POSSIBLE FUTURE ROLE OF ARCHITECTS IN REUSE

Research report

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PREFACE

This research report is part of the master thesis exam for the master Architecture, Urbanism and Building Sciences.

Research as part of the master track architecture usually involves an analysis of the building site/the building (in case of a reuse project) and the neighbourhood/surrounding area. In the graduation studio of Explorelab, research is an important part of the graduation. This way of doing research is fascination driven and offers the student to work on a problem he/she proposed, contrary to other graduation studios. The results of this research offer insight in the problem, tools for the final design and knowledge for the academic society.

I want to thank R. Nottrot and J. Heintz for the opportunity to graduate at explorelab, and my research mentor H. Remøy for being my tutor. Her enthusiasm and interest in my project was of great help. The input of my other tutors, J. Roos and J. Van de Voort was useful as well. Last but not least I want to mention family, friends, and B. Van Bommel for their view and help at difficult times.

Anna Karen Blanksma

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1 INTRODUCTION

FASCINATION DRIVEN RESEARCH

Since my first year I am interested in renovation rather than new architecture. The topic I want to work on during my graduation also involves reuse. Last year I thought of joining Explore Lab, but I did not have a clear subject in mind. Then, a combination of different things happen which gave me an idea. First, the speech of the Dean Laglas who was very convinced that the building industry as we know it has to change from building new things to more reusing existing buildings (Laglas, 2011). Second, I was wondering about my own future and where I could work after graduation. Third, I was invited to the Real Estate Career Day by an acquaintance and had some interesting discussions with real estate developers about the future. So these three issues combined can form an interesting research about what the possible new role could be for reuse architects or architects in reuse.

PROBLEM STATEMENT

The economic crisis of 2008 is the start of a new era. There is a common impression that things are about to change. What is going to change?

The first aspect is that it is not all about building new buildings anymore. Building top-down large scale projects are over. *The word 'grow' is no longer a keyword, 'slow urbanism' might be*. 'Slow Urbanism' could be seen as an applied philosophy in architecture of 'the slow movement'. This movement came up as a reaction on the fast, large scale, impersonal cities and how we, as a society, adapted that way of living . Translated to urban development this means small scale projects, involvement of local people, more private commissioning and more sustainability in the broad sense of the word. These topics were focussed upon in the spring semester project 'The Binckhorst', The Hague, by RMIT studio of the faculty of architecture, TUDelft 2012[1].

Secondly we are facing new building assignments such as redesign of office buildings and former government buildings triggered by vacancy, a rise in the ageing population, population shrinkage of non-Western parts of our country and a rising number of households[2]. Programs like 'Slag om Nederland' (VPRO, 2012) show a more public engagement with the built environment. *It is common sense to reuse existing buildings, structures or neighbourhoods instead of demolishing them.*

There is also a sustainability aspect in this. This is not only about saving building materials, but also saving existing structures and landmarks the area, which has characteristics for people to identify with.

Liesbeth van der Pol says in an interview for Nationaal Programma Herbestemming (2012) that urban redevelopment is the best option for locations with a history or a story. They are the best location for offices and housing. There is already history present, some characteristics that you cannot create with newly built buildings or areas[3].

As a result of this, developers also tend to take more interest in redevelopment. What does this mean for our built environment? Are they going to take certain values into account?

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[1] For more information about the project see http://www.waardestelling.nl/binckhorst/

[2] See full topic list of Nationaal Programma Herbestemming on http://www.kennisbankherbestemming.nu/kennisbank

[3] Video 'Waarom Herbestemming van karakteristieke gebouwen en terreinen?' by Nationaal Programma Herbestemming, direct link http://www.youtube.com/watch?feature=player_embedded&v=8wpVr6Hi25s

1.1 Research questions

From the problem definition we can draw some main issues and facts to build my fascination and research:

- Complex new building assignments (shrinkage, aging population and office vacancy);
- Changing building industry (reuse, small projects, private commissioning).

These factors are likely to affect the system of building as we know it, but how? Architects and real estate developers have to find a place in all this, what could this be? If the building industry is changing to reuse, what are real estate developers going to do with our 'heritage' or built environment? If there is not a lot of money available, how can it be a successful redesign, and how can reuse be profitable? Is reuse profitable?

The main question for this research is:

Considering the changing building industry, what is the sum of co-operation between real estate developers and reuse architects <u>in the initial phase</u> in the building process <u>in a reuse project</u>?

The hypothesis I want to test is:

Fig. 1-1: Hypothesis of a future close cooperation between architects and developer.

The sub questions are:

How can the building industry network be described in terms of processes and actors? How does the hypothesis fit in this network?

What is the current relationship between architects and developers? What is about to change?

What are the design approaches of a developer and a reuse architect?

1.2 Design and research goal

The design goal is:

'making a redesign for a post-war housing flat in context with the future building industry and with one of the future building assignments'.

There are several reason for choosing this part of our building stock.

First of all, it is a large part of our building stock, 30% of our current building stock (Van der Flier & Thomsen, 2006). Requirements do not meet current standards in terms of isolation, technical installations (technical requirements) and in terms of use, spacing and lay-out of the floor plans (functional requirements. Second, as a result, there is a tendency to demolish these flats instead of reusing them (Van der Flier & Thomsen, 2006). Van de Flier and Thomsen do not exactly pin-point the reason for this, but they do mention their suspicion of housing associations having a secret agenda and sometimes demolishing part of their stock to get rid of unwanted tenants or develop a prime location.

Thirdly, there is still a shortage of housing, 2.5 % of total building stock, what is approximately 180.000 houses (Van der Flier & Thomsen, 2006). This will rise with a 20.000 a year till 300.000 houses in 2020 (Vastgoed.nl, 2012). This sounds dramatic, but the shortage is more qualitative than quantitative. This is due to higher welfare and changes in demographics, and thus higher housing wishes (CBS, 2011).

The research goal is:

'exploring a successful close cooperation (assumption) between developers and reuse architects in a time of complex building assignments and difficult financial times.

Answering the sub research questions will create a theoretical framework to understand the changes in the building industry and the relations between construction related professions. With this framework the results of the research and design can be seen in a wider perspective.

Together with the design goal, the result of this research will also provide an answer to the question: if the tendency to demolish post-war housing is legitimate or are there still feasible options for these flats?

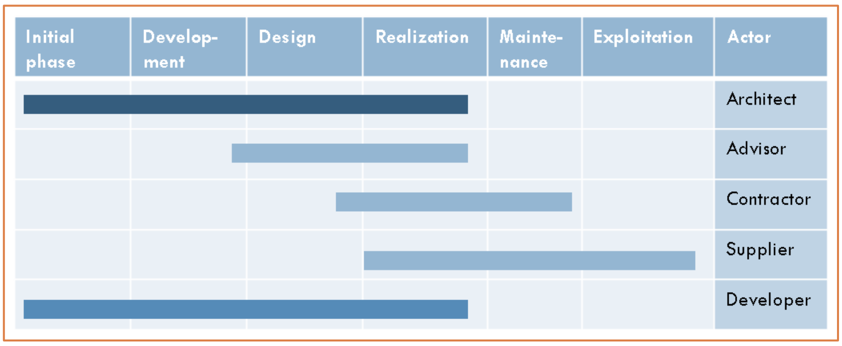


Fig. 1-2: Proposed change in the building process

The target group for this design is starters. The reasons for choosing this group are:

- Creating more housing for 1 or 2 person households (more demand for smaller households);
- Starters are a group which I can easily relate to;
- The municipality of Delft wants to offer the opportunity for graduates to stay in Delft (Gemeente Delft).

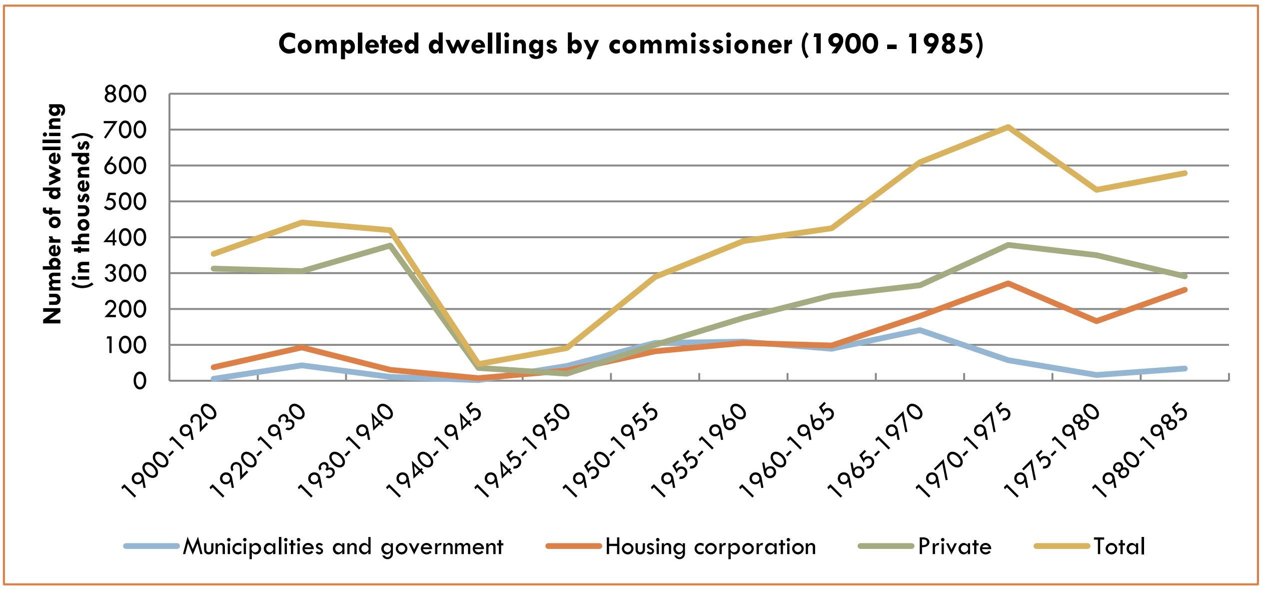


Fig. 1-3: Completed dwellings by commissioner in the period 1900-1985 in the Netherlands. (After Klijn et al., 1987, p. 9)

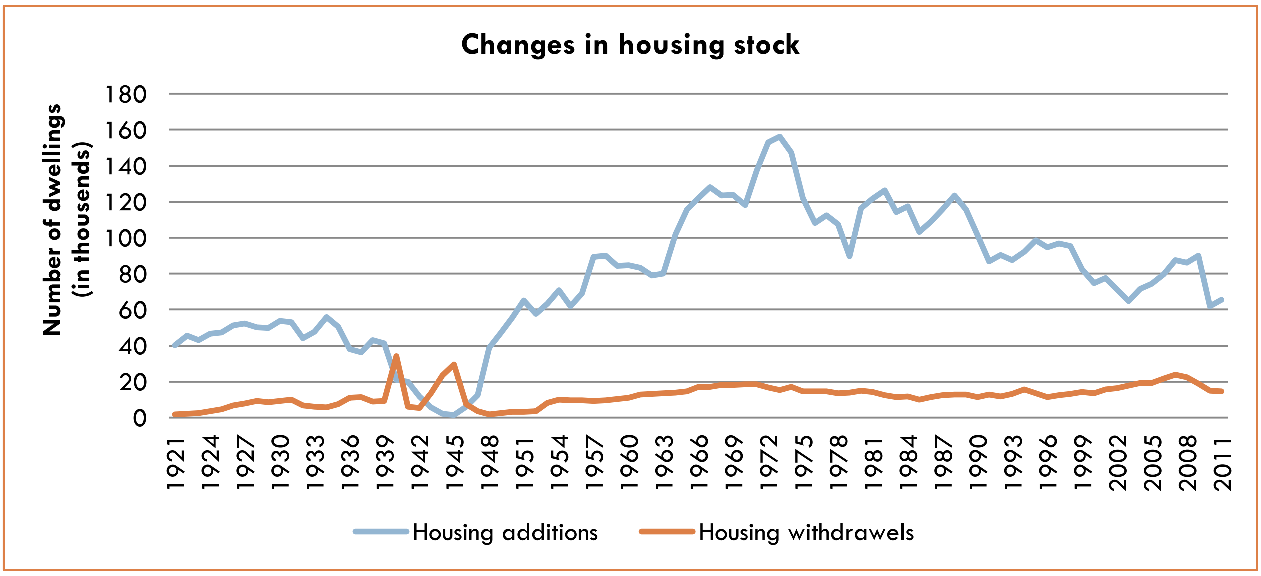


Fig. 1-4: Housing additions and withdrawels in the housing stock. Data from CBS Statline (2012).

1.3 Research methods

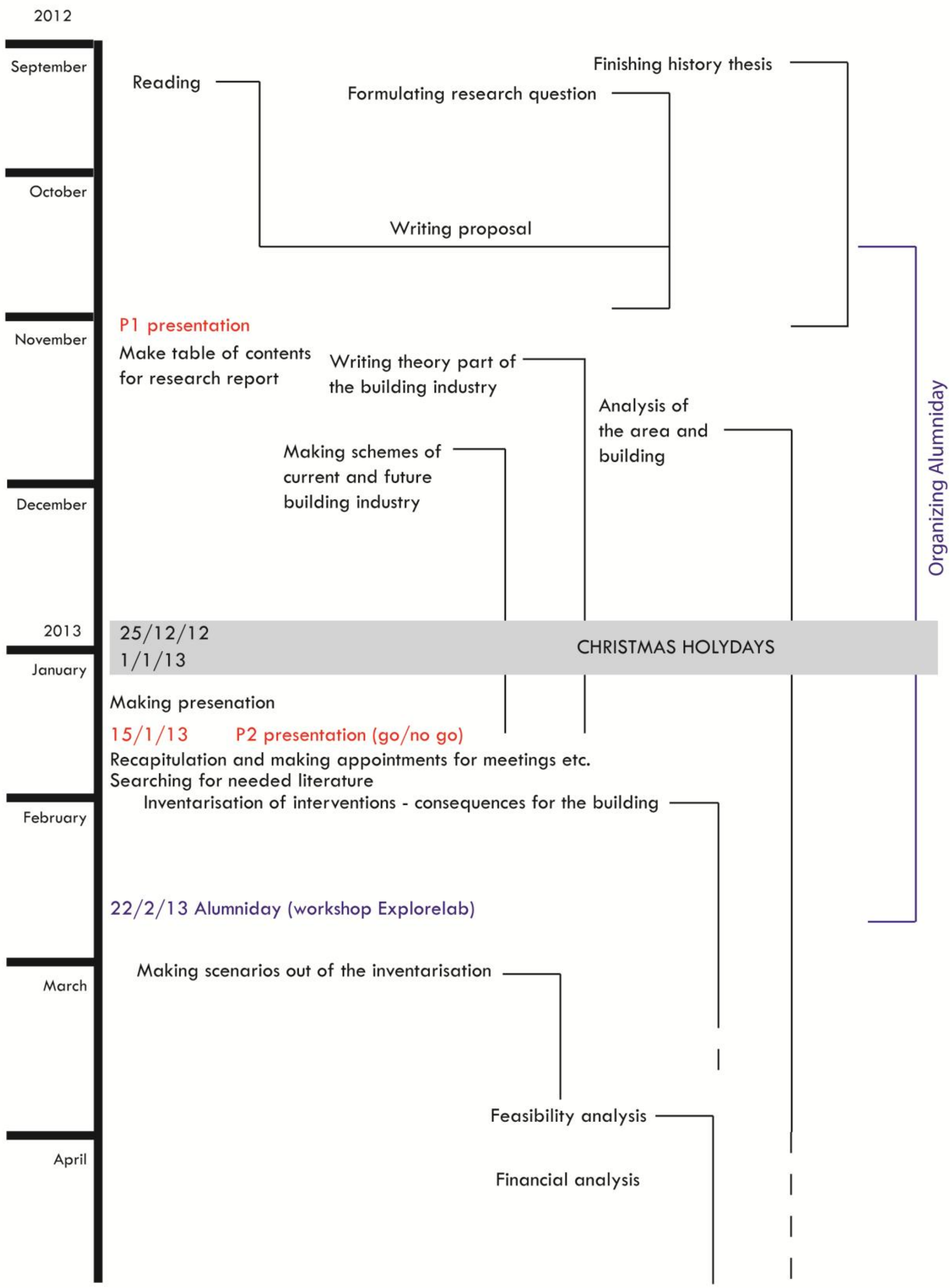
The general approach for this research is **testing my hypothesis by acting as architect and developer in the initial phase of the design process**, thus performing both analyses and designing with knowledge of both analyses.

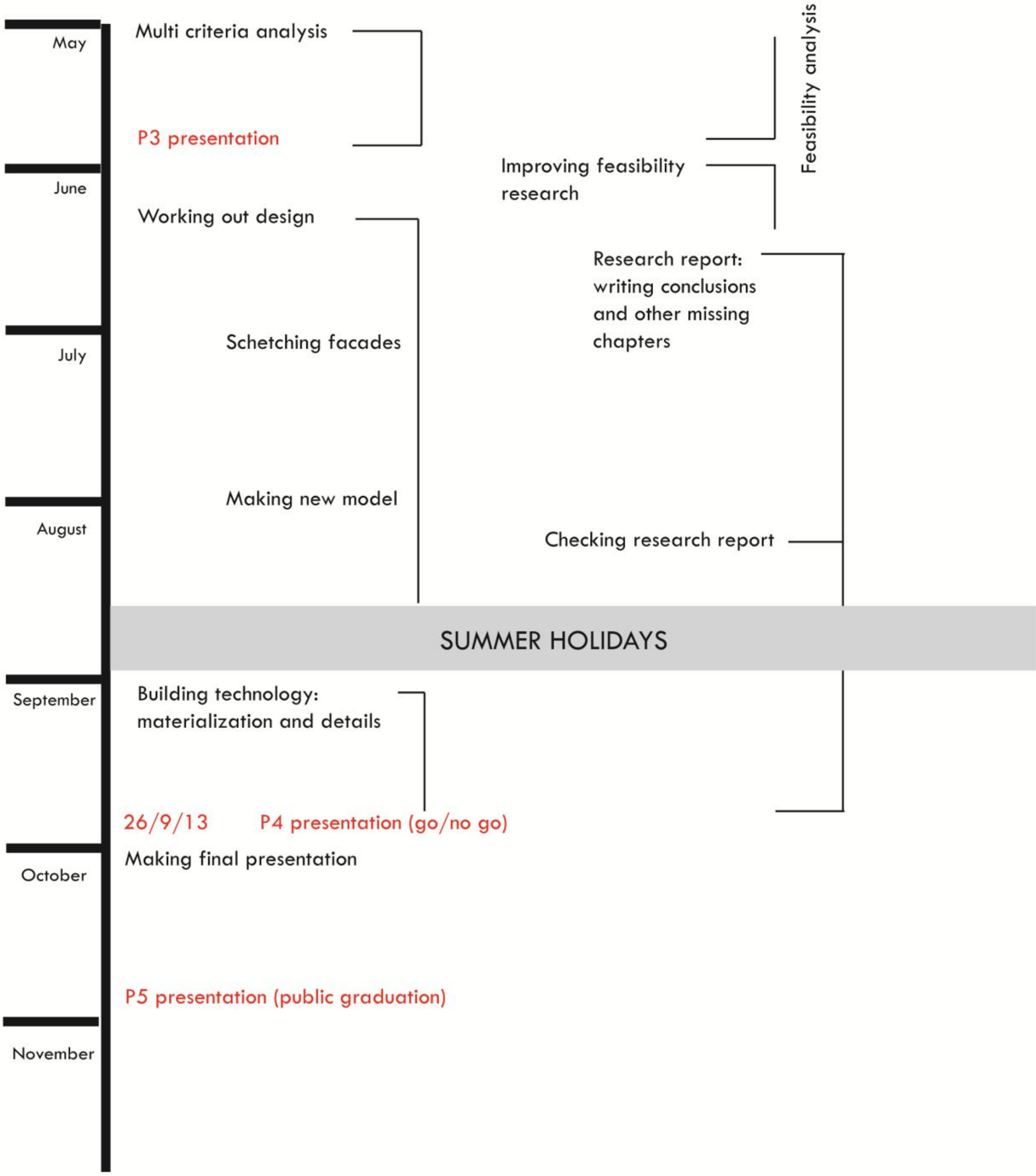
Therefore I need to do:

- **Literature study** : gathering background information about the current and possible building industry to place my theory in a theoretical framework (chapter 2);
- **Literature study:** describing analysis methods of RMIT and RE&H (chapter 3);
- **Research by design:** exploring possible design solutions and creating testable scenarios, executing the methods described in chapter 3 (summary in chapter 4, complete analysis in appendices). Chapter 5 contains the description of the scenarios;
- **Financial analysis** and a **multi criteria analysis** as part of the scenario comparison (chapter 6) and choice for final scenario for the architectural part of the graduation.
- **Design by research**: final design with knowledge of this research.

The conclusions from this process will be described in chapter 6 and chapter 7. Chapter 8 will be the evaluation and elaboration.

1.4 Time planning




May
Multi criteria analysis
P3 presentation
Feasibility analysis
Improving feasibility research
June
Working out design
Research report: writing conclusions and other missing chapters
July
Schetching facades
August
Making new model
Checking research report
SUMMER HOLIDAYS
September
Building technology: materialization and details
26/9/13
P4 presentation (go/no go)
October
Making final presentation
P5 presentation (public graduation)
November

2 THE BUILDING INDUSTRY

2.1 Historical context

THE NECESSITY OF REAL ESTATE

Vande Putte and Heijer (2004, p. 24) first describe the earth as a hostile place. Humans need the built environment to protect themselves against the elements of nature, such as wind, temperature and precipitation. We can live anywhere in the world, as long as we have the ability to build and create our own environment.

Second, they indicate that this built environment has a great social and cultural value. Living together in a city as a community creates cultural meaning. The streets, squares, buildings and entrance roads are the collective memory of a civilization. Functionality may change, but the structure remains. According to De Jonge (2000, p. 17) cultural anthropologists also look at the way people built their buildings and villages when they study a tribe, because this tells a lot about their culture.

Vande Putte and Heijer agree with this and say that, in this context, it can be understood why large real estate development projects are often experienced as 'soulless' and frequently have social problems. This is because these developments erased the history of a place, and a new collective memory has to be formed before it can be socially successful.

A third value of real estate is economic value. This is usually the most important possession of a nation. (Vande Putte & Den Heijer, 2004, pp. 24-25)

CITIES AND GUILDS

Building activity now happens around the built environment, what we would call a 'settlement'. These settlements did not appear randomly, or are created 'just to be there'. Building was not a goal in itself, but building for status, economic power or political influence was. Housing as we know it was not a responsibility of the government. The government only executed building to achieve the higher goals mentioned. (Boerenfijn, 2008, p. 141). For example, Maastricht is founded as a military post by the Roman Empire and became an economic and governance centre during the Middle Ages. Den Bosch ('s Hertogenbosch) is a city founded by the nobility around 1200 for economic reasons, but also to gain power and control in that region (Rutte, 2008, pp. 148-150).

The building of churches was also a big part of the building industry in the middle ages. Construction was led by a master builder. Because the big and important buildings were made out of stone, usually the master builder was a master stonemason and member of the stonemason's guild. This meant that they made the design for the building, coordinated the construction and sometimes were the suppliers for the materials. The guild for professions such as masons and carpenters prevented the creation of specialized professions in the building industry. In the sixteenth and seventeenth century only a few 'designers', educated as painters or fortification designers entered the group. This was possible because the 'design' was a theoretic approach and not part of the guild regulations. After the guilds were abolished in 1798, the industry changed. In the nineteenth century, educational institutions were established, such as the Politechnische Hogeschool in Delft, introducing the term 'architect'. Also the term contractor is new. Before 1798 the guild regulations ordered that the masters per guild got the assignment. (Stenvert & Tussenbroek, 2007, pp. 120-121).

MANAGEMENT

Since humans have been building, there has been a record of someone involved in 'managing' the building process. This role was usually played by the architect (Lousberg, 2007, p. 35), or, as mentioned before, by the guild masters.

During the Industrial Revolution a new building type was introduced: industrial buildings. Before the Industrial Revolution buildings (not houses) were constructed either for the government, the church or the army. Because of the immense growth of the companies, a lot of corporations set up a division with specialized people which were to control the construction activities, availability of skilled employees and make sure the corporate image is expressed in the architecture of the building. Corporate real estate was born.

In the 1960s and 1970s corporate growth led to another shift; decentralisation of responsibilities within the companies. This led to the urge for these divisions to prove themselves useful for the company, especially with the emergence of professional real estate agents. (Krumm et al., 2000, p. 27)

According to Lousberg (2007) managing was part of the architects' profession until the 1980s. Afterwards, it became a profession of managing professionals. This has a few reasons:

- The construction of a building has become more multi-disciplinary. The division into disciplines promotes further specialization and more specialists;
- The increasing complexity of a building demands advice from specialists;
- 'Managing' has become a real profession.

2.2 Cooperation in the building industry

Building *is* cooperation, according to Blankert (2007, p. 5). This does not mean that this cooperation is always going smoothly.

There is a lack of trust between clients and contractors, because each actor expects the other one to put their interests first. This leads to defensive behaviour where actors

- try to shift responsibilities to other parties;
- hedge themselves against building errors;
- will seek legal counsel when in a disagreement.

Distrust between developers and architects came most likely from the time when the architects' fee was a standard percentage of the building costs. Here developers, trying to build as efficient possible and wanting to reduce costs where they can, are opposite to the architect who want to increase the building cost, to get a bigger fee (Remøy, 2013)

Inside the building team (contractors) things go wrong as well. Each actor only focuses on his task in the process. Problems are forwarded to the next stage in the building process and they blame each other for mistakes.

If we look at all the actors involved in the building industry, we can say that it is specialized and complex. To give an idea of which parties are involved, Rutten (2010, p. 81) gives an overview of actors involved in the building industry. Already a lot of parties are involved, but this is in fact a simplified scheme of the total (Fig. 2-1). Rutten also sees the lack of trust between the parties that Blankert describes. A lot of money goes into failure costs (about 10% of the profit) and now the profit margins are getting slimmer. It is wise to be more efficient. (Rutten, 2010, p. 88)

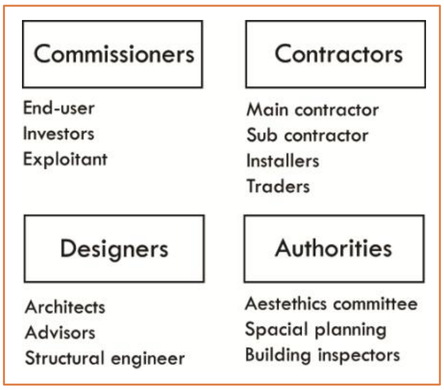


Fig. 2-1 Actors involved in the building industry (after Rutten, 2010, p. 81).

Rutten did several interviews with different parties in the building industry. She comes up with two suggestions about cooperation: “chain integration” and “fore- and backwards integration”.

Like the figures from Geraerdts (Fig. 2-2 and Fig. 2-3) Rutten presents a top-down organisation and remarks that because of this, processes take a lot of time and there is no optimal use of each other’s expertise (Rutten, 2010, p. 86). She proposes a different cooperation on basis of a network, which results in more horizontal organisation where parties have a joint responsibility. Rutten also points out that the role of the client is going to change; the client is going to be much more important and will even lead the building process, supported by a ‘concept provider’.

For- and backwards integration is not necessarily a form of cooperation. It can also be done by one company that manages more divisions of the building process. For instance, an architects’ firm that also builds the buildings they have designed, is a form of backwards integration. An architects’ firm that also does the finance and the developing part would be an example of forward integration.

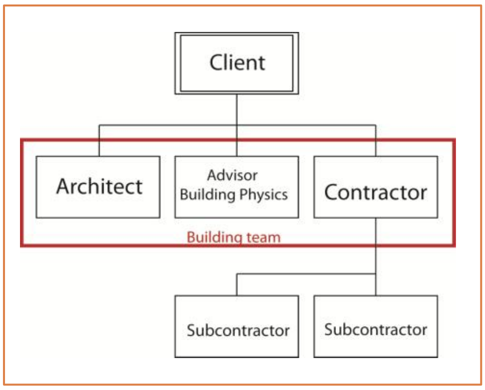


Fig. 2-2 Standard contract model (after Geraerdts, 2007, p. 97).

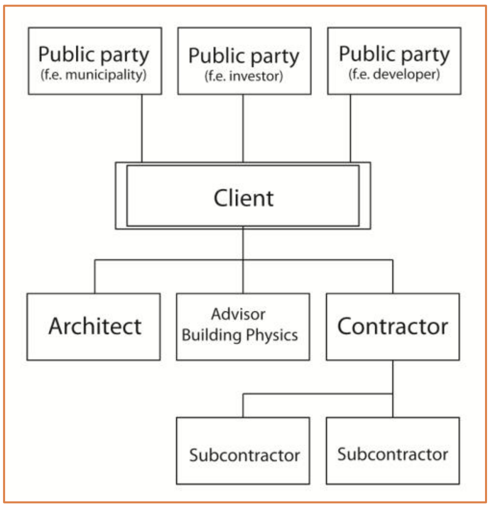


Fig. 2-3 Contract model large scale projects (after Geraerdts, 2007, p. 103).

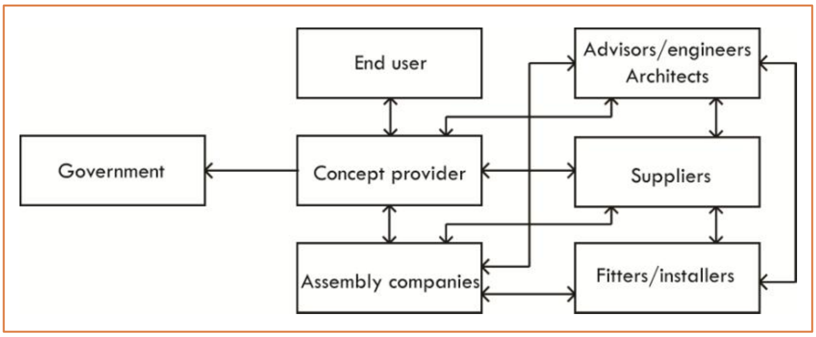


Fig. 2-4 Future cooperation as a network (after Rutten, 2010, p. 87).

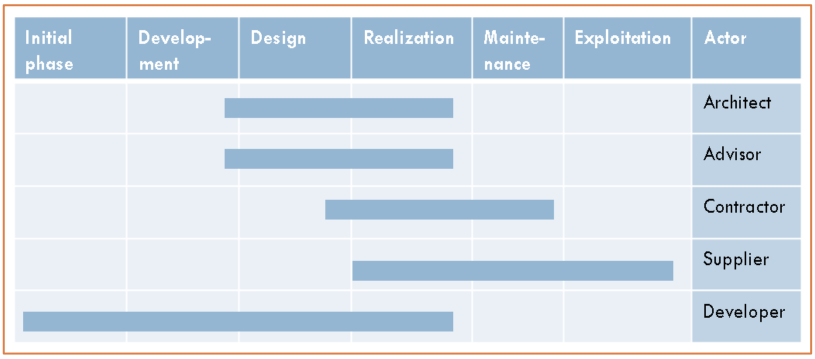


Fig. 2-5: Phases of involvement of the different parties (current organization)

2.3 The creation, life and strategies of real estate

CREATION OF A BUILDING

The creation of a modern building is quite complex. There is an actor for the design, for the construction and for management. Although they can be pointed out as separate entities, they have a lot of overlap, and can be visualized as in Fig. 2-6.

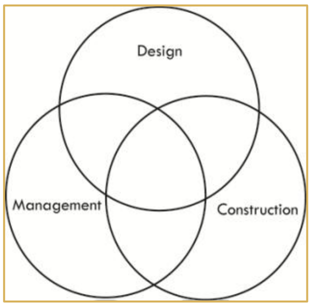


Fig. 2-6: Building Cycle (after De Jonge et al., 2004, p. 3).

Construction can be described as a cyclic process. Fig.2-7 shows this process with the mutation phase (below the dotted line) which is covered by *design & construction management*. The management phase is covered by *real estate management*. Construction management involves technical-, design- and cost/quality/time management. Design management is more focussed on managing the design process. Real estate management is management before design phase and after construction phase. Before the building starts, real estate management is about safeguarding specifications and coordination, although this can also be done by the architect. After the building process real estate management is responsible for maintenance and initiation of adaptations on different scale levels of the building, when the building does not meet the requirements anymore (De Jonge, et al., 2004, p. 3).

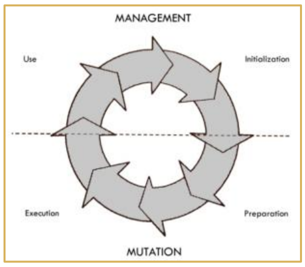


Fig.2-7: Different specializations (De Jong, 2012; after De Jonge, et al., 2004, p. 2).

LIFE OF A BUILDING

Immediately after a building is built, the devaluation begins. A building has an economic, functional and technical life, see Fig. 2-8. Economic life is the time in which the benefits of the building are higher than the costs *for the owner* (not the user). The functional life is the time when the needs of *the user* are met in the building. The technical life is the time that the technical equipment are still functional and building physics are according to building laws (Geraerdts et al., 2007, pp. 227-232).

In Fig. 2-8 the time of the graphs is set over a period of 50 years, but nowadays some office buildings are demolished after 15 years (De Jonge, 2000, p. 22). Normally, during the life time of a building, many renovations or adaptations can take place. The mutation phase in the red square in Fig. 2-9 can happen multiple times between newly built and demolition.

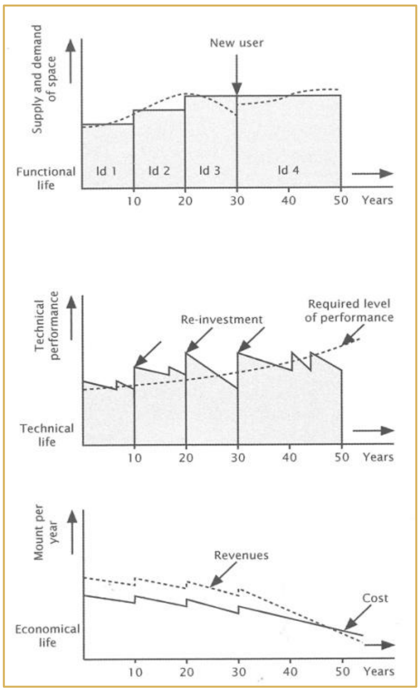
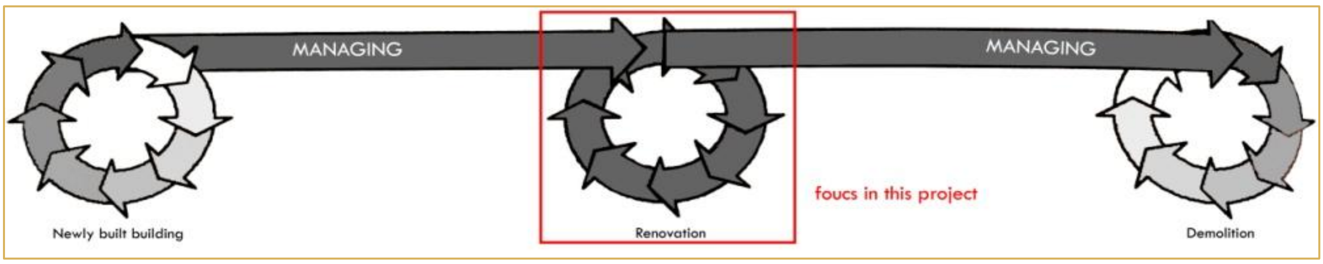


Fig. 2-8: → Life cycles of a building (De Jonge, 2000, p. 22).

Fig. 2-9: Renovation as part of the life of a building (after De Jong, 2012; De Jonge, et al., 2004, p. 4).



REAL ESTATE STRATEGIES: BUILDING LEVEL

On a building level these strategies can be looked at from two different perspectives: that of a building owner and of a building user. Building users are usually not the owner of the building, so there is an interesting interplay between strategies of owners and users.

When qualifications are not met anymore (either technical, financial or functional) the *initial phase* is initiated by the real estate manager. This can also happen as a reaction to complaints from the real estate department of the users. Users and building owners have a list of possible actions when they are unsatisfied with the current situation. Real estate departments of large building stock owners/managers (private and public) are an important commissioner. An example of a large public owner is the government. A large private (non-profit) owner is a housing corporation. (Geraerdts & Wamelink, 2007, p. 26). They, as a client, can still hire a real estate developer to act on behalf of the client.

Owners can:

- Do nothing;
- Sell the building;
- Modify the building and then sell it;
- Modify for current user;
- Modify and find new user (Den Heijer & Van der Voordt, 2004, pp. 48-49)

Examples of owners are:

- Investor or owner/user
- Developer
- Executive contractor
- Government
- Housing corporation

Users can:

- Adapt their activities, so they make better use of the building;
- Adapt the building, so that it meets the requirements again;
- Move to another building;
- Have a new building specially built for them. (Den Heijer & Vijverberg, 2004, p. 41)

Example of users are:

- Government
- Housing corporation
- Corporation/office organisations
- Private

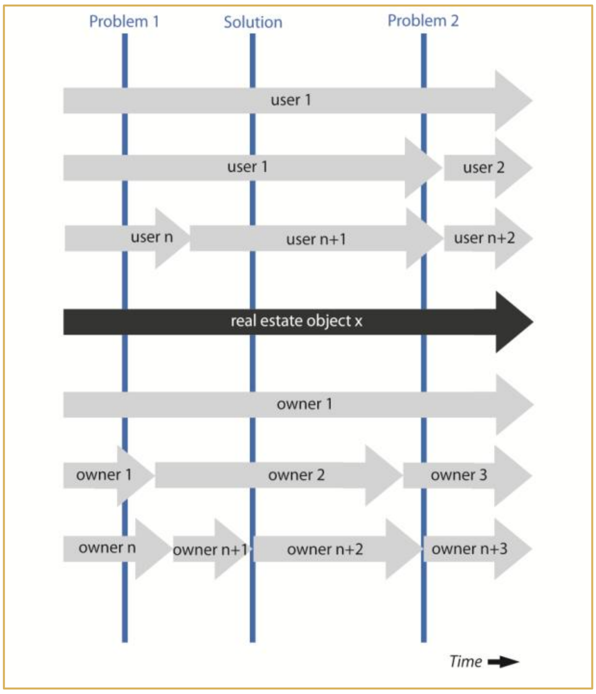


Fig. 2-10: Combinations of owners and users during the life time of a real estate object (after Den Heijer & Vijverberg, 2004, p. 55).

As we can see, adapting the building is not the only option. There can be a change of user of the building, or the owner decides to sell, or after a feasibility test it appears it is best to do nothing (zero-alternative). A switch of user/owner can happen multiple times during the life time of a real estate object (Den Heijer & Vijverberg, 2004) as is shown in Fig. 2-10.

REAL ESTATE STRATEGIES: BUILDING STOCK LEVEL

As has been stated before, the large building stock owners are the most important commissioners in the building industry. For example, of the existing housing stock about 30% is owned by a housing corporation (CBS, 2012). This means that a ajority of the building stock in The Netherlands is influenced by a corporate real estate strategy. Future demand has influence on decisions made now in the current supply, so the dotted arrow in Fig. 2-11 going from A_1 to A_0 can also directly be pointed from V_1 to A_0.

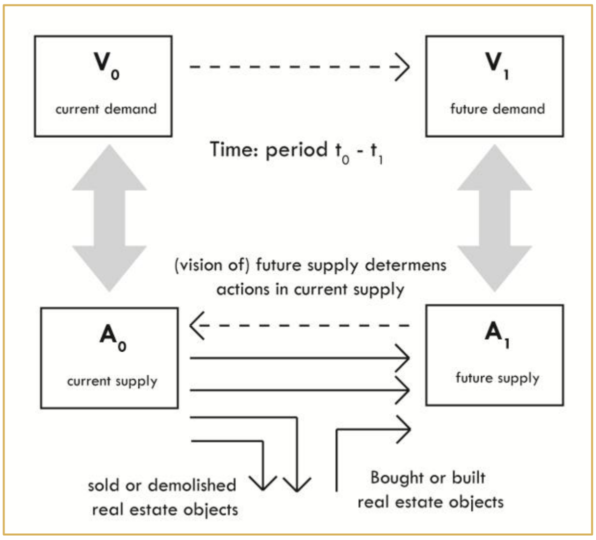


Fig. 2-11: Influence of (future) supply and (future) demand on real estate strategies (after Den Heijer & De Jonge, 2004, p. 73).

From this it can be concluded that the future demand is an input for the decision making of the building(stock) owner. This future demand can be in short term, so that it is more likely to involve the wishes of a user. For a longer time period other demands will play a role, such as changing demographics.

FUTURE DEMAND

The future cannot be predicted, but there are some ideas about what the future building industry could look like.

Rutten (2010) discusses a lot of problems, thoughts and improvements about the future building industry. On the basis of a lot of interviews with actors in the building industry, she composed strategies, possible solutions and scenarios about the future building industry. Although this is not a scientific research, the actors she interviewed are experts in their field and thus the ideas presented in this book can be realistic and interesting scenarios for the future building industry. A list of interesting points for this research (Rutten, 2010, pp. 14-40):

Changing building assignment:

- Changing demographics (rise in the ageing population);
- Sustainability (shortage of raw materials, energy consumption, use of drinking water, rising sea levels, city heating);
- Migration of population to the city;
- Population shrinkage (certain areas now, all of the Netherlands in the future);
- Rising number of smaller households (for starters and elderly);
- Reuse of existing building stock (demand for houses is a qualitative demand, not a quantitative demand);
- City redevelopment;
- Blending of functions (no more building for one function);
- Different ways of working;
- Vacancy of office space;
- Minimal or no economic growth in the Western countries.

These issues are sometimes related as cause-effect or a combination of problems together which point in a certain direction of problem solving and represent V_1, the future demand.

2.4 Combining current building industry and future demand

Now that the actors, actions and what influences their decisions are known, it is possible to show this in schemes. This is necessary to show where the changes are taking place and what these changes set in motion. The focus will be on the building owners and not so much on the users.

PHASE 1: MAKING PROCESS/DECISION SCHEMES OF THE CURRENT BUILDING INDUSTRY

The most upper level is level 0, showed in Fig. 2-12. This represents the building stock level and what influences the choices of (in particular) building owners have on the building stock. Note that the next deeper level is marked A1, A2 and A3, corresponding to Fig. 2-15, Fig. 2-14 and Fig. 2-16.

Level B is the decision making process of the owner against the phases in the building industry. Level C is level B but zoomed in on only the initial phase.

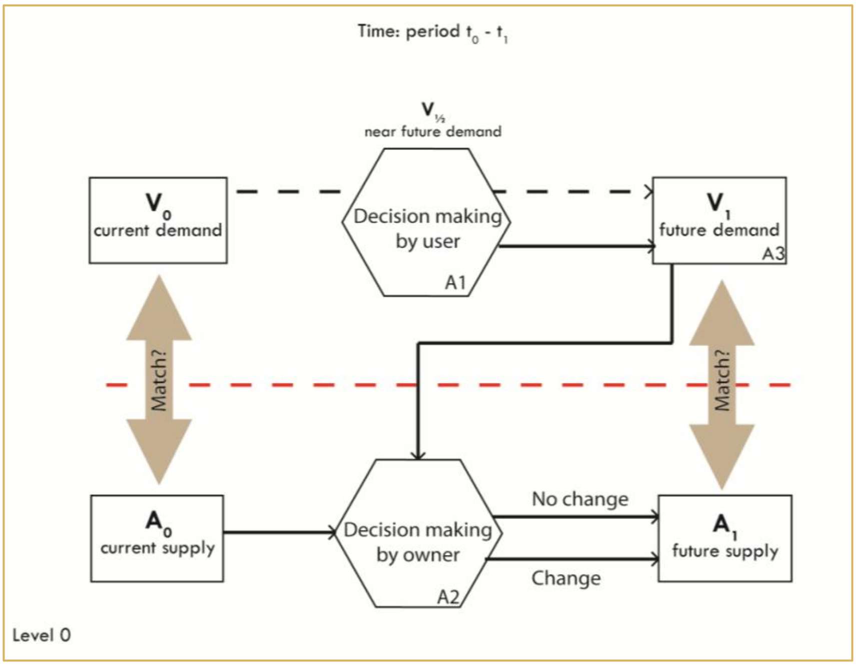


Fig. 2-12: decision making by owner and user integrated in Fig. 2-11.

On the next page, Fig. 2-13 shows an overview of all levels and schemes to be explained.

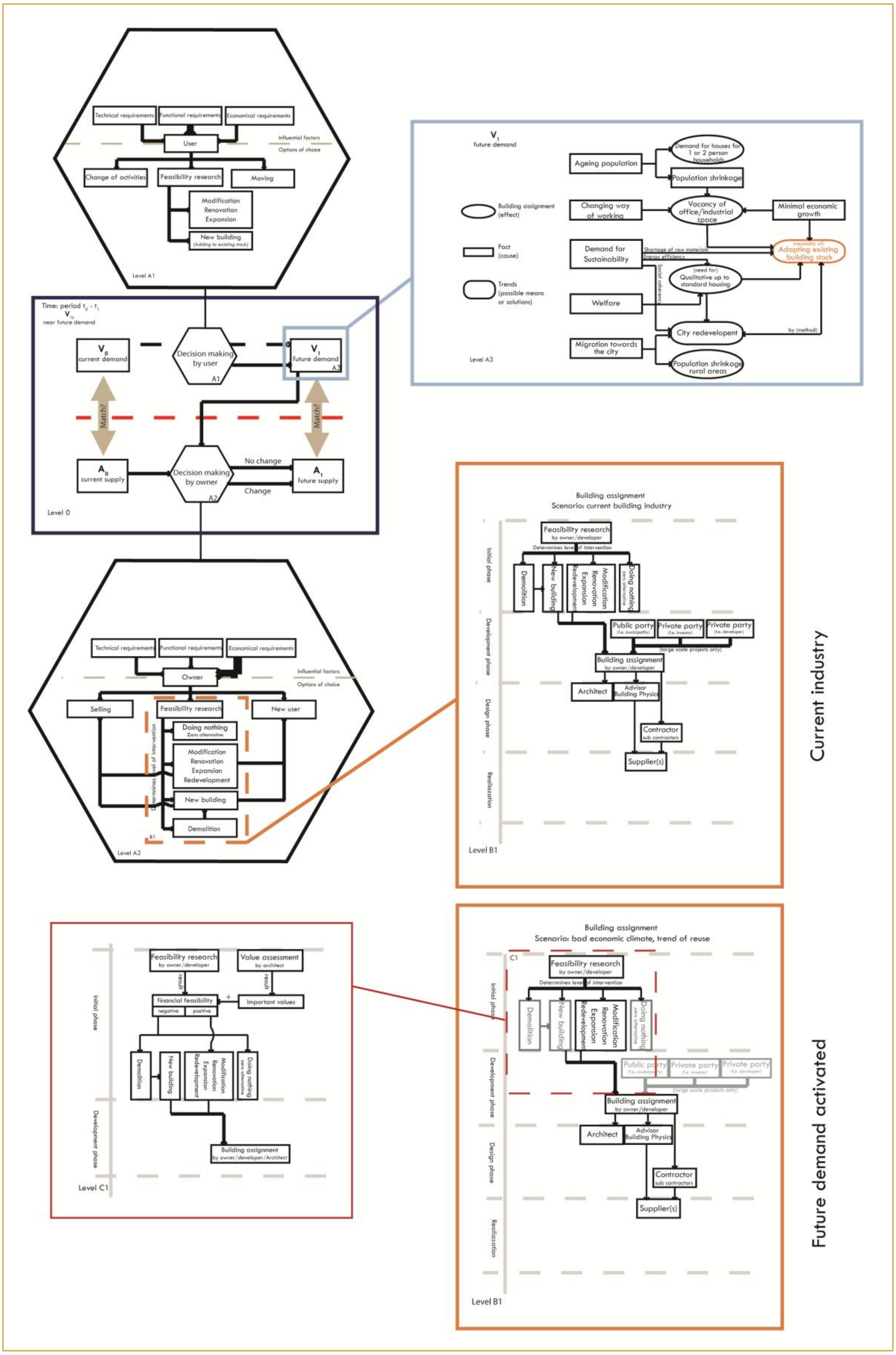


Fig. 2-13: Overview of schemes and levels.

The list of possible actions for users and owners on page 16 can be visualized as Fig. 2-14 and Fig. 2-15

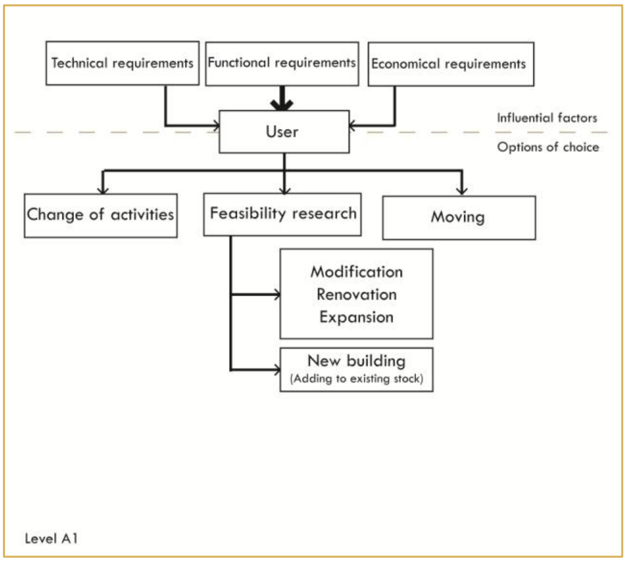


Fig. 2-15: Influences and possible decisions by an user (demand perspective). The stronger the line, the more important the influence.

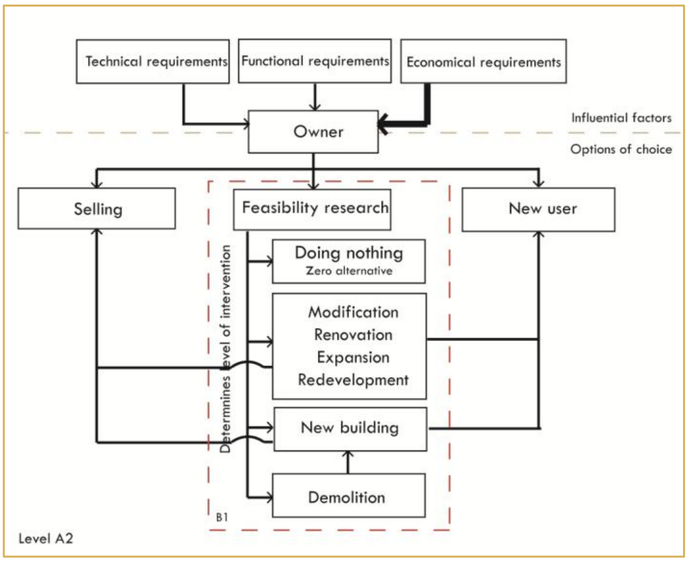


Fig. 2-14: Influences and possible decisions by an owner (supply perspective). The stronger the line, the more important the influence.

Also the list of future issues can be shown in a scheme. Demands, developments and facts together may point towards a certain set of possible solutions, in this case reusing existing building stock.

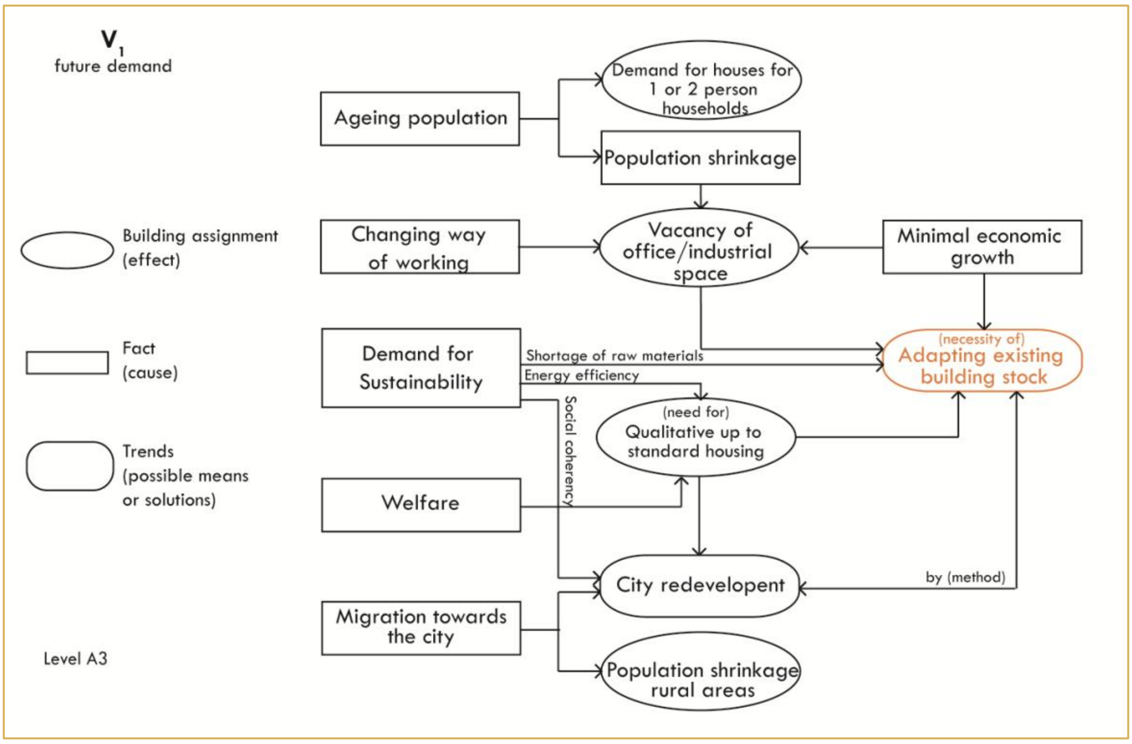


Fig. 2-16: The list of future issues combined in a scheme.

To make clear what decisions are made during the building process en when actors are involved, a cut out is made of part of level A2 (Fig. 2-14) and combined with the timeframe of Fig. 2-5. This, in a way, displays the decision making in the time frame of the building process in case of a building assignment.

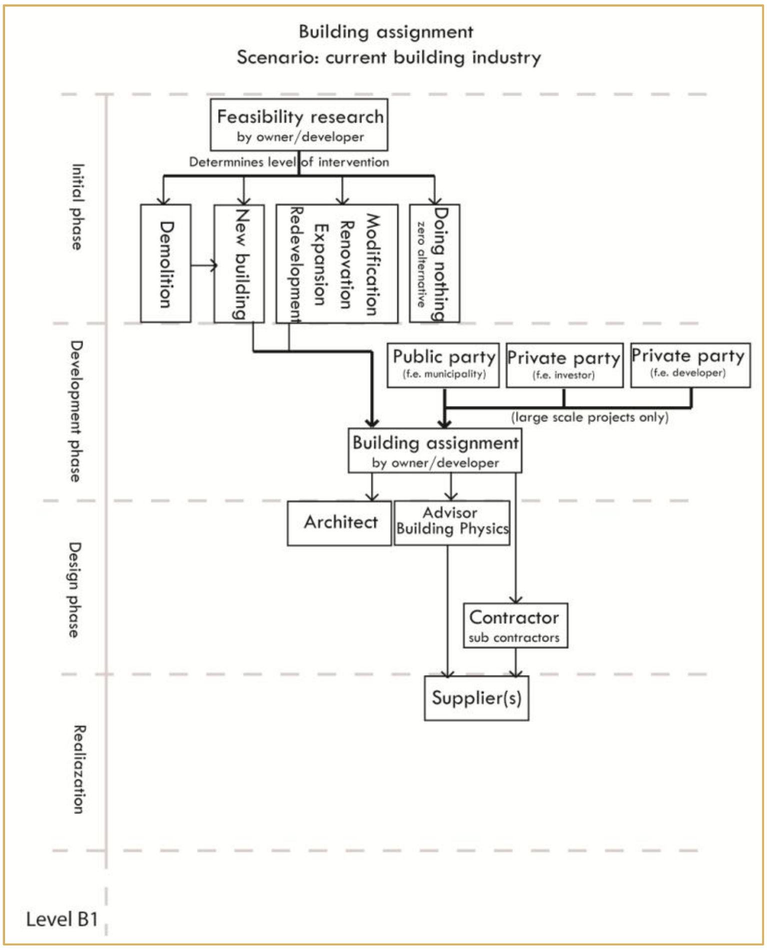


Fig. 2-17: Decision making scheme and managing scheme in the time frame of the building process. Since the scope is on the initial phase until design phase, the end phases of the building process are left out in the time frame.

PHASE 2: INTODUCING A POSSIBLE FUTURE SCENARIO

Level B1 (Fig. 2-17) is influenced by the future demand, as described in level A3 (Fig. 2-16). So what will happen if this scheme influences the building industry?

First, we can see a trend pointing towards city redevelopment. Sustainability dictates that reuse should be considered. Second, there is an unfavourable economic climate. So how do these facts influence the options for the building owner/developer?

First of all, some options become highly unlikely. The (most) financial parties involved will not invest in large scale building projects. So large new projects involving PPP cooperation will not be possible. It could be interesting to reuse old buildings to save costs.

Second, from the list of assignments in Fig. 2-16, it can be concluded that 'change' of the existing building stock is inevitable. So the option of 'doing nothing' for the building stock owner could be still possible, but is a tricky proposition. His future building stock probably would not meet future demand when he sits and waits.

The third is more complex, because it deals with economy, welfare, migration towards the city and sustainability that all influence each other. A big part of our housing stock is not up to modern standards anymore. This is caused by demand for energy efficient housing, but also by a level of welfare, which demands for a modern lay out of the houses[4]. Because these post-war houses are a significant part of our building stock and complete neighbourhoods consist of these houses, this upgrading will lead to city redevelopment. Upgrading and redevelopment can also happen by demolishing and building anew. This leads back to the sustainable issue, which addresses the shortage of raw materials and the importance of 'heritage' for people to relate to. This pushes city redevelopment and housing upgrades towards reuse, leaving demolishing and building anew non-favourable options. The changes that come from the future demand (level A1, Fig. 2-16) makes the B1 level (Fig. 2-17) look like Fig. 2-18.

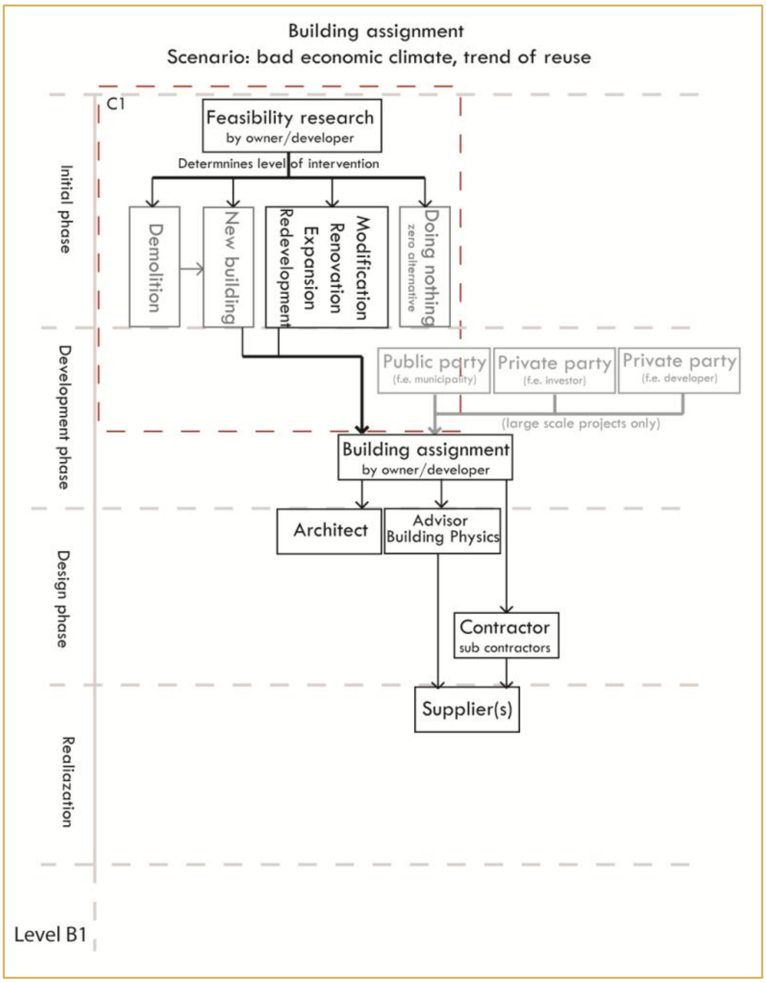


Fig. 2-18: Decision making scheme and managing scheme in the time frame of the building process, with influence of the changing building industry.

[4] Keep in mind that the shortage of housing is mostly a qualitative shortage because a large part of our building stock is built between 1950 and 1975. Since then, our welfare has risen and so did our demands.

Still, the building owner will start with a feasibility research. And since his main drive is exploitation of the building, he may consider that investing in a building at the end of its economic, functional ànd technical life (what post war housing usually is right now) is not the best option. This might be when a developer rather chooses for demolition and building anew, instead of renovation. And this is where the input of an architect can make a difference.

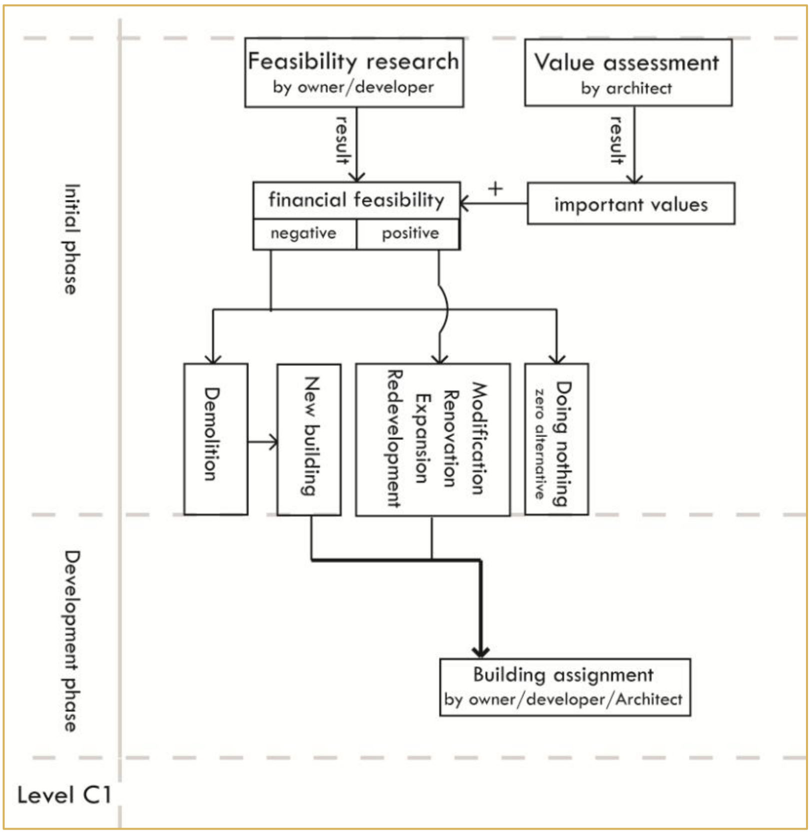


Fig. 2-19: This figure shows where the architect in the process should be involved and how this may influence the decision making.

In case of a premeditated (large-scale) reuse project, the architect can point out architectural qualities and values that help increasing the users value and exploitability. This acts also as a safeguard for architectural quality, preservation of structures and elements where people can relate to. This makes the project sustainable in multiple ways.

When the developer or owner is still in doubt, these qualities can convince him to reuse the building instead of demolishing it.

Of course, we can't keep everything, but once something is gone, it is gone.

3 DIFFERENT DESIGN APPROACHES

In order to get a better understanding what exactly a feasibility research and a value assessment is, this chapter will describe both design approaches of RMIT (department of Renovation, Transformation, Intervention and Modification) and RE&H (department of Real Estate & Housing).

3.1 Design approach of RMIT/architecture

THE NEED FOR A DESIGN APPROACH IN REUSE

The design approach for redevelopment does not exist. Each building is unique and requires a 'personal' approach from the architect. This also poses a threat. The architect might, even if not intended, destroy or erase valuable parts of a building because of personal taste or out of convenience. Not having an objective set of rules to go by is a free pass for architects to 'go ahead' with the building as they like. This happened in the past, in the beginning of the 20th century. A lot of buildings were reconstructed to their 'original (middle age) form' and a lot of additions from around the 19th century were erased. The most famous rule is the slogan 'preservation before renewal', that was already known in the 18th century, but not followed by all architects (Denslagen, 1987). The charter of Venice (first version 1964) is an international treaty that expanded the 'preservation before renewal' into a set of general rules for professionals dealing with monuments. These rules advocate respect for the existing, the need of research, the need for documentation, and general awareness of the impact of actions (UNESCO-ICOMOS Documentation Centre, 2012). So it is stated that the interventions of the architect should be reversible and they are accountable for every decision they make.

VALUE ANALYSIS

The value analysis is part of the research that is advised by the Venice Charter. Although they point out mostly value on a material level, there can be a lot of values.

Job Roos (2007, p. 29) uses these multiple values, that also involve social and emotional values:

- Aesthetic value;
- Emotional value;
- Cultural value;
- Societal (social) value;
- Users value;
- Ecological value;
- Architectonic value;
- Cultural historic value.

These values can be conflicting. For example, high architectonic value but no users value (beautiful but impossible to work in) or a high functional value versus a low architectonic value (nice useful building unappealing aesthetially).

The *Guidelines for Building Archaeological Research (2009, p. 17)* describe some guidelines:

'The value assessment is partly dependent on the integrity (authenticity) and the rarity in relation to other objects with the same or similar values. On these points too, it needs to be able to verify the value assessment.

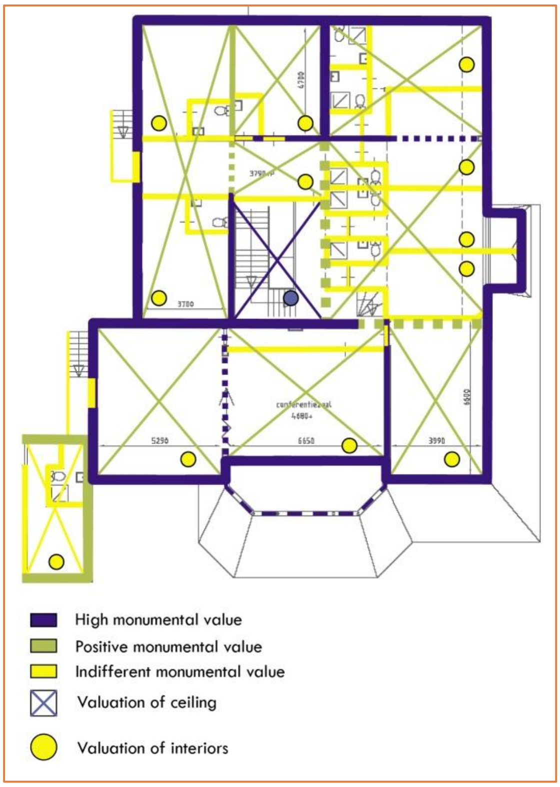


Fig. 3-1: Example of an valuation with color scheme (after Rijkstdienst voor Cultureel Erfgoed, 2009, p. 21; After Roos, et al., 2007, p. 36).

That is why definitions need to be included of:

- The reference basis: contextual or solely within the building (internal);
- The perspectives and observation levels: from global to detailed;
- The comparison levels: general history, ensemble, architectural and construction history, history of use, etc.'

I order to document these values you can use a colour system to indicate what parts of the building are valuable to keep, f.e. in Fig. 3-1. Although this may feel like a constraint in the creative process, it also can indicate strong points of the building that can be enhanced in reuse. The value evaluation is not a 'restriction manual' but challenges the architect to defend their choices.
After an understanding of the building is established, the design process proceeds as normal. There is only one exception: during the rest of the design process the discovered values will keep influence the choices made

DESIGN PROCESS
Job Roos (2007, pp. 34-39) describes the design process as a 3d spiral with different elements to take into account (see Fig. 3-2).
The ***central hollow axis*** represents the historical continuity. This does not represent the whole existing building, but the historical dimension and value of the building. This axis is first and foremost filled with information from the historical architectural research.
The ***value lines*** show the other different values that are important for the assignment, such as economic value, social function and aesthetics.
Click-on lines stand for moments of choice in the design project and show a relation between the historical continuity and other values. This is a recurring event during the process. The architect has to balance the conflicting values of that point and may have to choose between certain methods of intervention[5].
The design process is pictured as the ***spiral line***. The line leads past all click-on points that increase in the middle of the spiral. The wide base to the centre shows the search for *the assignment*, which is found in the middle. After that, the cone widens again, representing the diversity of solutions to 'solve' the assignment.

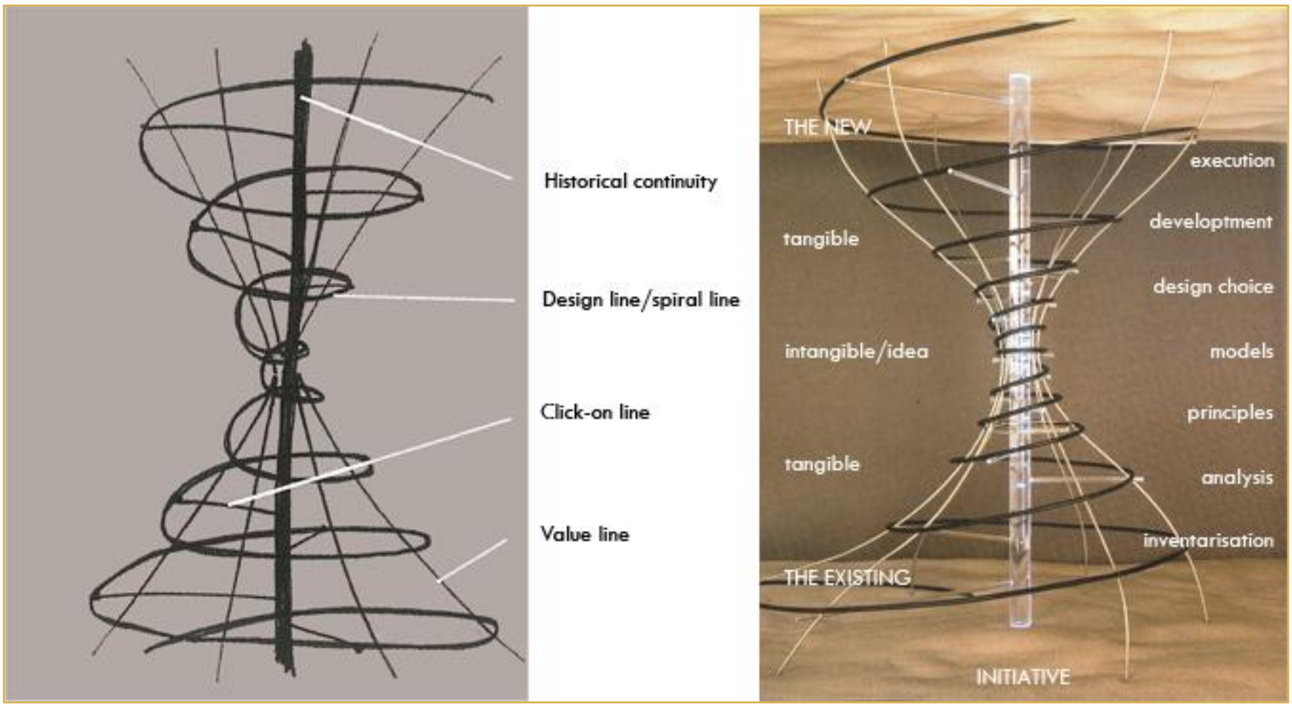


Fig. 3-2: Thought model of the redesign process (after Roos et al., 2007, p. 39).

[5] See appendix 10.3: Methodologies of architectural reuse

WHAT DOES THE RMIT APPROACH MEAN FOR MY PROJECT?

Looking at the guidelines it is 'fairly simple' to make a value assessment for a widely appreciated building like a church or castle from the Middle Ages or a town hall from the renaissance. The materials and elements are monumental in age and in craftsmanship. The building is probably old enough to guarantee the rareness and the public is convinced of its preservation. The building has become part of our collective memory. The assignment for these buildings is not the preservation, but how to deal with modern wishes and these monumental values (tearing down walls, replacement of windows, etc.).

For buildings without clear monumental value it is not easy to point out why and what should be preserved for future generations. The post-war social housing blocks are an example of this. Certainly when the architecture of these buildings is associated with low class and socially troubled people. Usually there is no protest when these buildings are demolished. The assignment for these buildings is on another level than 'can I tear down this wall or not'.

The assignment for these buildings is usually finding the 'good' in the architecture, values that can be still appreciated today, or can be turned into these appreciated values.

These values can be amplified to strengthen the architectural concept so that the architecture can be appreciated once more, also in modern times. There has to be a scientific way to value this, because it is impossible for the next generation to value the previous one, purely due to the fact that the next generation is always rebelling against the previous one. So, in that view, without a method it is impossible for me to objectively judge post-war architecture. So how do I approach the value assessment for the post-war housing blocks?

- Inventory of the original; how is it built?
- Where is it built? (urban context)
- What was the context of the architecture? (social- economical- political- and time context)
- Inventory of the existing; what is there now, what has been changed and why?
- Inventory of the existing; what does not meet current standards functionally and technically?
- What is the current context of the architecture? (social- economical- political- urban- and time context)

With this analysis done, it should provide a list with conclusions that tell what interventions are necessary or desired. These partial solutions can be combined into different scenarios, with most divergent intervention levels. These scenarios can be tested afterwards on architectural quality and financial feasibility by a multi criteria analysis. This will give an insight into the quality and costs, and whether reuse is cheaper or more expensive than building anew.

3.2 Design approach by RE&H

The approach of RE&H starts with a feasibility analysis on a number of subjects. Different scenarios are tested on the following subjects:

URBAN LEVEL

Context

Accessibility of the area in terms of access roads, public transport, highway or regional roads, walkways etc. What and where are the facilities? What kind of area is it? Green, urban, countryside? What kind of neighbourhood is it and what do I want to be? What are the plans of housing corporation/municipality? How is the safety?

Sustainability

What is the social cohesion? How do people use their neighbourhood? How long do they live there? Are they involved in communal activities?

BUILDING LEVEL

Target group

What are the requirements of your target group? Any special needs?

Functional demands

Does the program fit in the building? What adaptations need to be made for the target group? Does it all work/function?

Technical demands

Does the program fit? What is the quality of construction? Can it hold changes in load distribution? Can I do /change this? Are the installations still ok?

Aesthetical demands

What changes are aesthetically ok? What is permitted and what not? Will the aesthetics committee agree?

Sustainability

Juridical demands

Does the building/interventions meet function zoning (bestemmingsplan)? Is everything in line with the Building Act?

New Building vs. Renovation; what will the ecological costs be in different scenarios?

Financial demands

Owner occupied or rental? What is the price going to be? What are the building costs per m^2? Are your functional demands feasible? Does this fit your target group? What are the prices in the direct neighbourhood? "BAR[6]" for housing corporation is between 6 and 7%.

[6] BAR = Bruto Aanvangsrendement ≈ initial gross return

WHAT DOES THE RE&H APPROACH MEAN FOR MY PROJECT?

When starting a renovation project from an investors' perspective, picking the right building in the right area is also part of the feasibility analysis[7]. Sometimes, the building and location is already chosen, and then the assignment focuses on the situation in the neighbourhood and the building and what has to/can be changed. This results in conclusions in the form of advice, for example, advice could be to add a function such as a neighbourhood supermarket and meeting point to encourage more social meetings within the neighbourhood.

On a building level, the financial analysis creates insight in which intervention is financially feasible and for what target group, and does this still fit in the previous given advice about the composition of the neighbourhood.

Effectively, this means that the scenarios produced by the architectural analysis are checked and evaluated by this feasibility study. The main goal for the feasibility research is to compare the reuse design (on different intervention levels and quality levels) with a similar newly built building, and what kind of (extra) architectural quality you get for the (extra) costs. Contributing arguments are those of environmental costs.

[7] Transformatiemeter Real Estate and Housing, http://www.bk.tudelft.nl/fileadmin/Faculteit/BK/Over_de_faculteit/Afdelingen/Real_Estate_and_Housing/Opleiding/Bachelor/Bachelor_6/Eindwerkstuk/voorbeelden_eindwerkstuk/doc/Bijlage1_transformatiemeter.pdf

4 SUMMARY OF THE ANALYZES

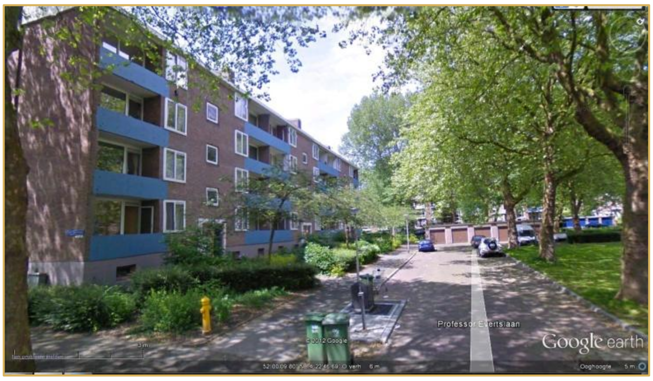


Fig. 3-1: Front and back facades of the flat

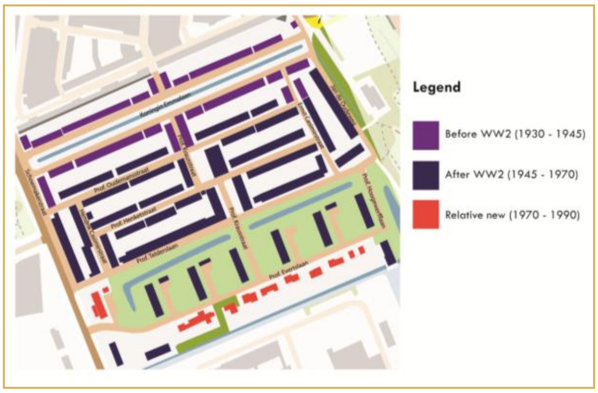


Fig. 4-2: Building ages of houses in the neighbourhood.

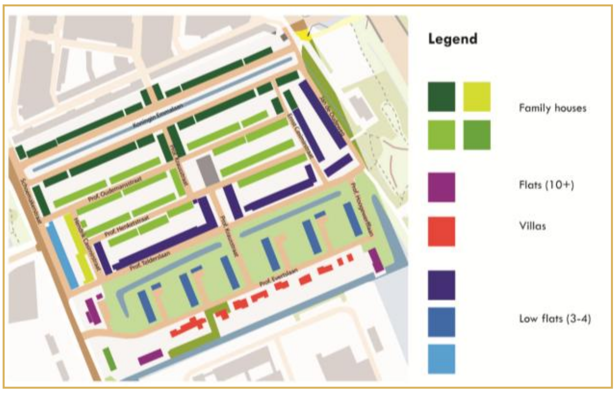


Fig. 4-3: Types of houses in the neighbourhood.

HISTORICAL CONTEXT AND NEIGHBOURHOOD

After the slums of the 19th century and the devastation of the WW2, these building types represent the post-war rebuild period. The focus was on families in a green, light and spacious environment, also known as the licht, lucht en ruimte (light, air and space) slogan. Each family could have their own kitchen, toilet, balcony and different rooms for parents and children to stay and sleep in. The typical design for this kind of housing (portiekflats) is that apartments have their entrance at an entrance hall and stairways. These flats can be 2 to 4 and exceptionally 5 floors high, and they have balconies or loggias for private outside space.

The neighbourhood consists of a mix between low flats, family houses, some villas, a student housing complex, and an old people's flat. This suggest that old, young, rich and poor are living together in this neighbourhood. Big green public space in between the flats gives opportunity to play and allows (sun)light to reach the facades.

Fig. 4-4: Section of the area

FYSICAL STATE

While these kind of flats were luxurious just after the second world war, nowadays these apartments are in need of an upgrade. This upgrading mostly involves new installations, sound insulation and heat insulation. The construction is still in good condition, but relatively thin walls of concrete masonry blocks and hollow brick floors provide no sound insulation. There is an outside cavity wall, otherwise the walls are not insulated. The windows are double glazed, but might already need to be replaced. The only heating present is gas heating in the living room.

ARCHITECTURE

There is a direct link between what is happening on the inside and on the outside of the building. The staircases have smaller windows than the housing rooms and it is clear which part belongs to which apartment. The typical organisation – inside staircase, entrance and distribution – makes for different zones in the apartment. The bathroom and hallway are in the centre (with the least light entrance) and the living room, bathroom and bedrooms are at the facades (with more light). This gives the facade a simple, calm and clean expression.

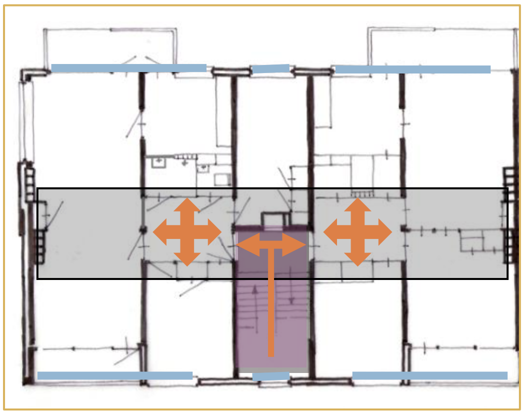


Fig. 4-5: Internal organisation and light entrance.

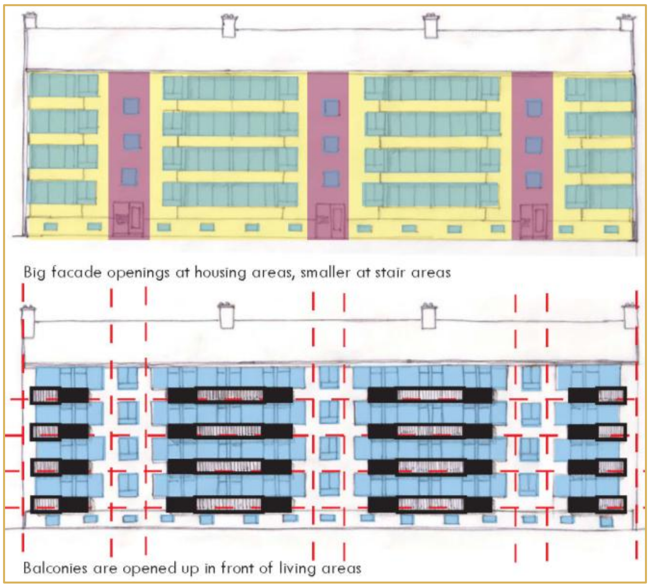


Fig. 4-6: Open en closed parts in the building façade.

INTERVENTIONS SINCE

Already some interventions have taken place to meet the requirements of the tenants. First of all, notice that a house, built for families, now usually is occupied by 2 or 3 person households. Second, a lot of people have demolished the thin wall between a living room and bedroom, making the widest bay a living room over the depth of the flat. As a third, some interventions were made in the layout of the floor plan. Also the attic is being used as living space instead of storage space. This suggests that the lay-out is not optimal anymore.

PROPOSED INTERVENTIONS

After assessment of the current state of the building, a list of possible interventions can be made. This ranges from making more space by creating private gardens to restructuring the apartments or adding central heating. Also the possibility of building extra houses between the flats is investigated (see Fig. 4-). Each intervention has an impact on the appearance of the flat. This is also shown. The conclusion of this bundle of measurements unclear. The next step would be selecting measurements and combining them in 3 different scenarios.

Fig. 4-7: Examples of possible interventions.

5 DESCRIPTION OF SCENARIOS

These scenarios are developed with the (architectural) analysis in mind. Each scenario is a possible answer to problems, solved in different ways. This way we are able to see the difference in intervention level, adding an elevator and the reorganization of apartments within or across the existing apartment/building envelope.

Creating scenarios is necessary to get a grip on the abundance of architectural possibilities. After establishing these variants, they can be used for financial calculations and for a multi criteria analysis. This way it is possible to see difference in appearance, costs and functionality for different target groups, and helps to choose one of these scenarios as project for the architectural part of the graduation.

A full floor plan and housing types are available in appendix I.

SCENARIO 1: RECONSTRUCTION is based on a renovation level where the existing apartments are restructured. The goal is to create as many ground accessed (family) houses as possible and create a more diverse offering of 1 or 2 person apartments. The target group will be diverse, just like the area, but exchangeable; a family house with garden can be occupied by a starters couple that want more space than the minimum, or by a family with children that want a garden instead of an apartment.

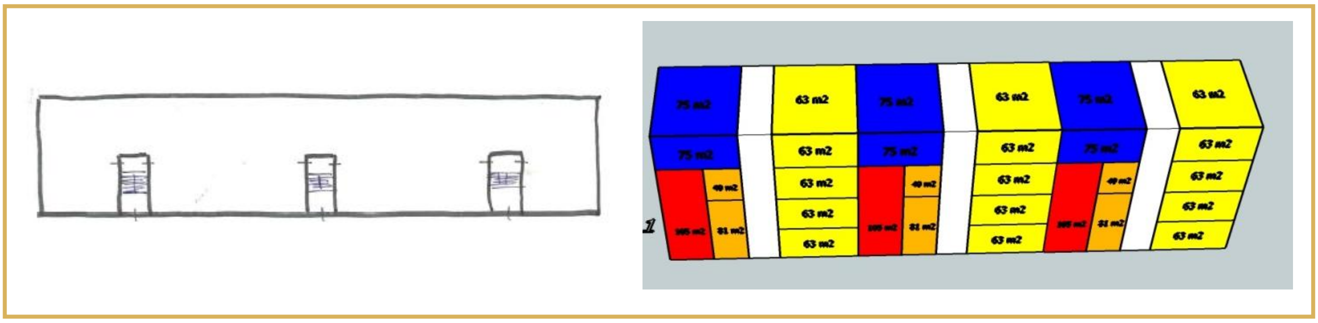


Fig. 5-1: Organisation of scenario 1.

This creates 24 units:

3x +attic apartment 75+ m^2
3x +attic apartment 63+ m^2
6x one level apartment 63 m^2
3x one level apartment 40 m^2
3x ground floor house 105 m^2
3x ground floor house 80 m^2
3x one level ground floor house 63 m^2

SCENARIO 2: INTERNAL ELEVATOR adds an elevator within the existing structure, granting the top floor apartments access by elevator. The ground floor houses are restructured to create as many family houses with a garden as possible. This will create a lively plinth with families on the bottom and 1-2 person apartments suitable for starters and elderly people.

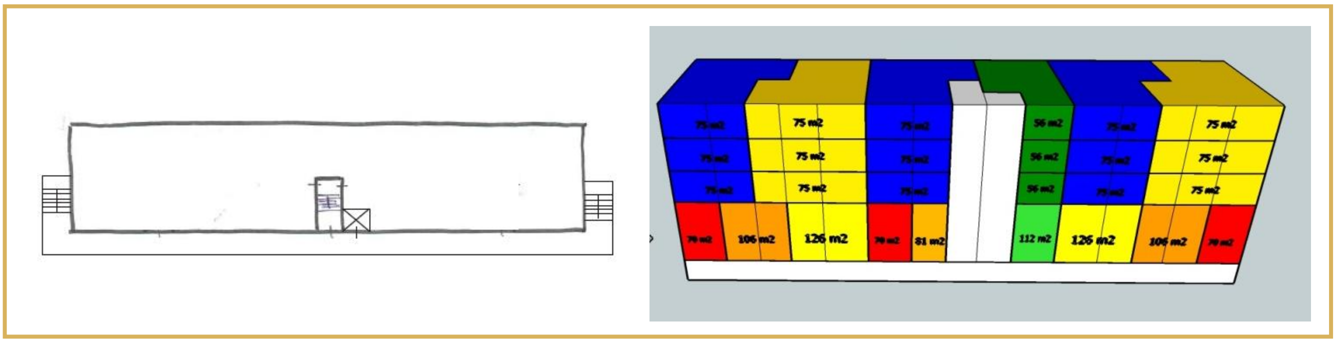


Fig. 5-2: Orgaisation of scenario 2.

This creates 27 units:

15x one level apartment 75 m^2
3x one level apartment 56 m^2
1x ground floor house 81 m^2
3x ground floor house 70 m^2
2x ground floor house 106 m^2
1x ground floor house 112 m^2
2x ground floor house 126 m^2

SCENARIO 3: SIMPLE FUTURE PROOFING adds an external elevator and walkways to access all apartments. The apartments are minimally restructured and approximately the same size as before.

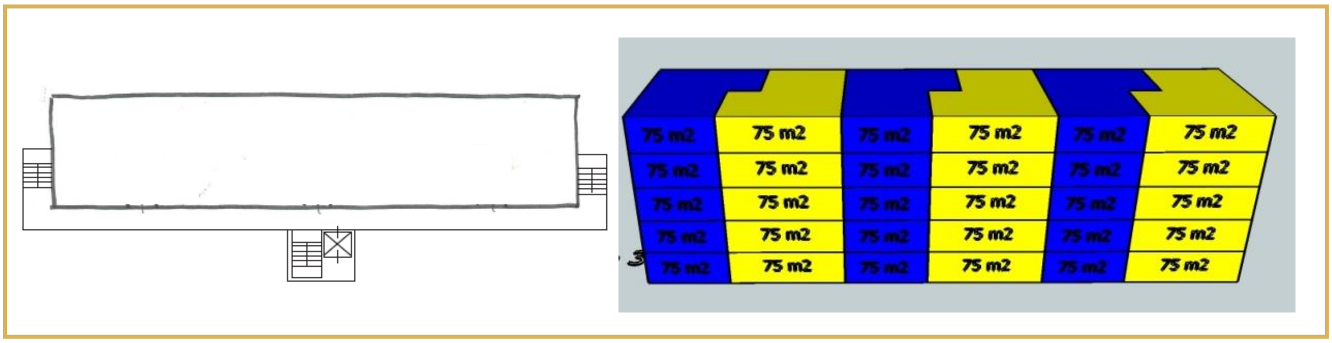


Fig. 5-3: Organisation of scenario 3.

This creates (A) 30 units of 75 m^2

6 COMPARISON OF SCENARIOS

6.1 Financial comparison of scenarios

With the scenarios established, it is possible to determine the financial feasibility by calculating what each scenario would cost. Feasible means that the yield minus costs is equal or larger than 0, thus

FORMULA 1:

$$Feasible = yield - investment \geq 0$$

For renovating an existing building, all variables are displayed in fig. 9.

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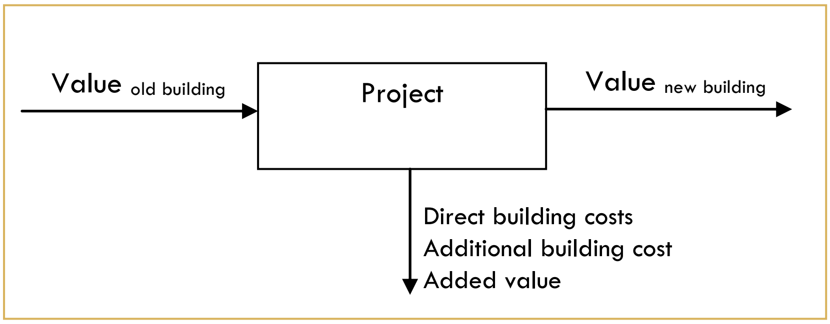

Fig. 29: Scheme of increased value through redevelopment (after De Jong, 2012, p. 4)

In formula fig. 9 looks like

FORMULA 2:

$$Value_{old\ building} + added\ value + direct\ \ building\ costs\ +\ additional\ building\ cost = Value_{new\ building}$$

Where the $Value_{old\ building}$ can be calculated with

FORMULA 3:

$$Value_{old\ building}\ = \#apartments * years'\ rent * exploitation\ time\ (y)$$

Then, for an estimation of the additional building costs (commission, fees, permits etc.) the next formula is used:

FORMULA 4:

$$Additional\ building\ costs = \ Value_{old\ building} * 10\% * project\ duration\ (y) +\ direct\ building\ costs * 5\% * project\ duration\ (y) +\ direct\ building\ costs * 10\%^{8}$$

What is more or less the same as the total yield over that exploitation time. The direct building costs are calculated by a Winket (2013) reference project. As can be seen in formula 3, there is also a time factor involved. The feasibility is dependent on the exploitation time. Therefore exploitation times of 15 to 30 years are displayed with 5 years interval.

[8] According to ing. P. de Jong.

How to interpret this, depends on whether the owner is developing, or if the building is first sold and developed by a new owner. This makes the interpretation of the formulas slightly different.

For instance, the owner of the building has probably depreciated the building, so that the $Value_{old\ building}$ is more or less 0. When the owner sells the building, he probably wants a price of the potential value of the building, so the $Value_{old\ building}$ for him is calculated with the maximum possible rent (level 2013). The truth will lie somewhere in between. In the calculations these two extremes are assumed.

For the building owner the building may be worth next to nothing. But he does lose income during the building period. In Fig. 6-2 we can see that the majority of the tenants live there for over 15 years. This means that we can assume that the average rent is left from the centre point. An estimate of the current average rent is made at €400,- .

When we have the new value of the building, there are several ways to calculate the rent prices per month. Note that these rent prices are meant to break even.

In this case calculations have been made for:

1. Spreading cost over the number of units;
2. Spreading cost over the number of square meters.

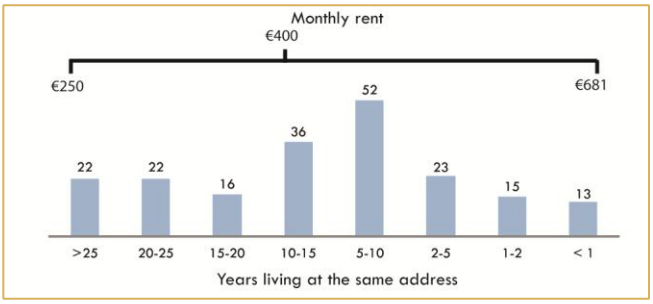

Fig. 6-2: Estimation of current average rent by looking how long people have been living there.

The most fair rent determination would be to take into account gardens, size of balconies, proximity to the elevator etc. This is more realistic, but not necessary to say something about the financial feasibility. Looking at the unit price is sufficient, this is an average. For the complete calculations and prices per housing type see appendix II.

Feasibility based on max. €681,- Social sector

	INV. (Mil. €)	Montly rent			
New new3	8	1484	975	890	742
New New2	7,9	1621	1216	973	810
Ren. New3	7	1300	975	780	650
Ren. New2	6,9	1423	1067	854	711
New new1	6,1	1409	1057	845	705
New Own3	5,8	1075	806	645	537
New Own2	5,7	1166	875	700	583
Ren. New1	4,9	1136	852	681	568
Ren. Own3	4,7	877	658	526	439
Ren. Own2	4,6	955	716	573	477
New Own1	3,9	897	673	538	449
Ren. Own1	2,9	640	481	385	320
TIME (y)		**15**	**20**	**25**	**30**

Feasibility based on max. €900,- Private sector

	INV. (Mil. €)	Monthly rent			
New new3	8	1484	975	890	742
New New2	7,9	1621	1216	973	810
Ren. New3	7	1300	975	780	650
Ren. New2	6,9	1423	1067	854	711
New new1	6,1	1409	1057	845	705
New Own3	5,8	1075	806	645	537
New Own2	5,7	1166	875	700	583
Ren. New1	4,9	1136	852	681	568
Ren. Own3	4,7	877	658	526	439
Ren. Own2	4,6	955	716	573	477
New Own1	3,9	897	673	538	449
Ren. Own1	2,9	640	481	385	320
TIME (y)		**15**	**20**	**25**	**30**

Ren. Own = Renovation by owner

New own = Building new by owner

Ren. New = renovation by new owner

New new = building new by new owner

Fig. 6-3: Feasibility of all scenarios: green means feasible for an certain investment exploited for a certain time. Prices are based on spreading costs over number of units.

After seeing these different rents, what is the margin on these different projects? The investment and the rent prices that can be asked for these are already known. Instead of determining the possible investment, the possible GIY[9] will be calculated to see which scenario is the most profitable by calculating the GIY for each scenario. The minimum is set on 6%.

FORMULA 5:

$$Investment = \frac{1^{st}\ years'rent}{GIY}$$

GIY based on max. €681,- Social sector		GIY based on max. €900,- Private sector	
New New2	2,8%	New new3	4,1%
New new3	3,1%	New New2	4,1%
Ren. New2	3,2%	Ren. New3	4,6%
Ren. New3	3,5%	Ren. New2	4,7%
New Own2	3,9%	New new1	5,3%
Ren. New1	4,0%	New Own3	5,6%
New new1	4,0%	New Own2	5,7%
New Own3	4,2%	Ren. New1	6,6%
Ren. Own2	4,8%	Ren. Own3	6,9%
New Own1	5,0%	Ren. Own2	7,0%
Ren. Own3	5,2%	New Own1	8,3%
Ren. Own1	6,8%	Ren. Own1	11,2%

Ren. Own = Renovation by owner
Ren. New = renovation by new owner
New own = Building new by owner
New new = building new by new owner

Fig. 6-4: GIY percentages for all scenarios

From this we can conclude that

- Accept for scenario 1 (renovation by the owner), making profit with a safe margin is not possible in the social rent sector;
- All renovations by the owner are profitable in the private sector;
- Building new for scenario 1 is also highly profitable, but not so much as renovating it.

[9] Gross Initial Yield ≈ Bruto aanvangsrendement

CONCLUSION

The question was what the differences in rent price would be for the different scenarios, and for whom this is affordable.

Some observations:

- Building new is more expensive than renovation, on all levels;
- Scenario 2 and 3 are more expensive than scenario 1, as expected;
- Scenario 2 and 3 do not differ much in costs even though scenario 2 has a higher restructuring level;
- The longer the exploitation time, the more feasible the scenario becomes
- Development in possession of the building is cheaper than first buying and developing. Of course this depends on the selling price.
- Renovation seems to be more profitable than building anew.

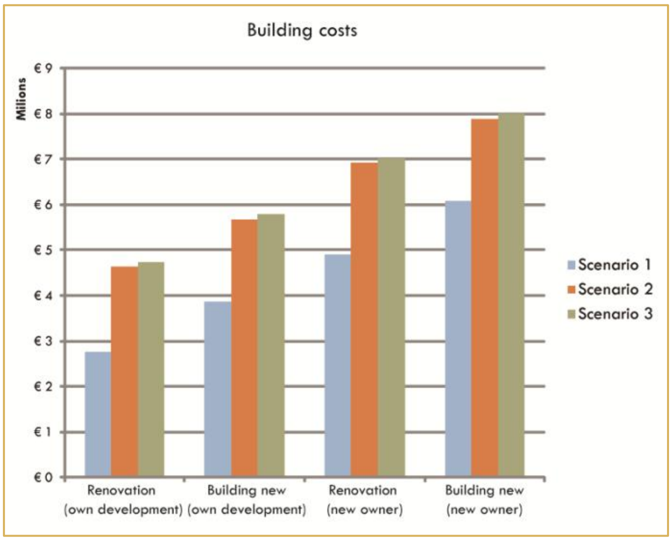

Fig. 6-5: Total of all building costs.

From this we can conclude:

- Renovation is feasible, and the building costs are less than building new;
- Scenario 1 is the cheapest;
- The costs are not in the internal restructuring level, but in the newly built galleries and elevators;
- Scenario 2 is, in terms of target groups, the most flexible and can be exploited longer;
- Since scenario 2 and 3 cost more or less the same, scenario 2 wins easily on intuitive quality of the whole building;
- In terms of profit scenario 1 has the best GIY;
- Development as the owner of the building is more feasible than buying, developing and exploiting;
- Scenario 1 is definitely affordable for starters, scenario 2 and 3 as well.

Although scenario 2 gives the most flexibility and therefore more or less a guarantee that the building can be exploited for over 20 years, scenario 1 is still a good option. With the university present and hundreds of graduates per year, it is safe to say that in Delft scenario 1 is exploitable for at least the same period as scenario 2.

DISCUSSION

There are a few remarks to this calculation.

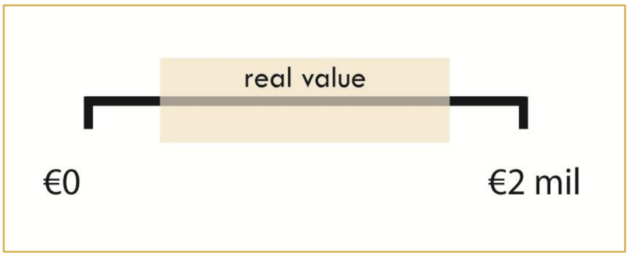

Fig. 6-6: Range of the possible building value. The truth lies somewhere in between.

First of all, the building costs are calculated as accurate as possible, but it is not a professional calculation. Therefore the mentioned costs are an indication of the costs and prices. Also the ' BAR' is not included in the calculation.

Second, having different assumptions for the current building value may influence the feasibility. The calculations are done with two extremes; a value of nothing and a maximum value of about 2 million Euros. The true value lies somewhere in between.

6.2 Ecological costs

Eco-cost are virtual costs that indicate the price for the environment if they would be paid. There are plans to pass these costs on to the end user; in this case the tenant of the apartment. Like for the direct building costs, Winket provides reference material for calculating the eco costs. For comparison we only look at the amount of owner development.

These costs can be absolute, as in Fig. 6-7 or as a ratio, Fig. 6-8 which compares the costs to the created value (EVR).

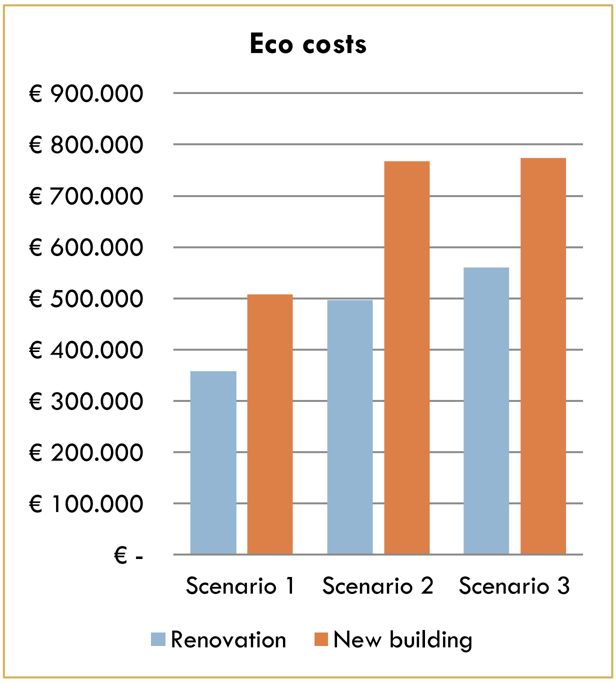

Fig. 6-7: Eco costs of the scenarios, of renovation and building anew.

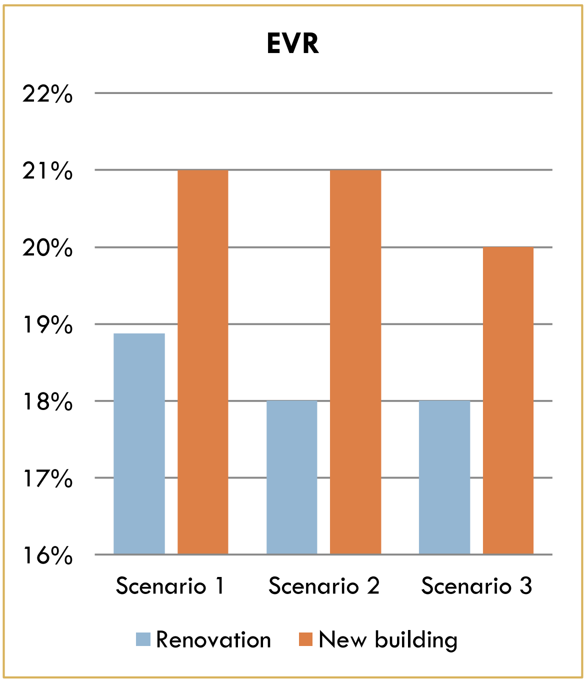

Fig. 6-8: Eco/value ratios: the lower the ratio the more value for de created costs.

From these figures we can conclude that the eco-costs in absolute terms are successive by scenario and by intervention level (renovation first, than building new). When the eco costs are compared by the value that is achieved, the renovation has a better EVR than building new.

CONCLUSIONS
Some observations:

- All renovations have a lower EVR than building new
- In absolute costs scenario 1 is the cheapest, but not in ratio
- Scenario 2 and 3 have the same costs and ratio

From this we can conclude:

- Renovation is indeed better for the environment than building new
- Scenario 2 and 3 have the best value for cost ratio

For the best comparison between old and new, the costs for energy should be included as well. These numbers are not easily available and housing corporations are not likely to share, that is why energy is not in this comparison.

6.3 Qualitative comparison of scenarios

The qualitative analysis will be done by a multi criteria analysis which is colour based. With only using three colours (green, orange and red) margins by using numbers (a 7 has a range from 6,5 to 7,4) are avoided. This way the results are more distinct.

At this moment the choice for renovation is already made. The financial analysis showed that in all scenarios renovation is cheaper than building new. This quality comparison is done to make a more objective choice for one of the scenarios by testing them on multiple criteria.

The first set of criteria apply to the building as a whole and tests values like space quality and representation. The second set of criteria is target group focussed and applies to the most suitable apartments in the building for this target group. Here, necessities such as an elevator for elderly people are tested. Also the financial demands are taken into account, based on rent prices of 15 years current exploitation and 15 years new exploitation (see §6.1 Financial comparison).

ASPECT	CRITERIA	SCENARIO 1	SCENARIO 2	SCENARIO 3
Representation				
1,1	personal identification	+	+	-
1,2	entrance	o	+	-
1,3	elevator	-	+	+
Building physics				
2,1	Heat insulation	-	+	+
2,2	Soundproofing	o	o	o
Housing quality				
3,1	Private garden	+	+	-
3,2	private entrance	o	+	-
3,3	lay-out of apartments	+	o	o
3,4	spatial quality of rooms	o	+	+

Fig. 6-9: General criteria for the multi criteria analysis.

Target group specific		weight			
Elderly					
E1	Elevator	go/no	no	go	go
E2	Barrier-free	go/no	no	go	go
E3	Spacious floor plan	5		+	+
E4	2 bedrooms	5		+	+
E5	parking (& visitors)	2		o	o
E6	Affortable by ideal type (expl. 15/15)	5		o	+
	total	17			
Starters					
S1	2 bedrooms	5	+	+	+
S2	spacious living room	2	+	+	o
S3	garden	2	+	+	-
S4	own entry	1	o	+	-
S5	parking	2	o	o	o
S6	Affortable by ideal type (expl. 15/15)	5	+	-	+
	total	17			
Families					
F1	min 3 bedrooms	5	+	+	-
F2	garden	2	+	+	-
F3	spacious bathroom	2	-	+	+
F4	own entry	1	+	+	-
F5	private parking spot	2	-	+	-
F6	Affortable by ideal type (expl. 15/15)	5	o	-	+
	total	17			

Fig. 6-10: Target group specific criteria.

The target group criteria are weighted to come up with more extreme and clear results. The numbers range from 1 (neutral), 2 (plus) and 5 (want to have) and are based on logical thinking: the elderly need a more spacious floor plan to get around with help equipment, a family needs 3 bedrooms if they have 2 children and might want a spare room.

With all the colours mixed and some criteria weighing more than others, it is difficult to see what the outcome is. The next step is to pile up the colours in bars, starting with green on the bottom, then orange and red on top. This creates 3 bars that indicate how well each scenario suits the target group. It is crucial that the total weighing points are the same; this way all bars have the same height. The criteria are numbered so the individual blocks are not lost.

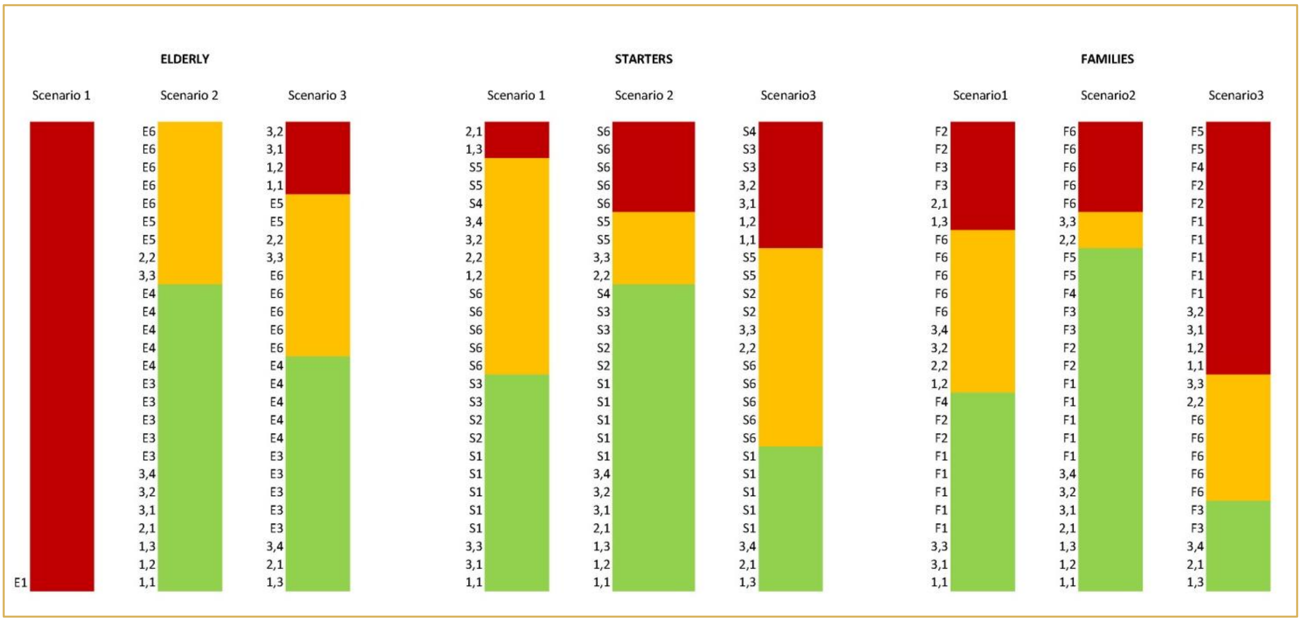

Fig. 6-11: All criteria and weighing stacked together in to bars

In Fig. 6-11 all the coloured blocks are piled up and now we have a clearer view.

It shows that scenario1 does not exist for the elderly; there is no elevator present and the houses are not without thresholds. It also shows that scenario 3 is not favourable for families; the apartments lack an extra room, have no garden and a relative small bathroom.

Looking at these bars, scenario 2 seems to be the most favourable for all three target groups. Points of criticism are the prices, but if all three target groups can live there without big adaptations the apartments have a longer exploitation time. It can be seen in figure Fig. 6-3 that the prices can drop to a more reasonable level. This flexibility favours scenario 2 even more.

This does not mean that scenario 1 or 3 should be taken off the table. Because of the galleries Scenario 3 is, from a social and architectural point of view, the lesser option.
With enough starters who want to stay in Delft a couple more years after graduation, scenario 1 is still a reasonable scenario if you want to invest in starters and starting families.

7 PERSONAL OBSERVATIONS

COACHING

During coaching from both mentors I could feel the different approach in reuse very clearly. Thinking of scenarios was pretty quickly done in a real estate way of thinking; while the architecture tutor was always asking what the impact on the building was. This is also due to the fact that architecture is the main subject I graduate in, but the emphasis was clearly on the architectural impact, values of the old building and the tension between old and new. This is typically for the RMIT approach. All this takes some time to work out and this may influence the feasibility because an architect is working longer on possible architectural solutions.

DESIGN BY RESEARCH

Specifically for post-war architecture is that these buildings are not (yet) listed as a monument. Being a monument already implies that the building has certain qualities that should be continued. These 'easy' guidelines for what can or cannot be done with the building are not there yet. Without any guidelines for interventions, the possibilities are endless and one gets easily stuck. The approach *analysis* → *partial (architectural) solutions* → *creating scenarios* → *multi criteria analysis* → *choice of scenario* is in that sense a workable structure to make a design.

RESEARCH BY DESIGN

By designing, thus making modifications, interventions and so on, the consequences of these choices can be of help in finding values and qualities of the building. The best example for this is when the consequences of the floor plans of scenario 2 were drawn in the facade for the first time. Intuitively you know that something is not right. Then you have to become aware what it was that made the original facade work, and try to implement this in the new facade. This might have consequences for the layout of the building. This can mean that the conclusions from the initial value analysis are partial conclusions, and by designing you find more general conclusions.

8 CONCLUSIONS

In the beginning of this document the following questions were posed:

> **Considering the changing building industry, what is the sum of co-operation between real estate developers and reuse architects <u>in the initial phase</u> in the building process <u>in a reuse project</u>?**

What created the following hypothesis:

With the following sub questions:

How can the building industry network be described in terms of processes and actors? How does the hypothesis fit in this network?

What is the current relationship between architects and developers? What is about to change?

What are the design approaches of a developer and an reuse architect?

8.1 Answering sub research questions

BUILDING INDUSTRY AND RELATIONS IN THE BUILDING INDUSTRY

We can say that the traditional building industry is mainly linearly structured. Generally speaking each actor or party is involved in a certain phase, and usually this involvement stops when this phase is finished. For the relationship between actors this means that distrusting each other is common, responsibilities are shifted to the next party, and therefore time and money is spent to hedge oneselves against building errors. Distrust and prejudice between architects and developers originate from the time architects received a fee based on a percentage of the building costs (see §2.2: Cooperation in the building industry, page 15).

The proposal of cooperation between an architect and developer in the initial phase of the building process is an example of *forward integration* of the architect in the linear building process. Rutten says that the linear process will disappear completely and that all actors will work as a network (see §2.2: Cooperation in the building industry, page 15). More cooperation between the actors *before* the actual building has started is not a strange idea to have, but it will probably not be limited to developers and architects. In that perspective this cooperation suits the future building industry.

DESIGN APPROACHES

The design approaches of the developing party (RE&H) and the architect (RMIT) have overlapping points, but there are also differences. The RE&H approach is focussed on non-monumental, young buildings such as vacant office buildings and their exploitation or on large scale urban regeneration. RMIT focuses more on monumental buildings or buildings as special objects in their environment in general. Both take the urban context and the user into account, for example by looking at public space, accessibility and functions. What they can learn from each other is:

- Implementation of financial calculations. This gives an insight for the designer where exactly the costs are made and thus where the creative freedom might be. For example, the internal restructuring level was of a minor influence on the building costs compared to adding an elevator and walkways (see §6.1: Financial comparison of scenarios, page 36), what resulted in a minor financial difference between scenario 2 and 3, but a big difference in appearance;

- Research by design. This method can show developers and building owners that a depreciated building, seemingly outdated and 'ugly', still has qualities and demolition is not the only option. Thinking that a neighbourhoods' social problems are due to the aged building stock and will be resolved by building new, is a wrong way to handle this kind of problem (see §1.2 Research and design goal, page 9). Moreover, in §2.1 is explained what influence large scale demolition has on the collective memory of that place. Again, this does not mean that everything has to be kept and redeveloped. It is possible that there are some flats that are not suitable for reuse. This does not mean that this fact has to lead to the conclusion that all flats should be demolished.

8.2 Answering the main research question

So, after these conclusions, what can be said about the main research question and the hypothesis?

Yes, there is a sum. By acting as architect and developer I have discovered:

- As an architect the financial analysis showed me on what level it was possible to create architectural quality (level of internal reconstruction was of minor financial influence, but major in terms of quality);
- As a developer the architectural analysis showed me that a seemingly outdated 'ugly' building still has possible qualities and profitable options, and trying to achieve architectural quality is not more expensive than a simple, functional intervention (scenario 2 vs. Scenario 3).

By acting as both I have created design scenarios:

- that are cheaper and more profitable than building new;
- that have architectural quality (in more or lesser extend);
- that are less demanding in terms of material use compared to building new and therefore more sustainable.

8.3 Evaluation and meaning of outcome

REUSE VS. BUILDING NEW

The conclusion that architectural quality in renovation is affordable does not mean that all post war stair case entrance flats should be kept and renovated. The goal of this case study was to show that there are still possibilities for these flats, and the preconception of 'ready to be demolished' is not true for all. It is a plea for urban regeneration with respect for structure, values and history for people to connect with instead of demolishing *all* history and building new.

BUILDING PROCESS

The impact on the building process also needs some elaboration. Analyzing the building takes time and thus money before you know what the options are, and if these options are feasible. The consequence might be that the initial phase takes more time and the architect and developer spend more time analysing before a plan comes together. This can be a threat to the financial feasibility in the current building industry. On the other hand, the whole building process might change into a network process, that means that the traditional linear phases (initial phase, design phase, execution phase) are not there anymore. All actors can be involved from the start of this new process, where the research is executed simultaneously along with other processes and in total, no additional time is spent.
Also prejudice and distrust should become less, because all parties are involved from an early stage. This makes the whole building process more transparent and might increase the feeling of responsibility and involvement.

COOPERATION

I strongly believe that using knowledge of both actors has contributed to this outcome. If the reuse project would only be an architectonic design, it may not have been financially feasible. If this would be only a redeveloping project from a financial point of view, it may not have existed at all (demolition) or it would likely be a functional intervention (like scenario3). The question remains, could one person do this, or do you need two specialists?

I think that having two professionals working in their field is better than having one person do both. Provided that they can work together and understand each others' language. They can focus their energy on 'out of the box' solutions in their own field, with the input of the other.

What does this mean for the role of the renovation architect? As stated in the personal observations and in the previous paragraph, research by design is a good method to get to know the values of the building, but it takes time. To make this analysis more efficient (taking less time), is there a guideline to set up for architects to follow, or is it just a matter of experience?

I think that this case study shows a method to get a grip on the endless list of possible solutions for these flats. Having the finance done at an early stage, it shows what levels of intervention cost the most, and where there is room for developing quality.

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9.2 Literature

The list of literature exists of books, articles and documents that I have read before starting graduation or during graduation, but were I did not refer to. Still, this might have influenced my opinion or view on matters.

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10 APPENDICES

10.1 Value analysis

External appendix

10.2 Feasibility research

External appendix

10.3 Methodologies of architectural reuse

At the department of RMIT a subject is taught called *Methodologies of architectural reuse*. This subject is based on the book *Noties* of J. Coenen[10]. In this book seven approaches are discussed, explaining how to cope with the historical context and the encounter between old and new. These seven approaches are:

- *continuity* (of the style of the original architect);
- *contemporary;*
- *contrast* (clear difference between old and new);
- *congruence* (in materials or size);
- *context;*
- *consensus* (approximately the same as the original, but not the same).

These approaches can be on a architectonic level as on an urbanism scale. It is obvious that some are in contradiction with each other. For example, building in contemporary style contradicts with continuing the style of the original architect (contemporary vs. continuity).

Fig. 10-1: Vermeer Centre in Delft Centre

Fig. 10-2: Restaurant on the corner of Asvest

[10] Coenen, J., & Mesman, M. (2010). Noties. Amsterdam: SUN.

APPENDIX I VALUE ANALYSIS

1312537
Karen Blanksma

Value analysis

This document contains the value analysis as part of the graduation research “Possible future role of architects and developers in reuse”.

Preface

This value analysis is the first appendix to the research report ‘Possible future role of architects in reuse’.

As part of the research, a value analysis is done to get familiar with the building.

The value analysis is an analysis to assess what is of (architectural) value and what is not. Usually aspects like architecture, details, use of materials and cultural meaning are assessed to determine whether the building represents unique values and therefore need to be kept. However, talking about stair case entrance flats; there are still a lot of them. There may be variants, but in general they the same.
With a creative mind a plan can be made to improve every building, so this analysis will not give an answer to the question: demolish or reuse? In this case the value analysis is used to find strengths and weaknesses as a guideline for the intervention.

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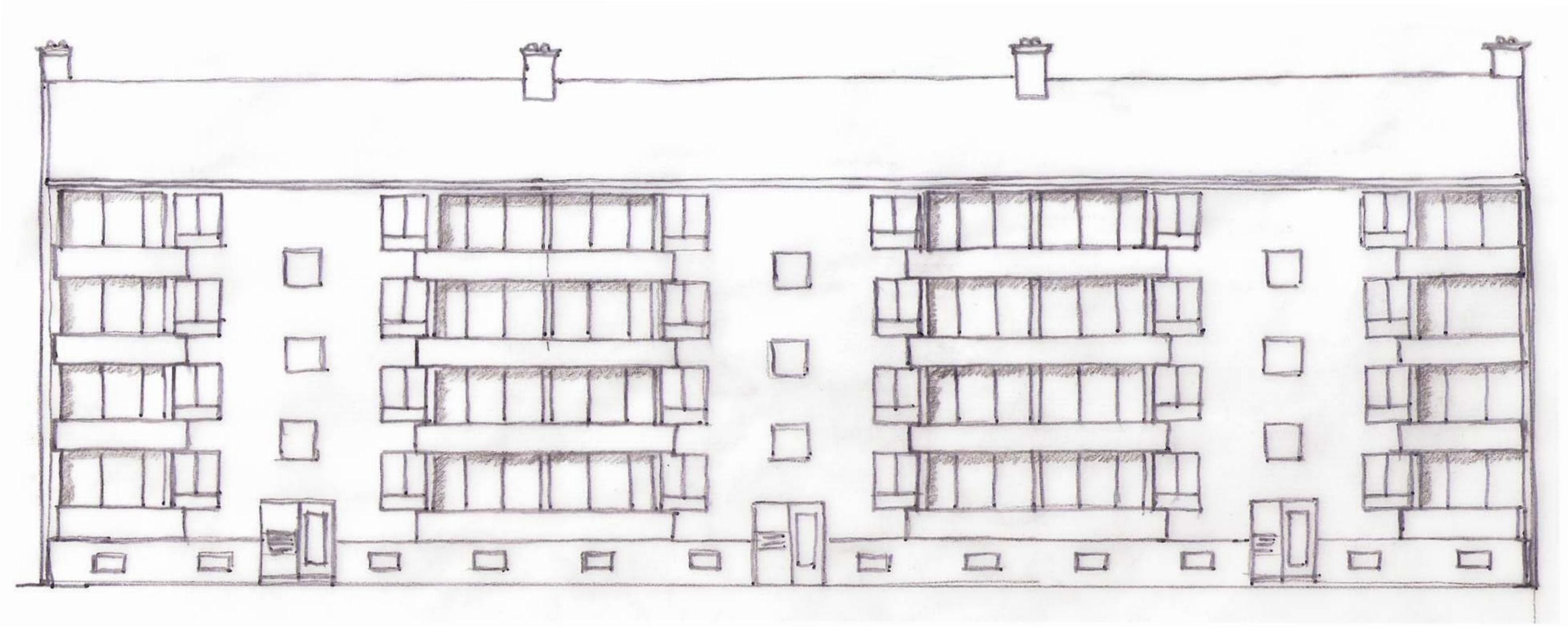
Value analysis

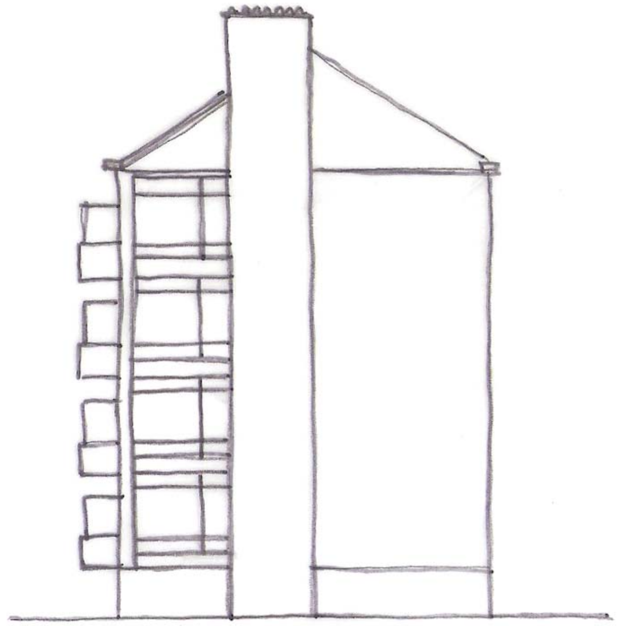
The value analysis is done to discover what the building's values are. These values can be material or architectural value, but also emotional or cultural value. Finding out what strong and weak points are, now and when the building was built, gives an insight in what to inprove and what to keep.

Facades

Original design and current situation



North east



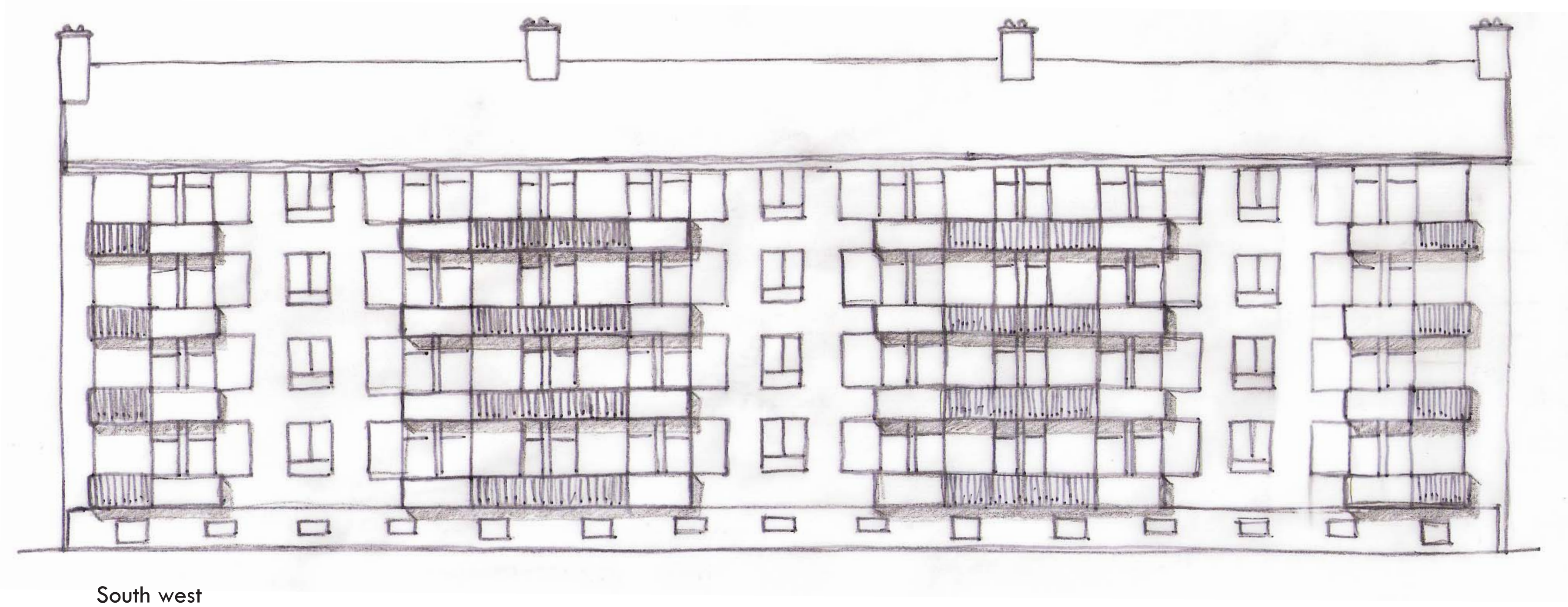
South east

Front facade

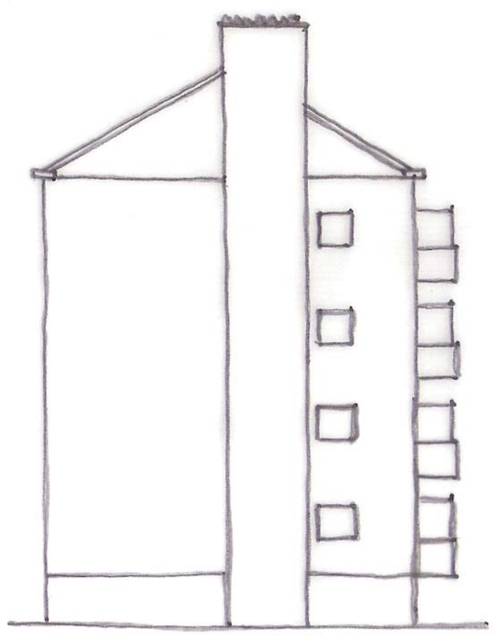
End 1950ies - view from the now demolished flats to the front facades of the prof. evertslaan

Entrance

Facades
Original design and current situation



South west



North west

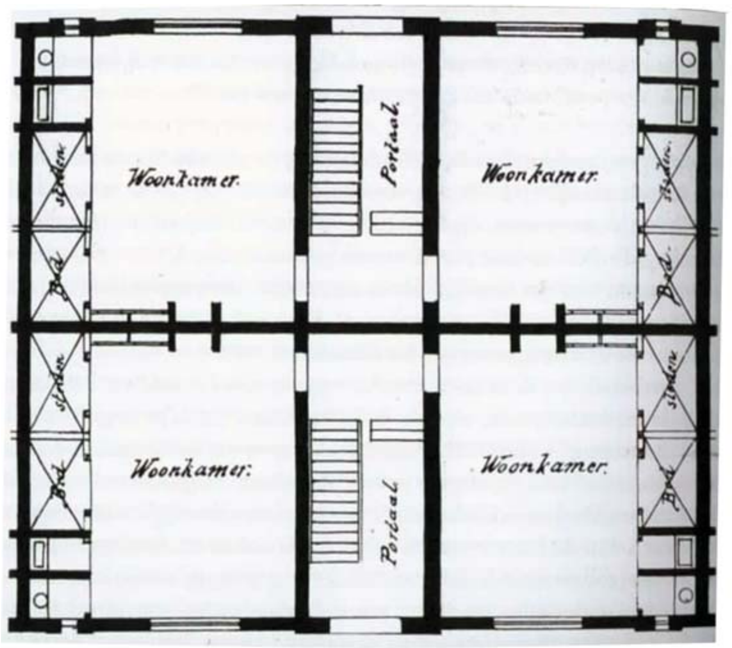
Back facade

End 1950ies - view on the backside of the flats (in de background flats that are beeing demolsihed

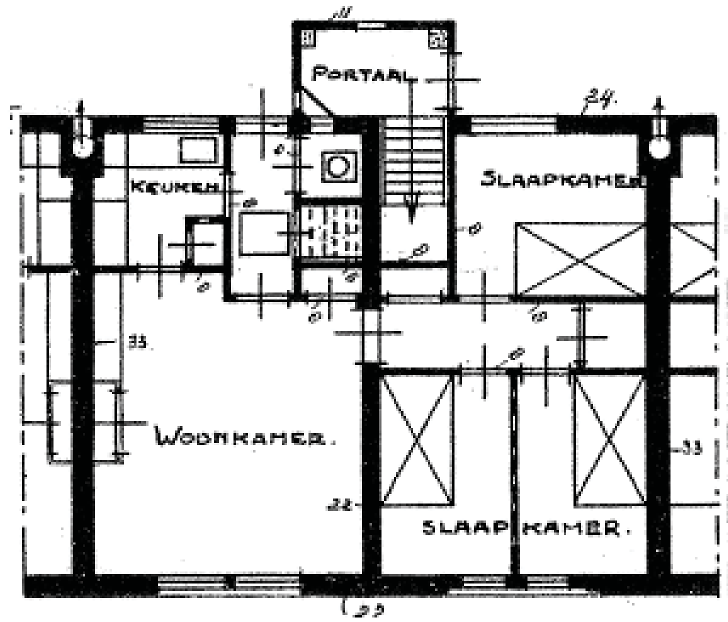
Historical Context

Light, air and space

Housing as we know it was not standard for a long time. Before any building regulations in 1901, people have lived in slums and filth since the Middle Ages. The migrations to the cities was not the cause of slums, but this has made the situation more distressing.



Good housing for the working classin Amsterdam Marnixstraat - Westerkade in 1878.
Living room of 4x5,4 m, feces container (toilet), closet with sink and two box beds. These replaced the worse slums that were demolished



Housing of the Justus van Effencomplex in Rotterdam. Original floor plan with seperate living, kitchen, toilet and bedrooms. Bathing and washing were shared in the bathhouse in the centre of the compex (see photgraph).

Amsterdam 1895 by Weismüller

Amsterdam 1912 by Jacob Olie

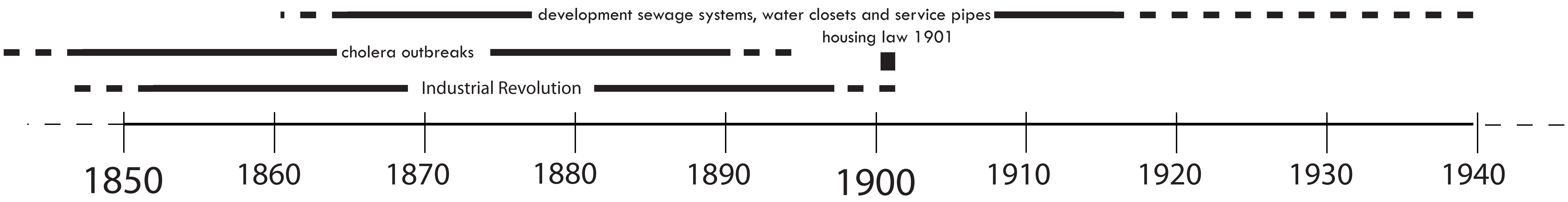
Social housing Rotterdam 1920ies - Molenaar & Van der Winden - Hebly Theunissen

Social housing Amsterdam 1930ies - by A. Bakker (2011)

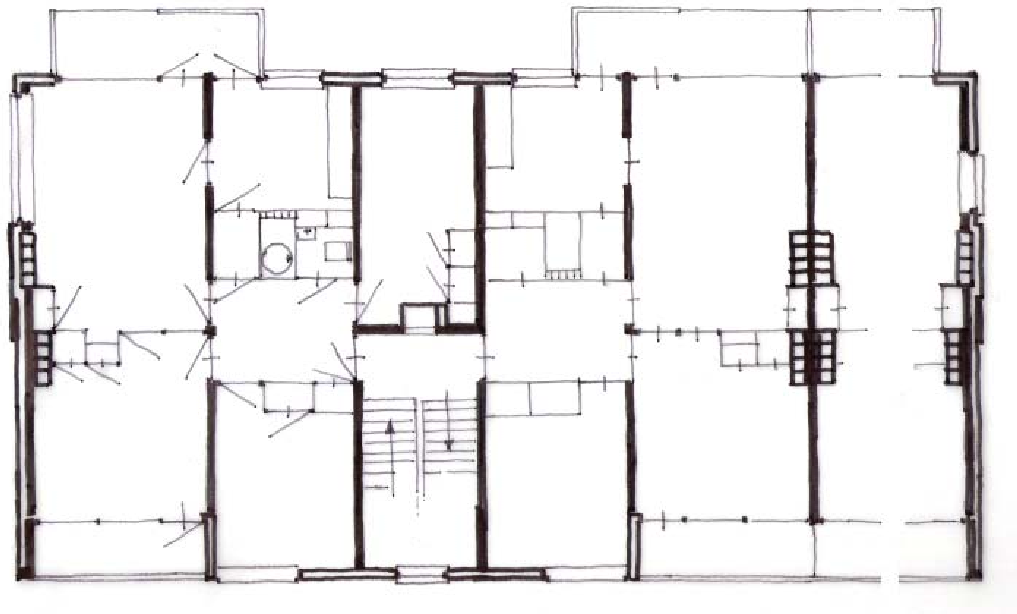
The industrial revolutiontriggers a major migration to the city. Private investors developed areas like the Jordaan in Amsterdam.

One room appartments were common housing for the workers class. Lack of building regulations promotes the creation of ghettos, and anything with four walls can be rented as a house.

Health problems (cholera outbreak) encouraged municipailties to make laws for building and housing. Later on this law was expanded for city expansion. They also experimented with various ways of fecal disposal (sewage systems)



Historical Context
Light, air and space



Social housing end 1950ies, Delft. Apart from A living-room, kitchen and bedrooms, there are two balconies and a bathroom with toilet and lavette for washing and bathing at home.

'het complete lavet' - by anonymous on Flickr.com

Expansion Amsterdam 1950ies by NUL20

Osdorp 1960ies - by stadsarchief Amsterdam

Flats Haag en Veld in Amsterdam 1971 - by Bewonersvereniging Haag en Veld

After the war a combination of the 'light, air and space' slogan and the shortage of housing created the concept of spacial arranged 'garden cities' at the borders of old city centers

Technical developments in the 1960ies made higher flats possible

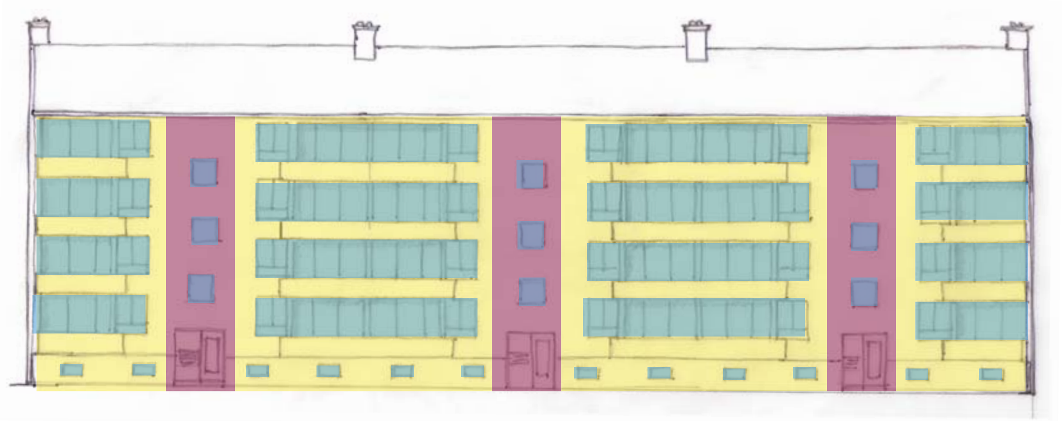
In the 1970ies and 1980ies high rise flats were the way of building

WWII

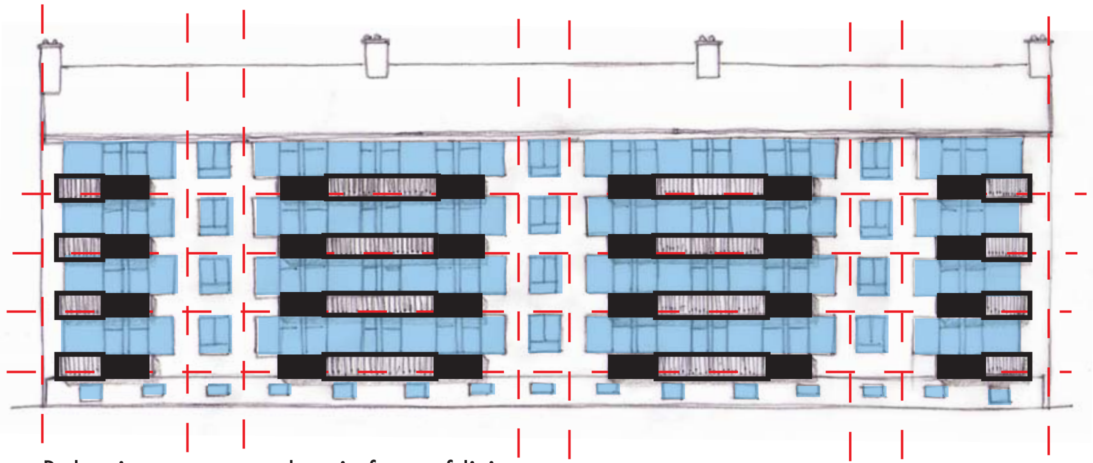
Municipal building rules prescribed the obliged presence of a bombshelter, influenced by the cold war. The semi-underground basement are a result of this

1940 1950 1960 1970 1980 1990 2000

Facades
Analysis and changes

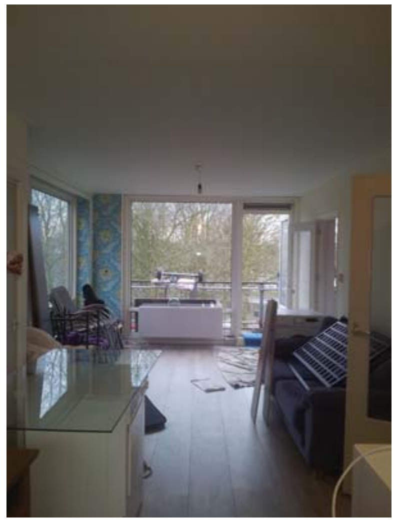


Big facade openings at housing areas, smaller at stair areas



Balconies are opened up in front of living areas

New window frame - plastic window frame and wooden frame



Living room (facing west) without seperation wall

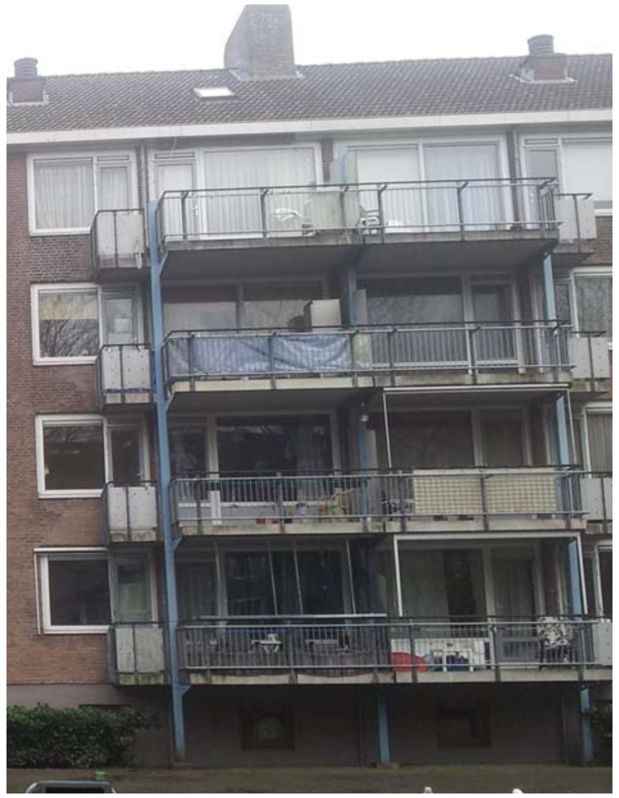
Stairs

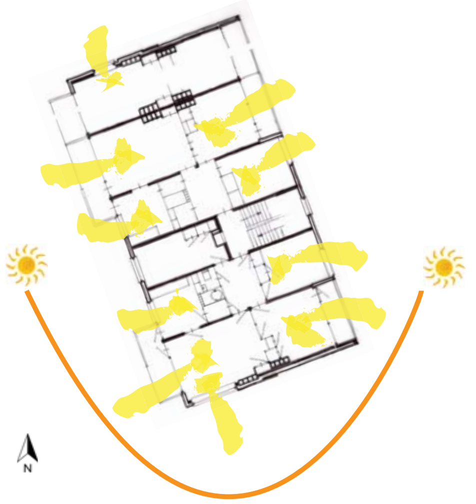
Strong

Sufficient light entrance housing
Sleep area faces noth-east
living area faces south-west
Readable facade

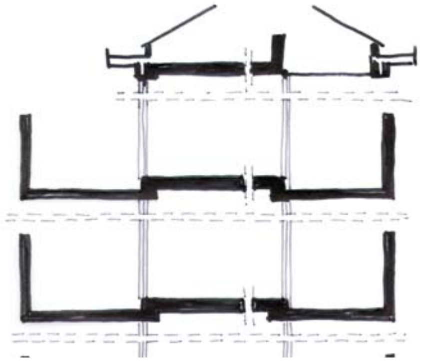
Weak

Dark staircase
Glass facades can cause cold draft in winter and overheating
in summer
Attic (still) does not meet light entrance standards
Repetitive elements make the





Orientation and sun movement



Glass facades over the width
of the (living)rooms
Glass facades from bottom to top

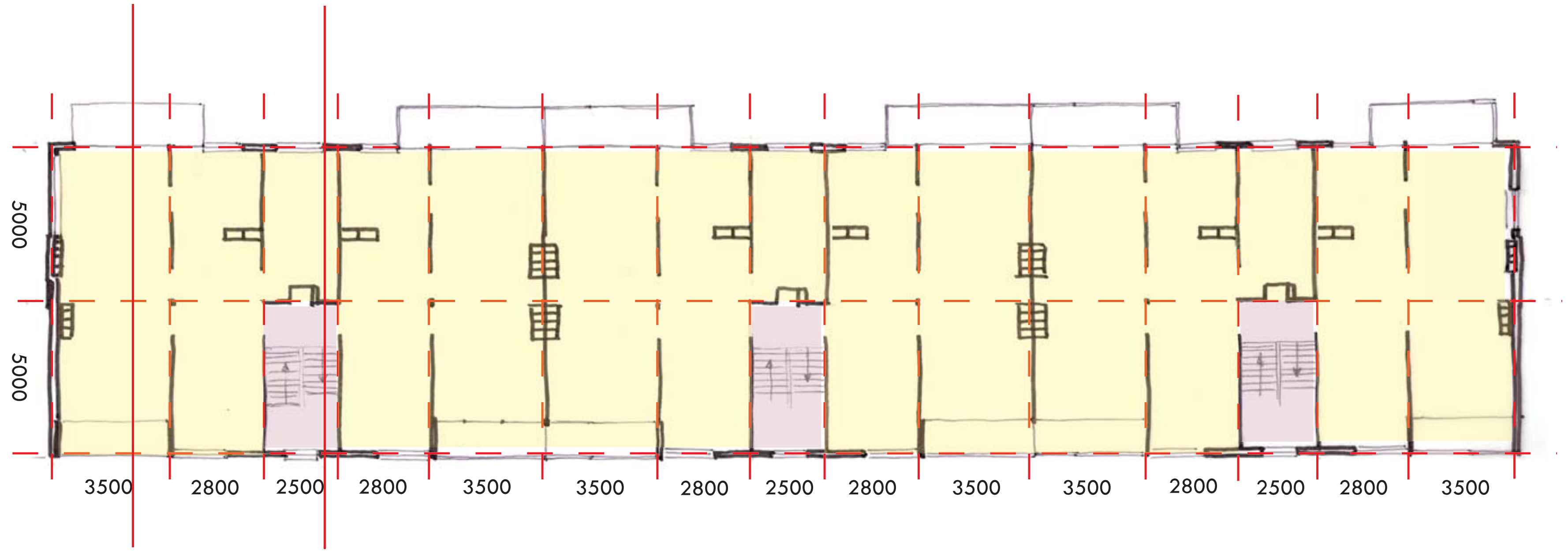
Adaptations since

Steel load bearing structure for balconies
Balconies are completely open
Plating of front facade are painted blue
Windows in roof for light entrance
Replacement of windows and window frames

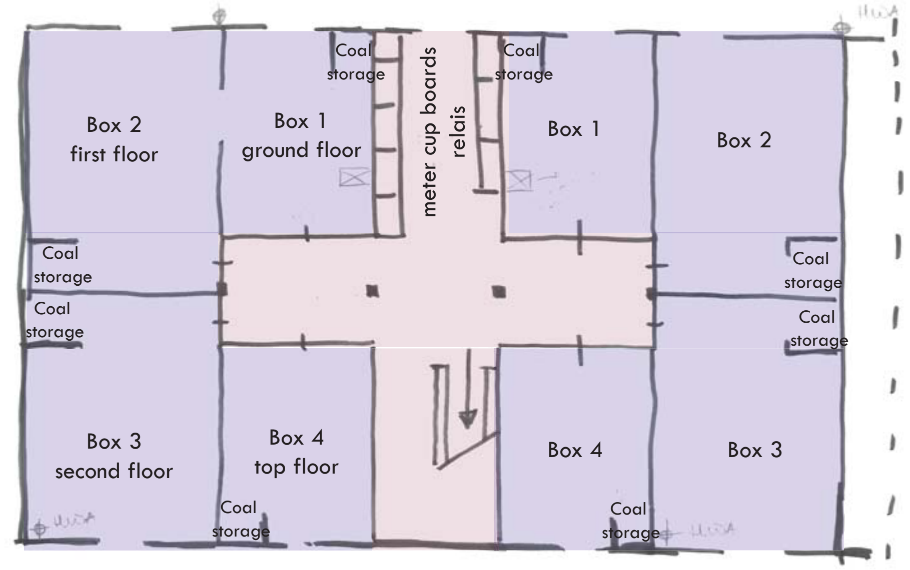
Effects

Steal load bearing elements make the facade more messy.
Baconies are less defined
Minimum effect for roof lights
Replacement of the window frames changes the expression of the facade

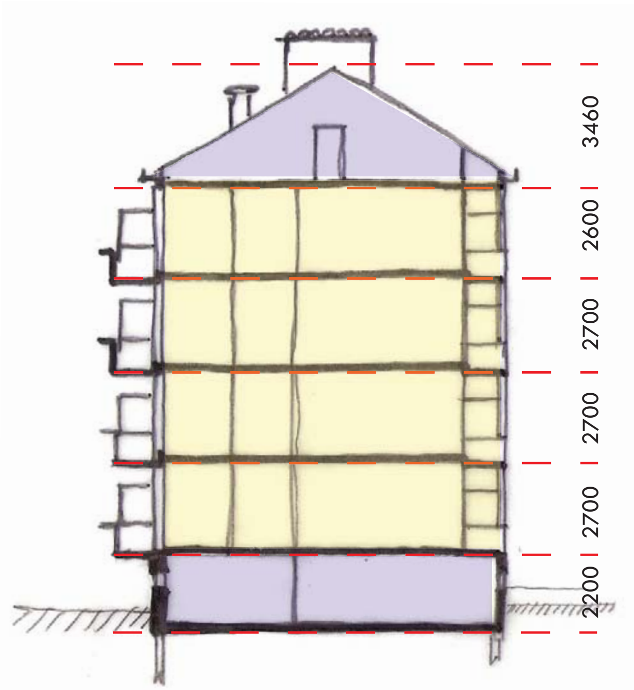
Organisation



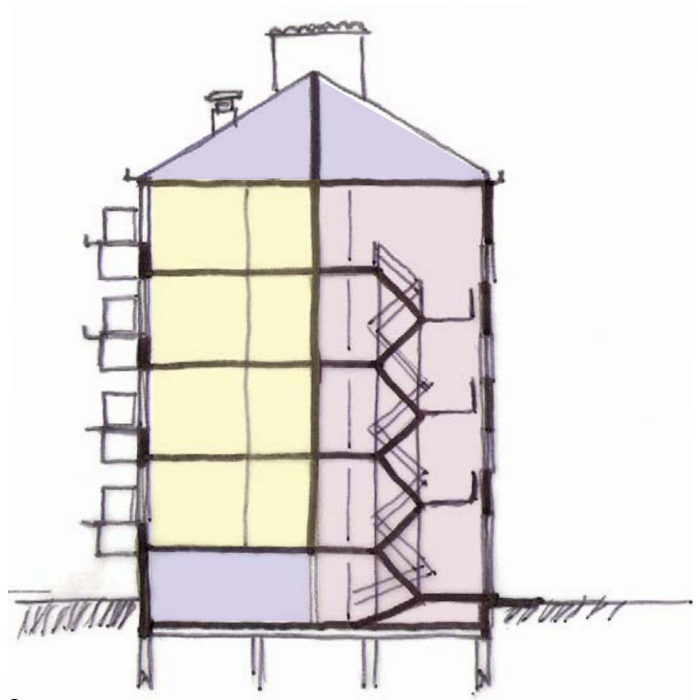
Structure and grid of complete flat



Basement

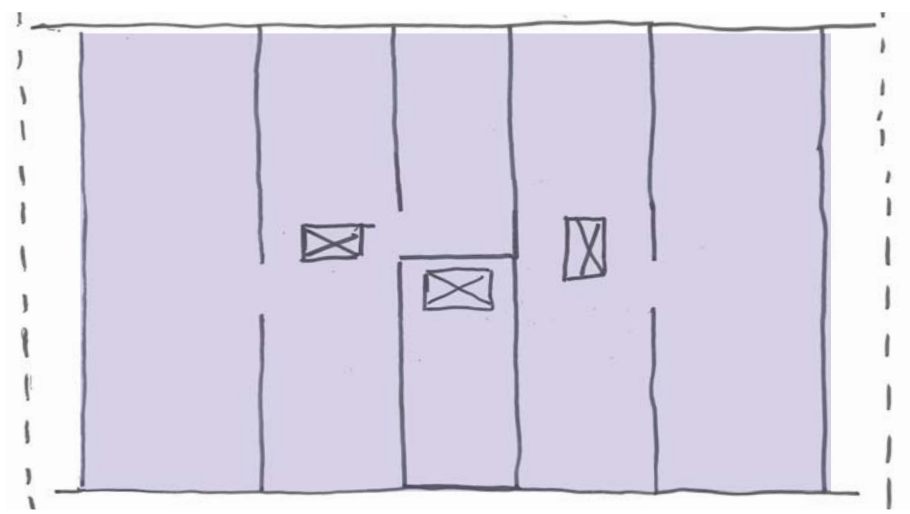


Section over living room



Section over staircase

- traffic area
- living area
- storage area



Attic

Strong

Appartments of appr. 70 m^2
Repetitive elements on a grid
Flexebilty

Weak

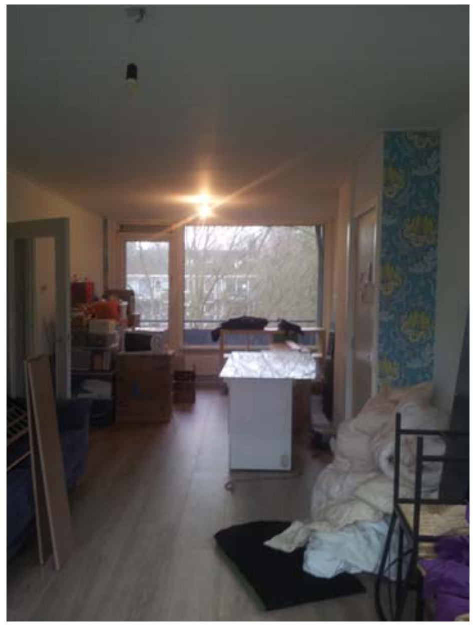
No elevator
Semi-underground basement
Relatively low ceilings
Attic generally no safe access and stairs take up all space in the hall

Adaptations since

Attic is used for living
Some have replaced the stairs to the attic

Room made in the attic

Attic access



Spacial living room

New balconies

Built in wardrobes

Built in wardrobes

Kitchen

Strong

Multiple rooms
built-in wardrobes
Private outside space

Weak

Fragmented floor plan
Small outdoor space
Small bathroom
Built-in wardrobes
Small balcony

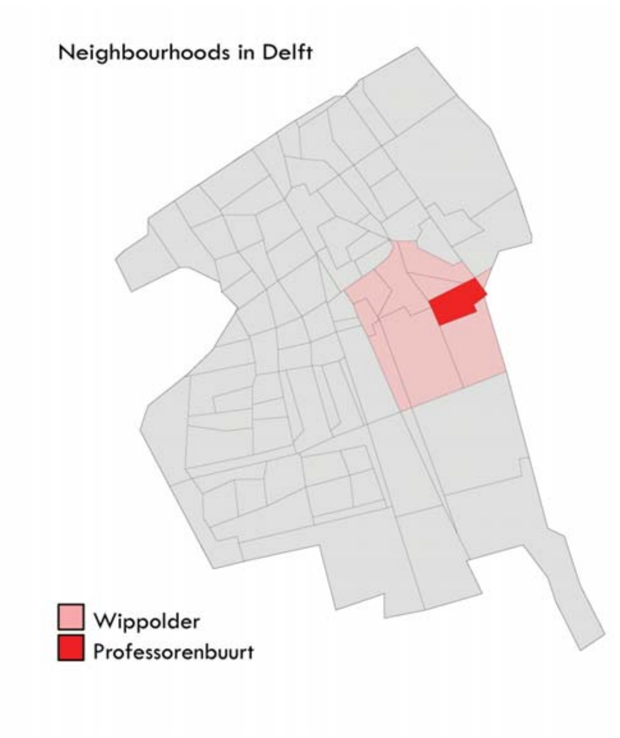
Adaptations since

Wall between bedroom and living room is removed
Balconies are replaced and enlarged
Lavette is replaced by shower and sink

Effects

Spacial living room

Neighbourhood
Current situation



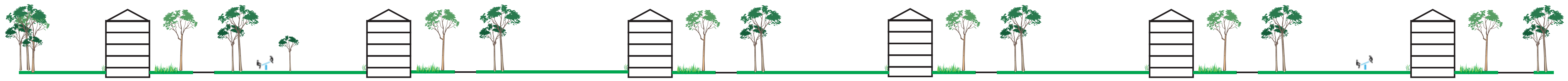
The professorenbuurt is a neigbourhood in the bigger area of Wippolder. The majority of buildings is built after WWII, but it has also the beautiful unoversity monuments of TUwijk North. Other remarkable areas are:

Jaffa Cemetry
TUDelft Campus
TNO and other research facilities
Southern entry road Schoemakersstraat

The neigbourhood of the professorenbuurt is a mix between some villas in the south, a middle area with social housing flats (some in the process of beeing demolished) and family houses with front and back yard.

Light, air and space
Public space (area level)

Section across
plan area 1:1000



Between the flats there is a collective green area, some of them has some playground equipment

(1) Inner courtyard with playground

(2) Inner courtyard with grass and benches, garage boxes at the end of the access street

(3) Waterfront on the north side of the area

Spacing between flats (app. 50m), filled in with grass, bushes and some playground equipment
The north border of the area is formed by water

Head of the plan area: no clear definition or transition

Strong

Green and light area
Pond/water present
Space for interaction and play

Weak

Undifined space
Shared resposiblilty = no responsibilty
Water is not 'present'
Borders are not defined
Not nearly enough parking space

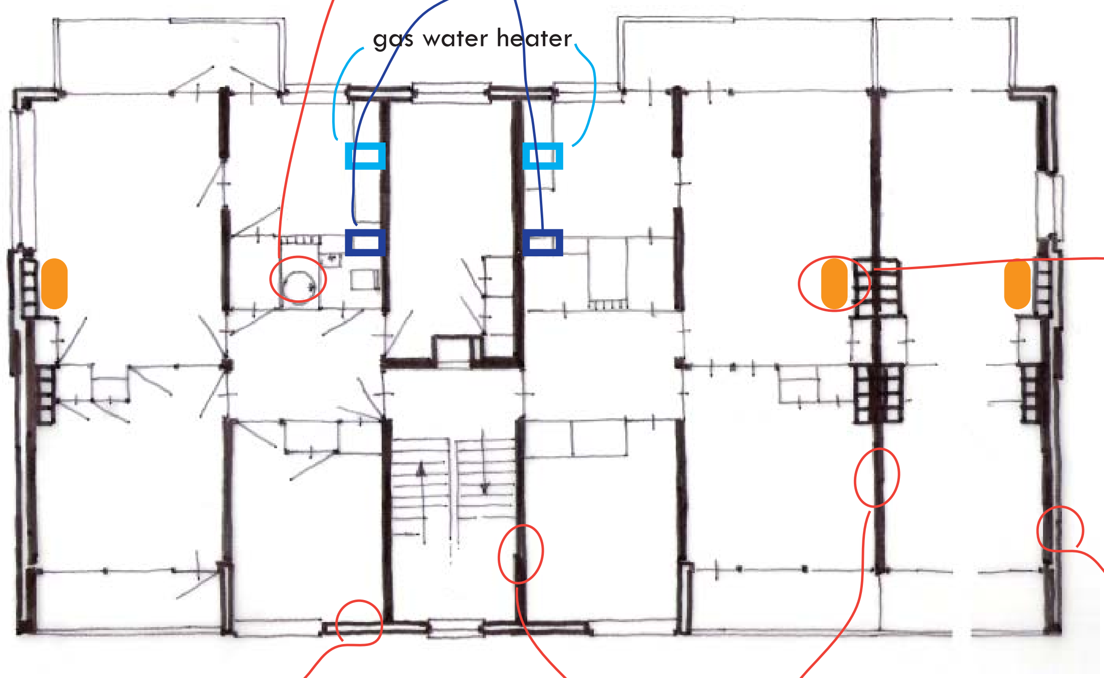
Adaptations since

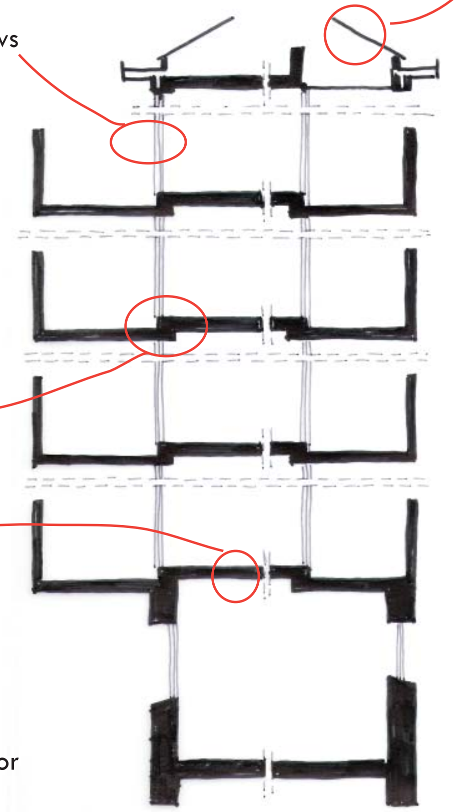
Trees in and around the courtyard

Effects

Courtyards are more dark because of the trees

Installations and materialization





Accorrding to the renewed NEN8700 standards a renovated building must meet the minimum R_c of 1,3 m^2K/W for non-windows and -doors.

This requirement is not met.

Strong

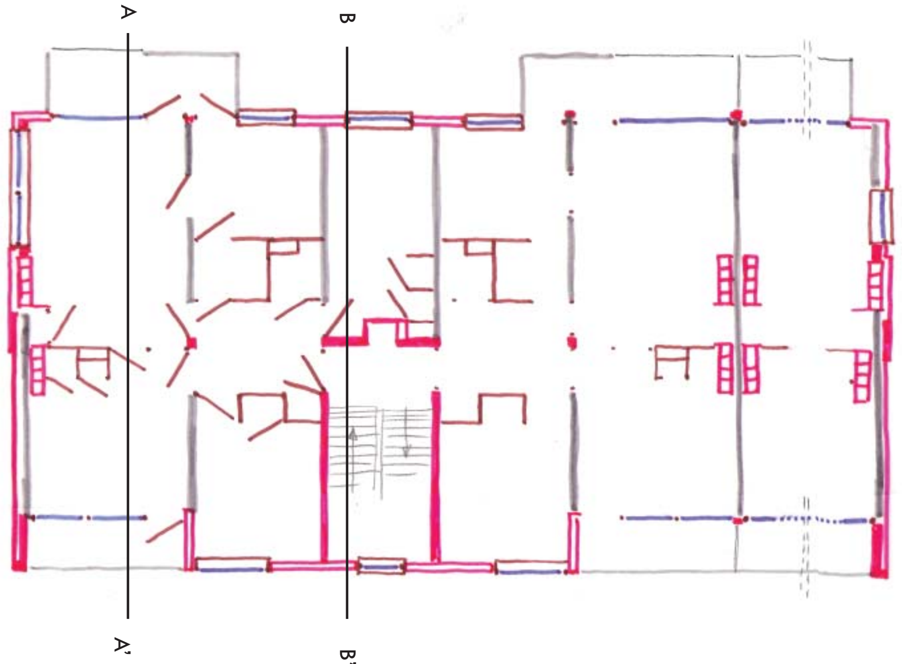
Seperate stucture load bearing walls and facade
Cavity walls (outer walls)
Bathing place
Central service entrance
Groceries elevator
Load bearing structure of concrete

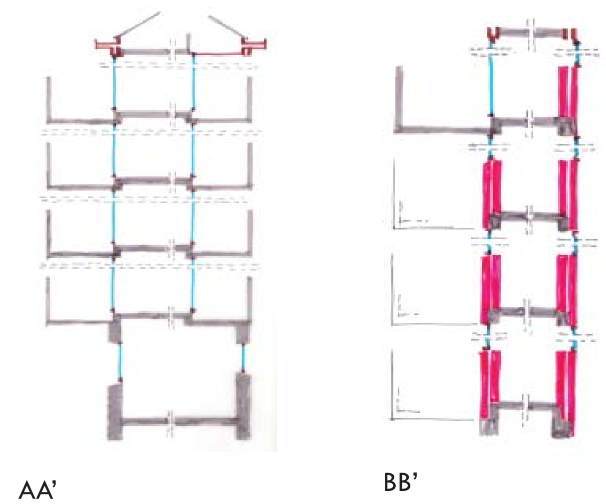
Weak

Some have still single glass
No central heating
Thin walls and floors (seperation between houses)
Single glass
Thermal bridge to balconies
Not insulated

Adaptations since

Some appertements have central heating (elevator shaft used as canal)
Some have their roof insultated
Replacement of the windows by double glass.
Individual replacement of finishing floor
Mechanical extraction from bathroom and toilet





Concrete
Glass
Masonry
Wood

It appears that the primairy load bearing structure is made out of (in-situ) concrete. All the secundary structure such as chimneys and inner- and outer cavity walls of the facade are out of masonry.

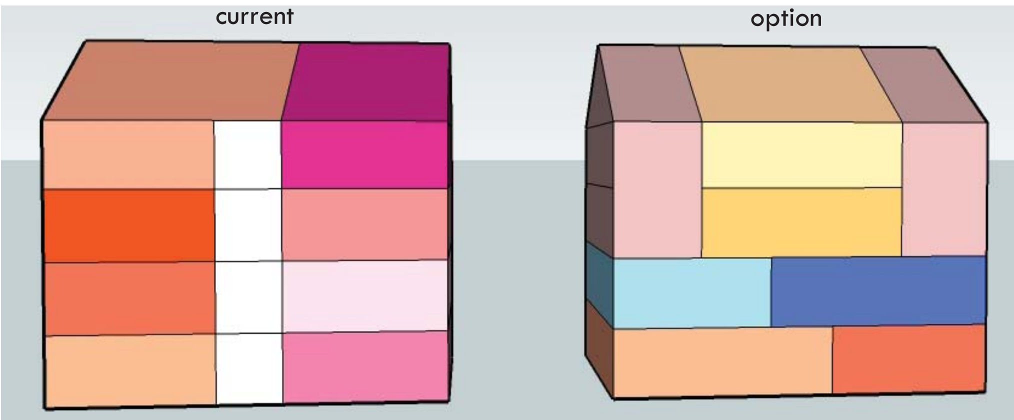
The walls of the staircase are out of masonry. This is probably because the stairs are pre-fab concrete elements

Conclusions

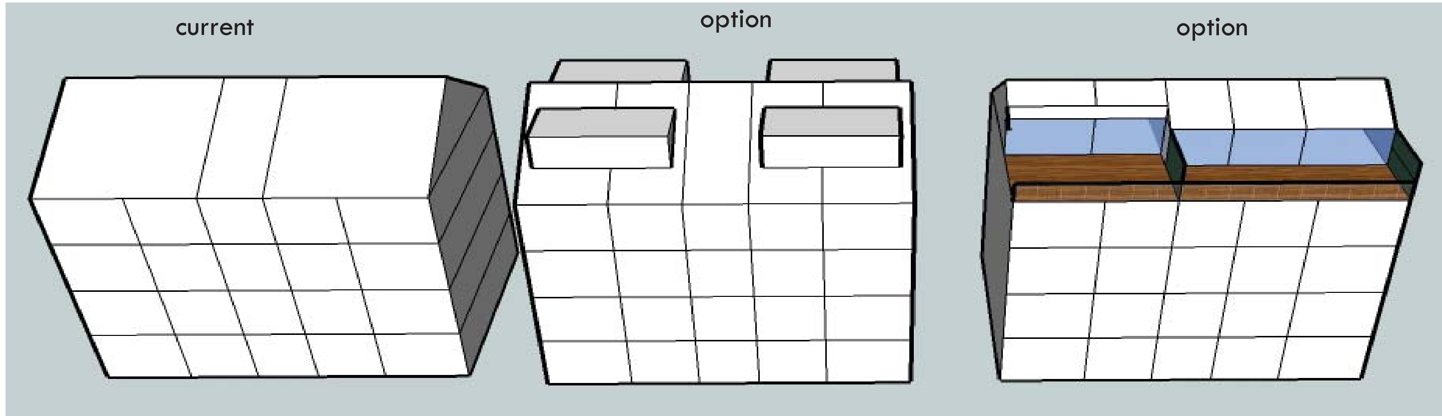
From this analysis it can be understood that:

- these flats were luxury, clean and hygienic, spacious and child-friendly compared to the slums of the 18th and 19th centuries;
- shortage of housing led to developments in building and construction, but the mass production and anonymity of the high rise flats could lead to social problems;
- these buildings are outdated for their original target group (families and children), but with some adaptations the values of light, air and space can still be valid;

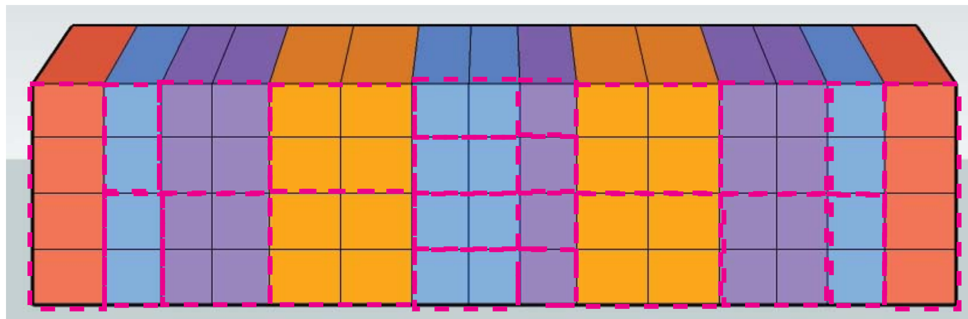
Possible interventions



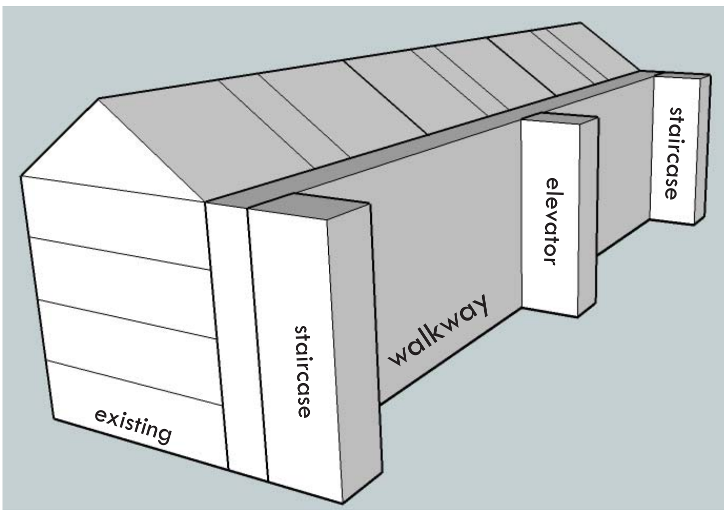
Restructuring houses - within repetitive unit



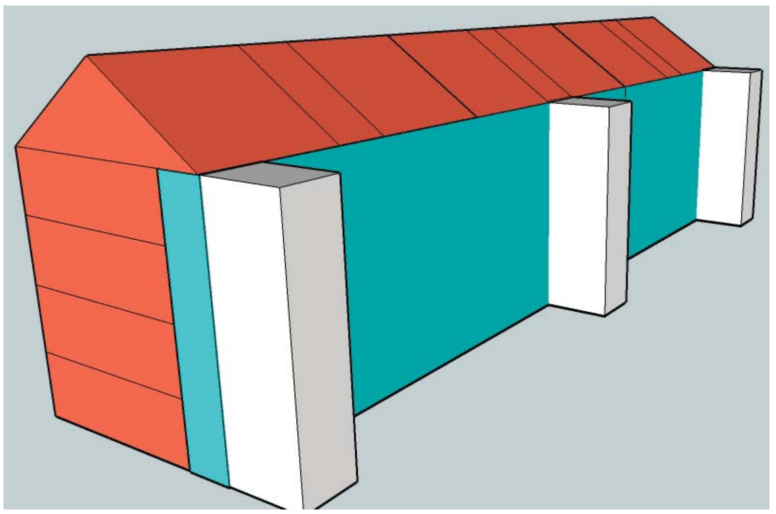
Officital use of the attic - adding more space on top



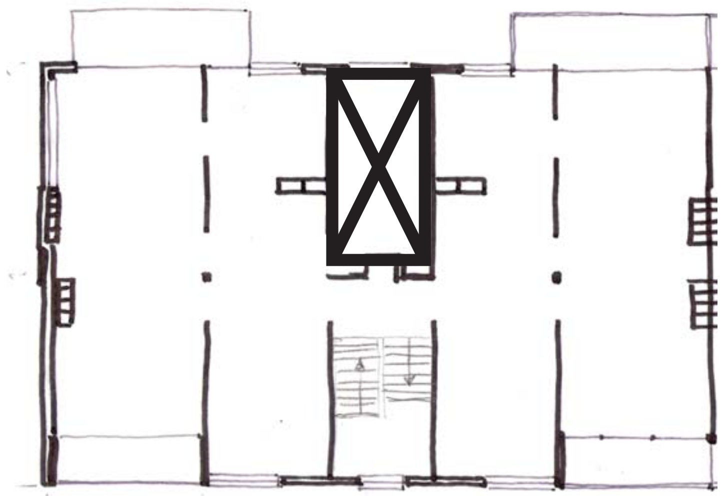
Restructuring houses - outside repetitive unit



Restructuring access - outside walkway

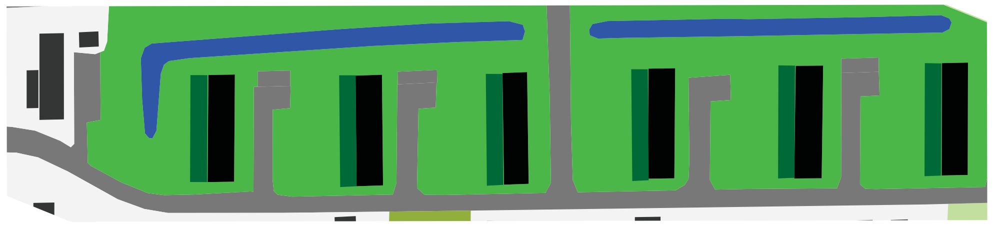


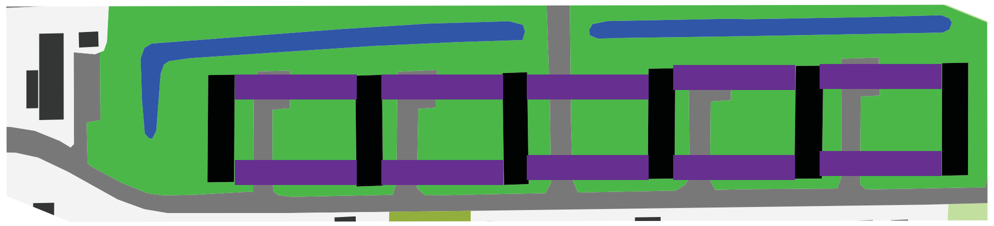
Restructuring access - inside walkway

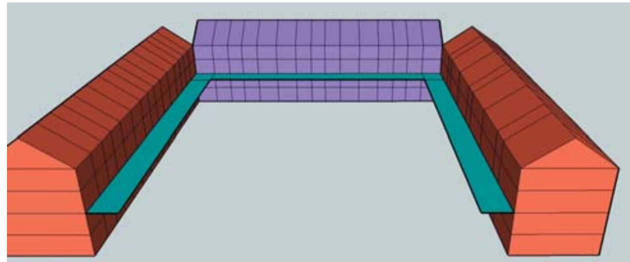


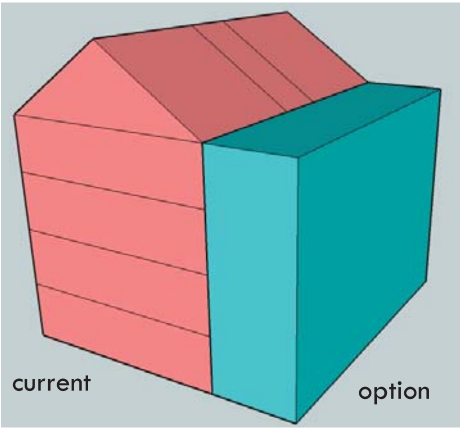
Adding elevator to existing staircase

Possible interventions

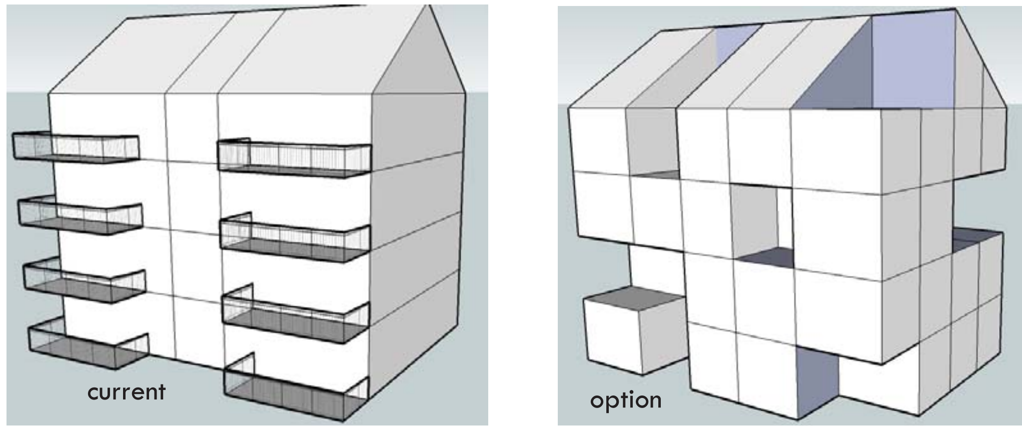

Creating private gardens


Making the courtyard more intimite

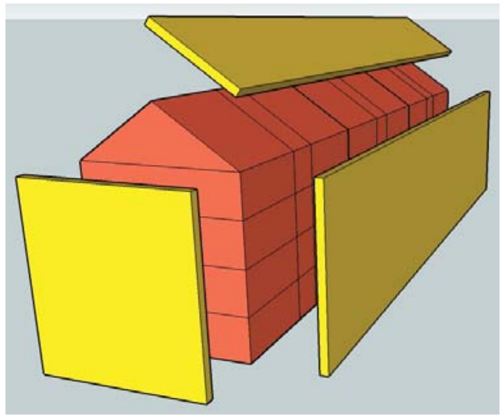

Elevated entrance level



Enlargement by adding square metres



Creating roof gardens/balconies for appartments


Adding insulation by 'wrapping'


Adding insulation by 'purring' cavity walls

Sound insulation for floors and walls

Practice references

Second entry level - Lootsbuurt Amsterdam - ANA architects
(new building)

Secund entry level - courtyard - Justus van Effen Complex Rotterdam
Renovation by Van der Winden & Molenaar Architecten

Before

Adding square metres - roof terrace - new ways of entry
Kanaleneiland Utrecht - Renovation by Dittmar en Bochmann architecten

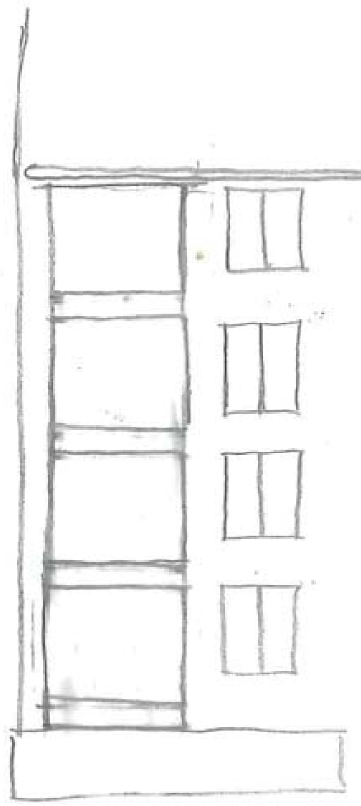
Internal walkway with elevator and staircases

Baandererenweg Boxtel - renovation by Van Aken architecten
Nomination Gulden Fenix

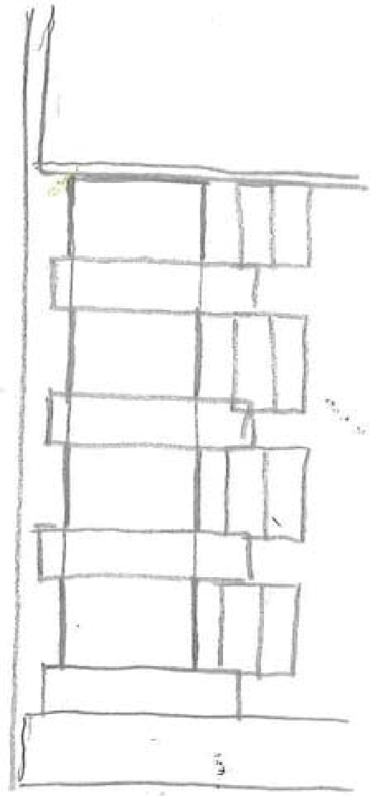
Inventory of possible solutions

Because there are so many things that could be improved, so many ideas that could work, a inventory of all possible solutions to the found weaknesses is made. This helps to get an overview.

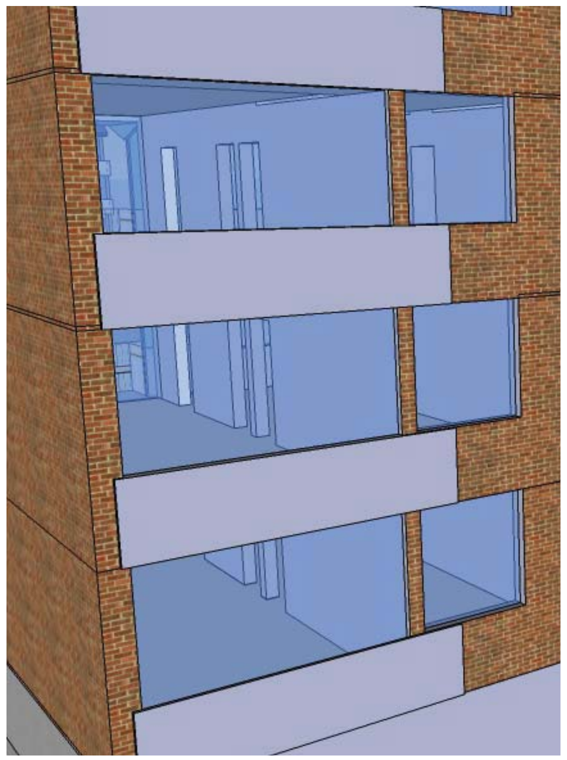
Making loggia inside space

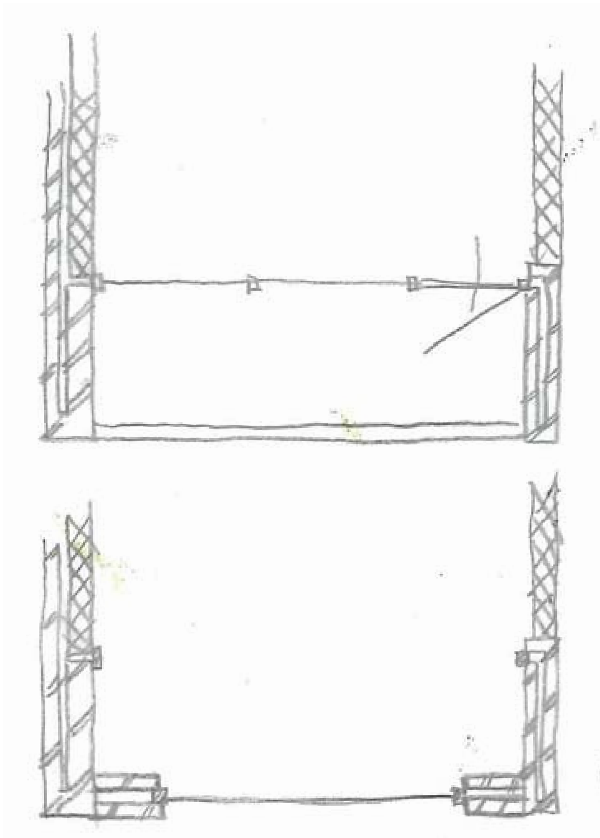


making new openings

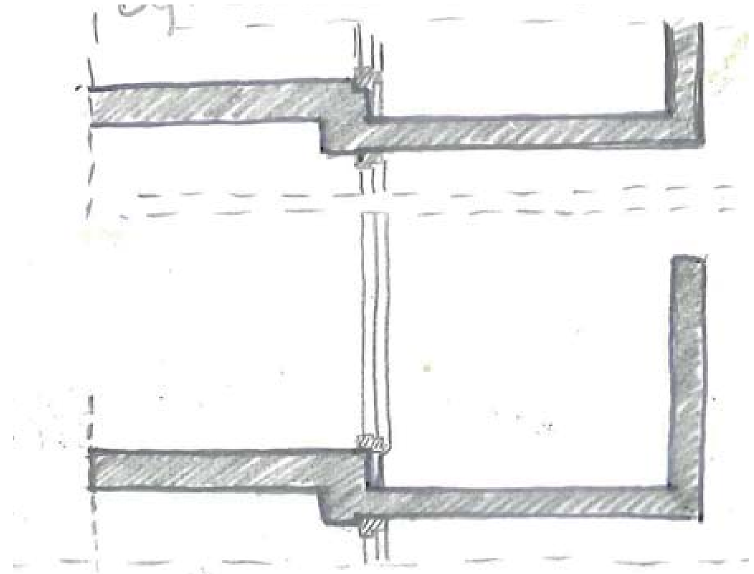


using existing balcony in the facade

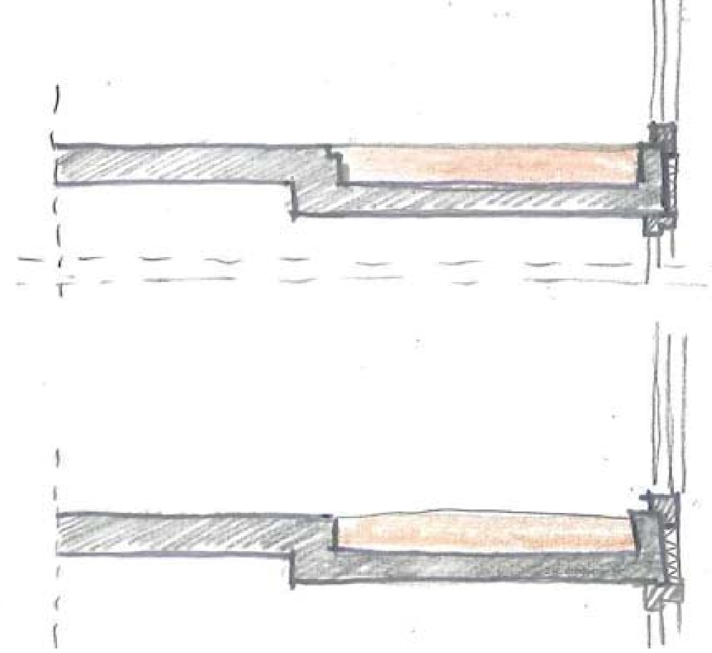




Adding wall because of experience with leaking



Existing



New

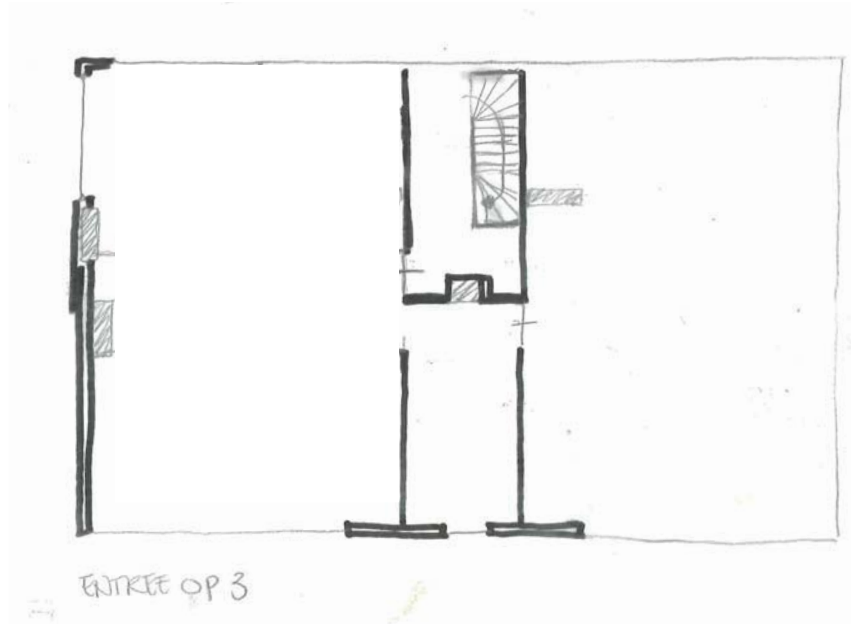
The loggia on the north side of the facade is barely used. This space can be used inside, and more light can enter the apaprtment

Attic

The attic is officially not meant for permanent living. but people use it this way. This may cause health issues; the entrance stairs are not safe for frequent use and light and ventilation is insufficient. Improving this is one option, if the idea is to add an elevator anyway, making a new foor is also a possibility.

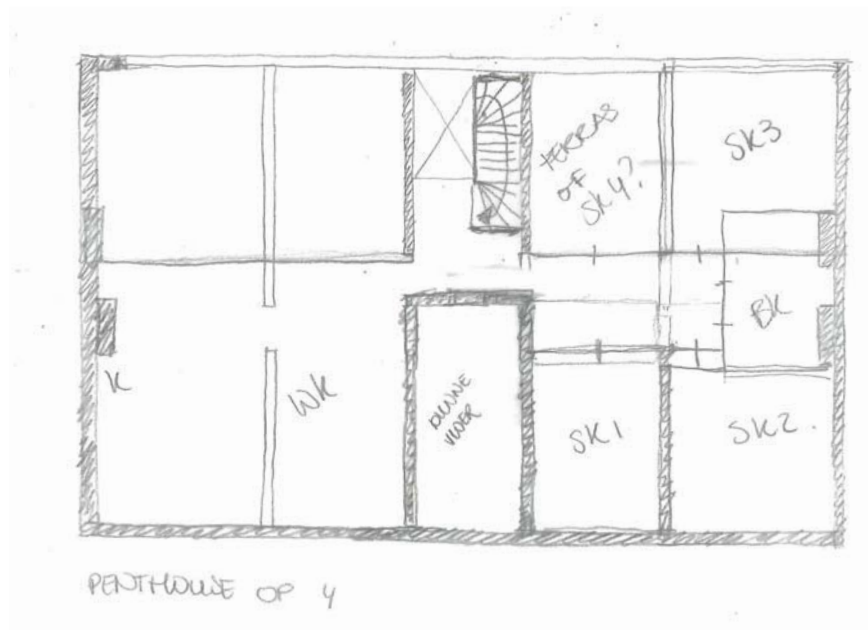
2_dakkapellen_zolder

2_dakkapellen_bovenwoningvoor

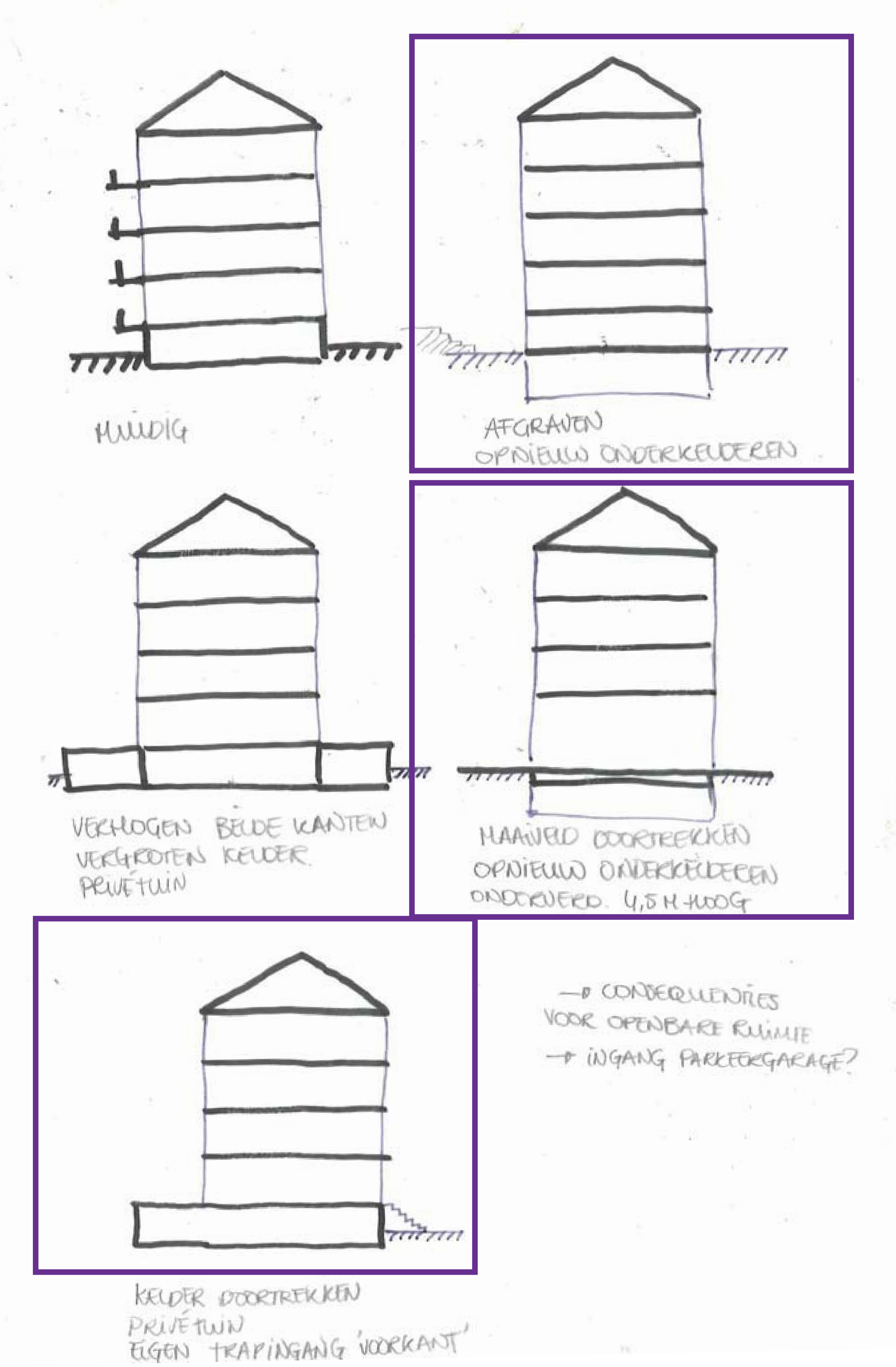


2_dakkapellen_nieuwe verdieping (LIFT)

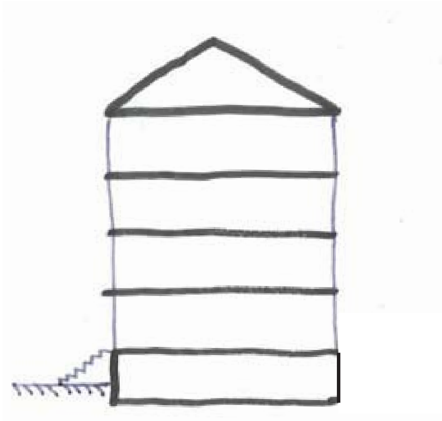
2_dakkapellen_bovenwoningachter



Entrance/leveling/parking garage/public and private gardens



One of the caracteristics of these flats is the semi-sunken basement. This can be seen as an obstruction of making contact with the surrounding area. This topic focusses on the relation of the flat with the area, how this can be inproved, modified or adapted.
The variants with a purple square are investigated more closely.

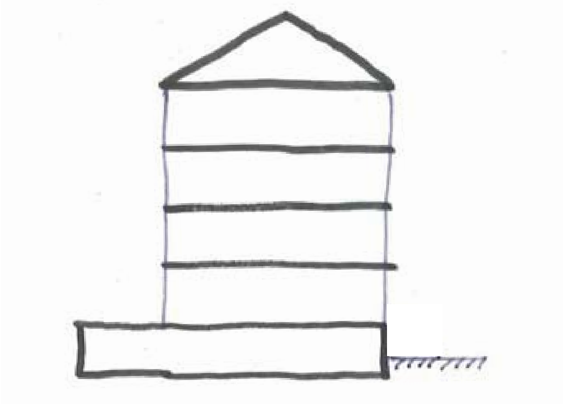


Private gardens with stairs

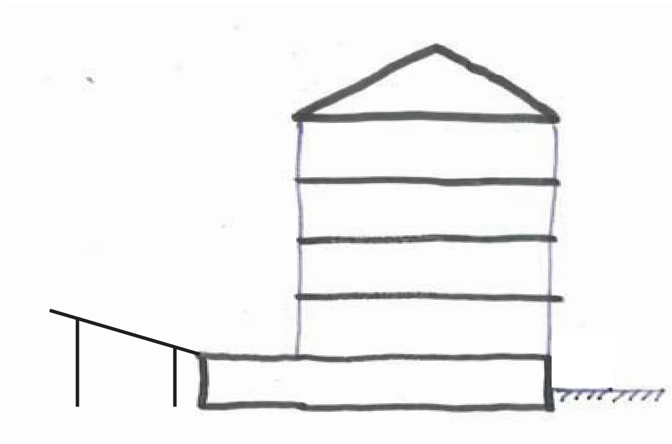
1_privetuinen door trap

Private entrance with stairs

1_eigen ingang met trap



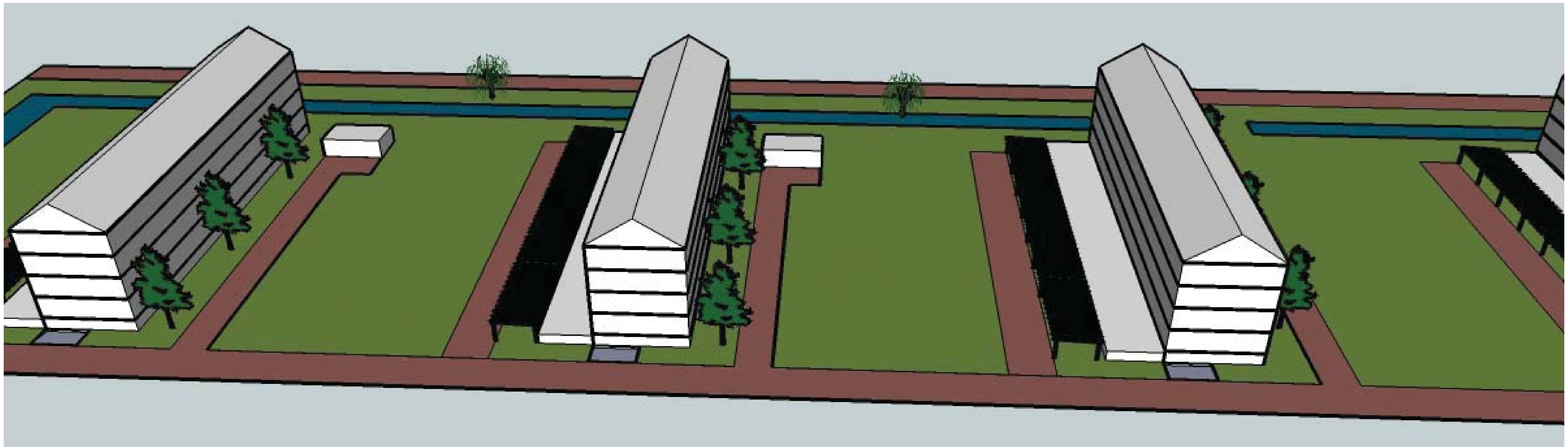
Elevated entrance ground floor
Parking garage expansion
Private gardens

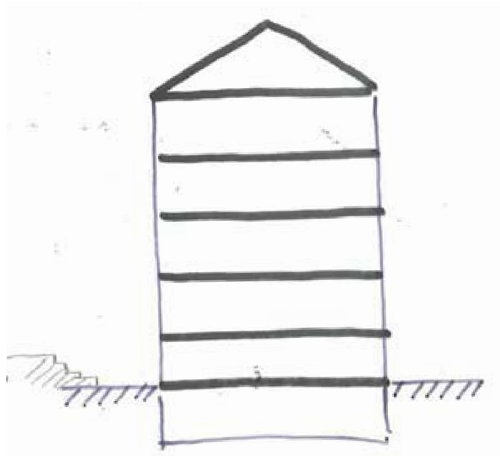


3_verhoogde tuin + ongewijzigde plattegrond

3_verhoogde tuin met autopergola

No garage, outside parking

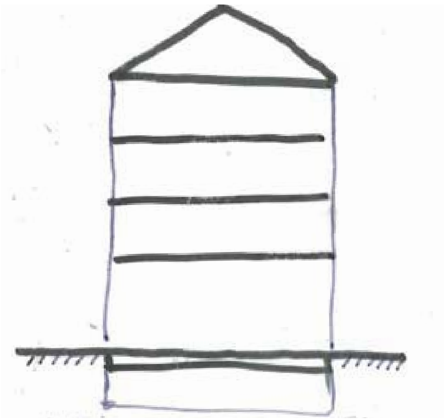




Digging out front and back
New basement

3_verlaagde vloer achter

3_verlaagde vloer voor



Leveling groundlevel
New basement

3_vloer op maaiveld doortrekken

Elevator and walkways

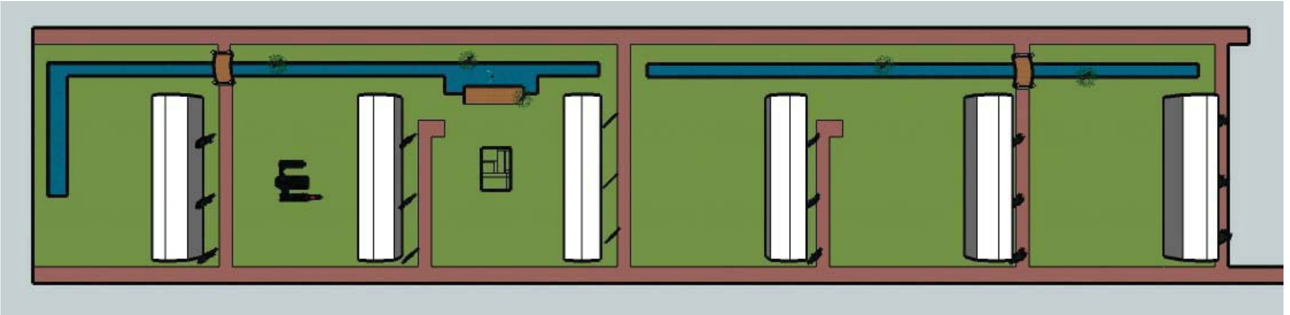
With a certain future perspective in mind, it may be interesting to add an elevator to meet the demand for a certain level of luxury. Placing an elevator in every enterance is for sure not feasible, so the possibilities of a single elevator and the necessary walkways are explored. For sure they have an impact on the facades, the relationship with the surrounding area and so on.

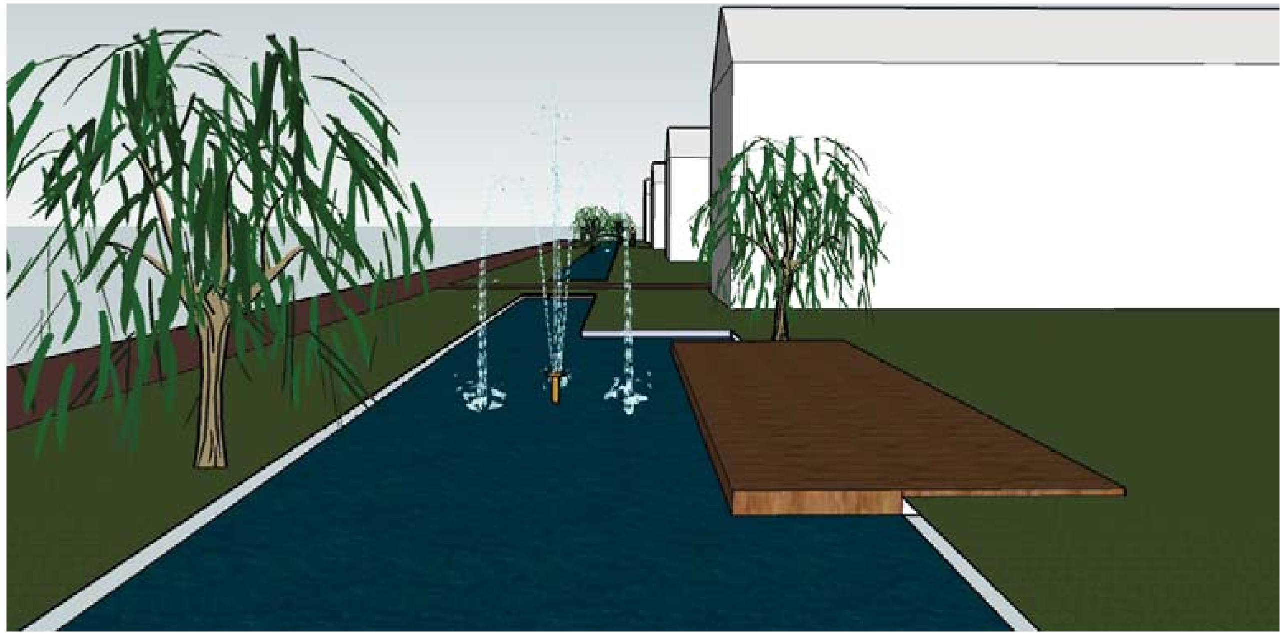
Intern

Extern

Little things

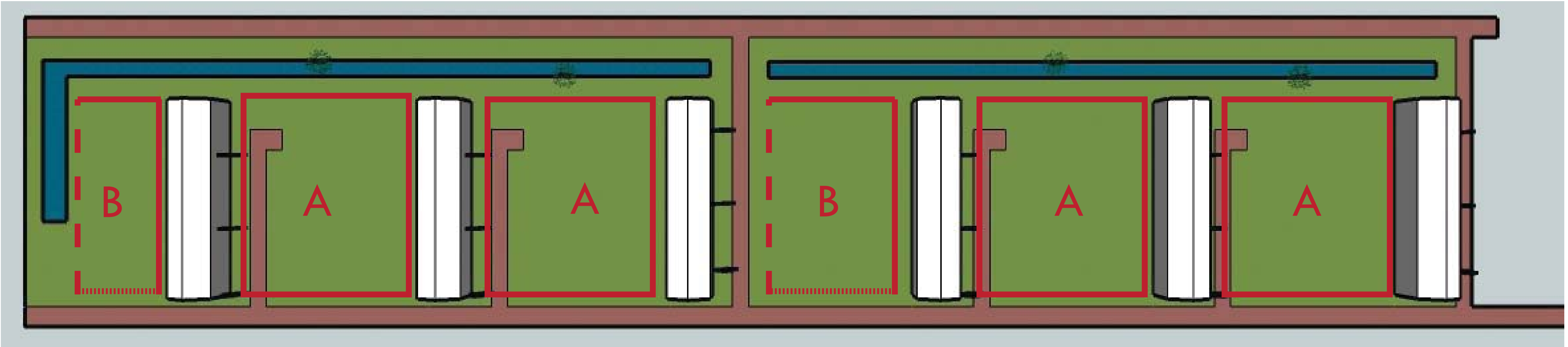
More interaction with water
New playgrounds
Community use of ground





The public space in between the flats is something that has to be looked at. These open spaces between the function allow light and air into the apartments, so in that sense they have a good use. Nowadays the social control of pubic space is far less than when the flats where built. This poses a risk of deterioration. By making clear what the purpose is of the space, the chances are enlarged that the space will be used in a appropiate way and that the inhabitants feel more responsible for their surroundigs.

Public gardens and environment

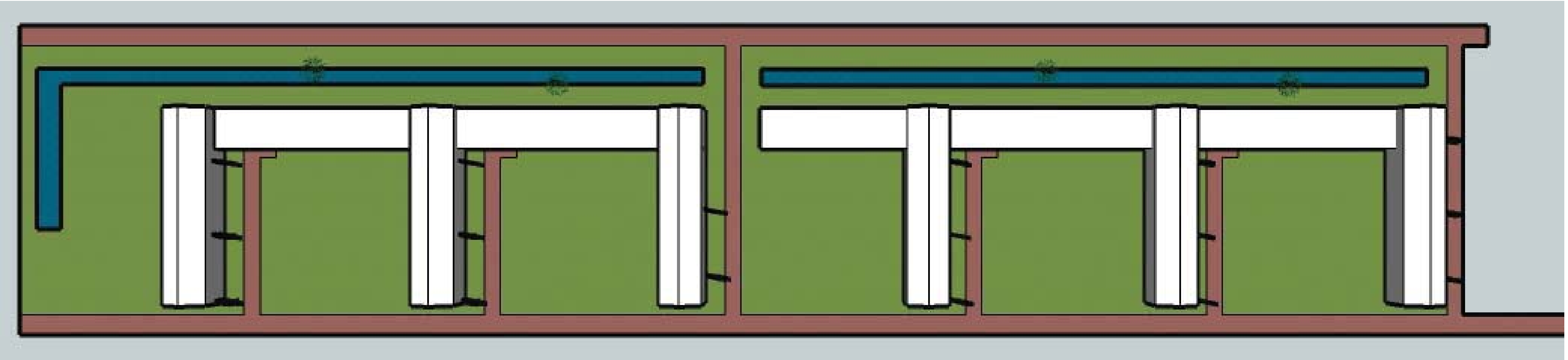


5_Stedebouwkundige massamodellen_uitgangpositie

A Public space with closed borders, flat to flat

B Public space with a open border - drive through traffic

Courtyards

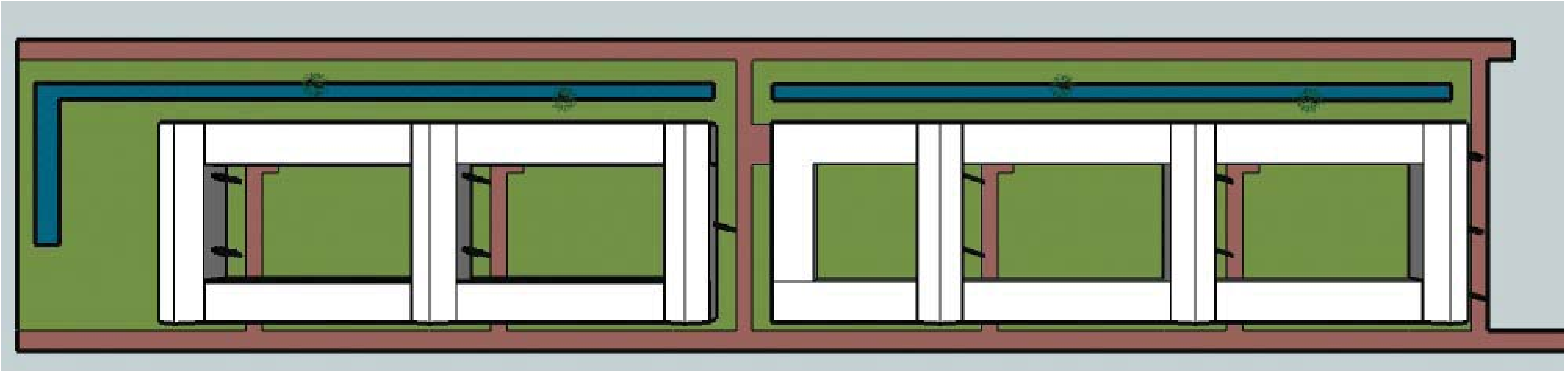


5_Stedebouwkundige massamodellen_halve hofjes

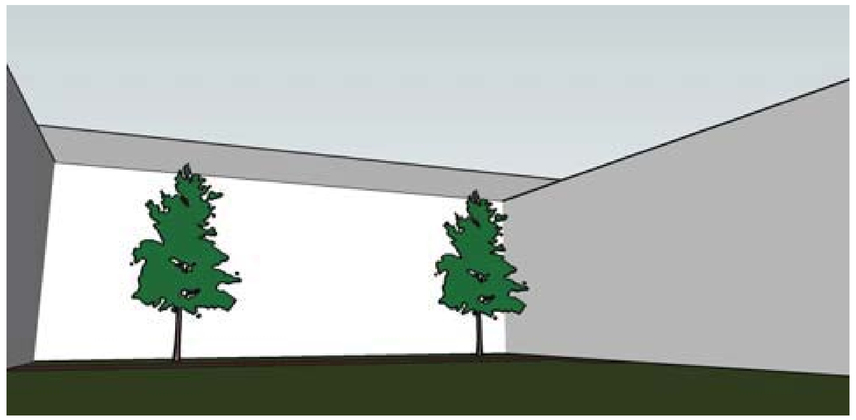
The option of making courtyards are explored for two reasons:

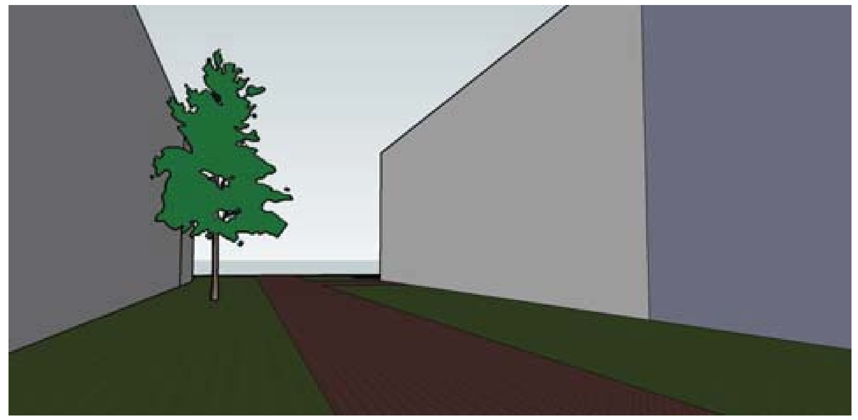
- defining public space, making it more private to prevent unwanted use or deterioration;
- building new inside the open space can be interesting for the financial feasibility and offers more housing.

Courtyards



5_Stedebouwkundige massamodellen_hele hofjes





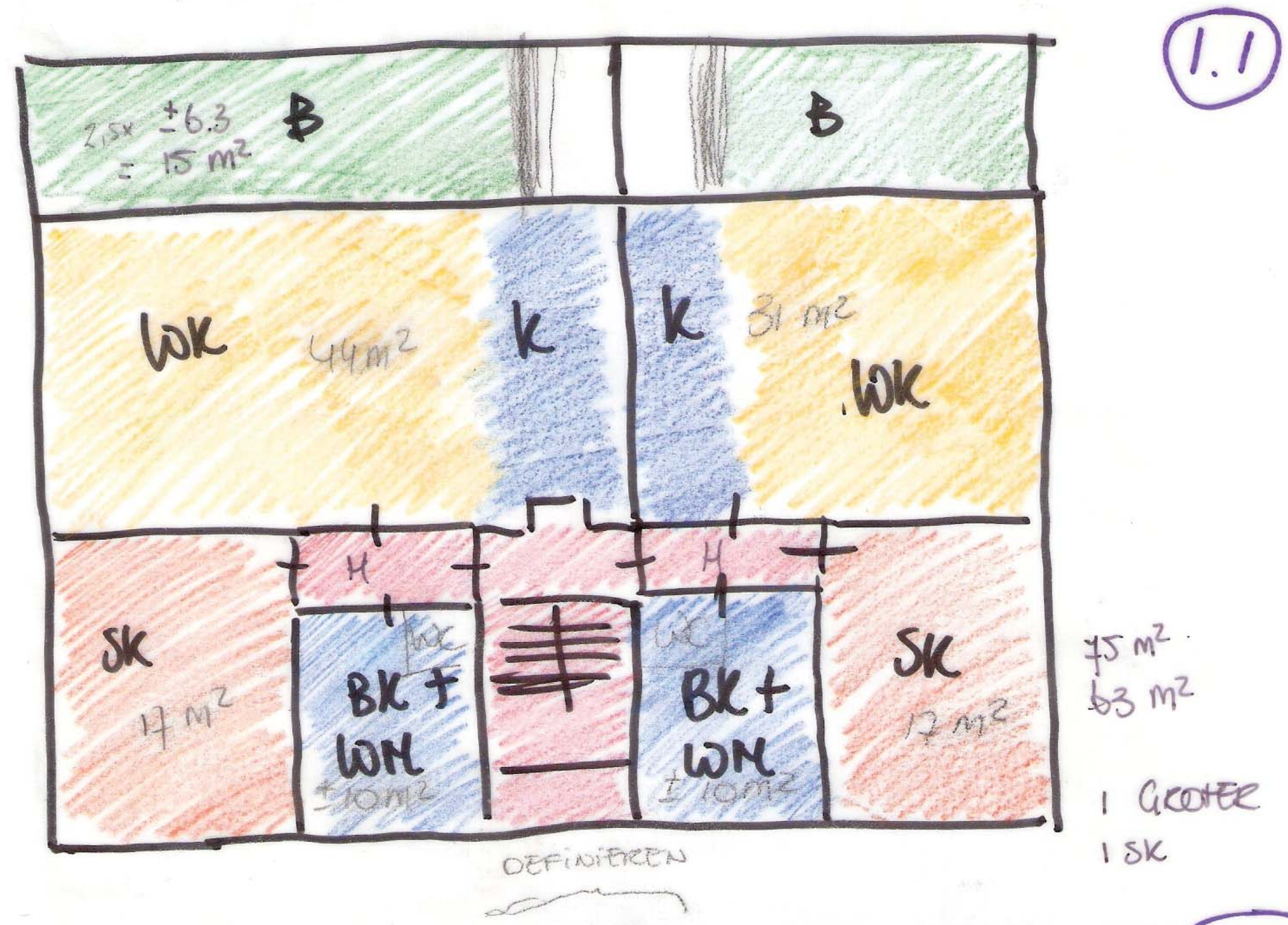
Note: space gets cramped and a little claustrofobic.

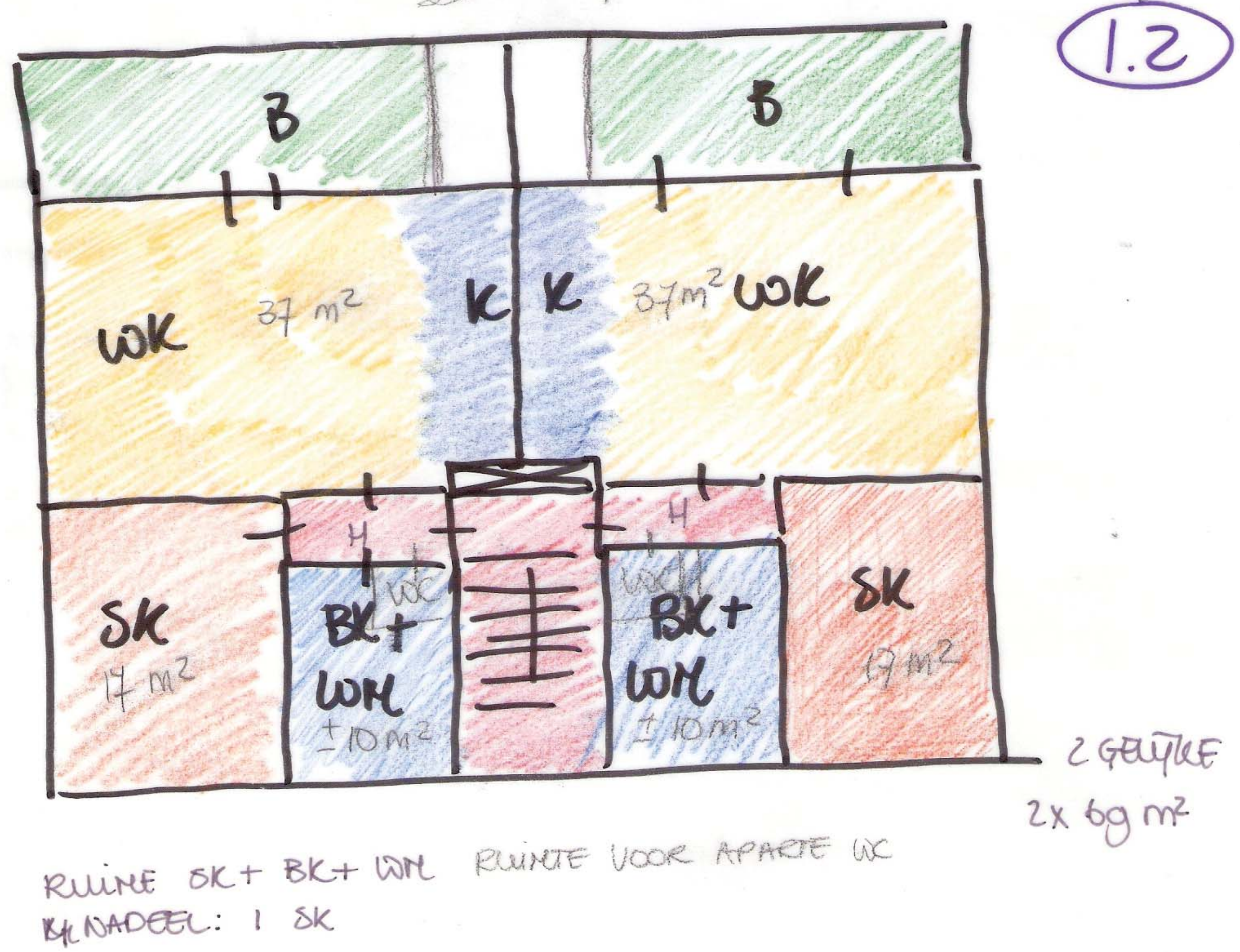
Reorganising apartments - new internal lay out

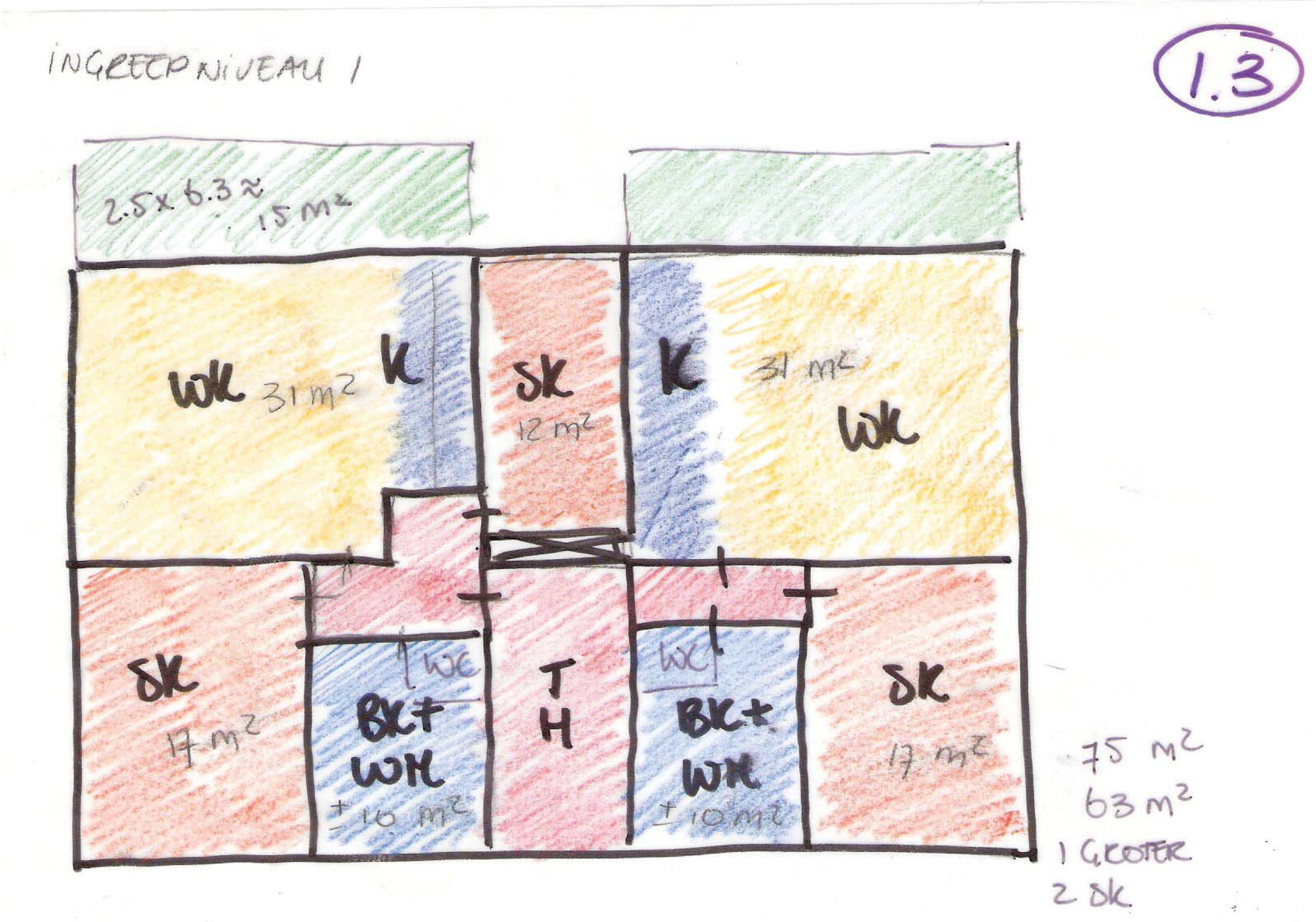
Originally built for families, according to our modern standards these apartments are outdated. What once was sufficient for a whole family, is now used for two or maybe three persons households. With this in mind, the search starts to find more quality in the floorplans.

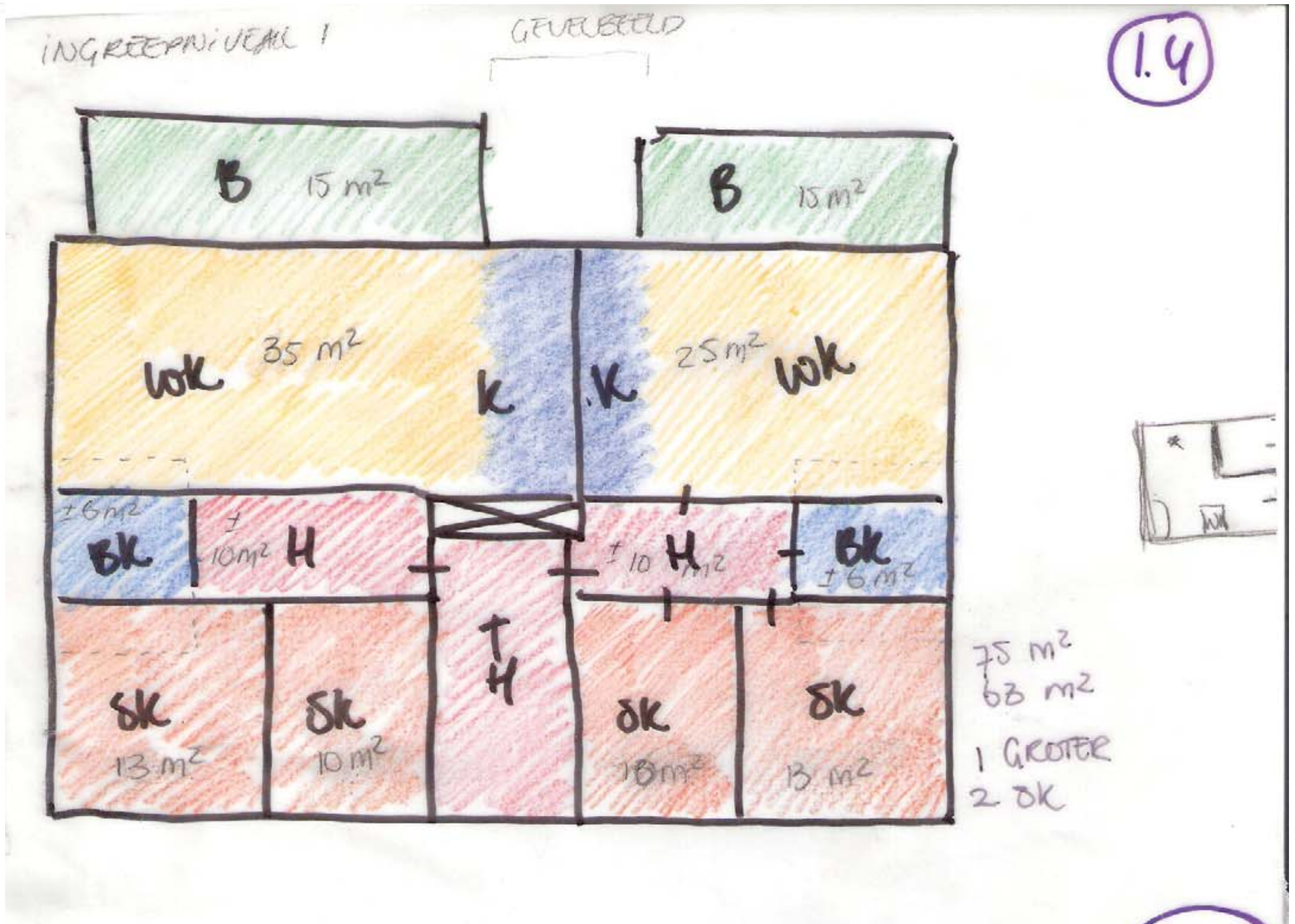
The next drawings are a chronological story of the development of different floor-plans. Ideas become more real when they are checked for ventilation shafts, piping and so on.

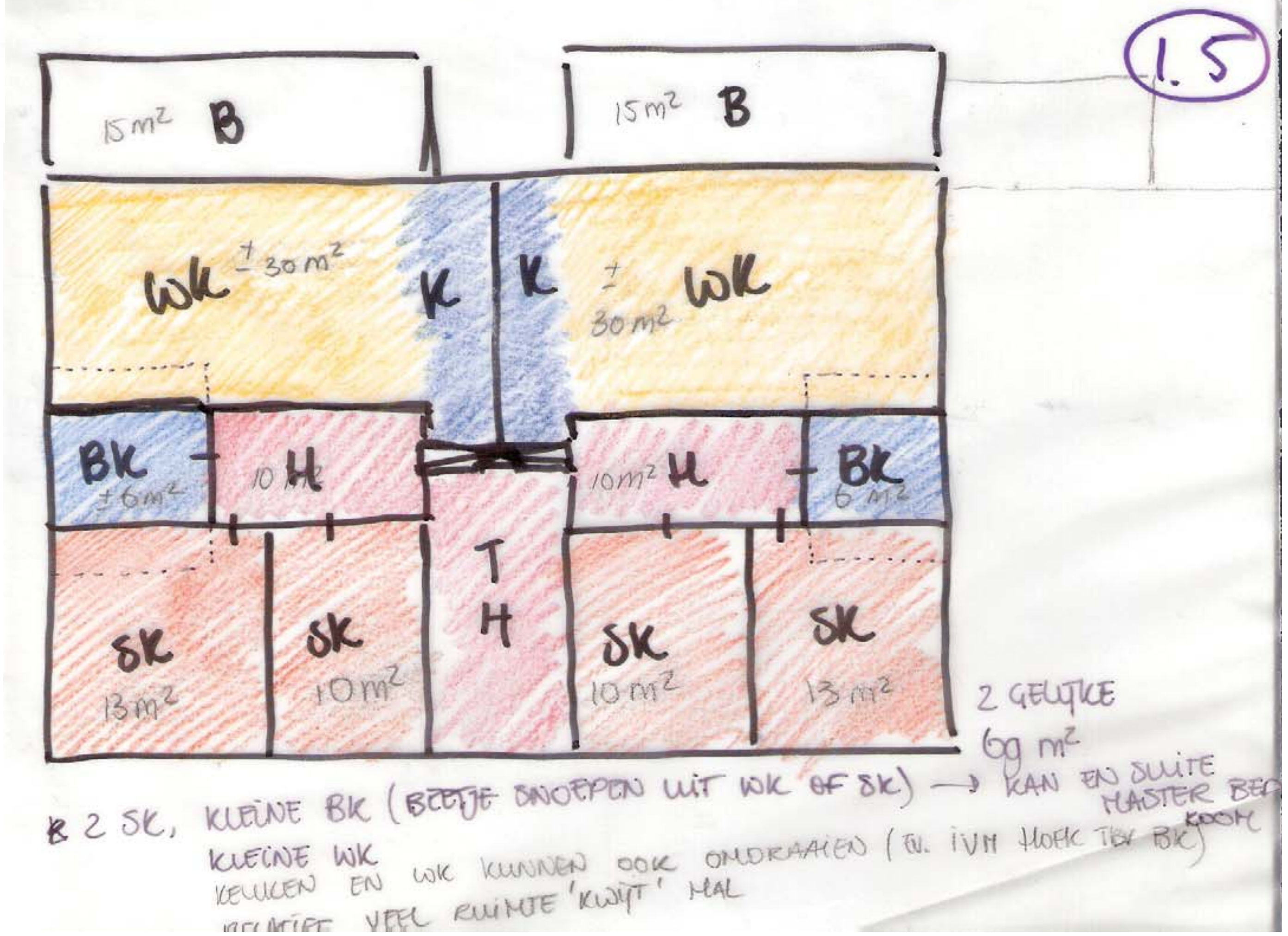
There is also a play with horizontal/vertical combinations of bays.

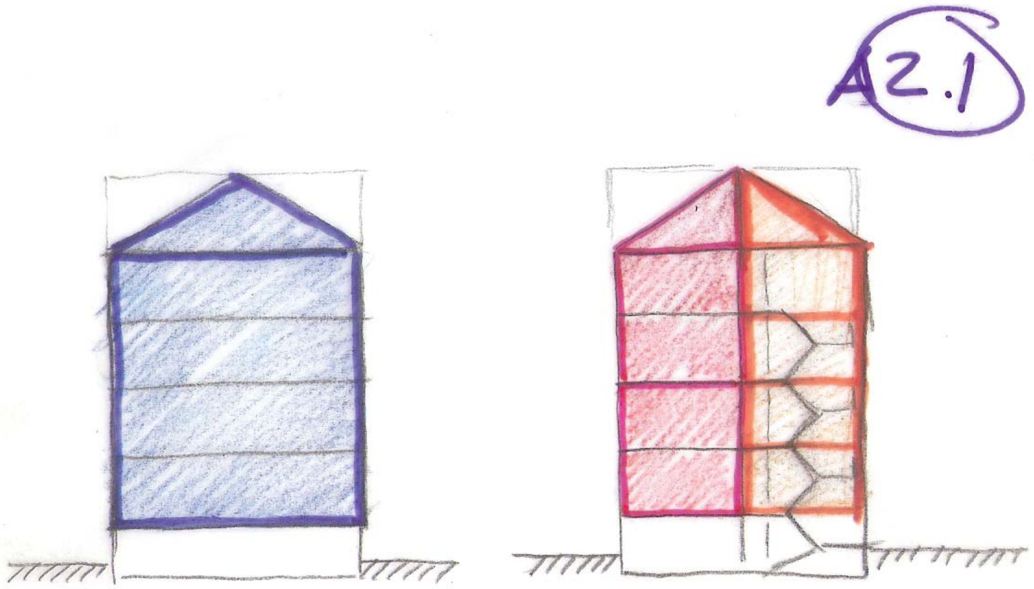




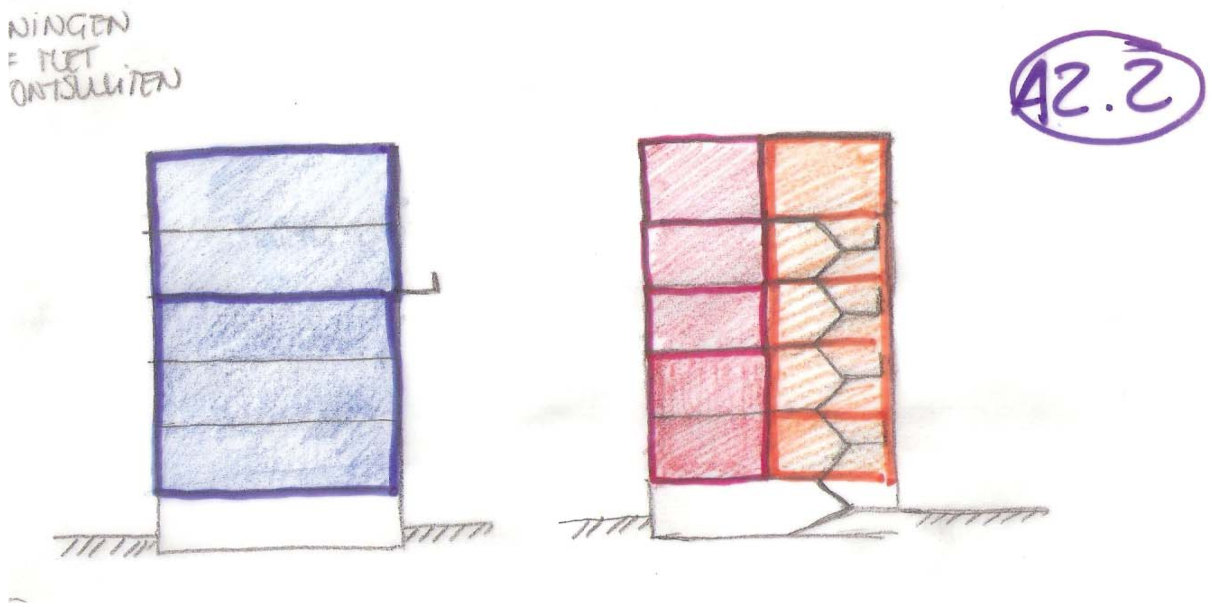

INGREEPNIVEAU 1
1.3
2.5 x 6.3 ≈ 15 m²
WK 31 m²
K
SK 12 m²
K
31 m²
WK
SK 17 m²
WC
BK + WK ± 10 m²
T H
WC
BK + WK ± 10 m²
SK 17 m²
75 m²
63 m²
1 GROTER
2 SK

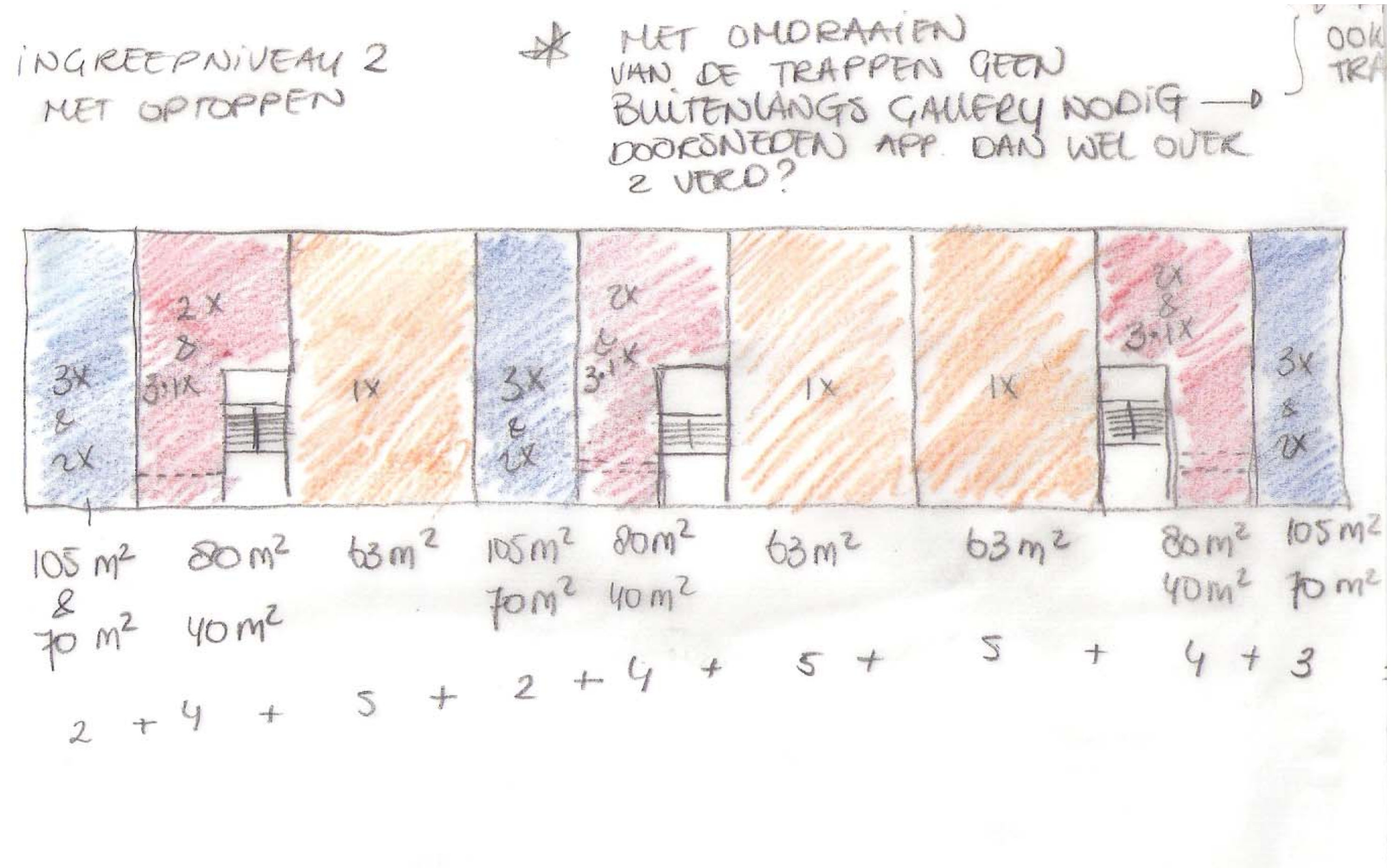

INGREEPNIVEAU 1
GEVELBEELD
1.4
B 15 m²
B 15 m²
WK 35 m²
K
K
25 m² WK
± 6 m² BK
± 10 m² H
T H
± 10 H m²
BK ± 6 m²
SK 13 m²
SK 10 m²
SK 10 m²
SK 13 m²
75 m²
63 m²
1 GROTER
2 SK

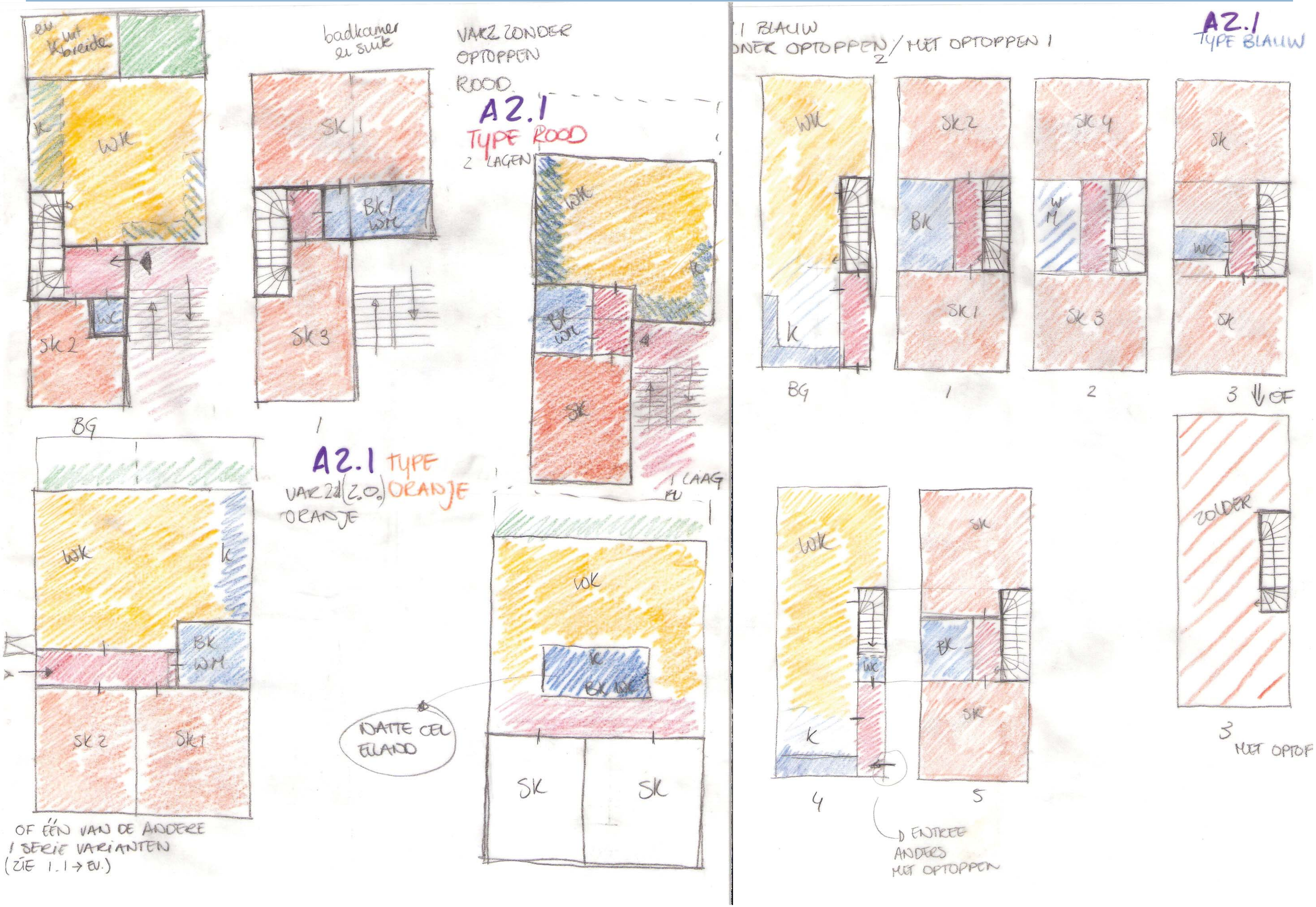

1.5
15 m² B
15 m² B
WK ± 30 m²
K
K
± 30 m² WK
BK ± 6 m²
10 H
T H
10 m² H
BK 6 m²
SK 13 m²
SK 10 m²
SK 10 m²
SK 13 m²
2 GELIJKE
69 m²
2 SK, KLEINE BK (BEETJE SNOEPEN UIT WK OF SK) → KAN EN SUITE MASTER BED
KLEINE WK
KEUKEN EN WK KUNNEN OOK OMDRAAIEN


A2.1

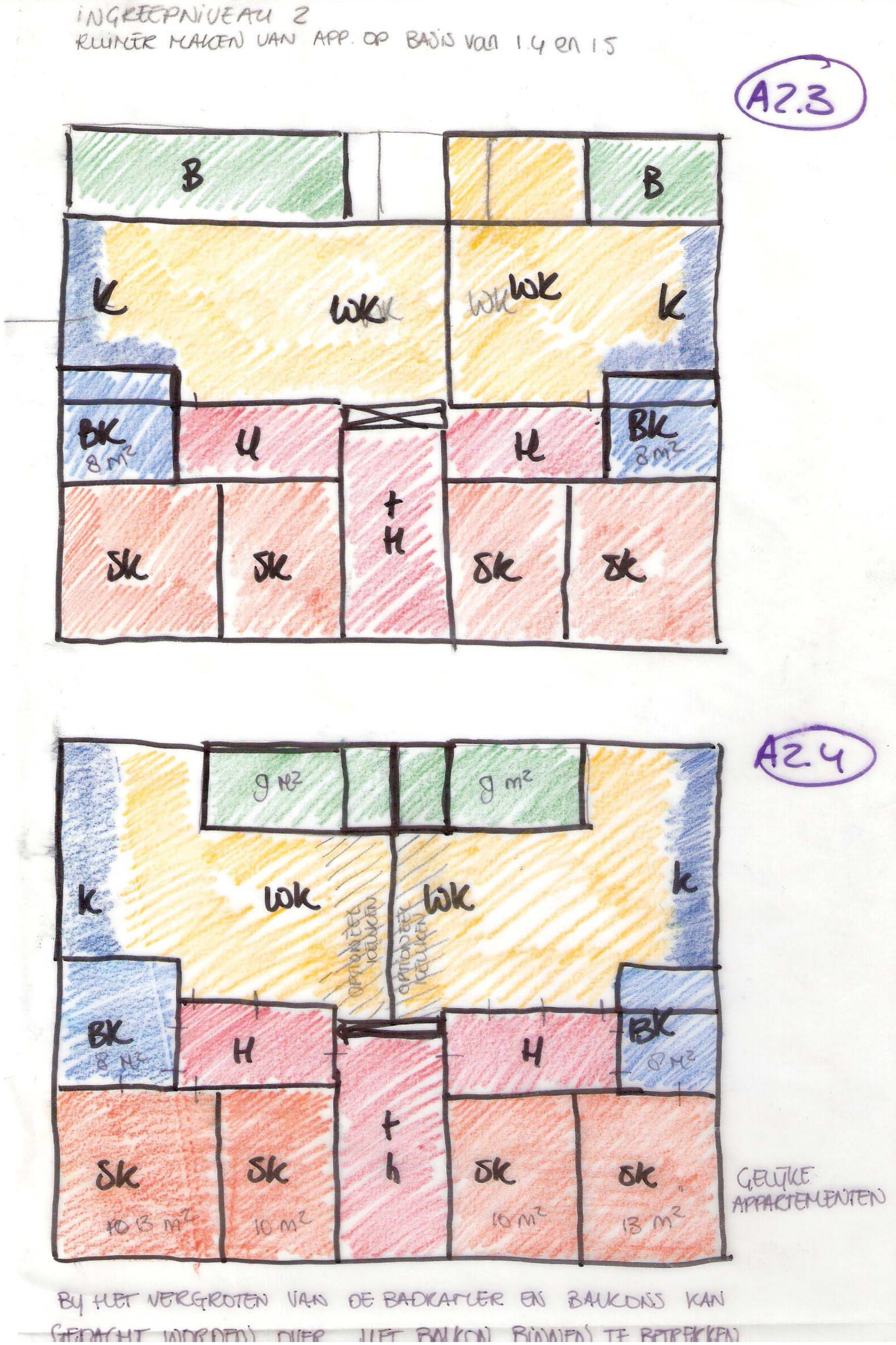

INGREEPNIVEAU 2
VAR. ZONDER OPTOPPEN
4X
2X
1X
4X
1X
1X
2X
4X
1
2
4
1
2
4
4
2
1
140 m2
80m2
63m2
140 m2
80m2
63m2
63m2
80m2
140 m2

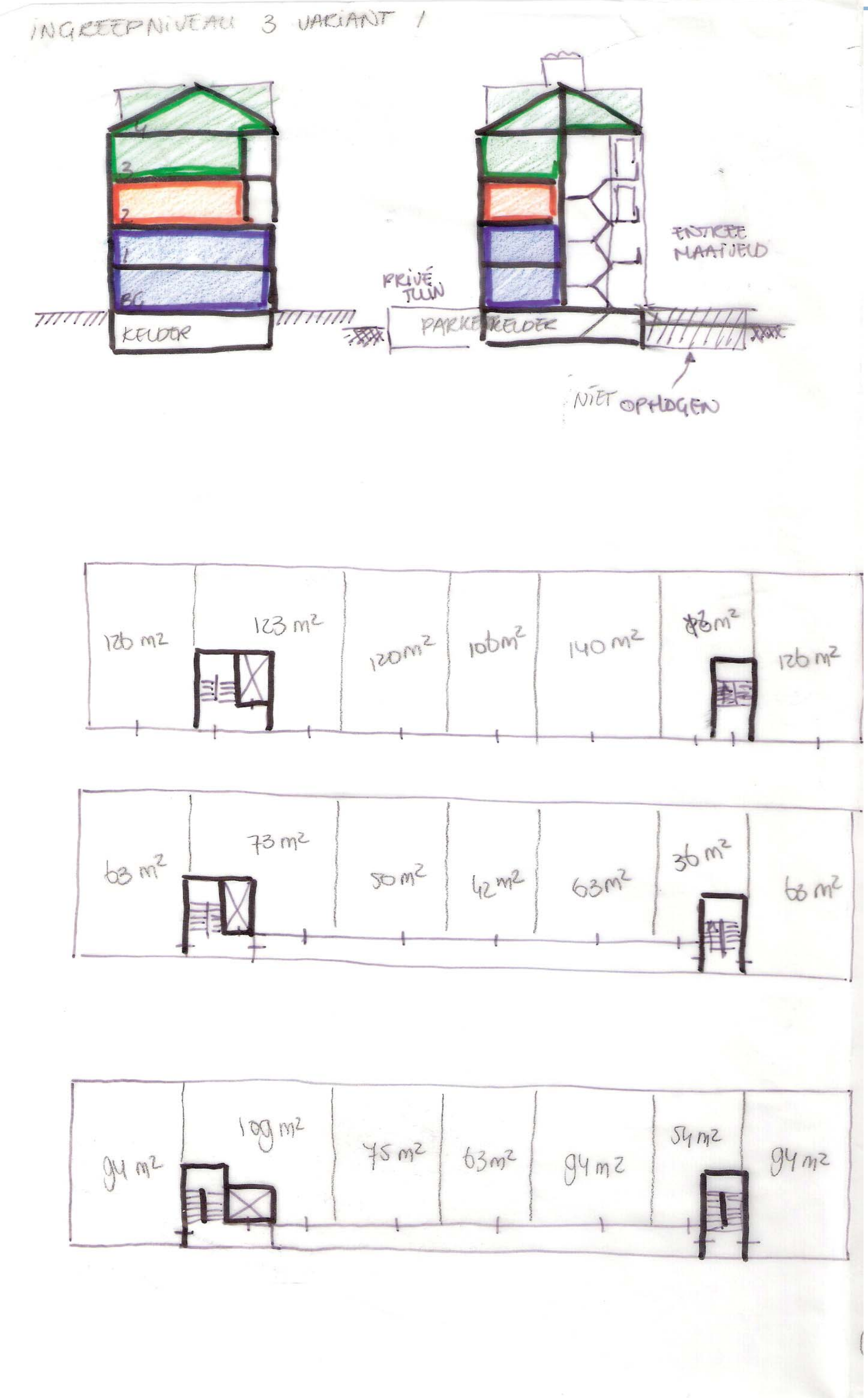

A2.2

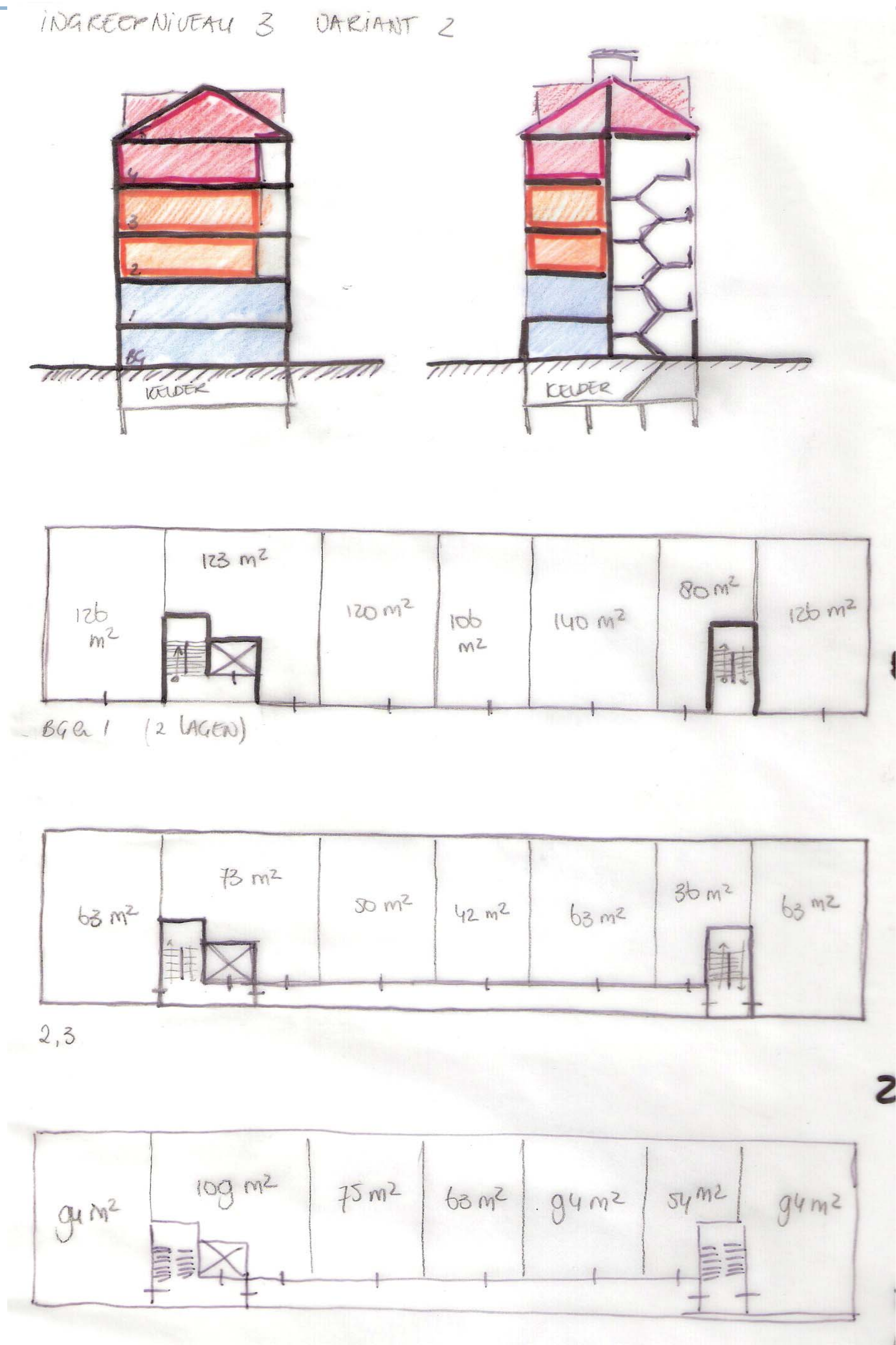

INGREEPNIVEAU 2
MET OPTOPPEN
MET OMDRAAIEN VAN DE TRAPPEN GEEN BUITENLANGS GALLERY NODIG
DOORSNEDEN APP. DAN WEL OVER 2 VERD?
3X & 2X
2X & 3.1X
1X
3X & 2X
1X
1X
3X & 2X
105 m2 & 70 m2
80 m2 40 m2
63 m2
105m2 70m2
80m2 40m2
63m2
63m2
80m2 40m2
105m2 70m2
2 + 4 + 5 + 2 + 4 + 5 + 5 + 4 + 3


badkamer en suite
VARZ ZONDER
OPTOPPEN
ROOD
A2.1
TYPE ROOD
2 LAGEN
WK
K
SK 1
SK 2
SK 3
SK 4
BK / WM
WC
BG
1
2
3
4
5
A2.1 TYPE
ORANJE
2 LAGEN
1 LAAG
NATTE CEL
EILAND
SK
OF ÉÉN VAN DE ANDERE
1 SERIE VARIANTEN
(ZIE 1.1 → EV.)
A2.1
TYPE BLAUW
MET OPTOPPEN
ZOLDER
3 MET OPTOP
ENTREE
ANDERS
MET OPTOPPEN

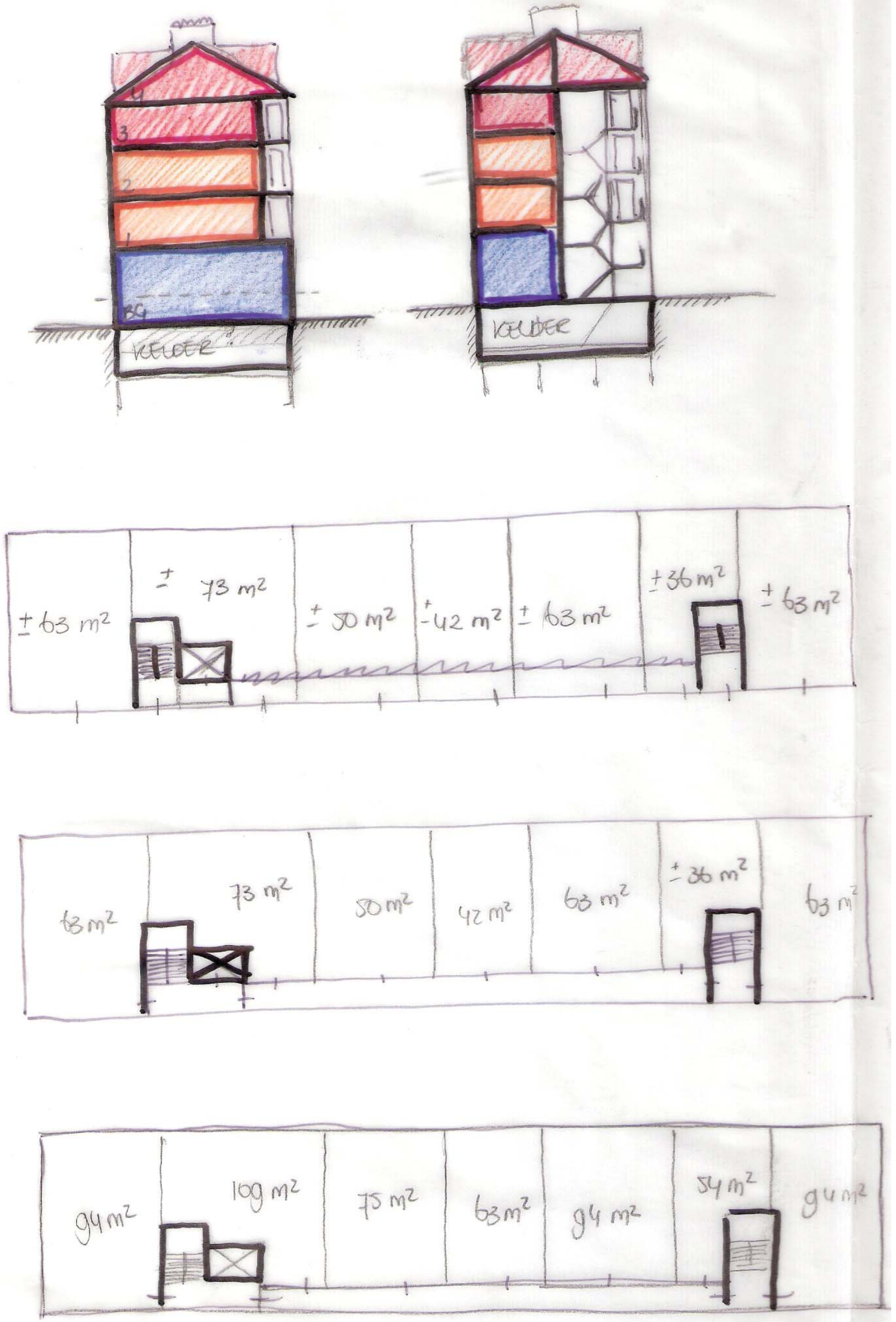

K
WC
wk
SK1
W
BK
SK2
SK3
BG
1
2
3
NORMAAL
OVER 2700
3,8 m
x 90 cm
optrede 18
OVER 1,5 VERD
2700 + 1600 = 4300
25 TREDEN VAN 17
15 treden
VOLGENS PLATTEGROND
NIEUWBOUW.


INGREEPNIVEAU 2
KLEINER MAKEN VAN APP. OP BASIS van 1.4 en 1.5
A2.3
B
B
K
WK
WK
K
BK
8 m²
H
H
BK
8 m²
SK
SK
H
SK
SK
A2.4
9 m²
9 m²
K
WK
WK
K
OPTIONEEL KEUKEN
OPTIONEEL KEUKEN
BK
8 m²
H
H
BK
8 m²
SK
13 m²
SK
10 m²
SK
10 m²
SK
13 m²
GELIJKE APPARTEMENTEN
BIJ HET VERGROTEN VAN DE BADKAMER EN BALKONS KAN
GEDACHT WORDEN OVER HET BALKON BINNEN TE BETREKKEN


INGREEPNIVEAU 3 VARIANT 1
KELDER
PRIVÉ TUIN
PARKEERKELDER
ENTREE MAAIVELD
NIET OPHOGEN
126 m2
123 m2
120 m2
106 m2
140 m2
126 m2
63 m2
73 m2
50 m2
42 m2
63 m2
36 m2
63 m2
94 m2
109 m2
75 m2
63 m2
94 m2
54 m2
94 m2

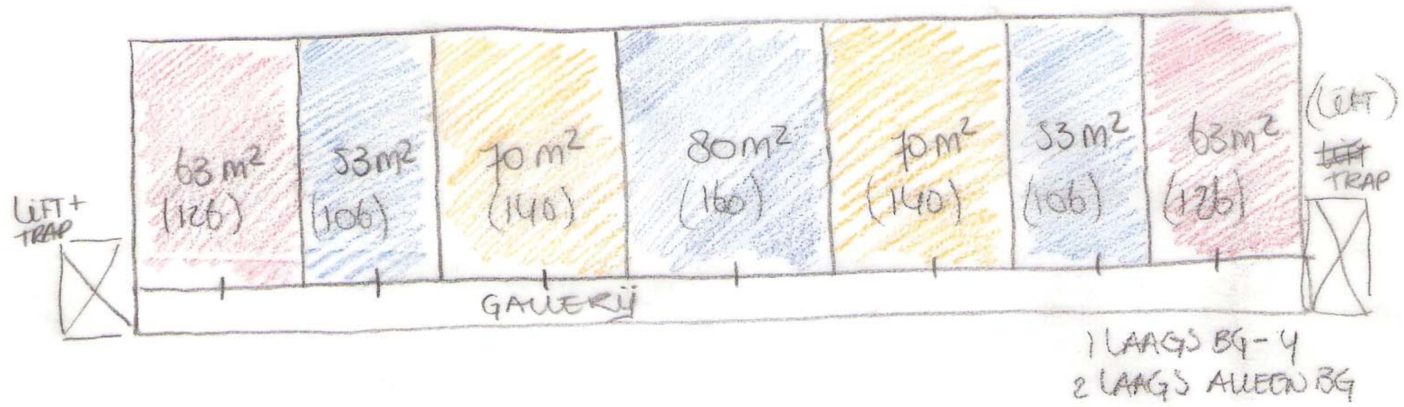

INGREEPNIVEAU 3 VARIANT 2
KELDER
KELDER
123 m2
126 m2
120 m2
106 m2
140 m2
80 m2
126 m2
BG e 1 (2 LAGEN)
73 m2
63 m2
50 m2
42 m2
63 m2
36 m2
63 m2
2,3
109 m2
94 m2
75 m2
63 m2
94 m2
54 m2
94 m2

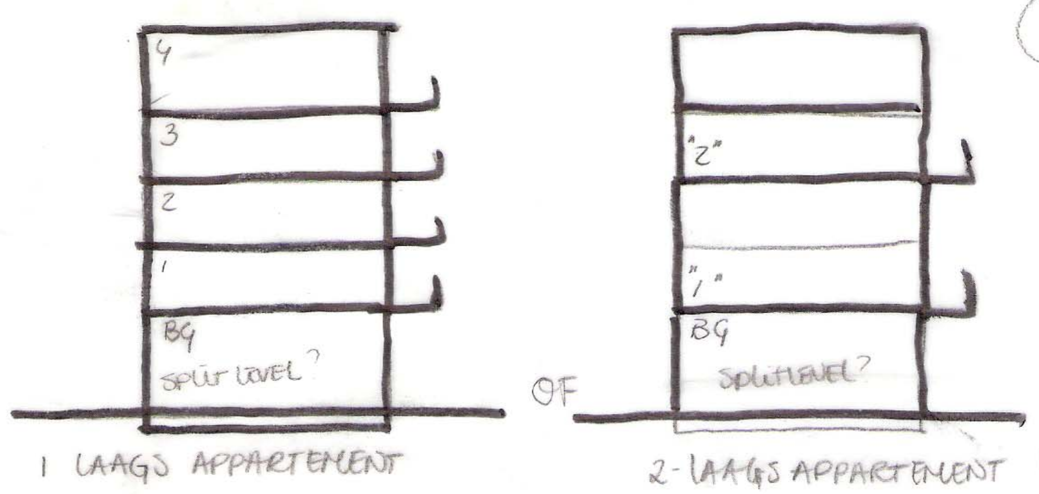
INGREEPNIVEAU 3 VARIANT 3



INGREEPNIVEAU 3 VARIANT 4
BUITENGALLERY
MET OPTOPPEN

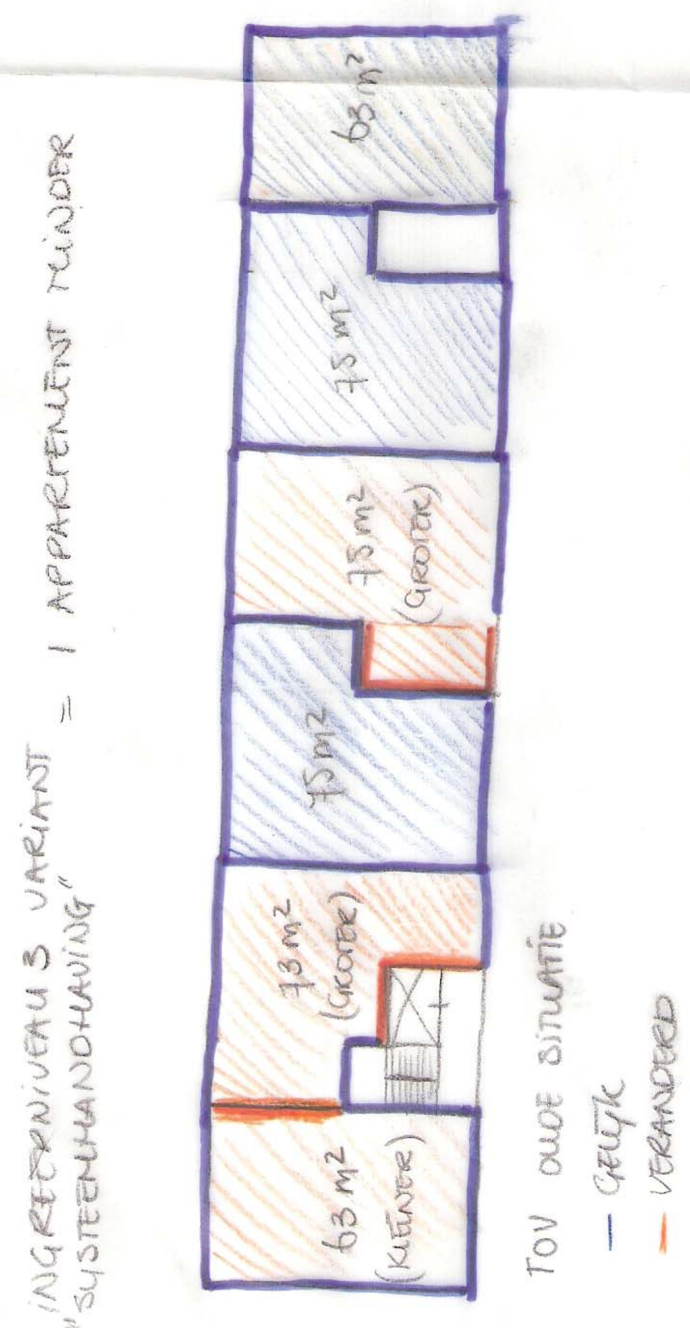
A3.4

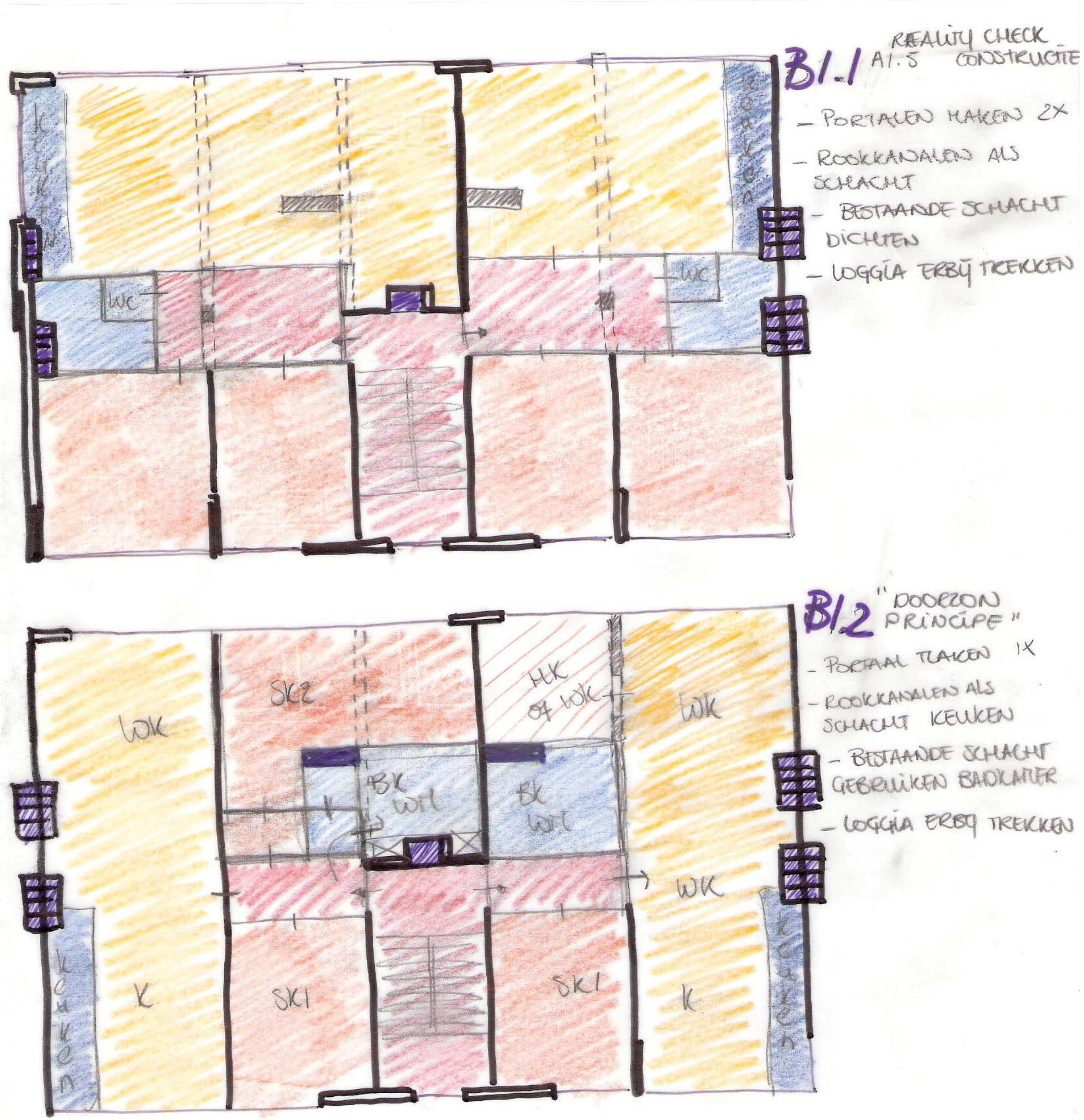


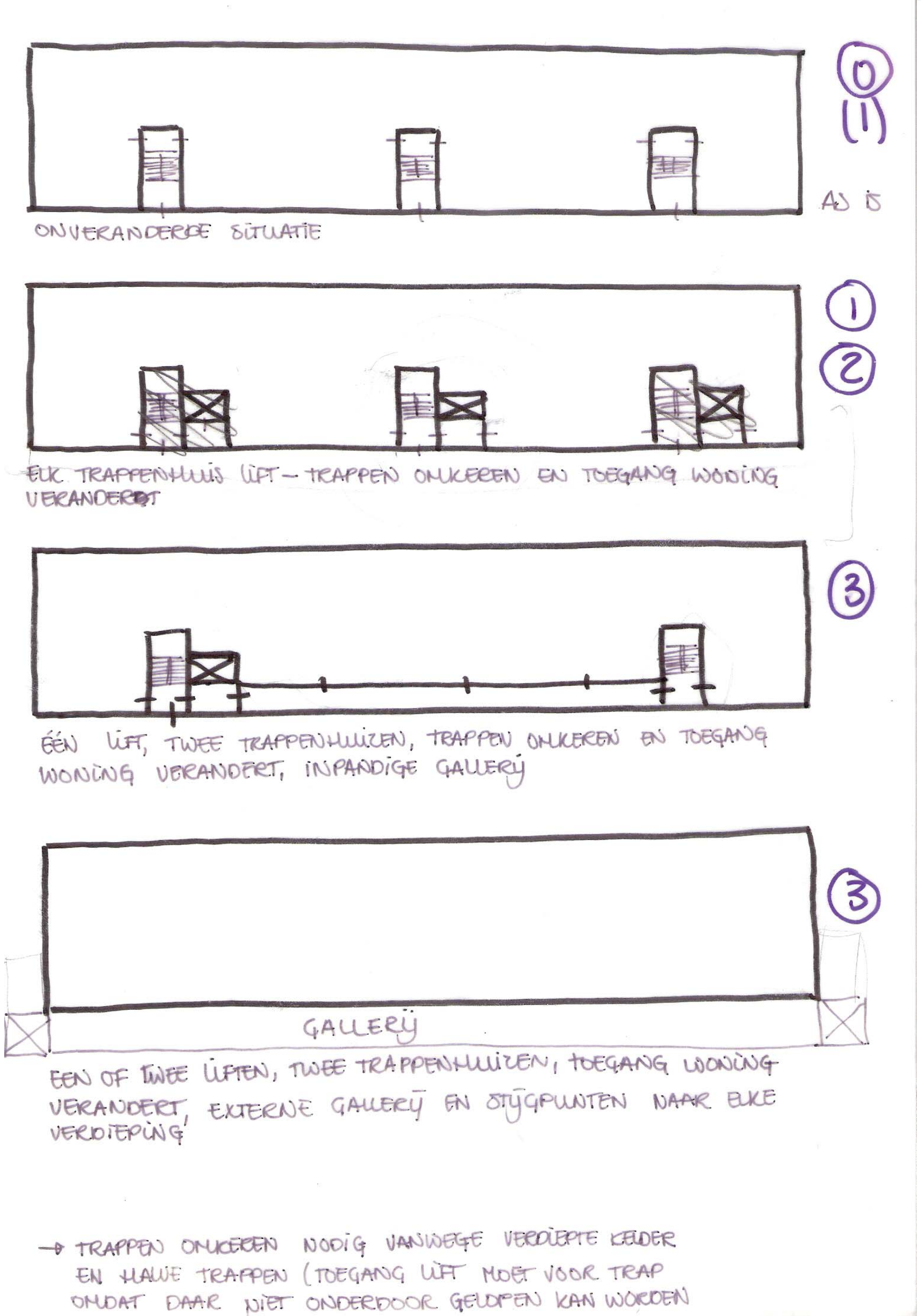


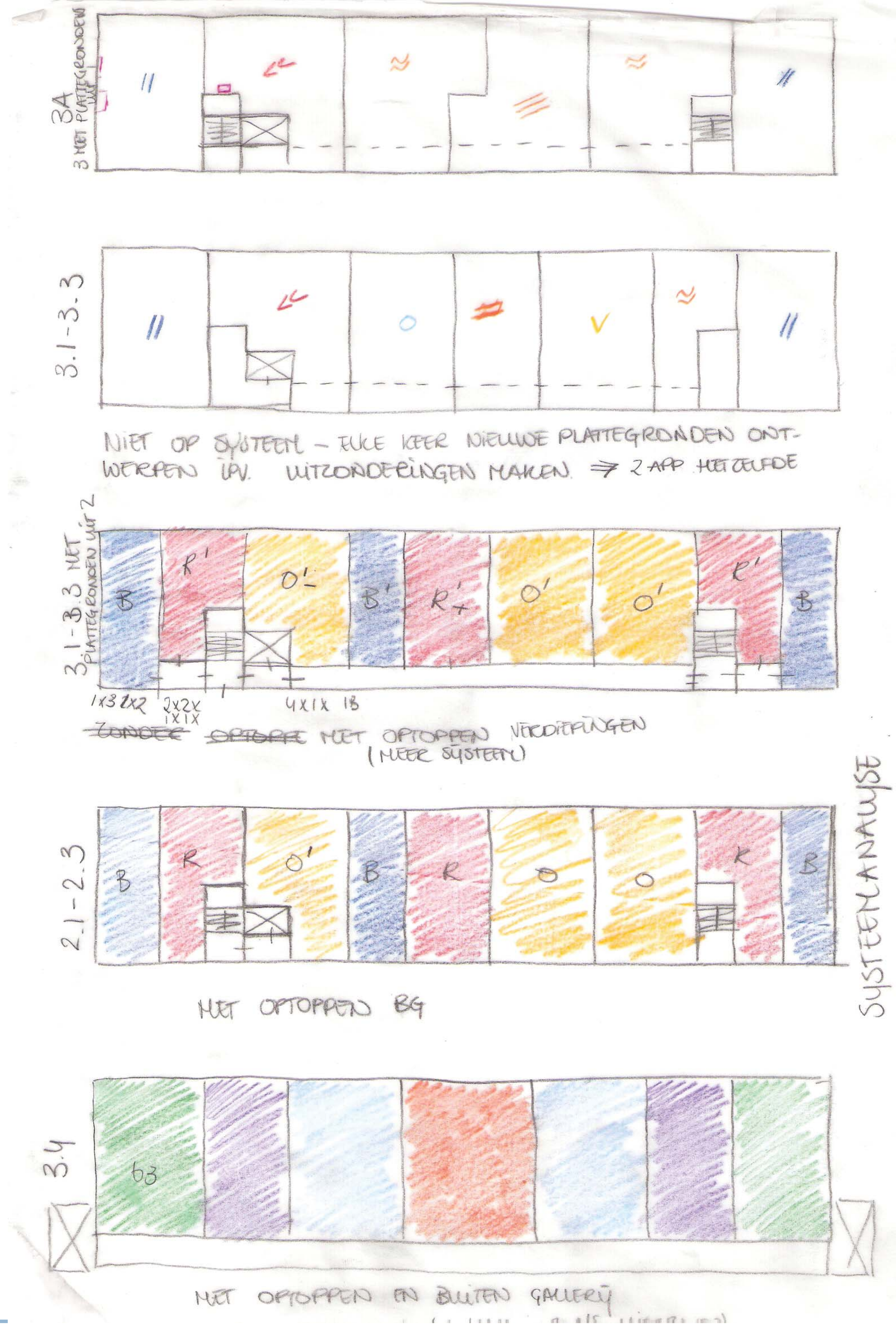
A 3.5

TYPEN
VLOER DOORTREKKEN: SPLITLEVEL GRONDGEBONDEN WONINGEN
DUBBELLAAGS: ZEER RUIME APPARTEMENTEN, ENKELLAAGS:
AANGEPAST DUBBELLAAGS: | DREMPELLOOS APPARTEMENT MET
→ BALKON
RUIME APPARTEMENTEN MET (KLEINE) BALKON
→ GALLERIJ KAN ALS GLASVLIESGEVEL DIENEN

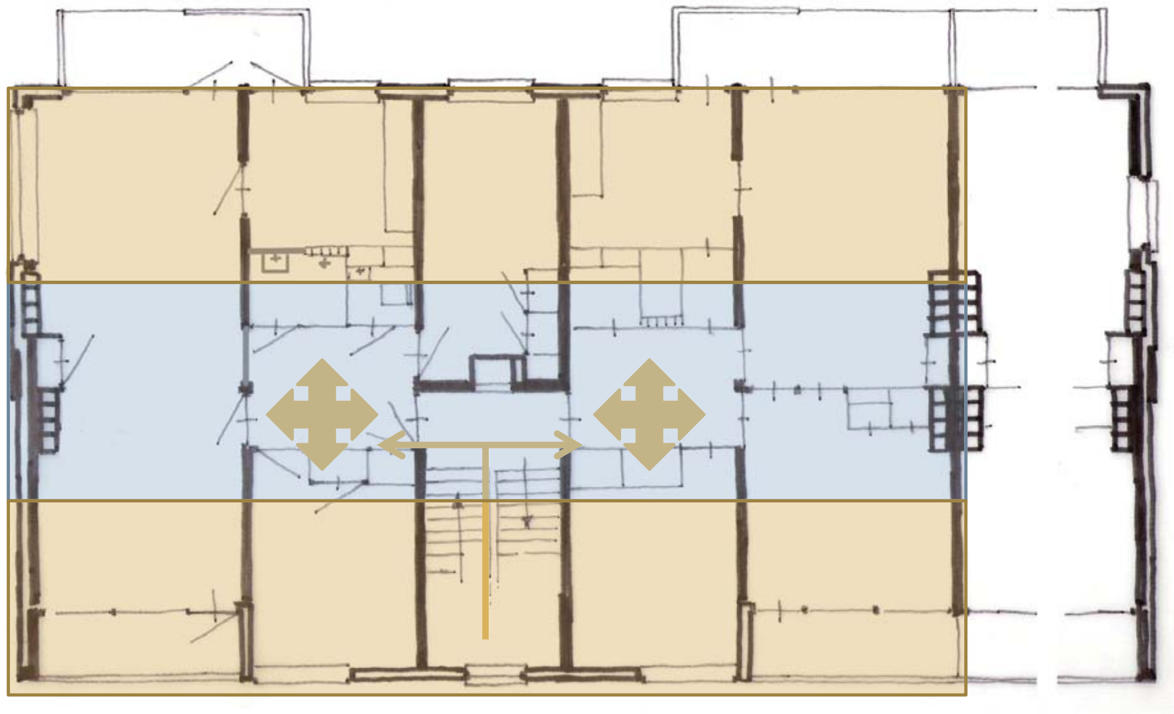

INGREEPNIVEAU 3 VARIANT
"SYSTEEMHANDHAVING" = 1 APPARTEMENT MINDER
63 m2
75 m2
75 m2 (GROTER)
75 m2
75 m2 (GROTER)
63 m2 (KLEINER)
TOV OUDE SITUATIE
— GELIJK
— VERANDERD


B1.1
REALITY CHECK
A1.5 CONSTRUCTIE
- PORTALEN MAKEN 2X
- ROOKKANALEN ALS SCHACHT
- BESTAANDE SCHACHT DICHTEN
- LOGGIA ERBIJ TREKKEN
WC
WC
KEUKEN
KEUKEN
B1.2 "DOORZON PRINCIPE"
- PORTAAL MAKEN 1X
- ROOKKANALEN ALS SCHACHT KEUKEN
- BESTAANDE SCHACHT GEBRUIKEN BADKAMER
- LOGGIA ERBIJ TREKKEN
WK
SK2
HK OF WK
WK
BK WM
BK WM
WK
K
SK1
SK1
K
KEUKEN
KEUKEN


0
(1)
AS IS
ONVERANDERDE SITUATIE
1
2
ELK TRAPPENHUIS LIFT – TRAPPEN OMKEREN EN TOEGANG WONING VERANDERD
3
ÉÉN LIFT, TWEE TRAPPENHUIZEN, TRAPPEN OMKEREN EN TOEGANG WONING VERANDERT, INPANDIGE GALLERIJ
3
GALLERIJ
EEN OF TWEE LIFTEN, TWEE TRAPPENHUIZEN, TOEGANG WONING VERANDERT, EXTERNE GALLERIJ EN STIJGPUNTEN NAAR ELKE VERDIEPING
→ TRAPPEN OMKEREN NODIG VANWEGE VERDIEPTE KELDER EN HALVE TRAPPEN (TOEGANG LIFT MOET VOOR TRAP OMDAT DAAR NIET ONDERDOOR GELOPEN KAN WORDEN


3A
3 MET PLATTEGRONDEN
3.1-3.3
NIET OP SYSTEEM – ELKE KEER NIEUWE PLATTEGRONDEN ONTWERPEN IPV. UITZONDERINGEN MAKEN → 2 APP HETZELFDE
3.1-3.3 MET PLATTEGRONDEN UIT 2
B
R'
O'
B'
R+
O'
O'
R'
B
1x3 2x2 2x2x 1x1x 4x1x 1B
MET OPTOPPEN VERDIEPINGEN
(MEER SYSTEEM)
2.1-2.3
B
R
O'
B
R
O
O
R
B
MET OPTOPPEN BG
SYSTEEMANALYSE
3.4
b3
MET OPTOPPEN EN BUITEN GALLERIJ

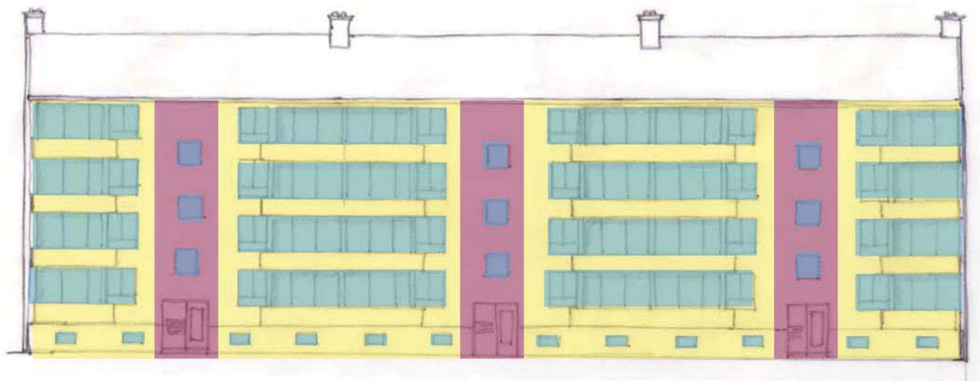
Conclusions



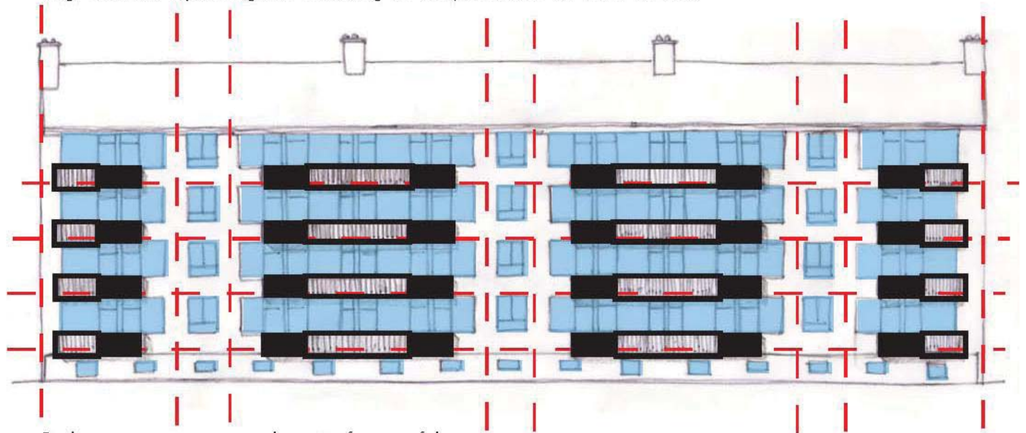
The apartments are organised around a central entrance. This way of entering the apartment makes a 'dark zone' in the middle of the block what is only meant for hallway or toilet and bathroom, maybe the kitchen. The 'light zone' is on the edges of the block, where living room and bedrooms are situated.

When restructuring these apartments, this principle of zones is still valid. Especially when trying to make the entrance somewere else than in the middle, there is a lot of resistance within the whole structure. Internal reconstruction like in A is working pretty good, but as can be seen in B, moving the entrance from the internal point to the front gives some problems with an traditional Dutch hallway before you enter the home itself.

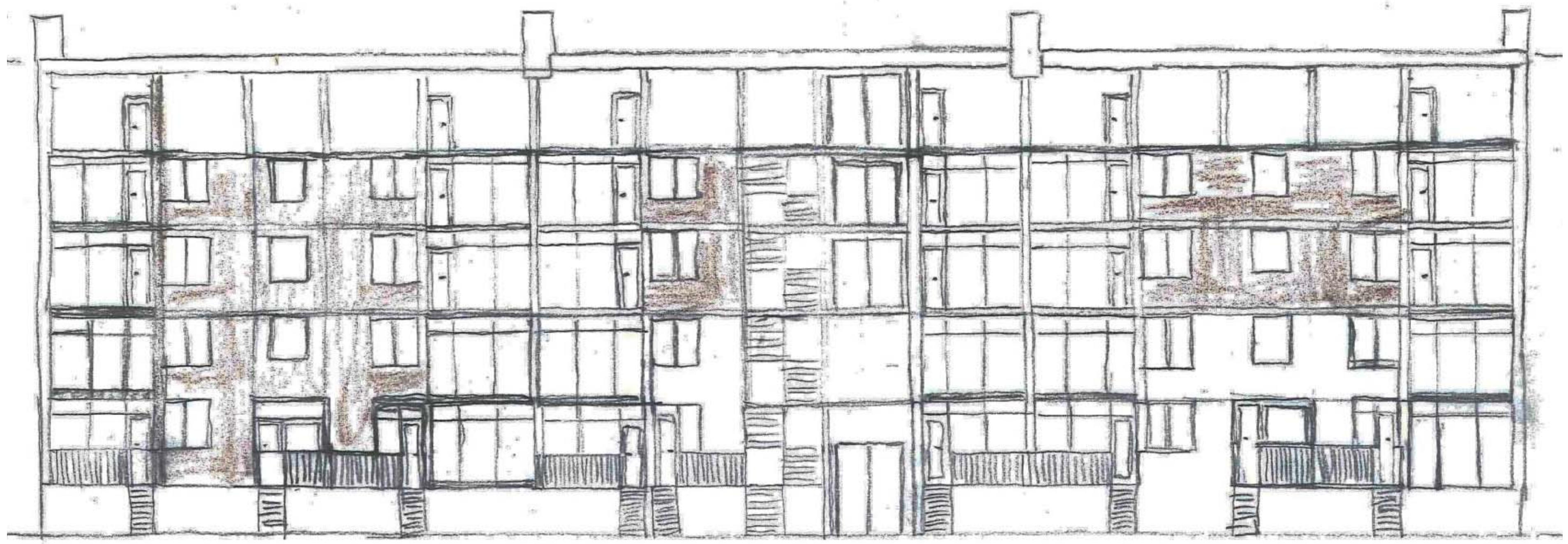
This same difference between 'dark zones' and 'light zones' can be seen in the facades. This makes the facade clear and readable. This shows best what happens when the inside of a restructured apartment is copied to the outside: it becomes a mess.



Big facade openings at housing areas, smaller at stair areas



Balconies are opened up in front of living areas



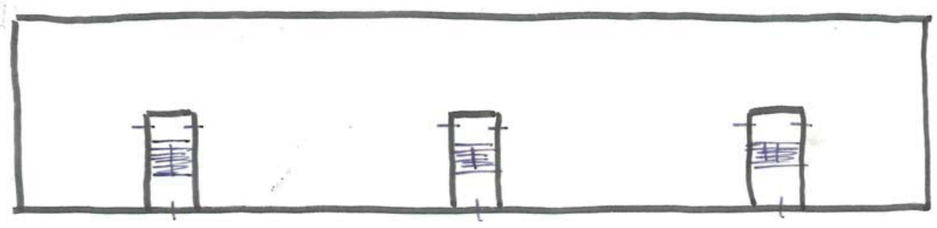
Scenarios

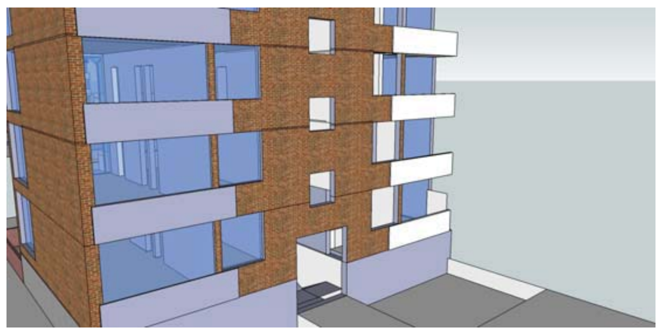
After looking at a whole range of different solutions to different problems, the best way to see the difference between these options is to make scenarios. These scenarios should have different options to guarrantee extreme differences, this makes the comparison easier.

Some starting points:

- heavy internal reconstruction vs. mild reconstruction
- no elevator vs. elevator (intern/extern)
- private gardens (leveled, stairs)
- Private entrance vs. staircases and walkways

Scenario 1:
reorganizing apartments





Typology:

Apartments
Apartments with attic
Ground floor housing

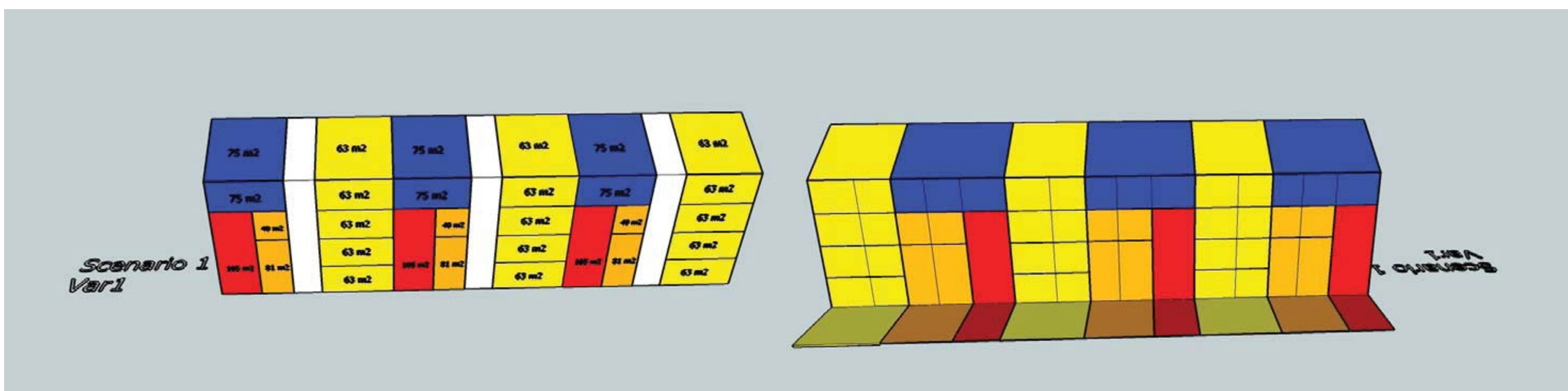
Communal house

Target group:

Starters and some small families

Goal: create as many houses with garden as possible. To be reasonable in size some have multiple stories. This creates a interesting mix from some family(starting) houses, small family houses and apartments for starters/couples. This scenario targets more or less the same people as the existing situation.

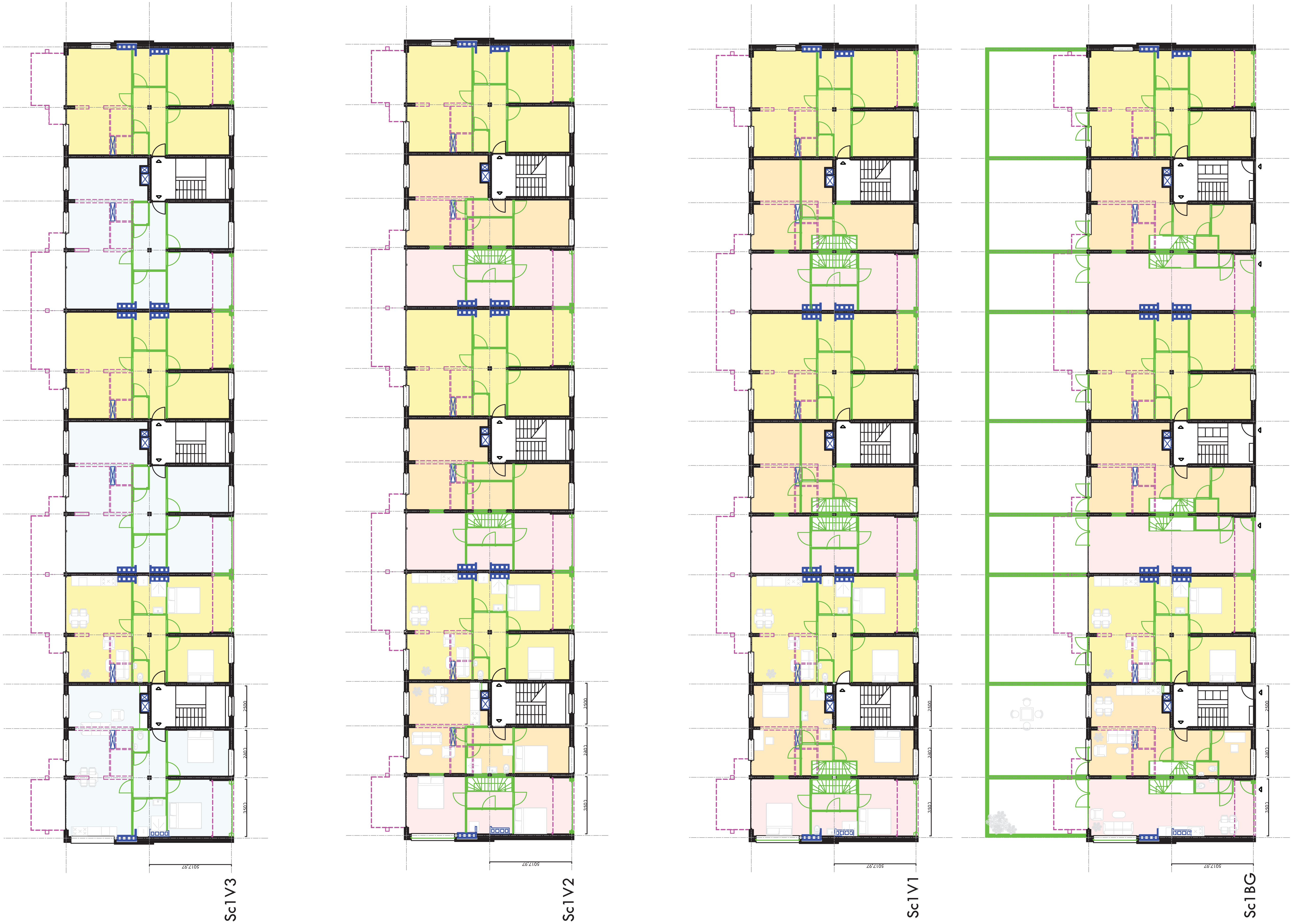
24 units

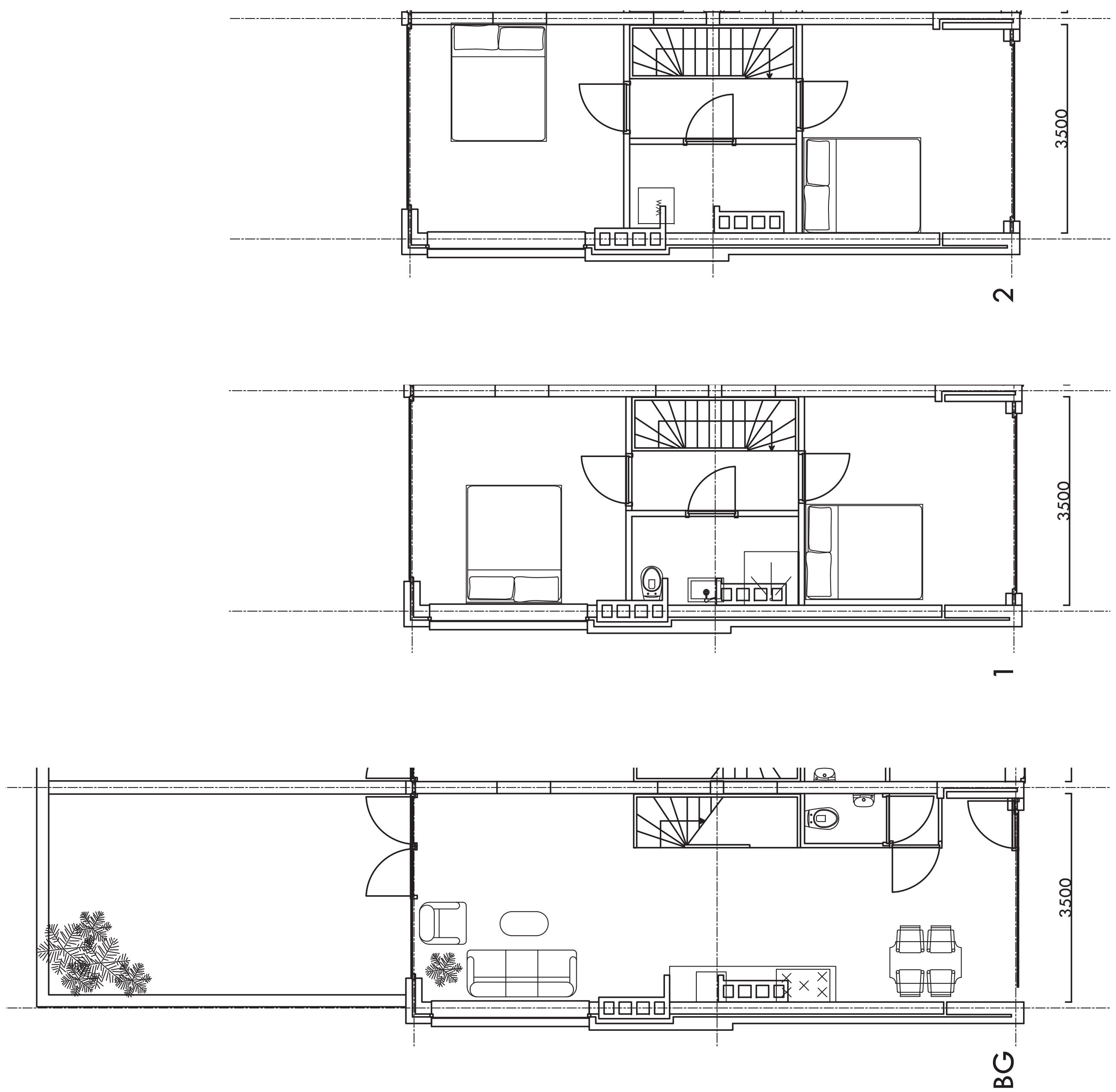


3x +attic apartment 75+
3x +attic apartment 63+
6x one level apartment 63
3x one level apartment 40

3x ground floor house 105
3x ground floor house 80
3x one level ground floor house 63

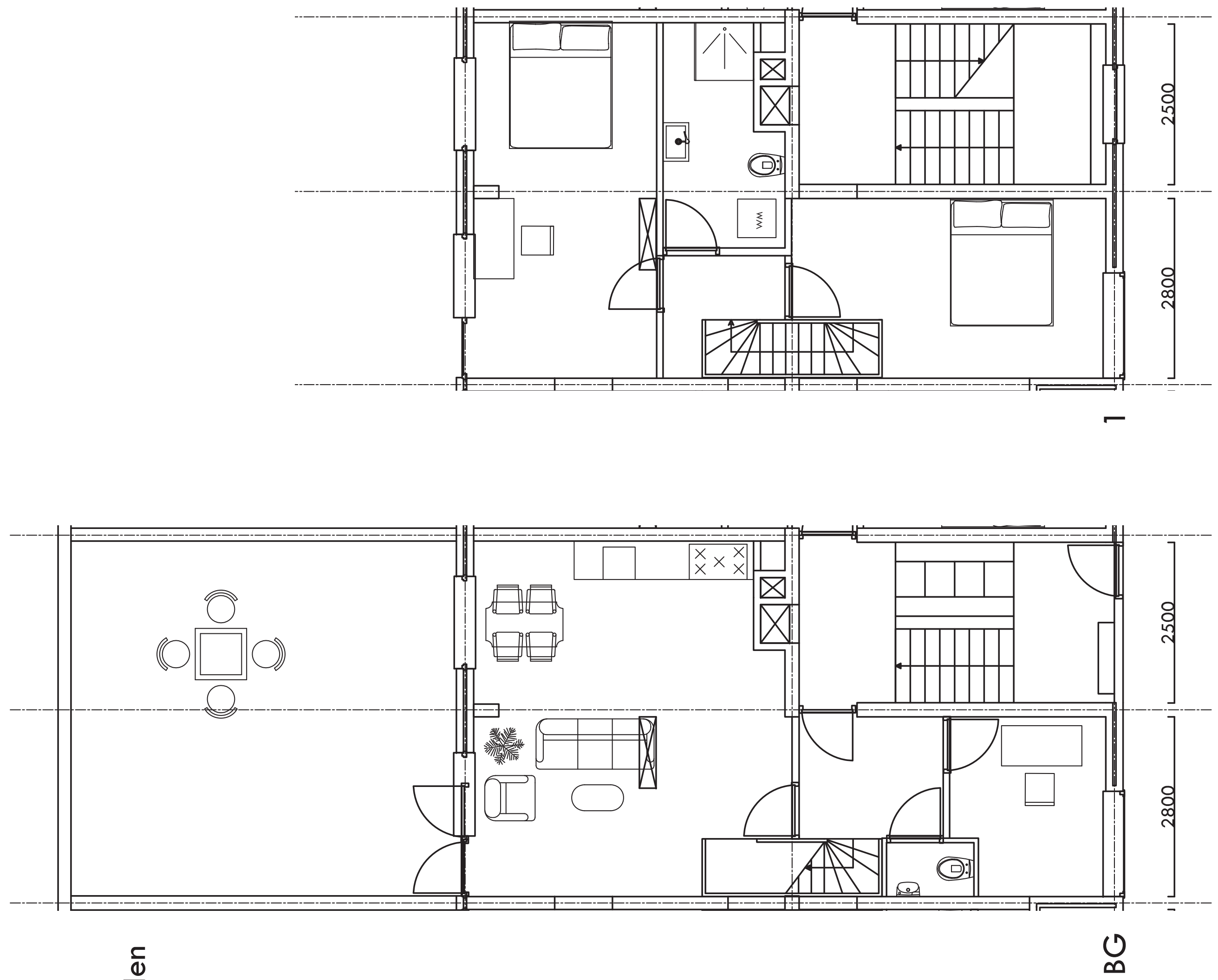
Scenario 1A





Typology of houses:

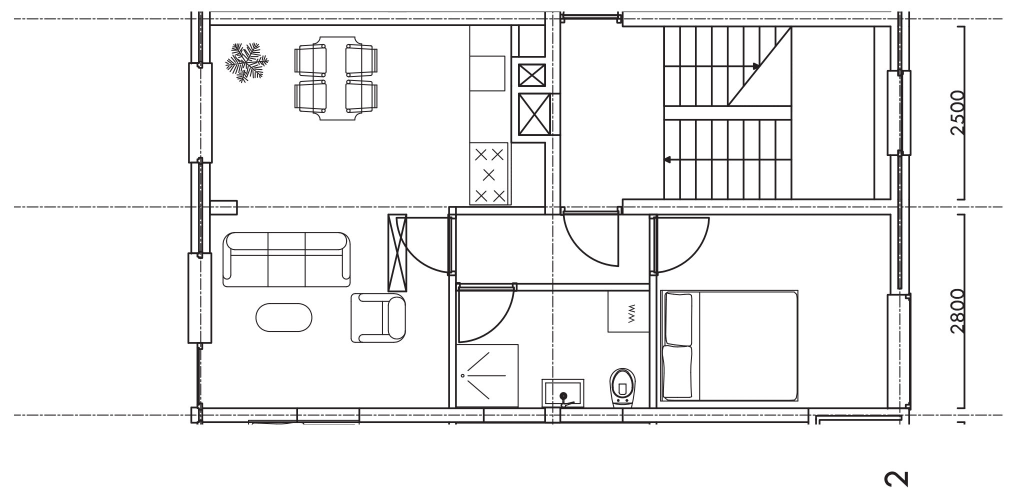
4 bedrooms with garden
105 m^2



2 bedrooms with garden
81 m^2

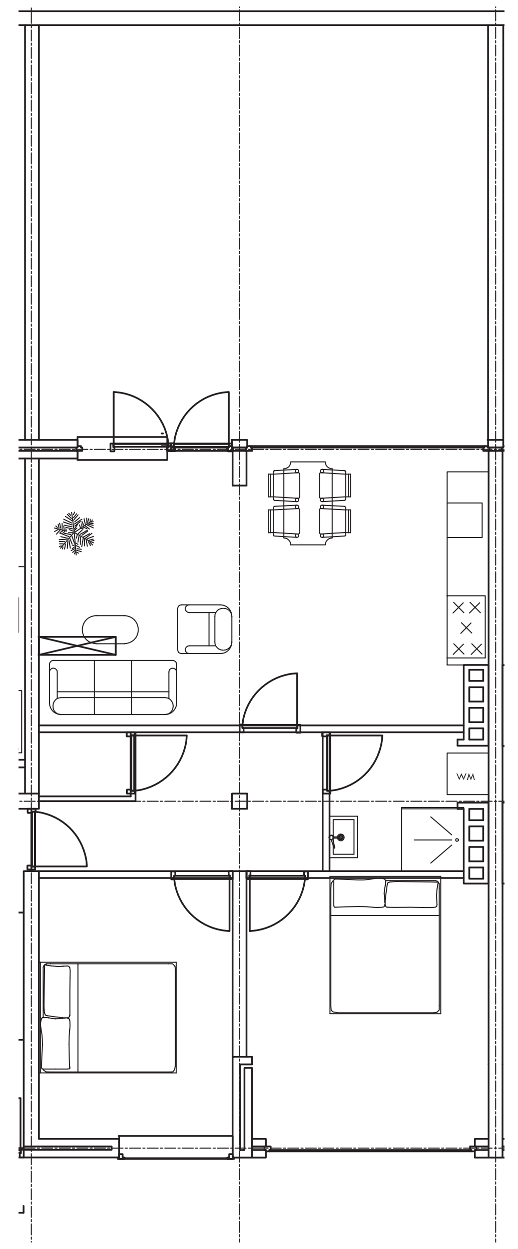
Typology of houses:

1 bedroom apartment
40 m^2



Typology of houses:

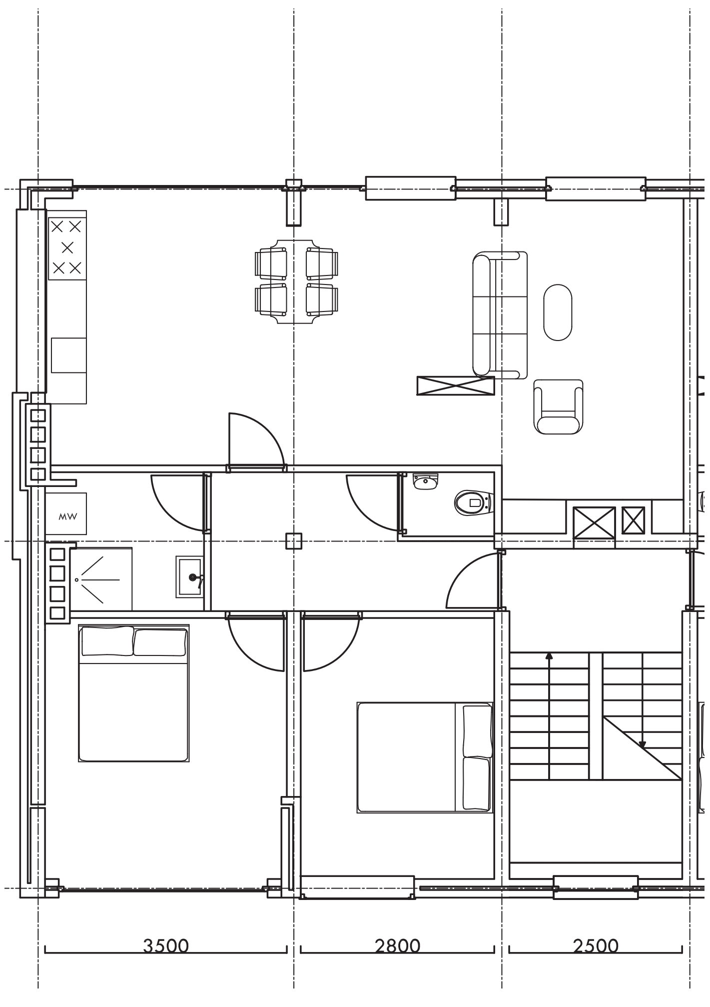
2 bedroom apartment with garden
63 m²



BG

Typology of houses:

2 bedroom apartment
75 m²



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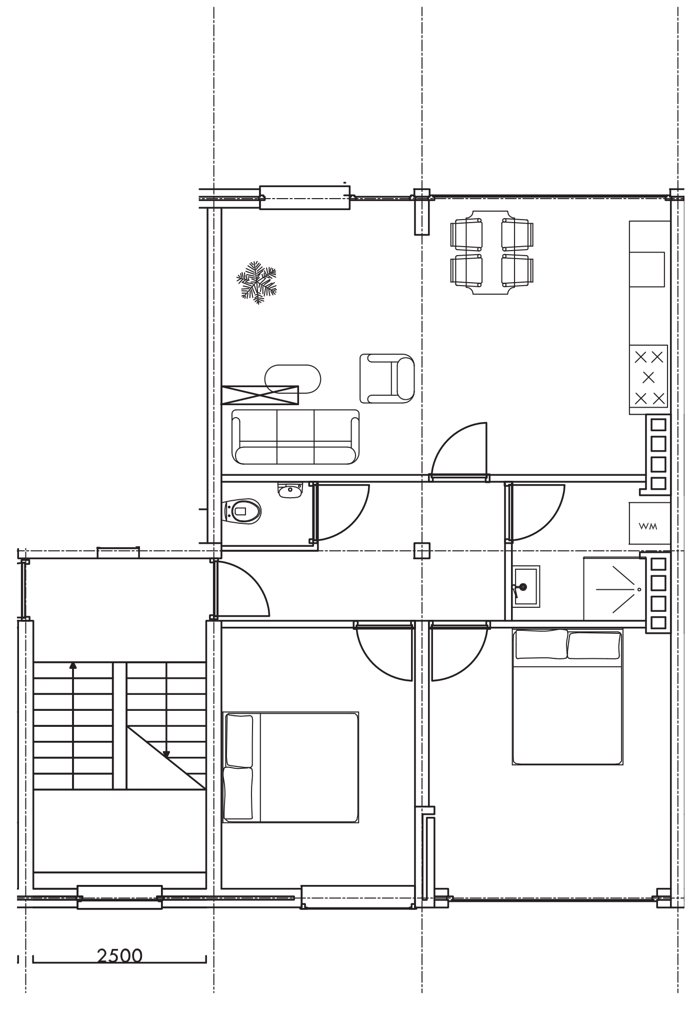
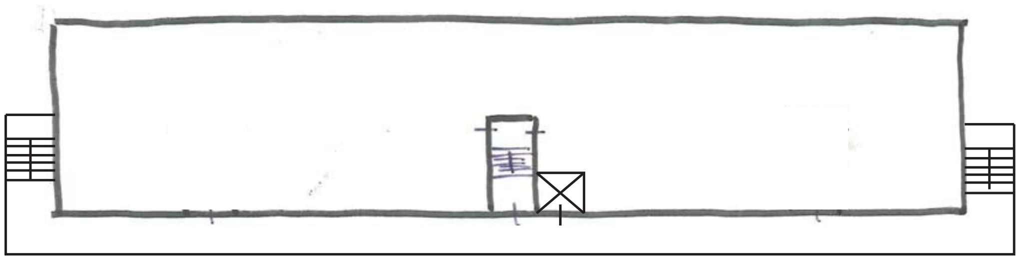


1 2 3

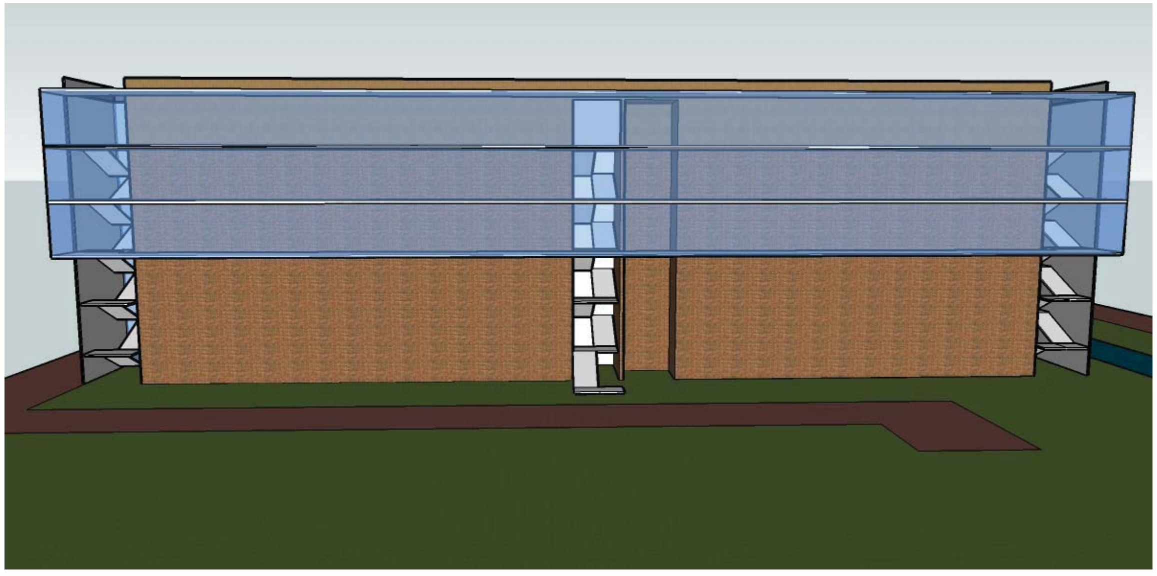
Scenario 2:
elevator inside existing structure



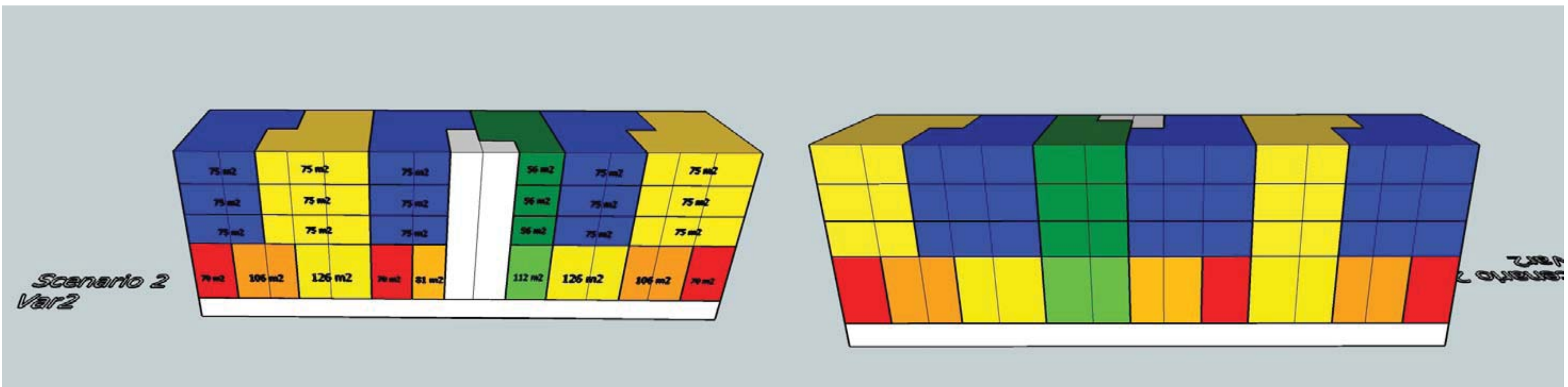
Typology:

One floor apartments
Ground floor houses

Goal: making as many reasonable sized family houses with gardens as possible. This will create a lively plinth with mainly families. The intention for the families is to create a steady base. The elevator accessible top apartments are without doorsteps so they are suitable for starters as well as elderly people. These apartments are without doorsteps.

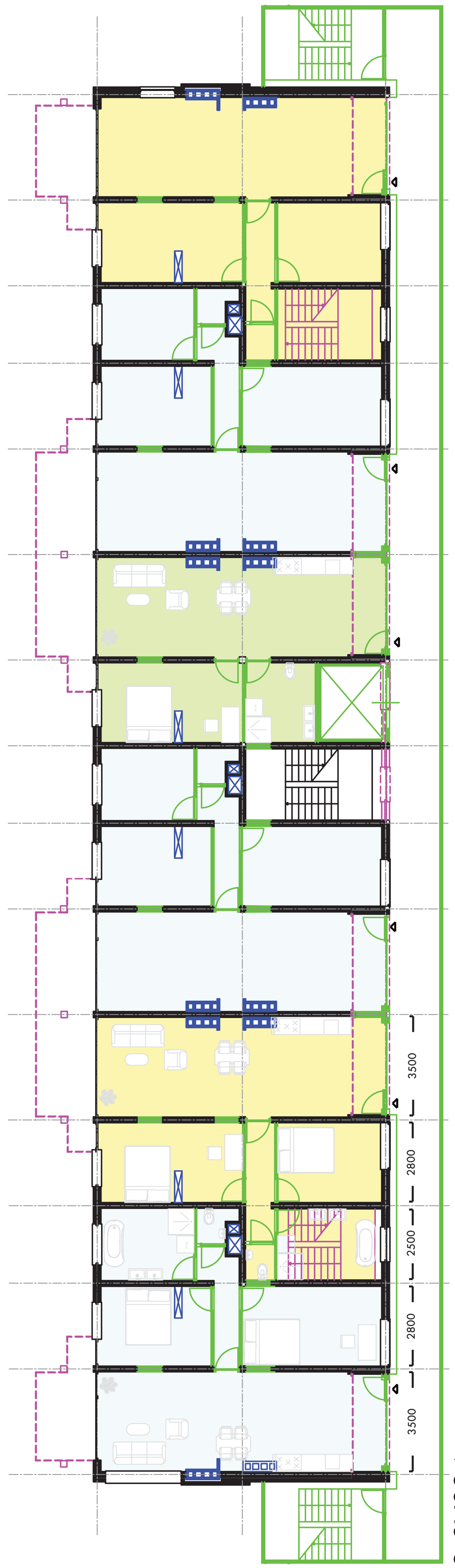


27 units

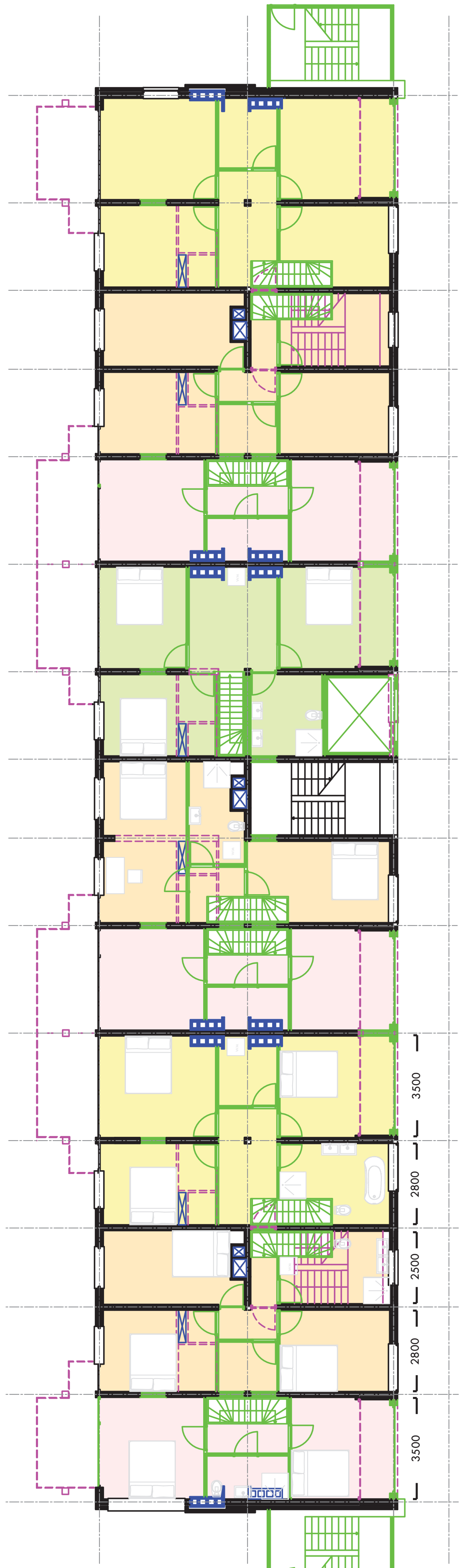


15x one level apartment 75
3x one level apartment 56

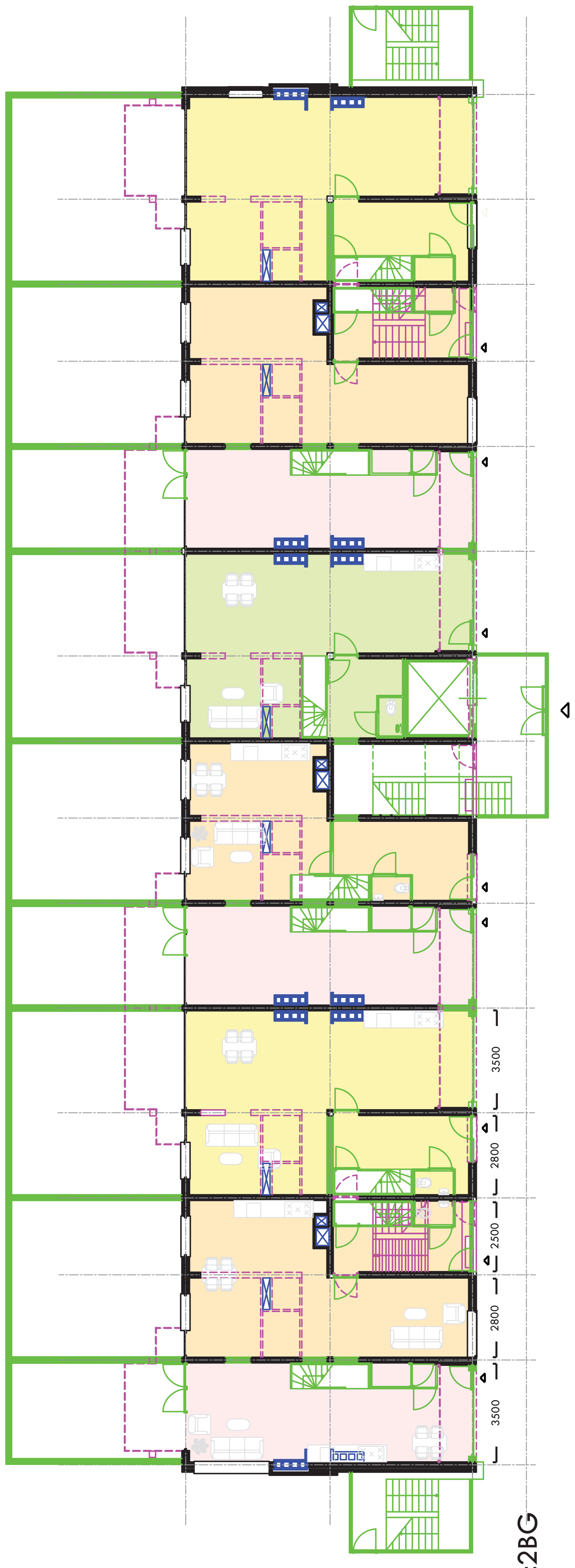
1x ground floor house 81
3x ground floor house 70
2x ground floor house 106
1x ground floor house 112
2x ground floor house 126



Sc2V234



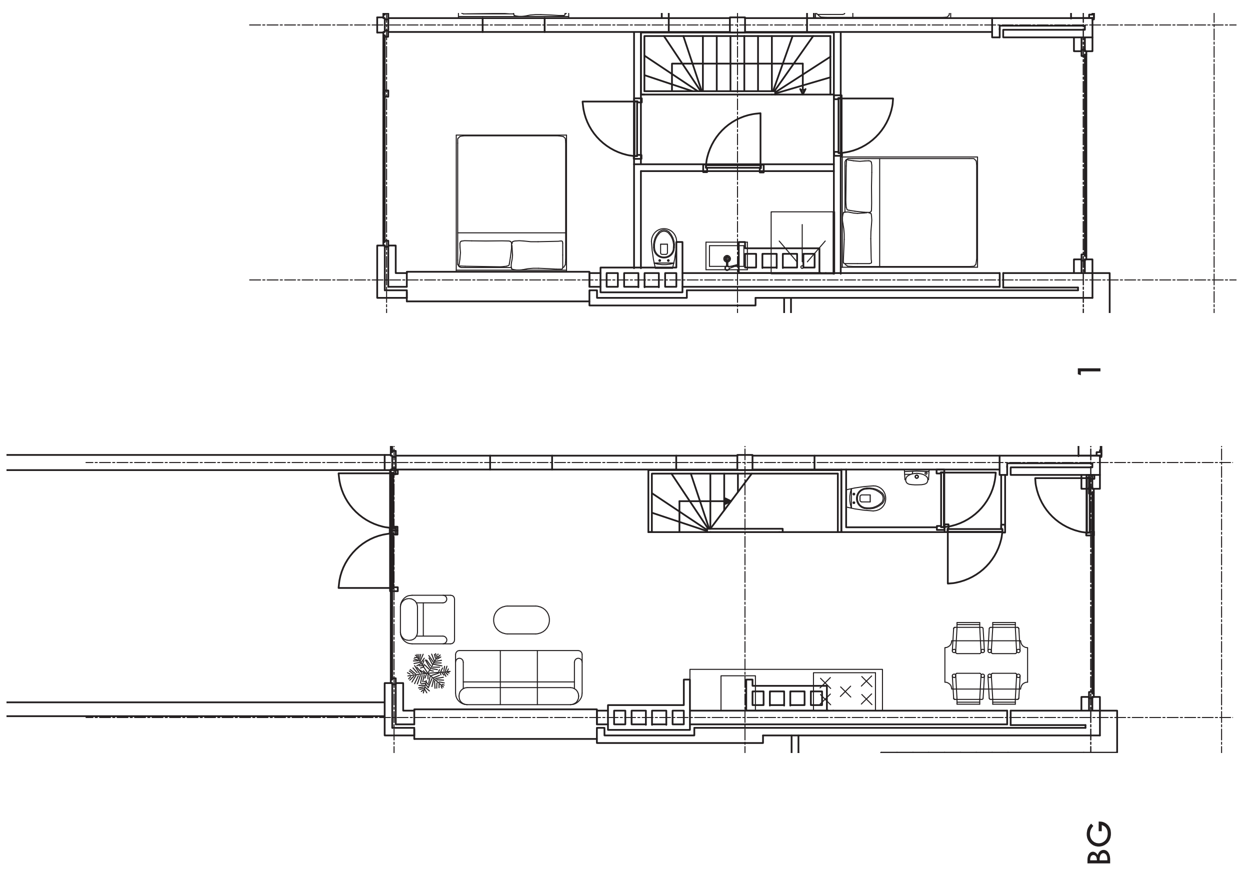
Sc2V1



Sc2BG

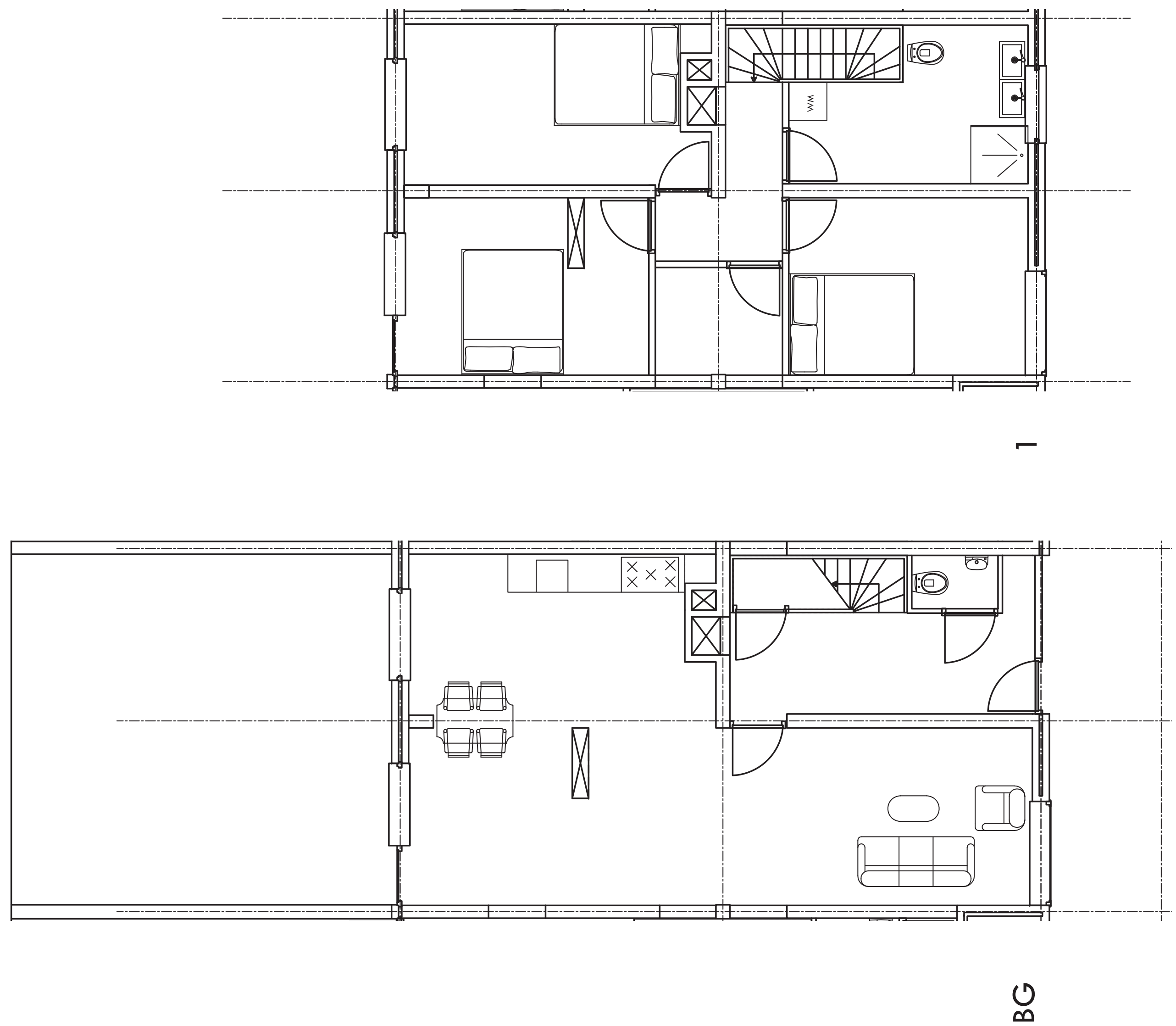
Typology of houses:

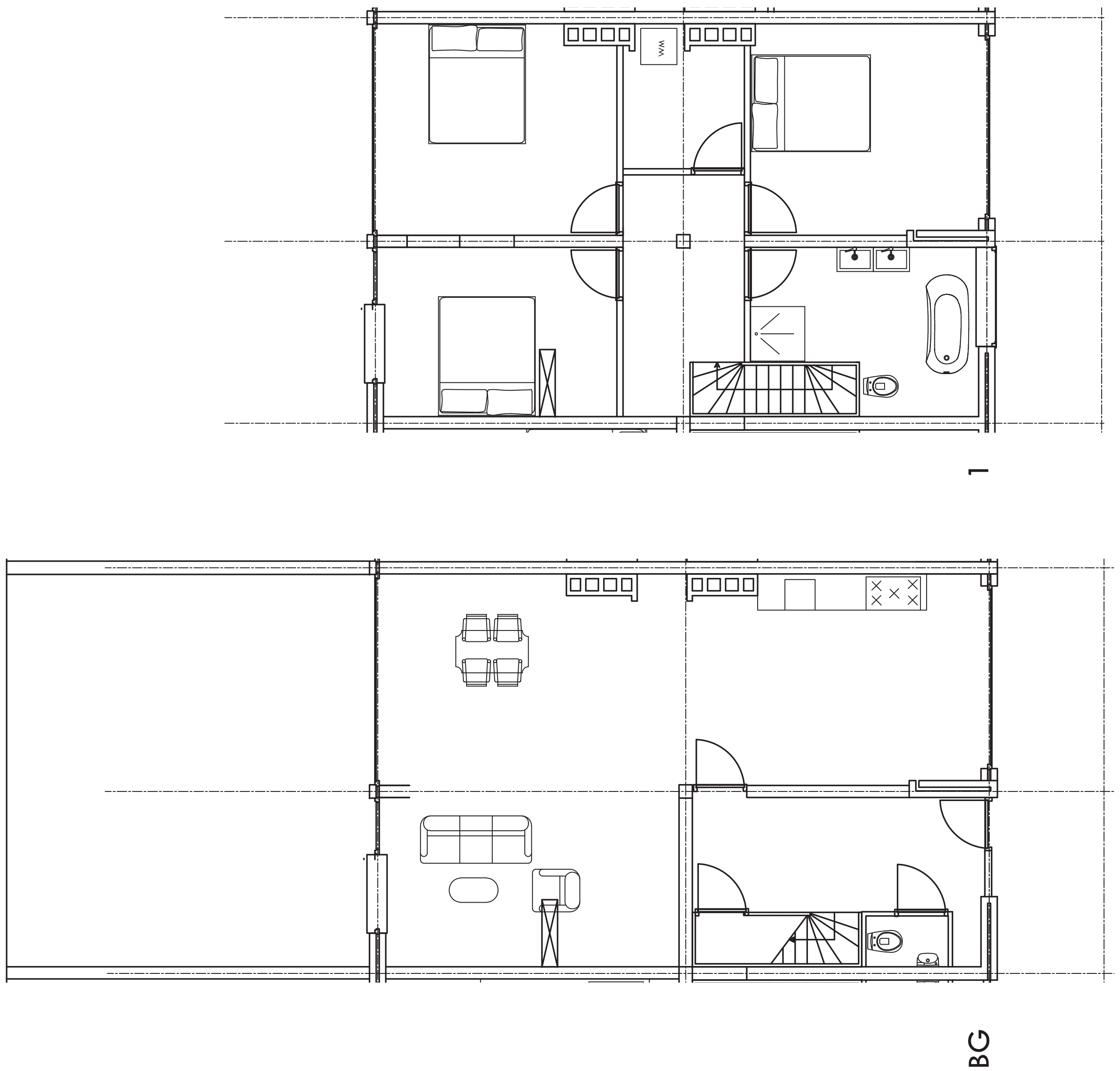
2 bedrooms with garden
70 m^2



Typology of houses:

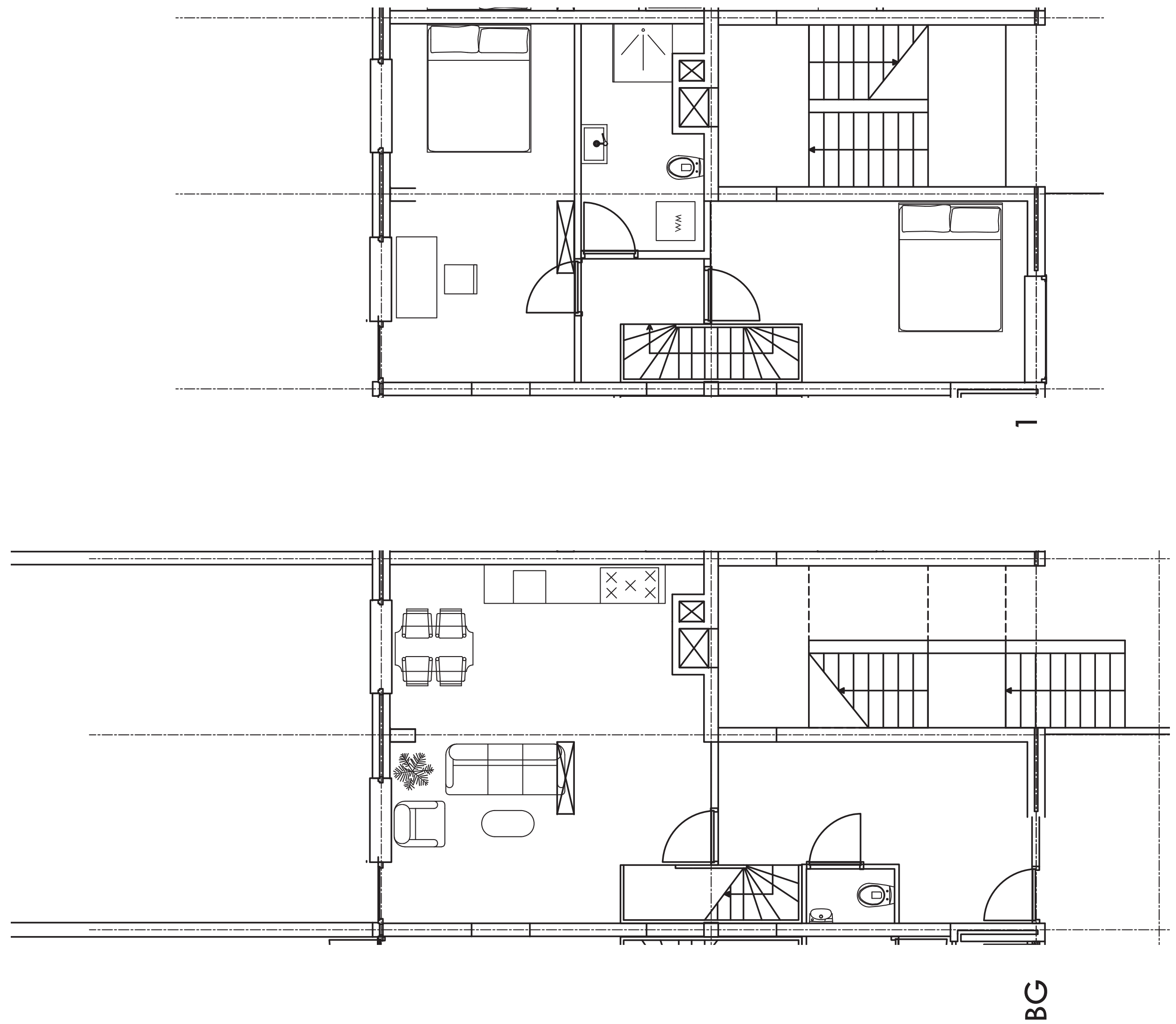
3 bedrooms with garden
106 m^2





Typology of houses:

3 bedrooms with garden
126 m^2

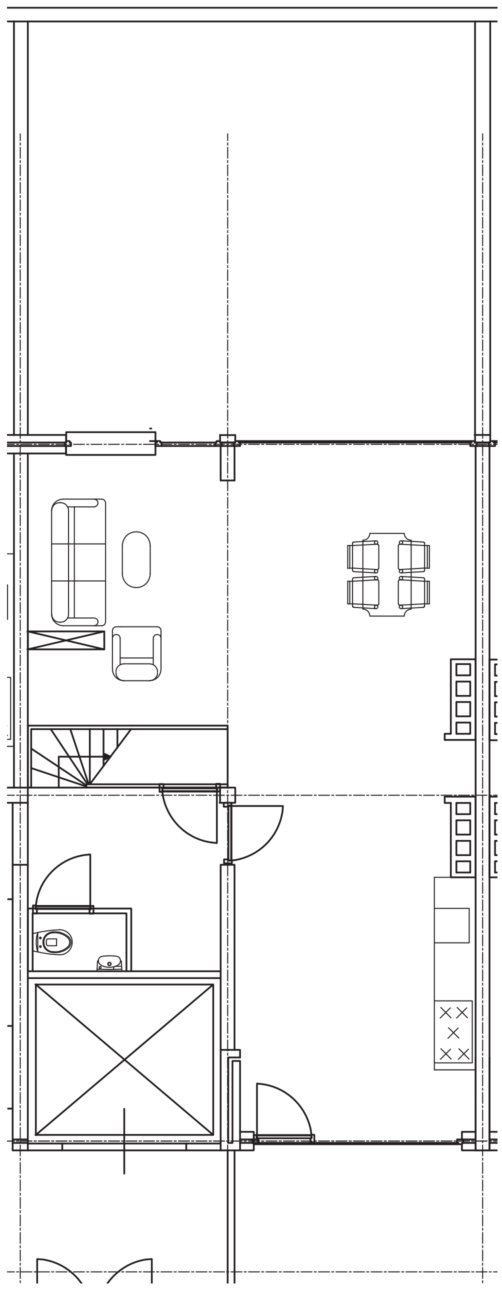


Typology of houses:

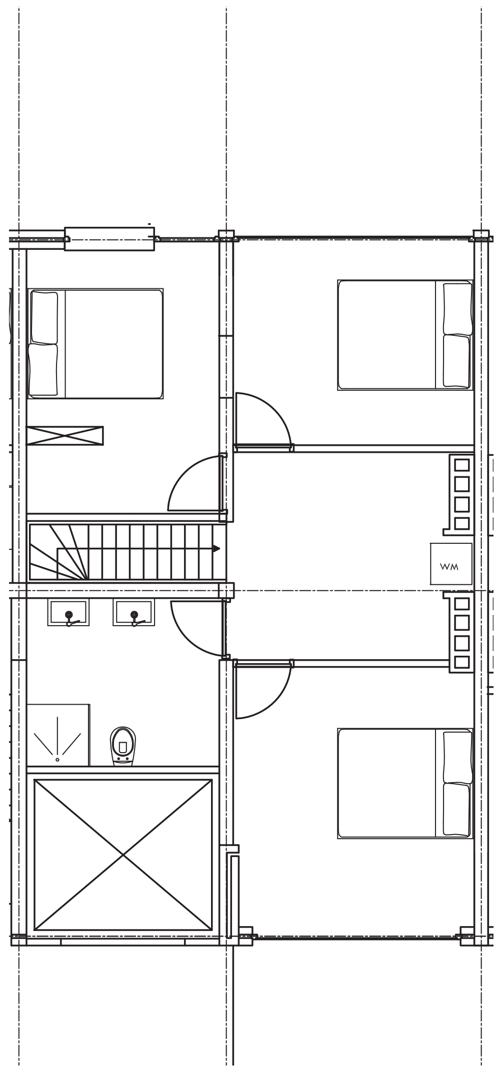
2 bedrooms with garden
81 m^2

Typology of houses:

3 bedrooms with garden
112 m^2



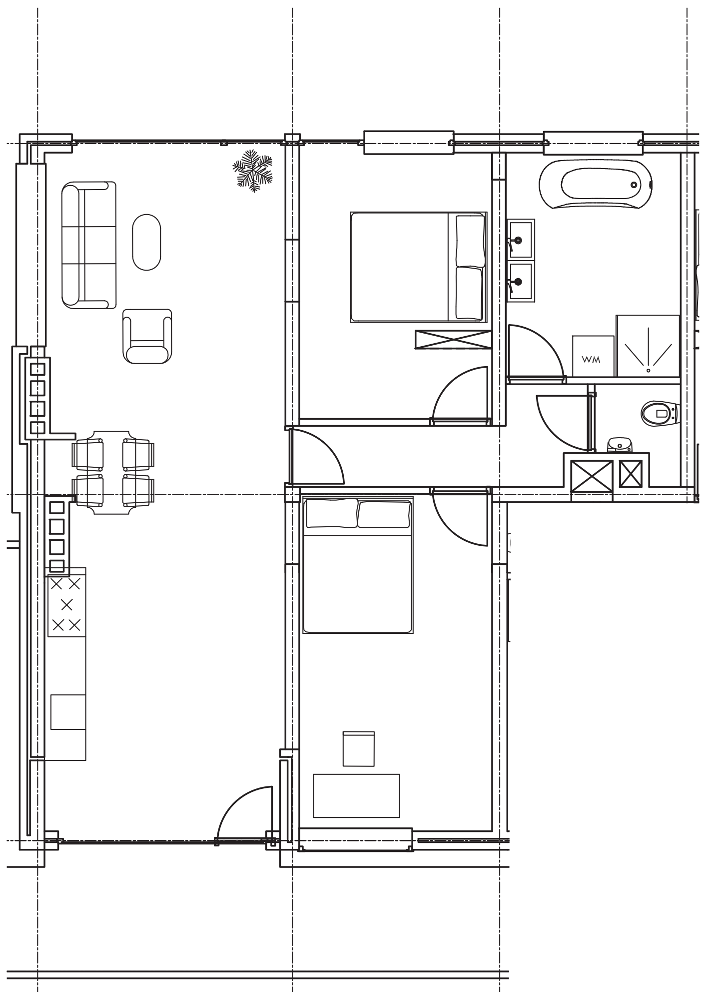
BG



1

Typology of houses:

2 bedroom apartment
75 m^2



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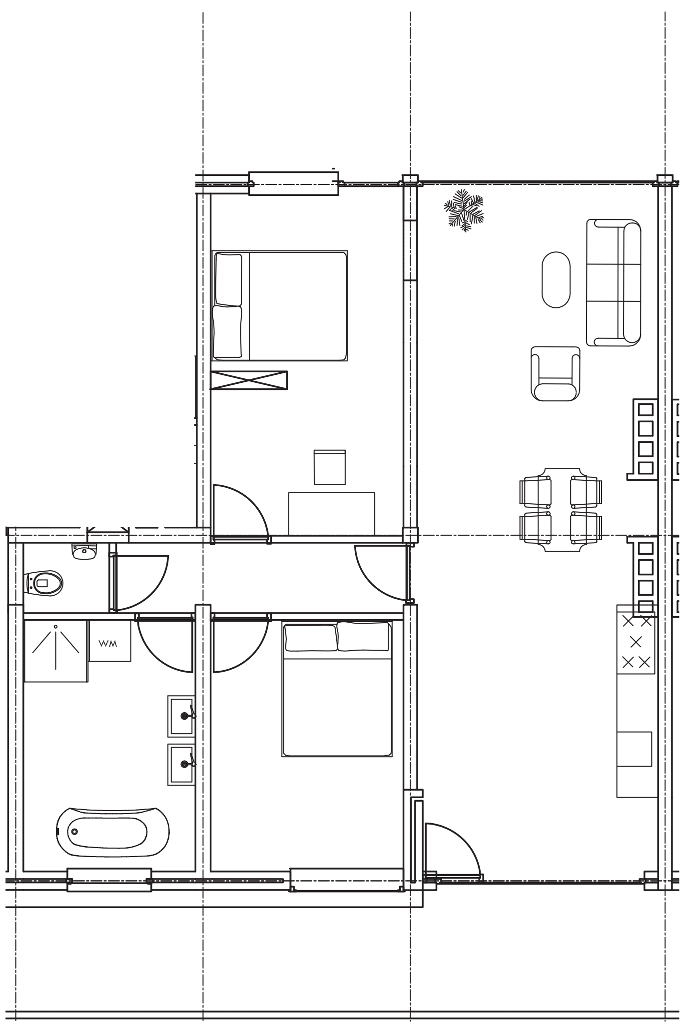
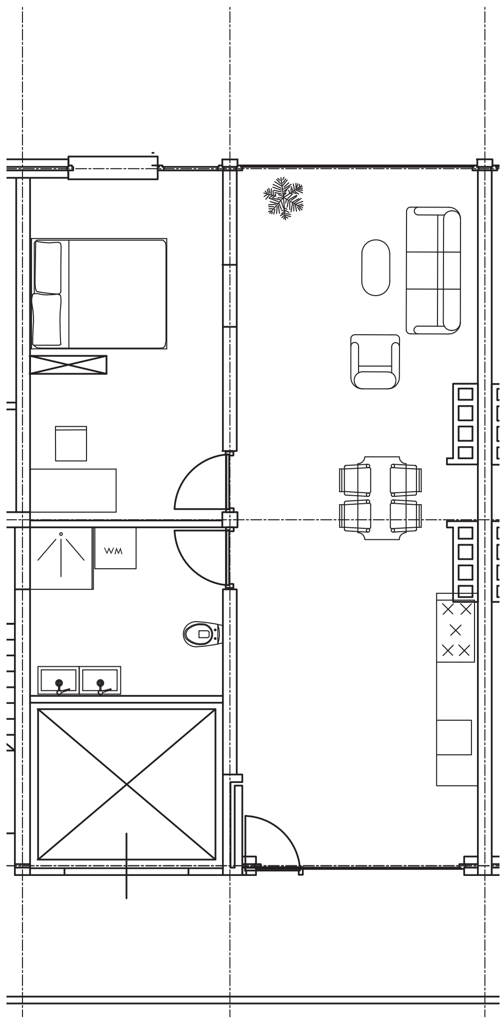


234

Typology of houses:

1 bedroom apartment
56 m^2



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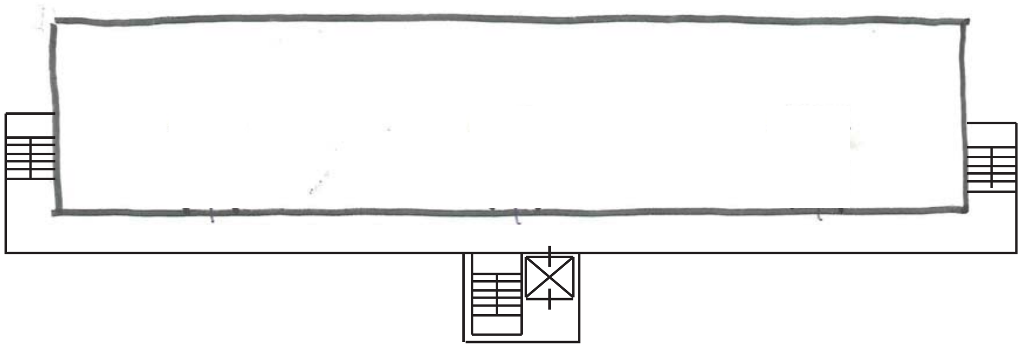
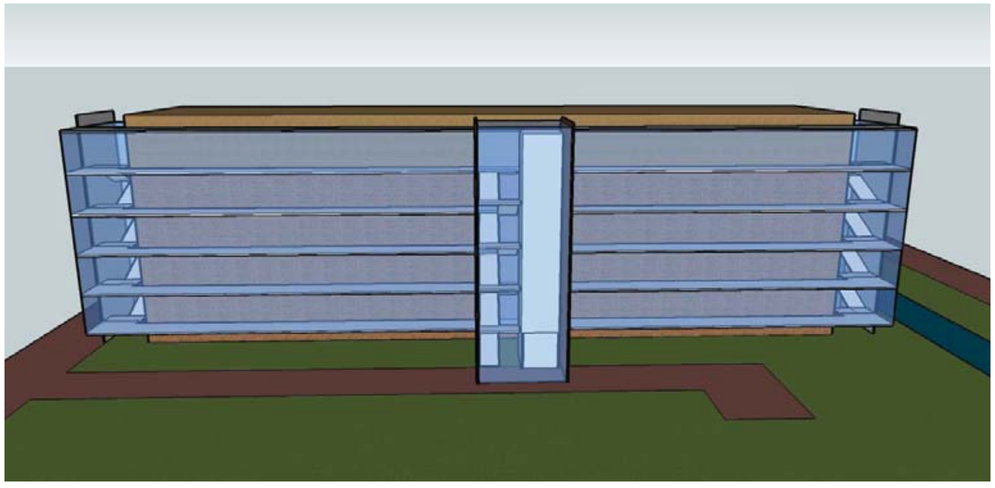
Scenario 3:
External elevator and walkway



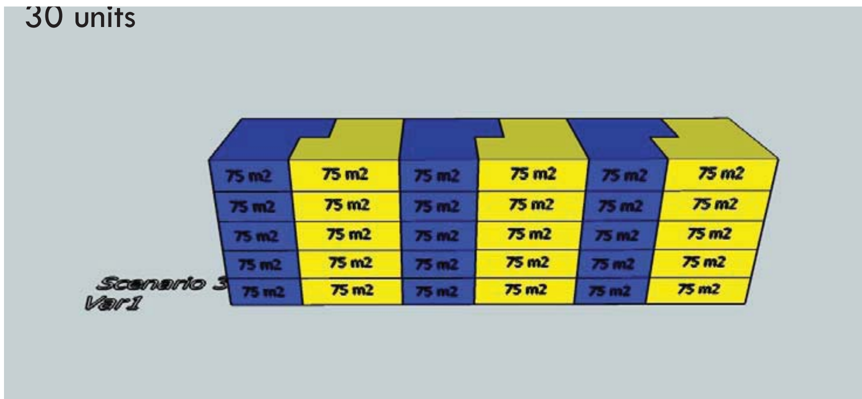


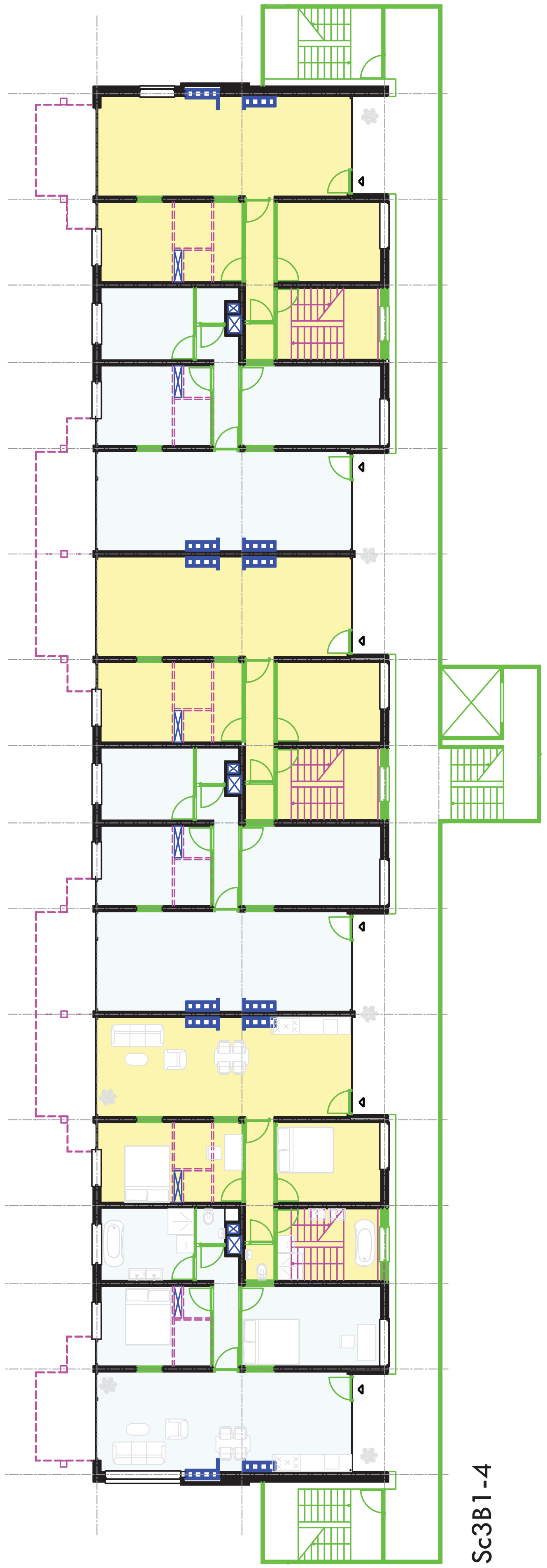
Typology:

One floor apartments

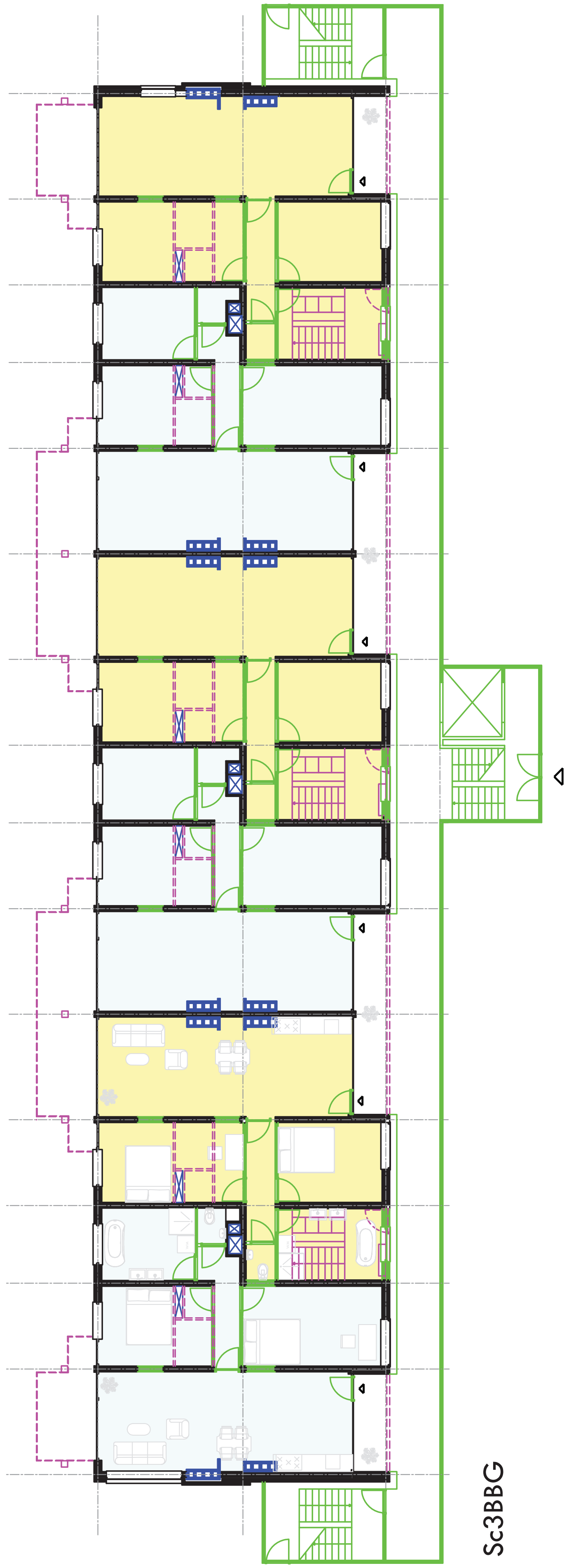
Goal: create elevator access for all apartments. The lay out of the apartments is suitable for (re)starters as well as elderly people. The A and B variants are mainly to explore the difference of creating more (different) apartments by restructuring.

30x apartment 75



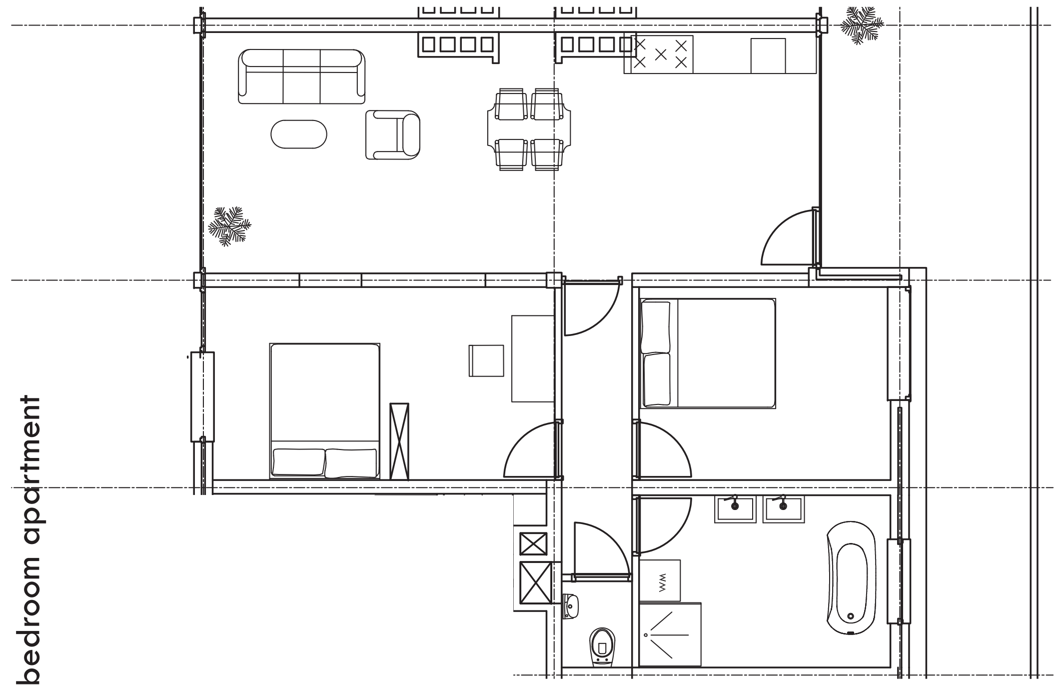


Sc3B1-4



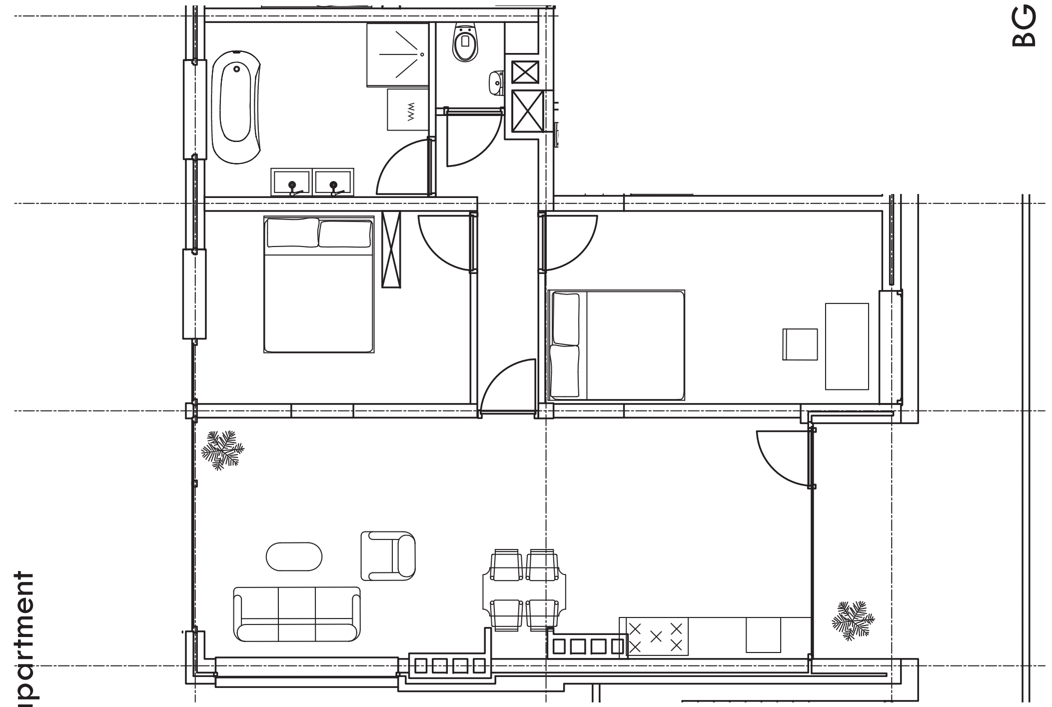
Sc3BBG

Typology of houses:



'right' 2 bedroom apartment
75 m^2

BG 1 2 3 4

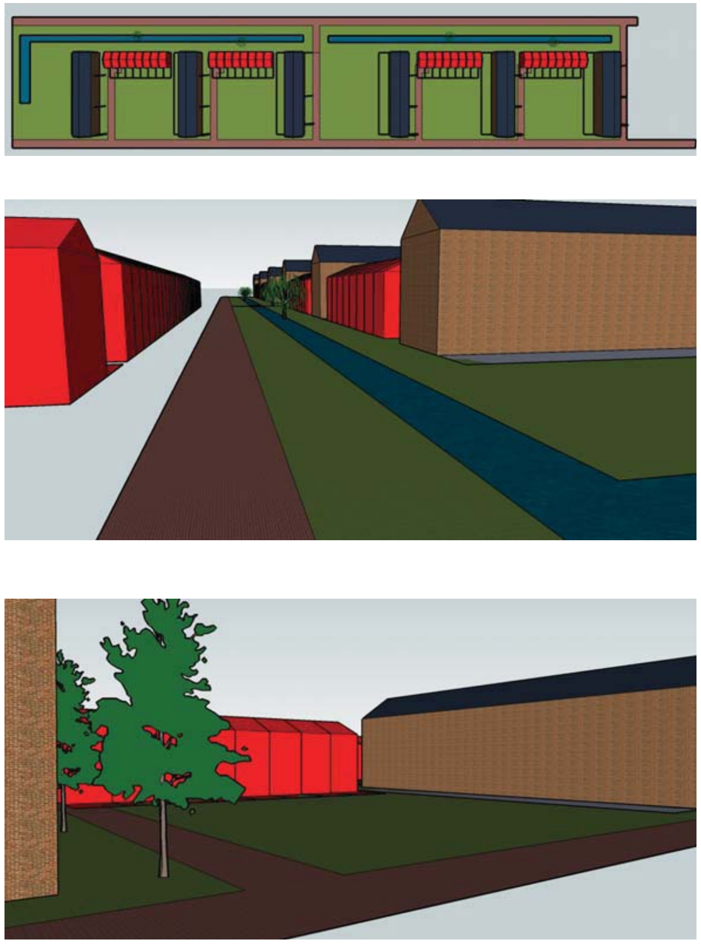


'left' 2 bedroom apartment
75 m^2

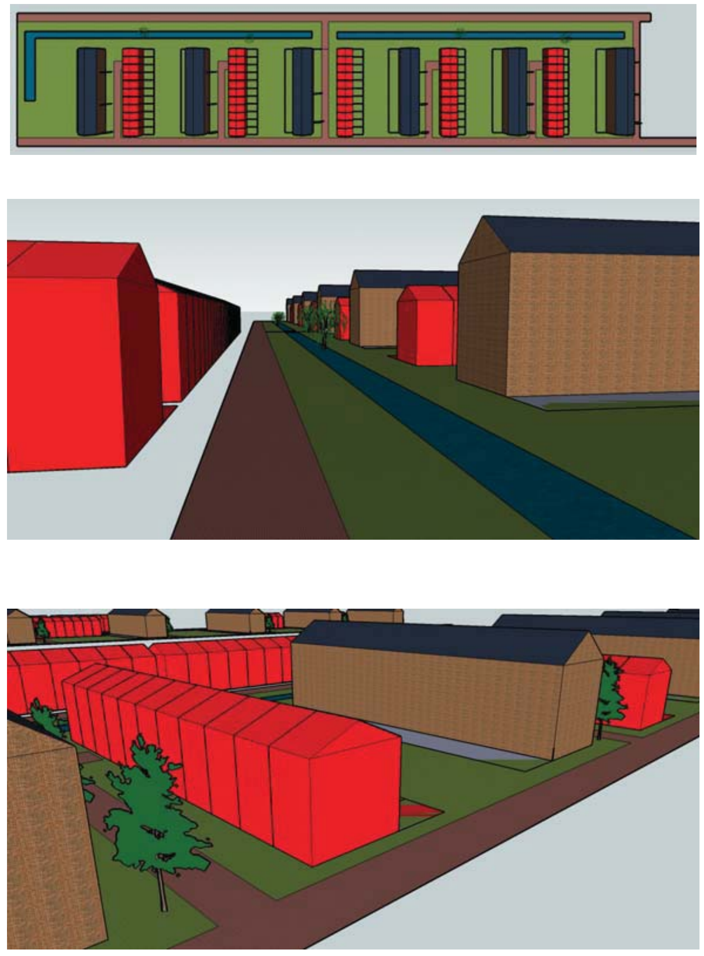
BG 1 2 3 4

Scenario addition:
Building new in between flat blocks

32 houses

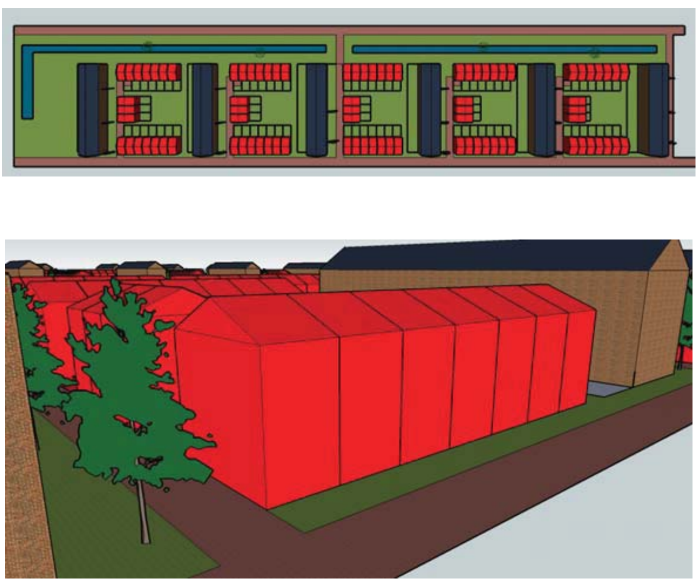


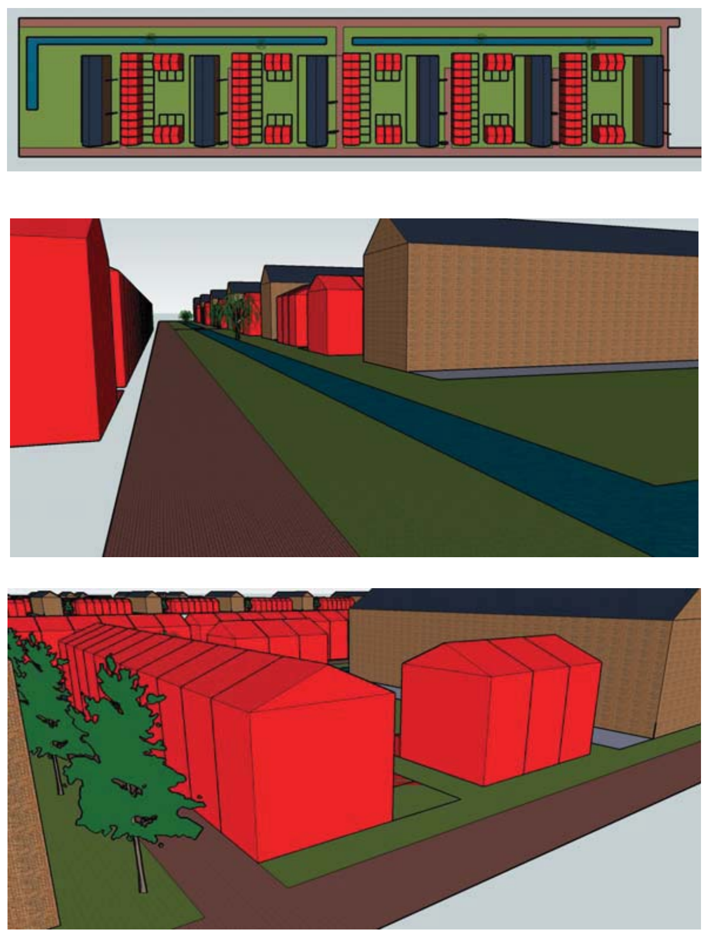
66 houses



Building new in between flat blocks

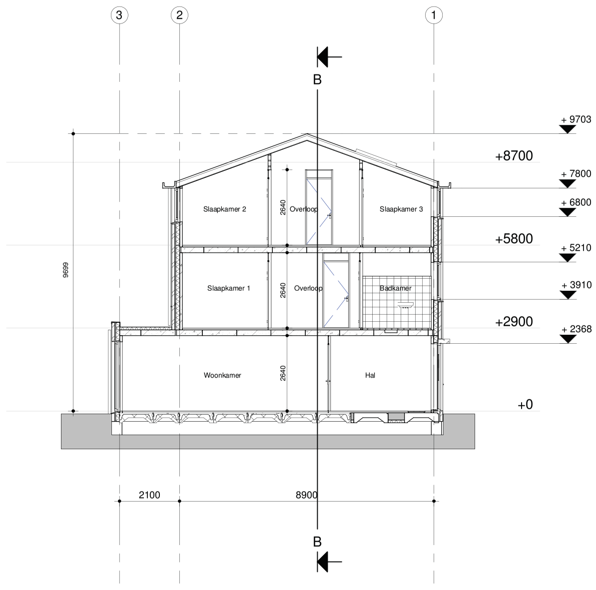
102 houses

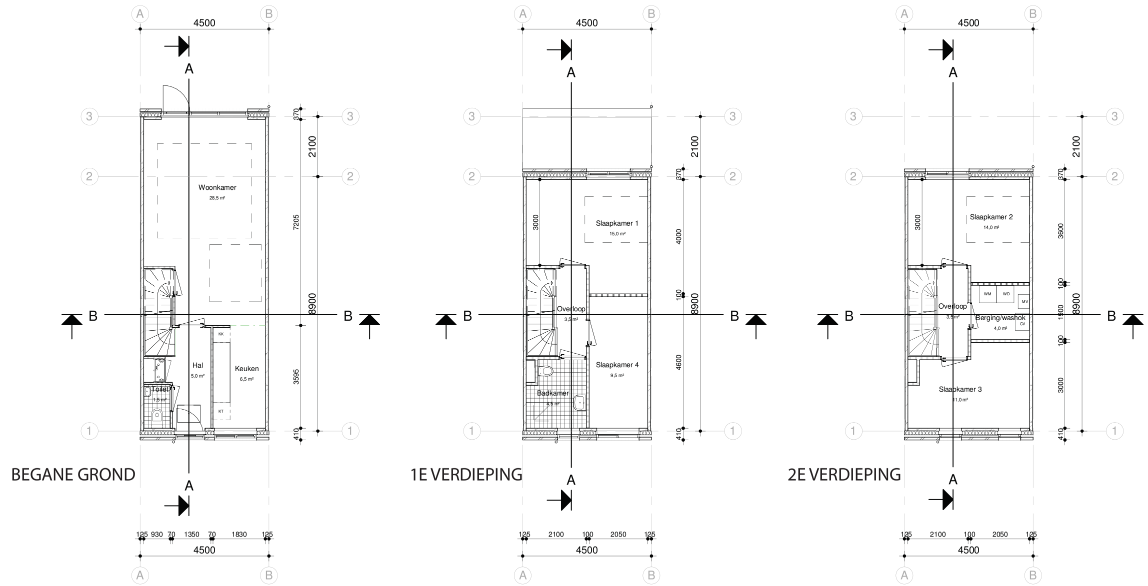


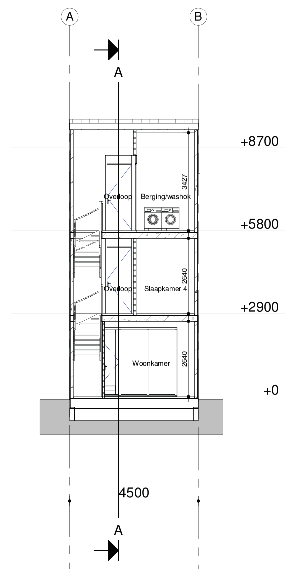


Scenario addition:
Building new in between flat blocks

building costs €75.000 - €85.000







APPENDIX II FEASIBILITY RESEARCH FLATS PROF. EVERTSLAAN, DELFT NL

1312537
Karen Blanksma

Analysis report

This document contains the feasibility research as part of the graduation research “Possible future role of architects and developers in reuse”.

TABLE OF CONTENTS

INTRODUCTION

This feasibility report is part of the research report which belongs to the research 'the changing role of the architect (and developers) in reuse. This feasibility analysis is executed as part of the research, the design approach or analysis from both RMIT as RE&H.

The target group chosen for the design is starters, as mentioned in §1.2 Design goal, page 7 of the research report and will be further explained in this document.
The approach of RE&H starts with a feasibility analysis on a number of subjects:

URBAN LEVEL

Context
Accessibility of the area in terms of access roads, public transport, highway or regional roads, walkways etc. What and where are the facilities? What kind of area is it? Green, urban, countryside? What kind of neighbourhood is it and what do I want it to be? What are the plans of housing corporation/municipality? How is the safety?

Sustainability
What is the social cohesion? How do people use their neighbourhood? How long do they live there? Are they involved in communal activities?

BUILDING LEVEL

Target group
What are the requirements of your target group? Any special needs?

Functional demands
Does the program fit in the building? What adaptations need to be made for the target group? Does it all work/function?

Technical demands
Does the program fit? What is the quality of construction? Can it hold changes in load distribution? Can I do /change this? Are the installations still ok?

Aesthetical demands
What changes are aesthetically ok? What is permitted and what not? Will the aesthetics committee agree?

Juridical demands
Does the building/interventions meet function zoning (bestemmingsplan)? Is everything in line with the Building Act?

Sustainability
New Building vs. Renovation; what will the ecological costs be in different scenarios?

Financial demands
Owner occupied or rental? What is the price going to be? What are the building costs per m^2? Are your functional demands feasible? Does this fit your target group? What are the prices in the direct neighbourhood? "GIY (BAR)[1]" for housing

This feasibility research focuses on financial advice; is reuse cheaper or more expensive than building new? Is there a difference in direct building costs between different scenarios, and what intervention costs the most?

[1] BAR = Bruto AanvangsRendement = Gross Initial Yield (GIY)

PART 1: ANALYSIS

Analysis of the location

Urban context

The professorenbuurt is part of the district Wippolder. This area is situated on the east –south east of the city centre of Delft. Wippolder was called 'the red village' because it was constructed by the Algemene Woningbouwvereniging Volkshuisvesting, a housing corporation started by the working class of Delft. Before the war, they constructed the area of the Koningin Emmalaan, which was the pride of the corporation. These houses have a bathroom and kitchen. After WW2, building material became scarce and the municipality helped to create the rest of the neighbourhood to meet the demand for cheap housing.

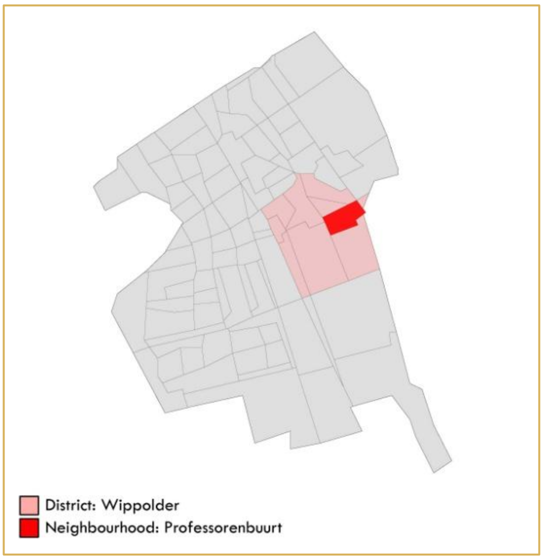


Fig. 1: Neighbourhood and district in the city of Delft (after: wiki/CBS)

Now the area is a mix between social rentals, some private rentals, owner occupied housing, and some owner occupied houses that are salary bound ('social buy'). There is a wide spread of typology: flats, low flats, family houses and villas. This makes this neighbourhood a post war housing area, but with a lot of variety (dense urban family housing to flats with lots of open green space). This variety provides a mixed demographic of students, elderly people, families and young couples. Because of the high concentration of student housing in the higher flats, there are relatively more people between 14-34 than average for Delft city.

This mix seems to be working in the sense that the area does not look deteriorated or slum-like, but it shows that the area has not been upgraded for a while . The feeling about the neighbourhood is comparable to the Hof van Delft, a highly attractive neighbourhood for (starting) families. According to criminality statistics burglary and theft from/off cars is relative high, but one has to keep in mind that the district the police counts as Wippolder also involves Ruiven and Schieweg, what are mostly industrial areas. Improving social control and minimizing opportunities for crime are always a good ambition.

The professorenbuurt is surrounded by access roads and public transport. There is a quick access to the A13 highway, the centre of Delft and neighbouring villages like Pijnacker, Delfgauw and Zoetemeer. Thanks to the university and the proximity of a regional road, four busses cross the area. The most important bus line for the area is line 121 to Zoetemeer, it has two stops in the heart of the neighbourhood. This bus passes 4-6 times during rush hour, and twice an hour on other hours and days, accept for Sunday. All busses pass Zuidpoort and Delft central station, so the city centre and station are accessible by public transport.

More close to the area is the Nassaulaan, the nearest street with facilities like a school, supermarket, health centre and some various retail businesses like flower shop, hobby fishing shop and tobacco store. This street is a approximately 5 minute bike and a 10 minute walk.
It seems that the accessibility is sufficient. This does not mean that the introduction of a new function in the area can't have an added value.

The municipality of Delft does not have special plans for this neighbourhood in particular. In general the municipality wants to offer graduates from the university a chance to stay in Delft. There is still a shortage of student housing as well. The municipality also thinks that the housing stock of the city is rather limited to social housing. They want more family houses and houses in the more expensive category. In other words: they are looking for more (highly educated) wealthy people to live in Delft.

Social cohesion and other social aspects

Some of the inhabitants have lived in the area since they were born, and/or since the apartments were built. For them, it would be great if they could stay.

It has been said that some inhabitants do not want another large scale student housing project. Although it has something to do with the trouble students cause, they also think that there is not enough social housing and do not want to sacrifice the apartments at prof. Evertslaan for student housing. This feeling of shortage of social housing is probably because of graduates and starters living in social rental houses. Giving them an opportunity to move, might ease the stress on the social housing market. Other than the usual worries about students, there is no reason to believe this mix is not working.

A mixed target group (thus not only starters) could be a nice representative for this area, but more student housing seems to not be an option.

When it comes to social activities, Vestia seems to be most supportive. They were happy to support the initiative of neighbours for communal herbs and groceries gardens, and are actively organizing social activities. This is something that can be easily stimulated by creating facilities and space for interaction.

Analysis of the building and direct environment

Target group

There are different kinds of starters. For example, graduates that move out of their student house, singles that need space to live after a divorce, young newlywed couples that move out of their parents house, and so on. All these different groups of starters have different wishes for their homes/location near or in a city and they have different amounts of money to spend[2].

Recognition that a mix of younger, older, a little bit wealthy and not so rich in the neighbourhood can be reflected in the building, means that the target group needs expansion. For the first analysis the focus remains on starters/2 person households.

Desired program:

- Apartment, rent
- 2 bedrooms
- Extra (small) room preferred over separate room with washing machine
- Spacious living room
- Outside space, garden preferred, balcony okay
- Near parking

Building characteristics

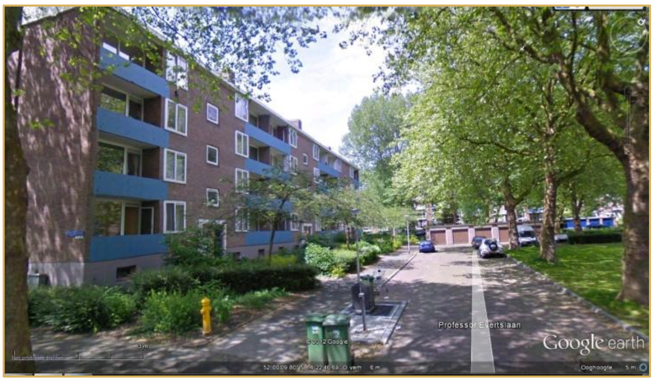


Fig. 2: front facade of the flat

Fig. 3: Back facade of the flat

The flats of prof. Evertslaan are a typical example of post-war architecture. A lot of these portiekflats are constructed to deal with the housing shortage after WW2.

The flat is built on a alternating grid of 3.5m, 2.8m and 2.5m, representing span for the living area, sleeping/kitchen area and stairs/small bedroom area. Maximum depth is 5m. Total sizes are 10m in depth, total length is 48m and total height 14m, including an attic for storage. This attic is only accessible for the top floors through a loft ladder. Free floor height is 2.6m, except for the top floor that is 2.5m. A staircase gives access to a total of 8 apartments, left and right. This unit is repeated three times, so the flat houses 24 apartments. A semi-underground basement gives room for more storage.

[2] www.startersaanzet.nl

The load bearing structure is made of concrete hollow masonry blocks, as are the floors. The facades are of cavity masonry. The stairs and balconies are made out of prefab concrete elements. The huge glass windows are carried by wooden window frames that are brownish (painted or stained).

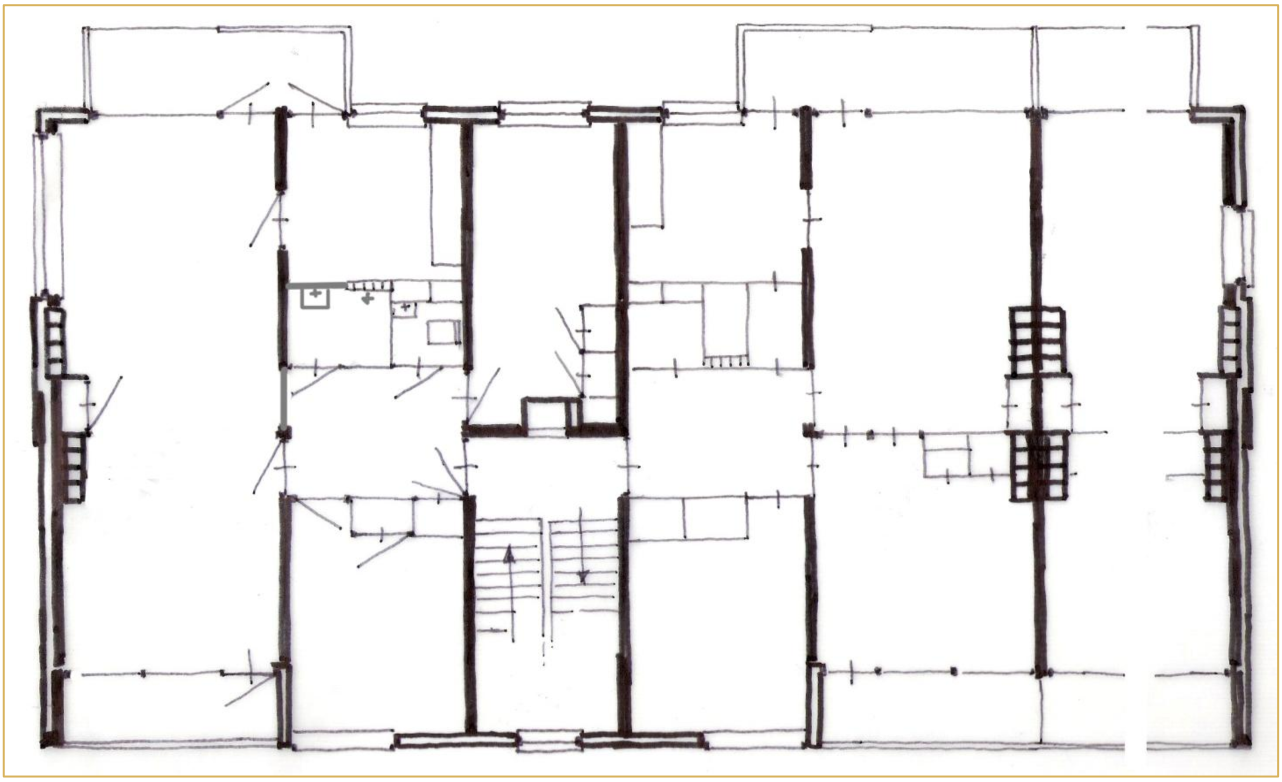


Fig. 4: repetitive unit of the floor plan

Functional description

Apartments on the left (seen from the front of the building) have an extra room, so they are slightly bigger. Plus, top floor apartments have access to an attic that is as big as the apartment itself (with sloping roof). This makes 4 types of housing per repetitive unit:

I: 3 room apartment (±70 m^2) (3x)

II: 2 room apartment (±60 m^2) (3x)

III: 3 room apartment + attic (±140 m^2) (1x)

IV: 2 room apartment + attic (±120 m^2) (1x)

Conclusion: It is safe to say the program will fit, although a closer look at the use of the attic is advised. An elevator suits modern standards, but this is not a must.

Technical demands

INSTALLATIONS

It is safe to say the installations (air, water and heating) are outdated. A gas heater and geyser prohibits the use of mechanical ventilation.. To meet current standards, central heating and mechanical ventilation have to be installed. If the plumbing is still copper or other metal, this must be replaced.

Momentarily there is no elevator present. Introduction of an elevator might increase the attractiveness of the apartments, but this is not a must.

CONSTRUCTION
Until proven otherwise, there is no reason to say the load bearing structure is incapable of handling changes, or that the construction has lost load bearing capability over the years. However, the steel reinforcement in the floors may have started to corrode, due to the thin covering layer.

Aesthetical demands

These flats are not protected by any monumental law. However, the aesthetics committee may consider the context of the neighbourhood as important. Given the fact that the majority of the housing in the environment was built in the first period after the war, a hyper modern building might be out of place. The already approved family houses that will replace the flats at prof. Telderslaan can give an idea what is appropriate for this neighbourhood, see fig. 4.

Fig. 5: Facade impression from the family housing that will replace the flats of Telderslaan. The architecture is very modest and fits the neighbourhood.

Juridical demands

ZONE PLANNING
The function of the area is destined to be housing, and will stay housing. No problems are expected with regard to the zoning of functions in Delft.

THERMAL INSULATION
According to the renewed NEN8700 standards (2012) a renovated building must meet the minimum Rc of 1,3 m^2K/W for non-windows and -doors. This is not met for any of the walls. The requirement of newly built buildings would be 3,5 m^2K/W, but this is not necessarily the demand for renovated buildings. Currently the building is not insulated at all, accept for the double glazed windows. The building has to be insulated if redeveloped to a minimum of 1,3 m^2K/W.

SOUND INSULATION
Thin floors provide no insulation considering sound, mainly contact sound. The walls made out of concrete masonry provide some, 22 cm is sufficient for room to room sound proofing, but not for housing dividing walls. Extra insulation on the floors and house dividing walls are necessary.

Sustainability

One of the stronger arguments for redevelopment would be that renovation is more sustainable than demolishing and building new, or even doing nothing with the building. Of course there are also other arguments that can be called sustainable, such as the flexibility or adaptability of the project. The focus here is on the footprint or eco costs of the project. This will be done with the Winket method, where reference costs are available to calculate the EVR, or eco costs / value ratio. In the future, it might be the case that these eco costs are passed through to the tenant, making it a part of the feasibility as such.

Financial demands

Depending on the scenario, there are options for social rental, social buy, buy and private rental in different combinations. It depends on the different scenarios what mix is desired.

AS RENT
For social rentals the rent is max. €681,- per month for 2013, regardless of the size of the housing[3].

The rent for the free sector is determined by a point system and depends on a variety of issues. For example, the number and size of the rooms, entrance to the house, garden/communal space etc.[4]. The average rent in the free sector in Delft is €967,- per month. [5] For now, there are no rentals in the free sector in the Professorenbuurt.

Because of the lack of affordable rentals, the advice would be to rent out the new apartments.

AS BUY
Although the focus is on renting out the flats, it might be interesting to keep in mind what the possibilities are if the apartments would be sold. The maximum loan for single starters with an income of €25.000,- is €115.022,-[6] (based on a starters position with no former loan, residual house value/loan or alimentation). The loan for an average income of €33.000 a year is €154.000.

In the neighbourhood comparable houses cost €200.000,- for a house with garden, €100.000 for an apartment. The villas are estimated at around €400.00,-

Corporations that have apartments 'for sale' (sort of social buy construction) often ask x-time the year's rent price as purchase price for the house, where the x might be around 15.

[3] http://www.rijksoverheid.nl/onderwerpen/huurwoning/vraag-en-antwoord/wat-is-een-sociale-huurwoning-en-wanneer-kom-ik-daarvoor-in-aanmerking.html
[4] http://www.huurcommissie.nl/huurprijscheck/
[5] http://www.delftopzondag.nl/onroerend-goed/schaarste-op-de-particuliere-huurwoningmarkt-toegenomen
[6] http://www.hypotheker.nl/Hypotheken/Ik+wil+een+woning+kopen/Hoeveel+kan+ik+lenen/Bereken+maximale+leenbedrag/default.htm

PART 2: SCENARIOS

These scenarios are developed with the (architectural) analysis in mind. Each scenario is a possible answer to problems, solved in different ways. This way we are able to see the difference in intervention level, adding an elevator and the reorganisation of apartments within or across the existing apartment/building envelope.

Creating scenarios is necessary to get a grip on the abundance of architectural possibilities. After establishing these variants, they can be used for financial calculations and for a multi criteria analysis. This way it is possible to see difference in appearance, costs and functionality for different target groups.

SCENARIO 1 is based on a renovation level where the existing apartments are restructured. The goal is to create as many ground accessible (family) houses as possible and create a more diverse offering of 1 or 2 person apartments. The target group will be diverse, just like the area, but interchangeable; a family house with garden can be occupied by a starters couple that want more space than the minimum, or by a family with children that want a garden instead of an apartment.

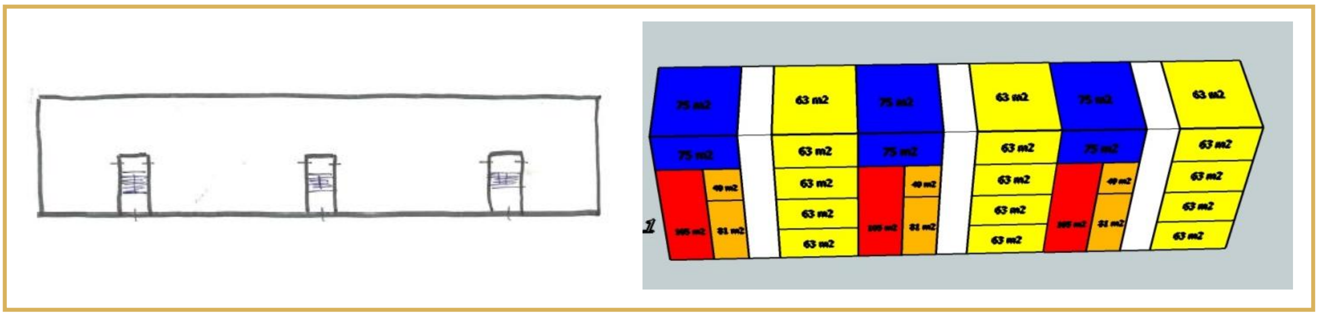


Fig. 6: Organisation of scenario 1

This creates 24 units:

3x +attic apartment 75+ m^2
3x +attic apartment 63+ m^2
6x one level apartment 63 m^2
3x one level apartment 40 m^2
3x ground floor house 105 m^2
3x ground floor house 80 m^2
3x one level ground floor house 63 m^2

SCENARIO 2 adds an elevator within the existing structure, granting the top floor apartments access by elevator. The ground floor houses are restructured to create as many family houses with a garden as possible. This will create a lively plinth with families on the bottom and 1-2 person apartments suitable for starters and elderly people.

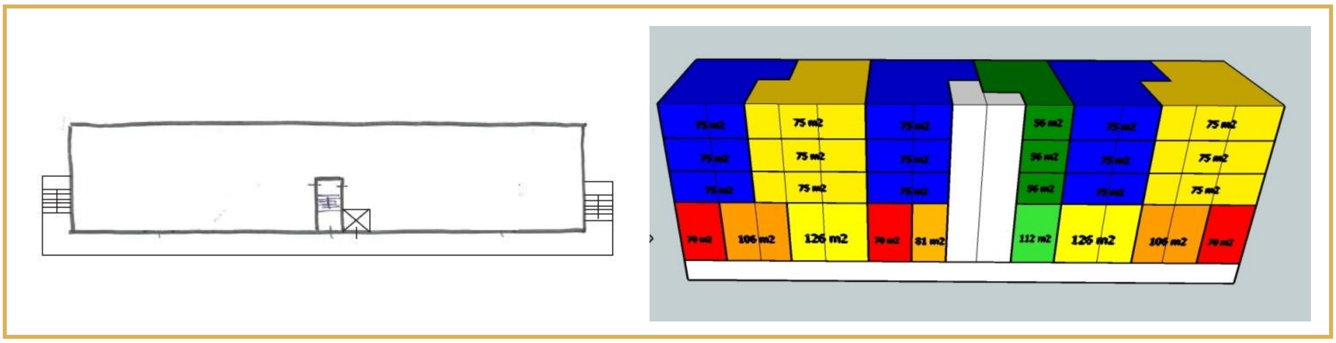


Fig. 7: Orgaisation of scenario 2

This creates 27 units:

15x one level apartment 75 m^2
3x one level apartment 56 m^2
1x ground floor house 81 m^2
3x ground floor house 70 m^2
2x ground floor house 106 m^2
1x ground floor house 112 m^2
2x ground floor house 126 m^2

SCENARIO 3 adds an external elevator and walkways to access all apartments. The apartments are minimally restructured and approximately the same size as before.

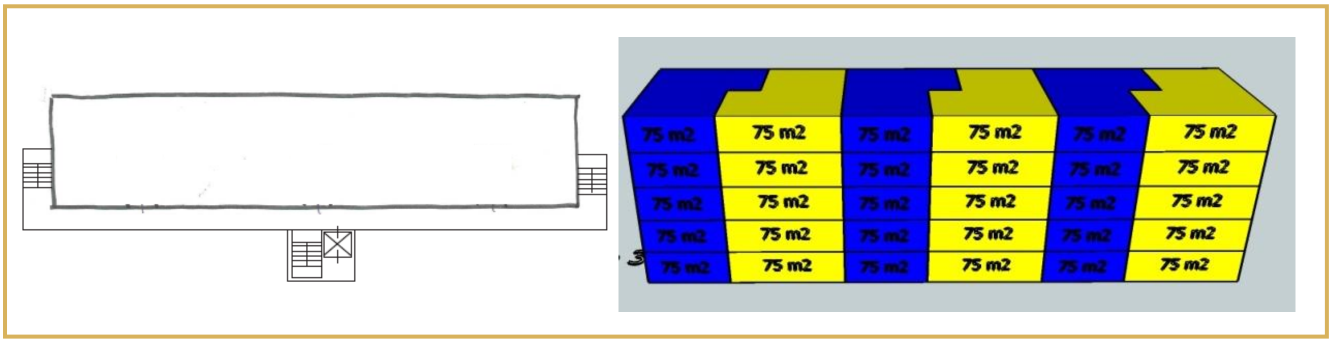


Fig. 8: Organisation of scenario 3

This creates (A) 30 units of 75 m^2

Financial calculations[7]

With the scenarios established, it is possible to determine the financial feasibility by calculating what each scenario would cost. Feasible means that the yield minus costs is equal or larger than 0, thus

FORMULA 1:

$$Feasible = yield - investment \geq 0$$

For renovating an existing building, all variables are displayed in fig. 9.

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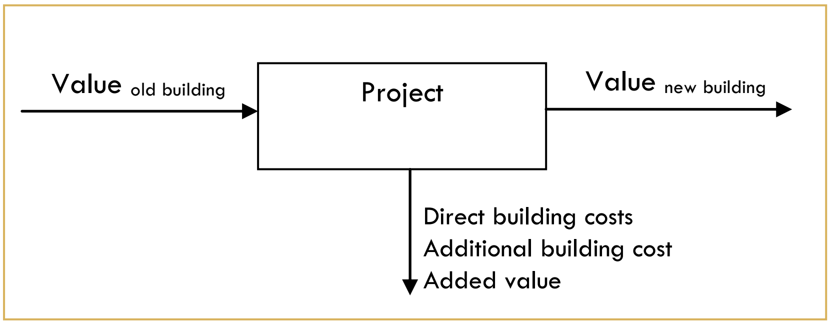

Fig. 9: Scheme of increased value through redevelopment (after De Jong, 2012, p. 4)

In formula fig. 9 looks like

FORMULA 2:

$$Value_{old\ building} + added\ value + direct\ \ building\ costs\ + \ additional\ building\ cost = Value_{new\ building}$$

Where the $Value_{old\ building}$ can be calculated with

FORMULA 3:

$$Value_{old\ building} = \#apartments * years'\ rent * exploitation\ time\ (y)$$

What is more or less the same as the total yield over that exploitation time. The direct building costs are calculated by a Winket (2013) reference project.[8] For an estimation of the additional building costs the next formula is used:

FORMULA 4:

$$Additional\ building\ costs = \ Value_{old\ building} * 10\% * project\ duration\ (y) + \ direct\ building\ costs * 5\% * project\ duration\ (y) + \ direct\ building\ costs * 10\%$$[9]

This formula is an estimation of all extra costs on top of the direct building costs, including fees, permits, loss of income during building, financing, rent, management etc.

The added value can be described as quality or improvement of the building by investing in the building (a project does not necessarily add value). This added value is not included in further calculations because the question was whether the level of intervention is affordable, not what the added value is.

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[7] See the appendices for the full direct building costs calculation sheets
[8] See appendix for the complete analysis
[9] According to ing. P. de Jong.

As a result of removing the added value from the equation, the term $Value_{new\ building}$ cannot be used to indicate the value of the new building anymore. According to definition standards this per definition includes added value.

Instead, the investment (solely the direct building costs and additional building costs) are a measurement for the new rent levels *based on breaking even*. In formula form, with the help of formula 3 this will look like

FORMULA 5:

$$Investment\ (Value_{old\ building} + \ total\ building\ costs) = \#apartments * years'\ rent * exploitation\ time\ (y)$$

How to interpret all above, may differ per situation. For instance, the $Value_{old\ building}$ may differ whether the owner is developing, or if the building is first sold and developed by a new owner. This makes the interpretation of the formulas slightly different. To be able to say something about the differences, we have to make some assumptions. These are mentioned in **orange**.

Assumption 1: after 50 years the building has depreciated and can be exploited for no more than 10 years without intervention. After this period, it will be 30 years since the last major maintenance.

An estimation of the rent can be derived from the point system available online[10].

When we have the new of the building, there are several ways to calculate the rent prices per month. Note that these are rent prices *meant to break even*.

In this case calculations will be made for:

1. Spreading cost over the number of units;
2. Spreading cost over the number of square metres.

As can be seen in formula 3 and 5, there is also a time factor involved. The feasibility is dependent on the exploitation time. Therefore exploitation times of 15 to 30 years are displayed with a 5 year interval.

[10] http://www.rijksoverheid.nl/onderwerpen/huurwoning/puntensysteem-huurwoning/puntensysteem-zelfstandige-woning

Development by the owner

According to the point system for rent, the monthly rent is maximum € 608,- and € 538,-. This brings the current value to € 2.062.800,-[11]. However, this is not realistic and can only be achieved when the building is filled with new tenants this year.

Therefore I assume

Assumption 2: $Value_{old\ buidling} = 0$

FORMULA 6:

$$Investment = direct\ building\ cost + additional\ cost$$

The owner does lose money during the building period (see formula 4), so for calculating the additional building costs there should be a value. An estimation for the average rent can be made from looking at the amount of time people have lived in the flats. In figure 10 we can see that the majority of the tenants live there for so long that the average rent is left from the centre point.

Assumption 3: the loss of income during building period will be calculated with an average rent of €400,- a month per apartment.

Fig. 10: Choosing an average rent on basis of how long residents have been living there

[11] (608*15+538*15)*12*10

RENOVATION

	SCENARIO 1	SCENARIO 2	SCENARIO 3
Building time (y)	1	2	2
Direct costs	€ 1.898.003	€ 3.008.790	€ 3.077.471
Additional costs	€ 428.700	€ 889.758	€ 903.494
Total investment (incl tax)	**€ 2.768.777**	**€ 4.639.272**	**€ 4.737.348**

Distribution key: by units

	SCENARIO 1				SCENARIO 2				SCENARIO 3			
Numer of units	24				27				30			
	Exploitation (years)				Exploitation (years)				Exploitation (years)			
	15	20	25	30	15	20	25	30	15	20	25	30
Unit price (€)	640	481	385	320	955	716	573	477	877	658	526	439

Distribution key: by square metre

		SCENARIO 1					SCENARIO 2					SCENARIO 3			
Total user's surface (m²)		1650					2160					2250			
		Exploitation (y)					Exploitation (y)					Exploitation (y)			
Price (€)		15	20	25	30		15	20	25	30		15	20	25	30
Size (m²)	*40*	373	280	224	186	*56*	668	501	401	334	*75*	877	658	526	439
	63	587	440	352	294	*70*	835	626	501	418					
	75	699	524	420	350	*75*	895	671	537	447					
	80	746	559	447	373	*81*	967	725	580	483					
	105	979	734	587	489	*106*	1265	949	759	632					
						112	1336	1002	802	668					
						126	1503	1128	902	752					

DEMOLISHING AND BUILDING NEW

	SCENARIO 1	SCENARIO 2	SCENARIO 3
Building time (y)	1	2	2
Direct costs	€ 2.474.447	€ 3.728.762	€ 3.823.503
Additional costs	€ 782.889	€ 1.1033.752	€ 1.052.700
Total investment (incl tax)	**€ 3.876.231**	**€ 5.667.393**	**€ 5.802.683**

<u>Distribution key: by units</u>

	SCENARIO 1				SCENARIO 2				SCENARIO 3			
Numer of units	24				27				30			
	Exploitation (years)				**Exploitation (years)**				**Exploitation (years)**			
	15	**20**	**25**	**30**	**15**	**20**	**25**	**30**	**15**	**20**	**25**	**30**
Unit price (€)	897	673	538	449	1166	875	700	583	1075	806	645	537

<u>Distribution key: by square metre</u>

	SCENARIO 1					SCENARIO 2					SCENARIO 3			
Total user's surface (m^2)	1650					2160					2250			
		Exploitation (y)					**Exploitation (y)**					**Exploitation (y)**		
Price (€)		**15**	**20**	**25**	**30**		**15**	**20**	**25**	**30**		**15**	**20**	**25**	**30**
Size (m^e)	*40*	522	392	313	261	*56*	816	612	490	408	*75*	1075	806	645	537
	63	822	617	493	411	*70*	1020	765	612	510					
	75	979	734	587	489	*75*	1093	820	656	547					
	80	1044	783	626	522	*81*	1181	886	708	590					
	105	1370	1028	822	685	*106*	1545	1159	927	773					
						112	1633	1224	980	816					
						126	1837	1377	1102	918					

Selling and development by others

When first selling the building, the seller probably wants the maximum possible value. This means that the estimated value (selling value) for the building could be calculated with the maximum possible rent of €608,- and €538,- a month.

Assumption 4: the building is sold for the maximum potential value. Value$_{old\ building}$ = €2.062.800,-

RENOVATION

	SCENARIO 1	SCENARIO 2	SCENARIO 3
Building time (y)	1	2	2
Direct costs	€ 1.898.003	€ 3..056.975	€ 3.129.973
Additional costs	€ 490.980	€ 1.023.955	€ 1.038.555
Total cost (incl tax)	**€ 2.842.890**	**€ 4.856.306**	**€ 4.960.548**
Total investment:	**€ 4.905.690,63**	**€ 6.919.106**	**€ 7.023.348**

Distribution key: by units

	SCENARIO 1				SCENARIO 2				SCENARIO 3			
Numer of units	24				27				30			
	Exploitation (years)				Exploitation (years)				Exploitation (years)			
	15	20	25	30	15	20	25	30	15	20	25	30
Unit price (€)	1136	852	681	568	1.423	1067	854	711	1300	975	780	650

Distribution key: by square metre

		SCENARIO 1					SCENARIO 2					SCENARIO 3			
Total user's surface (m^2)		1650					2160					2250			
		Exploitation (y)					Exploitation (y)					Exploitation (y)			
Price (€)		15	20	25	30		15	20	25	30		15	20	25	30
Size (m^2)	*40*	661	496	396	330	*56*	997	747	598	498	*75*	1300	975	780	650
	63	1041	780	624	520	*70*	1246	934	747	623					
	75	1239	929	743	619	*75*	1335	1001	801	667					
	80	1321	991	793	661	*81*	1441	1081	865	721					
	105	1734	1301	1041	867	*106*	1886	1415	1132	943					
						112	1993	1495	1196	997					
						126	2242	1682	1345	1121					

DEMOLISHING AND BUILDING NEW

	SCENARIO 1	SCENARIO 2	SCENARIO 3
Building time (y)	1	2	2
Direct costs	€2.474.447	€ 3.728.762	€ 3.823.503
Additional costs	€907.449	€ 1.158012	€ 1.177.261
Total costs (incl tax)	**€ 3.381.897**	**€ 4.887.075**	**€ 5.000.764**
Total investment:	**€ 6.087.257**	**€ 7.878.419**	**€ 8.013.709**

Distribution key: by units

	SCENARIO 1				SCENARIO 2				SCENARIO 3			
Numer of units	24				27				30			
	Exploitation (years)				**Exploitation (years)**				**Exploitation (years)**			
	15	**20**	**25**	**30**	**15**	**20**	**25**	**30**	**15**	**20**	**25**	**30**
Unit price (€)	1409	1057	845	705	1.621	1216	973	810	1484	975	890	742

Distribution key: by square metre

		SCENARIO 1					SCENARIO 2					SCENARIO 3			
Total user's surface (m^2)		1650					2160					2250			
		Exploitation (y)					**Exploitation (y)**					**Exploitation (y)**			
Price (€)		**15**	**20**	**25**	**30**		**15**	**20**	**25**	**30**		**15**	**20**	**25**	**30**
Size (m^2)	*40*	820	615	492	410	*56*	1135	851	681	567	*75*	1484	1113	890	742
	63	1291	968	775	646	*70*	1418	1064	851	709					
	75	1537	1153	922	769	*75*	1520	1140	912	760					
	80	1640	1230	984	820	*81*	1641	1231	985	821					
	105	2152	1614	1291	1076	*106*	2148	1611	1289	1074					
						112	2270	1702	1362	1135					
						126	2553	1915	1532	1277					

GIY

After seeing all these different rents, what is the margin on these different projects? The usual margin is 6 to 7 percent. The official formula for determine the investment is

FORMULA 7:

$$Investment = \frac{1^{st}\ years'rent}{GIY}$$

The investment and the rent prices that can be asked for these are already known. Instead of determining the possible investment, the possible GIY will be calculated to see which scenario is the most profitable by calculating the GIY for each scenario. The minimum is set on 6%.

Assumption 5: Maximum rent level for social rent is €681,-, average rent private sector is €900,-.

GIY based on max. €681,- Social sector		GIY based on max. €900,- Private sector	
New New2	2,8%	New new3	4,1%
New new3	3,1%	New New2	4,1%
Ren. New2	3,2%	Ren. New3	4,6%
Ren. New3	3,5%	Ren. New2	4,7%
New Own2	3,9%	New new1	5,3%
Ren. New1	4,0%	New Own3	5,6%
New new1	4,0%	New Own2	5,7%
New Own3	4,2%	Ren. New1	6,6%
Ren. Own2	4,8%	Ren. Own3	6,9%
New Own1	5,0%	Ren. Own2	7,0%
Ren. Own3	5,2%	New Own1	8,3%
Ren. Own1	6,8%	Ren. Own1	11,2%

Ren. Own = Renovation by owner
Ren. New = renovation by new owner
New own = Building new by owner
New new = building new by new owner

Fig. 11: GIY percentages for all scenarios

From this we can conclude that

- Accept for scenario 1 (renovation by the owner), making profit with a safe margin is not possible in the social rent sector;
- All renovations by the owner are profitable in the private sector;
- Building new for scenario 1 is also highly profitable, but not so much as renovating it.

Conclusion

In the financial feasibility analysis, the question was posed what the differences in rent price would be for the different scenarios, and for whom this is affordable.

Some observations:

- Building new is more expensive than renovation, on all levels;
- Scenario 2 and 3 are more expensive than scenario 1, as expected;
- Scenario 2 and 3 do not differ much in costs even though scenario 2 has a higher restructuring level;
- The longer the exploitation time, the more feasible the scenario becomes;
- Development in possession of the building is cheaper than first buying and developing. Of course this depends on the selling price;
- Renovation seems to be more profitable than building anew.

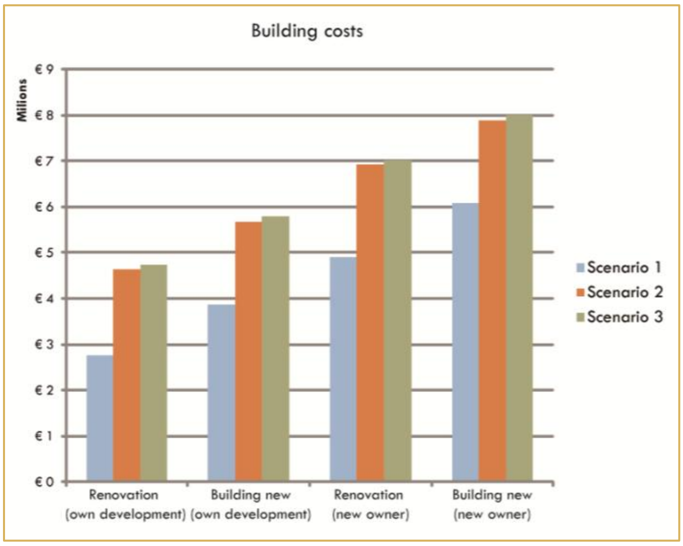


Fig. 12: Total of all building costs

Feasibility based on max. €681,- Social sector

	INV				
New new3	8	1484	975	890	742
New New2	7,9	1621	1216	973	810
Ren. New3	7	1300	975	780	650
Ren. New2	6,9	1423	1067	854	711
New new1	6,1	1409	1057	845	705
New Own3	5,8	1075	806	645	537
New Own2	5,7	1166	875	700	583
Ren. New1	4,9	1136	852	681	568
Ren. Own3	4,7	877	658	526	439
Ren. Own2	4,6	955	716	573	477
New Own1	3,9	897	673	538	449
Ren. Own1	2,9	640	481	385	320
TIME (y)		**15**	**20**	**25**	**30**

Feasibility based on max. €900,- Private sector

	INV				
New new3	8	1484	975	890	742
New New2	7,9	1621	1216	973	810
Ren. New3	7	1300	975	780	650
Ren. New2	6,9	1423	1067	854	711
New new1	6,1	1409	1057	845	705
New Own3	5,8	1075	806	645	537
New Own2	5,7	1166	875	700	583
Ren. New1	4,9	1136	852	681	568
Ren. Own3	4,7	877	658	526	439
Ren. Own2	4,6	955	716	573	477
New Own1	3,9	897	673	538	449
Ren. Own1	2,9	640	481	385	320
TIME (y)		**15**	**20**	**25**	**30**

Ren. Own = Renovation by owner

New own = Building new by owner

Ren. New = renovation by new owner

New new = building new by new owner

Fig. 13: feasibility of all scenarios

From this we can conclude:

- Renovation is feasible, and the building costs are less than building new;
- Scenario 1 is the cheapest;
- The costs are not in the internal restructuring level, but in the newly built galleries and elevators;
- Scenario 2 is, in terms of target groups, the most flexible and can be exploited longer;
- Since scenario 2 and 3 cost more or less the same, scenario 2 wins easily on intuitive quality of the whole building;
- In terms of profit scenario 1 has the best GIY,
- Development as the owner of the building is more feasible than buying, developing and exploiting;
- Scenario 1 is definitely affordable for starters, scenario 2 and 3 as well.

Although scenario 2 gives the most flexibility and therefore more or less a guarantee that the building can be exploited for over 20 years, scenario 1 is still a good option. With the university present and hundreds of graduates a year, it is safe to say that in Delft scenario 1 is exploitable for at least the same period as scenario 2.

DISCUSSION

There are a few remarks for this calculation.

First of all, the building costs are calculated as accurately as possible, but is not a professional calculation. Therefore the mentioned costs are an indication of the costs and prices.

Second, having different assumptions for the current building value may influence the overall feasibility. The calculations are done with two extremes; a value of nothing and a maximum value of about 2 million Euros. The true value will lie somewhere in between.

As a third, when calculating the GIY the rent prices are average and the same for every scenario. It can be expected that the prospected rent may differ with every scenario.

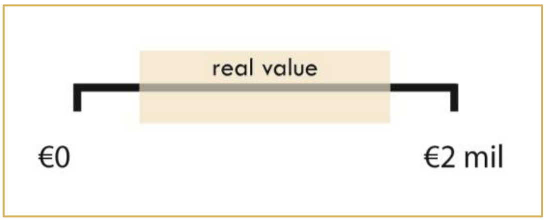


Fig. 14: Range of the possible building value. The truth is somewhere in between

Sustainability calculations[12]

Eco cost are virtual costs that indicate the price for the environment if they would be paid. There are plans to pass these costs on to the end user; in this case the tenant of the apartment. Like for the direct building costs, winket provides reference material for calculating the eco costs. For comparison we only look at the number of owner development.

These costs can be absolute, as in Fig. 15 or as a ratio, as in Fig. 16, which compares the costs to the created value (EVR).

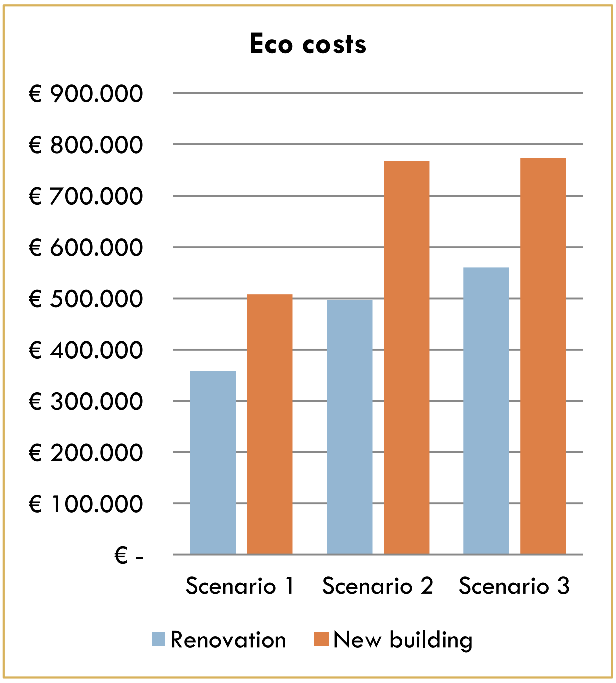


Fig. 15: Eco costs of the snearios, of renovation and

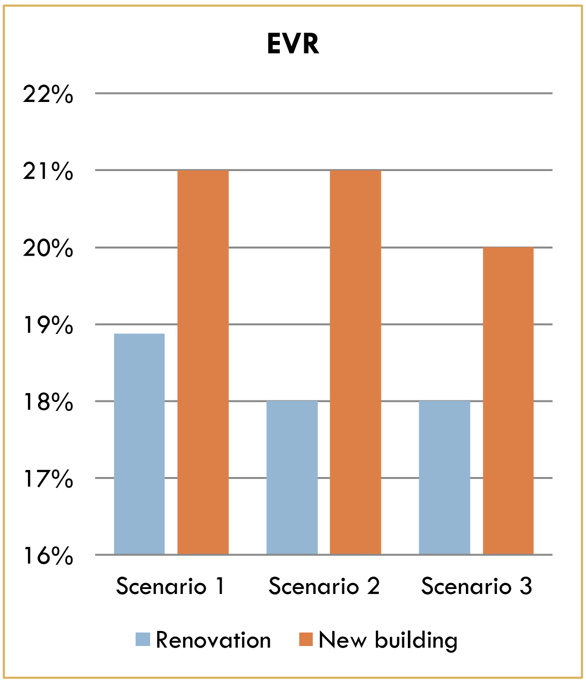


Fig. 16: Eco/value ratios: the lower the ratio the more value for de created costs

From these figures, we can conclude that the eco costs in absolute terms are successive by scenario and by intervention level (renovation first, than building new). When the eco costs are compared by the value that is achieved, the renovation has a better EVR than building new.

Conclusions

Some observations:

- All renovations have a lower EVR than building new
- In absolute costs scenario 1 is the cheapest, but not in ratio
- Scenario 2 and 3 have the same costs and ratio

From this we can conclude:

- Renovation is indeed better for the environment than building new
- Scenario 2 and 3 have the best value for cost ratio

[12] See the appendices for the full calculation sheets

CONCLUSION

After the first part of the analysis, there was a list of things that could be improved about the flats. The most important question remained: is it affordable and for whom?

Now we can conclude that a renovation is indeed affordable, depending on the aims of the building owner. Not The return of investment ratios are not taken into account, but the margin is wide enough to make a decent profit. The average rent in Delft is about €1000,- a month, and the average rent of the apartments is €477,- for scenario 2, or €350,- for scenario 1.

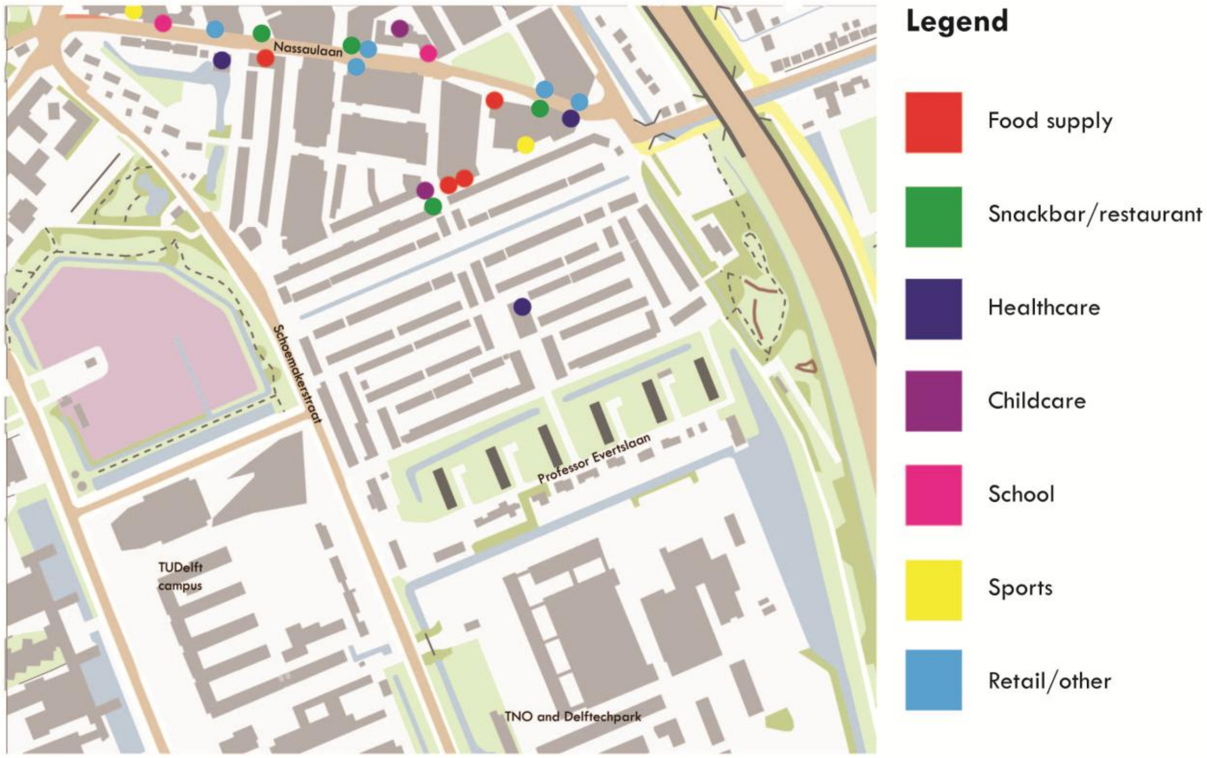
For general advice, for any place, I would advise to go with scenario 2. Scenario 2 is affordable for starters, elderly people and families, and this flexible target group ensures that this intervention can last the required 30 years.

For specific advice, for this location, I would advice an investor to go for scenario 1. With the university in Delft there will always be graduates that want to stay and rent in Delft. This makes flexibility of the building less necessary as the owner will still be able to exploit the building for 30 years without much change.

APPENDICES

Mapping and Statistics

Functions in the neigbourhood

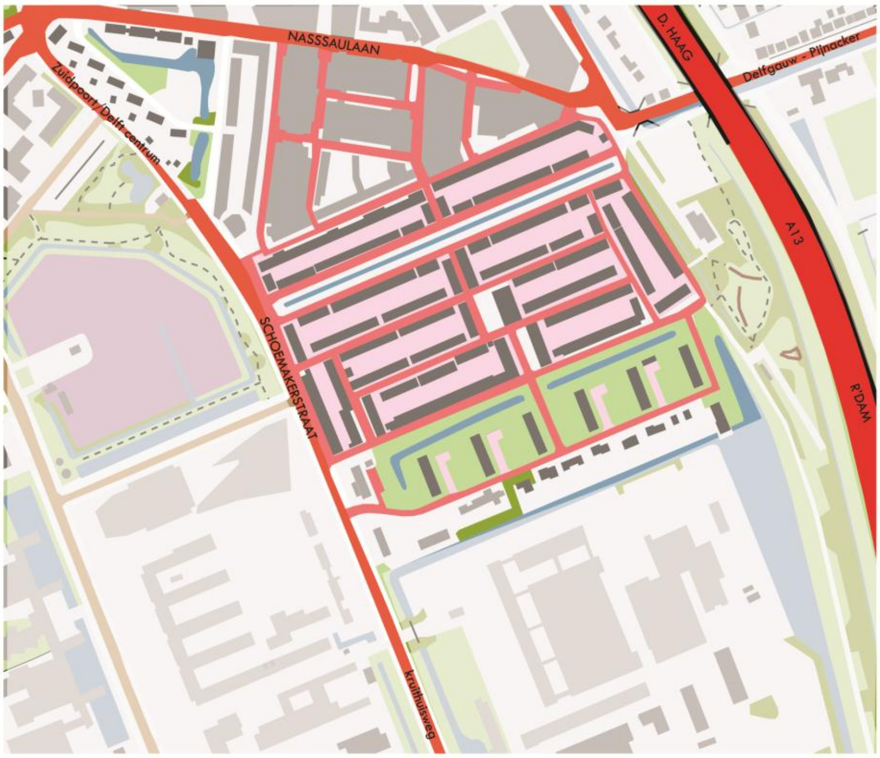


Public transport - bus

Legend

- 69 Technopolis
- 82 Delfgauw
- 121 Zoetemeer
- 174 Zoetemeer

Entrance roads



Legend

- Highway
- Through traffic
- Local destination roads
- Local traffic only/ not for motor vehicles

Building period of housing

Legend

- Before WW2 (1930 - 1945)
- After WW2 (1945 - 1970)
- Relative new (1970 - 1990)

Height of buildings

Legend

- untill 10 m
- 10 - 20 m
- 20 - 30 m
- More than 30 m

Housing types

Housing types with images

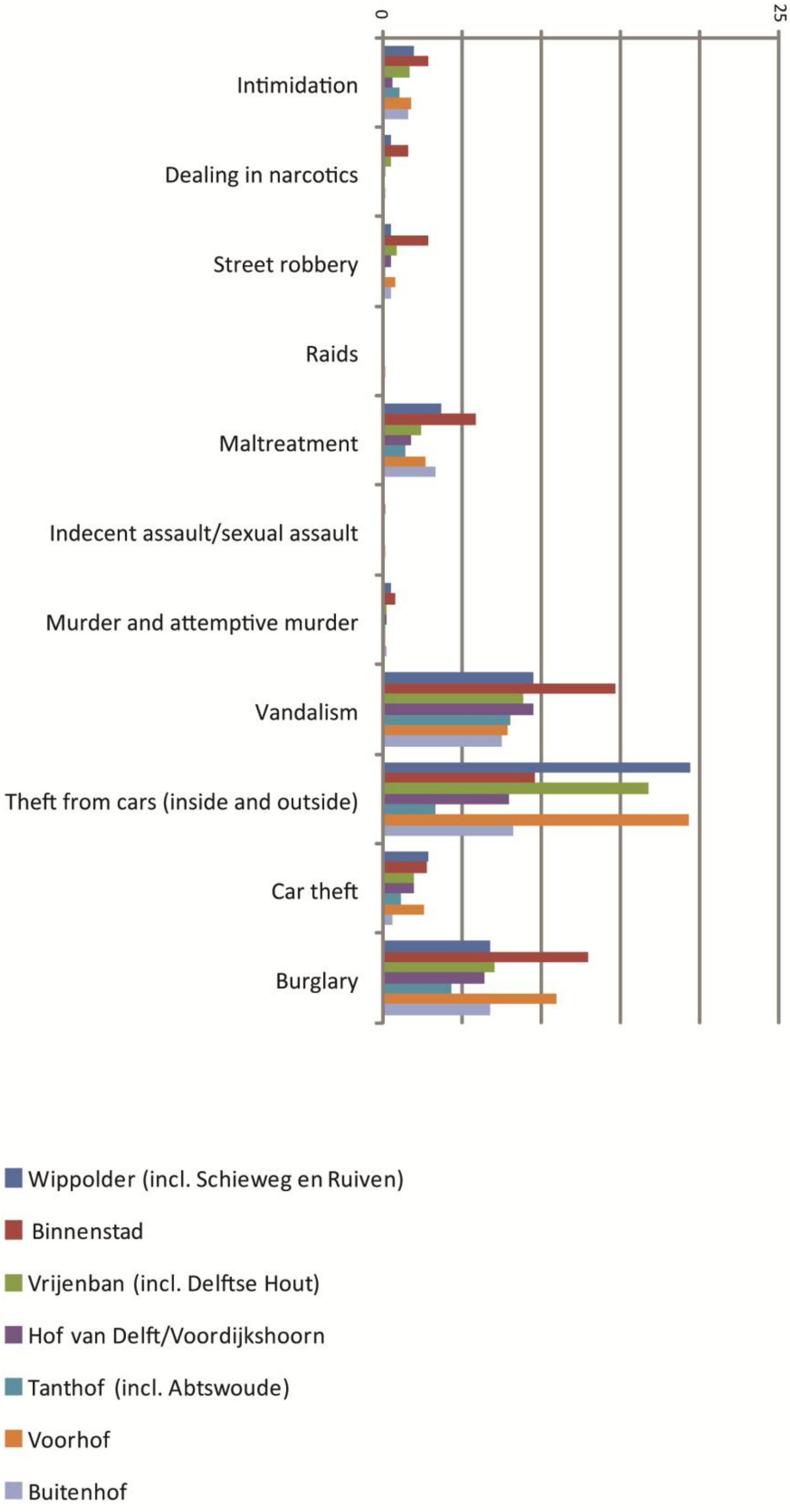
Family houses

Low flats (3-4)

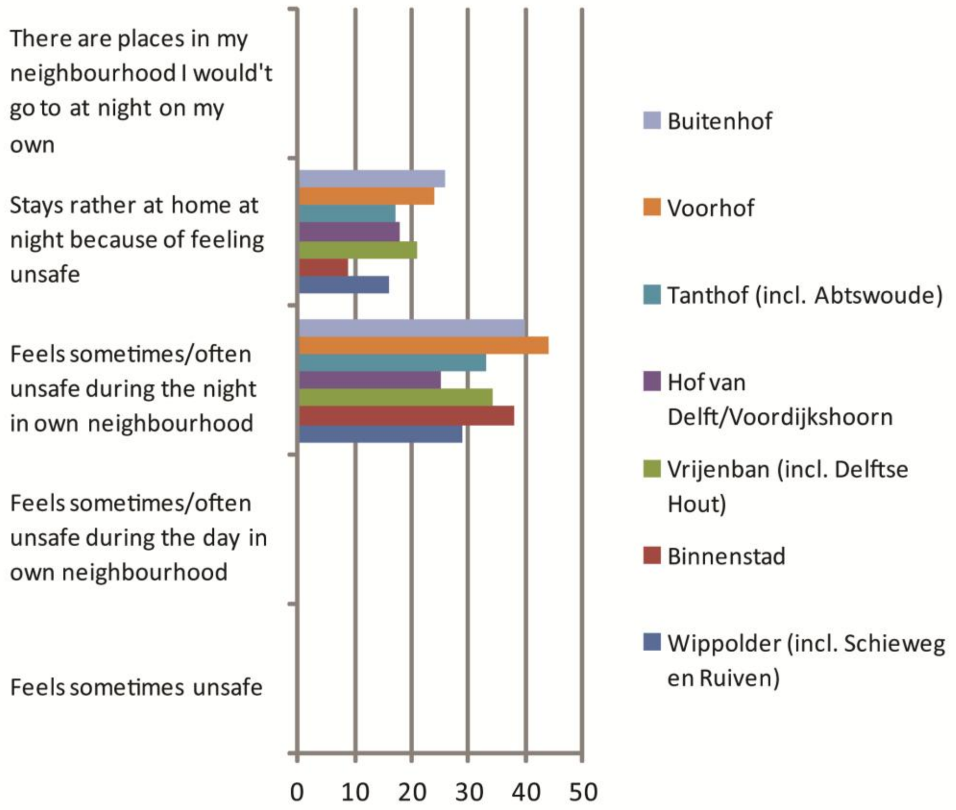
High flats (10+)

Villas

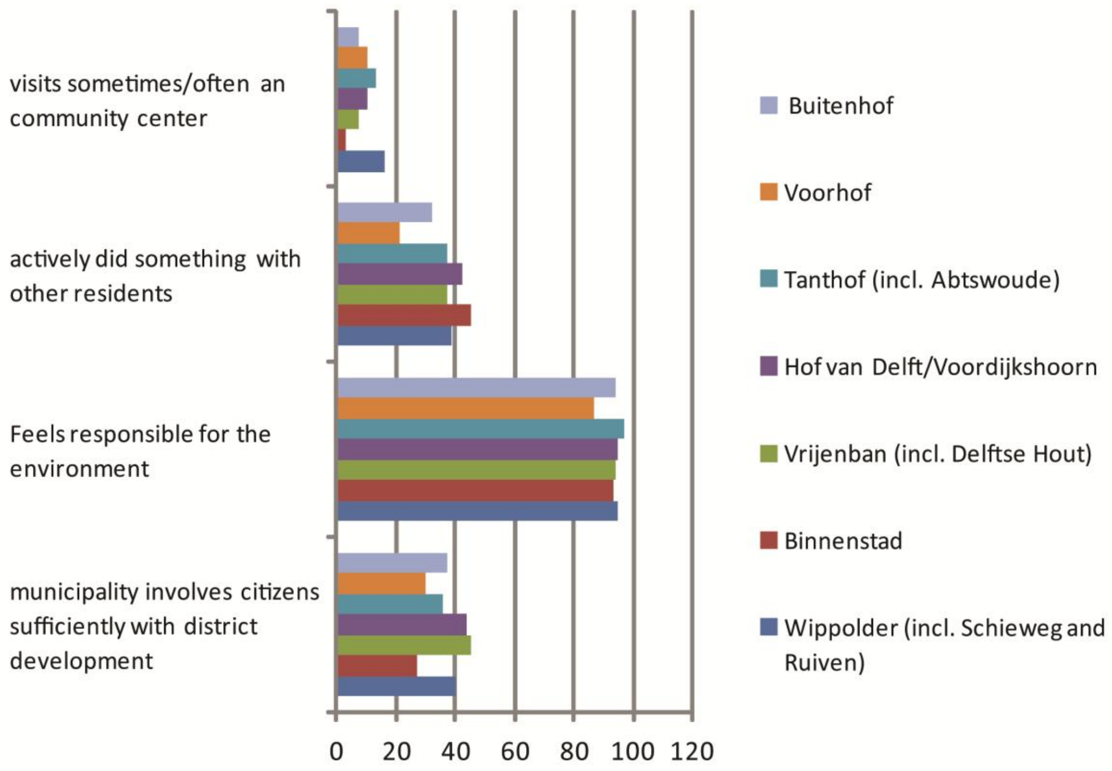
Crime reports by crime per 1000 inhabitants per district of Delft



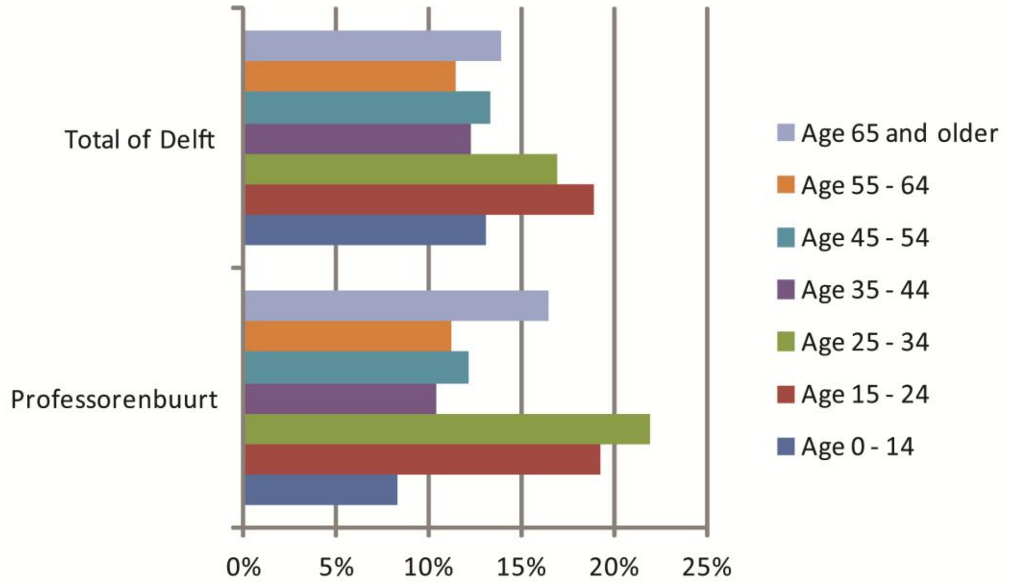
Feelings of unsafety: percentage of interviewed people per district of Delft



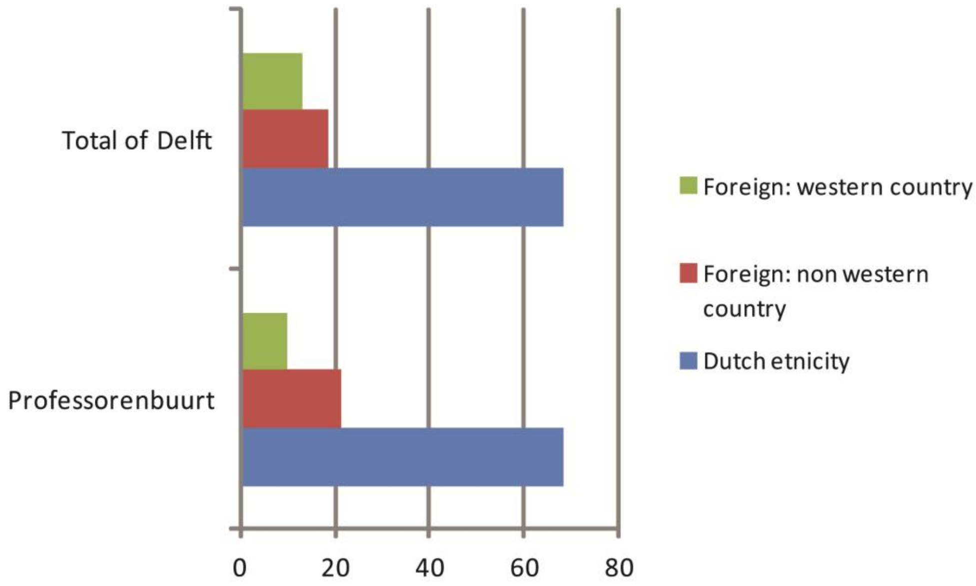
Involvement with district: percentage of interviewed people per district of Delft



Demography of Professorenbuurt compared to total of Delft



Etnicity of Professorenbuurt compared to total of Delft



Calculation Sheets

SCENARIO 1 RENOVATION

Winket bv | Huisvestingseconomie, bouwkosten en bestekken

www.winket.nl

Bouwkosten

laatste bewerking (14-10-2011) peildatum (01-01-2011)

Projectcode **RPR 86.005-2006**

RPR 86.005 112 appartementen te Rotterdam

112 woningen

Scenario 1 24 units

Gegevens per flat

			Hoeveelheid		Bouwkosten prijs/ehd	Bouwkosten totaal	Ecokosten prijs/ehd	Ecokosten totaal	EVR
1		**NEN 2634 (niveau 1)**							
		Bouwkosten							
		Exclusief BTW							
		Bouwkosten per m2 GO	1.650	m2	553	912.450	99	163.350	18%
		Bouwkosten per m2 BVO	2.009	m2	489	982.401	87	174.783	18%
		Bouwkosten per m3 BI	6.360	m3	168	1.068.480	30	190.800	18%

			Hoeveelheid		Bouwkosten prijs/ehd	Bouwkosten totaal	Ecokosten prijs/ehd	Ecokosten totaal	EVR
		NEN 2634 (niveau 3)							
2		**Bouwkundige werken**							
2A		**Fundering**							
	(11)	bodemvoorzieningen	480	m2	1	480	0		
	(13)	vloeren op grondslag	480	m2	0	0	-		
	(16)	funderingsconstructies	480	m2	1	480	0		
	(17)	paalfunderingen	480	m2	0	0	-		
						960		**0**	
2B		**Skelet**							
	(21)	buitenwanden (constructief)	742	m2	1	742	0	0	0%
	(22)	binnenwanden (constructief)	1.862	m2	5	9.310	1	1.862	20%
	(23)	vloeren (constructief)	1.812	m2	7	12.684	1	1.812	14%
	(27)	daken (constructief)	576	m2	1	576	0	0	
	(28)	hoofddraagconstructies	1.812	m2	0	0	0	0	
						23.312		**3.674**	16%
2C		**Daken**							
	(27)	dakafbouwconstructies	576	m2	10	5.760	1	576	10%
	(37)	dakopeningen		m2	986	0	266	0	
	(47)	dakafwerkingen	576	m2	67	38.592	17	9.792	25%
						44.352		**10.368**	23%
2D		**Gevels**							
	(21)	buitenwandafbouwconstructies	742	m2	77	57.165	11	8.166	14%
	(31)	buitenwandopeningen	766	m2	367	280.975	83	63.545	23%
	(41)	buitenwandafwerkingen	742	m2	0	0	0	0	
						338.140		**71.711**	21%

2E		**Binnenwanden**							
	(22)	binnenwandafbouwconstructies	712	m2	80	56.960	14	9.968	18%
	(32)	binnenwandopeningen	907	m2	169	153.283	42	38.094	25%
	(42)	binnenwandafwerkingen	5.890	m2	47	276.849	8	47.123	17%
						487.092		**95.185**	20%
2F		**Vloeren**							
	(23)	vloerafbouwconstructies	1.812	m2	213	385.956	43	77.916	20%
	(33)	vloeropeningen	23	m2	134	3.082	0	0	
	(43)	vloerafwerkingen	1.812	m2	15	27.180	2	3.624	13%
						416.218		**81.540**	
2G		**Trappen, hellingen, balustrades**							
	(24)	trappen en hellingconstructies	64	m2	138	8.860	34	2.183	25%
	(34)	balustrades en leuningen	81	m	188	15.228	57	4.617	30%
	(44)	trap- en hellingafwerkingen	64	m2	47	3.017	6	385	13%
						27.105		**7.185**	27%
2H		**Plafonds**							
	(45)	plafondafwerkingen	2.388	m2	38	90.744	9	21.492	24%
						90.744		**21.492**	24%
3		**Installaties**							
3A		**Werktuigbouwkundige installaties**							
	(51)	afvoer vaste stoffen	2.009	m2	0	0	-		
	(52)	afvoeren	2.009	m2	6	12.054	1	2.009	17%
	(53)	water	2.009	m2	6	12.054	1	2.009	17%
	(54)	gassen	2.009	m2	2	4.018	0	0	0%
	(55)	klimaatinstallatie: koeling		m2	0	0	-		
	(56)	klimaatinstallatie: verwarming	2.009	m2	28	56.252	4	8.036	14%
	(57)	klimaatinstallatie: luchtbehandeling		m2	4	0	1	0	
	(58)	regeling klimaat en sanitair	222	m2	1	222	0	0	0%
						84.600		**12.054**	14%
3B		**Elektrotechnische installaties**							
	(61)	elektra algemeen	2.009	m2	0		0	0	
	(62)	krachtstroom		m2	-		-		
	(63)	verlichting	2.009	m2	27	54.243	5	10.045	19%
	(64)	communicatie	2.009	m2	5	10.045	1	2.009	20%
	(65)	beveiliging		m2	1		0	0	
	(67)	gebouwbeheersvoorzieningen		m2	-		-		
						64.288		**12.054**	19%
3C		**Lift en transport**							
	(66)	lift en transport		st	39.095		-	0	
								0	
4		**Inrichtingen**							
4A		**Vaste inrichtingen**							
	(71)	vaste verkeersvoorzieningen	150	m2	1	150	0	0	
	(72)	vaste gebruikersvoorzieningen		m2	0	0	0	0	
	(73)	vaste keukenvoorzieningen	72	m2	7	504	2	144	29%
	(74)	vaste sanitaire voorzieningen	150	m2	11	1.650	2	300	18%
	(75)	vaste onderhoudsvoorzieningen		m2	0	0	0	0	
	(76)	vaste opslagvoorzieningen		m2	0	0	0	0	

						2.304		**444**	19%
5		**Terrein**							
5A		**Terrein**							
	(90)	terrein	2.500	m2	7	17500	2	5000	29%
		terrein ophogen	466	m3	8	3724,8			0%
						21.225		**5.000**	24%
6		**Diversen/onvoorzien**							
6A		**Diversen/Onvoorzien**							
	(99)	diversen		m2	-		-	0	
								0	
		Totaal directe bouwkosten				**1.600.340**		**320.707**	20%
6A		Algemene bouwkosten			7,60%	121.626	6,70%	21.487	18%
6B		Algemene bedrijfskosten			7,00%	112.024	5,00%	16.035	14%
6C		Winst en risico			4,00%	64.014	0,00%	0	0%
		Totaal bouwkosten Exclusief BTW				**1.898.003**		**358.230**	19%

SCENARIO 2 RENOVATION

Winket bv | Huisvestingseconomie, bouwkosten en bestekken

www.winket.nl
Bouwkosten
laatste bewerking (14-10-2011) peildatum (01-01-2011)

Projectcode **RPR 86.005-2006**
RPR 86.005 112 appartementen te Rotterdam
112 woningen

Scenario 2 27 units

Gegevens per flat

		Hoeveelheid		Bouwkosten prijs/ehd	Bouwkosten totaal	Ecokosten prijs/ehd	Ecokosten totaal	EVR
1	**NEN 2634 (niveau 1)**							
	Bouwkosten							
	Exclusief BTW							
	Bouwkosten per m2 GO	2.160	m2	553	1.194.480	99	213.840	18%
	Bouwkosten per m2 BVO	2.902	m2	489	1.419.078	87	252.474	18%
	Bouwkosten per m3 BI	8.664	m3	168	1.455.552	30	259.920	18%

			Hoeveelheid		Bouwkosten prijs/ehd	Bouwkosten totaal	Ecokosten prijs/ehd	Ecokosten totaal	EVR
		NEN 2634 (niveau 3)							
2		**Bouwkundige werken**							
2A		**Fundering**							
	(11)	bodemvoorzieningen	622	m2	1	622	0		0%
	(13)	vloeren op grondslag	487	m2	0	0	0		
	(16)	funderingsconstructies	622	m2	1	622	0		0%
	(17)	paalfunderingen	622	m2	0	0	0		
						1.244			
2B		**Skelet**							
	(21)	buitenwanden (constructief)	968	m2	1	968	0	0	0%
	(22)	binnenwanden (constructief)	2.258	m2	5	11.290	1	2.258	20%
	(23)	vloeren (constructief)	2.991	m2	7	20.937	1	2.991	14%
	(27)	daken (constructief)	646	m2	1	646	0	0	0%
	(28)	hoofddraagconstructies	2.742	m2	0	0	0	0	
						33.841		**5.249**	16%
2C		**Daken**							
	(27)	dakafbouwconstructies	646	m2	10	6.461	1	646	10%
	(37)	dakopeningen	0	m2	986	0	266	0	
	(47)	dakafwerkingen	646	m2	67	43.289	17	10.984	25%
						49.750		**11.630**	23%
2D		**Gevels**							
	(21)	buitenwandafbouwconstructies	1.828	m2	77	140.787	11	20.112	14%
	(31)	buitenwandopeningen	766	m2	367	280.975	83	63.545	23%
	(41)	buitenwandafwerkingen	1.828	m2		0	0	0	
						421.762		**83.657**	20%
2E		**Binnenwanden**							

	(22)	binnenwandafbouwconstructies	2.258	m2	80	180.640	14	31.612	18%
	(32)	binnenwandopeningen	890	m2	169	150.410	42	37.380	25%
	(42)	binnenwandafwerkingen	10.860	m2	47	510.439	8	86.883	17%
						841.489		**155.875**	19%
2F		**Vloeren**							
	(23)	vloerafbouwconstructies	3.141	m2	213	669.033	43	135.063	20%
	(33)	vloeropeningen	23	m2	134	3.082	0	0	
	(43)	vloerafwerkingen	3.141	m2	15	47.115	2	6.282	13%
						719.230		**141.345**	20%
2G		**Trappen, hellingen, balustrades**							
	(24)	trappen en hellingconstructies	280	m2	138	38.668	34	9.527	25%
	(34)	balustrades en leuningen	246	m	188	46.267	57	14.028	30%
	(44)	trap- en hellingafwerkingen	280	m2	47	13.169	6	1.681	13%
						98.104		**25.236**	26%
2H		**Plafonds**							
	(45)	plafondafwerkingen	3.637	m2	38	138.210	9	32.734	24%
						138.210		**32.734**	24%
3		**Installaties**							
3A		**Werktuigbouwkundige installaties**							
	(51)	afvoer vaste stoffen	2.902	m2	-		-		
	(52)	afvoeren	2.902	m2	6	17.412	1	2.902	17%
	(53)	water	2.902	m2	6	17.412	1	2.902	17%
	(54)	gassen	2.902	m2	2	5.804	0	0	0%
	(55)	klimaatinstallatie: koeling		m2	-		-		
	(56)	klimaatinstallatie: verwarming	2.902	m2	28	81.256	4	11.608	14%
	(57)	klimaatinstallatie: luchtbehandeling		m2	4		1	0	
	(58)	regeling klimaat en sanitair	198	m2	1	198	0	0	0%
						122.082		**17.412**	14%
3B		**Elektrotechnische installaties**							
	(61)	elektra algemeen	2.902	m2	0	0	0		
	(62)	krachtstroom		m2	0	0	-		
	(63)	verlichting	2.902	m2	27	78.354	5	14.510	19%
	(64)	communicatie	2.902	m2	5	14.510	1	2.902	20%
	(65)	beveiliging	100	m2	1	100	0		0%
	(67)	gebouwbeheersvoorzieningen		m2	0	0	-		
						92.964		**17.412**	
3C		**Lift en transport**							
	(66)	lift en transport	1	st	39.095	39.095	-		
			,			**39.095**			
4		**Inrichtingen**							
4A		**Vaste inrichtingen**							
	(71)	vaste verkeersvoorzieningen	426	m2	1	426	0	0	
	(72)	vaste gebruikersvoorzieningen		m2		0	0	0	
	(73)	vaste keukenvoorzieningen	81	m2	7	567	2	162	29%
	(74)	vaste sanitaire voorzieningen	117	m2	11	1.287	2	234	18%
	(75)	vaste onderhoudsvoorzieningen		m2		0	0	0	
	(76)	vaste opslagvoorzieningen		m2		0	0	0	
						2.280		**396**	17%

5		**Terrein**							
5A		**Terrein**							
	(90)	terrein	2.500	m2	7	17.500	2	5.000	29%
						17.500		**5.000**	29%
6		**Diversen/onvoorzien**							
6A		**Diversen/Onvoorzien**							
	(99)	diversen		m2	-		-		
		Totaal directe bouwkosten				**2.577.550**		**495.946**	19%
6A		Algemene bouwkosten			7,60%	195.894	6,70%	33.228	17%
6B		Algemene bedrijfskosten			7,00%	180.429	5,00%	24.797	14%
6C		Winst en risico			4,00%	103.102	0,00%	0	
		Totaal bouwkosten Exclusief BTW				**3.056.975**		**553.971**	18%

SCENARIO 3 RENOVATION

Winket bv | Huisvestingseconomie, bouwkosten en bestekken

www.winket.nl

Bouwkosten

laatste bewerking (14-10-2011) peildatum (01-01-2011)

Projectcode **RPR 86.005-2006**

RPR 86.005 112 appartementen te Rotterdam

112 woningen

Scenario 3 30 units

Gegevens per flat

			Hoeveelheid		Bouwkosten prijs/ehd	Bouwkosten totaal	Ecokosten prijs/ehd	Ecokosten totaal	EVR
1		**NEN 2634 (niveau 1)**							
		Bouwkosten							
		Exclusief BTW							
		Bouwkosten per m2 GO	2.250	m2	553	1.244.250	99	222.750	18%
		Bouwkosten per m2 BVO	3.162	m2	489	1.546.218	87	275.094	18%
		Bouwkosten per m3 BI	9.183	m3	168	1.542.744	30	275.490	18%

			Hoeveelheid		Bouwkosten prijs/ehd	Bouwkosten totaal	Ecokosten prijs/ehd	Ecokosten totaal	EVR
		NEN 2634 (niveau 3)							
2		**Bouwkundige werken**							
2A		**Fundering**							
	(11)	bodemvoorzieningen	622	m2	1	622	0	0	0%
	(13)	vloeren op grondslag	487	m2	0	0	0	0	
	(16)	funderingsconstructies	622	m2	1	622	0	0	0%
	(17)	paalfunderingen	622	m2	0	0	0	0	
						1.244		0	0%
2B		**Skelet**							
	(21)	buitenwanden (constructief)	968	m2	1	968	0	0	0%
	(22)	binnenwanden (constructief)	2.114	m2	5	10.569	1	2.114	20%
	(23)	vloeren (constructief)	3.041	m2	7	21.287	1	3.041	14%
	(27)	daken (constructief)	646	m2	1	646	0	0	0%
	(28)	hoofddraagconstructies	3.026	m2	0	0	0	0	
						33.470		**5.155**	15%
2C		**Daken**							
	(27)	dakafbouwconstructies	646	m2	10	6.460	1	646	10%
	(37)	dakopeningen	0	m2	986	0	266	0	
	(47)	dakafwerkingen	646	m2	67	43.282	17	10.982	25%
						49.742		**11.628**	23%
2D		**Gevels**							
	(21)	buitenwandafbouwconstructies	2.054	m2	77	158.189	11	22.598	14%
	(31)	buitenwandopeningen	766	m2	367	280.975	83	63.545	23%
	(41)	buitenwandafwerkingen	2.054	m2		0	0	0	

						439.164		**86.143**	20%
2E		**Binnenwanden**							
	(22)	binnenwandafbouwconstructies	2.114	m2	80	169.100	14	29.593	18%
	(32)	binnenwandopeningen	960	m2	169	162.240	42	40.320	25%
	(42)	binnenwandafwerkingen	10.509	m2	47	493.942	8	84.075	17%
						825.282		**153.988**	19%
2F		**Vloeren**							
	(23)	vloerafbouwconstructies	3.191	m2	213	679.683	43	137.213	20%
	(33)	vloeropeningen	0	m2	134	0	0	0	
	(43)	vloerafwerkingen	6.719	m2	15	100.785	2	13.438	13%
						780.468		**150.651**	19%
2G		**Trappen, hellingen, balustrades**							
	(24)	trappen en hellingconstructies	184	m2	138	25.392	34	6.256	25%
	(34)	balustrades en leuningen	167	m	188	31.471	57	9.542	30%
	(44)	trap- en hellingafwerkingen	184	m2	47	8.648	6	1.104	13%
						65.511		**16.902**	26%
2H		**Plafonds**							
	(45)	plafondafwerkingen	3.687	m2	38	140.106	9	33.183	24%
						140.106		**33.183**	24%
3		**Installaties**							
3A		**Werktuigbouwkundige installaties**							
	(51)	afvoer vaste stoffen	3.162	m2	-		-		
	(52)	afvoeren	3.162	m2	6	18.972	1	3.162	
	(53)	water	3.162	m2	6	18.972	1	3.162	
	(54)	gassen	3.162	m2	2	6.324	0		
	(55)	klimaatinstallatie: koeling		m2	-		-		
	(56)	klimaatinstallatie: verwarming	3.162	m2	28	88.536	4	12.648	
	(57)	klimaatinstallatie: luchtbehandeling		m2	4		1	0	
	(58)	regeling klimaat en sanitair	375	m2	1	375	0	0	
						133.179		**18.972**	
3B		**Elektrotechnische installaties**							
	(61)	elektra algemeen	3.162	m2	0	0	0		
	(62)	krachtstroom		m2	0	0	-		
	(63)	verlichting	3.162	m2	27	85.374	5	15.810	
	(64)	communicatie	3.162	m2	5	15.810	1	3.162	
	(65)	beveiliging	100	m2	1	100	0	0	
	(67)	gebouwbeheersvoorzieningen		m2	0	0	-		
						101.284		**18.972**	
3C		**Lift en transport**							
	(66)	lift en transport	1	st	47.675	47.675		0	
						47.675		0	
4		**Inrichtingen**							
4A		**Vaste inrichtingen**							
	(71)	vaste verkeersvoorzieningen	710	m2	1	710	0		
	(72)	vaste gebruikersvoorzieningen		m2		0	-		
	(73)	vaste keukenvoorzieningen	90	m2	7	630	2	180	29%
	(74)	vaste sanitaire voorzieningen	285	m2	11	3.135	2	570	18%
	(75)	vaste onderhoudsvoorzieningen		m2		0	-		
	(76)	vaste opslagvoorzieningen		m2		0	-		

						4.475		**750**	17%
5		**Terrein**							
5A		**Terrein**							
	(90)	terrein	2.500	m2	7	17.500	2	5.000	29%
						17.500		**5.000**	29%
6		**Diversen/onvoorzien**							
6A		**Diversen/Onvoorzien**							
	(99)	diversen		m2	-		-		
		Totaal directe bouwkosten				**2.639.100**		**501.343**	19%
6A		Algemene bouwkosten			7,60%	200.572	6,70%	33.590	17%
6B		Algemene bedrijfskosten			7,00%	184.737	5,00%	25.067	17%
6C		Winst en risico			4,00%	105.564	0,00%	0	
		Totaal bouwkosten						**560.001**	18%
		Exclusief BTW				**3.129.973**			

SCENARIO 1 BUILDING NEW

Winket bv | Huisvestingseconomie, bouwkosten en bestekken

www.winket.nl
Bouwkosten
laatste bewerking (14-10-2011) peildatum (01-01-2011)

Projectcode **RPR 86.005-2006**
RPR 86.005 112 appartementen te Rotterdam
112 woningen

Scenario 1 24 units

Met eenheidsprijzen sloop en nieuwbouw

Gegevens per flat

NEN 2634 (niveau 1) Bouwkosten	Hoeveelheid		Bouwkosten prijs /ehd	totaal	Ecokosten prijs/ehd	totaal	EVR
Exclusief BTW							
Bouwkosten per m2 GO	1.650	m2	553	912.450	99	163.350	18%
Bouwkosten per m2 BVO	2.009	m2	489	982.401	87	174.783	18%
Bouwkosten per m3 BI	6.360	m3	168	1.068.480	30	190.800	18%

	NEN 2634 (niveau 3)	Hoeveelheid		Bouwkosten prijs /ehd	totaal	Ecokosten prijs/ehd	totaal	EVR
	Sloop huidige appartementen	24	st	6000	144000	1500	36000	25%
	Bouwkundige werken							
	Fundering							
(11)	bodemvoorzieningen	480	m2	18	8.640	4	1.920	22%
(13)	vloeren op grondslag	480	m2	128	61.440	48	23.040	38%
(16)	funderingsconstructies	480	m2	64	30.720	22	10.560	34%
(17)	paalfunderingen	480	m2	11	5.280	7	3.360	64%
					106.080		**38.880**	37%
	Skelet							
(21)	buitenwanden (constructief)	742	m2	61	45.286	15	11.136	25%
(22)	binnenwanden (constructief)	1.862	m2	108	201.096	29	53.998	27%
(23)	vloeren (constructief)	1.812	m2	60	108.720	27	48.924	45%
(27)	daken (constructief)	576	m2	63	36.288	23	13.248	37%
(28)	hoofddraagconstructies	1.812	m2	8	14.496	2	3.624	25%
					405.886		**130.930**	32%
	Daken							
(27)	dakafbouwconstructies	576	m2	24	13.824	7	4.032	29%
(37)	dakopeningen		m2	0	0	0	0	
(47)	dakafwerkingen	576	m2	45	25.920	9	5.184	20%
					39.744		**9.216**	23%

	Gevels							
(21)	buitenwandafbouwconstructies	742	m2	127	94.285	20	14.848	16%
(31)	buitenwandopeningen	766	m2	287	219.727	124	94.934	43%
(41)	buitenwandafwerkingen	742	m2	4	2.970	0	0	
					316.982		**109.782**	35%
	Binnenwanden							
(22)	binnenwandafbouwconstructies	712	m2	49	34.888	10	7.120	20%
(32)	binnenwandopeningen	907	m2	120	108.840	39	35.373	33%
(42)	binnenwandafwerkingen	5.890	m2	10	58.904	2	11.781	20%
					202.632		**54.274**	27%
	Vloeren							
(23)	vloerafbouwconstructies	1.812	m2	254	460.248	29	52.548	11%
(33)	vloeropeningen	23	m2	30	690	8	184	27%
(43)	vloerafwerkingen	1.812	m2	15	27.180	2	3.624	13%
					488.118		**56.356**	12%
	Trappen, hellingen, balustrades							
(24)	trappen en hellingconstructies	64	m2	203	13.033	72	4.622	35%
(34)	balustrades en leuningen	81	m	234	18.954	53	4.293	23%
(44)	trap- en hellingafwerkingen	64	m2	46	2.953	0	0	0%
					34.940		**8.915**	26%
	Plafonds							
(45)	plafondafwerkingen	2.388	m2	8	19.104	3	7.164	38%
					19.104		**7.164**	38%
	Installaties							
	Werktuigbouwkundige installaties							
(51)	afvoer vaste stoffen	2.009	m2	0	0	-	-	
(52)	afvoeren	2.009	m2	12	24.108	1	2.009	8%
(53)	water	2.009	m2	15	30.135	2	4.018	13%
(54)	gassen	2.009	m2	6	12.054	0	0	0%
(55)	klimaatinstallatie: koeling		m2	0	0	0	0	
(56)	klimaatinstallatie: verwarming	2.009	m2	51	102.459	7	14.063	14%
(57)	klimaatinstallatie: luchtbehandeling		m2	7	0	2	0	
(58)	regeling klimaat en sanitair	222	m2	0	0	0	0	
					168.756		**20.090**	12%
	Elektrotechnische installaties							
(61)	elektra algemeen	2.009	m2	-		-		
(62)	krachtstroom		m2	-		-		
(63)	verlichting	2.009	m2	40	80.360	7	14.063	18%
(64)	communicatie	2.009	m2	14	28.126	2	4.018	14%
(65)	beveiliging		m2	1		0		
(67)	gebouwbeheersvoorzieningen		m2	-		-		
					108.486		**18.081**	17%
	Lift en transport							
(66)	lift en transport		st	47.955		11.028	0	
							0	
	Inrichtingen							
	Vaste inrichtingen							
(71)	vaste verkeersvoorzieningen	150	m2	1	150	0	0	

(72)	vaste gebruikersvoorzieningen		m2	0	0	0	0	
(73)	vaste keukenvoorzieningen	72	m2	13	936	4	288	31%
(74)	vaste sanitaire voorzieningen	150	m2	14	2.100	2	300	14%
(75)	vaste onderhoudsvoorzieningen		m2	0	0	0	0	
(76)	vaste opslagvoorzieningen		m2	0	0	0	0	
					3.186		**588**	18%
	Terrein							
	Terrein							
(90)	terrein	2.500	m2	13	32500	3	7500	23%
	terrein ophogen	466	m3	8	3724,8	3	1396,8	38%
					36.225		**7.500**	21%
	Diversen/onvoorzien							
	Diversen/Onvoorzien							
(99)	diversen		m2	13		3	0	
							0	
	Totaal directe bouwkosten				**2.074.139**		**461.777**	22%
	Algemene bouwkosten			8,30 %	172.154	6,20%	28.630	
	Algemene bedrijfskosten			7,00 %	145.190	3,80%	17.548	
	Winst en risico			4,00 %	82.966	0,00%	0	
	Totaal bouwkosten Exclusief BTW				**2.474.447**		**507.954**	21%

SCENARIO 2 BUILDING NEW

Winket bv | Huisvestingseconomie, bouwkosten en bestekken

www.winket.nl

Bouwkosten

laatste bewerking (14-10-2011) peildatum (01-01-2011)

Projectcode **RPR 86.005-2006**

RPR 86.005 112 appartementen te Rotterdam

112 woningen

Scenario 2 27 units

Met eenheidsprijzen sloop en nieuwbouw

Gegevens per flat

			Hoeveelheid		Bouwkosten prijs/ehd	Bouwkosten totaal	Ecokosten prijs/ehd	Ecokosten totaal	EVR
1		**NEN 2634 (niveau 1)**							
		Bouwkosten							
		Exclusief BTW							
		Bouwkosten per m2 GO	2.160	m2	553	1.194.480	99	213.840	18%
		Bouwkosten per m2 BVO	2.902	m2	489	1.419.078	87	252.474	18%
		Bouwkosten per m3 BI	8.664	m3	168	1.455.552	30	259.920	18%

			Hoeveelheid		Bouwkosten prijs/ehd	Bouwkosten totaal	Ecokosten prijs/ehd	Ecokosten totaal	EVR
		NEN 2634 (niveau 3)							
		Sloop huidige apartementen	24	st	6000	144000	1500	36000	25%
2		**Bouwkundige werken**							
2A		**Fundering**							
	(11)	bodemvoorzieningen	622	m2	18	11.196	4	2.488	22%
	(13)	vloeren op grondslag	487	m2	128	62.300	48	23.363	38%
	(16)	funderingsconstructies	622	m2	64	39.808	22	13.684	34%
	(17)	paalfunderingen	622	m2	11	6.842	7	4.354	64%
						120.146		**43.889**	
2B		**Skelet**							
	(21)	buitenwanden (constructief)	968	m2	61	59.048	15	14.520	25%
	(22)	binnenwanden (constructief)	2.258	m2	108	243.864	29	65.482	27%
	(23)	vloeren (constructief)	2.991	m2	60	179.460	27	80.757	45%
	(27)	daken (constructief)	646	m2	63	40.704	23	14.860	37%
	(28)	hoofddraagconstructies	2.742	m2	8	21.936	2	5.484	25%
						545.012		**181.103**	33%
2C		**Daken**							
	(27)	dakafbouwconstructies	646	m2	24	15.506	7	4.523	29%
	(37)	dakopeningen	0	m2	0	0	0	0	
	(47)	dakafwerkingen	646	m2	45	29.075	9	5.815	20%
						44.581		**10.338**	23%
2D		**Gevels**							
	(21)	buitenwandafbouwconstructies	1.828	m2	127	232.207	20	36.568	16%

	(31)	buitenwandopeningen	766	m2	287	219.727	124	94.934	43%
	(41)	buitenwandafwerkingen	1.828	m2	4	7.314	0	0	
						459.248		**131.502**	29%
2E		**Binnenwanden**							
	(22)	binnenwandafbouwconstructies	2.258	m2	49	110.642	10	22.580	20%
	(32)	binnenwandopeningen	890	m2	120	106.800	39	34.710	33%
	(42)	binnenwandafwerkingen	10.860	m2	10	108.604	2	21.721	20%
						326.046		**79.011**	24%
2F		**Vloeren**							
	(23)	vloerafbouwconstructies	3.141	m2	254	797.814	29	91.089	11%
	(33)	vloeropeningen	23	m2	30	690	8	184	27%
	(43)	vloerafwerkingen	3.141	m2	15	47.115	2	6.282	13%
						845.619		**97.555**	12%
2G		**Trappen, hellingen, balustrades**							
	(24)	trappen en hellingconstructies	280	m2	203	56.881	72	20.174	35%
	(34)	balustrades en leuningen	246	m	234	57.587	53	13.043	23%
	(44)	trap- en hellingafwerkingen	280	m2	47	13.169	0	0	
						127.637		**33.218**	26%
2H		**Plafonds**							
	(45)	plafondafwerkingen	3.637	m2	8	29.097	3	10.911	38%
						29.097		**10.911**	38%
3		**Installaties**							
3A		**Werktuigbouwkundige installaties**							
	(51)	afvoer vaste stoffen	2.902	m2	0	0	0	0	
	(52)	afvoeren	2.902	m2	12	34.824	1	2.902	8%
	(53)	water	2.902	m2	15	43.530	2	5.804	13%
	(54)	gassen	2.902	m2	6	17.412	0	0	
	(55)	klimaatinstallatie: koeling		m2	0	0	0	0	
	(56)	klimaatinstallatie: verwarming	2.902	m2	51	148.002	7	20.314	14%
	(57)	klimaatinstallatie: luchtbehandeling		m2	7	0	2	0	0%
	(58)	regeling klimaat en sanitair	198	m2	0	0	0	0	0%
						243.768		**29.020**	12%
3B		**Elektrotechnische installaties**							
	(61)	elektra algemeen	2.902	m2	0	0	0	0	
	(62)	krachtstroom		m2	0	0	0	0	
	(63)	verlichting	2.902	m2	40	116.080	7	20.314	18%
	(64)	communicatie	2.902	m2	14	40.628	2	5.804	14%
	(65)	beveiliging	100	m2	1	100	0	0	0%
	(67)	gebouwbeheersvoorzieningen		m2	0	0	0	0	
						156.808		**26.118**	17%
3C		**Lift en transport**							
	(66)	lift en transport	1	st	47.955	47.955	11.028	11.028	23%
			,			**47.955**		**11.028**	23%
4		**Inrichtingen**							
4A		**Vaste inrichtingen**							
	(71)	vaste verkeersvoorzieningen	426	m2	1	426	0	0	
	(72)	vaste gebruikersvoorzieningen		m2	0	0	0	0	
	(73)	vaste keukenvoorzieningen	81	m2	13	1.053	4	324	31%
	(74)	vaste sanitaire voorzieningen	117	m2	14	1.638	2	234	14%

	(75)	vaste onderhoudsvoorzieningen		m2	0	0	0	0	
	(76)	vaste opslagvoorzieningen		m2	0	0	0	0	
						3.117		**558**	18%
5		**Terrein**							
5A		**Terrein**							
	(90)	terrein	2.500	m2	13	32.500	3	7.500	23%
						32.500		**7.500**	23%
6		**Diversen/onvoorzien**							
6A		**Diversen/Onvoorzien**							
	(99)	diversen		m2	13		3		
		Totaal directe bouwkosten				**3.125.534**		**697.751**	22%
6A		Algemene bouwkosten			8,30%	259.419	6,20%	43.261	17%
6B		Algemene bedrijfskosten			7,00%	218.787	3,80%	26.515	12%
6C		Winst en risico			4,00%	125.021	0,00%	0	
		Totaal bouwkosten Exclusief BTW				**3.728.762**		**767.526**	21%

SCENARIO 3 BUILDING NEW

Winket bv | Huisvestingseconomie, bouwkosten en bestekken

www.winket.nl

Bouwkosten

laatste bewerking (14-10-2011) peildatum (01-01-2011)

Projectcode **RPR 86.005-2006**

RPR 86.005 112 appartementen te Rotterdam

112 woningen

Scenario 3 30 units

met eenheidsprijzen sloop en nieuwbouw

gegevens per flat

		Hoeveelheid		Bouwkosten		Ecokosten		EVR
				prijs/ehd	totaal	prijs/ehd	totaal	
1	**NEN 2634 (niveau 1)** **Bouwkosten**							
	Exclusief BTW							
	Bouwkosten per m2 GO	2.250	m2	553	1.244.250	99	222.750	18%
	Bouwkosten per m2 BVO	3.162	m2	489	1.546.218	87	275.094	18%
	Bouwkosten per m3 BI	9.183	m3	168	1.542.744	30	275.490	18%

			Hoeveelheid		Bouwkosten		Ecokosten		EVR
					prijs/ehd	totaal	prijs/ehd	totaal	
		NEN 2634 (niveau 3)							
		Sloop apartmenten	24	st	6000	**144000**	1500	**36000**	25%
2		**Bouwkundige werken**							
2A		**Fundering**							
	(11)	bodemvoorzieningen	622	m2	18	11.196	4	2.488	22%
	(13)	vloeren op grondslag	487	m2	128	62.336	48	23.376	38%
	(16)	funderingsconstructies	622	m2	64	39.808	22	13.684	34%
	(17)	paalfunderingen	622	m2	11	6.842	7	4.354	64%
						120.182		**43.902**	37%
2B		**Skelet**							
	(21)	buitenwanden (constructief)	968	m2	61	59.072	15	14.526	25%
	(22)	binnenwanden (constructief)	2.114	m2	108	228.285	29	61.299	27%
	(23)	vloeren (constructief)	3.041	m2	60	182.460	27	82.107	45%
	(27)	daken (constructief)	646	m2	63	40.698	23	14.858	37%
	(28)	hoofddraagconstructies	3.026	m2	8	24.208	2	6.052	25%
						534.723		**178.842**	33%
2C		**Daken**							
	(27)	dakafbouwconstructies	646	m2	24	15.504	7	4.522	29%
	(37)	dakopeningen	0	m2	0	0	0	0	
	(47)	dakafwerkingen	646	m2	45	29.070	9	5.814	20%

						44.574		**10.336**	23%
2D		**Gevels**							
	(21)	buitenwandafbouwconstructies	2.054	m2	127	260.909	20	41.088	16%
	(31)	buitenwandopeningen	766	m2	287	219.727	124	94.934	43%
	(41)	buitenwandafwerkingen	2.054	m2	4	8.218	0	0	
						488.854		**136.022**	28%
2E		**Binnenwanden**							
	(22)	binnenwandafbouwconstructies	2.114	m2	49	103.574	10	21.138	20%
	(32)	binnenwandopeningen	960	m2	120	115.200	39	37.440	33%
	(42)	binnenwandafwerkingen	10.509	m2	10	105.094	2	21.019	20%
						323.868		**79.596**	25%
2F		**Vloeren**							
	(23)	vloerafbouwconstructies	3.191	m2	254	810.514	29	92.539	11%
	(33)	vloeropeningen	0	m2	30	0	8	0	
	(43)	vloerafwerkingen	6.719	m2	15	100.785	2	13.438	13%
						911.299		**105.977**	12%
2G		**Trappen, hellingen, balustrades**							
	(24)	trappen en hellingconstructies	184	m2	203	37.352	72	13.248	35%
	(34)	balustrades en leuningen	167	m	234	39.172	53	8.872	23%
	(44)	trap- en hellingafwerkingen	184	m2	47	8.648	0	0	0%
						85.172		**22.120**	26%
2H		**Plafonds**							
	(45)	plafondafwerkingen	3.687	m2	8	29.496	3	11.061	38%
						29.496		**11.061**	38%
3		**Installaties**							
3A		**Werktuigbouwkundige installaties**							
	(51)	afvoer vaste stoffen	3.162	m2	0	0	0	0	
	(52)	afvoeren	3.162	m2	12	37.944	1	3.162	8%
	(53)	water	3.162	m2	15	47.430	2	6.324	13%
	(54)	gassen	3.162	m2	6	18.972	0	0	0%
	(55)	klimaatinstallatie: koeling		m2	0	0	0	0	
	(56)	klimaatinstallatie: verwarming	3.162	m2	51	161.262	7	22.134	14%
	(57)	klimaatinstallatie: luchtbehandeling		m2	7		2	0	
	(58)	regeling klimaat en sanitair	375	m2	0	0	0	0	
						265.608		**31.620**	12%
3B		**Elektrotechnische installaties**							
	(61)	elektra algemeen	3.162	m2	0	0	-		
	(62)	krachtstroom		m2	0	0	-		
	(63)	verlichting	3.162	m2	40	126.480	7	22.134	18%
	(64)	communicatie	3.162	m2	14	44.268	2	6.324	14%
	(65)	beveiliging	100	m2	1	100	0	0	0%
	(67)	gebouwbeheersvoorzieningen		m2	0	0	-		
						170.848		**28.458**	17%
3C		**Lift en transport**							
	(66)	lift en transport	1	st	47.955	47.955	11.028	11.028	23%
						47.955		**11.028**	23%
4		**Inrichtingen**							
4A		**Vaste inrichtingen**							
	(71)	vaste verkeersvoorzieningen	710	m2	1	710	0		

	(72)	vaste gebruikersvoorzieningen		m2	0	0	-		
	(73)	vaste keukenvoorzieningen	90	m2	13	1.170	4	360	31%
	(74)	vaste sanitaire voorzieningen	285	m2	14	3.990	2	570	14%
	(75)	vaste onderhoudsvoorzieningen		m2	0	0	-		
	(76)	vaste opslagvoorzieningen		m2	0	0	-		
						5.870		**930**	16%
5		**Terrein**							
5A		**Terrein**							
	(90)	terrein	2.500	m2	13	32.500	3	7.500	23%
						32.500		**7.500**	23%
6		**Diversen/onvoorzien**							
6A		**Diversen/Onvoorzien**							
	(99)	diversen		m2	13		3		
		Totaal directe bouwkosten				**3.204.94 8**		**703.393**	22%
6A		Algemene bouwkosten			8,30%	266.011	6,20%	43.610	16%
6B		Algemene bedrijfskosten			7,00%	224.346	3,80%	26.729	16%
6C		Winst en risico			4,00%	128.198	0,00%	0	
		Totaal bouwkosten				**3.823.50 3**		**773.732**	20%
		Exclusief BTW							

SOURCES

Maps

Kaartenkamer TUDelft
http://kaartenkamer.library.tudelft.nl

Floor plans and technical details

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http://ahn.geodan.nl/ahn/

Statistics

Delft Buurtmonitor
http://delft.buurtmonitor.nl/

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http://www.archief-delft.nl/
http://www.virtueeldelftslexicon.nl/

Onder anderen project
http://www.onder-anderen.nl/

Social cohesion and other social aspects

Onder anderen project
http://www.onder-anderen.nl/

Germa Huijbers en Carolina Agelink
Ingrid van der Vlis for Historisch Onderzoeksbureau Tijdelijk

Financial data

Winket voor de bouw
www.winket.nl

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Bouwkosten
www.bouwkosten.nl

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Sustainable data

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