DESIGNING LIVABLE ARCHITECTURE
IN A RAPIDLY DENSIFYING
URBAN ROTTERDAM

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2021 - 2022

Contents

1. Introduction

1.1/ Personal motivation

Since the beginning of my studies, I was fascinated by architecture aimed towards housing. The ability an architect possesses to think about, predict and design for the dwellers' needs is something I always found almost magical. As a soon-to-be young professional, I was also observing the housing market. As Greece recovered from a 10 year recession, housing prices -especially in cities like Athens and Thessaloniki- kept going up, something that in the beginning, I found logical; The western world lives in an era of mass urban densification. Countries and cities around the world are going through massive housing crises, where demand drastically overcomes the supply for adequate housing, driving the housing market prices to extremes. At the same time, especially in Europe, land is scarce. That, in addition to other factors such as aggressive market policies and inflation means that plot prices are also rising dramatically. [1] Then I saw the raw consequence of this seemingly never-ending price increase; people forced to move because they were unable to afford the sharply rising rent prices.

After graduating from my masters' degree in Greece and dabbling into the professional world, I realized that in many cases, architecture is in fact part of the problem; I realized that architecture is affected by two large pulling forces; one dynamic force stems from the architects ethics and ideals- which for this argument we'll assume are based on inclusivity and fairness- while the other comes from the actual urban development; a world governed by regulations, politics and profitability margins. These two forces do not always align, as practice differs greatly from theory. When architects theorize about architecture, they talk about social and political values, they investigate the effect space can have on humans, they hold a critical view towards architectural creation. However, when it comes to practice, where an architect's design is held accountable to a client -be it a private party, a developer or others- there seems to be a switch of incentive. Values and theories give way to profit margins and capital gains. The idealist becomes the economist, trying to fit a design within a tight budget. These news are as old as the commodification of land in the 18th century, however the effect of capital in architectural design has been rapidly increasing since the late 20th century.[2]

The financialization of architecture[3] leads to gentrification and placeless architecture; over designed buildings meant to flaunt the inhabitants' wealth, standing awkwardly, with no regard to their immediate context. One great example being the luxury high-rise towers. Marketed towards overseas investors and housing corporations, these towers drive local market prices sky high, pushing the existing communities away from the center of the metropolis. "…blocks of generic could-be-anywhere towers designed with no sensitivity to climatic or cultural context, with stacks of mono-tenure apartments and barely any affordable housing."[4] Rotterdam is no exception to the rule, where, despite the existence of housing regulations specifically in place to keep the housing market prices under some control, "existing home prices rose strongly by 8.6% during 2020 (7.4% inflation-adjusted), to an average of €307,358 (US$367,599), following a y-o-y rise of 10.2% in 2019."[5]
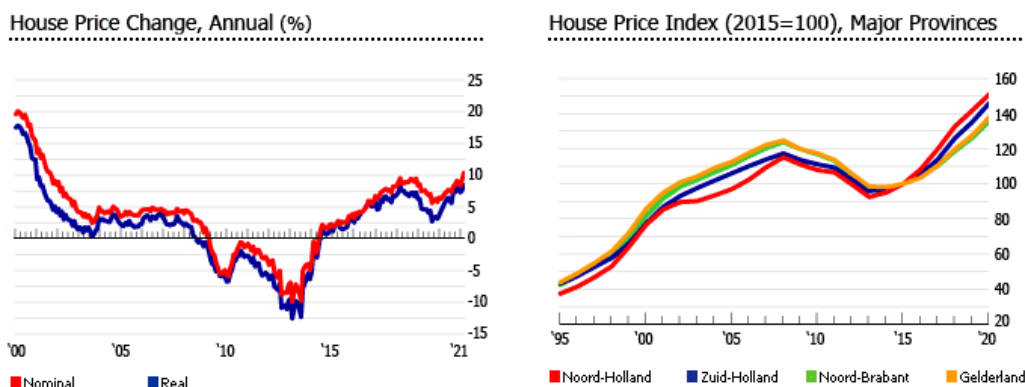
1   Housing in Europe- Evolution of house prices and rents. (2020). Housing in Europe. https://ec.europa.eu/eurostat/cache/digpub/housing/bloc-2a.html?lang=en

2   Cheng, L. (2019, April 2). How money shapes architecture: Oliver Wainwright. Architecture Now. Retrieved November 3, 2021, from https://architecturenow.co.nz/articles/how-money-shapes-architecture-oliver-wainwright/

3   Willis, C. (1995). Form Follows Finance: Skyscrapers and Skylines in New York and Chicago. Princeton Architectural Press.

4   Cheng, L. (2019, April 2). How money shapes architecture: Oliver Wainwright. Architecture Now. Retrieved November 3, 2021, from https://architecturenow.co.nz/articles/how-money-shapes-architecture-oliver-wainwright/

5   Delmendo, L. C. (2021, May 18). The Netherlands: Pandemic not enough to cool down its red-hot housing market. Global Property Guide. Retrieved October 13, 2021, from https://www.globalpropertyguide.com/Europe/Netherlands/Price-History.

Through the advanced housing graduation studio, I seek answers to a question that had arose while observing the ongoing housing trends in the modern western world ; How can architecture stand opposed gentrification and provide viable and productive answers whilst coexisting with the financial landscape? A possible solution that was proposed within the wings of the studio was co-operative housing, an economic and governmental concept I was not familiar with.

Co-operative housing is a form of collective ownership. Interested buyers purchase a stake of the co-operative and then pay a monthly fee, also referred to as "cost rent".[6] In a collective housing scheme, housing prices are guaranteed to not increase. This is ensured by the government, with politicians passing regulations specified for non-profit housing. This lack of housing price speculation means that dwelling units cannot be seen as a commodity. This in turn allows architects to freely experiment, detached from capital that restrains them and forces them to profit- making oriented design decisions. Architectural discourse within a collective housing scheme is allowed to go from research and theory, organically into practice. *The idea of co-operative housing is highly democratic.*

fg.2 Kalkbreite housing complex,Müller Sigrist Architekten

6   Jones, E. L. (2020, July 22). How housing co-operatives built a city. Architectural Review. https://www.architectural-review.com/archive/how-housing-co-operatives-built-a-city

1.2/ Problem statement

Within the umbrella of co-operative housing, and through my research and design proposal, I want to focus on two main user groups, both heavily affected by the ongoing housing market trend, both in Rotterdam and globally, each for different reasons.

Higher education students

Through a multitude of reports, higher education-i.e. master's- students appear to be one of the most privileged social groups; in the vast majority of cases, this group of people comes from wealth, and has the opportunity and can afford to spend-in some cases- up to 8 years on their education, without needing to work to sustain themselves.[7] Based on data published by the European Union, 68% of students currently attending higher education programs have parents who have degrees[8]. At the same time, this group is largely dependent on their parents, with most students not working to support themselves, making them vulnerable to increases in living costs. In conversations with fellow students, there have been numerous cases of people reducing their day-to-day costs to cover for increasing rent prices or municipal taxes.

The current housing market uptrend is turning higher education into a privilege, reserved only for the families that have the means to support their studying children. TU Delft has an expected annual cost for their master's programs.[9] Along the 19.600 euros in tuition fees for non-EU students, the university proposes an expected amount of monthly expenses, totaling between 850 and 1100 euros. Taking into consideration that the average price for a studio apartment in the Netherlands currently sits at 800 euros per month, we see that the estimated monthly living expenses can easily be entirely spent on housing.[10] So, based on TU Delft's estimated costs, a non-EU master's student following a two year degree must fork up a total of 60.800 euros for their education (2*19.600 euros in tuitions+ 24 * 900 euros average monthly living costs). Through conversations with fellow non-EU students, I found out that this number is not at all unreasonable, with families allocating almost this exact amount for their child's 2 year education in the TU.

The situation for EU students is of course better, but not by much. The main difference here, is the tuition fees; an EU student only has an annual tuition of 2.209 euros[11], with the estimated monthly costs remaining the same (24 * 900 euros average). This amounts to a total of 26.018 euros for a two year master's degree, around 3/4 of the average Dutch family income for 2020, sitting at 36.452 euros[12]. This leads to many Dutch and EU students not being able to leave their parents' homes to pursue their studies due to the high cost of education.

It is therefore obvious that higher education is a level that only the elite or a very lucky few manage to reach; and with housing being one of the biggest monthly costs, there is a huge problem that needs to be addressed.

7   Seneviratne, K. (2021, November 24). Universities Need to Be More Accessible Instead of a Privilege. IDN-InDepthNews | Analysis That Matters. https://www.indepthnews.net/index.php/sustainability/quality-education/4895-universities-need-to-be-more-accessible-instead-of-a-privilege

8   Hauschildt, K., Gwosć, C., Schirmer, H., & Wartenbergh-Cras, F. (2021). Social and Economic Conditions of Student Life in Europe. Eurostudent. Retrieved from https://www.stjornarradid.is/library/01--Frettatengt---myndir-og-skrar/MRN/EUROSTUDEND_ensk_2021.pdf

9   Delft University of technology. (2022). Tuition Fee & Finances. TU Delft. https://www.tudelft.nl/en/education/practical-matters/tuition-fee-finances#:%7E:text=the%20EU%20nationality-,Daily%20Expenses,and%201%2C100%20Euro%20per%20month.

10   Numbeo. (2022). Cost of Living in Netherlands. https://www.numbeo.com/cost-of-living/country_result.jsp?country=Netherlands
11   Delft University of technology. (2022). Tuition Fee & Finances. TU Delft. https://www.tudelft.nl/en/education/practical-matters/tuition-fee-finances#:%7E:text=the%20EU%20nationality-,Daily%20Expenses,and%201%2C100%20Euro%20per%20month.

12   https://www.ceicdata.com/en/indicator/netherlands/annual-household-income-per-capita

Elderly

The elderly is another group that I'd like to focus on. People that live alone, in houses that are usually too big for them. "Loneliness and social isolation in older adults are serious public health risks affecting a significant number of people in the United States and putting them at risk for dementia and other serious medical conditions."[13] I believe it is very important for humans to be part of a community in the later stages of their life, and my ambition through my research and design proposal, is to provide the elderly with the much needed sense of belonging, a sense of community.

The mixing of students and elderly brings a multitude of advantages, for both age groups involved. For example, students who are living on their own for the first time can benefit from the close contact with older, experienced co-residents. For the elderly, intergenerational housing helps in combating loneliness by offering the chance for residents to be part of a community. According to a study performed by the NHS, more than 50% people over 75 living alone go for over a month without speaking to a friend, neighbor or family member[14]. The Dutch National Fund for the Elderly estimates that 900,000 of the more than 2.9 million over-65s feel lonely, an immediate result of too little social contact[15]. One of the major benefits of intergenerational housing, is the bringing together of different and diverse groups -both in age and ideology- and helping to reduce inaccurate stereotypes as older adults and youth develop interpersonal relationships. It is a useful tool in building a sense of personal and societal identity while encouraging tolerance.

To summarize; Rotterdam is suffering from dramatically increasing rent prices, which leads to gentrification. A social group that suffers the consequences of gentrification is higher education students. At the same time, people from a very different social group, the elderly, suffer from loneliness. The end goal within the scope of the studio is a design solution in the urban area of Blijdorp, right next to Rotterdam's central station. In my eyes, this solution should give an answer to the problem of gentrification, while at the same time bringing the two very different age groups together, aiding to the combating of elder loneliness. Intergenerational co-operative housing can potentially act as a catalyst for both diverging problems and user groups.

1.3/ Research question

Taking the aforementioned problems into consideration, and the possible solution found in intergenerational co-operative housing, a new question arose; ***How do we design affordable, high quality co-operative housing units in a rapidly densifying urban Rotterdam?***

As the research feeds into, and aims to provide a solid theoretical base for the design discourse of this studio, the following sub-questions will be assessed;

- *How can we translate the Dutch row house typology into a dense high-rise context?*
- *What should the minimum "architectural standard" for a functional private space be? How does this abstract standard compare to the European legislation on minimal room requirements?*
- *How do we design social cohesion between students and elderly? How does the in-between space affect quality of life within a collective living model?*

13   CDC. (2021). Loneliness and Social Isolation Linked to Serious Health Conditions. Centers for Disease Control and Prevention (CDC). https://www.cdc.gov/aging/publications/features/lonely-older-adults.html

14   https://www.nhs.uk/mental-health/feelings-symptoms-behaviours/feelings-and-symptoms/loneliness-in-older-people/

15   E. Zolyomi (2019), Peer review on "Strategies for supporting social inclusion at older age", DG Employment, social affairs and Inclusion. Retrieved from: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjQlaKGo571AhX0hP0H-HYzICEEQFnoECAYQAQ&url=https%3A%2F%2Fec.europa.eu%2Fsocial%2FBlobServlet%3FdocId%3D21810%26langId%3Den&usg=AOvVaw28_KMtZgx4_Tkfgsw6BSd_
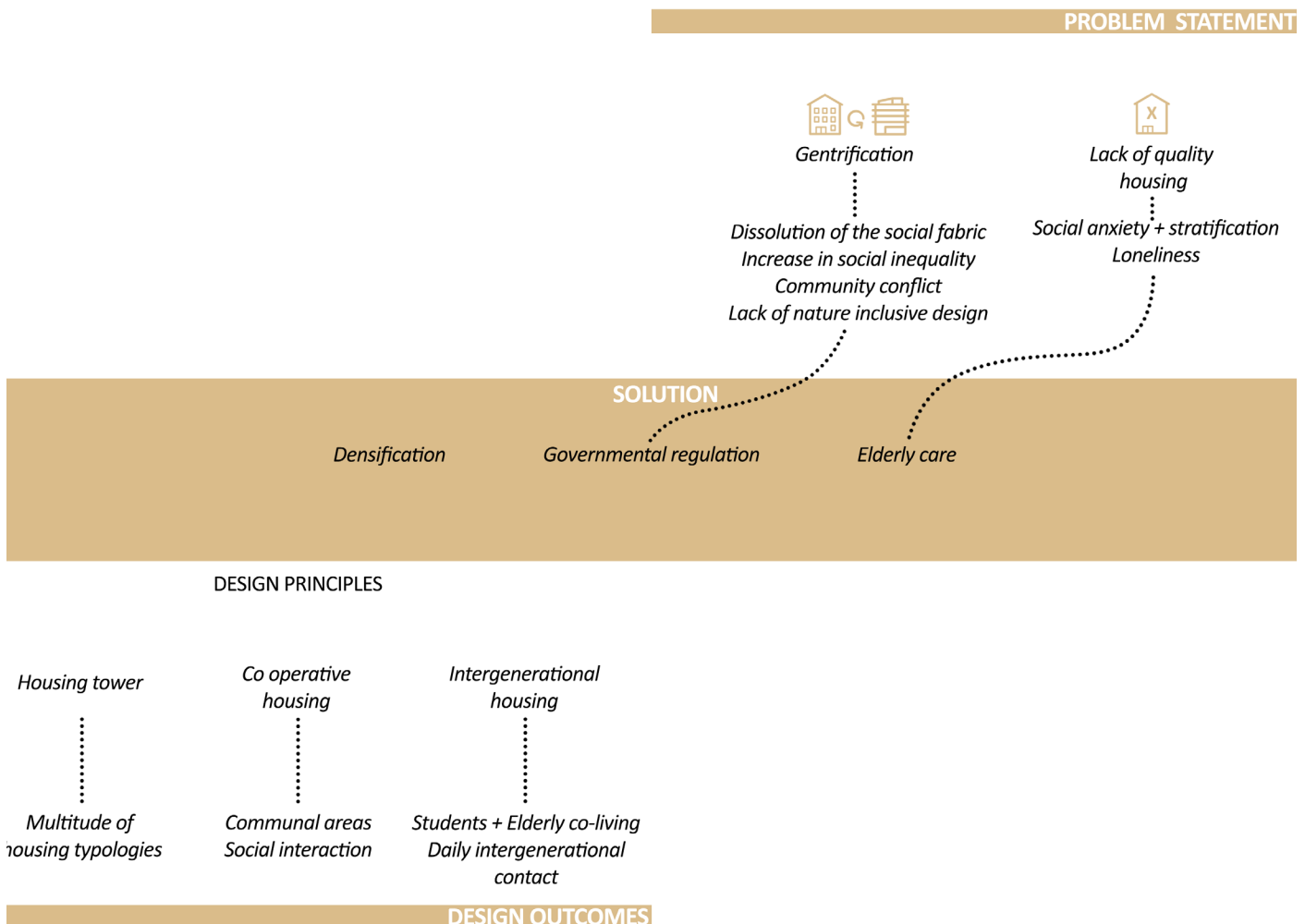
1.4/ Research methodology

As aforementioned, this research, along with the graduation design has two main goals;

- The densification of housing and a revisit to the classic Dutch row typology, Placing it within a dense high rise volume
- Designing an inclusive collective housing model, built for and used by students and elders.

I believe that my research will prove to be paramount to me reaching my goal, providing me with the much needed theoretical foundation to start my design discourse and experimentation. A re imagined collective Dutch row housing typology, incorporated within a high rise context. To take the first step, based on pragmatical data provided by the EU concerning existing housing regulations and critical studies done on today's co-operative housing models in books such as "Architecture and feminisms- Ecologies, economies, technologies" by Helene Frichot, Catharina Gabrielsson and Helen Runting, I start with analyzing and developing the theoretical background of my research questions. I then continue with an examination of case studies; studying the buildings and the thought process behind them, in order to draw certain qualities to incorporate into my final graduation design, such as apartment size, existence and sizing of communal spaces etc. This analysis is based around three main axis of interest; User groups and intergenerational dwelling, accessibility and circulation and apartment layout. I also gather data from qualitative interviews with dwellers and administration members of a selected case study. The end result of the research is knowledge, a series of guidelines that will lead to an intergenerational co-operative housing design proposal that can serve as an example for similar future developments.

A visualization of this thought process can be seen in the graph below (fg.3)

PROBLEM STATEMENT

Gentrification

Lack of quality housing

Dissolution of the social fabric
Increase in social inequality
Community conflict
Lack of nature inclusive design

Social anxiety + stratification
Loneliness

SOLUTION

Densification   *Governmental regulation*   *Elderly care*

DESIGN PRINCIPLES

Housing tower   *Co operative housing*   *Intergenerational housing*

Multitude of housing typologies   *Communal areas Social interaction*   *Students + Elderly co-living Daily intergenerational contact*

DESIGN OUTCOMES

2. Theory

2.1/ Translating the Dutch row house typology into a dense high-rise context

      My main goal through this research is to design resilient, high quality intergenerational co-operative housing within a dense urban context such as the Blijdorp area. "Verticalizing" the Dutch row typology has been a key aspect to my design since the early days of spatial exploration.

      The first Dutch row houses were constructed in the Netherlands during the 15th century[16]. Since their introduction, they were heavily linked to what we now know as "social housing". They were single story wooden buildings, covered by a triangular roof. Over the next centuries, the row house typology would evolve into what today characterizes the Dutch urban landscape; Multi story, brick facade buildings that share load-bearing walls. The typology we know today originates from the late 1800s; The population shift towards the big cities caused by industrialization, led manufacturers to building large complexes with houses for their laborers. These houses usually came with a back garden or terrace. The housing act of 1901 gave further way to social housing, with cities building garden districts for financially vulnerable social groups. After the financial crisis of the 1930s and the second World War, row houses continued to be built, this time with a few alterations, as prefabrication and standardization became part of Dutch construction. Homes were built en masse, and the interior layouts remained largely the same from unit to unit, to reduce building costs.

      In post-War Netherlands, the Dutch row typology met its first sceptics, as Le Corbusier's "Charte d'Athènes"[17] gained popularity, convincing Dutch urban planners that high rise was the way to go when it came to mass residential housing. However, after the failure of the "Bijlmermeer"[18], the planners changed course once again. In the 1970s, when the Dutch welfare system reached its peak, the row house became the Dutch answer to dense, medium rise housing, the quintessential raw material for new residential districts. And it remains so today.

fg. 4 The Beyerinckstraat, Delft
Luuk Kramer

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16   B. (2012, December 27). Cherished and Preserved Rows in Amsterdam, The Netherlands. Row House Living. https://row-house-living.com/2012/05/06/cherished-and-preserved-rows-in-amsterdam-the-netherlands/#:%7E:text=The%20first%20row%20homes%20were,fires%20often%20eradicated%20entire%20blocks.

17   Corbusier, L. (2016). La Charte d'Athènes. Suivi de : Entretien avec les étudiants ((réédition)). POINTS.

18   The Bijlmermeer is a high rise residential district built in the 1970s in the south of Amsterdam. In the first five years after its completion, the project was deemed a failure, as it was plagued by problems of criminality and vandalism

While some might find this typology mundane, in his book "*Kleine filosofie van het rijtjeshuis*"[19], Pieter Hoexum signifies the importance of it. He describes it as the depiction of the Dutch mixture of conformity and individualism, of community and isolation. He also presents the row houses as the "golden mean" between freestanding houses and the-also very typical in the Dutch context- gallery apartments; by providing each unit with its own entrance-and more often than not its own garden or terrace-, the residents live "together alone", in practically identical houses. Hoexum's ideas on the Dutch row house typology are echoed by the 1998 "*Das Niederländische Reihenhaus*"[20], where the authors also see the row house as the golden mean of medium rise housing, depicting the typology as part of an "ideology of coziness, normality and harmony in Dutch society".

The back garden found in most Dutch row houses is a very significant component. It allows Dutch children plenty of outdoor play, which in itself reaps big benefits for them, such as improved Motor skills, lower body fat indexes, improved social development skills among others[21]. "Light, air and space"[22], a famous modernist ideal, envisioned by Le Corbusier in Ville Radieuse, is perfectly realized in the seemingly mundane, simple row house typology.

The key element that piqued my interest in this typology, is the highly permeable transition from "public" (sidewalk) to "private" (house) to "garden" (semi-permeable, private outside space). Walking on a sidewalk in a Dutch neighborhood, I clearly know that I'm in a public place, bordered by the very solid walls of each row house. But at the same time I can peek inside through the large windows-architectural curiosity seems to almost always beat good manners- and see the living room and garden at the back. It is this permeability that intrigues me.

By placing this traditional typology of living within a dense high rise building context, I intend to create a diverse design, both in plan and facade. But what are the challenges of placing this typology in a high rise context? How can I mix Le Corbusier's idea of a modern way of living, with this traditional form of housing? It is with these questions that I begin the design exploration, which is elaborated on in chapter 6 of this report.
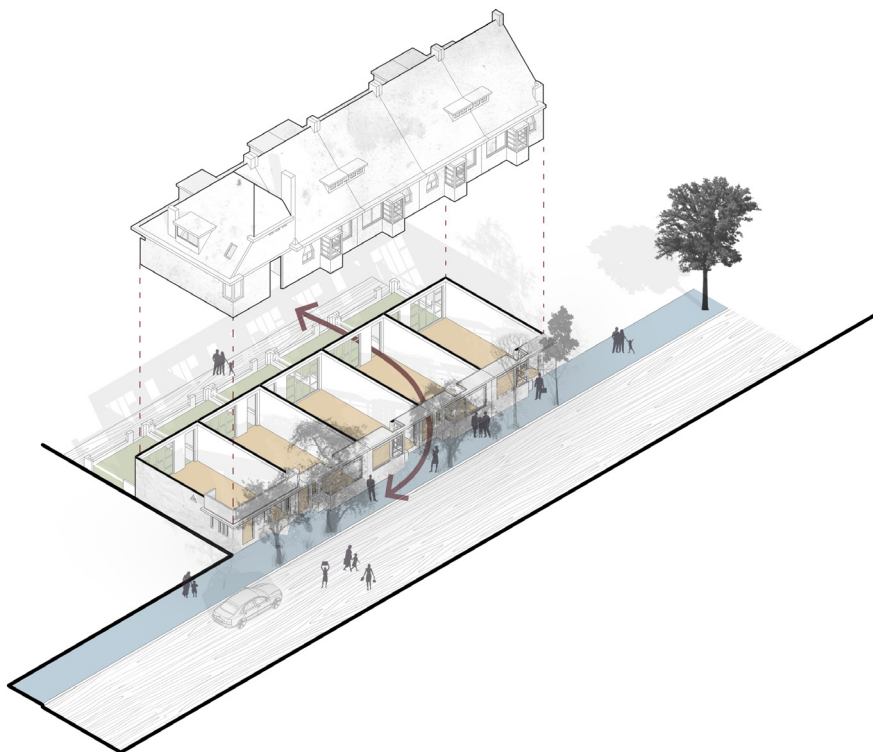
fg. 5 Transition from "public" to "private" to "garden" diagram
Personal work

19   Hoexum, P. (2014). Kleine filosofie van het rijtjeshuis. Atlas Contact, Uitgeverij.
20   Gool, R. V., Hertelt, L., Raith, F., & Schenk, L. (2000). Das niederländische Reihenhaus. Serie und Vielfalt. Deutsche Verlags-Anstalt DVA.
21   M. (2022, March 2). Why Should My Child Play Outside? Benefits of Outdoor Play for Kids. Miracle Recreation. https://www.mira-cle-recreation.com/blog/why-should-my-child-play-outside-benefits-of-outdoor-play-for-kids/?lang=can

22   Corbusier, L. & Le Corbusier. (2021). Vers une architecture. Nouvelle édition. HACHETTE LIVRE.

2.2/ Gap between conceptualization and applied design

By examining and comparing theorists' opinions on co-operative housing, and architectural projects/ buildings designed for collective housing, owned by developers (capital), we see that the two have very different approaches to living.

Frei Otto, "The Baumhauser"

The Baumhauser, also known as "the Eco house", was designed as part of the IBA initiative in 1987. The main idea was unifying building and nature. It was built according to social housing standards and costs, therefore it was initially deemed affordable, while still being in the center of Berlin.[23] The design was based on Otto's "tree house" idea, initially born in a form of a housing tower in New York.

While Otto Frei was the idea initiator, he willingly stepped down from the final design process of each individual apartment and let the future dwellers design their homes the way they wanted with almost complete freedom. This eventually led to a building looking essentially like a patchwork, composed of multiple smaller "buildings" within a larger structure. When the project came to its building stage, a billboard was placed outside the construction site to attract customers through an application form. The idea was to get families to co-build the site, and that is why a building collective was created. The process of meeting and collaborating to reach a finalized design, almost automatically dubbed the Baumhauser as a building with a communal identity.[24]

fg.6 Baumhauser, Otto Frei

23   Social housing in Berlin describes the state-subsidized construction of apartments in Berlin for social groups who cannot meet their housing needs on the free housing market due to their low income. The state increases the private supply of affordable housing through subsidies. Private builders, commercial or non-profit housing construction companies and also cooperatives can take advantage of subsidies.

24   X.M. (2015, October 24). Der Traum vom Baumhaus/Dreaming of a treehouse- Frei Otto`s ecological building project in Berlin [Video]. Vimeo. https://vimeo.com/ondemand/freiotto
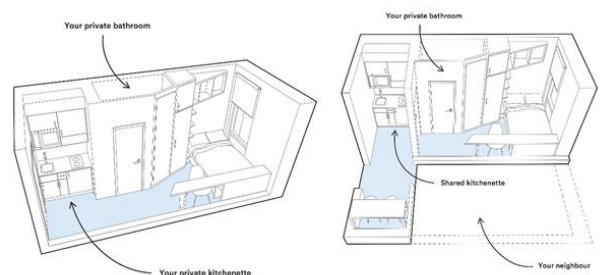
"Conscious co living"

"The Conscious Co living initiative" is a prime example of collective architecture working to serve the capital, ready to profit on "the trend of co-living"[25]. It is led by real estate venture TechFarm and architecture office CoDesign, both Stockholm-based. The project is deemed to become a "Flagship building", and includes a "conscious living" initiative. The so-called 'micro-apartments' designed for long- stay are between 10 and 30 m2, while short-stay capsules, described as cells, even drop to sizes ranging between 4 to 26 m2. The short term apartments are separated by a 'border' wellness floor, above which the floors are only accessible with the right keycards, corresponding only to long-term stay apartment residents.[26]

fg. 7+8 Concious co living initiative

2.3/ Minimums of functional private space

In extreme cases, what is currently being sold as "collective living",-i.e. a living capsule bordered by forced and segregating communal areas- is highly dysfunctional and dystopian, European legislation seems to be favor the business part of architecture, that treats space as a product, a commodity. Except for Italy, Europe seems to be heading towards deregulation when it comes to minimum usable and livable spaces. While analyzing housing typologies in Europe, in his paper about European housing standards, Alessandro Rigolon writes; *"…This trend has been curbed to some extent, but only because of the introduction of accessibility regulations. Minimum standards, when present, vary to a large extent from one country to another. For example, in Italy, the minimum area for a room defined as habitable is 9 square meters; in France, it drops to 7 square meters (and until 2006 it was 6 square meters)*[27]. In the Netherlands, according to "Het Praktijkboek Bouwbesluit" of 2012 -the most updated version of Dutch building regulations-, a bedroom " has to be 1,80 meters wide to accommodate a single bed and a door that can open inside the room"[28].

fg. 9+10 Concious co living initiative

25   Mairs, J. (2021, May 25). Millennials want experiences not possessions, say co-living entrepreneurs. Dezeen. https://www.dezeen.com/2016/04/05/co-living-shared-collective-accommodation-housing-millennials-trend-common-wework/

26   Frichot, H., Gabrielsson, C., & Runting, H. (2017). Architecture and Feminisms: Ecologies, Economies, Technologies (Critiques) (1st ed.). Routledge. Pp. 143

27   Rigolon, A. (2009). European Housing Concepts 1990-2010
28   Ministerie van Binnenlandse Zaken en Koninkrijksrelaties. (2018, November 30). Praktijkboek Bouwbesluit 2012. Richtlijn | Rijksoverheid.nl. https://www.rijksoverheid.nl/documenten/richtlijnen/2011/10/05/praktijkboek-bouwbesluit-2012

By looking at the European minimum housing standards, it becomes evident that the response to the growing housing crisis provided by many member countries, Netherlands included, is overcrowding and deregulating. This gives way for the growing trend of micro apartments like "conscious co-living", which are marketed as a supposed modern way of life for modern day entrepreneurs. But, when we look at the raw numbers -rooms as small as 4 square meters-, we can easily compare them to a situation far less marketable or desirable. A globally considered "extreme" form of micro-apartments are the ones in Hong Kong, often -ominously- referred to as coffin homes. Hong Kong is a great example of a city unprepared for a housing crisis. About 7% of land in Hong Kong is allocated towards housing, most of it enjoyed by wealthy families. This tremendous housing shortage has led to young starters, the elderly, and sometimes even families sharing a private space smaller than 6 square meters. This number is even more shocking when we take into account Neufert's minimum room sizing, measuring at 3,6*3,6 meters, or 12,96 square meters[29].

fg. 11 Hong Kong "coffin home"

No matter how much we sugar coat the idea of tiny living, overcrowding and minimizing private space to such extremes unquestionably has negative side effects. Effects on quality of life due to crowding may include increased physical contact, lack of sleep, lack of privacy and poor hygiene practices[30]. Susan Saegert, professor of environmental psychology at the CUNY Graduate Center and director of the Housing Environments Research Group, warns that tiny living conditions can be detrimental for a large portion of residents. To further emphasize her point, she mentions children and teenagers as an example; *"I've studied children in crowded apartments and low-income housing... and they can end up becoming withdrawn, and have trouble studying and concentrating."*[31] In extreme conditions like these, over designed details and luxuries such as floor to ceiling windows, extra storage and the addition of overly marketed communal areas don't make up for a fundamental lack of every day privacy in a dwellers' home. As an example, the degree to which teenagers grow up in crowded housing is an important aspect of social inequality. Poor living conditions can serve as a mechanism of social stratification, affecting their wellbeing and resulting in the intergenerational transmission of social inequality.[32]

29   Neufert, E., Neufert, P., Baiche, B., & Walliman, N. (2006). Architects' data: Neufert. Blackwell Science.

30   Gray A (2001). "Definitions of crowding and the effect of crowding on health". Ministry of Social Policy, New Zealand.

31   Urist, J. (2018, May 8). The Health Risks of Small Apartments. The Atlantic. Https://www.theatlantic.com/health/archive/2013/12/the-health-risks-of-small-apartments/282150/

32   Solari, C.D., Mare, R.D. (2012), "Housing crowding effects on children's wellbeing", Social Science Research, Volume 41, Issue 2, P. 464-476, University of North Carolina, Chapel Hill, United States

The integration of the standard of tiny living in the design norm bears dangers for normalizing gentrification; if micro-apartments are indeed the housing typology of the future, Saegert argues, they increase the base rent, or euro per square meter that a developer gains and foresees from their investment. So gradually, dwellers may actually experience a significant bump in housing prices, paying the same amount to rent a studio in the neighborhood where they used to be able to afford a one-bedroom. With the gradual disintegration of zoning rules, the micro-apartment could become the only viable choice for a large number of social groups, like starters and lower income households. Just like Hong Kong.

Taking into account the driving trend of Rotterdam's-and the worlds'- rapidly densifying urban fabric, I believe it is vital to find a balance between profit maximization and high quality of life within a collective living context. What we define as "minimum" space for a room to be functional is of course highly subjective and debatable. And especially when economics are put into play, balancing between profit margins and square meter allocation per capita is tricky. Even though my design interests aren't geared towards tiny living, it is vital that architects hold a critical view towards this pan European deregulation in minimums of functional private space that force people to a confined, capsularised life.
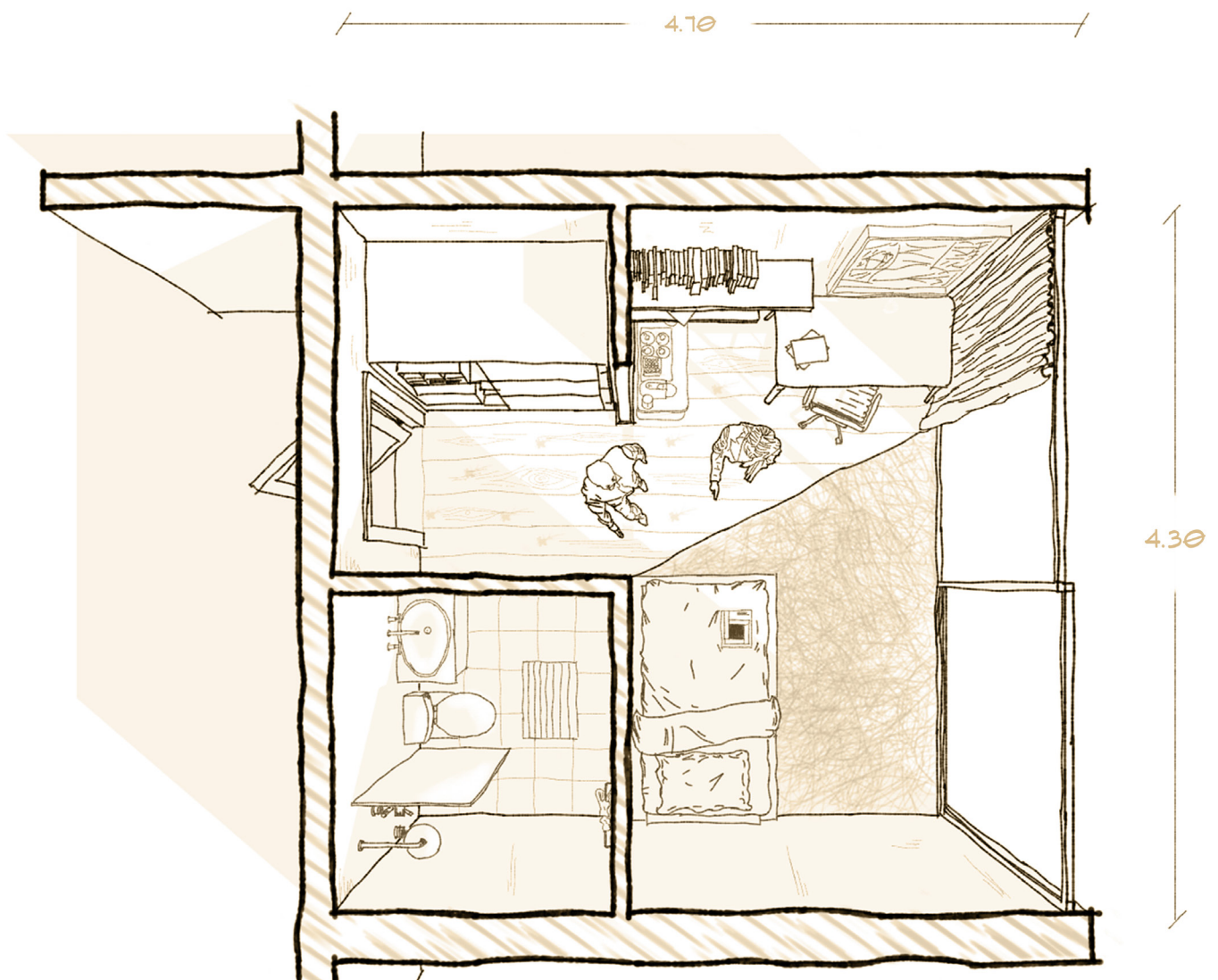
fg. 12 A livable space
Personal work

2.4/ In- between spaces in collective housing

ABSTRACT

Many theorists have talked about liminal spaces. In the book *"Architecture from the outside"*, Elizabeth Grosz describes them as paradoxical since they can acquire meaning, a position, in relation to something that is not and can never exactly be, that is, the two spaces surrounding the in-between. [33] And the in-between spaces are always differentiated from them since they are the Intermediate, the third space. These spaces, she claims, are strange, as they are always placed in relation to two other spaces, one inside and one outside, one here and one there, one closed and one open, one covered and one not, one public and one private and so on. Doreen Massey, in her book *"A global sense of place",* mentions that the in-between is the space we consider to depict, amid all these modern flows of movement and communication, the desperate seek of peace and quiet. [34]
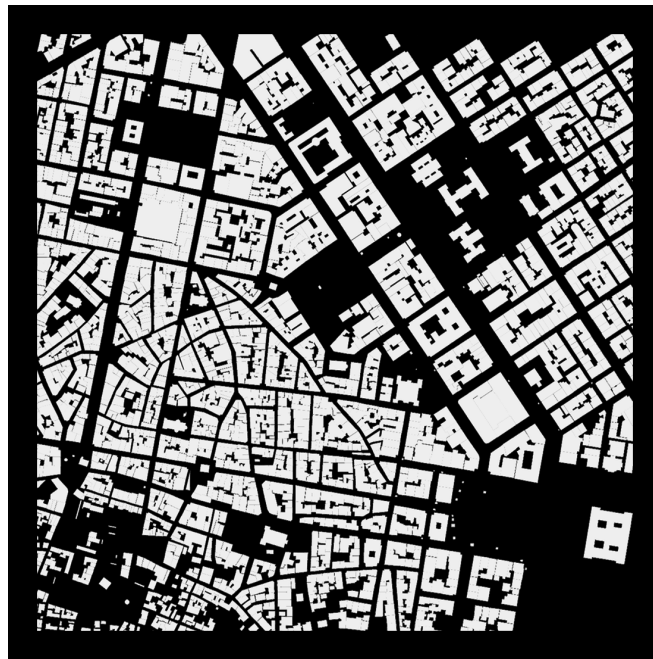
fg. 13 The inbetween space within a city's context
Personal work

As mentioned in the previous chapter, there seems to be a driving trend in newly built, profit driven collective initiatives; Communal areas are a selling point, as the interweaving of liminal spaces with a co-living model of design can provide a productive answer to both densification and the market's demands. However in most cases, this -selling of communal areas- is done almost in an effort to reconcile for the lack of private space. Even in the densest forms of living, be them collective or not, we find liminal spaces, spaces that exist between two others. These spaces can come in the form of a balcony, a corridor or, in the case of collective living, a shared public space. Why do modern collectives upsell these spaces so intensively? How do these liminal spaces act upon their users?

33   Grosz, E. (2001). Architecture from the Outside / Essays on Virtual and Real space.
34   Massey, D. (1994). A Global Sense of Place (from Space, Place, and Gender). Minneapolis: University of Minnesota Press.

Before I jump to the definition of the word itself, it is of value to underline that the in-between space, its size, form and use depends entirely on its context. On a **city scale**, it consists of all the roads, pavements, and bicycle lanes, all the spaces that help us get from point A to point B. It is highly permeable and ever-changing, much like the city itself. As it is a place of interaction, it is highly affected by its inhabitants. It is formed through a series of social interactions, that met and coexisted in said given place. In **a public building** context, the in-between space consists of all the corridors, escalators, and common areas. It also is affected and in fact formed by its users, although it is a bit less permeable, as it's intended for in-building use. In a **housing context**, the in-between space is the buffer between the inside and outside, the social and the private.

It is, therefore, in its original sense, the space that each time "borrows" its character(public / private / semi-private / semi-public) but also its size and form (boundary / skin / strip of land / large area etc.) depending on:

• its position

• its use and

• its historical, social and spatial significance.

DEFINITION

As I understand it, the in-between space is highly affected by its context. It acts as a buffer between two distinct spaces, both in terms of limit and use. To try and densify the meaning of this space, we could use Herman Herzberger's definition. So, the in-between could be identified as

"An intermediate space between opposite elements, such as a whole and parts, inside and outside, open and close, central and decentral". A space that is defined by its position, its use, and its historic, social, and spatial importance.

CONTEXT OF RESEARCH

Taking into consideration the site of the studio (a fully urban, dense neighborhood near the center of Rotterdam), the studio's main focus (densification of housing), and to further narrow down the concept of an in-between space to help my research, I will be focusing on the "public building" and "housing" contexts I aforementioned. Therefore, I can try to form a definition of the in-between space, within the context of my research as:

An intermediate space between a private area -room/apartment- and the outside urban environment. A space characterized by its orientation towards collective use, its inclusivity, permeability, and versatility.
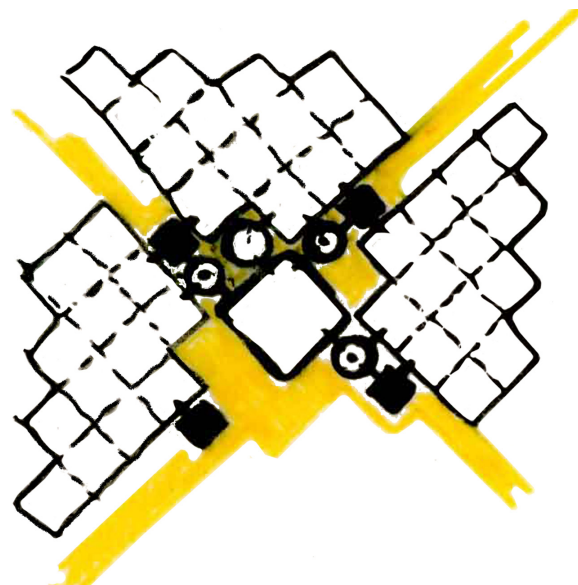

fg. 14 The inbetween space within a public building context
Herman Hertzberger

To further contextualize the scope of the research, and to further connect it to the design aspect of the studio, it is worth mentioning who these inbetween spaces will be created for; My selected user groups for the graduation design are elders and students. In chapter one, I analyzed how elders benefit from social contact, and students from contact with their elders. So, how can we design the in-between space to function ideally and to avoid possible frictions in the everyday contact for these two specific user groups?
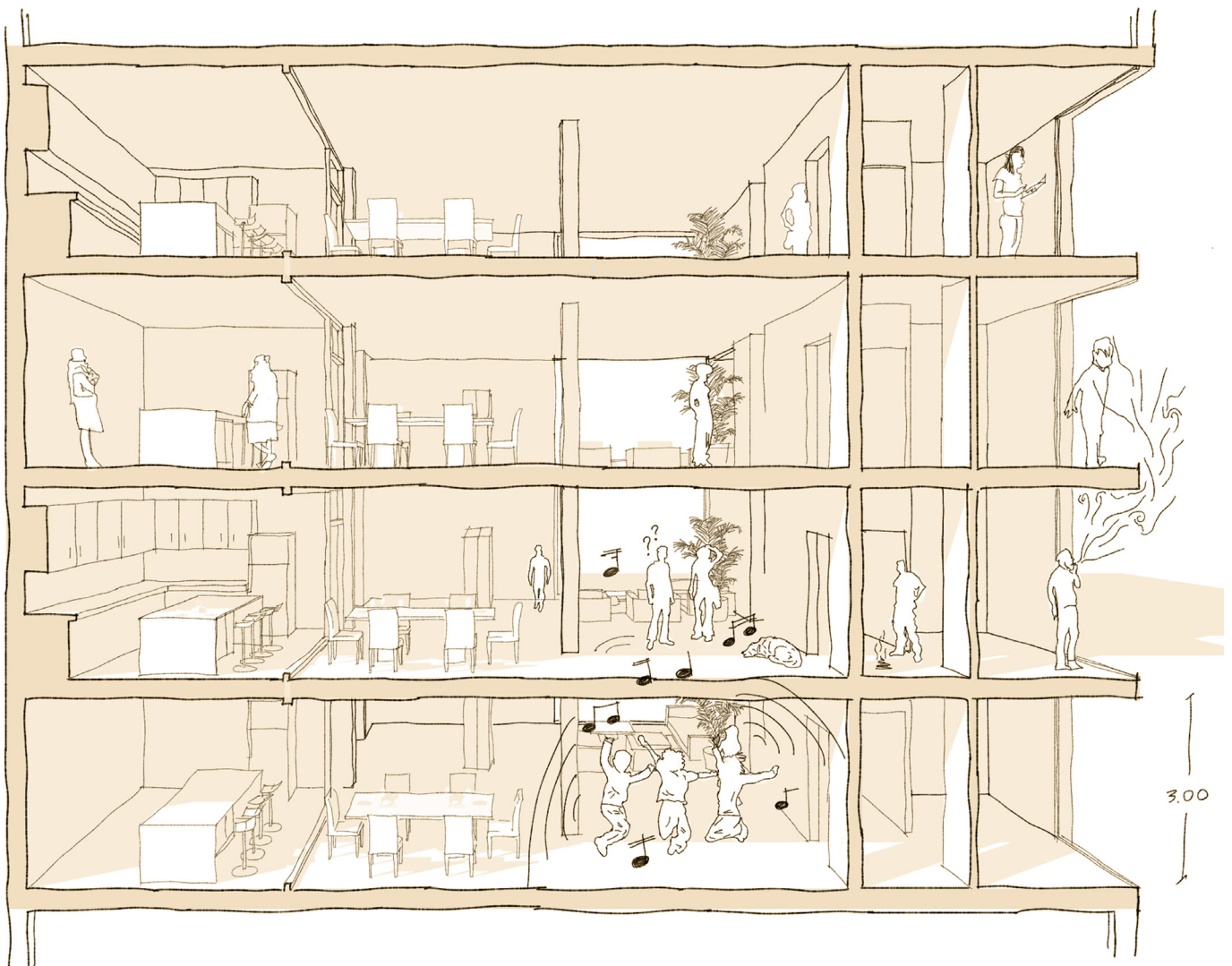
fg. 15 A situation to be avoided
Personal work

To help with this question, I visited Abtswoude Bloeit, to perform interviews and gain insights on multi generational collective space use.

"**Abtswoude Bloeit!",** Delft[35]

Abtswoude Bloeit is a former nursing home located in Buitenhof, Delft. It was initiated by SHS Delft[36], Pieter van Foreest[37] and the Perspektief foundation[38]. In this repurposed building, residents of the Perspektief foundation, students and elderly live together under one roof. Abtswoude is a place where the neighborhood comes together in "The Living Room of the Neighborhood", a communal area located on the ground floor of Abtswoude Bloeit. There, dwellers and adjacent neighbors get together and organize a multitude of events. Residents support each other and take care of the communal gardens and surrounding facilities.

fg.16 Abtswoude Bloeit activities in the communal areas

Abtswoude Bloeit is selected to be part of the case studies, both because it is a form of collective housing, but also because it contains the exact mix of user groups I want to incorporate in my graduation design-i.e. Students sharing communal spaces with elderly-

The mixing of students and elderly brings a multitude of advantages, for both age groups involved. Students who are living on their own for the first time can benefit from the close contact with older, experienced co-residents. For clients of the Perspektief Foundation, who have often gone through a difficult period, Abtswoude Bloeit is a place that offers them the chance of gradually regaining control of their life. For the elderly, this redevelopment contributes to combating loneliness, by offering the residents to be part of a community. It is not uncommon for people over 65 to feel lonely after their retirement. The Dutch National Fund for the Elderly estimates that 900,000 of the more than 2.9 million over-65s feel lonely, an immediate result of too little social contact[39]. Daily social contact with people from a younger generation can make a big difference.

35   Abtswoude bloeit! (2021). Abtswoude bloeit! https://abtswoudebloeit.nl
36   Student real estate developer
37   Nursing agency in Delft, Netherlands
38   The Perspektief Foundation offers help to people who have become economically homeless due to unfortunate circumstances.
39   E. Zolyomi (2019), Peer review on "Strategies for supporting social inclusion at older age", DG Employment, social affairs and Inclusion. Retrieved from: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjQlaKGo571AhX0hP0H-HYzICEEQFnoECAYQAQ&url=https%3A%2F%2Fec.europa.eu%2Fsocial%2FBlobServlet%3FdocId%3D21810%26langId%3Den&usg=AOvVaw28_KMtZgx4_Tkfgsw6BSd_

Qualitative research

To further understand the significance of communal areas, the positives as well as the challenges that come with co- operative intergenerational housing, a series of interviews were conducted, both with administrative staff, as well as with residents of the establishment[40]. The choice of participants was made in an effort to gather information from different points of interest. The interviewees varied in age, cultural background, occupation and ethnic group, in order to diversify the sources of input. The identities of the interview participants will remain anonymous in respect of their privacy. To keep the setup simple, only the initial letter of their given name will be used. From now on, "Abtswoude Bloeit" will be referred to as "A.B.".

W: Administration of A.B., cultural program maker

C: Masters students in TU Delft, living in A.B. in a student housing unit

P: Elder resident, living in A.B. in an individual apartment

The initial two questions were focused around communal living, and the participants' choice to join this type of living. The answers varied;

W was initially invited as an artist, to write a poem for the neighborhood that could contribute to the cultural sphere and connect people in the neighborhood. While they were working on the project, they were invited to take over the role of cultural program maker for A.B.

C found out about A.B. through an ad. They really liked their potential roommates, so they mostly moved in for the student "sub house", more than A.B. itself.

P was spending half the year in the Netherlands and half in Indonesia, their home country. Since all of their family is now located in the Netherlands, they decided to move back permanently. Due to their financial situation, they applied for social housing, and were given a spot in A.B.

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40   For an overview of the interview questions, refer to the Appendix

The next two questions revolved around the main communal area -the living room of the neighborhood-, and the experience the participants have had while using it.

W described some challenges A.B. faces when it comes to the common area; They mentioned that sometimes, people   can be noisy -the quiet hours in the common area start at 22:00, but some residents do not always respect that rule-. For instances like these, a solution in a form of a WhatsApp group has been utilized, where residents of the building can message and alarm each other when there is a disturbance.

C recognizes positive aspects about the communal living room. They find that the communal living room has a positive effect on the elderly, as "a small interaction or a chat with a younger person during the day can cheer them up". They also mention that some students enjoy spending time with the elderly as they can exchange ideas. However, *C* also recognizes some challenges in the way the living room is shared; They mentioned that elders prefer to keep the living room warm. But, since the heating costs are evenly spread across the residents, this desire affects the students, who prefer to keep monthly costs at a minimum. They also mention that some students might throw parties in the common living room, which causes tension, especially when the students fail to clean up after the parties.

P doesn't see the common living room as a "game changer". They appreciate its' existence, as they actively take part in events or happenings that are organized there, but do not use it daily as a tool for socializing.

The next questions were focused around the daily lives of the interviewees, their favorite spots and time of day spent in A.B.

Evidently, residents do not spend a lot of time in the shared spaces. Both for *C* and *P*, their favorite spot in A.B. was their private room or apartment, with both of them stating that due to the COVID regulations proposed by the government, residents mostly spend their time at home. This in turn means that the communal areas remain mostly empty, with the exemption of an event, where a small number of dwellers get together. *C* also mentioned that, due to their very different time schedules, only a few students -if at all- attend the aforementioned events.

It is evident that communal areas in living establishments such as A.B. have been heavily affected by the COVID-19 pandemic, limiting their use to a minimum. In A.B.'s case, administrative staff have been doing efforts to work around the restraints of COVID.

W talked about the situation; *"During COVID, and the most recent lockdown, we were closed. People could use the living room for themselves, but no events were held. We had to be very creative, less people, more distant, that sort of thing. With Christmas we did this very awesome thing I think; We wanted to do a big Christmas market with food and music -in the common living room-, but that obviously couldn't happen, so instead of doing it in one place, we turned it around; We asked a couple of artists to make a "mini Christmas cart", and made two groups of performers, in one of which I was part of as a poet, and we went around to all the homes and greeted the residents. We had some Chocomel, some gluhwein, homemade cookies and we had mini performances along the houses. That was the most recent effort to deal with COVID and bring people together while keeping them as safe as possible."*

Finally, when asked about what the residents would like to see as an extra addition to A.B., answers varied between the age groups. *C* thought an addition of communal workshops where elders and students come together to do hobbies such as woodworking and other activities would be beneficial. He informed me that A.B. has a basement that would be a great space for those activities, but the foundation has closed this area off due to water damage scares. On the other hand, *P* mentioned the lack of security in the building. During the evening, the rear entrance is very dark and doesn't have any camera surveillance, rendering it an easy spot for unwanted visitors to enter from.

Observations and conculsions from a day in A.B.

- The building's exterior is highly dated and shows evident signs of wear.

- The setup of the building is different than what I imagined; Instead of students and the elderly living together, for example sharing a corridor, they are completely separate. Student houses occupy different sections of the building, and are therefore completely separated from the elderly. They use a different entrance, making the occasional intergenerational "meet and greet" even less likely to happen.

-Giant corridors, covered in blue carpeting lead the dwellers to their housing units. Reminds me of a hospital.

- A striking number of apartments lay empty. Even though the Netherlands is going through an unforeseen housing crisis, more than 70% of the apartments in A.B. remain uninhabited, although in perfect condition. *P's* apartment was the only occupied one in the entire floor, with the floors below and above it being completely vacant.

- The communal living room is huge, and utterly empty. There was a small group of people having dinner in a corner. I was informed that this was the first day the communal kitchen had reopened after the COVID lockdown.

- The mere existence of a communal space does not guarantee its success. A shared space should have functions embeded within it, with human contact appearing as a natural outcome of the provided functions. Human interaction is the ultimate goal of a communal area, but that goal can only be achieved by the precise and accurate placement of appropriate functions within it.

fg. 17 Pictures of Abtswoude Bloeit

3. Case studies

To help with the research and to see how architects have tried to solve or express the aforementioned goals through their designs, I have selected a pool of case studies, based around three main axis of interest; User groups and intergenerational dwelling-which was addressed above with Abswoude Bloeit-, accessibility and circulation, and apartment layout.

/ Accessibility   Circulation

"**Spangen social housing"**, Michiel Brinkman, Rotterdam, 1919[41]

The Spangen Quarter is located in Rotterdam and designed by Michiel Brinkman. It's a rectangular four-story brick urban block, centered around two large courtyards. It is the first social housing project where the concept of "Streets in the sky" is carried out. Although the relation between housing and neighborhood (private and public) already appeared in the history of traditional architecture, "Spangen quarter" materializes this concept in an original way. Access to the duplex apartments on the top floors is achieved through a one kilometer long gallery. The gallery is located in the interior courtyard of the building, so it is considered a private space and there is no visual connection with the neighborhood. However, it is the first time in a built project where a transitional-in between- space between the public street and the private flats makes an appearance. Upon completion in 1919, the project offered many shared amenities, amplifying its communal character, like a public bathhouse situated between the two courtyards. The Concept of "streets in the sky" had tremendous influence in Dutch architecture, now being part of traditional dense housing design. It also influenced architects such as Le Corbusier, who further developed the idea in L' Unite d' Habitation.

fg. 19 Multitude of communal gardens

fg.18 Spangen social housing isometric view and plan
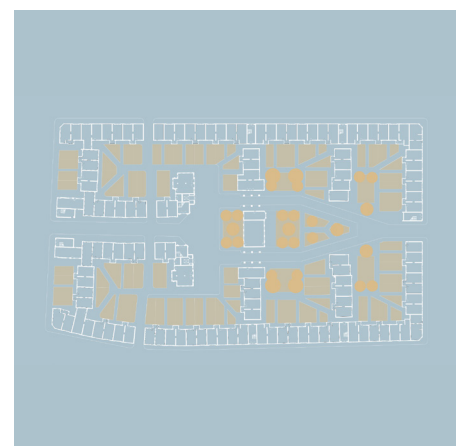
fg.20 Gallery apartment access

Spangen Quarter is part of the selected case studies as it provides vital insights to the history of the Dutch gallery housing typology (something that will be part of my graduation design), but also to the transition between the public and the private area within a dense housing model.

41   Hidden architecture (2019, June 7). Spangen Quarter Housing.http://hiddenarchitecture.net/spangen-quarter-housing/

/ Built block   Apartment layout

"Kasbah", Piet Blom, Hengelo, 1972

The kasbah housing project was designed and built by Piet Blom in Hengelo, a town in the Netherlands in 1972. Blom's goal was to create an urban roof, something he had conceptualized the years prior. The municipality of Hengelo issued an assignment, asking the architect to deviate from the usual forms of housing and housing types so that the unmet housing needs within the existing market can be met.[42]

The project initially contained 128 dwelling units, although that number later grew to 184. Blom, wishing to transfer the Dutch row typology into a new, experimental context, designed four different housing types, each corresponding to a different sizing need; The dwellings ranged from a single space studio to a 4 bedroom house. All units have an open floor plan, with an inside staircase connecting the different rooms. Almost all units have a private roof terrace. The four different housing typologies were meant to offer space for a varied society in which there would be room for singles, families, employees, self-employed entrepreneurs, students and professors.

One of the key elements of the Kasbah design, and the reason it is part of my case studies, is the peculiar pilotis area; Blom does not design or fill out the space under the urban roof, providing only a sketch with illustrations of social public life. According to him, the space is suitable for parking, shops, greenery, play areas and meeting places.[43] In 1976, a communal area for residents was created on the ground floor, named "De Tempel".[44]

fg.21 Kasbah Pilotis view
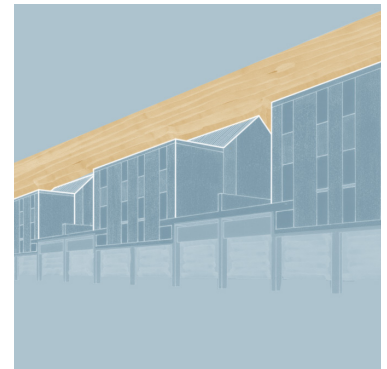
fg. 22 Dutch row housing typology

fg. 23 Pilotis

In Hengelo, Blom had the opportunity to materialize his ideas about societal structures and communal living. Despite the creative design approach, the project ultimately failed to meet the architect's vision. Due to high rent prices, the initially desired societal diversity was never achieved. High income households and young dual earners moved into the Kasbah, while working class families still opted for the familiar terraced house. The project resulted in a lonely version of the complex urbanity that Blom had in mind.[45] Despite its failure, the Kasbah complex, with its unique shape and spatial setup, challenges a traditional housing typology and offers a creative approach to it.

42   Kieft, K. (2000). Blom. Giesbeek: PeQu Drukkers.
43   Hengeveld, J. (2008). Monografie Piet Blom. Amersfoort: Jaap Hengeveld Publicaties.
44   Hiddema, S. (1984). Piet Blom en de kunst van het bouwen. Groningen: Academie Minerva Pers.
45   Hengeveld, J. (2008). Monografie Piet Blom. Amersfoort: Jaap Hengeveld Publicaties.

"Unite d' habitation", Le Corbusier, Marseille, 1952[46]

Unite d'Habitation is an apartment building block, located in Marseille, France. Designed by Le Corbusier in 1947, Unite is one of his most important projects, as well as one of the most innovative architectural responses to a residential building.

The built block is massive, measuring 165m long, 24m wide and 56m high. Each floor contains 58 duplex apartments, capable of housing 1.600 dwellers. The design, often referenced as a "vertical garden city", focuses on communal living for all the dwellers, with shops, pharmacies, and even a small hotel accompanying the apartments in the complex. My existing building is also a solid block, with gallery access, so studying this typology can help me re-imagine, redesign and transform the existing structure, maximizing space allocation, improving circulation and housing quality, while respecting the existing buildings' structural limitations.

fg. 25 Solid built block

fg. 24 Unite d' habitation view of balconies
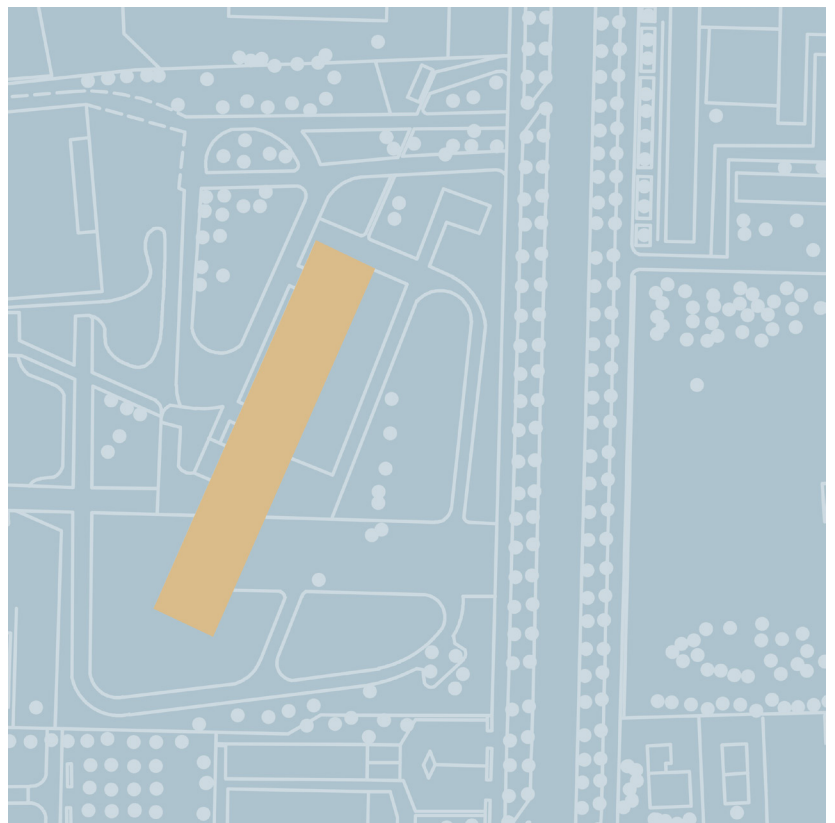
46   Kroll, A. (2020, February 3). AD Classics: Unite d' Habitation / Le Corbusier. ArchDaily. https://www.archdaily.com/85971/ad-classics-unite-d-habitation-le-corbusier

The "Vertical garden city" was based on Corbusier's idea of incorporating the typical villa typology into a large high-rise structure. An idea that allowed the dwellers their own private space, outside of which they would engage in social activities, such as shopping, exercising, and gathering together. The end design essentially gives the feeling of a "city within a city", with public functions carefully distributed throughout the floors of Unite. However, the majority of the communal functions are situated on its roof, which doubles as a garden, containing a running track, a kindergarten, a pool, a gym, and a running track. The typological transfer element in Corbusier's design is one of the main reasons I chose the building as a case study. As aforementioned, one of my design goals is transferring the Dutch row house typology in a dense high rise structure. By examining Corbusier's design, I can draw conclusions upon the positive and negative aspects of his approach and therefore provide some guidelines for the design process.

fg. 26 children playing outside the kindergarten in Unite's rooftop
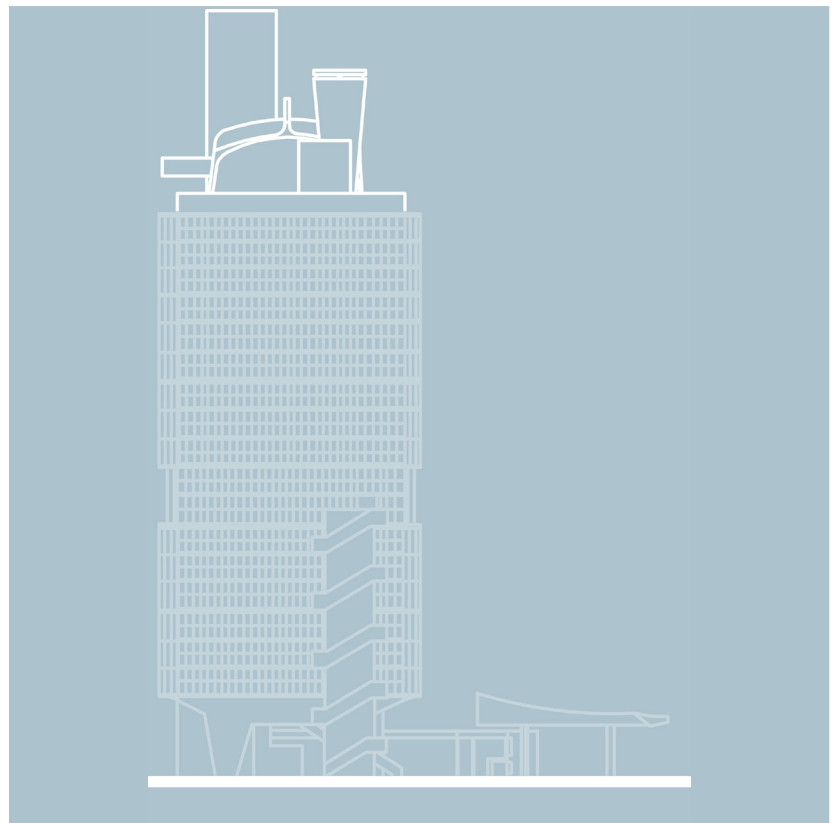
fg. 27 communal areas on roof

One of the building's characteristic traits is the ground floor. The entire structure rests on top of a pilotis, supported by 34 massive pillars. This provides an -almost- total permeability at the ground level, allowing for communication between the interior and the exterior, while at the same time providing access to the vertical communications. However, as seen in the two figures below, there seems to be a contrast between Corbusier's vision of this space and its actual use; While he meant it to be an inviting meeting place for the community -as seen in his sketch-, the reality is something very different. Due to the enormity of scale and the materiality of the space -exposed concrete-, the pilotis area seems rather cold and uninviting. In addition, and again due to the scale of the pilotis, the space does not protect the visitor from the elements. This is especially prevalent in the winter months, when the cold northern winds make the area practically inaccessible. As I plan on introducing a public plinth on the ground floor of my building, and wanting to make said floor highly permeable to emphasize the public sense of it, I think that drawing these conclusions about Unite's pilotis will help me when designing it.

fg. 28 View of pilotis Unite d'habitation

fg. 29 pilotis sketch - permeability
Le Corbusier

Another defining characteristic of Unite is its residential unit layout. Instead of using a double-stacked corridor system, Le Corbusier decided to span the units on each side of the building. He also gave them a two-story height, thus reducing the corridors to one every 3 floors. By doing so, he managed to place more units in the building. Unite d'Habitation is one of Le Corbusier's most important designs, having deeply influenced the brutalist style through the use of exposed concrete. Since its completion, Unite has been a source of inspiration for public housing across the world. This is an inspiring element in the design; It minimizes the need for corridors, or non-places-i.e. places with no identity, history or social interaction- and maximizes the space that can be allocated to apartments.[47] This is an element that can be used in my design, especially in the southern part of the Emmahuis where the corridor is found in the core of the built block.

L' Unite d' habitation is chosen as part of the selected case studies due to its innovative apartment layout and the liberal use of communal spaces within a dense built block.

fg. 30 Unite d'habitation corridor
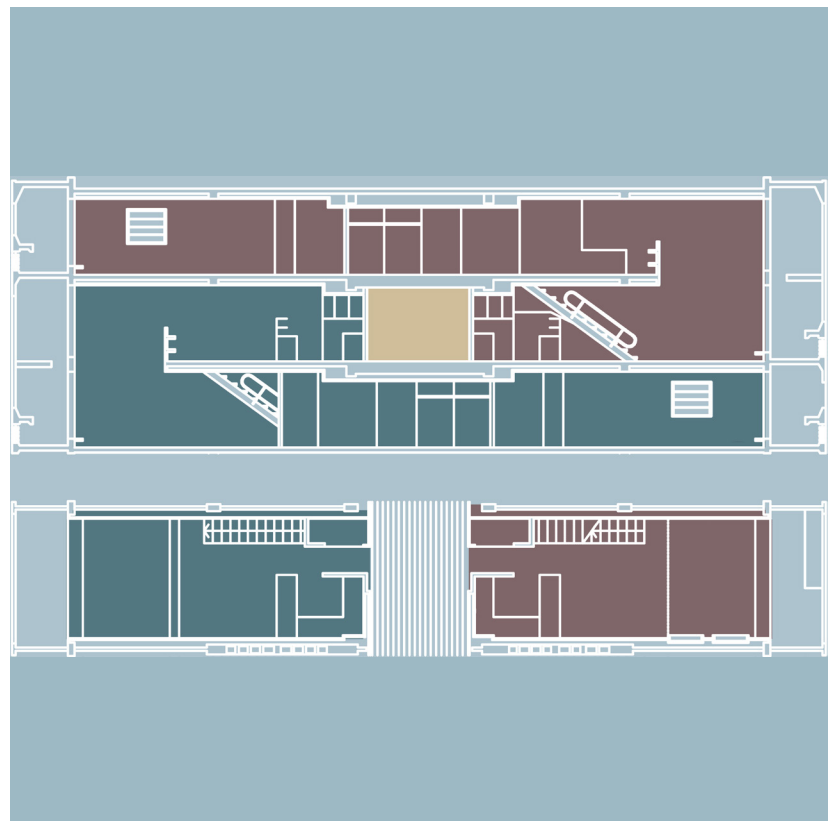
fg. 31 Apartment interlock in section

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47   On "non-places"; Auge, M., & Howe, J. (2009). Non-Places: An Introduction to Supermodernity (2nd ed.). Verso.

4. Research conclusions

The current issues of gentrification and over crowdedness lead to a multitude of pressing problems, such as the dissolution of the social fabric, community conflict, loneliness and others. Rotterdam is suffering from dramatically increasing rent prices. The integration of the new and highly marketed standard of tiny living in the design norm bears dangers for normalizing gentrification; Two social groups that suffer the consequences of the price rise and its consequences are higher education students and the elderly. A possible solution, that gives an answer to the problem of gentrification, while at the same time bringing the two very different age groups together, is intergenerational co-operative housing; A housing solution backed by governmental regulation, protecting housing prices from unreasonable spikes, while at the same time allowing architects to design and experiment, creating resilient, environmentally friendly buildings, while always keeping the dwellers' well- being their upmost priority.

Taking into account the driving trend of Rotterdam's-and the worlds'- rapidly densifying urban fabric, I believe it is vital to find a balance between profit maximization and high quality of life within a collective living context. What we define as "minimum" space for a room to be functional is of course highly subjective and debatable. And especially when economics are put into play, balancing between profit margins and square meter allocation per capita is tricky. However, it is vital that architects hold a critical view towards this pan European deregulation in minimums of functional private space that force people to a confined, capsularised life.

By examining the selected pool of case studies, I gathered useful information on a multitude of focus points and understood the thought process behind each design. How each architect envisioned his idea of communal housing. Every design interpretation differs, but all have a common goal; Creating a diverse, lively community within an innovative urban fabric. A community formed and characterized by its inclusive character, and not by the dwellers' wallets size.

With this theoretical background acting essentially as a guide to designing resilient housing, I began experimenting, to give my own interpretation and solution to the problems stated above.
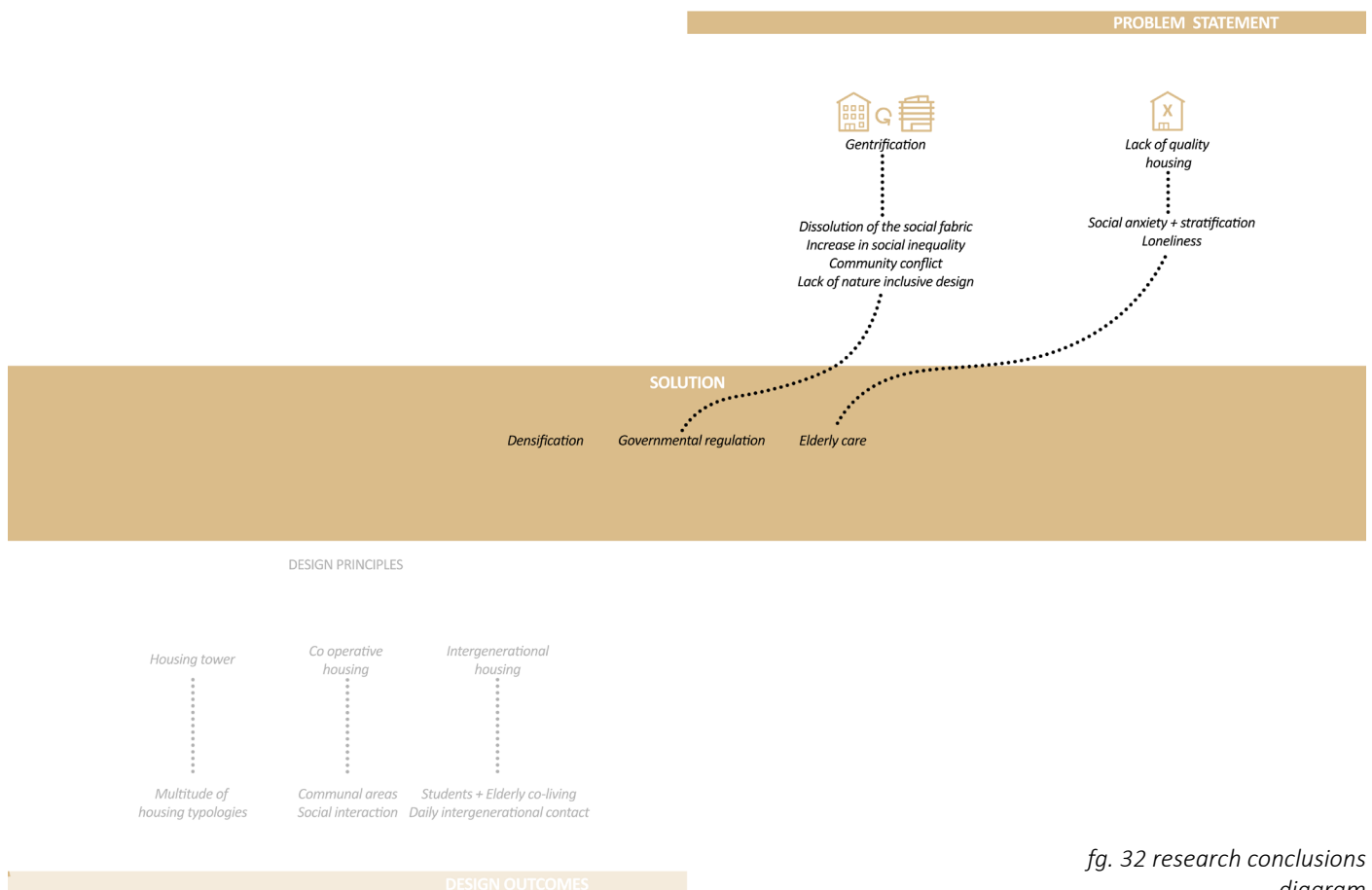
fg. 32 research conclusions diagram

5. Conceptual design

5.1/ Urban analysis

      In the beginning of the studio, we were separated in two different groups, to come up with two separate master plans for the site. One group focused on social inclusion, while the other on nature inclusivity.

fg. 33 Urban masterplan
Existing situation

      We, as the 'Species' group, were called to focus on a nature inclusive solution for our site, located near Rotterdam central. Before beginning the design process, we dove into a thorough urban analysis of the site and its surrounding areas, the results of which you see below.

1/10000

▊ Site border

• ● ● ● Rotterdam Central station

fg. 34 Rotterdam north

On a district level, Rotterdam Noord is closed off to the surrounding areas, bordered either by broad streets or water bodies. We can therefore talk of Blijdorp as an "island in itself". Throughout the neighborhood, there are no substantial green initiatives. Blijdorp is a heavily urban area, providing few natural resting areas for its residents. This, in turn, means that Blijdorp doesn't prove to be a good host environment for species cohabitation and biodiversity enrichment.
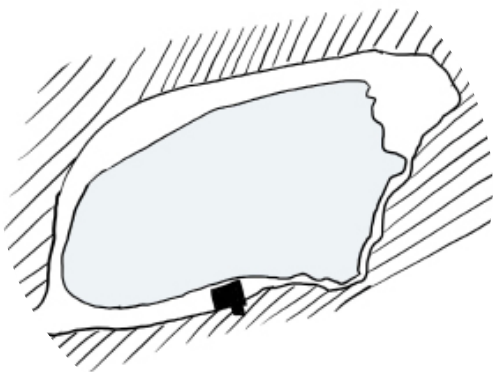
fg. 35 blijdorp - island

fg. 36 lack of connected greenery

Just like Rotterdam Noord, the site appears to be completely disconnected from its immediate surroundings. As an example, even though it's located so close to the train station, our site appears to be completely disconnected from it. The existing built blocks are miss-repaired, and are not designed to adapt to climate change, or to the ever growing demands for affordable, high quality housing. The building blocks awkwardly stand, without any public resting spaces, making the area highly inhospitable. Noise and air pollution are also key areas of concern for the site, as it is surrounded by the train tracks leading to the station, and Statenweg, a main road connecting Blijdorp and the north to the center of the city, that essentially cuts our site in two.
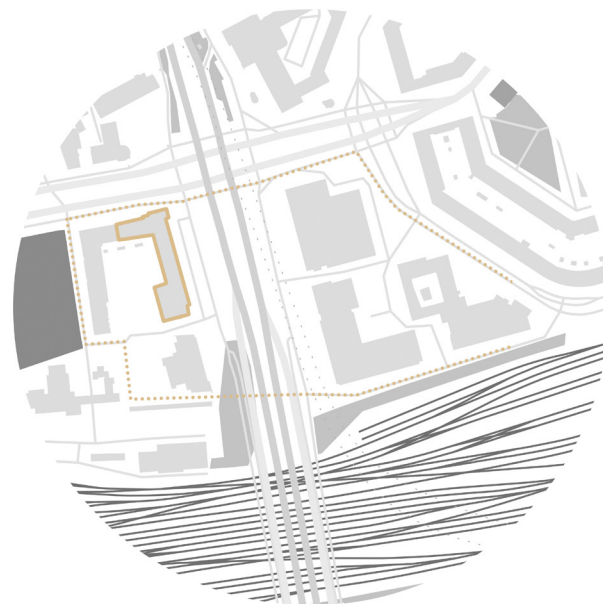
1/2000

▮ Selected building

······· Site border

fg. 37 site area
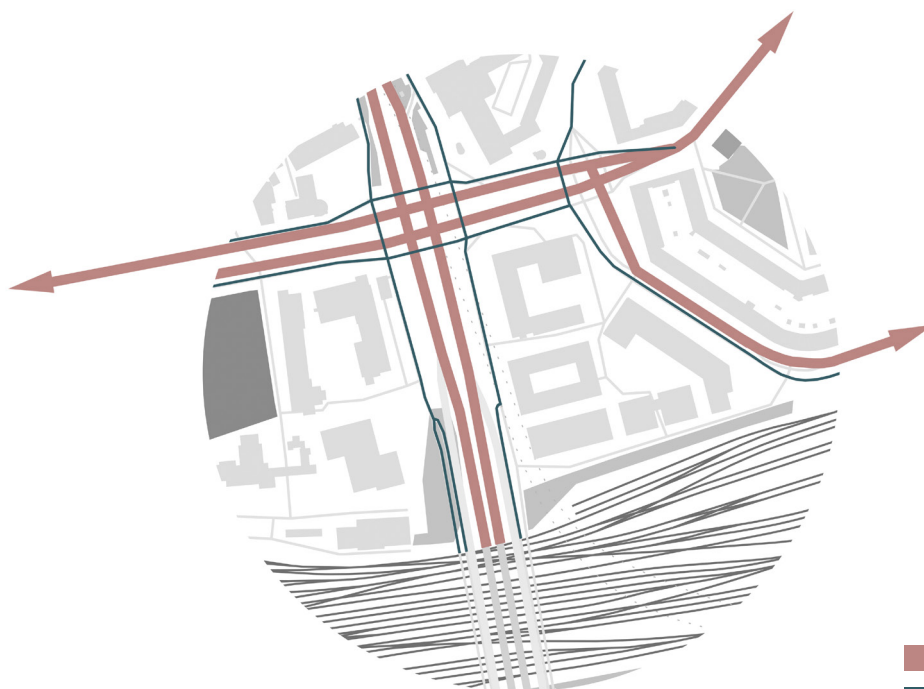
▮ Car routes

▮ Bicycle routes

······· Selected building

fg. 38 car and bicycle networks

fg. 39 Site pictures

Its proximity to the station is at max a 9 minute walk and the city center provides the cornerstone for creating a new dynamic center for the Blijdorp district. The site provides great potential for spatial experimentation, through its size (big open areas, big gaps between built blocks) and local urban typology (heavily urban, dense area). In our area, we also find the Homobonus building, a protected site, originally designed to represent Blijdorp's center.

1/2000

Monument

Open/ green areas

.... Selected building

fg. 40 points of interest
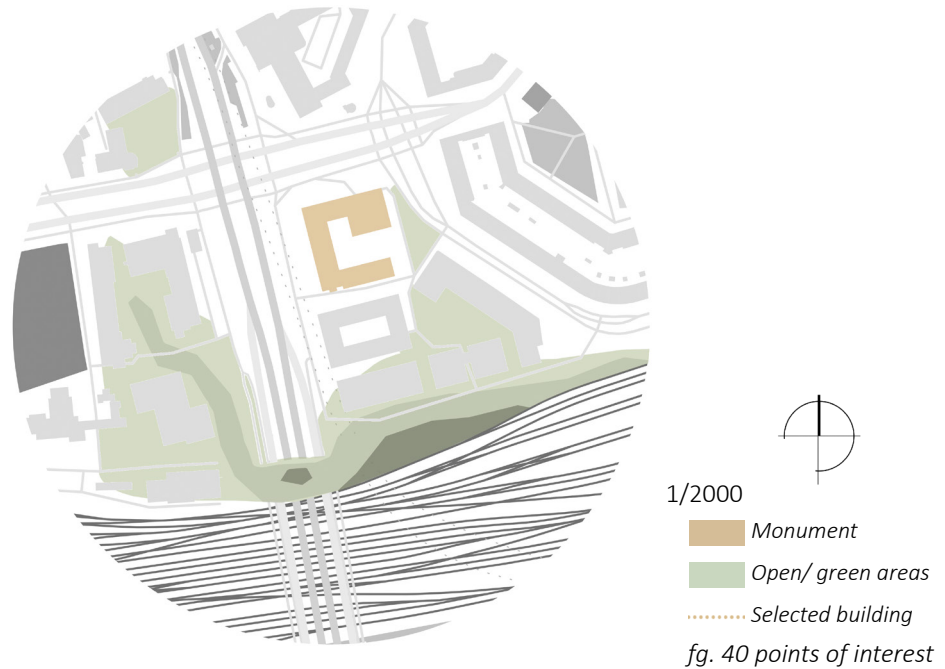
This provides an opportunity to retain the building's original image, while at the same time repurposing it, in an effort to reintroduce it as a central district for Blijdorp. Even though the existing building blocks neighboring the Homobonus building are outdated and fail to give viable solutions to problems such as the rise in housing demand, many existing building envelopes can be repurposed and turned into up to date, resilient structures. Through creative and adaptive architectural design, and by using alternative dwelling methods such as cooperative housing, our site could prove to be a role model for a resilient, degentrified dwelling future in an ever-densifying Rotterdam. Social cohesion and inclusion are two driving factors in our design approach. By introducing large open air facilities available to the public, and a multitude of public functions in the area, such as community centers, workshops and small businesses, we believe the site could have a new, more public and accessible character.

1/2000

Car routes

Bicycle routes
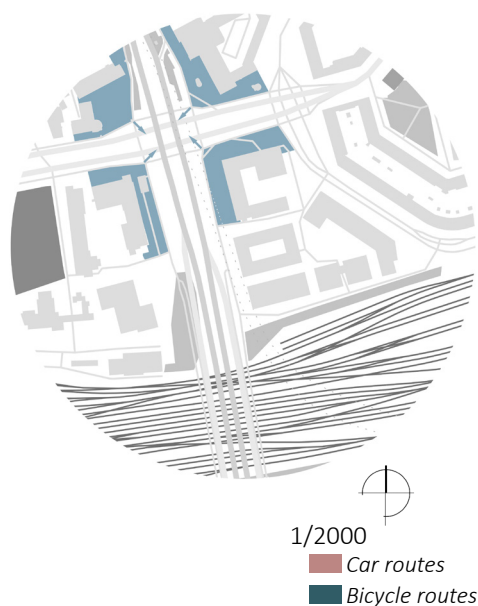
fg. 41 connecting the corners

1/2000

Car routes

Bicycle routes

Selected building

fg. 42 Design core values in the urban fabric

5.2/ Urban planning

fg. 43 Urban masterplan
Proposed solution

My design is part of a masterplan composed with nature and species inclusion in mind. Since the early stages of planning and designing, our vision was clear; Creating a resilient and dynamic center for the Blijdorp district, while at the same time making a statement about how far architects can go in terms of nature remediation in a dense urban area such as the city of Rotterdam. These core ideas are what led us to The Urban ForRest. A design centered around a slope that introduces a forest edge, with different habitats for species and humans, meant to connect the two sites.

Species and humans   Center area   Campus area

fg. 44 Group vision
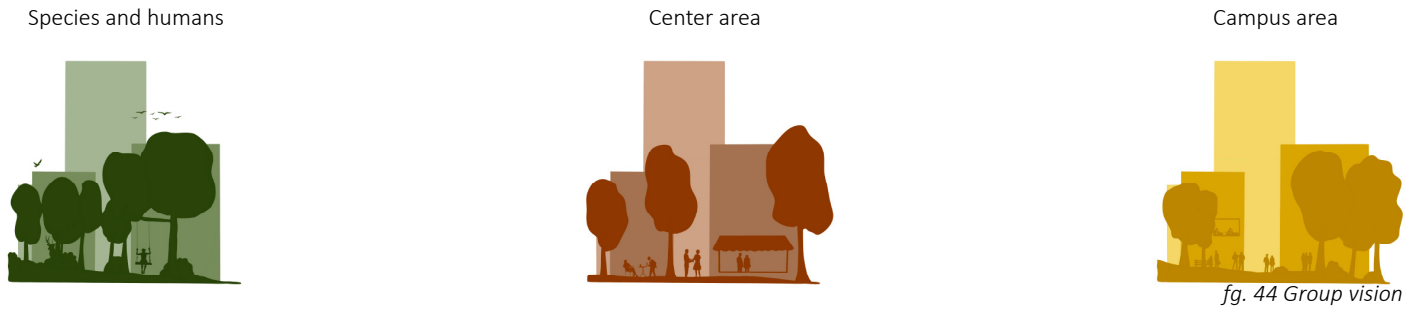
In the urban ForRest, everything revolves around the slope. On the south side, our design begins with a dense forest, providing much needed shelter for a multitude of species, as well as a noise barrier and air filtration system for the adjacent buildings, mitigating part of the air pollution caused by the trains. The trees we're planning on using are part of the existing local flora, to help with the growth of insect and local fauna.

Dense forest edge
Separate habitats for
species and humans

Open forest edge
Habitat for both species
and humans

Urban forest edge
Human habitat
with species

fg. 45 Habitats of the forrest edge

fg. 46 Tree typology
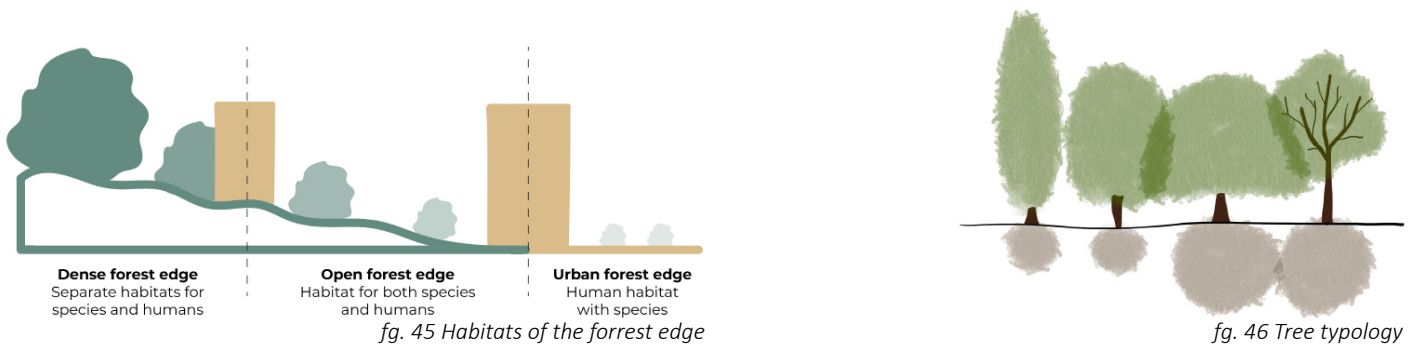
Landscape connectivity is a critical concept in ecology. Species of plants and animals rely on connected habitats, also called 'patches'. Built and paved areas fragment these patches. Moving between significant patches of habitat is critical for maintaining healthy populations of flora and fauna. So, these patches need to be interlinked. For this reason, the two sites are connected by the forest, through the use of an eco-duct situated next to the train tracks, above Statenweg. Under the slope, on both sites, we've placed parking facilities, taking full advantage of the newly created space.

fg. 47 Species route

Moving towards the north, the forest gradually gives way to urban development. The continuation of the slope provides our unbuilt areas with green parks and recreation spaces, making our site a place you want to be in, a place you want to relax in, instead of a place you want to pass through in a hurry. Reaching the far-northern part of our plot, we find the Blijdorp center district. An area focused on creating a dynamic center for our neighborhood, filled with shops, workshops and community centers.

fg.48 four districts of the masterplan

fg. 49 Campus district impression
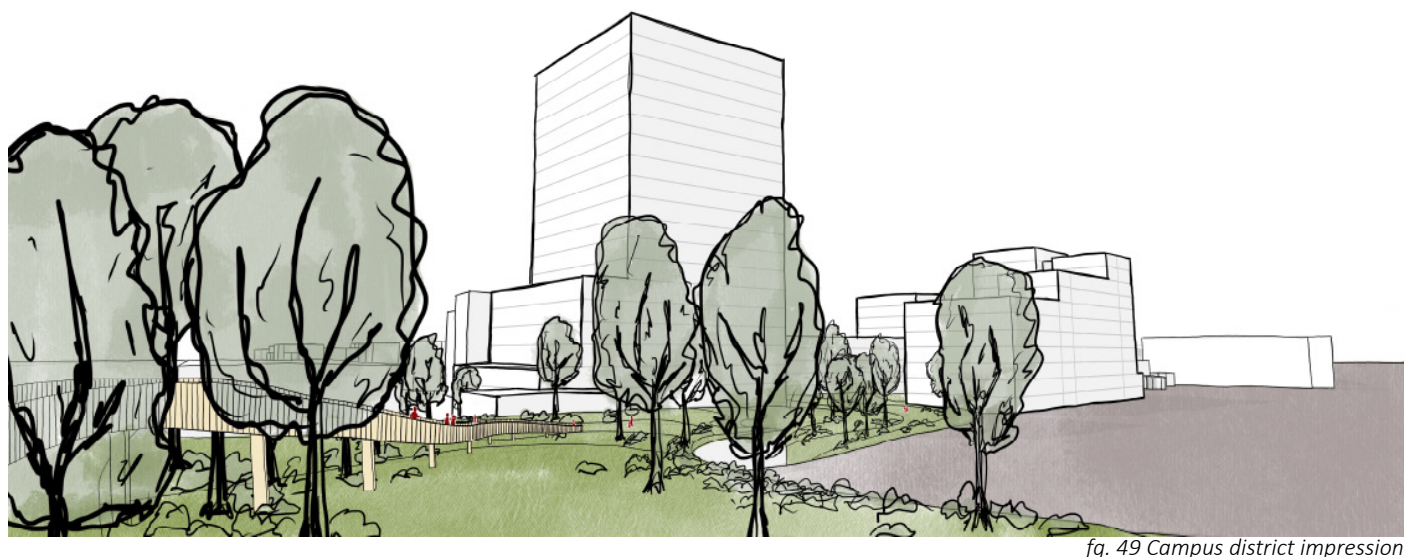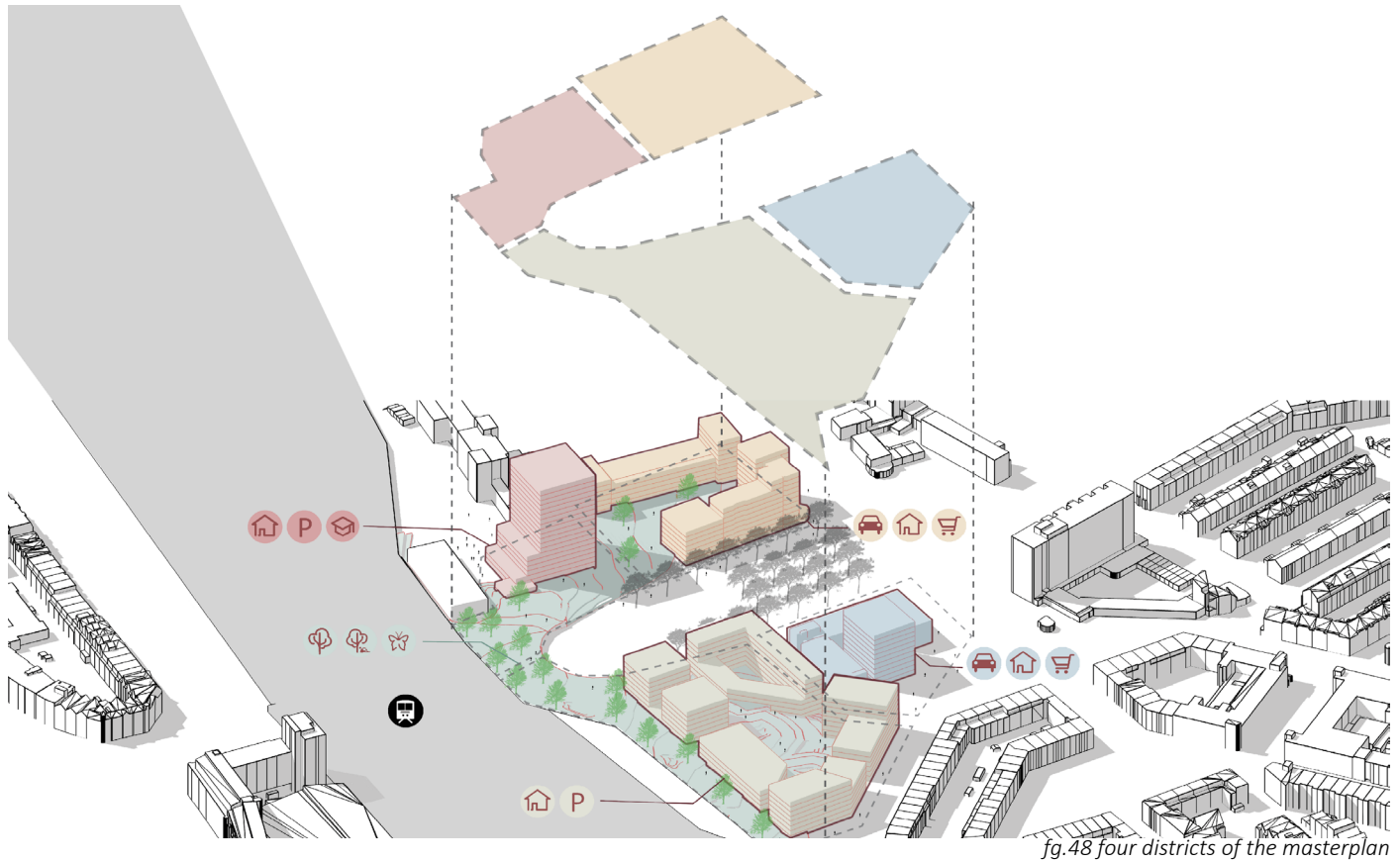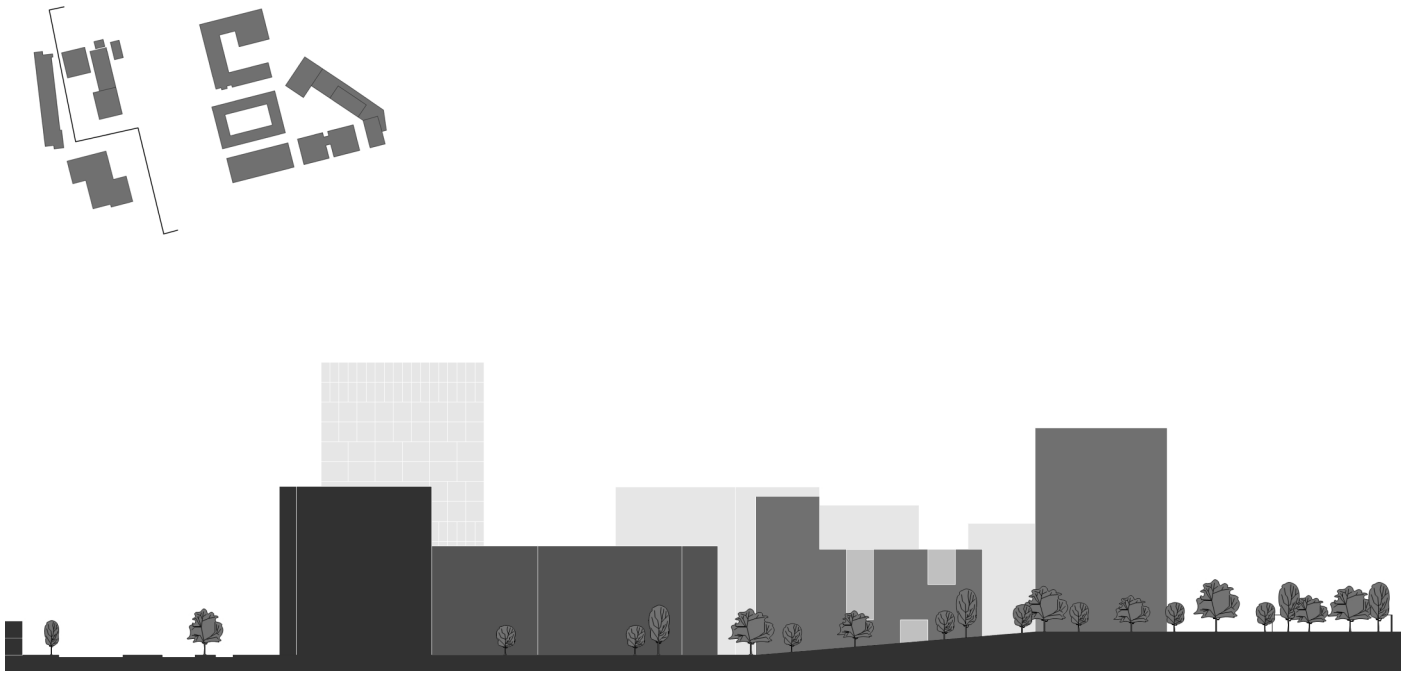
fg.50 Section A

fg. 51 Section B

5.3/ Design brief

Upon selecting a plot to develop our individual designs, the Emmahuis building proved to be the best candidate for the proposal of an intergenerational cooperative. It already has an elderly housing corporation under its roof. By keeping the existing user groups in the area, we retain the areas identity. The building itself is fairly recent and therefore is a great candidate for Repurposing and expansion. Its supportive structure (concrete envelope) is very Is flexible and is proven to be a great option for spatial experimentation while implementing a repurposing design. It's placement on our newly designed plot gives the opportunity of creating a highly public plinth on the ground floors, giving the building a diverse character, ranging from fully public to fully private. The gallery apartment access setup Of the existing building is a wonderful base In which spatial exploration can begin, with the end goal being a revisited, diverse form of Dutch row, both in plan and façade.

1/1000
Selected building
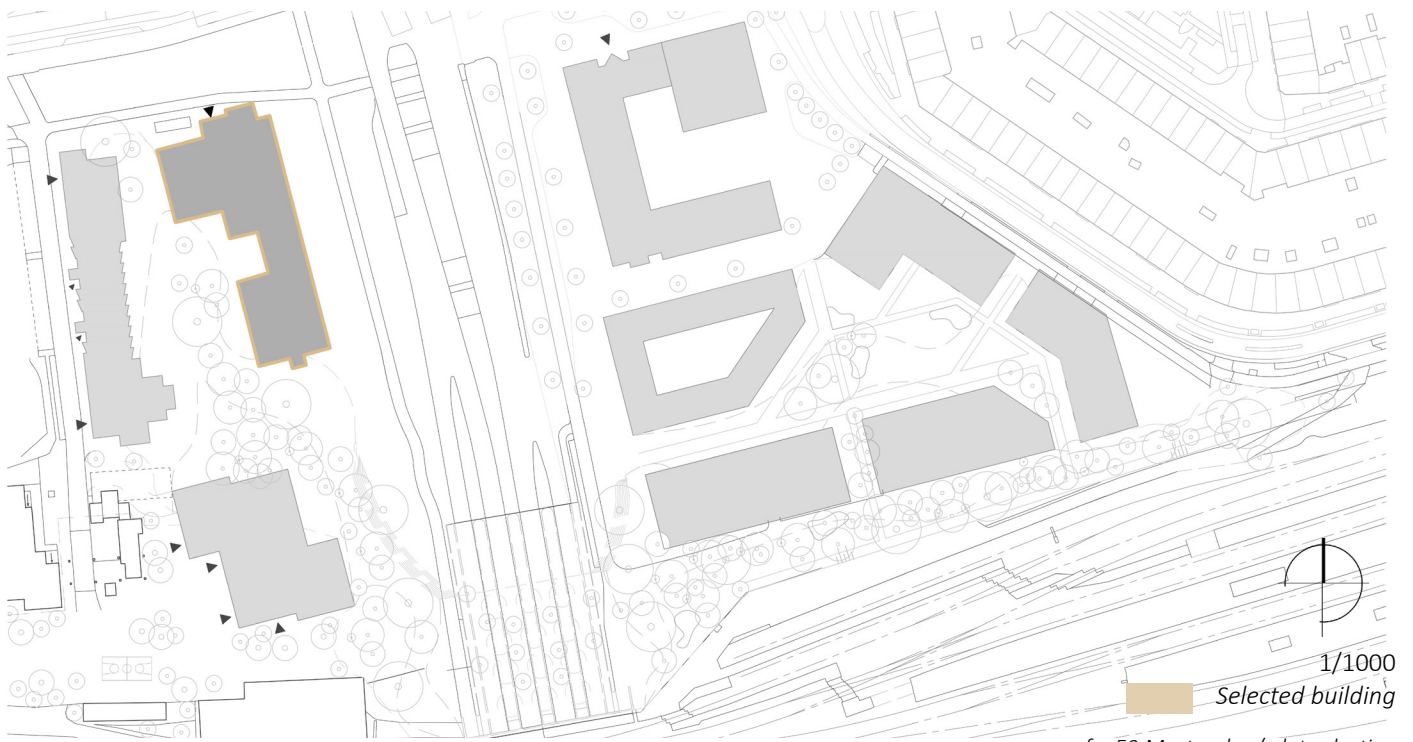
fg. 52 Masterplan/ plot selection
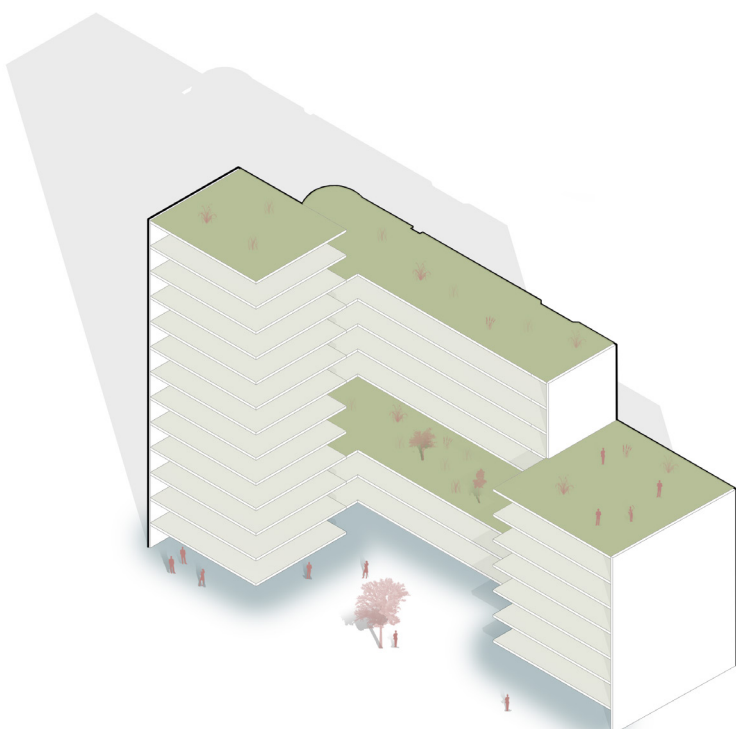
fg. 53 Emmahuis - Existing building
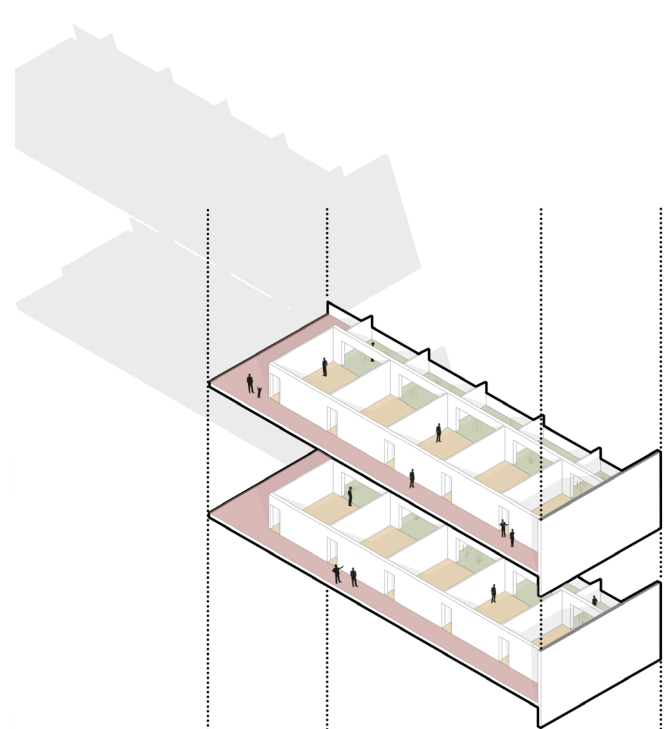
fg. 54 Verticalized Dutch row typology

Typological transfer exercise

Based on the case study analysis shown in chapter 3, the spatial exploration process for the graduation design began with a typological transfer. We were called to superimpose a selection of our case studies to our plot, triggering spatial exploration.
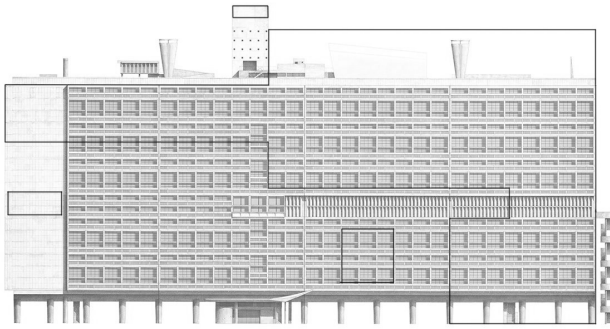
fg. 55 cutting
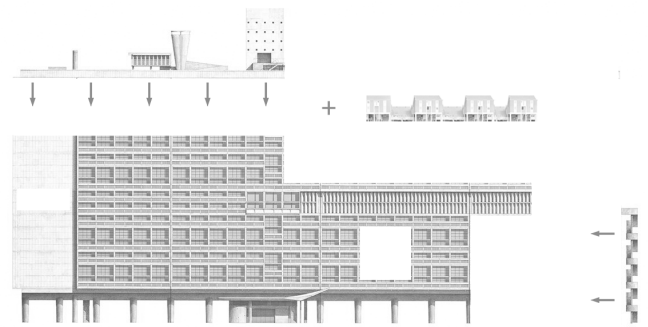
fg. 56 Stitching + adding
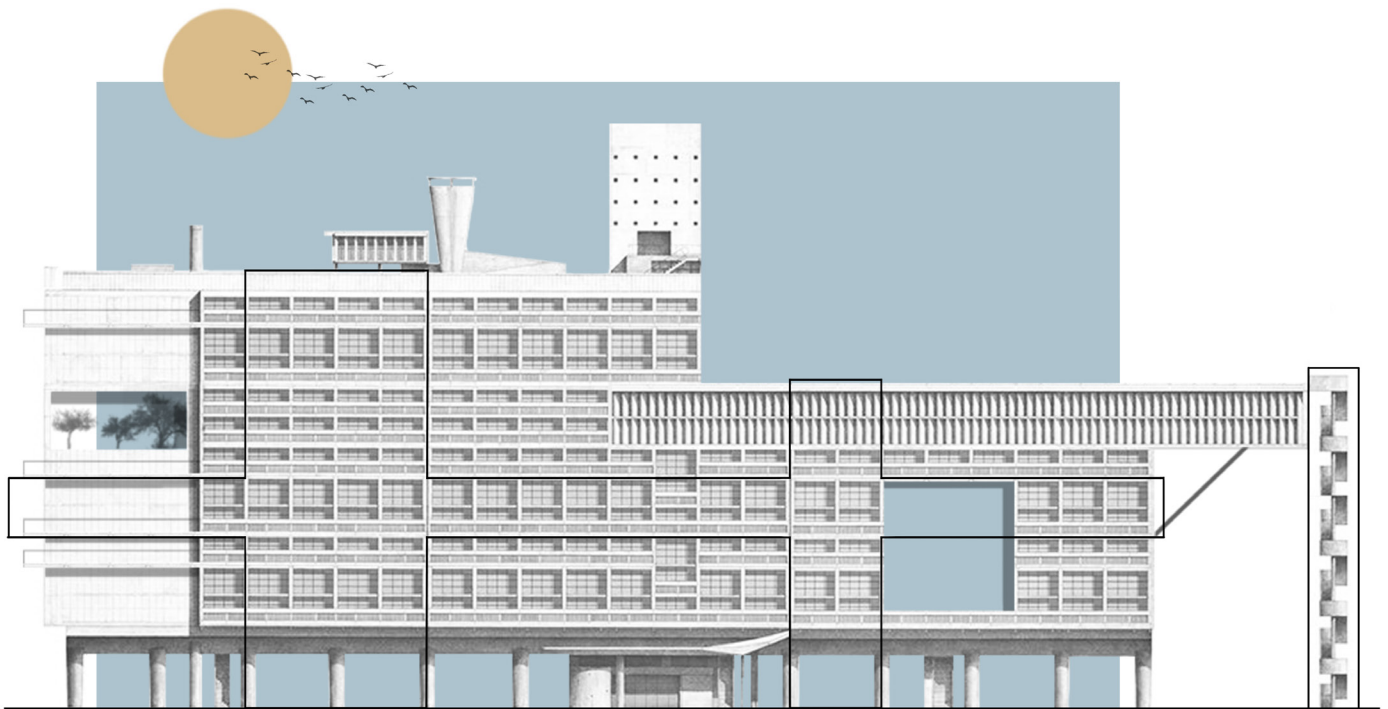
fg. 57 initial results - more cutting needed
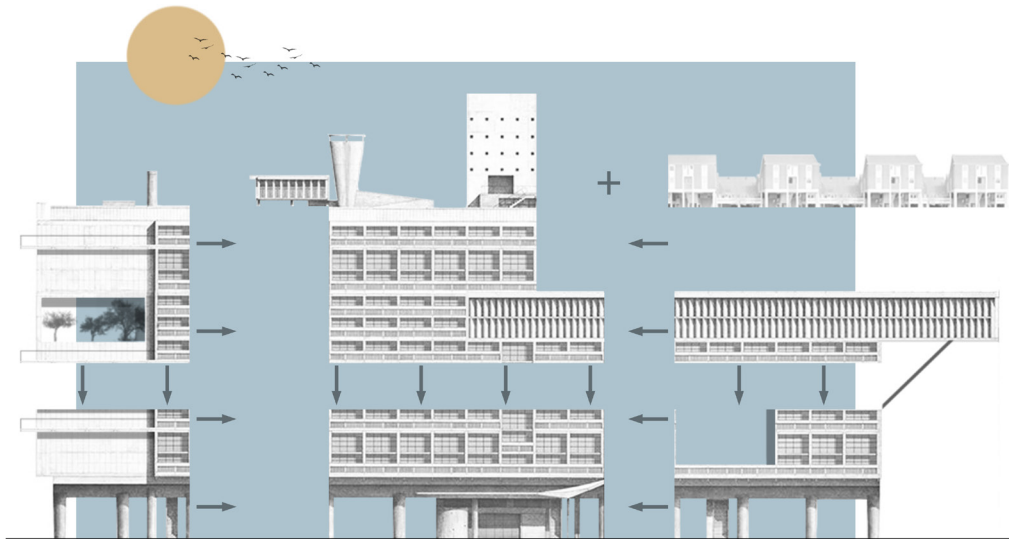
fg. 58 More cutting, stitching and adding
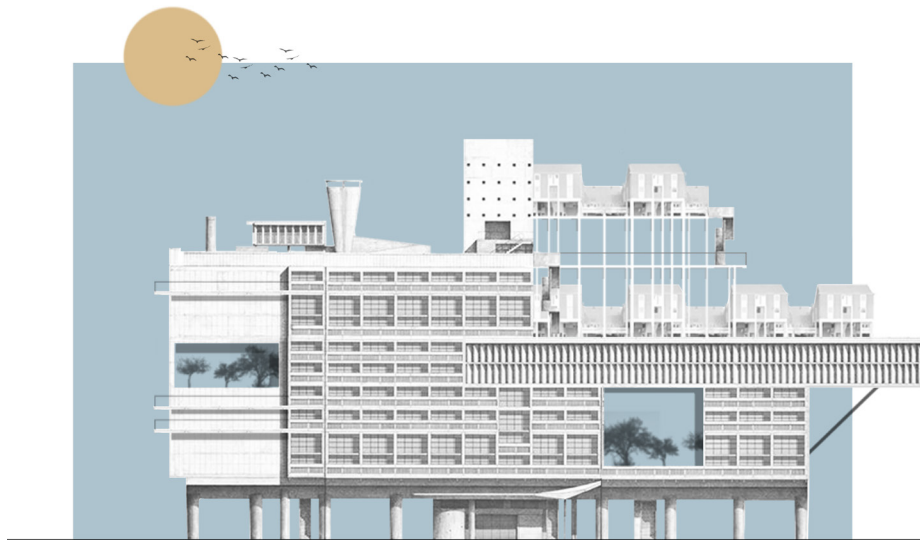
fg. 59 Final result of typological transfer
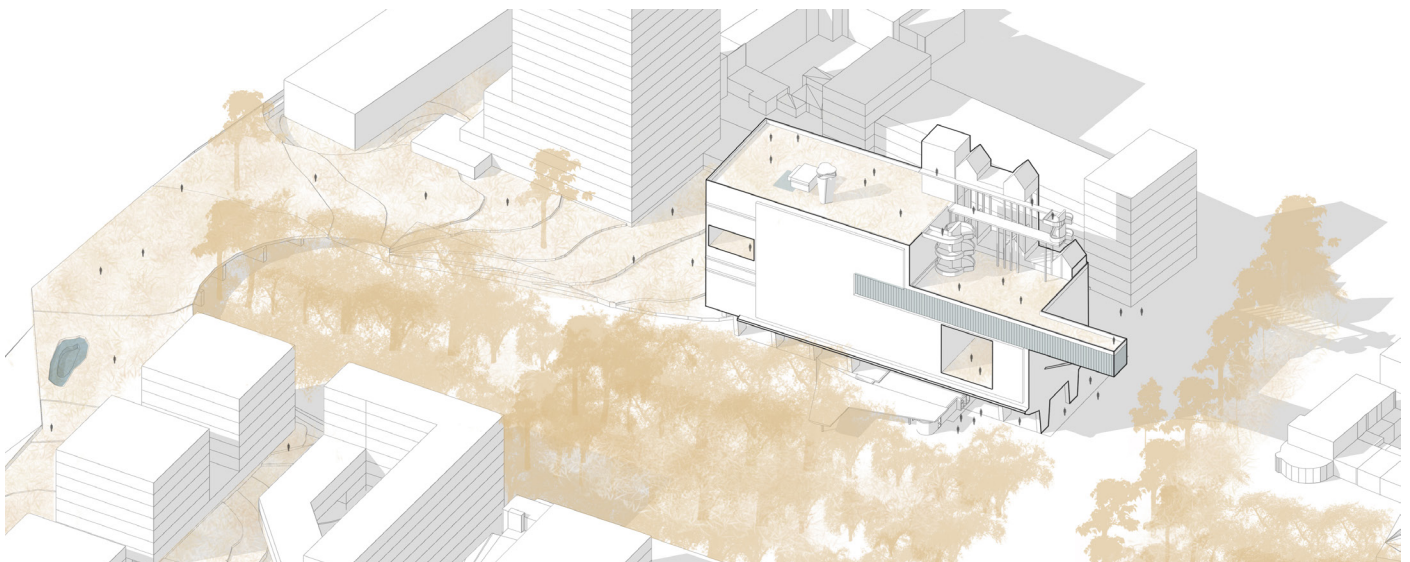
fg. 60 Superimposition of typological transfer on study area
isometric impression

This exercise produced some interesting insights.

- There needs to be a reaction to the large tower being designed on the south border of my building.

- The Emmahuis building's size needs to be reduced to fir the urban context

- The rooftops created by the fragmentation of the existing structure shall be public.

- An addition of a second built block is necessary to offset the reduction of allocatable square meters in the Emmahuis.

- The ground floor level needs an open plan, in order to connect the now-two buildings through one common entrance.
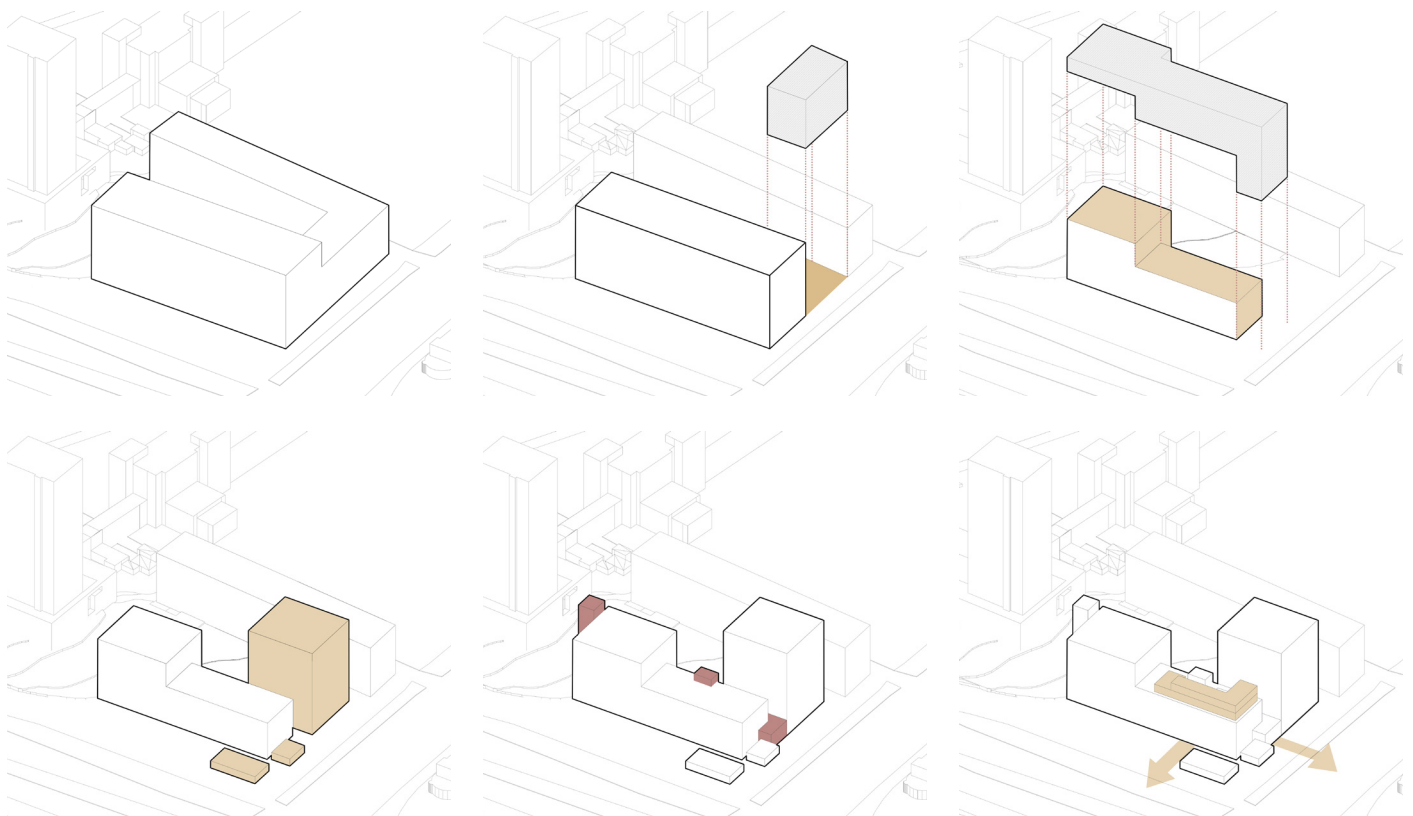
fg. 61 Massing sequence
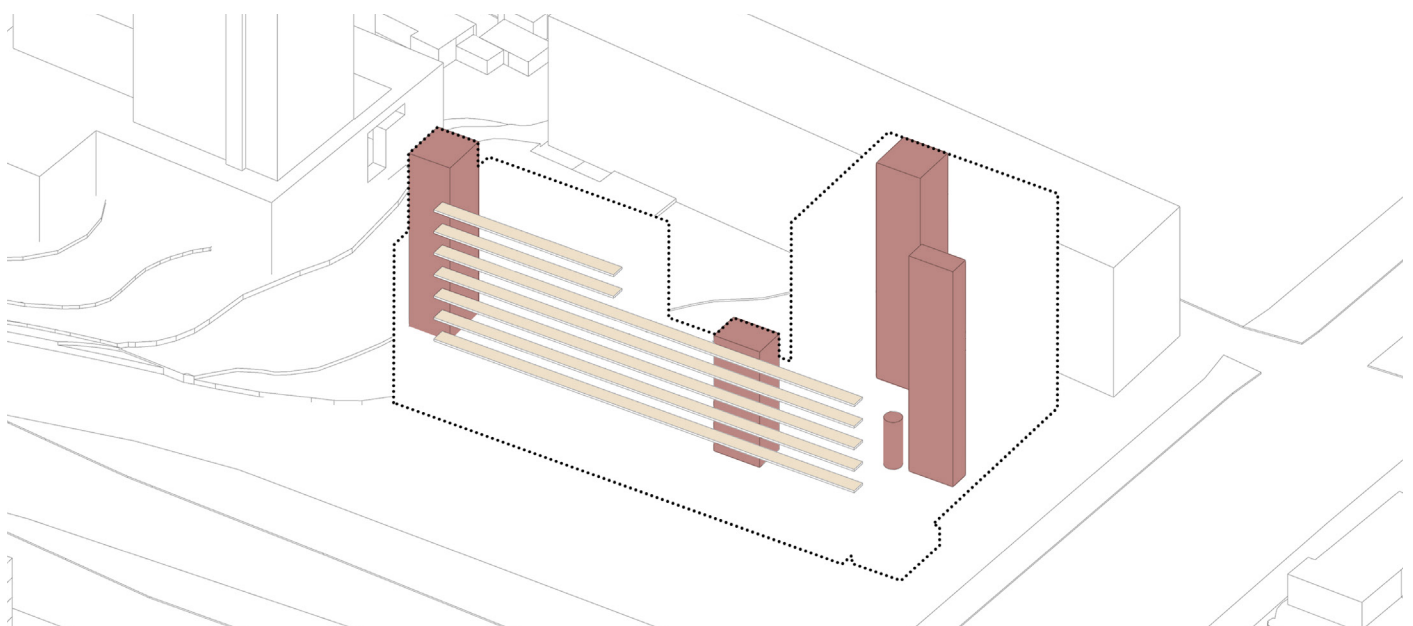
fg. 62 Circulation diagram

The building is essentially separated in two main parts. On the first two levels, the design has a permeable, public character. This area is dedicated to the communal entrance of the housing unit, as well as shops, workshops, cafes and open office areas. From the second floor up, the design is dedicated to intergenerational housing, accompanied by communal areas, green roofs and gardens.


**Usages/
Functions**

Lobby
Stores
Cafeteria
Storage
Library
Workshops
Housing
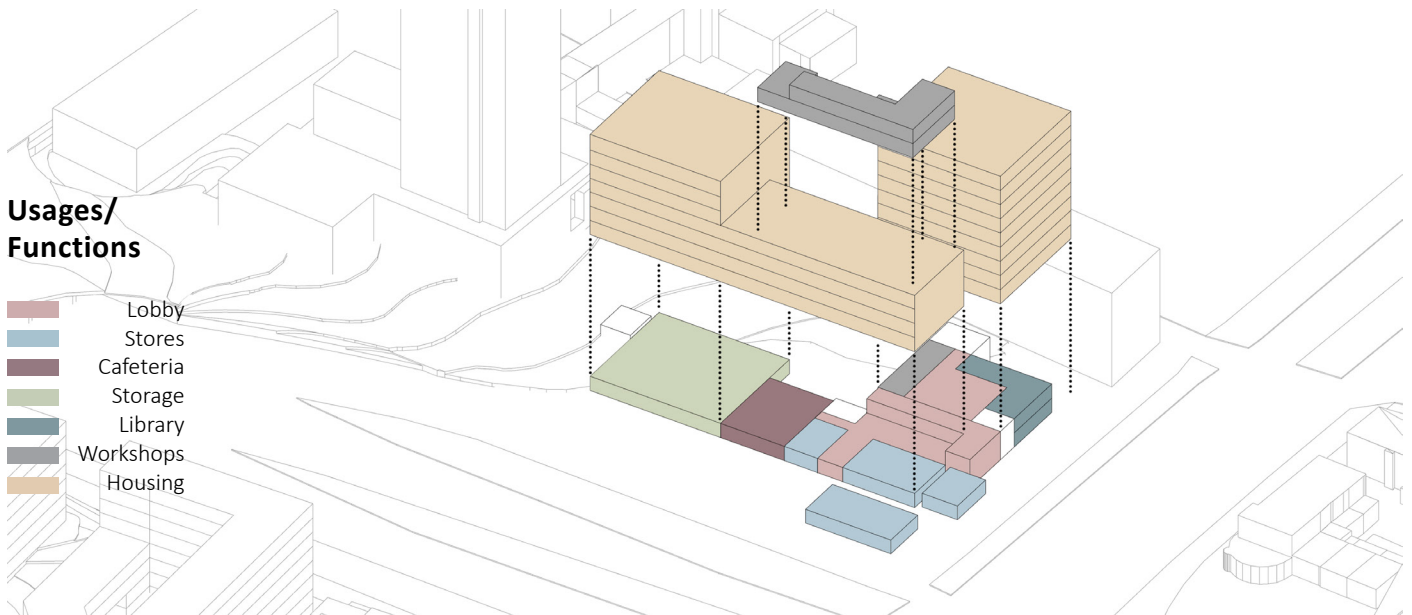
fg. 63 Land uses

Housing is split in three main typologies. The design respects the existing block's structural limitations while experimenting with different housing typologies within them (Gallery housing + Interlocking lofts) , and quite literally adds another typology ("New tower apartment") on the side of it, to introduce new and diverse forms of living, the design of which the existing built block could not allow.

**Housing
Typologies**

Gallery housing
Interlocking lofts
Tower apartments
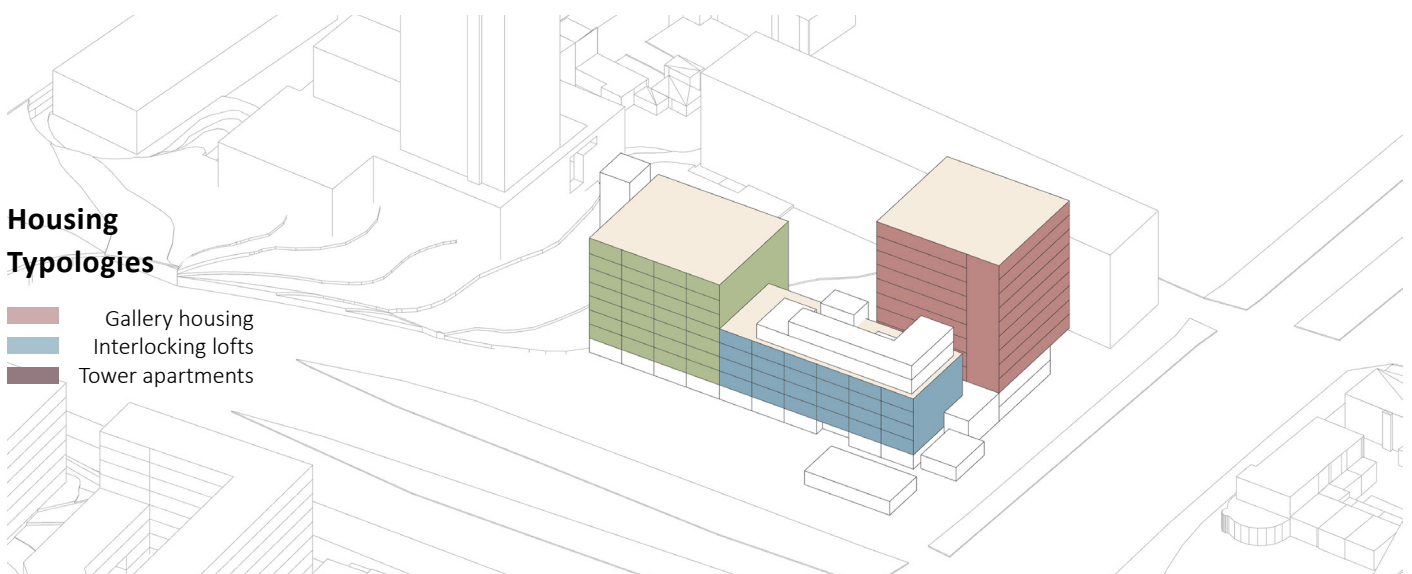
fg. 64 Apartment typologies

For the redesigned apartments situated in the existing built block, the structural interference remains minimal, respecting the very strict structural limitations of the building. The one storey studios follow a simple gallery house typology, with the introduction of a small private balcony at the back of each unit. Each unit is sized at 50 square meters and can house up to 4 dwellers (2 double bedrooms). These apartments are meant to be held and maintained by a co-operative housing association.

Private studio

Balcony

Gallery access

fg. 65 "Dutch row" typology
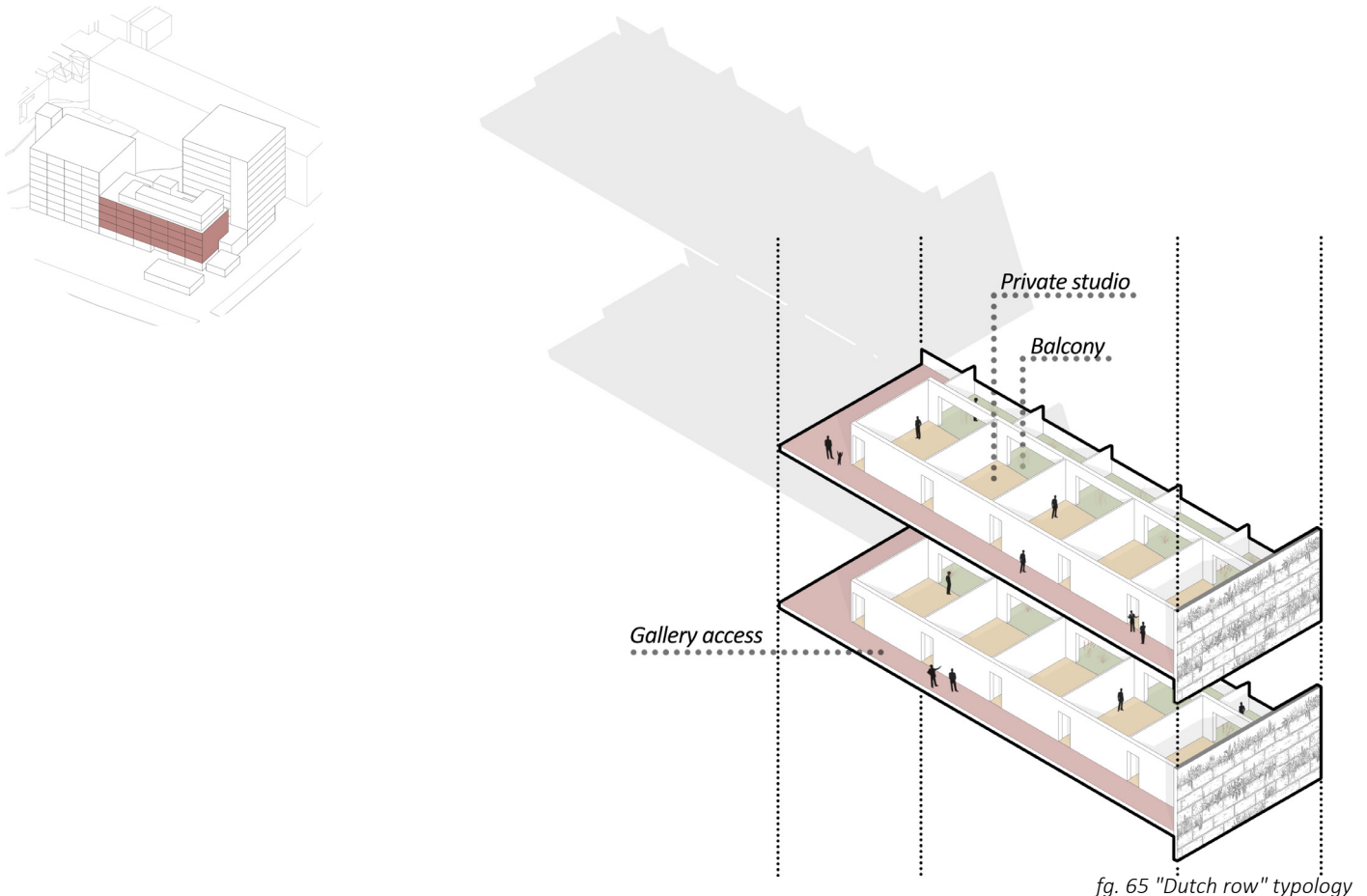
As mentioned in chapter 1, one of my fascinations was the Dutch row housing typology. When trying to introduce it to the Emmahuis, the main challenge was the lack of available space given at each floor. The total width of the building (12m), in combination with the structural scheme, did not provide enough room to succesfully transfer the essence of what a Dutch row is to the Emmahuis. For that reason, a new structure is added to the west facade of the Emmahuis, increasing its total width to 16m. This 4m wide addition serves as a "divided yet united" set of gardens, spanning the entirety of the west facade. Each dwelling unit gets a corresponding garden, in lieu of the traditional "back gardens" that characterize a typical Dutch row house. The aim of this addition is to provide the residents a place to meet with each other, a tool for them to live "alone together" (see chapter 1), but also as a much needed shading element for the west facade.

"Dutch row" typology

Standard floor plan

1 Gardens
2 Gallery access
3 Apartment module
4 Balcony
5 Elevator/ stairs

+6.60

+6.60

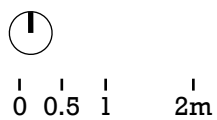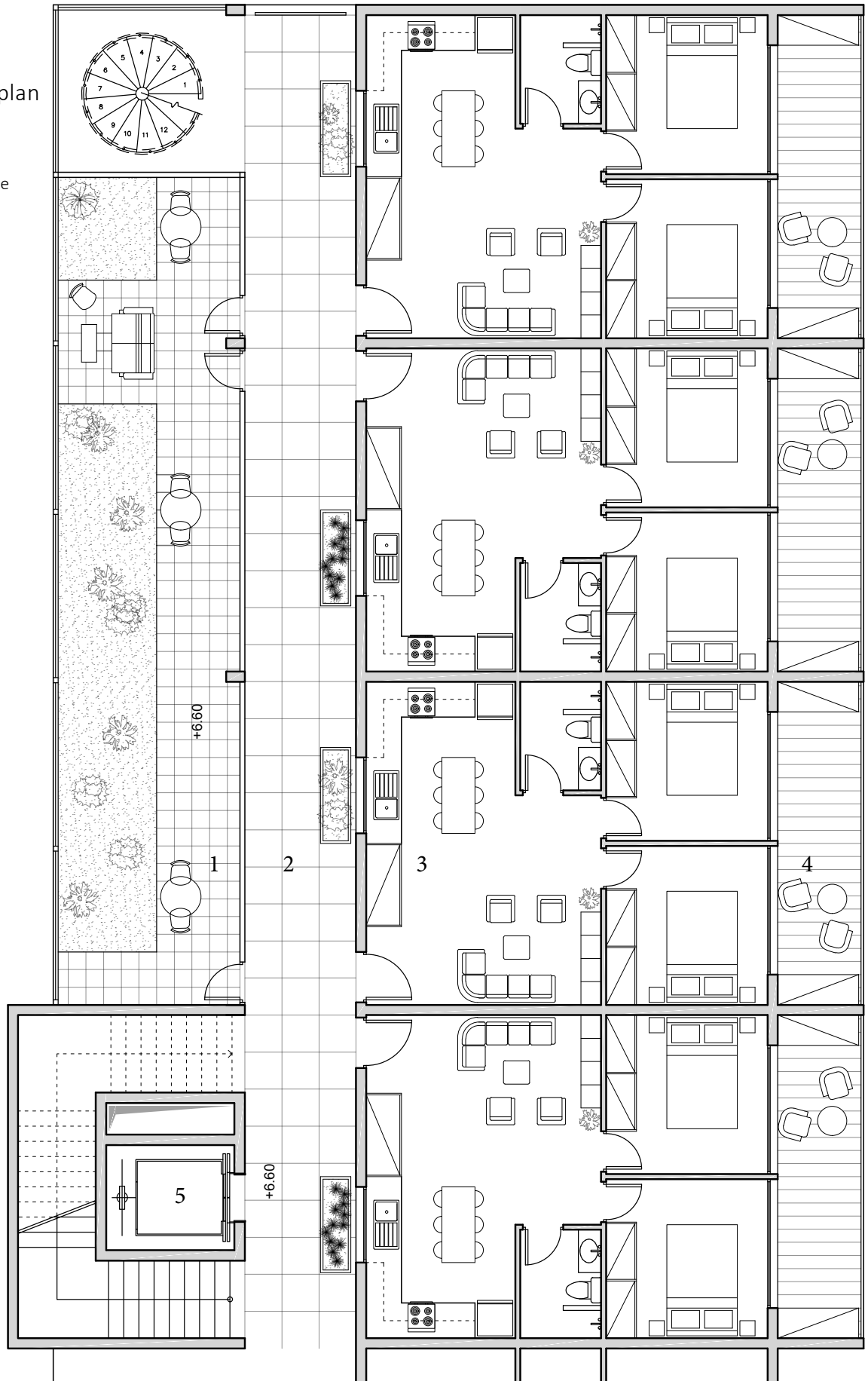1   2   3   4

5

0 0.5 1   2m

fg. 66 "Dutch row" housing typology

Inspired by Le Corbusier's work in Marseille, the south part of the Emmahuis is filled with interlocking lofts, reducing the need for a corridor to every three floors and maximizing residential square meter allocation. These new loft apartments are meant to be sold to private owners, in order to make the concept economically viable. Each unit is sized at 150 square meters and can house up to 6 dwellers (3 double bedrooms).
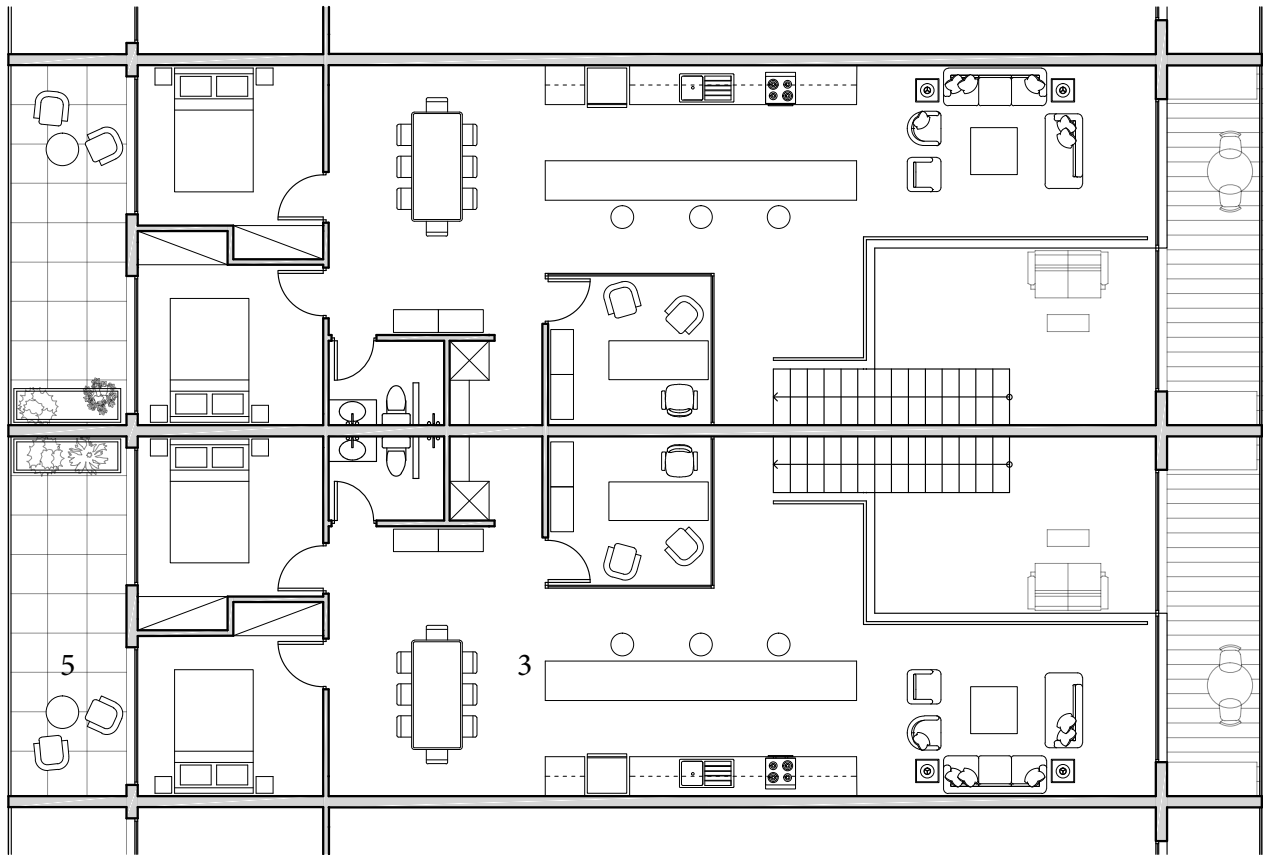
**"Interlocking lofts"
typology**

Standard floor plan

1   Gallery access
2   Loft 1st floor
3   Loft 2nd floor
4   Balcony 1st floor
5   Balcony 2nd floor

0 0.5 1   2m
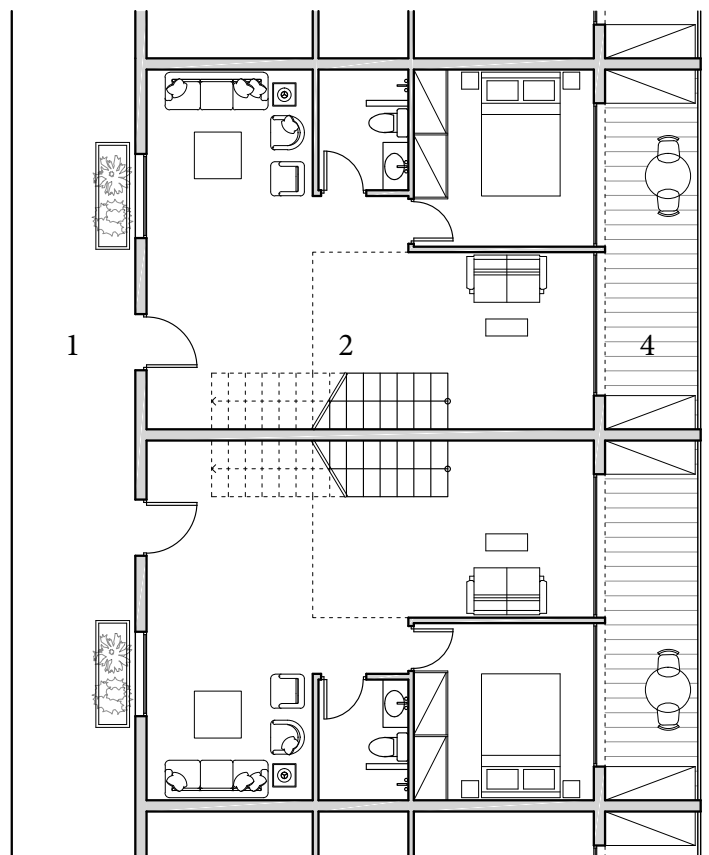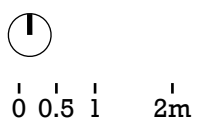
fg. 67 "Interlocking lofts" housing typology

In the new tower, every floor contains 2 complete apartments and 5 rooms that share communal amenities, such as the kitchen, bathroom, living room, study etc. In the beginning of the design process, the goal was for each floor to only contain rooms that share the provided amenities -as seen in figure 65-. However, in order to maximize the new buildings' efficiency and to respect fire regulations, the 2 individual apartments were added. This typology, used as a "middle groud solution" between private and communal living, aims towards boosting human interaction throughout the day. This typology was not possible to be designed in the existing block, and is the main inspiration for the addition of the new tower.

Room 1

Room 2

Room 3

Shared Living

Staircase
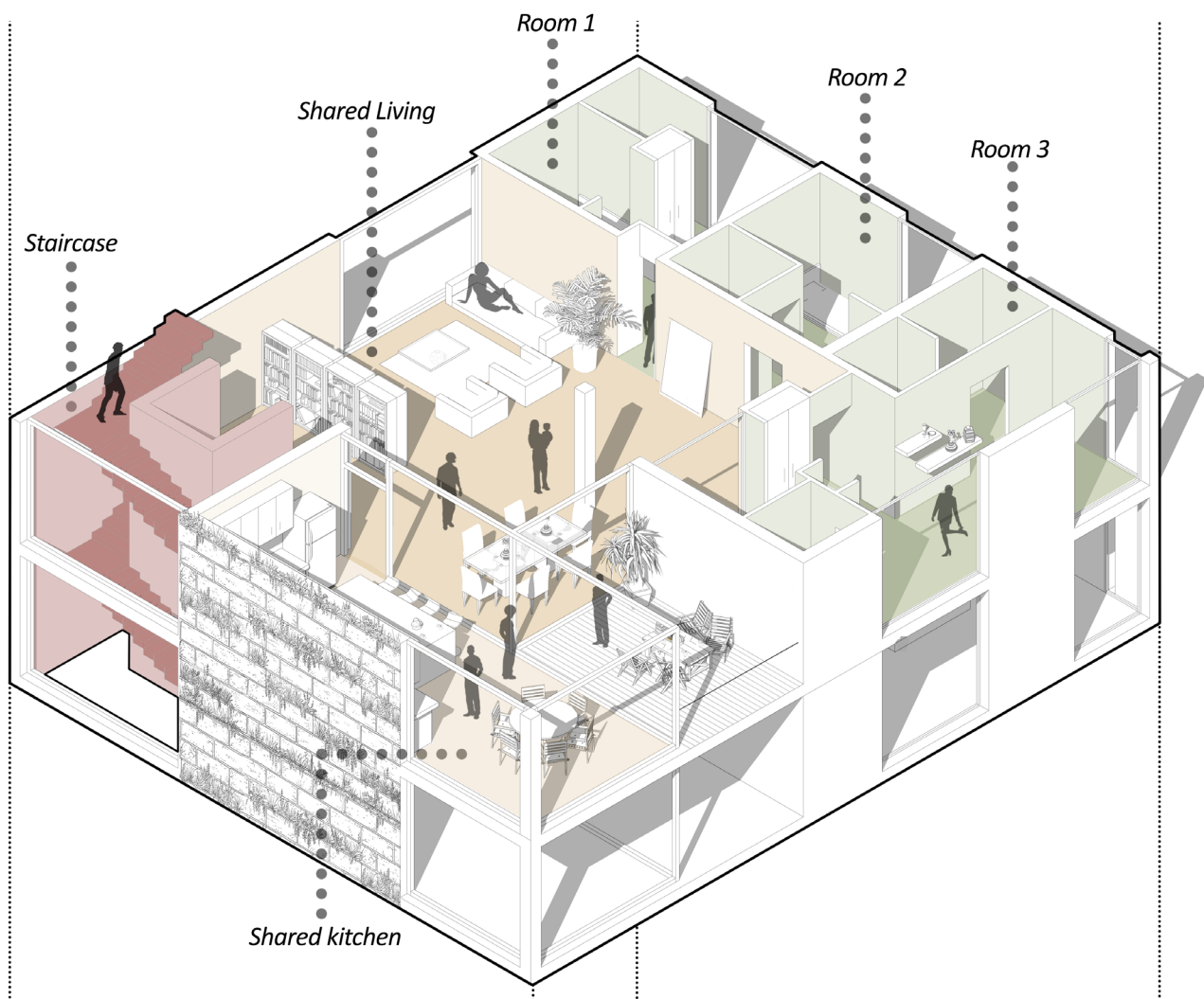
Shared kitchen

fg. 68 "New tower apartment" typology

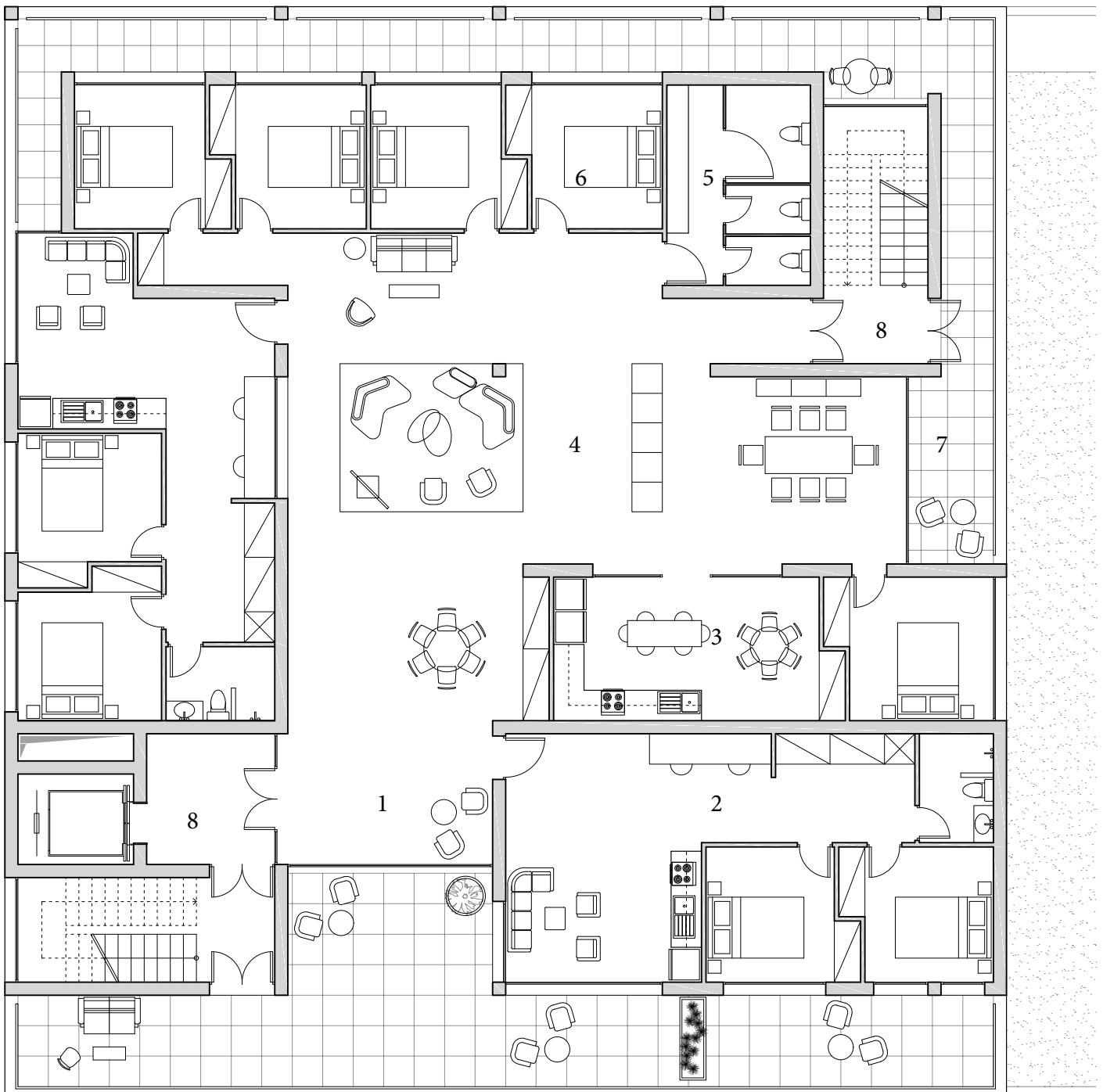*fg. 69 "Tower" housing typology*

"Tower" typology

Standard floor plan

1   Transfer zone
2   Private apartment
3   Collective kitchen
4   Collective living Room
5   Room
6   Shared bathroom
7   Balcony
8   Elevator/ stairs

0 0.5   1   2m

Building program

Commercial plinth (Business/ Workshops): First two floors (2*1500m2)

Intergenerational co operative housing facilities: ~7000 m2

Green floors- roofs: ~1000m2

communal spaces/ Common areas: ~1000m2

- Kitchens
- Living rooms
- Balconies
- Library
- cafeterias

HVAC: 500m2

Storage/ supplementary spaces: 500m2

housing sizes

"Dutch row": 50 m2 or 2*25m2

"Interlocking lofts": 150 m2

"Tower" individual apt.: 64 m2
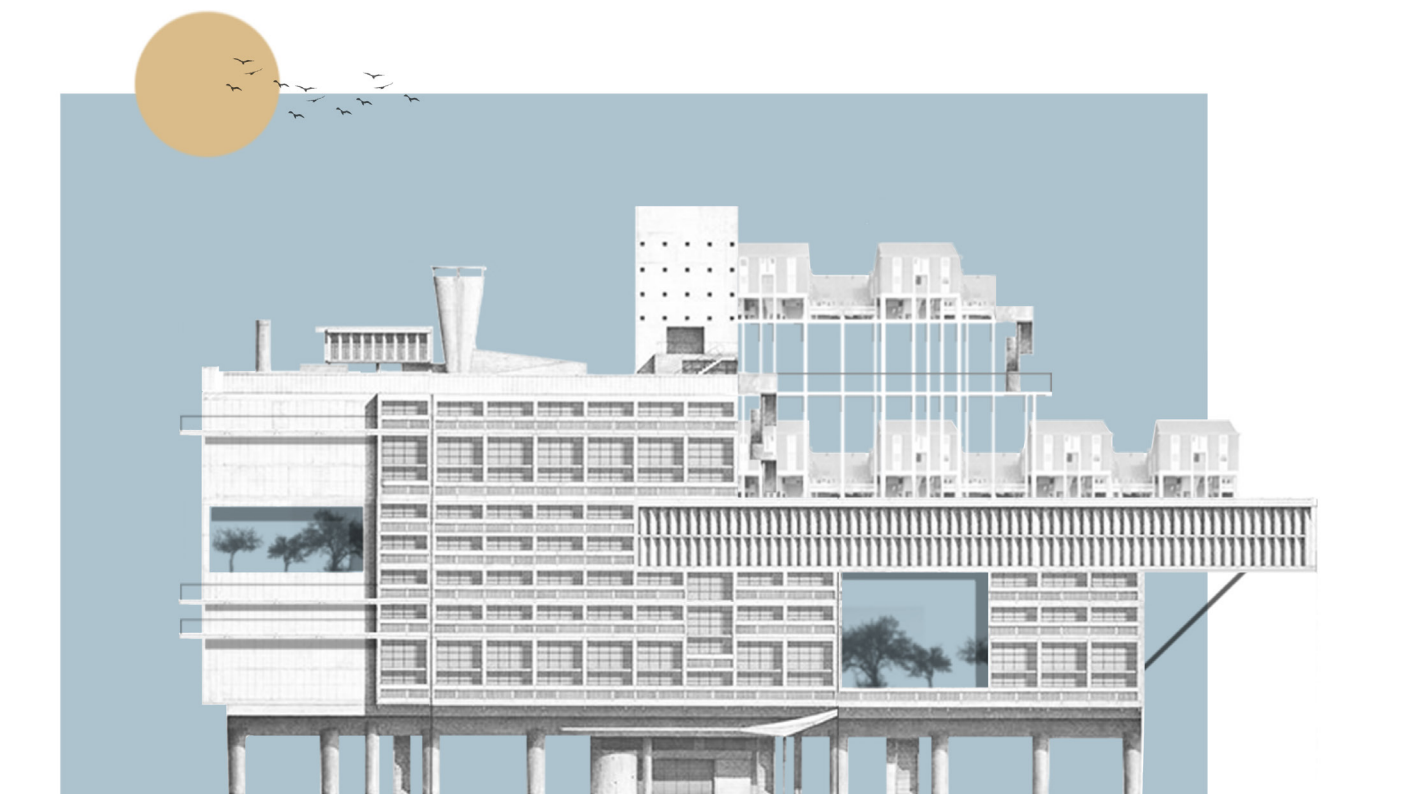
"Tower" room: 10 m2

Number of apartments: approx. 65

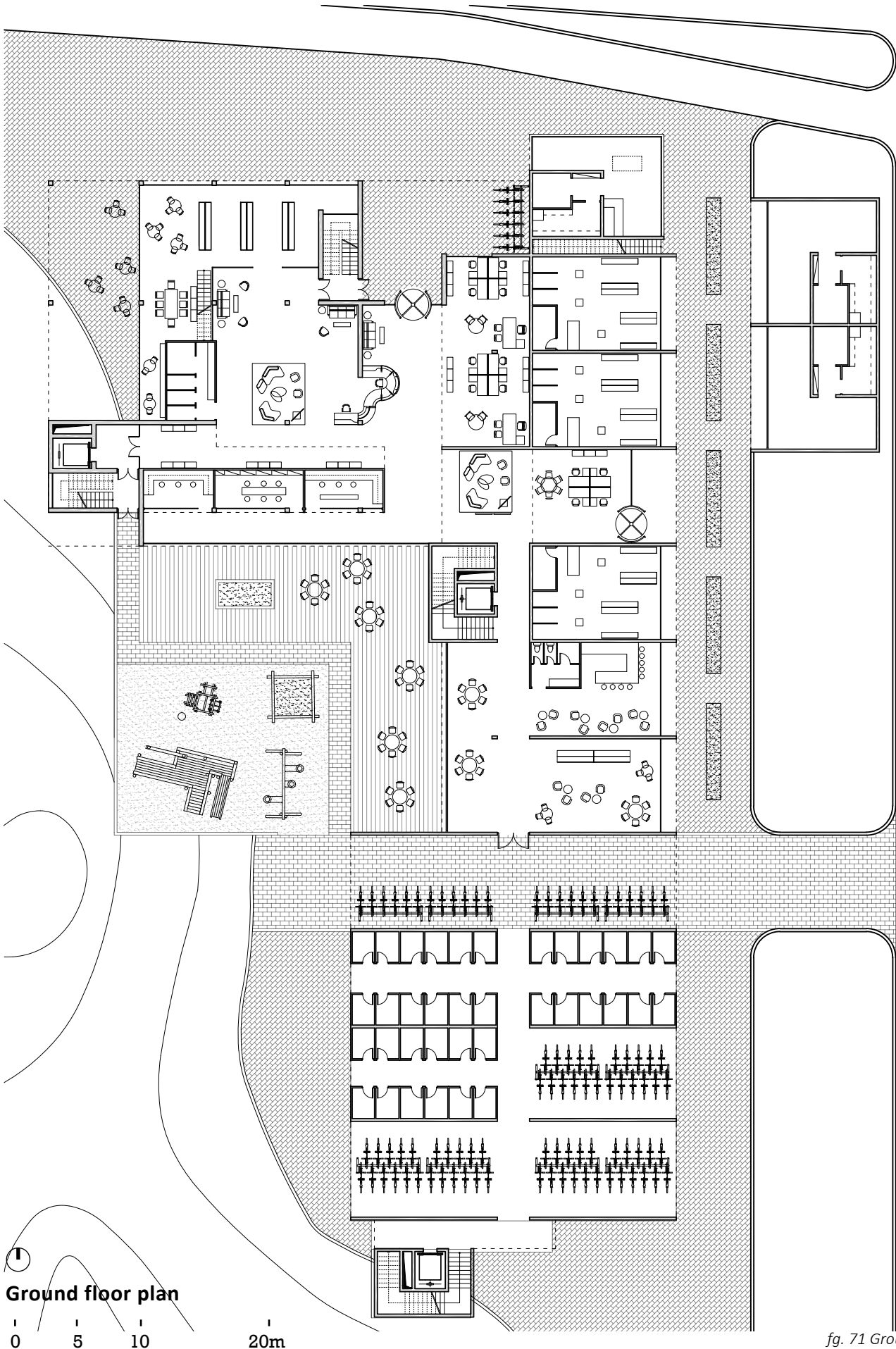Number of stores: 8

Parking spaces: 30 (off site)
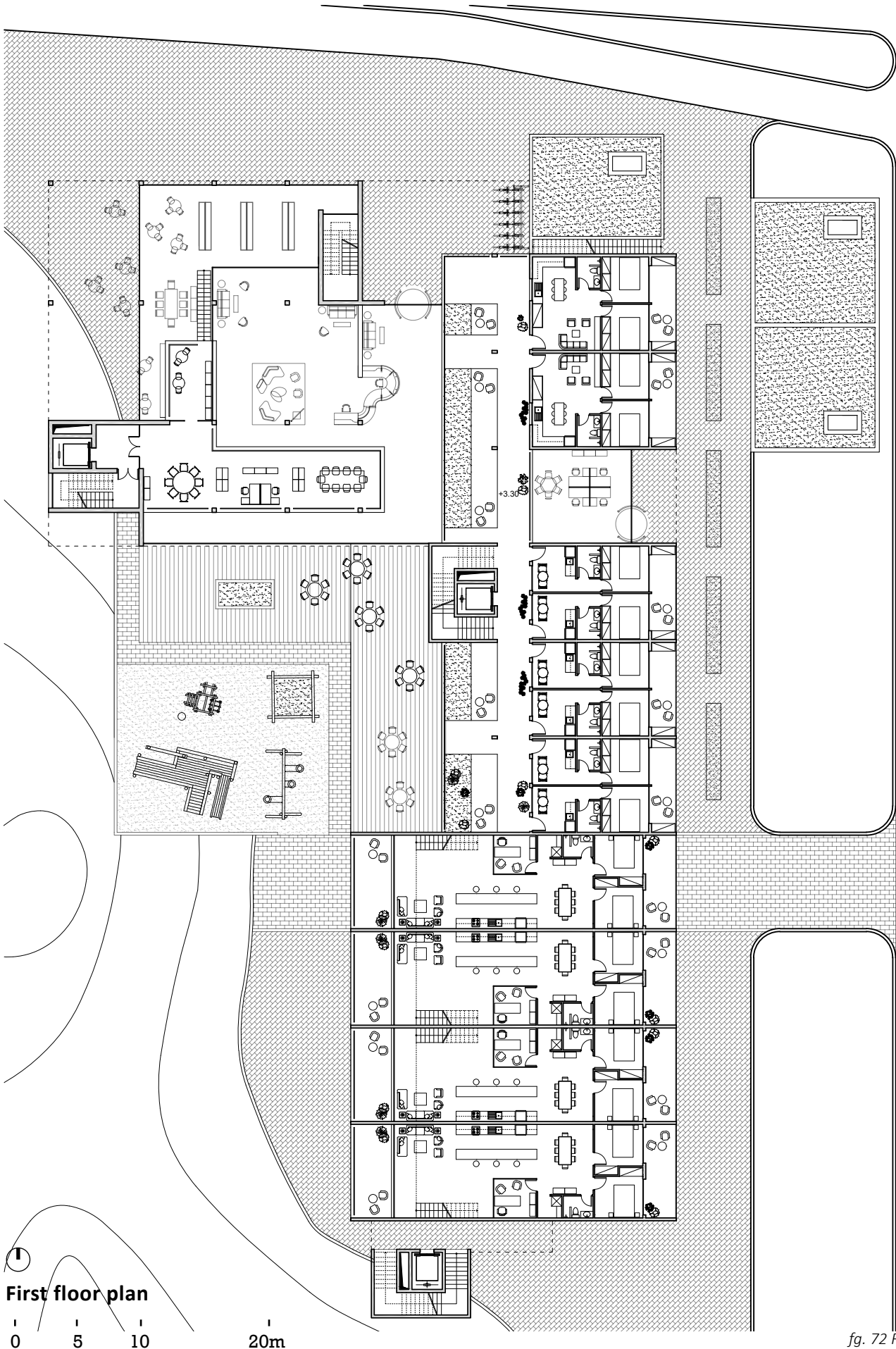
User groups

University students

Elderly

fg. 70 Typological transfer outcome
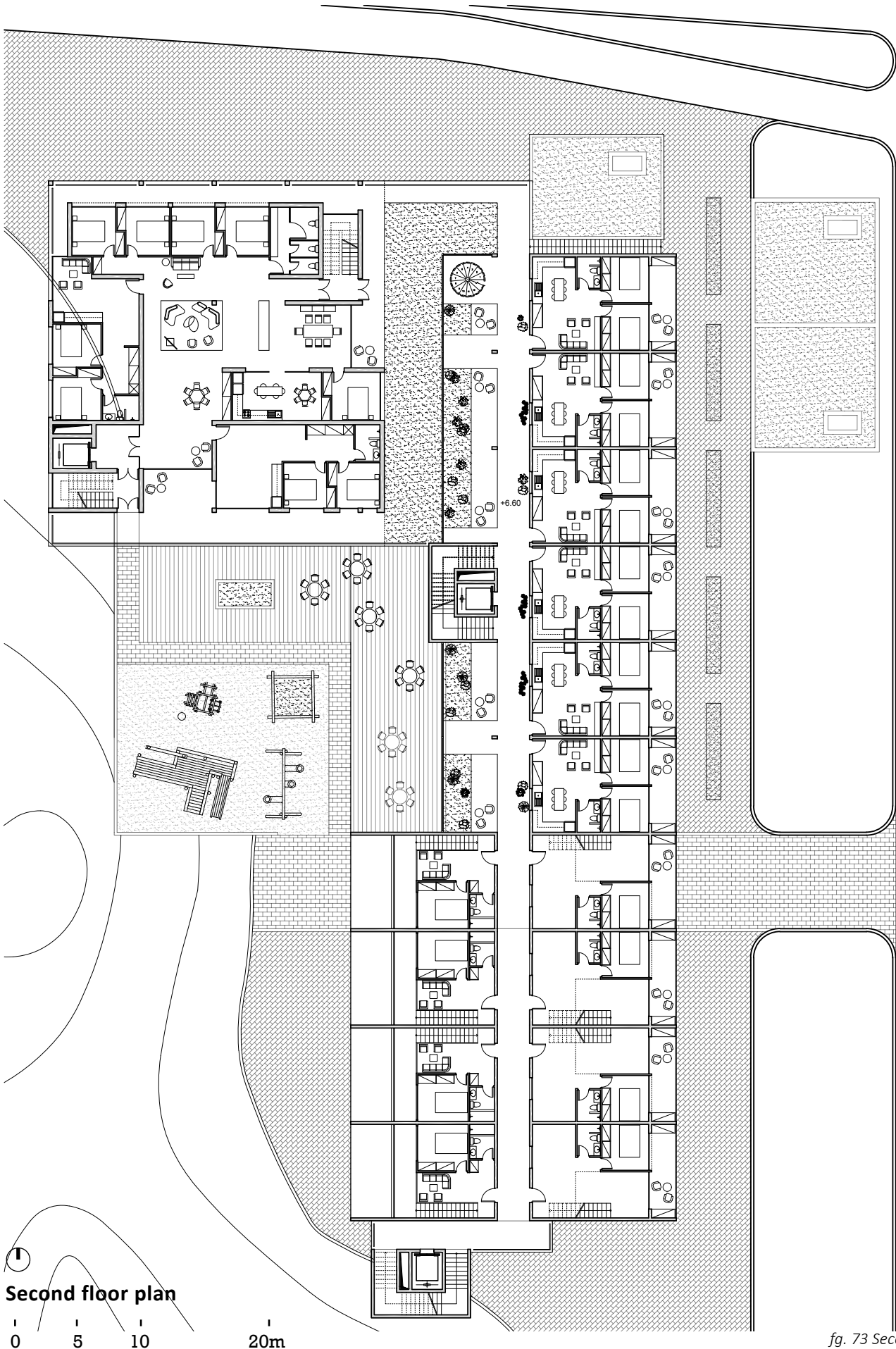
Ground floor plan

0   5   10   20m

+3.30

First floor plan

0   5   10   20m

fg. 72 First floor plan

+6.60

Second floor plan

0   5   10   20m

+6.60
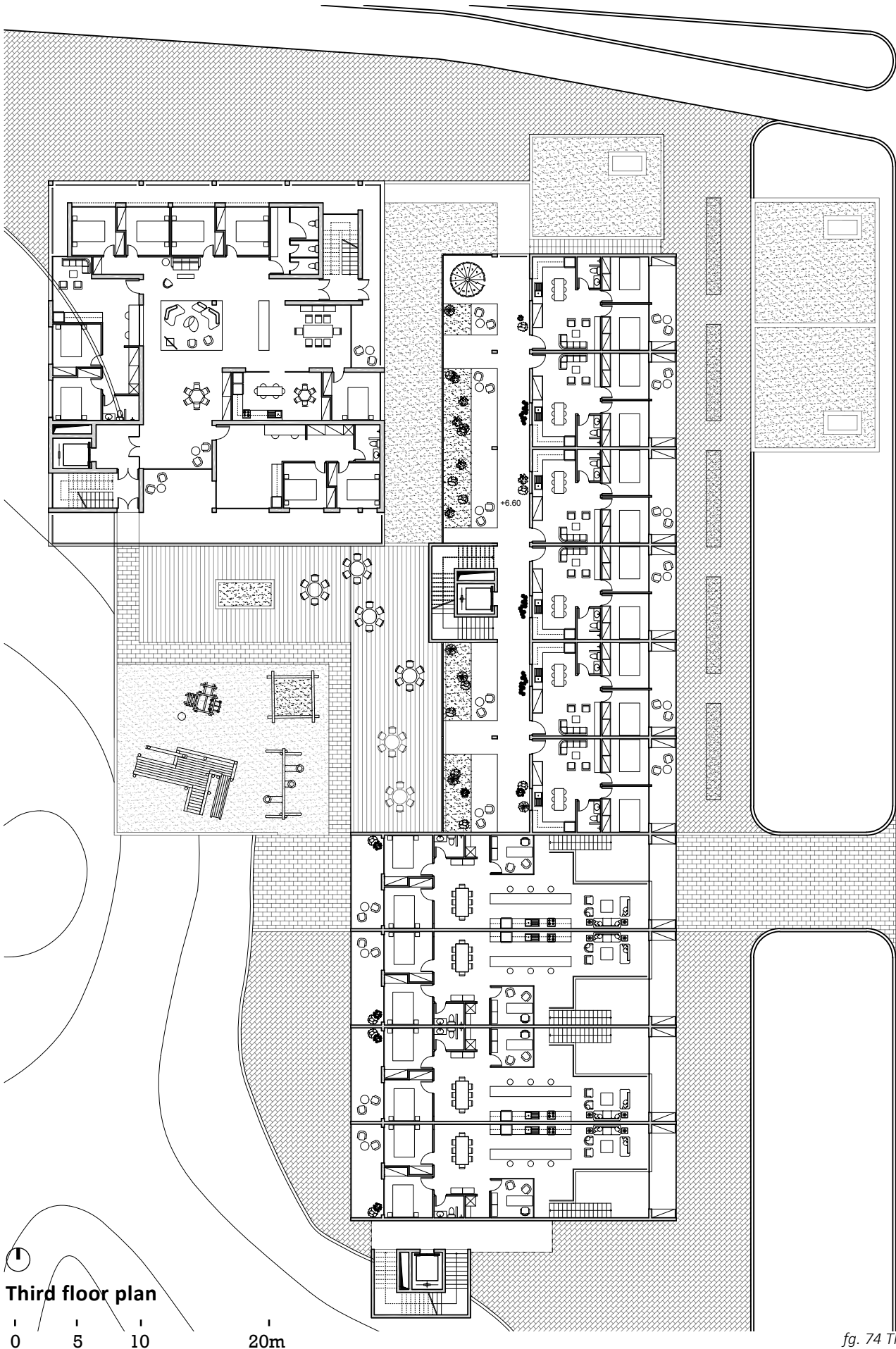
Third floor plan

0   5   10   20m
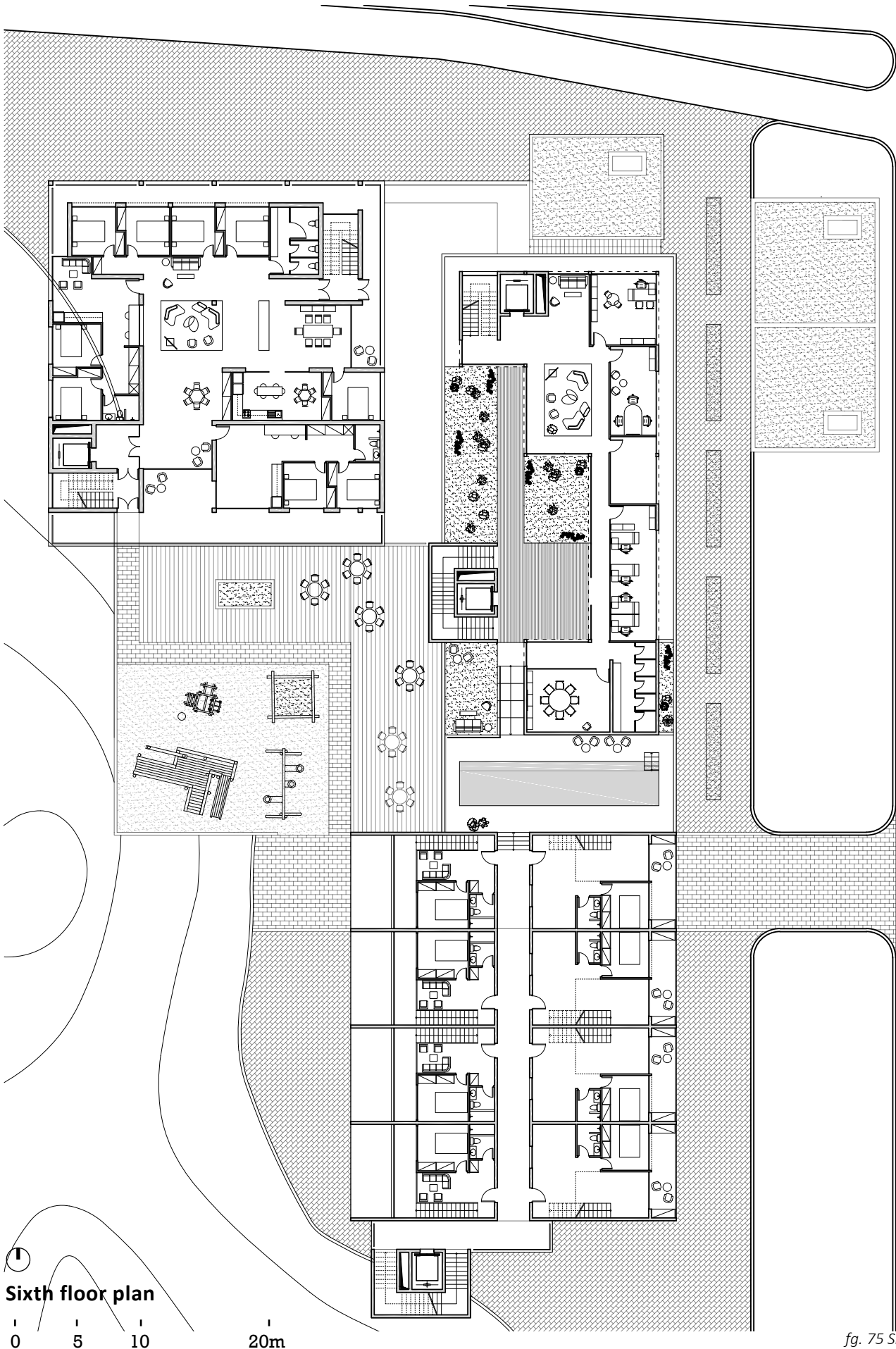
Sixth floor plan

0   5   10   20m
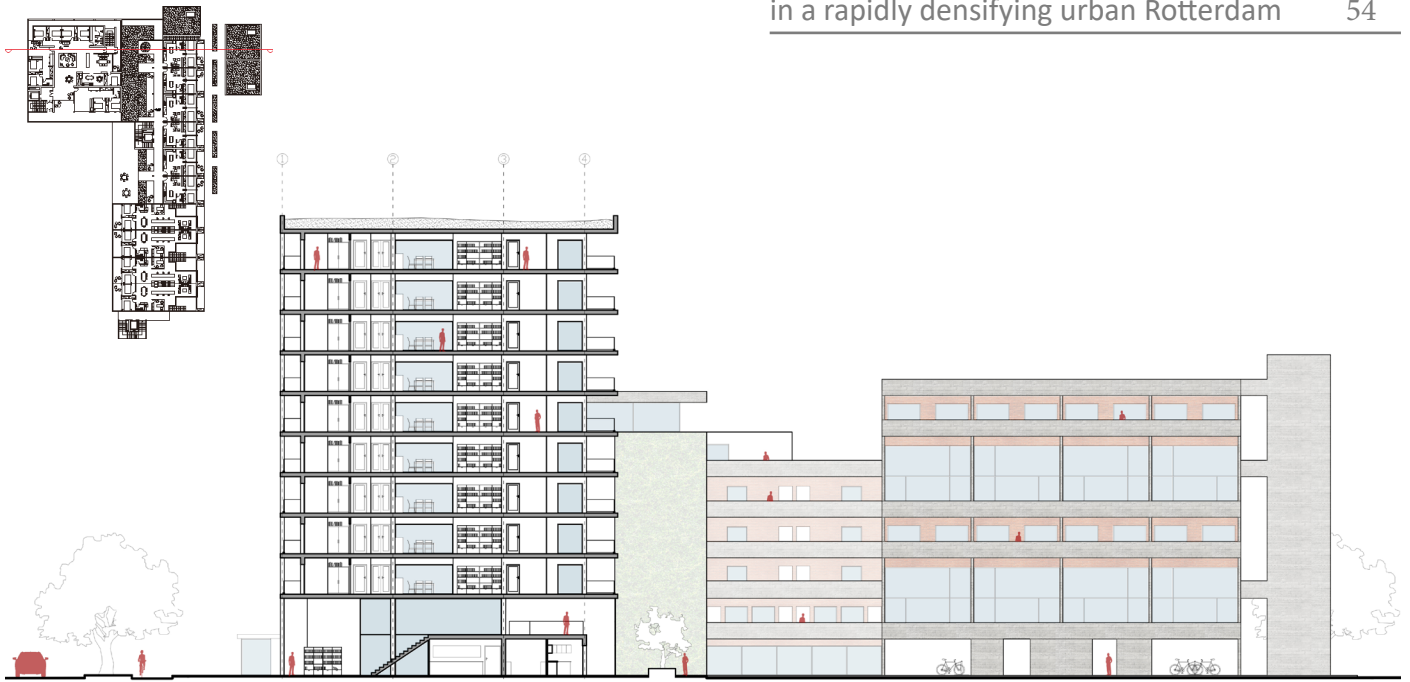
fg. 76 Section AA

Section AA

Work in progress

0   5   10   20m

Existing structure

Reinforced concrete
envelopes

Structure Lv. 03-11

Metal structure

Reinforced concrete
cores

Structure Lv. -01-02

Reinforced concrete
floors

and columns

Site

-1.5 meters from sea
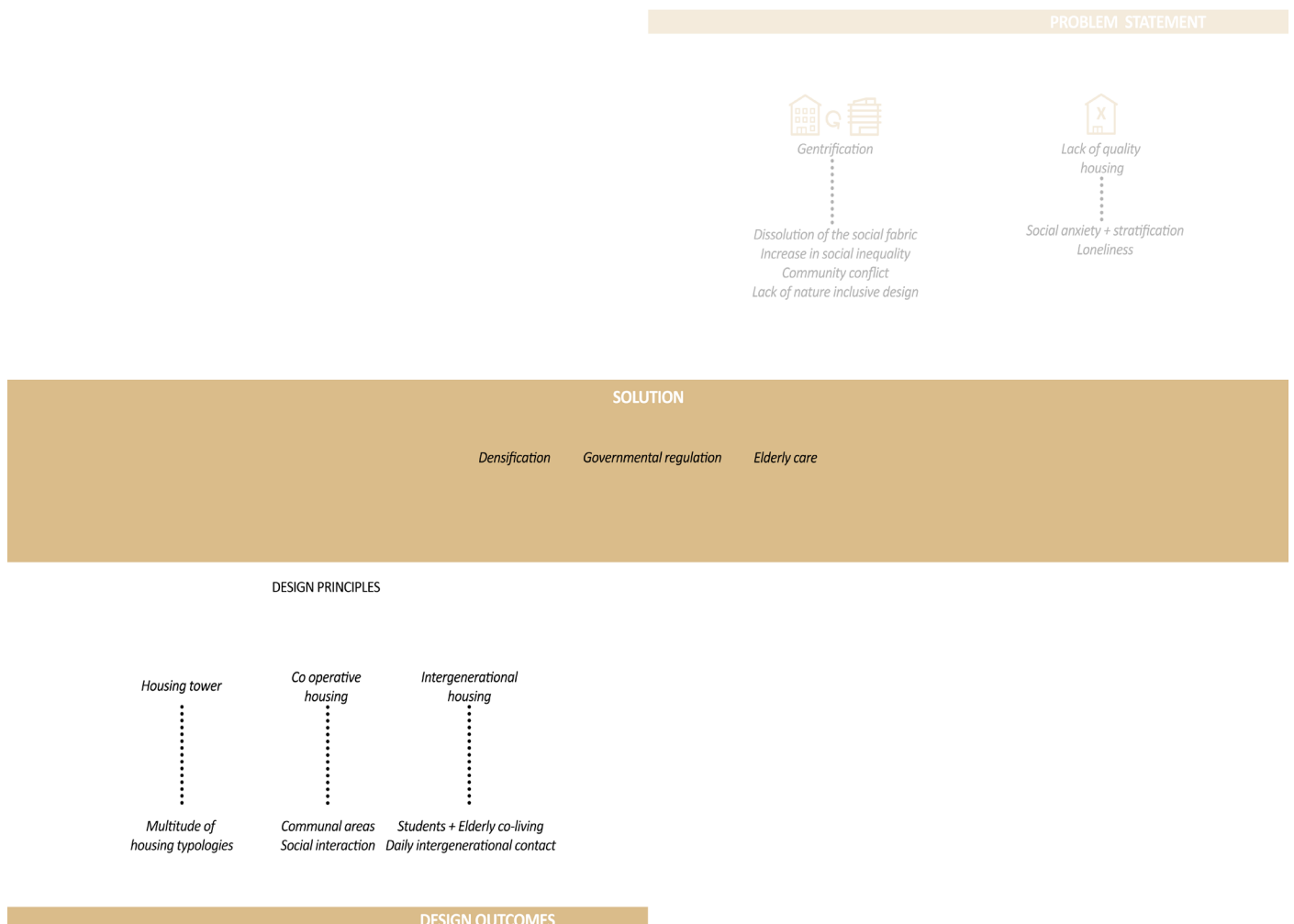level
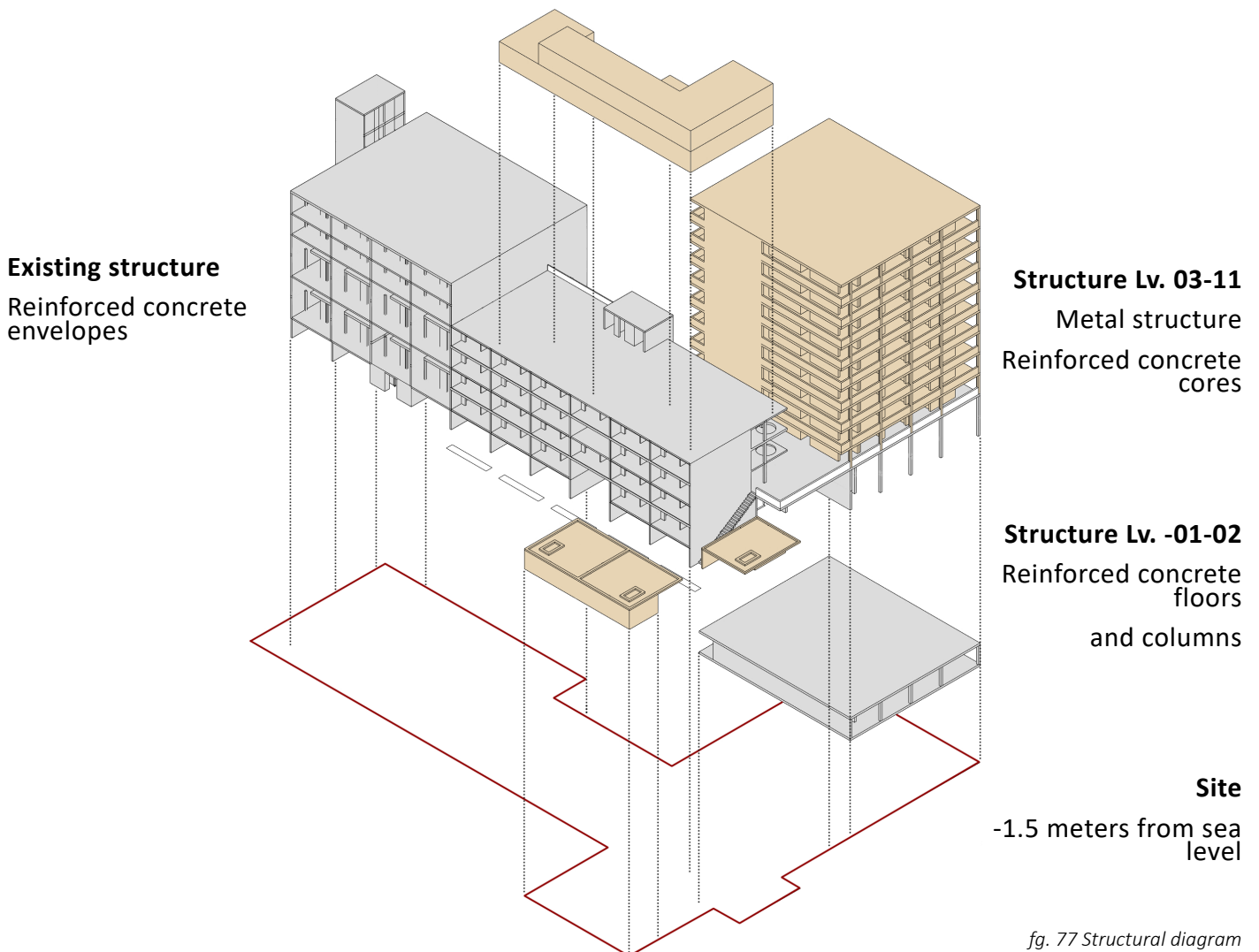
fg. 77 Structural diagram

6. Conclusions

This research and conceptual design were carried out with the end goal of producing an affordable, sustainable and socially engaging housing typology to address Rotterdam's problematic housing market, hindered by dissolution of the social fabric, community conflict and loneliness, among others. Using quantitative and qualitative analysis, it has discovered that two groups that are currently affected and would benefit greatly from a new adaptive housing solution are students and the elderly. Through identifying spatial strategies and the dwellers' needs, this research has acted as a framework that can be used to design an intergenerational co-operative housing unit with a variety of housing typologies to help alleviate this shortage in affordable and social housing.

REVELANCE

The research gave insights into how residential buildings can operate as co-operative units with multiple functions, providing a multitude of private housing unit typologies as well as space for intergenerational social interaction, and its findings supported design decisions in creating a sustainable co-operative unit. The spatial solutions proposed in the conceptual design achieve the municipalities' goal of creating a circular and sustainable built environment in Blijdorp. Although the research was heavily focused on the provided site area, the suggested design and housing typology principles can be adapted and built upon for other locations and target groups.

PROBLEM STATEMENT

Gentrification

Lack of quality
housing

Dissolution of the social fabric
Increase in social inequality
Community conflict
Lack of nature inclusive design

Social anxiety + stratification
Loneliness

SOLUTION

Densification   Governmental regulation   Elderly care

DESIGN PRINCIPLES

Housing tower

Co operative
housing

Intergenerational
housing

Multitude of
housing typologies

Communal areas
Social interaction

Students + Elderly co-living
Daily intergenerational contact

DESIGN OUTCOMES

fg. 78 Design conclusions diagram

7. Graphic Novel

7.1/ Actor setting

Protagonists: The protagonists of this storyboard are fictional. Any resemblance to real people or situations is purely coincidental.

Stan: Our main hero. A 70 year old man, whose children have long left the family home to start their own. Feelings of loneliness start creeping in, and our character starts dreaming of human contact, dreaming of community.

Chris: The architect. An idealist, who identifies a problem with the current housing situation in Rotterdam and works to find a creative solution to it.

Intergen Constructions inc.: The developer Chris talks to, in order to get the project undergoing.

Minor characters:

**Gunther:** The first acquaintance that Stan makes in the newly built co-operative housing unit.

7.2/ Plot

I see the graphic novel as a visualization of the research report. The identification of the problem, the effort of the architect to design a viable solution to it, the construction and dweller selection process, and finally the inhabitation of the now built idea. The story unfolds in parallel. In the first chapter, we see our two main characters, the architect trying to find a way to solve Rotterdam's gentrification problem by designing an intergenerational co-operative unit. In the second chapter, we see Stan move in the newly built collective, where he meets new people (both his age and students), exchanges ideas and experiences, creating friendly bonds. In the third and last chapter, we see a new character taking over Stan's room, filled with the previous hero's essence, ready to be re-habituated and re-transformed according to the needs of the new user.

7.3/ Issues described in the graphic novel

I want to outline all the issues mentioned in the introduction of the research report; Issues like gentrification, unaffordability of housing and loneliness among the elderly, as well as the potential strong points and potentials of intergenerational communal living.
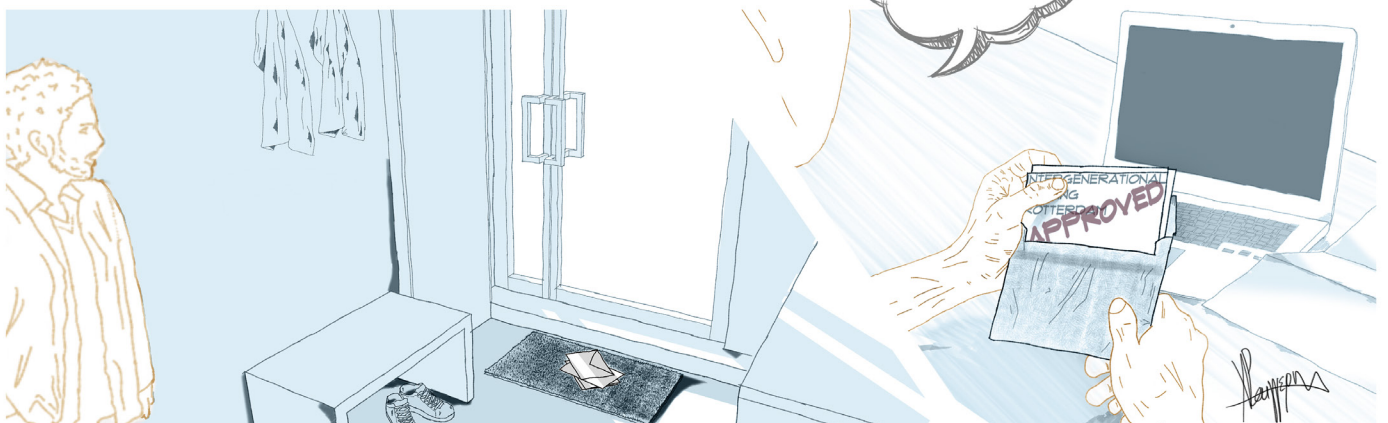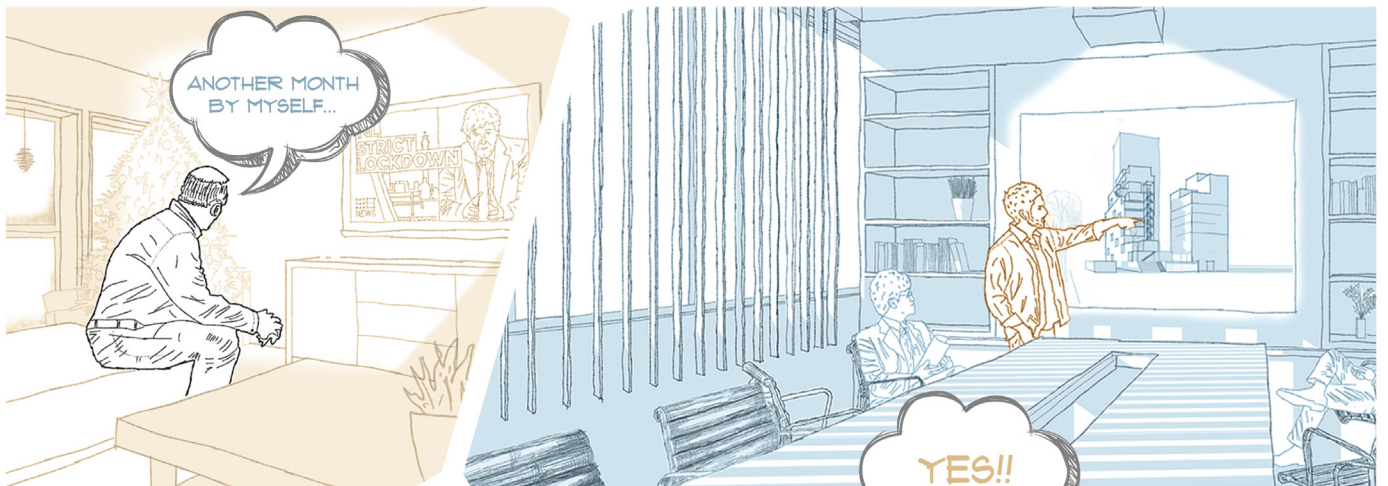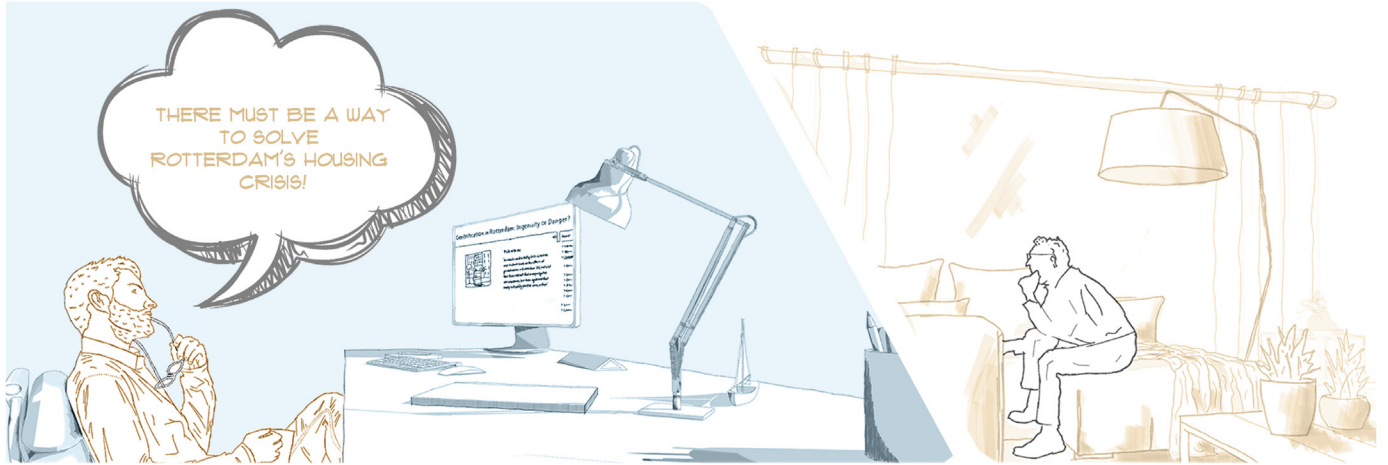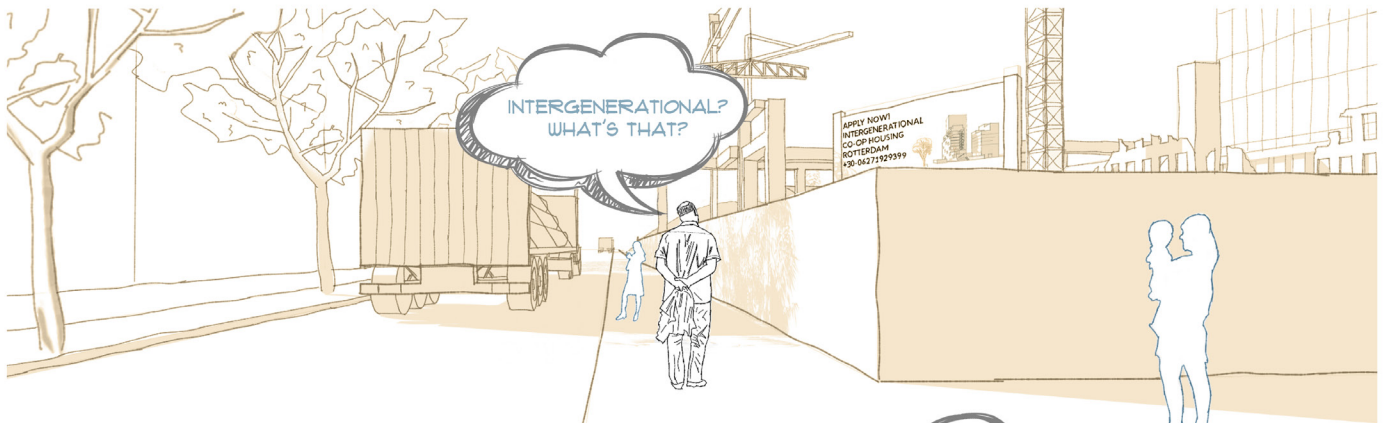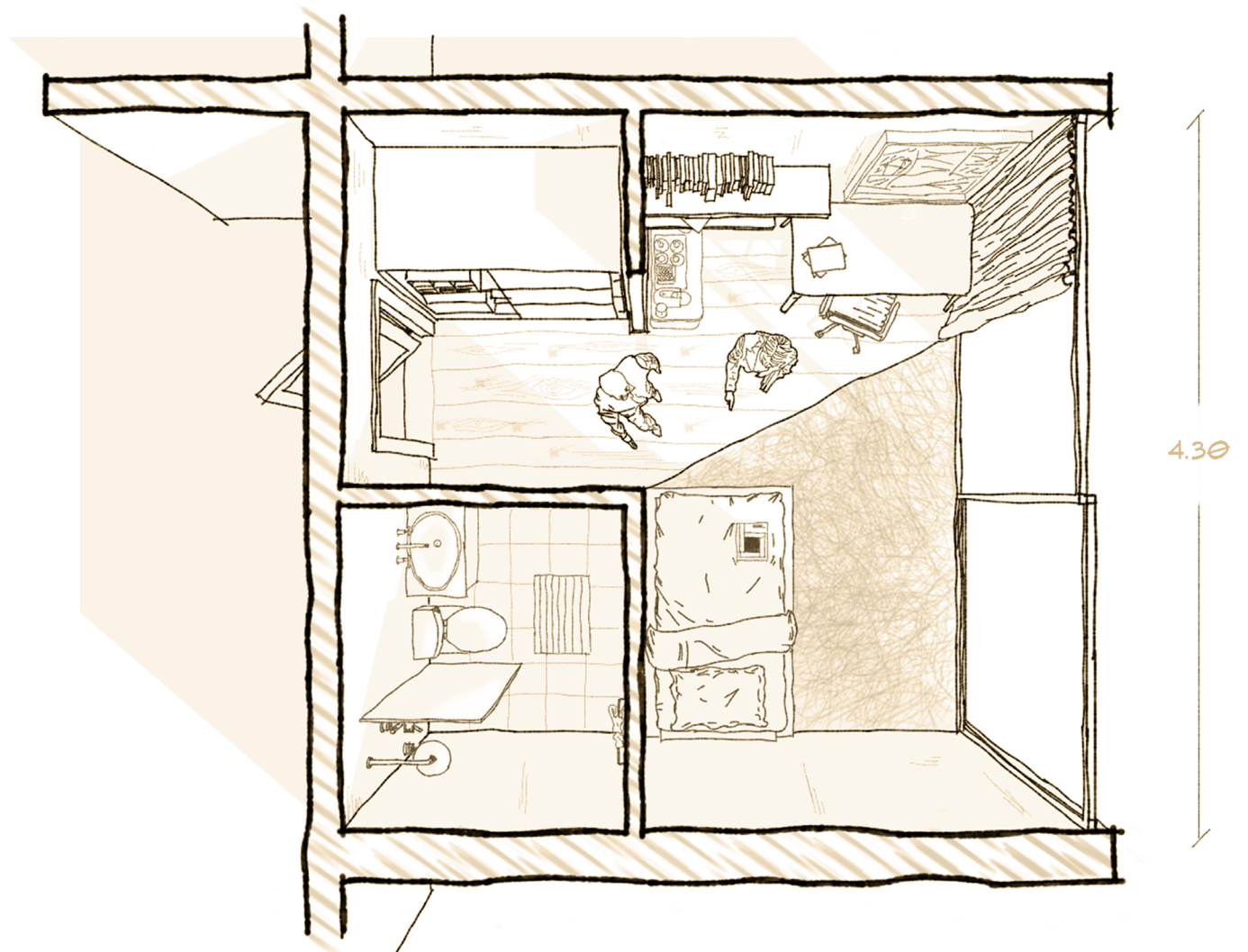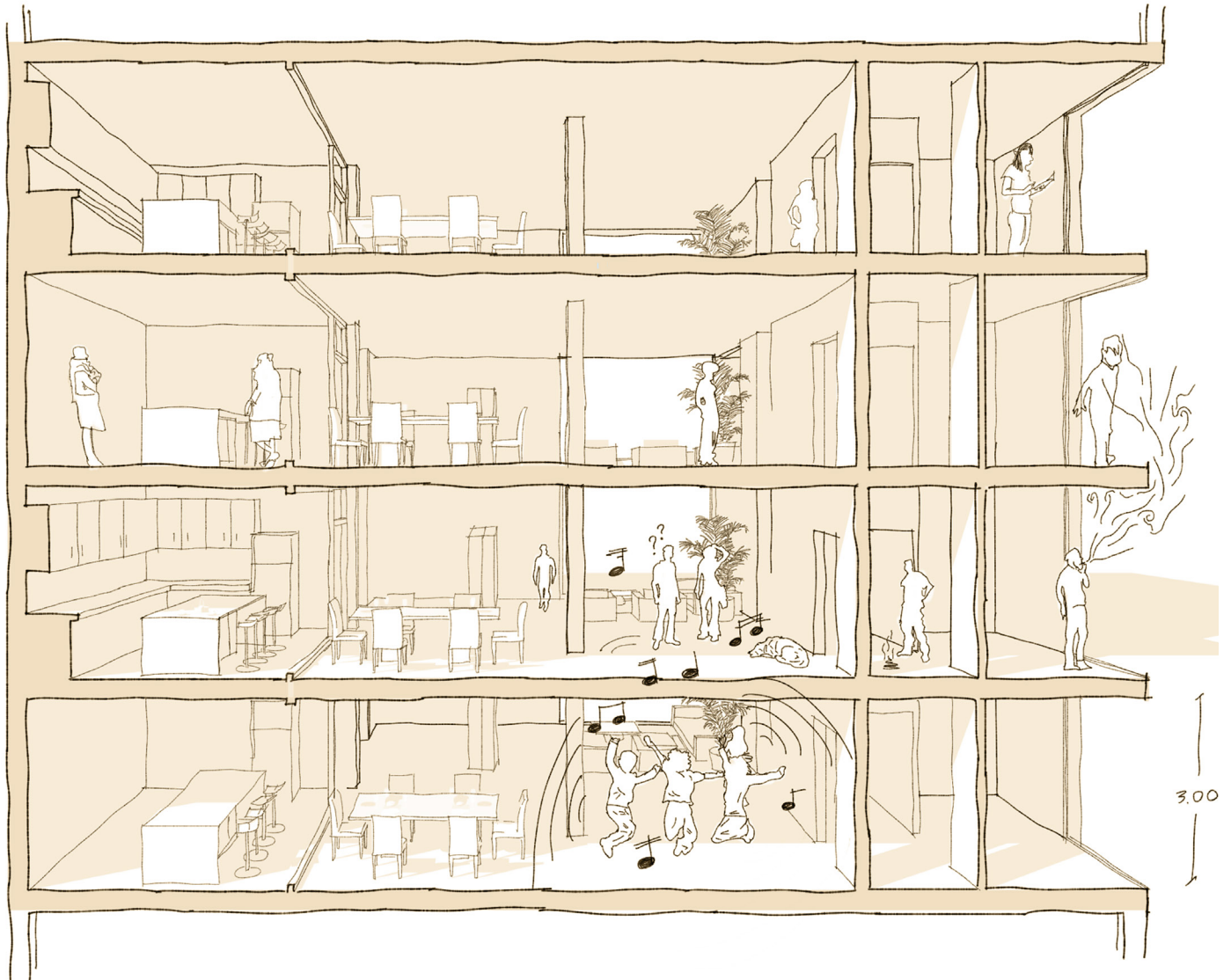
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9. Appendix

Interview format

For residents of Abtswoude Bloeit

1. "Why did you decide to move in to an establishment such as Abtswoude Bloeit?"
2. "When did you move in?"
3. "what are the positives of sharing the provided communal spaces?"
4. "what's it like sharing the provided communal spaces with a different age group?"
5. "Describe a typical day in Abtswoude Bloeit"
6. "Do you interact with the different age group daily? If so, in which part of the day?"
7. "What's your favorite part of the day in Abtswoude Bloeit?"
8. "What's your favorite spot in the facility?"
9. "What would you like to see as an extra addition to the establishment?"

For administration staff of Abtswoude Bloeit

1. "What pushed you towards merging elderly with students?"
2. "What's the entry criteria for Abtswoude Bloeit?"
3. "When do residents move out of Abtswoude Bloeit?"
4. "Describe a typical day in Abtswoude Bloeit"
5. "What are the main challenges of housing two different age groups together?"
6. "How have you dealt with COVID? How do residents come in contact with each other during the pandemic?"