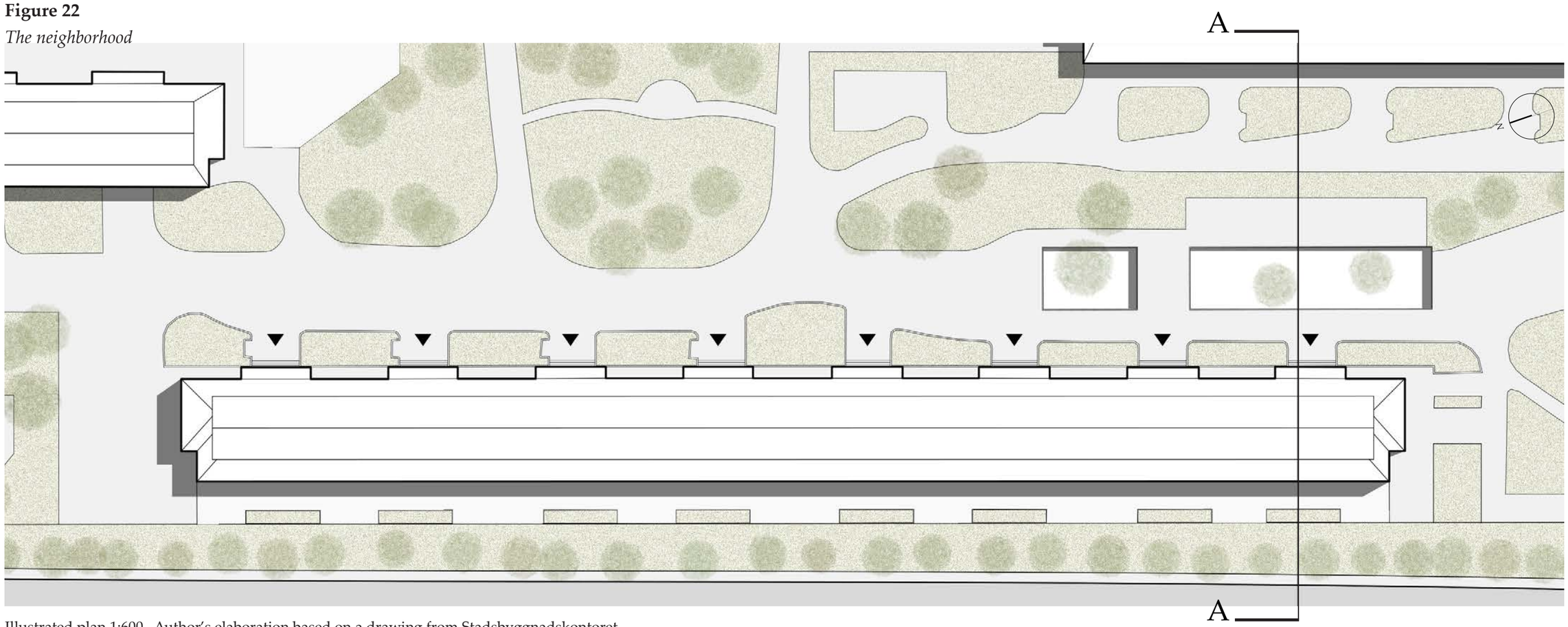
*Selected building with its surroundings*




Site plan 1:4000. Author's elaboration using a base GIS layer from https://geodata.chalmers.se/.

**Figure 22**

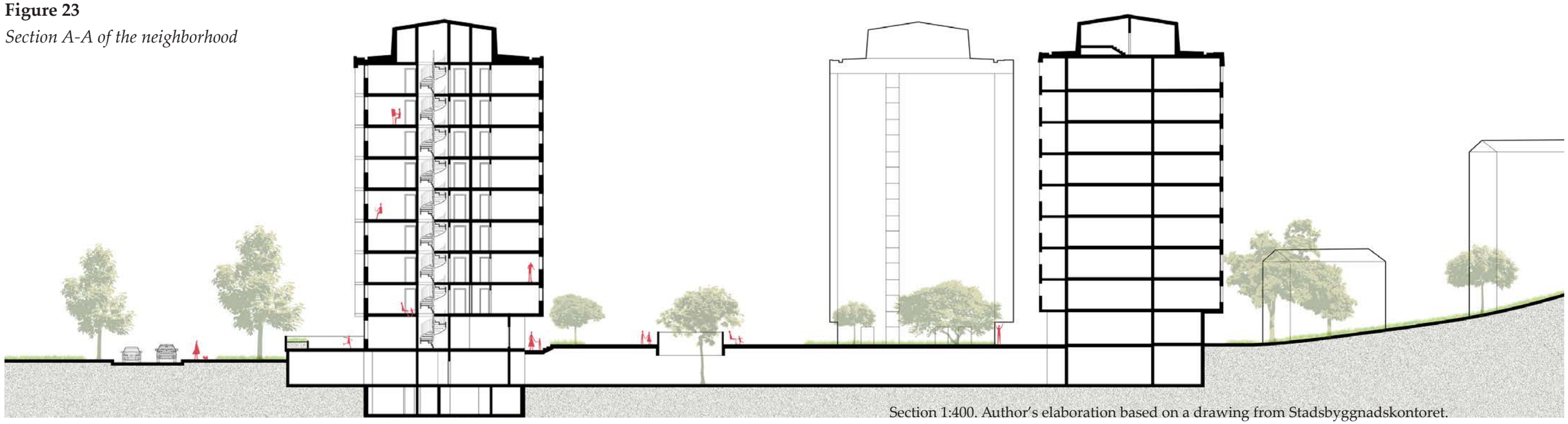
*The neighborhood*




Illustrated plan 1:600. Author's elaboration based on a drawing from Stadsbyggnadskontoret.

**Figure 23**

*Section A-A of the neighborhood*



Section 1:400. Author's elaboration based on a drawing from Stadsbyggnadskontoret.

## Plan layout

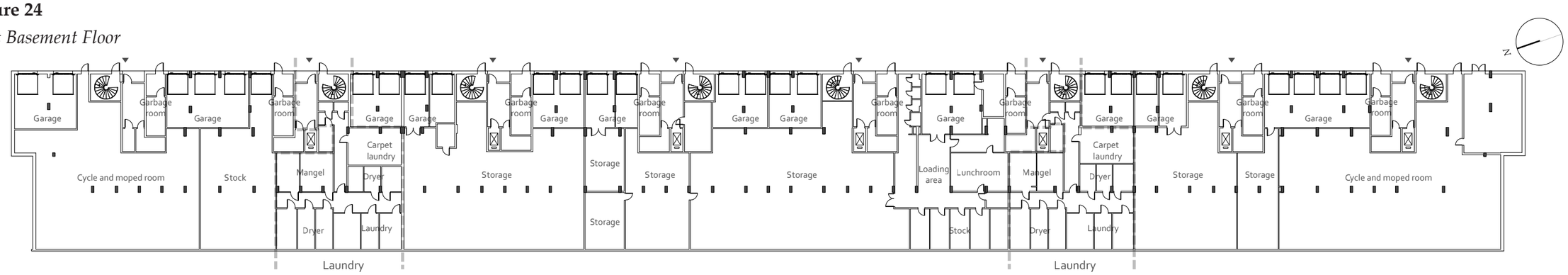
The first basement floor of the residence is the common area, including garages, cycle and moped rooms, laundry rooms, garbage rooms, and storage space.

The building entrances are on the east side of the building's ground floor. On the ground floor, doors number 6, 8, 12, 14, 16 also entrances to the offices; from doors 2 and 4, visitors can access the guest lounge. That means the residents sometimes share the entrances with people who do not live in the building. The stairwell that leads to the basement floor is separated from the one leading to the upper floors.

The general building floors contain four types of apartment units. On each floor, three apartment units surround and share one vertical transportation core.

**Figure 24**

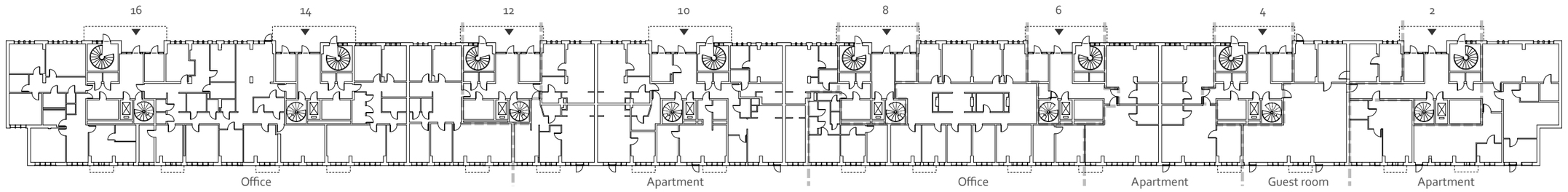
*First Basement Floor*




Plan 1:500. Author's elaboration based on a drawing from Stadsbyggnadskontoret.

**Figure 25**

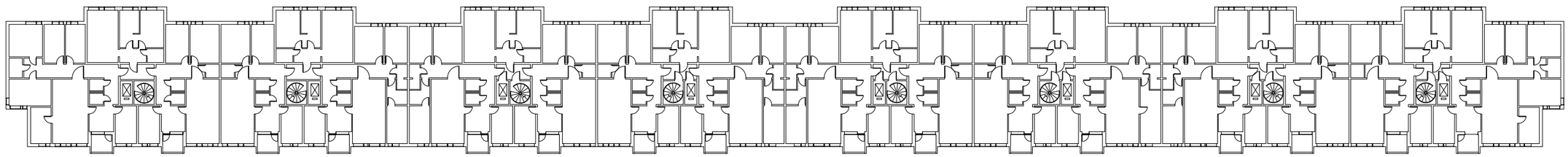
*First Floor*




Plan 1:500. Author's elaboration based on a drawing from Stadsbyggnadskontoret.

**Figure 26**

*General Floor*



Plan 1:500. Author's elaboration based on a drawing from Stadsbyggnadskontoret.





Urban Residence Response to COVID-19

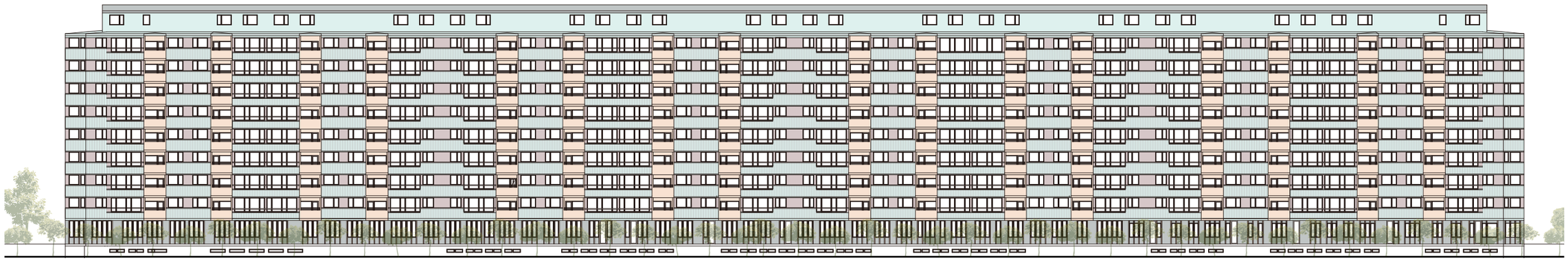
## The expression of the building

The flat roof slope without gaps is typical for its time, with balconies that are indented in the façade. The façade consists of sheet metal at the windows and balconies of concrete elements with exposed ballast. The recessed top floor is clad with sheet metal.

**Figure 27**
*East Facade*

Elevation 1:500. Author's elaboration based on a drawing from Stadsbyggnadskontoret.

**Figure 28**
*West Facade*



Elevation 1:500. Author's elaboration based on a drawing from Stadsbyggnadskontoret.





Urban Residence Response to COVID-19

**Roof**

**10th Floor**

Apartment Attics, 1490 sq.m.

**2nd - 9th Floor**

General Floors, 2560 sq.m.

Four types of apartment units.

**1st Floor**

Ground floor, 2390 sq.m.

Entrances, apartments, offices, and guest room.

**B1 Floor**

The upper basement floor, 3530 sq.m.

Laundry, garbage rooms, equipment rooms, cycle and moped rooms, garages.

**B2 Floor**

The lower basement floor, 2420 sq.m.

Equipment rooms.

## Vertical layout

The building has 12 floors, including two basement levels and eight entrances with independent vertical cores. On the ground floor of entrance no. 6, 8, 12, 14, 16, there are several office units.

There are 261 residents currently living in the building and 96 companies in the entire community.

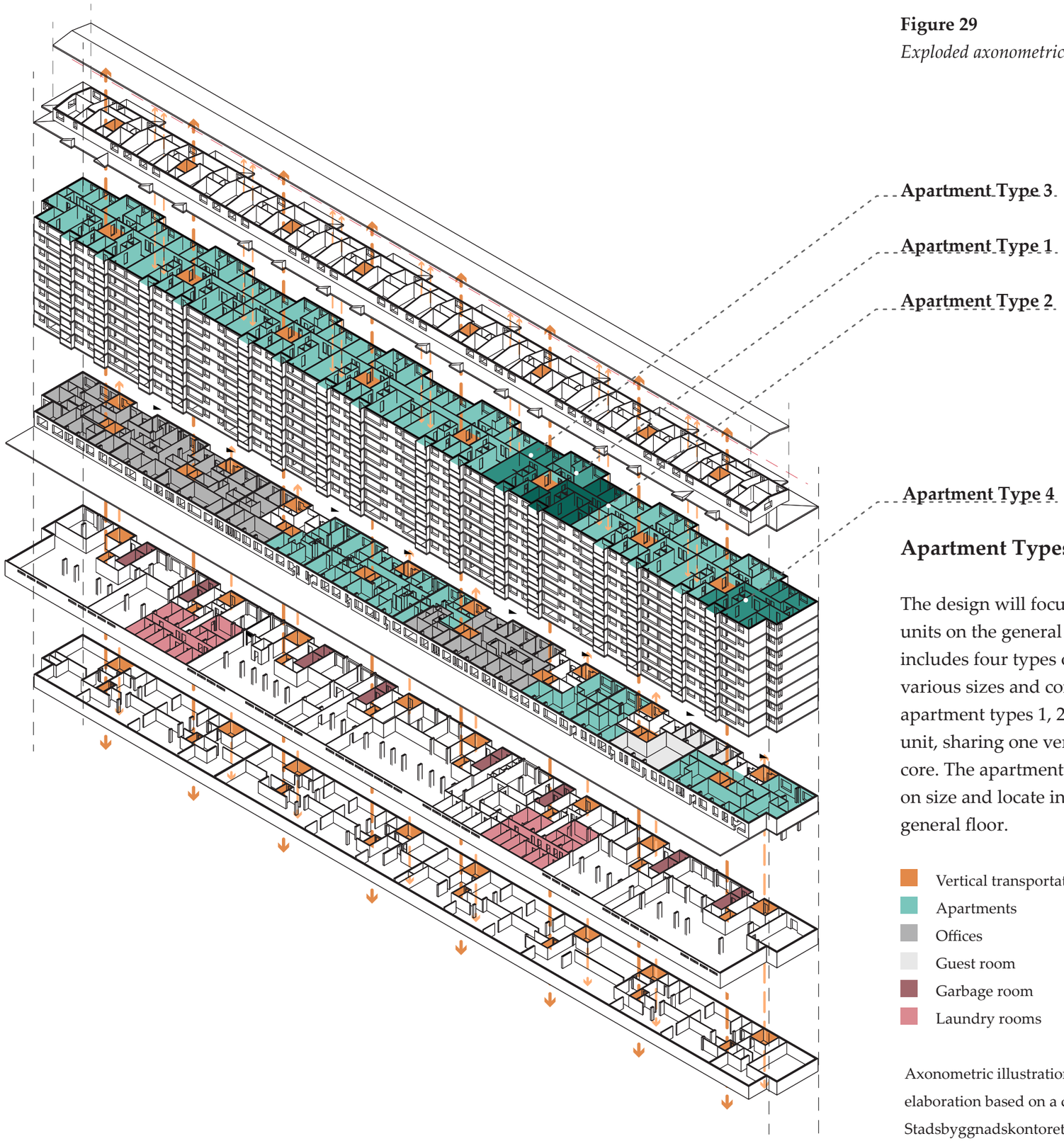



**Figure 29**

*Exploded axonometric view of the building*

## Apartment Types

The design will focus on the apartment units on the general floors, which includes four types of apartment with various sizes and configurations. The apartment types 1, 2, and 3 are in a same unit, sharing one vertical transportation core. The apartment type 4 is the largest on size and locate in both ends of the general floor.

- Vertical transportation
- Apartments
- Offices
- Guest room
- Garbage room
- Laundry rooms

Axonometric illustration. Author's elaboration based on a drawing from Stadsbyggnadskontoret.

# ANALYSIS

This chapter will analyze the spatial layout and functions of the existing building with infection control precautions as a focus to determine if the building in existing design can provide effective solutions to reduce the risk of virus transmission.

## Neighborhood and Entrances

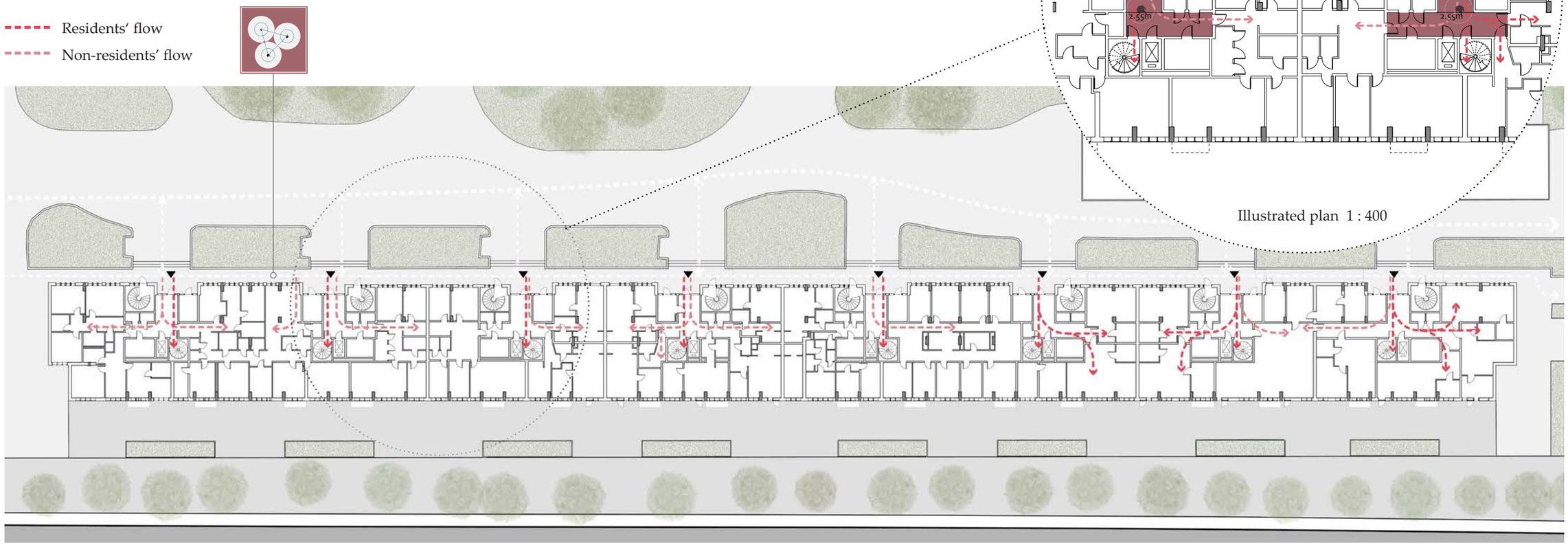
This part of the existing building is the surrounded streets with the main entrances. The existing design is as follows:

- The pathway on the east side of the building lacks distance from the building. When patients pass by on the street next to the building, the virus can enter the room through the street-facing windows on the ground floor.

- The ground floor contains of office and residential units. On the first floor both residents and office working are therefore sharing the entrances, which increases the risk of cross-contamination.

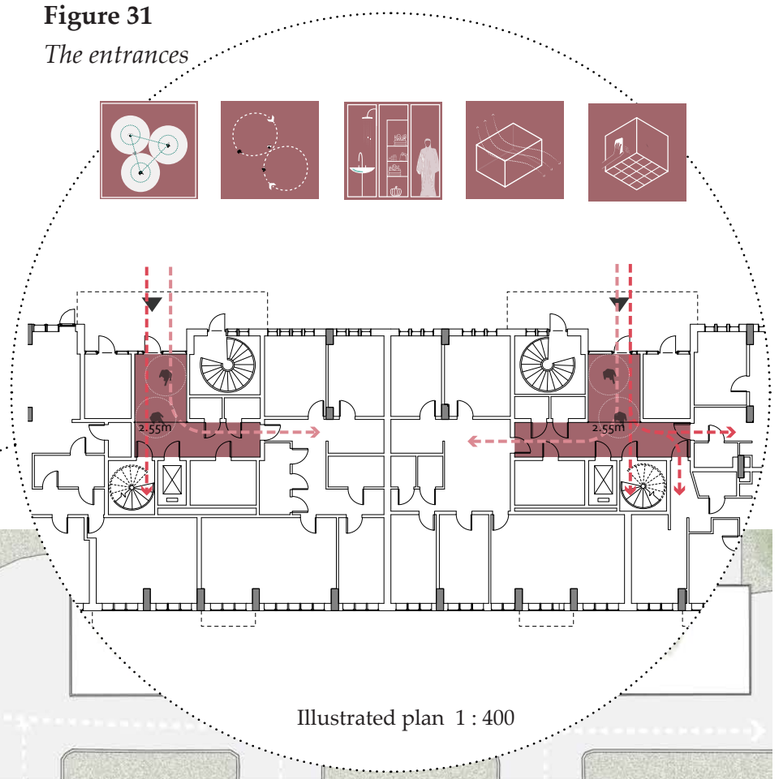
- According to the infection control precautions, the entrance as a common area needs to supply more space for social distancing and provide facilities for sanitation.

**Figure 30**
*The neighborhood*




Illustrated plan 1:500.

**Figure 31**
*The entrances*




Illustrated plan 1 : 400





Urban Residence Response to COVID-19

## Common spaces

The common spaces include the stairwell for residents and the laundry rooms.

- Surface materials in walk-through spaces may allow viruses to survive for more extended periods and may become potential virus transmission spots.
- Inefficient ventilation may increase the survival time of viruses.

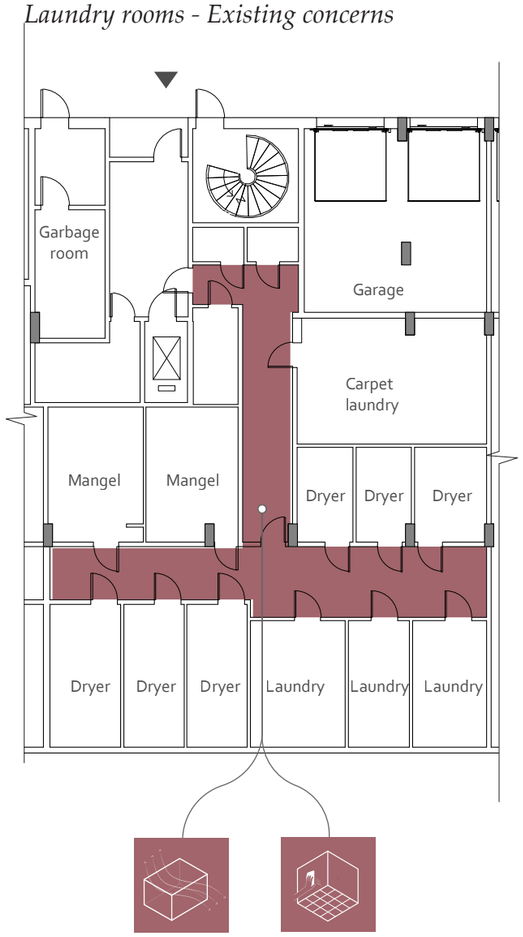
## Apartments

The selected apartments in this thesis come from the general building level. The analysis is based on a scenario where at least one household member is infected by Covid-19.

- The hallway is narrow and lacks facilities for sanitation.
- The hallway requires a threshold zone to separate the exterior from the interior to avoid the resident carrying virus and contaminating the clean zones when entering the aprtment.
- The patient and the healthy household members share the common area in the apartment.
- The interior corridor is narrow and has poor ventilation.
- The apartment needs an isolation room for the patient.
- The apartment may require extra space to storage supplies including food, PPE and others.

**Figure 32**

*Laundry rooms - Existing concerns*

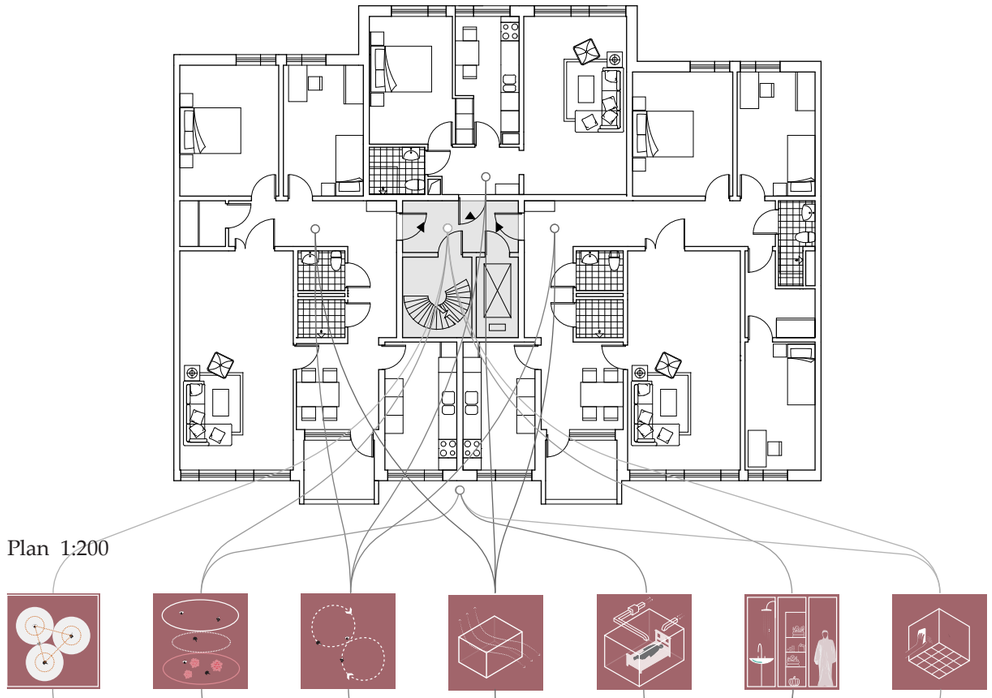



Plan 1 : 200

- The material of the high-touch surfaces may allow the virus to survive for an extended period, increasing the chance of disease transmission.

**Figure 33**

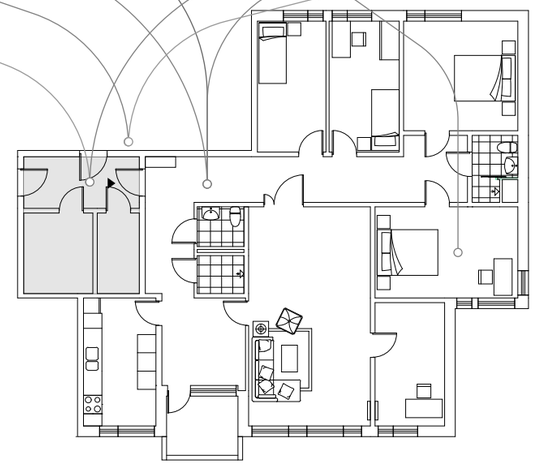
*Apartment 1, 2, 3 - Existing concerns*



Plan 1:200

**Figure 34**

*Apartment 4 - Existing concerns*



Plan 1:200

# DESIGN





## CHALLENGES AND MISSIONS

Many people have the ambition to follow the preventive measures. Even though we do not have a lockdown with home isolation in Sweden, indoor and outdoor activities in public and commercial areas have been limited, which means that people generally spend more time at home. Your home becomes the main place for your activities, whether you like it or not. The household therefore becomes more vulnerable if someone get sick in it. To tolerate this home stay for a long time, the home needs to be flexible and adaptable, to allow it to be an office, a kindergarten and a hospital at the same time. Unfortunately, today's homes in their layout and functionality have contributed to increased frustration, when new needs in the home could not fit existing apartment layout.

The concern we feel is how the current housing layout actually can reinforce the frustration people feel about mentally enduring a long lasting pandemic. Deficiencies in the home can make it more difficult for people to follow the preventive measures for a long time. Our ambition is therefore that a changed layout in the home can offer a long-term solution during future pandemics.

The goal is to avoid further transmission of virus in residence and still keep the dwellers' satisfaction to life in their work/study from home period. To solve this, strategies and aspects identified in the theory chapter (figure 8, 13, 14 and 15) have been tested on the context and will further on be tested in a flow and zone analysis. There are, however, some challenges to consider in how these strategies and aspects are used in the residential building renovation.

### Flexibility

If the renovation is done in a large urban scale, this new design for reduced contamination in the home will be applied in apartments where people mostly, and most of the time, are not infected. Therefore, it is important that the design solutions make the apartment equally functional in a normal situation as during a pandemic.

### Renovation

The adjustments needed must not damage existing functions in the apartment or the building's structure, such as limiting daylight in the home. The design that is added must therefore be carefully weighed against the conditions presented in previous chapter on the building itself, and at the same time improve the life satisfaction of the residents in the balance of professional and private life, and at the same time decrease the risk of further spread of the virus.

### Infection Prevention

The identified strategies, such as isolation rooms and a decontamination facility, are most often applied to hospital environments, but a home is not a hospital. The design therefore needs to be shaped according to the conditions of the home in order to meet its requirements. Someone who is infected of Covid-19 and who is advised to stay at home is not so seriously ill that they require hospitalization, therefore the design should be a solution for milder symptoms, where it is enough to isolate themselves at home to recover.

A home has a limited space where several people can circulate and have different activities. There are difficulties in zoning an apartment since there are so many different needs in the few rooms that are available. It is therefore important to find the right level of adjustments in the home, based on the residents, in order to make it easier for them to do the right thing in the treatment of infection at home.

### Life Satisfaction

In the assignment of avoiding further infection in the home, it is easy to focus on the patient and his/her needs to recover. On the other hand, it is important to remember that a home is not a hospital. The home is a home for the other members of the household as well, and for their lives to live well, it is important to see their needs as well, such as being able to work/study from home while someone else in the household is infected by Covid-19. The wishes that have emerged from the questionnaire show that there are challenges to tackle even around the healthy members in the household, which is not just about avoiding getting sick. It must therefore be possible to offer a range of activities to the healthy people in the non-contaminated areas.

### Limited by Architecture

Many people have ambition to follow the guidelines of preventive measures. However, architecture often limits the ability of safe behavior. To meet in a narrow hallway to the residential building is an example.

Let the architecture facilitate decontamination, the ability to keep distance and to limit the spread of virus through good ventilation.

The ambition with this thesis is not to let architecture force the user into a behavior, but to offer choices for the user to act in a correct way. In some cases, architecture can be enough to avoid infection just by rearranging functions. In this way, people can avoid ending up in the risky situations that previous architecture caused.

The ambition is to let the design, by itself in some parts, be sufficient enough to avoid infection and in other parts become an opportunity for the user to make more choices than the earlier, limiting architecture, allowed.



## SOLUTIONS

The project is an adaption of the design strategies to the specific building context. It includes the renovation of the apartments, the entrances, and the common space.

As the place where life mainly takes place during the pandemic and where most frequent close contact occurs, the apartment is the place with the highest risk of secondary transmission in the building and therefore has the highest priority in the renovation design.

In order to create a healthy apartment environment, the design applies the previously mentioned design strategies in conjunction with the existing conditions of the specific apartment. This includes, as shown in Figure 32,

- Distinguish clean and dirty zones in the apartment,
- Design multiple indoor circulations,
- Set up an isolation room,
- Improve ventilation in high contamination risk areas,
- Add sanitation and storage areas,
- Create living spaces with views,
- Use appropriate materials.

In order to maintain residents' life satisfaction, as illustrated in Figure 33, the design takes into account the behavior of the residents. It redefines the existing housing spaces based on the update of the apartment functions during the pandemic, by division of existing space and addition of new space.

**Figure 35**

*Health related solution tools for the apartments*

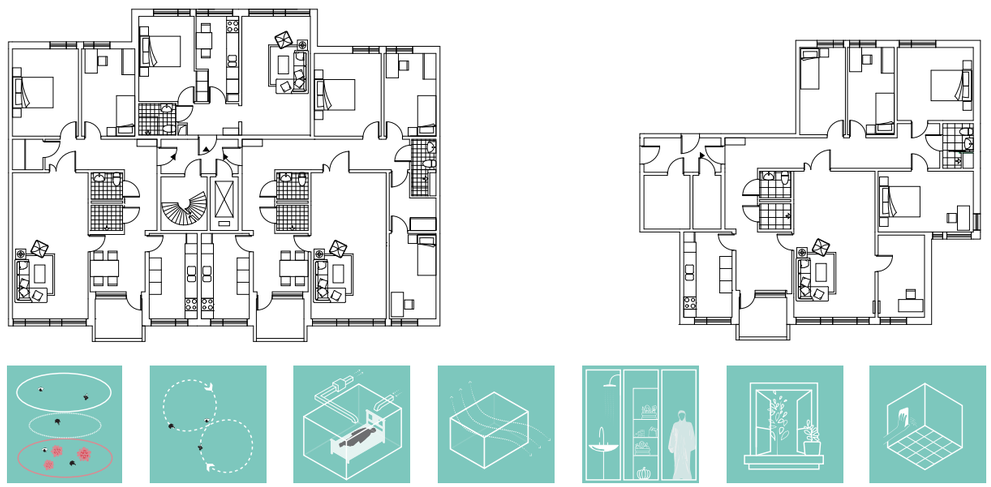
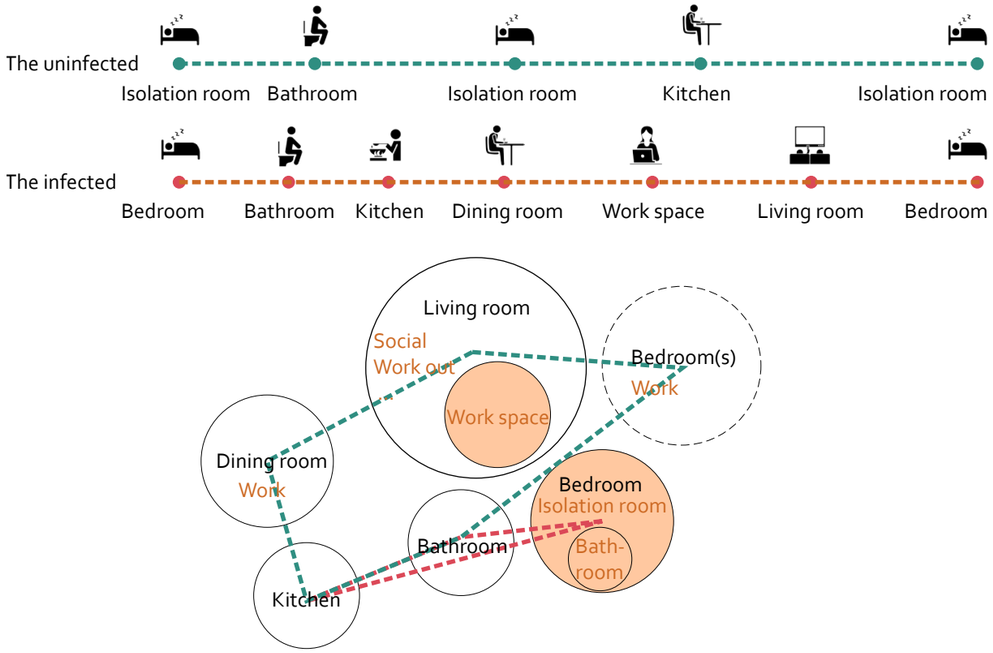


**Figure 36**

*Living function solution tools for the apartments*




The residential building entrance is a location where people tend to stay briefly, or meet. The entry also serves as the entrance to the office space, which raises the risk of secondary transmission due to potential flow mixing during the commuting hours. Therefore, it is the second priority design area. The entrance design addresses protocols of the pandemic, focusing on design strategies that reduce the virus transmission risk in public spaces. This involves,

- Provide more space for social distance and free movement,
- Reduce mixed flows,
- Install sanitation facilities,
- Improve ventilation,
- Use materials resistant to the virus's survival on touch surfaces.

The laundry area has the lowest design priority due to its time-shifted usage. Furthermore, the existing layout has individual rooms. There is a much lower risk of secondary transmission than the former two spaces. The design focuses on the necessary measures.

The project is set in the pandemic context, and the design strategies are geared towards the changing needs of the apartment building. However, due to the temporality of the situation, the design also constantly reflects on the value of the design for non-epidemic periods. As a result, there are flexible spaces and furnishings that can be shifted in different contexts.

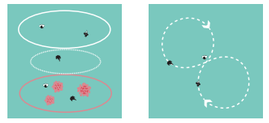




## APARTMENT FLOW AND ZONE ANALYSIS

The analysis is based on the assumption that one household member is infected with the Covid-19. To ensure the infected can both have an isolation room and is still accessible to the bathroom and kitchen, while avoiding unnecessary meet with the other household members, a seperated flow for the infected is essential.

**Clean Zone** is a space only used by the uninfected household members. To avoid virus spreading, the infected's flow should not have physical or ventilation overlapping with it. It needs to b**e separated with other zones** and **ensure a complete circulation within it**.



**Dirty Zone** includes the room where the infected stays and circulates, which is the isolation room, the independent path linked to it and an independent bathroom, if possible. The space need to be **isolated**, requires **good ventilation** and **safe surfaces**.

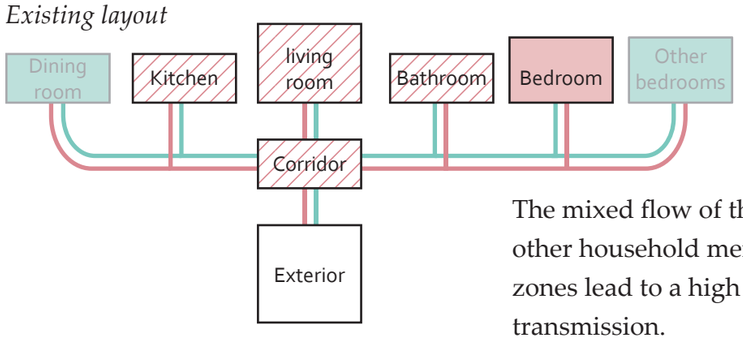
**Mixed Zone** includes the bathroom and the kitchen, where the necessary life needs happen and inevitably shared between the infected and other household members. The household should arrange the use of this space to avoid physical contact and always clean the space after using. The space requires **good ventilation** and **safe surfaces**.

**Anteroom** is a transit space between the exterior and the clean zone in the apartment. Residents can perform hygiene and leave their outdoor clothes in this space, avoiding contaminating the clean zone by the virus they might taken from outside. The anteroom needs **space to place outdoor clothes, PPE and disinfection supplies**, and **requires safe surfaces**.

## The Balcony Concept

**Figure 37**

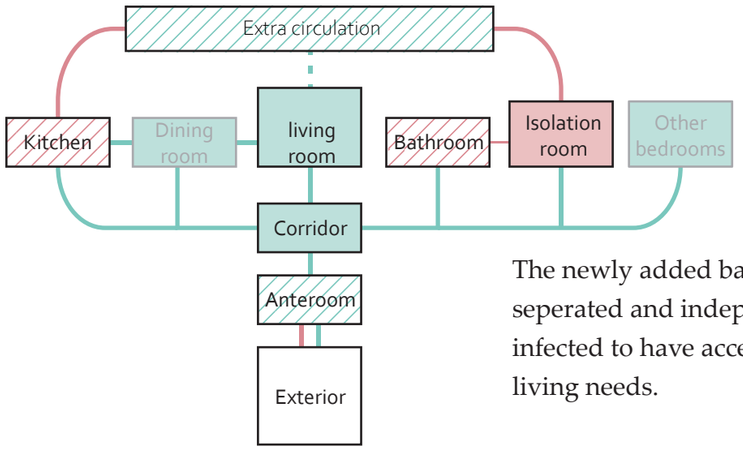
*Existing layout*




The mixed flow of the infected and other household members, and mixed zones lead to a high risk of household transmission.

**Figure 38**

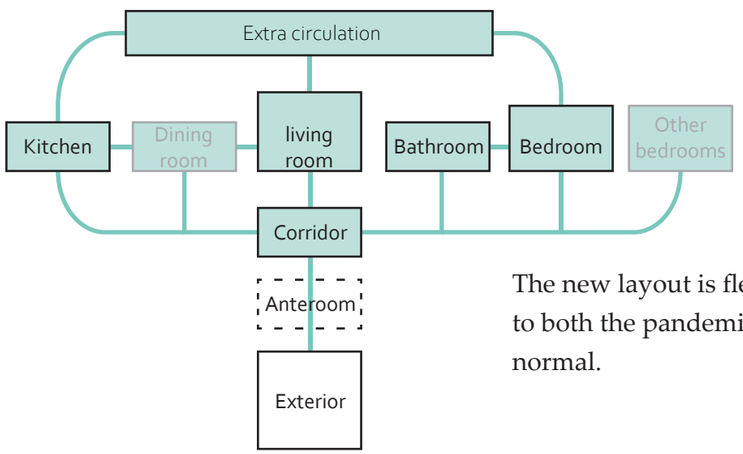
*New layout in the pandemic period*




The newly added balcony works as a seperated and independent path for the infected to have access to the necessary living needs.

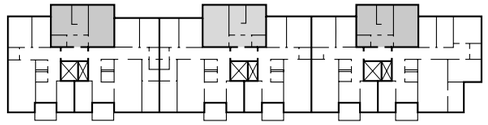
**Figure 39**

*New layout in a normal period*




The new layout is flexible to adapt to both the pandemic period and the normal.





## Apartment Type 1

- Flow of the uninfected
- Flow of the infected
- One person from outside
- Infected household member
- Uninfected household member

Apartment type 1 is the minor apartment unit with an area of 50 sq.m. The unit contains only one bedroom, which means when more than one household member lives in, it is impossible to have an isolated patient room if one is infected. Moreover, the configuration of the apartment denies the possibility of creating multiple, non-overlapping flows in it.

With the addition of a balcony and a temporary work and sleep area from the existing living room, the small-size apartment will allow for an isolation room, with an additional flow for the infected through the balcony to reach the kitchen and meet the dining needs. Moreover, an enlarged bathroom and a second bathroom door from the bedroom will allow access to the toilet. Finally, an anteroom at the doorway will avoid people carrying the virus on their outdoor clothes or hands into the clean zone of the apartment.

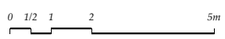



**Figure 40**

*Apartment 1 - Existing layout*

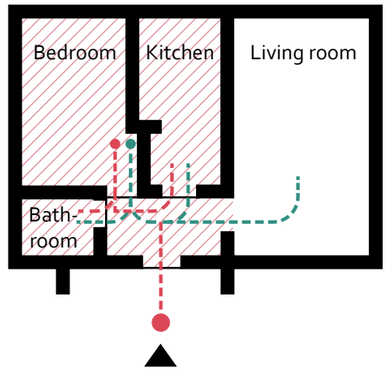
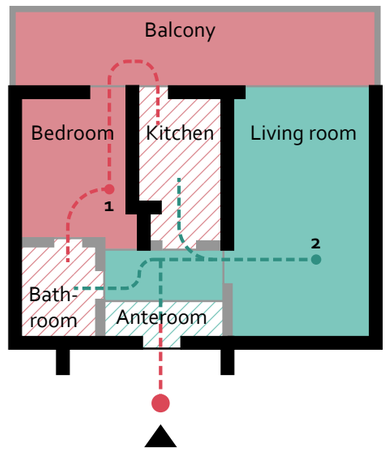



**Figure 41**

*Apartment 1 - New layout*



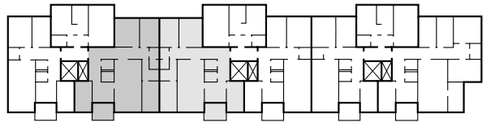


**Figure 42**
*Apartment 2 - Existing layout*

## Apartment Type 2

- Flow of the uninfected
- Flow of the infected
- One person from outside
- Infected household member
- Uninfected household member

Apartment type 2 contains three bedrooms. The flow of the household members living in each bedroom necessarily overlaps in the corridor, which is long and lacks natural ventilation, meaning a high risk of secondary transmission. And they are also likely to meet in the common area in the apartment.

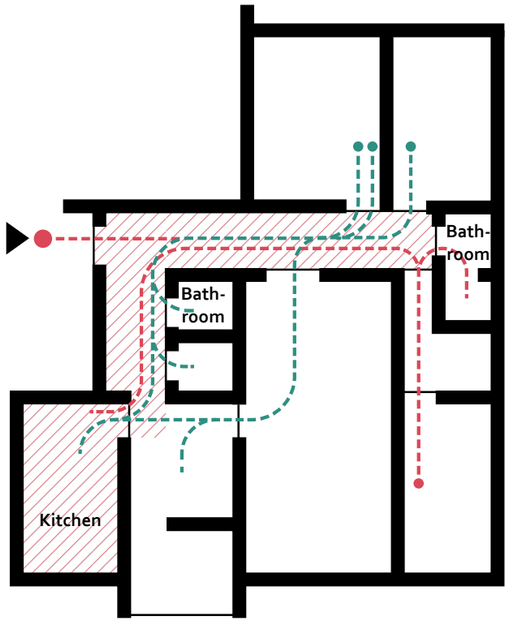
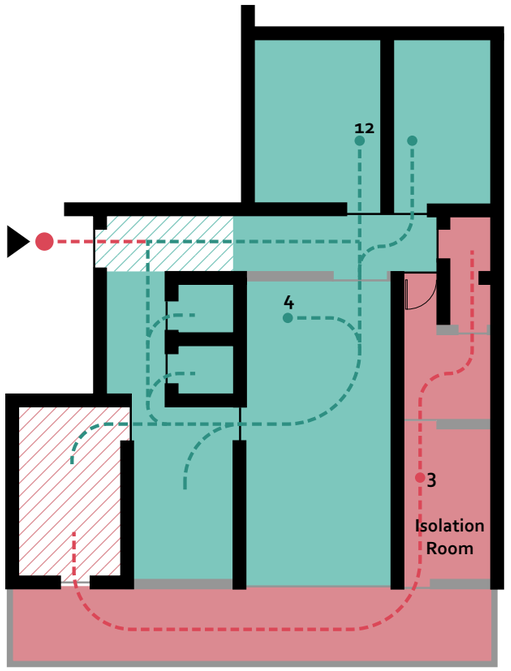



**Figure 43**
*Apartment 2 - New layout*

Setting up the bedroom closest to the bathroom as an isolation room, providing a second toilet door leading from the bedroom to the bathroom, and using the newly added balcony to provide a separate flow to the kitchen, can isolate the infected person from other family members. An anteroom at the doorway will avoid people carrying the virus on their outdoor clothes or hands into the clean zone of the apartment.







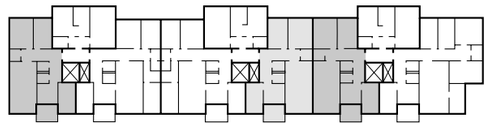


**Figure 44**
*Apartment 3 - Existing layout*

## Apartment Type 3

- Flow of the uninfected
- Flow of the infected
- One person from outside
- Infected household member
- Uninfected household member

Apartment type 3 contains two bedrooms. It has the same problem of mixed flows and poor ventilation corridor as the apartment types above. Moreover, both the bedrooms are not close enough to either the bathroom or the kitchen.

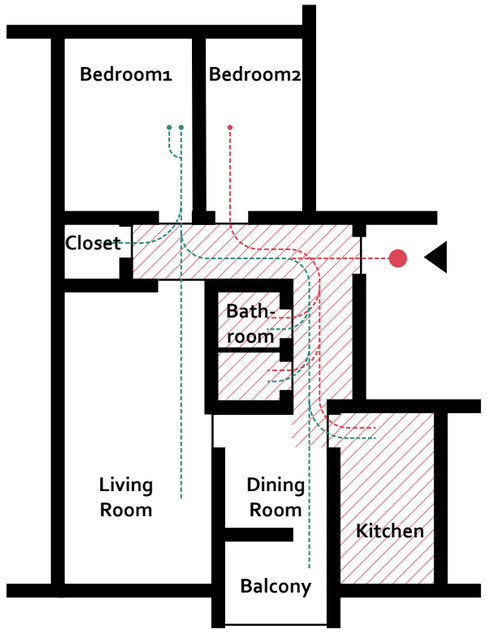
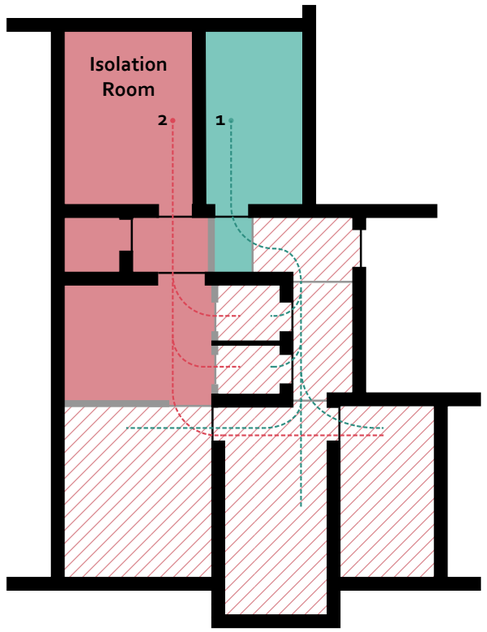
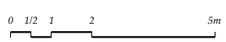



**Figure 45**
*Apartment 3 - New layout 1*

When setting up bedroom 1 as an isolation room, it needs to be expanded so that the patient can use the bathroom. However, in this case, the patient's flow to the kitchen will still overlap with that of other household members, and the entrance hall will not be able to have an anteroom. A balcony will not add value to the apartment.



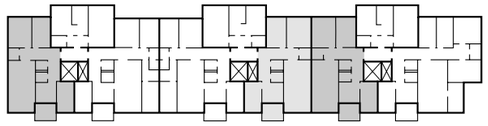


**Figure 46**
*Apartment 3 - New layout 2*

## Apartment Type 3, continuation

- Flow of the uninfected
- Flow of the infected
- One person from outside
- Infected household member
- Uninfected household member

When setting up bedroom 2 as an isolation room, the patient will use the corridor as a independent flow towards the bathroom. The patient's flow to the kitchen will still overlap with that of other household members, and the entrance hall will not be able to have an anteroom. A balcony will not add value to the apartment.

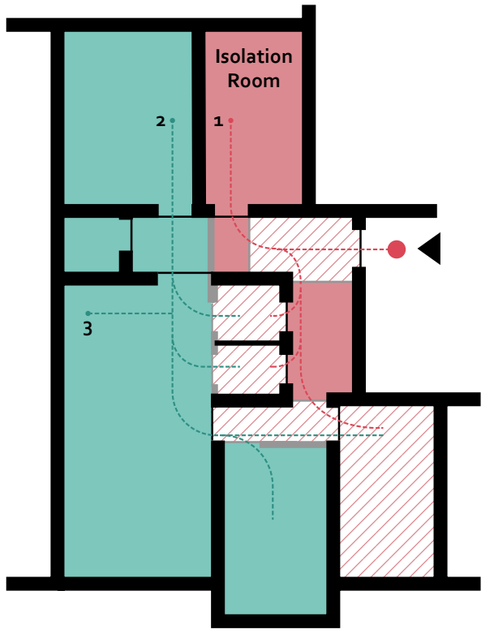
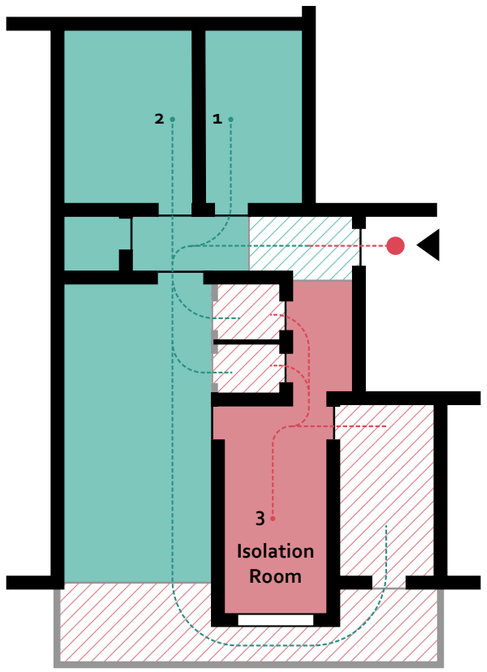
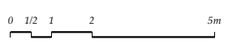



**Figure 47**
*Apartment 3 - New layout 3*

A solution for apartment type 3 will be to turn the existing dining room into an isolation room during the pandemic period. The uninfected household members will get to the kitchen through the balcony, which has natural ventilation. There will no overlapping of the physical flows.  An anteroom at the doorway will avoid people carrying the virus on their outdoor clothes or hands into the clean zone of the apartment.





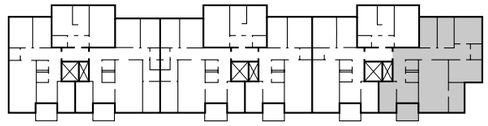



**Figure 48**
*Apartment 4 - Existing layout*

## Apartment Type 4

- Flow of the uninfected
- Flow of the infected
- One person from outside
- Infected household member
- Uninfected household member

Apartment type 4 locates on the ends of the general floor, containing four bedrooms and a study room. The problem of mixed flows and poor ventilation corridors can also be seen here.

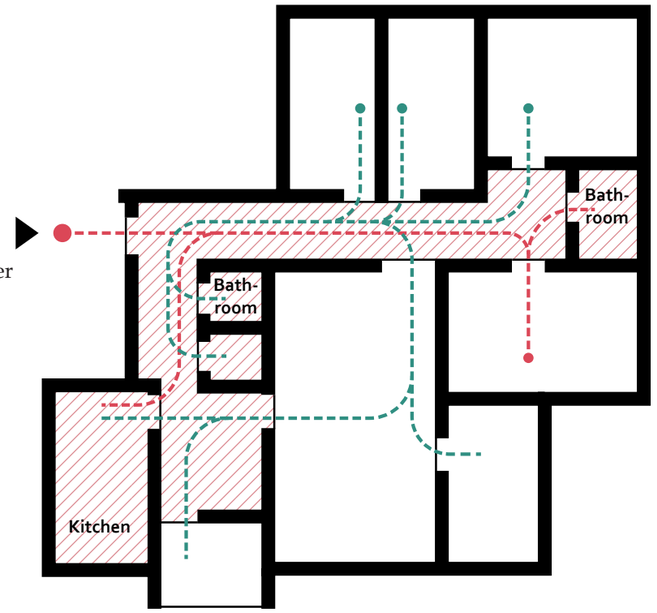
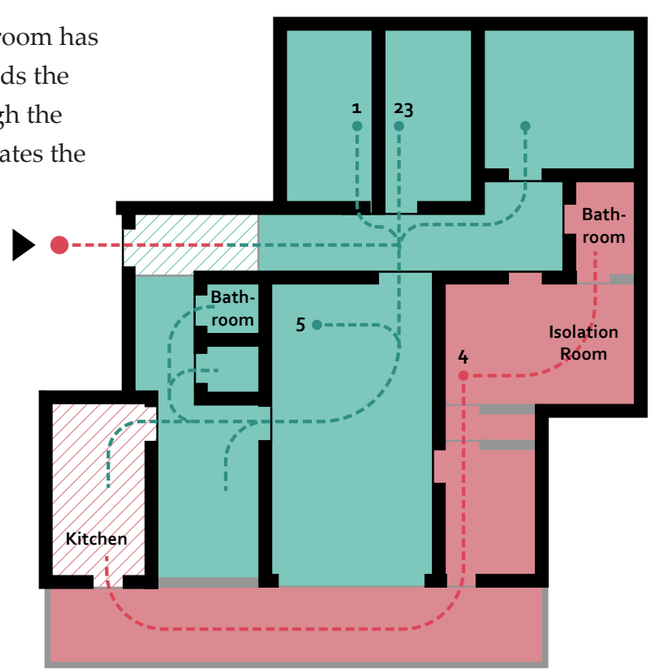
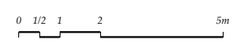



**Figure 49**
*Apartment 4 - New layout*

The infected in the isolation room has a separated circulation towards the bathroom and kitchen through the balcony. The anteroom separates the exterior and interior.



## Daylight analysis for additional balconies

The daylight analysis explores the limit of balcony extension length that does not impact the natural daylight condition of the existing interior space by calculating and comparing the daylight factor. See figure 51 for the balcony depths tested.

In order to compensate for the reduction of indoor lighting by floor slab extension, the design increases the height of the existing windows without compromising the structural stability of the building.

Combining the requirement of accessibility and daylight analysis, it is concluded that the balcony extension length in this design reaches 1.8m.

**Figure 50**

*Existing plan daylight condition, First Floor*

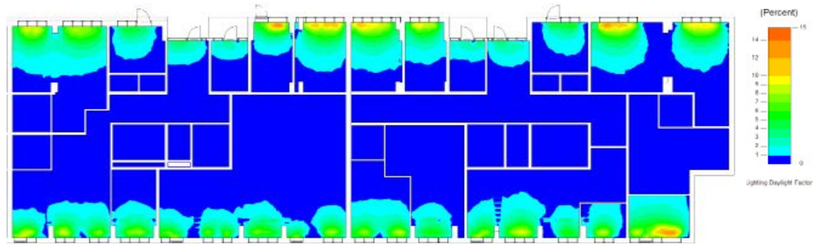



**Figure 51**

*1.8m extension daylight condition,First floor*

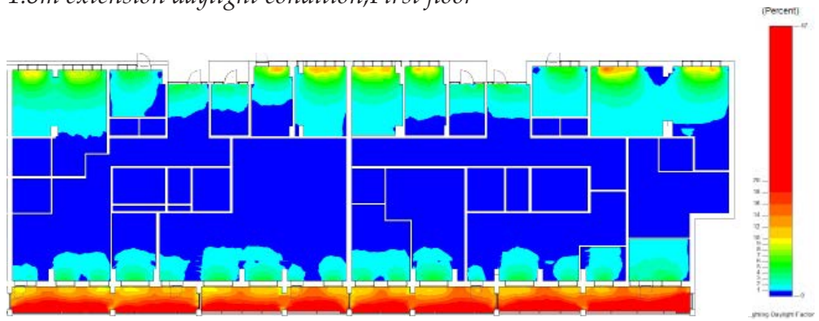
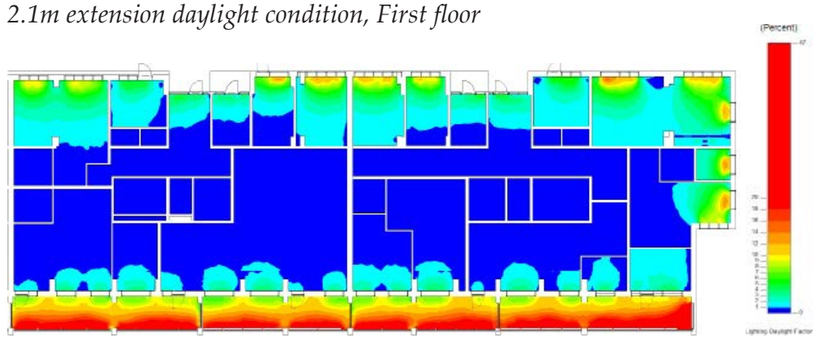



**Figure 52**

*2.1m extension daylight condition, First floor*

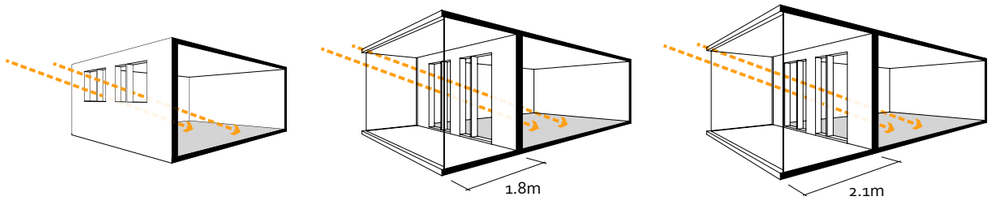



*Note:* Daylight analysis. © Revit (2021).



**Figure 53**

*Tested balcony depths in daylight analysis*




*Existing* *1.8m balcony, window enlarged* *2.1m balcony, window enlarged*

**Figure 54**

*Existing plan daylight condition, Second Floor*

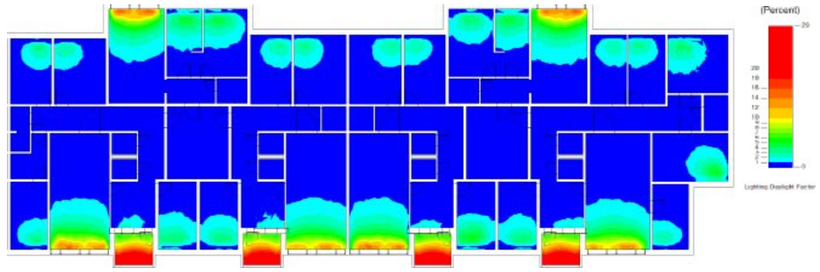



**Figure 55**

*1.8m extension daylight condition,Second floor*

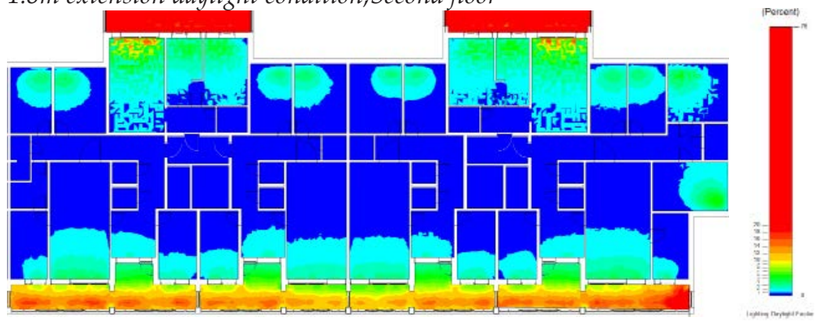
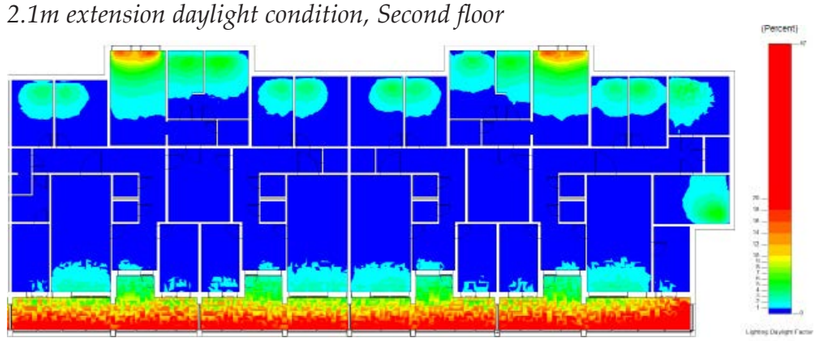



**Figure 56**

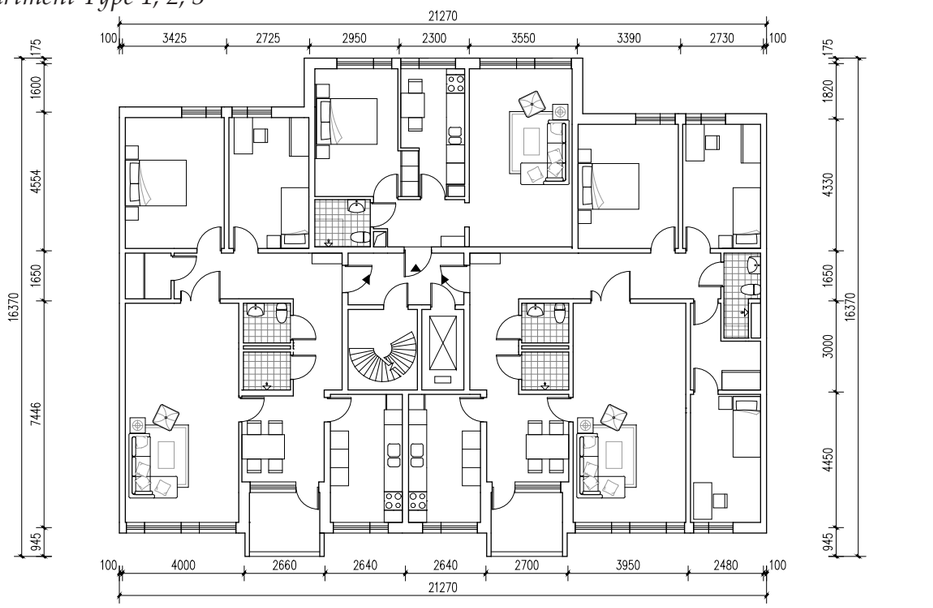
*2.1m extension daylight condition, Second floor*




*Note:* Daylight analysis. © Revit (2021).

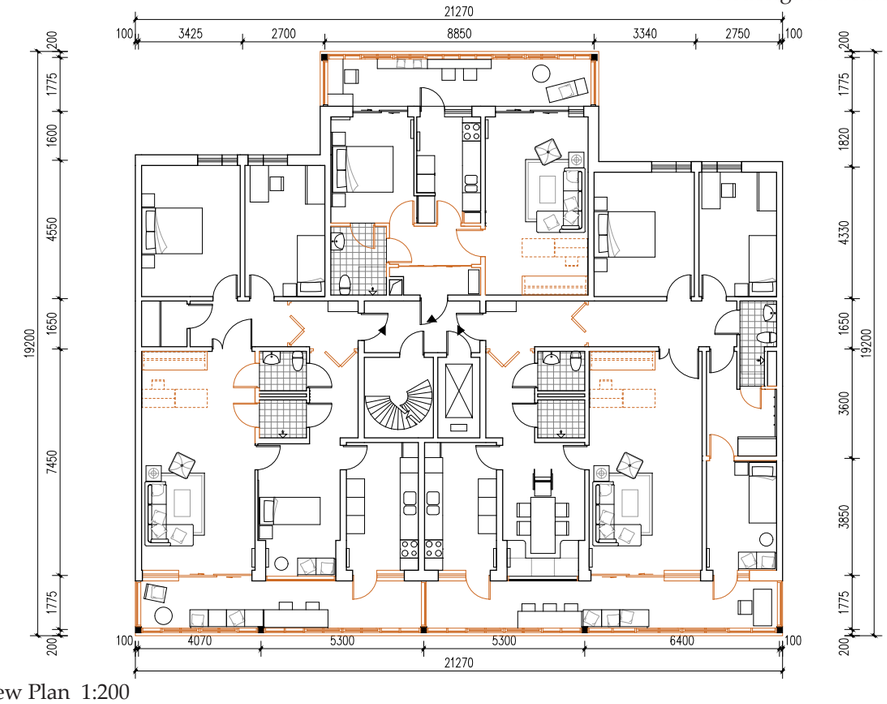
**Figure 57**

*Apartment Type 1, 2, 3*




Existing Plan 1:200

Redesigned elements



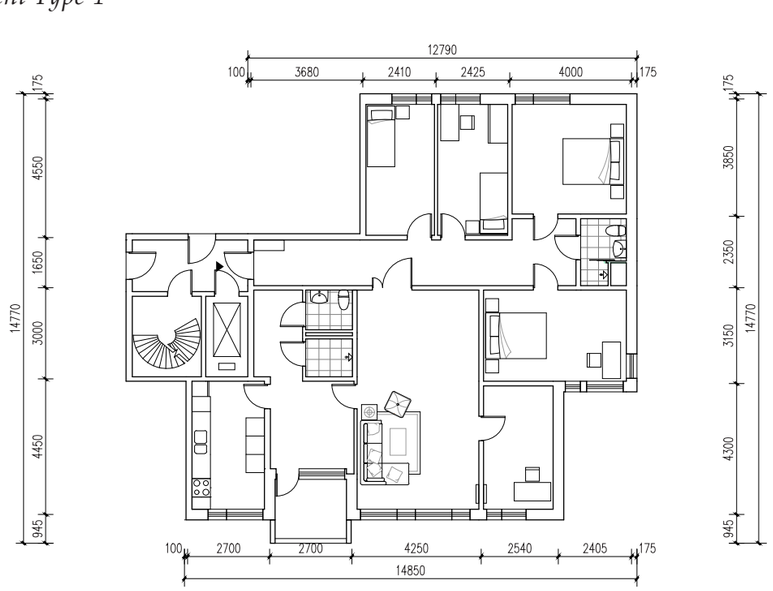

New Plan 1:200





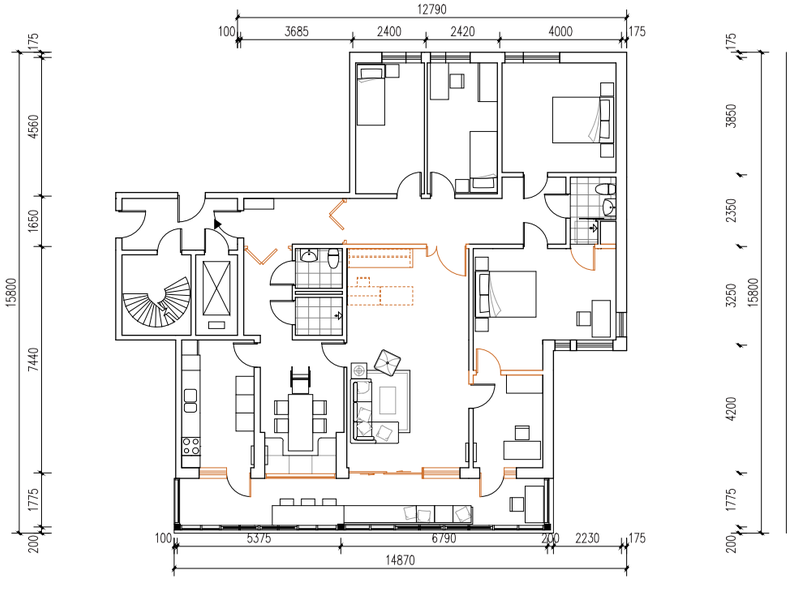
**Figure 58**

*Apartment Type 4*




Existing Plan 1:200

Redesigned elements




New Plan 1:200

## Functional Transformation - Apartment Type 1

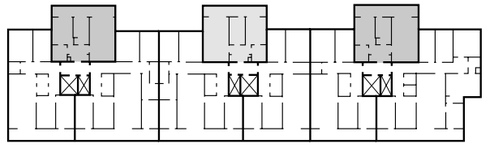
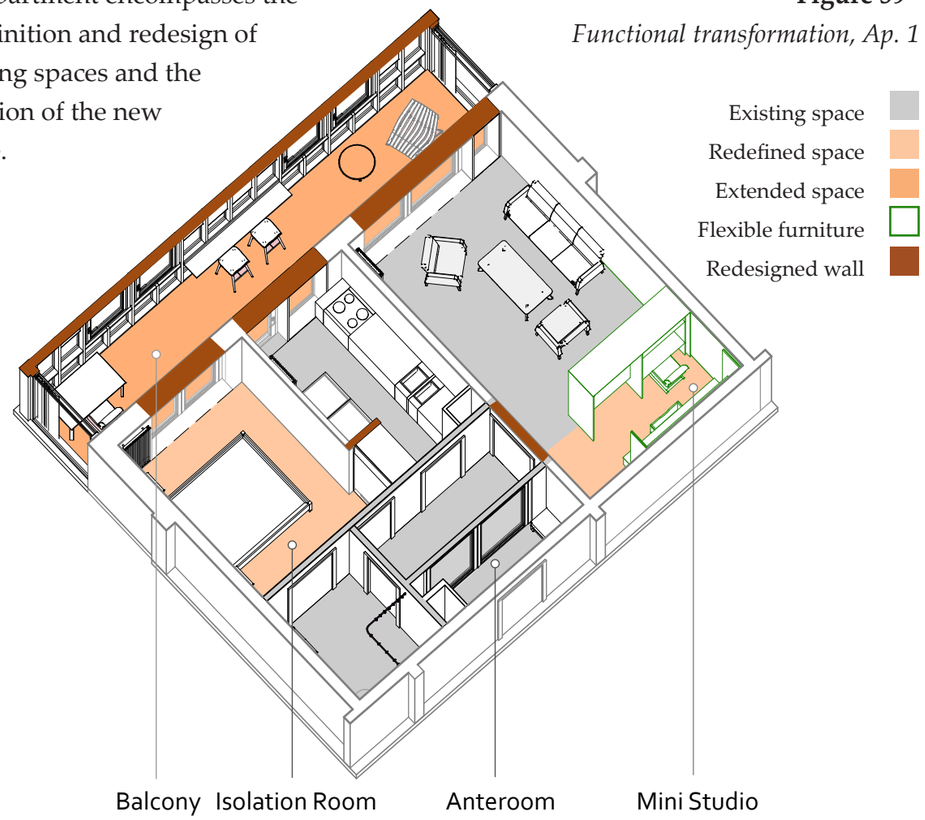


**Figure 59**
*Functional transformation, Ap. 1*

The functional transformation of the apartment encompasses the redefinition and redesign of existing spaces and the addition of the new space.




The redefinition of existing spaces includes:

- Adding an anteroom that can be closed during the pandemic
- Redesigning the existing living room's function
- Adapting of the existing bedroom to an isolation room

The addition of new space refers to the balcony. When a household member is confirmed to be infected, it serves as part of a separated circulation, distinguished from the existing one, for the infected person placed in the isolation room. When every household members are uninfected with the virus, the balcony design provides a better view of the apartment, more space for leisure activities and work, and reduces the residents' sense of isolation and congestion. The linear space is fully unitilized by containing activities according to the adjacent existing rooms. The glass wall of the balcony also provides the possibility for the residents to have visual communication with their neighbors if they wish.





## Zoning and Design Solutions - Apartment Type 1

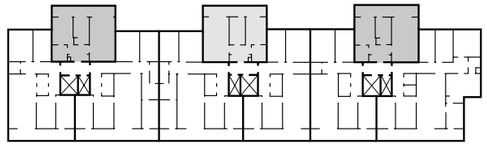
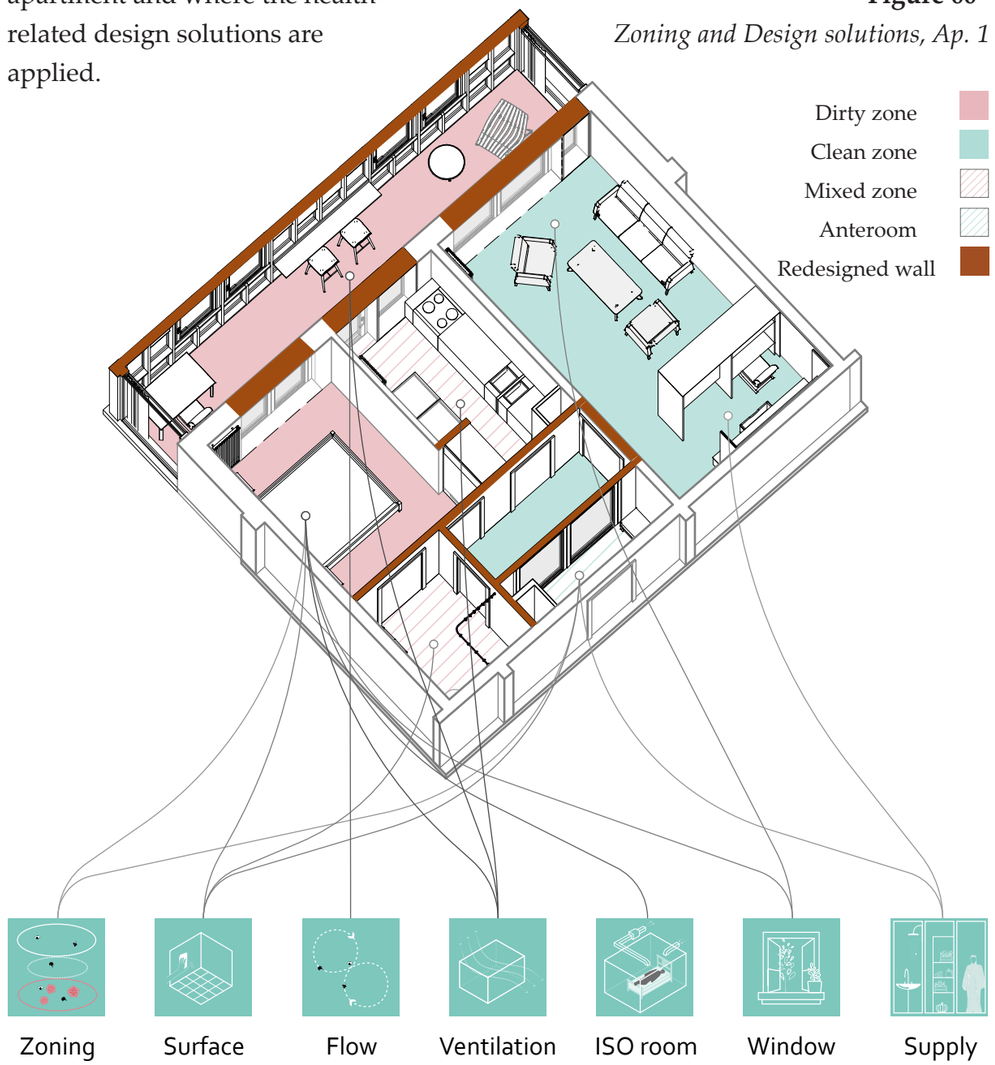


**Figure 60**
*Zoning and Design solutions, Ap. 1*

The illustration shows the zoning of the apartment and where the health-related design solutions are applied.




The zoning of the apartment follows the previous flow and zone analysis. Based on that, design solutions are applied to reduce the household's infection risk and keep the residents' mental health. Design solutions related to infection control are essential in the dirty zone and mixed zone. Meanwhile, in the space where people spend much time, including the isolation room and living room, having a window that has a view outside helps heal the residents mentally.

## Functional Transformation - Apartment Type 2

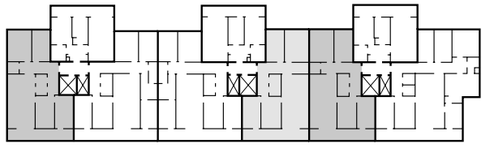
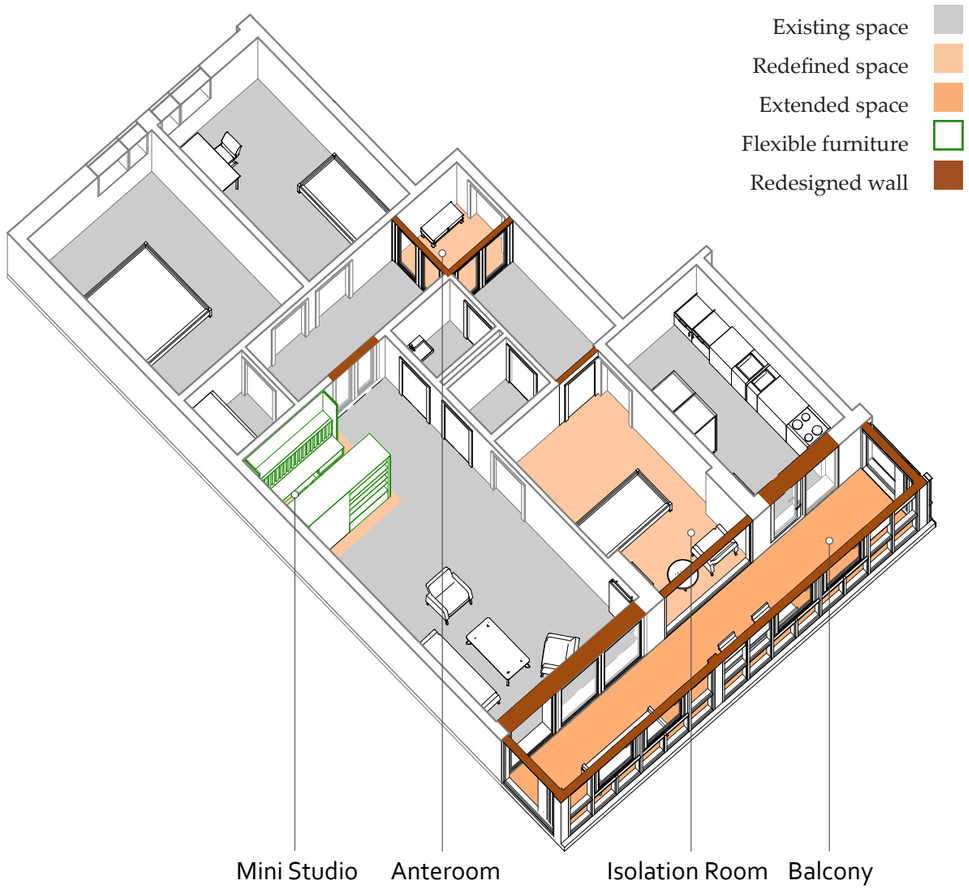


**Figure 61**

*Functional transformation, Ap. 2*




In the current apartment, the redefinition of existing space includes,

- Adding an anteroom that can be closed during the pandemic
- Redesigning the existing living room's function
- Adapting the existing dining room into an isolation bedroom during the pandemic.

The addition of new space is the balcony, which is both a part of the new circulation and an extension of the living room, providing extra social and leisure space.



## Zoning and Design Solutions - Apartment Type 2

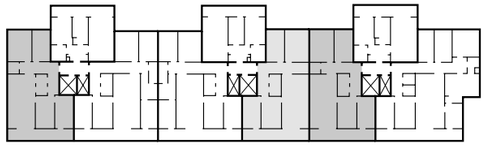
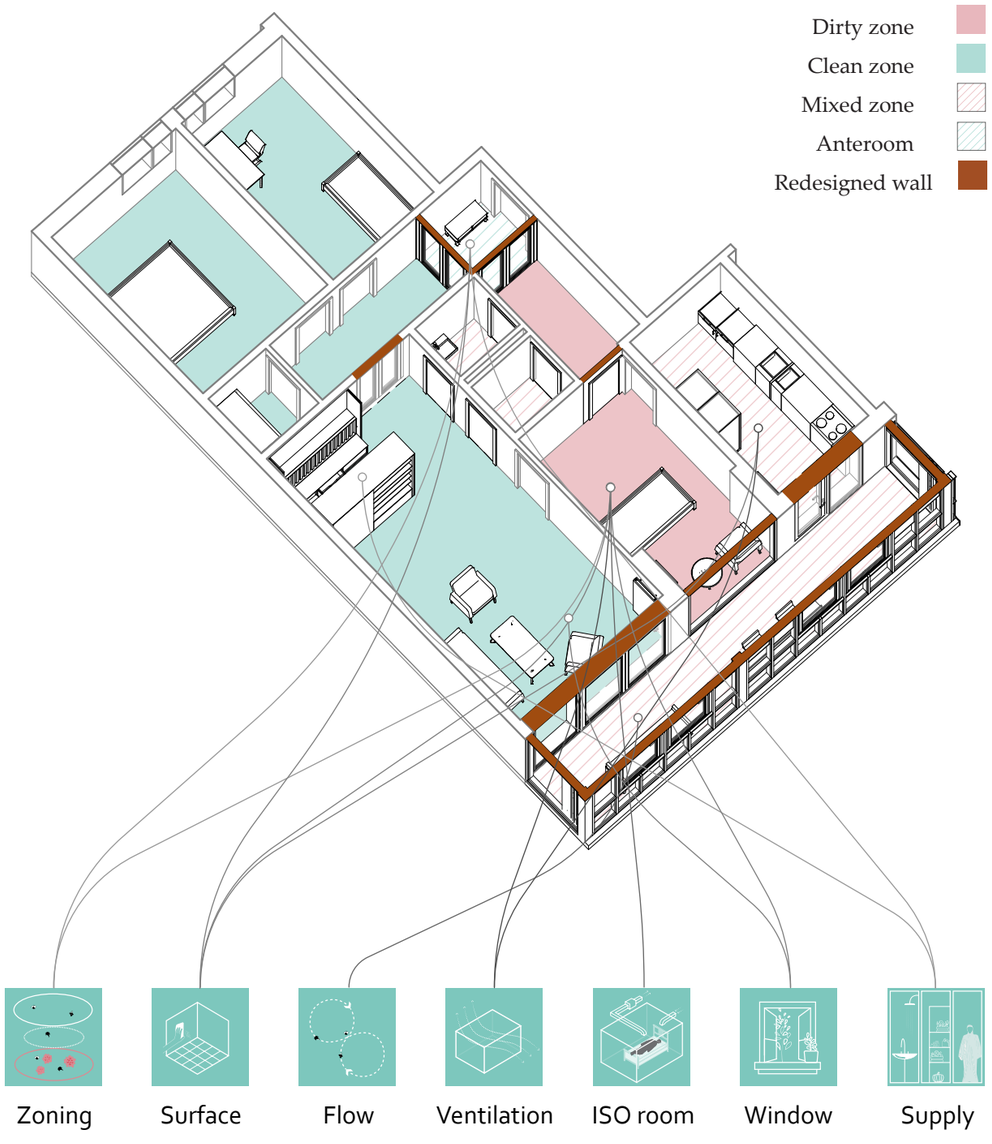


**Figure 62**

*Zoning and Design solutions, Ap. 2*




The apartment redesign creates two separatable circulations in the household, distinguishes the zones and sets up a room that can be transformed to an isolation room. In the new apartment, operable windows ensure ventilation and view outside of the patient room and social space.

## Functional Transformation - Apartment Type 3

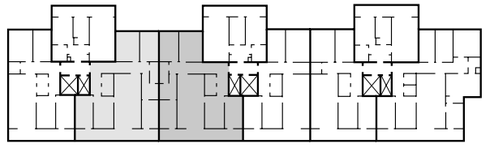
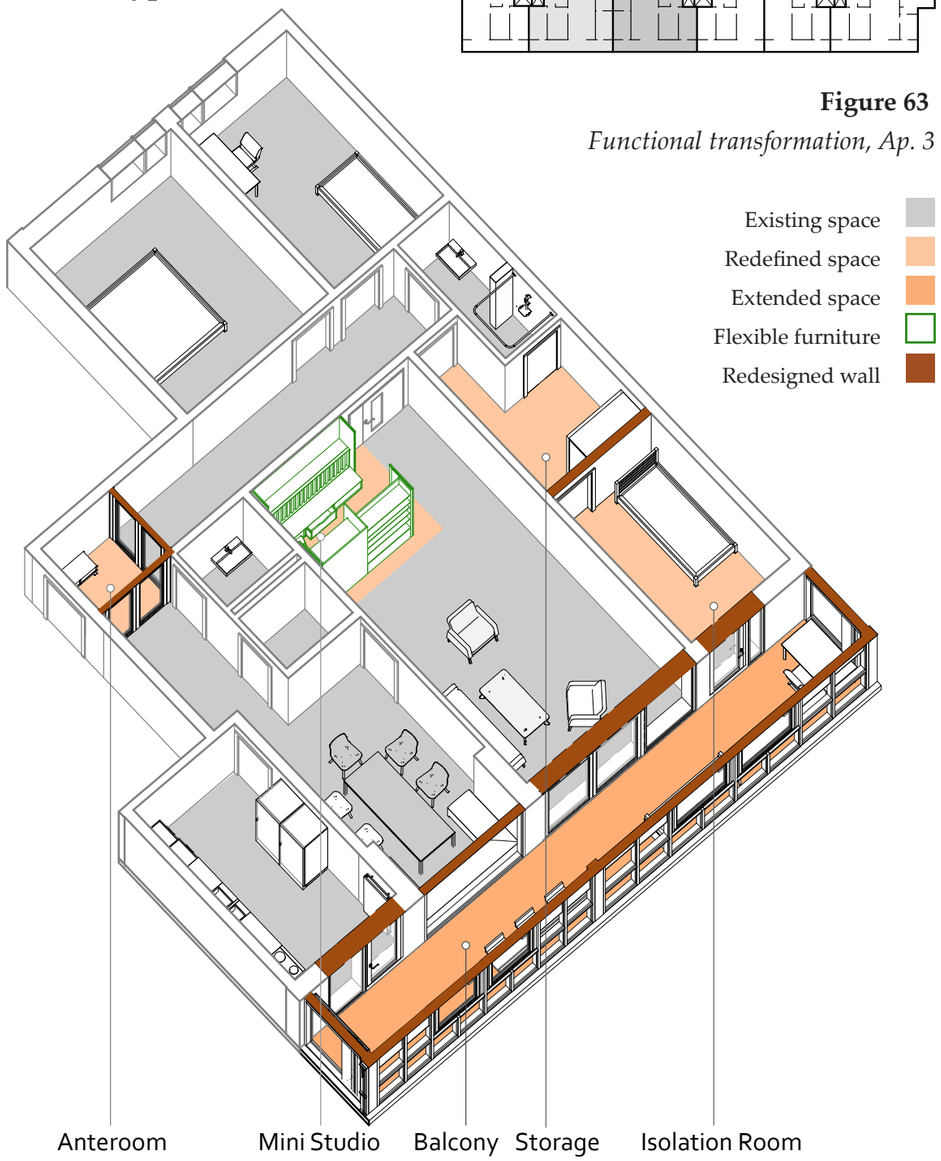


**Figure 63**

*Functional transformation, Ap. 3*




In the current apartment, the redefinition of existing space includes,

- Adding an anteroom that can be closed during the pandemic
- Redesigning the existing living room's function
- Adapting an existing bedroom into an isolation bedroom during the pandemic.
- Enlarging the storage space

The addition of new space, the balcony, is a part of the new circulation for the infected. When no one is infected, it contains multiple kinds of activities.





## Zoning and Design Solutions - Apartment Type 3

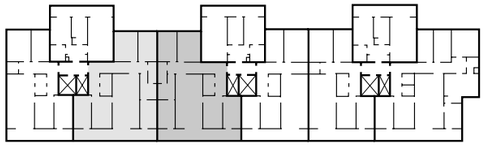
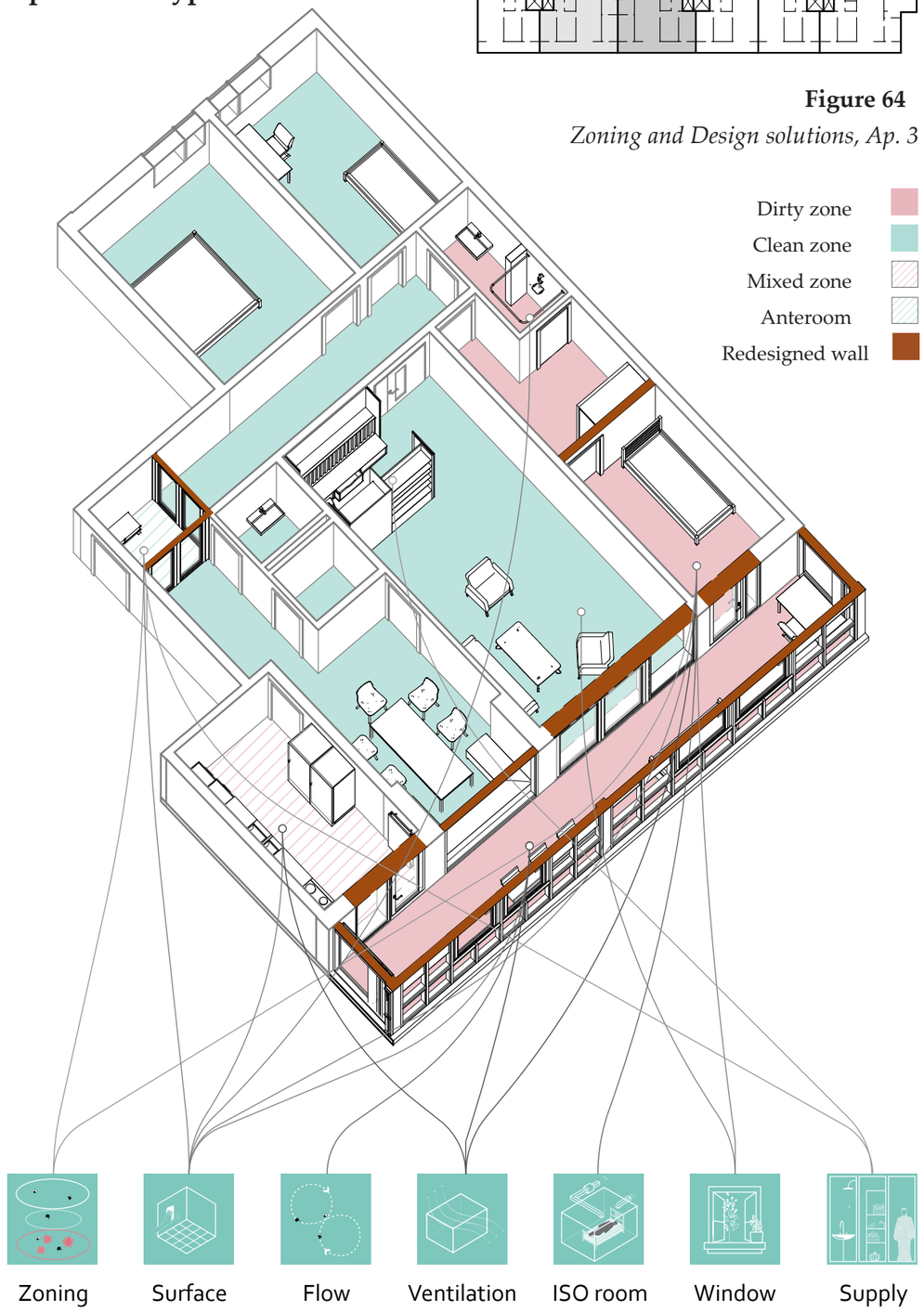


**Figure 64**

*Zoning and Design solutions, Ap. 3*




In the multiple bedrooms in this apartment, the redesign sets up one isolation room and creates an alternative circulation through the balcony.

## Functional Transformation - Apartment Type 4

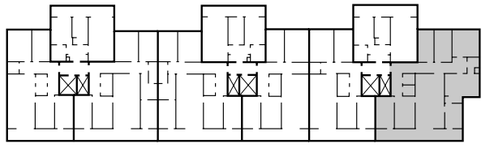
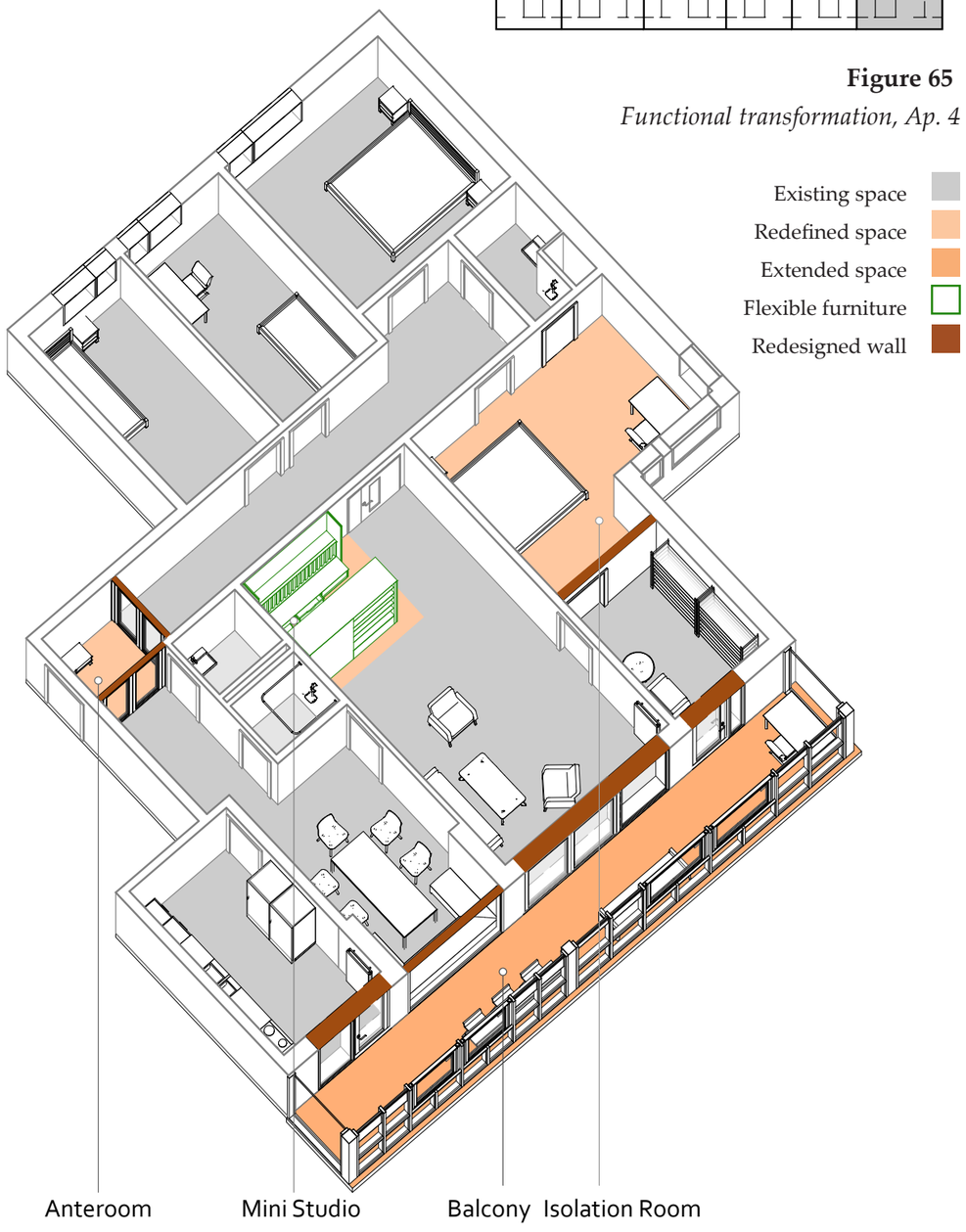


**Figure 65**

*Functional transformation, Ap. 4*




In the current apartment, the redefinition of existing space includes,

- Adding an anteroom
- Redesigning the existing living room's function
- Adapting an bedroom into an isolation room during the pandemic

The new balcony is a part of the new circulation for the infected.





## Zoning and Design Solutions - Apartment Type 4

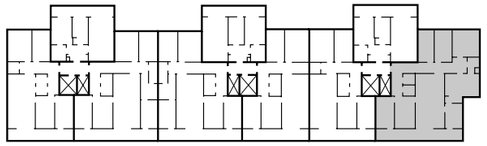


**Figure 66**

*Zoning and Design solutions, Ap. 4*

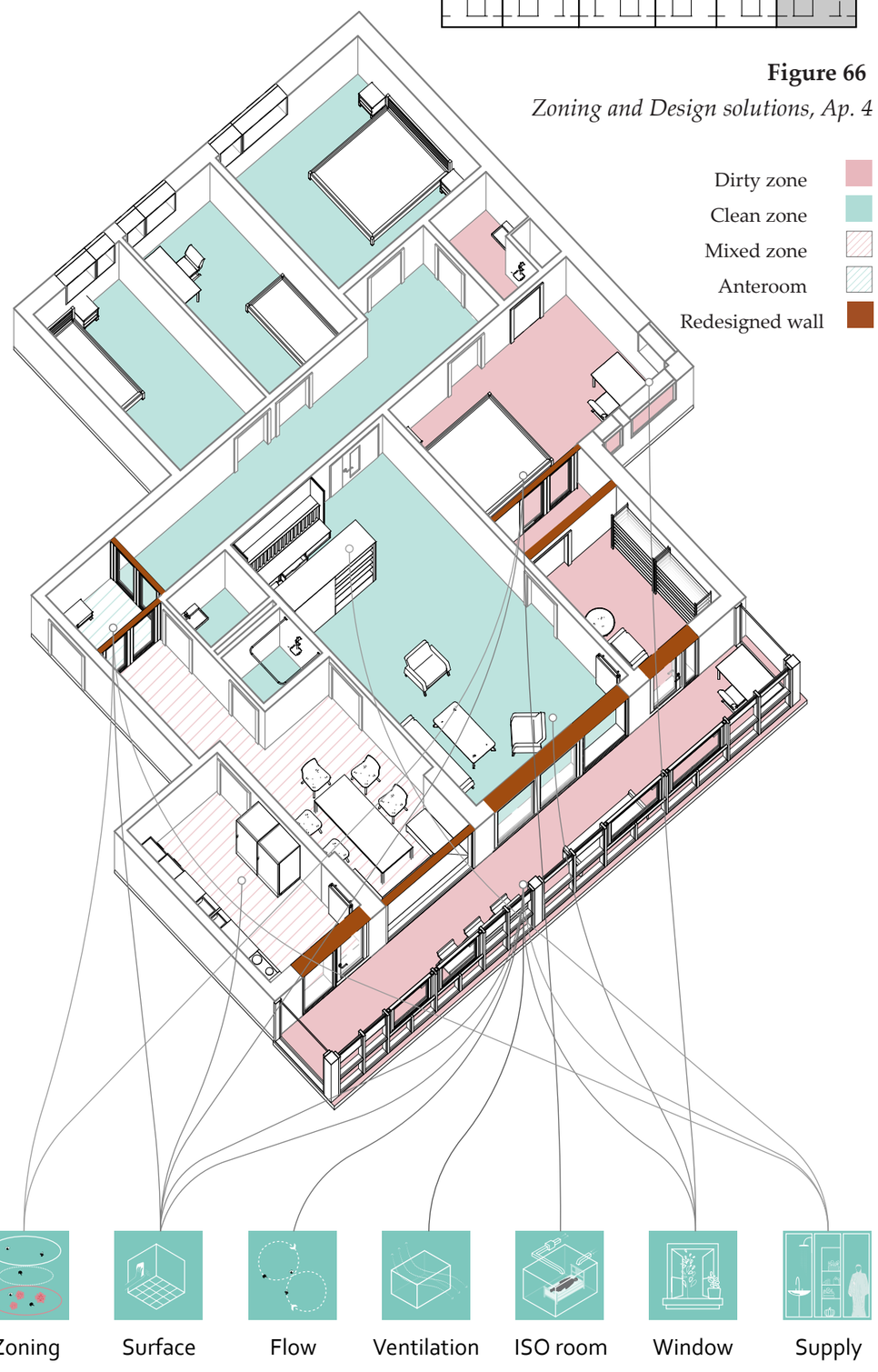
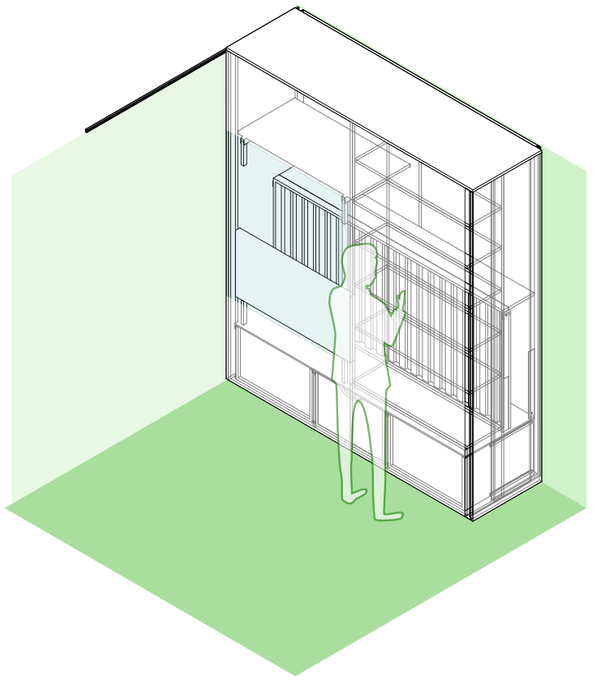


**Figure 67**
*The flexible furniture as a shelf*



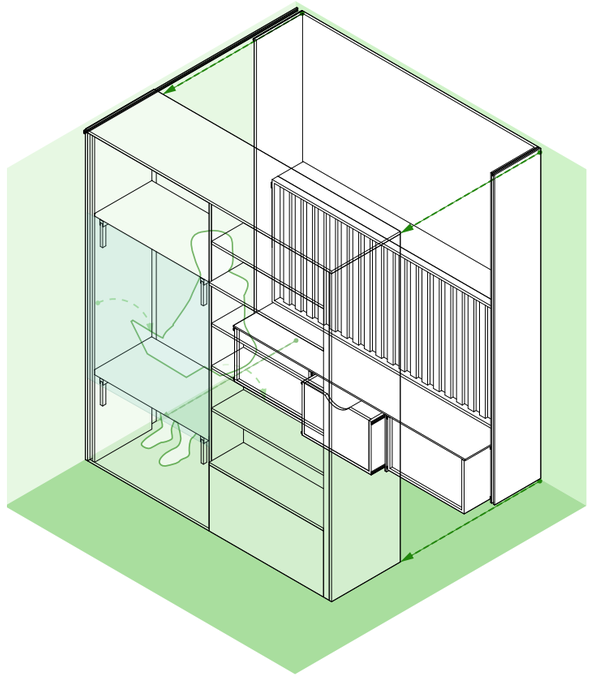
When the household members need to work or study at home during the pandemic, their life satisfaction is likely to degrade due to the work-life mixup and interference between members. The flexible installation is a response to such a situation.

A piece of movable furniture provides an alternative work and sleep space during the pandemic in the limited space of an apartment.

During a non-pandemic period, the installation can be closed and works as a shelf in the living room.



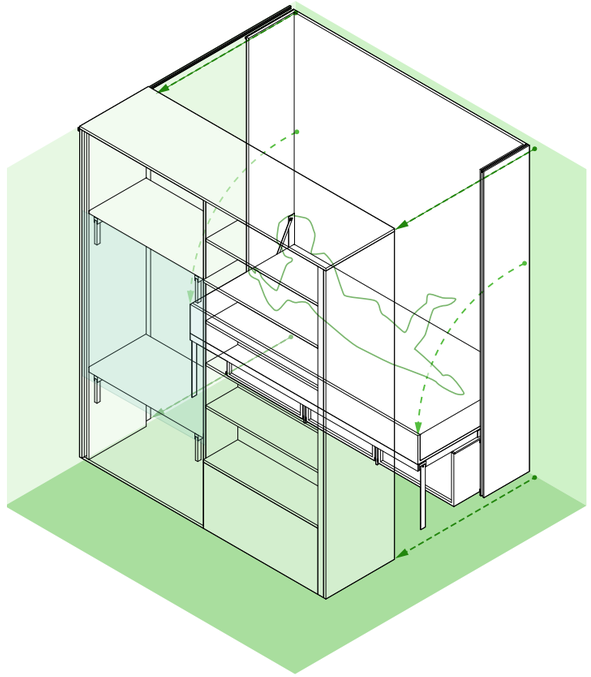
**Figure 68**
*The flexible furniture as a work station*



This furniture will become a partition wall when sliding it, separating an enclosed workstation from the existing living room space. It helps divide the existing space between the space used for leisure and the space used for work.

Glazing

**Figure 69**
*The flexible furniture as a bed*



The installation can also be transformed into a temporary sleep space, providing an alternative bed when one bedroom turns into an isolation room.

**Figure 70**
*Ground floor plan*

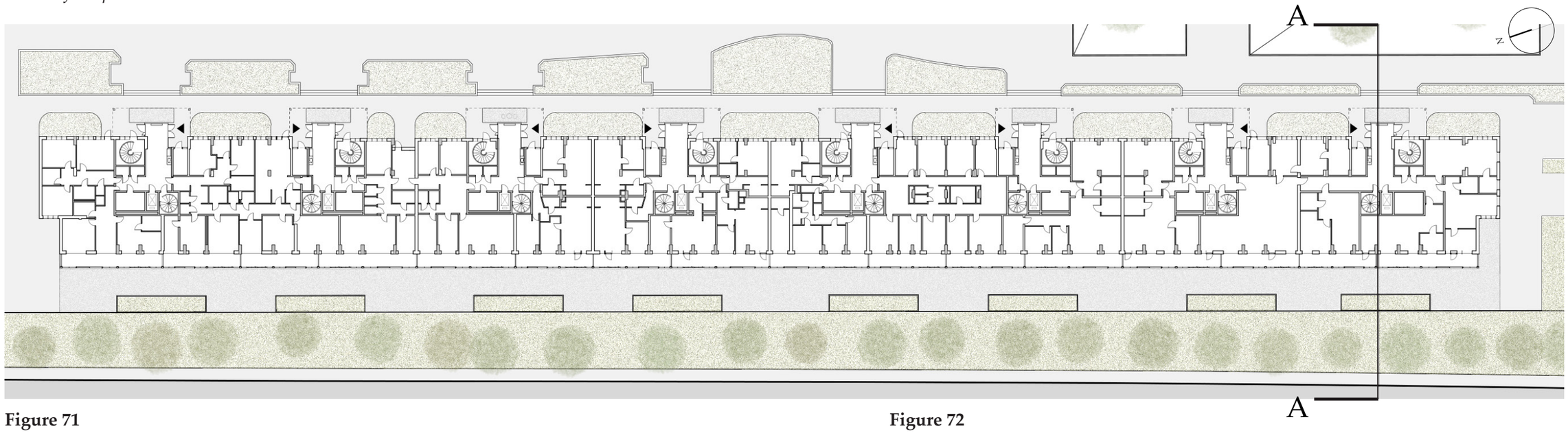
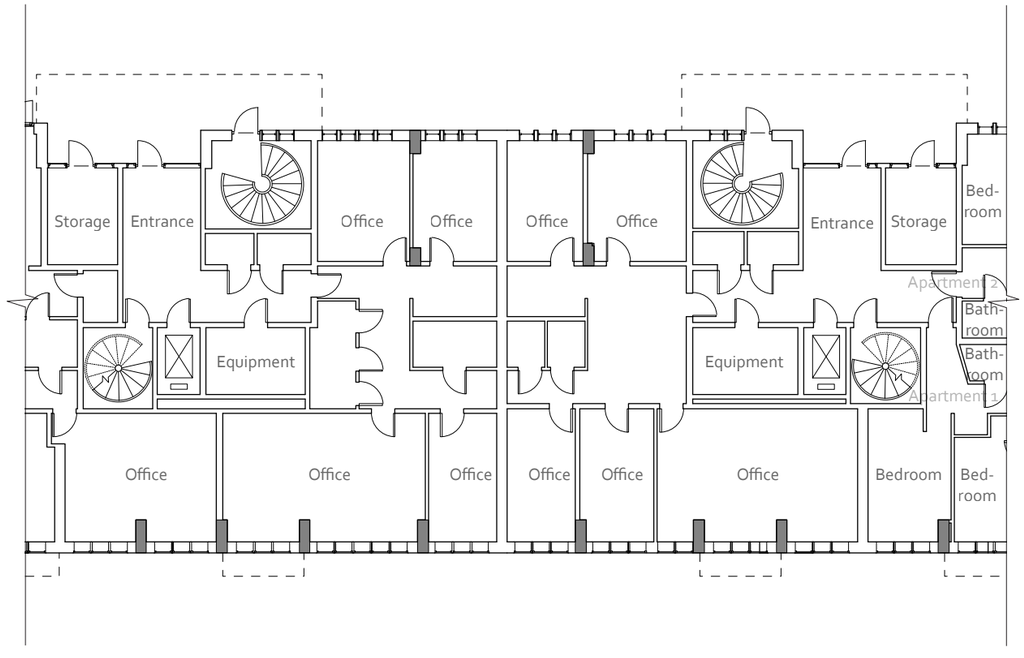
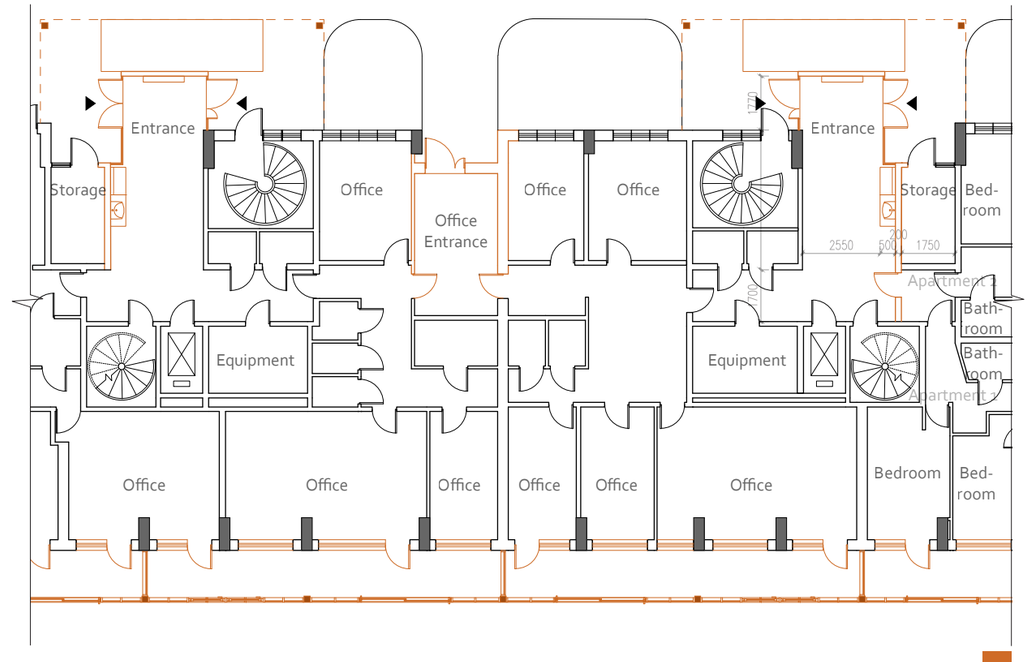



**Figure 71**
*Existing entrance layout*




Illustrated plan 1:200

**Figure 72**
*New entrance layout*




Illustrated plan 1:200

Redesigned elements

## Functional Transformation

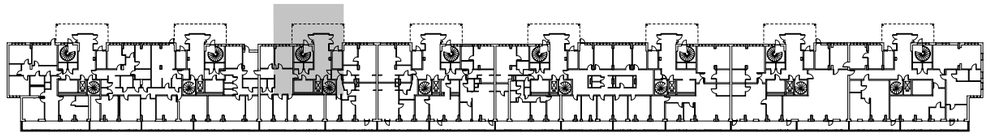
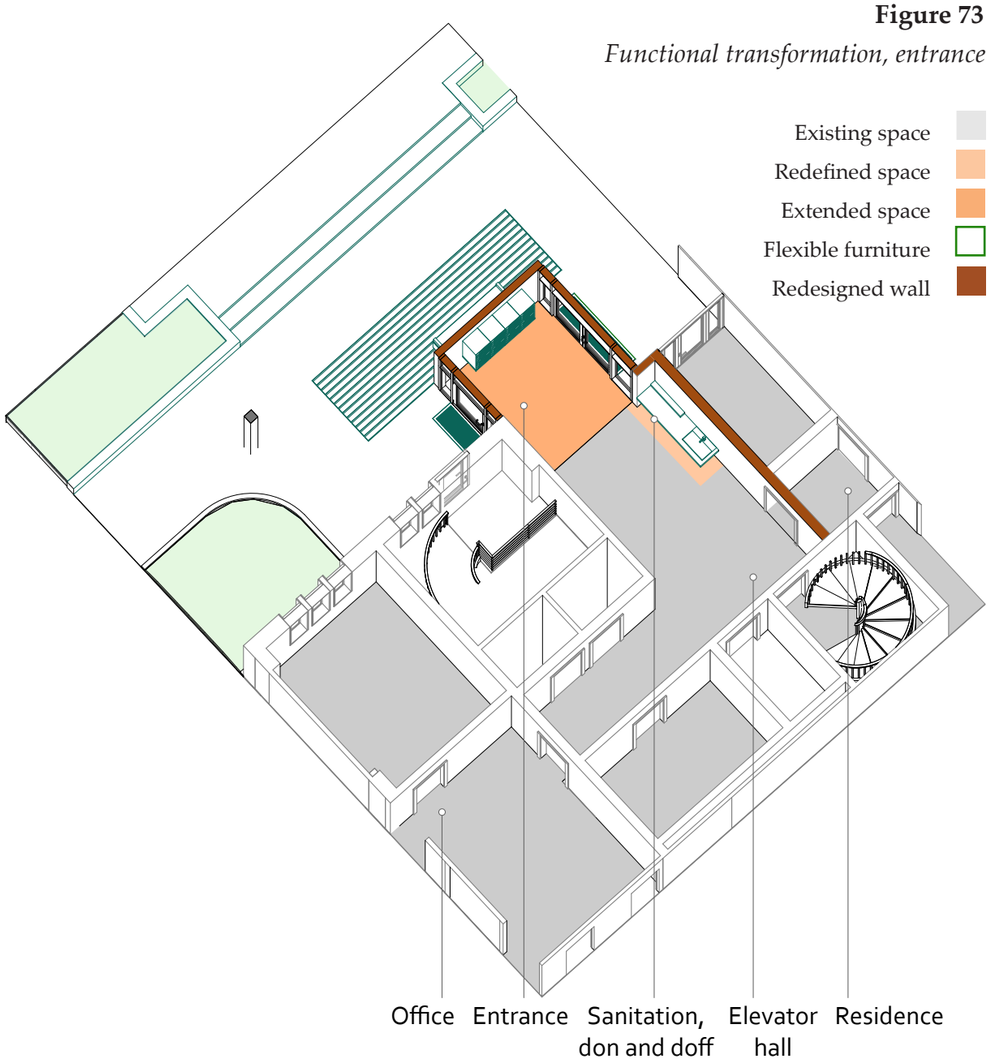


**Figure 73**
*Functional transformation, entrance*




The entrance contains space where people stay and pass through. The redesign of building entrance includes,

- Enlarging the waiting hall to provide larger space for social distancing
- Implementing a sanitation, and PPE don and doff zone.
- Creating a zone with natural ventilation.
- Separating the area used by the first floor residents and others.





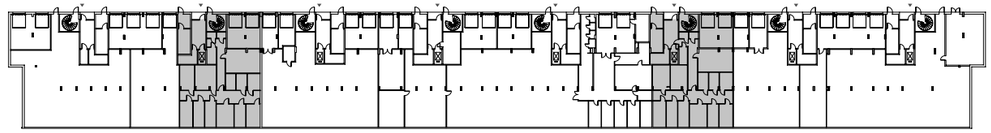
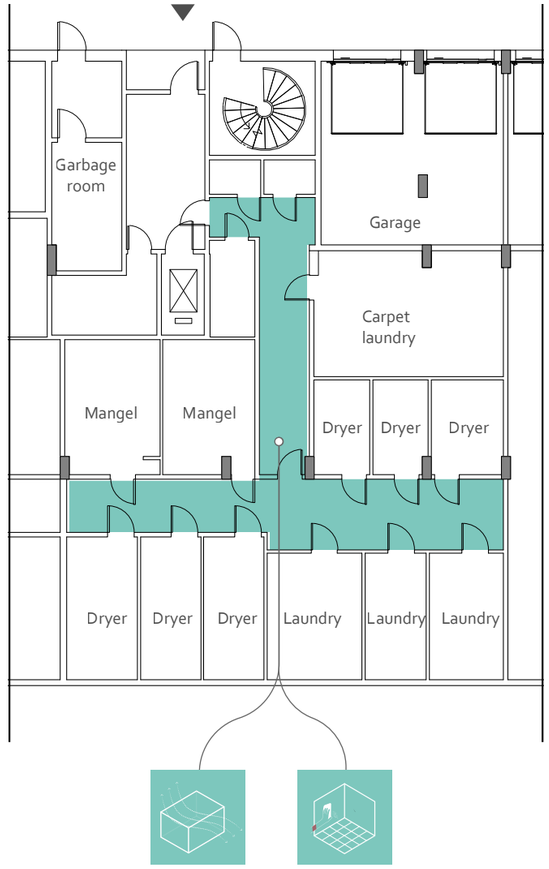


**Figure 74**
*Plan of the laundry rooms*




Illustrated plan 1:200.

The existing laundry functions locates in multiple independent rooms, which already avoids unnecessary meetings of the residents. The renovation of the laundry should focus on the ventilation and safe material, especially in the corridor.

# MATERIALS

Using safe material in essential places reduces secondary transmission through touching the surfaces. High risk areas must be made of materials that are resistant to mold and bacteria and can withstand wet wiping.

For clean zones in the apartment, the need for materials resistant to viruses is not as demanding, so use friendly material that is suitable for home.

For spaces other than clean zones, including public areas, dirty zones, mixed zones, and anterooms, it is recommended to use materials that are antimicrobial, durable, seamless, non-porous and easy to clean.

**Wood**
Coronaviruses can stay an extended period on wood. The porous material should only appear in the low contaminated risk area, which is the clean zones. The wood can benefit the residents' mental health.

**Fabric**
Fabric can absorb spoiled liquid, which makes it unsuitable for high contamination risk areas. The soft and colorful material can have a good effect on people's mental health.

**Rubber**
The high durability of rubber makes it a common solution for flooring also in healthcare facilities.



**Antimicrobial Paint**
Select paint that can shorten the duration of viruses surviving on it.

**Copper Alloy**
On high-touch surfaces, for example door handles, use copper or its alloys for their antiviral efficacies.



**Acrylic Solid Surface**
The durability and seamless surface of the material makes it a solution for safe furnishing.

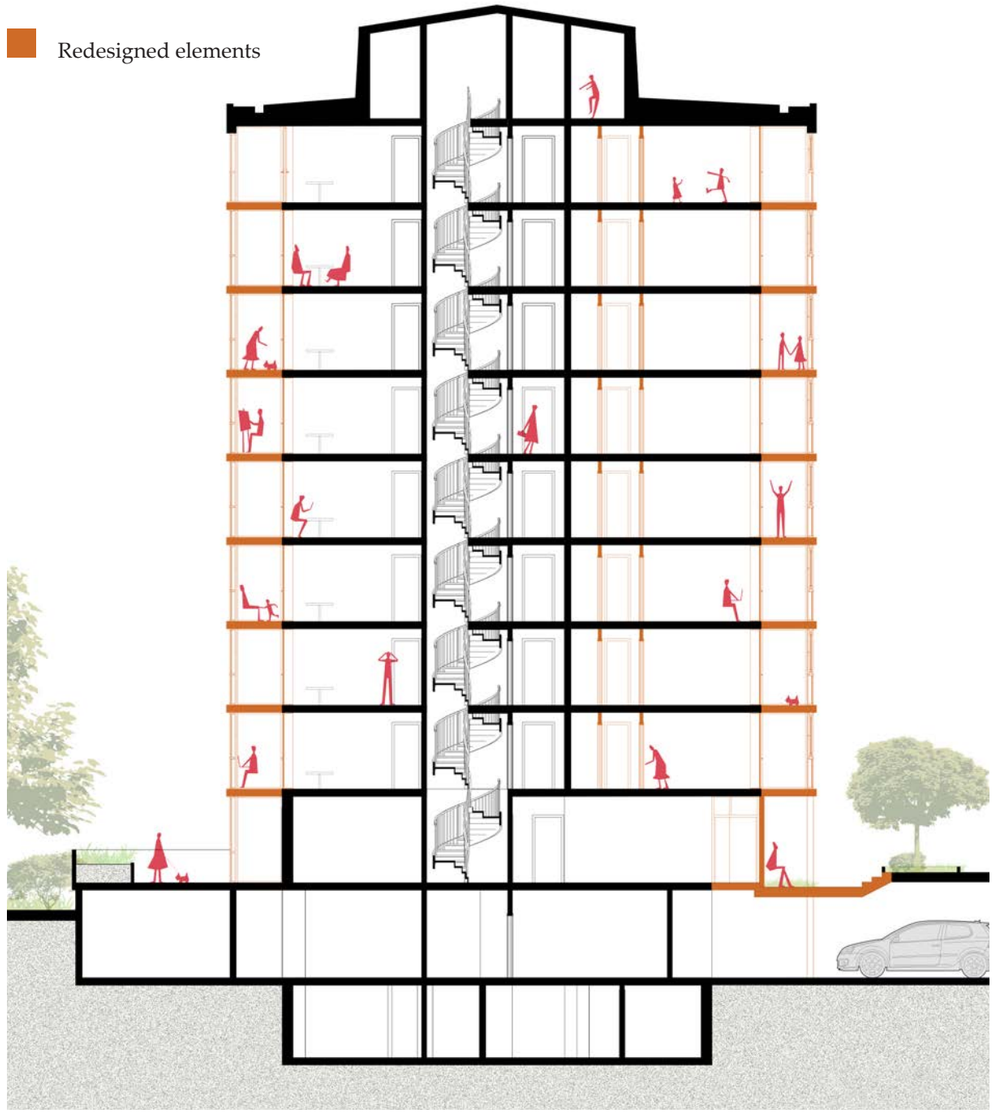


# ADDITIONAL STRUCTURAL ELEMENTS

In order not to load the existing structure, the new balcony is self-supporting.

**Figure 75**
*Redesigned building section A-A*

Redesigned elements



Section 1:200

## FAÇADE

The new façade covers the newly added balcony with the glass curtain wall and conserves the rest part of the existing facade. The windows format follows the existing ones.

**Figure 76**
*West Facade*

Elevation 1:500.

**Figure 77**
*East Facade*

Elevation 1:500.





Urban Residence Response to COVID-19

**Figure 78**
*View over the neighbourhood*

Perspective of the site, map data© Google (2021). Processed.

## Exterior of the main entrance

**Figure 79**
*Exterior view of the main entrance*

## Interior of the main entrance

**Figure 80**
*Interior view of the main entrance*

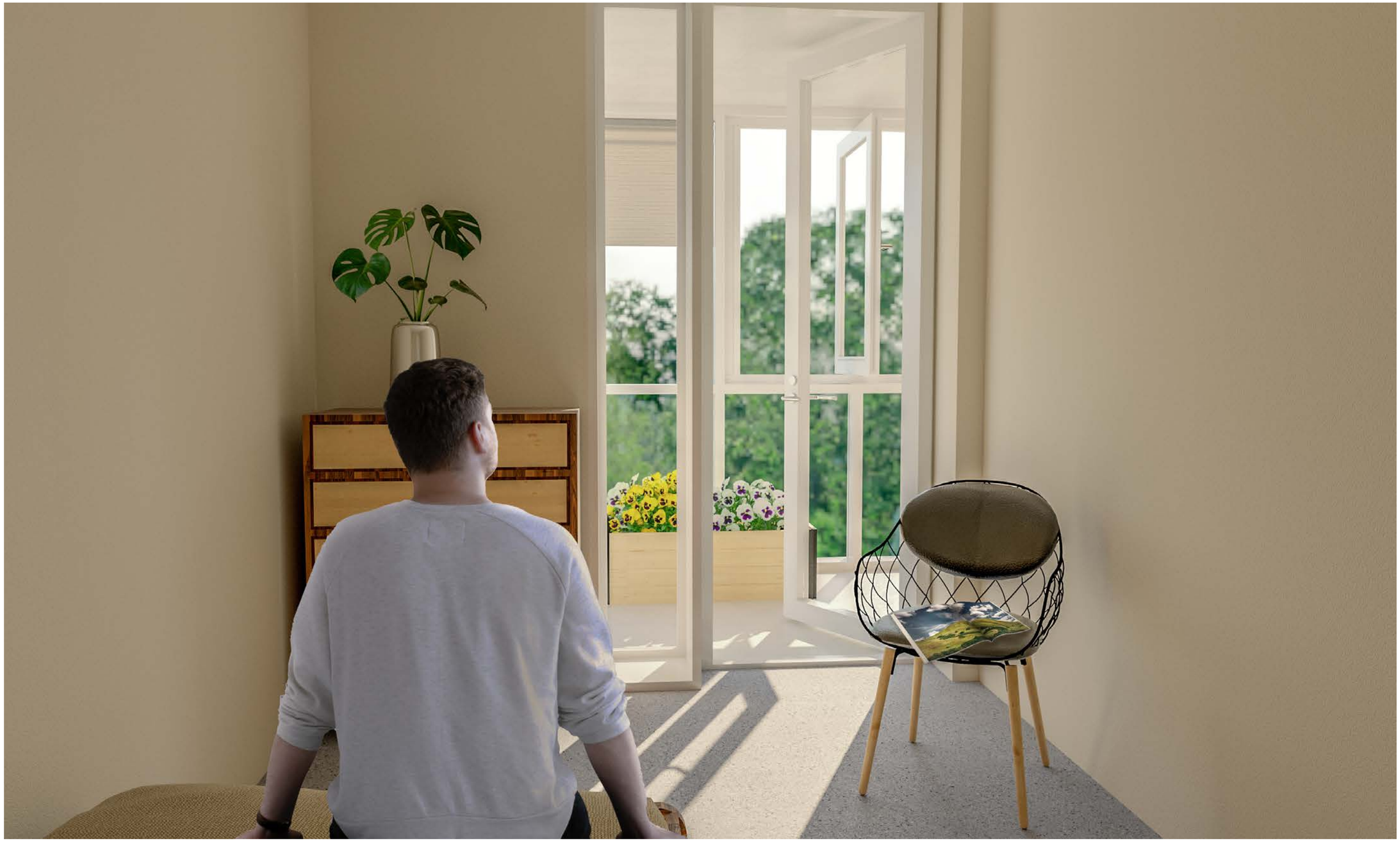




Urban Residence Response to COVID-19

## Isolation room

**Figure 81**
*Perspective view of the isolation room facing the balcony*



## Balcony

**Figure 82**
*Perspective view of the balcony*

## Living room

**Figure 83**
*Perspective view of the living room*

## Flexible mini studio

**Figure 84**
*Perspective view of the flexible mini studio in the living room*

# DISCUSSION





## IMPLICATIONS ON THE SOCIETY

Just like when housing was to be adapted to accessibility standards, resilience to future pandemics could become a requirement in housing design. What are the challenges of such standardization?

### Adaptability to a larger context

The outbreak and continuation of the pandemic COVID-19 have affected building design. As the situation continues, there is a growing concern for a healthy built environment. This thesis work summarizes eight architectural design strategies effective for a healthy housing environment by analyzing how diseases spread and how they are prevented, along with a series of case studies. The renovation project in this thesis is an application of the generalized strategies to a specific building. The approach is possible to adapt to a larger scale of residential building design, reducing the negative impacts of the building on the residents and provide alternatives for the dwellers to act correctly.

The design solution can respond to the times like the current pandemic when the number of infected cases exceeds the capacity of healthcare facilities, and thus home isolation for mild symptoms becomes necessary. From a human-centered perspective, it is critical to reflect on the adaptability and comfort of housing for home isolation. The corresponding architectural design will encourage home isolation for the mild symptoms and uninfected and reduce the pressure on healthcare facilities. Still, they will help reduce the residents' mental stress by providing a more familiar home environment than hospitals, which will benefit patients' healing process.

The solutions to enhance life satisfaction brought up in this project are to rearrange the existing home space to achieve most of their life activities at home without being disturbed or feeling mental stress. Such will minimize the inconvenience and anxiety caused by the pandemic by mitigating the impact of the home working/studying policy on residents' lives during the exceptional period.

The reflections on architecture in the context of a pandemic inspire architectural design to take a healthy built environment on an elevated priority. The design solutions from this thesis can be brought to a larger context of non-healthcare facilities, for example, to provide enough space for social distancing and free movement where people may gather, to integrate sanitation facilities into public space design, and to design corridors that

reduce congestion, according to the context. In this way, it will end up to diminish the conflict between pandemic restrictions and amenity, reduce the cost of people complying with the protocols, and thus reduce the social pressure to curb the disease spread.

### Renovation cost versus rental cost

One topic worth studying further about the treatment of Covid-19 in homes is how applied solutions are in balance with the rental cost after renovation. Excessive renovations mean that residents may be forced to move as a result of increases in rental costs. The question to take further is thus how high a price you want to put on an infection-reducing environment. Nor is there an all-or-nothing principle. It would be possible to prioritize differently in the choice of renovation from case to case. The same, of course, applies to the housing price for condominiums.

### Focus on the cause

This design adaptation and accessibility adaptation has points of contact. In Sweden, it is a legal requirement to meet accessibility in new constructions, but there are different ways to specifically meet the requirements. The same can apply to the design adaptation for resilience of future pandemics. The requirement itself can be so open in its wording that there are different ways of redesign. In this way, the focus is on the the cause itself rather than practical solutions, which therefore can be reconsidered and developed over time easier. The design solutions can be recommendations, but no requirements.

### Balance between two needs

This two-part task, to partly meet the need for reduced secondary transmission and at the same time keep the life satisfaction in the household, can be in conflict with each other. The need for isolation will limit the healthy household members need for freedom of movement in the home, specially when many in the household are stuck in home together. However, the design presented focuses on the period when one in the household is infected with Covid-19, and for most people, this period is relatively short. Of course, architecture can not solve all the frustration in the home during this period. Sacrifices are required from both the sick and the healthy. The design has tried to find a balance between these two needs, since the home is not a hospital. The design solutions result from weighing the existing character of the housing and the new requirements arising from the pandemic situation.



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# APPENDIX





## QUESTIONNAIRE

Following are the Swedish and English version of the original questionnaire preview, and summary of all the responds. There are in total 20 participants, 14 in Swedish and 6 in English.

### Outline of the Questionnaire

**DISCRIPTION** Questionniare for thesis project on work, study from home, and the spread of contagious disease.

- **BASIC INFORMATION** — Facts about your apartment.
- **PERSONAL EXPERIENCE** — Personal comfort at home.
  - Function transformation in the dwelling (Renovation, furniture or equipment).
  - Common areas.
- **INFECTION CONTROL EXPERIENCE** — Living in household exposed to COVID-19. Optional.
  *This part is for those who has been exposed to COVID-19 and home isolated.*

# Frågor för examensarbete om hemmaarbete, -studier och smittspridning av virussjukdomar i hemmet

Här kommer en rad frågor riktade mot personer som 1) bor i flerbostadshus och 2) som arbetar eller studerar hemifrån till följd av pandemin Covid-19. Era svar kommer att användas i undersökning för hur bostäder lättare kan fungera för hemmaarbete och -studier, samt hur bostäder kan anpassas för att minska smittspridning av virussjukdomar i framtiden. Era svar är helt anonyma. Inga personuppgifter behöver därför lämnas.

*Required

FAKTA OM BOSTADEN

Lägenhetens storlek *

- < 31 kvm
- 31-40 kvm
- 41-50 kvm
- 51-60 kvm
- 61-70 kvm
- 71-80 kvm
- 81-90 kvm
- 91-100 kvm
- > 100 kvm

Antal medlemmar i hushållet

- 1
- 2
- 3
- 4
- 5
- 6
- 7 eller fler

Antal barn i hushållet (under 15 år)

- 0
- 1
- 2
- 3 eller fler

BEKVÄMLIGHET I BOSTADEN

Vilken träning utövade du innan pandemins början? Gäller all form av fysisk aktivitet. Hur har dina träningsvanor förändrats sedan dess?

Your answer

Hur såg dina sociala mönster ut innan pandemins början? Hur har dessa sociala vanor ändrats sedan dess?

Your answer

Vad brukade du göra för att koppla av i bostaden innan pandemin? Har denna eller dessa akvititeter förändrats sedan dess?

Your answer

A: Blir du stressad till följd av hemmaarbete eller -studier? Varför?

Your answer

B: Om ja på fråga A, vad skulle du vilja ändra/åtgärda för att minska denna stress?

Your answer

A: Känns bostaden trängre efter pandemins början gentemot tidigare? Varför?

Your answer

B: Om ja på fråga A, vilka ytor i bostaden upplevs trängre än tidigare?

Your answer





Har tillgång till egen avskärmning/eget utrymme i nuläget i lägenheten? Om ja, vilket utrymme då?

- [ ] Vardagsrum
- [ ] Sovrum
- [ ] Kök
- [ ] Badrum/toalett
- [ ] Balkong
- [ ] Garderob
- [ ] Annat utrymme

A: Vilket utrymme i bostaden använder du att arbeta/studera i?

Your answer

B: Kan du arbeta ostört i detta utrymme? Om nej, varför?

Your answer

Om du fick förändra bostaden fritt, vad skulle du vilja förändra för att öka livskvaliteten där nu både arbete/studer och privatliv ska inhysas?

Your answer

FUNKTIONSANPASSNINGAR I BOSTADEN (RENOVERING, MÖBLERING ELLER UTRUSTNING)

A: Upplever du att pandemin har begränsat din livskvalitet?

- ◯ Ja
- ◯ Nej

B: Har ni införskaffat utrustning, möbler eller husdjur som reaktion mot pandemins inverkan på din/er livskvalitet? Om ja, vilken?

Your answer

Vilka anpassningar i möblering har du/ni gjort i bostaden för att inhysa hemarbete?

Your answer

Önskar du ökad hjälp eller speciell service under pandemin från din bostadsförening och hyresvärd? Om ja, vilken?

Your answer

## GEMENSAMMA YTOR

Vilka åtgärder har din bostadsförening eller hyresvärd vidtagit för hantering av pandemin i husets gemensamma ytor?

Your answer



Vilka åtgärder hade du önskat att din bostadsförening eller hyresvärd hade vidtaget för hantering av pandemin?

Your answer

Vilka utmaningar ser du för lägenhetshusets gemensamma ytor (trapphus, tvättstuga, entréhall, etc.) under pandemin?

Your answer

## BOENDE I HUSHÅLL MED COVID-19 (VALBAR)

Dessa frågor berör folk som har eller har haft Covid-19 i hushållet.

Hur hanterar ni skräp/avfall från den smittade?

Your answer

Om ni är flera i hushållet, hur undviker ni vidare smitta i hemmet?

Your answer

# Questionnaire for thesis project on work, study from home, and the spread of contagious disease

Here are questions aimed at people who 1) live in apartment buildings and 2) who work or study from home due to the Covid-19 pandemic. Your answers will be used in research into how housing can function more easily for working and studying from home, and how housing can be adapted to reduce the spread of viral diseases in the future. Your answers are completely anonymous. No personal information therefore needs to be provided.

*Required

## Facts about your apartment

Size of the apartment *

- < 31 sq.m.
- 31-40 sq.m.
- 41-50 sq.m.
- 51-60 sq.m.
- 61-70 sq.m.
- 71-80 sq.m.
- 81-90 sq.m.
- 91-100 sq.m.
- > 100 sq.m.

Number of household members

- 1
- 2
- 3
- 4
- 5
- 6
- 7 or more

Number of children in the household (under 15 years old)

- 0
- 1
- 2
- 3 or more

## Personal Comfort at Home

What kind of physical activity would you normally do before the pandemic started? – How did that change since then?

Your answer

What kind of social activity would you normally do before the pandemic started? – How did that change since then?

Your answer

What kind of relaxation activity would you normally do before the pandemic started? – How did that change since then?

Your answer

A: Do you feel stressed because of working from home? Why?

Your answer

B: If yes to question A, what would you like to change/fix to reduce the stress?

Your answer

A: Does the apartment feel cramped after the pandemic started compared to before? Why?

Your answer

B: If yes to question A, which areas at home are perceived as more cramped than before?

Your answer



If you still have your personal space at home, where will it be?

- [ ] Living room
- [ ] Bedroom
- [ ] Kitchen
- [ ] Bathroom
- [ ] Balcony
- [ ] Closet
- [ ] Other room

A: What space at home do you use to work/study?

Your answer

B: Can you work without being disturbed in this space? If not, why?

Your answer

If you could change your home freely, what would you like to change to increase the quality of life in the situation that both work/study and private life are now all at home?

Your answer

**Function Transformation in the Dwelling (Renovation, furniture, or equipment)**

A: Do you feel that the pandemic has reduced your life quality?

- ◯ Yes
- ◯ No
- ◯ Maybe

B: Did you get any new equipment/furniture/pet/... during the pandemic to keep your life quality? If so, what did you get?

Your answer

What adjustments have you made at home to accommodate work life?

Your answer

## Common Areas

What measures has your housing association or landlord taken to deal with the pandemic in the dwelling's common areas?

Your answer

What measures would you like your housing association or landlord to take to deal with the pandemic?

Your answer





Where do you see challenges for the apartment building's common areas (stairwell, laundry room, entrance hall, etc.) during the pandemic?

Your answer

Do you need further help or services from your housing association or landlord during the pandemic? If so, what is it?

Your answer

## Living in Household Exposed to COVID-19 (Optional)

This part for who has been exposed to Covid-19 and home isolated.

How do you handle the waste of the infected?

Your answer

If there are several of you in the household, how do you avoid further infection in the dwelling?

Your answer

## Summary of Responds

Facts About Your Apartment

Question 1. *Lägenhetens storlek?* /Size of the apartment?

| | |
|---|---|
| *< 31 kvm* / < 31 sq.m. | 6 participants |
| *31-40 kvm* / 31 sq.m. | 5 participants |
| *41-50 kvm* / 41-50 sq.m. | 0 participant |
| *51-60 kvm* / 51-60 sq.m. | 3 participants |
| *61-70 kvm* / 61-70 sq.m. | 1 participant |
| *71-80 kvm* / 71-80 sq.m. | 3 participants |
| *81-90 kvm* / 81-90 sq.m. | 0 participant |
| *91-100 kvm* / 91-100 sq.m. | 2 participants |
| *> 100 kvm* / > 100 sq.m. | 0 participant |

Question 2. *Antal medlemmar i hushållet?* /Number of household members?

| | |
|---|---|
| 1 | 6 participants |
| 2 | 11 participants |
| 3 | 1 participant |
| 4 | 1 participant |
| 5 | 0 participant |
| 6 | 0 participant |
| *7 eller fler* / 7 or more | 1 participant |

Question 3. *Antal barn i hushållet (under 15 år)?* /Number of children in the household (under 15 years old)?

| | |
|---|---|
| 0 | 18 participants |
| 1 | 0 participant |
| 2 | 1 participant |
| *3 eller fler* / 3 or more | 1 participant |

Personal Comfort at Home

Question 4. *Vilken träning utövade du innan pandemins början? Gäller all form av fysisk aktivitet. Hur har dina träningsvanor förändrats sedan dess?* /What kind of physical activity would you normally do before the pandemic started? – How did that change since then?

- Gym några gånger i veckan, sedan har ju all vardagsmotion försvunnit nu också.
- Gruppträning 2-3 gånger/vecka. Oförändrat under pandemin.
- Gym. Har helt upphört, nu blir det enbart promenader.
- gym, gruppträning, löpning, padel, promenad. Har slutat med gym/ gruppträning.
- Inga. Gymmar
- Cyklade till jobbet, cyklar nu inte varje dag pga beordrat hemarbete varannan dag
- Mindre träningsgrupper, annars samma
- Simning, löpning, cykling, gym - mer träning till följd av hemmajobb (kan träna på lunch) samt permittering
- Tränade ca 3 gånger i veckan på gym. Nu inget gym utan bara promenader
- Innan tränade jag bara på gym men nu kombinerar jag gym och löpträning
- Tränade ca 5 ggr i veckan på friskis o svettis samt promenader. Tränar nu hemma istället samt promenader
- Före: mest klättring inomhus, daglig cykling till och från jobb, ibland löpning. Efter: mest löpning och ibland yoga/styrketräning, totalt ca 2-6 gånger i veckan
- Take a walk - I have no physical activity now
- take a walk/no physical activity ever since
- Working Sleeping cooking. Nothing changed
- Swimming. Did not go to the pool anymore, was worried about contamination.
- badminton. I stopped because I don't dare to go to the gym.
- Yoga, it hasn't changed

Question 5. *Hur såg dina sociala mönster ut innan pandemins början? Hur har dessa sociala vanor ändrats sedan dess?* /What kind of social activity would you normally do before the pandemic started? – How did that change since then?

- Träffade kompisar nån till några gånger i veckan, nu nån enstaka och endast ute
- Färre sociala sammankomster, mer digitalt umgänge.
- Brukade träffa mycket människor både vardagar och helger. Nu blir det väldigt lite utanför hushållet.
- Träffade vänner ca. 1 gång/månad. Träffas endast i samband med utomhusaktivitet eller padel. Träffar fortf familj som vanligt.
- Man träffas utomhus
- Har börjat umgås mer via text
- Träffar färre människor nu
- Minskade kontakter med vänner och familj

- Mindre. Umgås med ett mindre antal människor. Noga innan träffar äldre.
- Bra innan, nu träffar jag bara närmsta familj
- Träffade vänner hemma hos varandra. Åt ut på restaurang några gånger i månaden. Ute på fik någon gång i veckan. Nu träffas vi framför allt utomhus
- Före: arbete 09-18, träning i klätterlokal 3×vecka, träffa vänner helger.
- Efter: arbete 09-19 (med längre pauser), hemma vardagskvällar och umgås inom kollektivboende, mer närvaro online för samtal med vänner. Mer hemma på helger.
- Meet people at school - online social activity
- dinner together sometimes/no social activity ever since
- I do not attend any social activities
- Going out for fika or drinks in groups, did not do it anymore when pandemic started.
- Game night on Friday. Still continue ~
- Get together with friends, now it has reduced

Question 6. *Vad brukade du göra för att koppla av i bostaden innan pandemin? Har denna eller dessa akvititeter förändrats sedan dess?* /What kind of relaxation activity would you normally do before the pandemic started? – How did that change since then?

- Ser ungefär samma ut
- Kolla film, serier. Samma som innan pandemin.
- Spela gitarr, spela spel med vänner. Nu spelar jag online på.datorn istället för brädspel runt ett bord.
- Streamingtjänster, läsning, måla, pussel etc.. Nej.
- Nej. Tv
- Kolla telefonen, läsa, bada, ingen förändring
- Ingen förändring
- Läsa eller lyssna på podd, har ej påverkats
- Nej
- Samma
- Läsa, titta på tv. Ingen förändring
- Brukar se film både före och efter pandemi.
- Outdoor activity - go to low-population places
- Sleeping
- Read or going out for walks, has not changed since the pandemic except limited access to the library or public places.
- Gaming:) no change
- Walking and shopping, it hasn't changed

Question 7 A. *Blir du stressad till följd av hemmaarbete eller -studier? Varför?* /Do you feel stressed because of working from home? Why?

- Ja, allt är på samma plats, det är svårt att koppla av och svårt att sluta när man borde. Allt blir plugg
- Nej
- Nej, inte stressad pga hemmaarbetet.
- Nej, upplever det främst tvärt om. Kan vara jobbigt med barn hemma som stör.
- Ja men bara för att jag tror att jag har mer tid än tidigare, vilken sällan blir av, istället jobbar man längre.
- Man blir osocial. Deprimdrande att vara i samma miljö
- Ja pga svårare att kommunicera med jobbet, sämre fysisk och psykisk miljö
- Inte direkt men jobbar sämre och saknar det sociala med kollegor
- Svårare att sluta jobba.
- Hemmastudier har minskat min stress faktiskt eftersom jag är mer effektiv
- Kan vara svårare med sysslor som inte känns motiverande när man inte har kollegor nära. Saknar ljuset från att komma mer ut. Små fönster och mörkt rum där jag arbetar. Lättare att jobbet drar över på kvällen. Sämre utrustning (laptop<pc).
- Less interactive work approach
- YES. There are fewer opportunities to talk to people face to face, easier to feel lonely.
- Not at all
- Yes. It's difficult to maintain a routine for working at home.
- A bit... Because of my procrastination. And less physical training.
- Yes, because I cannot meet and interact with people in person

Question 7 B. *Om ja på fråga A, vad skulle du vilja ändra/åtgärda för att minska denna stress?* /If yes to question 4 A, what would you like to change/fix to reduce the stress?

- Ha ett kontor där man kan lämna plugg/jobb när man stänger dörren
- Skulle må bättre av att ha mer utrymme och bättre möjlighet till avskärmad arbete bakom en stängd dörr. Har kontoret i köket i dagsläget.
- work/life balance
- Byta miljö. Gå ut ooch gå
- Jobba på jobbet mer
- Sjölvavstöngade dator
- Skaffa tydliga rutiner kring att gå upp samma tid, jobba effektivt för att bli ledig tidigare. Flyttar snart till ett större ljusare rum - känns viktigt. Fortsätta med regelbunden träning. Så småningom åka till jobbet ett par dagar i veckan när detta blir möjligt
- I need more outdoor accessibility, I prefer working with roommate around me

- To adore a super beauty. Believe me!
- Having separate spaces for working and living could help better with having a routine.
- Sports, and talk with friends.
- Maybe restricted gathering, or Meeting outdoors

Question 8 A. *Känns bostaden trängre efter pandemins början gentemot tidigare? Varför?* / Does the apartment feel cramped after the pandemic started compared to before? Why?

- Ja, hela livet är på samma plats nu
- Nej
- Lite, men inte något som är ett problem.
- Ja, vi har tagit bort köksbordet och ställt dit skrivbord istället.
- nej.
- Ja. Finns datorer, pennor och grejer överallt. Stökigt
- Ja pga att vi är hemma mer ofta pga att vi känner oss begränsade i vad vi kan hitta på så blir dagarna likadana
- Nej, jag har gjort en arbetshörna
- Nej, kanske snarar insett att jag behöver större lägenhet
- Nej, bor själv så det fungerar bra. Har både balkong och uteplats
- Kan ej bedöma. Bor inte på samma ställe före och efter pandemi. Men bostadens egenskaper blir nog tydligare när man är mycket hemma.
- No
- No
- No. No money to have new stuff.
- Not at all, I live alone
- Not at all! I feel so comfortable because I changed the layout and made it easier to shift from working mode to resting mode. It's perfect for my lifestyle:)

Question 8 B. *Om ja på fråga A, vilka ytor i bostaden upplevs trängre än tidigare?* /If yes to question A, which areas at home are perceived as more cramped than before?

- Vardagsrum och kök
- Vardagsrummet.
- Köket främst.
- Allt
- Kök wc vardagsrum
- The kitchen. Originally it is too small.

Question 9. *Har tillgång till egen avskärmning/eget utrymme i nuläget i lägenheten? Om ja, vilket utrymme då?* /If you still have your personal space at home, where will it be?

| | |
|---|---|
| *Vardagsrum* /Living room | 7 participants |
| *Sovrum* /Bedroom | 14 participants |
| *Kök* /Kitchen | 6 participants |
| *Badrum* /Bathroom | 11 participants |
| *Balkong* /Balcony | 4 participants |
| *Garderob* /Closet | 4 participants |
| *Annat utrymme* /Other room | 2 participants |

Question 10 A. *Vilket utrymme i bostaden använder du att arbeta/studera i?* /What space at home do you use to work/study?

- Har bara 1 rum
- Köket
- Vardagsrum
- Vardagsrum
- Vardagsrum eller extra arbetsrum
- Vardagsrum eller extra sovrum
- Vardagsrum/kök
- Vardagsrum
- Köket
- Vardagsrum/kök
- Vardagsrum/kök
- Vardagsrum/kök/sovrum
- Sovrum/kontor
- Living room
- Desk
- Living room
- Mine is a studio apartment so I use the study corner.
- My desk.
- Room

Question 10 B. *Kan du arbeta ostört i detta utrymme? Om nej, varför?* /Can you work without being disturbed in this space? If not, why?

- Ibland
- Nej, 2 personer bor i 1,5. Det går inte att helt skärma av sig.
- Inte längre perioder.
- ja

- Finns ingen yta för det
- Nej jag måste vara ensam hemma, men har även ”vobbat” det funkar varierande bra
- Både och, katten stör ibland och andra saker distraherar
- Ja, kan stänga dörrar.
- Inte vardagsrum på grund av att det är i anslutning till kök
- Nej, sambo
- Ja, bor själv
- Oftast. Mina roommates jobbar på sina rum eller inte i lägenheten.
- no, because I share the space with others
- NO. I’m noise maker.
- Yes Because I live alone
- I can.
- Yes, but sometimes there are noises from decoration and it’s annoying.
- Yes

Question 11. *Om du fick förändra bostaden fritt, vad skulle du vilja förändra för att öka livskvaliteten där nu både arbete/studer och privatliv ska inhysas?* /If you could change your home freely, what would you like to change to increase the quality of life in the situation that both work/study and private life are now all at home?

- Balkong, separat kontor
- Ett avskilt kontor där man kan stänga dörren om sig.
- Hade behövt större lägenhet med fler rum. Möjlighet till ett dedikerat kontor.
- trädgård, markplan för att kunna träna hemma. större kök/matplats att umgås i.
- Privat yta, mysig yta. Ha tillgång till sol, träning. Öppna ytor
- Eget rum för hemarbete med utsikt mot skogen
- Balkong så det är enkelt att få en tydlig paus och luft
- Bättre isolering mellan lägenheter och mot trapphus
- Ett till avskilt rum
- Adderat ett sovrum
- Möjligtvis inrätta ett litet kontor
- Arbetsplats direkt vid fönster med anslutning till tyst sida (för att kunna jobba med öppet fönster), större sovrum (enda på riktigt privata utrymme). Saker jag har och just nu uppskattar: kök som eget rum, ej i vardagsrum, kan arbeta i vardagsrum samtidigt som någon lagar mat.
- Shared work place and private bedroom
- Have a big TV. really really need.
- Buy another bigger apartment
- I would love a semioutdoor space with lots of light coming in with flexible furniture to set up space for work/study and relax during break or open and soak the sun in summer.
- I can work and have private life at the same time, guess it’s easier for people who live alone.
- I stay in a student apartment, so I don’t see much difference in the use before and at present due to the pandemic.

Function Transformation in the Dwelling (Renovation, furniture, or equipment)

Question 12 A. *Upplever du att pandemin har begränsat din livskvalitet?* /Do you feel that the pandemic has reduced your life quality?

| | |
|---|---|
| *Ja* /Yes | 15 participants |
| Nej /No | 3 participants |
| Kanske /Maybe | 2 participants |

Question 12 B. *Har ni införskaffat utrustning, möbler eller husdjur som reaktion mot pandemins inverkan på din/er livskvalitet? Om ja, vilken?* /Did you get any new equipment/furniture/pet/... during the pandemic to keep your life quality? If so, what did you get?

- Hemarbetsplats. ergonomisk bänk
- Installerat kontor
- Ja, skrivbord för hemarbete.
- Ja, träningsscykel.
- Köpte en yogamatta för träning hemma, kommer köpa extra datorskärm för bättre arbetsställning och dubbla skärmar, skulle gärna ha tillgång till skrivare (men kommer inte köpa)
- Möbler
- Nej
- nej
- Lights
- Yes! Switch, juicer.
- No.
- Yes, more games
- No

Question 13. *Vilka anpassningar i möblering har du/ni gjort i bostaden för att inhysa hemarbete?* /What adjustments have you made at home to accommodate work life?

- Inga utöver nya

- Skönare stol
- Främst skrivbord och mer förvaring.
- kontorsmöbler
- Inget. Ligger i soffan och jobbar
- Egenbyggd hemarbetsplats
- En bokhylla är nu arbetsplats, har tagit hem kontorsstolen så den tar plats
- Nytt skrivbord och stol
- Satt in ett kontor
- Inga
- Strykbräda som ståskrivbord, annars inget
- Inga ännu, men kommer snart flytta till ett annat kollektiv med större sovrum och bättre arbetsplats.

Common Areas

Question 14. *Vilka åtgärder har din bostadsförening eller hyresvärd vidtagit för hantering av pandemin i husets gemensamma ytor?* /What measures has your housing association or landlord taken to deal with the pandemic in the dwelling's common areas?

- Stängt ner allt gemensamt
- Inget
- Vet ej
- Lappar i trapphusen med uppmaning till att stanna hemma vid symtom och hålla god handhygien.
- Skrivbord
- inga utöver restriktionerna
- Inga, mer än att besök från värden är begränsade
- Inga men samtidigt inga gemensamma ytor
- Inget vad jag vet
- Inga
- Cleaning
- No measures.
- Shut down some common facilities temporarily like the pool, the rooftop.
- I don't known
- All common areas are closed

Question 15. *Vilka åtgärder hade du önskat att din bostadsförening eller hyresvärd hade vidtaget för hantering av pandemin?* /What measures would you like your housing association or landlord to take to deal with the pandemic?





- Lösa så att vissa saker kan utnyttjas ändå fast i begränsad mängd
- Gratis Wi-Fi under en period då fler befinner sig och arbetar hemma.
- inga specifika
- Ingenting
- Vet ej
- Inget särskilt
- Inga ytterligare
- Kanske råd om hur vi ska uppföra oss i hissen
- Kan inte komma på något, bor i en liten trappuppgång i ett lugnt hus
- Inga
- More hygiene equipment in the common area
- No need. I know better than them.
- More cleanliness in regards to circulation spaces, lifts, stairs, corridors.
- Strict disinfection
- Sanitize often

Question 16. *Vilka utmaningar ser du för lägenhetshusets gemensamma ytor (trapphus, tvättstuga, entréhall, etc.) under pandemin?* /Where do you see challenges for the apartment building's common areas (stairwell, laundry room, entrance hall, etc.) during the pandemic?

- Svårt när man möter folk, man kan ju behöva röra sig i trapphus och tvättstuga trots att man är sjukt
- Inga
- Bor många oroliga äldre i huset. Många som är rädda för att gå för nära varandra.
- att det är gemensamma ytor
- Inget
- Jobbigt att gå ner i trappan (hiss finns ej) med sjuka barn när grannar i riskgrupp kommer ut ur dörrarna
- Städning av gemensamma ytor och kontaktytor
- Kanske lite trångt vid entré ibland
- Många trängs i hissen
- Inga I nuläget. Tvättstuga I annat hus som jag inte nyttjar. Inte så mkt folk i entré och trapphus. Ingen hiss
- Inga. De flesta har egen tvättmaskin. Finns ingen hiss så ingen risk för smitta där. De flesta lämnar huset vid olika tider så ingen trängsel
- Stairwell, lift, long and narrow corridor
- No challenges.
- More mainanence support.
- I think it's okay, there are usually not a lot people.
- Lift, laundry and closed parking

Question 17. *Önskar du ökad hjälp eller speciell service under pandemin från din bostadsförening och hyresvärd? Om ja, vilken?* /Do you need further help or services from your housing association or landlord during the pandemic? If so, what is it?

- Nej
- Gratis Wi-Fi under ett tag.
- nej.
- Arbetsstol!
- Nej, inte personligen
- NO.
- They are not providing that much on-site repair service. We have to repair something by ourselves.
- Sanitize common areas

Living in Household Exposed to COVID-19. Optional.

Question 18. *Hur hanterar ni skräp/avfall från den smittade?* /How do you handle the waste of the infected?

- som vanligt avfall
- Slängde i vanliga sopor alternativt spolade ner i toalett

Question 19. *Om ni är flera i hushållet, hur undviker ni vidare smitta i hemmet?* /If there are several of you in the household, how do you avoid further infection in the dwelling?

- följer restriktioner coh riktlinjer
- Bor själv





CHALMERS
UNIVERSITY OF TECHNOLOGY

Spring 2021

Urban Residence Response to COVID-19:
Decrease desease transmission and maintain life satisfaction

Chalmers School of Architecture
Department of Architecture and Civil Engineering

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Architecture And Urban Design
Xue Zeng
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Examiner: Göran Linddahl
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Urban Residence Response to COVID-19