Block2 Eindhoven Inner City

high-rise and a new layer in an Eindhoven city block

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Award date:
2018

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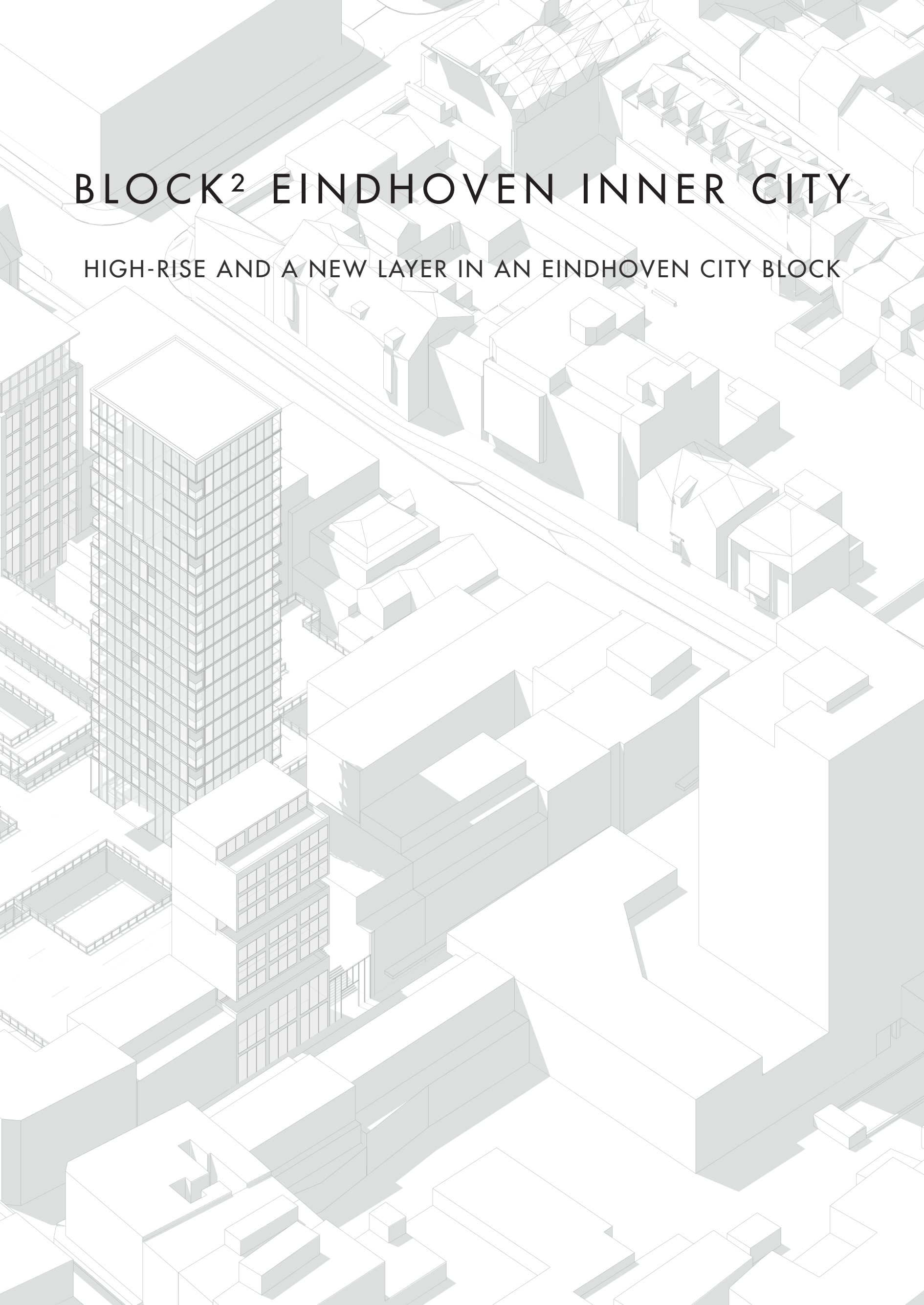

COLOPHON

This is a publication of the graduation studio ‘Tallness’. This studio, with supervision of prof.Dipl.-ing. Christian Rapp, was led by ir. Ruurd Roorda and ir. Bram van Kaathoven.

The graduation studio falls under the ‘Rational Architecture’ chair of the department ‘Architectural Urban Design and Engineering’ (AUDE) of the Department of the Build Environment at Eindhoven University of Technology.

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ABSTRACT

This thesis is written for the graduation studio 'Tallness', with supervision of prof.Dipl.-ing. Christian Rapp, and led by ir. Ruurd Roorda and ir. Bram van Kaathoven. This thesis is the result of the individual graduation project of Pieter Broers. Preliminary to the individual research , the graduation studio conducted a collective research on high-rise with a focus on Dutch high-rise. Results of this collective research are used as a starting point of the individual research and design.

The individual assignment focus on 'designing a tall building' in the broadest sense of the word. This thesis is a result of a research driven design. The research is focused on a location analysis and reference projects combined with research trough design. To give the research a theme and direction the following research question is formulated:

"How can the inner area of an existing building block be activated by adding a second layer?"

When Philips moved its head office to Amsterdam at the end of the 20th century and the second major economic player DAF was in heavy weather, Eindhoven was on the brink of bankruptcy. The city threatened to collapse, but the business community, the municipality and the major educational institutions joined forces and devised the Triple Helix construction, whereby knowledge sharing and intensive cooperation proved to be the solution for Eindhoven. Today, the city, as the beating heart of the top technological Brainport Region, is in the most renowned (international) lists when it comes to business, innovation, development and future prospects. But Eindhoven is in need of change. There is a huge housing shortage and the inner city is quite dead after closing-time of the commercial functions. The municipality of Eindhoven itself also sees that something has to change and therefore Winy Maas of MVRDV has been assigned as supervisor of the city centre. Winy sees that the city centre has a village character that does not reflect the international appearance of high-tech Eindhoven. He also mentions that the inner city has a chronic lack of greenery but that there is a great potential in the mostly unused inner area's of de building blocks.

The location on the edge of the inner city works great in combination with high-rise. The block is connected to a main road and close to the station, ensuring an easy accessibility. Because of its location on the edge of the inner city, the high-rise can react with the existing high-rise of Eindhoven. The apartments in the high-rise give a fantastic private view over the skyline of Eindhoven while at the same time the second layer adds a usable and green public space to the city while maintaining the functional use of the block on the ground floor. The design not only answers to the main question, it also answers to social issues of housing shortage in Eindhoven, the liveliness after closing time of the commercial functions and the lack of greenery in the inner city. It does that with preservation of the village-like character of Eindhoven while at the same time giving it the more international appearance of high-tech Eindhoven the city is looking for. High-rise is essential for the success of the design.

Because the chosen block is a representation of an average building block on the edge of the inner city and the design is based on a more universal urban concept, the design can serve as an example for designing other similar blocks on the edge of the inner city of Eindhoven.

CONTENT

RESEARCH QUESTION

The assignment for the graduation studio 'Tallness' is 'designing a tall building' in the broadest sense of the word. This means that any type of tall building can be designed. The result of the design assignment is a 'research driven design'.

The graduation project for the graduation studio 'Tallness' consists of two parts. The first part is a collective research with the entire graduation studio in which the development of the skyscraper has been studied with the focus on skyscrapers in the Netherlands. The second part is an individual design assignment that arose by analysing Eindhoven and extracting a research question to give direction to the research and design.

The research question is a leading part of the design. This research question was drawn up at the beginning of the design phase and served as a leading thread throughout the whole project. The research question is focused on the theme 'adding a second layer'. The main research question is:

"How can the inner area of an existing building block be activated by adding a second layer?"

To answer this research question the following sub-questions are formulated:

- What is the quality of the existing ground level and what qualities are missing for living?

- What qualities for living can be gained by adding a second layer in the building block?

- What is the required critical mass to activate the second layer and how can this critical mass be used to activate the second layer?

The answers to these questions give insights to different facets that are important while designing. The following points are discussed in the research and design: history of Eindhoven, urban development of the inner city, the urban masterplan, the urban integration, reference projects, program, structure, materialization and visualization. Photos, drawings, and visualisations are, where necessary, textually supported. The entire design is treated from a large to small scale.

COLLECTIVE PREPARATORY RESEARCH

The Skyscraper

In the collective preparatory research the phenomenon of skyscrapers is investigated. How did they originate, what was their development and how are they applied in our own country. Although the word skyscraper will probably recall a clear image in everybody's mind, it appears to be difficult to give a clear definition. The Cambridge Dictionary (n.d.) defines the following: 'a very tall modern building, usually in a city'. Although this probably corresponds to the definition most people would give, it becomes a bit problematic when one wants to distinguish a skyscraper from another high building. Are skyscrapers only dependent on height, do proportions play a role as well, or does a building needs to contain certain (constructive) elements? When one wants to point out the first skyscraper, again it becomes clear that there are different opinions about what a skyscraper is.

The Penguin Dictionary of Architecture and Landscape Architecture gives a more defined and extensive definition: "A multi-storey building constructed on a steel skeleton, provided with high-speed electric elevators and combining extraordinary height with ordinary room-spaces such as would be used in low buildings." (Fleming et al., 1999, p. 531). Although this definition is better defined and more specific, there are still different opinions about the importance of these characteristics, when pointing out the first skyscraper. Winston Wiseman, de dean of skyscrapologists (Jencks, 1980) appointed the Equitable Life Assurance Building (New York, 1868-70, Gilman, Kendall, George B. Post) as the first skyscraper. This was the first building in which the possibilities of the elevator were realized, and in which it was proven that the elevator was safe and efficient. This building was twice as high as the average five story commercial building and it was the first of many business buildings that were built as a result of its success. (Wiseman, 1970)

In 'de efficiency paradox' Tom van Leeuwen (1975) also mentions the argument of having an elevator as one of the often used conceptions. Some people go a step further by saying that only an elevator is not enough to build high, and that a skyscraper also requires certain constructive elements. With traditional building methods like bearing masonry walls the walls will become so thick that the building is not profitable anymore, and that containing a steel skeleton is a must. According to this 'steel skeleton – theory' the Home Insurance Building of William LeBaron Jenney (Chicago, 1885) was the first real skyscraper, because of the first used modern construction principles. A third point of view, which is not so clearly defined, is that a building must give the impression to be high. Both buildings mentioned above don't meet this requirement according to van Leeuwen. They lean heavily on the earth and have no light-footedness, which is necessary to 'kiss' the clouds, and the proportions are more dominant in the length-width direction than in the height direction. To the question whether in this last conception the condition of an elevator or the steel skeleton must be added, the opinions differ. An example of a 'skyscraper' without an elevator is the Jayne Building (Philadelphia, 1850). This building has eight stories and two additional ones in the tower, which makes the building look like it wants to reach higher. This last aspect is a good example of the real 'skyscraper way of thought'. (van Leeuwen, 1975)

Charles Jencks (1980) also commented on the expressive quality of skyscrapers. In his book 'Skyscrapers – Skycities' he states that the history of the skyscrapers does not even exist. According to him 'The problem is one of definition, or the lack of it. Architectural historians have taken limited view of the subject, both in time and substance. They confine their attention to the last hundred years and carefully overlook the most difficult and interesting aspect of the building type – it expressive quality. Thus many of their tall buildings do not scrape at all, but sit horizontally and four-square on the ground, or rise hesitantly in tiers like a stepped wedding cake. They might be large 'skylumps', or 'skycakes', or 'skyquatters' or 'skypalaces', but they are not often skyscrapers. Moreover so many vertical, pointing towers should really be reclassified as 'skyneedles', 'skypins' or the general category 'skyprickers'. The whole subject of tall buildings has to be rethought from the beginning'. (Jencks, 1980, p. 6) Far before the high buildings in New York were built there were already other buildings that reached the sky like the pyramids, obelisks and cathedrals. Jencks announces a formula as a starting point: morphology + articulation + style + activity + technology + motivation = metaphor (skyprickers, skyscrapers, skycities) (Jencks, 1980, p.7) This metaphor is thus a combination of different factors, and they express the most important aspects of a skyscraper since these distinguish the building from others. With this formula he tried to distinguish and name the most important expressive types.

One of the most important figures when it comes to the development of skyscrapers in Louis Sullivan, and he is often referred to as 'the father of skyscrapers'. In 'The Tall Office Building Artistically Considered' (Sullivan, 1896) he described five different layers which occur in an office building. The first one is an underground layer in which the technical spaces are positioned. Above this layer is the ground floor, which is meant for functions that need a big

space, such as stores and banks. On this layer there is a lot of light, space and many access possibilities. The third layer is accessible by stairs, and is usually divided in smaller spaces. Above this layer is an undetermined number of repeated layers which are used for offices. Each office can be seen as a cell in a honeycomb. The dimensions of these office cubes were usually decisive for the dimensions of the building. (Willis, 1995) The last layer is the top, which has a physiological nature, depending on the lifespan and usability of the structure. This division is visible in many (office) skyscrapers, and also in skyscrapers or high-rise in general a division of bottom/ plinth, middle part and top is almost always perceptible.

Next to expressive characteristics or appearance, one can also look at the influence of skyscrapers or to the motives why the skyscraper occurred in our cities. The Swiss architect Mario Campi (2000) sees the skyscraper as a representation of the changeability of our cities. It is a product of historical developments, skyscrapers are often the urban answer to the evolution of the modern city. 'The skyscraper contrives to present the public life of a private building in an urban context by adapting to the fabric of the city at the level of the street, whilst asserting itself in its own distinct manner on the vertical plane' (Campi, 2000, p. 9) He mentions them as an expression of modernity since they have often served as a symbol of new innovations. Problems of overpopulation, but also attempts to capture spacious experiences in enormous atria, spectacular roofs or the defining of different user zones, are examples of motives for building such notable structures. Also technical developments are expressed in skyscrapers. One thing is for sure, a skyscraper always evoke reactions, people like it or they do not.

Although everybody knows what a skyscraper is, an exact definition can still be a topic of discussion. As already mentioned this becomes a problem when one wants to define the first skyscraper, or distinguish one from another high building, but these problems are maybe a bit more from the past, and they are more applicable in the United States. Nowadays skyscrapers are spread around the world and they are getting higher and higher, so the contrast with low-rise is not difficult to see anymore. Another reason is that the development of skyscrapers in other continents usually started from a different point. They did not have to start with a low building and try to make it higher, a lot of these experiments have already taken place in the United States. The knowledge is already there and the starting point of high buildings was already a lot higher, the 'in between' skyscrapers do not exist in many cities, and so the contrast between skyscrapers and other buildings is big enough to be able to distinguish them. Although, for example in Europe, this contrast consists usually not only in height, but also in style. In the historic cities modern skyscraper are pretty good noticeable. These differences will be discussed in a following chapter.

The research focusses mainly on the Netherlands, and here every city has its own guidelines for what high-rise is. This definition is usually limited to mentioning a certain height. Our high buildings are relatively low compared to elsewhere in the world, and so the word skyscraper is not often used here.

Figure 1 | Equitable life assurance building

Figure 2 | Home insurance building

Figure 3 | Jayne building

The European Skyscraper

As already described the skyscraper started to develop in the United States halfway the 19th century. Although at that moment the Europeans had been building high structures for centuries, think of the many churches and cathedrals that enrich the continent, the development of skyscrapers only started much later, around 1950.

For this late development several causes can be named, but the most important one is probably the turbulant first half of the 20th century that the continent was subject to. This period was marked by two world wars, an economic crisis and periods of reconstruction. This decreased developments and productions of innovations in many sectors. Another cause is the history of many cities to which its citizens are attached closely. It seemed to be very hard to accept and embrace new modern skyscrapers in the historic skylines of many European cities.

In Russia a big project that included the first skyscrapers, was started in 1950, the building of the Seven Sisters. This project existed of seven buildings higher than 100 meter, and was commissioned by Stalin. The highest building, the MV Lomonosov State University, with a height of 182 meter, was until 1977 the highest building of Europe. The purpose of this project was mainly to express political power and to compete with the skylines of capitalist cities. In other East European communist cities like Warsaw, Riga and Bucharest skyscrapers were built for the same reasons. (Hollister, 2013) The style in which these towers were built is known as Stalinist Architecture or Socialist Classicism. The shape and aesthetics were of much bigger importance than functionality, which resulted in indoor spaces that were not all very efficient in usage. Characteristic for this style were references to gothic architecture like bows, columns and verticality, the dominance of construction and notable spiers and profiles. (Mwakini, 2017) In many West-European cities skyscrapers were much more modern with rectangular shapes. It was often of less importance to gain an iconic status or to reach a certain height, functionality played a bigger role in the designs. (Hollister, 2013). The building of skyscrapers became much more accepted during the years, at the end of 1969 there were 50 buildings higher than 100 meter in Europe, while ten years later this number was already tripled.

In The Evolution of the Species, Bernard Colenbrander (2012) arises the question whether there is reason to built such tall buildings when there is no spatial need for it. Also, when looking from an architectural point of view, is it possible to bring such a project to a good end in the historical cities of Europe? “Does the urban environment, and in particular the environment of the historical city, really have room literally and figuratively to accommodate the colossal ego represented by such a towering structure without friction?”(Colenbrander, 2012, p. ?) For many people it is not possible to answer these questions affirmatively, but there are several solutions where the integration of high rise buildings into historical cities might work.

The first one is to completely avoid high-rise in the city centre, like Rome is doing for example. It is also possible to point out an area in the outskirts of the city to develop this in an high-rise district. Paris’ La Défense and London’s Canary Wharf are examples of such a district that is developed and have a clear distance from the historic centre. This is a good solution to add skyscrapers but to avoid the difficult connection between historic low-rise and modern high-rise, although the accessibility of such a district can become problematic. If the centre of gravity of a public transport system is in the historic centre, it can be difficult to connect a new centre of gravity, which a new high-rise area is because of its density. This is a problem that occurred in Paris as well (Smith, 2011).

Another option is to position the high-rise in a central place in the city, in the traditional downtown. The most European cities that applied this model were cities of which the city centre was destroyed as a result of bombings during WWII, such as Rotterdam or Frankfurt. A third option is to spread the high-rise across the city, and investigate in which places this fits best. An example of this is the City of London. This district in London had been a leading business centre for decades, and had to be rebuilt after the WWII. In this case the new buildings had to be integrated between the old ones. Since the area was quite small, high-rise was needed to get all the requested program realized. By adding high-rise, it was important that the protected views on St. Pauls Cathedral, the Tower of London and other landmarks remained intact. Another aspect of the city that needed to be respected were the smaller streets and lanes in the surroundings of this area, since that is were restaurants, shops and pubs are located. These functions are very important for the liveliness of this business district. Although there were some worries in the beginning, the unusual shapes of ‘the Gherkin’, the ‘Walkie Talkie’ and the ‘Shard’ are now an accepted part of the famous skyline of London. This is a good example of how skyscrapers and historic structures can be integrated in a city. (Hollister, 2013)

Since skyscrapers were developed and firstly applied in the United States, one can wonder whether it is possible to distinguish skyscrapers from different

continents. Does such a thing as a 'European skyscraper' exist? The skyscraper, because of its outstanding appearance, is different than any other building. Whatever style it has, it will almost certainly always stand out in its surroundings. The embedding of a skyscraper in its surroundings is how skyscrapers of different continents can be distinguished. Also the motives behind the development of skyscrapers is of mayor influence for the appearance of it. Although, the latter is not entirely or necessarily continent dependent. Developers may come from foreign countries, but locals can also have their influence.

The context in which European skyscrapers and American skyscrapers are positioned is very different. In Europe this context usually consists of historic buildings and streets, mainly low-rise. The addition of skyscrapers usually results in big contrasts, something that does not often happen in the United States, where skyscrapers usually occur in clusters. According to Rafael Viñoly (2013), another difference is the planning process. 'In the United States this process is prescriptive, and has everything to do with fulfilling well-established technical and political requirements. It has absolutely nothing to do with design excellence. By contrast, the UK system, with which we are familiar, is not as well defined or efficient, but we believe its peculiarities influence the design outcome for the better'. (Vinoly, 2013, p. 20). The latter is caused by less defined and explicit mutual relationships of the stakeholders and authorizations. The historical context makes the public and the inhabitants more demanding when it comes to the quality of the design. Next to that economic motives play a role. In the United States one pays a land-price, on which one wants to build as much and as efficient as possible. In the Netherlands for example one pays per floor and so it is less logical to built high. Another aspect of influence are regulations, which was for example visible in New York after the entering of the zoning law.

In general it can be said that differences in context and culture are the most influential on the appearance of skyscrapers in different continents. The historical context of many European cities makes it difficult to integrate skyscrapers in an acceptable way. However the world is changing, cities are becoming more and more dense, technological developments take place faster than ever and the desires for cities to play a role on the world stage are increasing. Building in the air and creating a skyline full of skyscrapers seems to be the only way to keep up with these rapid changes.

Figure 4 | MV Lomonosov State University

Figure 5 | Paris - La Défense

Figure 6 | Frankfurt skyline city centre

Figure 7 | London skyline city centre

The Dutch Skyscraper

Around 1922 European architects got grip of the high-rise fever, however the desire to design and build high-rise structures, like the ones in Manhattan, went hand in hand with fear and criticism by urbanists as well as architects. This desire, but at the same the criticism on building high was clearly expressed in Le Corbusiers design of Une Ville Contemporaine in 1922. In this rationalist design, Le Corbusier confronts Manhattan with the centre of this own model city which consists of twelve, widely spaced towers standing on a free and empty plane in which he has a total lack of misapprehension of urban space as in the 19th century town planning (Koster & Van Oeffelt, 1997). Three years later Le Corbusier presented another high-rise plan: Plan Voisin. A redesign for the inner city of Paris which would be the solution for a clear, healthy and green city. Also this plan was heavily criticized, because of the total demolishing of two arrondissements of Paris its inner city, which shows that large developments of high-rise cities before WW II were a utopia for idealistic architects and urban planners. This had to do with the rather radical design but also the economic crises of the 1920's and eventually WW II (Den Dekker, 2009).

With the reconstruction of the damaged cities after the war, European architects saw the change to practise the concept of the American skyscraper onto European cities. High-rise in the city centres are often limited to a single rather small building, other than in America, urban planners start to value the historical structures of the cities more than before. The reconstruction of Rotterdam is a good example in which the concept of building high became a strategy. The skyscraper became a symbol for the new image of Rotterdam in which the modern city and the skyscraper became part of 'New Rotterdam'. For the first time in the Netherlands, the skyscraper was used as urban strategy (Schrijverscollectief De Baan, 1999). However even far before the war Rotterdam was progressive in terms of high-rise. The Witte Huis is seen as the first skyscraper in the Netherlands, built in 1898 and designed by Willem Molenbroek. The building heavily referred to the American skyscraper with its function as an office building, its decorated stone facade and its viewing point on top. It took until after 1985 before high-rise constructions really began to unfold them self in the Netherlands. The establishment of the Hoogbouw Foundation and the favourable market condition due to growing prosperity in that time lead to the wider acceptance of the skyscraper. The goal of the foundation was to make Dutch designers, builders and governments enthusiastic about building high-rise (Den Dekker, 2009).

As already mentioned earlier the urge to build high is an age-old tradition. However this urge is not the only condition that was required for the eventual creation of the skyscraper. Multiple other factors contributed to the rise of the skyscraper like for example the innovations and trends mentioned earlier. Briefly said the American skyscraper rose under the technical developments made in the country like the lift and steel construction but also the huge population growth in the cities which created a lack of space, was one the factors for the creation of the skyscraper. However, the Netherlands did not have such a huge growth of population. The rise of the skyscraper was the result of multiple different interests of actors came together. For example the governments tended to use urban densification to preserve the remaining green in the nearby of the city, skyscrapers offered a possible solution for this. The municipalities use the skyscraper as strategy for their city branding and to strengthen their economic position against other cities, like in the case of Rotterdam. This competitiveness also plays a role at private parties in which brand awareness and ambition overpower the risk of developing high-rise. Also companies use this strategy, the Zuid-As is a good example of high-rise that embodies the idea of a strong corporate identity of the companies that house such skyscrapers (Den Dekker, 2009).

All these factors have certain impact on the development of the skyscrapers. But in which way does the cityscape itself influence the design of the skyscrapers, and the other way around how do these skyscrapers influence the cityscape? To answer this question, the collective research focused on analysing six skyscrapers in three different cities.

While the Witte Huis was already been built in 1898, the skyscraper is a relatively new building type within Dutch cities. The highest density of high-rise can be found in respectively Rotterdam, Amsterdam and The Hague. In other cities like Utrecht, Leeuwarden and Tilburg high-rise is also present, however more incidental as in the cities mentioned before.

The development of the Dutch skyscraper is at full speed and in Eindhoven the discussion of using high-rise as a mean for the densification of the city centre and the internationalization of the city is reaching its tipping point with the appointment of Winy Maas of MVRDV as supervisor of the city centre.

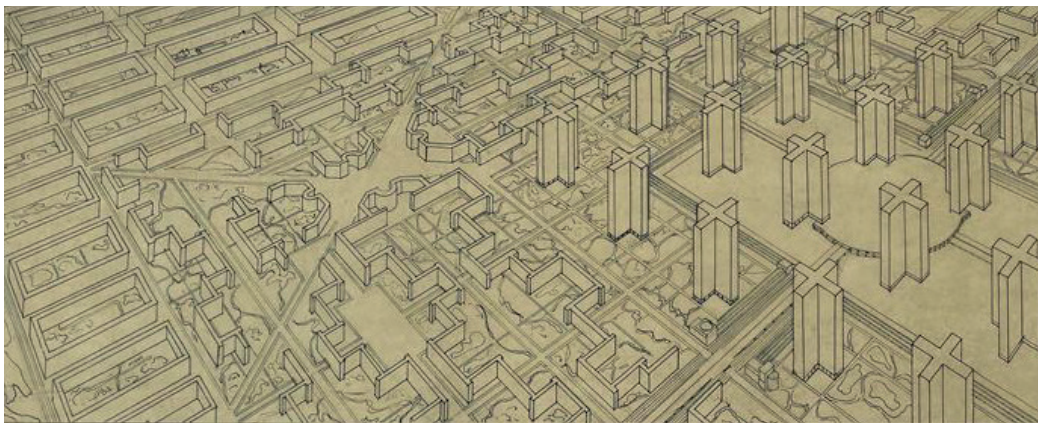


Figure 8 | Une Ville Contemporaine

Figure 9 | Plan Voisin

Figure 10 | Skyline Rotterdam

Figure 11 | Zuid-as Amsterdam

INTRODUCTION

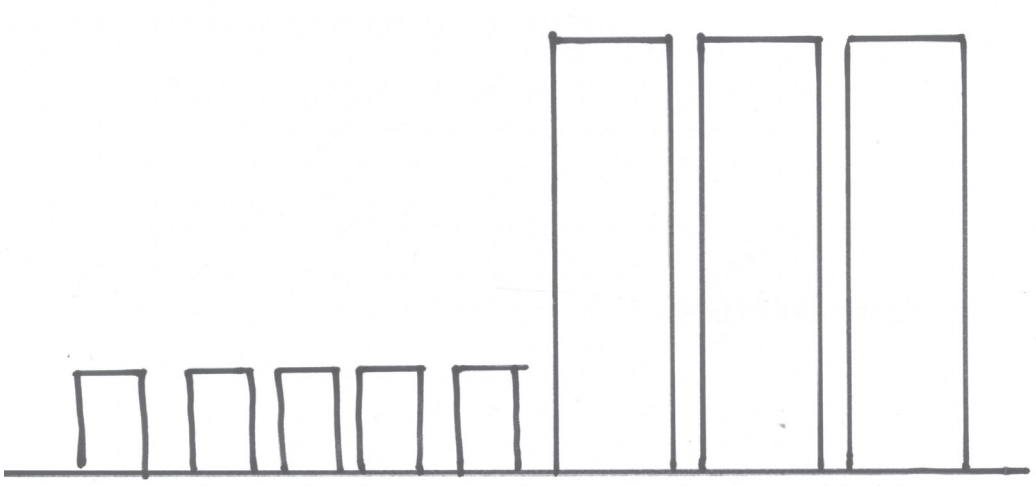
The collective preparatory research analyses Dutch high-rise in Amsterdam, Rotterdam and The Hague, in order to see their differences and similarities. The purpose is to find guidelines or supports to design a Dutch skyscraper in Eindhoven. The research will show if the city shapes the building and vice versa, thus giving a starting point for the individual thesis on the Eindhoven high-rise.

When analysing the urban context of high-rise in Amsterdam, Rotterdam and The Hague there is a big difference in the urban context visible. While most high-rise in Amsterdam is placed on an axes outside the city-centre (the South axes), high-rise in Rotterdam and The Hague is places mostly in the centre of the city between the (existing) low buildings.

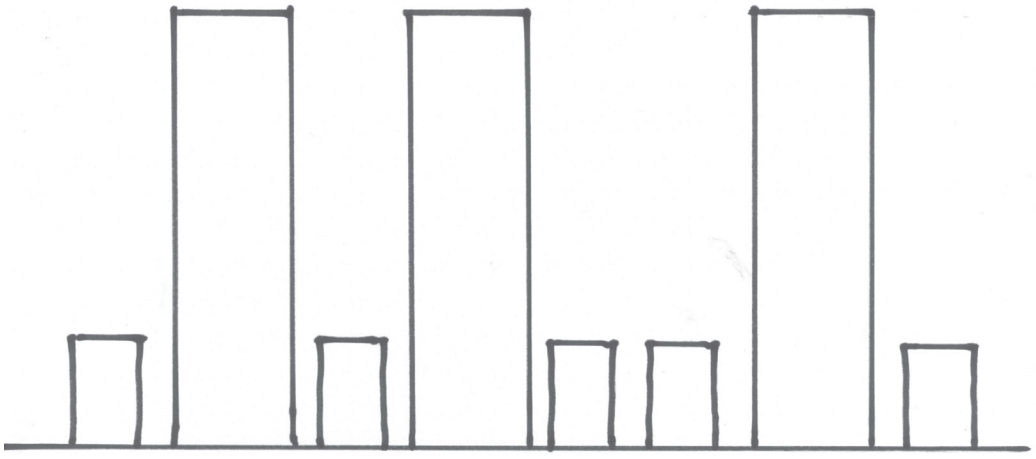
Interesting is how Eindhoven is preserved in a similar scheme. While most high-rise is placed in the inner city, there is something specific to the location of it. The existing high-rise buildings are placed on the blocks at the edge of the inner city, connecting almost directly to the main roads (the Vestdijk and the Keizersgracht) that define the inner city centre of Eindhoven.

Also the low buildings where the high-rise is placed between is different from the low buildings in Rotterdam and The Hague. The low buildings in the Eindhoven city centre are much lower and have a more village character compared to Rotterdam and The Hague. This gives a totally different urban context to designing high-rise in Eindhoven.

This urban context of the Eindhoven inner city centre, together with its village character, is the bases for the individual research and design.



Drawing 1 | High-rise Amsterdam schematic



Drawing 2 | High-rise Rotterdam & The Hague schematic

Drawing 3 | High-rise Eindhoven schematic

Fascination

A personal interest of my is traveling around the world. My last trip, a tour through the beautiful island of Sri Lanka fascinated me because of the way the people live with an enormous respect for nature. Even in the high-rise city Colombo nature is considered with great respect while in the Netherlands nature, with the exception of designated natural areas, often has to make place for urban and building designs. Even for new landscape designs the current landscape is often not considered. The way in which greenery, living and working go together in Sri Lanka, even in the cities, intrigues me. Buildings even incorporate existing trees in their design to ensure that they are not cut down Personally I prefer this way of treating nature and have a lot of nature in cities.

Relevance

Eindhoven is in need of change. There is a huge housing shortage and the inner city is quite dead after closing-time of the commercial functions. The municipality of Eindhoven itself also sees that something has to change and therefore Winy Maas of MVRDV has been assigned as supervisor of the city centre. ED (2018a) found that also Winy sees that the city centre has a village character that does not reflect the international appearance of high-tech Eindhoven. He also mentions that the inner city has a chronic lack of greenery but that there is a great potential in the mostly unused inner area's of de building blocks.

To add more greenery in the inner city, there should be less buildings. To add more liveliness after closing-time and therefore residents, there should be more buildings. High-rise could be a mean for the densification and internationalization of the city centre while maintaining space for greenery.

Location

The research and design will focus on the (edge of the) Eindhoven inner city. This is the place where at the moment the most high-rise is located and where the most demand is for living spaces with a small footprint. In addition, this location is very close to the station. This ensures that the location is easily accessible and avoids major transport problems by adding a lot of houses.

Starting point

The urban context derived form the collective research, the village character of existing Eindhoven, the international appearance of high-tech Eindhoven and the housing shortage together with the lack of green will form the starting point for both the research and design. The new high-rise should react with the existing high-rise and the context of its location. Programmatically the research and design should respond to the shortage of housing and greenery in the inner city.

Objective

The objective of the research is to create a design that reflects the internationally high-tech appearance of Eindhoven while maintaining the village-like character of the inner city. The design should add liveliness during the whole day and greenery to improve the quality of living in the city centre. The ambition is to add two times the current housing on the location to react on the housing shortage of Eindhoven.

Figure 12 | Sri Lanka Street

Figure 13 | Sri Lanka city greenery

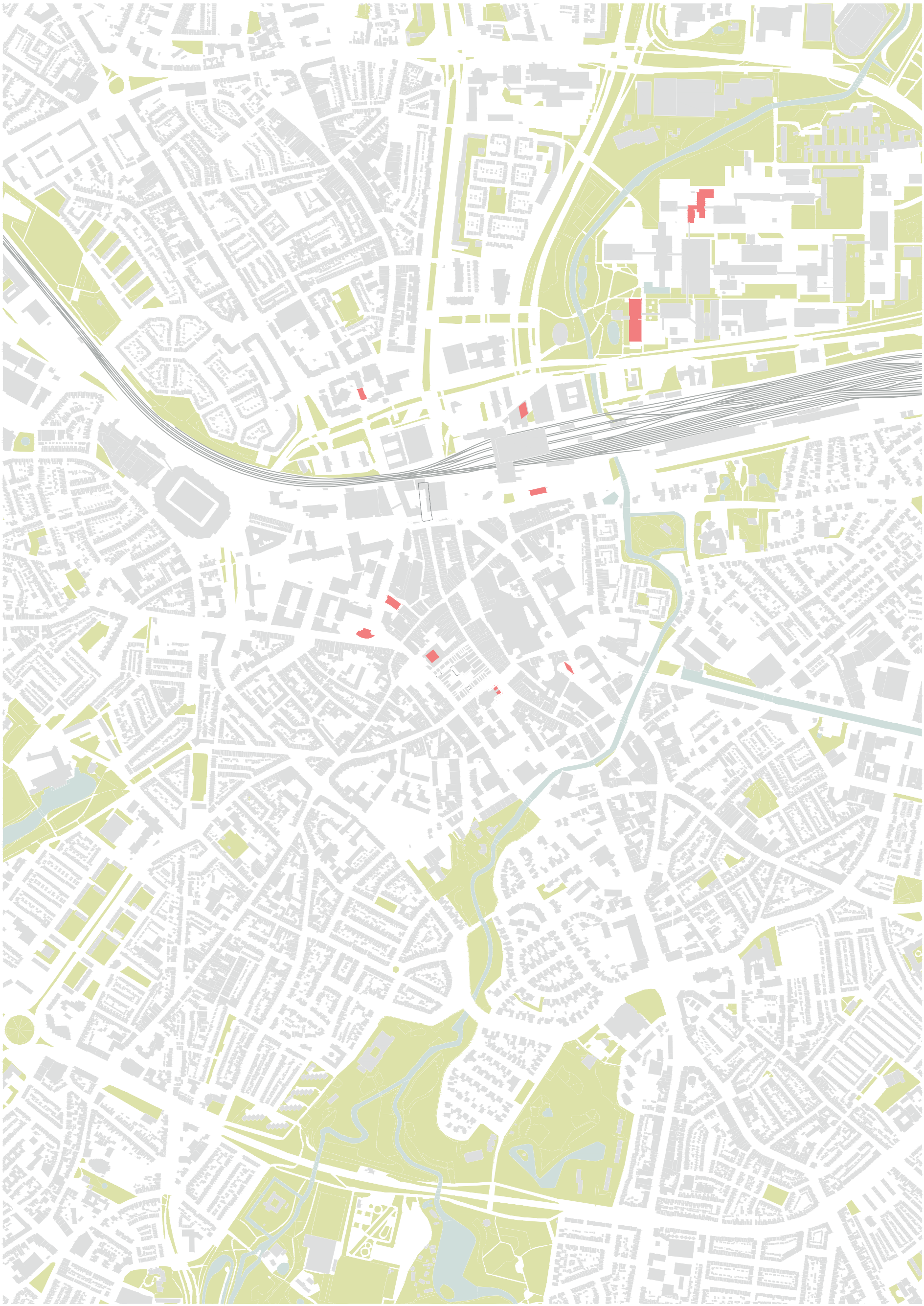
Figure 14 | Sri Lanka building and nature

Figure 15 | Sri Lanka building and nature


PHILIPS
IGLW
Philips Stadion
Admirant shopping
Station
VVV
Expail Center Brabant
Gratis stalling
19 September-plein

LOCATION ANALYSIS

Figure 16 | Eindhoven inner city



EINDHOVEN

Regionaal Historisch Centrum Eindhoven (2018) and Serc (2014) discovered that the written history of Eindhoven started in 1232, when Duke Hendrik I of Brabant granted city rights to Eindhoven. At the time Eindhoven was a small town right on the banks of the Dommel and the Gender.

Development Eindhoven

Wikipedia (2018) describes that in 1554 a big fire destroyed 75% of the houses. It only took six years to rebuild. After that Eindhoven switched several times between the Spanish and Dutch until it was finally occupied once more by the Spanish in 1583. Serc (2014) and Regionaal Historisch Centrum Eindhoven (2018) supports this and describes that in this period Eindhoven was partly burned down by Spanish soldiers and after the occupation by the Spanish the city walls were demolished. The demolishing of the city walls had as advantage that Eindhoven, because of the status of an open city, had not to endure sieges anymore. At the same time it made Eindhoven vulnerable to passing troops of all kinds.

It took until 1609 that there was truce in the Eindhoven (Wikipedia, 2018). At that time reconstruction plans were unfold and the economy slowly recovered. Twelve years later the hostilities started again and during the French occupation the city suffered once more with many houses being destroyed. Serc (2014) found that it took until the Batavian Revolution in 1795 that Brabant was equated with other provinces and truce was restored. The main church of Eindhoven at the time was the medieval St. Catharina church that was demolished in 1860 to be replaced with the current neo-gothic church from 1867, designed by Pierre Cuypers. According to Wikipedia (2018) Eindhoven remained a minor city until the start of the industrial revolution.

The industrial revolution

According to the Regionaal Historisch Centrum Eindhoven (2018) during the 19th century the industrial revolution provided a major growth. Roads, railroads and canals were constructed. Eindhoven was connected to the Zuid-Willemsvaart canal with the Eindhovens kanaal in 1843 and by rail to 's Hertogenboch, Tilburg, Venlo and Belgium between 1866 and 1870. The Industrial activities around that time centred around textile, tobacco, steam-leather factory, match factory and of course the Philips light bulb factory from 1891 according to Serc (2014). In the beginning of the 20th century the industry got an addition boost due to the car and truck manufacturer (DAF) and the subsequent shift of Eindhoven towards the electronic and engineering industry.

As a result of the industrial development, around 1900 the Eindhoven factories attracted more and more employees leading to a strong population growth to Eindhoven. Gemeente Eindhoven (2016) found that in 1815 Eindhoven had 2310 inhabitants. By 1920 this had explosively grown to a population of 47946 inhabitants. By 1925 this had grown to 63870 and ten years later it even went over the 100000 inhabitants. Serc (2014) and Wikipedia (2018) found that the explosive growth of industry and housing needs of workers called for a radical change in administration, as Eindhoven was still confined to its medieval city limits. In 1920 the five neighbouring municipalities around Eindhoven (Woensel, Tongelre, Stratum, Gestel and Strijp), which already accomodated housing needs, were incorporated into the new 'Groot-Eindhoven' municipality. The five former municipalities became districts of 'Groot-Eindhoven', with the former municipality of Eindhoven forming the sixth district as the city centre.

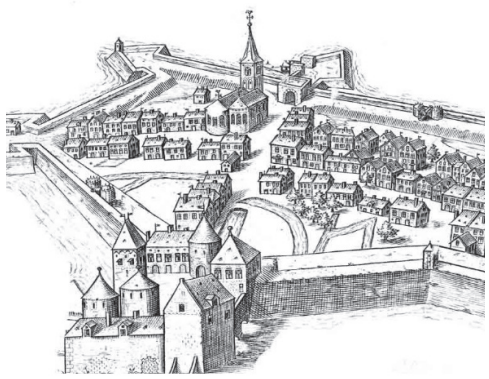


Figure 17 | Eindhoven 1583

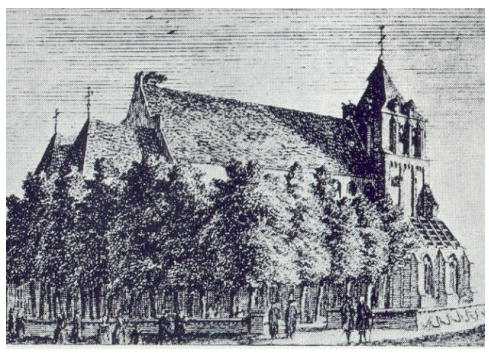


Figure 18 | Medieval St. Catharina

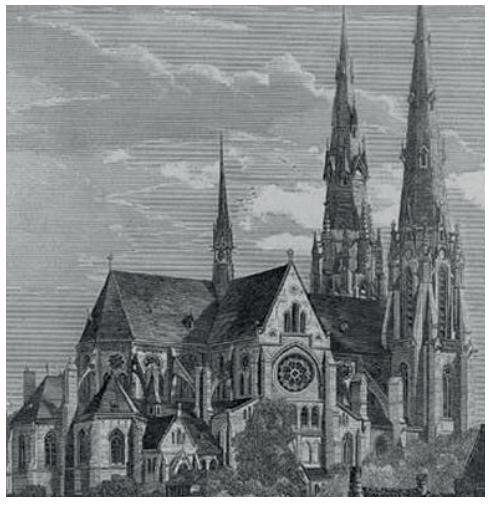


Figure 19 | St. Catharina 1867 Pierre Cuypers

Figure 20 | First Philips factory

Drawing 4 | Map high-rise (+55m) Eindhoven scale 1:10.000

World War II

Eindhoven was occupied by the Germans on May 12, 1940. Serc (2014) found that during the Second World War Eindhoven was largely bombed. About 500 houses have been destroyed and factories were badly damaged. According to Wikipedia (2018) and the Regionaal Historisch Centrum Eindhoven (2018) the first air raid, flown by the RAF, was on 6 December 1942. They targeted the Philips factory downtown. Even trough the attack was on a Sunday, 148 civilians died. Also large parts of Demer and Fellenoord were destroyed. This was followed by large-scale air raids, including the bombing by the Luftwaffe during Operation Market Garden on 18 September 1944, the day that Eindhoven was liberated. Unfortunately, this was not the end of the war for Eindhoven. Later that year and on 1 Januari 1945 the Germans bombed Eindhoven again. These air raids destroyed large parts of the city. After that a new era began for Eindhoven that at that moment had 129335 inhabitants (Gemeente Eindhoven, 2016).

Reconstruction

The reconstruction that followed left very little historical remains. There was at the time, according to Serc (2014), little regard for historical heritage. For instance in 1960 a new city hall was built and its predecessor from 1867 was demolished to make room for a planned arterial road that never materialised. As a result the city centre has very few old buildings dating back to before 1800. According to Wikipedia (2018) the postwar reconstruction saw drastic renovation plans in high-rise style, some of which were implemented. The 1970s, 1980s, and 1990s saw large-scale housing developments in the districts of Woensel-Zuid and Woensel-Noord, making Eindhoven the fifth-largest city in the Netherlands.

Eindhoven Brainport

When Philips moved its head office to Amsterdam at the end of the 20th century and the second major economic player DAF was in heavy weather, Eindhoven was on the brink of bankruptcy according to NPO (2017) and Eindhoven Now (2017). The city threatened to collapse, but the business community, the municipality and the major educational institutions joined forces and devised the Triple Helix construction, whereby knowledge sharing and intensive cooperation proved to be the solution for Eindhoven.

Today, the city, as the beating heart of the top technological Brainport Region, is in the most renowned (international) lists when it comes to business, innovation, development and future prospects. Ab-media & communication (2018), NPO (2017) and Innovationorigins (2018) found that nowadays the city of Eindhoven internationally is called 'The Silicon Valley of Europe'. The main reason for this is the High Tech Campus with 11.000 tech-savvy researchers, developers and entrepreneurs of more than 80 different nationalities. Furthermore there is the Eindhoven University of Technology which annually sends off some of the most progressive high-tech start-ups and the Dutch Design week that raises a lot of international attention to Eindhoven. This gives the city an high-tech image.

"To sum it up, Brainport's beating heart, Eindhoven is more than an epicentre of innovation in high tech and design. It is an exceptional blend of multinational trailblazing entrepreneurs, progressive ecosystem which never sleeps but invents, and an interminable engine of creativity, and this makes it an indispensable factor why Eindhoven is the new Silicon Valley."

Innovationorigins (2018)

High-rise vision Eindhoven

In 2008, Eindhoven drew up a high-rise vision (Gemeente Eindhoven, 2017). In this high-rise vision Eindhoven has designated four places where high-rise is allowed. The city centre is together with Woensel shopping centre, the West corridor area between the Philips Stadium and Meerhoven and around a future train station in Acht one of the locations. In addition, Eindhoven has determined four sizes for high-rise buildings: M (up to 45 meters), L (up to 75 meters), XL (up to 105 meters) and XXL (higher than 105 meters).

According to Architectenweb (2008) there was a need for the high-rise vision because the predicted growth of Eindhoven (Centraal Planbureau, 2008) and more and more high-rise plans appeared in the city. Also, the city map is as good as full, so houses need to go up in the air. Eindhoven is a real low-rise city. Where for example in Amsterdam only ten percent of all dwellings are ground based, this applies for almost three quarters of all dwellings in Eindhoven.

Now, ten years later there is a high-rise explosion coming up. Heritage watchdog Henri van Abbestichting calls in an interview (ED, 2018b) for a new overall vision on high-rise buildings in Eindhoven, because they find the old 2008 guidelines no longer sufficient. The municipality mentions that they are preparing to write a new high-rise vision. It is expected at the end of 2018.

The municipality of Eindhoven has already taken some steps in the last years by appointing Kees Christiaanse (KCAP) and Winy Maas (MVRDV) as supervisors of Fellenoord and the inner city. With this appointments Eindhoven wants to make a change in quality to a pleasant stay climate with allure.

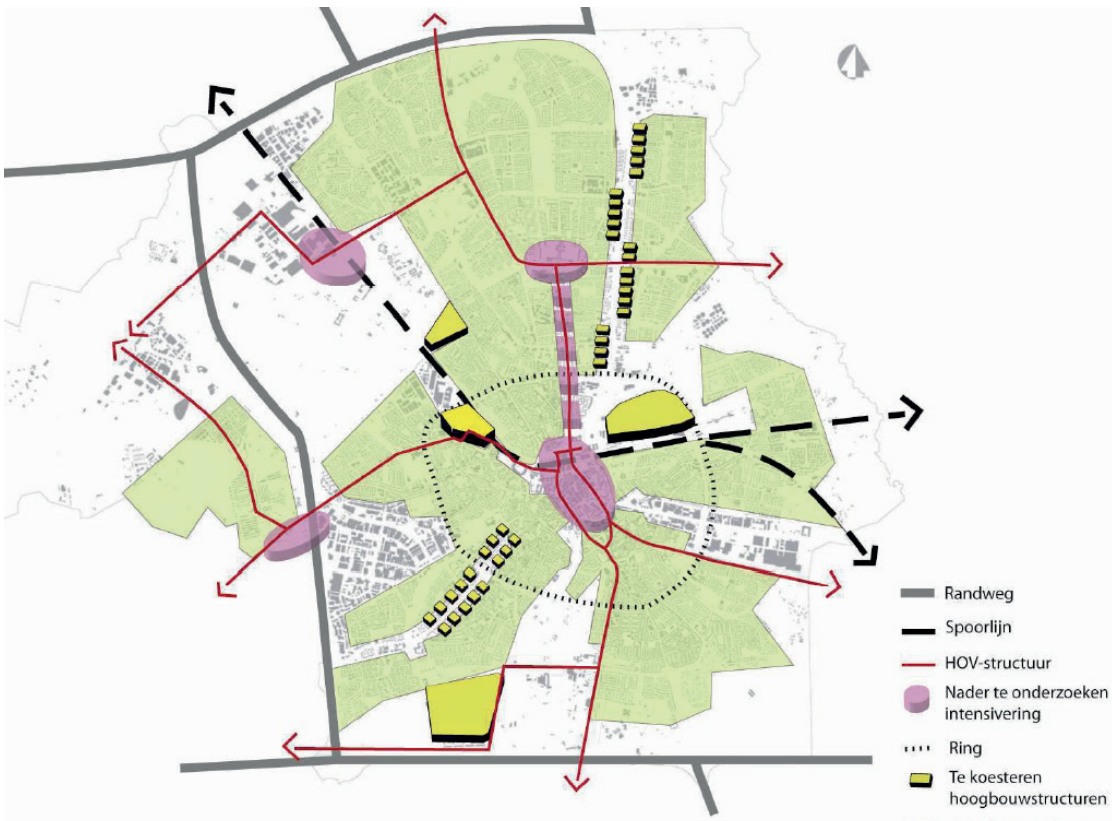


Figure 21 | High-rise opportunities Eindhoven

Figure 22 | Collage of planned high-rise projects in Eindhoven

EINDHOVEN INNER CITY

As previously mentioned, the inner city is as part of the city centre one of the designated areas for high-rise in the high-rise vision of Eindhoven (Gemeente Eindhoven, 2017). According to this high-rise vision, four of the five highest existing buildings are located in the city centre, from which three in the inner city (Vesteda-tower, Regent and Admirant). These are located on the inner ring. This inner ring forms in the high-rise vision of Eindhoven a 'pearl necklace' for high-rise in the inner city where a continuous connection is sought with the existing heights.

The rest of the inner city consists mostly out of urban building blocks. These blocks consists out of small buildings and have often an inner area. The building hight throughout the inner city is compared with other city's low. Most buildings have a hight between 12,5 and 17,5 meters. This gives the inner city of Eindhoven a human scale and a village-like feeling. The building blocks are mixed use. On the ground level is a commercial plinth. The plinth is mostly one story high, sometimes two stories. The commercial plinth houses shops, catering industry and offices. The upper levels is mostly housing. The inner area is mostly functional used and had a lot of blind façades. The inner areas have, like the rest of the inner city a chronic lack of greenery. These inner areas do not have any permeability. The few openings do not connect to other interesting streets and the atmosphere of the inner areas is not pleasant.

Exceptions are a few mono-blocks in the inner city, for example shopping-mall 'De Heuvel' and now vacant 'V&D' building. These urban blocks have a to big scale for the Eindhoven inner city and are not mixed use. Large scaled mono-blocks like 'De Heuvel' and the 'V&D building' are no longer desirable in the inner city.

Eindhoven is in need of change, as previously mentioned in the introduction. There is a housing shortage and the inner city is quite dead after closing-time of the commercial functions. The municipality of Eindhoven itself also sees that something has to change and therefore Winy Maas of MVRDV has been assigned as supervisor of the city centre.

The (unused) inner areas have a great potential to add more residents and therefore contribute to a solution for the housing shortage and at the same time adding liveliness to the inner city. Doing this with high-rise not only contributes at the densification of Eindhoven but could also contribute to the internationalization of Eindhoven. In addition, using slim high-rise buildings has the advantage of retaining space for qualitative greenery in the inner city and therefore contributing to the quality of life of the existing and new residents.

High-rise in the Eindhoven inner city started already in the thirteenth century with the medieval St. Catharina church as highest building of the city. In 1867 this church is replaced by the current St. Catharina church, designed by Pierre Cuypers. The tower of this church has a hight of 73 meters and was for centuries the highest building in the inner city.

The first commercial high-rise in the inner city was 'Het Hooghuis' build in 1970 and designed by Van de Broek en Bakema. This building was with 55 meters still lower than the St. Catharina church. In 1999 'De Regent', designed by Van Aken Architecten, is the fist commercial high-rise building to surpass the St. Catharina church with an height of 96 meter. After the completion of 'De Regent' more towers started to risen in the city centre of Eindhoven. On the next page is an overview of the High-rise development of the inner city.

Drawing 5 | Map high-rise (+55m) Eindhoven inner city scale 1:5000

High-rise development Eindhoven inner city

Figure 23 | Hooghuis

1970

Hooghuis
Van de Broek en Bakema
55 meter

The first commercial high-rise in the inner city was 'Het Hooghuis' build in 1970 and designed by Van de Broek en Bakema. This building was with 55 meters still lower than the towers of the St. Catharina church.

Figure 24 | De Regent

1999

De Regent
Van Aken Architecten
96 meter

'De Regent' was the first commercial high-rise to surpass the height of the St. Catharina church. The residential tower of 96 meters high was completed in 1999 in the inner city of Eindhoven. The Regent was the pioneer for Eindhoven high-rise buildings. After the completion of 'De Regent', more towers started to risen in Eindhoven

Figure 25 | Kennedy toren

2003

Kennedy toren
Van Aken Architecten
83 meter

'De Kennedytoren' is an 83 meters high office building and was completed in 2003. It stands on the 5th place of tallest buildings in Eindhoven. The building is located at the Kennedyplein in Eindhoven, at the intersection Fellenoord with the Kennedylaan, next to the bus station. The building is best known for its largely overhanging tower.

Figure 26 | Vestedatoren

2006

Vestedatoren
Jo Coenen & Co Architekten
90 meter

‘De Vestedatoren’ is a residential tower completed in 2006, located at the Vestdijk. The building is often praised for its architecture. The building shows a strong resemblance to the Flatiron Building in New York. This structure has the same characteristic round, pointed shape. An essential difference is that ‘De Vestedatoren’ has a diamond shape while the Flatiron Building has to do with one half of this, a triangle.

Figure 27 | De Admirant

2006

De Admirant
Dam & Partners Architecten
105 meter

‘De Admirant’ is a residential tower completed in 2006. It is located in the inner city, on the Emmasingel. With its 105 meters, ‘De Admirant’ is the tallest building in Eindhoven. ‘De Admirant‘ was also the last high-rise building build in the inner city before the 2008 credit crisis.

Figure 28 | The Student Hotel

2016

The Student Hotel
Cie Architecten
76 meter

Ten years later, after the 2008 credit crisis, The Student Hotel is the fist new high-rise in the Eindhoven city centre. It replaces the old post office located at the station square of Station Eindhoven. The Student Hotel, stands at 76 meters high in the top 10 of Eindhoven’s highest building. The establishment of this student hotel will respond to the growing number of foreign students enrolling at Eindhoven University of Technology.

EINDHOVEN BUILDING BLOCK

The chosen building block is located between 'Het Hooghuis' and the Catharina church, the two oldest high-rises of the inner city. The location is on the edge of the inner city, connected to the Keizersgracht and close to 'De Admirant' and 'De Regent'. The location fits in the 2008 high-rise vision of Eindhoven (Gemeente Eindhoven, 2017). The block is connected to the inner ring having the potential to be part of the 'pearl necklace' of high-rise in the inner city while 'Het Hooghuis' and the Catharina church give it the potential to seek connection with existing heights.

The chosen block is a representation of an average building block in the inner city, that fits in the 2008 high-rise vision of Eindhoven. It consists out of small buildings with a hight of 12,5 to 17,5 meters. The block is mixed use with a commercial plinth on the ground floor housing shops on the North-West and North-East side, catering industry on the South-East side, offices on the South west side, a casino on the South corner and a Hotel on the West corner. On the upper levels some housing is located.

The block has an (only functional used) inner area that has potential. Because it is a closed block with two underpasses to enter the inner area and just one connecting to an interesting street it has a bad permeability. On the inside and outside of the block is a lack of greenery, with an exception between the catering industry and the St. Catharina church on the South-East side.

The photo-series gives an impression of the atmosphere of the outside of the block. The first two pictures show the unpleasant entrance to the inner area of the block. The next pictures show the medium sized buildings on the corners. Between the corner buildings are small sized buildings. The most used material for the façades of the buildings is brick.

Drawing 6 | Map high-rise block (+55m)

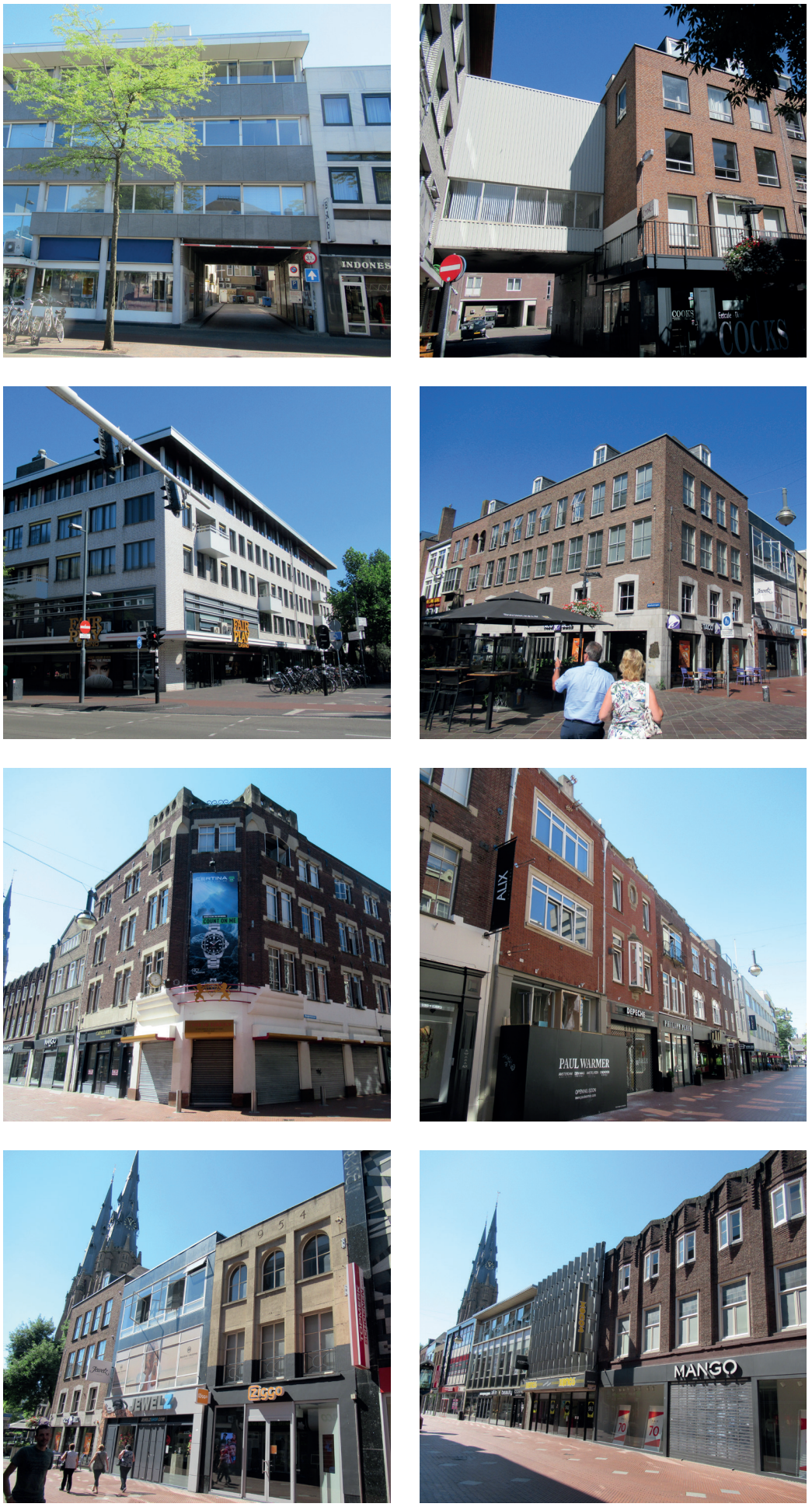
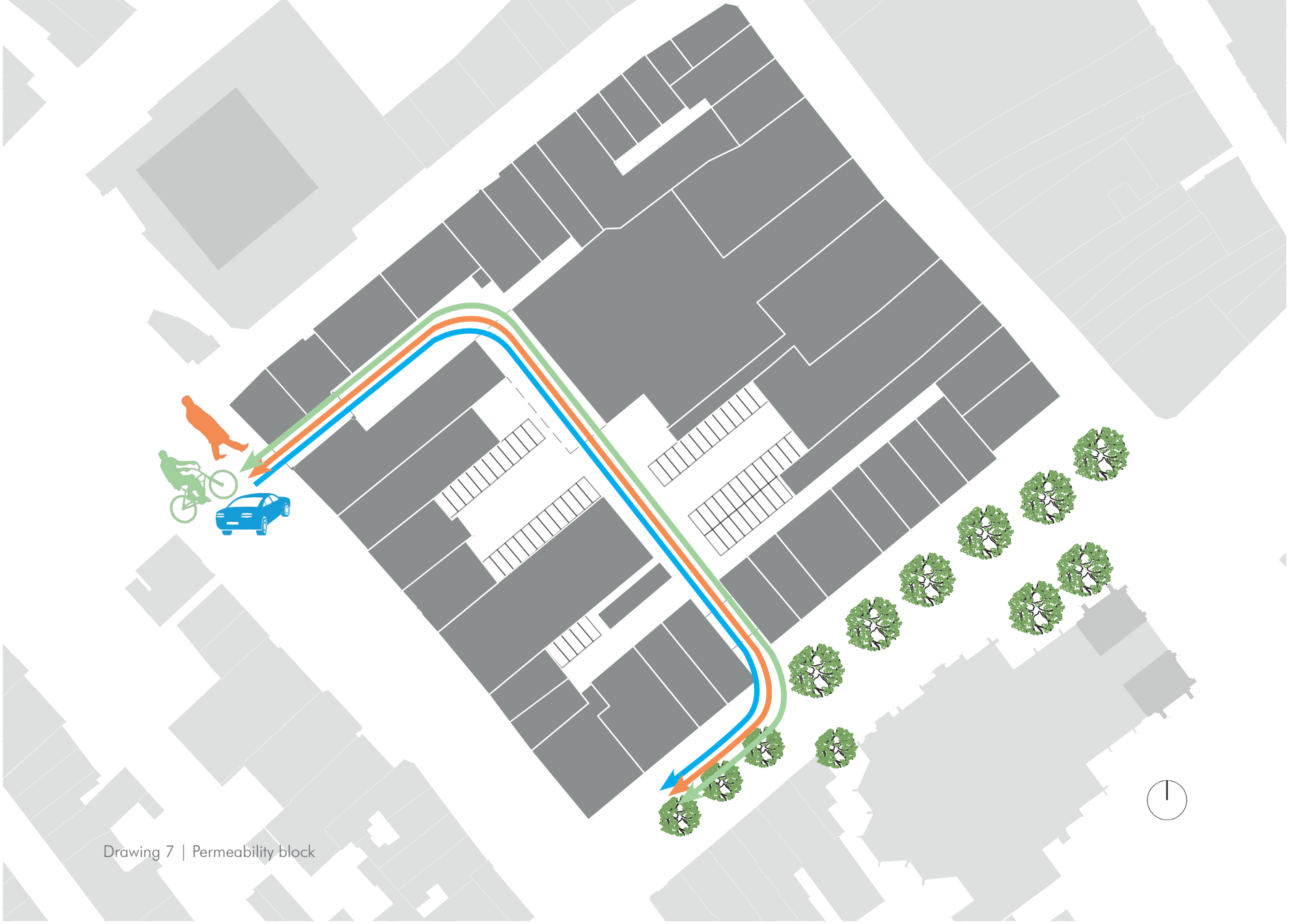


Figure 29 | Photo-series outside block

Movement

The movement through the existing block is limited. There is an one-way road for cars to reach the limited parking spaces and small trucks to supply the stores.

This same road is the only possibility to move trough the inside of the block with a bike or by foot. This makes the movement trough the inner area of the block limited to only necessary movement.



Drawing 7 | Permeability block

Block inner area

The photo series on this page gives an good impression of the atmosphere of the inner area of the block. The photos show the unpleasant atmosphere of the long and low underpasses and the small alleys with the containers. Furthermore, the many long fences attract the attention. This makes the stay and movement trough the inner area of the block limited to only necessary movement.

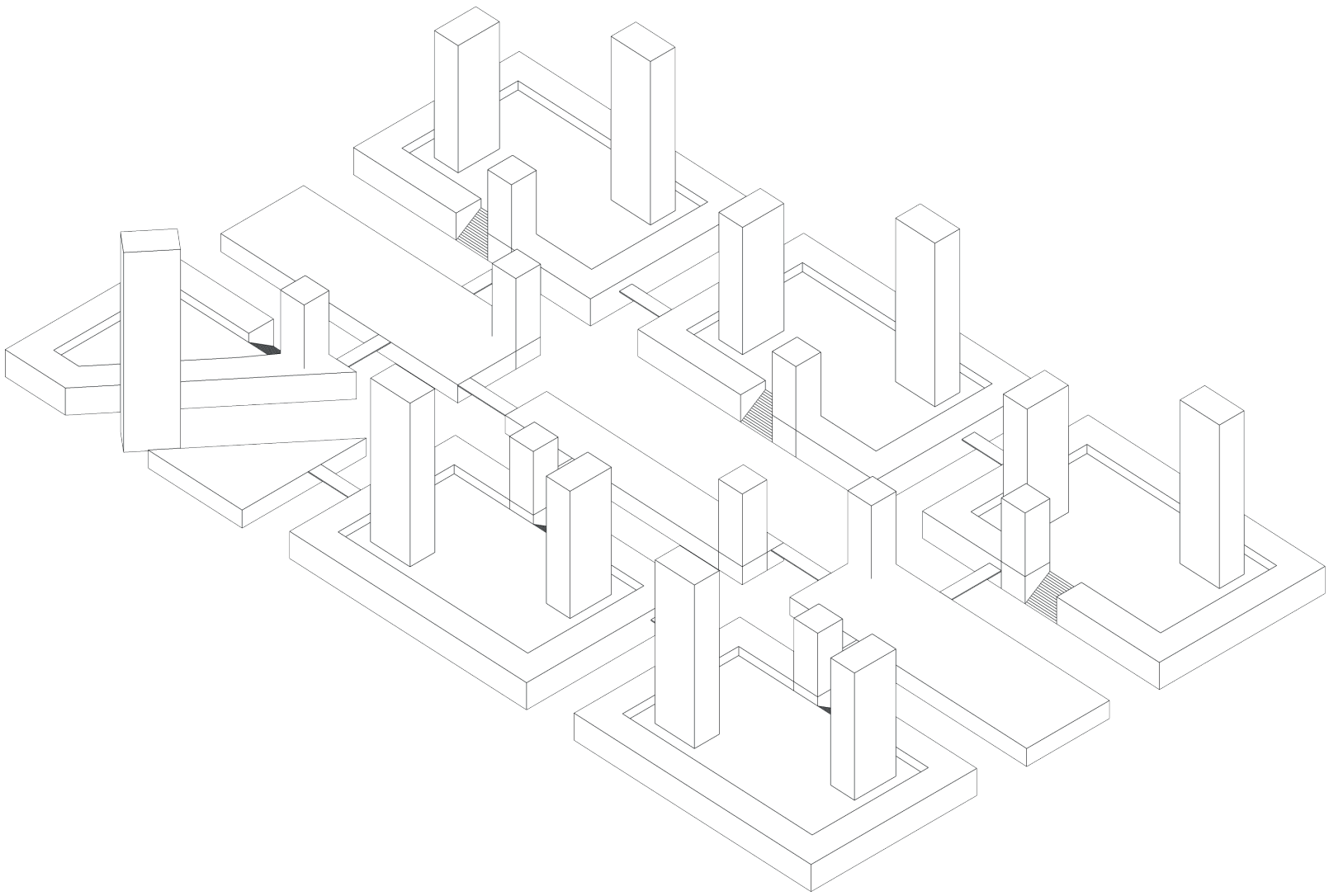
Figure 30 | Photo-series inside block

Tallness
Graduation studio
Eindhoven
Scale 1:500

CONCEPT #2

MASTERPLAN

Figure 31 | Photo experimentations with model inner city Eindhoven



CONCEPT

The inner city exists, in an abstract way, of three column from North to South. The blocks on the edge connect to the inner ring of Eindhoven and are mostly closed blocks with inner areas. The blocks in the middle column are narrower and mostly don't have an inner area.

The conceptual masterplan aims to use the potential of the inner areas of the building blocks on the edge. This fits in the 2008 high-rise vision of Eindhoven (Gemeente Eindhoven, 2017), to place high-rise in the building blocks connected to the inner ring and creating a 'pearl necklace' of high-rise around the inner city and seeking connection with existing heights. To respect the low building heights of the existing building blocks and therefore the village-like feeling of Eindhoven, the high-rise is places more to the middle of the blocks. The inner area is filled with an elevated second layer, hiding the unpleasant ground level while maintaining it's functional use. This second layer incorporates greenery and connects the high-rise with different sides of the block to create permeability. The high-rise is not only as an solution for densification, it also functions as the needed critical mass to activate the elevated second level. To create more movement over the elevated level and highlight the openings in the block there are some small towers. These lower towers also function as a scale mediator between the existing buildings and the high-rise.

In the conceptual masterplan there is a secondary green routing through the inner city connecting the elevated second layers of adjacent blocks. To keep the research manageable the research aims to make a concept of one block, which is a representation of an average building block on the edge of the inner city. The design is the case study of one block that has the potential to connect later to one of the surrounding block.

Figure 32 | Conceptual Masterplan

The conceptual masterplan is translated to a development scheme of a block that is a representation of an average block on the edge of the inner city. The potential to connect later to one of the surrounding block is not included. Scheme one shows the small grain size of the buildings in the existing block and the ragged edge on the inner area. The small grain size needs to be respected because this grain size gives Eindhoven its human scale and village-like feeling.

Scheme two shows the openings that need to be made to connect the inner area to the inner city and give the closed block a better permeability. The openings should not be opposite to each other to avoid fast walk-troughs. In the design must be prevented that high-value buildings are demolished to create the passageways. The inner area must be attractively designed to use as a passage, but it should also be an inviting area to stay.

In the third scheme the openings are highlighted with middle high buildings. These buildings have shared collective spaces or public spaces in the plinth to create movement through the block. In the inner area is an elevated second layer to hide the functional use of the ground floor and create space for greenery. The layer keeps an offset from existing buildings and reflects the ragged edge of the block. It connects all collective spaces of the towers and is a collective / public space on its own.

In the inner is the place for one or more high-rise towers, as shown in the fourth scheme. This tower adds critical mass needed to activate the elevated level and has like the middle high buildings a shared collective space in the plinth to stimulate more movement. Furthermore, the high-rise is a solution to the housing shortage and at the same time adds liveliness to the inner city.

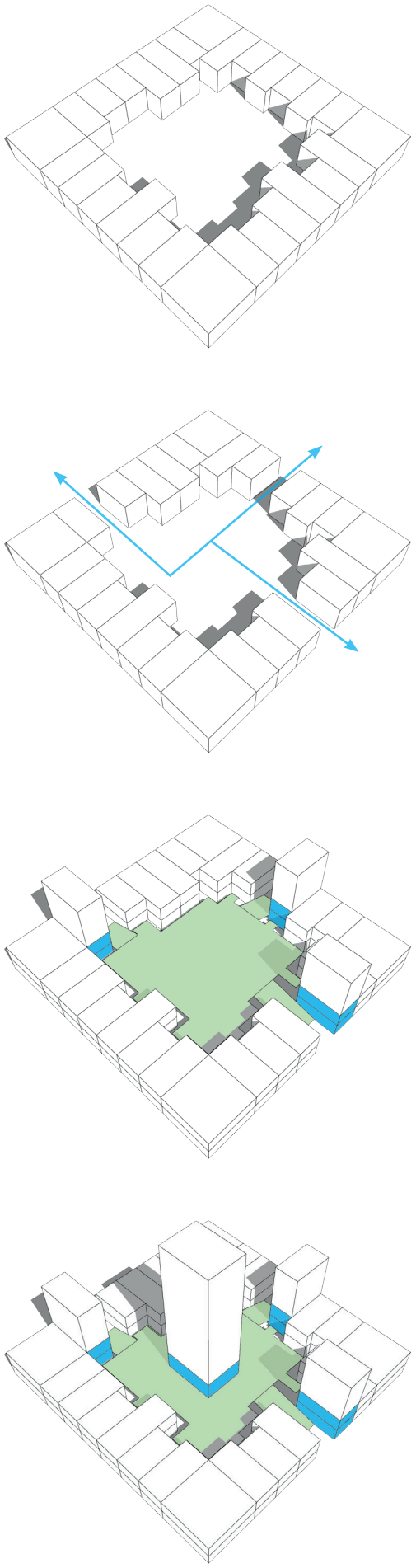


Figure 33 | Schemes development block

SUN STUDY

Sun study high tower

To research possible locations for the high-rise tower(s) there is a sun (and shadow) study conducted. The research does focus on the spring and autumn when sun is enjoyable but limited. The study does not aim at the extreme moments as the summer when the sun stands very high in the sky and there is plenty of sunshine, nor does it focus on winter when it is to cold to enjoy the sun and the sun stands very low in the sky creating extreme shadows.

In the research an 100 meter tower is placed on different locations inside the block and the sun is simulated during the morning, afternoon and evening, to simulate the shadow. The influence of the shadow on the surrounding buildings and the influence within the block is examined. This in order to limit nuisance on the new and existing structures and designing an elevated second layer on the inner area of the block. The latter because the sun is an important factor to create a pleasant place to stay.

The study finds that for the elevated second level a high tower in the middle or more to the North is the best solution. Because the sun is at its highest in the south, the shadow will not be that long to reach ‘de Markt‘, an important catering area with many terraces in the inner city.

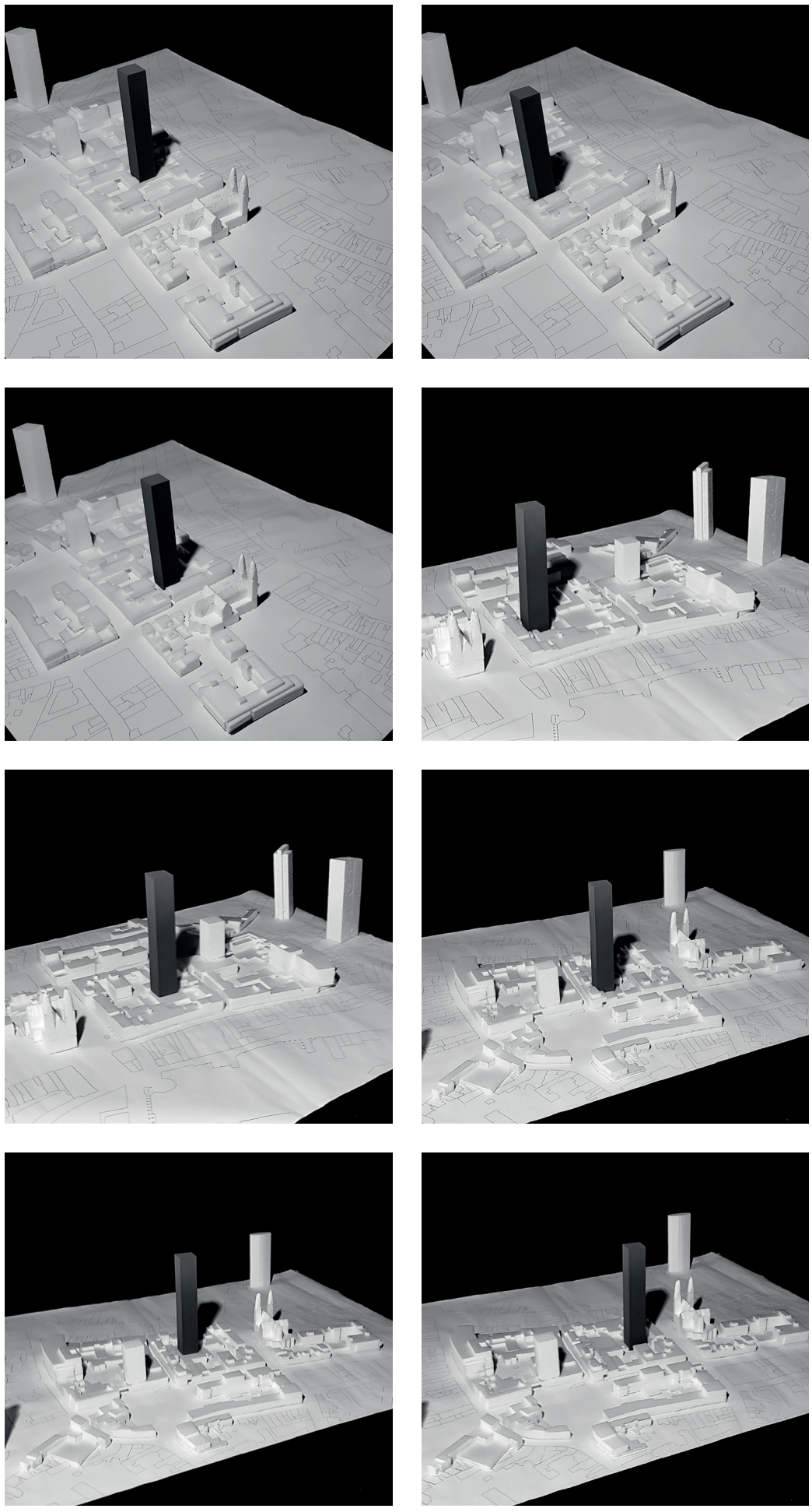


Figure 34 | Photo-series sun study 100 meter tower

Sun study low tower

To research possible locations for the lower tower(s) there also is a sun (and shadow) study conducted. The study has the same focus and aim as the study with the high-rise tower(s)..

In the research a 30 meter tower is placed on different locations on the edge of the block and the sun is simulated during the morning, afternoon and evening, to simulate the shadow. Hereby the influence of the shadow on the surrounding buildings and the influence within the block is examined. This in order to limit nuisance on the new and existing structures and designing an elevated second layer on the inner area of the block. The latter because the sun is an important factor to create a pleasant place to stay.

The study finds that because of the limited height of these towers they do not cause problems on the outside of the block. Also the presence of shadows in the inner area is limited and therefore not a problem.

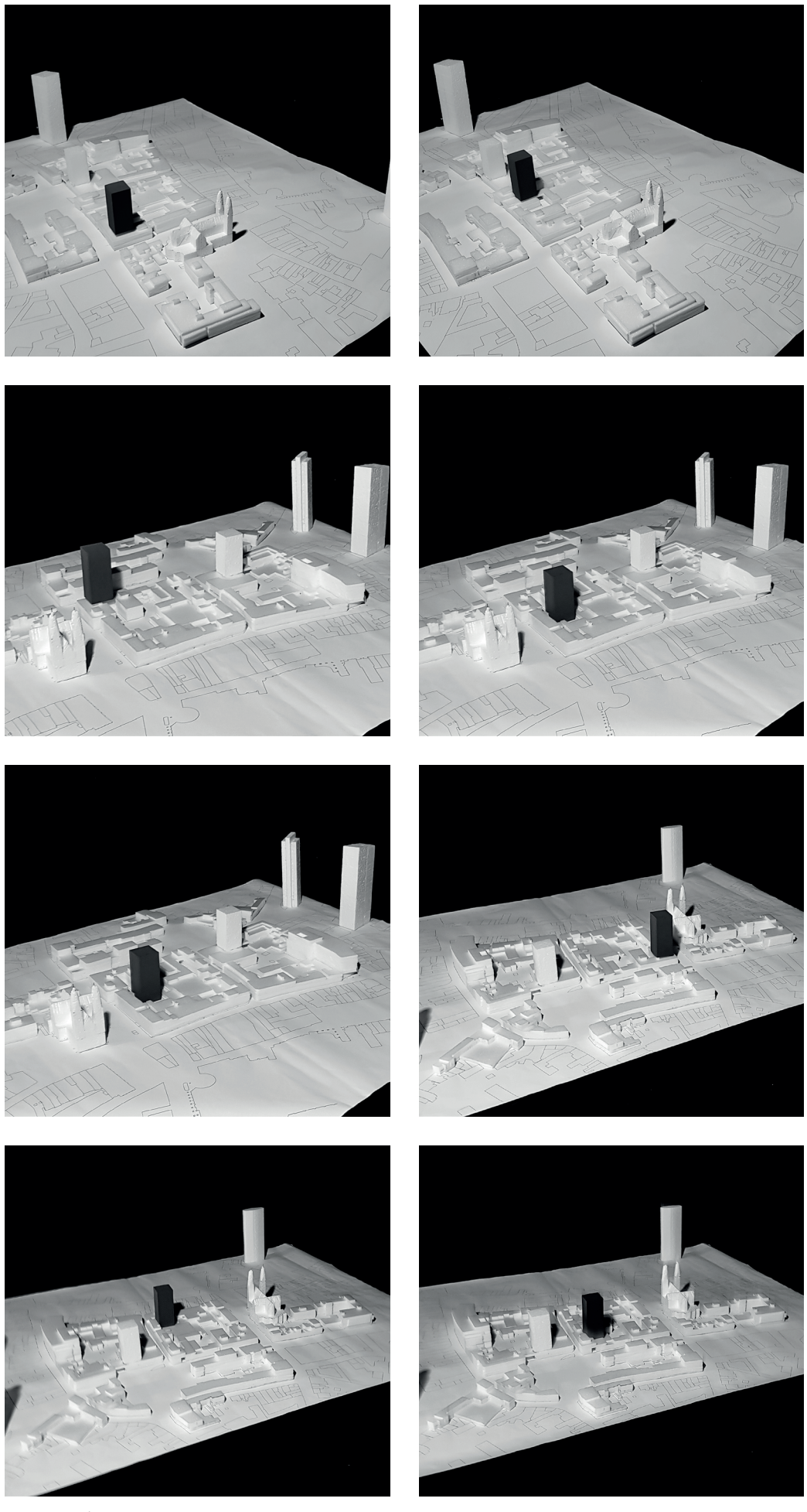
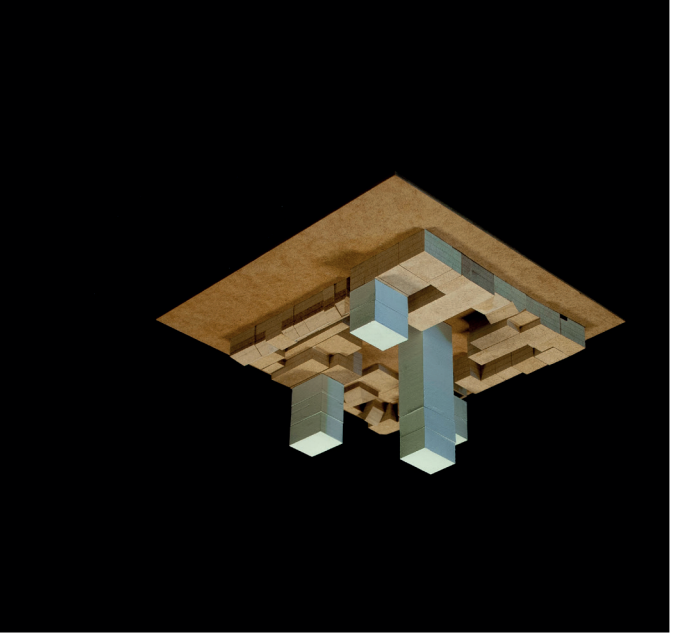
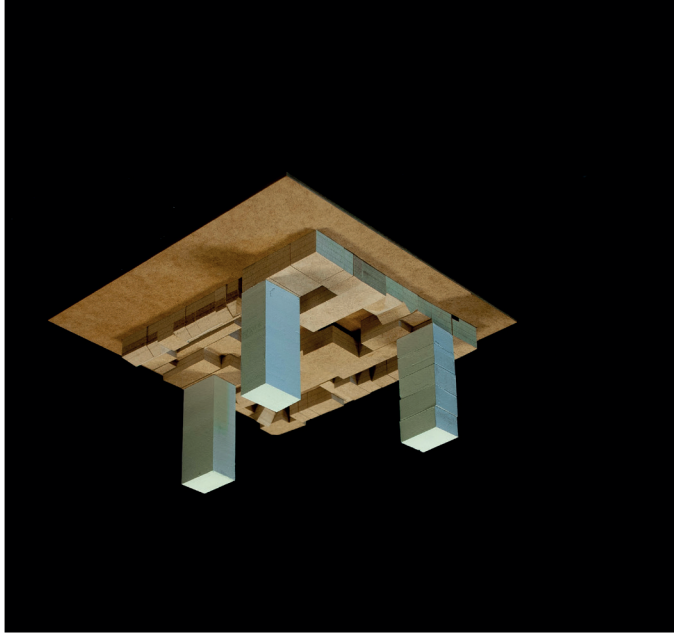
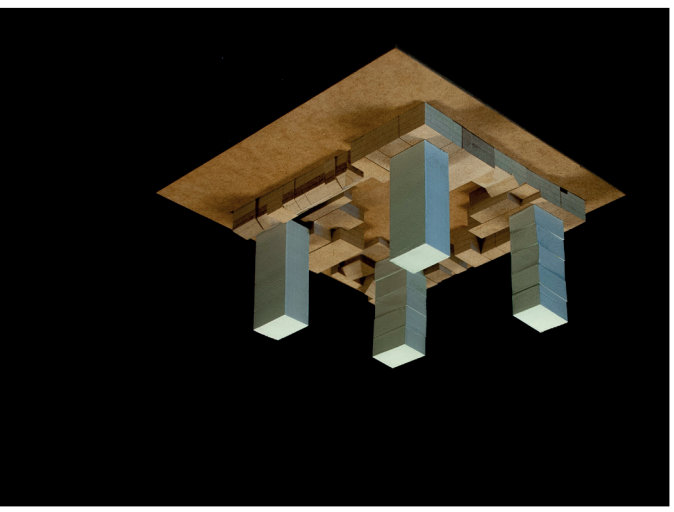
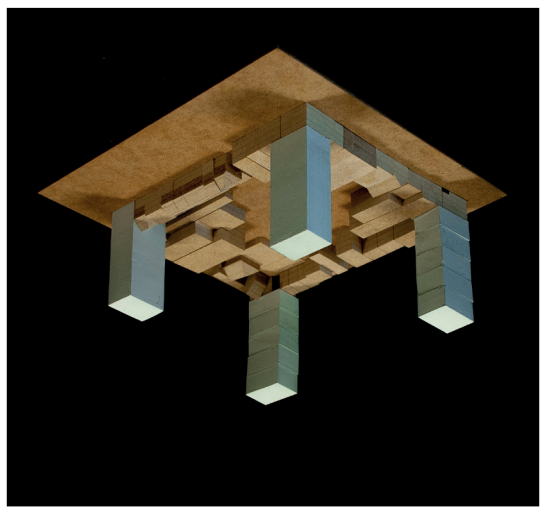
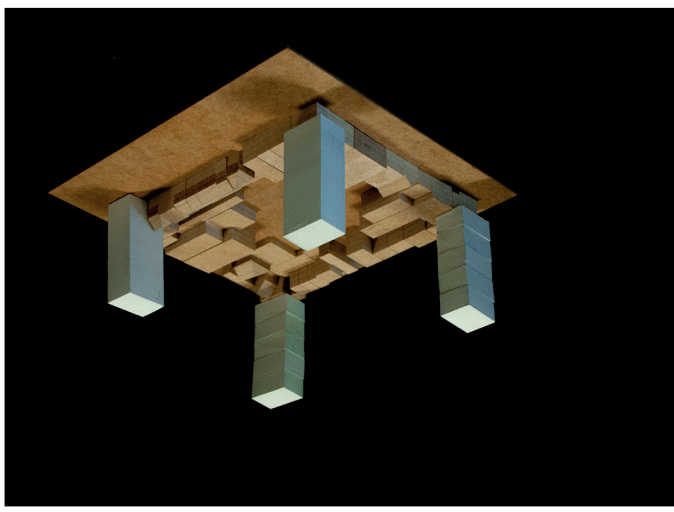
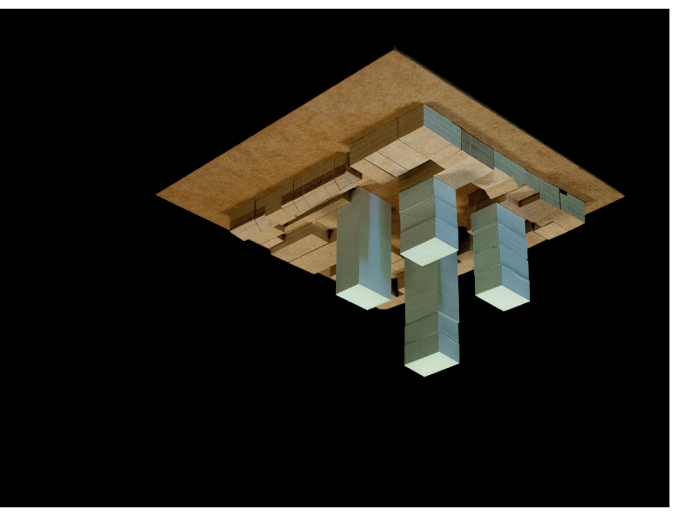
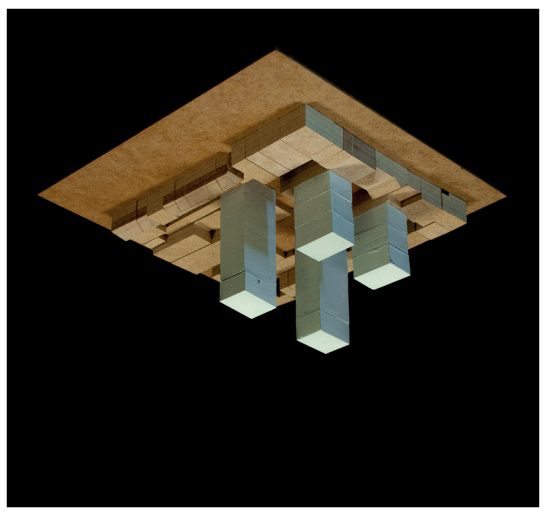
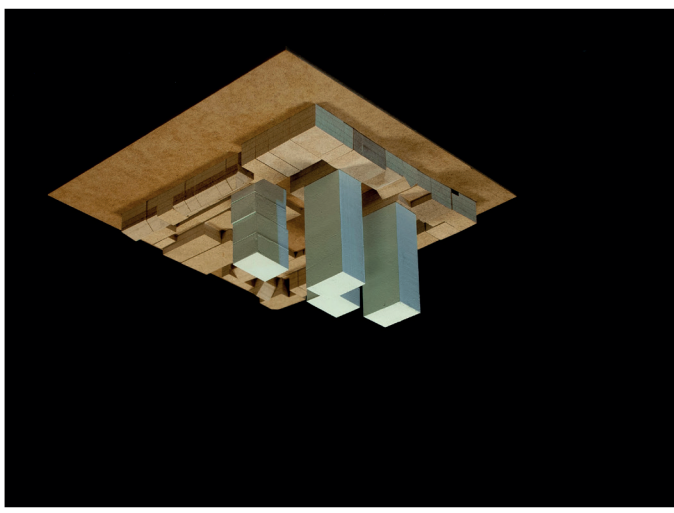
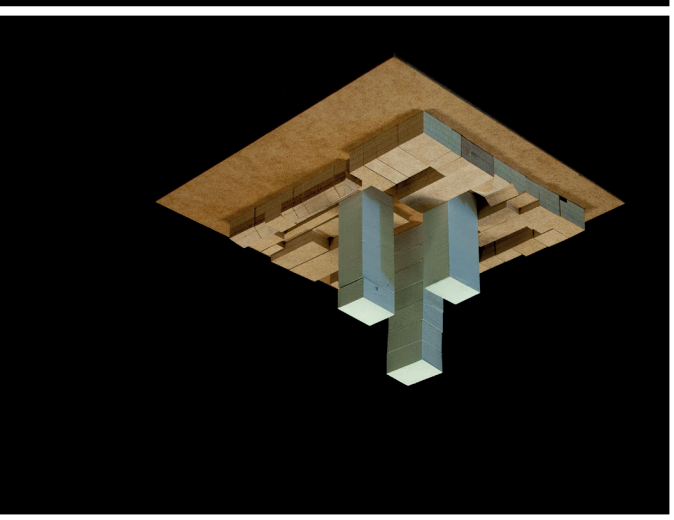
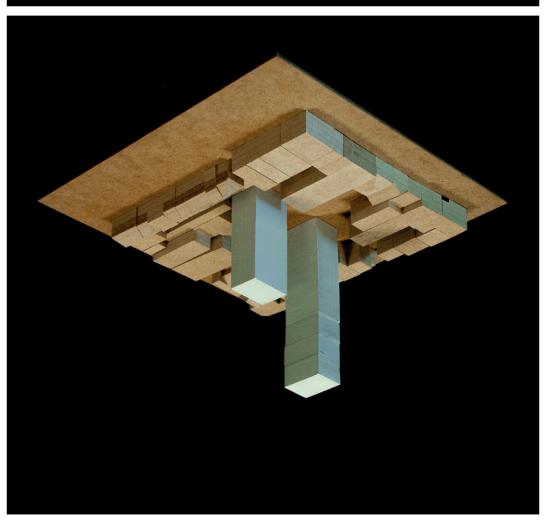
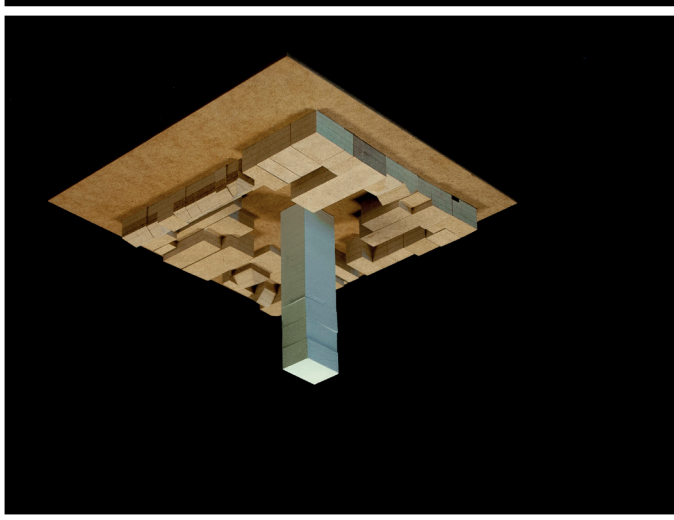
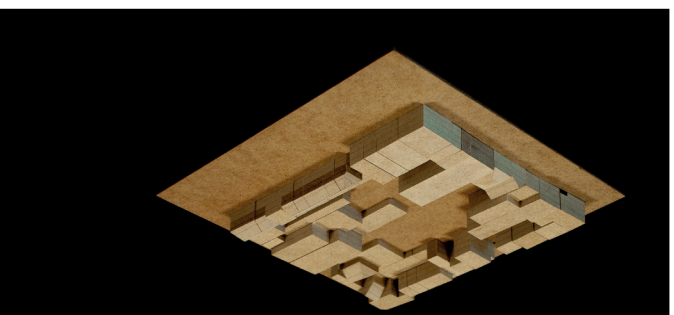
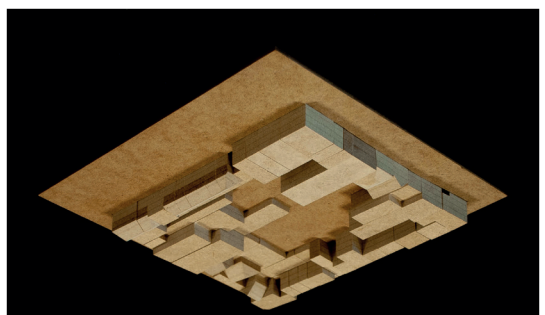
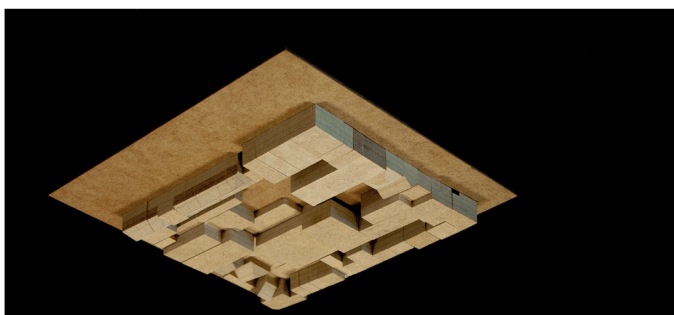


Figure 35 | Photo-series sun study 30 meter tower



URBAN INTEGRATION

To research the position, height and number of towers of the chosen block, a model study is conducted. This study tests systematic different themes. The main theme is formality and informality. This theme is reflected in all other themes. The other themes where about creating space between towers, placing towers on, over or behind the edge, concentrating the critical mass in one or more towers and accentuate passage ways through the block. In this study around forty different options were examined, of which the most interesting are displayed on the left page. The displayed options represent the most important steps of the urban integration. The first row is about creating space in the existing block. The large scaled mono-block in the middle does not add any quality to the inner city and is no longer desirable. It is also about creating room to give the block a better permeability with the inner city. The second and third row are about creating space around and between one, two, three or four closely placed towers. This creates a good relation with the towers but fails to make a relation with the rest of the block. The fourth row does the opposite while at the same time researching the relation of the towers with the edge of the block. The last row is about exploring the accentuating of the openings while making a connection with the towers and the block. The last model does this best and therefore will be explored further.

The conceptual development scheme of a block that is a representation of an average block on the edge of the inner city is translated to a rule-set. Scheme one shows the existing mix used block with the commercial functions on the ground level and housing on the upper levels. The second scheme shows the added housing in the towers and the introduction of a new kind of space in the bock; the shared collective space on the first two levels of the tower.
The third scheme shows the rule of height. The tower inside the block has an maximum of 100 meter. According to Zandbelt & van den Berg - Architectuur en urban design et al. (2008) there is in the Netherlands no economic reason to go any higher. They found, like Willis (1995) in Form Follows Finance, a ratio between land costs, building costs and profit. While for America one rule of thumb is that high-rise buildings become profitable when land costs exceed 70% of the building sum, this will not occur in the Netherlands due to the method of the residual land value that is applied. It appears that the costs increase exponentially and the revenues are directly proportional. The result is that above 33 layers (around 100 meters) the costs exceed the revenues. The residual land value is no longer positive from this point. This drop in the value of the land has already started earlier, namely around 23 floors (around 70 meters). Between 70 and 100 meters the residual land value is still positive, but to a decreasing extent.

Building above 100 meters is one and a half times more expensive than building up to 30 meters. Furthermore above 30 meters there is no connection to the ground level. To maintain the human scale of the inner city and reduce costs, the towers on the edge of the block have a maximum height of 30 meters.

The fourth scheme shows the contrast in materials between existing village-like Eindhoven (low), and the new international high-tech Eindhoven (high-rise) The lower towers on the edge are mediators between the existing buildings and new tower(s). The main material is the material of the tower, that has a big contrast with the existing materials in the block but the lower towers also adapt material and/or grids from the location where it is placed

Figure 36 | Photo-series urban integration model

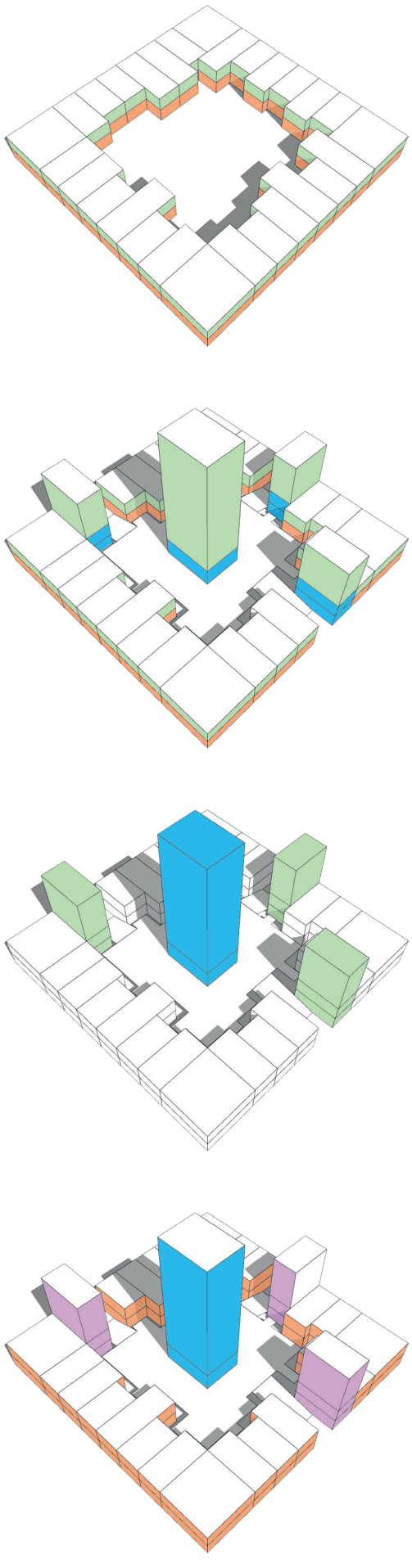


Figure 37 | Schemes rule-set block

REFERENCE PROJECTS

Figure 38 | Metahaven - City Rising

KASBAH HENGELO | PIET BLOM

What distinguishes architecture from other (applied) arts is that there is no possibility to practice. A building is only built once and as an architect you have to have a lot of conviction, daring and also naivety to experiment. Architect Piet Blom (1934-1999) had all three according to Bakker (2013) and became known for his residential area 'Kasbah' built in 1973.

The 'Kasbah' is somewhat hidden on the outskirts of the Dutch city Hengelo. From a distance the 'Kasbah' looks ordinary with façades that you could find in every 70s-neighborhood. The project will only become special when you get closer. The entire residential area has been lifted and 'floats' above a shared ground level. The neighbourhood has a high density and homes are directly stuck together.

Bakker (2013) explains that seen from the ground floor, there is an overwhelming jungle of stairs, columns, bridges and balconies hanging above. It feels like the ground has been excavated and you walk through a dark 'underworld' of cellars, foundations and garage boxes. The amount of closed façades on the ground floor contributes to this feeling.

According to Kuijpers (2008) it was never the intention of the architect to design such an 'underworld'. On the contrary: the 'Kasbah' is based on a very positive and optimistic picture of how the residents would make a pleasant place to stay from the public space under their lifted houses. Bakker (2013) found that Blom deliberately, did not design the ground floor. He wrote only a few words: 'studio', 'in love', 'dandelions', 'shelters' and so on. He trusted that people were challenged to come up with something nice. Precisely this undefined public space beneath the houses is the biggest problem. It did not cause the spontaneous behaviour that Blom had in mind. Activities, such as maintaining a shared vegetable garden, were only of short duration. Because there are many 'dead' corners in the public space below the buildings, it was perceived as unsafe. Soon, the project lost its initial shine and became an example of how it should not be done.

The main cause of the problems of the Kasbah was that Blom had too much faith in the creativity and entrepreneurial spirit of the residents. Instead of setting up the public space according to their own will the people retreated to their private balconies leaving the ground floor an abandoned area

Figure 39 | Kasbah Hengelo

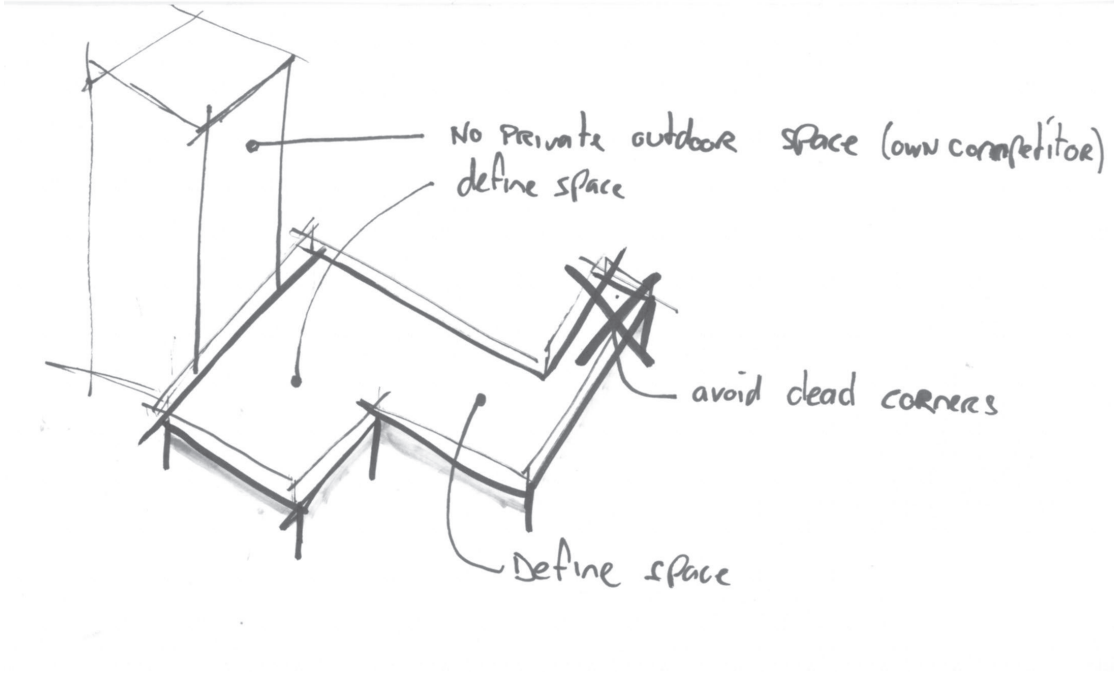
Design consequences

To make good use of the public space on a second level the space should be defined because undefined space could lead to an abandoned area.

The design should avoid creating 'dead corners' and therefore avoid that the space is perceived as unsafe.

It must be prevented that the design will be its own competitor. When the design should stimulate people to use the collective outside space they can not have a private outside space as a competitor to that.

Figure 40 | Kasbah Hengelo inner area



Drawing 8 | Design consequences

KUBUSWONINGEN ROTTERDAM | PIET BLOM

The 'Kubuswoningen' in Rotterdam is also a project of Piet Blom. As mentioned before, he had a lot of conviction, daring and a naivety to experiment. This can also in this project, build in 1982, clearly been seen.

The 'Kubuswoningen' are located in the 'Oud haven', the most historic section of Rotterdam's port. According to Pascucci (2014) Blom did not want it to resemble typical housing. It was his answer to the attitude that a building, to be qualified as a house, needs to be recognizable as a house. Blom considered the experience of living in trees. Each cube was elevated and represented a tree. All trees together represented a forest. Inspired by the work of Le Corbusier, Blom realized that the narrow trunks with elevated housing would maximize public space below.

The project serves as a pedestrian bridge that spans over the seven-lane Blaak, connecting the harbour to the other side. Pascucci (2014) found that the pedestrian bridge featuring a promenade of retail spaces, was inspired by the Ponte Vecchio in Florence. There were also two larger cubes of which one was developed as a school of architecture and the second intended for commercial functions but never entirely finished.

Unfortunately the pedestrian bridge was not used much because crossing the seven-lane Blaak was faster than using the bridge and because of that the retail spaces disappeared. Nowadays they are re-purposed as studio spaces creating a live-work community. The bridge is now mostly used, not only by residents, but also by tourists.

In comparison with the 'Kasbah', Blom has learned lessons. The public outdoor spaces are bigger and lighter. The jungle of overwhelming stairs, columns, bridges and balconies have been reduced to the overhanging cubes. The buildings seem less closed from the pedestrian bridge and has no dead corners, preventing it of being perceived as an unsafe dark 'underworld'.

Unfortunately, the second public layer, the pedestrian bridge, is only used by residents and tourist. There is not enough movement during the day to create a vibrant environment. There are two reasons for this. The entrance to the bridge is reasonably closed and looks rather (semi-) private as public. This together with the fact that crossing the seven-lane Blaak is faster than using the pedestrian bridge.

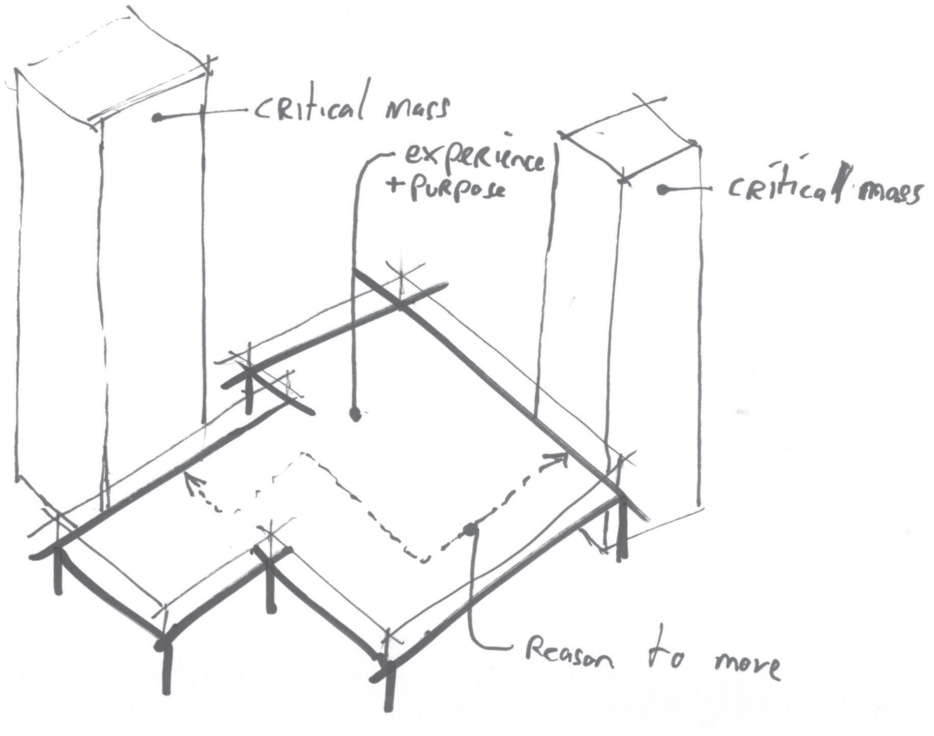
Figure 41 | Kubuswoningen Rotterdam

Design consequences

To make a second layer that actually is activated during the day, it should not only be defined, it must also have a purpose. Also in the case of the 'Kubuswoningen' there is a to strong own competitor with the same purpose, the direct crossing over the Blaak.

To create substantial movement there should be enough critical mass. However critical mass only is not enough, the residents and visitors should also have a reason to move during the day. In addition to its functional use it should attract people in another way as well, for example by making them curious, adding something new or making it an pleasant experience.

Figure 42 | Kubuswoningen Rotterdam inner area



Drawing 9 | Design consequences

NEW BABYLON | CONSTANT NIEUWENHUYS

Constant Nieuwenhuys (1920-2005) was a visual artist, author and musician. He was a prominent member of the art movement Cobra and the designer of visionary architecture under the name 'New Babylon'. He worked for more than twenty years on the elaboration of this New Babylon utopia.

According to Van den Bergen (1998) the realization possibility of New Babylon is based on two assumptions. On the one hand the socialization of the soil and on the other hand the complete automation of production. As Constant says, in New Babylon 'man' no longer has to work, in this new society the inhabitants lead a nomadic existence and 'man', in accordance with his desires, can come into his own as a creative being. He named this creative, playing man after the 'homo ludens' of Johan Huizinga.

"The question, how people would live in a society without hunger, without exploitation, without labor, a society in which every person without exception could fully develop his creativity, this important and intriguing question, evokes the image of a material environment that is essentially different from everything we know, from everything that ever has been realized in the field of architecture and urban design".

Constant Nieuwenhuys

According to Van den Bergen (1998) Constant states in his works that because a nomadic and creative way of life requires the greatest possible independence from material concerns, extensive public services must be present in the sectors of New Babylon to accommodate this.

Wigley and Witte de With (1998) shows that Constant presents New Babylon as a network. A chain of units that are mostly fifteen to twenty meters above the ground. These basic units, 'sectors', are structurally independent and hang over the existing city. Over time, the sectors grow together and thus make the traditional residential areas redundant.

In New Babylon the earth's surface consists mainly of vacant spaces, meant for agriculture, nature reserves, forests and parks, but also provides space for traffic routes, the complete automated production centres and other objects for which there is no room within the sectors.

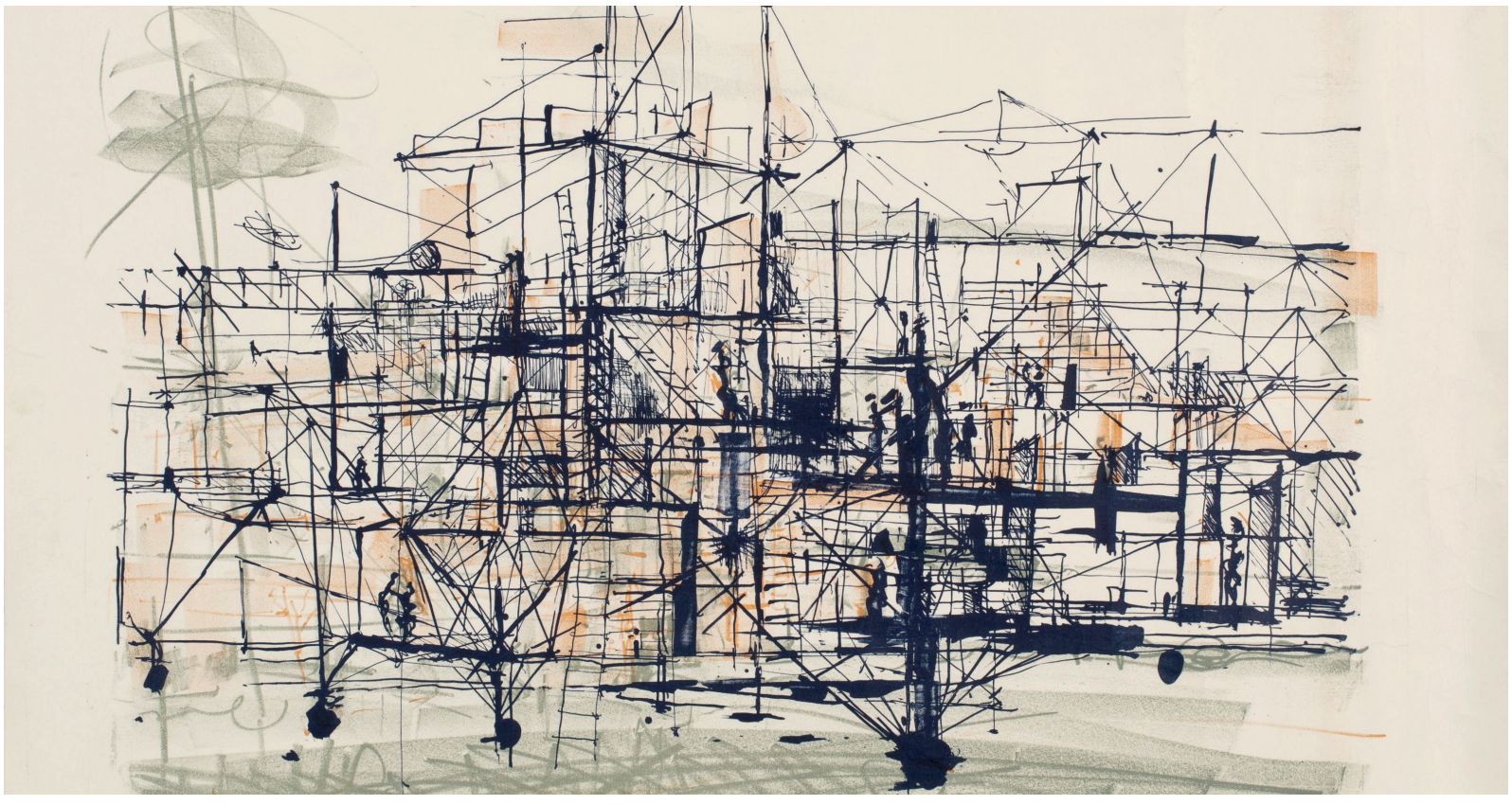


Figure 43 | Concept sktech New Babylon

Design consequences

Unfortunately, almost seventy years after the first sketch for New Babylon and despite the growing automation of production, 'man' still hast to work.

The idea of the nomadic existence could nowadays be translated to expats. They live temporarily in a foreign land and need also some independence from material concerns. This can be offered with the design of collective and public functions in the block.

Also the concept of sectors in New Babylon is interesting. In the masterplan the design of one block can be seen as a structural and functional independent sector. These sectors have the potency to connect later to create a chain of sectors across the inner city.

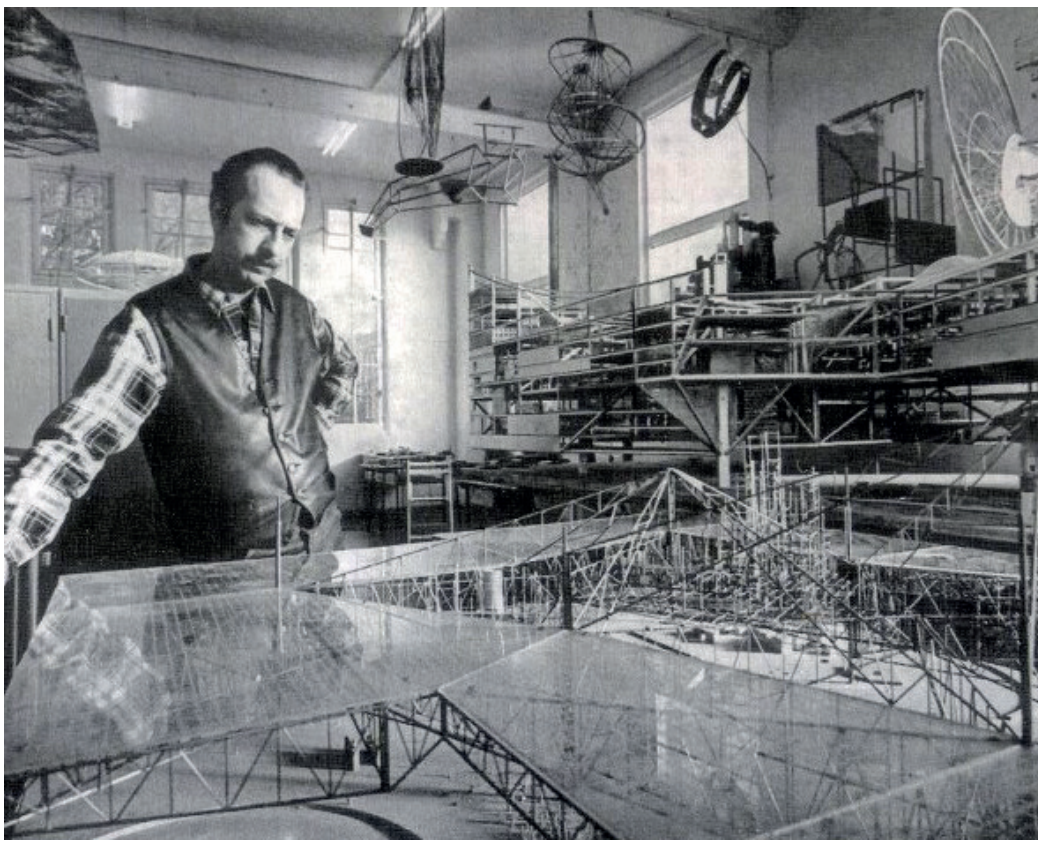
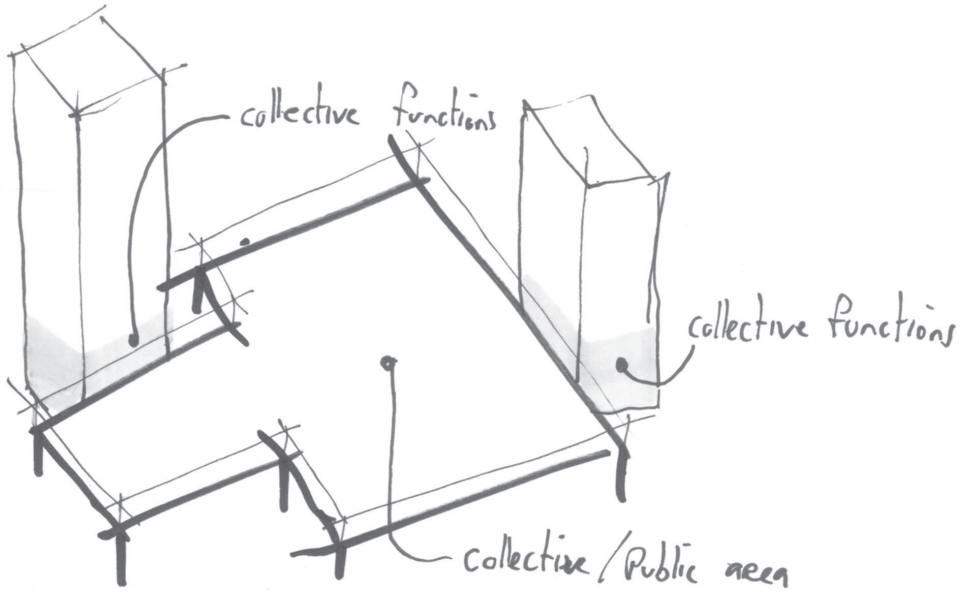
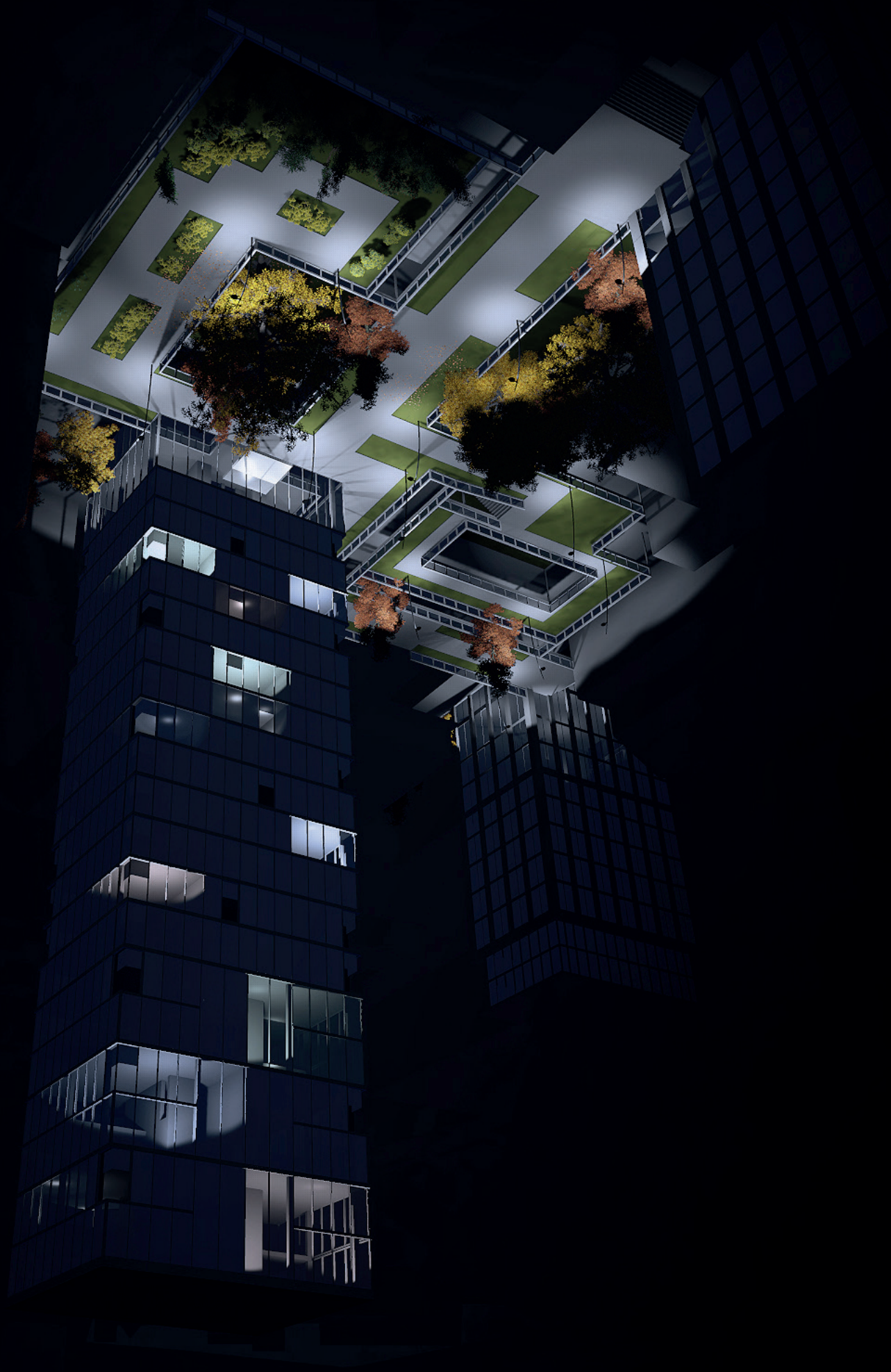


Figure 44 | Constant Nieuwenhuys

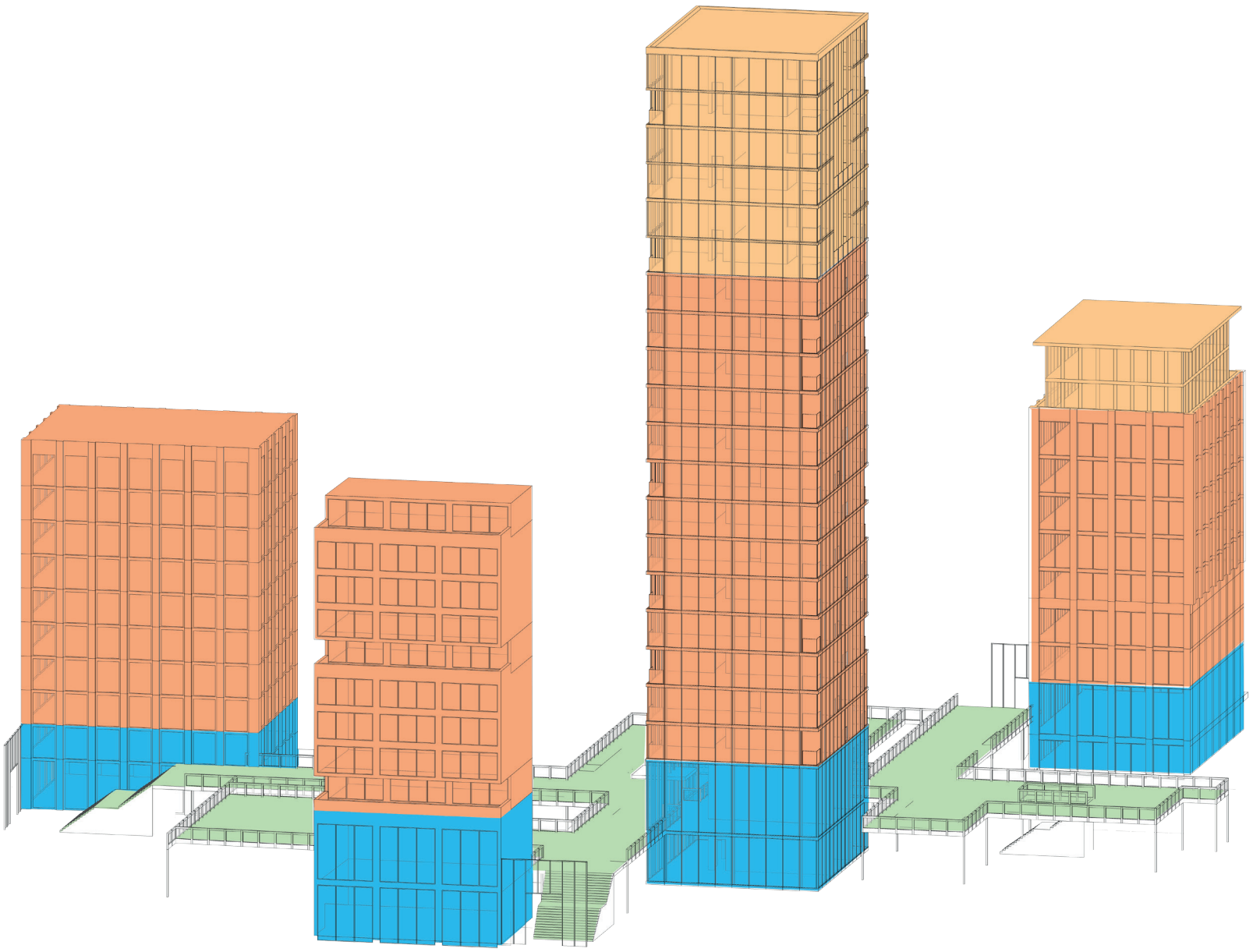


Drawing 10 | Design consequences



THE DESIGN

Figure 45 | Night visualisation


Collective spaces
Apartments
Penthouses

PROGRAM

The program consists of residential towers to react on the housing shortage. The ambition is to add two times the current housing of the block. The inner city has an average of 31 houses/ha and the block is almost 1 ha. Therefore the aim is to add at least 62 houses.

The New Babylon idea of independence from material concerns is considered in the towers trough collective spaces. These spaces are divided between the different towers to create movement. These collective spaces could also reflect the innovative way of thinking of high-tech Eindhoven. They accommodate for example shared cars and shared bikes.

The residential towers should also reflect the international high-tech appearance of Eindhoven in materiality. As a contrast to existing village-like Eindhoven the towers main material of the facade will be glass. Next to that the towers need to have a small footprint. This to maintain space for greenery in the block.

Next to the residential towers, the plan also accommodates a second layer. This second layers connects all the towers and there collective spaces, connects different sides of the inner city and provides greenery to the block. Next to the connections, the second layer accommodates also defined collective outside spaces as ‘sport‘, ‘events‘ and a ‘relaxing park‘. This to create liveliness during the day and add to the quality of living in the block.

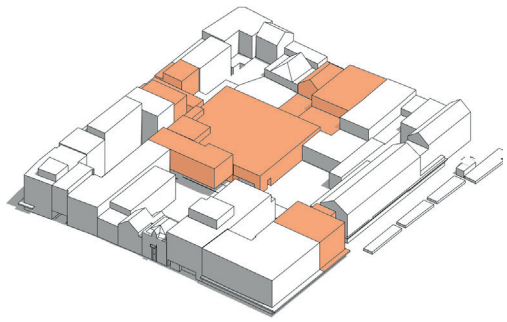
It must be prevented that the design of the towers is an ‘own competitor‘ to the collective second layer. Therefore the main outdoor space for the residents will be that second layer. Therefore there will be no balconies in the towers. To compensate the absence of a balcony, the apartments will have a corner window that can open up the whole corner, from floor to ceiling.

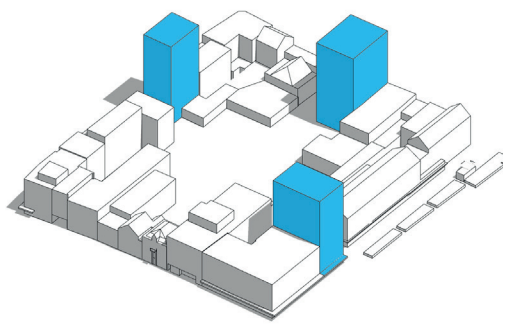
The development scheme of an average block is translated to the existing block. Scheme one shows the small grain size of the buildings in the existing block and the ragged edge on the inner area. The big building in the middle does not fit in this small grain size and does not add any value to the inner area. Therefore it will be demolished. Also on the edge some buildings will be demolished to create space for a better permeability. These openings are not opposite to each other to avoid fast walk-troughs.

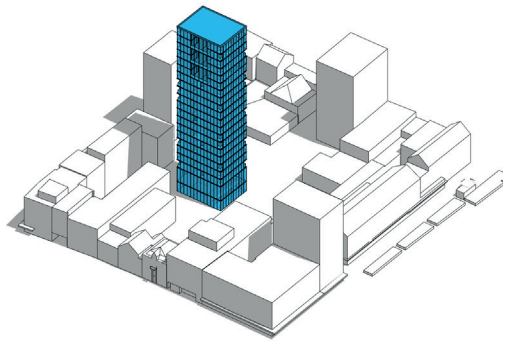
As shown in scheme tow, after the demolishing the openings in the block are highlighted with low towers. This creates a better visual permeability of the block while at the same time, because of their spread position on the edges, create movement between the towers collective spaces in the plinth. This makes sure the whole inner area will be used and that there are no dead corners in the inner area of the building block.

In the inner area is, as previously researched in the ‘urban integration‘, space for one tower. This tower adds the needed critical mass for activating the inner area and adds the needed housing. As shown in the ‘urban integration‘ this tower can reach seventy meters in height. It will be the central point of the project. This is shown in the third scheme.

To functional divide the use of the inner area, there will be an elevated second layer between the towers. The ground floor will maintain its functional use while the second layer will hide this functional use of the ground floor, accommodate permeability, greenery, and collective outside space. The second layer also connects all the collective spaces in the plinth of the towers







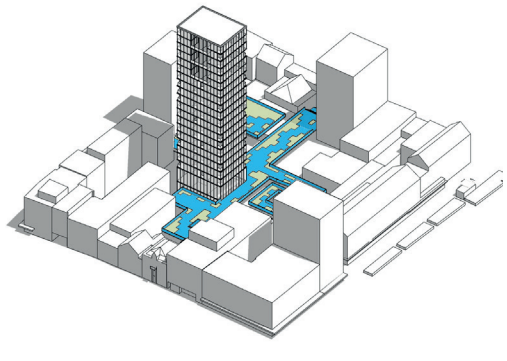


Figure 46 | Program

Figure 47 | Schemes development existing block

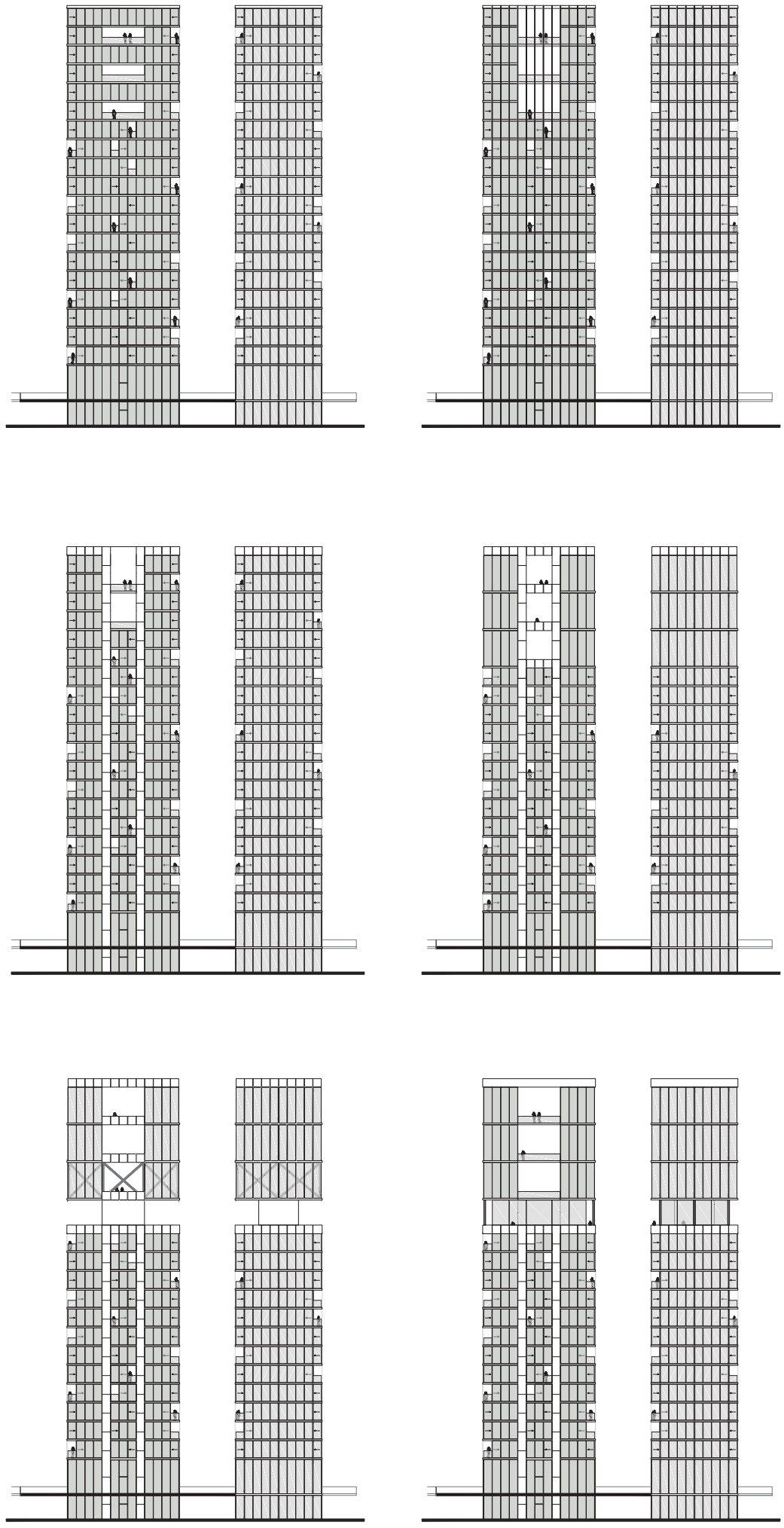
Tower facade

For the facade design of the main tower are a few starting points. As mentioned before the facade will be glass and the corner windows can be opened to create a sense of an outside space for the residents and at the same time dynamic in the facade.

The tower exists of three parts. The first two floors accommodate collective functions, the middle part accommodates apartments and the top accommodates double high penthouses.

This division of functions should be shown in the facade according to Sullivan (1896). These researched facade concepts do that in different ways. The top two façades show high windows on the bottom two floors followed by the middle part with the corner windows that can open. The top floors have double high windows/ indoor balconies to show the changing function. The middle two façades do the same but add a vertical element to the tower to give it more verticality and show the structure of the building on the outside. The last two facade options make a more expressive separation between the middle part and the top part.

The top right facade is the most in balance. The form of the tower gives it enough verticality and the open corners in the middle and top part give it a balanced dynamic. The subtle difference between middle part and the top shows the also subtle difference in function. This facade forms the base for the final facade design.



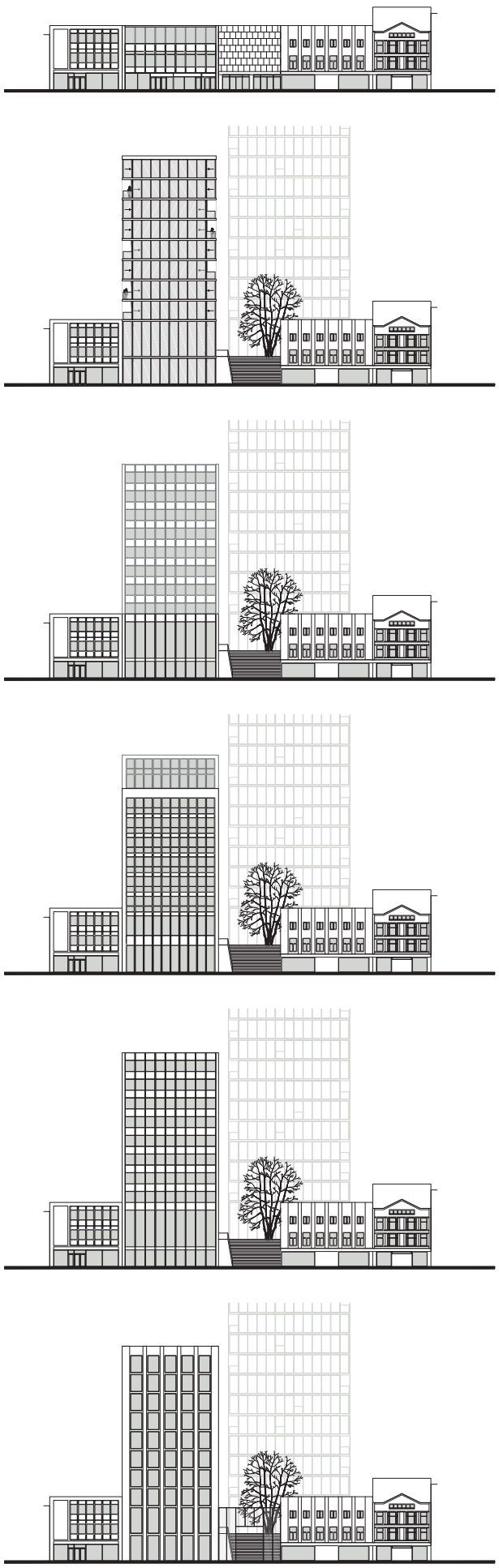
Drawing 11 | Concept façades tower 1:1000

North-East block facade

The low towers have not been worked out but because they have a relation with the main tower and the existing block, as a mediator, a facade concept on the outside of the block is designed to explore this relation.

The first concept aims to use the same facade as the main tower. The next four concepts use the grid of the existing building on the left or right. The North-East side of the block is quite flat and therefore the option with a setback does not fit well.

The last two options fit best in the block. The second last concept uses the grid of the building on the left while the last concept uses the grid of the building on the right. The last option is less busy and more in balance with the North-East side of the block and the main tower. Therefore the last option is used as concept for the North-East facade.



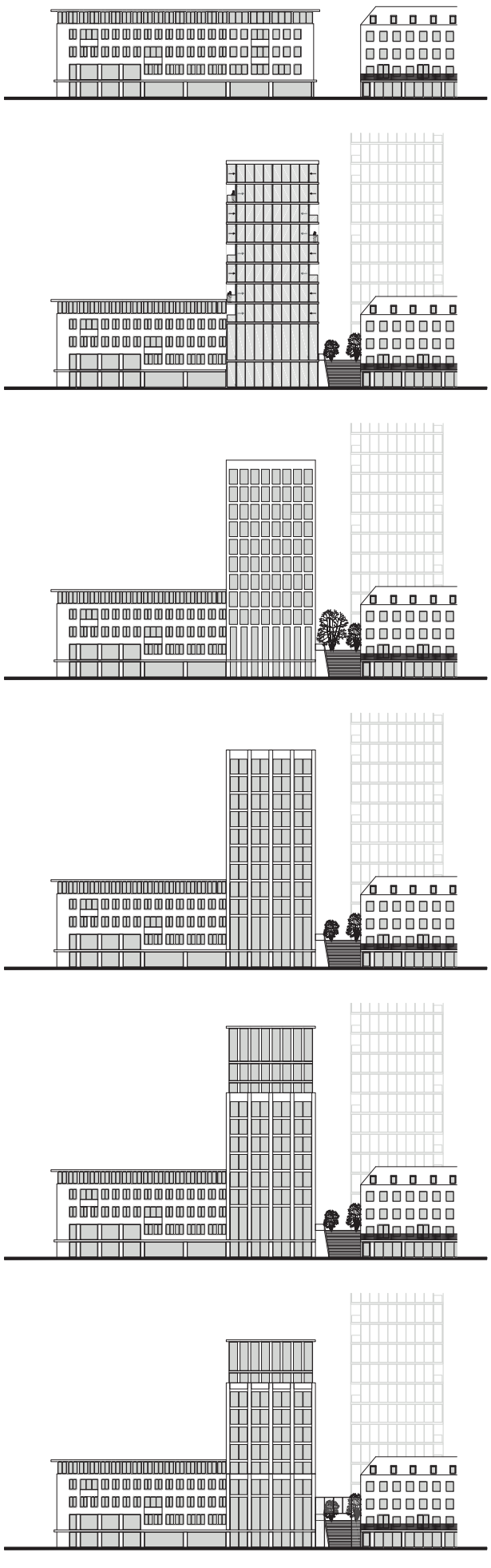
Drawing 12 | Concept façades block North-East 1:1000

South-East block facade

To explore the relation between the South-East side of the block and the main tower, also here a facade concept on the outside of the block is designed.

The first concept aims to use the same facade as the main tower. The next four concepts use the grid of the existing building on the left or right. The South-East side of the block consist of two main buildings with a setback (or pitched roof) on the top level. Therefore the concept with the setback on the same height works better.

The last two options fit best in the block. Both use the grid of the left building and add a top similar to the main tower. The height of this top is different and more in balance to the rest of the block in the last option. This option also has the best balance between the South-East facade and the main tower. Therefore the last option is used as concept for the South-East facade.



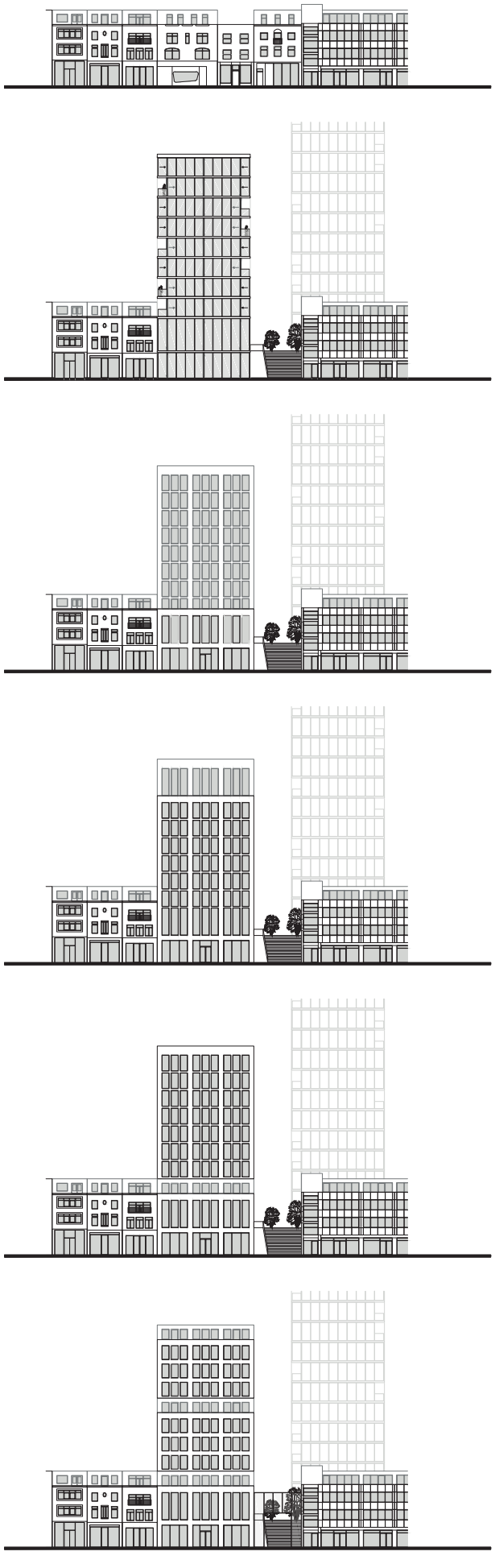
Drawing 13 | Concept façades block South-East 1:1000

North-West block facade

Also to explore the relation between the North-West facade of the block and the main tower, a concept of the facade of the low tower on the outside of the block is designed.

The first concept aims to use the same facade as the main tower. The next four concepts use the grid of the existing building on the left or right. Like the South-East side of the block, the North-West side of the block consist of buildings with a setback on the top level. Therefore the concept with the setback on the same height as the existing buildings works best.

The last concept fit best in the block. It repeats the height and setback of the existing buildings three times to reflect the height of the existing buildings and uses the grid of the buildings that its connected to. This option also has the best balance between the grid of the North-West facade and the material of the main tower. Therefore the last option is used as concept for the North-West facade.



Drawing 14 | Concept façades block North-West 1:1000

Design concepts second layer

To make a conceptual plan for the greenery of the second level four different sizes are uses. The ‘S‘ size is grass used for the sport area. The ‘M‘ size consists of low greenery to create greenery while maintaining sights. To create some privacy for residents living in the existing buildings and to ‘decorate‘ some existing closed façades the higher ‘L‘ size is used. As last, to create a unique atmosphere on the second level the ‘XL‘ size is used. The ‘XL‘ size uses tree’s on the ground level creating the unique atmosphere of walking and relaxing between a canopy of leafs on the second layer. It also contributes to the privacy of the second level. On the right page is a conceptual plan for the greenery.

On the following spread is a conceptual design of the walkway in a more formal and an informal way. The informal walkway reacts on the ravel edge of the existing building block, within the grid of the tower while the formal one makes a stronger relation to this grid. For the design is chosen for the formal way to create a more cohered design between building and second layer.

Figure 48 | Concept greenery S

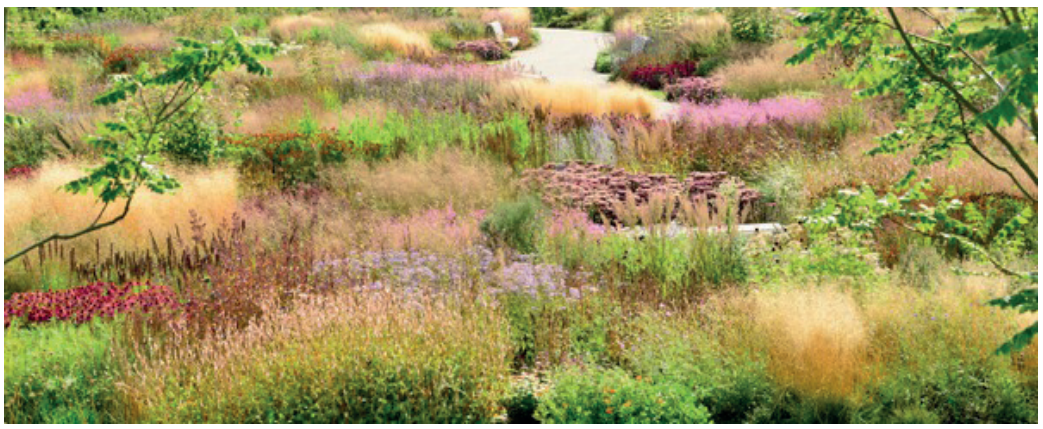
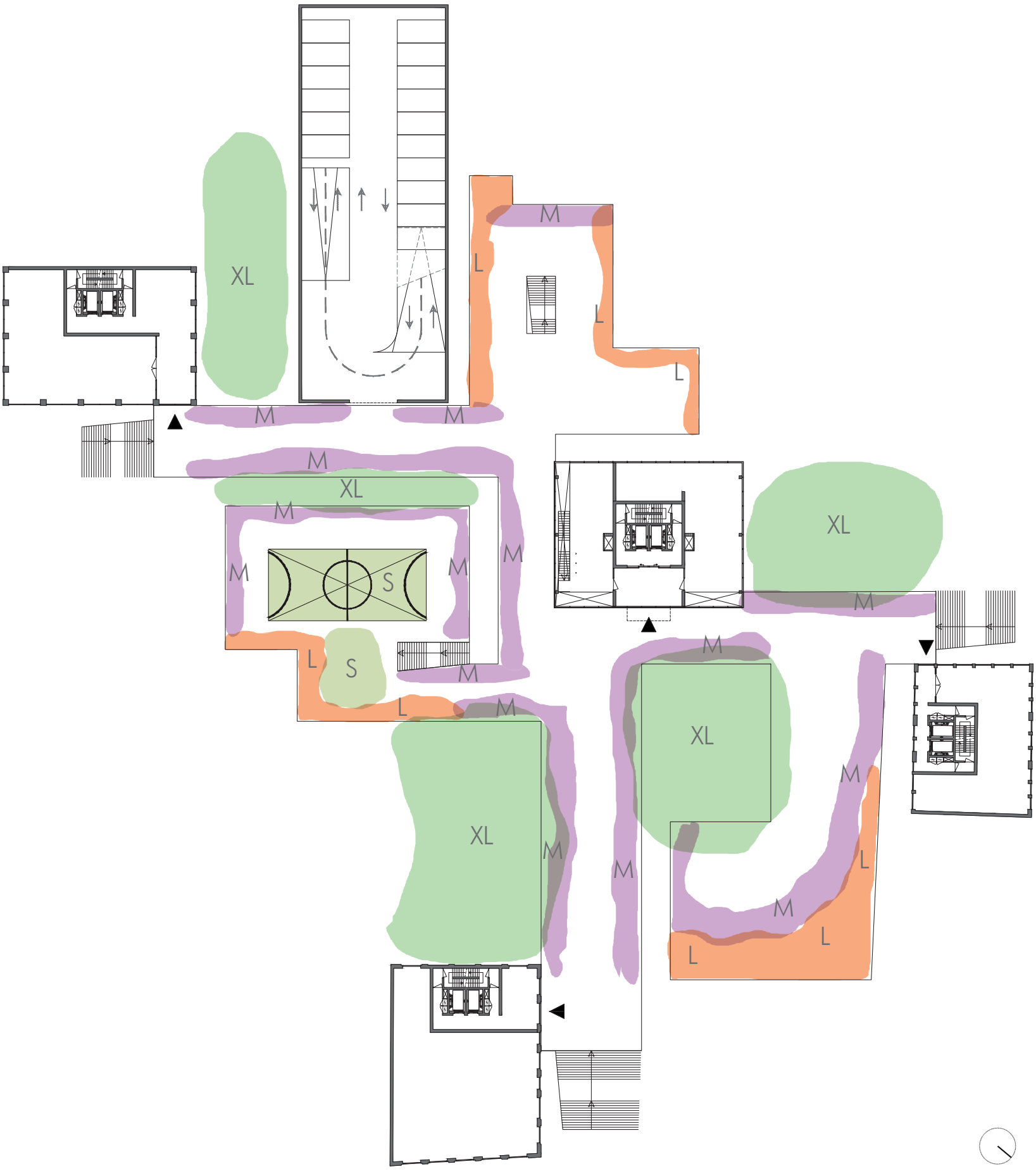


Figure 49 | Concept Greenery M

Figure 50 | Concept greenery L

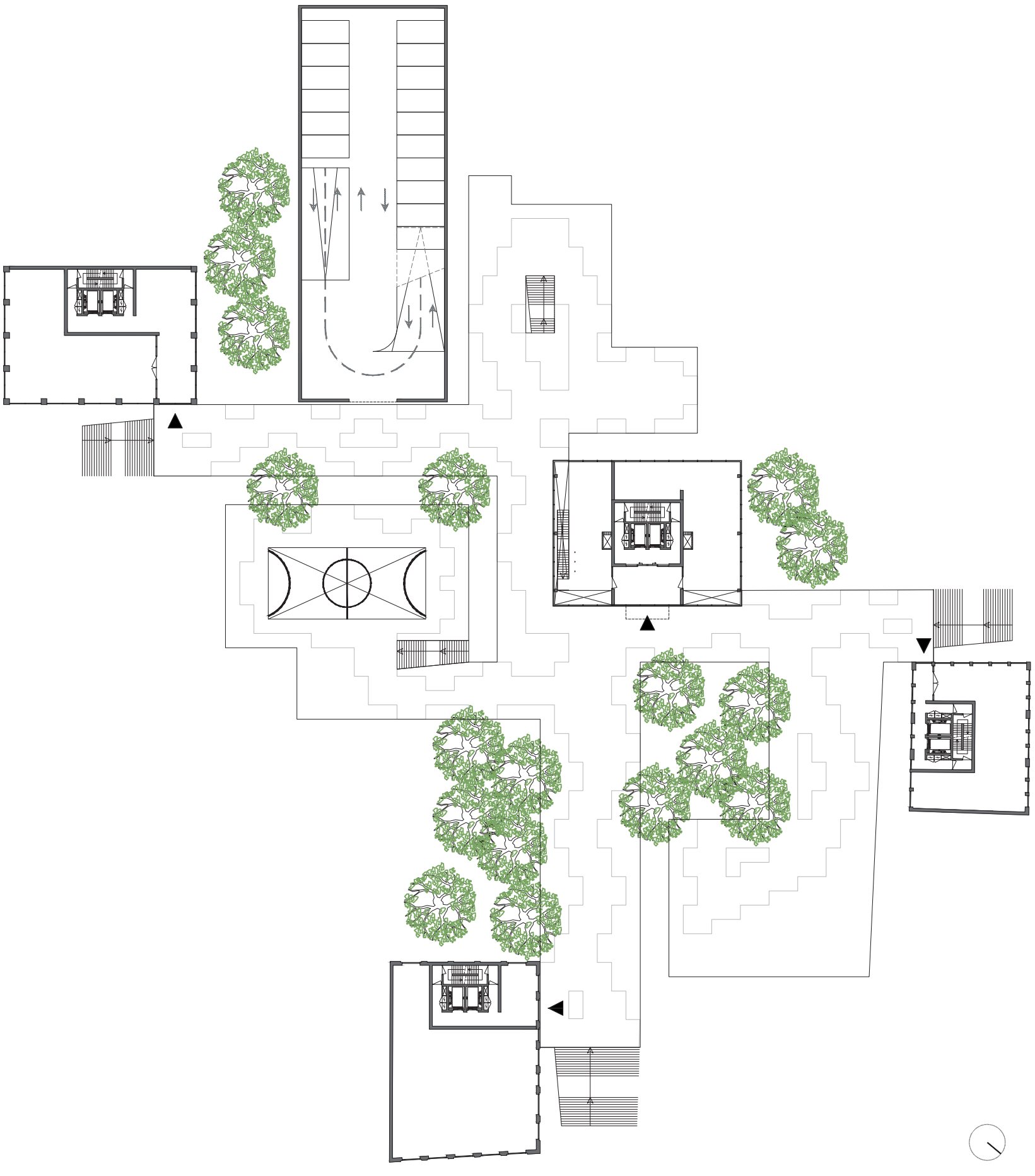
Figure 51 | Concept greenery XL

Concept greenery
scale 1:500



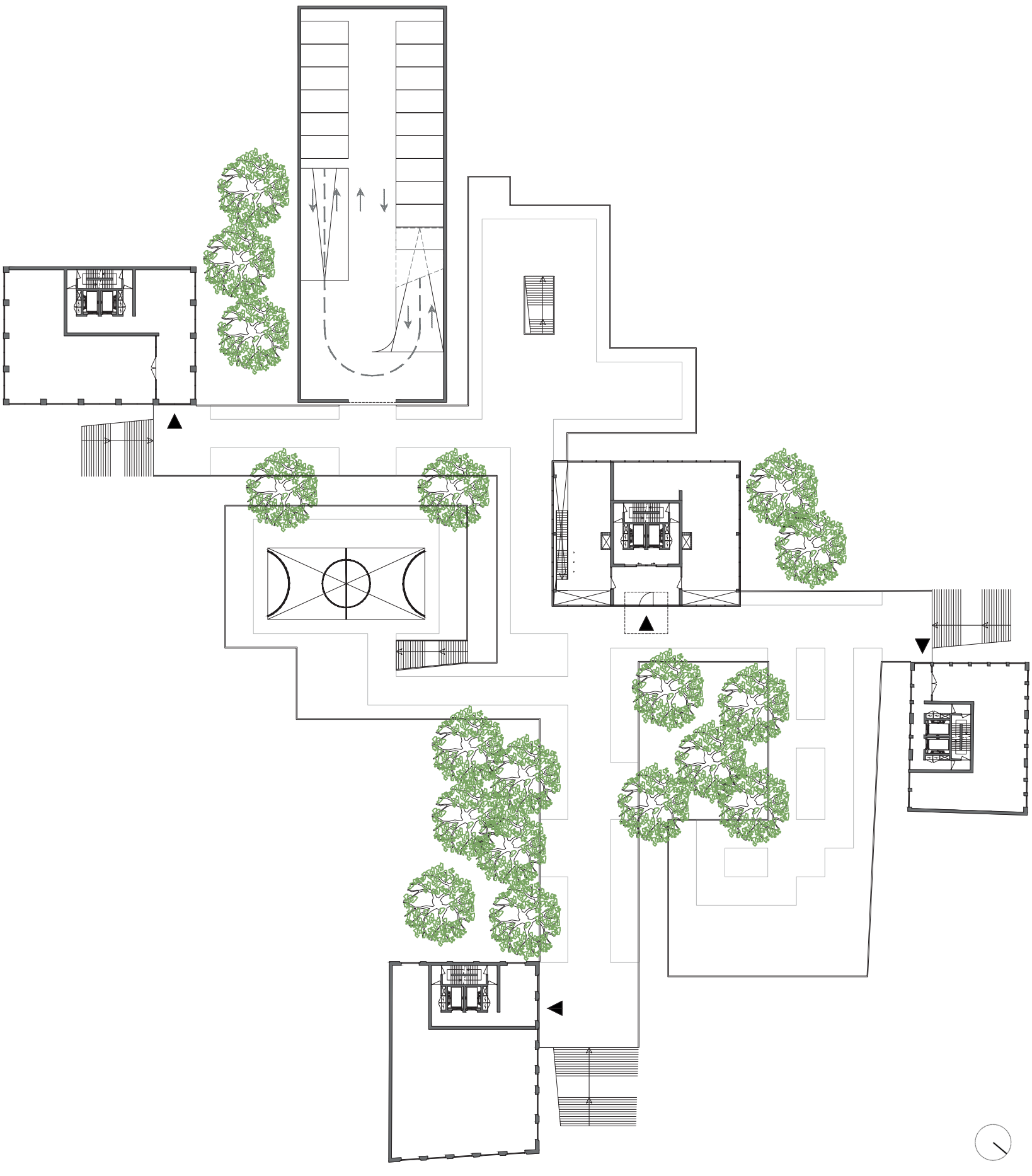
Drawing 15 | Concept greenery

Concept walkway informal
scale 1:500



Drawing 16 | Concept walkway informal

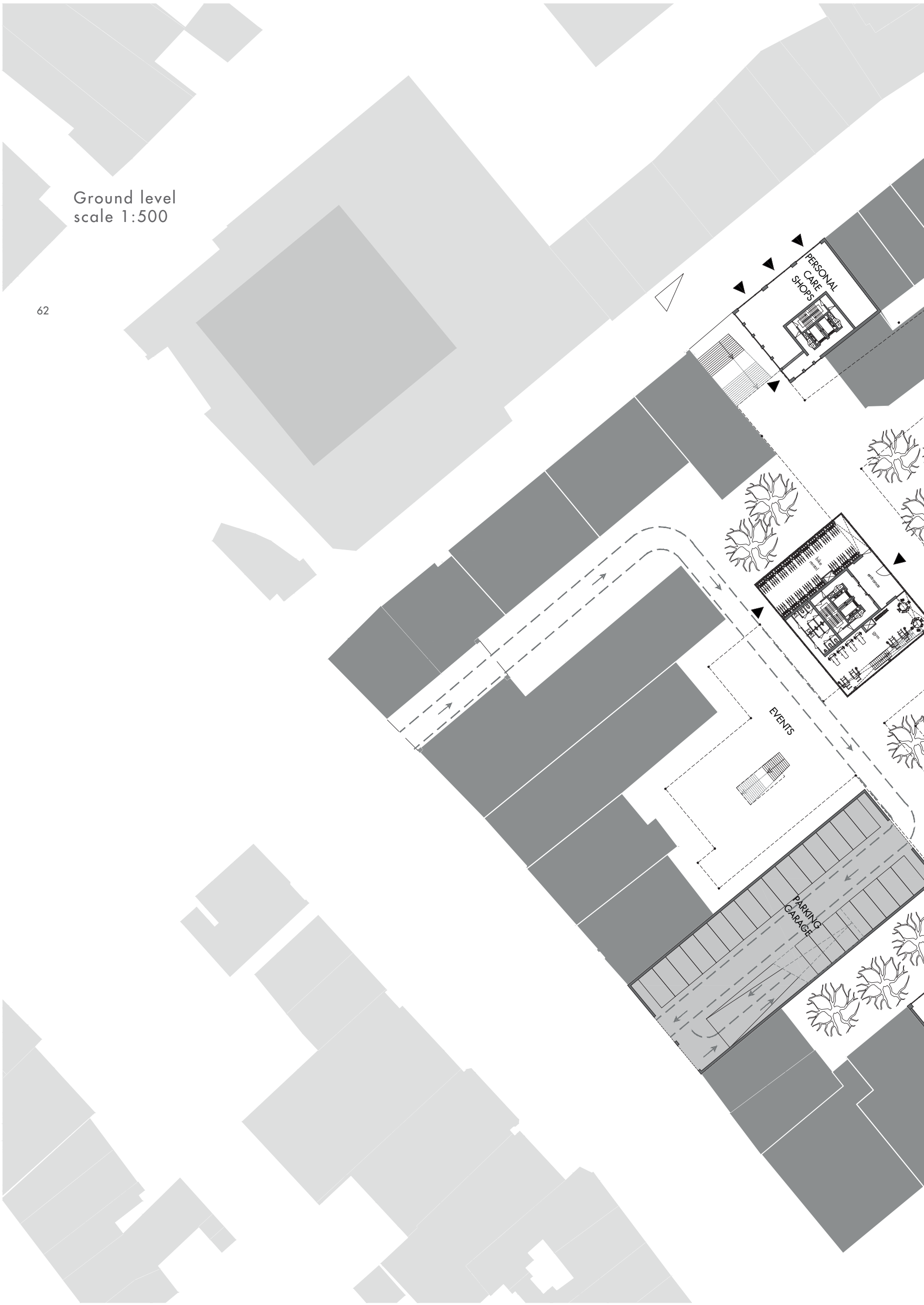
Concept walkway formal
scale 1:500



Drawing 17 | Concept walkway formal

Isometric view block (North to South)

Ground level
scale 1:500



63

CITY
SUPERMARKET

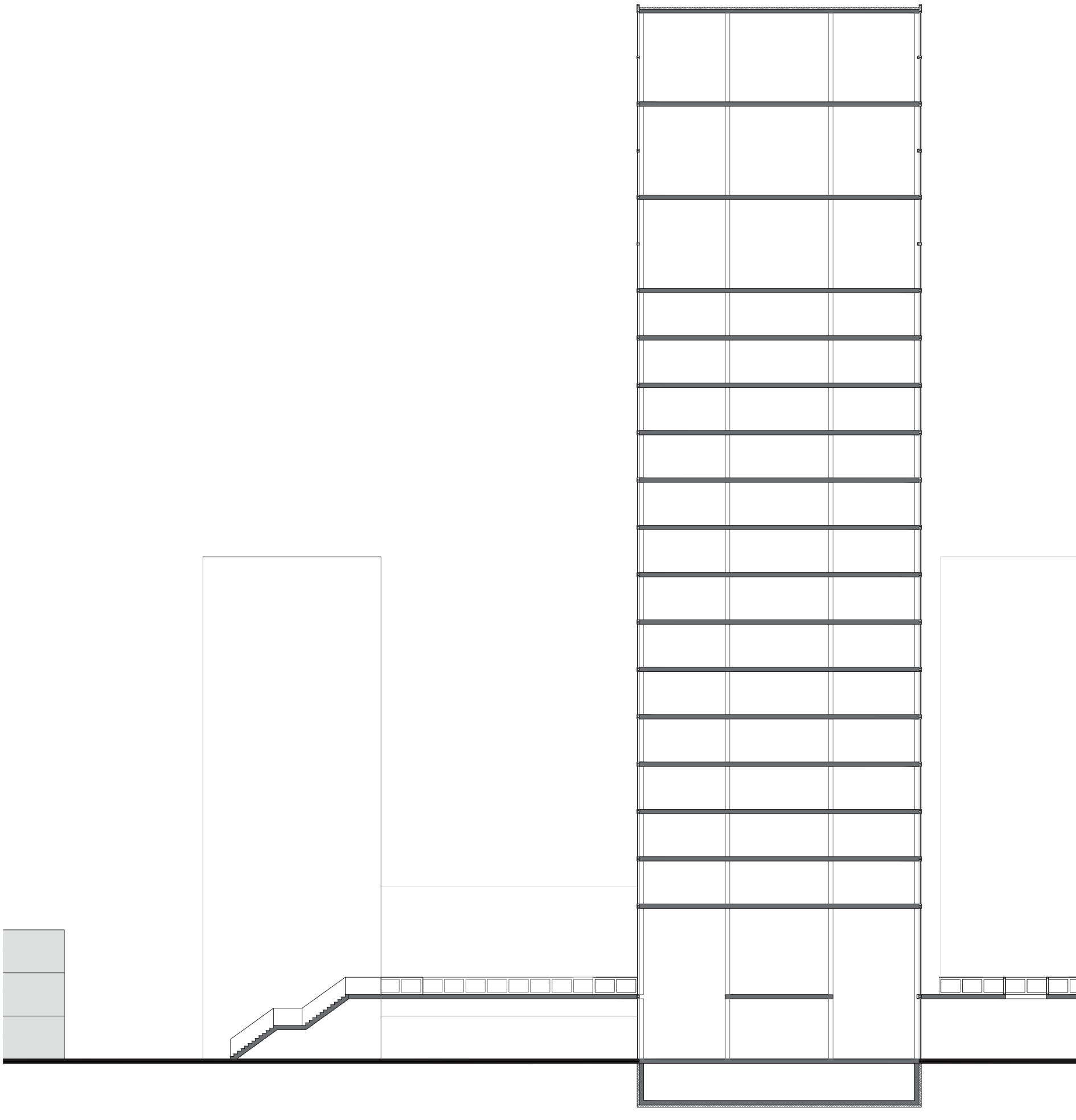
SPORTS

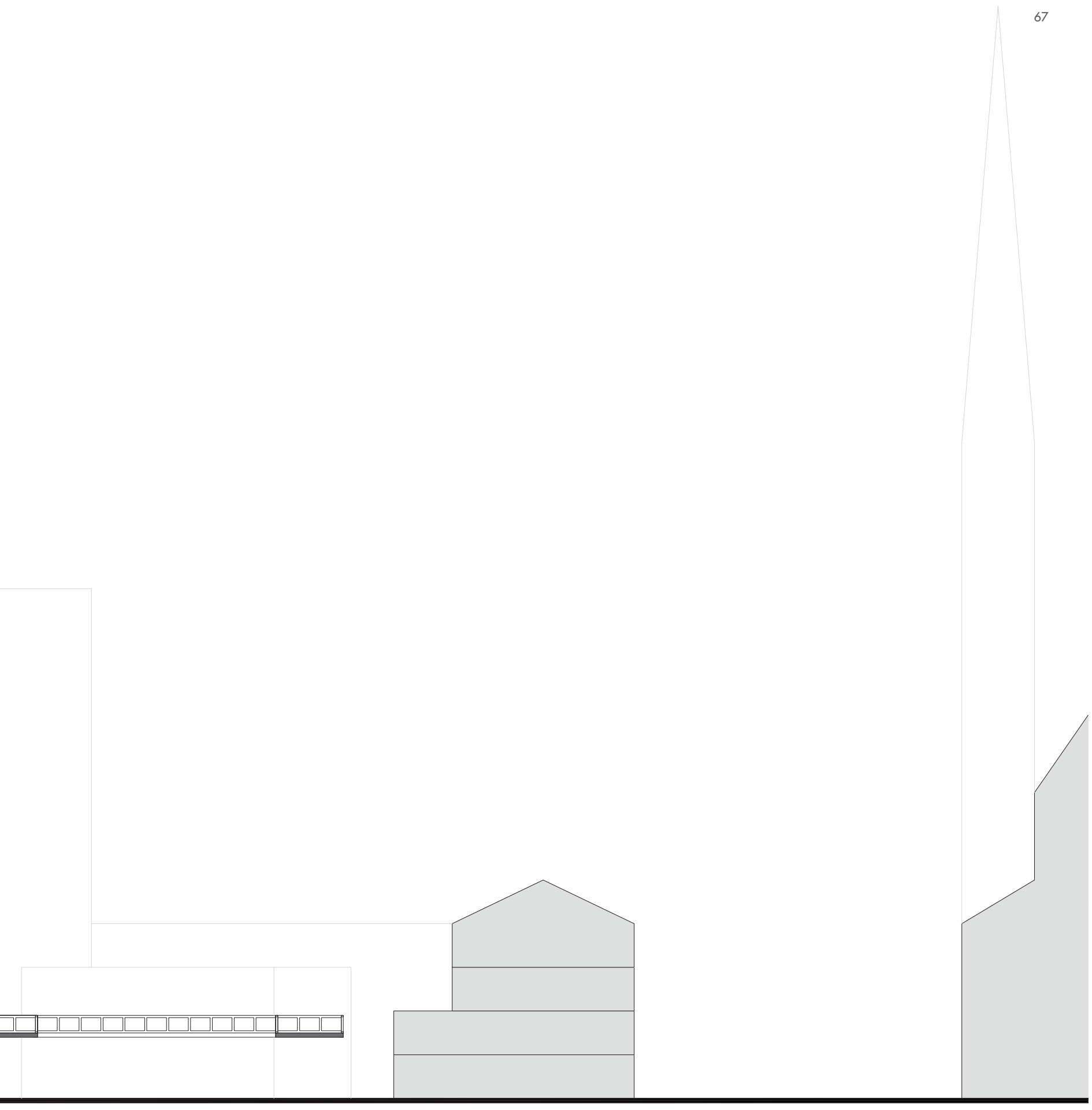
WORK
SPACES

Ground level 1
scale 1:500

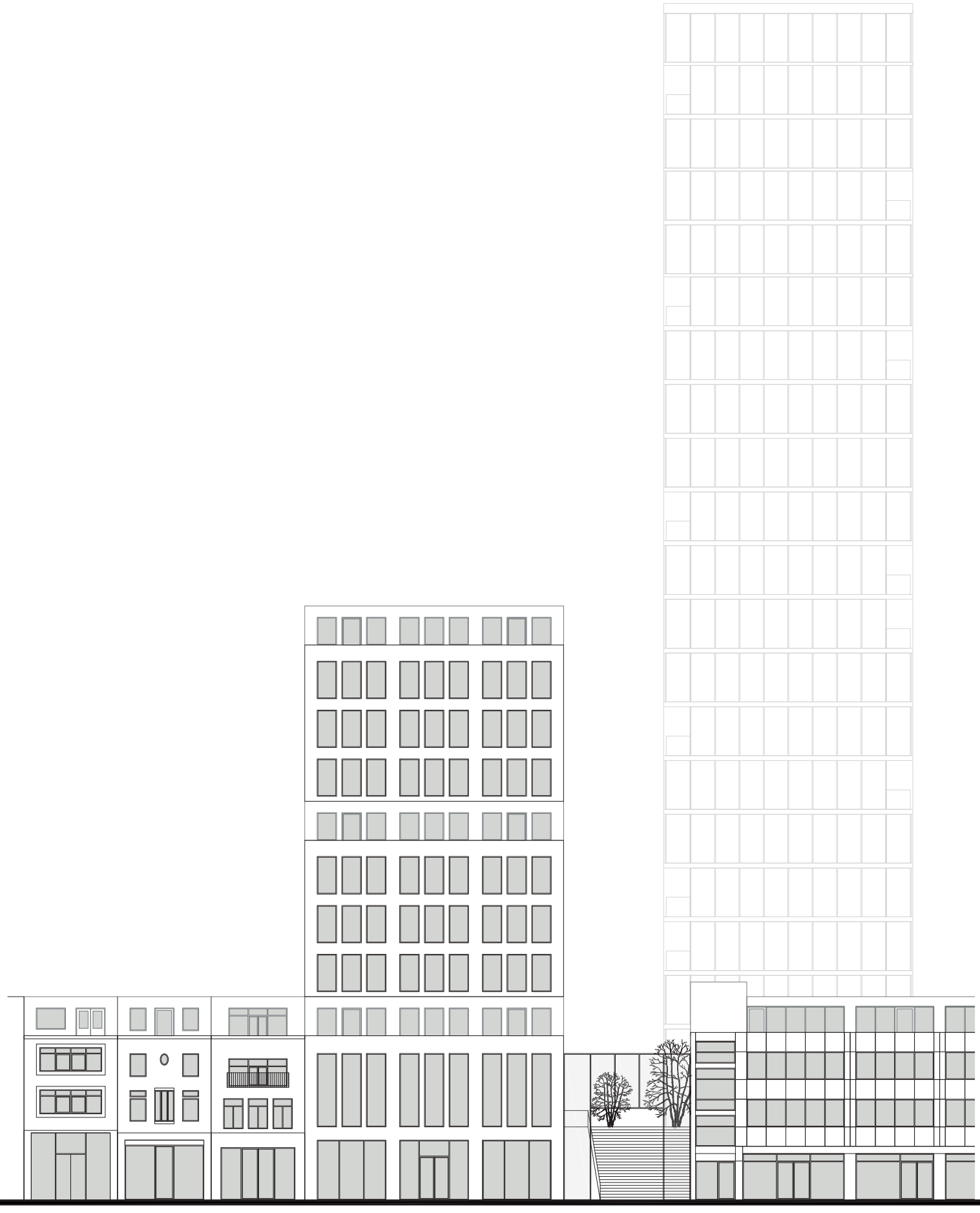

WORK SPACES
SPORTS
RELAX PARK
CITY SUPERMARKET

Section block
scale 1:300

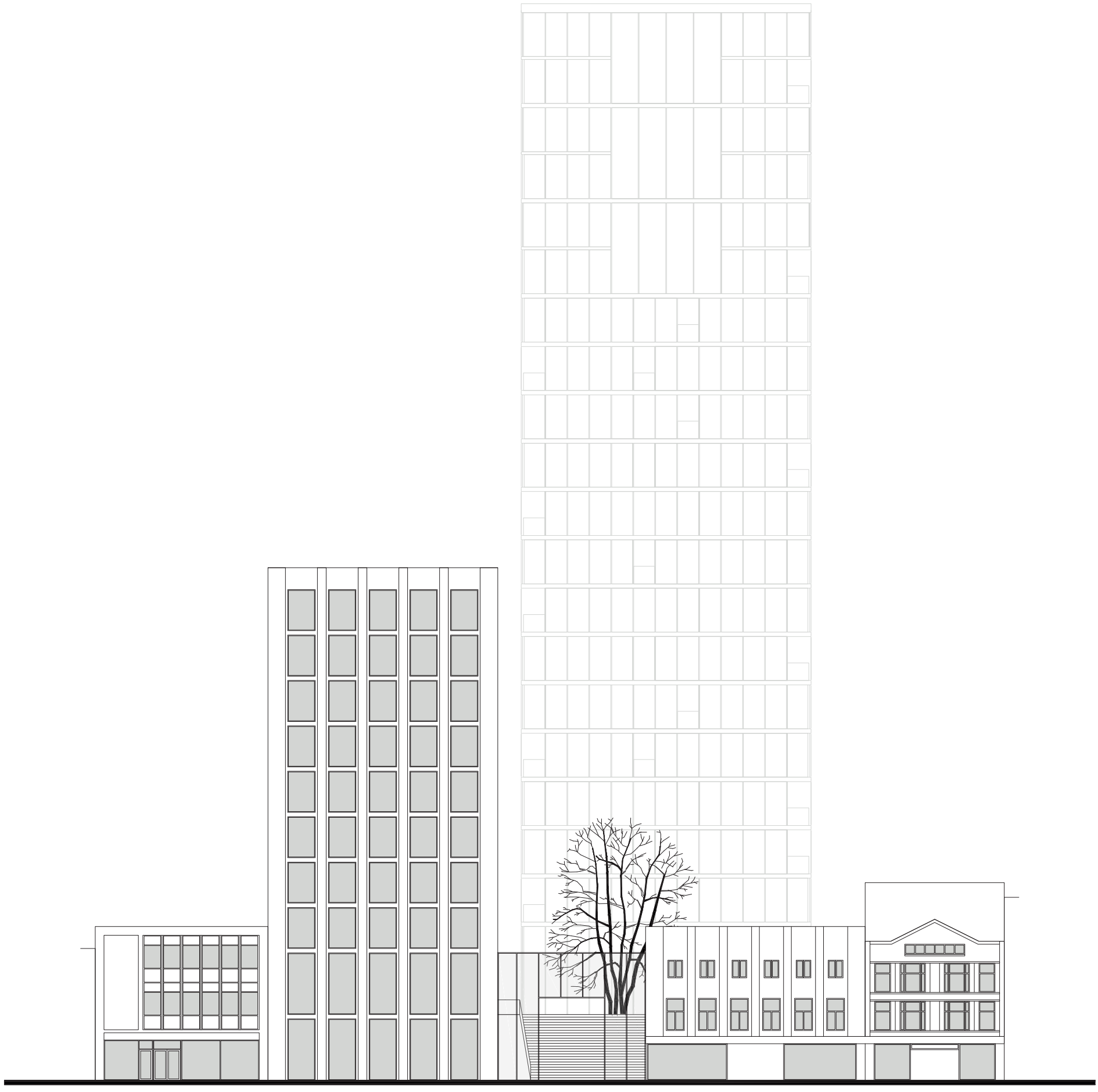




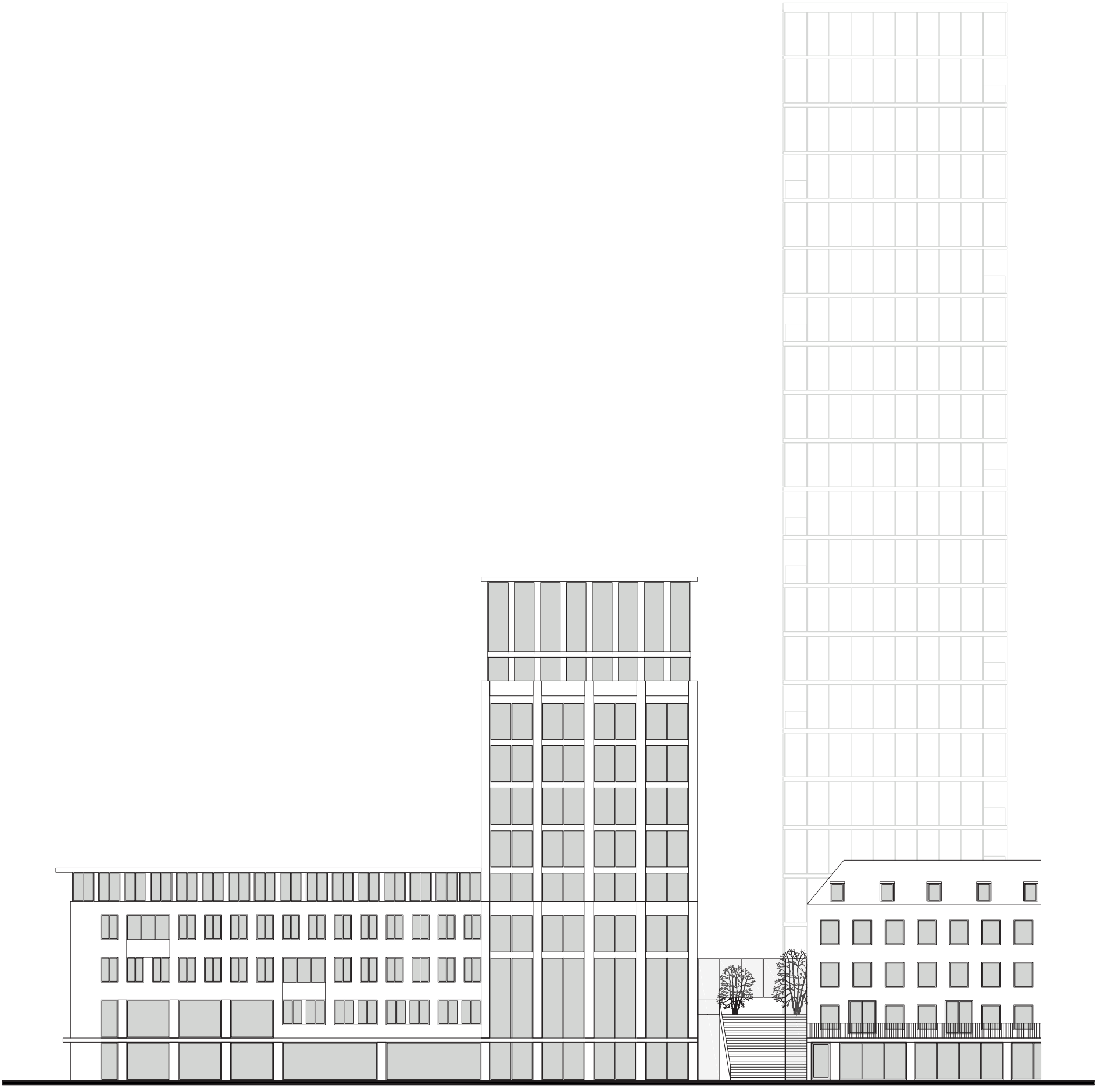
North-West facade block
scale 1:300



North-East facade block
scale 1:300



South-East facade block
scale 1:300




FAIR PLAY
CASINO
KEEP YOUR EYES
ON THE PRIZE
FAIR PLAY
CASINO

Floorplan Groundfloor
scale 1:100

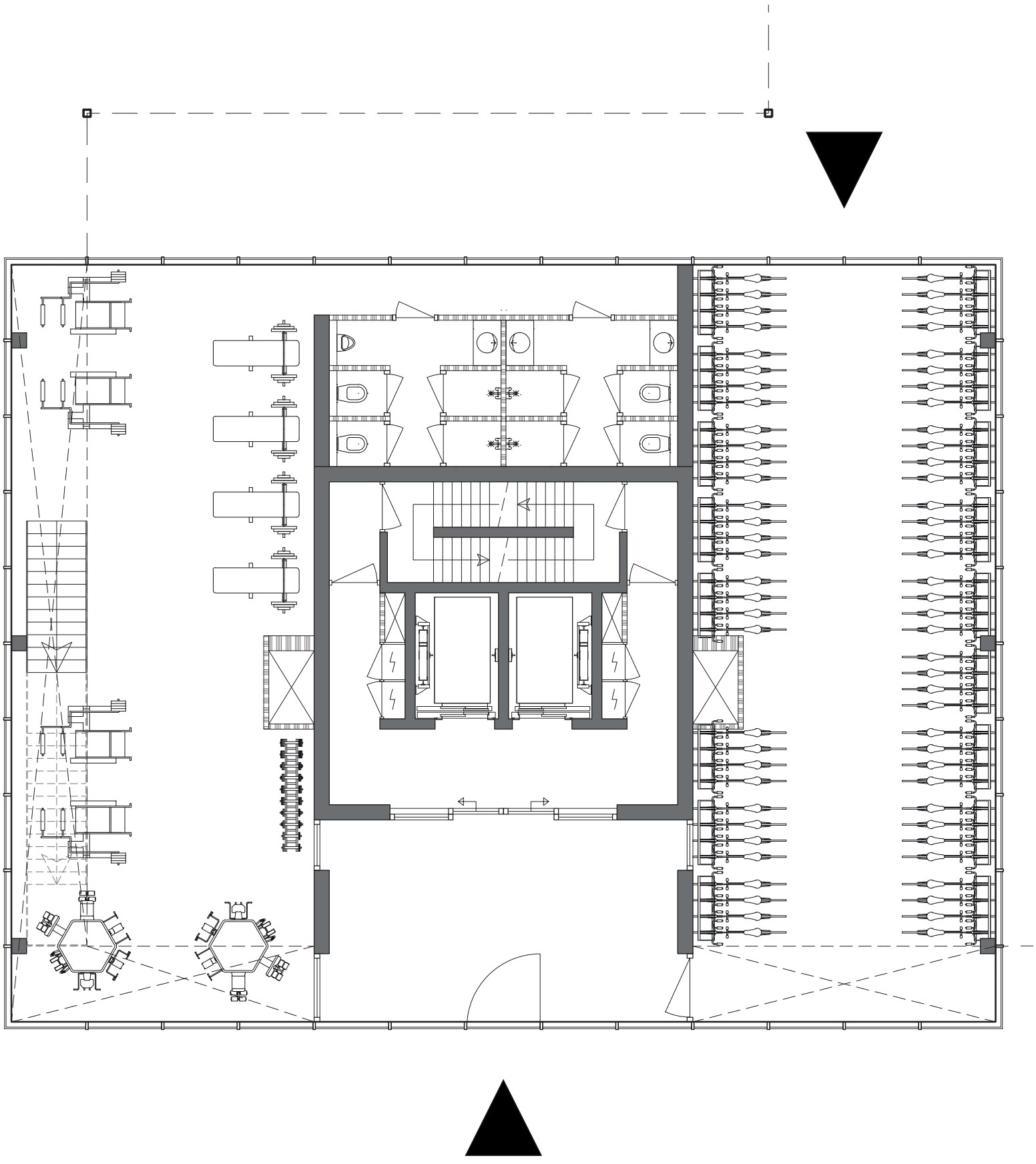
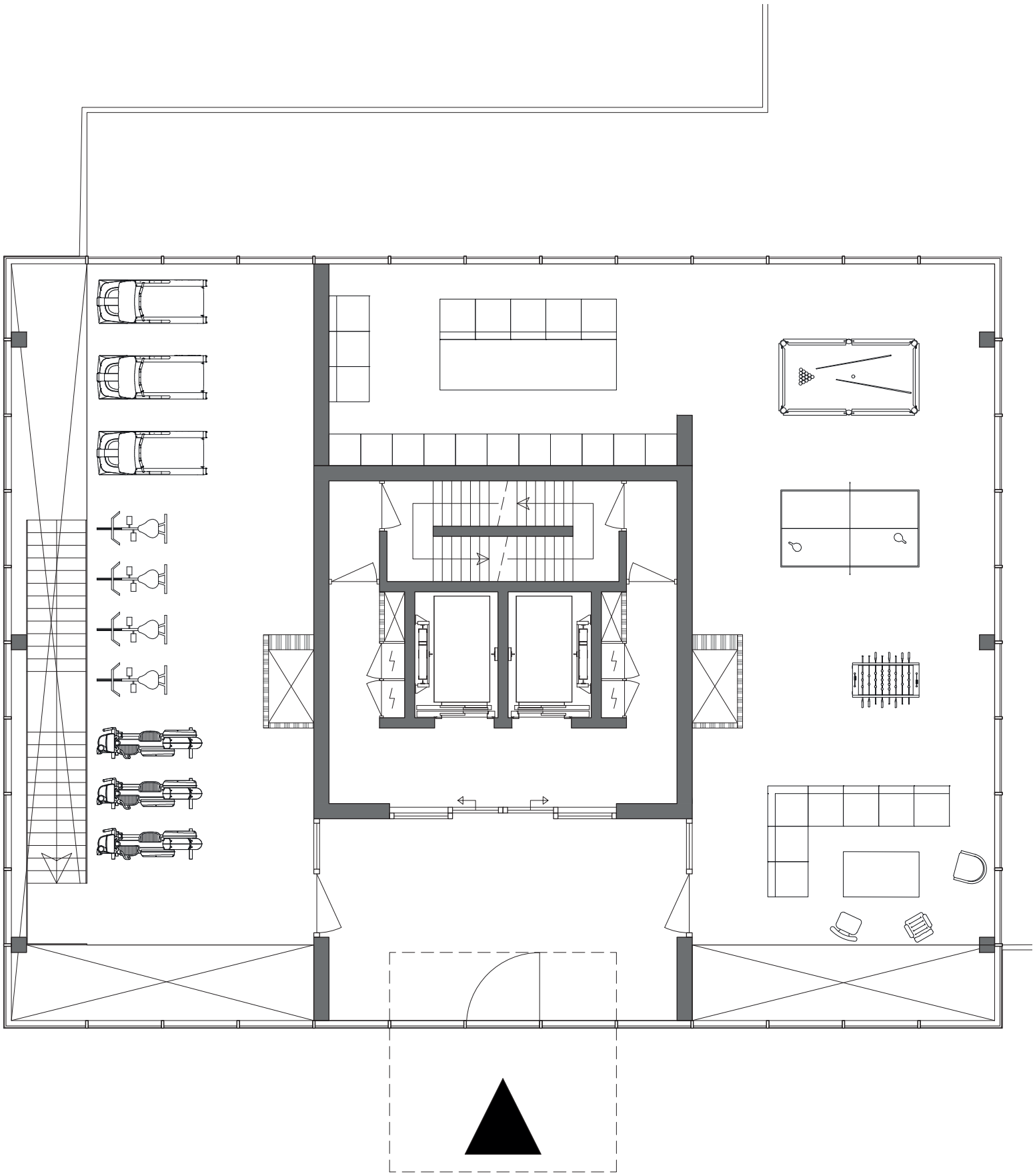
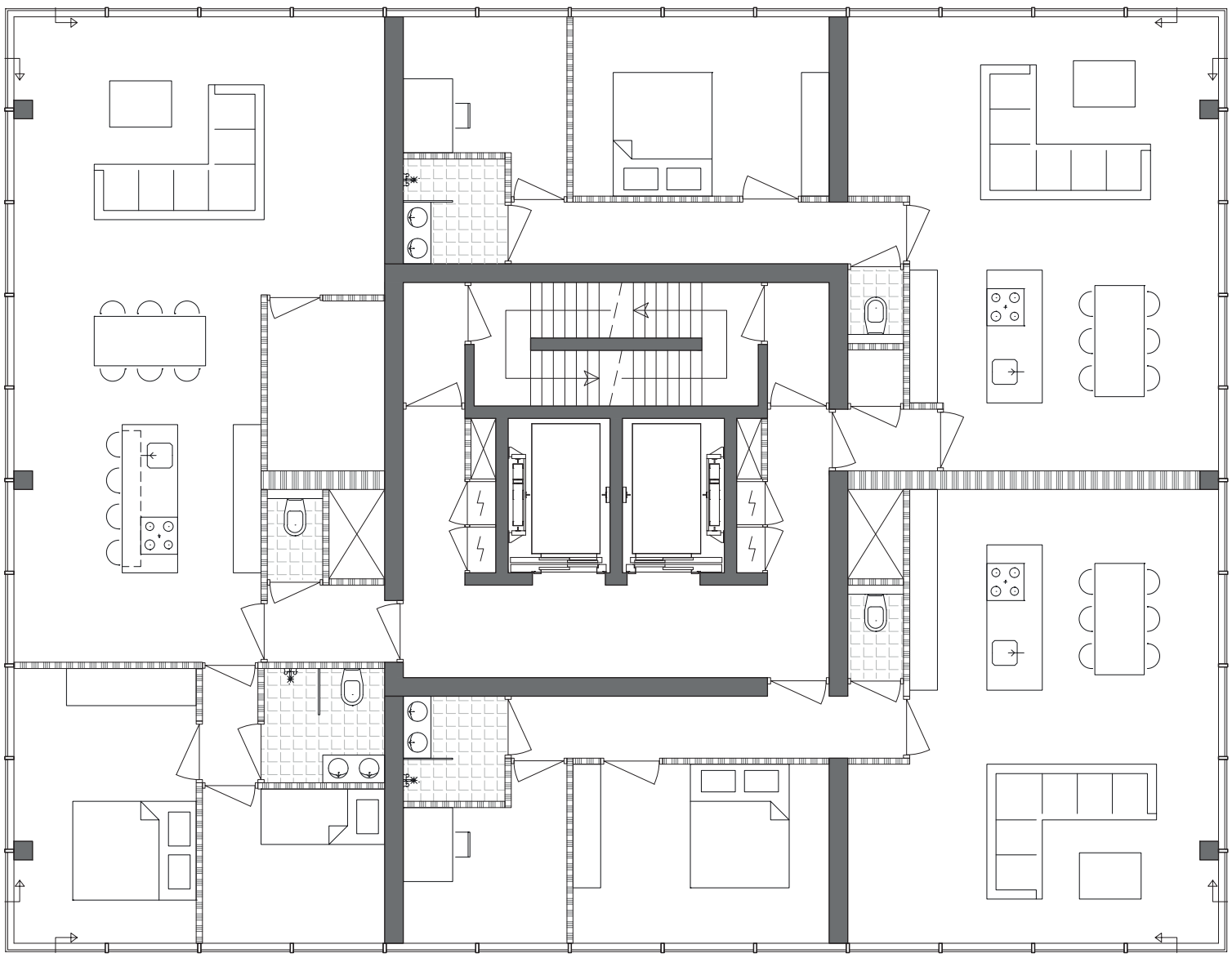


Figure 52 | Previous page: visualisation outside the block (main street)

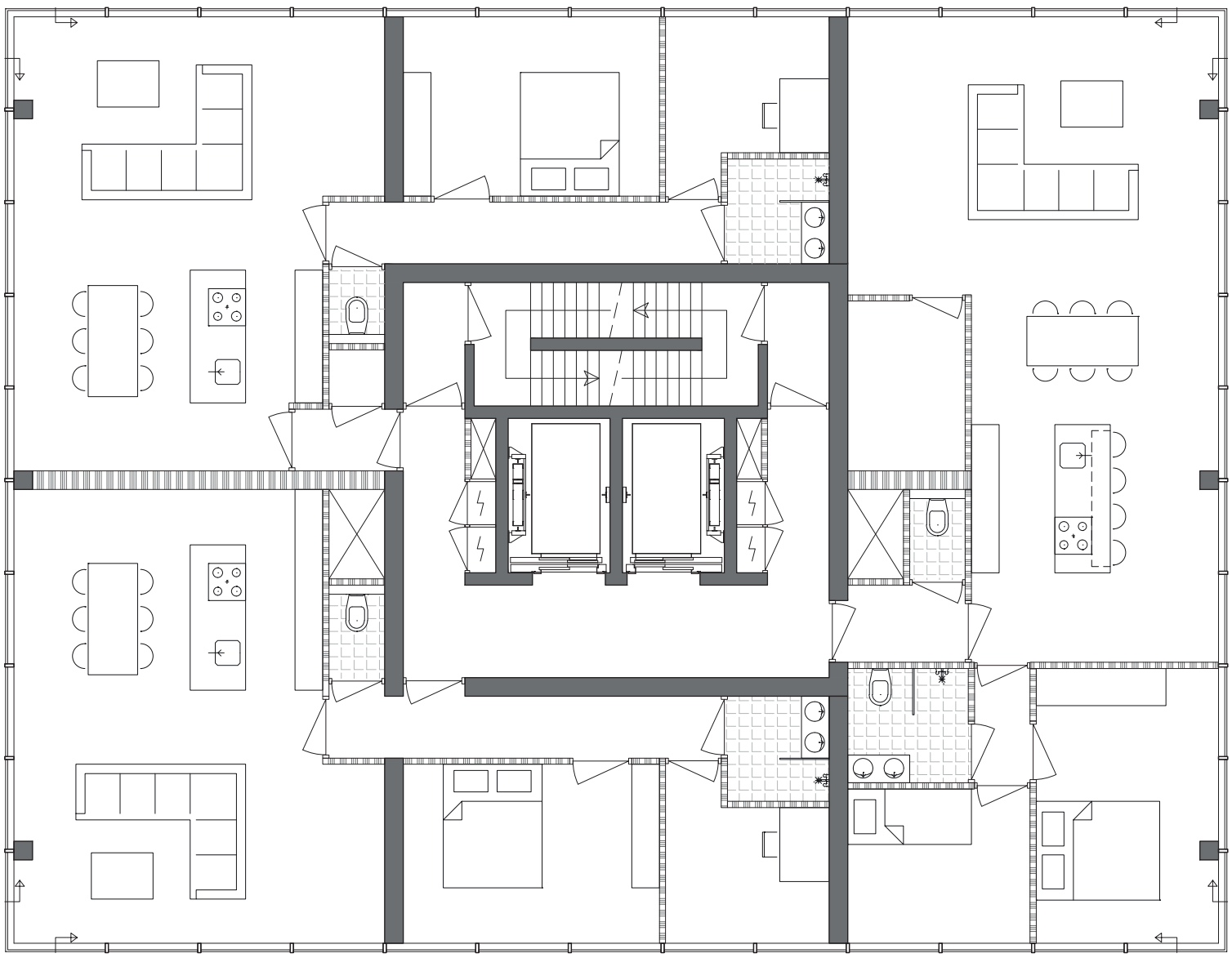
Floorplan level 1
scale 1:100



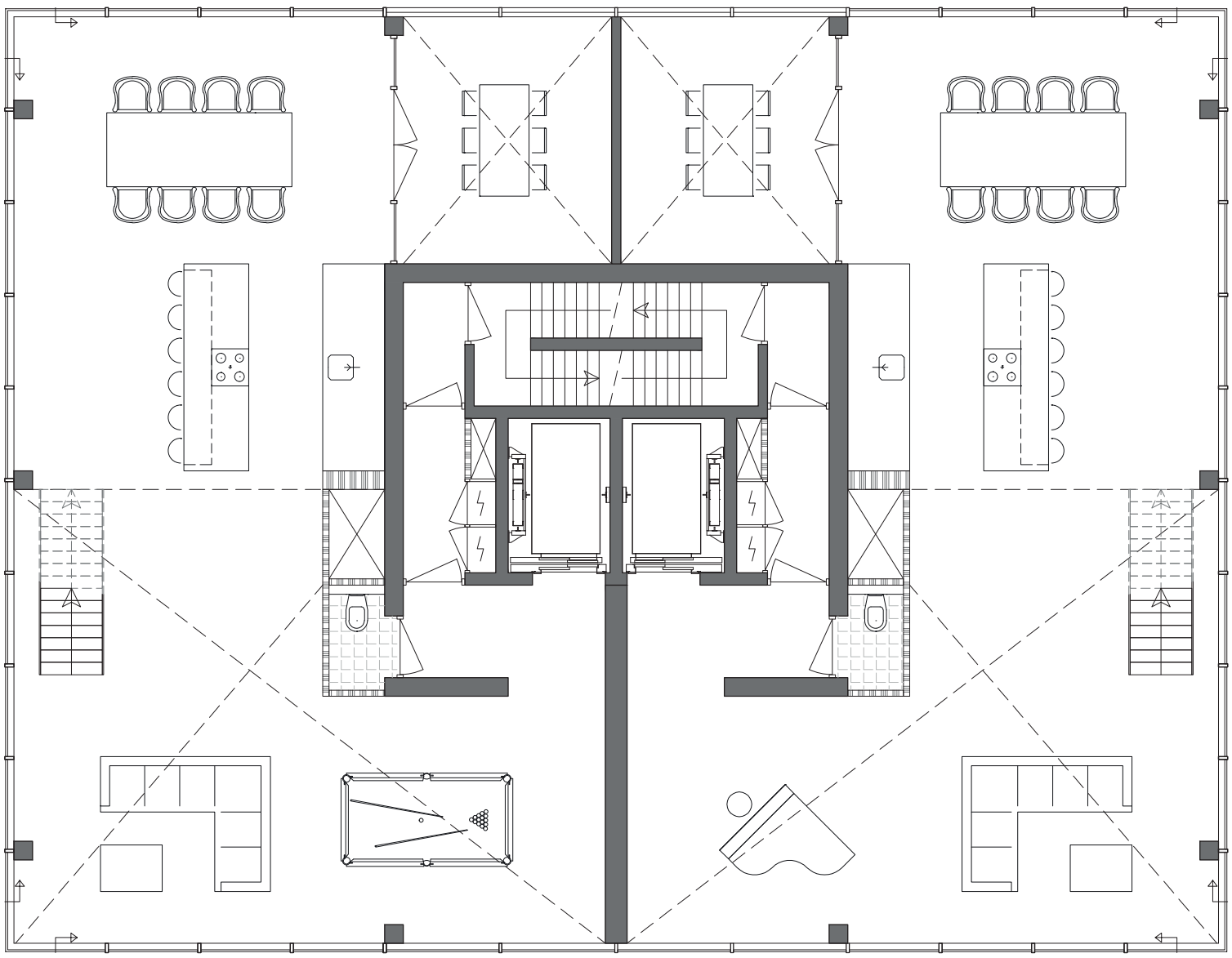
Floorplan Level 3 - 15 (odd levels)
scale 1:100

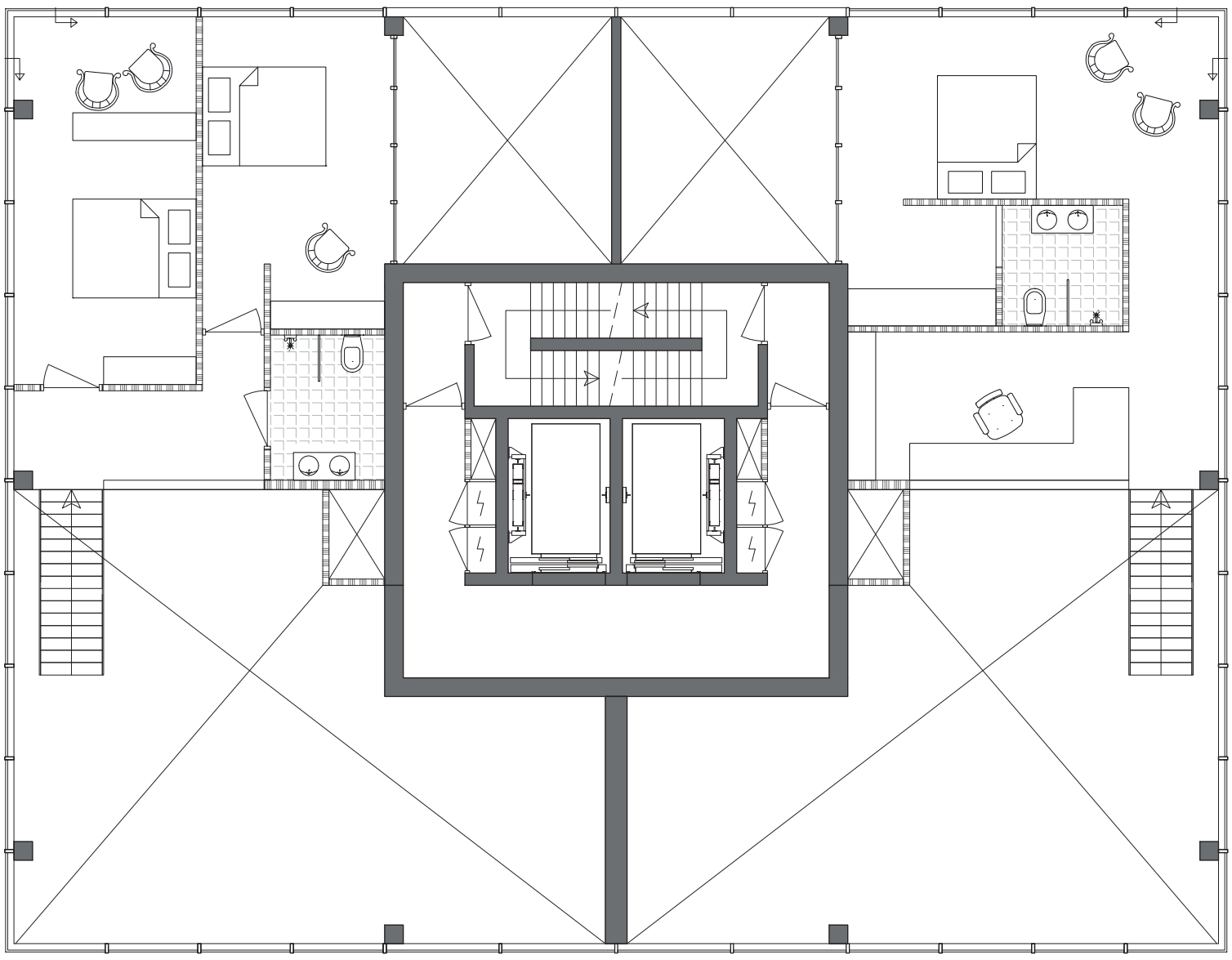


Floorplan 4 - 14 (even levels)
scale 1:100

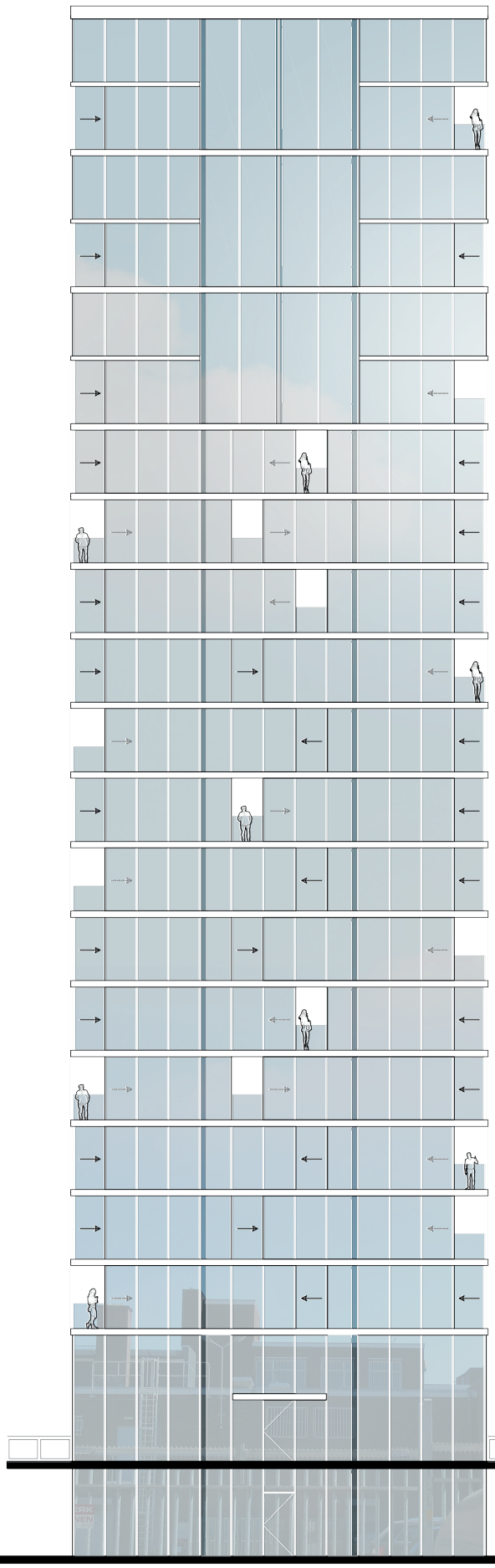


Floorplan penthouse level 16,17,18
scale 1:100

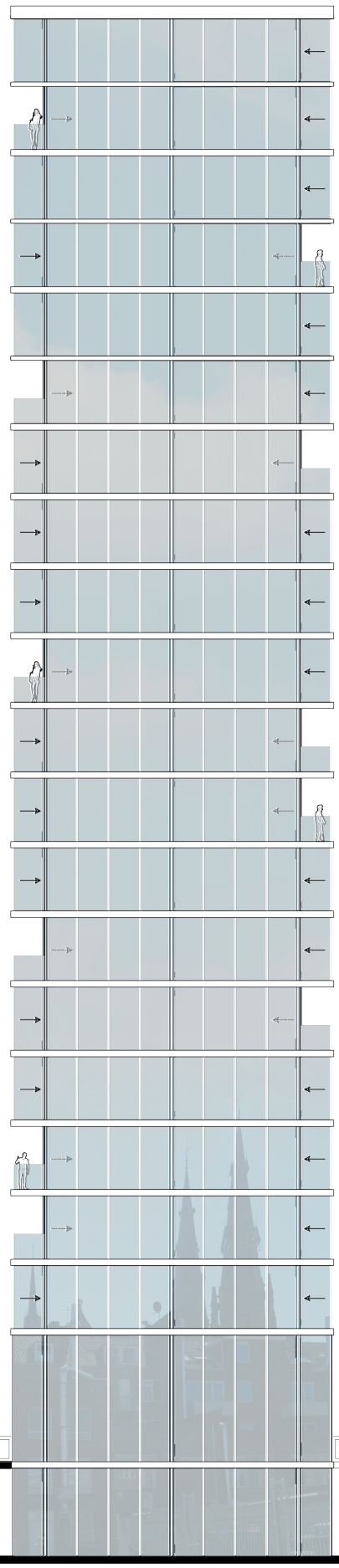




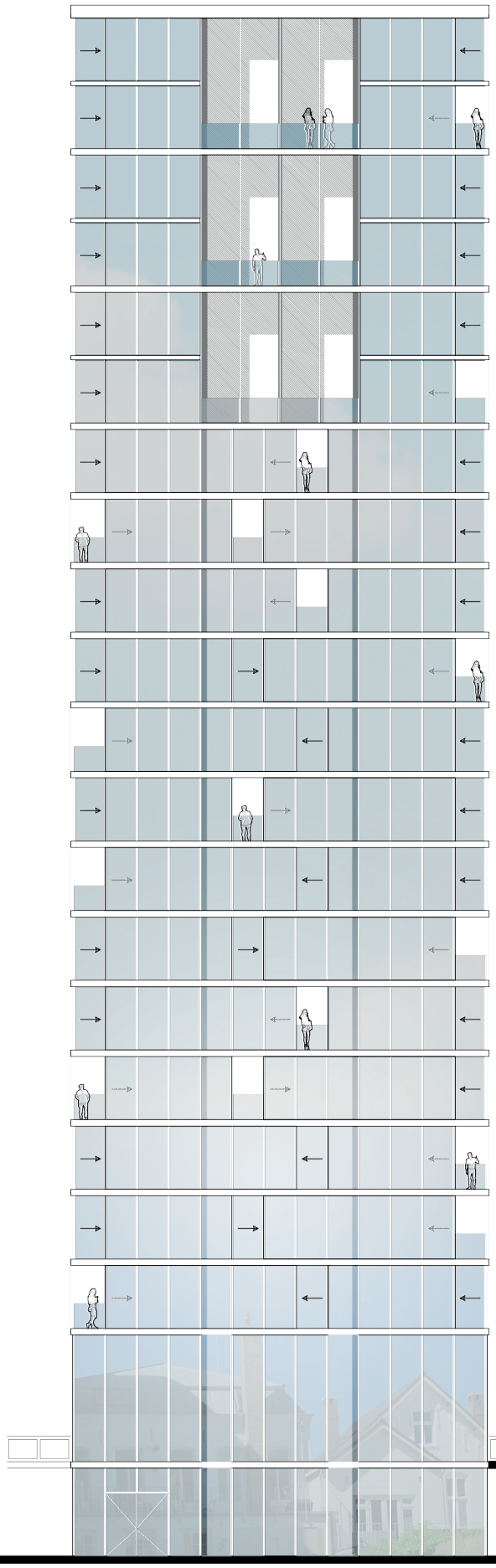
North-East Facade
scale 1:300



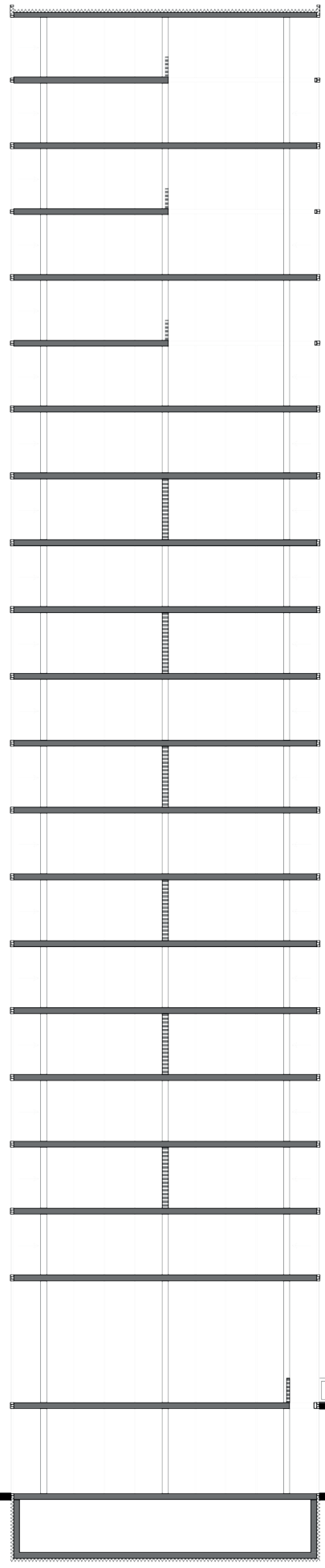
South-East & North-West Facade
scale 1:300



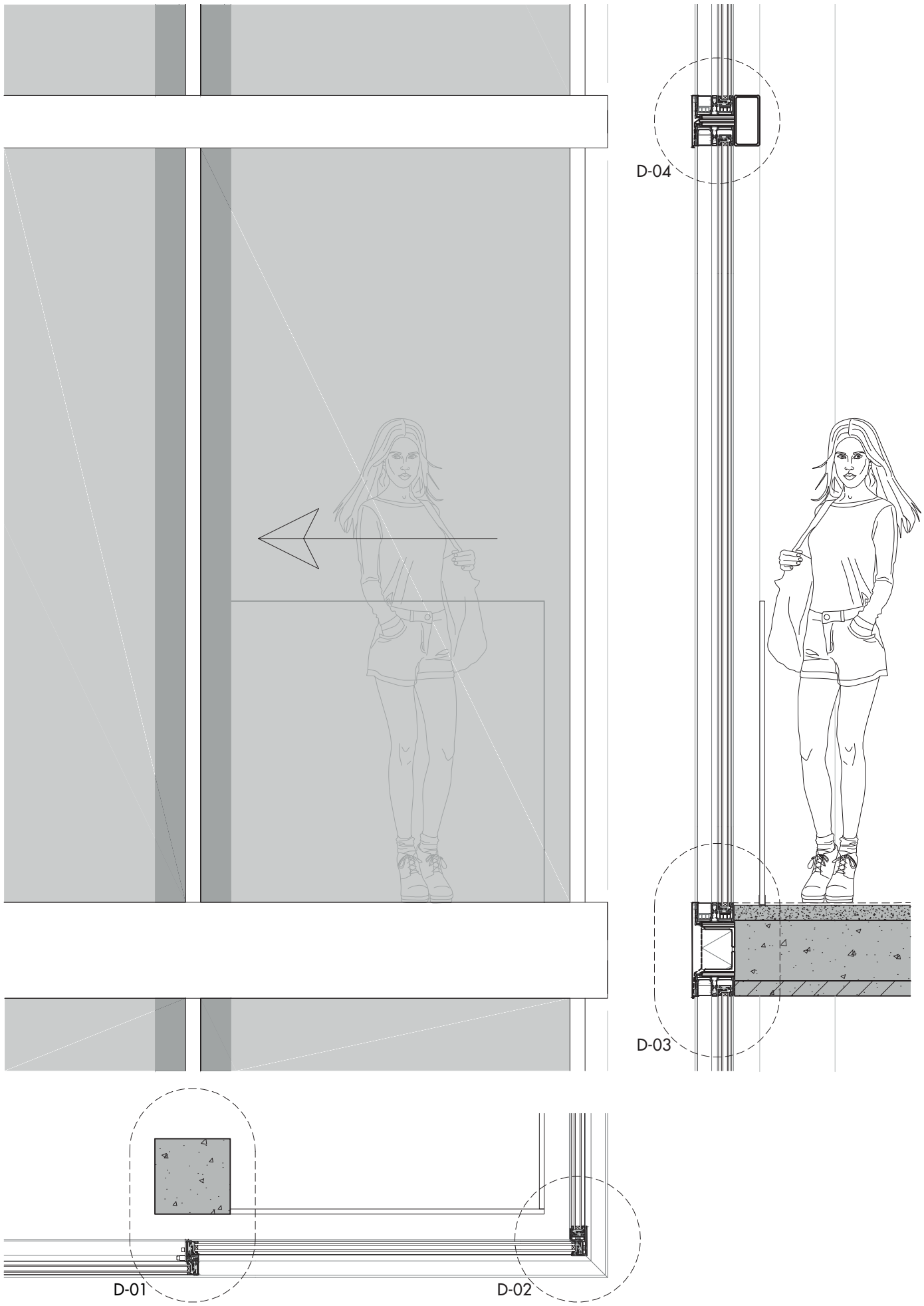
South-West Facade
scale 1:300



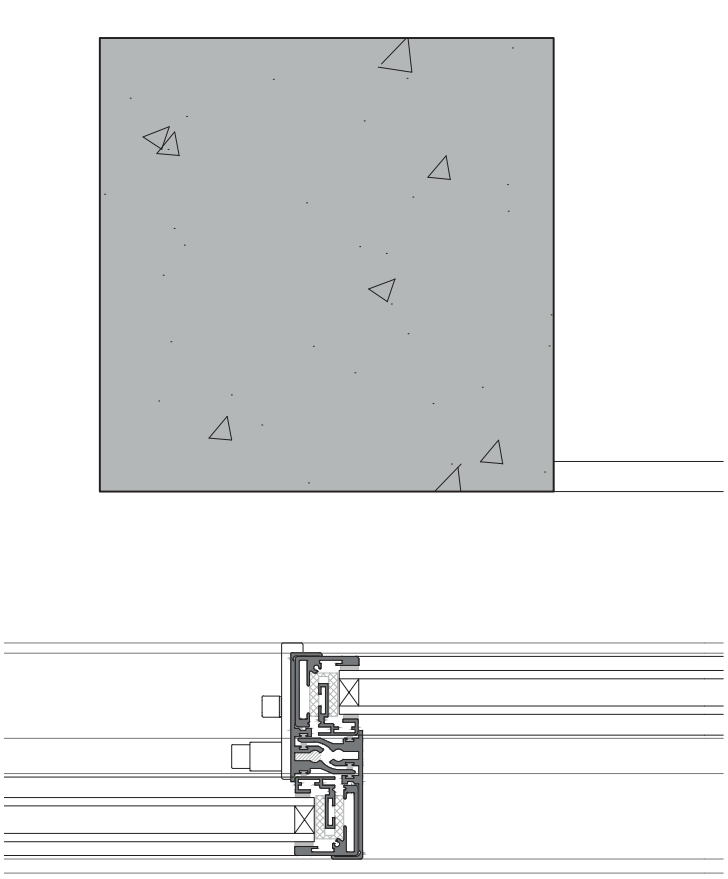
Section
scale 1:300



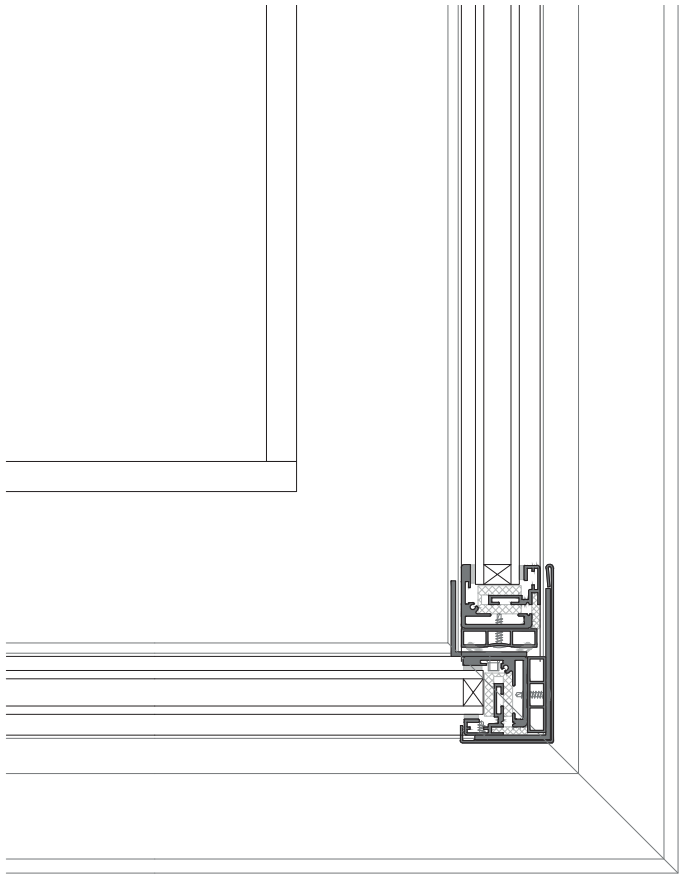
Facade detail
scale 1:20



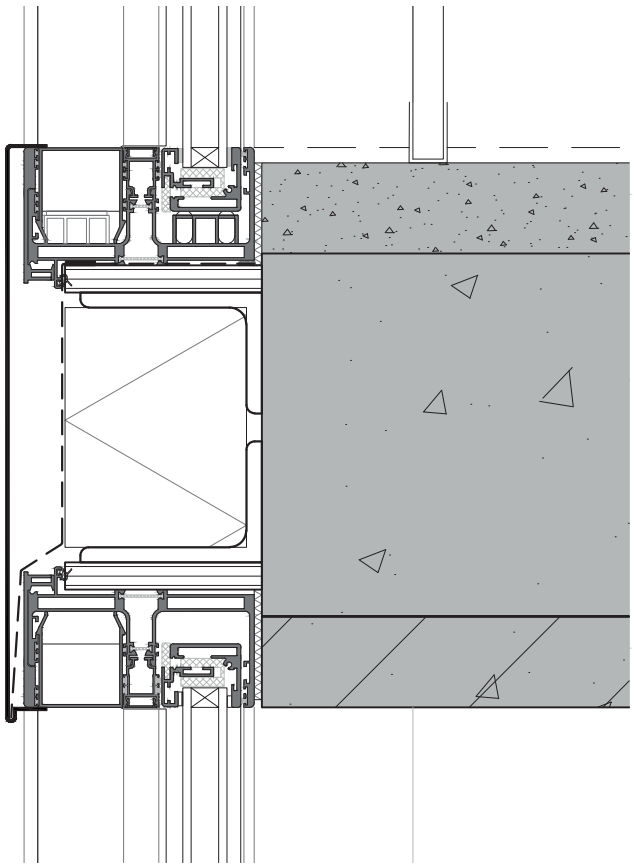
Facade detail
scale 1:5



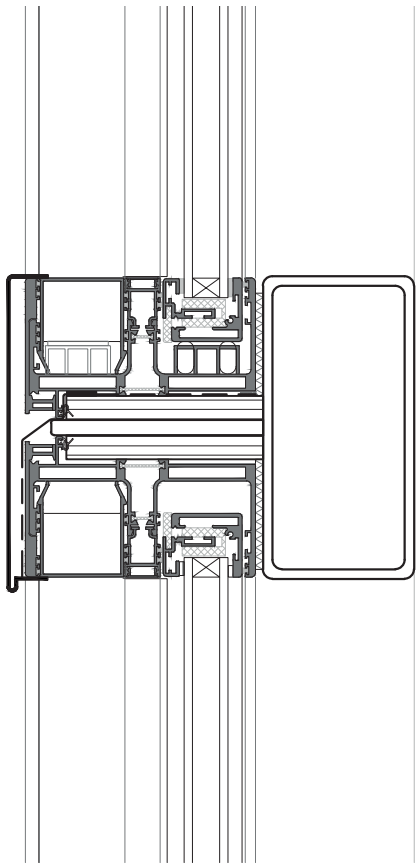
D-01



D-02



D-03



D-04

APARTMENT

Analytical drawing

As shown in the visualisation of the penthouse on the previous page, the glass of the facade starts at the same height as the floor, without a visible horizontal window frame. It will also end in the same way at the ceiling. This is important for the way the room is perceived. The same applies for the corner window. Even though it can be opened, here too is no horizontal window frame. This gives the apartment a more fluid connection to the view of the inner city. The only visible window frames are the vertical ones, that frame the view. In the facade fragment and conceptual details on page 80 and 81 there has been elaborated on this.

Important is how this is perceived when entering an apartment. From the elevator one enters the apartment in an entrance portal. From there is a direct connection to the open living area. Important is that there is a clear view and straight walk-line is from the doorway to the facade. Also along the facade is a free walking space, Not only in the main living space but also in the other rooms. This makes sure that the view can be optimal experienced everywhere in the apartment. It also contributes to the way the glass facade is observed from the outside. It prevents it from looking messy behind the glass.

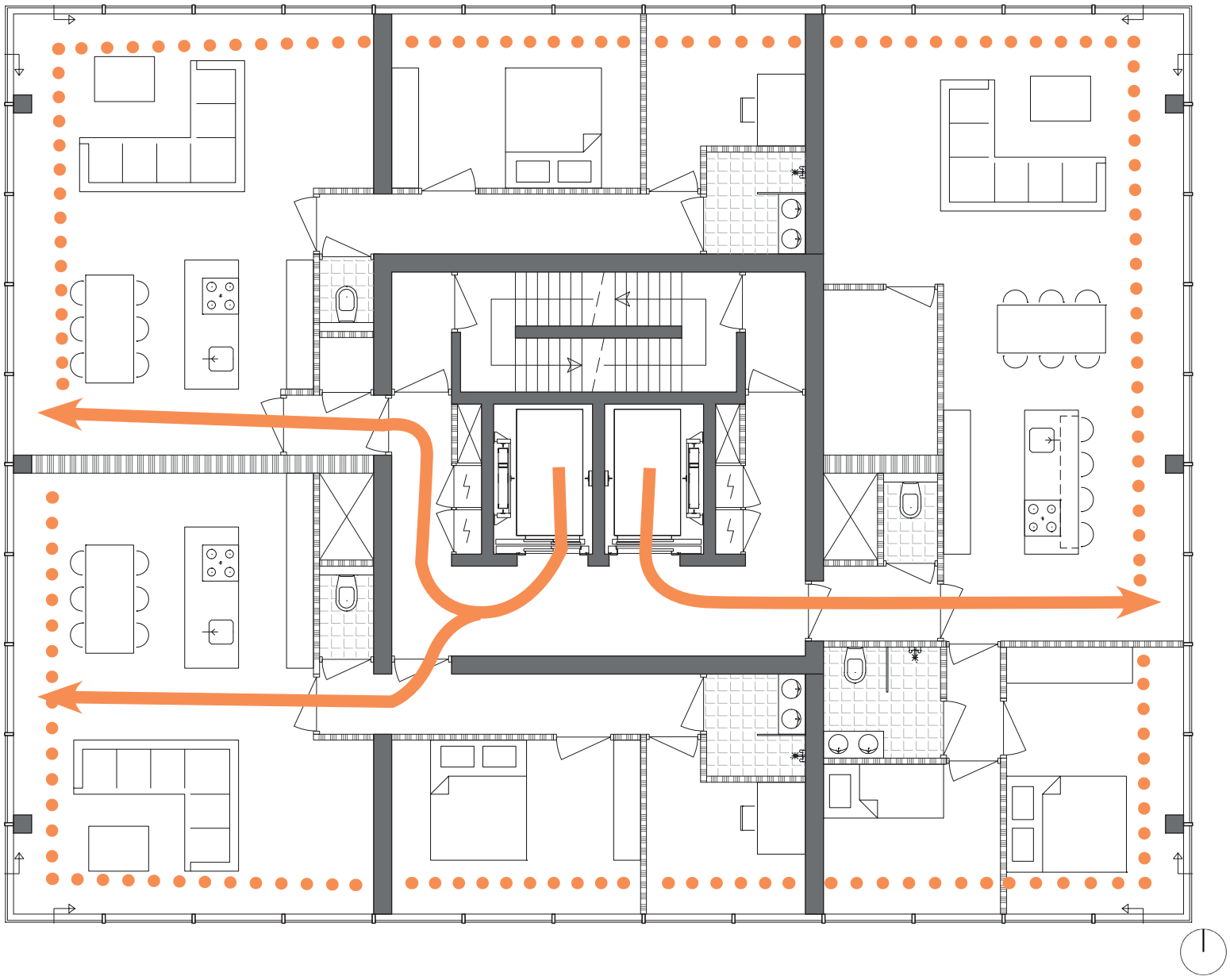
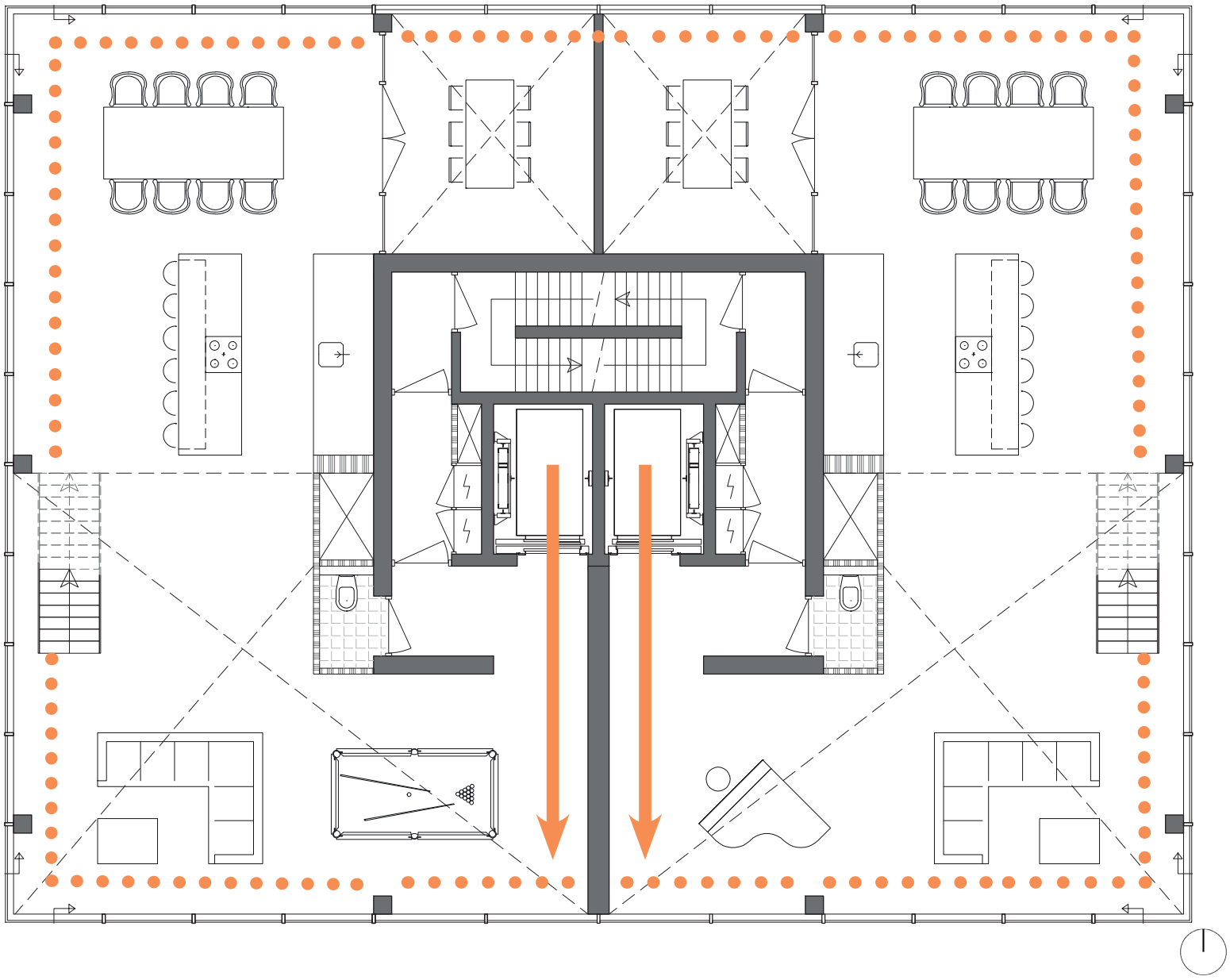


Figure 53 | Previous page: visualisation penthouse

PENTHOUSE

The same applies to the penthouse. Only here the you enter direct from the elevator in a double high room with a direct view and straight walk-line to the facade. This gives it an unique experience of entering the penthouse. Also here is the free walking space along the facade important. The only object placed in this zone is the stairs. This way you can walk up along the facade with a view over the skyline of Eindhoven. Also different with the apartments, besides the size and the double heigt space, is that the penthouses have a private outdoor space.

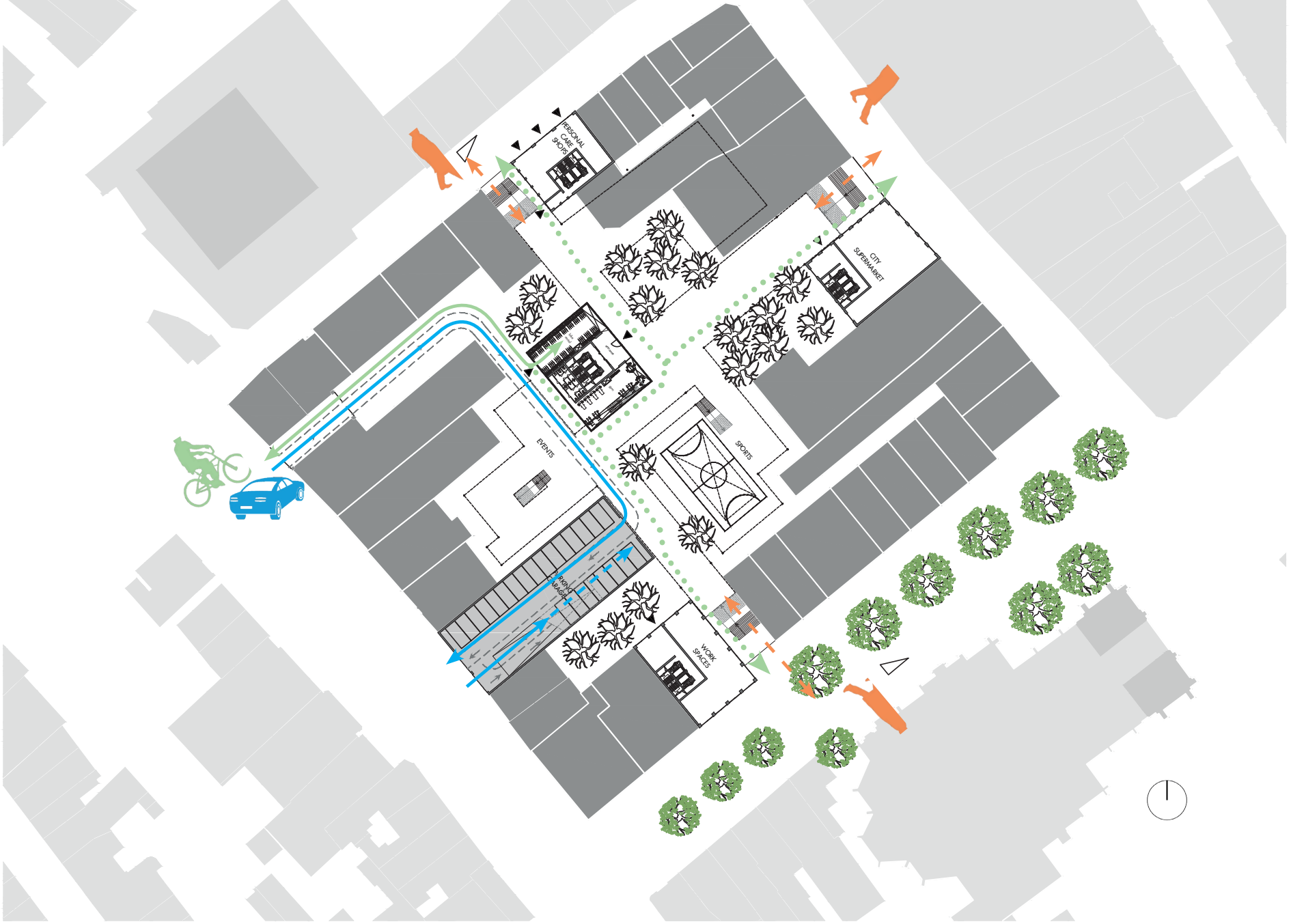


MOVEMENT

Movement groundlevel

The movement through the block on the ground floor is still mainly functional. Motor vehicles can use the one-way street to reach the parking garage or supply the stores. In addition, there is room for cyclists to reach the bicycle storage at the bottom of the main tower.

The second layer has an offset of three meters from existing structures and voids to provide the ground floor with daylight.



Movement groundlevel 1

The second level can be entered from the ground level through stairs on three sides of the inner city and through the parking garage. The towers have their main entrance and the entrance to the collective functions on this level.

This creates movement between the collective functions of the towers and between the towers and the parking garage. It also creates movement between the towers and different areas of the second level that people can use to sport, relax or even for events.

In addition to that there is movement from visitors to the city that can use the second level to relax and pass through. The green environment, unique to the inner city, has the power to make people curious and attract them.

Entry second level

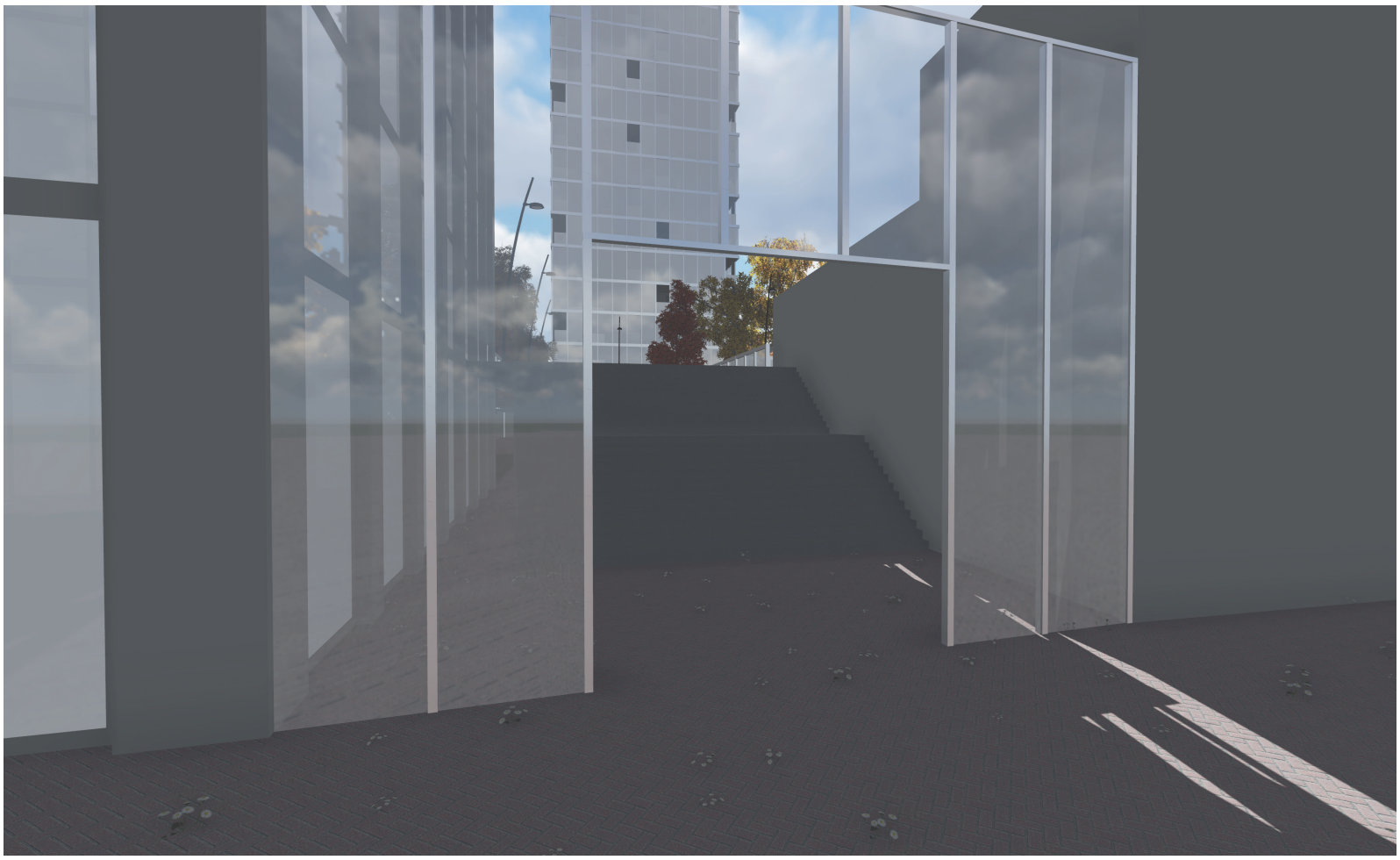


Figure 54 | Visualisation entry block

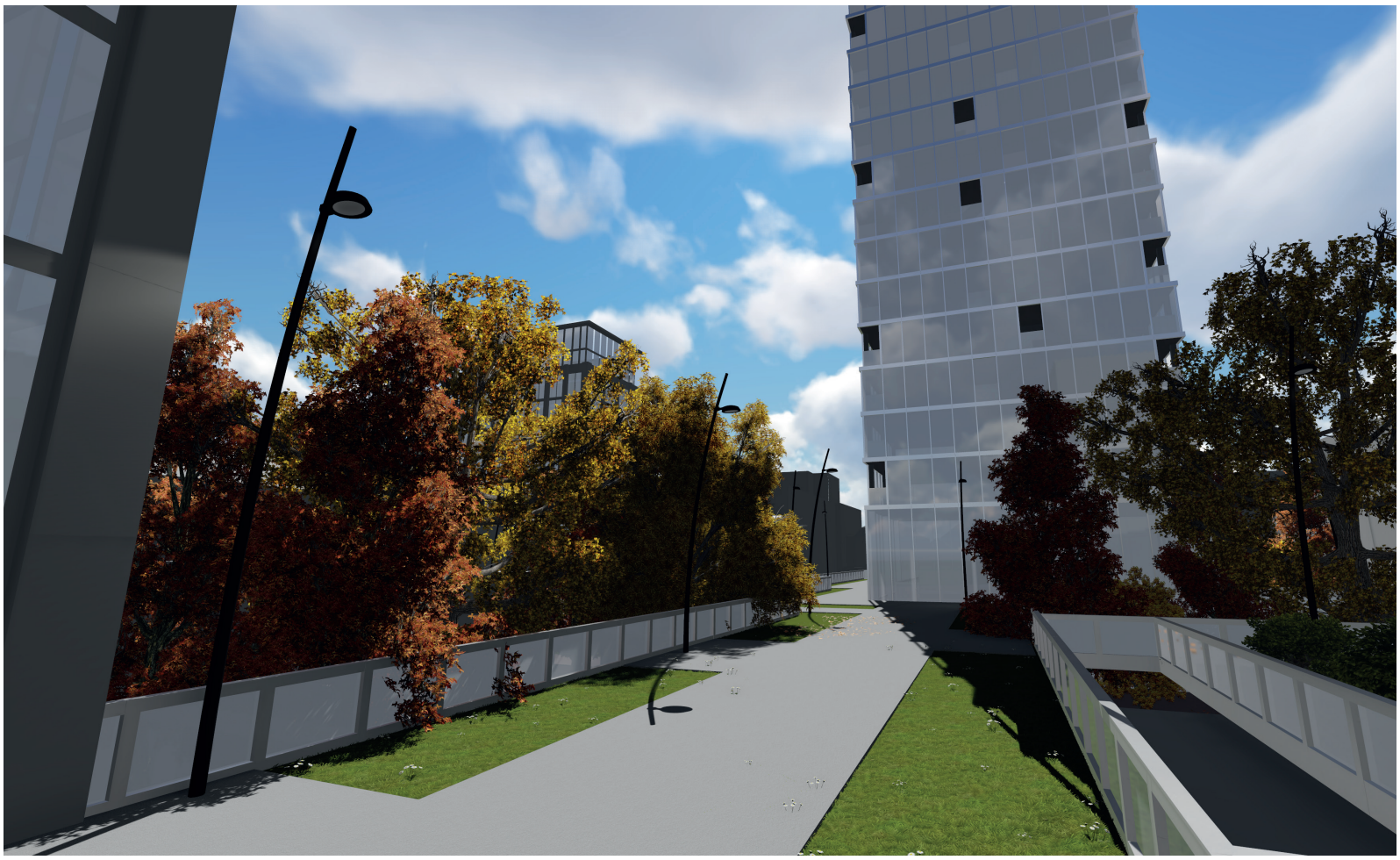


Figure 55 | Visualisation entry second level

SECOND LAYER

Structure

The main structure of the second level is the balustrade. These is made out of a ‘Vierendeel truss‘, named after the Belgian engineer Arthur Vierendeel.

The floors of the second level hang between the Vierendeel trusses. These beams are supported with columns on the ground level. The advantage of the Vierendeel beam is that they can make big spans without diagonals. Using them at the same time as balustrades saves space under the second level that normally would be uses for the structure. The Vierendeel truss is made with a grid of 1500 millimeter, to strengthen the grid of the tower and second level. Because of this wide span structure, the ground floor can keep its functional use.

The greenery exists mainly of light grasses and plants. The heavy trees are directly on the ground floor, rising above the second level with their leaf roof.

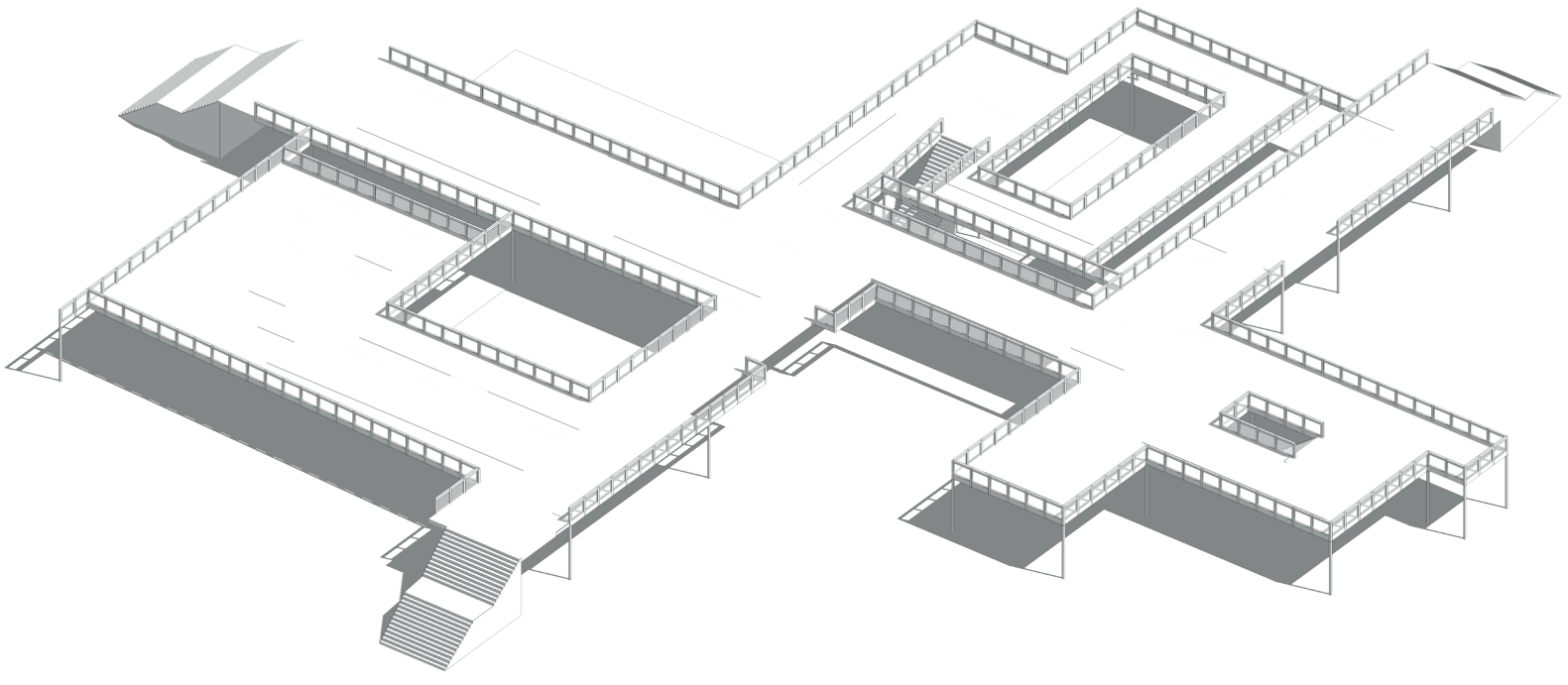


Figure 56 | Structure second level

Visualisation

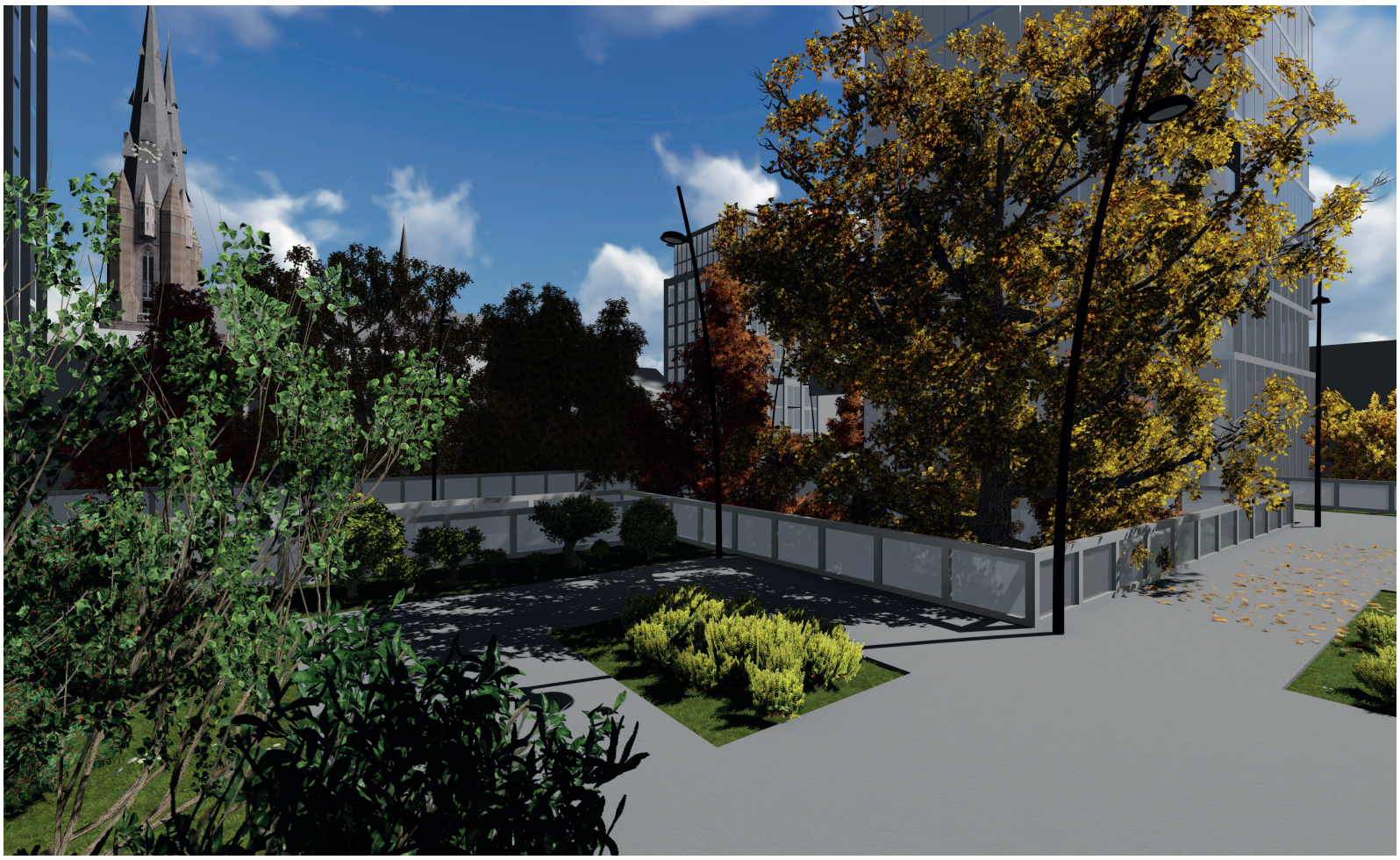


Figure 57 | Visualisation admosphere second level

Figure 58 | Previous page: visualisation skyline Eindhoven

CONCLUSION

“How can the inner area of an existing building block be activated by adding a second layer?”

During the research driven design is attempted to give an answer to the above main question. The final design can therefore be seen as an answer to the main question. Giving the second layer not only the function of the permeability of the block for visitors of the inner city, and not only add critical mass in the form of residents, but divide this critical mass over different towers and create movement over this second layer with the use of collective functions in the towers, while at the same time making the second layer a collective space on its own. This in combination with the for the inner city unique use of greenery will result in an interesting and activated second layer.

The design not only answers to the main question, it also answers to social issue of housing shortage in Eindhoven, the liveliness after closing time of the commercial functions and the lack of greenery in the inner city. It does that with preservation of the village-like character of Eindhoven while at the same time giving it the more international appearance of high-tech Eindhoven the city is looking for. Essential for this is the use of high-rise. Without high-rise, the needed critical mass can’t be placed and divided on such limited space and therefore the useful space for a second layer would be to limited. At the same time is the high-rise important for the international appearance and densification of the Eindhoven inner city. The architecture of the high-rise goes well with this ambition of Eindhoven.

The location on the edge of the inner city works great in combination with the high-rise. The block is connected to a main road and close to the station, ensuring an easy accessibility. Adding this amount of residents in the middle of the inner city could cause accessibility problems that do not occur on the edge of the inner city. Because of its location on the edge, the high-rise can react with the existing high-rise of Eindhoven. The apartments in the high-rise give a fantastic private view over the skyline of Eindhoven while the second layer adds a usable and green public space to the city while maintaining the functional use of the block on the ground floor.

Because the chosen block is a representation of an average building block on the edge of the inner city and the design is based on a more universal urban concept, the design can serve as an example for designing other similar blocks on the edge of the inner city of Eindhoven, and even connect them, to answer to the social issues of housing shortage and the lack of greenery in the Eindhoven inner city.

REFLECTION

The assignment was clear at the start of the graduation studio 'Tallness'. Designing a high-rise building in the broadest sense of the word. The theme of a second green layer made the research more interesting but at the same time complicated. The theme was almost entirely new so there was no literature about it. The fact that the studio focusses on my 'hometown' Eindhoven made it even more interesting and ensured that I enjoyed the project. Looking back to the conceptual masterplan in the beginning of the graduation studio, I stayed close to my original masterplan that connected all inner city blocks with an elevated green layer. I am also very satisfied with the next steps. The design does not only answer to the theme and main question, it also answers to the big social problem of housing shortage in Eindhoven and is the start of a change in its identity.

The graduation studio has undoubtedly been the best but also the most intensive period of the master program. The theme 'Tallness' suited me very well. I would like to thank Bram van Kaathoven and Ruurd Roorda for the help, insights, critical attitude and most of all sharing their enormous knowledge during the studio's guidance. I also would like to thank Christian Rapp for the evaluations and especially the feedback during the official moments. This made, without any doubt, the project better and stronger. Further I would like to thank the fellow students in the studio for the collaborations, feedback and of course the good atmosphere during the year. Especially when it was difficult and the pressure was high we could count on each other's experience and knowledge! Thank you Peter van Aert, Mandy Booijnk, Jerin Emmen, Erinch Firat and Dirk Jansen!

I can honestly say that I am very proud of the final result. During the graduation project my knowledge and skills grew enormously. It may not always have been easy, I am very satisfied with the end result!

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Figure 8 — Fondation Le Corbusier. (n.d.-a). Une Ville Contemporaine [Illustration]. Retrieved from:http://www.fondationlecorbusier.fr/corbuweb/morpheus.aspx?sysId=13&IrisObjectId=6426&sysLanguage=en-en&itemPos=3&itemSort=en-en_sort_string1%20&itemCount=3&sysParentName=Home&sysParentId=65

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Figure 16 — Eindhoven [Illustration]. (n.d.). Retrieved from http://startupdays.eitalumni.eu/wp-content/uploads/sites/2/2016/10/eindhoven-005.jpg

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Drawing X — All drawings are made by P.T.J. Broers (2018)