

EXPANDING BRUTALISM

Transforming by expanding post-65 architecture

Graduation Report
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17-06-2026



ABSTRACT

This design research explores a transformation strategy for post-65 architecture that is threatened by demolition because of changing urban context. Focusing on the Kanaalcentrum in Utrecht, a generic but distinct brutalist office complex, the research proposes an alternative for the future demolition of this building. Through research and design experimentation a design is developed that solves the required densification using the architectural language of the original building. The resulting design demonstrates how this disappearing architectural style can be preserved while adapting to changing requirements. The strategy that is used is formulated to be applicable for buildings facing similar pressure.

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INTRODUCTION

1.1. PROBLEM STATEMENT

Vacancy in office buildings is increasingly common this century in the Netherlands. Various reasons can lead to the abandonment of these buildings, with eventual demolition being a common solution. This demolition is caused by spacial challenges in the Netherlands that derive mostly from the need for housing and sustainability. It often leads to redevelopment of entire buildings or neighborhoods (Rijksdienst voor het Cultureel Erfgoed, n.d.) Vacancy and dated properties of post-65 buildings often result in demolition of especially this type of architecture to make way for new developments, resulting in the loss of many post-65 buildings, and therefore a loss of architectural style.

The Kanaalcentrum in Utrecht is a typical example of post-65 architecture. It is located in Utrecht along the Europalaan. The area where this building is located is currently being transformed into a high density mixed use neighborhood called the Merwedekanaalzone, of which construction is nearing the latest phase (BURA, n.d.). The Kanaalcentrum is located in the area that will be covered by the last phase of this development. While the buildings of this office complex are not that old and are still in a good condition (Gemeente Utrecht, 2017), the buildings are likely to be demolished to make way for the new development. This raises questions about the future demolition plans of the building.

1.2. RELEVANCE

Vacancy of office buildings

The Netherlands is dealing with a vacancy issue of office buildings, with a significant rise since 2000 (Compendium voor de Leefomgeving, 2018). This problem derives from the changing demands for these buildings, like location and sustainability, causing many office buildings to lose their users (NOS, 2024). According to CBS (2025) the percentage of vacant office buildings has been reduced in half in the last ten years, but still accounts for 9% of the buildings, or 6% of the total square meters of office floorspace in the country. This underlines the need for a solution for this type of buildings.

Rising valuation of brutalism

Vacancy of office buildings has become a big issue in the Netherlands, with a significant rise since 2000 (Compendium voor de Leefomgeving, 2018). This problem derives from the changing demands for these buildings, like location and sustainability, causing many office buildings to lose their function (NOS, 2024). According to CBS (2025) the percentage of vacant office buildings has been reduced in half in the last ten years, but still accounts for 9% of the buildings, or 6% of the total square meters of office floorspace in the country. This underlines the need for a solution for this type of buildings.

Demolition and transformation of post-65 architecture

The vacancy of post-65 office buildings often leads to demolition. Many of these buildings contain large amounts of material, meaning demolition will lead to a lot of waste. Although one of the reasons for demolition is often the lacking sustainability performance of the existing buildings, research shows that demolition followed by new construction results in greater environmental impact than transformation strategies (Van Bennekom, 2025).

A second strategy for these vacant buildings is transformation. While this preserves the existing material, it often results in a completely unrecognizable design, leading to the disappearance of post-65 architecture.



The transformation of Expeditie-knooppunt Haarlem, with the original architecture no longer recognisable (Source: Common Affairs, n.d.)

1.3. OBJECTIVE AND MOTIVATION

The objective for this research is to find a reasonable solution for one of the many office buildings in the Netherlands with an uncertain future, in order to show the possibilities the buildings potentially have. The aim is to understand what interventions are required to increase the performance of these written-off-buildings as well as what changes are needed to match the current demand that would have otherwise been accomplished by demolition and new construction, and implement these findings into a coherent and logical design.

In addition, this research aims to reintroduce or maintain valuation and appreciation of the architectural design, focusing on preserving the style and appearance of the building while adapting it to the current demand. The aim is to formulate a new transformation strategy that can be applied to not only the Kanaalcentrum, contributing to the possibilities for preservation of post-65 architecture.

1.4. RESEARCH QUESTIONS

This leads to the following research question:

How to transform post-65 office buildings to fit within new urban contexts while maintaining their architectural style?

To answer this question, a design will be made specifically for the Kanaalcentrum in Utrecht. This design will serve as an example of the effect of the transformation strategy and shows what this will result in. To be able to formulate a strategy and make a design, the following sub-questions are asked:

What are the architectural characteristics of the building?

What is the current state of the building?

What is the future demand for the location?

1.5. SCOPE

This research focusses on the repurposing of post-65 office buildings with unclear futures because of changing urban context. It focusses specifically the ones that have distinct architectural qualities, but are not regarded as the most important examples of their respective style. The strategy will present another way of transforming in between a precise renovation and an unrecognizable transformation, aiming to provide a different option for preserving the architectural style while adapting to new and different demands.

The strategy will be applied specifically to the Kanaalcentrum in Utrecht, a building that fits all of the above specifications. The main focus of the design will be on the continuity of the architectural style and how this can be achieved. Since demolition is to be avoided, the implementation in its surrounding urban environment is a key factor in this design research, as the design needs to be a logical alternative to demolition and new construction for this research to be relevant.

APPROACH

2.1. METHODS

This research will consist of a redesign of the Kanaalcentrum in Utrecht. This design will be based on a strategy derived from findings that are specific to the Kanaalcentrum. Since this building is a representative example of many buildings that face similar problems, the aim for this strategy is to be applicable to many other buildings with similar issues.

The research starts with an exploration of brutalist architecture that consists of the compiled material from 6 students, examining the scope of buildings and the general problems these buildings face to be able to formulate a design goal that is relevant for current architectural challenges.

Research on the Kanaalcentrum

This research then continues with an in-depth analysis of 6 different buildings and contains information from the following categories:

Perception
Material
Space

This information is used to answer the question what the architectural characteristics of the building are and what challenges it faces.

This research consists of archival research, literature review, and on-site fieldwork. The information is compiled into a booklet that consists of all of the research on the Kanaalcentrum, as well as the collective research on post-65 architecture in the Netherlands (Van Haaften et al., 2026) and serves as a reference for designing.

Merwedekanaalzone

To understand what the new context of the building will look like, the third category (space) expands its focus on the design principles of the Merwedekanaalzone to determine what the requirements are for the future of the plot.

Requirements

The current state of the building is compared to the demand of the future to formulate what elements have to change to match future demand and therefore make this design proposal successful. The effect of these changes is then tested with several exploratory designs (see appendix 1) to see what effect this has on the architectural expression and is used to formulate a transformation strategy that is tested on the building.

2.2. THEORETICAL FRAMEWORK

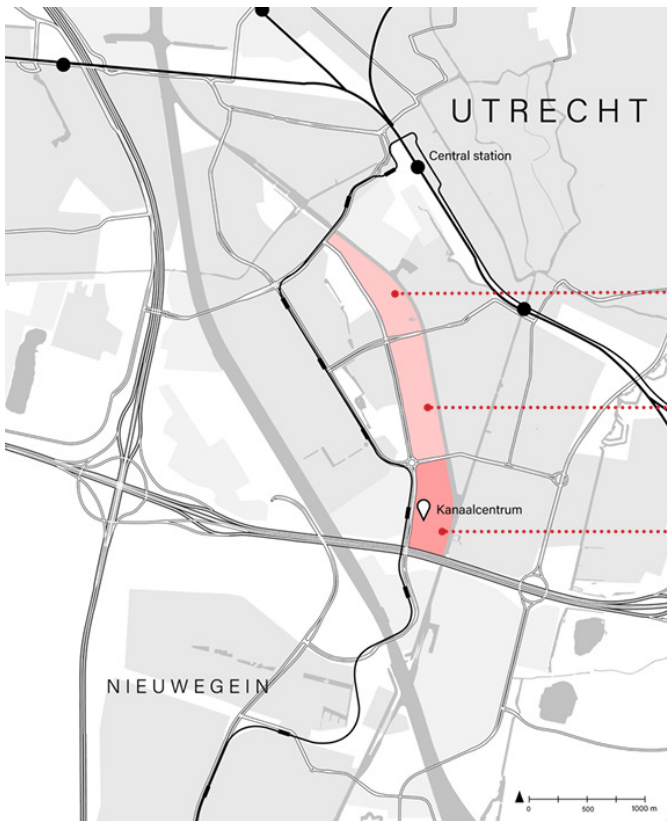
The information from the combined research (van Haaften et al., 2026) that is relevant to this design research is summarized below.

Location and future

The complex is located on the Europalaan, numbers 100 to 500, and is part of a large office district that is situated along the Merwedekanaal. The area consists solely of office buildings. Projects like the temporary housing solution of Europalaan 200 has seen the amount of residents in this area, 'Bedrijfsgebied Kanaleneiland', rise from just 50 in 2013 to over a thousand in 2026 (AlleCijfers.nl, n.d.). The area around the Kanaalcentrum has a relatively desolate atmosphere, especially in the evening (Gemeente Utrecht, 2017).

The southernmost part of this office district is the last remaining part of the development of this new neighborhood. Since the design of this development is not finalized yet, design principles from the earlier phases will serve as a guideline for what the future of this area will look like.

The area will be transformed into a mixed use, car-free, lively neighborhood with a lot of green space and attention to human scale and a high density (Bura, n.d.). Most of the existing buildings, including the Kanaalcentrum, are set to be demolished to make way for this new development. The Europalaan serves as the main connector from this new neighborhood to the A12 motorway and the city centre, with public transport links located right in front of the entrance of the complex.



The location of the complex within the city of Utrecht and the new neighborhood of the Merwedekanaalzone (own image)

The central location of the plot between the neighborhood and its public transport links will likely result in an increased amount of bike and pedestrian traffic around and through the plot. Additionally, new bridges will likely be built over the Merwedekanaal, connecting the area to the residential neighborhoods of Hoograven and Rivierenwijk. For the first phase of transforming the southern part of the merwedekanaalzone, these bridges are planned, but not required yet (Gemeente Utrecht, n.d). These bridges will be part of new slow traffic connections connecting the area to the east and west and will be situated roughly along the northern and southern boundaries of the plot.

The Eendrachtlaan to the east of the plot will be transformed into a mostly car-free street. To minimize the effect of shadows cast on the existing residential neighborhoods of Hoograven and Rivierenwijk to the east, the buildings in this new development will become gradually taller towards the Europalaan (Gemeente Utrecht, z.d) The light quality on street level is regulated by demanding a street width of at least the average height of the buildings on either side of the street.

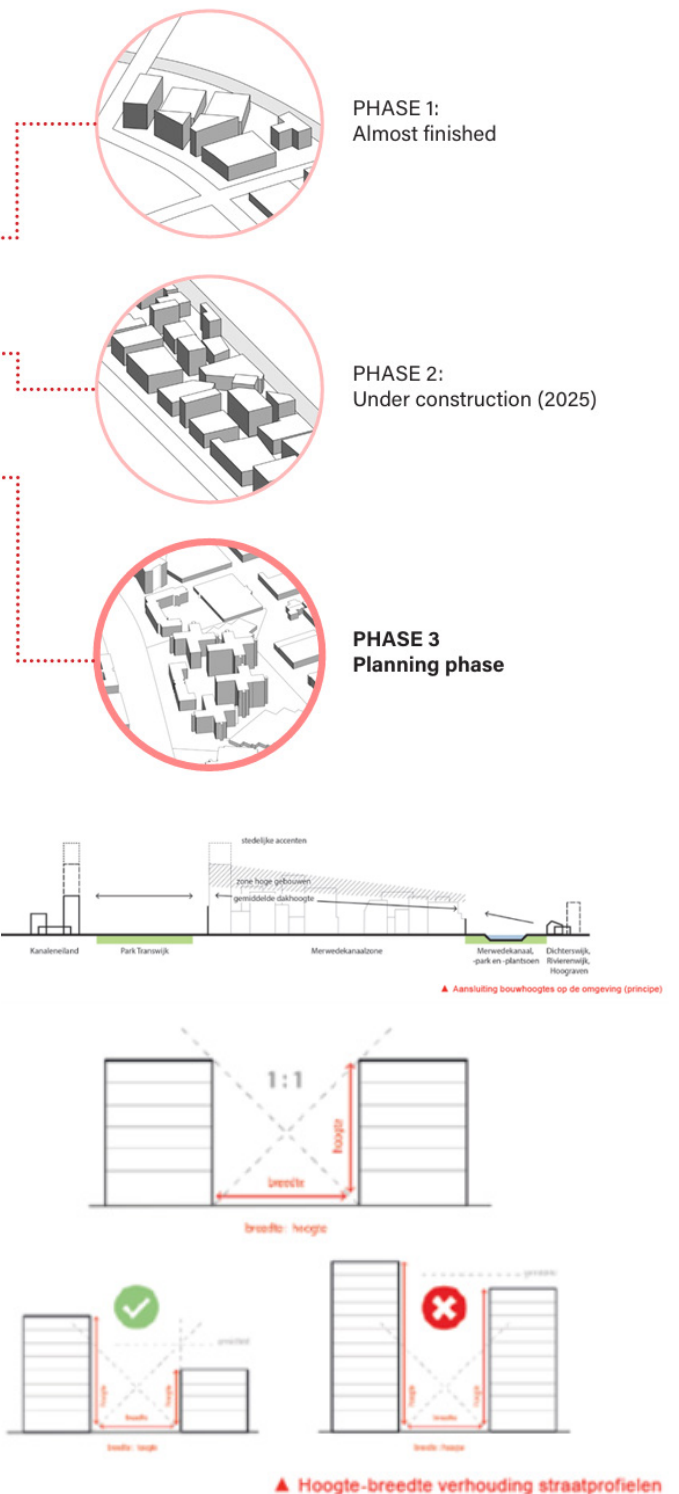
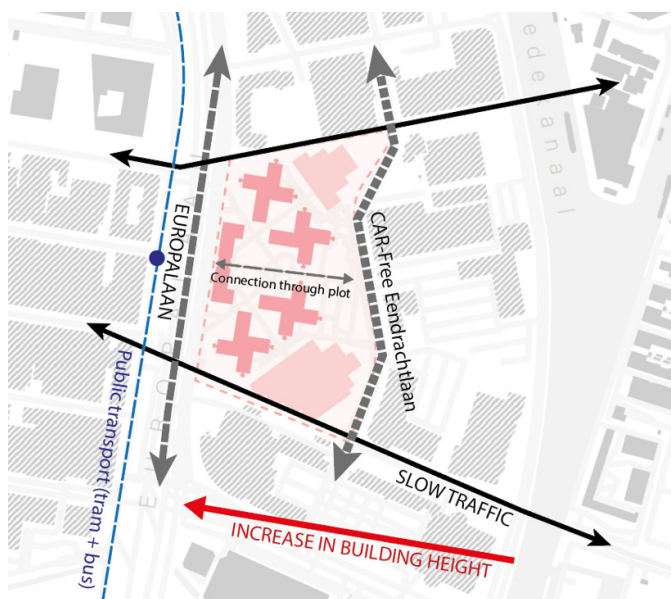


Diagram of building heights within phase 6 of the Merwedekanaalzone (Gemeente Utrecht, n.d.)

The eastern part of this neighborhood will be reserved for mostly residential functions. The eastern area, between the Eendrachtlaan and Europalaan, where the Kanaalcentrum is located, focusses on mixing functions with space for offices and startups. Commercial functions will be spread out across the plinths of residential buildings and is limited to a small scale for daily needs (Gemeente Utrecht, z.d). The exact amount of required densification and added functions has not been determined yet for the western part of this development. For the eastern part of the neighborhood, roughly 195.000 square meters of floorspace is planned on 100.000 square meters of land, resulting in an FSI of 2 (Gemeente Utrecht, 2025). The plans by the municipality of Utrecht state that unique architectural projects can be implemented into the neighborhood.



Map that shows the designed layout of the direct surroundings of plot (own image)

The plot and buildings

The complex was built in 1987 by Frans Dingemans and has been in temporary use since 2017, occupied by rentable office space and temporary housing. Since the implementation of this function in 2017, the plots transformation resulted in an increased activity of the neighborhood (Gemeente Utrecht, 2018)

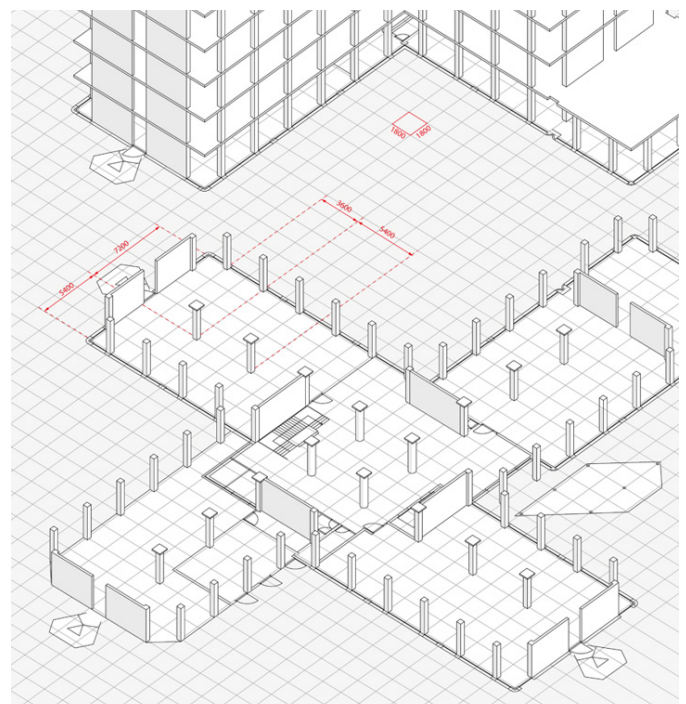
The plot the buildings are located on 37.400 square meters of land, the biggest plot in the neighborhood. The total floorspace of the buildings is 34.000 square meters. These buildings, Europalaan 100 200, 300, 400 and 500 have very similar floorplans with only Europalaan 300 being slightly different. The buildings themselves have very open and flexible repetitive floorplans, with 112 similar wings of 220 square meters. The ceilings are tall and combined with the excellent amount of daylight

this makes the building's interior feel very open and spacious. A private office garden with diagonal walkways connects the buildings to the street and the big parking facilities on the eastern side of the plot.

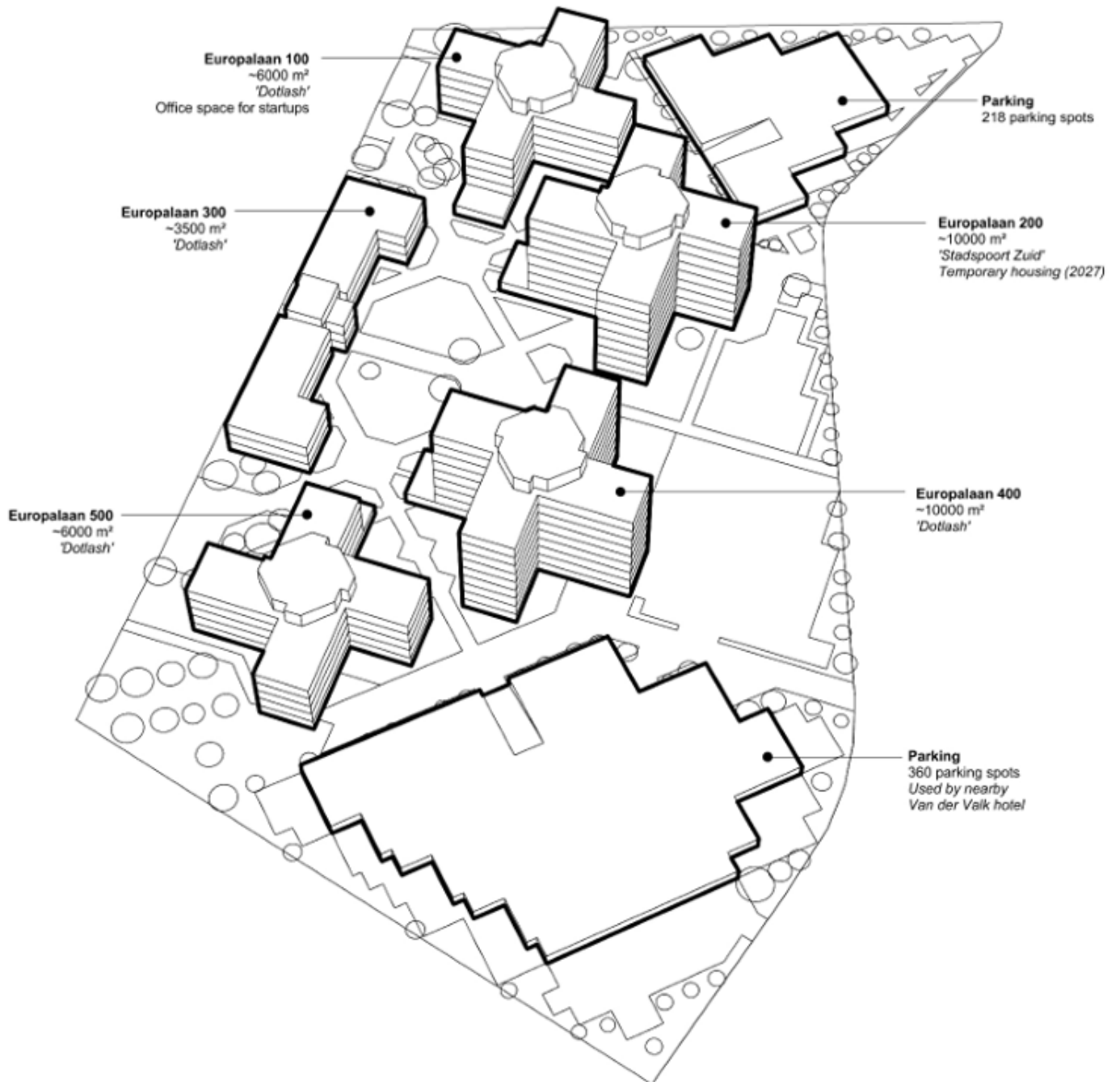


The kanaalcentrum viewed from the south-west (photo: Piet Kerstens)

The structure of the building consists of reinforced concrete square pillars with a width of 400 x 400 mm. The entire structure is cast-in-situ, including the floors with a thickness of 200 mm. Shear walls are built using the concrete, with a thickness of 200 mm, placed in between the columns in the central core and at the end of each wing. The entire complex is built on a grid of 1,8 by 1,8 meters.



The load bearing structure and its dimensions (own image)



The placement, size and current function of the buildings (own image)

Façade

The façade of the structure is covered with prefabricated concrete panels. They gravel granules are of a relatively large size (8-12 mm, see appendix 9) The thickness of the panels differs from 80 to 100 mm within the panel. The panels are connected to the structure with brackets. The dimensions of the elements is mostly continuous throughout the building. Occasionally, aluminium panels are used.

State of the building

According to the transformation document of the building from the municipality of Utrecht (Gemeente Utrecht, 2017) the building has:

Double glazing and an insulation layer around the building

Well-sealed, airtight façade

Balanced ventilation system

Connected to district heating

Electric cooking

Decent acoustic insulation

Accessibility for disabled

Spacious rooms

Tall ceilings

Meets fire safety standards

The renovation in 2017 has changed or maintained the following aspects of the building:

Demolition and removal of internal walls

Remove and reuse doors and frames within the building

Remove suspended ceiling

Preserve ventilation ducts

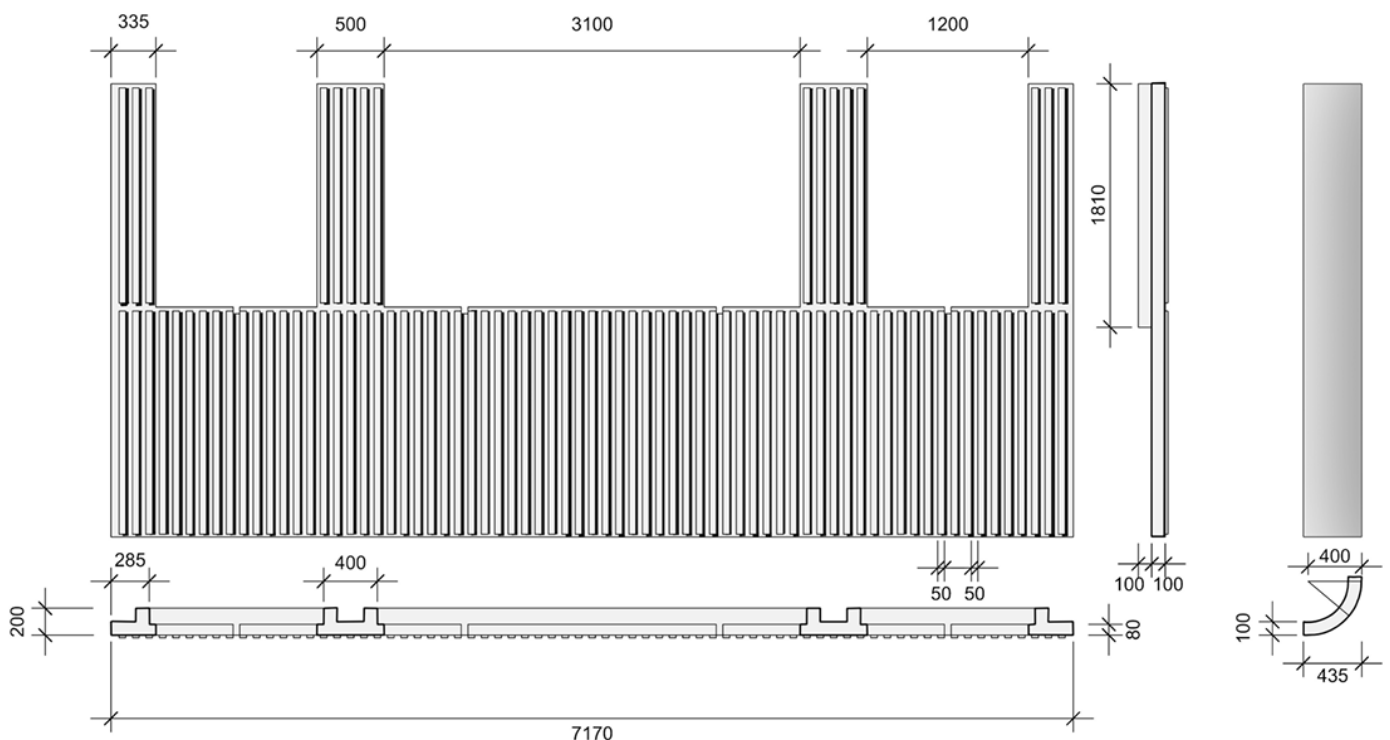
Preserve electrical outlets

Preserve existing plumbing/drainage systems

Construction of new bathrooms and kitchens (positioned to minimize pipe lengths)

Minimal material waste throughout the process

A few notable aspects mentioned in the document are the separation of the structure and internal parts of the building. The document also states that there is an overcapacity in the load bearing structure of the building. Lastly, it is mentioned that the building does not meet modern requirements in terms of insulation, energy consumption and other sustainability aspects, despite noting the good and closed insulation layer and double glazed windows. Furthermore, the building is connected to city heating. In the document it is stated that improving the insulation of the building for the temporary use of five years will create a higher number of CO2 emissions than when actually improving this (Gemeente Utrecht, 2017).



The main façade element and its dimensions (own image)

Main problem statement

Comparing the current situation to the future requirements that the Merwedekanaalzone brings to the plot leads to the following main challenges this complex faces:

*Insufficient residential density
Closed perimeter prevents through-traffic
Absence of public open space
Insufficient insulation*

Combining the challenges this building faces with the main research question (How to transform post-65 office buildings to match current demand while maintaining their architectural style?) leads to the following main design goals:

*Preserve the architectural style & materials
Adapt the plot and its buildings to match the design principles of the Merwedekanaalzone to fit into its new environment.*

To do this, a design strategy is formulated that is applicable for similar buildings.

The central location and big plot size brings the perfect opportunity within the design goals to create a landmark that stands as the centerpiece of this new neighborhood. This creates the opportunity to bring this architecture to the spotlight and change the negative perception of these lesser-known examples of post-65 architecture, by showing the chances and architectural value these buildings might have.

RESULTS

To preserve the architectural style of the building while increasing density, a strategy is formulated that focusses on a continuation of the architecture in the additions. This strategy adds to the existing methods used for post-65 buildings and consists of an extravagant preservation method. It presents a way to celebrate the architectural qualities of the original building.

The effect of adding density to the plot by adding volume is tested by making several exploratorial designs (see appendix 1). These designs explore the possibilities of expansion or addition and their effect on the architectural expression of the original building, the light quality and the integration of public space on and around the plot.

From this research it is concluded that the effect on the architectural expression is minimized by adding volume that resembles or is similar to the original. Since exactly copying the existing building does not result in a sufficient layout for the plot, a different approach is chosen to expand the plots' density.

3.1 TRANSFORMATION METHOD

To preserve the architectural style of the building while increasing density, a strategy is formulated that focusses on a continuation of the architecture in the additions. This strategy adds to the existing methods used for post-65 buildings and consists of an extravagant preservation method. It presents a way to celebrate the architectural qualities of the original building.

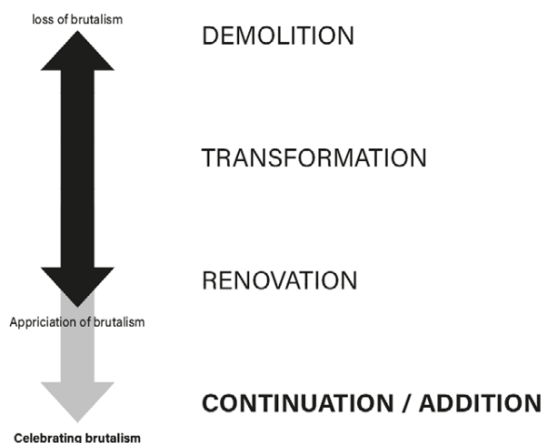


Diagram of the transformation method

With this method, the requirements from the new urban context are solved by using the architectural elements of the original building, instead of demolition.

The building is broken down into the architectural elements it is composed of. The addition will be made using these same design elements to construct a modern variant of the existing building, to compose a structure that fits the different function and modern requirements.

The design principles of the original complex are used on three different levels: The overall complex scale, the building scale and the detailing scale. On each scale, these elements are either directly copied or reinterpreted. This reinterpretation of elements occurs where the requirements of the new situation can not be solved with the architectural elements of the original building.

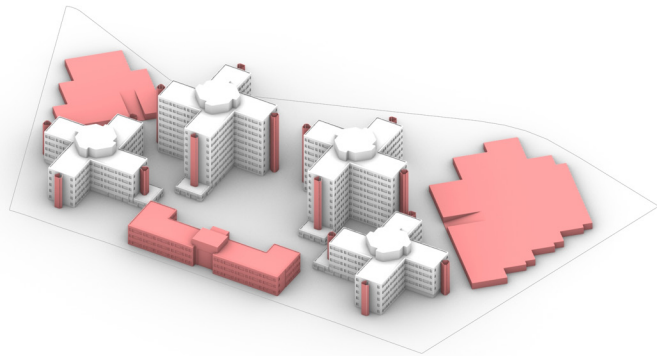
3.2. IMPLEMENTATION ON KANAALCENTRUM

The placement of the additions are determined by:

- The desired pedestrian routes through the plot*
- The repetitive design concept of the original to match the original architectural expression*
- The combined use of emergency staircases between the old and new to minimize the need for increasing the amount of staircases (currently amount: 23)*
- The daylight quality in each of the wings of the original building, making sure no windows are blocked by the new buildings, as well as providing a view of the surroundings from at least one long façade of the wing.*

Several different design explorations (see appendix 2) examine how the different combinations of implementation of the elements affects the resulting architectural expression, while fulfilling the future requirements of the area. This way it is determined what the exact definitions of the elements are. The resulting design is an example of how this reuse of architectural elements could work.

To be able to achieve a sufficient placement of these repetitive additions, Europalaan 300 and the parking garages are demolished. Its façade elements will be reused on-site. This creates a repetitive base to which the additional buildings are connected.



Demolition of Europalaan 300, parking garages and emergency staircases to make way for the placement of the additional residential buildings (own image)

The height of the addition is determined by:

- Minimizing the decrease of direct sunlight between the buildings*
- Copying the original design principle of similar buildings with different heights.*
- The design principles for phase 6 of the Merwedekanaalzone by the municipality of Utrecht.*
- The capacity of the load bearing structure*
- Densification requirements*

With this strategy, the design goals will be met in the following way:

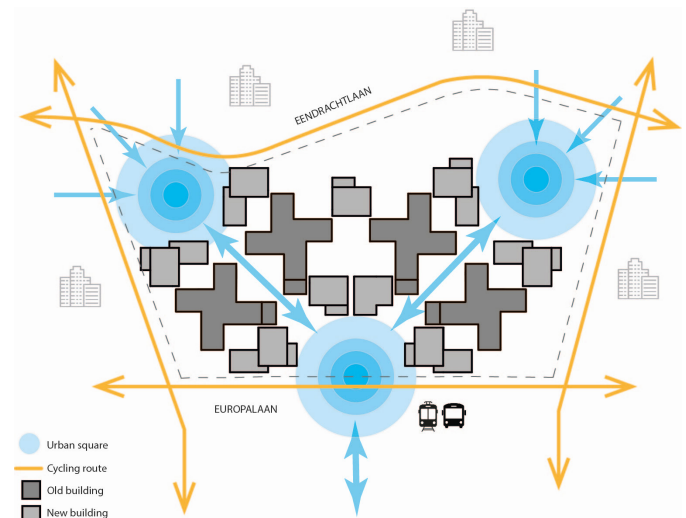
Preserve the architectural style & materials:

Keeping most of the original buildings and adding density by a continuation of style that is achieved by building with the original design elements of the complex.

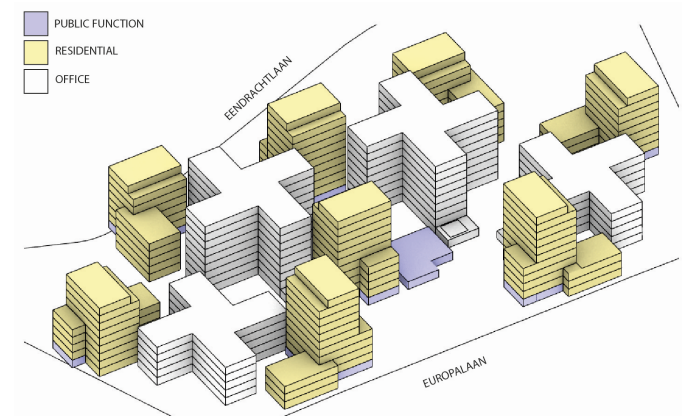
Adapt the plot and its buildings to match the design principles of the Merwedekanaalzone to fit into its new environment:

Adding residential buildings with public functions at the ground floor, while keeping the original buildings as rentable office space. This creates a mixed use neighborhood of a higher density that aligns with the plans of the municipality. Additionally, the space between and around the buildings will be transformed into a public open space with walkways connecting the public transport link on the Europalaan with the rest of the new development to the east of the plot. On the eastern side of the plot, two urban squares collect pedestrians

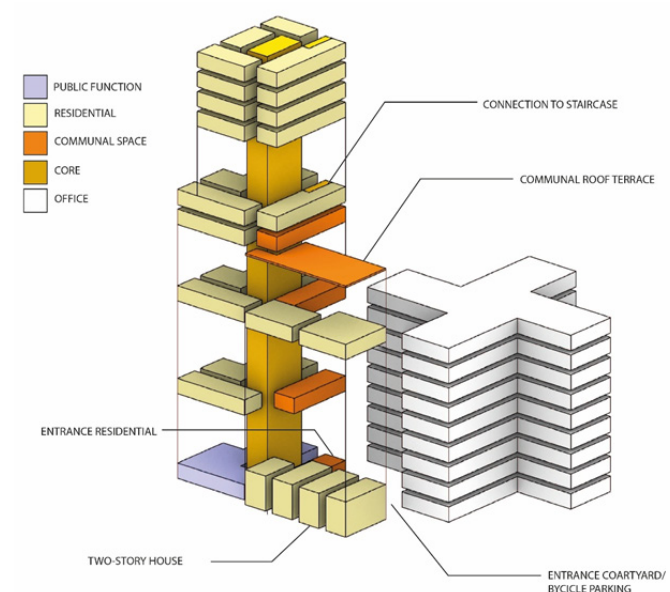
from the surrounding neighborhood. From these squares, two diagonal pedestrian passages connect to the urban square at the Europalaan with public transport connections.



Urban concept (own image)



Added volumes and respective future functions (own image)



Placement of functions in one of the additions (own image)

Formulate a design strategy that is applicable for other buildings:

The original buildings will be deconstructed into the main elements it is composed of. These are used to create an addition to the existing that follows the same design principles. This strategy is not necessarily specific to the Kanaalcentrum and can therefore be applied to different buildings.

3.3. IMPLEMENTATION OF THE STRATEGY ON DIFFERENT SCALES

The overall complex scale

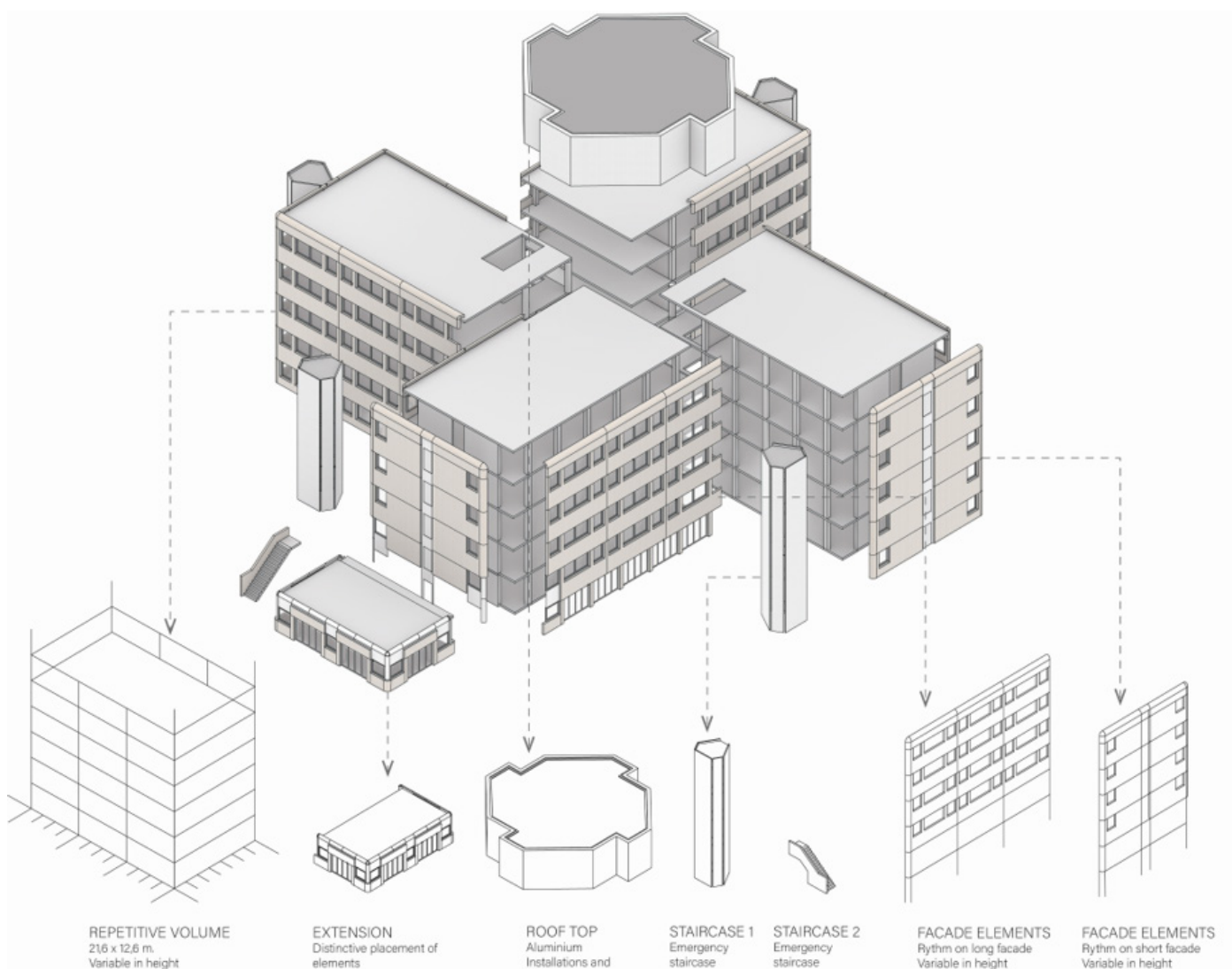
The main design principles will be incorporated into the design of the new layout of the plot and will be adapted to the future demand where necessary. The main design principles that will be kept are:

- Repetitive structure with different heights*
- Diagonal walkways between the rectangular volumes of the buildings*
- Green open space between the buildings*

The main reinterpretation on this scale is providing public access to the currently private green open space between the buildings. This way, the open space is connected to the future surroundings to provide accessible public space for the entire neighborhood, as well as direct connections through the plot.

The building scale

The building is decomposed into the following elements shown in the image below. These elements are then used to construct the shape and facades of the buildings. The exact composition of the elements in the addition can be found in appendix 3.



Breaking down the building into its main elements (own image)

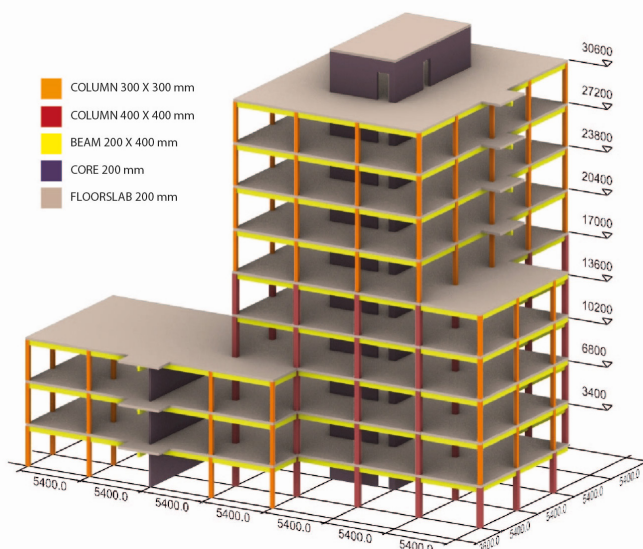
3.4. THE ADDITIONS

The additions will be constructed using volumes of similar dimensions, differing in height, following the design principles of light quality by the municipality of Utrecht. The respective façade layout covers these volumes with a pattern that is directly copied from the original building. Installations are placed on top of the roof, covered in a similar volume as the original.

The residential buildings require balconies. Since these are not present in one of the elements of the original, they are created by reinterpretation of the shape and design of the ground floor extension and the emergency staircases that have been demolished. The material from these staircases is reused to construct the fencing of the new balconies. A second type of staircase that is present in the original will be used for the emergency staircases and forms the visual connection between the original building and the addition.

The detail scale

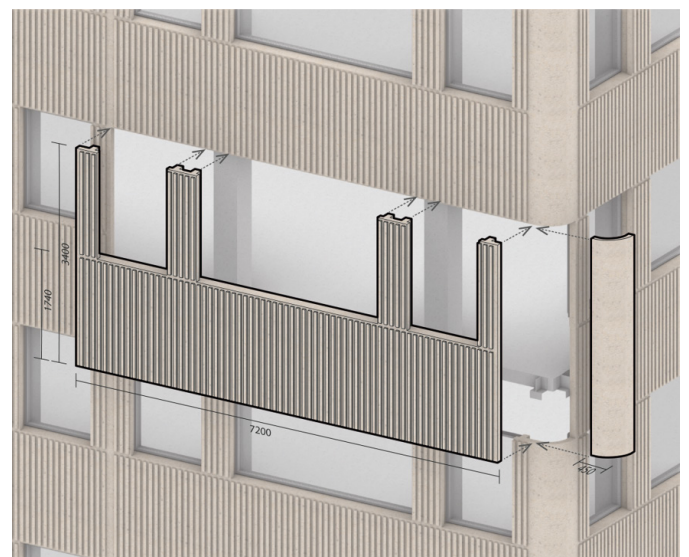
The structural system of the building, consisting of a central core and column structure, will be reinterpreted to a wooden variant with CLT floorslabs and core, combined with a glulam column and beam structure. The structure is built on the same continuous grid as the original buildings. The exact pattern of columns is different from the original to fit within the new volumes resulting from the design. Additionally, the structure differs from the original structure by beams connecting the columns, required for sufficient stability of the timber construction. The calculations of the construction can be found in appendix 4.



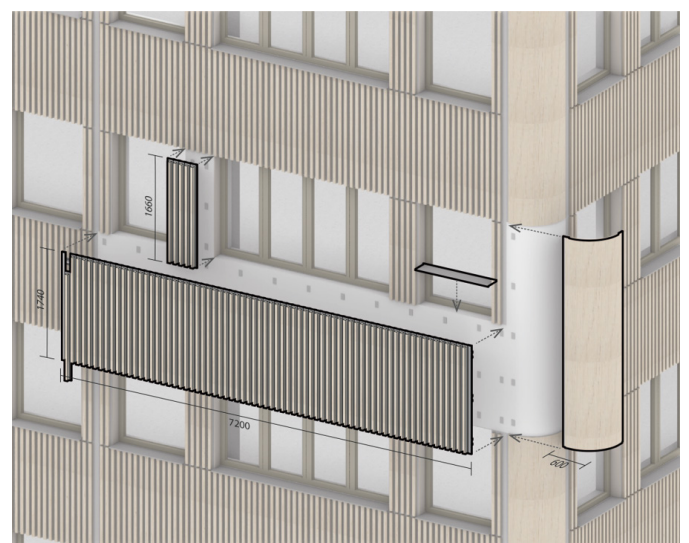
Load bearing structure of one of the additions (own image)

Just like the original building, the façade of the additions consists of prefabricated panels. The dimensions of the detailing of the façade is an exact copy of the original façade elements. Breaking down the element into smaller elements results in a reduced amount of unique panels compared to the original system. This does not affect the original dimensions and aesthetic of the façade.

The material is changed from concrete to wood to minimize the weight of the façade. This results in a wooden modern variant of the original concrete brutalist building. The separation visible between the different elements in the original building is copied. The color of the wood and the strips it is connected to is matched to the color of the original façade as closely as possible (see appendix 9).

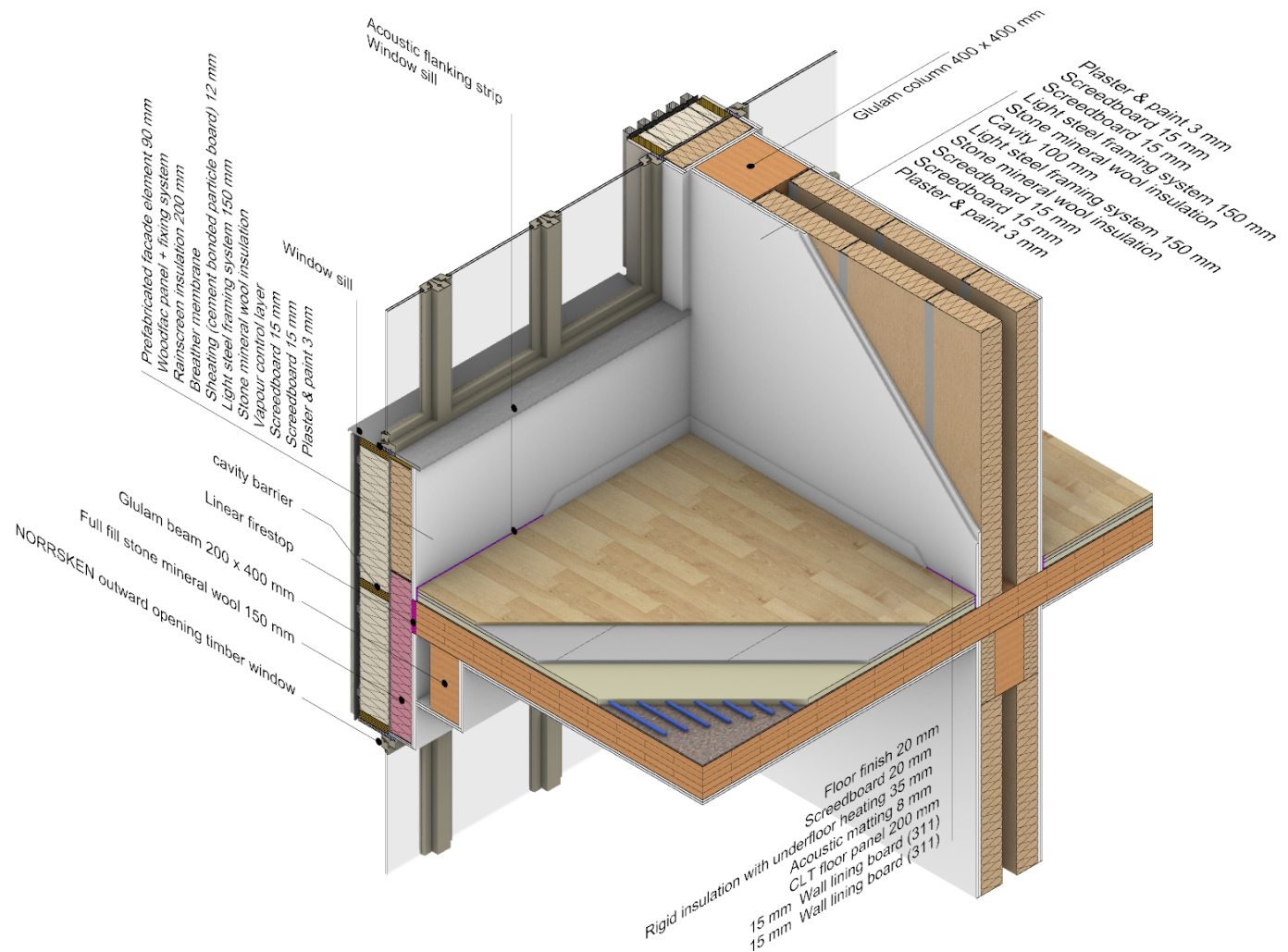


The dimensions and placement of the prefabricated façade panels of the original building (own image)



The dimensions and placement of the prefabricated façade panels of the additions (own image)

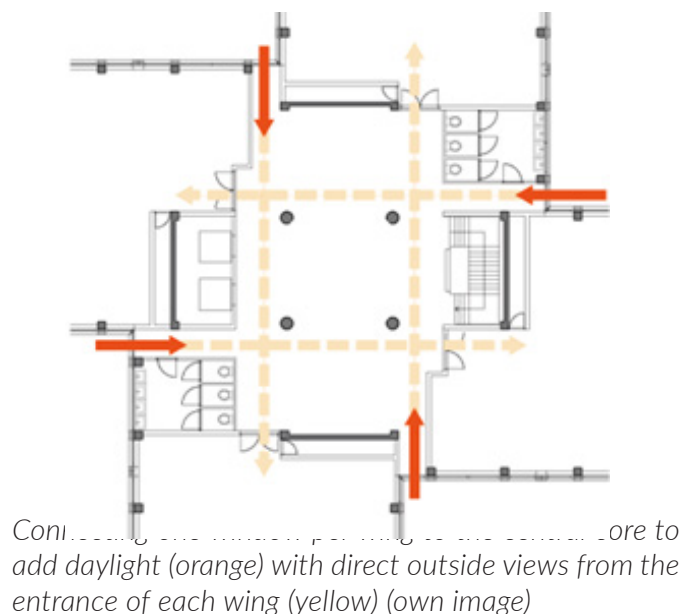
The insulation of the internal and external walls of the structure of the residential buildings are built according to 'The new Model Building Guide' (Waugh Thistleton Architects, 2023) for mass timber buildings and has openable double glass windows. All different residential or other units are a separate fire compartment. The fire performance between the compartments is 60 minutes.



Construction system of the new addition and the used materials (own image)

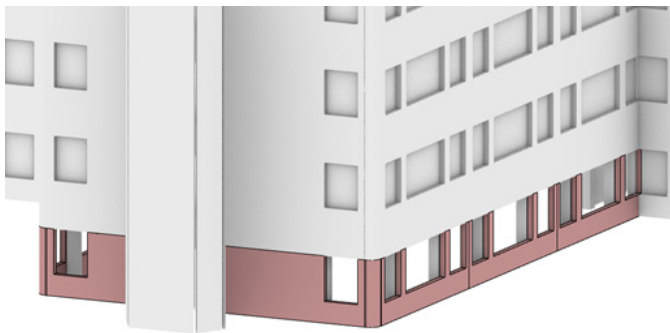
3.5. INTERVENTIONS IN THE EXISTING BUILDING

To improve the quality of the original office buildings few interventions are implemented. To improve the light quality in the central circulation core, each wing will contribute one window to add light from all directions. The restrooms are relocated to create a more open layout in the central core that can be used as a collaboration space between the different users of the building.



Core to add daylight (orange) with direct outside views from the entrance of each wing (yellow) (own image)

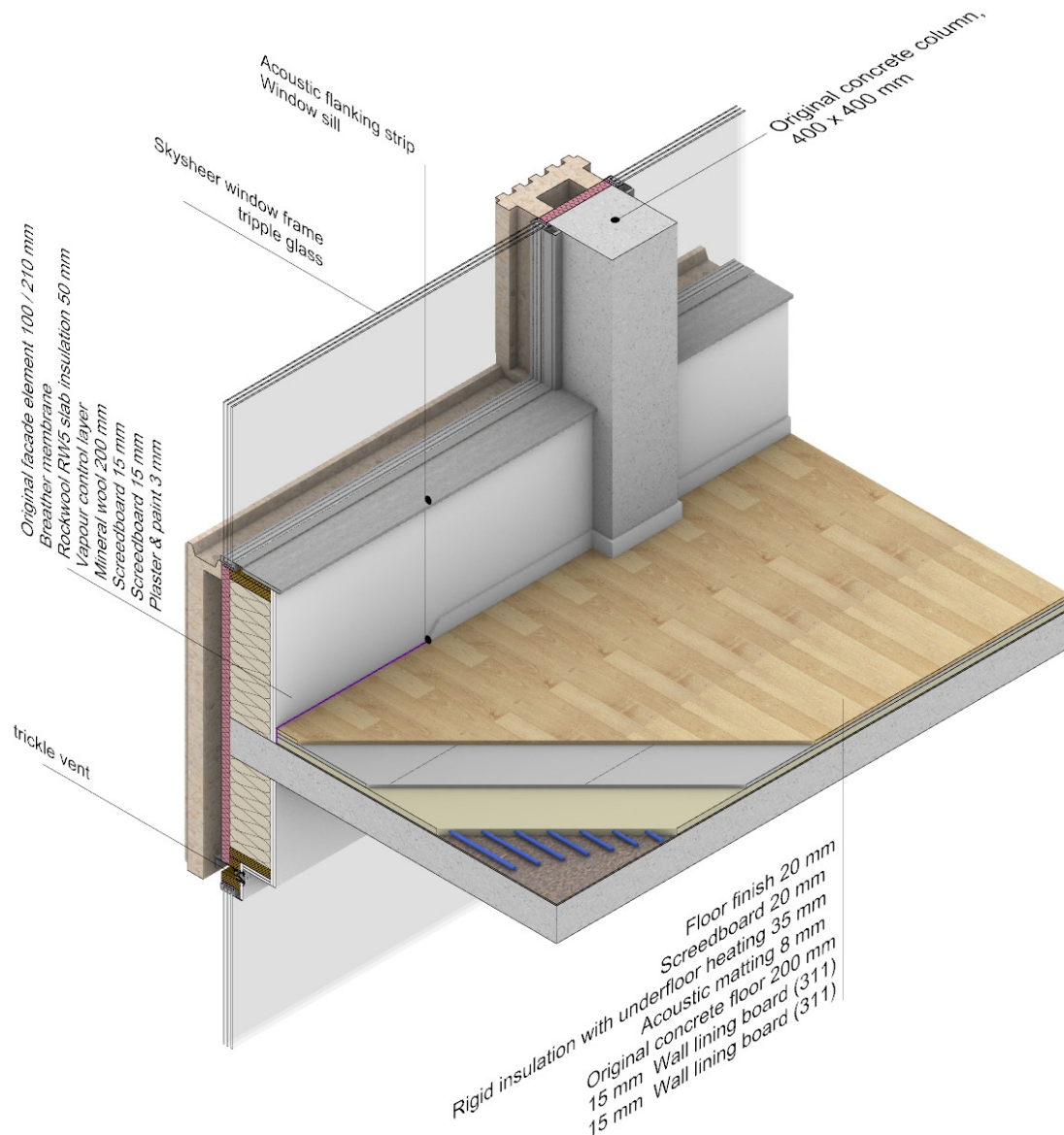
The outdoor bicycle parking on the ground floor on one of the wings is closed to be able to make the insulation layer wrap continuously around the building. Bicycle parking is relocated to the new created courtyards between the old and new buildings. To close the façade, original concrete façade elements from Europalaan 300 are used.



The existing insulation layer of just 5 centimeters is removed and replaced with a high performing stone rockwool layer due to its minimal depth. To further increase the performance, additional insulation is placed between the columns. This increases the R-value of the closed walls from 1,46 to 5,38. The existing ventilation system will be preserved, with the addition of new vents above the windows.

The original windows are removed and replaced with new frameless alternatives. The frameless aesthetic is made possible by the almost frameless design of this window system. The minimal frames are hidden behind the concrete panels. This intervention is done to make the geometry of the original façade panels more distinct. It differentiates the office buildings from the residential buildings.

Reuse of façade panels from Europalaan 300 to close the ground floor of the buildings. (own image)



Detail of the construction of the interior and insulation interventions in the original building. (own image)

3.6. PUBLIC SPACE AND SURROUNDINGS

The existing geometry of diagonal walkways separating green patches is applied continuously throughout the plot. The two urban squares at the eastern side of the plot are connected to the main square and public transport connection on the Europalaan with two diagonal passages for pedestrians only. The walls of the planters that form the geometric shapes are constructed using left-over material from the façade of the demolished parking garages. The planters divide the space into walkways and open squares, connecting to their surroundings and the entrances of the building.

The amount of parking space is reduced due to the car-free ambitions of the Merwedekanaalzone, where parking will be located in big garages at the edges of the area. According to the municipality of Utrecht, an A2 parking norm is in effect for this neighborhood, meaning the amount of required parking spaces can be reduced by a factor of 4 if they are replaced with parking places for shared cars. The amount can further be reduced by 20% if enough bicycle parking is implemented within walking distance. Because of this, the amount of parking spaces can be reduced. An underground parking facility with 432 parking spaces will be placed under the southern part of the urban square within the plot (see appendix 7).

4

CONCLUSION AND DISCUSSION

The implemented strategy of composing the additions with ingredients from the original building has led to the following design:



The complex after transformation viewed from the south-west (own image)

4.1. CONCLUSIONS

To evaluate the success of the transformation, the design goals are compared to the outcome of this design research.

Preserve the architectural style and materials

The preservation of the original architectural style is achieved partially. The increase of density. By using similar design principles on multiple scales in the construction and placement of the additions, this change in appearance is minimized.

The difference between the original and the additions implicate the difference of function by creating a slightly more playful composition that resulted from the different requirements of this new function. This is underlined by the use of wood instead of concrete and the use of window frames. This results in a slightly different texture and color and creates a difference between the expression of the residential additions and the original office buildings.

The demolition of Europalaan 300 results in a different atmosphere of the public space between the buildings compared to the current office garden. The original space between the buildings was visually blocked by Europalaan 300. Because of the change from private to public, this change in atmosphere is an intentional choice.

The recreation of the exact geometry of the façade panels resulted in a very similar esthetic to the original building. The change of material results in a different texture from up close, but appears similar from a distance.



The original facade after transformation (own image)

Adapt the plot and its buildings to match the design principles of the Merwedekanaalzone to fit into its new environment.

By adding residential and public functions to the existing office function, a mixed use area is created that matches the concept of the municipality for the neighborhood. The public functions are of a small scale and are placed at the ground floor, connecting to the slow traffic routes and urban squares leading to and around the complex. In total, there are 9 locations for public functions with a size of 243 m² each.

The existing office floorspace is kept in place in the original buildings of the Kanaalcentrum and aligns with the mixed use program that is projected for the eastern part of this neighborhood.

Most of the added floorspace is residential. The total added amount of residential units is 278, with sizes differing from 58 m² to 155 m². The total amount of added residential floorspace is 23.363 m². The total amount of added floorspace is 32.972 m², increasing the FSI of the plot from 1 to 2.

The plot includes almost 50% open public space, useable for the entire neighborhood. The open ring of public space around the building within the plot provides a green barrier between the complex and its future surroundings. This way, reduced daylight caused by narrow road and tall buildings is minimized, regardless of the placement and height of the future surrounding buildings.

The desired slow-traffic routes around and through the plot are implemented into the new design and supported by public functions. The design aligns with the car-free ambitions of the future neighborhood by transforming the entire plot into a pedestrian area.



New facade with a nearly identical design (own image)

4.2. IMPLICATIONS

The described transformation strategy is formulated based on the specific situation of the Kanaalcentrum. The implementation of this method on other buildings is not yet proven successful. For a building to fit this design method, a similar situation is required. The features that make a building suitable for this method are listed below.

*The need for densification of the area
Available open space within the boundaries
of the plot
Systematic building type that allows for a
repetition of the grid throughout the plot
Low FSI to facilitate the opportunity of
densification
Distinct architectural qualities that can be
used for designing the additions*

The rising valuation of brutalism has resulted in the preservation of several post-65 buildings throughout the country. This method is applicable for these buildings, but more specifically targets the lesser-known examples of post-65 architecture. This group of buildings has the potential to be architecturally significant and this method underlines their qualities. Therefore, it can contribute to the awareness of the qualities of this style.

The success of this method can be confirmed by designing multiple different buildings using this method. It requires a precise analysis of the architectural elements. The method does have some restrictions for the freedom of designing that may result in a different layout and organization of the plot than projected by the future plans for the area. The atypical layout the buildings might have is likely to reappear in the new design, since the overall appearance is kept similar and the additions are constructed using the same elements that this atypical design is originally built with. The resulting design is highly influenced by the future requirements of the area and the architectural elements of the original building. The freedom of interior layouts is minimized by the continuation of volume, rhythm and style.

A few buildings that are suitable for this method are:

*Atlas Arena complex, Amsterdam
Johannes Blookerweg office complex,
Amsterdam (very similar in layout to the
kanaalcentrum, but lacking in architectural
quality)
Novartis terrein, Arnhem
WTC Fellenoord, Eindhoven*

*Kristaltorens, Zoetermeer
Expedietieknooppunt Haarlem (already
transformed)
Flying deer, Utrecht
De mammoet, Zoetermeer*

The effectiveness of this method can be examined by implementing the method on these or other similar buildings.

4.3. REFLECTION

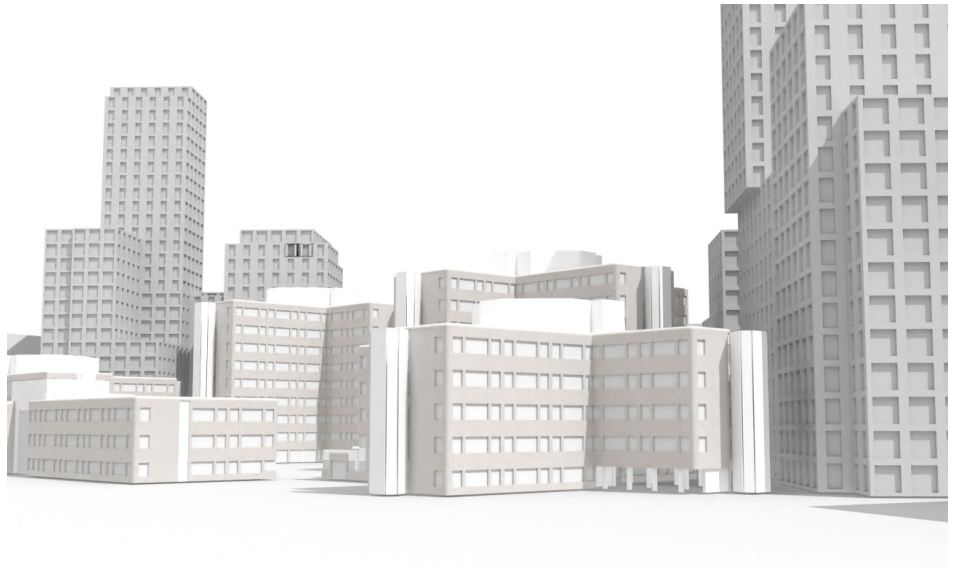
The resulting design is significantly different from the future developments that are likely to be built in this neighborhood. The resulting design is a very dramatic and extreme version of the original building.

The application of this method is not very specifically defined and depends on the definition of architectural elements and the way they are implemented within the requirements of the area or plot. Therefore it highly varies what the outcome of this method might be. It remains the question to what extent the architecture should be preserved and copied in the additions and how strict the design requirements are adapted. To make this research more valuable, a more concise explanation of the identifying of elements is required. However, this requires research on more than just one building.

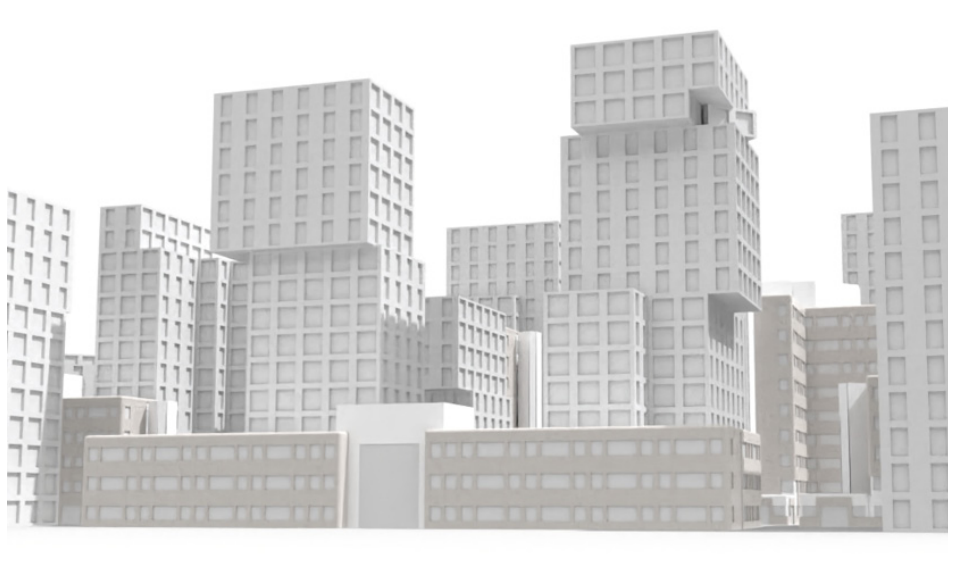
This method assumes that the architectural qualities of the building will be appreciated, deriving from the rising valuation of post-65 architecture. However, whether the resulting design with a very specific and distinct style will be appreciated is not proven by this research.

While design interventions are implemented in the original building, the focus of this project was more on the design of the additions and the overall complex. Further exploration of the possibilities within the existing building may lead to a more complete design.

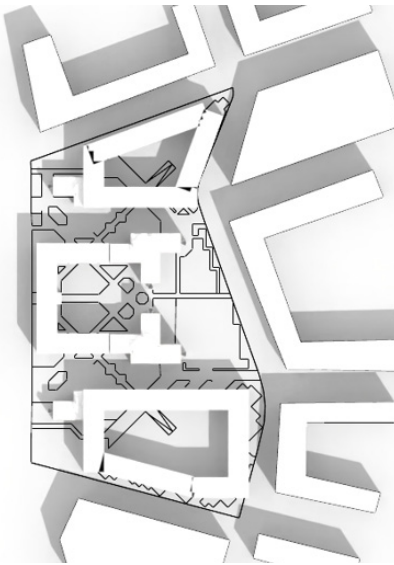
APPENDIX 1 - Exploring designs



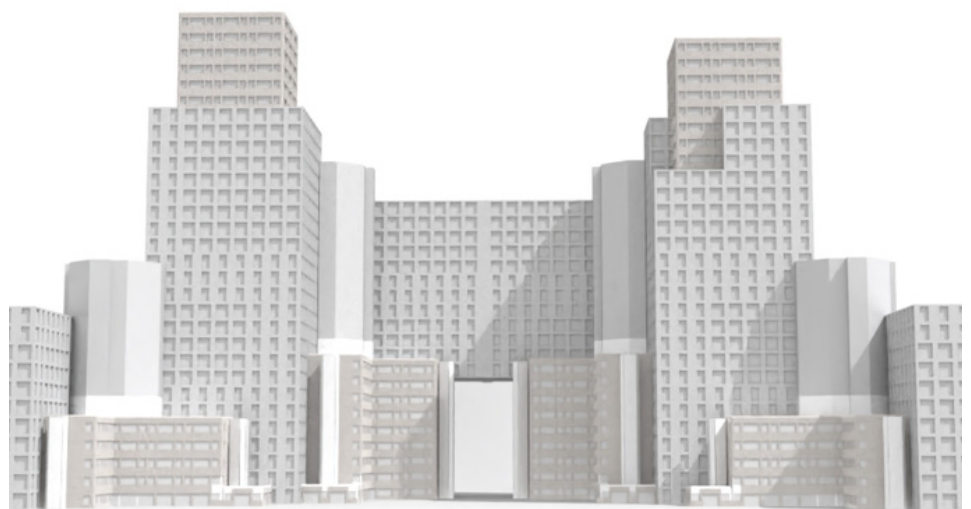
Densification in the corners of the plot, resulting in an unchanged original building and an FSI of 4



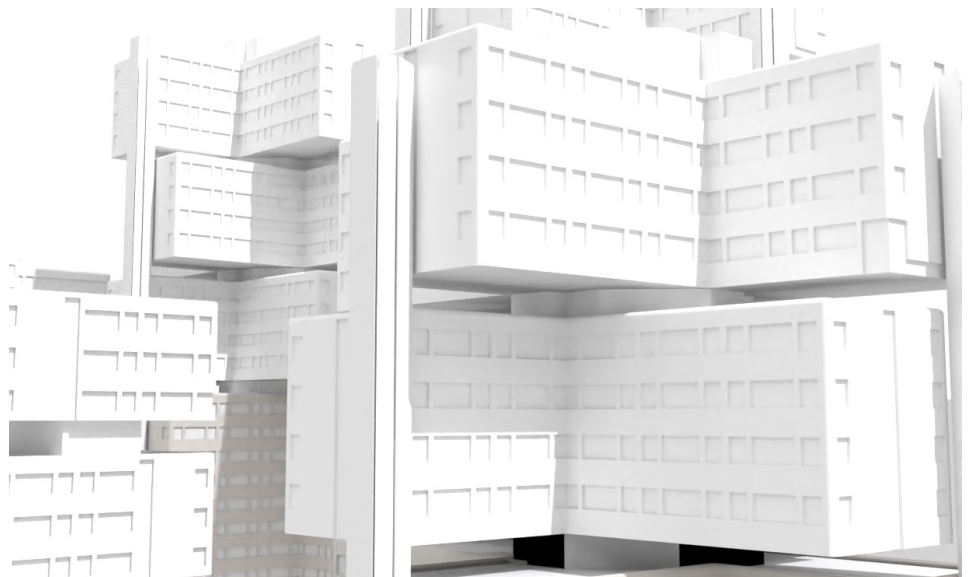
Densification in between the buildings, resulting in hiding the original architecture (FSI = 4)



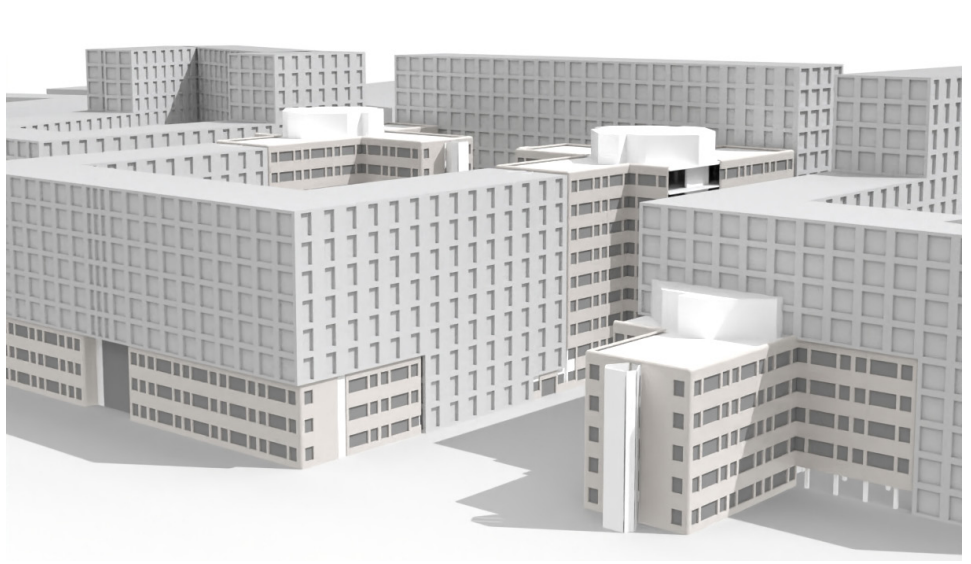
Partial demolition to form closed building blocks, resulting in hiding the original architecture (FSI = 3)



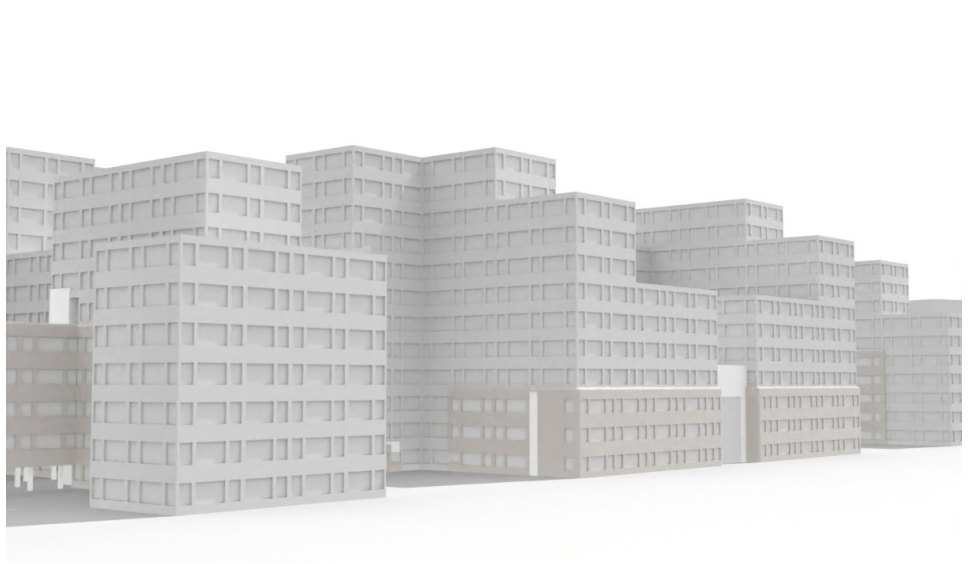
Incorporating the buildings in a large building (FSI = 4)



Stacking the buildings, repeating the architecture

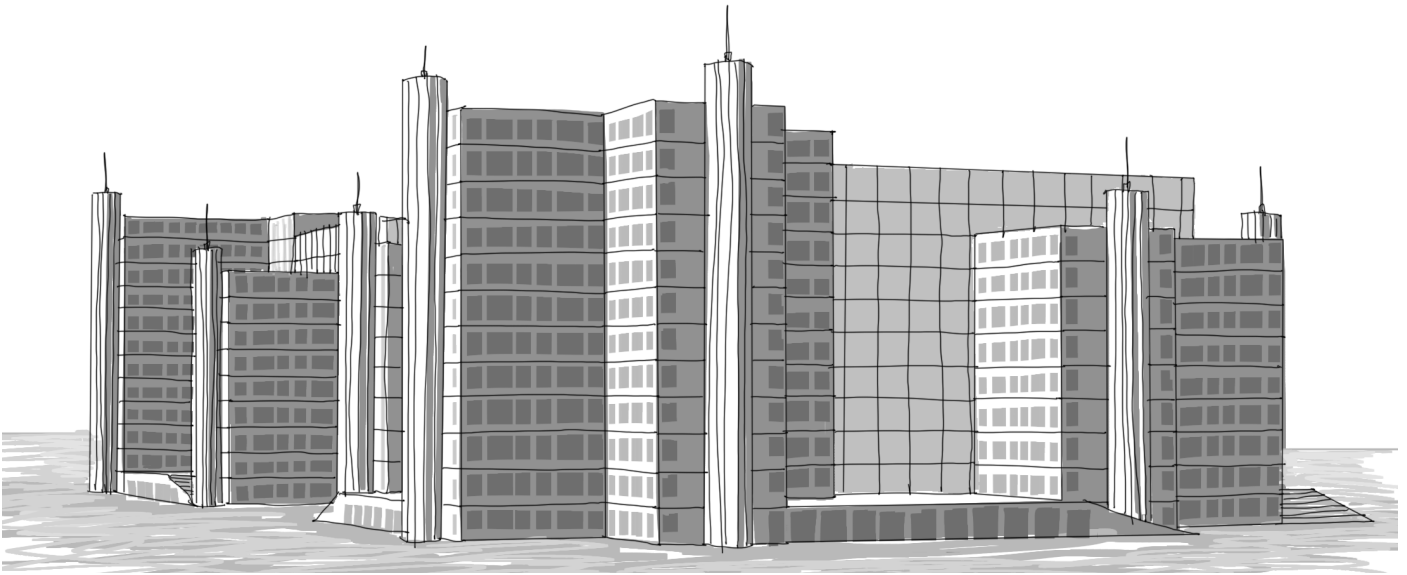
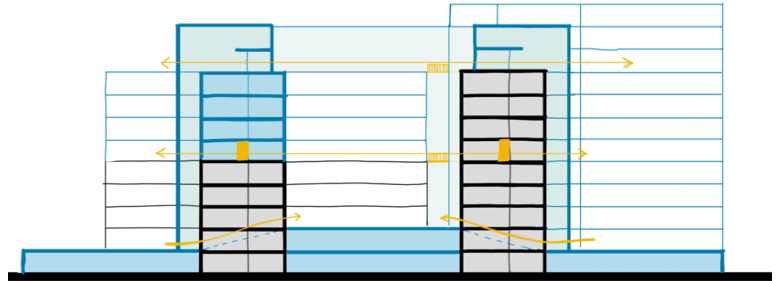
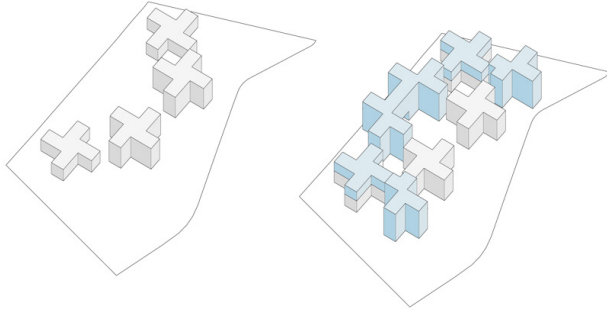


Partial demolition to form closed building blocks, resulting in hiding the original architecture (FSI = 4)



Repeating the system of the original building (FSI = 3)

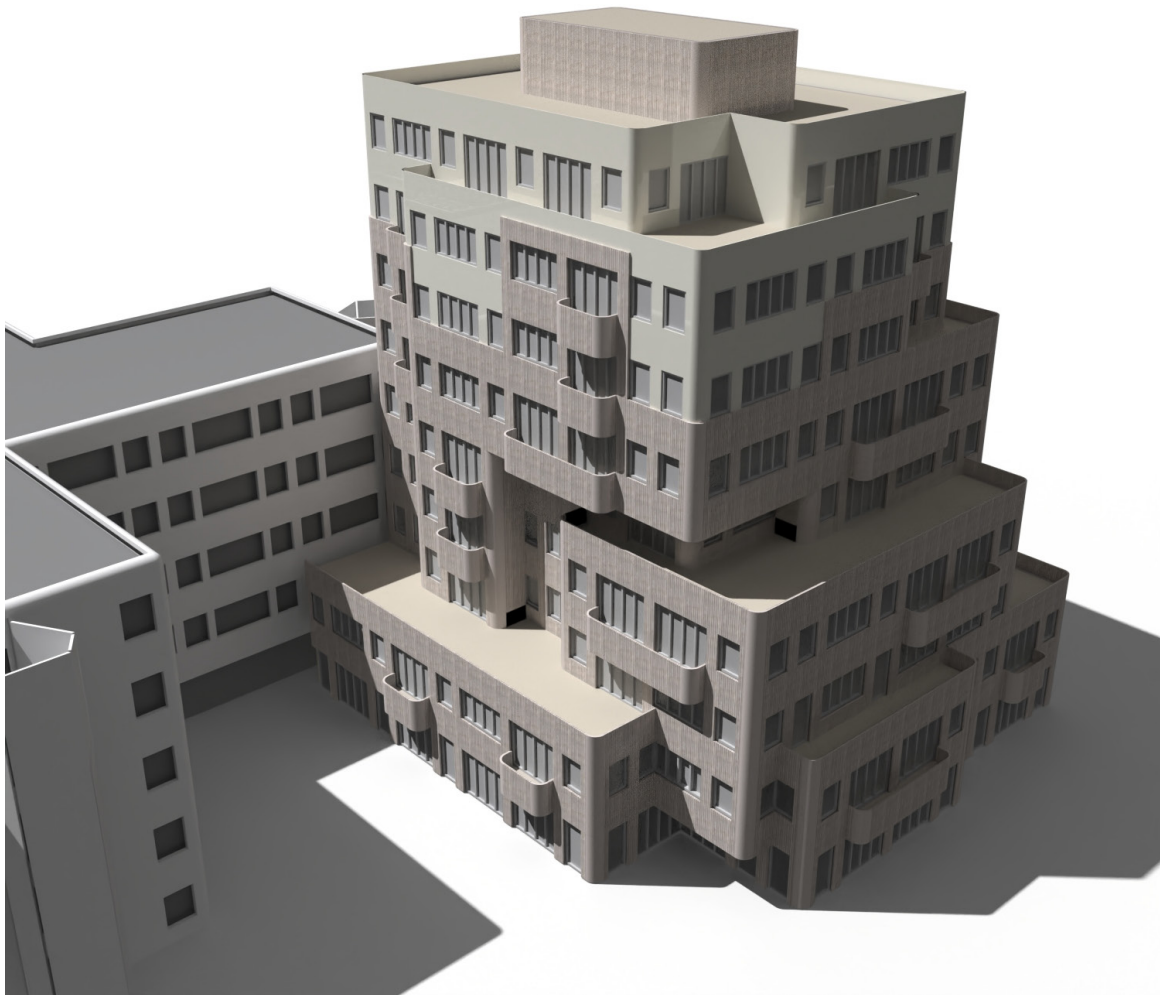
APPENDIX 2 - Exploring designs using existing architecture



Design that explores the repetition of the entire building to form one complex

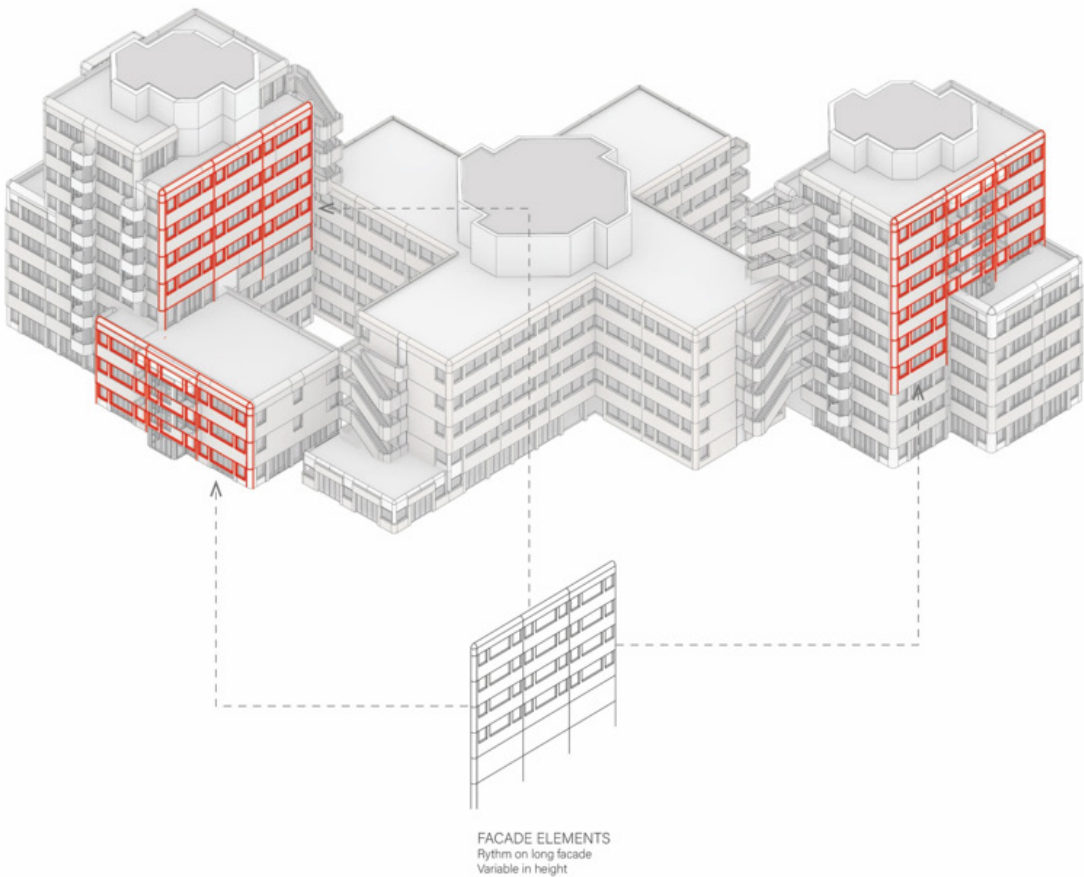
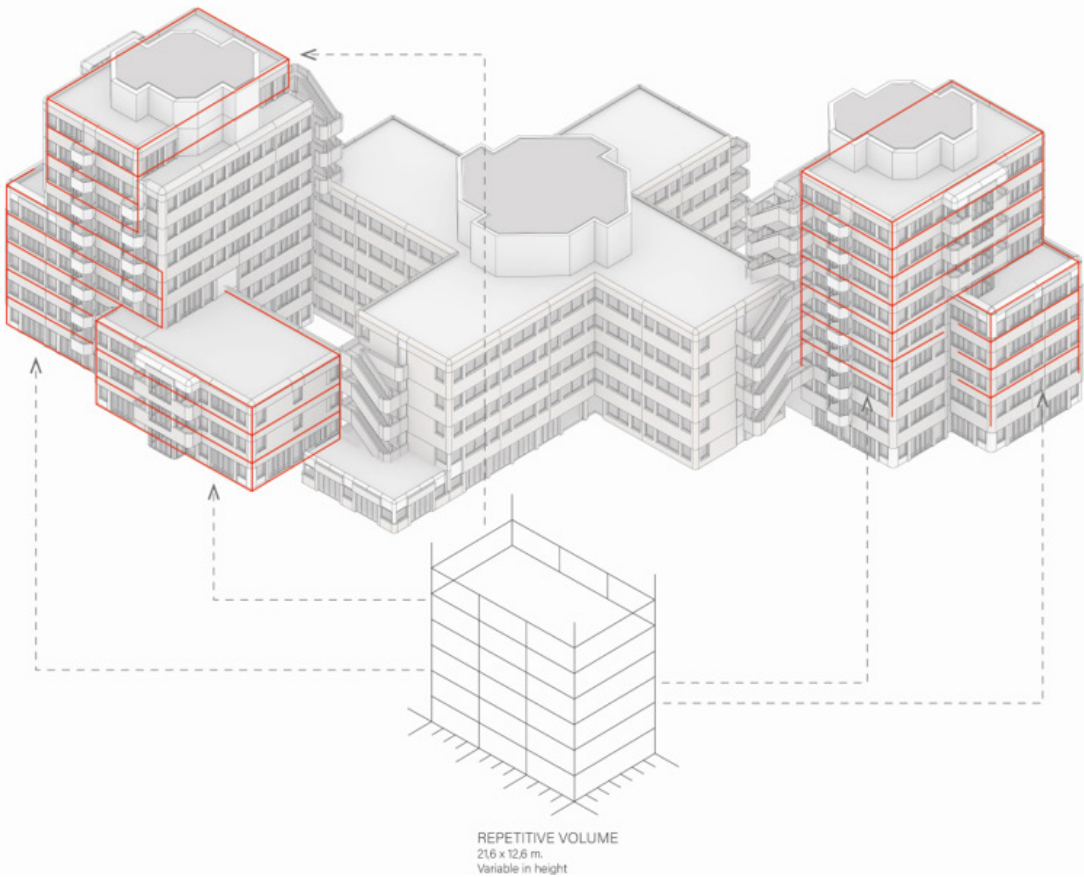


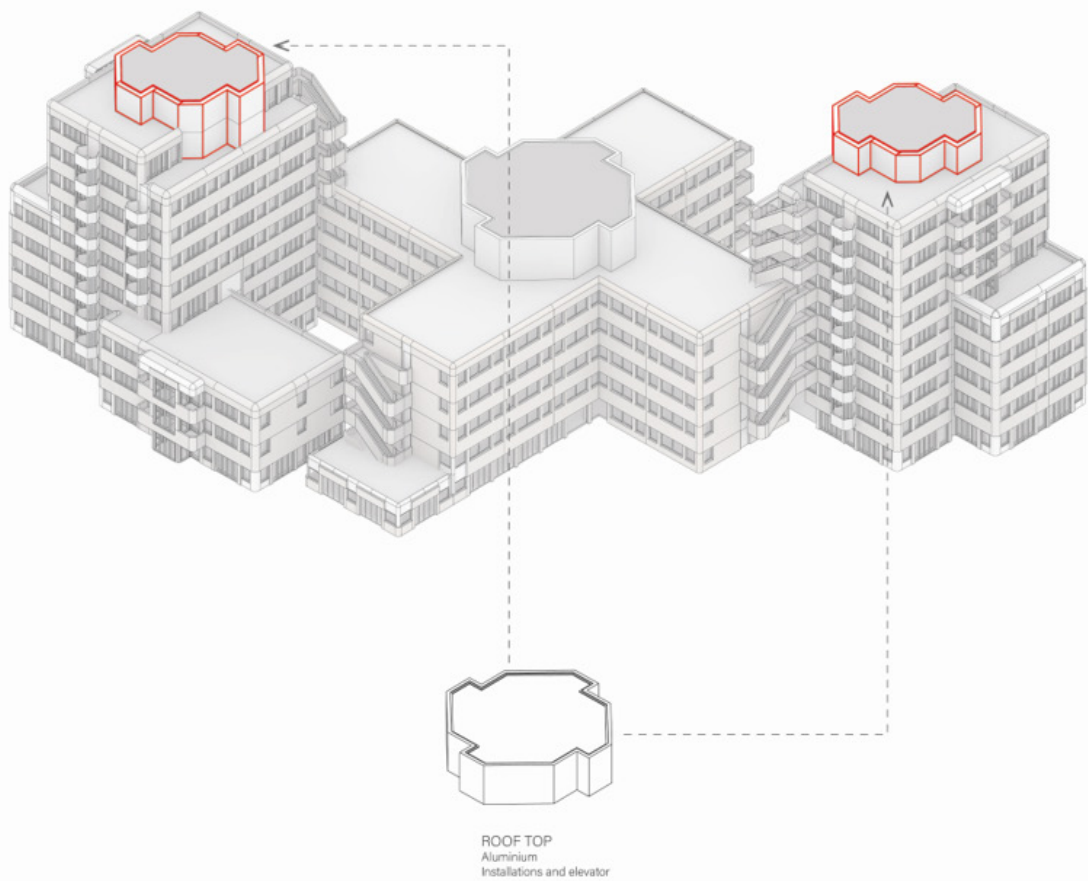
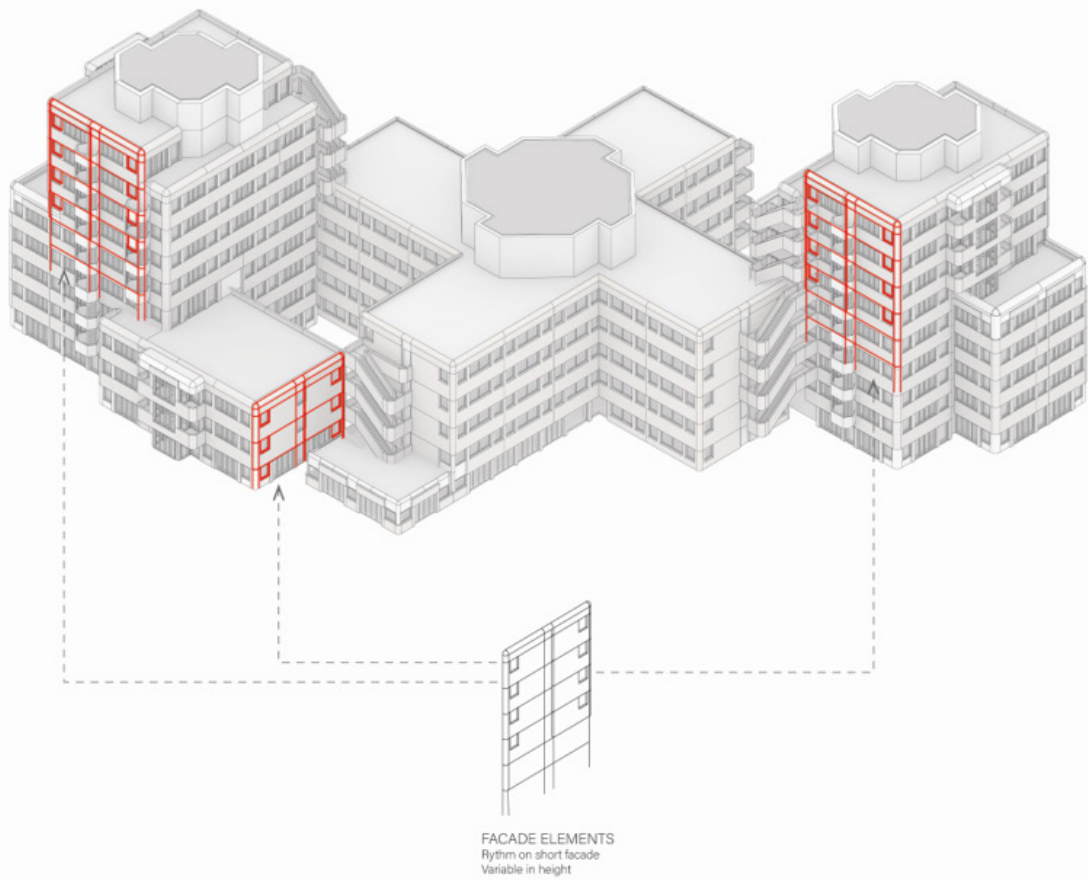
Design that uses elements of the original design as a guideline, more freedom of design is achieved.

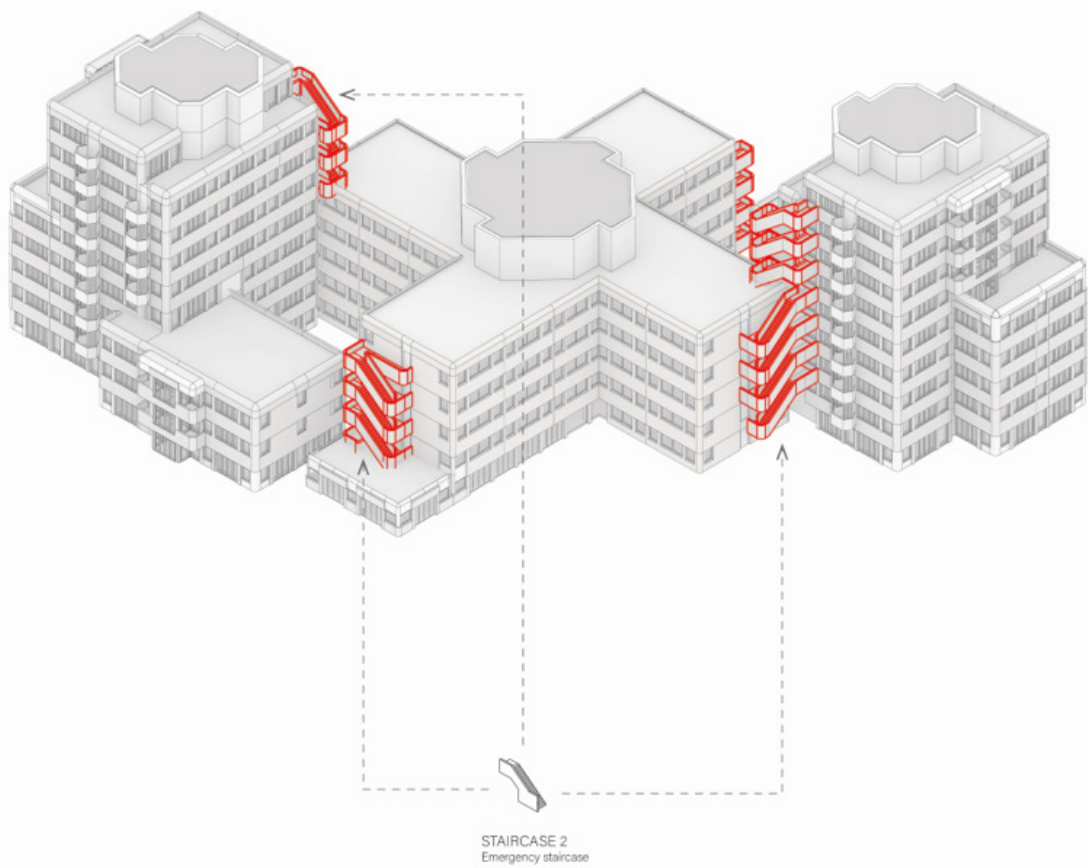
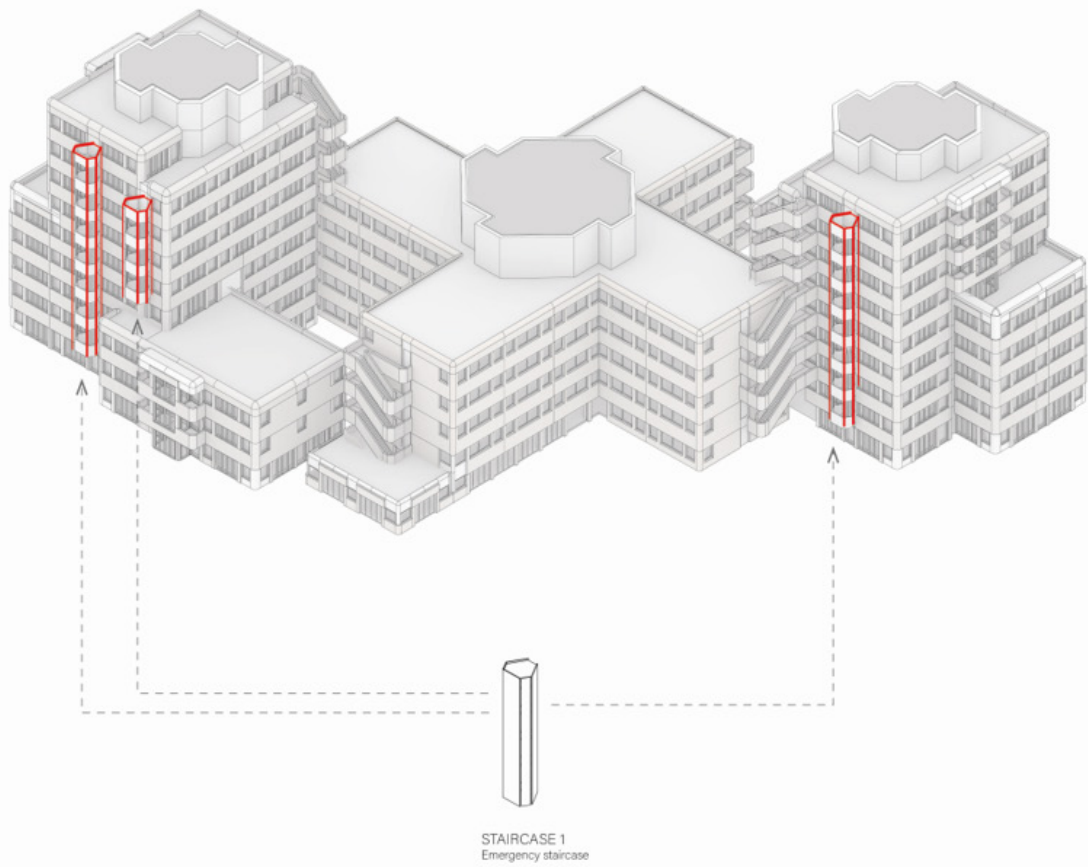


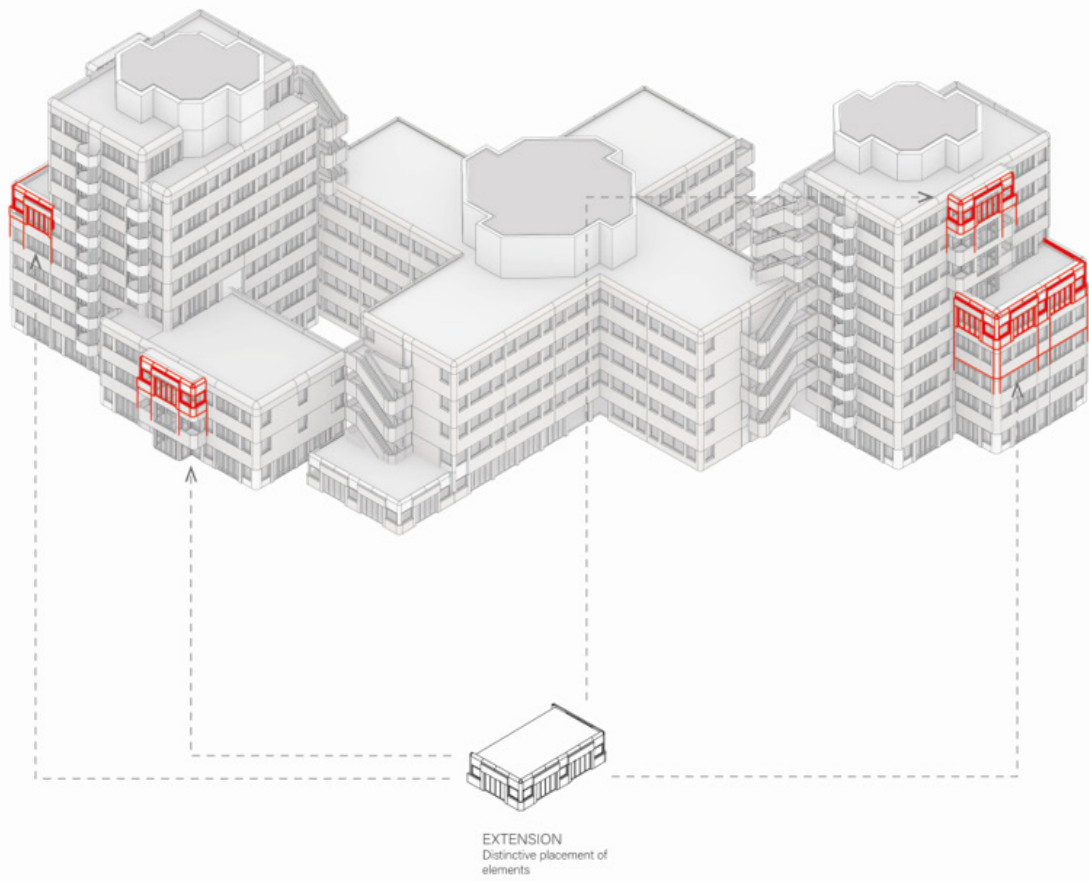
Design of an addition with a more playful interpretation of the placing of elements

APPENDIX 3 - Placement of elements in new design

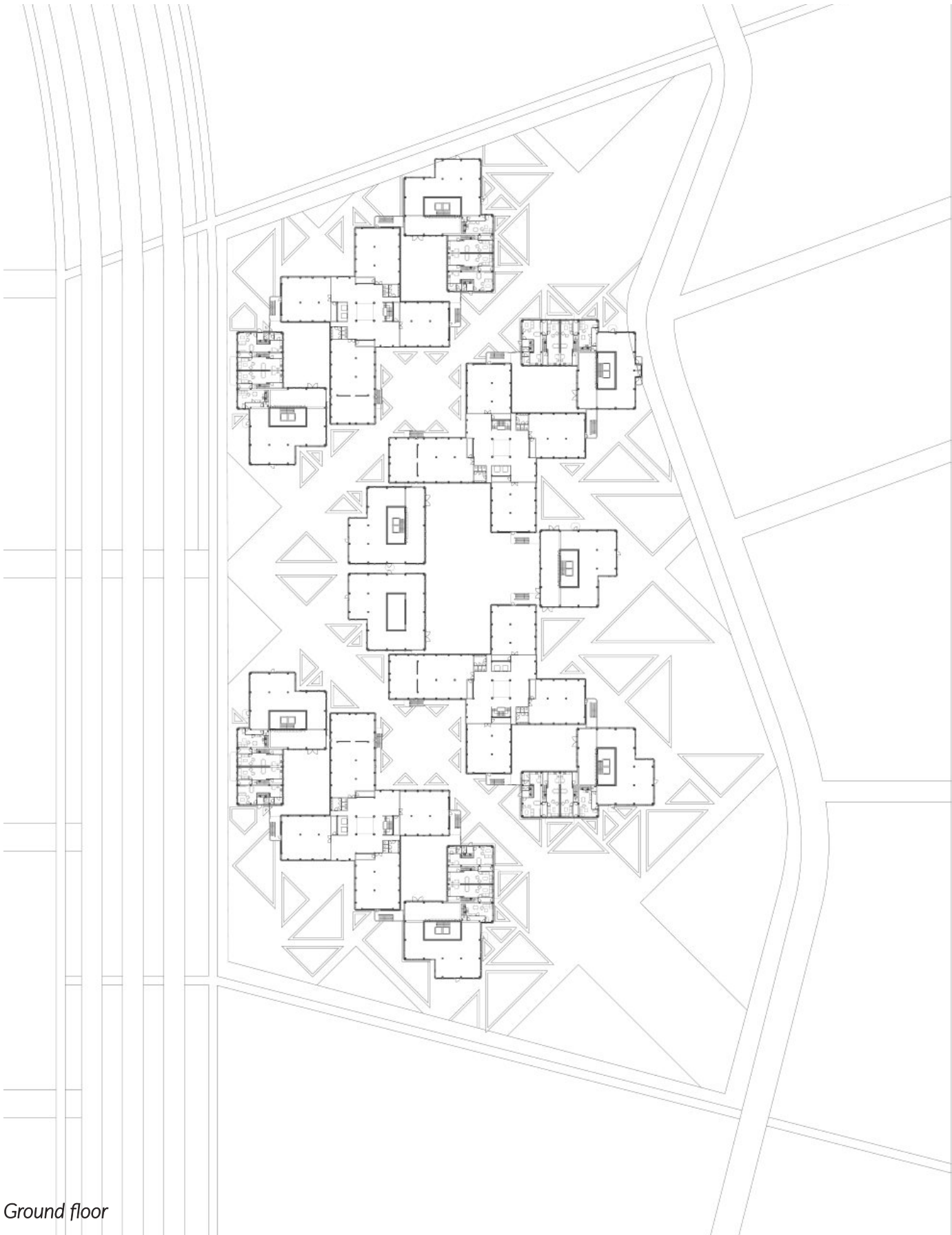




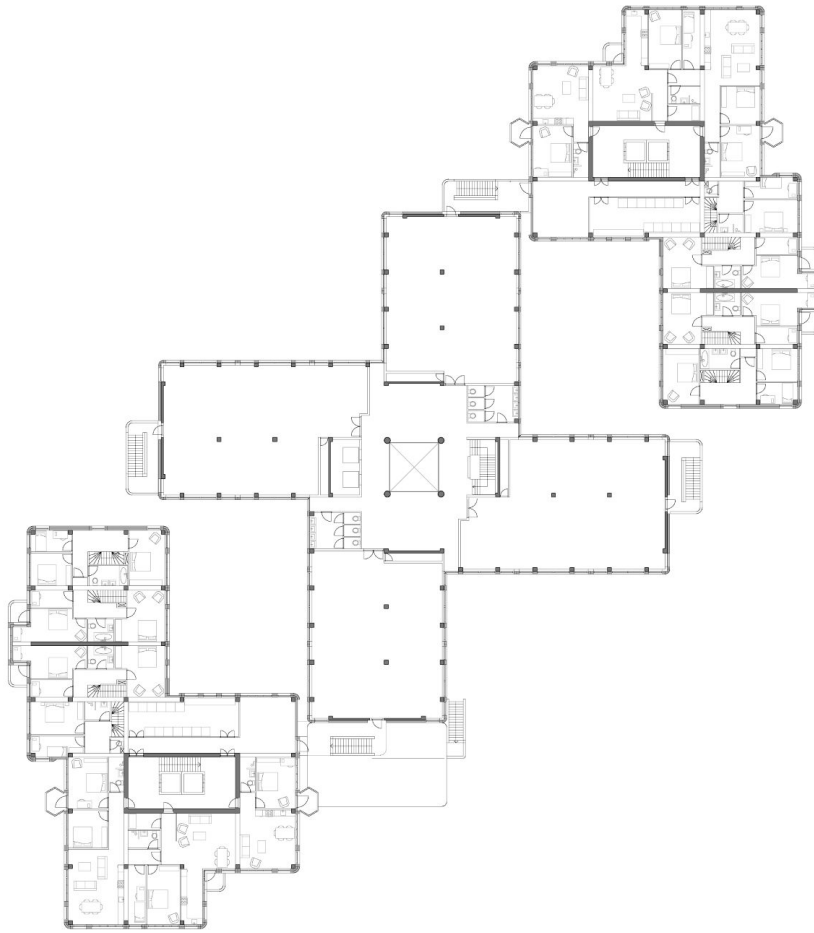




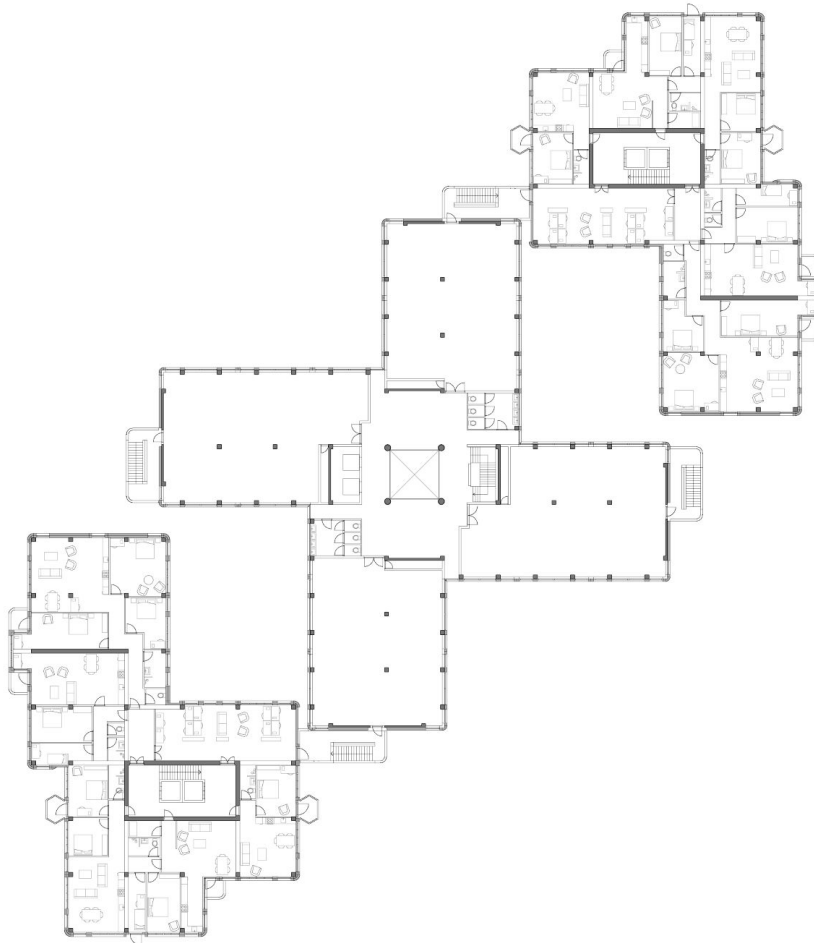
APPENDIX 4 - Floorplans



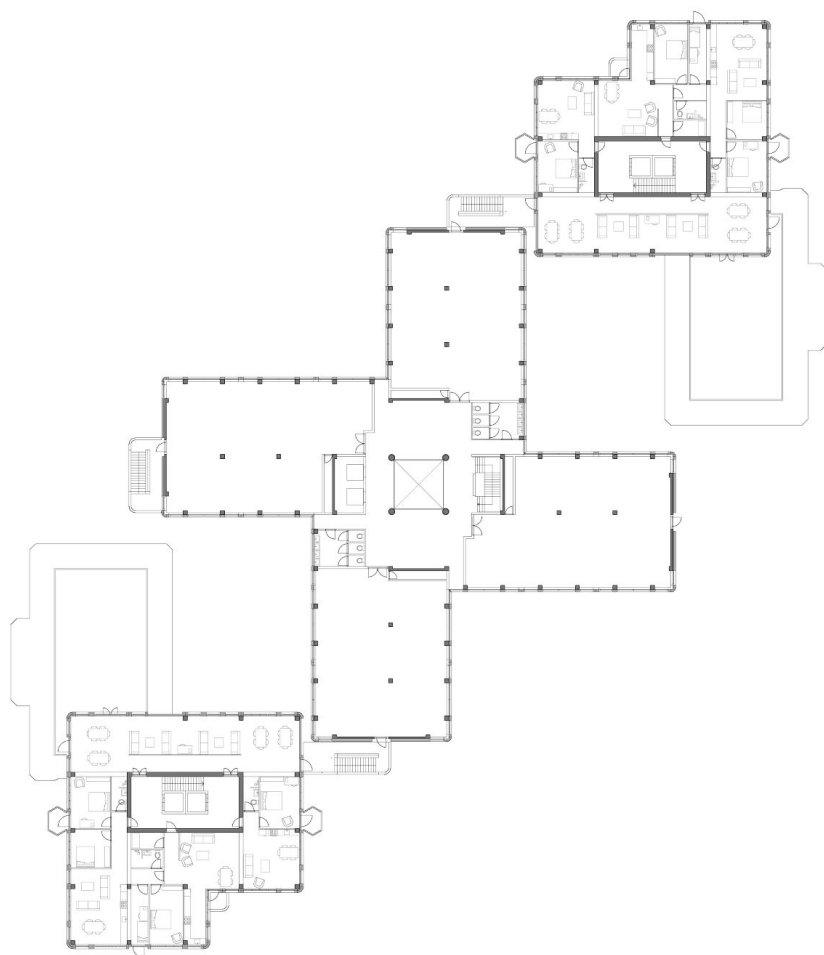
Ground floor



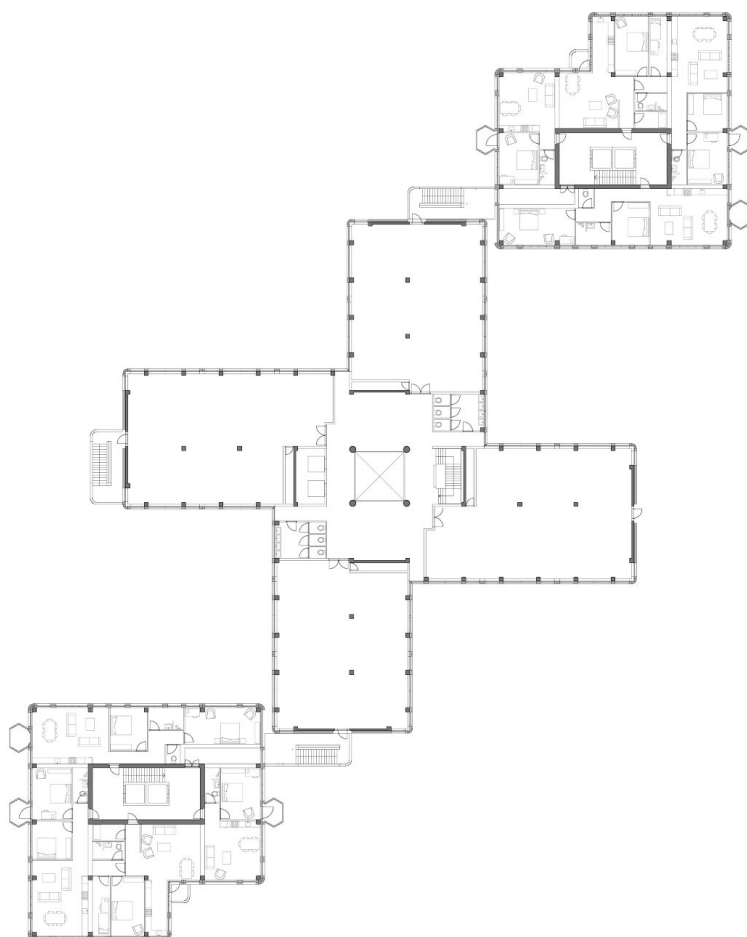
1st floor



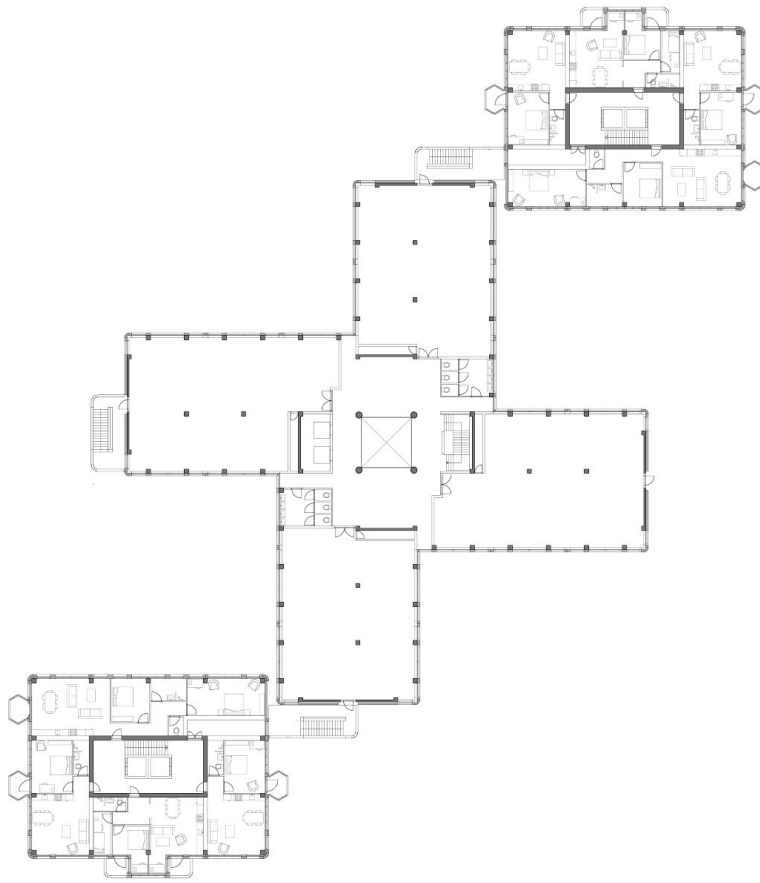
2nd floor



Communal garden level



Middle floors



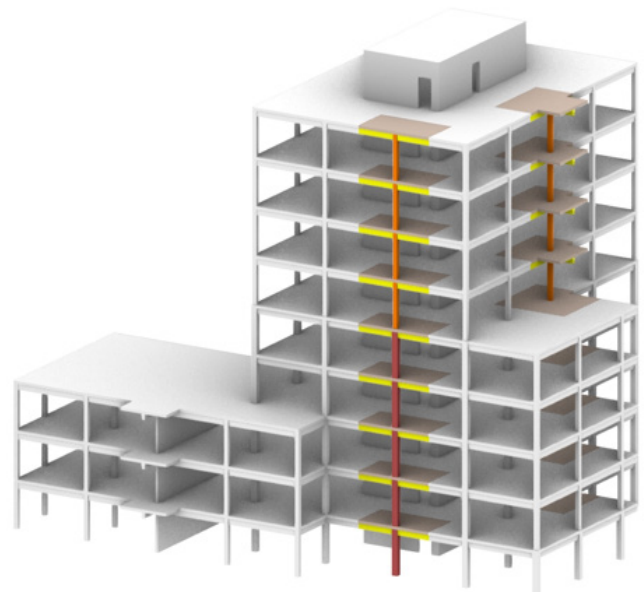
Upper floors

APPENDIX 5 - Load bearing structure calculations

Weight of elements				COLUMN 1					COLUMN 2				
Weight beam	density kg/m3	section (m2)	weight/m	amount of meters	kg	kn	safety factor	total Q	amount of meter: kg	kn	safety factor	total Q	
	430	0,08	34,4	80	2752	26,9696	1,2	32,364	67,5	2322	22,756	27,30672	
gewicht floor m2	dichtheid kg/m:	dikte (mm)	gewicht kg/m2	amount of m2	kg	kN	safety factor		amount of m2	kg	kN	safety factor	
Internal floor finish	2000	20	40										
Screedboard / gips	700	30	21										
Rigid insulation (PUR)	35	35	1,225										
Acoustic matting	200	8	1,6										
CLT floor panel	500	200	100										
Wall lining board	900	15	13,5										
			177,325	212	37593	368,41042	1,2	442,09	141	25003	245,03	1,2 294,0332	
weight window			kg/m2	amount of m2	kg	kN	safety factor		amount of m2	kg	kN	safety factor	
			60	29,92	1795,2	17,59296	1,2 21,112		67,32	4039,2	39,584	1,2 47,50099	
weight column /m	oppervlak (m)	gewicht/m		amount of meters	kg	kn	safety factor		amount of meter: kg	kn	safety factor		
weight column 300	430	0,9	387	12,8	4953,6	48,54528	1,2 58,254		12,8	4953,6	48,545	1,2 58,25434	
weight column 400	430	1,6	688	12,8	8806,4	86,30272	1,2 103,56		12,8	8806,4	86,303	1,2 103,5633	
weight column 500	430	2,5	1075	0	0	0	1,2 0		0	0	0	1,2 0	
weight facade	dichtheid kg/m:	dikte of aantal (mm)	gewicht kg/m2	amount of m2	kg	kN	safety factor		amount of m2	kg	kN	safety factor	
insul	50	200	10										
insul.bet	35	150	5,25										
framing			5,5										
fixing			0,1										
sheating board	1300	12	15,6										
screedboard	700	30	21										
			57,45	40,12	2304,9	22,5879612	1,2 27,106		97,92	5625,5	55,13	1,2 66,15593	
facade cladding	dichtheid kg/m:	dikte of aantal (mm)	gewicht kg/m2	amount of m2	kg	kN	safety factor		amount of m2	kg	kN	safety factor	
wood	525	25	13,125										
fixing			3,5										
			16,625	40,12	667	6,536551	1,2 7,8439		97,92	1627,9	15,954	1,2 19,14434	
internal wall	dichtheid kg/m:	dikte of aantal (mm)	gewicht kg/m2	amount of m2	kg	kN	safety factor		amount of m2	kg	kN	safety factor	
gips	700	60	42										
insulation	35	300	10,5										
framing	5,5	1	0,0055										
			52,5055	68	3570,4	34,9836652	1,2 41,988		68	3570,4	34,99	1,2 41,9876	
Balcony	density kg/m3	m3	weight per balcony kg	amount	kg	kN	safety factor		amount	kg	kN	safety factor	
aluminium board	2700	0,06	162										
Wooden clt floor/frame	500	0,7	350										
floor finish	2000	0,07	140										
framing fence			39,6										
occupancy load	density/m2	m2											
	175	3,5	612,5	4	5216,4	51,12072	1,5 76,681		9	11737	115,02	1,2 138,0259	
			1304,1										
Occupancy load			kg/m2	amount of m2	kg	kN	safety factor		amount of m2	kg	kN	safety factor	
			175	212	37100	363,58	1,2 436,3					1,5 0	
								1247,3				795,9723	

KNIK		
	Column 1	Column 1
dimension 400x400	400x400	400x400
Q	1247,299269	795,97234
material glulam	glulam	glulam
i	119,2	119,2
length mm	3200	3200
labda	26,84563758	26,845638
druksterkt	24	24
labda relat	0,427478305	0,4274783
k	0,597742766	0,5977428
Beta(c.)	0,1	0,1
k(c.)	0,984692941	0,9846929
Elasticiteit	9600	9600
k mod	0,8	0,8
materiaalf.	1,25	1,25
fd mod	15,36	15,36
kc*fd(mod)	15,12488357 > 7,79562	15,124884 > 4,97483

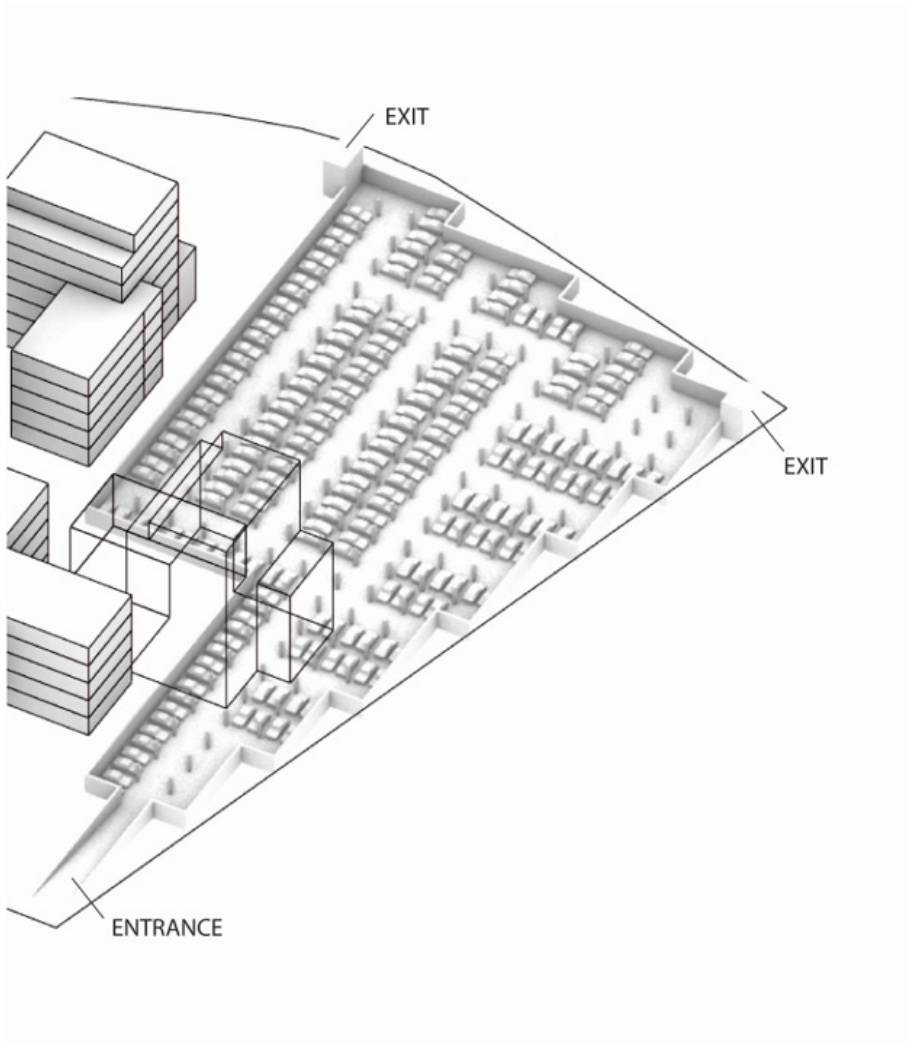
SPANNING		
	column 1	column 2
F(d) N	1247299	795972,3
A	160000	160000
spanning n/mm	7,79562	4,974827



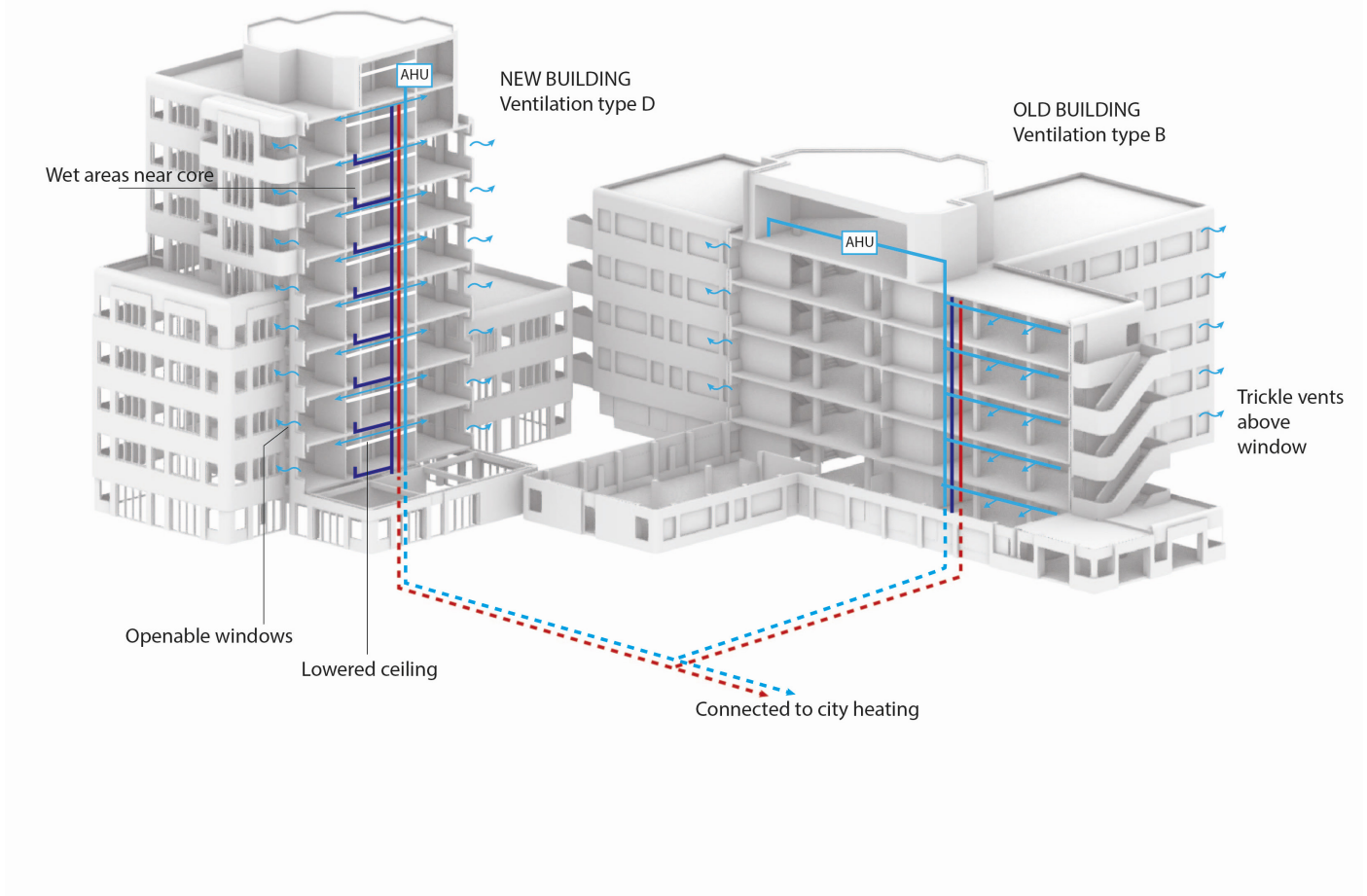
APPENDIX 6 - Insulation calculations

original new												
wall												
material	lambda W/m*k	d (m)	R-value	U-value	percentage	U	R total	u	percentage			
screedboard	0,22	0,015	0,06818	14,6667		14,6666667	0,0681818					
screedboard	0,22	0,015	0,06818	14,6667		14,6666667	0,0681818					
mineral wool	0,035	0,2	5,71429	0,175	0,95							
wood	0,12	0,2	1,66667	0,6	0,05							
						0,19625	5,0955414					
insulation	0,022	0,05	2,27273	0,44		0,44	2,2727273					
							7,5046323	0,13325	0,44	0,8		
on floor/column												
material	lambda W/m*k	d (m)	R-value	U-value	percentage	U	R	u	percentage			
insulation	0,022	0,05	2,27273	0,44		0,44	2,2727273	0,44	0,12	0,2	0,194600826	5,13872
Window												
material	lambda W/m*k	d (m)	R-value	U-value	percentage	U	R	u	percentage	U.total	R.total	
skysheer tripple					0,6	0,6	1,6666667	0,6	0,44		0,375430454	2,66361
original old												
wall												
material	lambda W/m*k	d (m)	R-value	U-value	percentage	U	R total	u	percentage			
screedboard	0,22	0,015	0,06818	14,6667		14,6666667	0,0681818					
mineral wool	0,035	0,05	1,42857	0,7	0,95							
wood	0,12	0,05	0,41667	2,4	0,05							
						0,785	1,2738854					
							1,3420672	0,74512	0,44	0,8		
on floor/column												
material	lambda W/m*k	d (m)	R-value	U-value	percentage	U	R	u	percentage			
insulation	0,022	0,05	2,27273	0,44		0,44	2,2727273	0,44	0,12	0,2	0,684095351	1,46178
Window												
material	lambda W/m*k	d (m)	R-value	U-value	percentage	U	R	u	percentage	U.total	R.total	
?					3	3	0,3333333	3	0,44		1,700652443	0,58801
ADDITION												
wall												
material	lambda W/m*k	d (m)	R-value	U-value	percentage	U	R total	u	percentage			
screedboard	0,22	0,015	0,06818	14,6667		14,6666667	0,0681818					
screedboard	0,22	0,015	0,06818	14,6667		14,6666667	0,0681818					
cement.board	0,22	0,012	0,05455	18,3333		18,3333333	0,0545455					
stone mineral	0,035	0,15	4,28571	0,23333	0,95	0,2333333	4,2857143					
mineral wool	0,035	0,2	5,71429	0,175	0,95							
wood	0,12	0,2	1,66667	0,6	0,05							
						0,19625	5,0955414					
							9,5721648	0,10447	0,56			
Window												
material	lambda W/m*k	d (m)	R-value	U-value	percentage	U	R	u	percentage	U.total	R.total	
Norrskan					1,2	1,2	0,8333333	1,2	0,44		0,586502963	1,70502

APPENDIX 7 - Parking



APPENDIX 8 - Climate design



APPENDIX 9 - Material reference



2613 - White cement
58% orange gravel Kampen 8-12 mm
23 % zilverzand 0 - 0.5 mm
19% maasgrind 8-12 mm

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