Transforming buildings by design strategies

The exploration of design strategies that can be used to transform an existing building by splitting it into smaller segments, transforming a theater and library building into a live/work area.

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Keywords: transformation, principles, strategies, splitting, adding, keep and removing

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Abstract

Every building is designed differently, therefore there is no set way of how building transformations can be carried out. The current state must be figured out for each building, and therefore the exploration and design phase of transformation projects takes a long time. For this reason, buildings are often demolished rather than being transformed. However, many of these buildings are important because of the value of essential history, shared ideas, and the physical environment. In addition, many buildings are vacant while there is a shortage of space for housing. By accelerating the design process, more buildings can be transformed instead of demolished. This will ensure that more housing can be created through the sustainable method of transformation.

The purpose of this research is to establish design strategies that can entertain and accelerate the design process of building transformations. For this purpose, the following research question was formulated: What design strategies can be used during the design process to preserve a building when it is split into smaller segments, and to what extent do these design strategies help in designing a building to be transformed?

To answer the research question, three case studies of transformation projects were analyzed and a comparison method was conducted. From these comparisons, five design strategies were extracted that help in the design process of a building to be transformed. The five design strategies are: 1) The space plan of the building should be kept the same in the main design as much as possible. In addition, a distinctive part of the building should remain unchanged. 2) More services will need to be added with a change of function, here some of the general service areas should be kept. 3) The facade should be kept as much as possible and only subtractions in the roof should be made where people gather. 4) The structure should remain visible where it was already visible, and in doing so the structure should be kept where it is still adequate. 5) The site can be added, removed, or remain the same. This should consider the possibilities of the surroundings and the new function of the building.

The five design strategies were tested on an assessment building. It followed that each of the strategies can be applied to the building and it facilitates and accelerates the design process of the transformation. In addition, the design choices made by the strategies are well-supported. Thus, using the strategies will benefit the design process of transformation projects.

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1. INTRODUCTION

1.1 Concepts and relations

This research explores design strategies that can be used to transform existing buildings by splitting them into smaller segments. The design strategies here are applied to theater and library building de Meervaart which is being transformed into a live/work area.

This research looks at three case studies of buildings that have been transformed. The transformations of the case studies were analyzed and then compared. From this comparison, design strategies were extracted that can be used in the design process of buildings to be transformed.

Finally, the design strategies were tested on a building to be transformed. The transformed building was then analyzed in the same way as the case studies and an assessment was made of how and to what extent the strategies can be used. From this assessment, conclusions were drawn as to whether the design strategies influenced the design process.

Definition of therms:

Heritage: “Heritage is something that can be passed from one generation to the next, something that can be conserved or inherited, and something that has historic or cultural value. Heritage might be understood to be a physical ‘object’: a piece of property, a building or a place that is able to be ‘owned’ and ‘passed on’ to someone else.” (Harrison, 2010)

Transformation/adaptive reuse: “The process of repairing and restoring existing buildings for new or continued use” (Plevoets & Van Cleempoel, 2019)

Design principles: Design principles are all the possible modifications that can be made within a building layer during its transformation. They are the collection of actions that happen in the layers during the transformation.

Design strategies: A design strategy refers to the overarching plan or approach that guides the design process. It involves decisions about the overall concept, spatial organization, choice of materials and other important aspects of the building or structure.

1.2 Problem field

Globally, the housing shortage is a problem, not only in the big well-known cities like New York, Amsterdam and London know the problem, but developing countries also suffer from it (The Housing Crisis: A Global Problem, 2018).

If you walk through the Netherlands you regularly come across buildings for sale or rent. In addition to this vacancy, there is also a major housing crisis in the Netherlands. So there is both an oversupply of spaces and a shortage, this is because the functions between these spaces are different.

In Amsterdam, many buildings are still being demolished when there is a change in function or target group and few buildings are being transformed. By transforming the buildings, the housing crisis can be solved faster and the use of existing real estate can contribute to a more sustainable city (Measures against the housing crisis | NUL20, 2023).

In addition, some buildings have not been designated cultural heritage, but have meant a lot to the surrounding residents, the environment and their history. These buildings are more likely to be demolished because there are no rules against not doing so. A lot of material is lost in demolition, whereas it could be preserved if they were transformed.

Recent years have increasingly shown how important it is to keep buildings in their condition. They are known for their history, culture and structure, and despite the fact that the old function cannot return, people want to preserve the buildings. They are valued for their essential history, shared ideas and physical value (Plevoets & Van Cleempoel, 2019).

For some types of buildings, such as churches and offices, many studies have been done on transformations. Such as the book Transformation to Living by Remoy et al. (2024). Becides that the municipality of Amsterdam has many plans and implemented projects in Amsterdam New West where offices are being transformed into housing (Gemeente Amsterdam, 2023). However, other types of buildings are still rarely transformed. This is because here it is harder to complete the design plans, the building is in the wrong place for current needs or the building cannot meet the digital age (Plevoets & Van Cleempoel, 2019).

This problem field concludes sight in the following problem statement:

- The vacancy of properties
- The housing crisis in the Netherlands
- The demolition of buildings that have significance for their surroundings
- The difficulty in designing plans in transformations

1.3 State of the art

Many studies have minor overlaps with this research. Most of these studies do look at transformations, but this only looks at the big picture such as the function that has changed.

Examples include the book transformatie van kantoorgebouwen(Van Der Voordt, 2007) and the book transformatie tot woningen(Remøy et al., 2024), these books are a collection of different transformation projects with underlying information. Some books go a little deeper into transformation projects, for example the book rekenen op herbestemming(Gelinck et al., 2014) describes more why buildings are reallocated and the numbers in numbers and the math behind the transformation is also studied.

The research Application of the Adaptive reuse potential model in Hong Kong(Langston & Shen, 2007) uses a case study to examine the relationships between financial, environmental and social parameters associated with building reuse. This research thus looks at the elements around building reuse, the research done will complement this.

There are also books that delve deeper into why and how we should concert buildings rather than demolish them. For example in the book Adaptive reuse of the built heritage (Plevoets & Van Cleempoel, 2019) is focused on identifying the opportunities and addressing the problems related to the reuse of buildings and sites in a theoretical way. The book discusses different approaches to building reuse, concluding that successful redesign projects must balance new interventions that are intelligently related to their future use. Adding that it is a constant dialogue between past-present-future is an obvious feature for reuse projects. However, only a few studies look more deeply at the architectural changes to the building.

The research of Andjelkovic(2016) has the most overlap with this research. The research focuses on transformation principles in the architectural design of a contemporary house. This research mainly looks at changes that residents themselves could apply to their homes.

Another research that has been done is that the research “Frame and generic space” by Leupen (2013). This research is focused on the changeability of dwelling proceeding from the permanent. In this research, the building is divided into multiple layers. He uses the Shearing Layers of Brand, S (1995) for this purpose. Then he started looking at the changeability of the different parts within the building. His method will not be used, but the different layers into which he divided a building, the Shearing Layers, will be used.

1.4 Aims & objectives

By conducting this research, there will be a better understanding of architectural changes when transformed buildings are split up. In addition, strategies will be created to help in the design process for buildings yet to be transformed. These two points together will ensure a better

understanding of the opportunities that exist within transforming buildings.

With this research, the assessment looks at the theater building and library building de Meervaart to be transformed. Plans are currently set to demolish the building and then construct a new building with new functions, including apartments and stores (Municipality of Amsterdam, 2022). The assessment examines whether it is possible to leave the current building standing and still provide the requested new functions using design strategies. The design strategies ensure that the building can be transformed in the best possible way and can remain standing sustainably.

In this way, more insight can be given into the possibilities of transforming more buildings instead of demolishing them.

1.5 Research question

What design strategies can be used during the design process to preserve a building when it is split into smaller segments, and to what extent do these design strategies help in designing a building to be transformed?

- What specific parts of buildings are modified during the transformation and segmentation process?
- What are the similarities and differences in the adjustments made to buildings that are transformed and segmented?
- What design principles and strategies can be derived from the comparisons of these adaptations?
- How can the design strategies be applied to a building to be transformed?
- To what extent is there a correspondence between the design strategies and the design of the transformed building?

2. METHODOLOGY

2.1 Theorethical framework

Add, keep or remove

This research will look at the transformation of buildings with large open volumes being transformed into buildings with smaller volumes. In building transformations, there are 3 options to choose from: add, remove or keep it the same. In this study, the transformation options, adding and removing, were split into two options each. For adding, one can look at adding or splitting/closing. For taking away, this is split into subtracting and joining/opening. The difference this adds is that it looks at what happens to the entire layer and what happens in a portion of the layer.

The hypothesis is that in this type of building transformation, there are 4 different ways to transform building layers. The 4 types of change that will be looked at are: adding, subtracting, splitting/closing and joining/opening, in addition, we will also look at how much is transformed and how much remains the same. Chapter 3.3 will define these sources more specifically for each layer of Steward Brand.

The Shearing layers by Steward Brand

According to Steward Brand(1995), a building consists of 6 layers: the site, the structure, the skin, the services, the spaceplan and the stuff. He came to this by another theorist, Frank Duffy. “Our basic argument is that there isn’t such a thing as a building” spoke Duffy, he sees a good building as different layers. Duffy saw the building as a collection of four layers, he called these layers the shell, services, scenery and Set(Brand 1995).

- Shell - This is the structure of the building.
- Services - This includes the systems the building has, such as the wiring, plumbing, air conditioning and elevators in the building.
- Scenery - This is the layout of the building that is defined by partitions and suspended ceilings.
- Set - This layer includes all the furniture.

Steward Brand has expanded the “four S’s” to the “six S’s,” as reported above: the site, the structure, the skin, the services, the space plan and the stuff(image ...). In his book How Buildings Learn: What Happens after they’re built (Brand, 1995) he has given his meaning to the different layers:

- Site - This is the plot on which the building stands, its urban location and the geographic location of the piece of land.
- Structure - Is the foundation and strength-bearing parts of the building and people do not change them easily.
- Skin - The entire exterior surface falls under the skin.
- Services - This layer is the same as Duffy’s layer, it is all the working systems in a building
- Space plan - This includes the entire interior layout, such as the walls, ceilings, floors and doors.
- Stuff- Last you have all the “loose” parts in the building, by this we mean all the furniture that is in the building.

This paper will not look at stuff because the lead time of this layer is so short that it changes too quickly to include in the study.

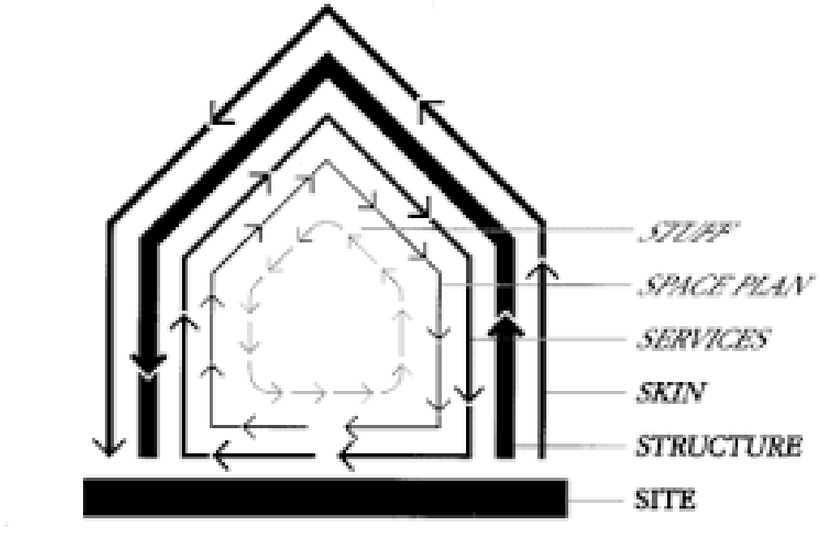


Figure 1: Shearing layers by Steward Brand (Brand, 1995)

Classification scheme

For all 5 layers, the type of change taking place in the transformations of three case studies will be examined. This will be done through colored designation in a schematic drawing of the transformed case studies. On the x-axis will be given the types of change and on the y-axis the shearing layers of Brand. The elaboration of this classification is shown in appendix ....

	Adding	Subtracting	Splitting/Closing	Joining/Opening	Changing	Keep the same
Shearing layers of Brand						

Figure 2: Classification scheme

After classifying these changes within the different layers, the buildings will be compared.

2.2 Methods

For this research, a comparative study was conducted using three case studies. The results of this study were applied to a building to be transformed.

Data collection

Three case studies were selected because all three are buildings that were important to the construction and history of their surroundings and are plans where the building was divided into smaller segments.

To collect data on the transformations of the case studies, floor plans were reviewed, which were collected using the archives of different cities. Scientific articles were also read and

found using Google Scholar and Scopus. These studies were used for background information and to determine what aspects the case studies relate to. Finally, newspapers were read and photographs were viewed to gain more insight into the transformed buildings of the case studies.

Processing

During this research, qualitative observations were used. The case studies were viewed, analyzed, and compared through schematic visual drawings. The different parts were marked to provide an overview of the different actions taken during the transformations.

To classify the buildings, the buildings were viewed with the following data in a diagram. On the horizontal axis are addition, subtraction, splitting/closing, joining/opening, changing and keeping the same. On the vertical axis are the layers of Brand(1995), here the layer of stuff was removed because the lifetime of this layer is very short. So the layers are space plan, services, skin, structure and site.

After classifying the actions of the buildings, the case studies were compared for each layer of Brand. By doing the comparison using this method, the data can be analyzed more clearly.

Data analysis

For each layer, the different case studies and actions were compared. The markings on the drawings give a clear overview of what changed in the layers and how much changed within the layers. By looking at the comparison and keeping the preliminary research with it, clear similarities and differences can be seen. These conclusions were analyzed and rewritten into principles and strategies.

Validity and reliability

Several times in the study, assumptions were made when information about the case studies could not be found. The effect of these assumptions on the principles was minimal, but they can be taken into account.

The principles and strategies were tested at an assessment. By testing it on this, it can be seen if and to what extent the strategies are applicable to buildings being transformed.

Design methods

For design purposes, principles and strategies will be applied to the Meervaart. The design strategies are transcribed into design starting points by looking at the characteristics of the building. These design starting points help in making choices made in the design process. In addition, they substantiate why choices were made and therefore the choices can be made more quickly.

2.3 Sources

The sources that will be used are mainly written sources, scientific articles, and books. In addition, unwritten sources such as maps and photographs have been used. Several websites were used for the case studies to better understand the spatial and components of the buildings.

2.4 Case studies

Three case studies were examined for classification and comparison. These case studies were chosen because all three buildings were very important to the community, the history of their surroundings, they had functions that were no longer in use, and they were split into smaller segments during transformation. The three projects that will be used are the old Rope Factory in Oudewater, the old Theater in Enschede and the Slaughterhouse in Haarlem.

A brief introduction of the transformations of each case study is given. In appendix 1 the case studies are examined in more detail. In addition, the building for the assessment is discussed. The building that will be used for this purpose is theater and library building de Meervaart. This building will be used to apply the strategies to test if they can be applied to any building to be transformed.

Case study 1: The old Rope factory - factory hall to residential

The old Rope Factory in Oudewater in the Netherlands has been transformed into housing. (Van Tongeren, 2022). The former Rope Factory is a national monument and has been vacant for a long time. Houses were created on both sides of the hall, in the middle part of the hall the roof was removed and an indoor-outdoor space was created (*Cement, kennisplatform over betonconstructies, z.d.*).



Figure 3, 4 and 5: A photo of the indoor-outdoor space (left) (ADO, 2017), a photo of the entire building from above (center) (Van Tongeren, 2022) and an impression of the building from the outside (right) (Van Tongeren, 2022).

Case study 2: The Twentse Theater - theater to shops, courtyard garden and living

The Twentse Schouwburg in Enschede is located in the city center. It is located between a lively shopping street and a quiet residential street. The old theater has an emotional significance for the city's residents and therefore the starting point was to partially preserve the building in the transformation.

The theater's main auditorium was transformed into a courtyard that is publicly accessible with several small stores. An additional entrance has also been added, making the garden accessible from two sides and forming a new connection in the city. The large tower has been replaced by a residential building which refers to the old silhouette and the small auditorium has been included in the new plan as it was (*Herbestemming Twentse Schouwburg - De Zwarte Hond, z.d.*).

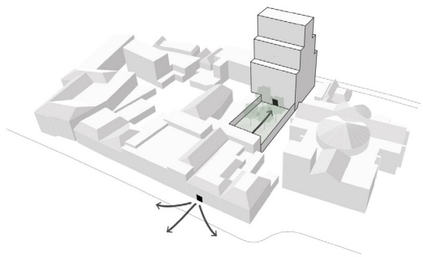


Figure 6 and 7: Schematic of the new building blocks and new passageway (left) and impression of the courtyard garden(right)(*Herbestemming Twentse Schouwburg - De Zwarte Hond*, z.d.).

Case study 3: The Slaughterhouse - slaughterhouse to live/work area with pop venue

The Slachhaus site has part new construction in addition to the transformed building. Only the transformed building will be considered in this study. The already existing building on the Slaughterhouse site has been transformed into housing and commercial spaces (De makers, z.d.).
The pre-existing building contained the slaughterhouse, director's house, canteen, water tower and stables. Over the years several additions were made to the building, and these were removed again, making more history visible (Transformatie, z.d.).

Figure 8 and 9: Schematic layout of the interior (left) and impression of the exterior(right) (Van Heeswijk Architecten, z.d.)

Design study: The Meervaart - theater and library building

The theater and library building de Meervaart will become vacant in a few years and will be demolished according to current plans. The theater will move to a site in the Sloterplas on the other side of the road than where the theater is currently located. This plan is part of a major urban renewal of downtown Osdorpplein. The major urban renewal is divided into two phases. Demolishing de Meervaart and replacing it with a new building will take place in phase two, which will take place after 2025.

At the current location of the Meervaart, a new building will be constructed, containing a hotel, internal bicycle storage and housing. The plan is to demolish the Meervaart and replace it with a new building(Gemeente Amsterdam, 2022).

This study will examine whether the Meervaart can be transformed into the functions it should have according to the plans instead of demolishing the building and building a new one.

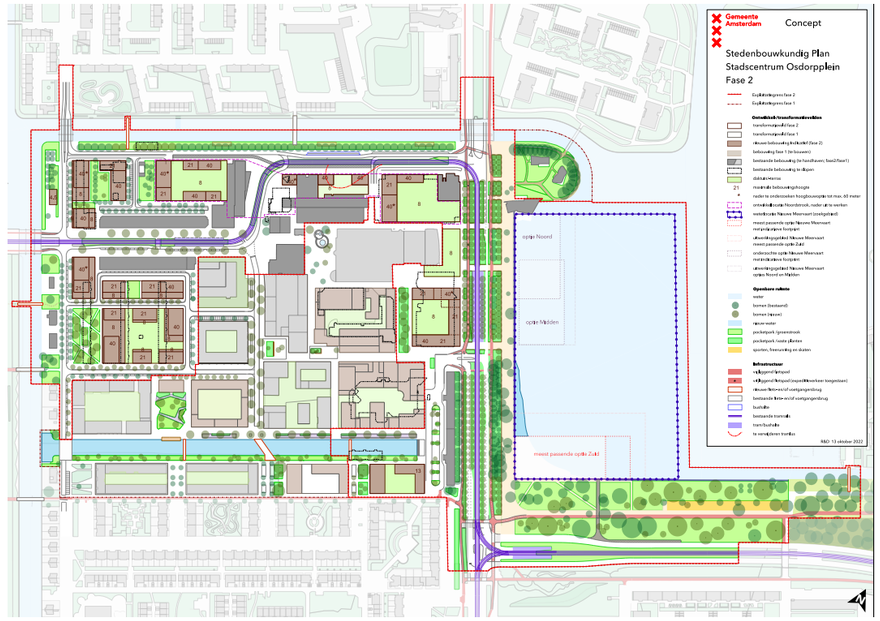


Figure 10: Amsterdam municipality's new plans for Osdorpplein projected with current buildings dotted (Gemeente Amsterdam, 2022)

Figure 11 and 12: Photo of the exterior of the de Meervaart building (left) and old schematic sketch plans (right) (Urhahn. 2022).

2.5 Scope

Three case studies were chosen for the research. This number was chosen so that, within the given time of a year, it would be possible to delve deeply into the transformations made within the case studies. In addition, 1 assessment building was used to provide a more comprehensive design for this. Possible follow-up research could look at more case studies to make the strategies more specific. Additionally, multiple assessment buildings could be looked at to test if the strategies can be applied to all buildings to be transformed.

2.6 Process

The process that will be followed is shown in figure 13 and will be explained additionally. To solve the problem statement, the research question is divided into five sub-questions.

Sub-question 1 provides an introduction on transformations of the three case studies also

discussed earlier. Here the case studies are classified with the transformations in the different layers.

Sub-question 2 goes deeper into the case studies by looking at similarities and differences between the transformations done in the three case studies.

Subquestion 3 examines the similarities and differences and concludes strategies and principles from them.

Sub question 4 translates the strategies and principles into design starting points for de Meervaart.

Finally, sub question 5 will look at the extent to which the design strategies have been used and can be used in the design of buildings to be transformed.

This comparison will help set up strategies that can be used in other transformations. After the design process of the transformation of the Meervaart, there will be feedback on the previously devised strategies to check and possibly add to them.

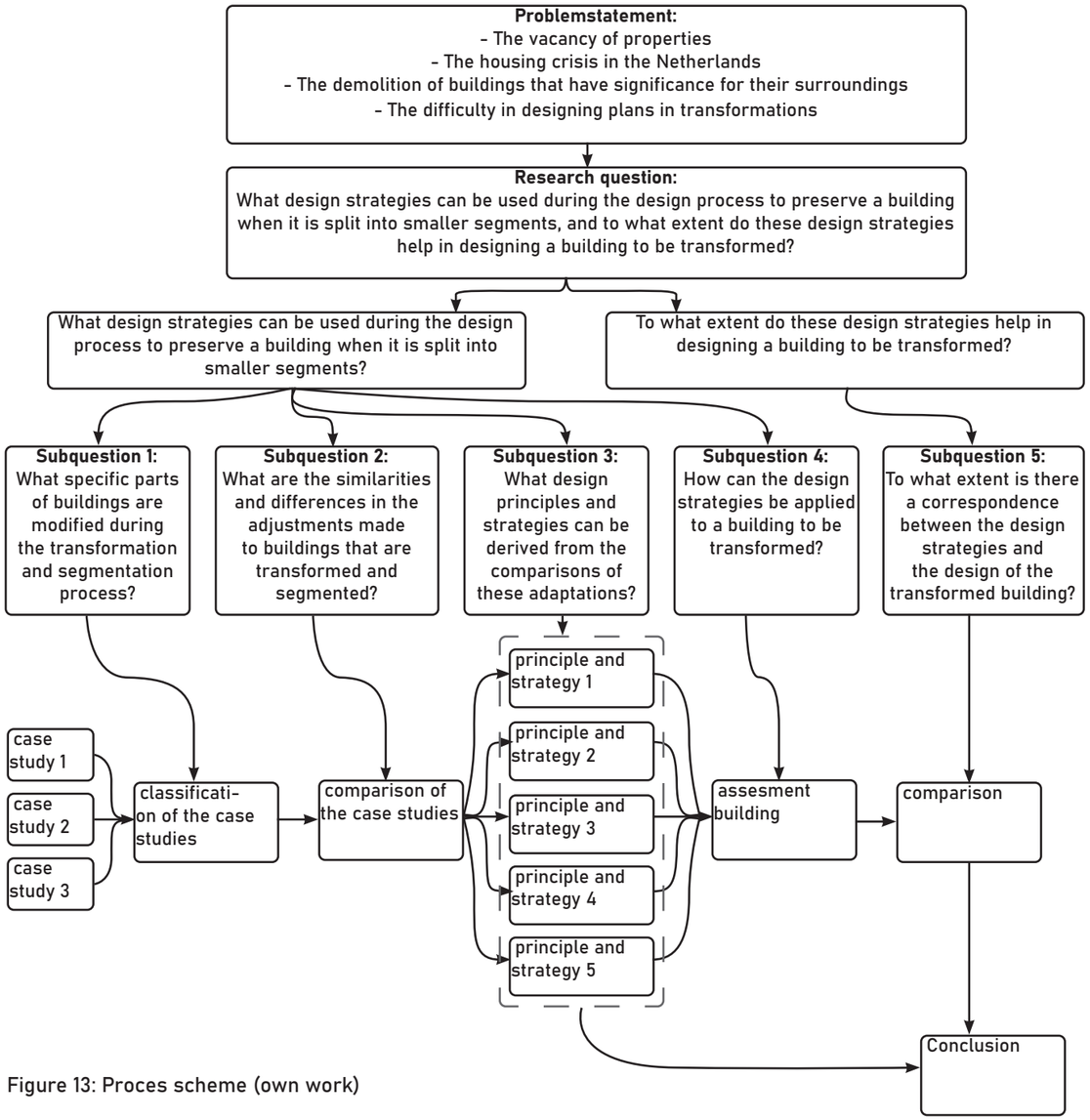


Figure 13: Proces scheme (own work)

3. RESULTS

3.1 Making the case studies studyable

The case studies were analyzed, classified, and compared using the same method. To better compare the case studies, schematic 3D drawings of the case studies were made, leaving out the roof. This allows a better look at what is changing in the buildings and, in addition, makes it easier to compare them.

The buildings are shown schematically in the following ways.

Case study 1:
The slaughterhouse in Haarlem

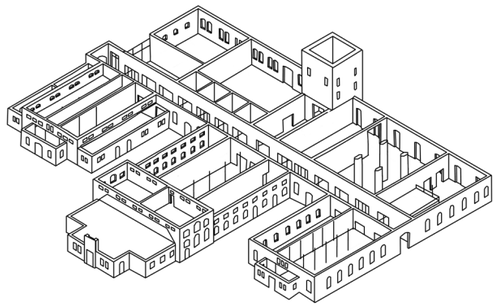


Figure 14: Schematic drawing of the old status of the slaughterhouse in Haarlem(own work)

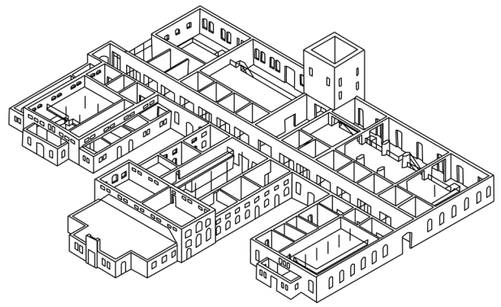


Figure 15: Schematic drawing of the new status of the slaughterhause in Haarlem(own work)

Case study 2:
Old rope factory in Oudewater

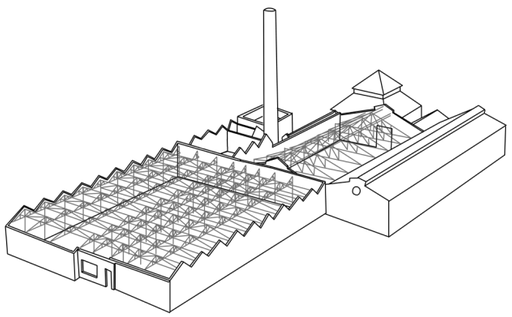


Figure 16: Schematic drawing of the old status of the rope factory in Oudewater(own work)

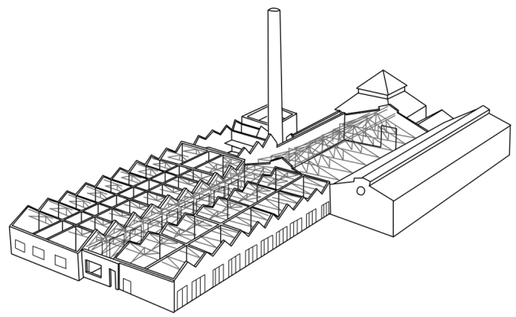


Figure 17: Schematic drawing of the new status of the rope factory in Oudewater(own work)

Case study 3:
The Twentse theater in Enschede

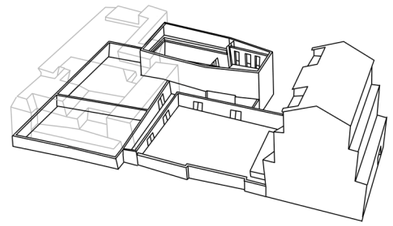


Figure 18: Improvised schematic drawing of the old status of the Twentse theater in Enschede(own work)

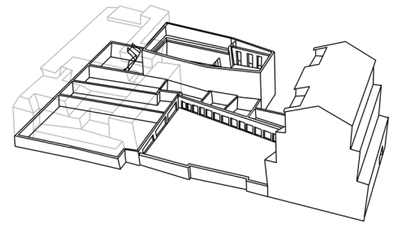


Figure 19: Schematic drawing of the new status of the Twentse theater in Enschede(own work)

The assessment:
The Meervaart in Amsterdam New West

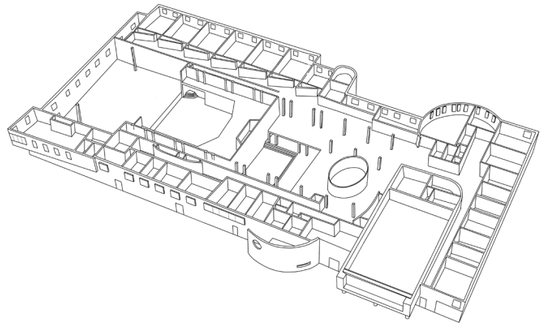
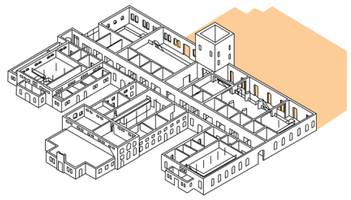
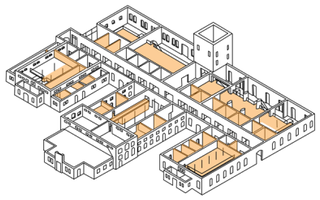
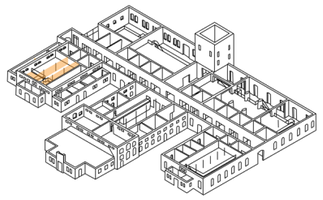
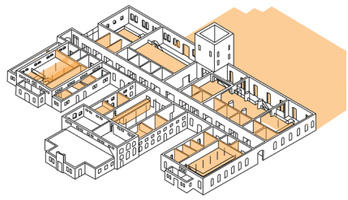
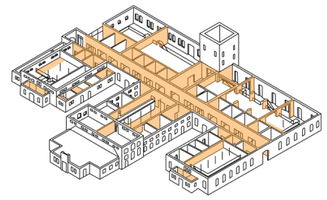
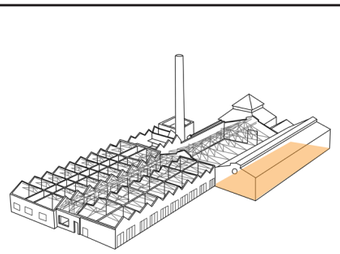
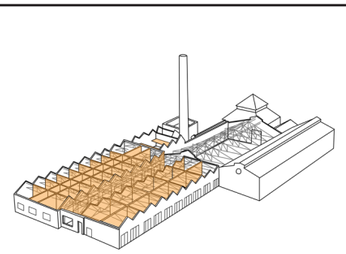
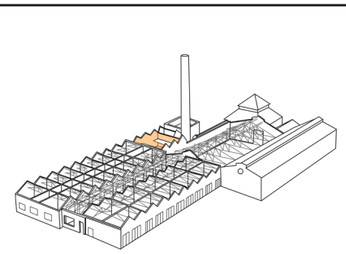
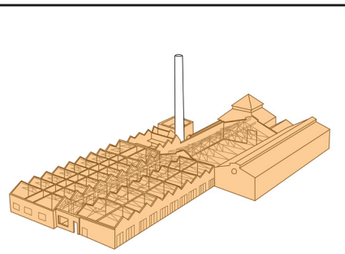
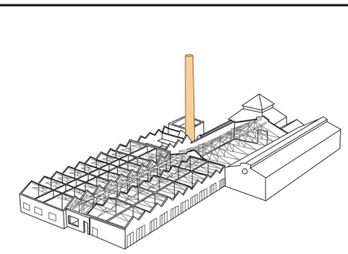
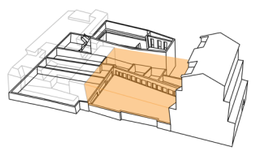
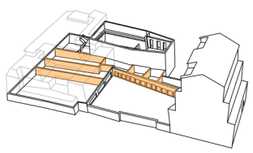
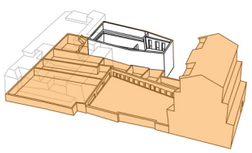
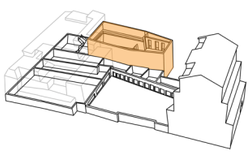


Figure 20: Schematic drawing of the old status of the Meervaart in Amsterdam(own work)

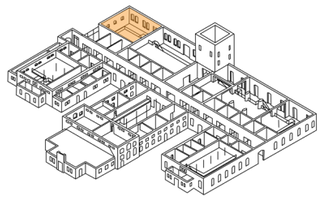
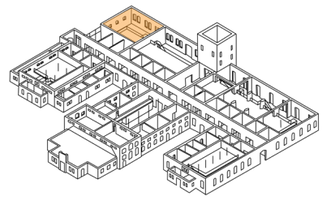
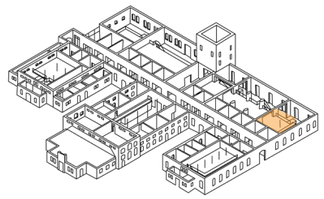
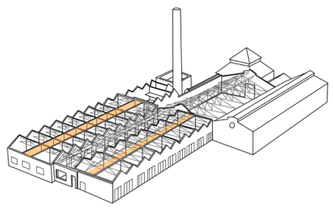
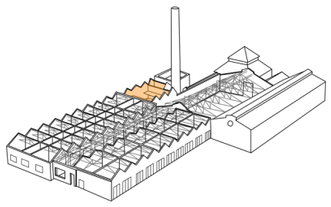
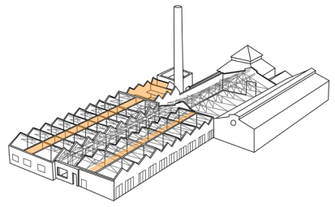
3.2 The comparison

The three classifications from the case studies (Appendix 2) were compared to see what similarities and differences there are. The comparisons were made based on each shearing layer of Brand. Each layer within the case studies is compared to each other to see what changes occur. The diagrams of these changes are shown first, then the observations and conclusions of this comparison will be discussed.

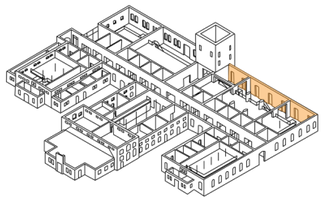
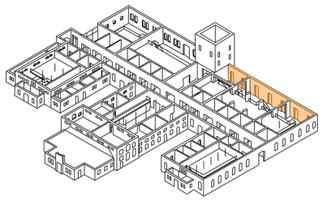
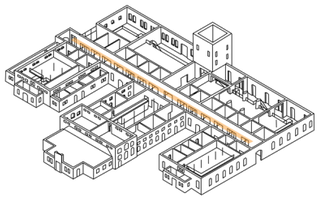
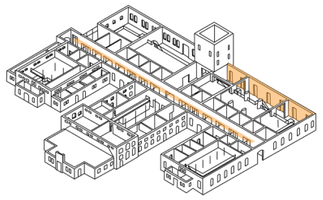
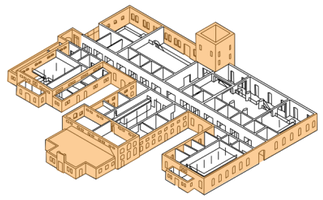
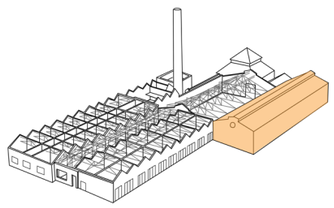
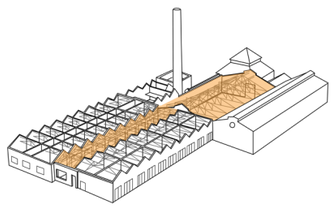
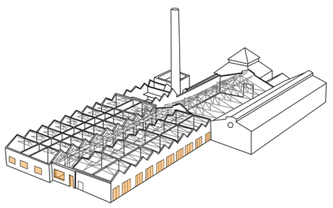
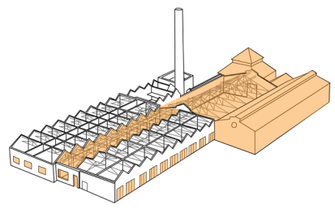
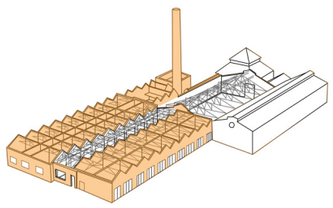
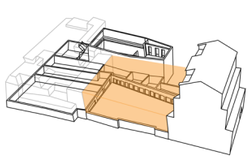
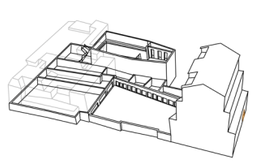
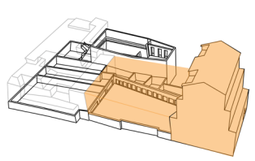
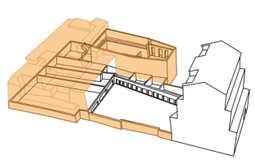
Comparison of the space plan

	Adding	Subtracting	Splitting/Closing	Joining/Opening	Changing	Keep the same
Slaughterhouse						
Rope factory						
Theater						

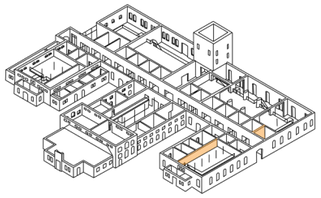
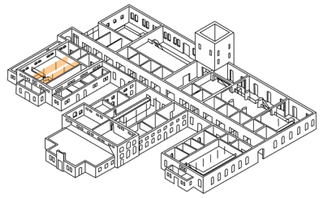
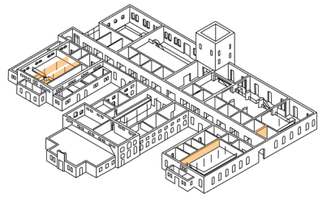
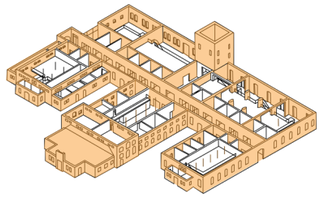
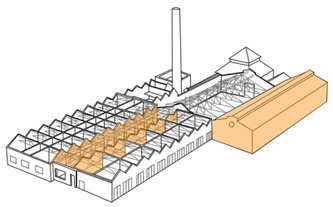
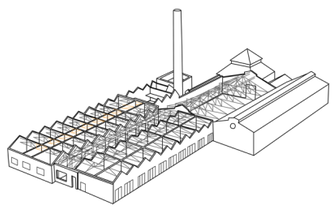
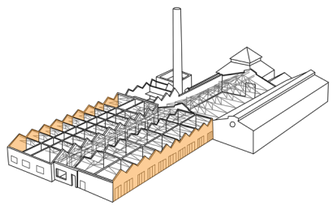
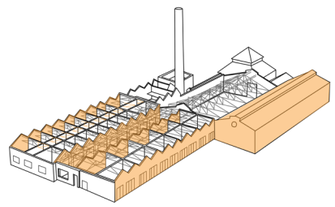
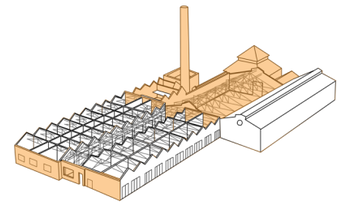
Comparison of the services

	Adding	Subtracting	Splitting/Closing	Joining/Opening	Changing	Keep the same
Slaughterhouse						
Rope factory						
Theater						

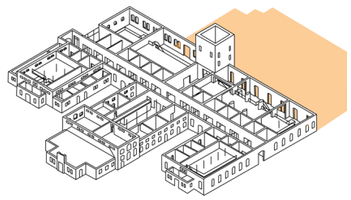
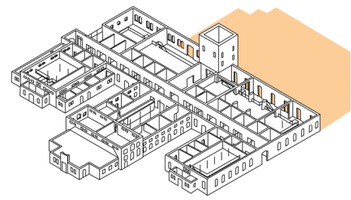
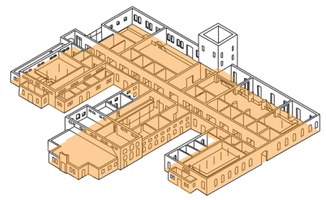
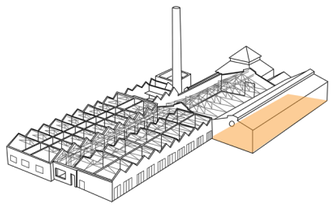
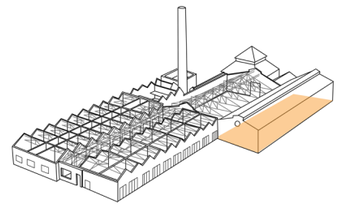
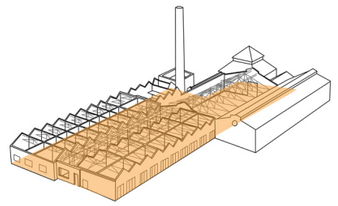
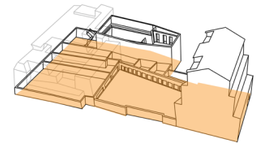
Comparison of the skin

	Adding	Subtracting	Splitting/Closing	Joining/Opening	Changing	Keep the same
Slaughterhouse						
Rope factory						
Theater						

Comparison of the structure

	Adding	Subtracting	Splitting/Closing	Joining/Opening	Changing	Keep the same
Slaughterhouse						
Rope factory						
Theater						

Comparison of the site

	Adding	Subtracting	Splitting/Closing	Joining/Opening	Changing	Keep the same
Slaughterhouse						
Rope factory						
Theater						

Comparison of the space plan

Adding and subtracting

- Adding: Adding part of the building, creating a larger spaceplan.
- Subtracting: Removing a part of the building, which creates a smaller space plan.

At the old rope factory, an additional building was added, it is connected to the current building. The slaughterhouse and the theater, on the other hand, were part of the building and thus the space plan was removed. This was done in two different ways, though. At the slaughterhouse, a contiguous part has been taken away (which had been added several years before) and at the theater part of the top has been taken away, creating open space.

From this comparison, it can be concluded that both options are used. The possible difference could be due to the space around the building. The rope factory is on its property and therefore has opportunities to expand, but the theater building is between a variety of other buildings and therefore needs more outdoor space.

Splitting and joining

- Splitting: Splitting a space within the space plan by placing dividing walls or floors.
- Joining: The joining of spaces within the space plan.

Since this study is about splitting up large buildings, it makes sense that all the buildings have added walls and the slaughterhouse has also added extra floors. At the slaughterhouse and the rope factory, both buildings also had spaces made larger, but this is only a small part of the whole.

Changing and keeping the same

The function of each of the buildings is changing. In addition, it can be seen that mainly many walls are changed and very little stays the same.

Standouts and the conclusion

Three points stood out the most within the layer of the space plan. First, parts of the spaceplan had been removed if it was not part of the original building, but had been added later. Second, all the buildings had splits, but all in the same pattern as the current building and the main structures remained the same. Third, in all three case studies, about as much was changed as remained the same, here often specific characteristic parts were kept the same, such as the tower at the slaughterhouse, the tower at the old rope factory, and the small theater at the Twente theater.

These three points result in a strategy that the space plan of the building should be kept the same in its main structure as much as possible, where additional walls and floors can be added. To which is added that a distinctive part of the building should be left unchanged.

Comparison of the services

Adding and subtracting

- Adding: Adding new installations in the building.
- Subtracting: The removal of installations in the building.

A changing function is often accompanied by a different need for installations. As in the example of the rope factory, a large room needs minimal heating first, but a lot of energy is needed to run all the machines. This could all be controlled centrally in one place. The factory was later transformed into housing. Homes are used at different times, each home wants to be able to control heat separately, and it also needs different facilities for washing and cooking, for example. Taking away services and adding new ones is a convenient way to do this.

At the slaughterhouse, on the other hand, fewer facilities are needed. The slaughterhouse consisted of a part where the cattle were slaughtered and a part where the meat was refrigerated until it was used. All these cold rooms needed many installations to keep the meat cool enough so that it would not spoil.

Changing and keeping the same

As also discussed above, functions all have different needs for installations. At the slaughterhouse some of the installations also remained the same, this is because these installations are part of the monumental heritage and therefore cannot be removed (Haumann, 2023).

Standouts and the conclusion

What was striking about the services was that it was very different for each function whether the services were distributed or located in one place in a technical room. Here it is used that homes need their own services space with one larger space in a central location and an office building all spaces can be connected to one large service space.

This results in the strategy that for houses more services should be added per apartment and part of the general service spaces should be kept.

Comparison of the skin

Adding and subtracting

- Adding: Adding a big part of the skin.
- Subtracting: Removing a big part of the skin.

In all the case studies, parts of the skin were taken away. In the case of the slaughterhouse, this is a part of the facade to which an extension was added that was removed during the transformation. The facade here was removed and replaced with a new facade designed by the architect himself(Haumann, 2023). At the old rope factory, a large part of the skin was removed during the transformation, but the newly added building was given its skin. In this case study, one part of the building had the entire roof removed and another part of the building had a middle strip removed. This created two new outdoor spaces. At the theater, a section was also removed in this way. The roof and a large part of the facade of the large theater hall were removed, creating a courtyard between the two building parts.

Closing and Opening

- Closing: Closing openings currently present in the skin.
- Opening: Adding openings in the skin.

As can be seen in the table, all the buildings have part of the skin opened. At the slaughterhouse a window has been made in the roof, at the rope factory many windows have been made in the facades, and at the theater an additional passageway has been made(seen on the right in the picture), connecting the garden to the street. In addition, it can be seen that none of the buildings

has made the facade more closed, a possible explanation for this is that the new functions need more light.

Changing and keeping the same

It is noticeable that all the skin remains pretty much the same during the transformations. Only the facade of the rope factory has been replaced in recent years. What is also striking is that in almost all case studies a part of the middle of the roof is removed. The possible extra light that this brings in may be a cause of this.

Standouts and the conclusion

For all the buildings, the exterior facades were considered distinctive and an effort was made to keep them intact as much as possible or reposition them in the original style. Only part of the skin was removed in places where many people were gathered. At the slaughterhouse this was done by opening the skin in the roof and adding a green interior wall in the hall, at the rope factory the entire middle section of the roof was taken away for an interior garden, and at the theater part of the roof and facade from the first floor was also taken away for a large terrace in the building.

These features result in the strategy of keeping the skin as much as possible and only creating an opening in the roof in places where people come together.

Comparison of the structure

Adding and subtracting

- Adding: Adding a construction.
- Subtracting: Taking away part of the structure.

At both the rope factory and the theater, part of the structure was added and taken away. At the theater, part of the building was demolished and rebuilt. In addition, the construction of the main hall was removed. At the Touwfabriek a new building was added with its own construction, in addition, in the middle of the hall of the transformed part constructive walls were placed which carry part of the old construction and the roof. For part of the old construction, it is not clear whether these have been preserved or removed. Further investigation is needed to draw clear conclusions. It has been assumed that they have been removed from above the bathrooms.

Closing and Opening

- Closing: The closing of an open visible structure.
- Opening: Making a structure located in a wall visible.

At the slaughterhouse, no structures were removed or added. The only thing that was done here is that in two places the construction was made visible or hidden in a wall. This was also done at the rope factory, where the old construction was hidden in the outer wall.

Changing and keeping the same

Many of the structures remain the same, the biggest changes are where part of the building has been removed and rebuilt. In addition, a new structural wall did come down at the rope factory, the possible reason for this is that the old structure would cause cold bridges in the homes.

Standouts and the conclusion

Within this layer the greatest differences were in degree of changeability, often preserving as much of the structure as possible and keeping the old structure visible if it was also previously visible. At the old rope factory, keeping the construction visible was very important. The old construction no longer met load-bearing requirements so here load-bearing walls were installed, but the old structure remained visible. In contrast, the construction of the slaughterhouse was unchanged except for the opening and closing of two walls with columns.

This results in the need to keep the structure visible where it was already visible and to keep it as it is as much as possible.

Comparison of the site

* The site is actually about the plot the building is on. These have not changed with all the buildings. However, the built-up area on these parcels has changed, which is something this section looks at.

Adding and subtracting

- Adding: Adding a building section.
- Subtracting: Taking away a building part.

Two case studies involved adding or subtracting a part of a building.

Changing and keeping the same

The buildings remained within the same plot and only the percentage of the built-up area changed.

Standouts and the conclusion

At the site layer, it can be seen that all options occur. A piece was added in one building, removed in another and yet another was unchanged. At the site, it depends on whether additional or less space was needed for the new function and whether there was space around the building for this or had to be created.

As a strategy, the site can be added, taken away or remain the same. This involves considering the possibilities of the surroundings and the new function of the building.

3.3 From principles and strategies to design starting points and their assessment

The following components will be discussed in a diagram for each layer. From the conclusions of the comparison, principles and strategies have been identified. These strategies were transcribed using the assessment building, the Meervaart, into design starting points. The visual will show how these design starting points were ultimately reflected in the design. Then the assessment will discuss how and to what extent the strategies were expressed in the design of the transformed Meervaart.

The principles and strategies

From the comparison, we can conclude that not every change takes place in every layer of the shearing layers of Brand. The changes that do take place are called the principles that can be used. With these principles, each layer has a strategy for the best change for the layer. So the principles are all the changes that can take place and the strategies are ways in which these principles can best take place.

The design starting points

The test of whether the strategies help with building transformations is done by applying them to a building to be transformed. The theater and library building de Meervaart is used for this test. Based on the building, the strategies are transcribed into design starting points. These points can be used to guide the design process.

The assessment

To assess whether the strategies are reflected in the transformed building of de Meervaart, the building was analyzed in the same way as the case studies (appendix 3) . The design of the new Meervaart can be found in the design booklet at page 80. By analyzing the building in the same way, the building can also be compared on a layer-by-layer basis with the case studies. Based on this comparison and the pre-formulated design strategies, it can be concluded whether or not the design strategies were used during the design process.

A schematic representation of the status of the future Meervaart is used for this assessment (figure 22). Figure 21 shows what the Meervaart currently looks like. The classification of the Meervaart can be found in appendix 2.4 The comparison between the Meervaart and the three case studies can be found in appendix 2.

As can be seen in the comparisons, each layer in de Meervaart changes about as much and retains as much as the three case studies. At first glance, this may indicate that the strategies were used. To check this, we looked at the strategies formulated for each layer to see if and how these strategies were used.

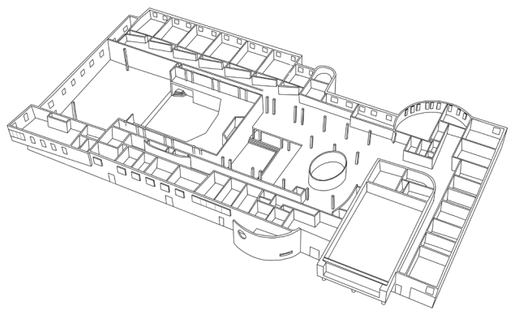


Figure 21: Schematic drawing of the old status of the Meervaart in Amsterdam New West(own work)

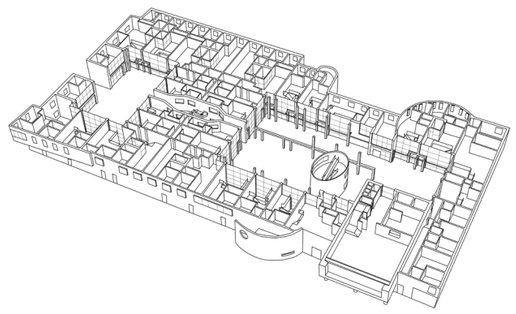
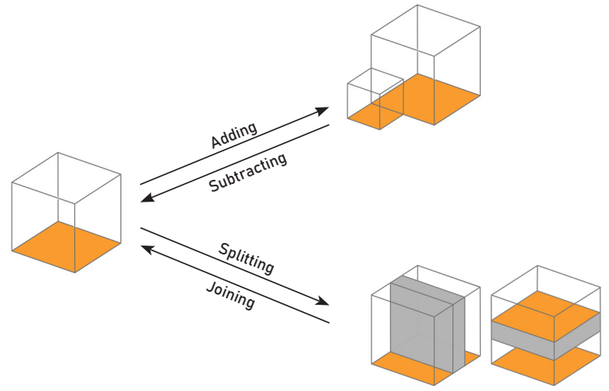
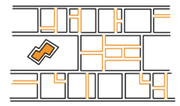


Figure 22: Schematic drawing of the new status of the Meervaart in Amsterdam New West(own work)

Space plan

Principles	Strategies
	The space plan of the building should be kept the same in main plan as much as possible, where additional walls and floors can be added. It is added that a distinctive area of the building's floor plan should remain unchanged. 

Design starting point	Visual
In the current building of the Meervaart, the walls are often situated on the grids, all 7.2 meters apart. As a result, the building already contains a clear main structure. Efforts will be made to preserve this in the design as much as possible. In addition, the building has many distinctive shapes. The forms that stand out the most are the small theater hall that pops out, the ellips shape in the middle of the building, the big open squeare with sloping roof above the seating area of the large theater hall, and the open square with the tower above the stage of the large theater hall. At least one and preferably more of these distinctive forms will be preserved.	 

Assesment

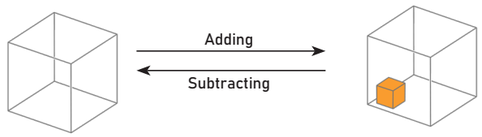
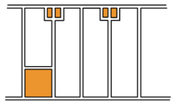
According to the space plan strategy, the main structure should be kept the same as much as possible and additional walls and floors could be added. Added to this was that a distinctive part of the building should be left unchanged. As a result, the main structure of the space plan was preserved, keeping the original partitions between the stores, classrooms, and meeting rooms. In addition, the overall main structure of the open interior of the building and the closed functions around it were taken into account. Secondary walls were eventually added and removed to make the spaces better serve the functions. Thus, the proportions of spaces in the apartments that give a desirable home were considered.

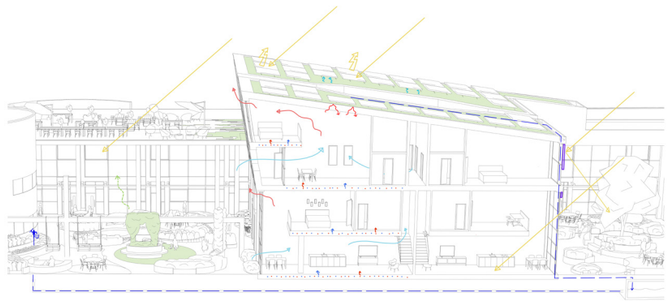
During a mass study (design 9), the removal and keeping of distinctive parts of the building were considered. By conducting this mass study, it was possible to see how the characteristic parts were related to each other and what effect it would have if they were

removed. Ultimately, the decision was made to retain the elliptical interior within which the checkroom, restrooms and technical area were located, but to give it a new function of a common laundry and coffee area connected by newly added stairs. In addition, the distinctive space plan of the small theater has also been preserved. The shape of the detached square that tilts over the facade is transformed from theater to restaurant. The theater's seating area will be removed and some walls will be added for the kitchen.

It can be concluded that the design strategies for the space plan helped during the design and are reflected in the transformation of the Meervaart. The preservation of the distinctive forms has provided the mass study maquette that gives important insights into the coherence and transformation possibilities of the building.

Services

Principles	Strategies
	More services should be added per apartment and part of the general service spaces should be kept. 

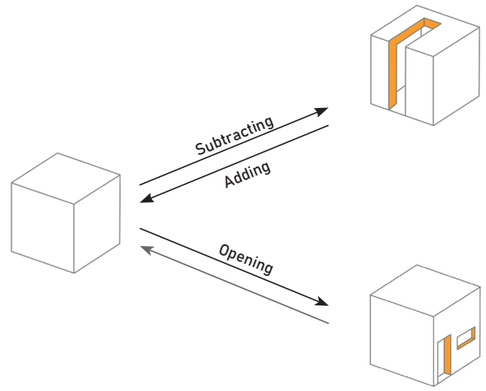
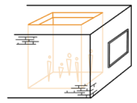
Design starting point	Visual
The new Meervaart will have stores, housing, and a restaurant. The residences and stores all need their individual services. Also, some general technical areas will need to be preserved. In addition, the restaurant will also need its own slightly larger technical space.	

Assesment

The strategy for services, which for homes required adding more services per apartment and keeping some of the general service areas. This eventually led to adding small services per apartment. The small services were added under the stairs and between apartments. The storage spaces all contained storage where services were added. The large technical rooms were kept as general service storage for the stores and apartments and one was added for the restaurant.

So the strategy for services was followed and it can be concluded that they provided more insights into which service spaces could be removed and which needed to be added.

Skin

Principles	Strategies
	The facade should be kept as much as possible and only an opening in the roof should be made where people gather. 

Design starting point	Visual
The facade of the building will be kept as much as possible. Openings for additional access areas should be considered here. In addition, at the place where most people congregate, part of the roof will be subtracted in this area.	

Assesment

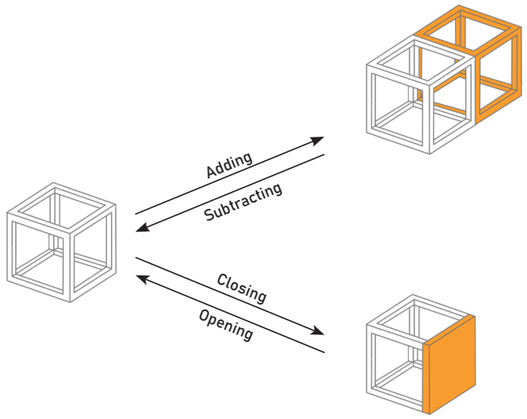
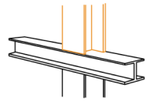
Keeping the facades as much as possible, but creating an open roof where people congregate was the skin's strategy. Ultimately, this resulted in keeping the facades the same as much as possible, except for additional openings on the north side of the building for the entrances to the stores.

Part of the roof is subtracted, in two middle sections of the building, above the garden. This is where people congregate and it provides additional daylight to the rest of the building. The subtraction is most similar to the courtyard garden of the Old Rope Factory.

The space plan and the skin together chose to explore removing part of the building using the mass study. With the space plan it was to preserve a characteristic form, with the skin the mass study helped to see which part of the skin could be removed, while still following the strategy. Therefore, an open interior was eventually chosen, where the exterior facades could remain the same as much as possible and an interior garden could be created.

The strategies helped in deciding which part would be removed and which would not. It can therefore be concluded that the strategy for the skin was used and helped in designing the transformation project.

Structure

Principles	Strategies
	Keep the structure visible where it was already visible and keep the structure the same much as possible. 

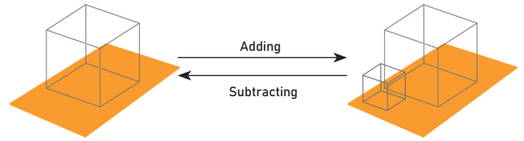
Design starting point	Visual
Because the Meervaart has already been transformed once and only the structure has been preserved, these are located in distinctive places in the building. Additional construction was added during the transformations. The variable load of the current functions is higher than that of the new functions, so the current structure can be retained and continued to be used.	

Assesment

The strategy of the structure was to keep the structure visible where it was already visible and as much as possible keep the structure as it is. In the end, as much of the structure as possible was retained. Because the variable load of the new features was smaller than the variable load of the current features, all the columns were oversized. The floor ensured that no buckling of the columns occurred. Because the columns were oversized, the floor could still be removed because the extra thickness absorbed the possible buckling. The columns in the building were still in the old spots from when the building was built in 1977. The columns are all on certain grids and by putting two new facades 1-1.5 meters behind these columns, the structure could be shown again.

The courtyard made the concrete structure in the middle unnecessary. By leaving it in place and including it in the garden design and creating a gathering place around these columns, the strategy of the construction is used and this is reflected in the design. So it can be concluded that the strategy of the construction helped in making design decisions.

Site

Principles	Strategies
	The site can be added, taken away or remain the same. This involves considering the possibilities of the surroundings and the new function of the building. 

Design starting point	Visual
The building is bordered on two sides by busy roads, the other two sides are next to a passageway and square that are the entrance to the shopping center. Thus, there is no space opportunity around the building to add on. The space that is there will be used as optimally as possible to place apartments and stores, therefore efforts will be made not to lose any site.	

Assesment

The strategy of the site results in the opportunity to see if any part can be added to the site, taken away or it stays the same. This can be done by looking at the possibilities of the surroundings and the new function of the building. There is no space around the building and the available square footage will be used as much as possible. This ultimately ensured that the site remained the same.
According to the strategies, both the principles of adding and subtracting could be used. It was also possible that the site would remain the same and that is what was finally chosen in the design.
Due to the openness of the strategy in which anything could happen, this strategy did not help in making a design decision, but it did ensure that all possibilities were looked at and considered.

Conclusion assesment

By looking at the comparisons and how the design strategies of the different principles were expressed, it can be concluded that the strategies helped design the transformation of the Meervaart. The strategies became design starting points, making these the first parts of the building to be looked at during design. It also helped in making choices, such as choosing between different massing studies; keeping and taking away walls; how services are distributed throughout the building; which parts of the skin could be taken away; what to do with the structure, and whether the site could be added, taken away or it kept the same.
Therefore, it can be concluded that the design strategies add value to use when designing buildings to be transformed.

4. CONCLUSIONS

4.1 Results summary

In this study, the Slachthuis in Haarlem, the Oude rope factory in Oudewater, and the Theater in Enschede were divided into the 6 layers of Brand(1995), within which the 5 layers of Spaceplan, Services, Skin, Structure, and the Site were examined. For each layer, aspects were examined to see if they were added, removed, split/closed, and opened/joined.

By breaking down the different layers and looking at the similarities and differences between the three case studies, the transformation principles can be stated and the following components were observed. In the space plan, the principles of adding, subtracting, splitting and connecting were applied. It was found that the main plan of the floor plans remains the same. Thereby, a specific part of the building is unchanged and the function is also not changed. It is added that adding secondary floors and walls does apply in each case study. For the services, the principles of adding and subtracting are used. It can be seen that with a changing function there is also a change in services. The buildings initially provided a few service spaces, but with the changing function with loose users more are added. For the skin, the principles of add, subtract and open were applied. It has been concluded that the facades are kept the same as much as possible or have been brought back to the old state, in addition the roof has been taken away in places where many people gather. In the structure, the principles of adding, subtracting, closing and opening were applied. Within this layer the most changeable outcomes were seen, here sometimes a structure was added and sometimes completely replaced. However, there is a similarity that when the structure was already visible it remained visible. Also at the site it could be seen that there were large differences between taking away, adding and keeping part of the building. Here it was observed that within this layer both the principle of adding and subtracting were applied.

To answer the main question: *"What design strategies can be used during the design process to preserve a building when it is broken up into smaller segments, and to what extent do these design strategies help in designing a building to be transformed?"* The following strategies were extracted from the conclusions of the above comparisons:

- The Spaceplan: The space plan of the building should be kept the same in main plan as much as possible, where additional walls and floors can be added. It is added that a distinctive area of the building's floor plan should remain unchanged.
- Services: More services should be added per apartment and part of the general service spaces should be kept.
- Skin: The facade should be kept as much as possible and only an subtraction in the roof should be made where people gather.
- Structure: Keep the structure visible where it was already visible and keep the structure the same much as possible.
- Site: The site can be added, removed, or remain the same. This should take into account the possibilities of the surrounding area and the new function of the building.

Based on the assessment building, the Meervaart, the strategies were transcribed into design start points. This allows the strategies to assist in starting the design process and help make informed choices during design.

It was concluded that each strategy was reflected in large measure in the design of the assessment building. They especially helped in making choices, such as choosing between different massing studies that led to the mass of the building; retaining and removing walls; how services are distributed through the building; that the facades remained the same as much as possible, and part of the roof was removed; retaining and showing the structure and or keeping the site.

The fact that the strategies helped design the Meervaart will mean that they can also help with other buildings. It can therefore be concluded that the design strategies have added value when designing buildings that need to be transformed.

4.2 Framing results

There have been many studies looking at transformations of buildings, but they have not been used to extract design strategies. The studies only gave insight into what had changed. The research of Andjelkovic(2016) does deal with strategies, however, this research deals with the changeability of a house in itself where the function remains unchanged and thus does not correspond to the research done. This research is about the transformation of a building, where the function of the building also changes. Therefore, this research deals with a different scale and can be seen as an addition to the general knowledge about transformation and not as an addition to any particular research.

4.3 Discussion

This research was conducted within 10 months. Due to the length of this research, only three case studies were analyzed. The more case studies that were analyzed, the better the strategies that emerged from the research would be the same and thus make the research more valid. However, due to the large analysis of the project, the research is reliable and could well be conducted on other case studies.

However, what makes the research less reliable is that floor plans of each case study were not found and therefore images from google maps were used. Thus, it is possible that transformation elements were missed. Taking buildings from which all information could be obtained would both make the research more reliable.

The last point that falls within the discussion is that the assessment was conducted only on one building to be transformed. Applying the strategies to more buildings to be transformed would make the results more reliable and valid.

4.4 Further recommendations

For follow-up research, more case studies could be analyzed using the classification and comparison method. By doing this, the strategies will become more valid.

In addition, research could be done on what happens when a building is transformed without the strategies and see what design decisions are then based on and how quickly they are made. By comparing this research with the research done, it would be possible to see how much influence the strategies had in the design process.

If the study were to be conducted again it would be possible to see in percentages how much change occurred within each layer. These percentages could play into the arrangement of strategies.

4.5 Relevance

This research will help speed the design process during building transformation. The strategies provide direction and make choices within the design process, allowing informed choices to be made quickly. Speeding up and entertaining the design process would make it easy to consider the potential of transforming a building. By considering transformation, more buildings could be preserved and transformed, rather than demolished or left vacant.

So in this way, the strategies help throughout the design process and more buildings can be transformed.

5. REFLECTION

5.1 Reflection

This reflection will answer questions regarding the process and methods of the research and design. The reflection is divided into two parts.

The first part will answer mandatory reflection questions. This will look at the relationship of the topic to the studio and the master, then it will discuss how the research and design functioned to each other, it will also look at the value of the way of working, followed by the academic and social value and lastly it will look at the transferability of the project.

The second part is the personal reflection questions which will address the feedback on the design that was most influential and a good and improvement point as an architect within this study.

Mandatory Reflection

1. What is the relation between your graduation project topic, your master track (A, U, BT, LA, MBE), and your master programme (MSc AUBS)?

When transforming a building, you look at the different parts a building has. All of these parts can change in different ways, which has different effects on the building. Making these parts of the building more visible can help when designing a transformation project. More transformations of heritage projects can be looked at in this way, which is a sustainable way to look at the existing architecture instead of building everything new.

The thesis topic *Preservation of buildings when transforming to smaller segments, with the reallocation of theater and library building de Meervaart*, ties in with the study topic *Adapting 20th century heritage*. The building was built in 1977 and renovated in 1999 and thus falls into the 20th century. The Meervaart may not be a designated heritage building, but it has meant a lot to the development of Osdorp and bringing neighborhood residents together. Therefore, the building is still considered heritage.

By looking at design principles that can accelerate the speed of design decisions within transformation projects, potentially more buildings can be reused and less needs to be demolished. This sustainable way of using the existing and looking at innovative methods to speed it up falls within the characteristics that *master Architecture* stands for.

2. How did your research influence your design/recommendations and how did the design/ recommendations influence your research?

By looking at the Meervaart according to the different layers and their principles and strategies, which were the outcome of the research, it gave a clear picture of the different aspects of the building that could be modified. The choice was made to start with the strategie of subtraction of the skin.

The principle of subtraction of the skin, was done in the projects for creating more light in the rest of the building. The former function of the theater possessed many dark areas, which was convenient for the theater shows. Since the building was to be given a new function, which was housing, this creation of additional light and outdoor spaces was an important starting point.

So the strategy ultimately ensured that the first design choices were made. Part of the building would be removed to create more light. Mass studies were then used to further develop this strategy and see how best to do it.

Later in the process, the principles and strategies were looked at a little less strictly and the main focus was on what the building spoke for, but having worked on the research for six months, the way of seeing the layers separately, comparing the layers with each other and thinking of possible adjustments did grow on me as an architect and therefore will always be looked at as this way.

Testing the strategies at de Meervaart allowed a close look at how they influenced the design process. They provided reasoned choices and were design starting points that could be used. By using this circular method, it is easy to compare whether the research and design reinforced each other (Figure 1).

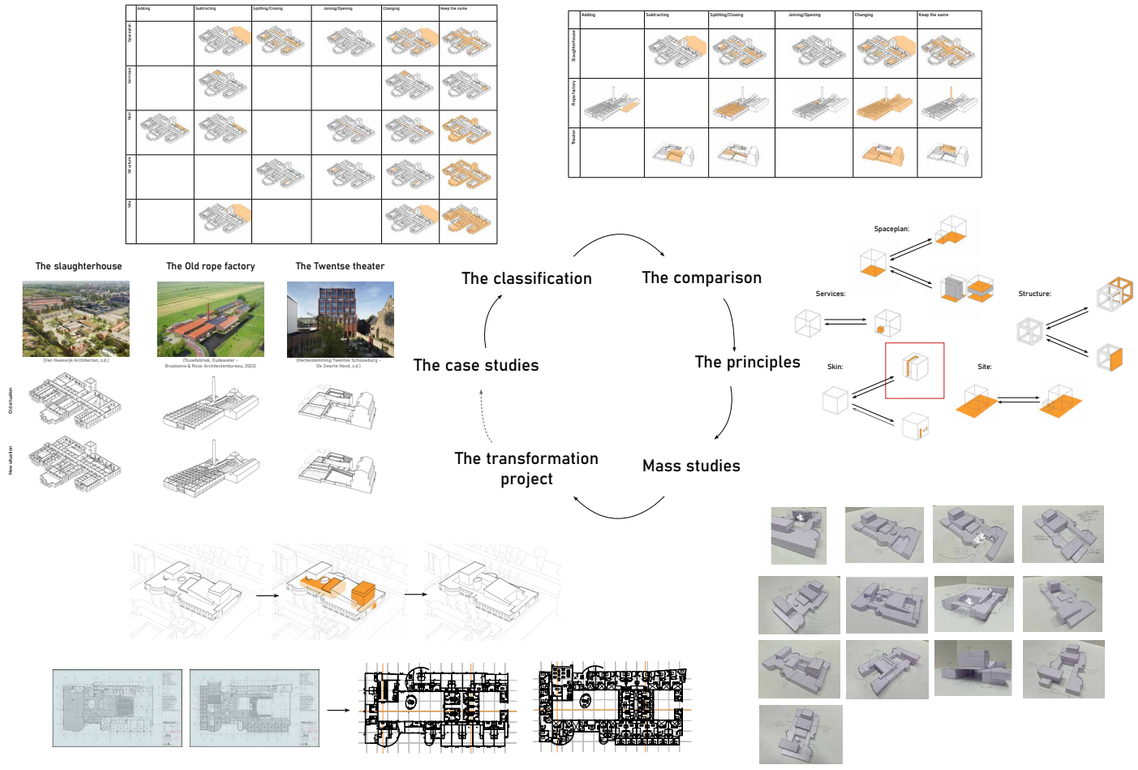


Figure 23: The research and design circle

3. How do you assess the value of your way of working (your approach, your used methods, used methodology)?

This question will be divided into two parts, the research part and the design part.

Research

The research was done through three case studies. The three transformed buildings were selected because they all had great significance to the history of their surroundings and were then vacant due to the relocation of function.
The buildings were analyzed using the shearing layers of Brand(1995). For each of the layers, it was examined whether it had been added, removed or kept the same. In this study, the transformation options, add and remove, were split into two options. For add, one could look at adding or splitting/closing. For remove, this was split into subtract and joining/opening.

By looking at the building in this way, design decisions could be properly separated. Making it visible in drawings provided a clear picture and good for comparison. By extensively analyzing and comparing these case studies, it was possible to see which parts of the building and how much of the building had been transformed. One disadvantage of this method is that it

does not look at the values these transformations had and whether the users ultimately thought these were good or not so good changes. Checking this with the users, for example through an interview, makes the research more valid. Also, the research only looked at three case studies. Expanding the number of case studies would make the research more reliable. But for the time frame of this study, it was a successful method.

Design

Many principles and strategies emerged from the research, all of which could be tested in the Meervaart. The principles were good tools to see what might change about a building if it were transformed. In addition, the strategies gave more direction on what to transform in the layers. Ultimately, the choice was made to strart designing by looking at removing the skin. Ultimately, this led more to looking at what parts could be removed from the building to serve the new function.

To investigate which part of the building could best be removed, a mass study model was created. By removing parts from the model, taking pictures of these different solutions and making sketches over them, we could see what was happening to the rest of the building and what its strengths and weaknesses were. Four examples of how this was done are shown in Figure 2. This research method worked very well and ultimately provided a well-reasoned rationale for removing these specific parts of the buildings.

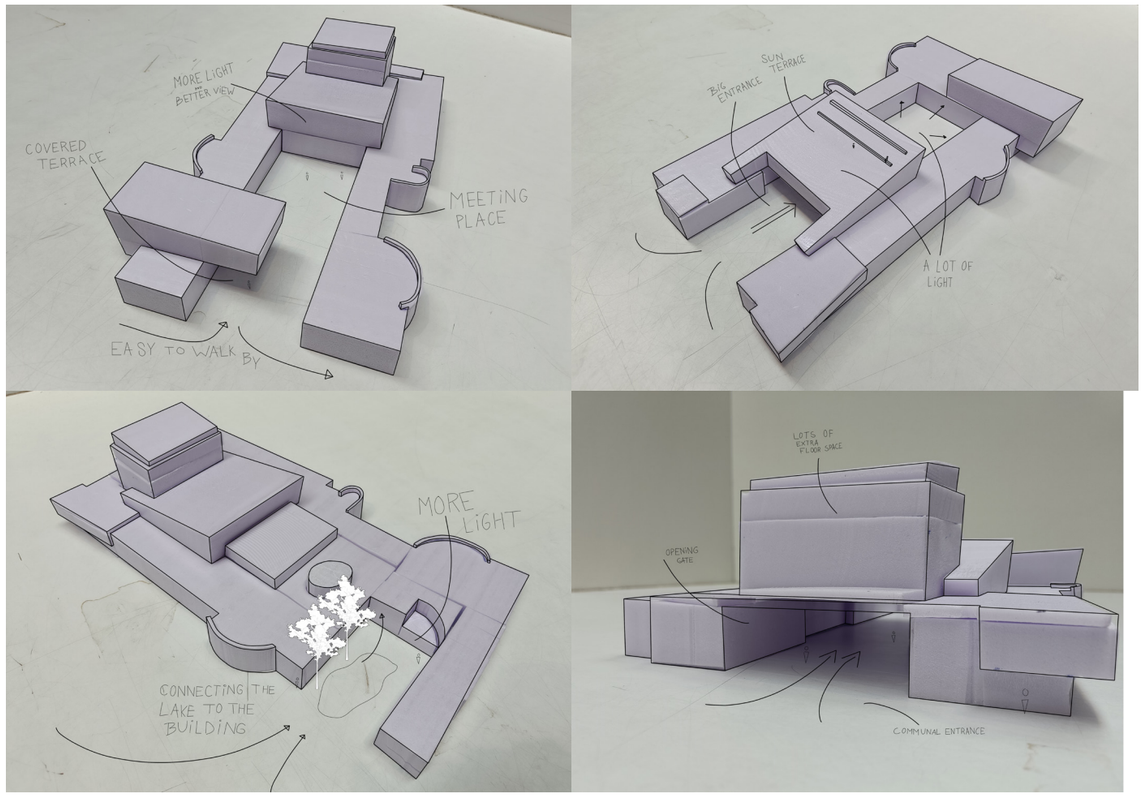


Figure 24: Mass study with overlying drawings

After the shape was more or less established, the structure of the building was considered. The goal was to favor congregation between residents and create a separation between living and working. Three components were tested with schematic sketches(Figure 3). 1) How a dwelling above a store could work, without dead facades. 2)Houses that were located on the upper floor, but still had enough light and outdoor space, and 3) A way in which the stores were easily accessible.

A twisted L was chosen after sketching, with the residences located above the stores. In this, the residences are all connected to the garden and provide meeting space for the residents and the stores are accessible from the outside where they are adjacent to the busy street and shopping center. Making schematic sketches and contrasting the positives and negatives of these made for a well-reasoned decision.

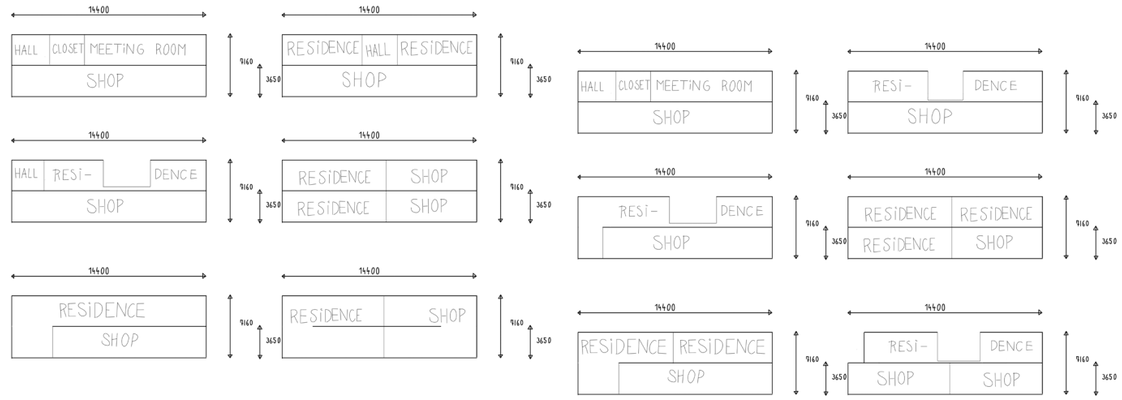


Figure 25: Schematic sketches of the cross-section of the building sections adjacent to the exterior façade of the building.

4. How do you assess the academic and societal value, scope and implication of your graduation project, including ethical aspects?

Transforming buildings is happening more and more over the years. In this way, much is already known about the transformation of offices and old factories, and more and more is also known about church transformations.

While searching for a subject, it was found that little was known about other public buildings, such as theaters and libraries. The opening for research on transformations of these types of buildings was seen as an opportunity to supplement the research already available on transformations.

The thing that connects these buildings is the large open spaces that are located in the building, this ensured that it was chosen to focus on dividing these spaces.

De Meervaart was chosen as a design test, because according to the municipality's plans this building will be demolished next year and a new building with other functions will be built on the same spot. This makes it a very hot topic and also tests whether the functions designated for this location will fit into the old building. Other possibilities of functions in the building were still considered, but the preferred option was for the municipality to use the designated functions. In fact, the municipality chose these functions by doing a preliminary study on this, so it is known that the designated functions are needed in the area.

When the Meervaart was built, many local residents volunteered to help build it. Transforming the building to keep construction costs lower than new construction can ensure that the housing remains affordable and accessible to people in the neighborhood. In doing so, something is given back to the environment which helps for the social value of the building.

5. How do you assess the value of the transferability of your project results?

Using the principles and strategies that came out of the research on de Meervaart has already attempted to answer this question.

During the design process it provided more insight into the layering of the building and gave tools to start designing. Because the layers and changeability were known, it was easy to look at the building and see where the different opportunities lay.

During the research, at first only the principles emerged. By going deeper into the case studies and their comparison, the strategies could eventually be drawn up. The strategies helped a lot in drawing up the design starting points and were therefore an important part of the design process.

A good study to test how much these strategies helped would be to have someone design a building without the strategies and someone design the same building with the strategies. Then if the same analysis is done as during the research and they are compared to the case studies it could be seen which has more similarities. Here the speed of design choices could also be a focus point. So these are possibilities for follow-up research.

For me as an architect, the research will definitely help in making choices and starting next design assignments in the future.

Personal Reflection

1. Which feedback about your design influenced you the most and how did you deal with this feedback?

During the design consultations, I received many questions about the locations of the columns. Because the building had already been transformed once and the columns were the only thing preserved, they were often in random locations in the space. The previous architect explicitly preserved these columns and this was also attempted in the new design. In my design, they were not very accentuated at first, but were retained. After much sparring, I finally managed to give these columns a functional and architectural place within the design. In this way, a care object was transformed into a gift from the building.

Another point that was discussed a lot was how the outdoor spaces in the building would be used and by whom. I found it very useful to spend more time on this and explore what effect different layouts of the building had on this. For example, I had not thought about the turned L of the houses beforehand, but it makes for an innovative design with lots of views of the courtyards. Also the feedback about the patios that can be used in a deep house led to new insights that would not have been thought of before.

2. What is a tip and a top about your skills as a arcitect that you discovered during the research and design process?

Research

Tip: In the beginning I found it very difficult to find a good topic and to distinguish the main and side issues in this topic. Only later in the process when the analyses were made I found it easier to make this distinction.
Top: What I liked about the research is that I tried to make the data of the analysis visible in other ways than in text. I found out for myself that this makes it more visible to me than when it is given as text and that is how I want to convey it to others.

Design

Tip: Even though a site visit was done right at the beginning of the design phase to see the size of the building, I noticed later in the process that I still found the scale of the building very difficult. Because of the large dimensions and different functions within the building, estimating sizes was more difficult than I thought.
Top: What I liked about my process within the design is that I did not start from the standard shapes of an upper and lower floor, but started looking for other ways to combine living, working and outdoor spaces.

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-
- correspondence with mevrouw Haumann, S. architect at Hans van Heeswijk architecten 27 november 2023
- correspondence with architecture firm Braaksma en Roos

APPENDIX

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Appendix 1: Elaboration of the case studies

1.1 The slaughterhouse in Haarlem

Location: Haarlem, Rockplein
Former function: Cattle slaughterhouse
Built in: 1907
Architect: city architect L.C. Dumont (GH, 2012).

New function: sports halls, offices and catering industry
Transformed in: 2018-2023
Architect of transformation: Hans van Heeswijk Architects

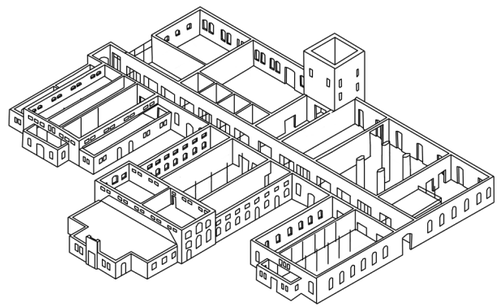


Figure 26: Schematic drawing of the old status of the slaughterhouse in Haarlem(own work)

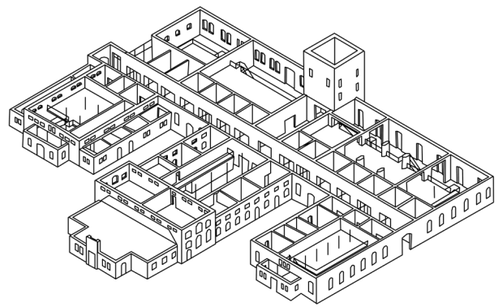


Figure 27: Schematic drawing of the new status of the slaughterhause in Haarlem(own work)

History

The Slachthuis site is located in Haarlem East. Before the 19th century, slaughtering was spread throughout the city in about 150 private slaughterhouses, for hygienic reasons and the quality of the meat, plans were made in the 19th century to centralize the slaughtering activities. The building was built in a lonely place far outside the city, around 1917 around it was added and the neighborhood was named after the slaughterhouse, The Slaughterhouse Neighborhood (GH, 2012).

The slaughterhouse project is a project where the old slaughterhouse will be transformed and new housing will be built around it. This study will only look at the transformed building.

The slaughterhouse in Haarlem was built in 1907 and was used for the slaughter and storage of livestock(De geschiedenis, z.d.). The building has an east-west corridor that provides access to the different sub-volumes. These different sub-volumes vary in height(GH, 2012). The architect included this layout in the design. On the north side was the “dirty side” and on the south side was the “clean side.” The cattle were brought in and slaughtered on the north side. Through the large passageway, it could then be moved to the freezers on the south side. So the street in the middle of the building, running from east to west was also previously used a lot as a traffic route and the architect wanted to keep it that way(Haumann, 2023).

The tiny tower on the south facade has a pointed roof. This tower attracts much attention from the surrounding area and is often used as a recognizable focal point from the surrounding area(GH, 2012). The building has gone through many changes, as shown in figure 28. Over the years, several additions have been made and also partially demolished several times. As can be seen at the end of the timeline, during the transformation the building was brought back to its original shape and size.

At the beginning of the last century, the Haarlem slaughterhouse was still the epitome

1905 street layout

1926 the first construction

1952 the first extension

1961 the second extension

1969 more surrounding buildings

1993 a large building nearby

1999 part of the extension removed

2001 the second part of the extension removed

2008 the little extra buildings have been removed

2021 removed the entire extension

2022 in the process of transformation

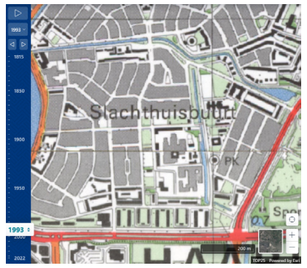


Figure 28: Maps of the slaughterhouse over the years (*Topotijdreis: 200 jaar topografische kaarten*, z.d.)

of modernity and hygienic slaughter. The moment before the transformation it looked like an unattractive no man's land, made up of multiple incidents that can be seen in the extensions. However, the area has a lot of potential according to the municipality and several architects. It is near the entrance to Haarlem and it has many architectural qualities (GH, 2012).

Visions

Several visions and studies were made for the transformation plans. Soester van Eldonk had made plans with a large number of dwellings. In the plans they had made, the slaughterhouse complex would be demolished, which gave a lot of resistance, in addition, the plan was not financially feasible. Rijnboutt had also made a plan for the slaughterhouse site; their vision was based on "an integral development of the area, in which all objects in the vicinity are captured by a new type of building that provides unity." Braaksma and Roos had also made a plan, their vision assumed apartment blocks around the slaughterhouse. This was done to finance the transformation of the slaughterhouse and to make a supermarket in it. The problems with this plan were the high demand for parking spaces that would come with it and the traffic pull. Finally, Studio Assendorp also made a vision, they paid great attention to the connections of the neighborhood with the environment, in addition to the traffic coherence they also focused on the green-blue structure that is much present (GH, 2012). By looking at these visions and seeing why they did not go through, a good look can be taken at what the municipality and the neighborhood felt was important to preserve.

Difficulties

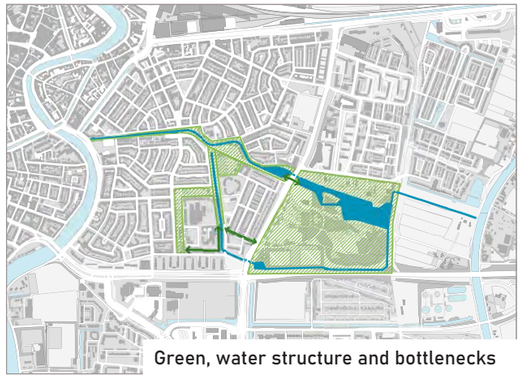
From these visions, they were able to capture several bottlenecks. The biggest issues will be identified in figure 29. The first bottleneck is the green and water structure. There is enough green space in the area, but the connection with the green space in the surrounding area is missing. The main roads and slow traffic routes lack a link to each other around the slaughterhouse. The loose location concerning the surrounding neighborhoods gives a closed and introverted character and because the site has many loose functions it gives a cluttered and divided image(GH, 2012). These points are pulled from the environment into the building as well, so this should also be considered when transforming the building.

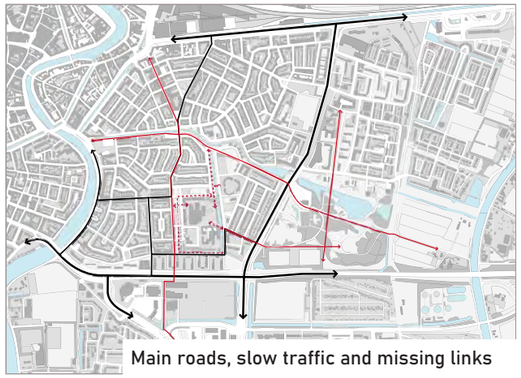
The transformation

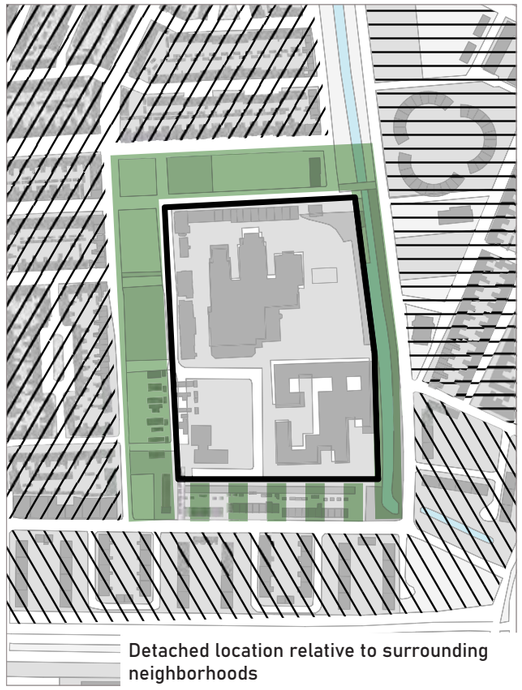
Taking these bottlenecks into account, architectural firm Hans van Heeswijk ultimately created a plan for the transformation of the Slachthuis; Bureau ZUS worked on design and research in the areas of architecture, urban planning and landscape design; Architect Joeri van Ommeren was responsible for the design of the new-build homes around the Slachthuis; BPD looked at the area development and De Nijs Projectontwikkeling took care of the entire development process(GH, 2012)

The left half of the south facade, of the Slaughterhouse, where the extension was attached, is very damaged. It was complex to make a design for this because all kinds of different time layers were present here. The cold room behind this was fitted with new refrigeration units with shafts in the 1930s. These shafts were located exactly where the original windows were on the inside of the exterior facade and were therefore bricked up at the time. Later, several additions were made to this facade. The shafts of the cooling system are also monumental which made it impossible to return the windows to their original position. In the end, after the demolition of the extension, the choice was made to leave the existing exterior facade intact as much as possible. The original piers that guide the facade were reconstructed. Between the trusses, contemporary windows were designed with a new regular rhythm, as the original facade is also very regular(Haumann, 2012).

Another problem the architects of the transformation had to think about was the


Green, water structure and bottlenecks


Main roads, slow traffic and missing links


Detached location relative to surrounding neighborhoods

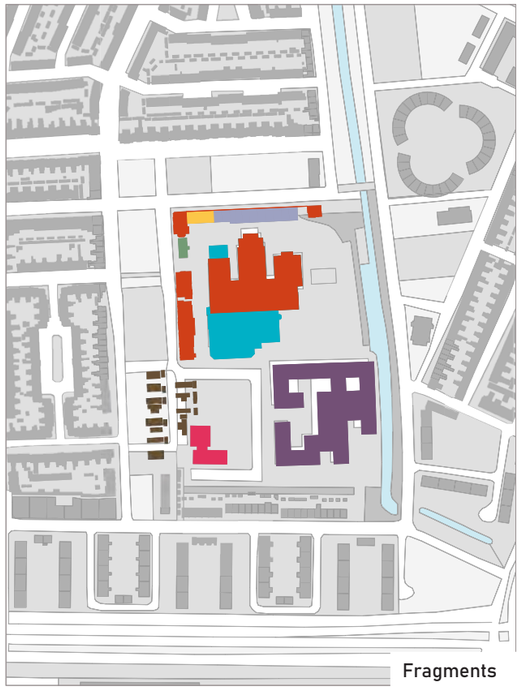

Fragments

Figure 29: Analyzing maps of the environment around the slaughterhouse (GH, 2012)

installations. The installations in the building are all in plain sight, so they wanted to organize them as much as possible and neatly finish them. Due to the high construction costs, they are still looking at whether they can achieve this ambition(Haumann, 2012).

The original facade was very regular. In some places, there were large facade openings. These did not follow the rhythm but were preserved to add more transparency and daylight to the building(Haumann, 2012).

1.2 Old rope factory in Oudewater

Old rope factory in Oudewater
Location: Oudewater, Oude Touwfabriek
Old function: rope factory
Built in: 1545
Architect: unknown

New function: residential
Transformed in: 2007-2018
Architect of transformation: Braaksma and Roos architects

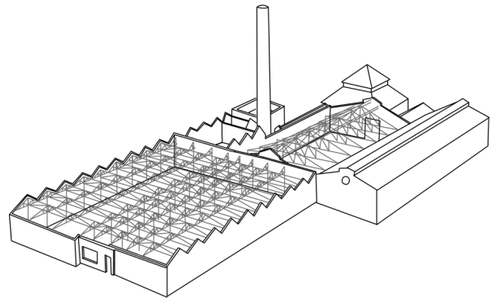


Figure 30: Schematic drawing of the old status of the rope factory in Oudewater(own work)

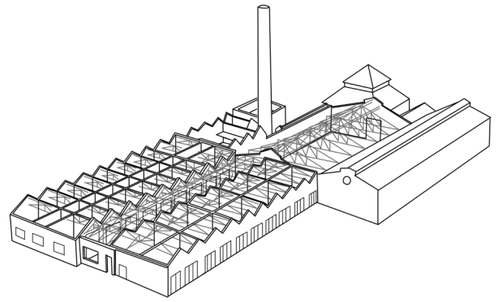


Figure 31: Schematic drawing of the new status of the rope factory in Oudewater(own work)

History

The G. van der Lee rope factory has existed for more than 475 years, making it one of the oldest companies in the Netherlands. It was a family business until its transformation in 2013 and was already operating before its official establishment in 1545. The company was known for its craftsmanship and innovations. Besides being the oldest family business in the Netherlands, according to research by Nyenrode in 2007, the rope factory was also the last Dutch rope factory to make fiber ropes. For example, manager Hans Hubregtse said, “We are proud to be the last Dutch rope factory making fiber ropes. From that factory come all kinds of rope: from climbing ropes for gymnasiums to ropes for replicas of medieval ships. Our kabelarings (ropework around sloops that prevent damage to the boat) and rekkers (ropework for tugs) are internationally renowned” (Dekker, 2020).

In 2013, the company was sold to the Hendrik Veder Group after the Van der Lee family ran the business for 14 generations. The starting point of the Van der family was that they always wanted to make sure all the ropes needed could either be imported or produced. They always placed a high value on the workforce so they could focus on the long term(Dekker, 2020).

The transformation

From 2007 to 2018, the architectural firm Braaksma & Roos Architects BV has been working on the transformation of the old Touwfabriek(Touwfabriek, Oudewater, 2023). The site is divided into several buildings, in this research we will only look at the buildings that have been restored and thus transformed(Hekendorperweg 36, z.d.). These are parts A to H in figure 32 and parts 1 and 2 in figure 33.

Part 1 is the ‘sheds’, it consists of a large industrial shed built in the period 1925 and 1926 and has a characteristic industrial roof shape. Only the eastern part of the shed dates from

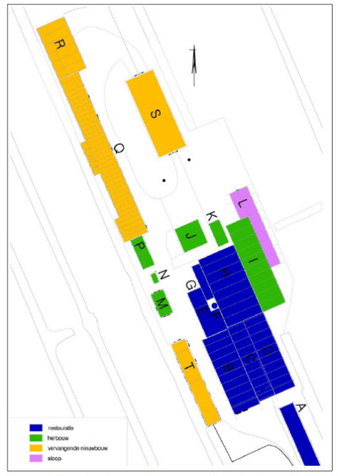


Figure 32: Utilization of existing buildings (architecture firmBraaksma en Roos)

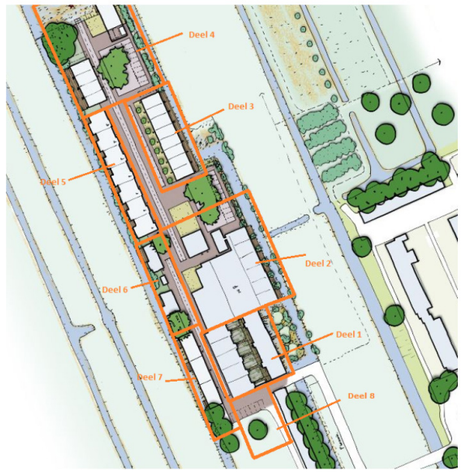


Figure 33: Sub areas (Hekendorperweg 36, z.d.)

1948 (Hekendorperweg 36, s.d.). The shed has been transformed into houses and gardens. The houses came on either side of the hall. The middle part of the shed has been transformed into an indoor-outdoor space and now mainly has the function of a garden. The roof has been removed from the structure. The structure has remained in place, however, creating a contrast between the old striking lattice construction and the new architecture of the houses (*Oude fabriekshal omgetoverd tot woningen,* 2015).

Part 2 are the lumber yard(H, 1940), the twinery(L, 1964), the boiler house(E, 1900) and the forge(I, 1952). The carpenter's yard has been restored and has become parking lots, the forge has been rebuilt and renovated and they have become 6-row houses, The twinery has been demolished and the boiler house has been restored to a live-work studio(Hekendorperweg 36, s.d.).

Dificulties and solutions

Problemen: geluidsoverlast tussen de woningen. Dus om contactgeluid te voorkomen worden op de plekken waar woning scheidende wanden komen de stalen spanten ontkoppeld. De woning scheidende wanden zullen de spanten dragen. Deze wanden zijn uitgevoerd in houtskeletbouw. Er wordt wel gezorgd dat in iedere woningen minimaal één hoofdspand en meerdere dwarsspanten zichtbaar blijven. (Oude fabriekshal omgetoverd tot woningen, 2015).
Een ander probleem was dat na onderzoek de fundering niet sterk genoeg meer was en dus volledig funderingsherstel nodig was. Er zijn nieuwe funderingspalen door de oude vloer geleid en op deze oude vloer is een nieuwe betonvloer gestort waarbij de oude vloer als bekisting werd gebruikt. Ook de 25 m hoge karakteristieke schoorsteen had een nieuwe fundering nodig. Er is een voorspanning in aangebracht waardoor de dikke metselwerkconstructie niet kan scheuren (Oude fabriekshal omgetoverd tot woningen, 2015).

1900 the boiler house is built

1925 Sheds are built

1940 lumber yard is built

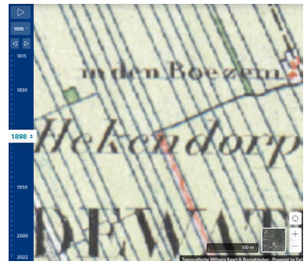
1952 the forge is built

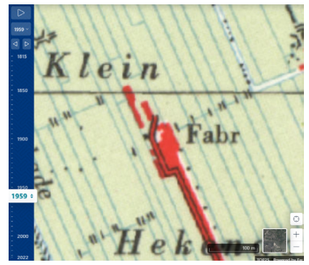
1964 the twineky is built

2007 the transformation has started

2016 the plot is connected to the neighborhood

2018 the transformation is done





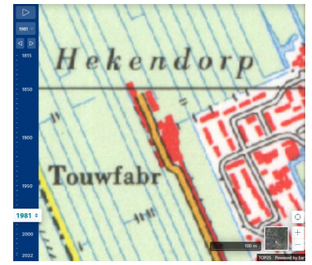


Figure 34: Maps of the rope factory over the years (*Topotijdreis: 200 jaar topografische kaarten*, z.d.)

1.3 The Twentse theater in Enschede

Location: Enschede, between the Langestraat and the Walstraat
Former function: theater
Built in:
Architect:

New function: Shops, housing, catering and courtyard garden.
Transformed in: 2008-2012
Architect of transformation: De zwarte hond architecten

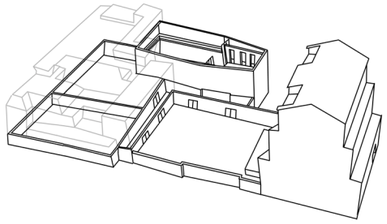


Figure 35: Improvised schematic drawing of the old status of the Twentse theater in Enschede(own work)

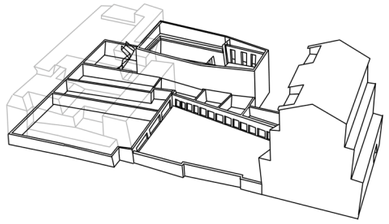


Figure 36: Schematic drawing of the new status of the Twentse theater in Enschede(own work)

History

In 1810 a society was built on the site of the Twentse theater, a gentlemen's club where all kinds of business were discussed, however, this building was lost in a major city fire in 1862. A year later a new building was built, the "Groote Sociëteit. After several years, in 1889 the building was given away for a new theater hall. In 1953 the theater was expanded with a Great Hall and the building was named Twentse Schouwburg, the old theater hall was turned into a cinema in 1978. In 1983 another major renovation took place and the theater was able to reopen in 1985 (Geschiedenis, z.d.).

Between the lively shopping street and a quiet residential street light the former Twentse Schouwburg building. The complex has been used a lot over the years and because of the emotional significance it had for the city as a result, the starting point was to partially preserve the old complex (Herbestemming Twentse Schouwburg, z.d.).

The transformation

In 2008, the Twenthe Theatre moved to the new National Music Quarter. The old building was a landmark building so the starting points were to include the characteristic front facade, the old foyer and the small auditorium in the new building. The tower on the quiet Walstraat still refers to the old silhouette but has been replaced by a residential building. The building section on the busy Langestraat has been preserved and has been rezoned to a café-restaurant and a large retail space(Herbestemming Twentse Schouwburg, z.d.).

The large auditorium at the heart of the venue has given way to an enclosed theater garden. Several small stores and a terrace are located here. The garden can be reached from both streets and therefore offers a new connection through the city(Herbestemming Twentse Schouwburg, z.d.).

1810 the society was built

1862 a city fire destroyed the building

1863 the society was built again

1953 the building was given to the theater

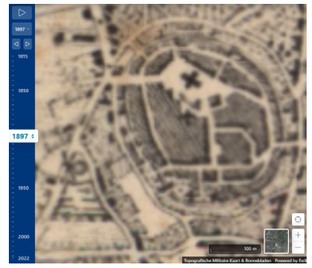
1978 the old theater hall turned into a cinema

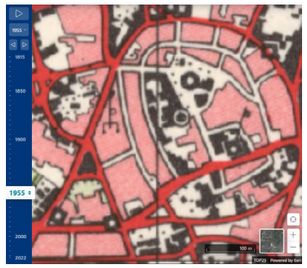
1983 a big renovation took place

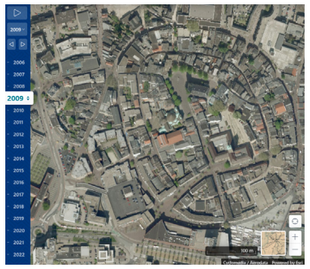
1985 the theater reopend after the renovation

2008 the theater moved out and the transformation began

2012 The transformation is done







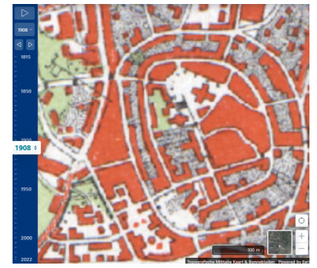
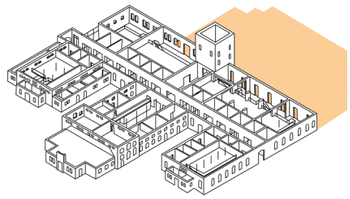
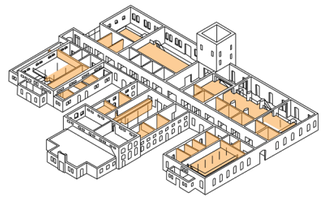
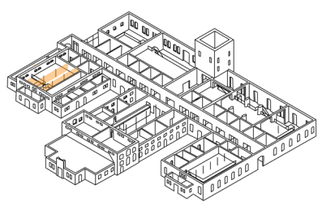
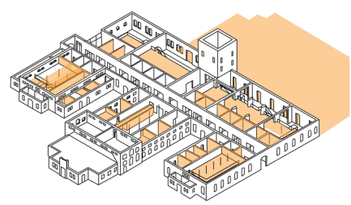
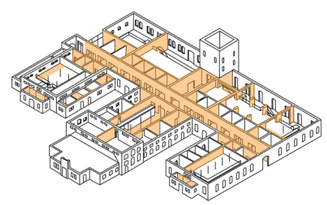
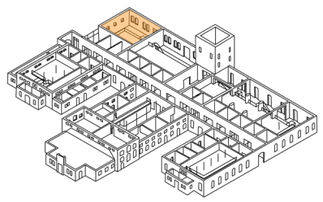
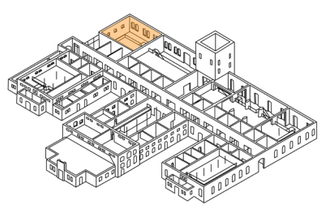
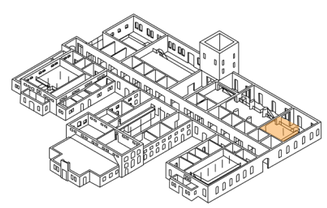
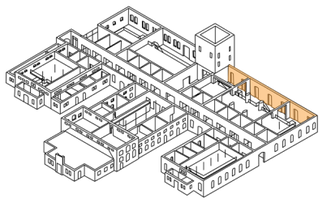
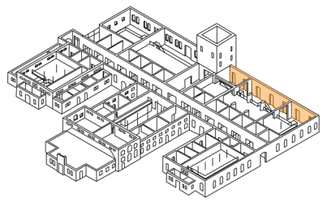
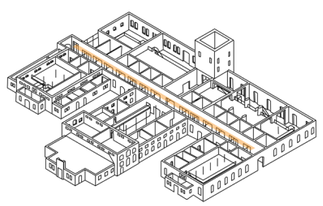
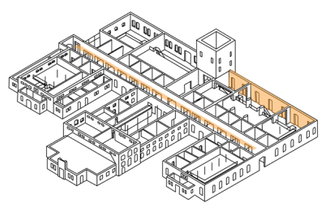
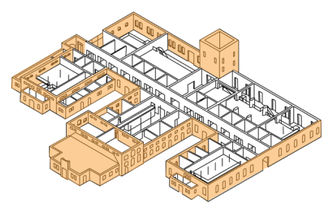
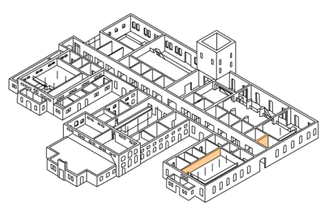
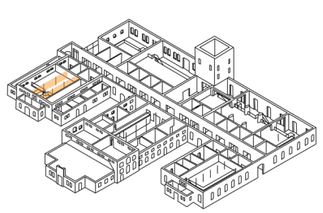
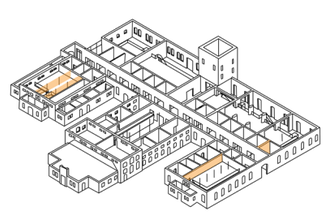
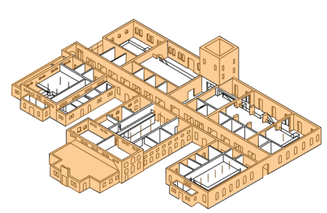
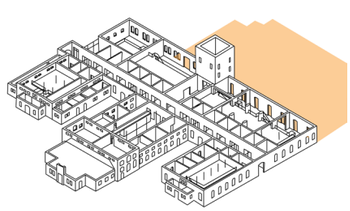
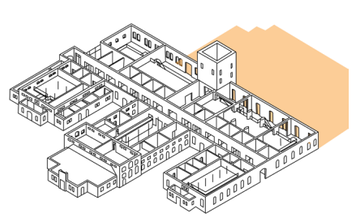
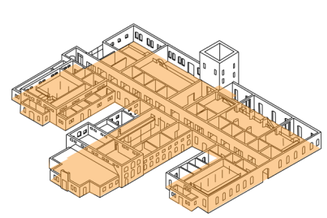


Figure 37: Maps of the Twentse theater over the years (*Topotijdreis: 200 jaar topografische kaarten*, z.d.)

Appendix 2: The classification

2.1 Classification of the Slaughterhouse

	Adding	Subtracting	Splitting/Closing	Joining/Opening	Changing	Keep the same
Space plan						
Services						
Skin						
Structure						
Site						

2.2 Classification of the Old rope factory

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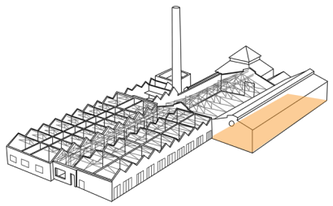
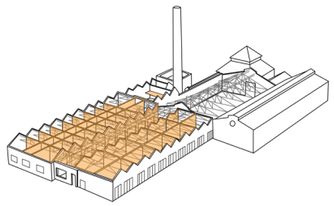
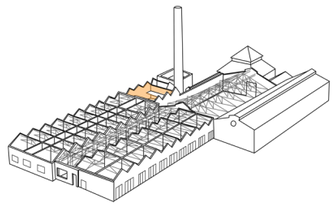
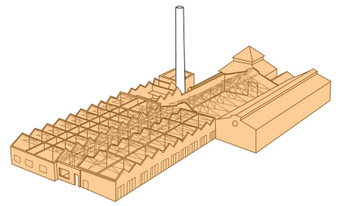
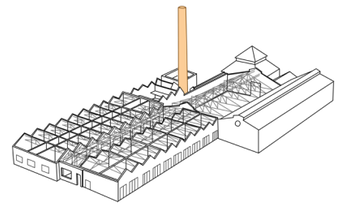
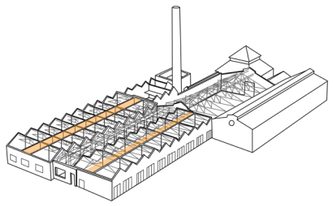
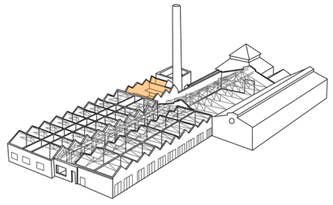
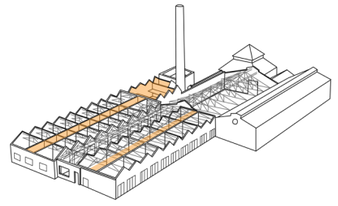
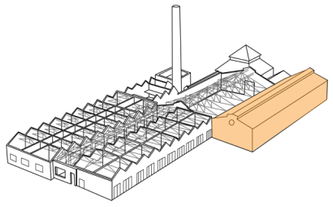
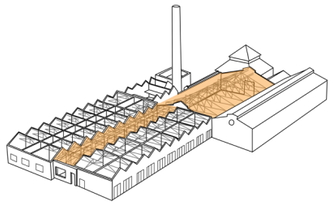
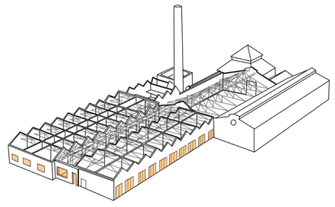
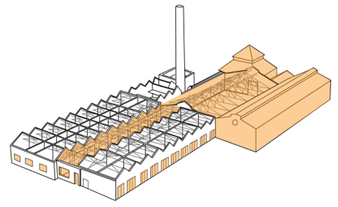
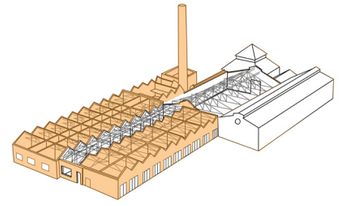
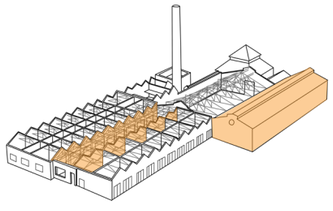
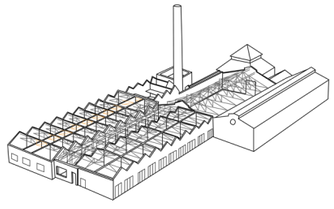
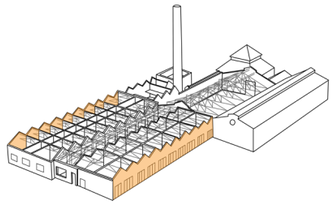
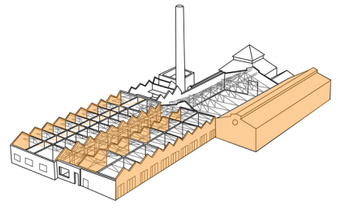
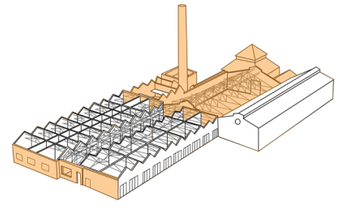
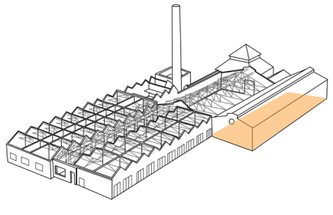
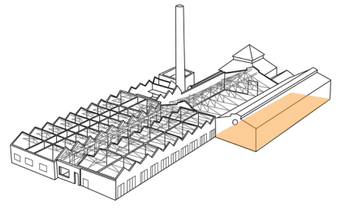
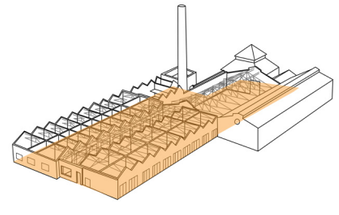
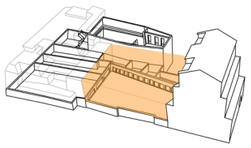
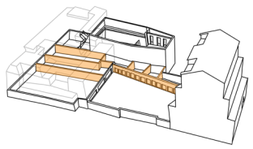
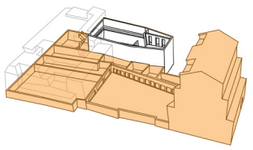
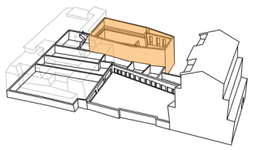
Space plan						
Services						
Skin						
Structure						
Site						

2.3 Classification of the Twentse theater

	Adding	Subtracting	Splitting/Closing	Joining/Opening	Changing	Keep the same
Space plan						
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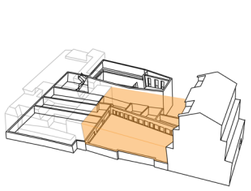
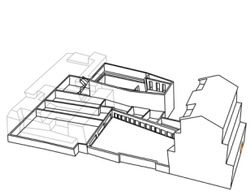
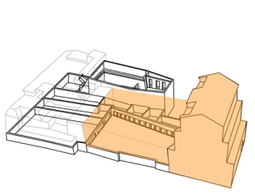
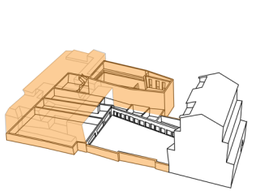
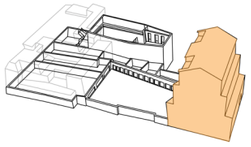
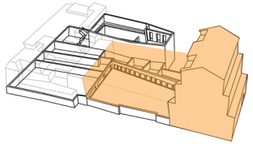
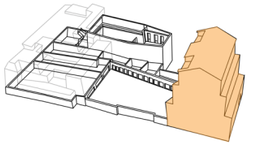
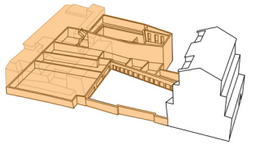
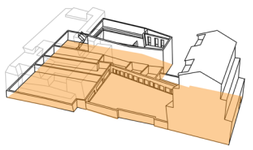
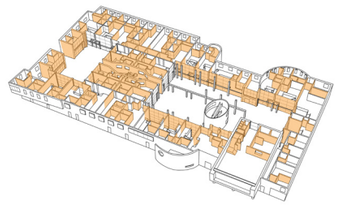
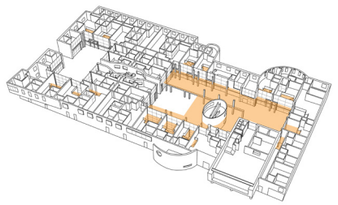
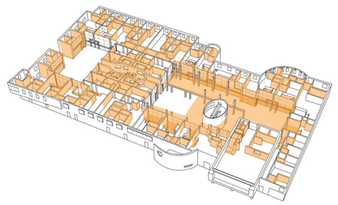
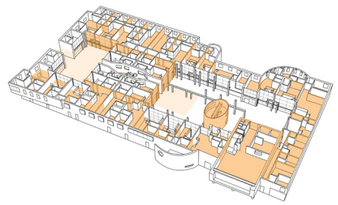
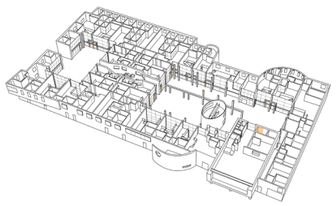
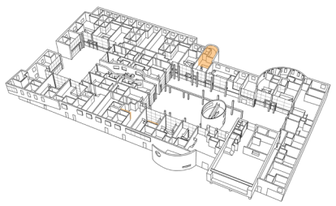
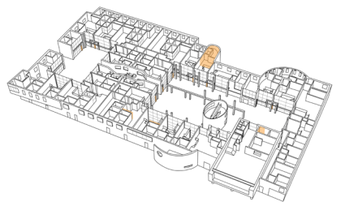
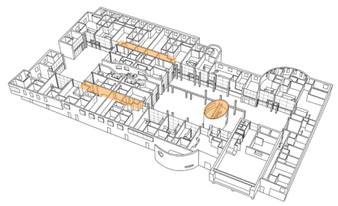
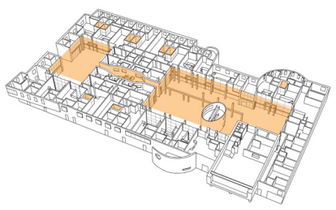
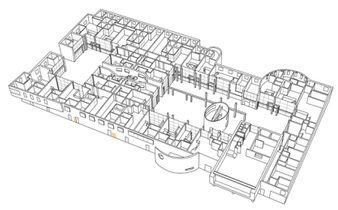
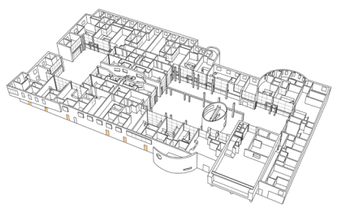
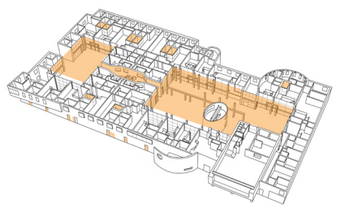
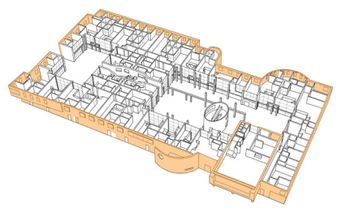
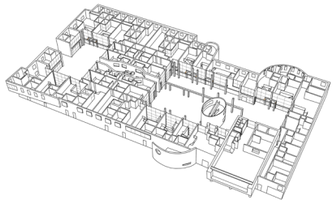
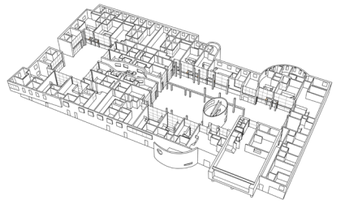
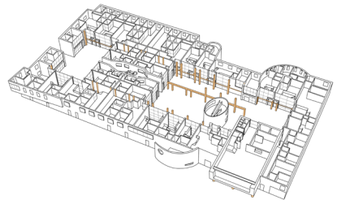
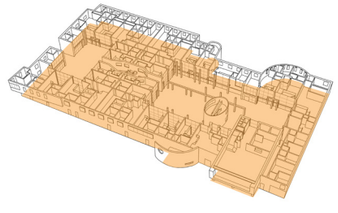
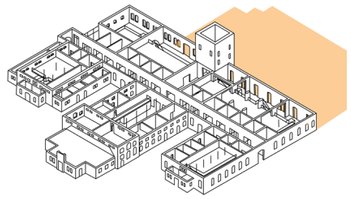
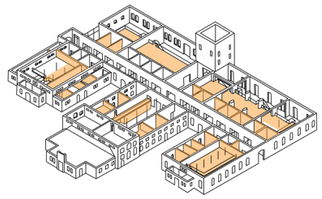
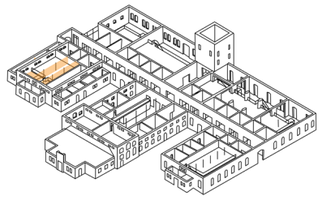
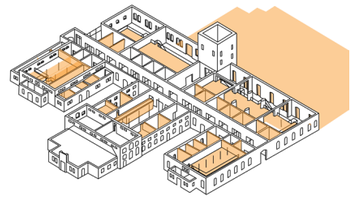
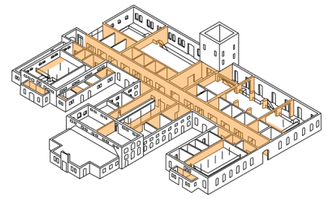
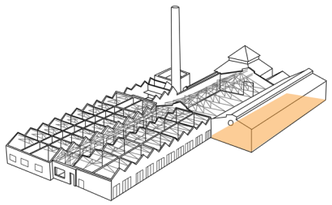
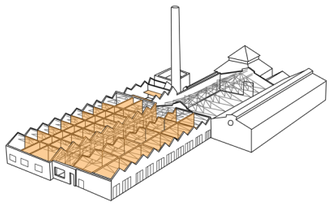
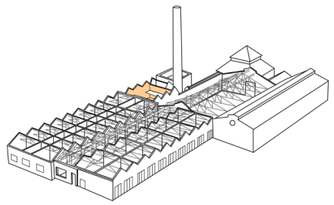
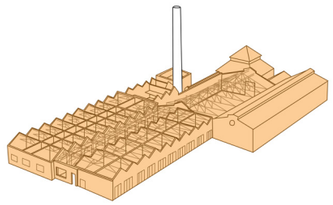
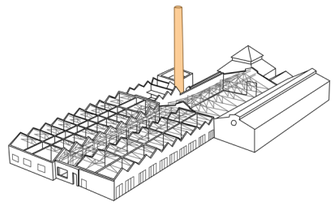
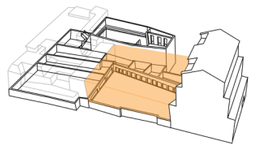
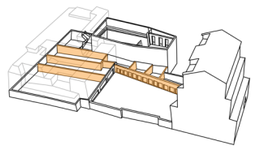
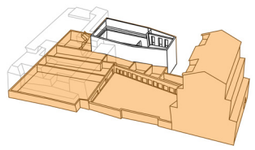
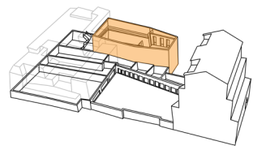
Skin						
Structure						
Site						

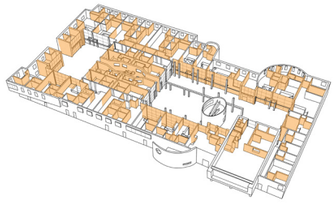
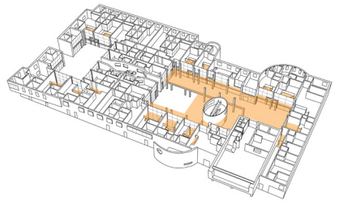
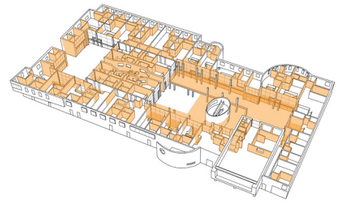
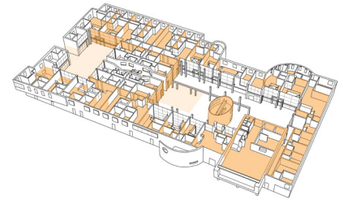
2.4 Classification of the Meervaart

	Adding	Subtracting	Splitting/Closing	Joining/Opening	Changing	Keep the same
Space plan						
Services						
Skin						
Structure						
Site						

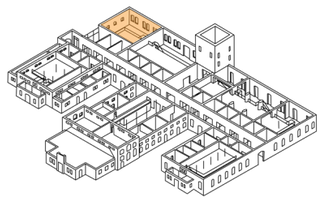
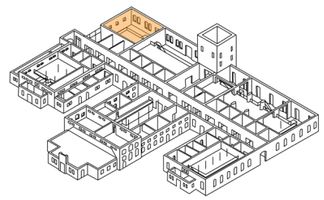
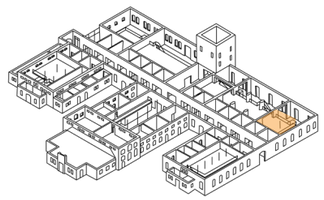
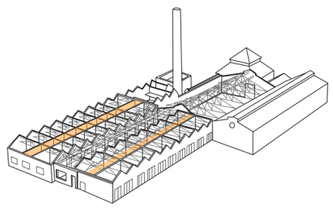
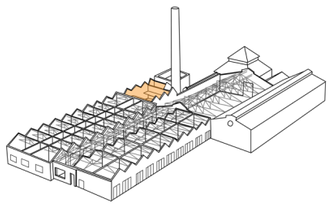
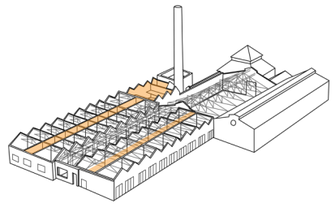
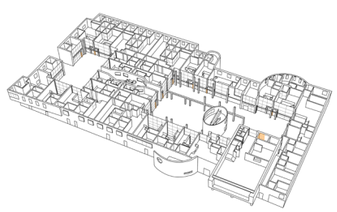
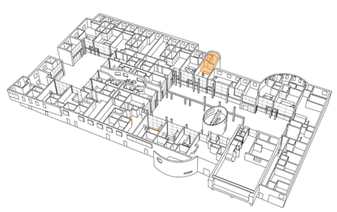
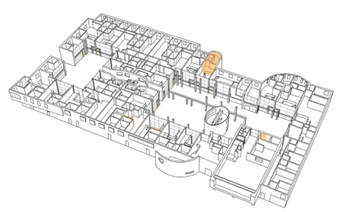
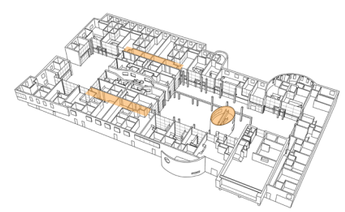
Appendix 3: The comparisons

3.1 Comparison of the space plan

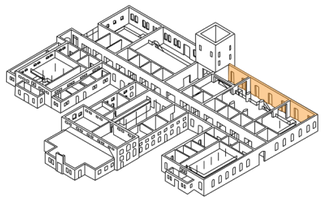
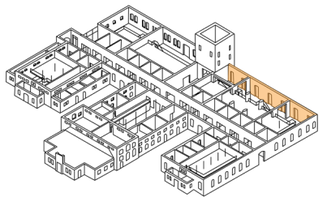
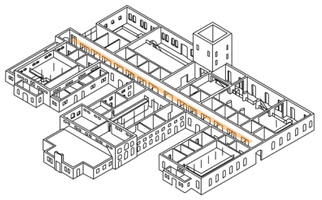
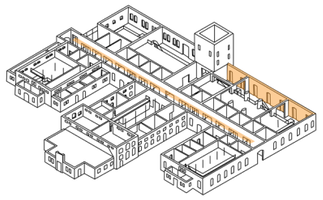
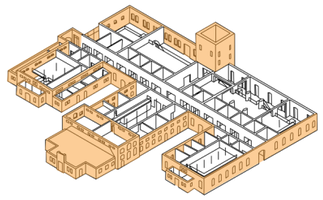
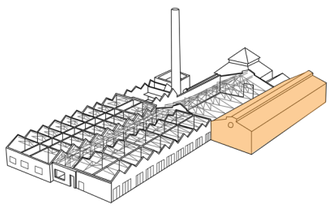
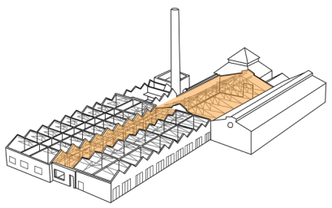
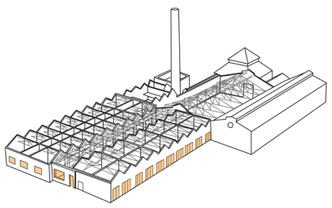
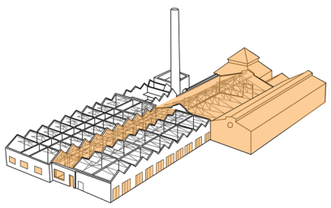
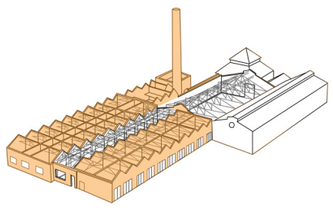
	Adding	Subtracting	Splitting/Closing	Joining/Opening	Changing	Keep the same
Slaughterhouse						
Rope factory						
Theater						

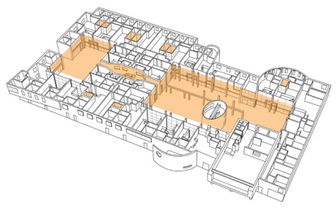
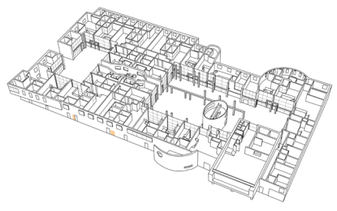
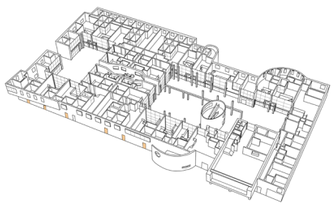
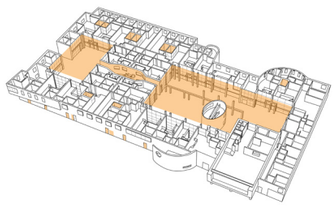
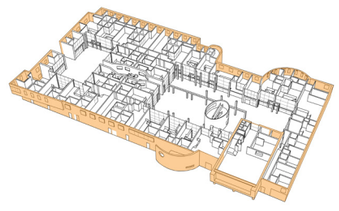
The Meervaart						

3.2 Comparison of the services

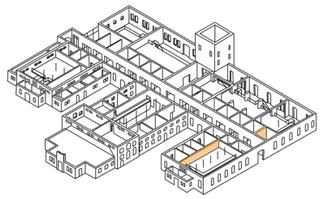
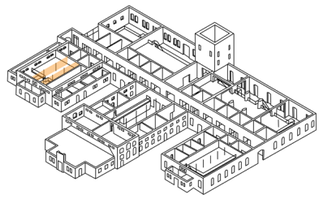
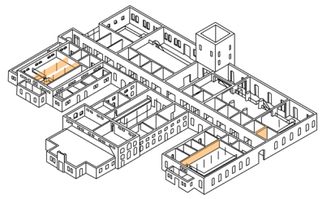
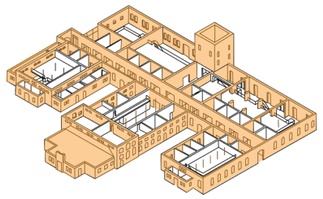
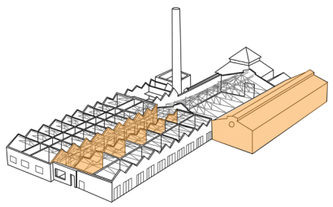
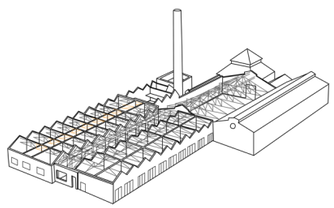
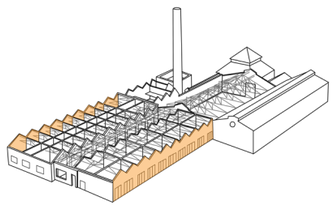
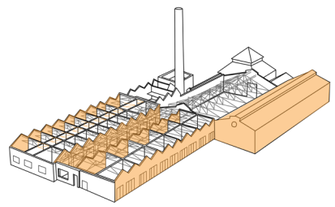
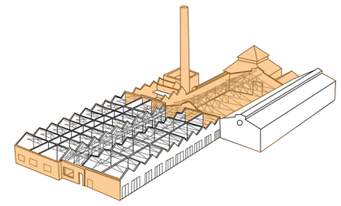
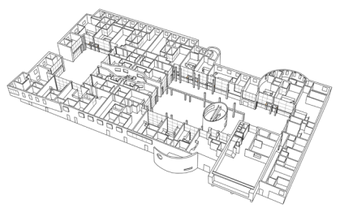
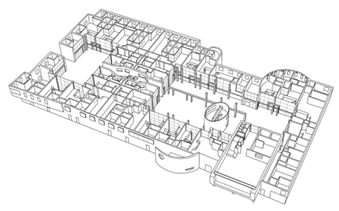
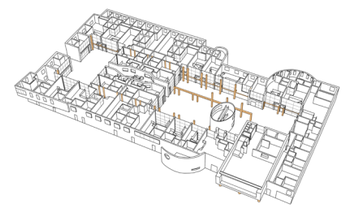
	Adding	Subtracting	Splitting/Closing	Joining/Opening	Changing	Keep the same
Slaughterhouse						
Rope factory						
Theater						
The Meervaart						

3.3 Comparison of the skin

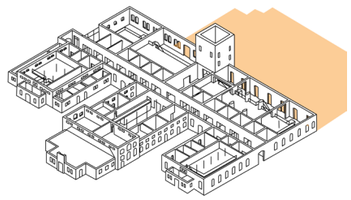
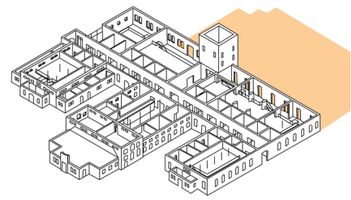
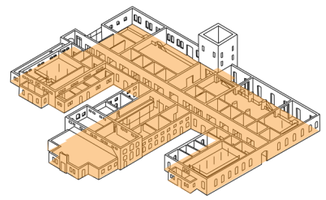
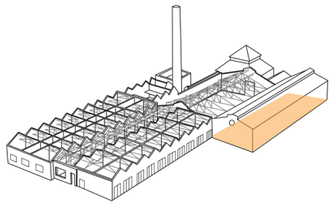
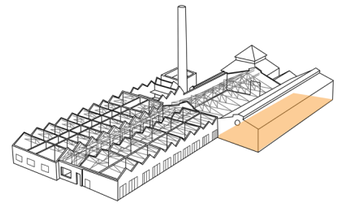
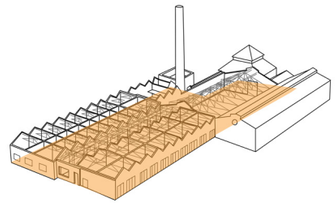
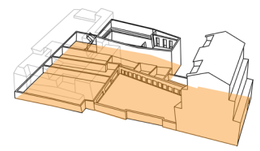
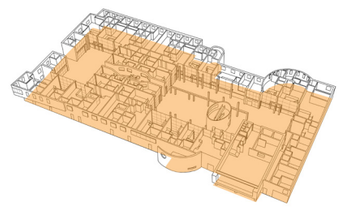
	Adding	Subtracting	Splitting/Closing	Joining/Opening	Changing	Keep the same
Slaughterhouse						
Rope factory						
Theater						

The Meervaart						

3.4 Comparison of the structure

	Adding	Subtracting	Splitting/Closing	Joining/Opening	Changing	Keep the same
Slaughterhouse						
Rope factory						
Theater						
The Meervaart						

3.5 Comparison of the site

	Adding	Subtracting	Splitting/Closing	Joining/Opening	Changing	Keep the same
Slaughterhouse						
Rope factory						
Theater						
The Meervaart						

DESIGN

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1.2 New surroundings of the Meervaart

Design 2: 3D of the transformed building

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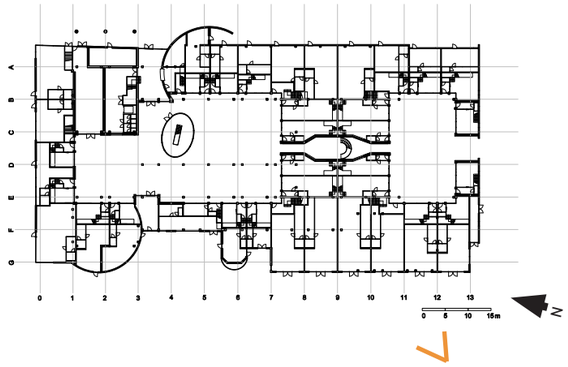
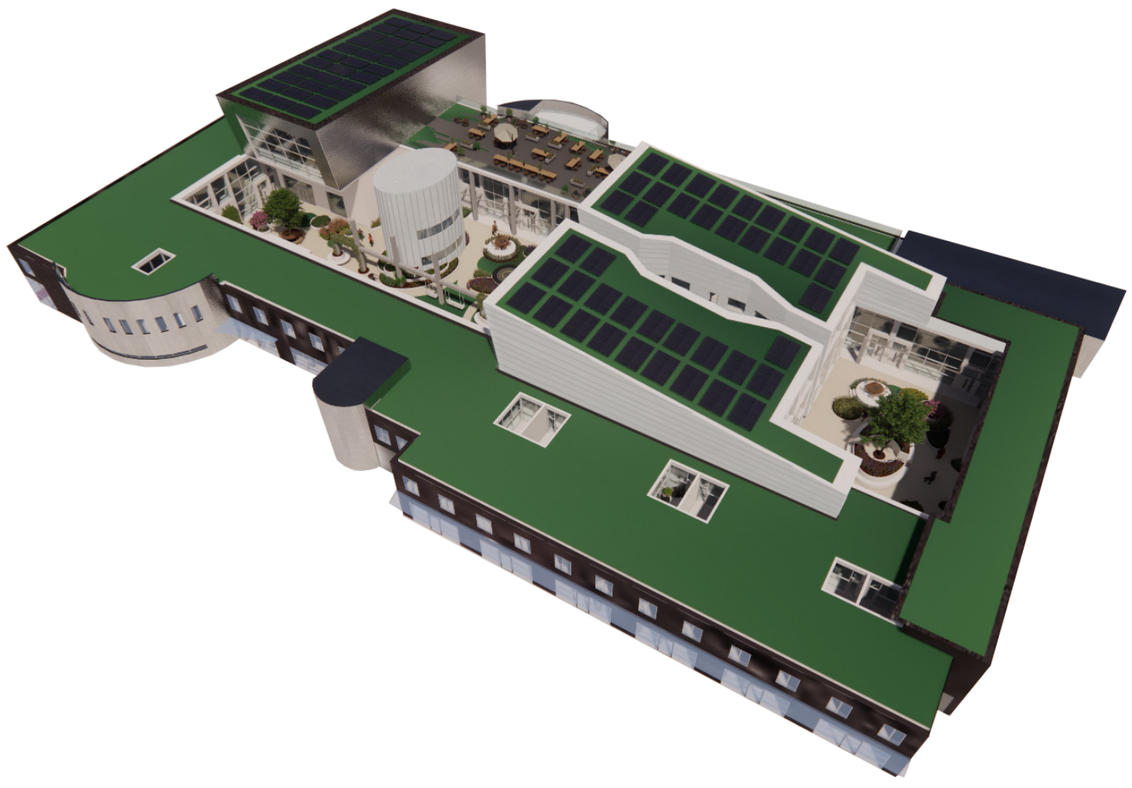
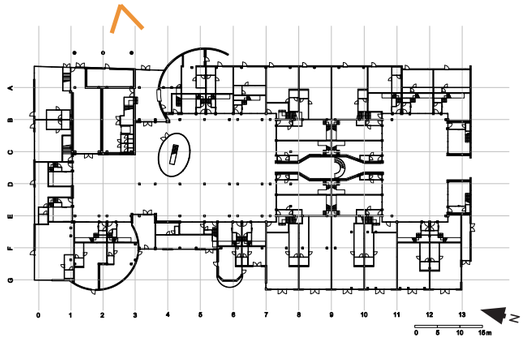
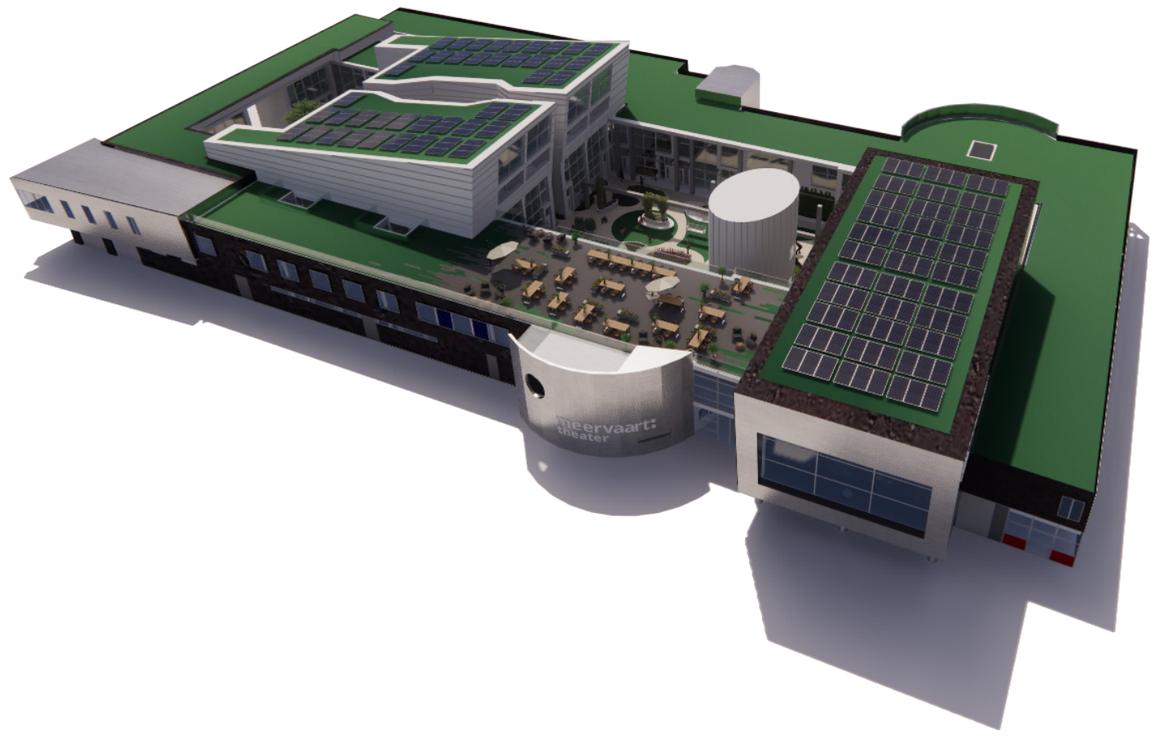




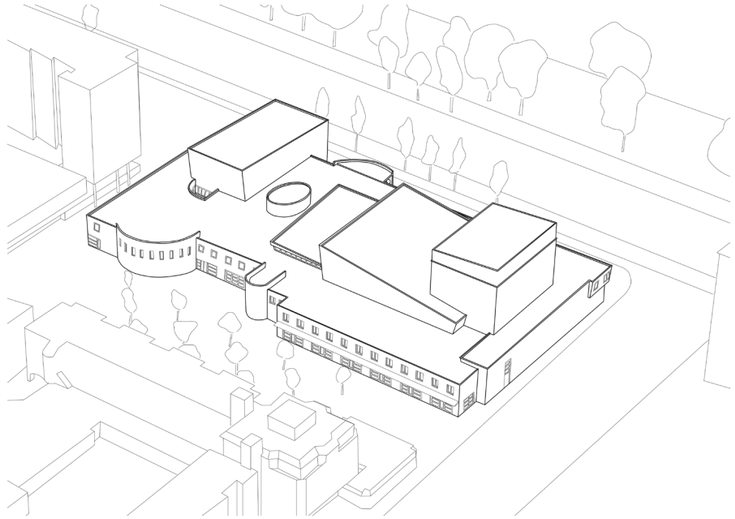
2.2 3D visualization of the building from the northeast



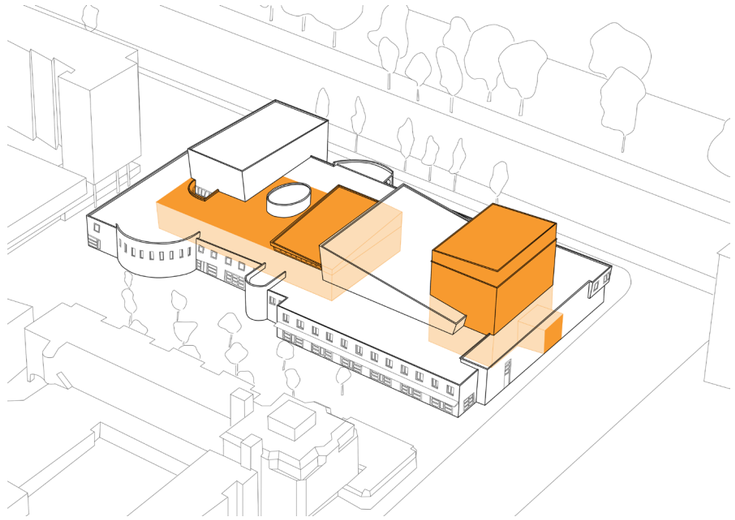


2.3 Transformation of the building

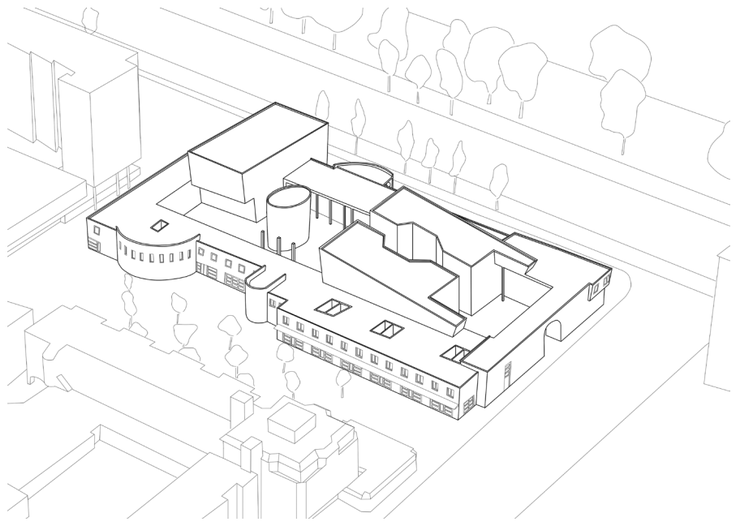
Current situation



Subtracted parts

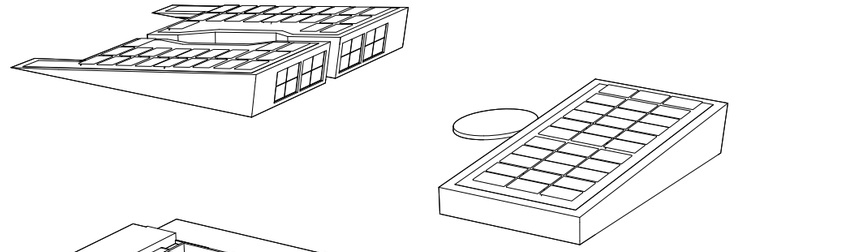


New situation

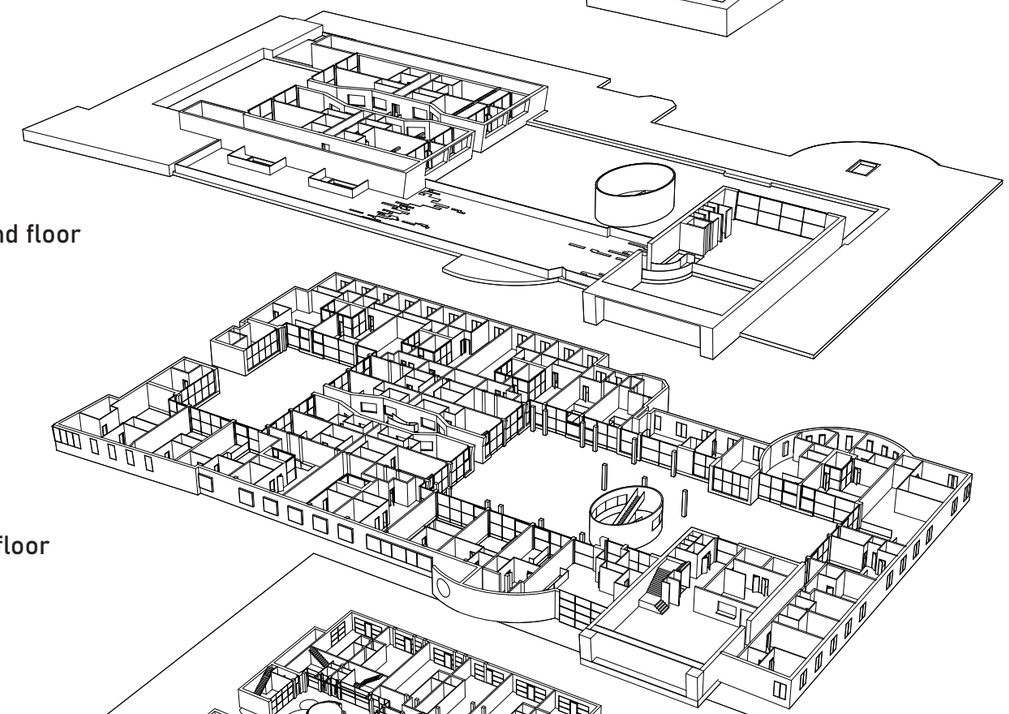


2.4 Axonometry of the different floors of the building

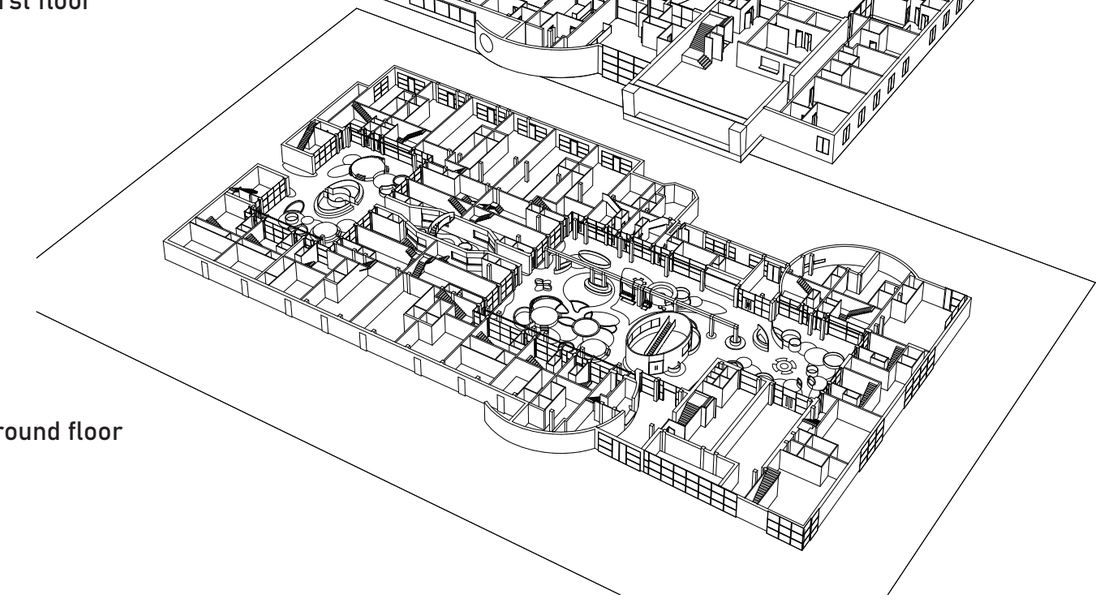
Third floor



Second floor



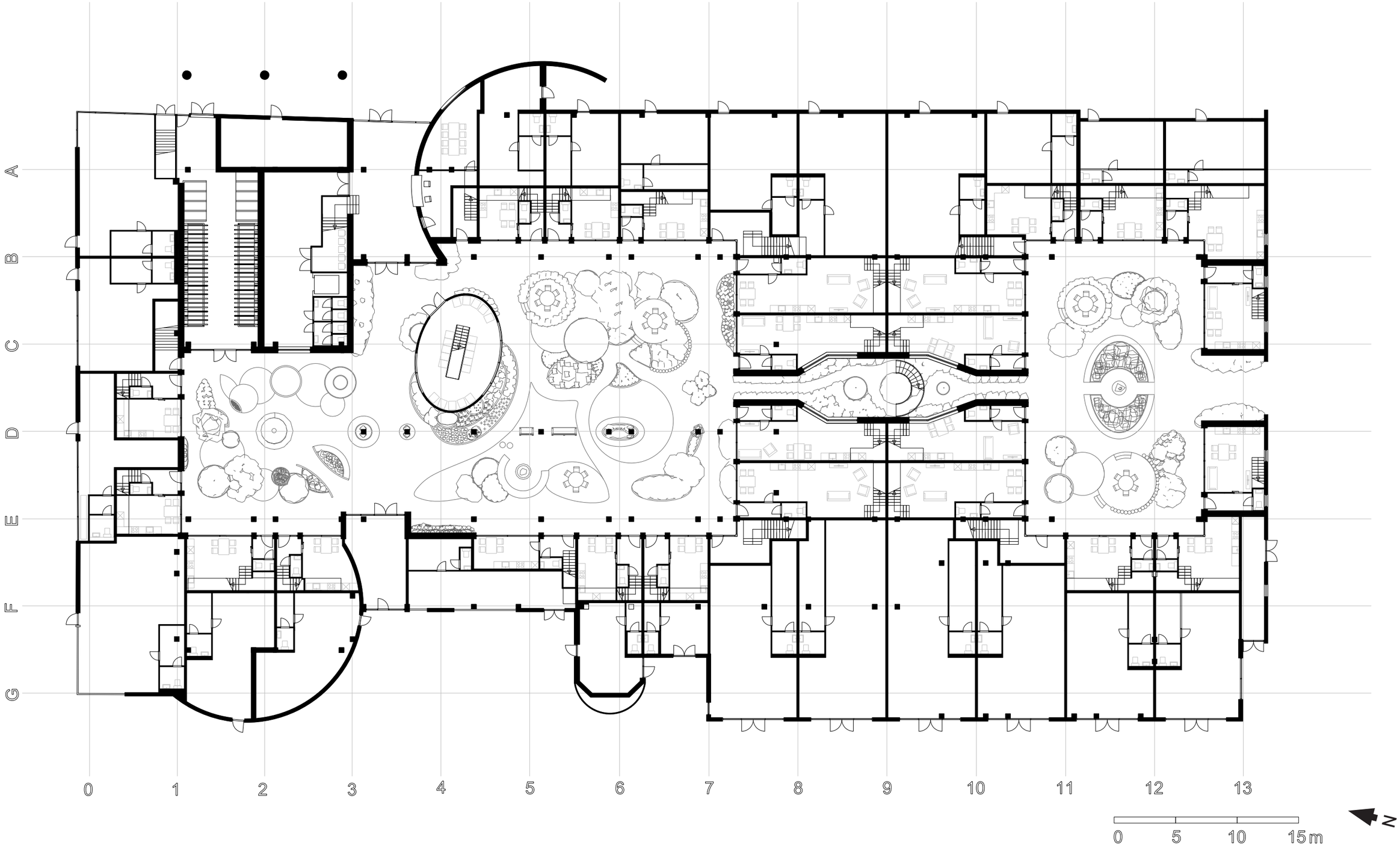
First floor



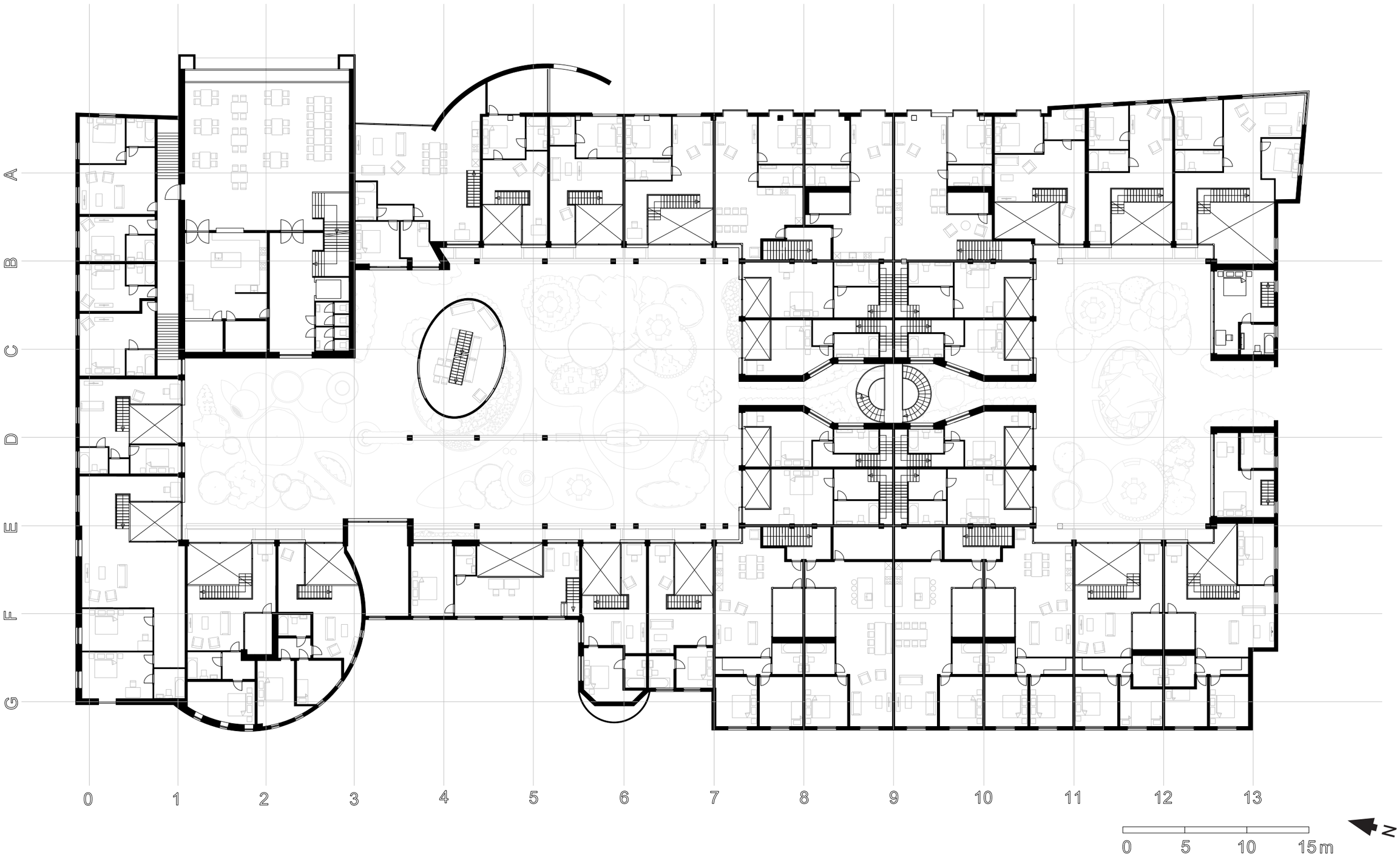
Ground floor

Design 3: The floorplans

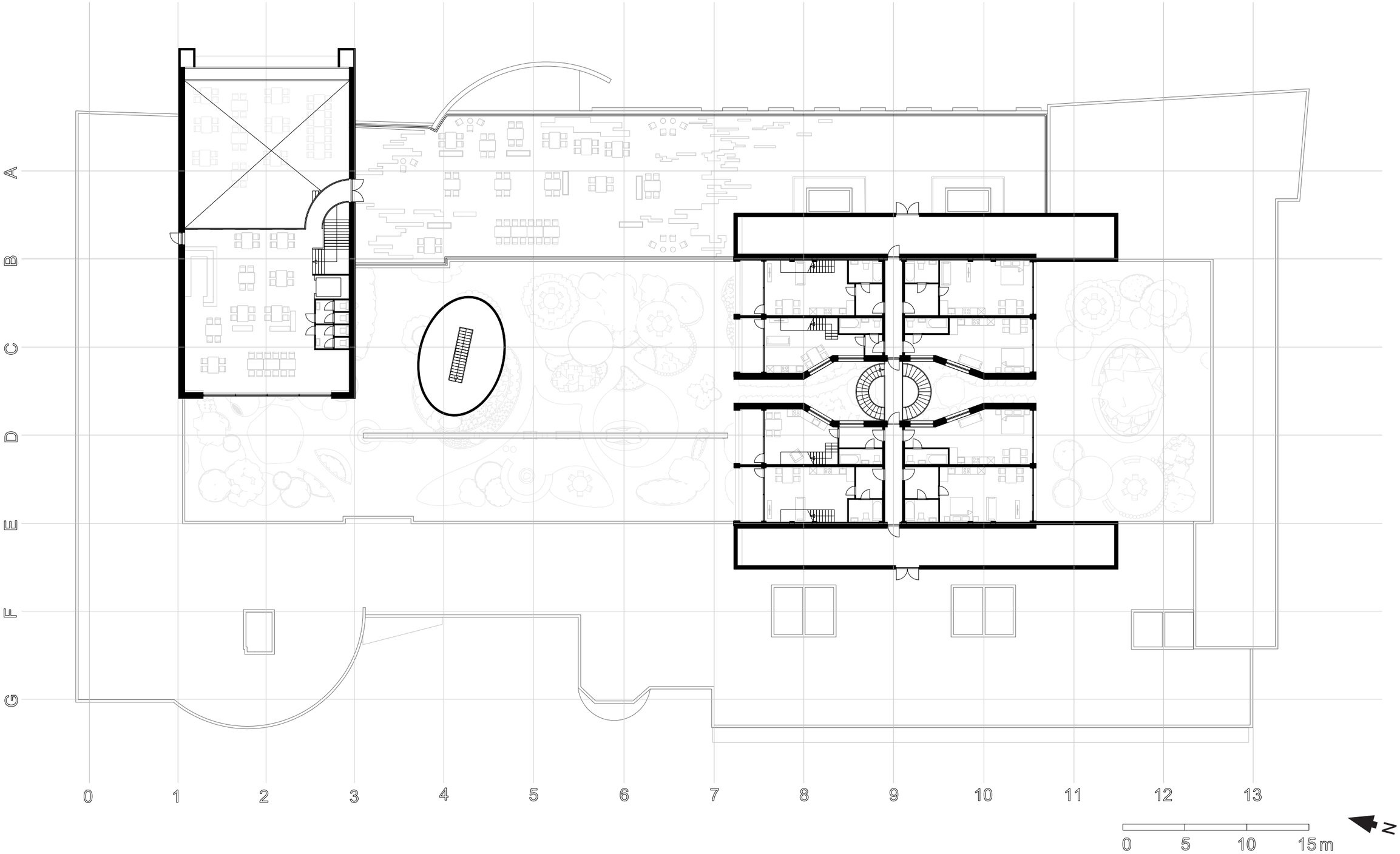
3.1 Floorplan groundfloor 1:300



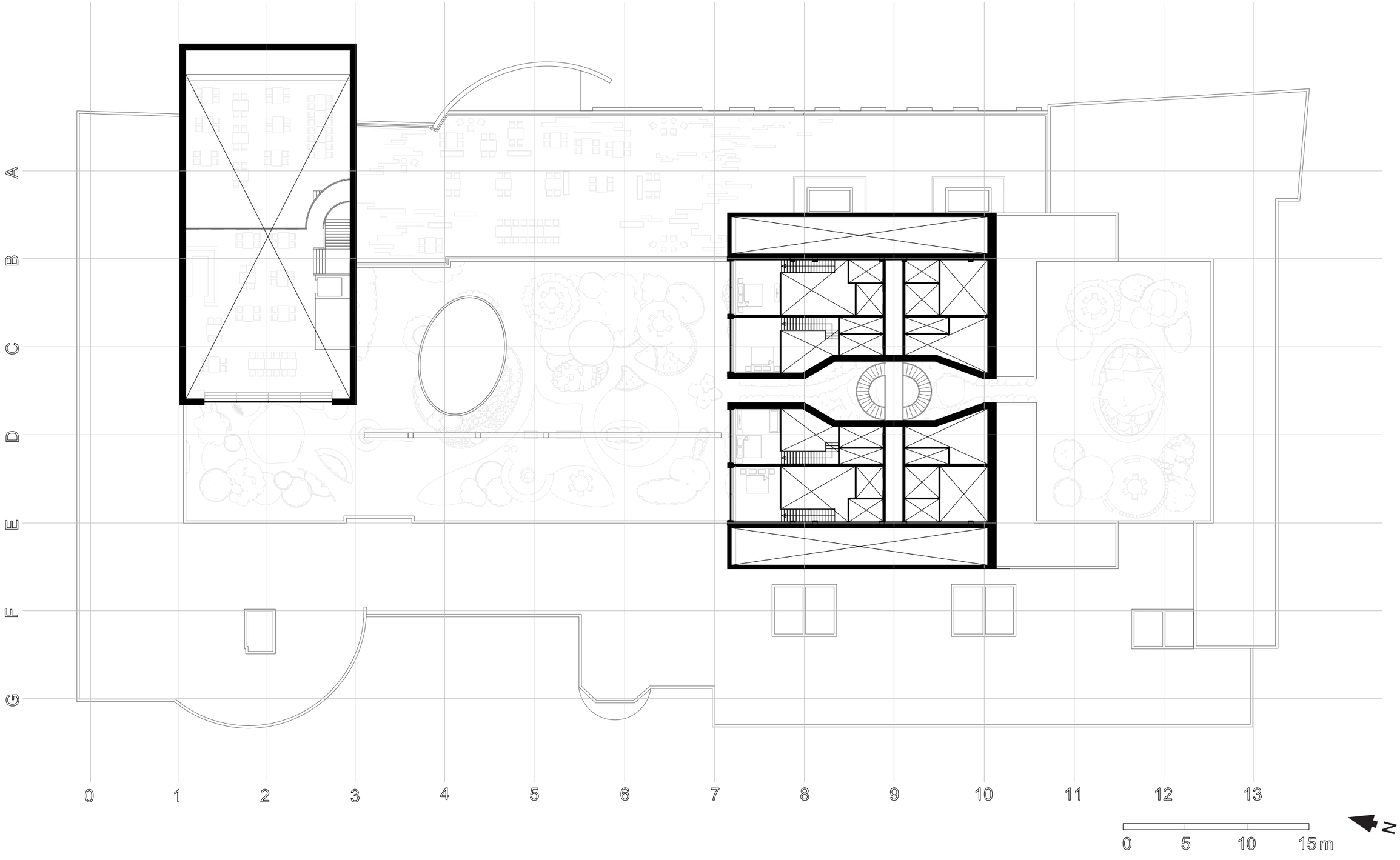
3.2 Floorplan first floor 1:300



3.3 Floorplan second floor 1:300



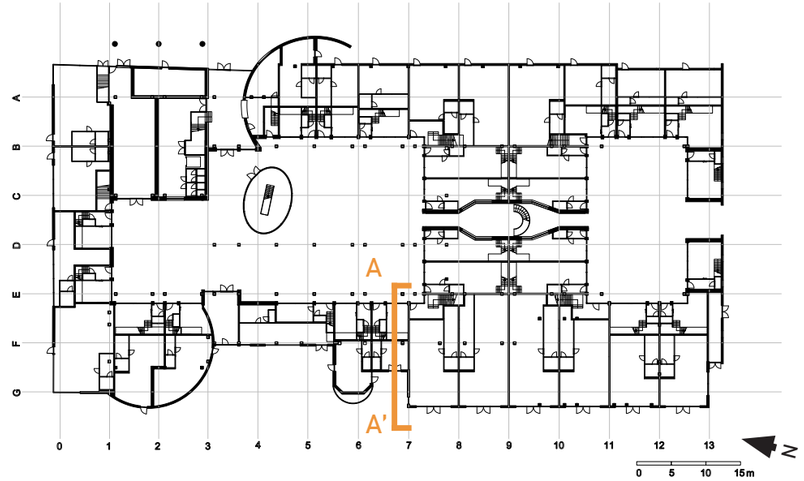
3.4 Floorplan third floor 1:300

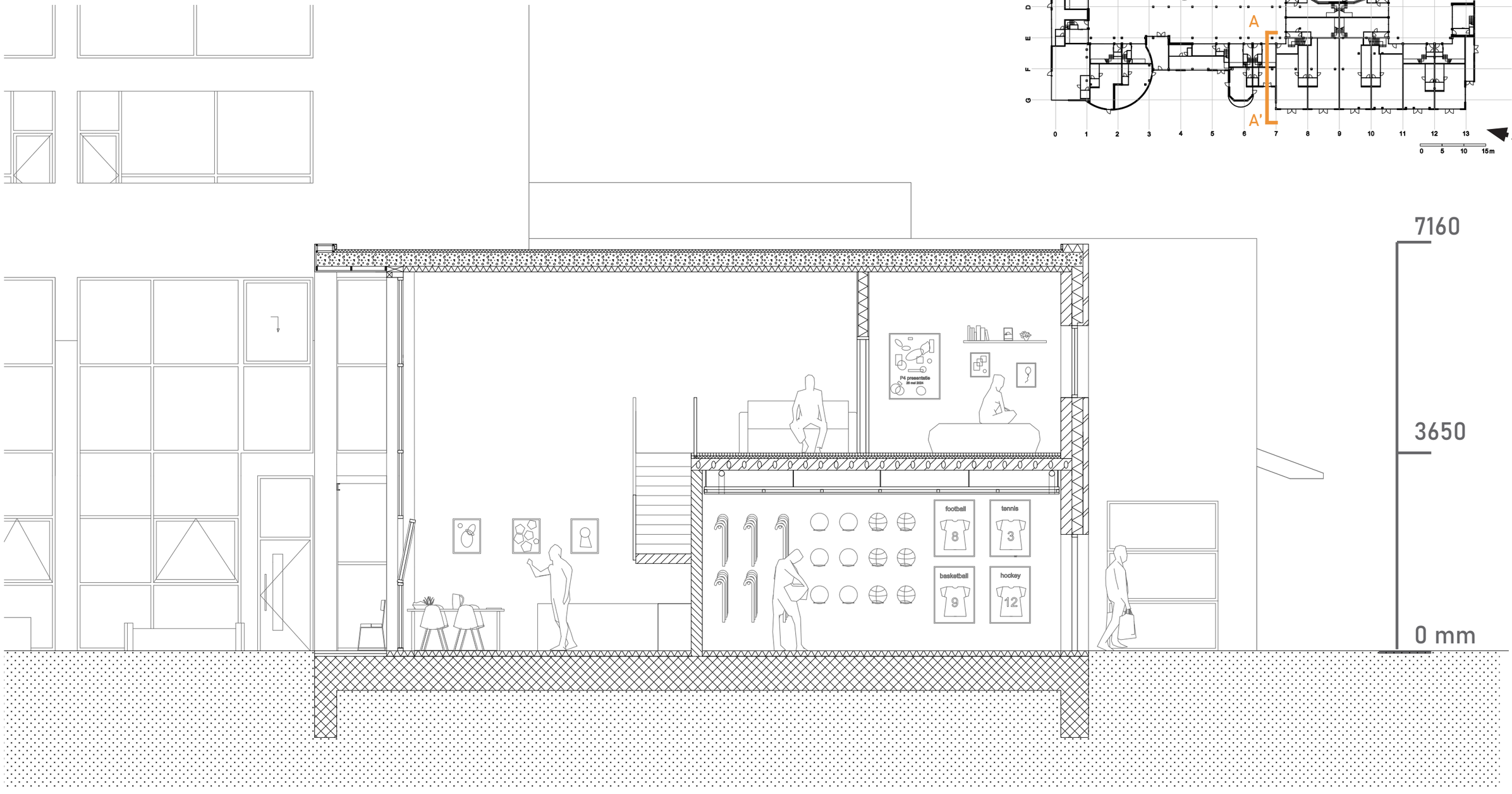


Design 4: Sections

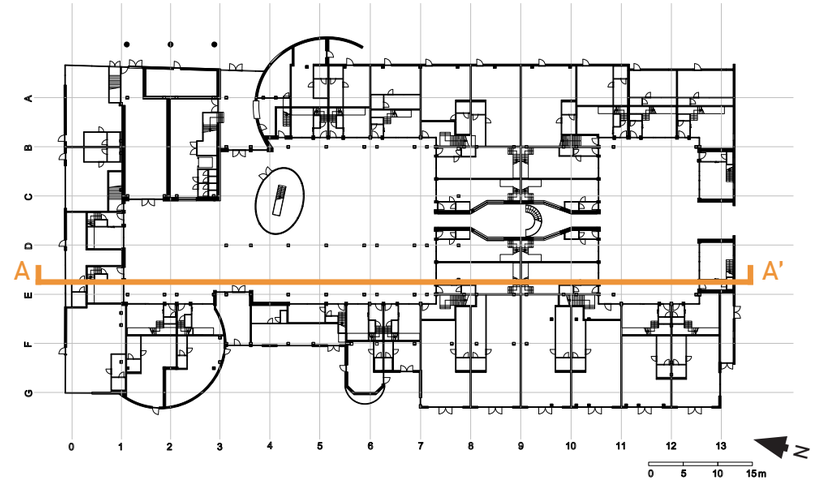
4.1 Section across the building from the Sloterplas to the shopping center

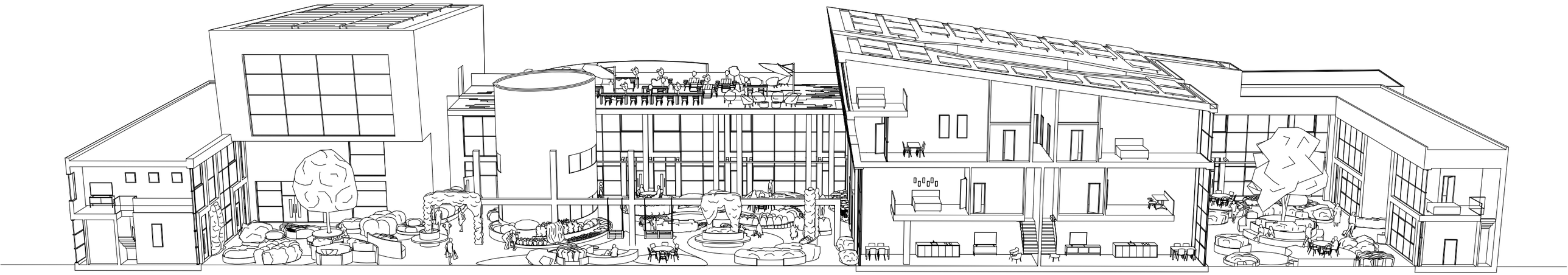
4.2 Zoomed section





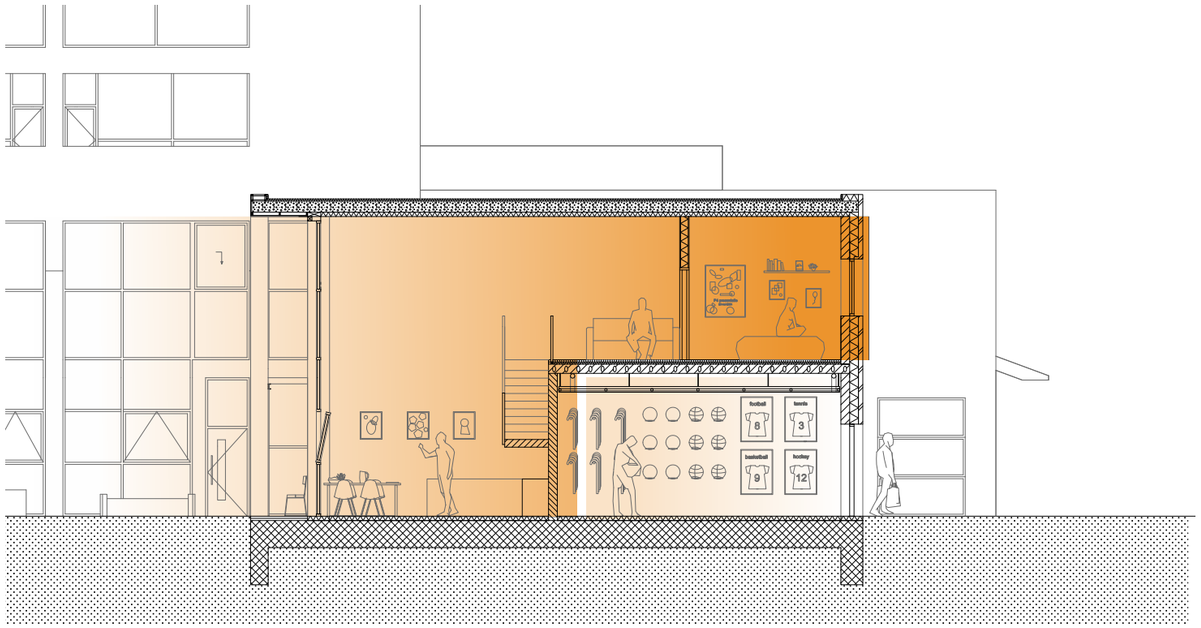
4.3 Longitudinal section



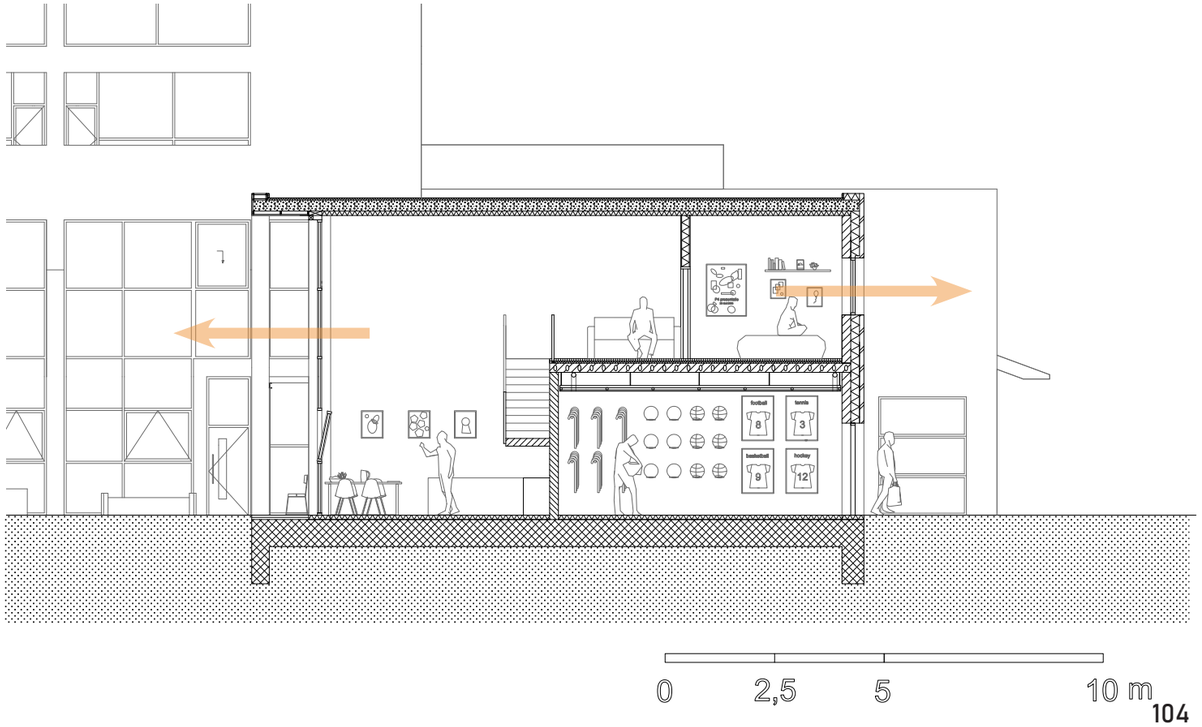


Design 5: Building qualities

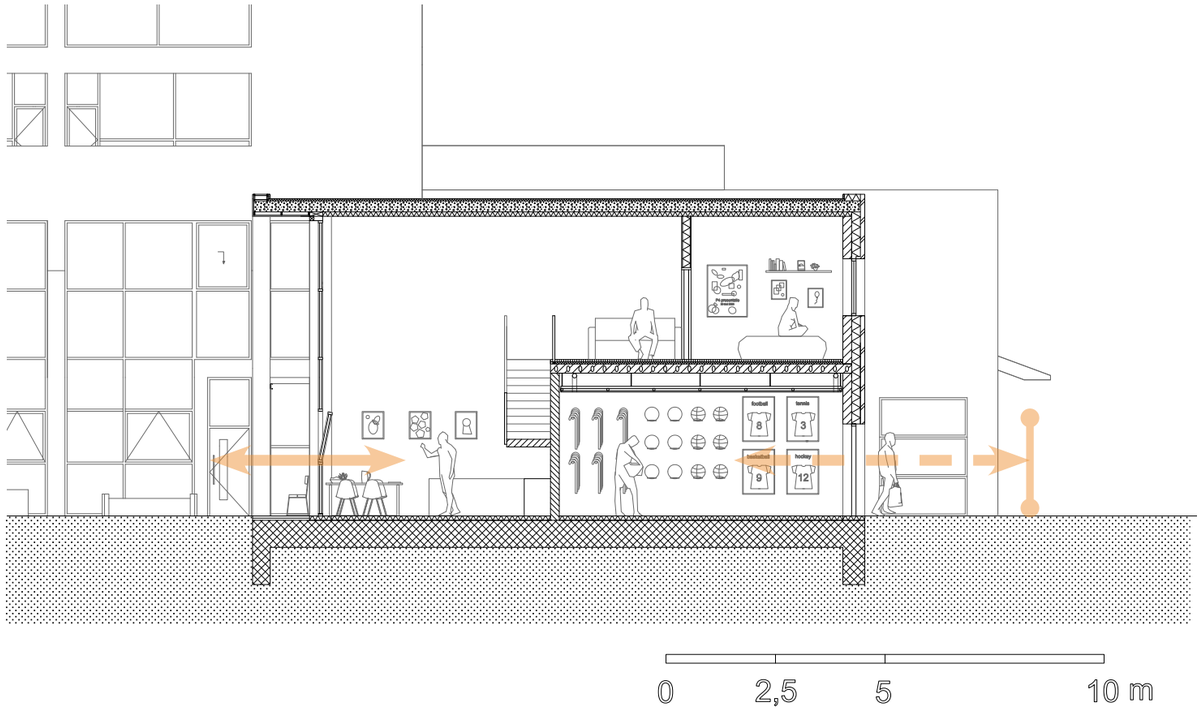
5.1 Section A-A' with gradations of public (white) and private (orange)



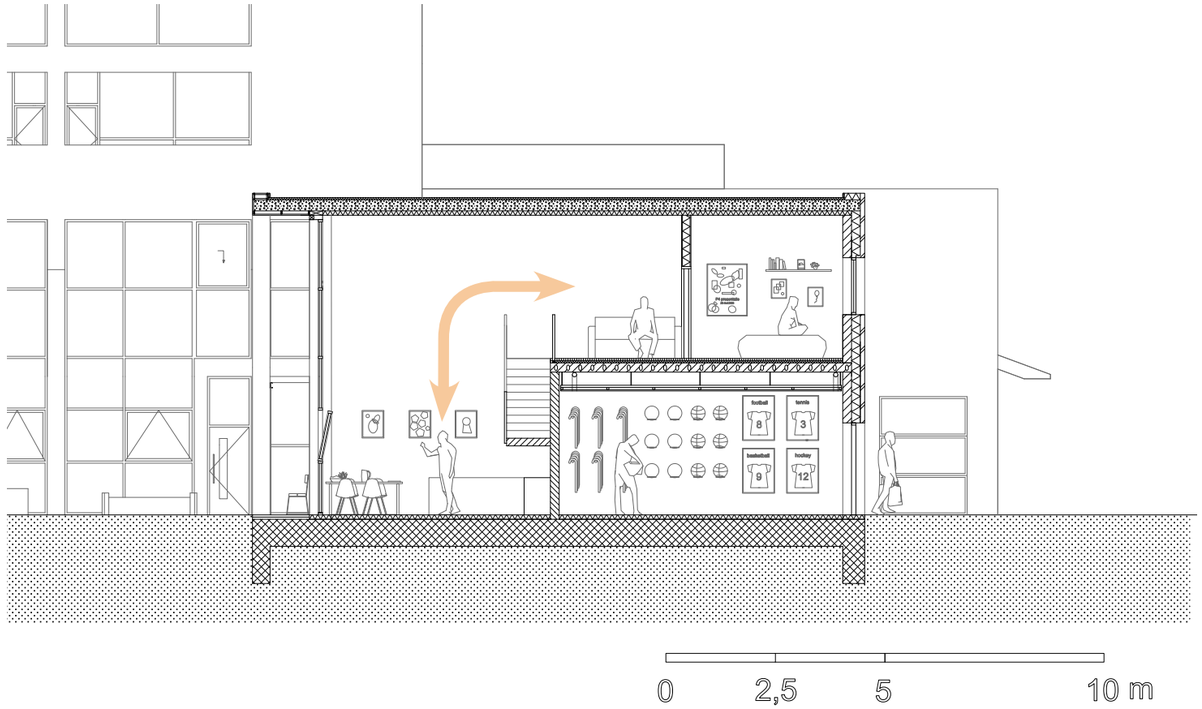
5.2 Section A-A' sense of location



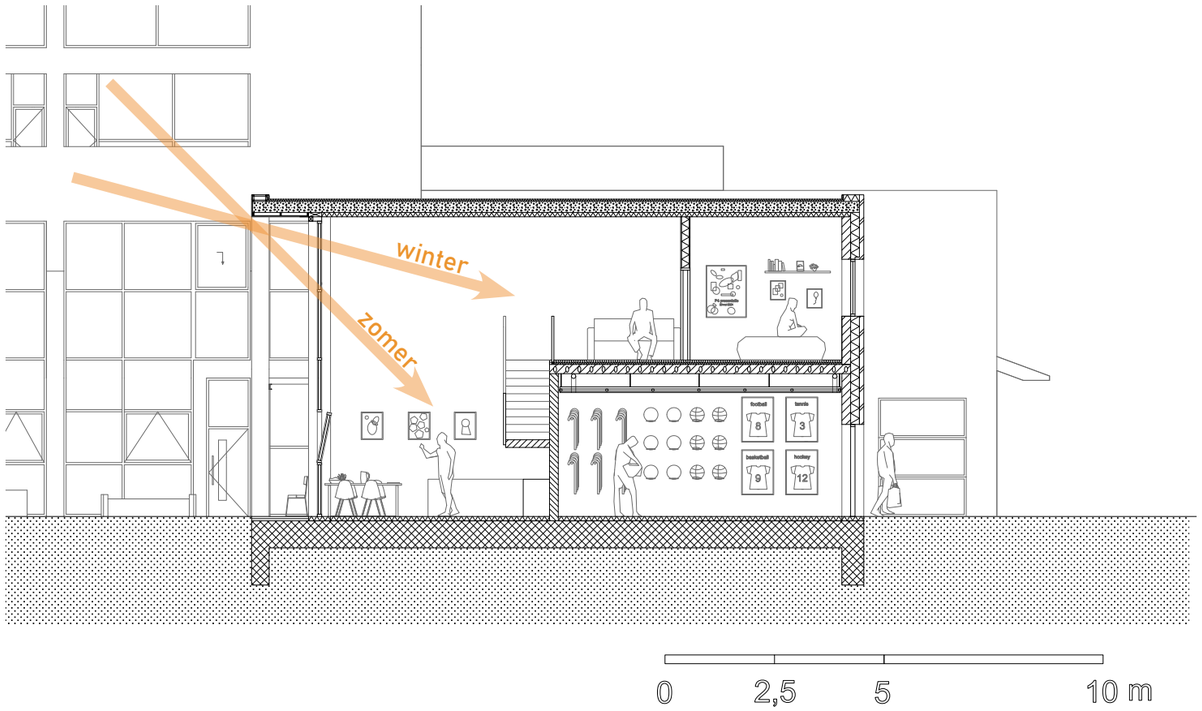
5.3 Section A-A' social safety/eyes on the street



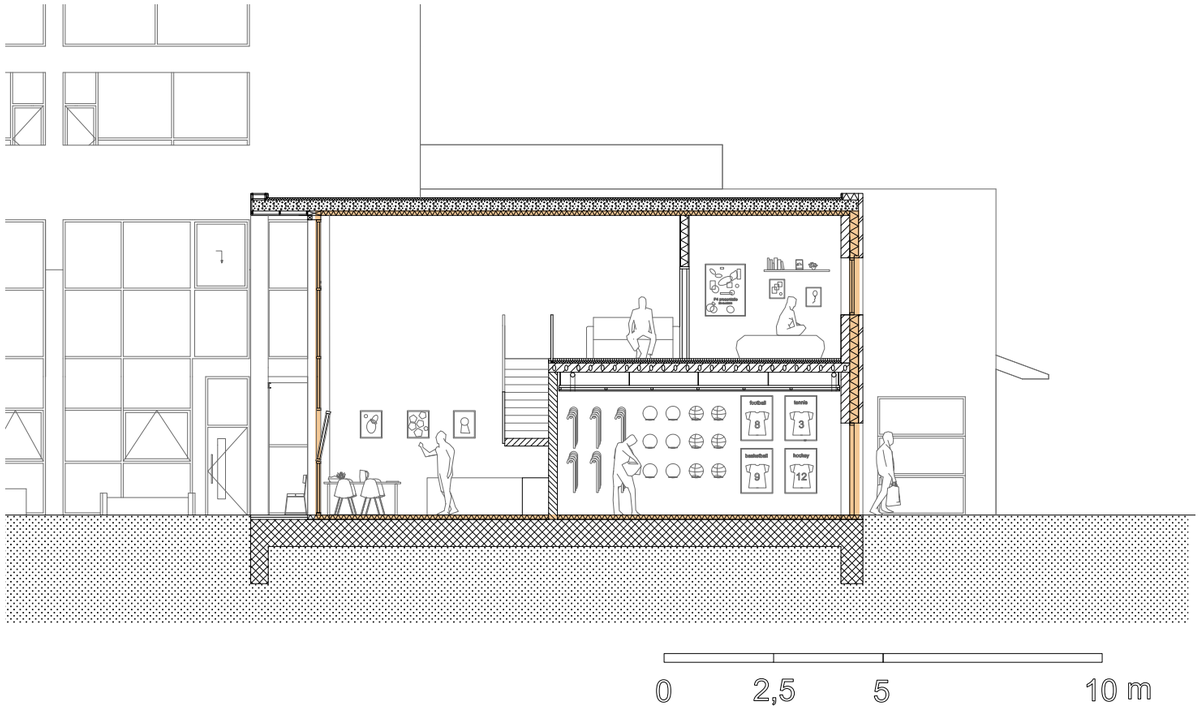
5.4 Section A-A' open floor plan



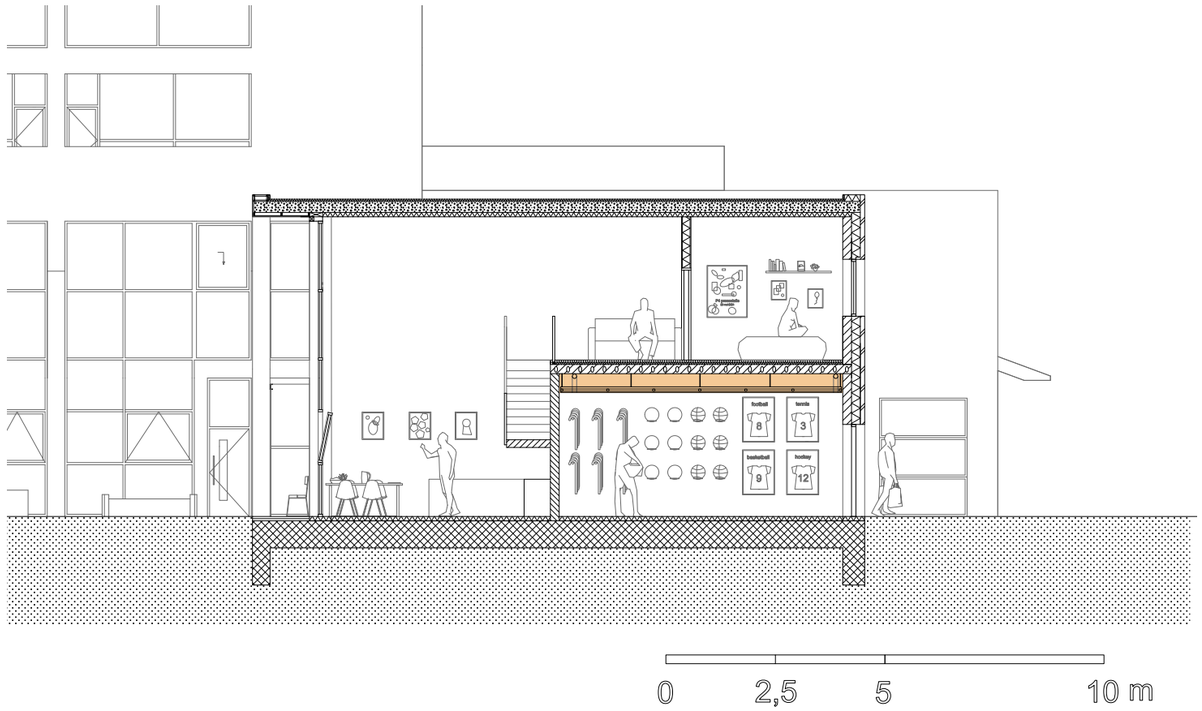
5.5 Section A-A' take light into account



5.6 Section A-A' added additional interior insulation

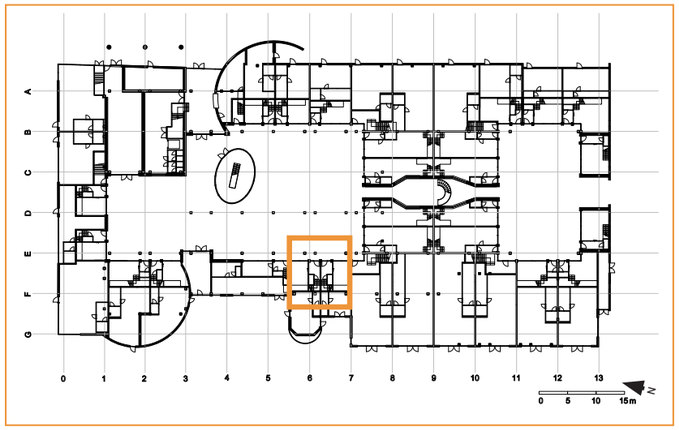


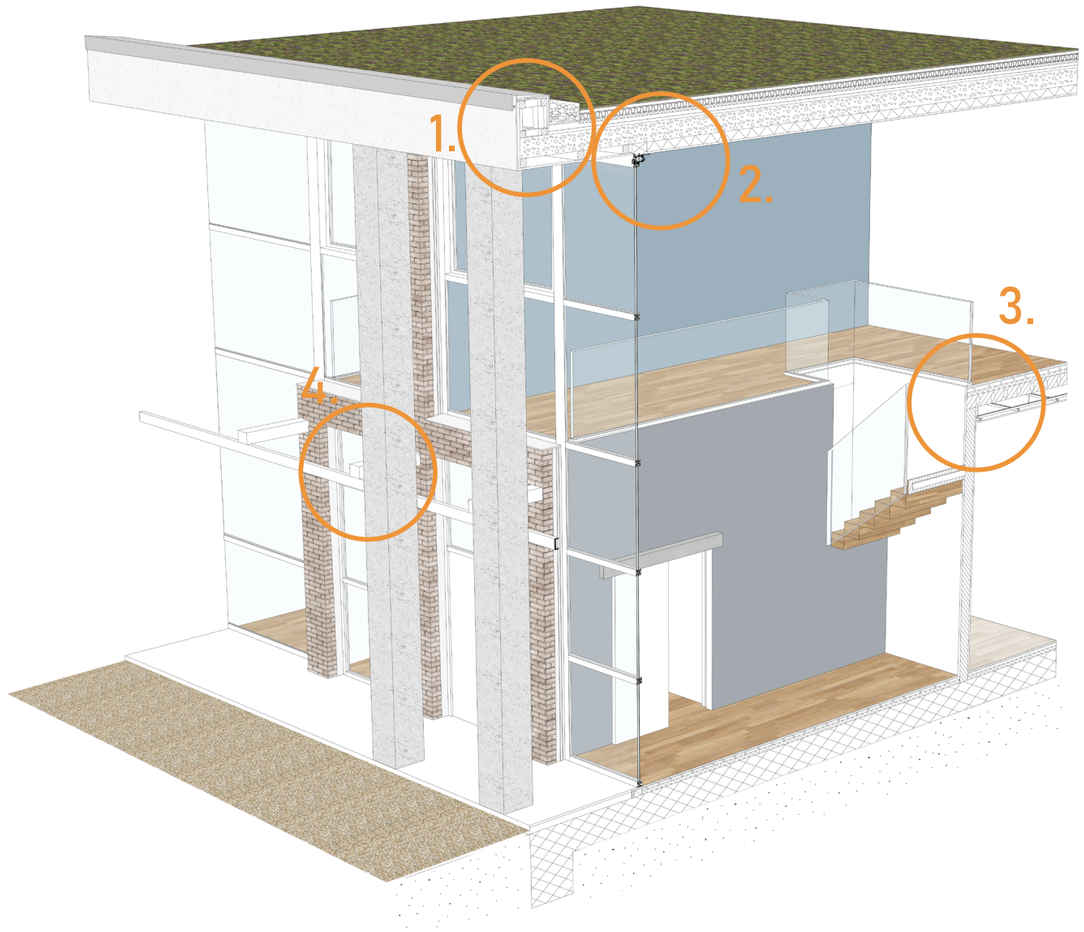
5.7 Section A-A' climate ceiling



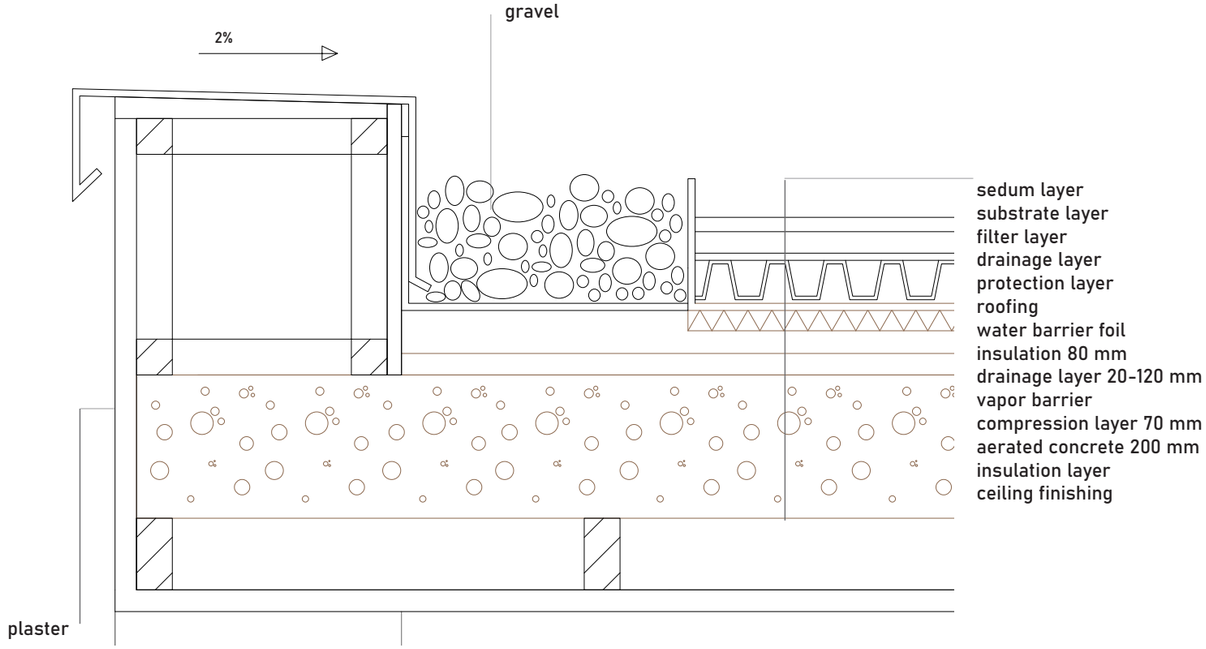
Design 6: Details

6.1 A cross section with material detailing

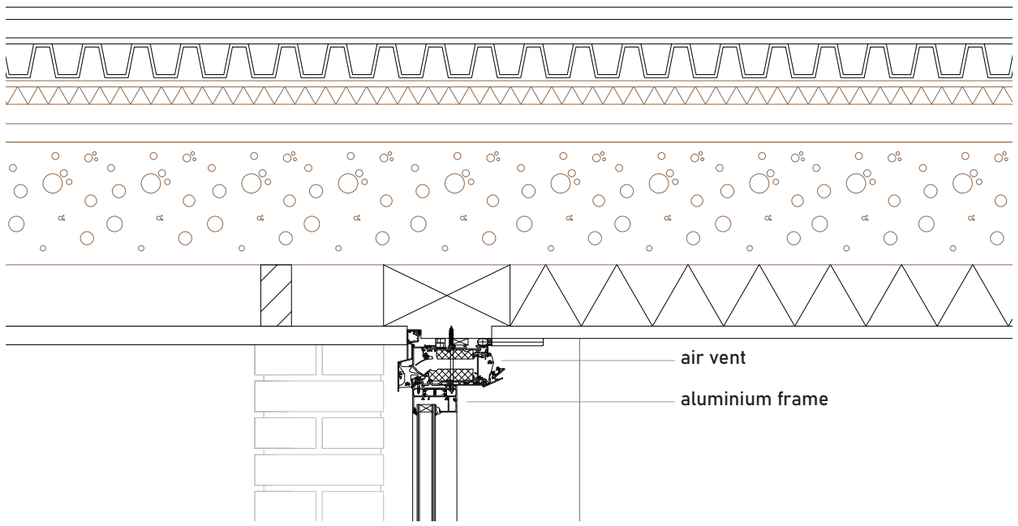




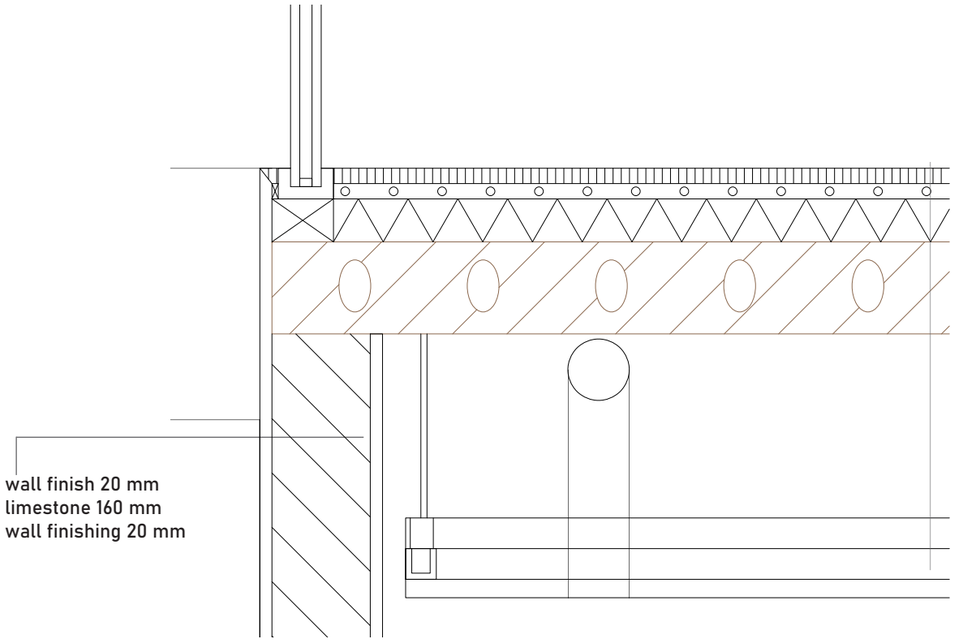
6.2 Detail of the roof edge 1:10



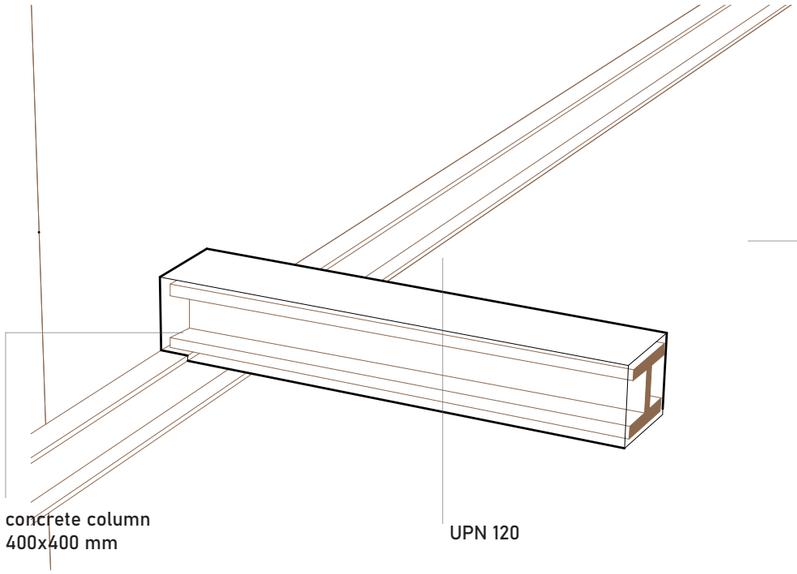
6.3 Detail of the connection of the window frame to the roof with air vents



6.4 Detail of the partition wall



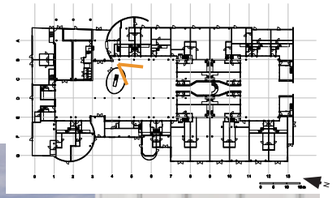
6.5 Explanation of the construction connection

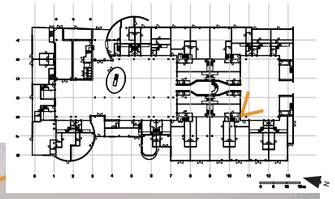


variable loads
5 kN/m2 meeting room
1.75 kN/m2 living area
Belasting berekening Eurocode 1. (z.d.).
https://www.mile17.nl/belasting.php

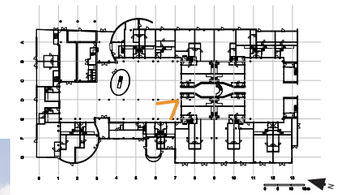
Design 7: The experience

7.1 Skin

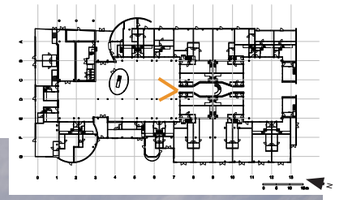


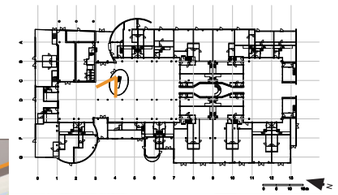


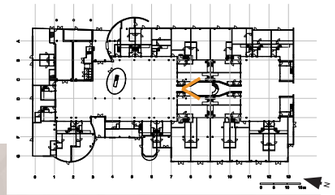
7.2 Structure

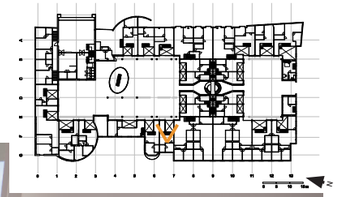


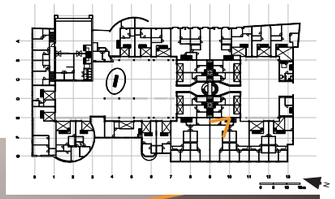
7.3 Spaceplan

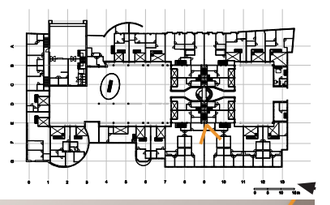




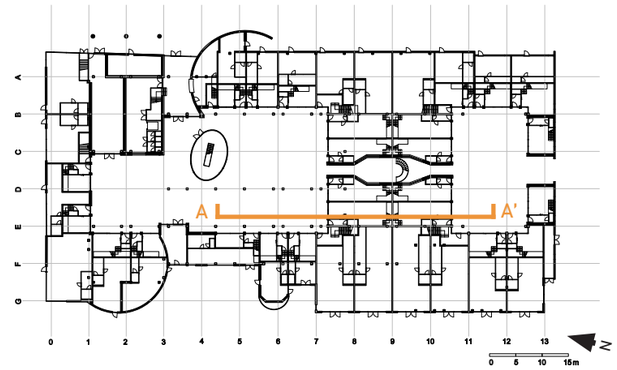








Design 8: Sustainability scheme



Solar panels for generating energy

Sedum roof for energy saving and cooling the solar panels

Ventilation type A, natural ventilation

Greenery in the garden for a pleasant microclimate

Outdoor blinds for a better indoor climate

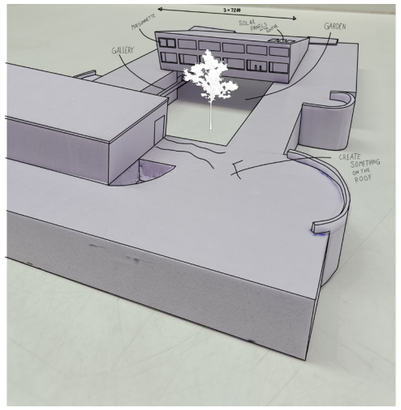
Floor heating for lower energy costs and efficient heat distribution

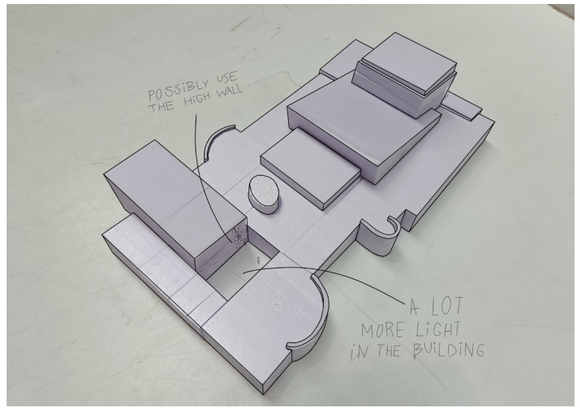
Voids for increased light

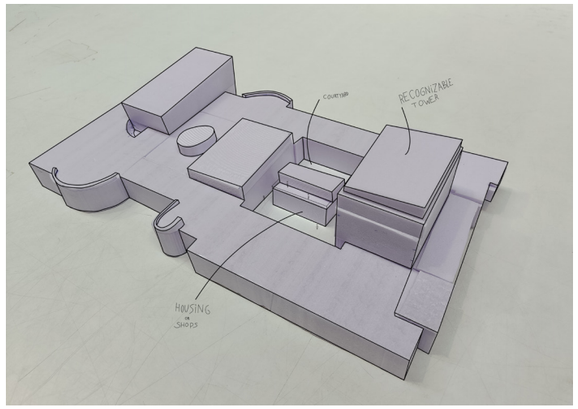
Water storage in the old cellar for irrigation of the garden

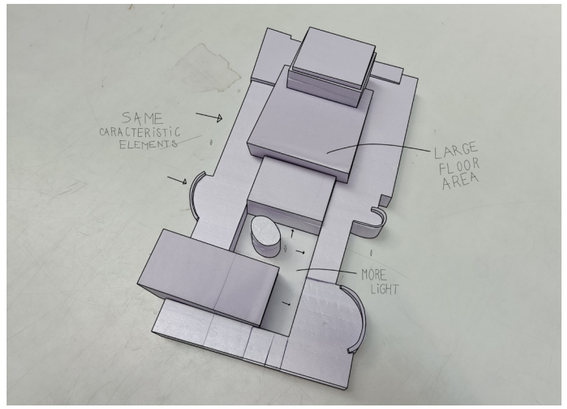
The stores and restaurant will use Type D ventilation with mechanical supply and exhaust through an air treatment cabinet with a heat exchanger. These cabinets are located in the stores' storage area.

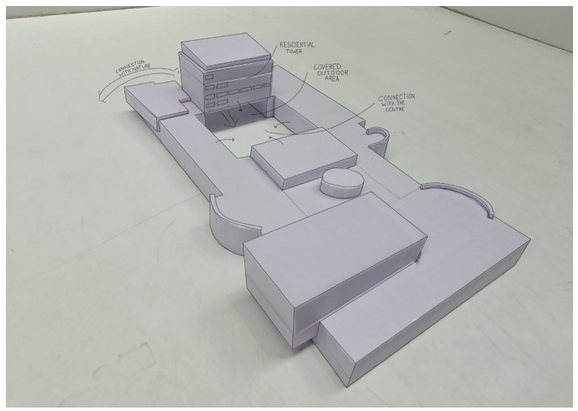
Design 9: Mass study

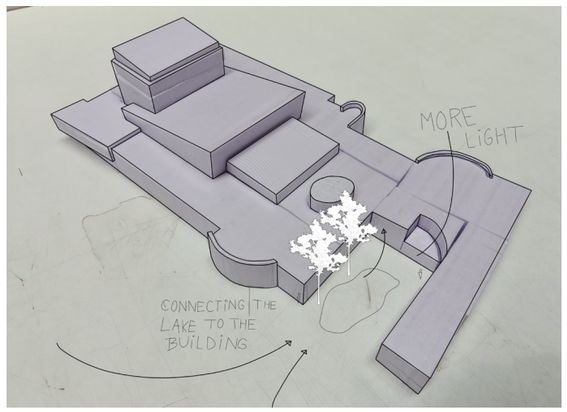


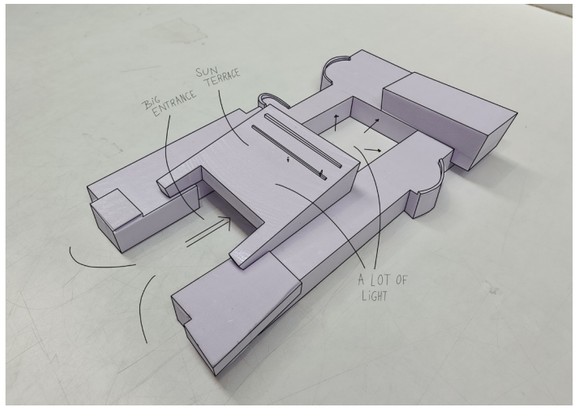


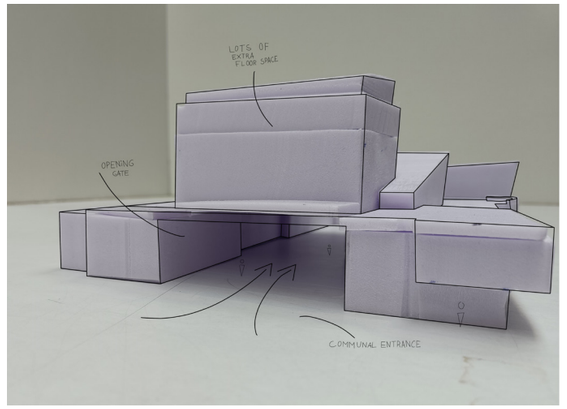


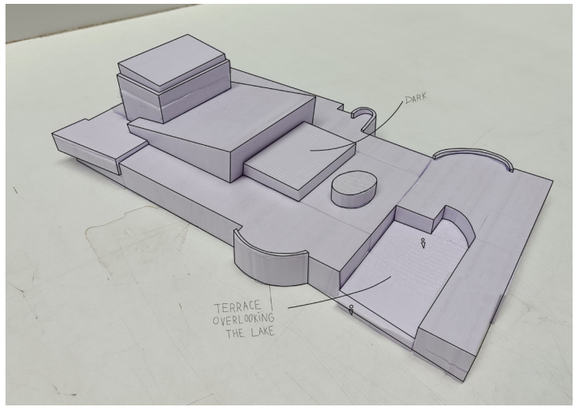


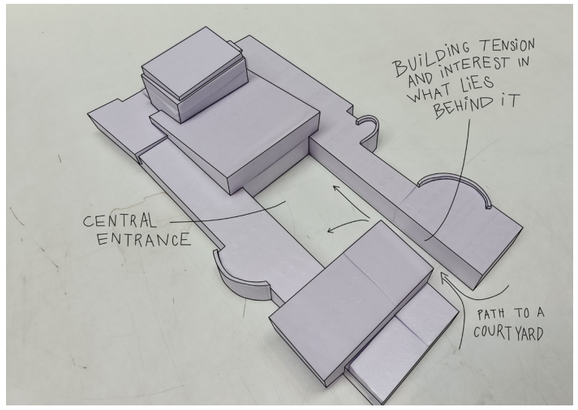


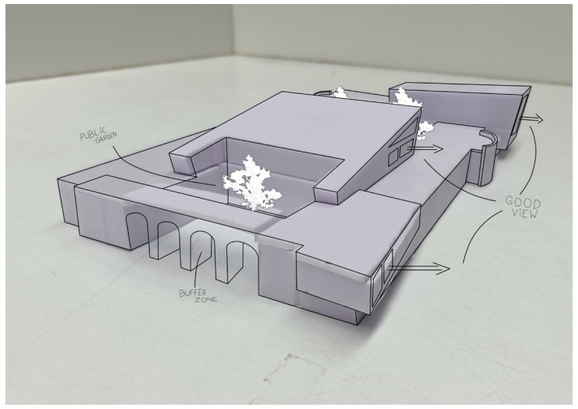


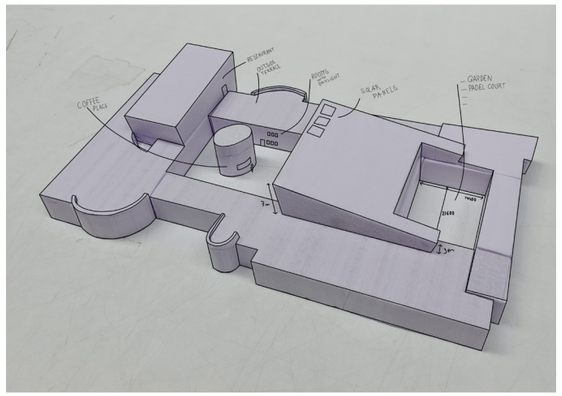


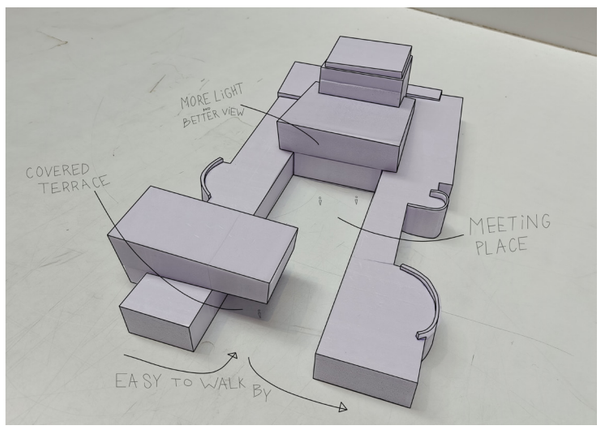


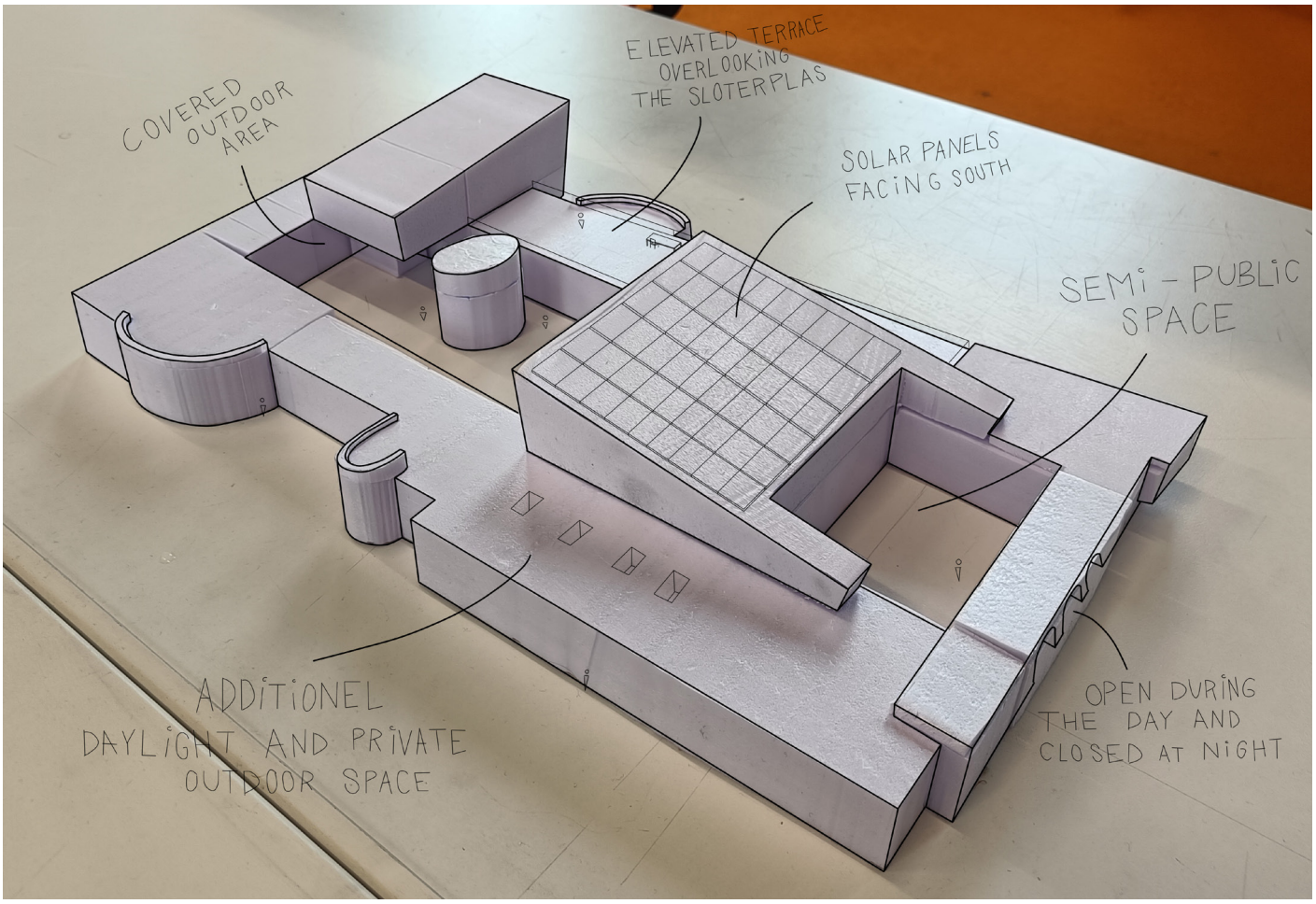


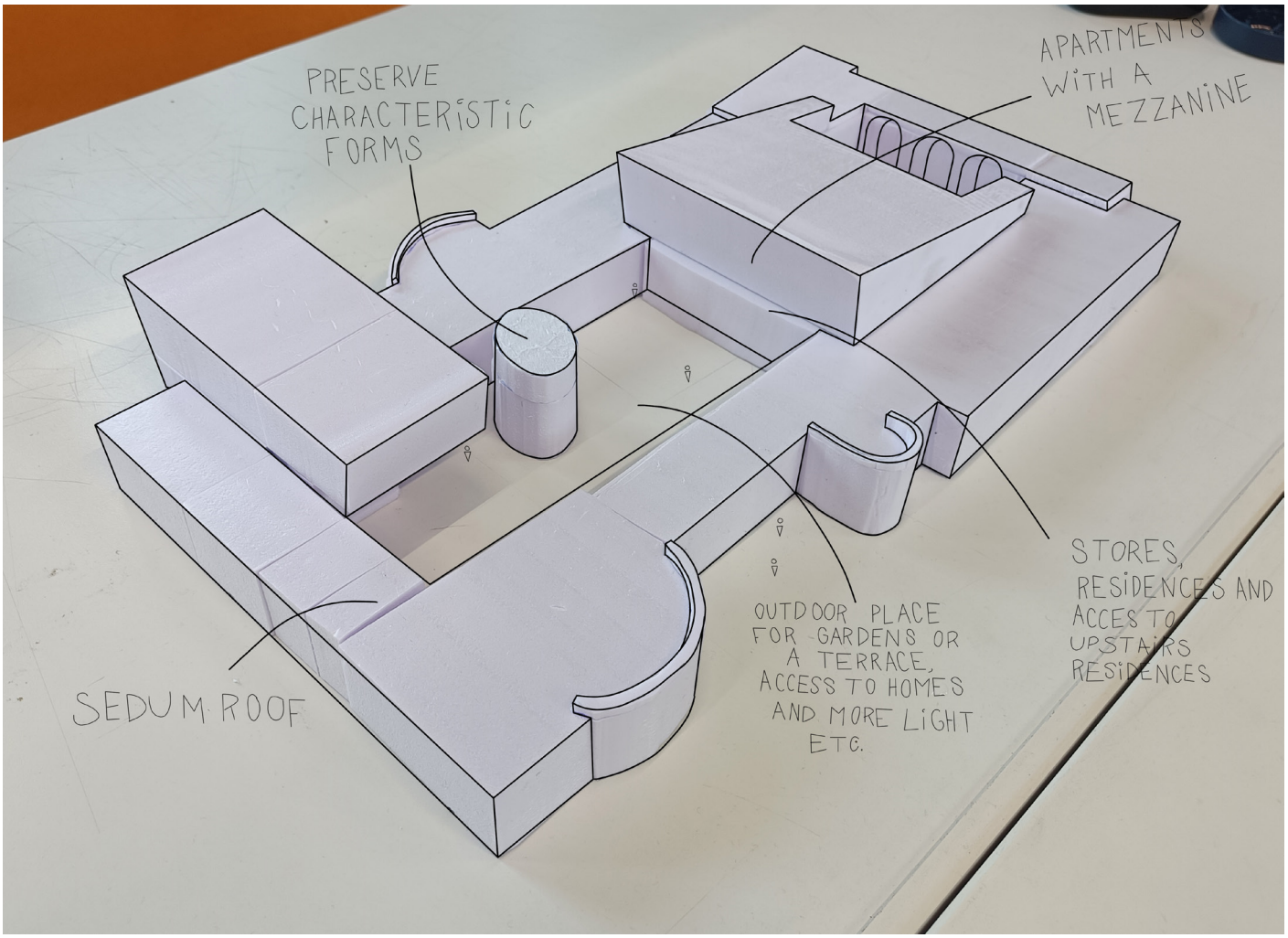









COVERED OUTDOOR AREA
ELEVATED TERRACE OVERLOOKING THE SLOTERPLAS
SOLAR PANELS FACING SOUTH
SEMI - PUBLIC SPACE
ADDITIONEL DAYLIGHT AND PRIVATE OUTDOOR SPACE
OPEN DURING THE DAY AND CLOSED AT NIGHT


PRESERVE CHARACTERISTIC FORMS
APARTMENTS WITH A MEZZANINE
STORES, RESIDENCES AND ACCES TO UPSTAIRS RESIDENCES
OUTDOOR PLACE FOR GARDENS OR A TERRACE, ACCESS TO HOMES AND MORE LIGHT ETC.
SEDUM ROOF