P5 Report

Exchanging urban knowledge:

Japan X Netherlands

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Monk Nichiren Calming the Stormy Concrete, collage
((Kuniyoshi, 1835), (Tomatsu, 1961), own illus.)

A street in Takayama, Japan
(own illus.)

I dedicate this document to my parents.

dr. Elena van Eeden-Nikitkina, 2nd of January 1954 - 26th of December 2010
Johan Adriaan Karel van Eeden, 18th of April 1939 - 9th of June 2020

I would like to thank Rients Dijkstra and Fransje Hooimeijer for their guidance during the project.

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1.

Motivation

There are several personal starting points for this project that come together. One metaphysical and some practical ones. It is accompanied by the societal relevance, detailing larger societal trends which feed into and connect with the project.

A feeling of belonging

The motivational aspect I consider metaphysical for this project is related to the feeling of a city. This is personal and abstract, but it was so incredibly striking to me at the time that I have decided to use it as a starting point for my project. The city of Osaka in Japan (and most cities in Japan for that matter) has been the only city I've visited that has given me a feeling of the city belonging to me, as a pedestrian. There are many cities around the world that are dense, perceived as livable and/or having good mobility. However, neither come as close in feeling as a Japanese city does. The big difference comes from the physical way the city is built. Some cities have big malls, large car-free areas, wide sidewalks and whatnot. But all seem to put you, as a pedestrian using the city, into a cordoned off space that is "for you". A pedestrian island, shut away from the rest of the city. This space is often smaller than the space for cars. In regular streets, you are constantly reminded that the car dominates you. Over one third of a street is often reserved for cars, whether it's the right-of-way or the parking spaces. Very few places give pedestrians priority over cars (that are not also car-free areas). This is what makes the Japanese city stand apart - the city is built in a way that feels built for you, as a pedestrian, without banning cars altogether.

An inner-city street in Osaka, Japan
(Google Streetview, 2022)

Merwedekanaalzone

To continue with the phrase "banning cars altogether". The practical aspect behind my motivation is previous work experience. Within the project for a part of the Merwedekanaalzone in Utrecht, a large car-free area is being built. Functioning as the entire framework for the project area, only the surrounding roads were to be for cars (already existing of major four-lane city avenues like the Europalaan). This would leave a 1000m by 300m area where cars were not allowed. Not a major issue for people living along the surrounding roads, but the inner blocks - at minimum 150m away from the road - would always be mildly inconvenienced.

This results in a problem, not just for personal vehicles, but also for services. How do things like trash collection, elderly/disabled person transportation, emergency services, moving (vans), parcel delivery, supply delivery, etc. work in a situation like this? In the end, a long list of exceptions was created (i.e. supply delivery can enter the area on Saturdays from 10-11am, etc.) for the neighbourhood to function properly. As well as several limiting factors (longer walk to throw trash away, difficulties moving). The area is car-free, but it also creates several limitating factors.

The Japanese city solves all these problems in the way it's physically built, or rather than solves, it completely negates them so they don't need to be worried about at all.

Car-free Merwedekanaalzone, Utrecht
(bura.city, 2019)

Societal relevance

Landscape turning into low density city, Weesp
(GJ Schultz, Weespernieuws.nl, 2016)

Tokyo's water catacombs keep the city dry
(Getty Images, 2022)

Reduced share of space for pedestrians
(Karl Jilg, 2014)

There are several topics currently relevant in society that come together in the project. As this project aims to tackle both Dutch and Japanese topics, both of these are mentioned.

Currently there is an alarming housing shortage in the Netherlands, causing friction in society. The ones who own a house or are able to rent at reasonable prices (the haves) and the ones who do not (the have-nots) are drifting further apart. Without the possibility to move to a house more fitting to one's personal situation, many people choose to stay where they are, delaying plans or making due with not having their needs met. Apart from the grief this causes to persons, it causes strain and glaring inefficiencies to a city which has to overcome this. The government's goal is to build a million homes by 2030, but how?

At the same time, the climate crisis is unfolding. Whereas the solution to the housing shortage may have simply been "build a lot, cheaply", this is not justifiable in the current time. In the past entire polders, huge green swaths of land, were built to accommodate housing, such as the post-war AUP (Amsterdams Uitbreidings Plan) or many Vinex locations. This way of development is not sustainable, both due to the land claim for housing, as well as the physicality of these developments (being largely made up of built, paved, impervious surfaces).
Therefore, the government largely promotes further densification of urban areas. Using space more efficiently by increasing density is a logical conclusion to prevent large patches of (now empty, green) land becoming built. It does not, however, answer the physicality of these developments. Within these developments, it is essential to build in a way that allows for climate adaptation. Moreover, although densification is promoted, many projects are STILL being built as spatial expansions in the surrounding landscape, taking over aforementioned empty, green land. It is important to stay aware of the reason to keep empty green spaces in the Netherlands, our nature depends on it.

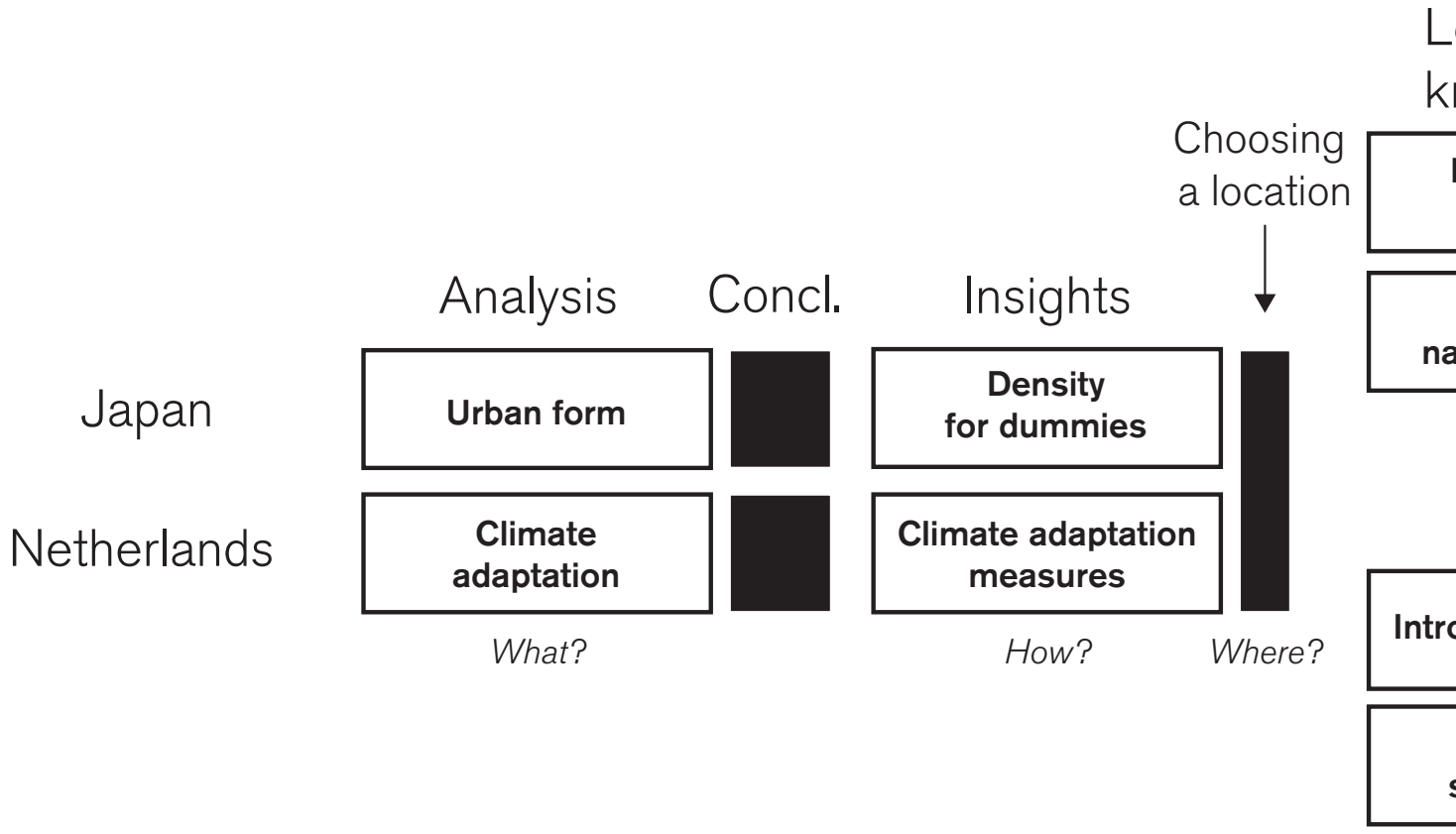
In Japan too, climate adaptation is topical. Whereas Japan always had technical solutions for everything, the 2011 Tohoku earthquake and tsunami fundamentally undermined the trust in built solutions. As architect Toyo Ito points out in the wake of the earthquake: "We cannot win a fight against nature", implying that human settlement patterns must be integrated in the natural system instead of trying to resist it (Nijs, 2021). Spurred on by worsening climate conditions, a bottom-up push against the dominant construction sector is underway. Can it lead to an increase in natural systems?

As a last point of relevance, the question "Who's the city for?" must be raised. More efficient land use is not merely a densification question, but also a question for whom this densification happens. Roadways are mainly designed for cars, but are we densifying the inner cities for cars? We are densifying for people to live, not for cars to exist. Therefore, the question must be raised not only to densify inner cities, but to rethink the physicality of inner city streets.

2.

Structure

The following shows the overall structure of the thesis, with phases, main products and divergence / convergence periods (white and black boxes). The structure scheme is further elaborated upon in the planning sections of this document.



oc. spec.
nowledge

**Metabolism
movement**

**Meaning of
ture in Japan**

oduction to ISR

**Location
specificities**

How?

Knowledge exchange

Goals & wishlist

Example project

Street and block in Osaka

Block and street in Netherlands

two examples of high dense climate resilient urban environments in NL and JP

Why?

Thesis structure
(own illus.)

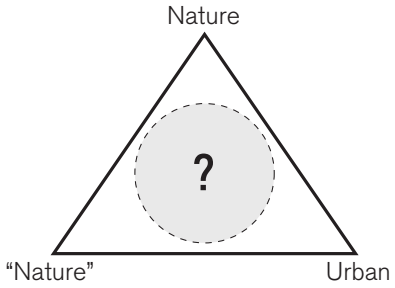
3.

Problem statement

The problem statement is mostly derived from the societal relevance section, and summarises the main issues to tackle. There are three main issues and the aim for the project is to provide a combined answer.

Inner-city densification (Netherlands)

One of the many challenges facing the Netherlands is the government's goal of building one million homes by 2030, as a solution to the housing deficiency that's plaguing the Netherlands. The intended method is to densify the inner-city, that is, to densify current urban areas rather than continuously expand outward into green areas. This will take up currently empty land in the city and strain usage of public space in particular, compelling us to decide about how much space we want to give ourselves over the car. Looking at one of the most extreme examples of inner-city densification (Japan) may provide answers for the Dutch context.



Nature, "nature", urban trilemma
(own illus.)

Climate adaptation and nature-based solutions (Japan)

Most if not all Japanese cities are built with mechanical solutions for everything. The entire city is a stone machine, incredibly dense and efficient. However, the 2011 Tohoku earthquake and tsunami undermined the faith in mechanical solutions against natural phenomena. Climate change will further stretch the normal functioning of this machine to its breaking point through higher highs and lower lows, which the system is not designed for. Climate adaptation as known in the Netherlands is exploring (and changing towards) nature-based solutions, which can alleviate pressure on and / or entirely negate the mechanical systems currently in place. These may increase reliance of the entire system (mechanical or nature-based) in extreme events.

Weespersluis polder in Weesp
(GJ Schultz, Weespernieuws.nl, 2016)

Outer-city amplification (Netherlands)

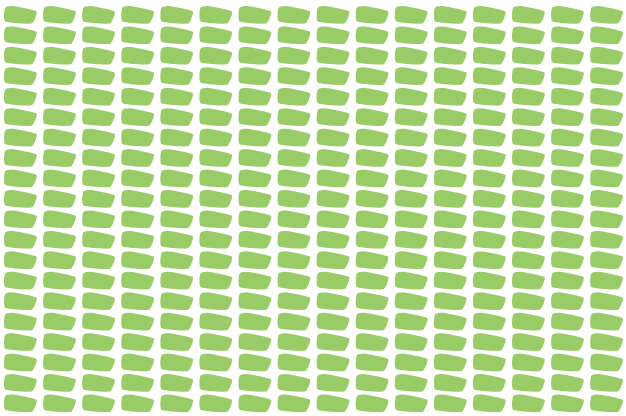
As the antecedent to inner-city densification comes outer-city amplification. An important reason to densify the inner-city is to keep the natural environment open for nature. Despite this, many green areas are still being developed for housing, as people desire a "green" environment to live. By providing inner-city densification with a strong element of greenery, the tendency to continue building in open fields may be quelled, so that Gerrie (the grutto) can stay where he is.

Can the combined effort of "Japanese style" urbanisation and "Dutch style" climate adaptation lead to a form of high-density climate resilient urban environments so that natural areas may remain as they are?

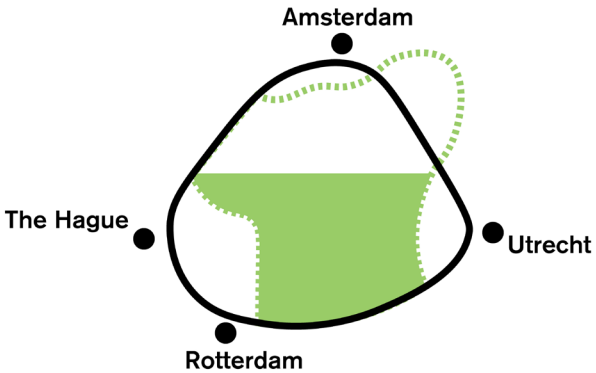
Exchanging ideas may be the way to find solutions together!

If we keep building the same way as the polder in Weesp (Weespersluis, shown in the photograph on page 10), no matter how popular it is to live there, we would need 220 times the surface area of the polder to reach one million homes. That is the same size as half of the Groene Hart. This is simply not feasible.

The size of Weespersluis
(own illus.)



Amount of Weespersluis we would need for one million homes in the same density
(own illus.)



This would cost half of the Groene Hart in size.
(own illus.)
Photo of Gerrie the Grutto
(Natuurmonumenten, 2022)

3.1 Research questions

Main and sub research questions

Main research question:

How can the existing urban form (of public space) in the Japanese metropolis and the Dutch approach of climate adaptation be combined to create high-density climate resilient urban environments?

Sub questions:

What is the existing urban form (of public space) in Japanese cities?

Aims to answer and showcase the current state of urban form in Japanese cities, necessary to be able to apply an abstraction of the urban form onto the Dutch context.

What are relevant climate adaptation topics to cover?

To make clear and summarise the relevant climate adaptation topics. “Climate adaptation” is a wide and varied subject and certain topics need to be chosen to focus on, primarily physical interventions, as well as what is relevant to Dutch and Japanese cities.

How does the topic of impermanence affect the Japanese city?

Impermanence permeates the physicality of Japanese cities, with a varied and deep reasoning as to why. Partly about nature, partly about culture, and one influences the other. There is a lot of depth to explore culturally regarding nature in Japan. It is also important to prevent a ‘neo-colonial’ outlook, such as: “We do such and such well here so you must do it this way too”.

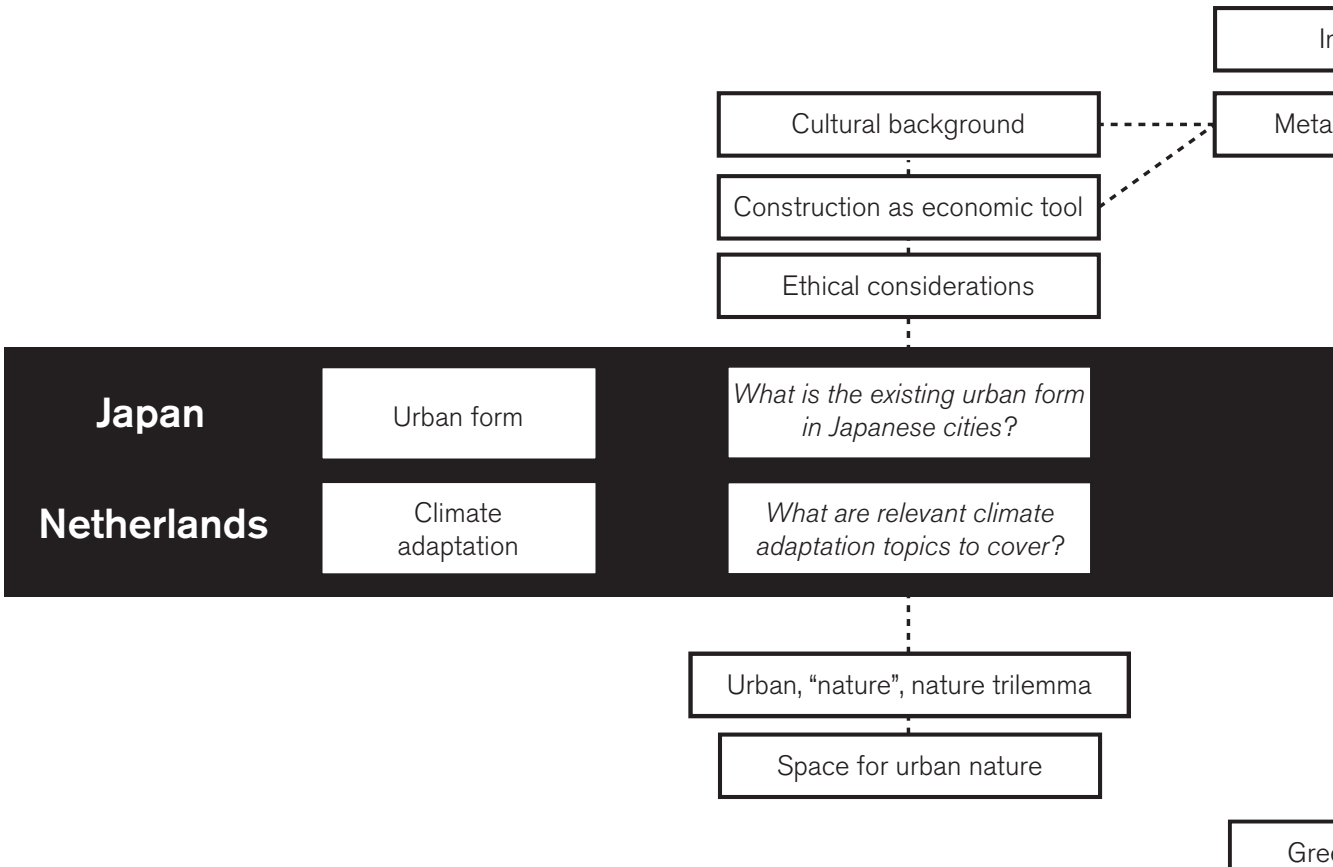
How can urban greening be embedded into urban design?

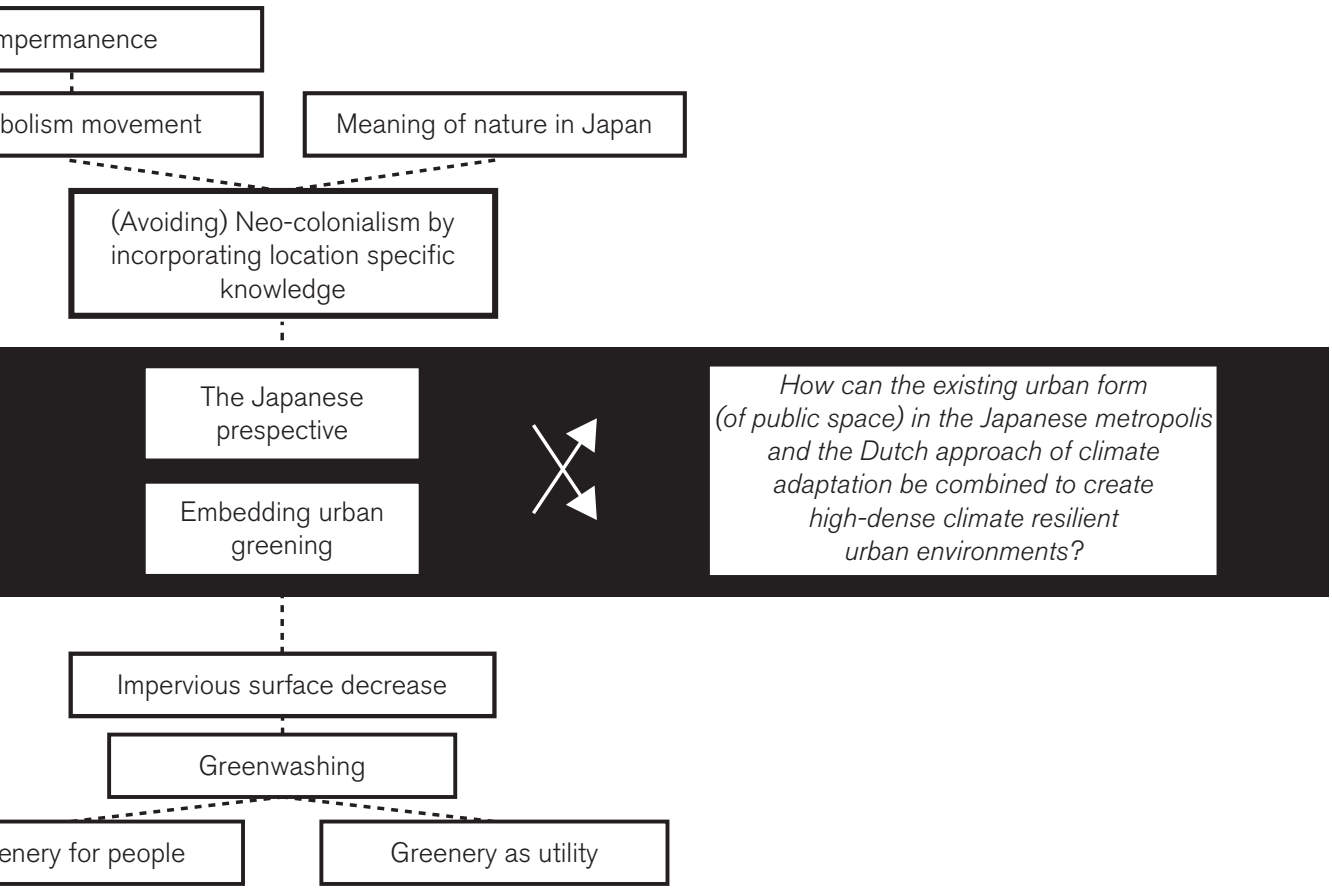
FSI and MXI are indexes which embed a certain topic into urban design from the beginning of the process. A certain FSI can be set and used in early discussions, and the final result can be measured in FSI and tested with the original aim. This is not the norm with urban greening, a plan may be presented as “green” and then abandoned to end up with no greenery. Using an index (like ISR as proposed in this project) in the same way will help embed urban greening into urban design from the first phase and provide verifiable results in the last phase.

Dense urban street in Kyoto
(own illus.)

3.2

Theoretical framework





Thesis structure
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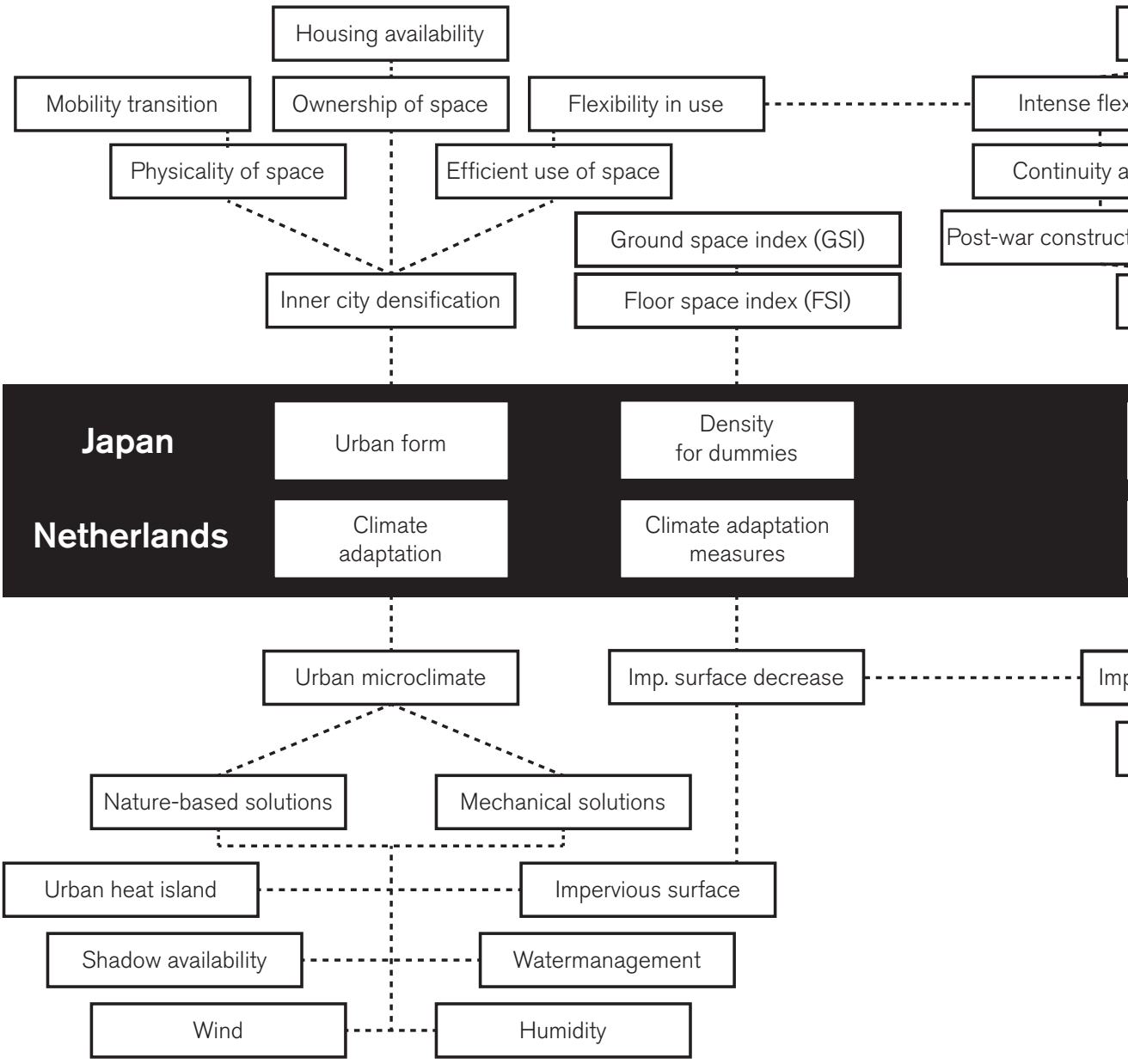
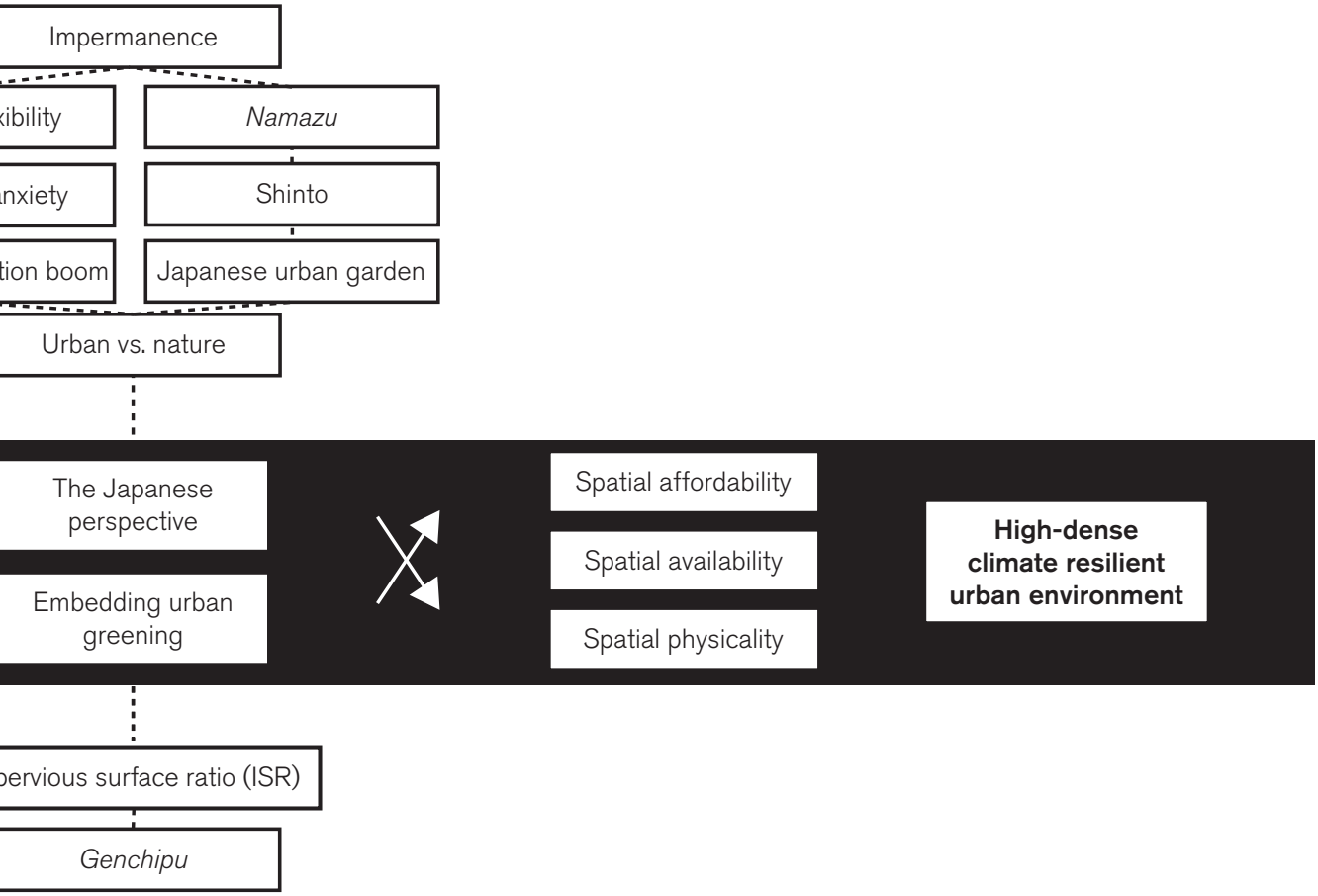
3.3

Conceptual framework





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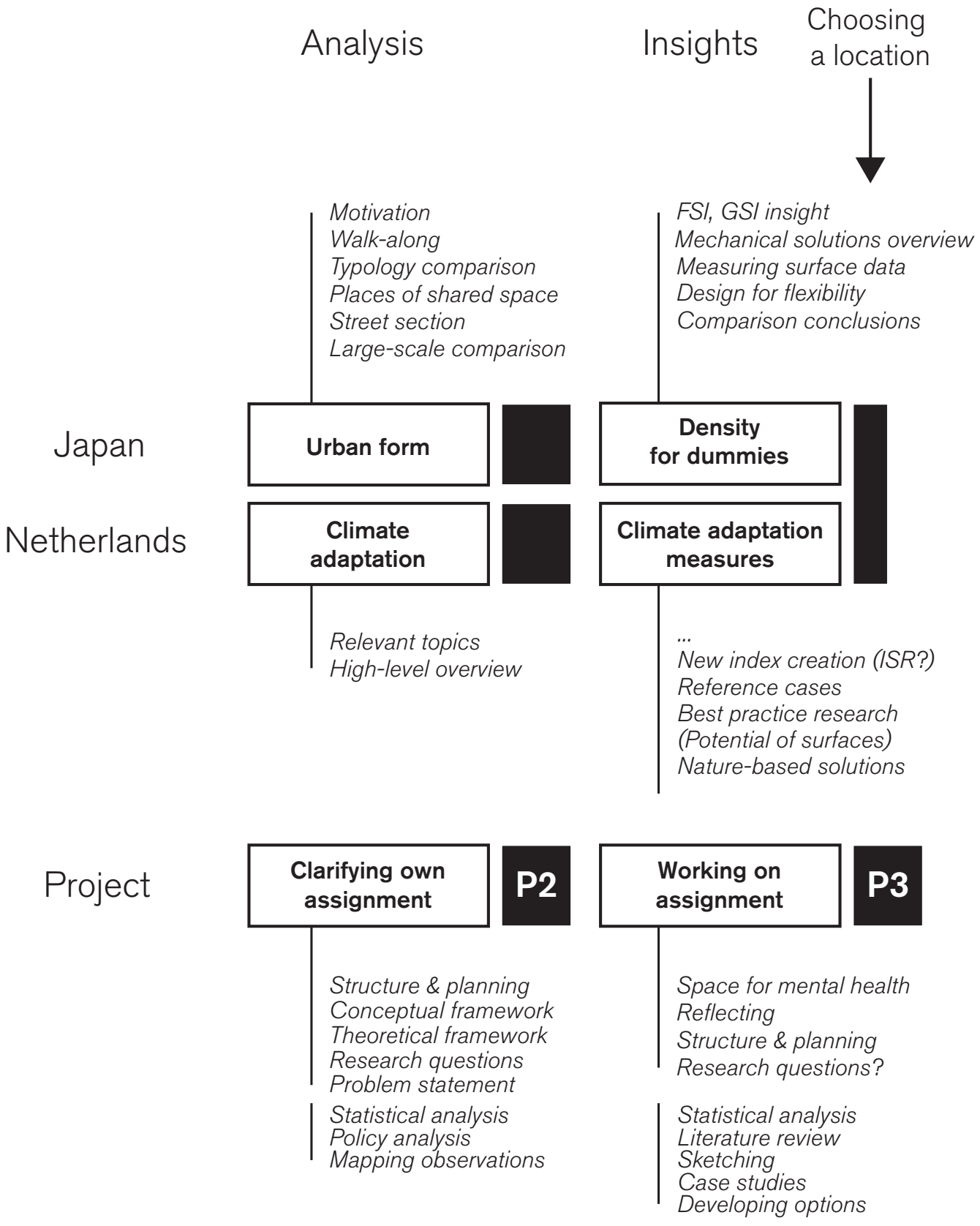
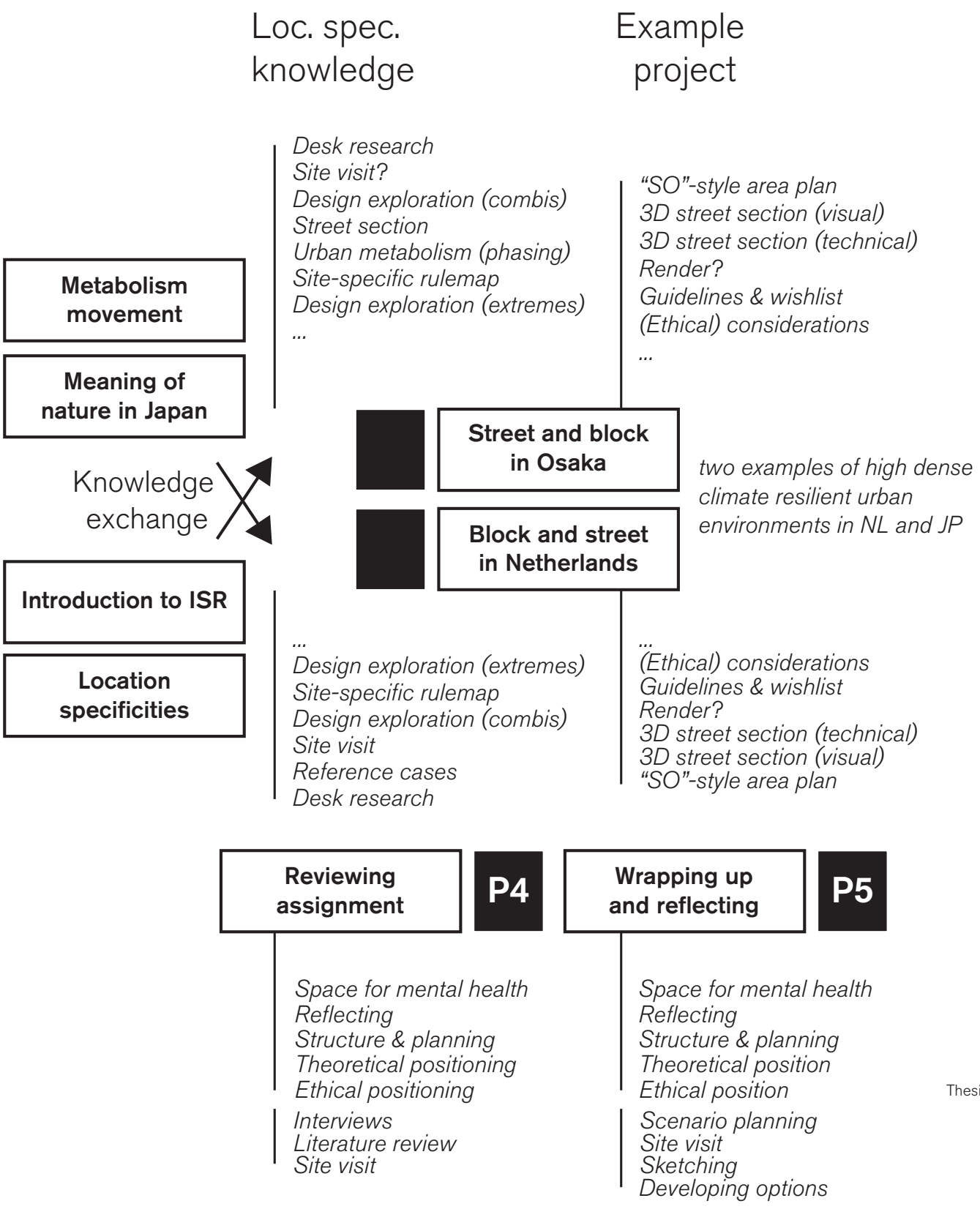
3.4

Structure & Planning





Thesis structure
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4.

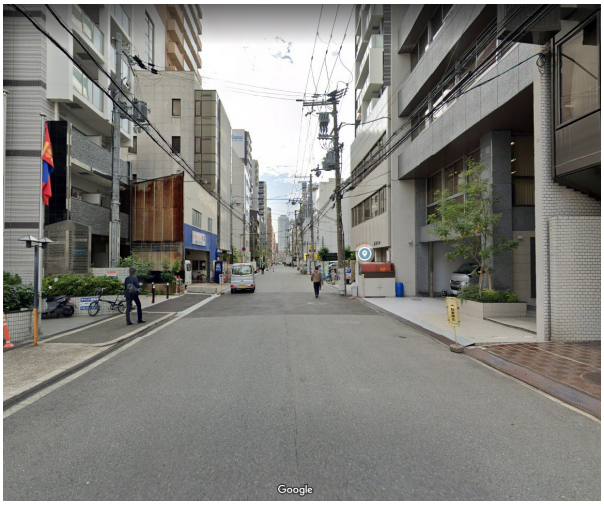
Analysis

4.1 Walk along (block and street analysis)

The walk along is a first introduction to the Japanese urban fabric in a dense environment. In the walk along a block has been chosen to walk around, seeing it from all sides. Providing context and a general look and feel. Certains elements and observations are made explicit, to be combined into a general definition of a Japanese inner-city street.

Starting on the south side looking east, what is immediately noticeable is the form of the street - essentially just a flat asphalt surface. The sidewalk is non-existent, in this case marked by a solid line along both sides.

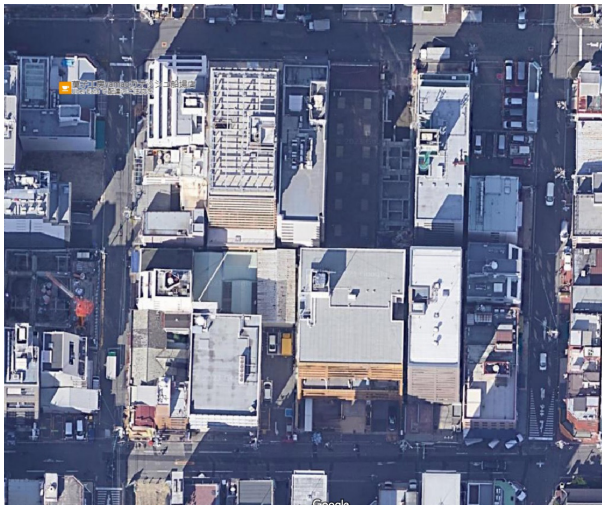
Walking around the block, now on the east side looking north, we are greeted with a view of somewhat smaller buildings. The diversity of entrance-spaces is noticeable, grey rock, red brick, concrete and orange tiles are all present. Each building is on its own plot, and therefore each building has its own entrance, which I have dubbed “Japanse stoep”. These front spaces do not create a connected sidewalk - in fact, they are often separated from each other with a low wall or some greenery, also visible in the previous side of the block. Some buildings barely have a frontage at all.



On the north side looking west, some greenery is present. This is mostly all on the private plots, as the street is all asphalt surface. The “Japanse stoep” on the left mimics a real sidewalk, but it does not continue past the end of the plot. Larger buildings often have a larger opening at the ground floor, with either a set-back and thus larger entrance area, or simply a (visually) taller opening.

The last side of the block, the west side looking south. As is visible in all other sides, the electricity lines are all hanging along poles. However, the sewage and (rain) water drainage remain under the street. The “Japanse stoep” on this side is used for a lot of (bike) parking. Also noticeable here is the amount of people using this street to bike. There is some greenery on the private plots once again. One of the few parked cars can be seen - there is virtually no on-street parking, and many buildings either have underground parking or none at all.

On one side, there is a good look into a block. Differing from most block typologies in the West, blocks in the centre of Osaka often consist of wall-to-wall buildings with minimal space in between. There is no courtyard or shared space in the middle. This look into the block does show quite well how much space remains, a good 1,5-2 metres which lays bare. Overall, the in-between space is quite a lot of square metres of a block which may have potential.



The satellite view shows the diversity of buildings well, mostly narrow and deep. Some are very large where others are quite small. There are a lot of height differences. The lack of a shared interior courtyard is also apparent. Some plots are unbuilt, consisting of surface parking space.

A look at a block in Osaka
(Google Streetview and Maps.)

4.2 Typology comparison (street)

To start a comparison between the Netherlands and Japan, four main typologies were generalised. These are centre (中央, “Chuo”), city-adjacent suburb, new town suburb and rural town. The equivalent Dutch typologies have been chosen: centre (centrum), pre-WW2 city suburb, Vinex suburb and rural town. Additional characteristics used to choose a location for a fair comparison are mentioned in the Dutch typology side.

The rural town in a Japanese setting often consists of a ribbon typology with several branching alleyways and sometimes parallel streets. The main street is **3-4m** wide, often with a temple somewhere along it, as well as a crossroads. Most rural towns are now connected by a two-lane asphalt road with a bypass around the town.

In this typology, the reccuring physicality of the street becomes apparent. A flat asphalt surface where all types of mobility share the space. Not historically built for cars, but also not (now) taken over by cars.

The city-suburban style typology fits between the centre and new town typologies. During the 20th century these were the first (large scale) city expansions beyond the centre. The expansions were mostly pre-WW2, and were built in a similar way, but more dense, as the new town typology. While the urban structure is pre-WW2, most of the buildings are newer and are often replaced every 20-30 years.

The physicality of the street is quite similar as before: a flat asphalt surface of **5-7m**, with an opaque transition from public to private. These streets are often one-way only and can therefore “give” more in terms of spatial use. The centre of the street is inflexible - to ensure cars can pass through, but the sides are flexible. People appropriate the space by putting many potted plants outside (also to have some greenery at all), or park their bikes (perpendicularly) in this space. Some temporary storage (construction material) can be found as well, making the street seem quite informal while not being fundamentally different physically compared to the new town.

To compare the rural town typology to a location in the Netherlands, a location was chosen looking at the following elements: historic, not water-oriented (no central canal), not defence-oriented (such as a fort town), mainly built around a ribbon. The historic main street is compared.

The town of Loenen aan de Vecht was chosen. The historic main street: “Dorpsstraat”.

What is most notable is despite the width being quite similar (**4m**) to the Japanese rural town, a distinction is made between the “central” part of the street and the sides. Using a different kind of brick, and a small height difference. The raised sides are cluttered with parked bikes. The material is also noteworthy - “old-style” brickwork, creating a “rustic” feel. Compared to the Japanese typology using a modern material, asphalt.

To compare the city-suburban typology to, a location in the Netherlands was chosen looking at the following elements: pre-WW2, large-scale expansion of existing city, secondary street, buildings of 2-4 stories.

A street in Tuindorp Utrecht was chosen, the Doctor H. Th. s’Jacobslaan.

The street consists of an asphalt surface with paved sidewalk of **10m** (excl. front garden)(**total width is ~21m**). The asphalt surface is used for parking (both sides) and a passing lane for cars. Street+parking is 7m, therefore the total space for pedestrians is 3m, less than 1/3 of the space. The street is car dominated due to being built before the car was as widespread in use, and having to be retrofitted. It’s not car oriented due to its location and when it was built.

Comparison between street typologies Japan and the Netherlands (Google Streetview)

Typology comparison (street)

The new town typology is defined by low-density small-scale housing built in large quantities on flattened hill areas or reclaimed land.

In this typology, the recurring physicality is once more visible. A flat asphalt surface without sidewalks, now of **6m**, dominates the streetscape in the new town typology. All streets are similar with exception of the main artery, located centrally or on the side of the overall development. These developments are often characterised as transit-oriented development (TOD), with a metro or train station in the middle of the development, as well as a mall or such shopping area.

Physically the same since the 60s, this typology of neighbourhood is still being built. These areas are car-oriented (even when built as TOD), mainly due to geography and function distribution, but not physically car dominated as the public space remains the same (a flat asphalt surface). Every household has a driveway and a car, and daily activities are centred around the car - mainly manifesting in (American-style) shopping malls with huge parking.

The centre (中央, “Chuo”) is characterised by, essentially, the same physicality of street as the previous typologies. Part of the central grid of Osaka, the street is a flat asphalt surface of **6-8m** (pictured 7.8m) wide. The adjacent buildings vary from being directly on the street to having a wide front space, the “Japanse stoep”, often depending on overall building size (taller building, bigger frontage). These frontages are private and offer a variety of materials. They do not come together to create a sidewalk, often having a wall between plots.

To conclude, the Japanese street can be generalised as a flat surface consisting of asphalt, 6-8m wide, functioning as a shared space between all of its users. The design excels in flexibility as the surface allows any kind of functionality to happen on it. A glaring omission is any sort of greenery or general consciousness of nature - it is in its entirety a built entity with mechanical solutions. The centre typology is the chosen typology to continue exploring.

Typology comparison

The Japanese new town typology to compare to has remained the same since the 60s. As such, several different ("Western") typologies can be used as comparison. However the decision is made to compare to a neighbourhood in Leidsche Rijn, due to the housing typology (single family housing) being most similar.

This typology can be seen as the modern Dutch suburb, one that is car-oriented due to location. The wide street is car dominated, with a large parking space, narrow sidewalk with a small front garden between the building and the street. The overall street (excl. garden) is **12m** wide, (street+parking is 8,5m, therefore the total space for pedestrians is 3,5m, less than 1/3 of the space). **Total width is 18m.**

To compare the centre typology to, a secondary street in the centre of Rotterdam has been chosen. The street is **10m** wide. Of which, ~7m is parking or the right of way, therefore the total space for pedestrians is 3m, less than 1/3 of the space. The street is car dominated.

To conclude, Dutch streets vary wildly by typology depending on building age. However all, except the oldest, are much wider than their Japanese counterparts and are dominated by cars either by design or by retrofitting. **Often less than 1/3 of the entire street is meant for pedestrians.**

Comparison between street typologies Japan and the Netherlands (Google Streetview)

4.3 Typology comparison (block)

The Japanese suburbs mostly consist of free-standing, tightly packed dwellings. Each dwelling is different and features a carport on their own plot. These developments are usually car-oriented, although TOD-elements certainly exist. A mix between going to work (in the city) by train and doing daily activities (shopping) by car. Dwellings such as these are made of low-quality materials in a prefabricated way. Picking a ready-made house from a brochure is common, and these houses typically have a lifespan of 20 years. Despite being free-standing, the plots hardly have any (private) yard. This usually entails about a metre in front or behind the building, with 0,5m on the side. The available space is often very green with many plants, trees and plant pots.

Blocks in the city consist of a variety of plots in terms of sizes, and this is reflected in the type of buildings. There is often a “short” and a “long” side, with the short side having plots that are less deep. Buildings may be built on these plots with no restrictions, except for a 0,5m boundary along the edge to avoid building against each other for earthquake safety as well as providing flexibility. Within the block there is hardly any unbuilt space, as the ground prices are high. If space is unbuilt, it is used for surface parking with the intention to build something new in the future. As there are no restrictions, buildings differ greatly in terms of materials, form, height, depth, etc. Usually the plot depth is maximised, with a small set-back on the street side. Windows facing each other with 1m in between is common, as is low lighting conditions on the bottom floors. Tall buildings often have set-backs around the 6th floor, step-wise or diagonally. Roofs are generally unused. Buildings such as these often have a short lifespan of 20 years.

Typology comparison

In many recently built suburbs, blocks are almost always row houses of at least five dwellings wide, with an average width of ~5,4m, built in the same way and at the same time. These row houses are often part of a larger ensemble of the same buildings. Unless special measures are taken, the block features no notable green measures. Each building typically has a small front yard and a large back yard. Often, the backyard is oriented towards the parking and is used as the main entrance. Yards are typically paved with small potted plants.

The block features visitor parking along the street, often on both sides. Resident parking happens as surface parking in the centre of the block.

Buildings are built to last.

Inner-city developments are often large closed blocks with a large communal (private) courtyard. Buildings of the block may be visually distinct from one another, but are essentially the same one building with different facades. Such a block has a minimum depth of 40m, but there is a large variety in sizes. At a certain depth and width, smaller buildings may be built within the block courtyard. Closed blocks contain a (half-depth) parking garage with one entry to the main road. These blocks tend to be 4-6 stories tall, depending on overall size. There may be forced variation in building heights across the block. Roofs are generally unused, except perhaps for solar panels. The courtyard would have a green centre but is limited in terms of planting due to the parking garage underneath.

Comparison between block typologies Japan and the Netherlands (Google Streetview)

Typology comparison conclusions (street)

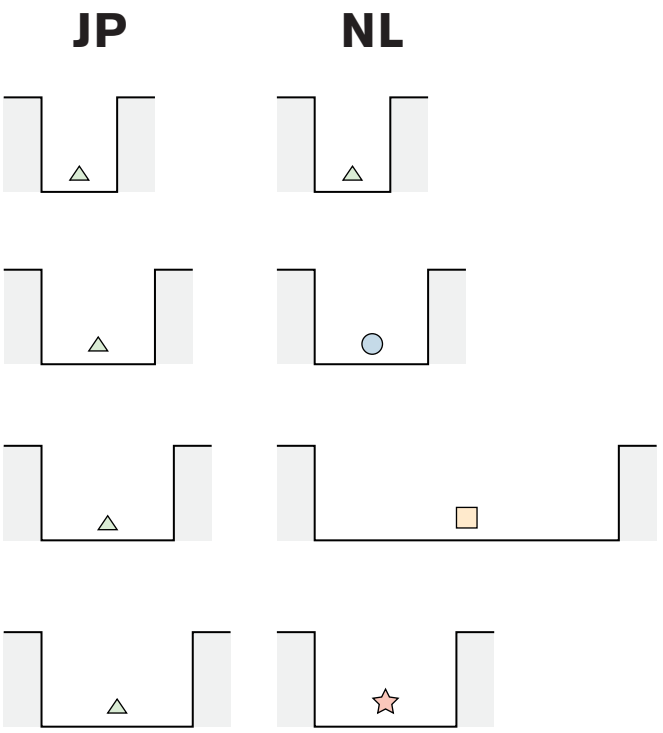
The Japanese street typically consists of bare asphalt, all the way through the scales. Both its physicality and the fact it's nearly the same on all scales is very different when compared to Dutch streets. Only the oldest street is as narrow as the Japanese comparison. Any other scale has the Dutch example seriously outweigh the Japanese one in terms of width. The Dutch examples always feature traffic type separation, even on the smallest level. This happens occassionaly in the Japanese example, usually through painted lines. Larger streets feature sidewalks as well. Most areas in the Japanese context can be considered shared space, while the Dutch context mostly gives 1/3 of the street space to pedestrian use.

Perhaps the most striking is, even though both the Japanese and Dutch examples are car-oriented, a fundamental different choice is apparent: despite the lack of space, car parking is always integrated into the plot (off-street) in the Japanese example, neutralising the street. While car parking is always integrated into the street (on-street) in the Dutch example, even if just for visitor parking. Making the street car-dominated in the Dutch example.

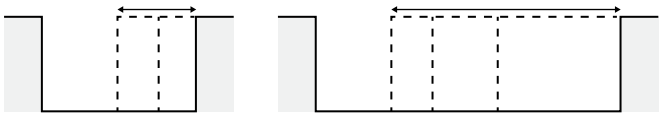
Typology comparison conclusions (block)

Blocks in the suburbs vary wildly between the Dutch and Japanese context. With the Japanese always having free-standing houses, no matter how densely packed they are. The amount of personal space also differs, as the Dutch context often has a large amount of yard (such as 3m in the front, 7m in the back) where the Japanese context has barely a metre or two. There's a wide variety in buildings, with the Dutch context usually being one variation of a building copied many times.

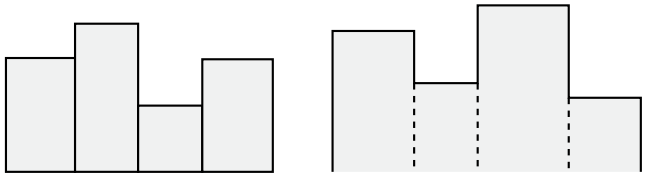
Buildings in the inner-city are also very different. Every square centimetre is optimised in the Japanese city, completely built up. Because blocks consist of multiple plots, there is a large variety in different buildings. In the Dutch context, there is often a large courtyard in the middle. With only one building per block, which may or may not be formed to look like multiple buildings by changing materials or heights within the block.



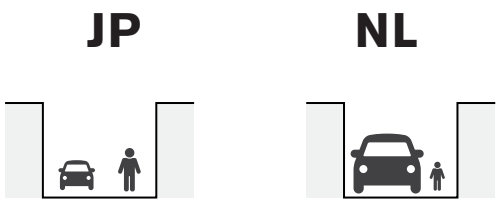
Streets in Japan are similar, streets in the Netherlands completely different
(own illus.)



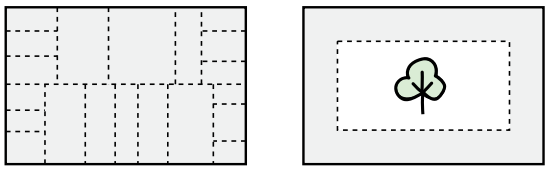
Variety of width in streets studied is lower in Japan than in the Netherlands
(own illus.)



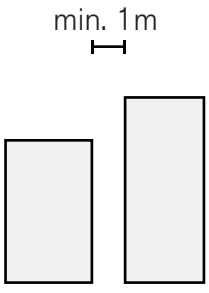
A block consists of different buildings in Japan versus visually different buildings in Netherlands (own illus.)



Pedestrian-car balance versus car dominated space
(own illus.)



Plot structure of a block
(own illus.)



Buildings in Japan maintain a minimum of 1m (0,5m around each building)
(own illus.)

4.4 Places of shared space

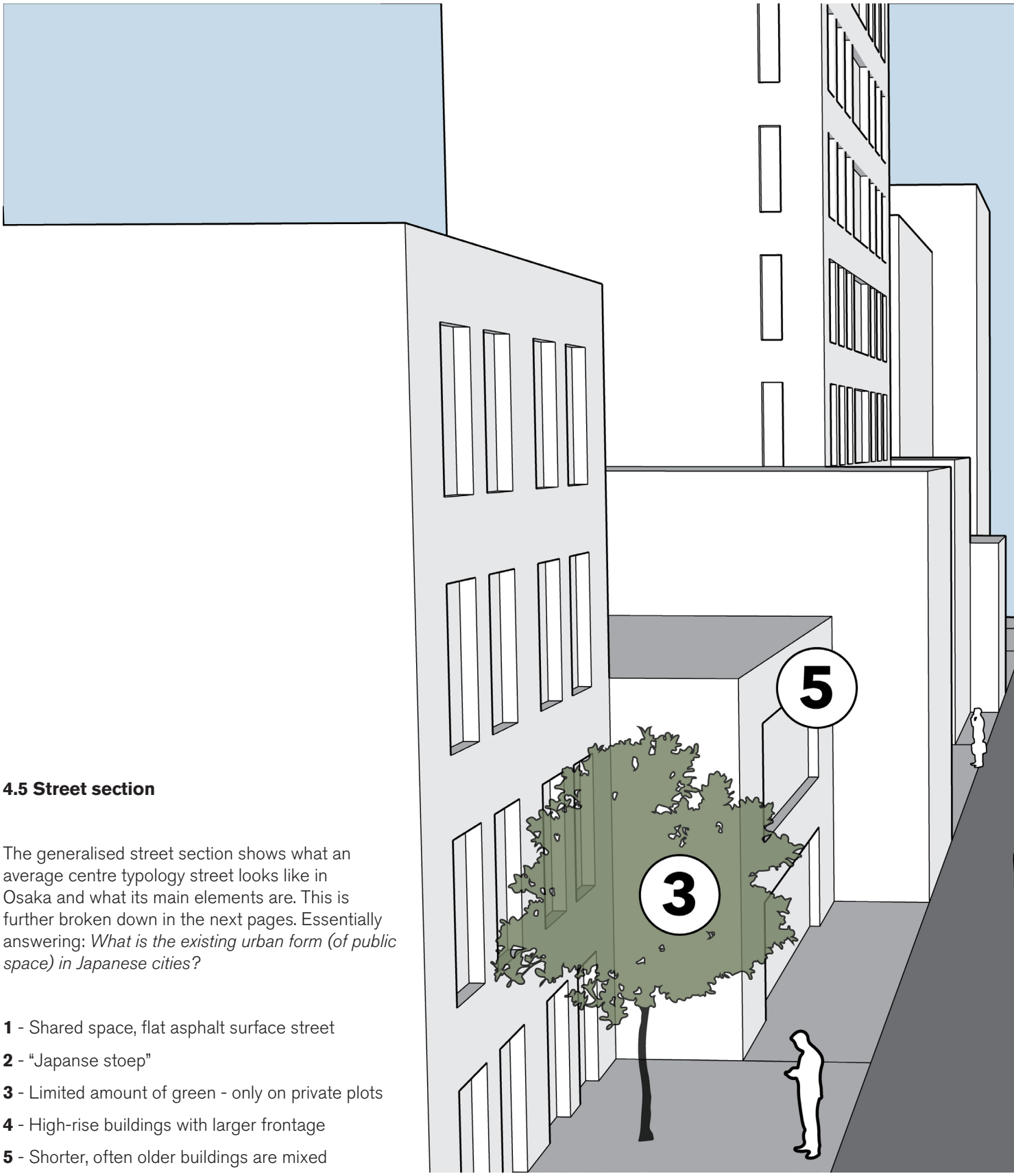
As has come forward in the typological comparison, most Japanese streets consist of one flat asphalt surface functioning as shared space. Greatly benefiting flexible use of space. The width of streets is vastly reduced compared to most Dutch streets, and space is used more efficiently. However, it goes too far to say that shared space is Japanese, or that the way of building (streets) would be impossible and not fitting with Dutch urbanism. There are plenty of examples of shared space in the Netherlands, and while the surface material and buildings are different, these shared spaces fundamentally work the same.

One example is neighbourhoods built before cars were the norm, this extends all the way back from small fishing villages to the first example pictured, Tuindorp Oostzaan. Consisting of mostly narrow streets, cars were ultimately retrofitted in, sacrificing space for parking spots. However, many streets retain their original functioning, with a front garden and one flat paved surface - shared space.

The greatest example, perhaps, is the “woonerf”. The “woonerf” is a shared space in residential areas, with a focus on traffic calming measures and a low speed limit. Even the Japanese themselves have a name for “woonerf”, コミュニティ道路 (community douro), and in Japan this is differentiated from their “regular” shared space streets as mentioned above.

Newer examples of shared space streets exist in Vinex locations (and beyond), where the woonerf is by design inefficient. Its building configurations and parking spaces put in such a way that a lot of “in-between” space is created. The newer iteration is focused on efficiency, with parking directly along the street and almost no “in-between” spaces. The functionality remains the same, however, people walking and biking share the street-space with cars. Increasing the amount of street that is “meant for pedestrians” to at least 50%, as the parking still takes up space.

Different types of shared spaces in the Netherlands
(Google Streetview)



4.5 Street section

The generalised street section shows what an average centre typology street looks like in Osaka and what its main elements are. This is further broken down in the next pages. Essentially answering: *What is the existing urban form (of public space) in Japanese cities?*

1 - Shared space, flat asphalt surface street

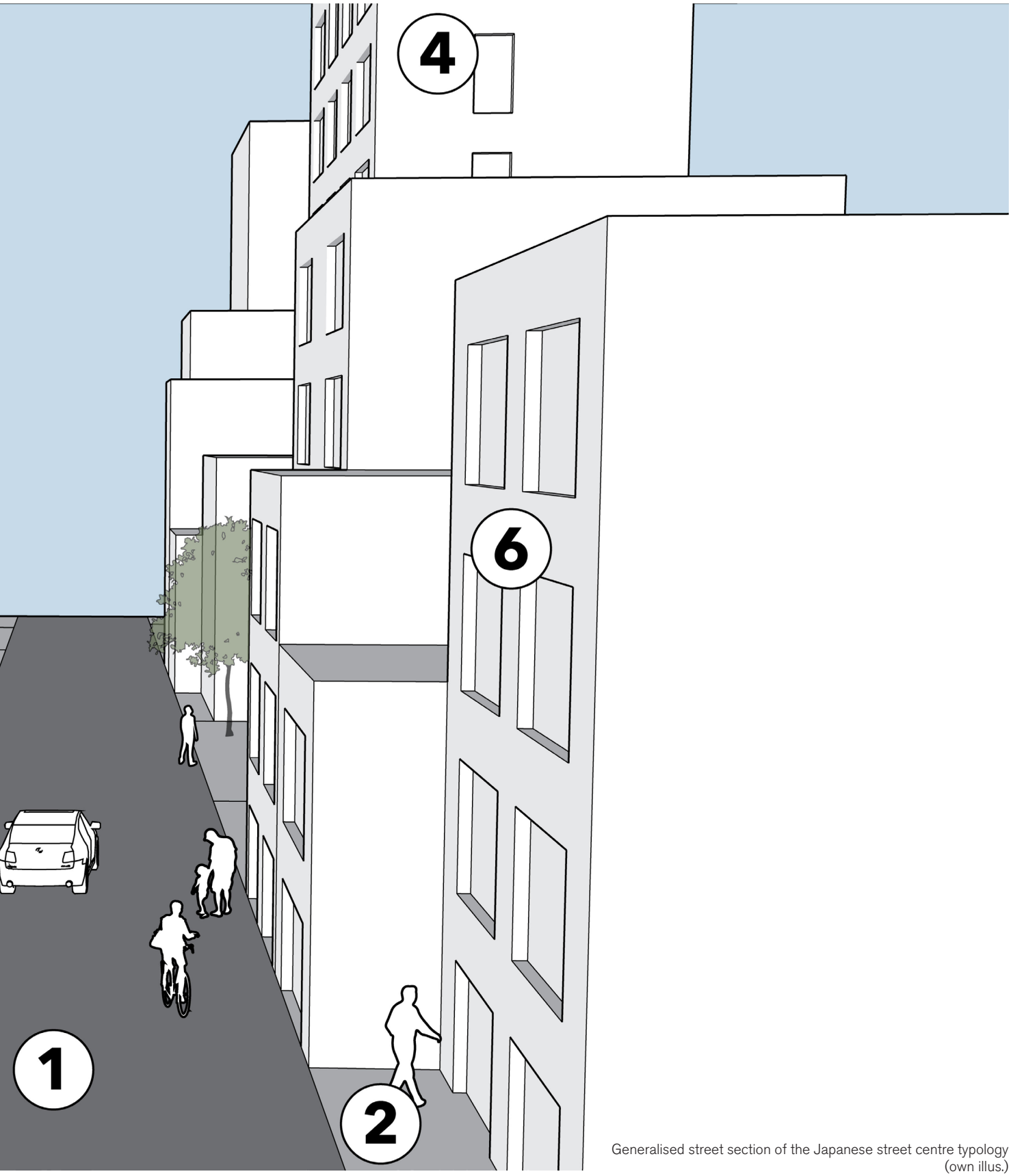
2 - “Japanse stoep”

3 - Limited amount of green - only on private plots

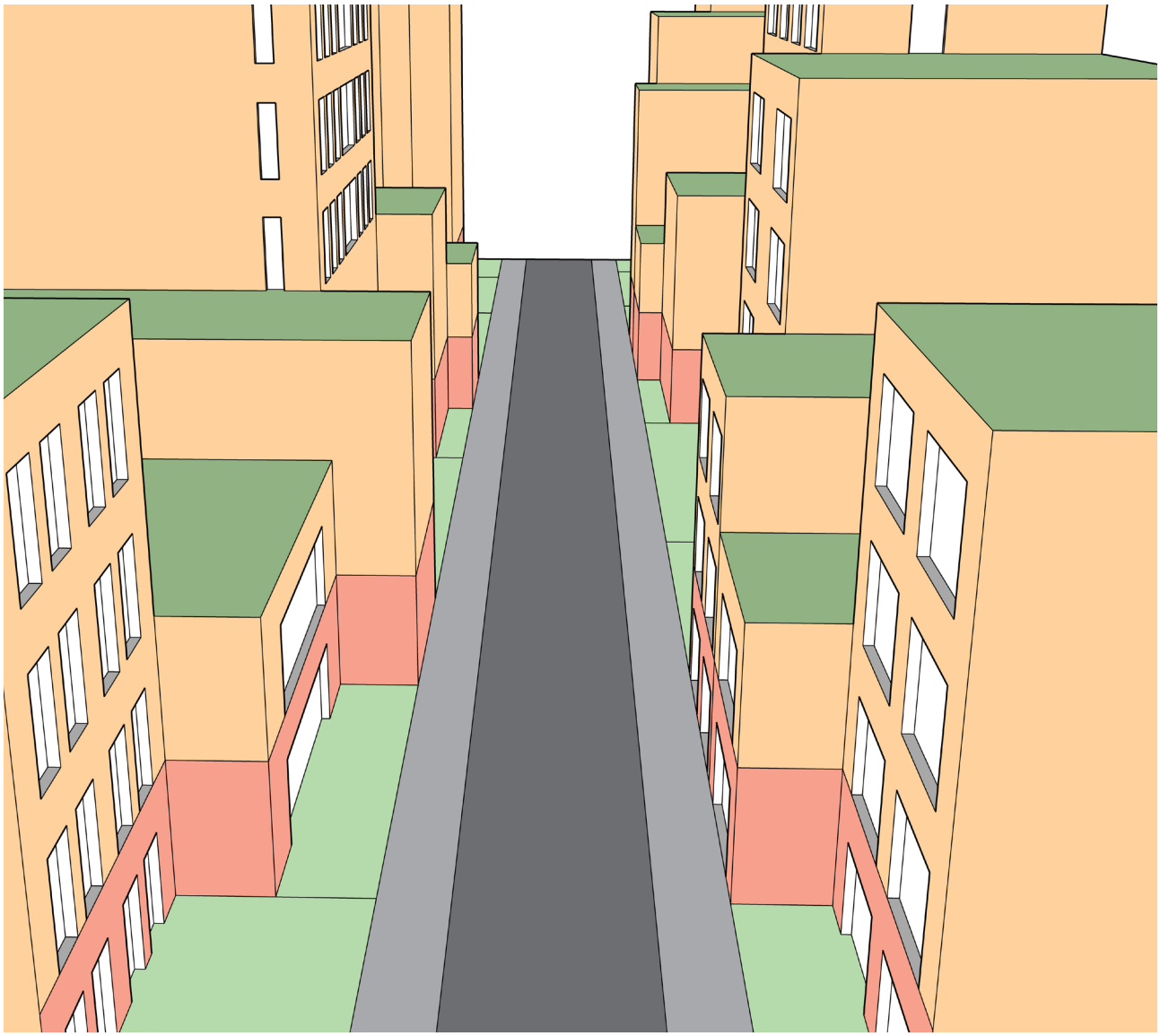
4 - High-rise buildings with larger frontage

5 - Shorter, often older buildings are mixed

6 - Always street-facing as buildings are back-to-back



Generalised street section of the Japanese street centre typology (own illus.)

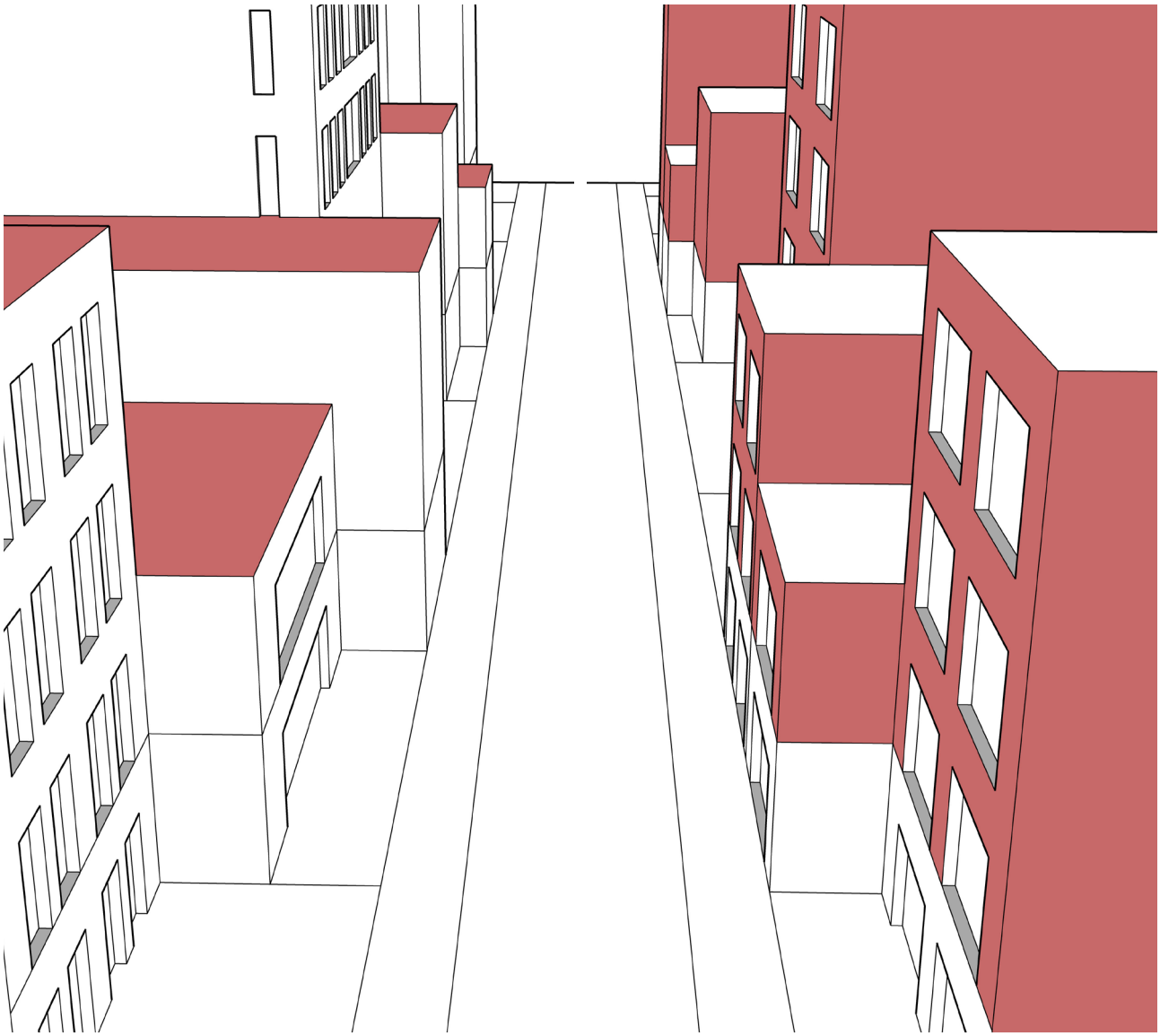


Surfaces

All the different types of surfaces are highlighted within the street. These surfaces will become the “knobs to turn” when approaching the climate adaptation portion of the Japanese street, later in the graduation project. These surfaces will be the specific places wherein physical solutions will be applied.

These surfaces are:

- Street - inflexible part
- Street - flexible part
- The “Japanse stoep”
- Building plinth
- Building walls
- Building roof



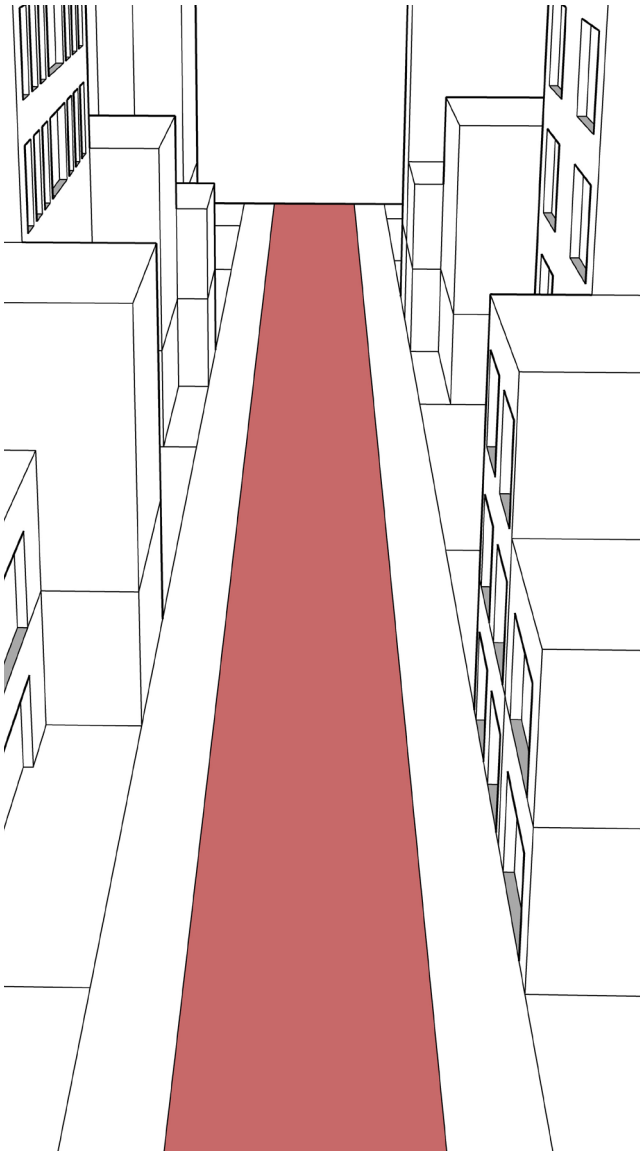
Rooftops

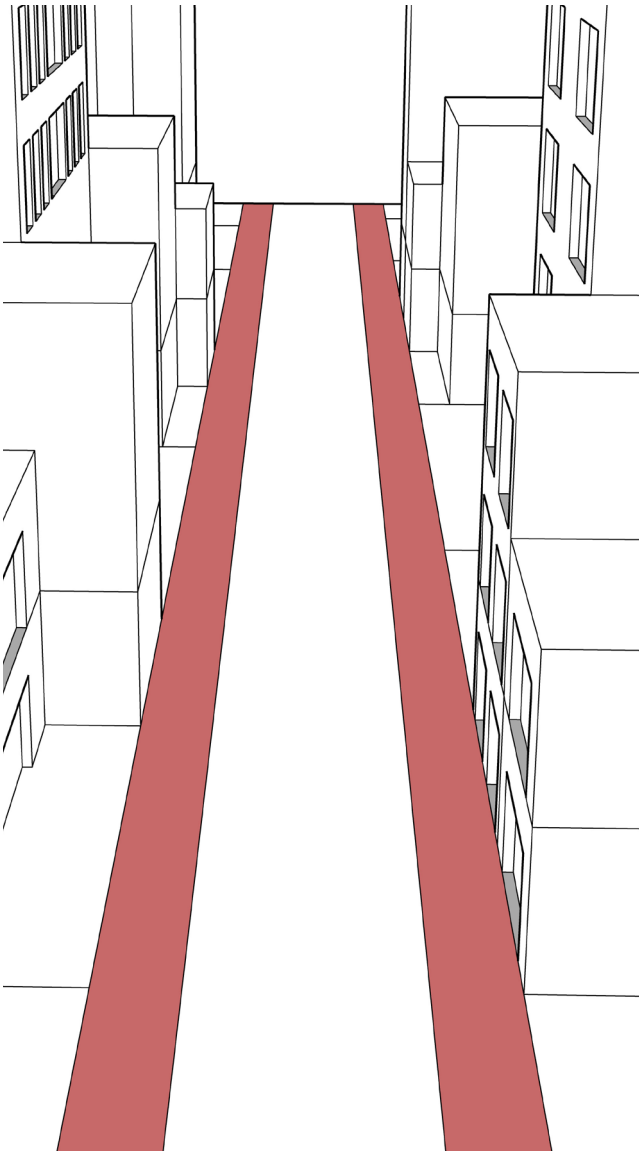
This surface is not specific to this situation. Most roofs go unused in the centre of Osaka. Many roofs are slanted, directly pathing rainwater onto the street. There are barely any roofs with a particular use, be it a roof terrace, green roof, blue roof, or other.

Wall

This surface is not specific to this situation. The wall is a significant surface in the street, but it does not get utilised at all. The large surface has potential for various uses in terms of climate adaptation.

Generalised street section of the Japanese street centre typology (own illus.)





Shared space street

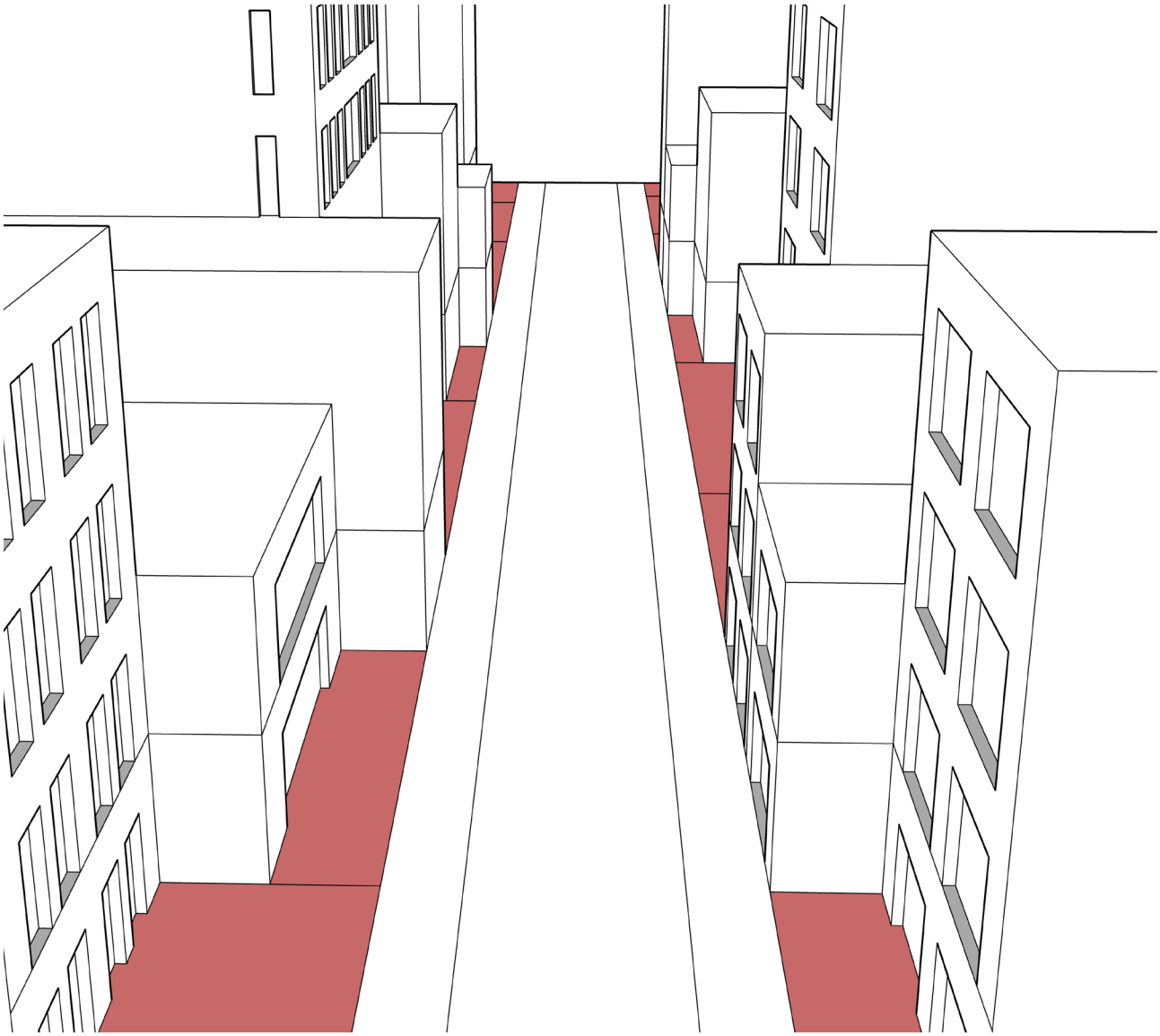
This surface is specific to this situation. The shared space street consists of a flexible space zone and inflexible space zone. The difference is sometimes explicitly made - with painted lines, and sometimes implicit. Essentially, it is the affordance of the street. The inflexible space zone ensures traffic can go through the street unimpeded. The flexible space zone is used for various purposes: spatial appropriation in the form of plant pots, temporary storage (such as for construction material), space to park (temporarily) or space to stop (such as for deliveries or trash collection). Noticeable on the right image: when the zones are made explicitly with paint, some inflexible space is still more flexible than other inflexible space (the parked car in the distance).

Spatial appropriation

Informal parking

Space to stop

(Google Streetview)

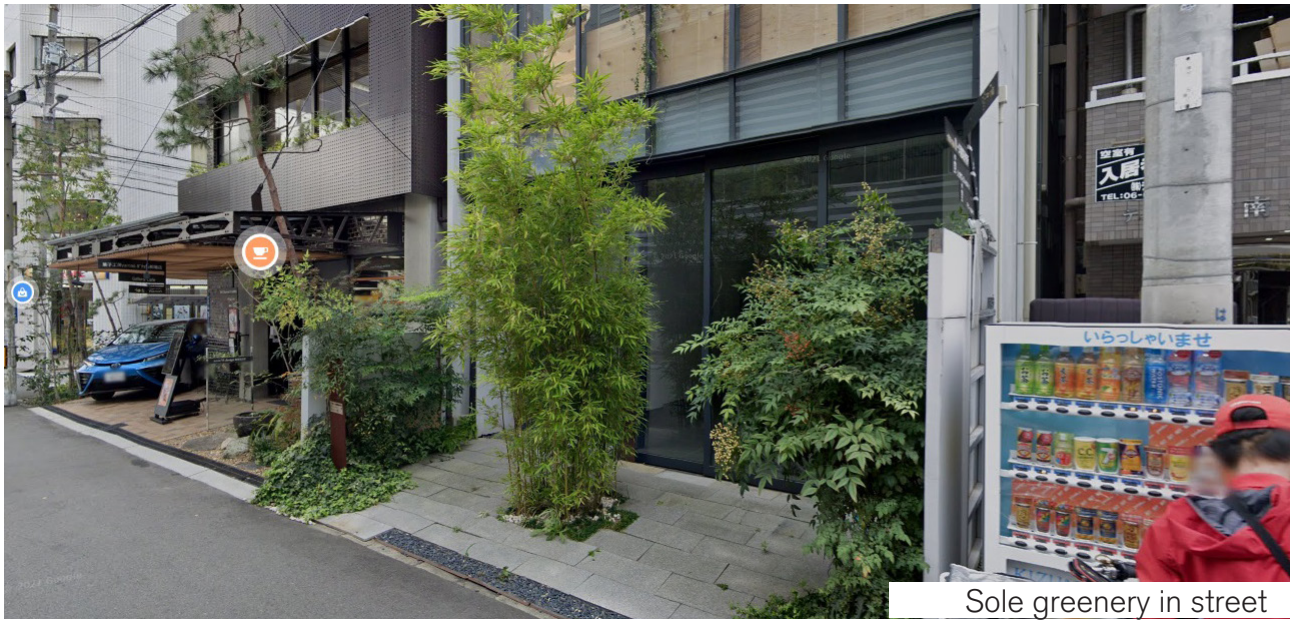


“Japanse stoep”

This surface is specific to this situation. The area in front of a building, belonging to the plot itself. The “Japanse stoep” shares similarities with the “Delftse stoep”. Most buildings have some form of “Japanse stoep”, although smaller or older buildings lack one entirely. This space is private and plot specific, and this can be seen in the street overview. With the buildings themselves all differing from each other, this space strengthens that view, adding to a building’s character by utilising the same material as the building, or differing to create contrast. It’s essentially an expression of the building.

This space is often the only space in the centre typology to have greenery, as it is a private area and privately maintained. The spaces are not connected to each other, thereby not creating a common sidewalk. In fact, most have a wall on either side to specifically separate themselves from surrounding buildings. It is noticeable that taller buildings often create a larger frontage, and very large buildings (that take up 1/3 or more of a whole block) often create a “real” sidewalk and/or a garden with trees.

Taller = more spatious



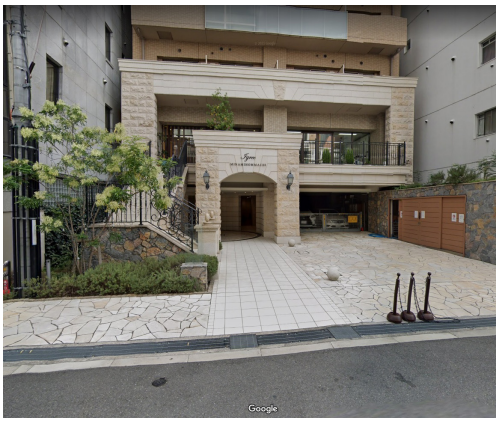
Sole greenery in street

Adds character

(Google Streetview)

Street section

The Japanese street consists of an amalgamation of various singular buildings co-existing around the street. Due to the flexibility of the street, these buildings can take on many forms. In a way, this style of development creates another layer of flexibility to the already flexible street. This style of development facilitates urban renewal as smaller buildings on their own plot along a flexible road are more easily renewed than large buildings taking up the entire block with the street layout fine tuned to its requirements.



Temporary

Appropriation

Future Connection

Flexibility

The Japanese street excels in three kinds of flexibilities it offers. These are “temporary”, such as just stopping for a moment to deliver something. “Appropriation”, all the flexible space on the side could technically be appropriated by inhabitants without harming the overall functioning of the street. This includes people putting plant pots outside (very common), but also temporary storage of materials and people using the space as private bike parking. Another important dimension of Japanese flexibility is the “future connection”, as buildings are very quickly renewed (average lifespan is 20-30 years in the city), it makes sense for the street to be neutral - it does not need to be reconfigured every time a new building in the street is built.

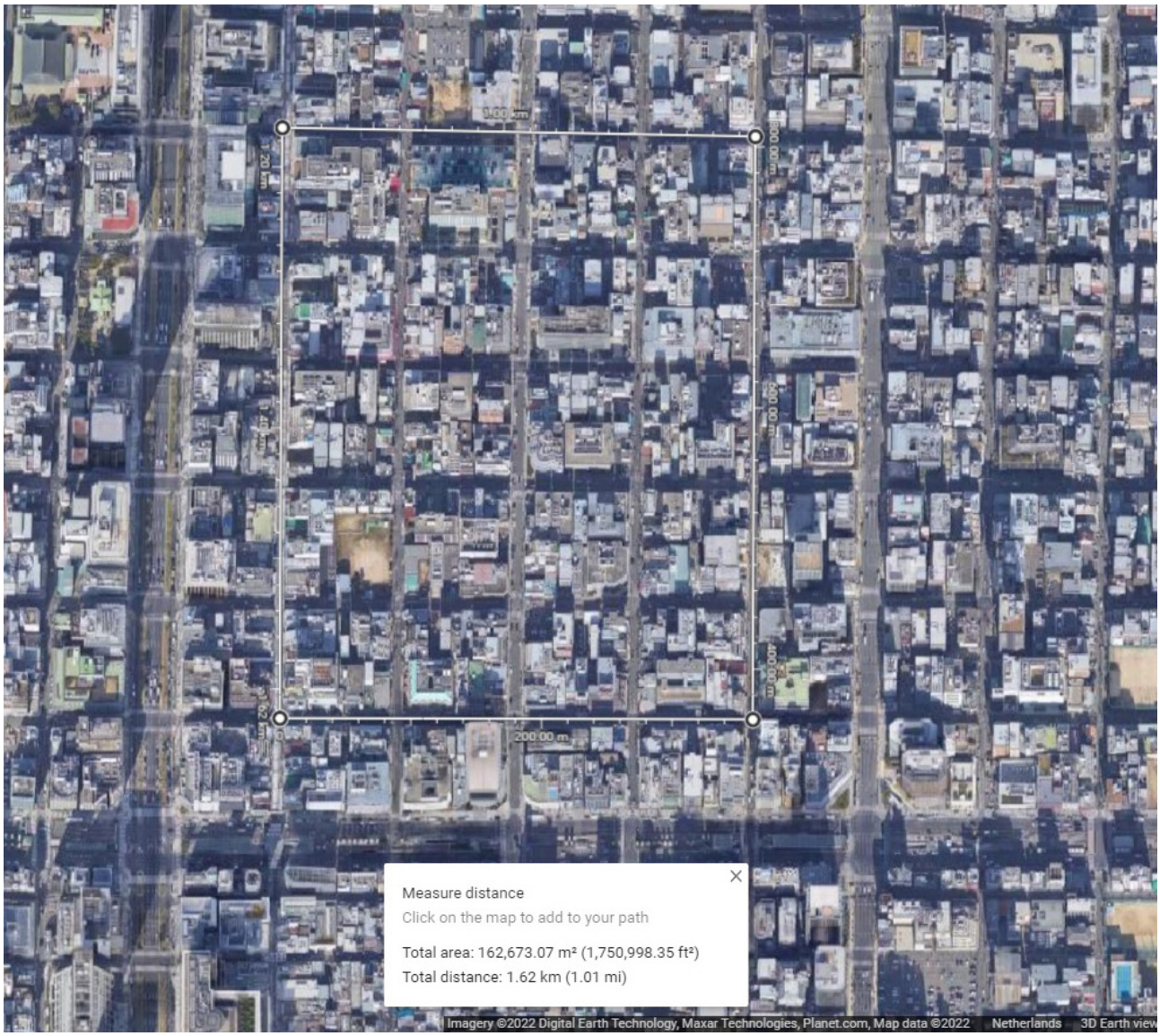
4.6 Large-scale comparison

In order to understand the difference in urban form between a Dutch city and Osaka, and to see the effects on square metres in the city, a comparison of a large area has been made. A part of central Rotterdam adjacent to the Lijnbaan (central shopping street) has been compared to a part of central Osaka (中央, “Chuo”) adjacent to Shinsaibashi (central shopping street). For Rotterdam, each building has been numbered, with square metre data from BAG 3D and floors counted in Google Streetview. For Osaka, four representative blocks were chosen out of twenty pictured, with each building numbered and with square metre data from OSM and floors counted in Google Streetview. These four blocks were divided to create a single representative block, which was multiplied by twenty, for each block present in the calculated area.

As the total area chosen in Osaka is slightly larger than in Rotterdam, the end result of m2 in Osaka was re-calculated proportionally to the same size as in Rotterdam.

The expectation that the ratio between block size, greenery and road surface is greater in Osaka, meaning there is more block size (more built area) and less greenery and road surface. This expectation has been met with higher numbers than initially thought.

All numbers are visible in Appendix A (Rotterdam) and Appendix B (Osaka).



Total surface in Rotterdam area: 155.718 m2

Total BVO calculated in Rotterdam area: **351.260** m2

FSI bruto: 2,26

FSI netto: 4,80

GSI: 0,47

On the same surface area, the urban fabric of Osaka's centre contains ~**1.8 times more** BVO than the urban fabric of Rotterdam's centre.

Total surface in Osaka area: 162.673 m2

BVO calculated in four blocks: 133.581 m2
Average BVO per block: 33.395 m2
Total BVO calculated for twenty blocks in Osaka area: 667.905 m2

Adjusted for smaller total surface size: **639.346,6** m2 (4,4% smaller)

FSI bruto: 4,11

FSI netto: 7,04

GSI: 0,58

Measurements to calculate with (Google Maps)

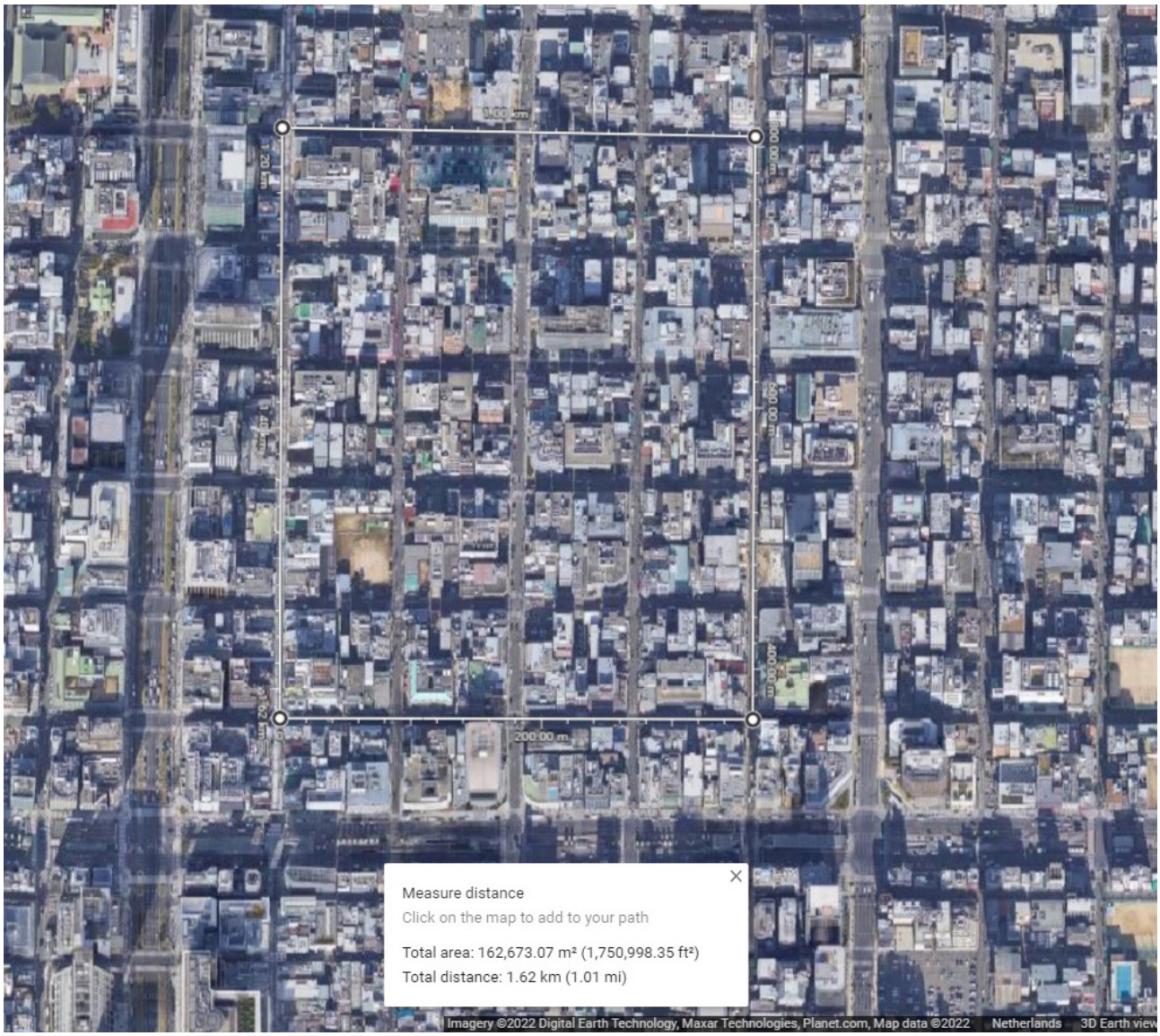
4.6 Large-scale comparison

The amount of soft surface (greenery) is measured in Rotterdam and Osaka.

For the surface area in Rotterdam, the visible green spaces over 50m2 area are measured in Google Maps and subjected to a form factor reduction, based on an assumption. For example, a green inner courtyard of 3.600 m2 with a large amount of parking and a playground, may have a form factor of 0,4, as the parking and playground are not soft surfaces. 1% of the total surface area measured is added to the soft surface area to incorporate any small soft surfaces, such as space around trees and small flower beds, into the calculation.

For the surface area of Osaka, the visible green spaces over 50m2 area are measured in Google Maps. 2% of the total surface area measured is added to the soft surface area to incorporate any small soft surfaces. As well as any space in between buildings that may be soft surfaces, as this is difficult to measure.

All numbers are visible in Appendix A (Rotterdam) and Appendix B (Osaka).



Total surface in Rotterdam area: 155.718 m2

Total soft surface calculated in Rotterdam area: **18.510** m2, amounting to 12% of total area.

On the same surface area, the urban fabric of Osaka's centre contains ~**3 times less** soft surface (greenery) than the urban fabric of Rotterdam's centre.

Total surface in Osaka area: 162.673 m2

Total soft surface calculated in Osaka area: **6.501** m2, amounting to 4% of total area.

Measurements to calculate with (Google Maps)

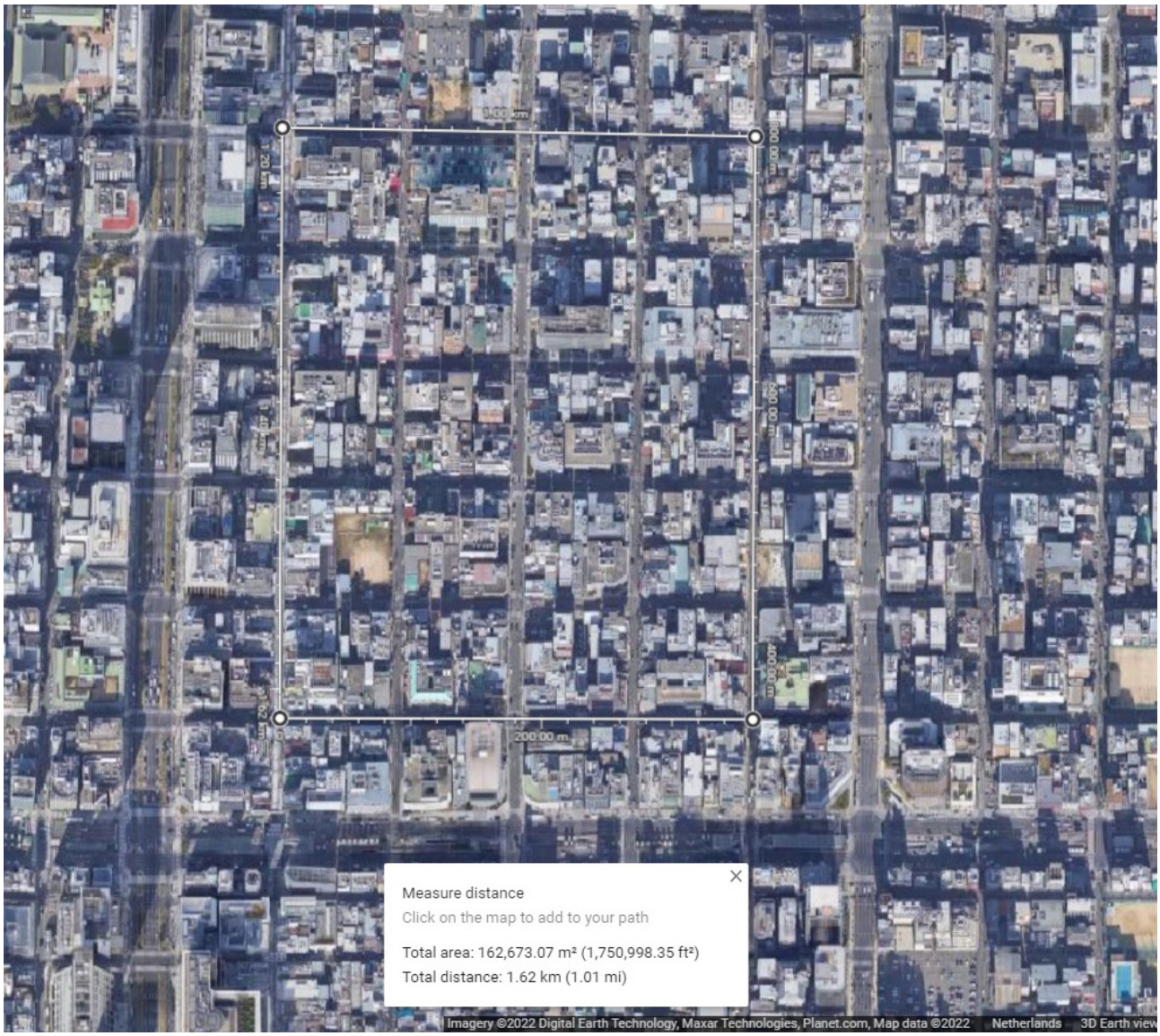
4.6 Large-scale comparison

The block to public space ratio reveals the relationship between the block and the street.

This ratio is made by combining the total built surface with the total courtyard surface (to obtain the block surface) and detracting this from the total measured surface (to obtain the non-block surface or public space surface). For this exercise the courtyard is treated as block surface even if the courtyard is publicly accessible. This is partly to create a black-and-white comparison, but mainly since the possibility exists that the publicly accessible courtyard may be built in to densify. An example of this is the Jan Evertsenplaats in Rotterdam.

In Osaka, the block to public space is more straightforward, as the grid dictates the public space and block size. There's no public space within the block's surface (in the measured area). The "Japanse stoep" in plots is counted as block surface as it may be built on in the future.

All numbers are visible in Appendix A (Rotterdam) and Appendix B (Osaka).



Total surface in Rotterdam area: 155.718 m2

Total “public” area (streets) calculated in Rotterdam area: **49.636** m2, amounting to 32% of total area.

Total “private” area (blocks) calculated in Rotterdam area: **106.082** m2, amounting to 68% of total area.

The block : OR ratio is **2:1**.

On the same surface area, the urban fabric of Osaka’s centre contains ~**2 times less** public space (streets) than the urban fabric of Rotterdam’s centre.

Total surface in Osaka area: 162.673 m2

Total “public” area (streets) calculated in Osaka area: **32.172** m2, amounting to 20% of total area.

Total “private” area (blocks) calculated in Osaka area: **130.501** m2, amounting to 80% of total area.

The block : OR ratio is **4:1**.

Measurements to calculate with (Google Maps)

5.

Climate Adaptation

5.1 Climate adaptation management

Climate adaptation in the Netherlands is based on the Deltaplan spatial adaptation of the Dutch government. Within this Deltaplan, the aim is to create a Netherlands which is water-robust and climate resilient by 2050.

The “7 ambitions” are visible and made explicit, however, what is noticeable is the disparity between physical interventions and management. The Deltaplan spatial adaptation consists of mainly management-oriented ambitions (six of them, with “meekoppel kansen” being arguably intervention-based) and lacks in physical actions to take to make climate adaptation a reality.

Within climate adaptation for this project, the aim is to not focus on management, but to focus on tangible interventions that impact physical space to alleviate problems. A particular focus lies on nature-based solutions, that is to say providing solutions for (climate-related) problems in a way that utilises nature. This is distinct from the Japanese way of doing things - mainly focused on regulation and mitigation through mechanical solutions.

While the Deltaplan spatial adaptation is the overall strategy of climate adaptation in the Netherlands, this project is limited to nature-based solutions for dense urban centres.

Deltaplan Spatial adaptation
(Rijksoverheid)

5.2 Nature-based solutions

As the focus of the project is on nature-based solutions for dense urban centres, related physical interventions will be based around (micro-)climate management in the city.

This encompasses the following topics:

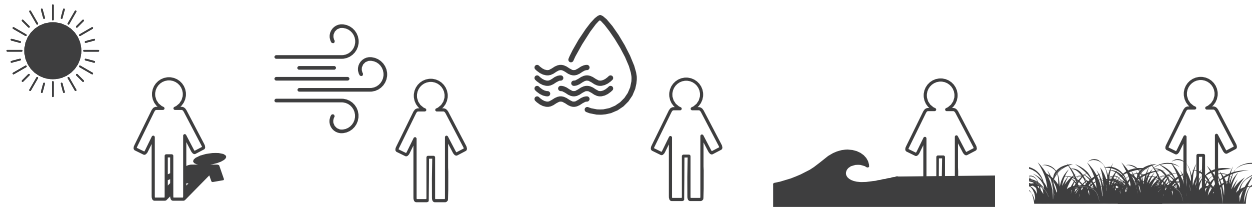
- Heat/shadow
- Wind
- Humidity
- Water management (runoff, retention, drought)
- (Im)pervious surface management

There are also several topics which are harder to grasp (measure) and may manifest as a result from physical interventions of the other topics:

- Mental health / stress (reduction)
- Clean air
- Social interaction

Essentially answering: *What are relevant climate adaptation topics to cover*?

Several physical solutions are offered for the aforementioned topics.



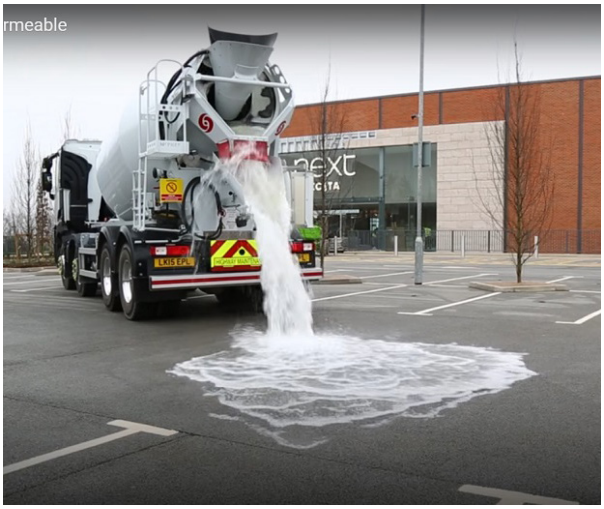
Climate adaptation topics to consider
(own illus.)

5.3 Examples of nature-based solutions

There is a large variety of nature-based solutions to specific problems and situations. The focus for these examples is physical, “outside space”-based solutions. This excludes complex architectural solutions, vertical applications or (building) materials. The following solutions can work on their own, but the real strength lies in the cumulative. Many solutions provide conditions to build upon.

Flooding is an increasing issue during heavy rainfall, and directing all this water to the sewer system is unsustainable. **Decoupling the grey water** system (rainwater catchment) from the sewer system can do a lot. Directly impacting the topics watermanagement and impervious surface management.

Soft surface (greenery) can provide the space and capacity for a lot of water to infiltrate into the ground. **Reducing/removing hard surface** in favour of soft surface (greenery) will help provide the capacity for water to infiltrate into the ground as well as provide opportunity for contaminants to be filtered out of the water. Creating this space is an added benefit to all the fauna in the ground, as 80% of biodiversity is underground (Vink, et.al., 2017). Directly impacting the topics watermanagement and impervious surface management.



In instances where soft surfaces don’t meet requirements for use, **using permeable surfaces** can provide an answer for water infiltration into the ground, without the other benefits of transformation to soft surface. This includes permeable concrete, open hexagonal stones, etc. Once again directly impacting the topics watermanagement and impervious surface management.

In larger surfaces, soft surfaces can be added in the form of **bioswales**. These can handle larger quantities of water for infiltration and serve a whole block. The height difference is further beneficial for flora, as plants have the opportunity to “move” up or down in search for their ideal circumstances (Vink, et.al., 2017). It also provides a solution against fast runoff, slowing water down that can’t be retained. Directly impacting the topics humidity, watermanagement and impervious surface management.

Adding trees and greenery to these soft surfaces and bioswales.

Trees play an important role against urban heat island effect, add specific point water infiltration, and greenery even provides measurable effects in curing disease, stress reduction and stimulating motor-/cognitive and emotional development (Yuan & Bauer, 2007).

Directly impacting the topics heat/shadow, wind, humidity and impervious surface management.

Proper maintenance is crucial to reach the biggest benefits. This can be done by planting a variety of plants, not mowing a whole surface but doing it in steps to retain flowers in bloom and insects and providing information about “messiness”. The way and timing of maintenance also matters (Vink, et.al., 2017). Maintenance can even be done by citizens to increase social connection, responsibility and sense of place.

Image sources in order of appearance
(duurzaamthuis.nl, 2022) (Dijkstra, 2022)
(Topmix Permeable, 2020) (Atelier Dreiseitl, 2019)
(kew.org, 2019) (PenrithACT, 2019)

5.4 Green roofs

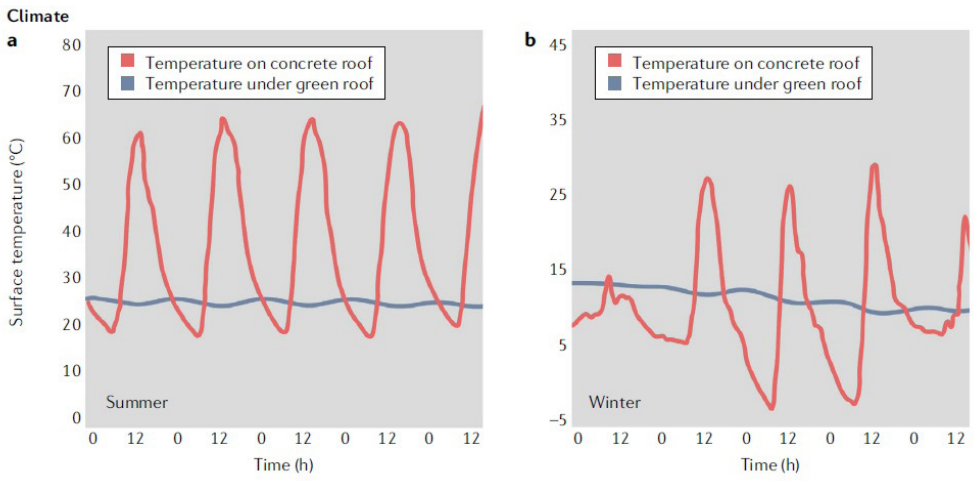
An important aspect of the ISR is the decision to include green roofs into the calculation. This is partly to stimulate the creation of green roofs, as well as to keep the overall plan workable considering the demands for an ISR of 0,5 on the plot and the minimum built area on the plot of 50-90%.

The green roof in question has a primary use for water storage and cooling, with a secondary usage for ecology. It is not necessary for the green roof to have a “human” function, but this is also not excluded.

There are multiple forms possible for the green roof, such as the rooftop garden, the brown roof - a roof simulating an empty plot of land with spontaneous growth, as well as a sedum roof. These are just some generalisations, green roofs are free to be formed in any way they need. This could include options for thick or thin roof combinations, natural soil or substrate, with or without watering system, planted with a variety of greenery from sedum to bushes and trees (Vink, et.al., 2017, pg.162). A preference exists towards native species, therefore the brown roof may be interesting, as it employs a “wait and see what grows approach”. As long as the roof can retain a large amount of water.

It is important that the roof does not add too much weight, while still meeting its requirements. If the consequence of the roof is enlarged construction (more materials used) then the sustainability is diminished.

For future calculations, typical retention capability of an extensive green roof is estimated at 24,43 L/m2 (0,6 gal/ft2) (Johnson, 2008).



Effects of a green roof on temperature
(Wong, Tan, Kolokotsa, & Takebayashi, 2021)

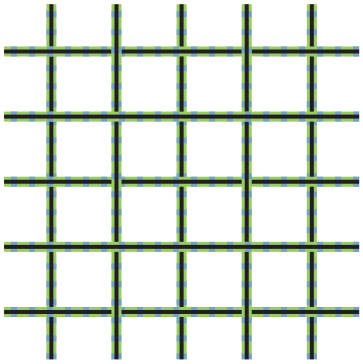
Green roofgarden
(Rijksoverheid)

Brown roof
(Rijksoverheid)

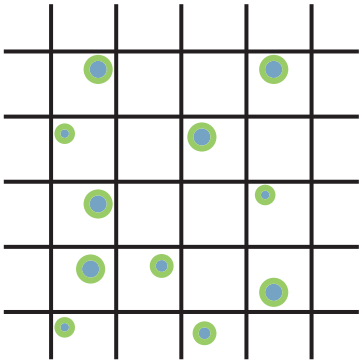
5.5 Variety of nature-based solutions

Although the aforementioned examples of nature-based solutions can work in unison, creating cumulative effects, it is not enough to simply place a few of these examples into the public space to reach their full potential.

The solutions need to be of a variety of scales and shapes to be qualitative additions to the city. Replacing a square metre of asphalt with grass in one location will not make a significant impact. The combination of network solutions, being solutions that are made in a successive way in the physical space, and larger point-based solutions will provide quality and elevate the single solutions to a greater whole. The point-based solutions themselves can be of a variety as well, a large park with many measures stacked could be considered a point, or a plot in a block, or a small space on a plot, etc. The infill is also subject to variety, filling every point-based solution, however large, with the exact same plants and measures is not only monotonous but also lacking.



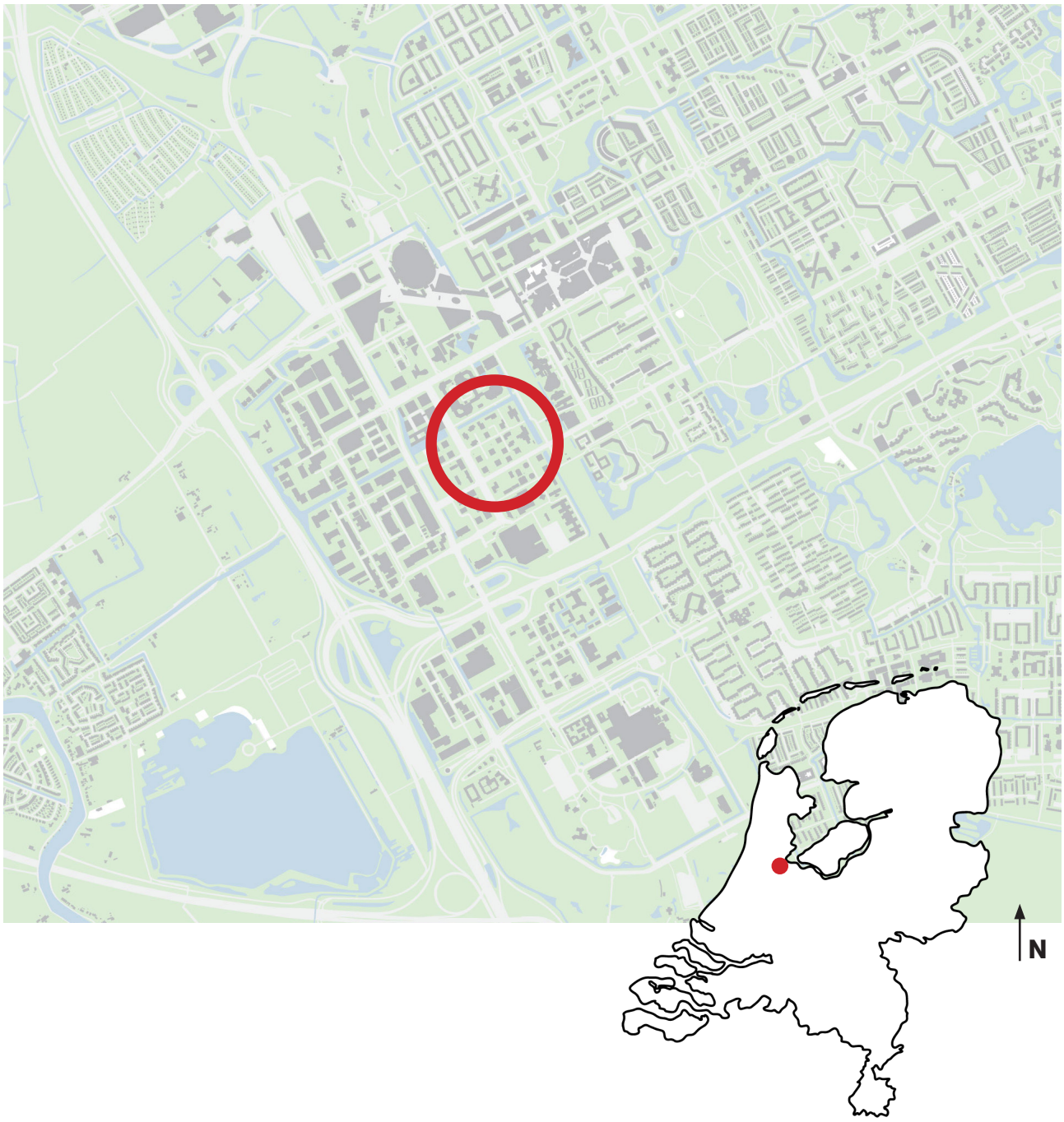
Network



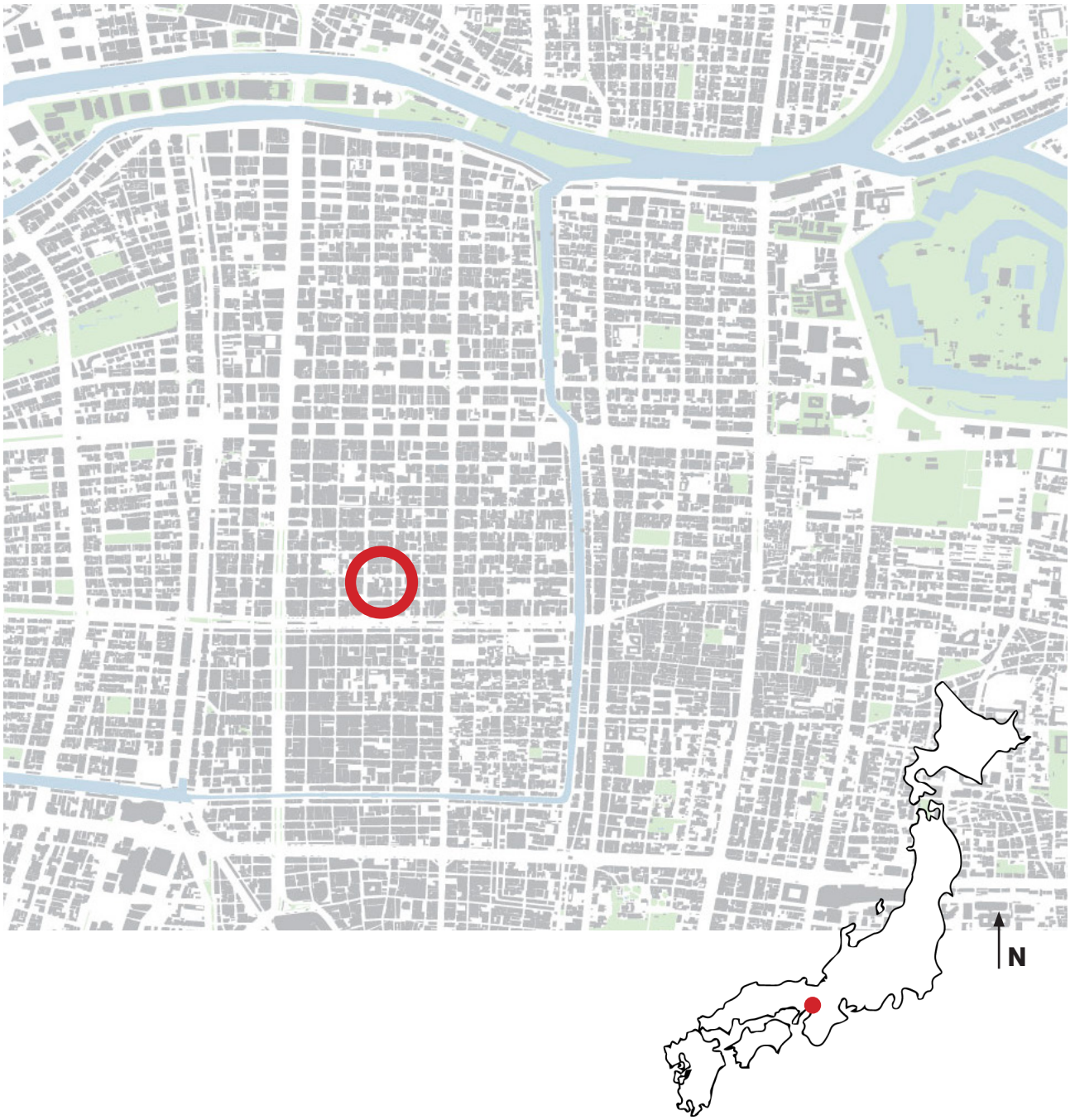
Points

6.

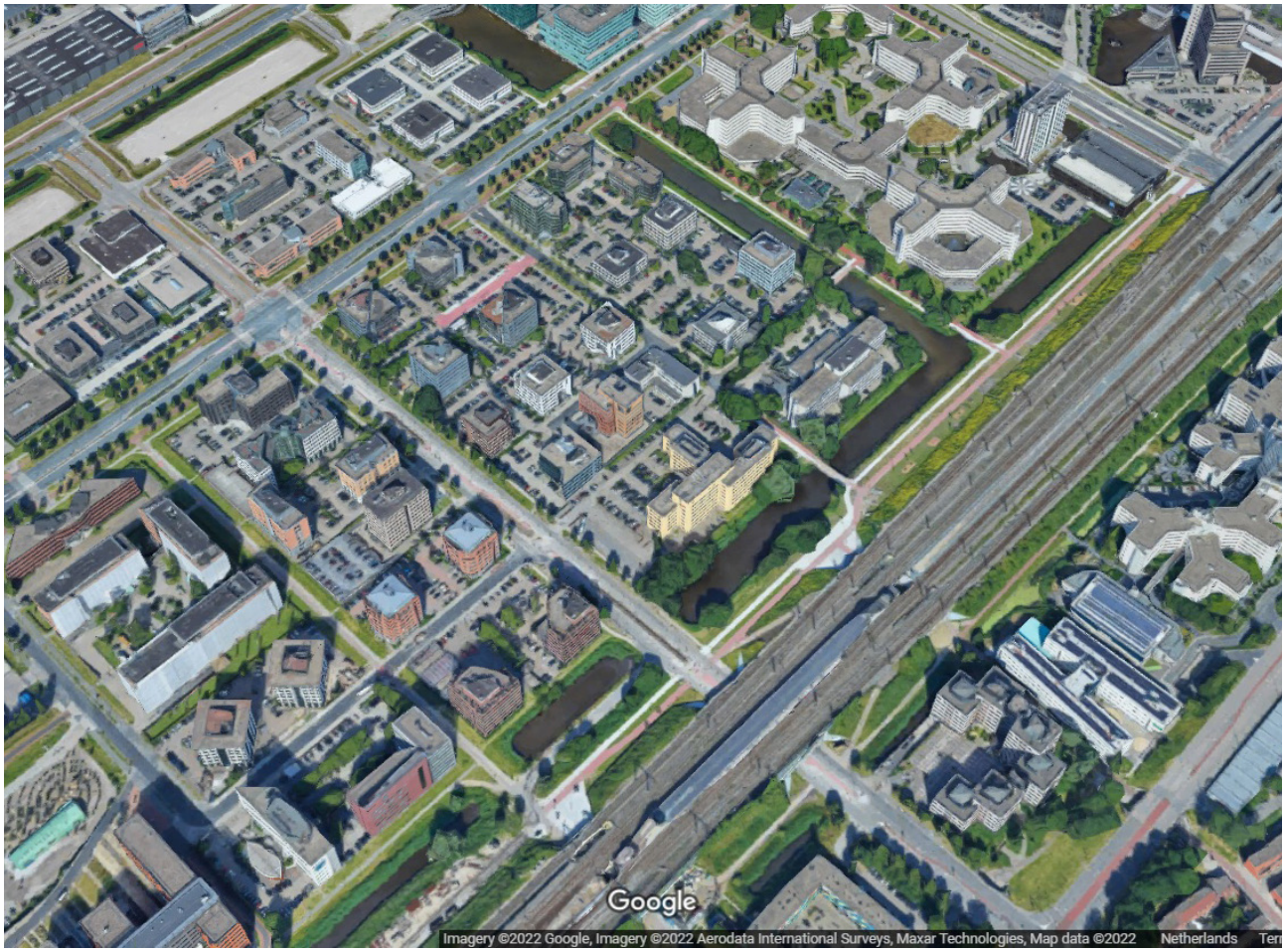
Location-based knowledge



1:15000, Bullewijk, Amsterdam, Netherlands
Outline of the Netherlands
(own illus.)



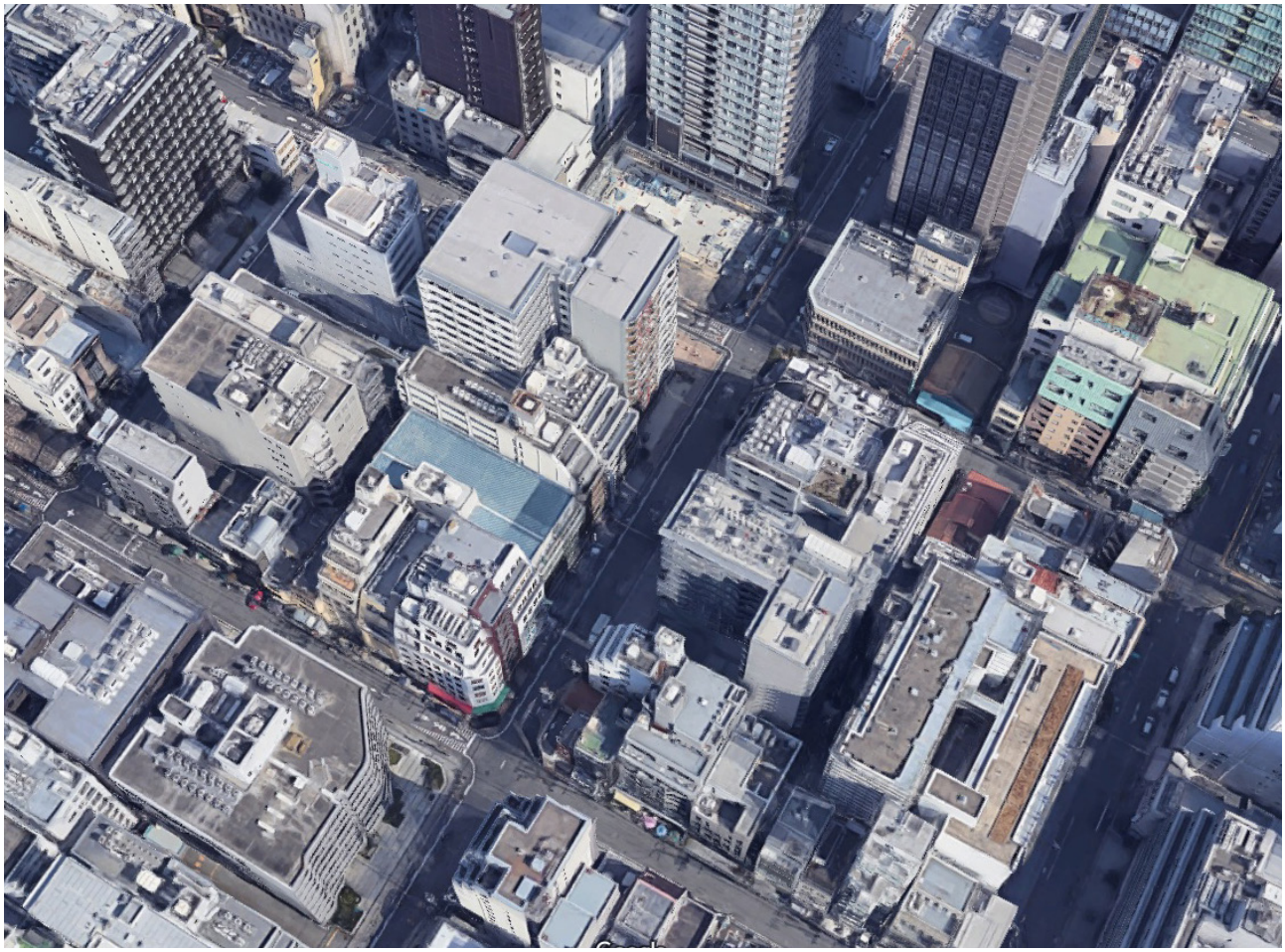
1:15000, Chuo, Osaka, Japan
Outline of Japan
(own illus.)



6.1 Chosen locations

The neighbourhood of Bullewijk is an area of Amsterdam with a lot of (empty) office buildings, very well located in terms of highways (A2, A9) and public transport (subway station, Bijlmer ArenA nearby, various buses). Due to these factors, the municipality of Amsterdam intends to turn it into a high-density mixed-use urban environment, befitting the location of this project. Currently the area consists mostly of free-standing 4-8 story office buildings surrounded by a large asphalt surface for parking. With a tree-like network, of big roads leading to smaller roads leading to dead-end roads into the parking lot. The network inside of the neighbourhood is abysmal. The current form dictated by ownerships structure is seeping through in the new developments, where they are very much island-like as they are now, this is further discussed in 7.2.

Bullewijk, Amsterdam, Netherlands
(Google Maps)



Chosen locations

The area in Osaka is chosen as randomly as possible - while it should be able to show off most of the street-related design choices, it doesn't need to be very specific. Most of the urban fabric of the centre of Osaka has the same elements the plan means to hook into, therefore "any" place is good.

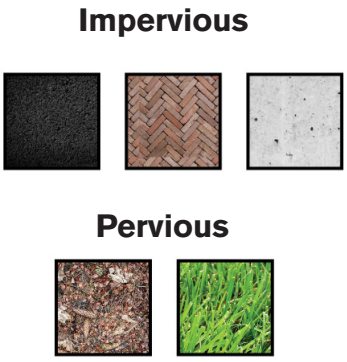
This place was chosen for its variety of building sizes and the proximity of FamilyMart.

Chuo, Osaka, Japan
(Google Maps)

6.2 Impervious surface ratio

The following text is a summary of an earlier essay written for the course AR1U121, called “ISR: Grounding indexed impervious surface area as development guideline in urban design practice and education”. This essay explained the distinction between pervious and impervious surfaces, the benefits of increasing pervious surfaces and how an index like FSI or MXI but for impervious surface can be important (van Eeden, 2020).

The following text is partly summarised, partly original, and answers the research question: *How can urban greening be embedded into urban design?*



Impervious and pervious surfaces (Own illus.).

Impervious surfaces

Impervious surfaces are defined as surfaces consisting of materials that prohibit the infiltration of water into the underlying soil, compared to natural conditions prior to urban development, and are therefore directly correlated with urbanisation. These surfaces include rooftops, sidewalks, roads and parking lots that are paved with asphalt, concrete, stone or other impervious materials.

Current developments

In recent times it has become a trend to build developments with a “green” and “ecological” way but these words often ring empty when looking at the final result of a neighbourhood (figures). Many developments are still being designed and built in a way that turns an entire area of pervious surface (such as a field) into an almost entirely paved (impervious) surface, with wall-to-wall pavement and tiled roofs. Due to a lack of verifiable design guidance, it is possible to promote a development as “green”, without the end result actually being green.

Street in Dijckerwaal, Westland (ABB Bouwgroep, 2020).

Increased impervious surface area is acknowledged as a threat to future water management on high scale levels of government (Rijksoverheid, 2006, pg. 3,4,19; Hoogheemraadschap van Delfland, 2015, pg. 17,33,39). But when looking at individual developments, impervious surface area is diminished to a mere precipitation calculation. Where adding a small x somewhere in a project “solves” the rest of the project site transforming from pervious to impervious surface. Making no mention of other topics, such as ecological quality or urban heat island effect (Gemeente Westland, 2016).

Street in de Bongerd, Amsterdam (Google, 2020).

To prevent every empty field (pervious surface) from turning into impervious surface through urbanisation, the Dutch government imposed a policy of inner city densification (PBL, 2012, p. 31). This would prevent pervious surfaces becoming impervious outside of urban areas, but would cause what pervious surfaces are left in cities to become impervious. Therefore condensing and intensifying the issues related to impervious surface area increase to pre-existing urban areas. A combination of inner city densification and pervious surface increase is necessary, and although they may seem contradictory, they don’t have to be.

Ecological quality

The amount of impervious surface has a direct impact on ecological quality. One study evaluated the growth of linden trees in Gothenburg, Sweden, showing a direct correlation between surrounding surface imperviousness and tree growth (Figure 1) (Sand et al. 2018). With new shoot growth being strongly suppressed and stem growth being somewhat suppressed. The main cause being attributed to increased water availability for trees

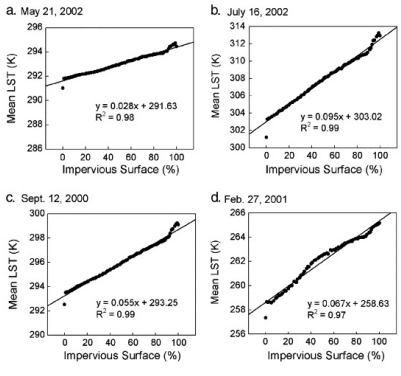


Figure 2. Effect of IS area on mean land surface temperature (LST) (Yuan & Bauer, 2007).

surrounded by more pervious surface, as water supply strongly influences tree growth (Gillner, et al. 2014). This is also visible in figure 1, as 2015 had higher than normal precipitation and greater growth compared to 2016.

Urban Heat Island (UHI) effect

The urban heat island effect is the phenomenon of increased atmospheric and surface temperatures in urbanised areas compared to surrounding rural areas, caused by urbanisation (Voogt & Oke, 2003). This is mainly attributed to the transformation of pervious surfaces to impervious surfaces. A three percent decrease rate of pervious surface, into impervious surface per square kilometre per year, has been statistically significant in increasing surface temperature (Owen, et al. 1998). A strong connection between elevated surface temperature and amount of impervious surface area has been established (Figure 2) (Yuan & Bauer, 2007) .

Impervious surface also completely or partially inhibits water to reach tree roots. Trees in urban areas alleviate heat stress by providing shade and through transpiration (Shashua-Bar, et al. 2010). For trees to do the latter, water must be available in the ground for tree roots to access. In urban areas with mostly impervious surfaces, tree transpiration may be the main source alleviating heat stress. The more impervious surface area, the more is relied upon tree transpiration, dependent upon tree species (Kjelgren & Montague, 1998). However, more covered ground also causes less water to reach the roots constraining transpiration (Nielsen, et al. 2007; Konarska, et al. 2015).

Benefits of ISR index

Indexes like FSI (for density) and MXI (for mixing of functions) are being used by municipalities (Gemeente Amsterdam, 2008, pg. 21) to express a desired outcome from the beginning of a project. This provides design guidance during the process of development, a tool for discussion and clarification, and leads to a verifiable result in the final design. The solution to inner city densification and pervious surface increase may lie in such an index, namely the ISR. Due to all the reasons here mentioned using an index as ISR, as a design guide and way to check after a project is done, may be beneficial to confirm if it meets greenery requirements.

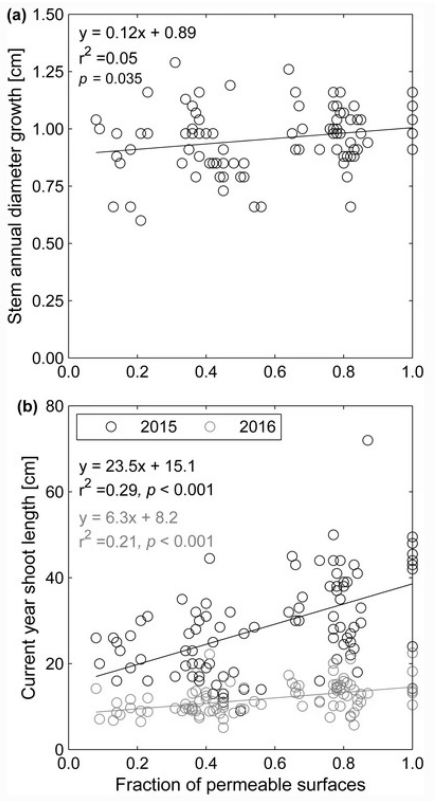


Figure 1 Effect of IS area on stem diametre growth and shoot length (Sand et al. 2018).

Presented plan and built reality, Cambridge (David Butler, 2018).

6.3 Impermanence & metabolism

The following text aims to explain the topics relevant to urban development in Japan post-WW2. It details the land reforms immediately after the war, the architectural reaction as a consequence of the atomic bomb resulting in the Metabolism movement, and the perversion of the Metabolism movement into an approach of intense construction for economic growth. This section ends with the take-aways for the project, and answers the research question: *How does the topic of impermanence affect the Japanese city?*

Post-WW2 land reforms & inheritance tax

There are two legal forces at work which shape(d) the Japanese city into what it is today, these are the post WW2-land reforms and the inheritance tax.

The Japanese Land Reform as it has been executed in post-war Japan has had a profound influence on the development of the city in Japan as it currently still stands. It was essentially an ownership reform, whereas before nearly 50% of farmers were tenants farming the land of landowners. The reform was meant to give back control of farmland to the farmers. The overwhelming feeling of defeat post-ww2 led to landowners having little to prevent the land reform from happening (Kawagoe, 1999).

The land reform was an instigator - a moment in time which “reset” land ownership, causing a more fair distribution of land. What came after, and what is still relevant, is the inheritance tax. This tax can be seen as a process which proceeds from the instigator - it keeps land ownership (somewhat) fair. Someone who inherits land often has to sell part of it to pay for the inheritance tax, causing one to not be able to hold onto property forever (Nijs, 2021, pg. 37).

The combination of land reforms and inheritance tax caused the messy outward expansion of Japanese cities. People often sold their land, to pay their inheritance tax, to developers. As this amount of land was not much, the new development that would be built on it was of small size as well. Ending in a checkerboard landscape of small patches of built area and rice paddies.

The Metabolism movement

Within the architecture world in Japan post-WW2, there were competing narratives as to how to move towards the future. With the threat of war, there was a sense of nuclear anxiety (Cho, 2011). If an entire city can be levelled in a day, then how do you build cities?

Four architects formed the Metabolism group in the late 50s, namely: Kiyonori Kikutake, Kisho Kurokawa, Fumihiko Maki, and critic Noboru Kawazoe, all heavily influenced by Kenzo Tange. They were to rethink society using architecture, speculating how buildings can change and grow, rather than constant destruction and reconstruction. The term metabolism is based on biology: “*In the same way as life, as organic beings composed of tangible elements, as the cell, continually renewing its metabolism and still retaining as whole a stable form - thus we must consider our cities.*” - Kenzo Tange (Koolhaas & Obrist, 2011, pg.197). Moreover, there is a spiritual aspect to the name as well. The Japanese word used for the movement, *shinchintaisha*, is closest to the Buddhist concept of impermanence, the meaning of renewal, replacement, and regeneration. (Obradovic, 2021)

Buildings were meant to behave as cells or grow as vegetation. As buildings themselves are not easily movable, it was most practical to create moving parts to attach to a solid core - not unlike a tree. The most famous (built) example of this was the Nakagin Capsule Tower. These moving parts could be added and removed as necessary, essentially creating impermanent spaces in the building. Unfortunately, the Capsule Tower was built in such a way that the separable units were not actually able to be removed individually - seriously hampering the usability.

"*There is no fixed form in the ever-developing world*" Kawazoe concludes in his essay for Metabolism 1960, Material and Man. his private manifesto for Metabolist principles of transience and renewal. "*Our time is not viable for architecture in the monumental sense Europeans regard it. If one tried to create such architecture, it would immediately turn into 'ruins.' ... it is ... necessary to turn away from the wasteful expense and effort of building and scrapping ... What we need is ... a plan for a hundred years.*" - Noboru Kawazoe (Koolhaas & Obrist, 2011, pg.236).

Metabolism metabolised

Metabolism showcased its best ideas as an architectural movement in the1970s Osaka world expo, but it also fell apart in the 1980s world expo. The philosophical points of impermanence in the culture and practicality of changing buildings were

The "wasteful expense of building and scrapping" Kawazoe mentioned seemed harder to shake than he probably had hoped. Indeed, "there is no fixed form in the ever-developing world", as may be visible in the major cities in Japan, where the average lifespan of a building is only thirty years (Kira et al., 2001, pg.33). Instead of the (arguably more sustainable) concept behind the Capsule Tower, where room/capsules would be added/removed as necessary, entire buildings are added/removed as necessary. The ambition for buildings to behave as cells has been achieved - they are just replaced entirely ever so often. Kenzo Tange's quote is just as relevant in this context.

Commercial forces had overtaken the Metabolism movement, it was deemed uneconomical to build large structures such as a solid core. This devolved into a machine for constant redevelopment. The mechanisms of impermanence have been hijacked by demands of intense capitalist competition. Spurred on by the government, who establishes new building norms, construction companies are incentivised to rebuild buildings to new norms. This building and scrapping is currently about 20% of Japan's GDP (Kira et al., 2001, pg.33), and proposals for less construction are therefore not easily changed. Buildings seem to be put together as quickly and cheaply as possible. They have no resale value after a mere two decades, and this impermanence is translated into cheap and light materials. In the street nothing is fixed, any building could be replaced tomorrow (Kira et al., 2001, pg.38).

Cycles of destruction and renewal are deeply engrained in Japanese society. For example, Ise shrine is replaced every 20 years. "*The shrine is 1200 years old, it's true, but it's reconstructed every 20 years. Do you understand? Everything we see is impermanent. ... But what's important here is that we conceive of our tradition and philosophy as invisible, which is very different from Europeans.*" - Kisho Kurokawa, (Koolhaas & Obrist, 2011, pg.385).

There is also the term *mujo*, combining nothing (mu) and permanence (jo), relates to the foreseeable cycle of the seasons to unpredictable eruptions of natural disasters within a single concept. In traditional buildings, the innate impermanence of building components such as wood joinery and paper screens, readily replaced, appeared to provide the best defence against ensured ruin (Kira et al., 2001, pg.37).

Metabolism in my project

There are two main take-aways.

It provides an answer as to why the Japanese build so incredibly flexibly. The impermanence embedded into people's mind combined with the rapid renewal and detachment to the material and to the city coalesced into a major anxiety and proceeded to a strong sense of flexibility. Essentially to facilitate everything because none may know what would happen in the future. To non-design things to such an extent that anything can happen. With the many renewal projects and large-scale developments in the Netherlands, it may be good to think about future flexibility and how to incorporate it into projects (rather than renewing whole areas again, as is currently happening with post-war residential neighbourhoods and 80s-90s office parks).

The Metabolism movement's connection of cell structures and cities holds value for the current time, although it did not quite work out for them back then. Using a similar kind of moving parts to facilitate (cell) growth and change, but in the street rather than buildings may offer significant value to the Dutch context.

Image sources in order of appearance
(AFP, 1945) (Dezeen, 2022)
(Archdaily, 2019)(Bock, 1974)

6.4 Impermanence & nature (the meaning of nature in Japan)

The following text aims to explain the topics relevant to nature in Japan. It details historic views, the myth of the Japanese people being a "nature loving" people as well as the change in attitudes regarding nature in the city and construction in general. This section ends with the take-aways for the project, and answers the research question: *How does the topic of impermanence affect the Japanese city?*

An early look

There is a profound double-sidedness in the feelings regarding nature for Japanese people. On the one hand it is believed there are deities, kami, in everything. There is a forest kami, a sea kami. There are kami for worldly things such as prosperity and success, essentially kami inhabit all things. On the other hand, nature is a powerful force that throws tsunamis, typhoons, earthquakes and volcanic eruptions at Japan.

In the past, on an architectural level, people lived closer to nature. Wooden materials sourced from nature, paper windows. On the floor would be tatami mats that could be moved around the house to follow the sun, being closer in touch with the local climate.
The following quote puts this well:

"*To become one with nature is challenging when nature itself shows two faces. While the expectation of cherry blossom petals dancing in the wind takes the mind of the imminent threat of typhoons and earthquakes, Japan's streams flanked by cherry blossom trees remain trapped in their concrete embankments. Will modern Japan ever transcend its highly ambivalent relationship with nature?*" (Nijs, 2021, pg. 37).

The myth of nature

"*Zen gardens, cherry blossom viewing and naked bathing in natural hot springs: Japan's intimacy with nature is not hard to picture with eyes closed. Eyes wide open, the cliche quickly dissolves. It is replaced with overhead power lines obstructing the sky (and trees to be planted), and concrete embankments cutting off streams and rivers from human contact. ... At first sight, JP seems more addicted to concrete than to its natural riches. ... it is a superfluous product of Keynesian economic policy that uses the construction industry as a lever to boost country's productivity and crush unemployment*" (Nijs, 2021, pg. 18).

The Japanese people as a nature-loving people is mostly a marketing myth. Oneness with nature is a

cultural model to be emulated, but ecology is not a major concern in Japan. Idealised Japanese images of nature are modern productions. Nature is excluded as much as possible in city life, as evidenced in the analysis. Where it is allowed to exist it is heavily controlled, such as in the Japanese garden, bonsai, potted plant "gardens" in the cities. A cultural model based on idealised aesthetic aspects feeds industrialisation put before all.

"*I don't think the Japanese have ever been that fond of nature*" - Hidetoshi Ohno, (Kira et al., 2001, pg.34).

In Japan, the monsoon season means typhoons and insects, and it will come no matter what. As opposed to the western view of confrontation or mutual empowerment of nature. The Japanese have a more submissive view and see nature as a teacher. Gateway to a relation with nature is the forest shrine. Post-war Japanese people became enamoured with the modern city as a way to isolate themselves from nature. And are therefore more fond of paving everything over with concrete.

Post-earthquake ecology (and construction)

The 2011 earthquake changed everything. The perception that construction can solve all issues and that nature can be isolated from vanished. "*We cannot win a fight against nature*" - Toyo Ito, human settlement patterns must be integrated in the natural system instead of trying to resist it.

Traditionally, the contradiction of nature's beauty and mercilessness is resolved in *mujo*, combining nothing (*mu*) and permanence (*jo*). It relates to the foreseeable cycle of the seasons to unpredictable eruptions of natural disasters within a single concept. In traditional

'Namazu and the Foundation Stone', (1855), artist unknown.
(Tokyo Metropolitan Library, n.d.)

buildings, the innate impermanence of building components such as wood joinery and paper screens, readily replaced, appeared to provide the best defence against ensured ruin (Kira et al., 2001, pg.36). The Japanese state pushed growth hard through a top-down approach of construction. It's difficult to face authority, so people don't look at larger problems above themselves. This requires a bottom-up revolution (Nijs, 2021, pg. 224).

Until now, building more meant increasing value. But nobody wants to be near empty buildings, it is now visible that building less may increase value. As Japan's population declines and buildings start to become empty, a cutting back of scale is in order. Hidetoshi Ohno referred to this as genchiku, from gen (reduce) and kenchiku (architecture) (Kira et al., 2001, pg.36).

An empty lot in Tokyo can give this feelings of "what a waste". Studio Bowwow have identified this as a certain "void phobia" of an empty lot. Naturally resisting the simple public/private dichotomy of open and built space. As the counterpart to the traditional mottainai ethic, which raises a cultural awareness of both the interdependence and inpermanence things. The concept perfectly explains why empty lots are considered a waste but scrapping and rebuilding at rates three or four times faster than in Europe is not, in Tokyo, empty space is the real limited resource.

But Japan is shrinking and this void phobia can not continue. Another point of view, without purposefully creating voids is to look at the building stock itself. The hardware doesn't need to be changed for the software to have a big effect. Mobile internet introduced a new way of organising urbanity and odds with this tradition. Pokemon GO puts a new layer over the city, turning any place into a playground, whether it's a square or a parking lot doesn't matter. The distinction between player and non-player does.
You don't need to create a new building for every new function, just change the interior and the label on google maps. People will find you. (Nijs, 2021, pg. 183).

"Capca" in the suburbs of Tokyo is a space shared by artists, people staying on airbnb at night and people visiting a cafe during the day, a real cultural centre. This does not require specific typology, just creative interior design. The sleepy suburbs have retained more Japanese culture than the big centres.

Progress can be achieved by seeing the existing building stock in a new light and from different viewpoints. Tactical changes can be implemented. A realistic approach, inherently more ecological than the fantasy of a whole new world.
Japan is in a post-growth stage and should go beyond the era of eternally building more conrete. But it cannot reject the concrete world it has built, instead of building a new world, the 20th century should be recycled. (Nijs, 2021, pg. 184)

"*We are not in the century of construction anymore*" - Yoshiharu Tsukamoto.

Namazu is a giant catfish who symbolises shaking the earth whenever history takes a wrong turn and is venerated.

Take-away in my project

There are two main take-aways.

The addition of respect (the city) to reuse, reduce, recycle. Being more respectful of existing buildings. The following deserves repeating: "*You don't need to create a new building for every new function, just change the interior and the label on Google Maps. People will find you.*" (Nijs, 2021, pg. 183). Creating ambiguous space in the city (or perhaps just in the plinth), combined with a new label on Google Maps, may prevent any unit from ever being empty for a long time. But, this can only happen if the zoning allows it.

This could be seen as the Metabolism of the 21st century, but instead of physically changing "hardware" (building units, cells), you change "software" (the nerves?).

The call for bottom-up revolution, as well as societal realisation that construction can not solve all issues and nature can not be isolated from, are a good entry point for the addition of climate adaptation and nature-based solutions into the Japanese city.

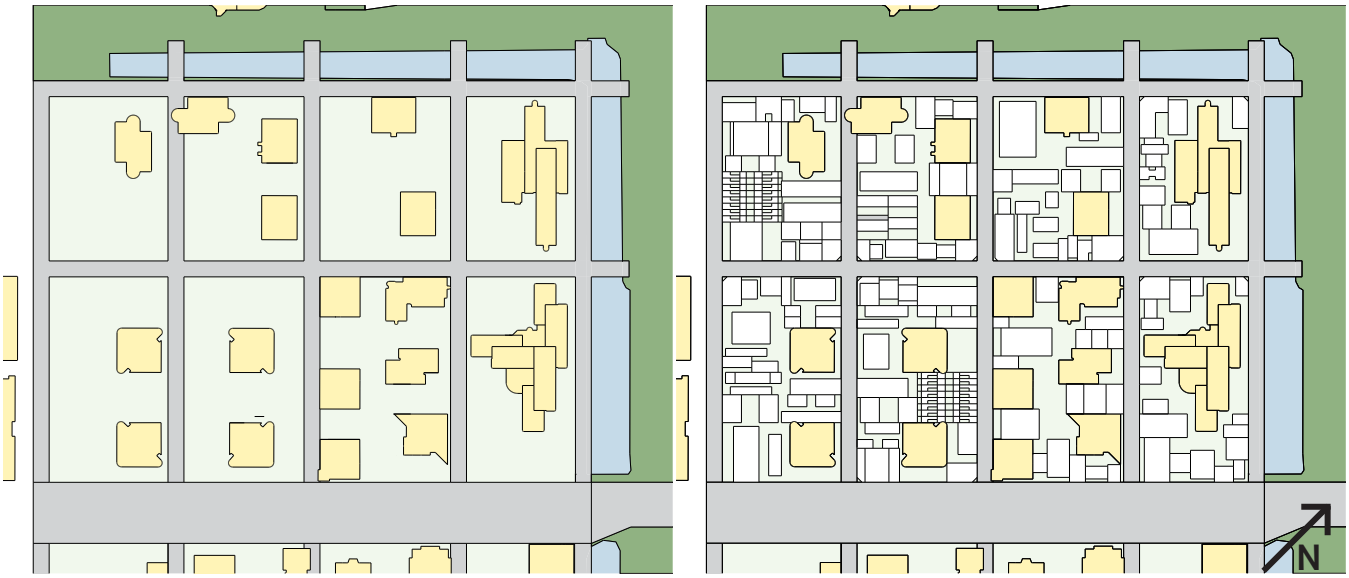
Mock up of testing model in 3D context
(own illus., Google Maps)

6.5 Testing model

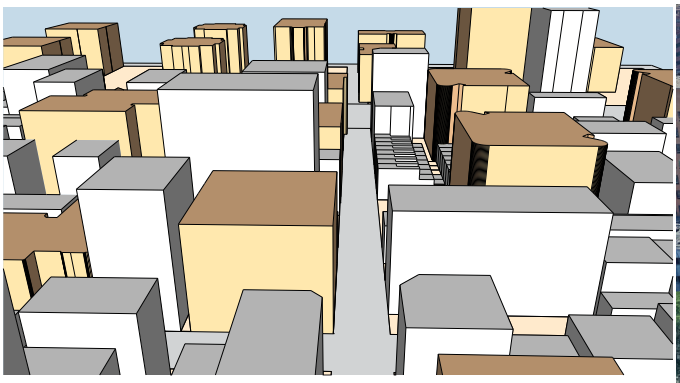
To start off, the decision was made to use a “research by design” approach. Without any starting point it would be difficult to begin. Within the testing model, the subjective “feeling” of the Japanese urban context was implemented to reach a desired image of the city without following strict (self-made) guidelines. There were only two main considerations: realistic building sizes and light. The Japanese context does not seem to mind (lack of) light, as buildings are often built with windows directly opposing one another with only the minimal distance between buildings (1m). This also translates to different (unrealistic) building dimensions in regards to a Dutch context. Most of the building shapes used are based on existing buildings in the Dutch context.

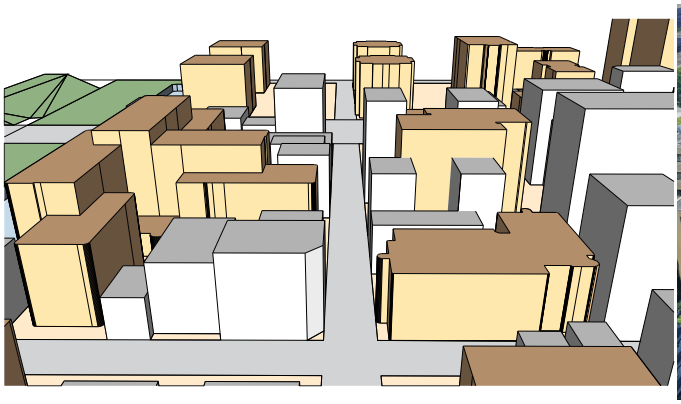
The creation of a grid and a standard street width of 10 metres were also decided upon. These are based on the Japanese context, with the street slightly wider (10m instead of 6-8m).

The testing model gave a good overview of what is achievable without much effort; without creating a lengthy list of guidelines it was possible to design a (very rough) neighbourhood model. The model was scrutinised, the design decisions were made explicit and used further in the creation of the guidelines and wishlist.



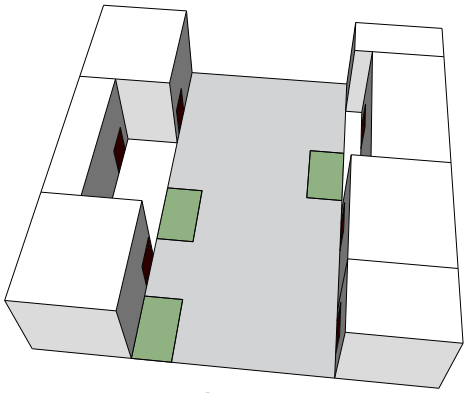
Mock up of testing model in 3D context
(own illus., Google Maps)





6.6 ISR ratio

As evidenced by the impervious surface text, decreasing impervious surface has many great benefits for overall comfort and ecosystem services, while providing an essential tool in water management anticipating major rainfall events. However, it is difficult to quantify “the project should be green” and it is often the case that new project areas end up completely paved, where renders have shown a green oasis. To prevent this (measurably) a new index is proposed, the ISR (Impervious Surface Ratio). A simple index ranging from 0-1, where 0 is completely impervious and 1 is completely pervious. This could be used similarly to FSI or MXI in area development to propose a desired result from the design phase and measurably test the design and outcome whether it matches the desired.



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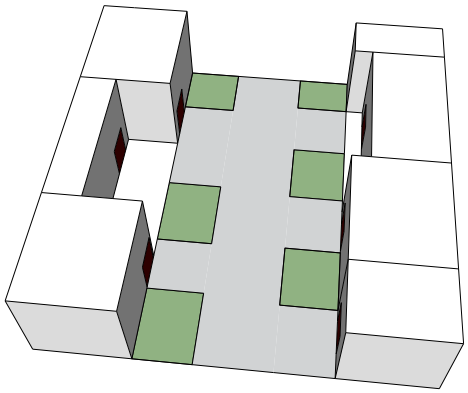

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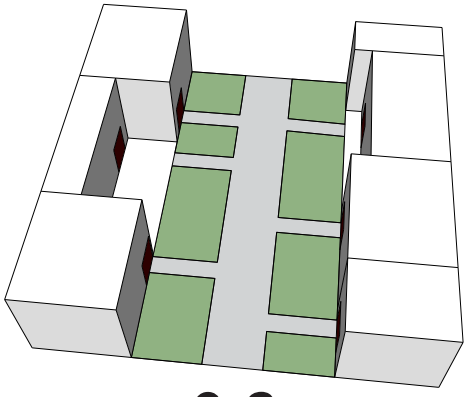

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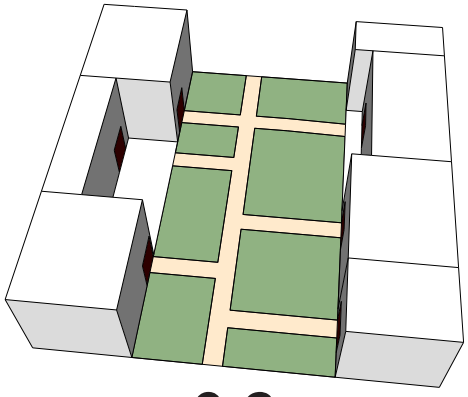

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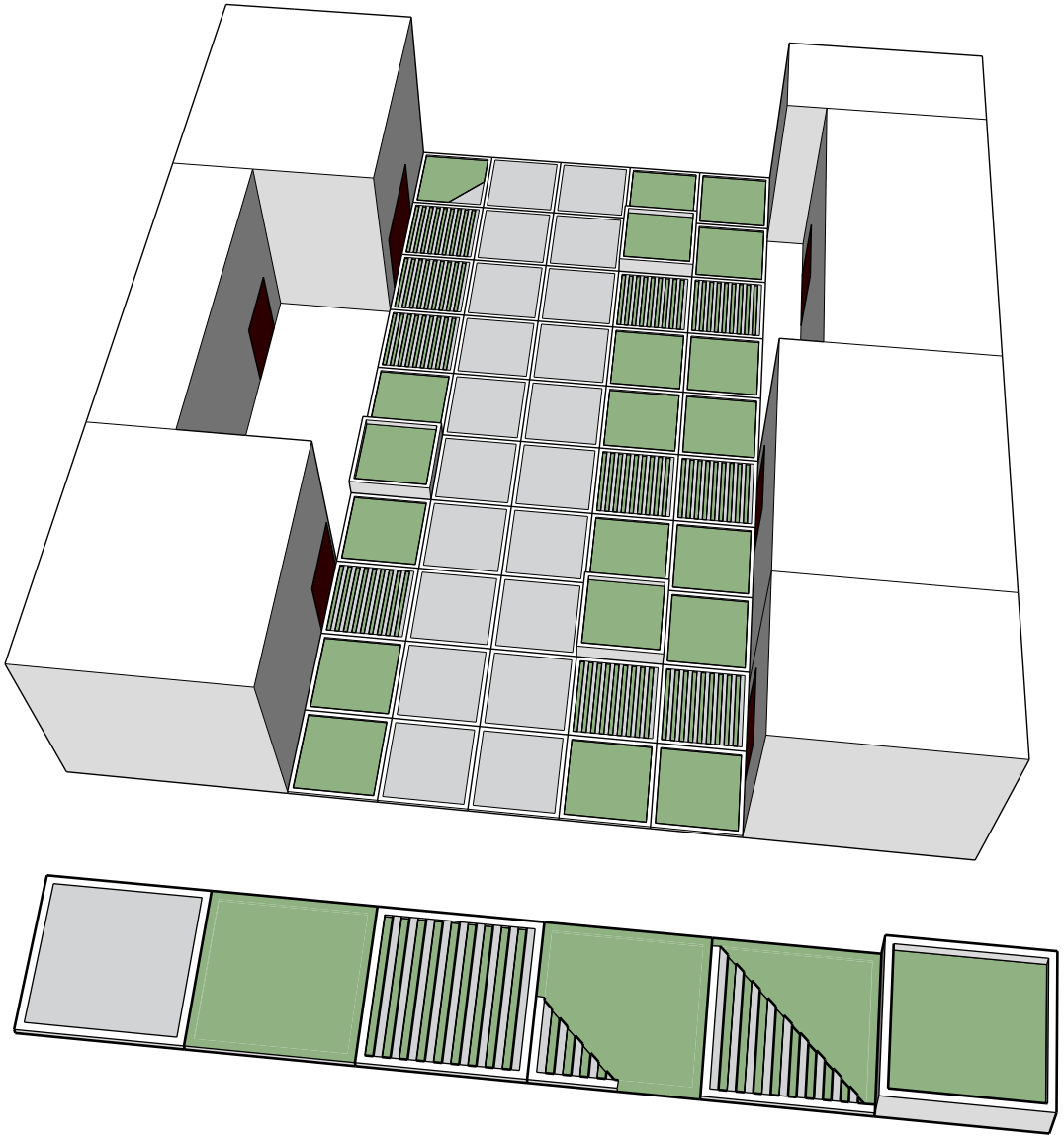
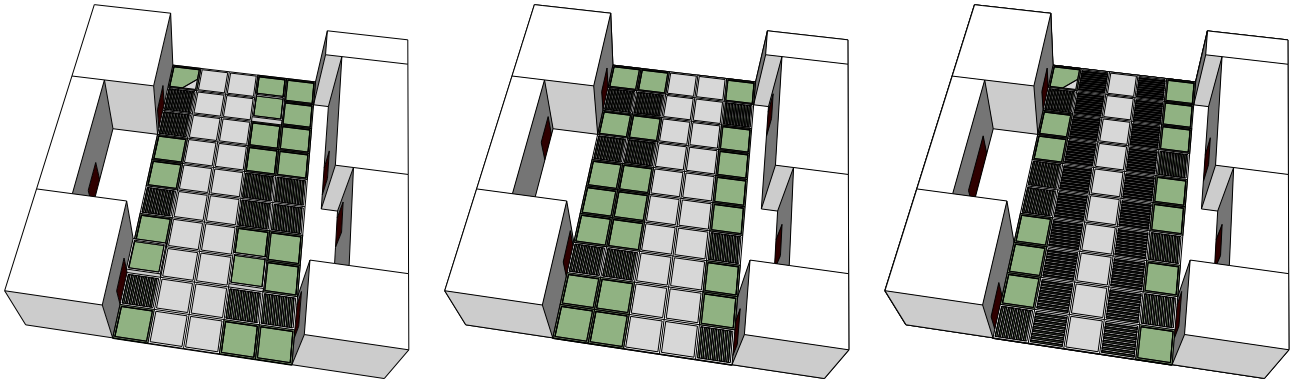


The ISR applied

By utilising flexible plates, the ISR can easily be measured in the street. With a width of five plates (10m), the incremental steps in ISR are 0.2 (one fifth). The ISR example on the left is applied in a pragmatic way. With the plates, it is unlikely the ISR will become lower over time, as the borders of plates are clearly visible. Of course, many different combinations are possible. The plates tie-in with the desire for flexibility in the street.

Further details of this composition are provided in the street design section of the booklet.



7.

Goals

The test model reached its form by way of intuition, using real life building blocks with loose rules to put together an image of what the new neighbourhood could be. Many decisions were implicitly taken to reach this image. To further quantify this, and produce a more realistic neighbourhood model, findings from the test model were written down and translated to goals and a wishlist. Alongside the results from the analyses. The goals are abstracted, desired outcomes, whereas the wishlist is a combination of rules set to reach these outcomes, providing the necessary constraints while still giving freedom to design.

DENSITY

One of the main points of the project is to reach a higher density than is the norm in the Dutch context. Densifying the periphery and thereby leaving open parts of the landscape that would otherwise be turned over to low density development. The density creates a vibrant neighbourhood with a large diversity in buildings and typologies, while guaranteeing a light environment.

Little C
(Arisca Photography, 2022).

FLEXIBILITY

The new neighbourhood is built in a way that is flexible, leaving possibilities for future change. The future is uncertain and being able to quickly change the functions in buildings, or buildings themselves, on a small scale (the building scale rather than the block scale) will open up chances for rapid renewal, without demolishing the entire neighbourhood.

Multifunctional building
(Play Time, 2020).

GREEN BLUE

A major constraint to densification is the idea that a dense city has to exclude any form of greenery in favour of stone, as is also visible in the Japanese context. By using the nature-based solutions and other points found in the analysis, the new neighbourhood can be friendly to the environment and be high-density at the same time.

Orlyplein, Sloterdijk
(Riske de Vries, 2015).

IDENTITY, SCALE & COMFORT

The new neighbourhood is of a human identity, the scale fits with human beings in a way that feels natural to be in, this comes with an inherent sense of comfort. The building a resident lives in will feel at home, the sense of “my building, my square, my entrance” prevails.

Your front door
(Getty Images, 2020).

7.1 Guidelines

There is a three step plan in transforming the new area:

1. Defining the grid based on location
2. Defining the block limits and plots
3. Implementing the wishlist

The guidelines are created for both the block and street, and the result (block and street design) are presented separately.

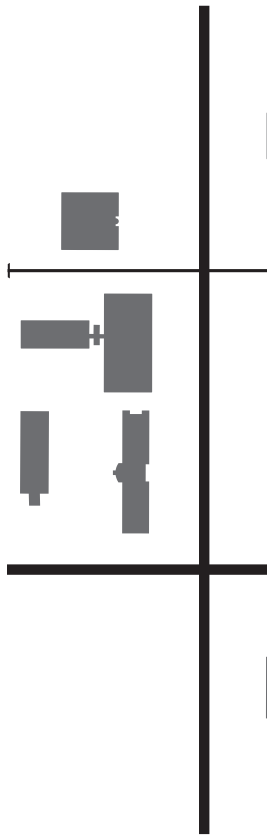
This three step plan will provide guidance to reach the goals while giving enough creative freedom to create ever distinct neighbourhoods.

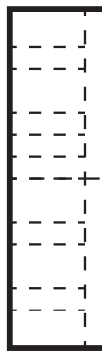
There is no reason to create perfectly sized, uniform blocks, apart from a vague notion of “order” - especially so when transforming an already existing neighbourhood. The lived situation would not feel distinctly different whether all blocks are exactly 100x75m, or various (large) sizes. Using a grid system not only mimics the Japanese situation but is also most applicable to the type of neighbourhoods often transformed in the Netherlands, post-war areas are often already built on a grid to begin with. However, imposing a rigid grid would only conflict with the existing situation. It is therefore fitting to use the existing buildings (which can stay) in creating the grid. By measuring where “corridors” can be located in between buildings - regardless of building orientation - a grid system is created. In the case of Bullewijk, a grid system of approx. 80x100m is created, wherein all blocks are slightly differently sized. The Hondsrugweg is changed to a “corridor”, as it is currently slated to be downsized already. The width of the corridors is chosen at 10m, larger than the 6-8m often found in the Japanese context, but smaller than most roads in the Dutch context (although on-par with old centre roads as seen in the analysis). Large space saving measures are the introduction of shared space and removal of street parking, found in the wishlist.

In the Japanese context a grid already (implicitly) exists, based on the underlying (rice) terrace system. Therefore these steps don’t apply.

In addition, the corridors define the block extent. However, the block itself has two limits imposed onto it - before the wishlist items take effect. The mix of parcel sizes is a measure meant to mimic the variety of plots in the Japanese context, not only visually - by dividing the block into plots of various sizes, an inherent diversity (of buildings and typologies) is achieved. The plots are divided into XS, S, M and L - based on their width towards the corridor and depth. Hence XS plots can only be on the short side. The width exists in steps of 4m, being XS, 8-12m being S, 16-24 being M and 24+ being L, with a 10-23-33-33% split between aforementioned sizes. The corners of the block are cut or set-backed by 3m to give the intersections some more space.

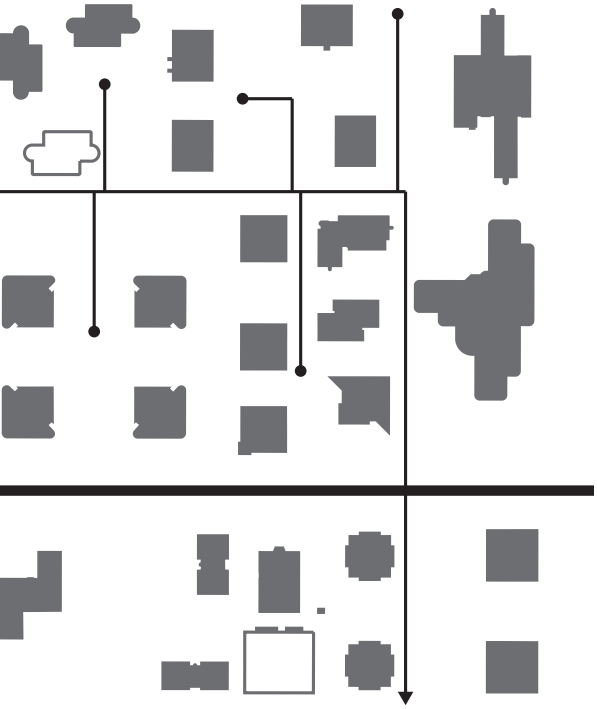
This results in the future situation onto which the wishlist is set loose.



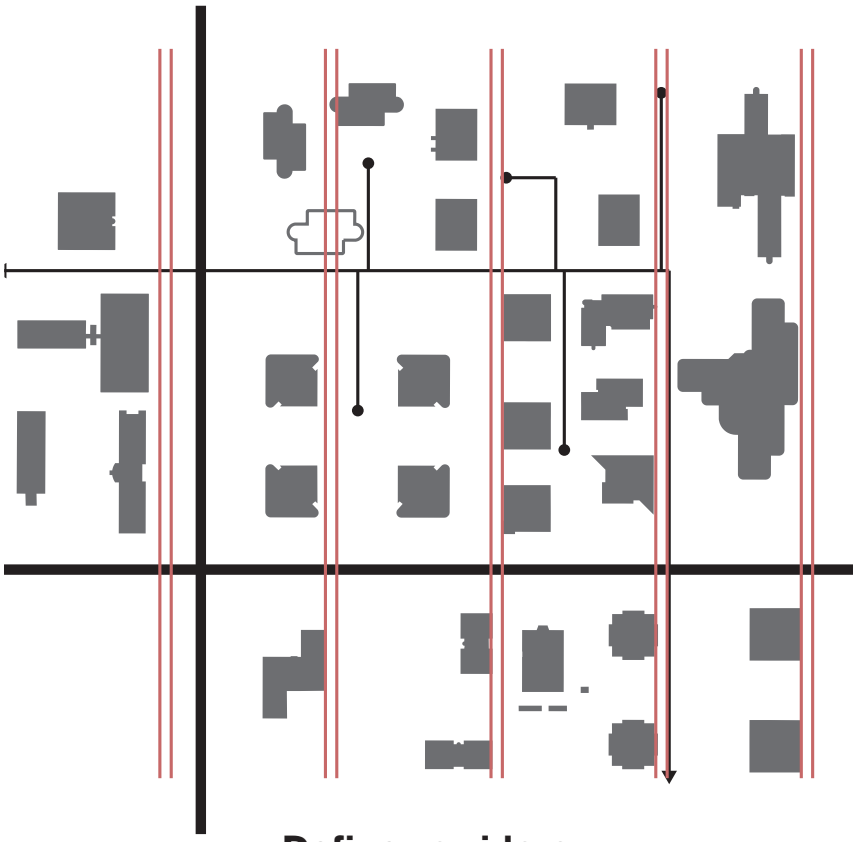


Mix of parce

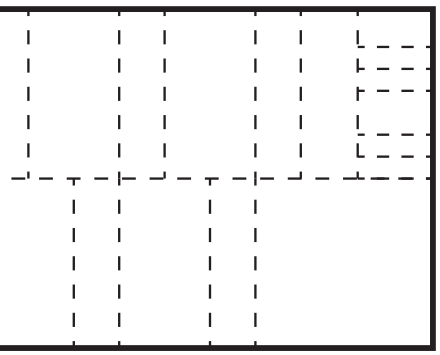
Corn



Current situation

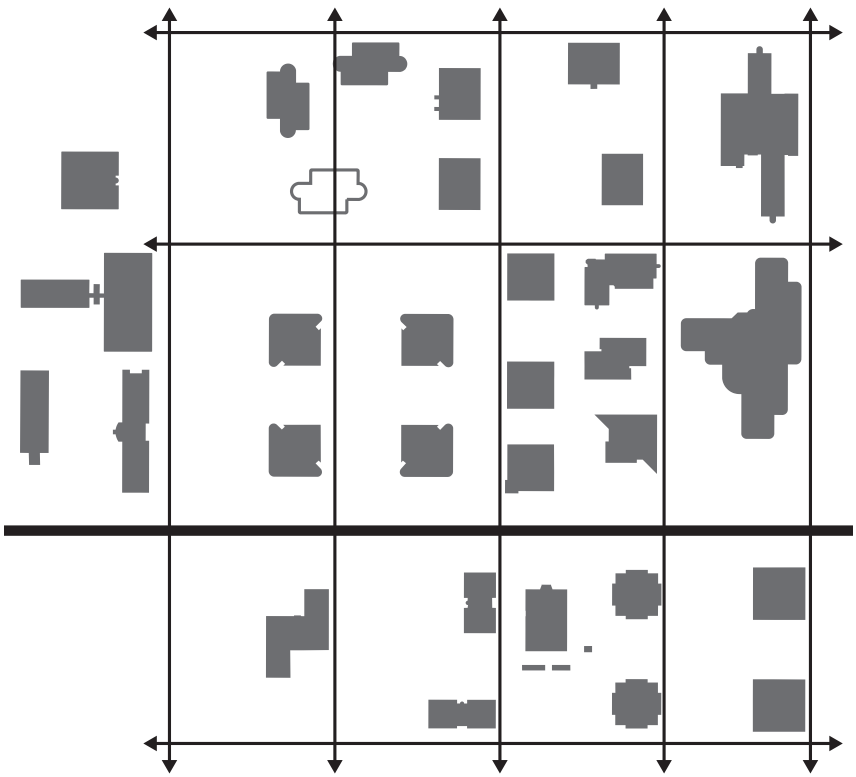


Define corridors



el sizes, “short” side less deep

ers cut or set back (3m)



Future situation

7.2 Ownership structure detailed

The above mentioned guidelines to create the grid and blocks, as well as the plots within the blocks, are a large departure from the current situation. The current ownership structure consists of multiple (private) stakeholders, with only the roads in control of the municipality. The suggestion of creating a grid rests on the municipality creating new roads that intersect with the current ownership structure. Even if this were to be achieved, further complications arise. With the grid created, the blocks take shape. However, the decision to split the block up into different plots implies each plot would have a different owner - as is the situation in the Japanese context. If the plots are subdivided but remain with the same owner, the end result may be to omit the plot subdivision or to add plots together as cost-saving measures. While understandable, these actions would undermine the overall plan's integrity and yield a sub-par result as opposed to the final design presented within this project. Especially the goals described in identity, scale and comfort and flexibility is reliant on the smaller scale that is created through the plot subdivision. The incentive to densify the plot is also derived from the size of plots, in comparison to the creation of standard blocks with a large courtyard.

One of the negatives to not creating a new ownership structure is already visible in current plans for Bullewijk, especially the recently constructed Karsp building. As the ownership structure remains the same, the same urban form of the neighbourhood is rearing its head. Bullewijk now consists of buildings spread in the form of "islands" in a sea of parking lots. So too is Karsp essentially an "island", except the sea of parking lots has become grass. While this is an improvement, the urban form did not change so much, and the thought of reaching the goal of a dense urban environment as the municipality envisions it for Bullewijk is questionable with developments such as these. They are simply the same urban form but with taller buildings and a different function (housing rather than offices). This in itself proves how important changing the ownership structure is when trying to reach a certain goal (dense urban) rather than trying to fit the goal within the ownership structure and thus not reaching the possible potential.

The fundamental question may be how to convince the current owners.
With the goal of densifying the periphery, what is now visible is that the ground remained cheap enough to be used simply for surface parking. There is lots of light and open space in the current situation - why change this? What are the advantages (for the current owners) to go along with the densification of this area? The benefit on a large scale is more apparent, harkening back to Gerrie's plight. Leaving more open (empty) space, relieving stress on public systems (sewer), a greener environment.

There are some possible ways of going about this. One way to explore is to simply implement the project as is. Perhaps the principles as they are, combined with a fair re-distribution of ownership (necessary roads for the grid become municipality, plots are divided and distributed among current owners, any necessary compensation happens), can provide enough value for the owners as opposed to other developments.

The most straightforward way of going about it is a municipal buy-out of the owners of the land and redevelop the area with all "cards" in hands of the municipality. Which can proceed with development according to the guidelines, to fully profit from the plan themselves. However, this is of course a very large investment, politically difficult, potentially not possible in terms of laws - the difficulties with such an implementation are beyond the scope of this project.

Another way of going about it is for the municipality to acquire a small part of the space in the development. Perhaps a corner of a block around already existing roads - before an implementation of the grid system - and proceeding with a plan as if the surroundings are already (going to be) developed according to the guidelines. This should be at least 1/3 or 1/2 of a block to be in any way representable. If this is a success, it shows the guidelines can reach the desired goals, and the other owners may want to come on-board.

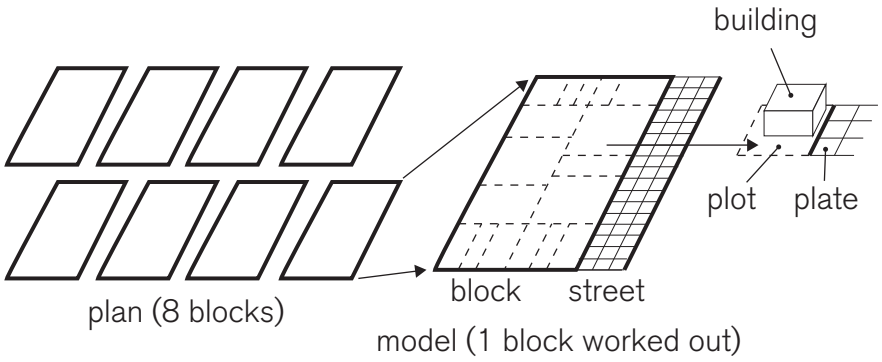
It is always a balance between profitability of the development directly (ROI) and larger-scale societal benefit. The green-blue in itself has many benefits that don't necessarily translate to profit for a developer, mentioned in the ISR-related text above. A platform should be created which can show what the advantages are to both the developers and the municipality. A government tool called teeb.stad has been used to suggest a real-term benefit of €36.387.902 when creating all the green measures, subdivided to €28.980.000 towards developer benefit and €7.405.902 towards societal benefit (Rijksinstituut voor Volksgezondheid en Milieu, 2016). A short overview is added as Appendix D, a long overview is also available.

The exact solution, phasing, ownership and partnership structures go beyond the scope of this project. However, as the change is so great, it is necessary to be aware of the situation and acknowledge the difficulties.

Karsp building in Bullewijk
(OZ Architects, 2022).

7.3 Definitions

There are several scales at work in the plan, and the proper terms used in the plan are visualised below to show the distinctions between terms such as plan, block, model, plate and plot.



Karsp building is on an “island” due
to ownership structure
(OZ Architects, 2022).

7.4 Japanese situation

In the project, the new forms are presented in the way of “block” and “street”. Where in the Japanese context, most of the “block” already exists. The wishlist would not retro-actively be imposed upon a Japanese block, but may be applied when a plot is redeveloped.

As many of the block-related wishlist measures are derived from the Japanese situation, not much would have to be changed necessarily. Only the new green measures would have to be taken into account, as well as the creation of a green anchor (rule 4.3, similar to the term *genchipu*). It could be argued that some block measures which may be applicable to the Japanese context should also be omitted, such as the 30 degree rule. As the current situation in the Japanese context (without rules for light) is apparently acceptable/possible there. The wishlist items not derived from the Japanese situation are, naturally, derived from the Dutch situation. However, these points are not reflected with the Japanese situation, and may be seen as too restrictive from a Japanese perspective. Some attention is dedicated to this in the theoretical reflection. Although it may be considered “colonial” to force these Dutch context-based items onto the (new) Japanese context, the desire to afford all the wishlist points for the Japanese context is hereby explicitly made.

Most of the impact for the Japanese situation is on the street, therefore in the block section, only the new block in Bullewijk is presented and detailed. In the street section, the (new) Japanese context is shown alongside the one in Bullewijk.

8.

Wishlist

8.1 Density

To tackle the housing crisis in the Netherlands, the aim is to build a million homes. A medium is sought between the Weesperpolder (FSI 0,2) and the centre of Osaka (FSI 4,0). The decision is made to target an average of FSI 2,0-3,0 (bruto) for the overall neighbourhood, similar to the centre of Rotterdam.

To reach this, several wishlist rules were created.

High density in a Japanese context often leads to unfavourable conditions regarding light reaching the unit, as well as windows being oriented towards closed walls with very little space in between. In the Dutch context, one of the main constraints to creating high density is ensuring enough light reaches each unit, as the buildings in the Japanese context would not even be possible to build. To ensure this happens, the 30 degree rule is created, **rule 1.1**.

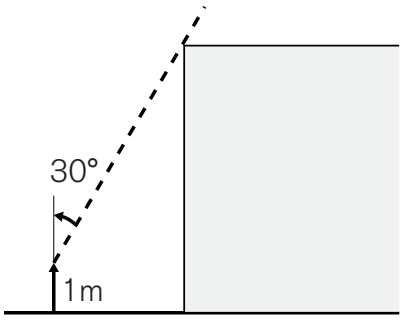
To aid the reaching of a certain density, and improve spatial efficiency, at least 50% of the surface of a plot should be used for building upon, up to a maximum of 90%, leading to **rule 1.2**.

Combining the minimum surface coverage with a minimum height in levels creates a baseline square metres for the plot. This excludes basements and half floors so that the baseline square metres are always “real”. The minimum of three levels ensures the spatial efficiency is high, while still facilitating every kind of typology, such as ground-based housing. This is **rule 1.3**.

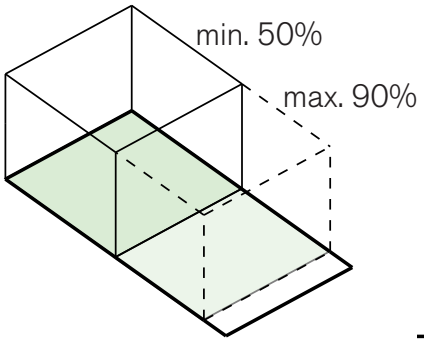
High density does not mean monotony; a mixing of (housing) typologies is important. Higher density also allows for more diverse mixing of functions, as a higher threshold value is created. This includes but is not limited to: studios, one-bedroom apartments and two-bedroom apartments, maisonettes, small and large ground-based housing, free-standing buildings (residential) as well as small and large business and office spaces. The average dwelling size would be 80 m2 (bruto), indicating a leaning towards smaller housing to provide a larger total amount of homes. Creating **rule 1.4**.

The density rules create a high density within (relatively) low buildings, therefore it is not necessary to include (many) height accents. Tall buildings would disproportionately affect light and sun intake of surrounding buildings. However, it is possible to build tall buildings near to the collective building (rule 2.7), as long as the shade would affect mostly car parking, **rule 1.5**.

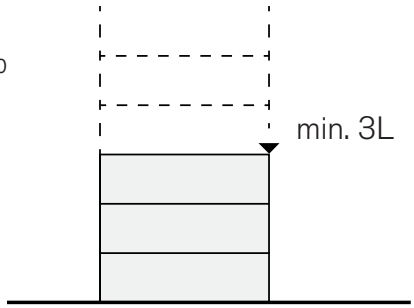
These rules are in place to reach as closely as possible the Japanese-style block (and implicitly its density) while excluding most of the negative aspects caused by their laissez-faire style of development, and creating an optimal balance in density and quality.



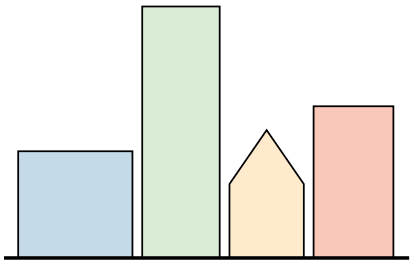
1.1 30 degree rule (own illus.)



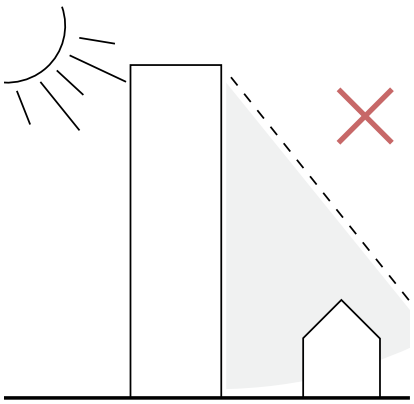
1.2 Plot surface built (own illus.)



1.3 Minimum 3 floors tall (own illus.)



1.4 Diverse supply of buildings (own illus.)



1.5 Height accents and sun (own illus.)

To reach that we must:
1.1 A leading rule is created: the 30 degree rule. This rule stipulates that, when orienting windows, at 1m from ground level a line at the opposite side (street or plot extent) is drawn at 30 degrees towards the sky. This line is unimpeded and creates a plane that guarantees light coming in.
This rule also fits in the “identity/scale/comfort” section of the wishlist.

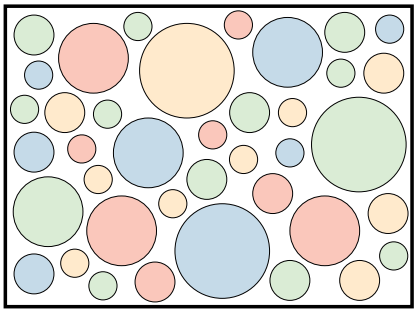
1.2 At least >50% of the surface of the plot is to be built, up to a maximum of 90%. (Mind rules 4.1 and 4.4, soft surface and water management).

1.3 The minimum building height is 3 floors, excluding basements or half floors. The maximum is dictated by the 30 degree rule.

1.4 There is a diverse supply of all kinds of buildings and typologies. Including at least 5% of m2 per mentioned typology per block.

1.5 Height accents only down-sun from the collective building (rule 2.7).

8.2 Flexibility

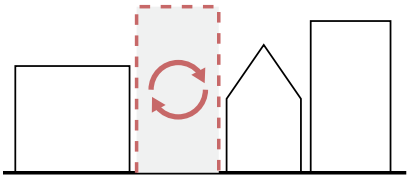


2.1 no function zoning
(own illus.)

The Japanese context is ultra flexible, everything about it - except the building functionality - is designed to be as flexible as possible.

The area is multi-zoned/flexibly zoned, nothing is forced to be built in a certain place and a building's functions are free to change over time. Such as a shop on the corner, a printerette halfway along the street or a gym in one of the L plots. This excludes "loud" functions (bar, nightclub, car garage), ones that create disproportionate traffic (supermarket) and functions to be bundled in the collective building (2.7), this creates **rule 2.1**.

The flexibility of rule 2.1 is facilitated in the plinth of buildings. The plinths are raised to accommodate any function, as well as any function change in the future (this includes housing). A direct connection to the street is included (3.4). This flexibility is not limited to the plinth, but only in the plinth is it a requirement. It can provide an answer to large vancancy in one function by providing "ambiguous space", which can be easily transformed according to demand, rather than specific monofunctional space. This creates **rule 2.2**.



2.5 plot-bound development
(own illus.)

For existing buildings to remain, at least the currently existing amount of functions should be retained (in m2). As housing may be more in demand, a desired minimum of 25% non-housing functions is to be made, **rule 2.3**.

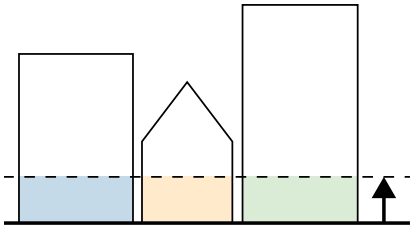
Anchoring more flexibility into spatial development has many positive outcomes. It would no longer be necessary to delete an entire neighbourhood (such as is happening in Bullewijk currently), instead a transformation can happen on the building scale to meet new requirements. This is facilitated by utilising the Japanese method of separating buildings from each other. Building-specific transformation provides better mix in the local supply. The flexibility in function increases the function mix without rigid function zoning, **rule 2.4, 2.5**.

Orientating units requiring light towards the street or inward of their own plot will create blind walls, which in turn guarantee adjacent plots the flexibility of building with the same constraint (rather than new extra constraints imposed by inhabitant's windows on the other side). Creating plot autonomy, **rule 2.6**.

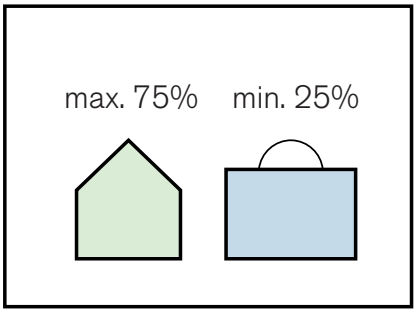
Several functions are to be combined into one building, the "collective building". This includes (visitor) car parking, as well as larger functions such as a supermarket, (primary) school, health centre, neighbourhood centre, library, and other public functions. As well as "loud" functions. The "collective building" is to be at least 32m wide, to facilitate a more efficient parking structure. These functions are to be collected to create as much flexibility in the rest of the block, as they carry certain restraints or could not exist in another way. Collecting all parking into one building frees the public space for other uses, **rule 2.7, 2.8**.

Using a shared space approach to public space incorporates the "flat" street from the Japanese example. This makes the use of the street entirely flexible for whatever is necessary at the time, without a hierarchy and with a balance between pedestrian, car and bicycle, **rule 2.9**.

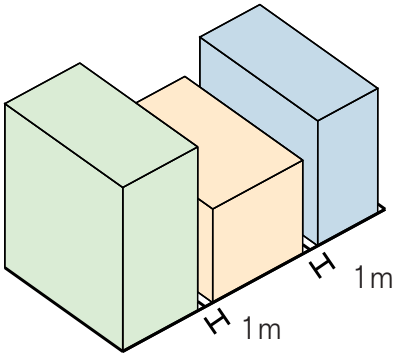
By using predetermined 2x2m plates for the street, maintenance to any systems becomes a lot less impactful (no breaking open of the street), as well as any future needs due to re-organisation of the plots. Increasing the flexibility of the street without decreasing its affordance of use, **rule 2.10**.



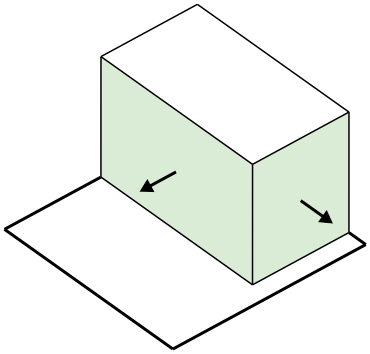
2.2 raised plinths
(own illus.)



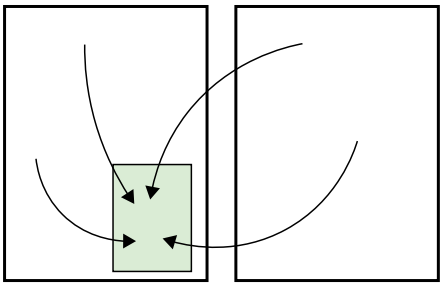
2.3 housing/non-housing mix
(own illus.)



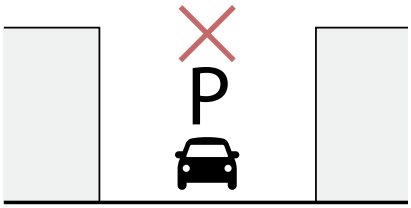
2.4 own building, own plot
(own illus.)



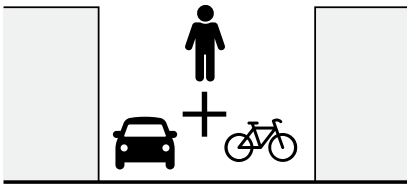
2.6 oriented toward street or inward of plot
(own illus.)



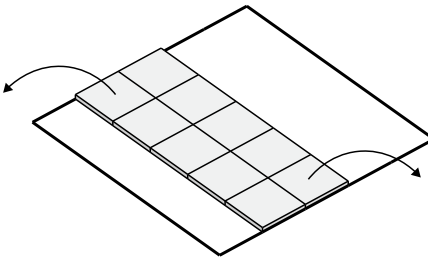
2.7 collective building
(own illus.)



2.8 no street parking
(own illus.)



2.9 shared space
(own illus.)



2.10 road plates
(own illus.)

To reach that we must:

2.1 No function-zoning. Within the block, every function (which space can realistically accommodate) can be situated. (Excluding "loud" functions, functions to be in the collective building and functions which create disproportionate traffic).

2.2 The plinths of every building are raised and provide unlimited space for aforementioned functions. (Including housing).

2.3 At minimum, current amount of business functions should be retained (in m2); desired minimum living/non-living 75/25.

2.4 Own building own plot; Every building is free-standing on its plot, with as much as possible built towards the street (street "front"). 1m space between buildings.

2.5 Plot-bound (instead of block-bound) development means existing buildings can be retained for longer.

2.6 Each unit requiring light (housing/office) is oriented towards the street or plot inward (mind rule 1.1).

2.7 A "collective building" will be built per two blocks to bundle public services, "disproportionate traffic" services (supermarket) and facilitate (visitor) car parking.

2.8 No street parking.
This rule also fits in the "identity/scale/comfort" section of the wishlist.

2.9 Hard surface in the street is of a "shared space" variety, with a balance between pedestrian, car and bike.

2.10 The form of hard surface (2x2m replaceable plates) makes (road) maintenance and future changes easy, increasing road flexibility.

8.3 Identity, scale & comfort

Cities are built for people to live and work in, and the city should reflect that. The identity and scale of a place must match the human experience, intrinsically providing comfort when done right.

A place in the new Bullewijk is not a unit in a complex of 500 units. The human scale plays a leading role in the design of buildings and public spaces. “My home, my building, my square”, strengthening the inhabitant’s feeling of belonging in the immense city. Living in the city, but with a human scale nonetheless, with a balance between pedestrians, cars and all functions necessary within an arm’s reach.

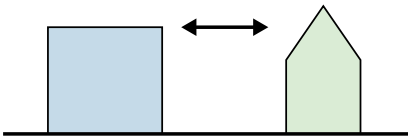
The first step in providing such a feeling is the scale of buildings - mostly dictated by the plot structure, each building is to have a different feeling. Different height, colour/material, different details. Every building in the Japanese context is entirely different and **rule 3.1** should reflect this, “my building”.

By enforcing the creation of a “Japanse stoep”, the feeling of “my building” is amplified in the way and materialisation of entering, while providing the street with a diverse and playful look, **rule 3.2**. This is further strengthened by highlighting the main entrance of each building, **rule 3.4**, while also providing functions on the ground floor with their own, additional entrance. This, in combination with (2.2), the conditions are made for inhabitants to appropriate the space immediately surrounding their entrance, potentially creating (legal) versions of the spontaneous Japanese street gardens, “my garden”, **rule 3.5**.

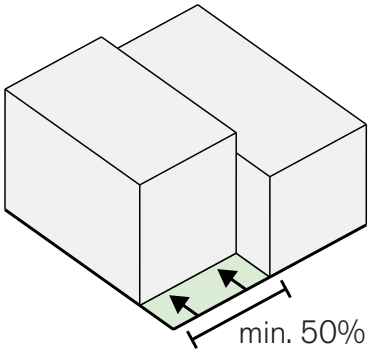
Instead of a large square in the neighbourhood or the block having its own large inner court, both less personally identifiable with as inhabitant, each building is to create their own enclosed outside area on the plot, at least enclosed on two sides (such as the front and back with the enclosed outside area in the middle of the plot), “my square”, **rule 3.3**. Additional entrances from rule 3.4 may be oriented towards this space to further increase the effectivity of rule 3.5.

In the conventional Dutch context, the space for pedestrians in a street is often less than 1/3 of its width, by eliminating street parking (in combination with 2.9), there would overall be more space for pedestrians and a lot of space for 4.2. There would still be enough space for temporary stopping, **rule 3.6**.

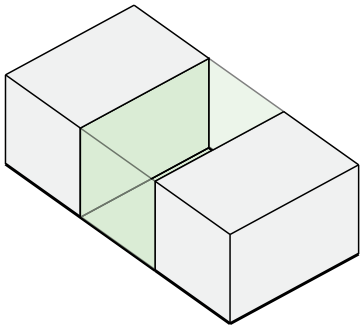
The high-density plan and the context of being in Amsterdam and near the metro makes a parking norm of 0 per plot plausible in the area with a defined maximum, **rule 3.9**. This does not mean there is no parking whatsoever, as a lot of (visitor) parking is facilitated in the “collective building” (rule 2.7). In addition, M and L-size blocks have a large enough scale to make a private (plot-specific) parking garage viable. This potential parking garage may not be at-level to prevent a poor quality street, looking at the Japanese context where this is the norm, it is possible to create this private parking without deteriorating the quality of the street, **rule 3.8**.
Bike parking can happen in the “second line”, deeper into the plot than immediately adjacent to the street, **rule 3.7**.



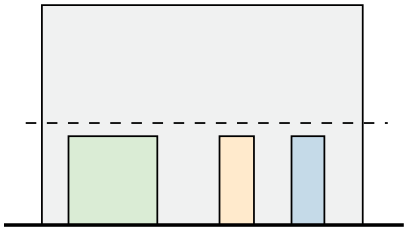
3.1 variety of building shapes
(own illus.)



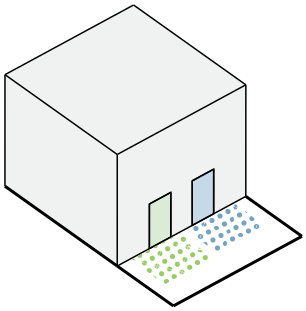
3.2 50% setback, Japanse stoep
(own illus.)



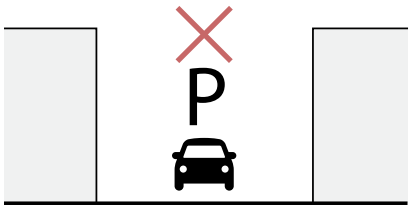
3.3 semi-enclosed area on plot
(own illus.)



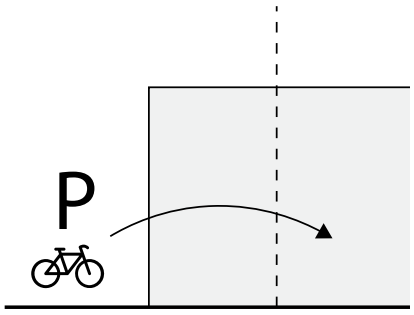
3.4 clear main entrance, other entrances
(own illus.)



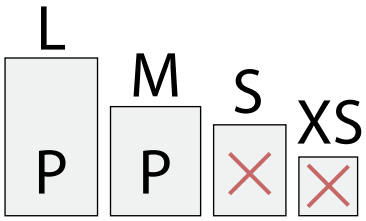
3.5 appropriation of space
(own illus.)



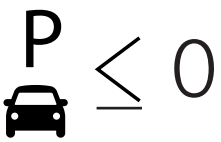
3.6 no street parking
(own illus.)



3.7 bike parking
(own illus.)



3.8 parking solutions
(own illus.)



3.9 no minimum parking norm per plot
(own illus.)

To reach that we must:

3.1 A large variety of building shapes and sizes, mostly dictated by the plot structure. Neighbouring buildings are of different height and colour.

3.2 At least 50% of the streetside (on each side of the block) has a set-back on ground level, creating a “Japanse stoep”.

3.3 On each plot the building creates an (semi-) enclosed outside area (minimum on two sides) for its residents (as opposed to a large inner court per block).

3.4 Each building has a clear main entrance, marked by a (slight) material/colour change in the building, with separate entrances to functions on the ground floor.

3.5 Ground floor function’s entrances and soft surface on the facade facilitate appropriation of space immediately surrounding said entrances.

3.6 No street parking. (rule 2.8) Enough width for temporary stopping (mail/packages, emergencies, taxi, construction, etc.).

3.7 Bike parking per building on the plot behind the first line. Visitor bike parking can also be located here.

3.8 M and L blocks have the possibility of building their own parking solution in the form of a parking garage which is below-ground, half below-ground or raised (not at-level), provided it fits in the plot and meets rules 4.4, 4.1 for water retention and impervious surface ratio. XS and S blocks have no (own) parking solution. (2.7)

3.9 No minimum parking norm per plot, maximum of 1 pp per unit/100m2 non-housing function or 100pp per pkg/plot, excl. 2.7.

8.4 Greenblue

Adding greenblue to the city has many important effects; it cools the city, provides ecological value, looks nice, improves inhabitants' mental wellbeing and makes an important difference in climate change by providing natural solutions as opposed to technical solutions that may fail. Green is qualitative if there are multiple forms, as in, a green street for ecology and water, a green courtyard for water retention and small-scale social activities and a large green plot per block for water retention and large-scale social activities.

The desire for the new neighbourhood is to be as green as possible, in the street and block. An ISR of 0,5 for both the street and block is implemented.

The ISR is mentioned as a design standard in the beginning of the process with the intention of making it measurable. By requiring each plot to reach ISR 0.5, the neighbourhood will be measurably green while making sure no micro-areas are negatively affected. If the ISR counted for a whole block, one part could be a wholly hard surface with a "park" as balance. By allowing green roofs to be counted for the ISR, the application of green roofs is stimulated while still being able to use the surface for building upon, **rule 4.1**.

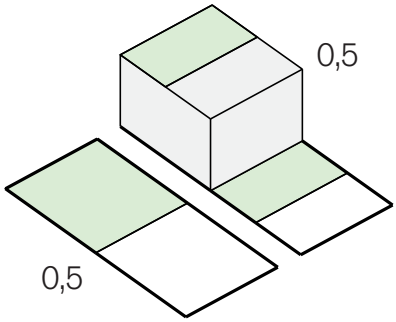
For the street a similar requirement exists, reaching ISR 0,5. The street is to be flexibly usable for people (rule 2.9.) while also being green, the "inflexible" part as from the Japanese street to be paved with (pervious) concrete plates of 2x2m, providing flexibility in use and maintenance. Using two plates in a 10 metre wide street leaves space for the plot accessibility with half-pervious plates. While the "flexible" part from the Japanese street is used to provide the greenery, **rule 4.2**.
NB the mentioned concrete plates may vary in size depending on the Dutch or Japanese application.
NB the perviousness of pervious concrete is not taken into account for this project and it is treated as ISR 0.

By requiring one plot per block to serve a green/blue function, a large "place" is created in the network. This plot is essential in the network of otherwise smaller lines and plots, and provides a different scale to the aforementioned important effects. The additive benefit of including a large "place" is also a social function - a gathering place for the whole block for communal activities (urban farming) as well as providing a place of longevity to the otherwise flexibly designed plan. The plot is the "green anchor" and is meant as a permanently open green plot, *genchipu*, **rule 4.3**.

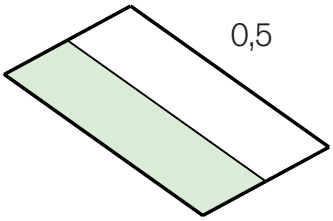
Water is to be retained and infiltrated as much as possible per plot, this is an important function of the green roof and soft surface in the plot, and is necessary to deal with extremes in rainfall. The design goal would be to completely negate the need for a sewer, that is to say detach the grey water from the sewer system. While water falling on the street is retained in the street, XS and S blocks may also utilise the street for this function if they can not reasonably fit it on their plot size, **rule 4.4**.

By employing height differences in the landscape, plants can be given assistance in finding their desired moisture level. In an exceptionally dry or wet year, they could have the possibility to "move over" to a higher or lower area, **rule 4.5**.

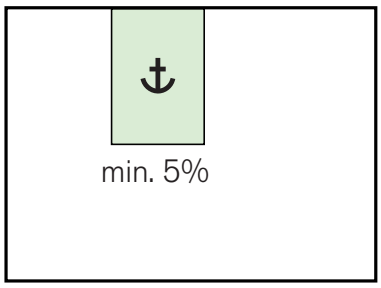
Sustainable maintenance is crucial for microfauna to thrive in the greenery that is being created, this means maintenance on greenery should happen in phases. Mowing should happen patch-by-patch, so that insects always have somewhere to be and gain sustenance, **rule 4.6**.



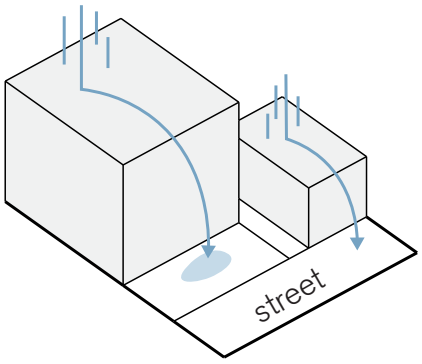
4.1 Plot ISR 0,5 incl. roofs
(own illus.)



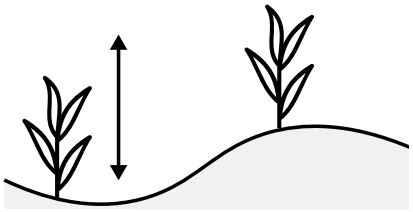
4.2 Street ISR 0,5
(own illus.)



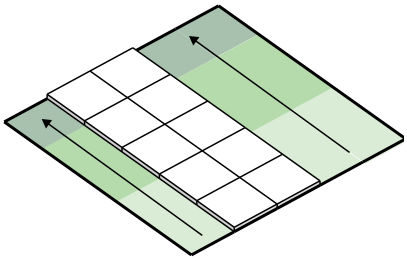
4.3 Green anchor
(own illus.)



4.4 M/L water on plot, S/XS in street
(own illus.)



4.5 Height difference for plants
(own illus.)



4.6 Progressive maintenance
(own illus.)

To reach that we must:

4.1 Each plot consists of at least 50% soft surface (ISR 0,5) looking from above. Green roofs count in this measure.

4.2 The street is to be designed with 50% soft surface (ISR 0,5) and the capacity to retain/infiltrate water of its surface and XS/S plot potential. Providing a green quality for individual use (appropriation) as well as being a line in the green network.

4.3 Each block has one plot specifically designed for a greenblue function in retention/infiltration and collective use and functionality, as well as a large place in the green network. Surrounding plots may use this plot for their water runoff. This plot is at least 5% of the block. This is the green anchor.

4.4 In M and L plots, (rain) water is to be retained and infiltrated fully on their own plot in the green roof or ground floor surface. XS and S plots may transfer water runoff to the street, but are encouraged to use their own green roof and ground floor surface as much as possible.

4.5 Employ height differences in the landscape to provide multiple levels of moisture and increase robustness of plants in exceptionally dry or wet years (plants can “move over”.

4.6 Sustainable maintenance; by not mowing entire swaths of greenery, microfauna can thrive.

9.

Plan & model

Overview of the whole plan with existing buildings highlighted (own illus.)

The plan and model

The plan consists of eight blocks demarcated by the Karspeldreef, Hondsrugweg and canals in Bullewijk. Two blocks (of eight) in the plan have been worked out to conform to the wishlist items, where one block (of eight) has been worked out into detail to show various aspects of the block in relation to the wishlist, this is defined as the model. Together with data and visualisations.

The first block, being the detailed block, has a total of 28.971m2 and an FSI (bruto) of 2.78.
The second block, only worked out to wishlist, has a total of 26.506m2 and an FSI (bruto) of 2.74.
This leads to an average of 27.739m2 and FSI (bruto) of 2.76 per block, for a total of 221.908m2 within 8 blocks (the plan).

A rough split has been made of 18.206m2 housing, 9567m2 working and 1200m2 other functions. At 80m2 per house, that's 228 houses per block.

Detailed numbers are included in Appendix C.

Overview of the two blocks built conform wishlist
(own illus.)

A view of the street
(own illus.)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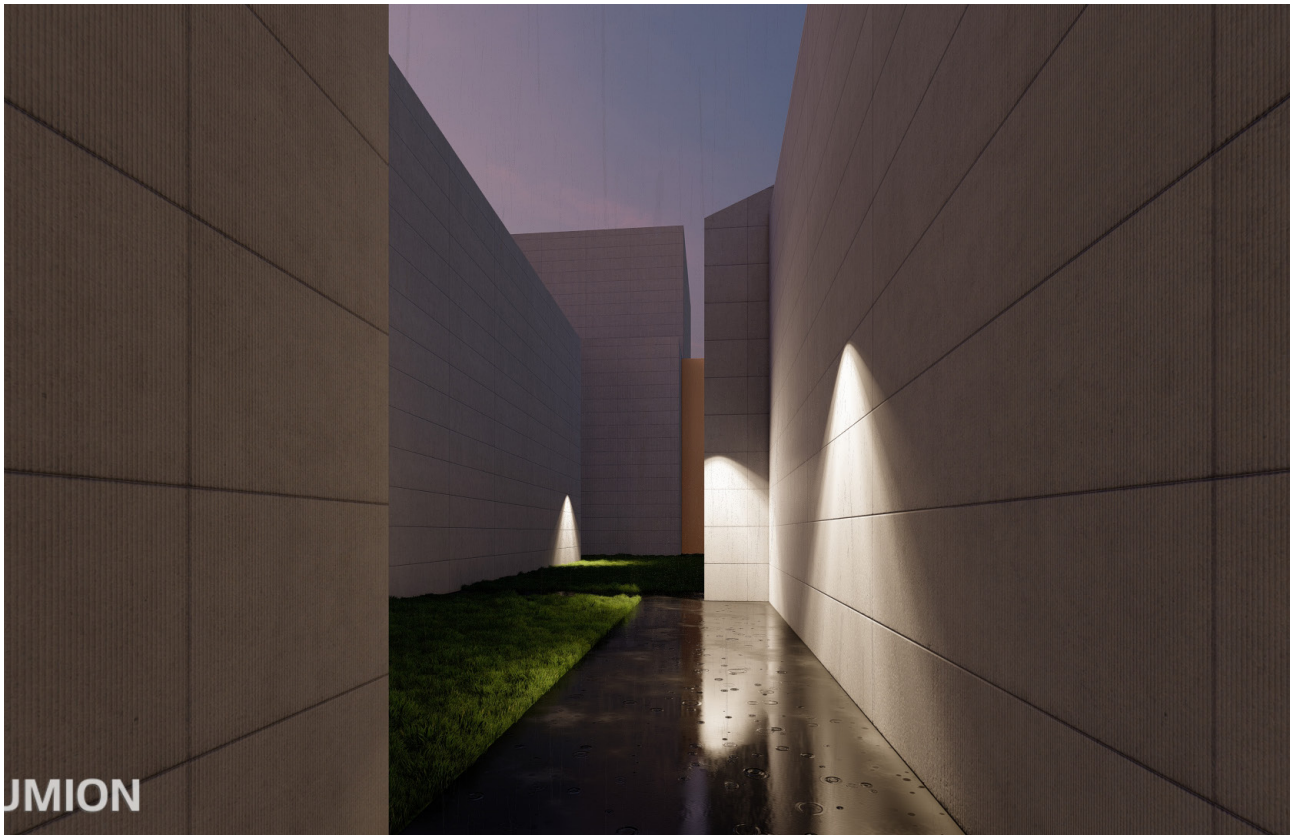
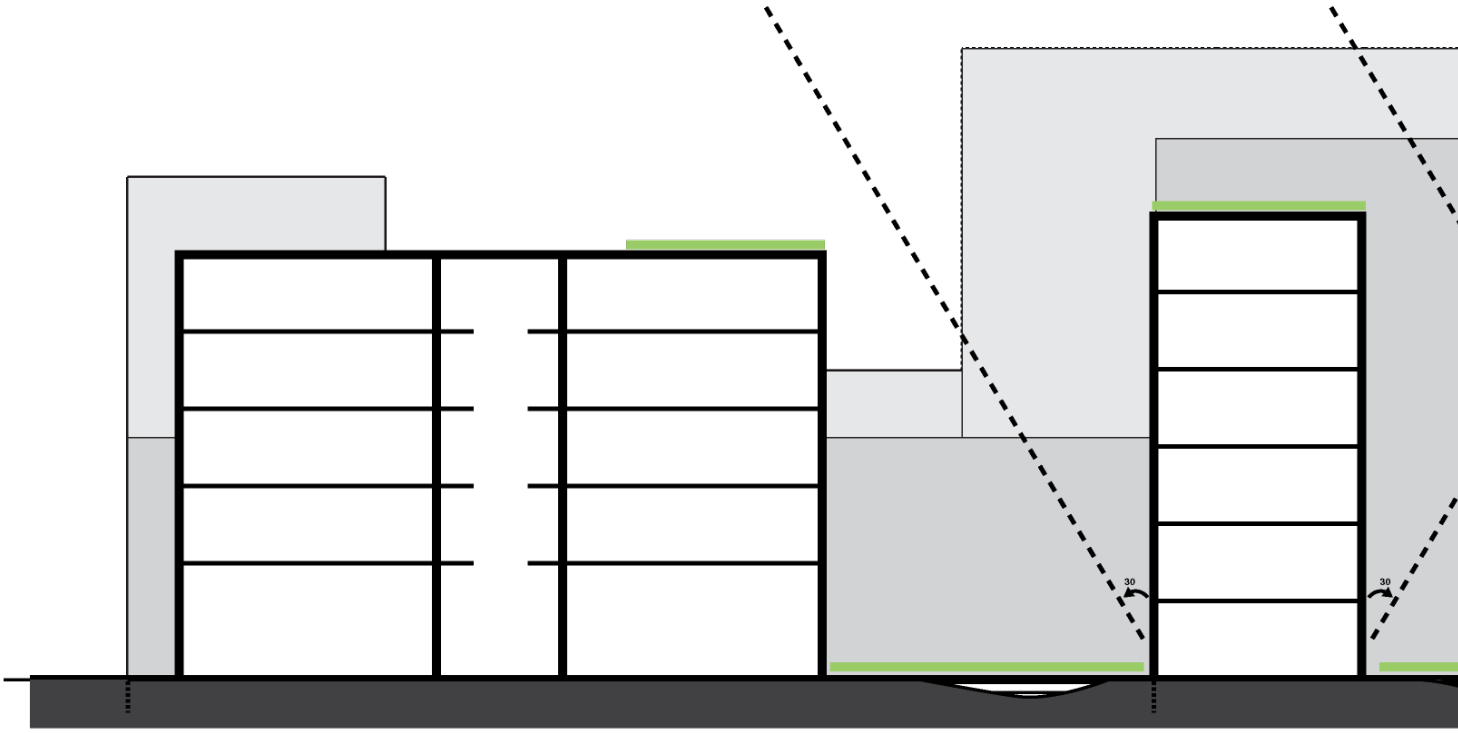


Various inner courtyards and view from the street
(own illus.)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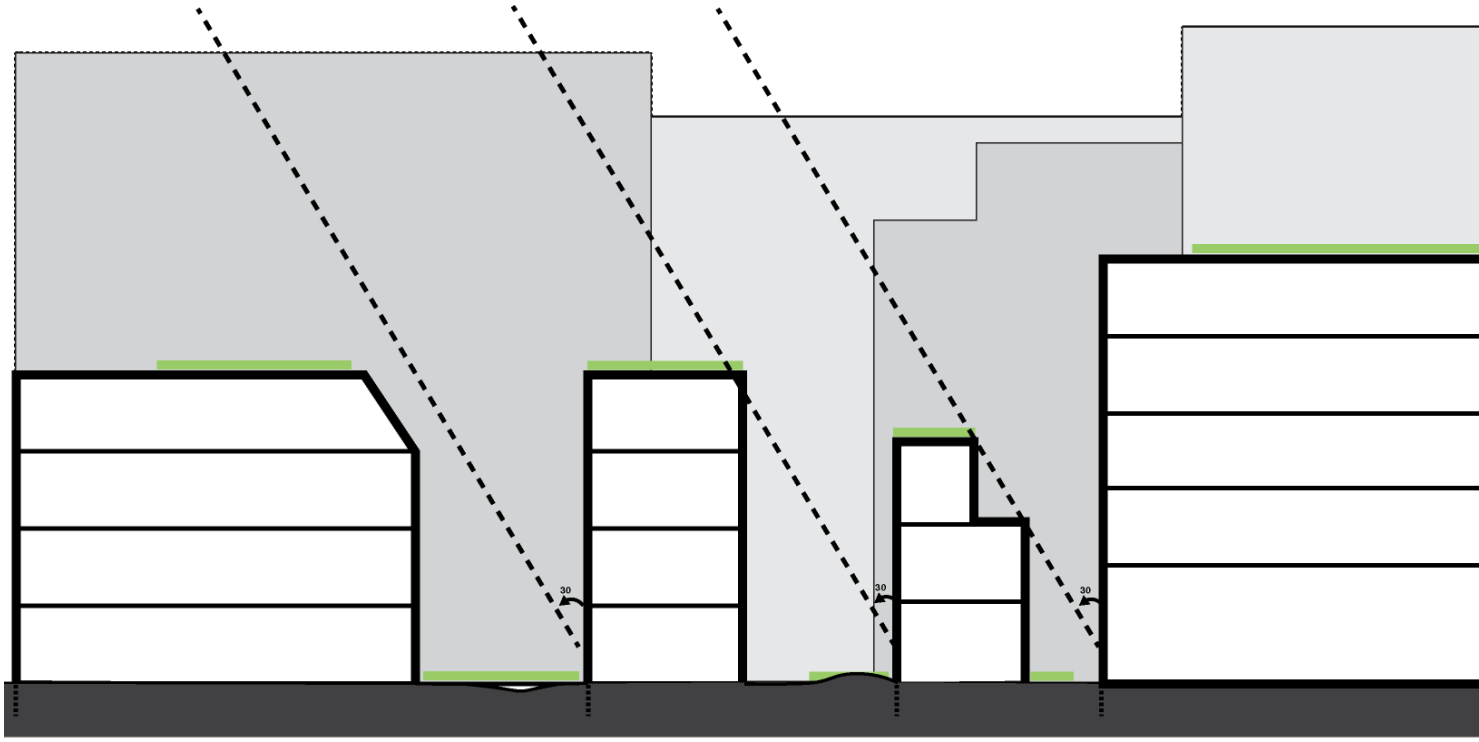
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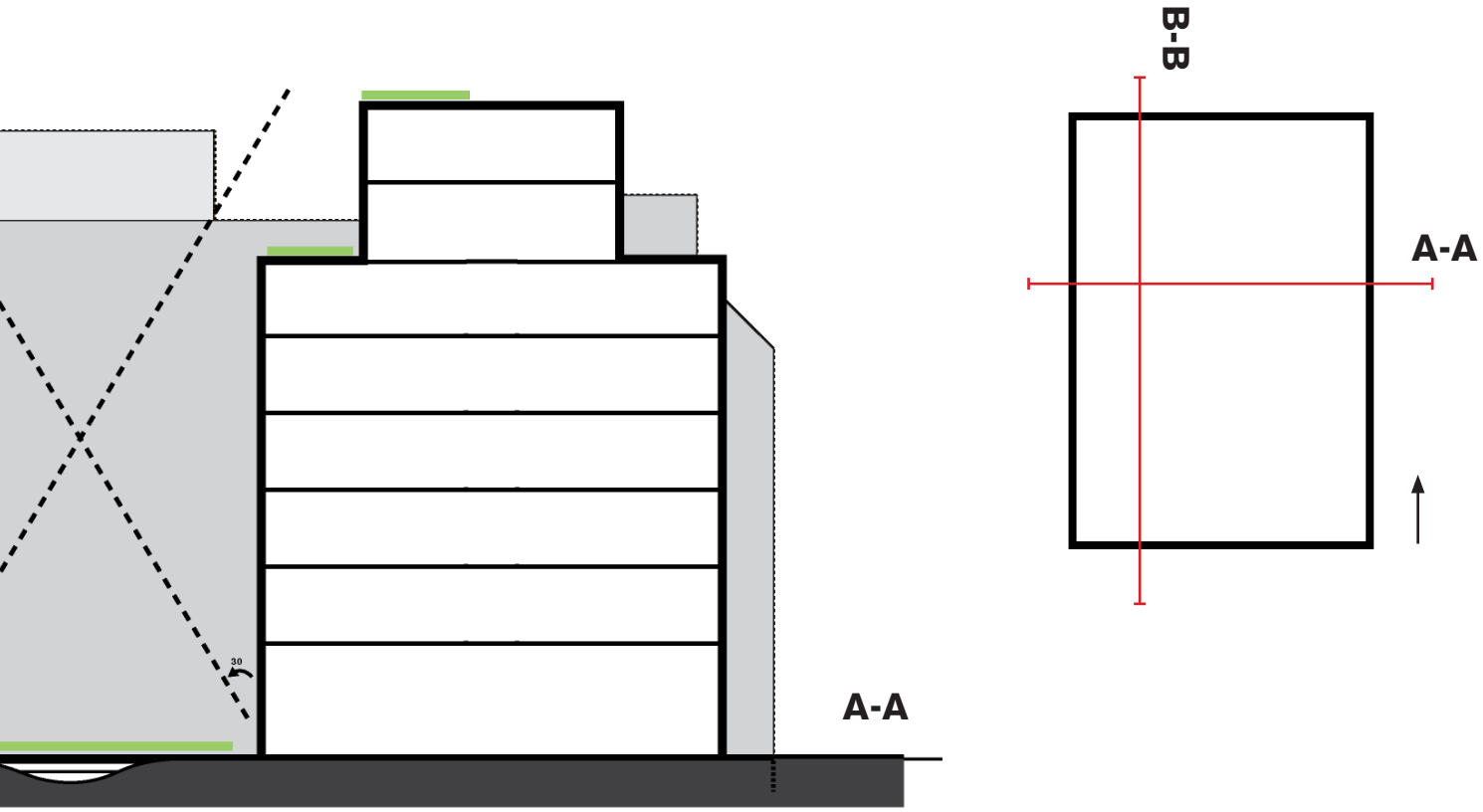
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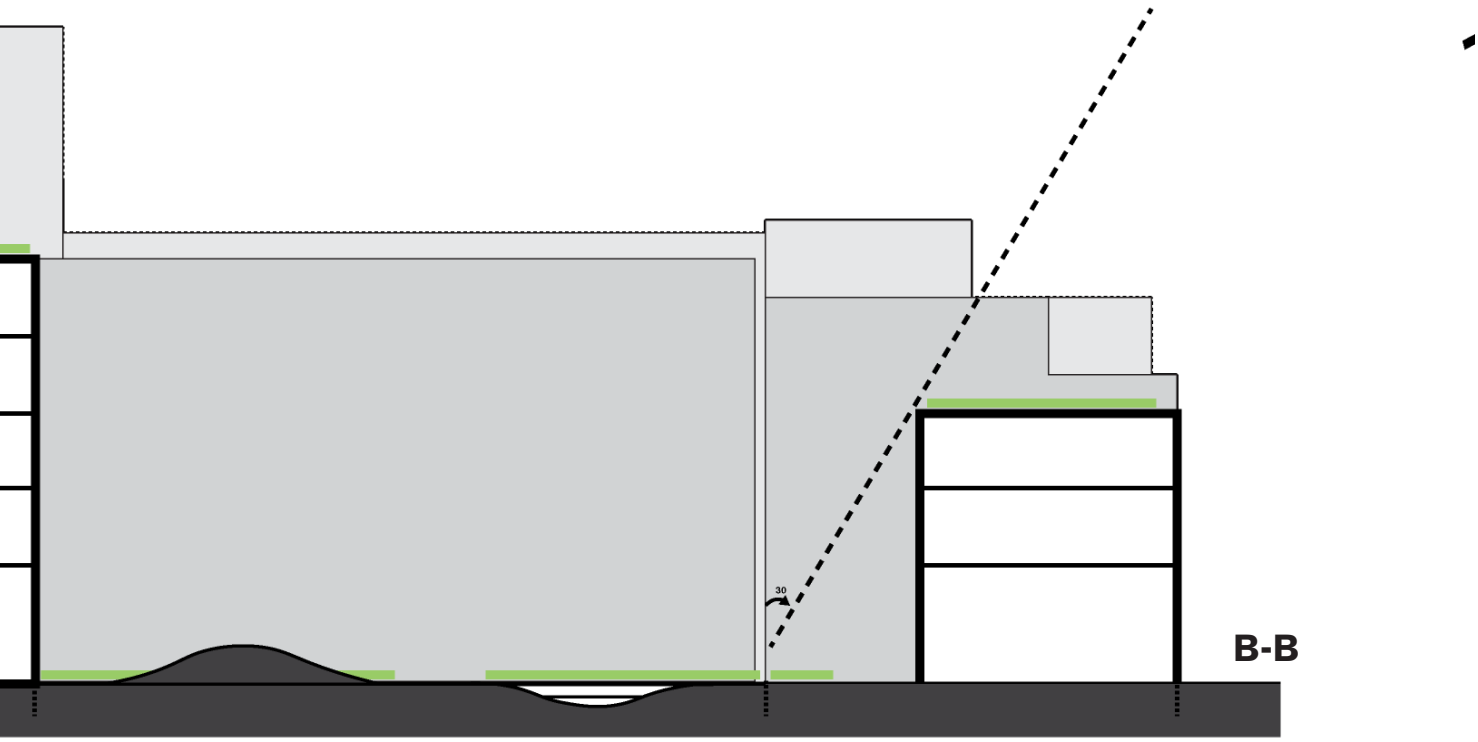
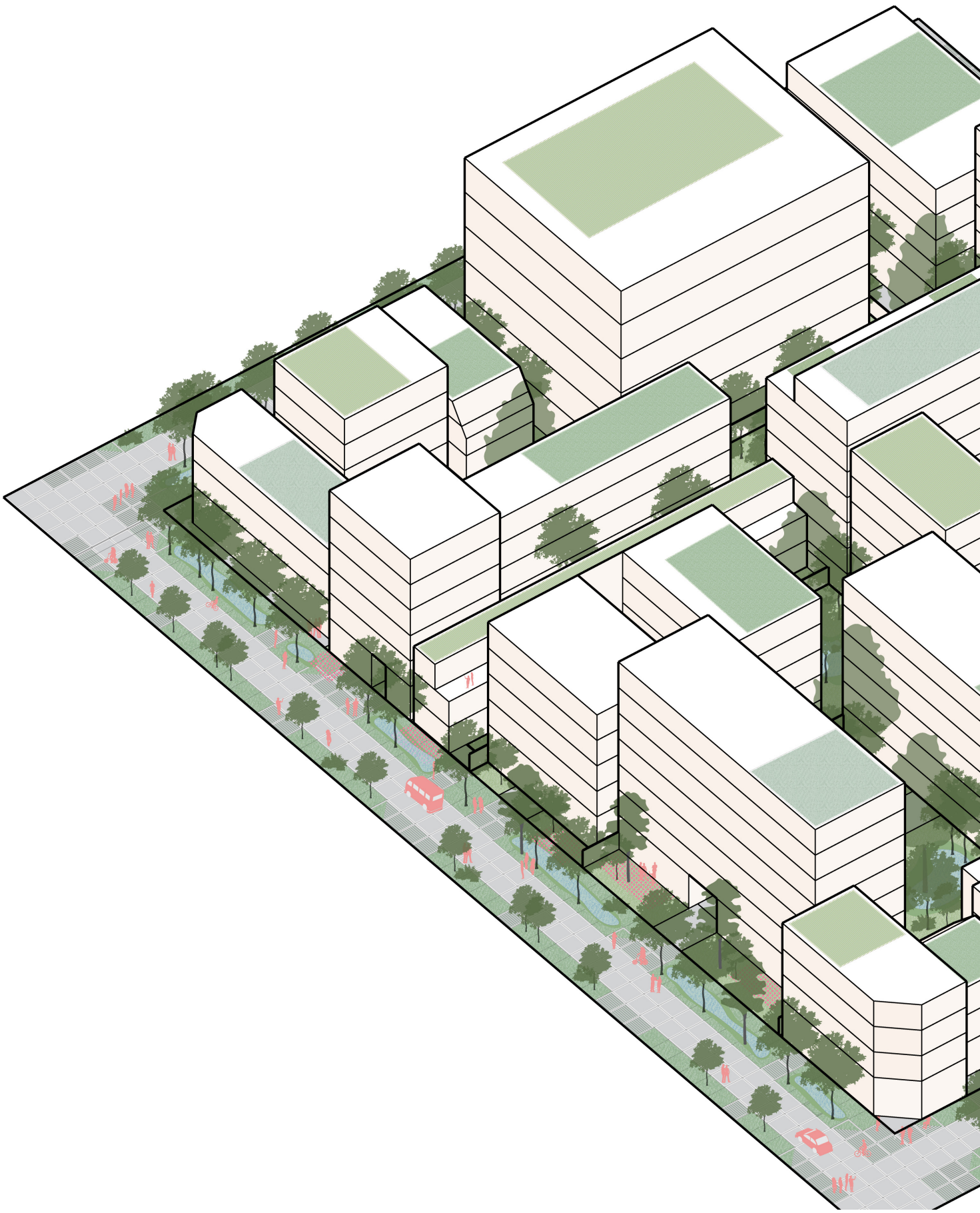
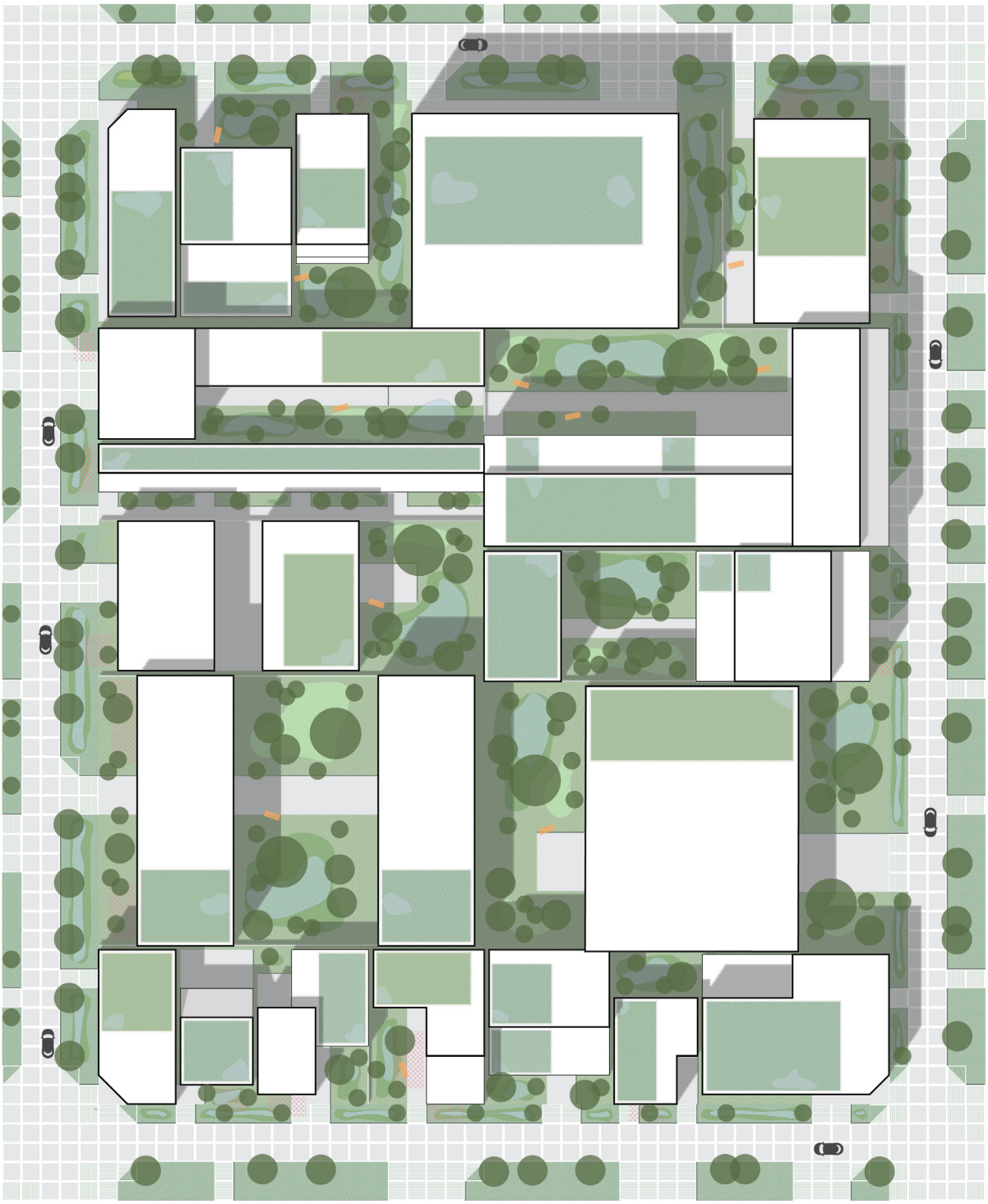
A-A
30
A-A


30
B-B



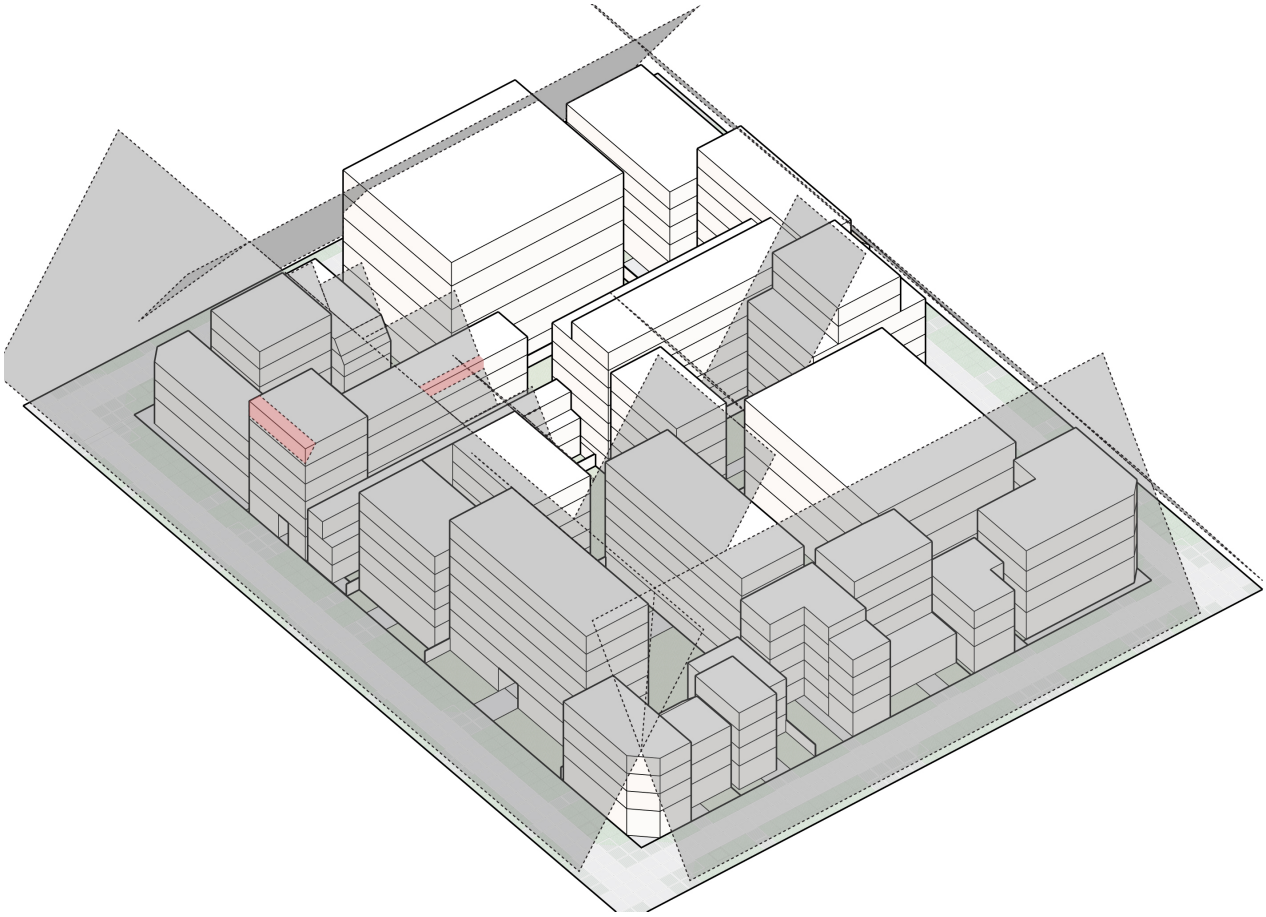


9.1 The block

This example model of a block with surrounding streets placed in Bullewijk is essentially the answer to the main research question:

How can the existing urban form (of public space) in the Japanese metropolis and the Dutch approach of climate adaptation be combined to create high-dense climate resilient urban environments?

The guidelines are a combined effort derived from both the existing urban form in the Japanese metropolis (and partly taken from the Dutch context) as well from the Dutch approach of climate adaptation. The example model, based on these guidelines, is therefore the result. Essentially, everything hereafter is an addition to the answer. As the block and street are presented separately (for reasons) it is important to remember the street section gives as much an answer to the main question as this block section does.

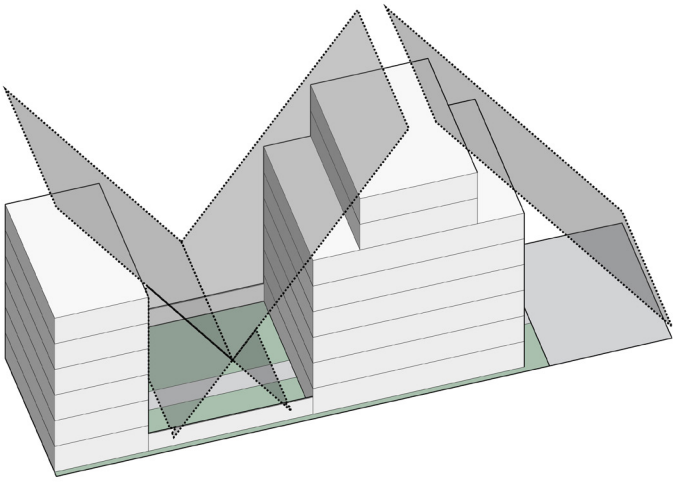


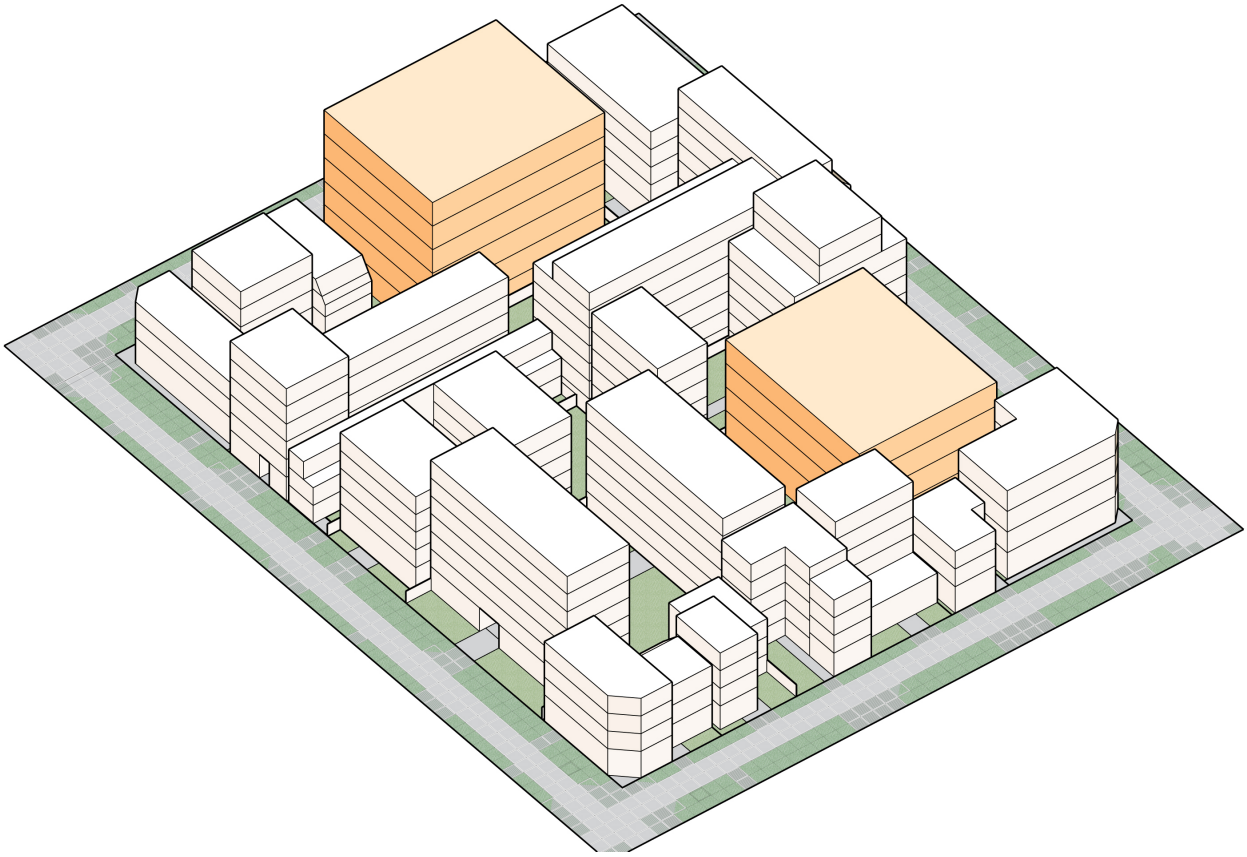
The block - 30 degree rule

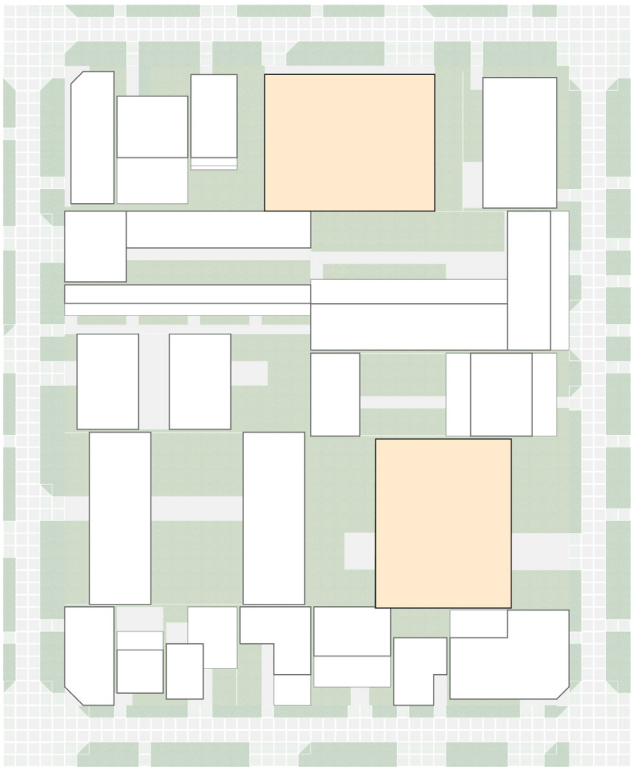
It's clearly visible how the 30 degree rule (rule1.1) creates planes around and in the model, which impact the form of the model. Nearly each building is fitting within the planes, two buildings are existing buildings and are exempt from the rule.

The zoom-in image provides an overview of the 30 degree planes and how they affect the building. As well as what measures are taken in the building to conform to this rule (set-backs at the appropriate levels).

The plane is created from the street side, as well as the two inner-court sides projecting a plane onto either side, as these sides are oriented towards the inner-court.

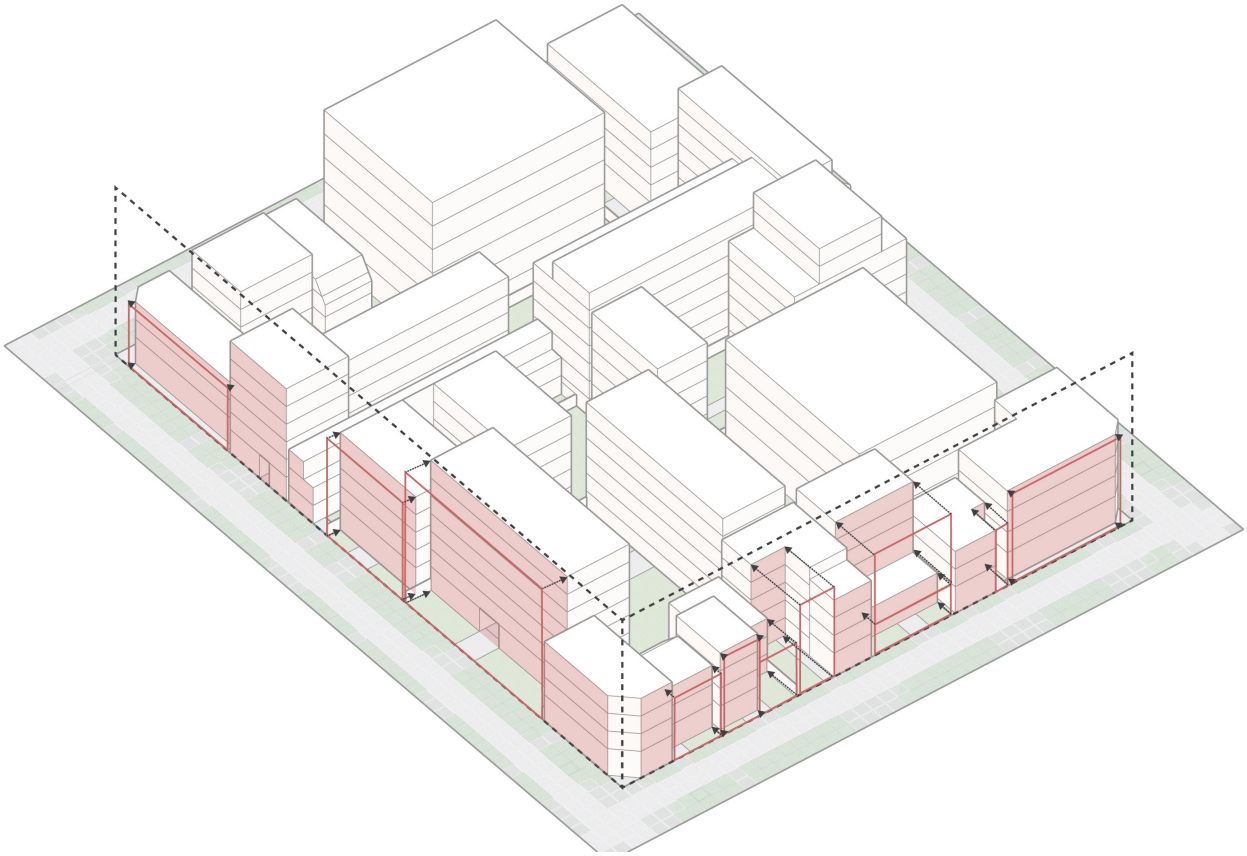






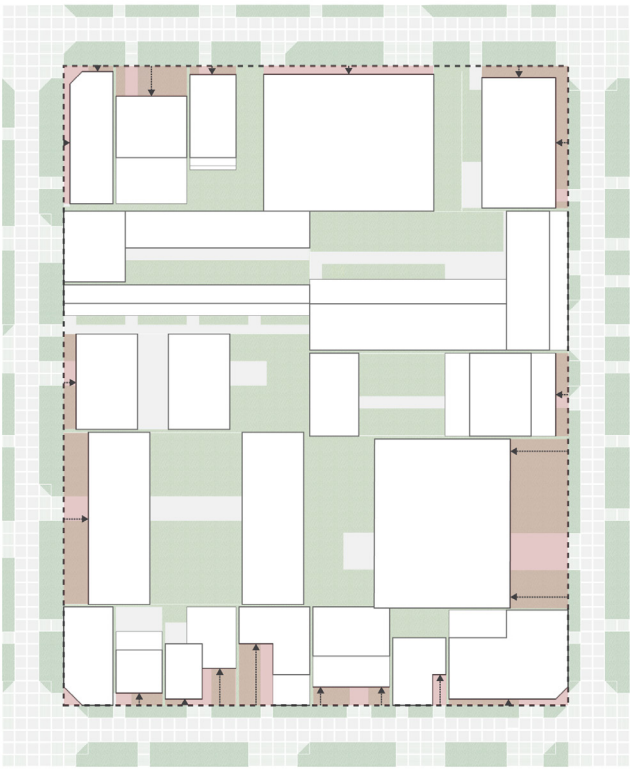
The block - existing buildings

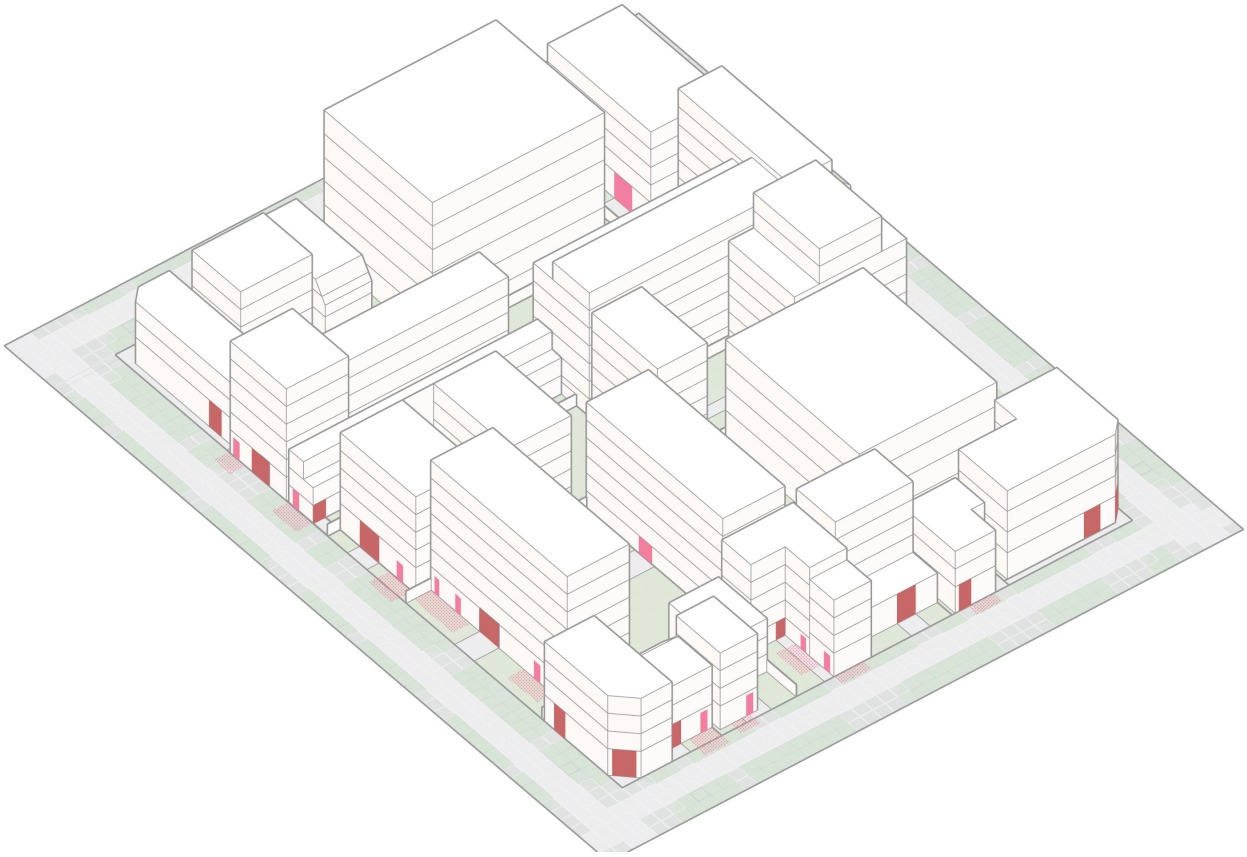
The existing buildings are retained and buildings are able to be constructed around the existing buildings without having to demolish the entire block. (rule 2.5). This gives these buildings a longer lifespan than simply demolishing them for not “fitting into the plan”. These structures may be used for any purpose as indicated in rule 2.1, but are expected to stay their existing function (office) due to their shape.

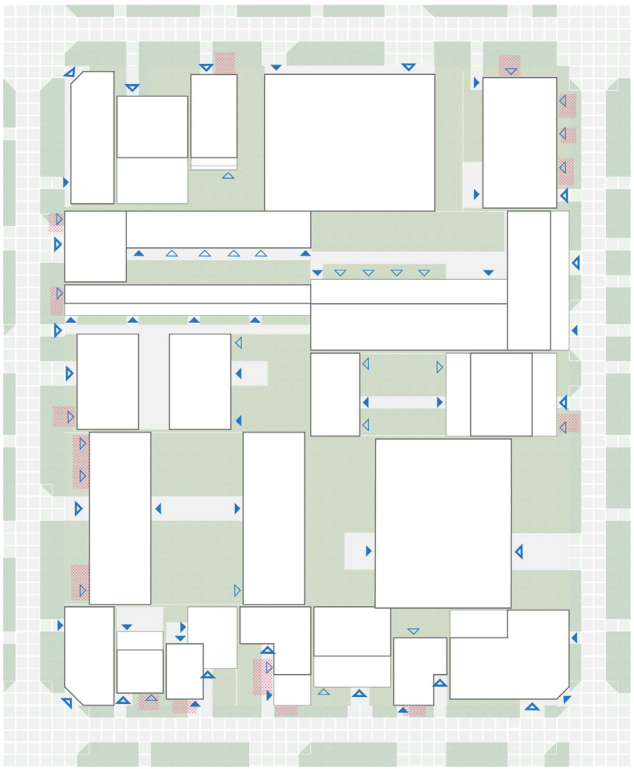


The block - setbacks

The “Japanse stoep” is created in 50% of each side through a set-back (rule 3.2). This will create a bit more “air” in the street, while providing the residents with space to appropriate. These spaces are excellent for creating an identity for the building, as evidenced in the Japanese situation.

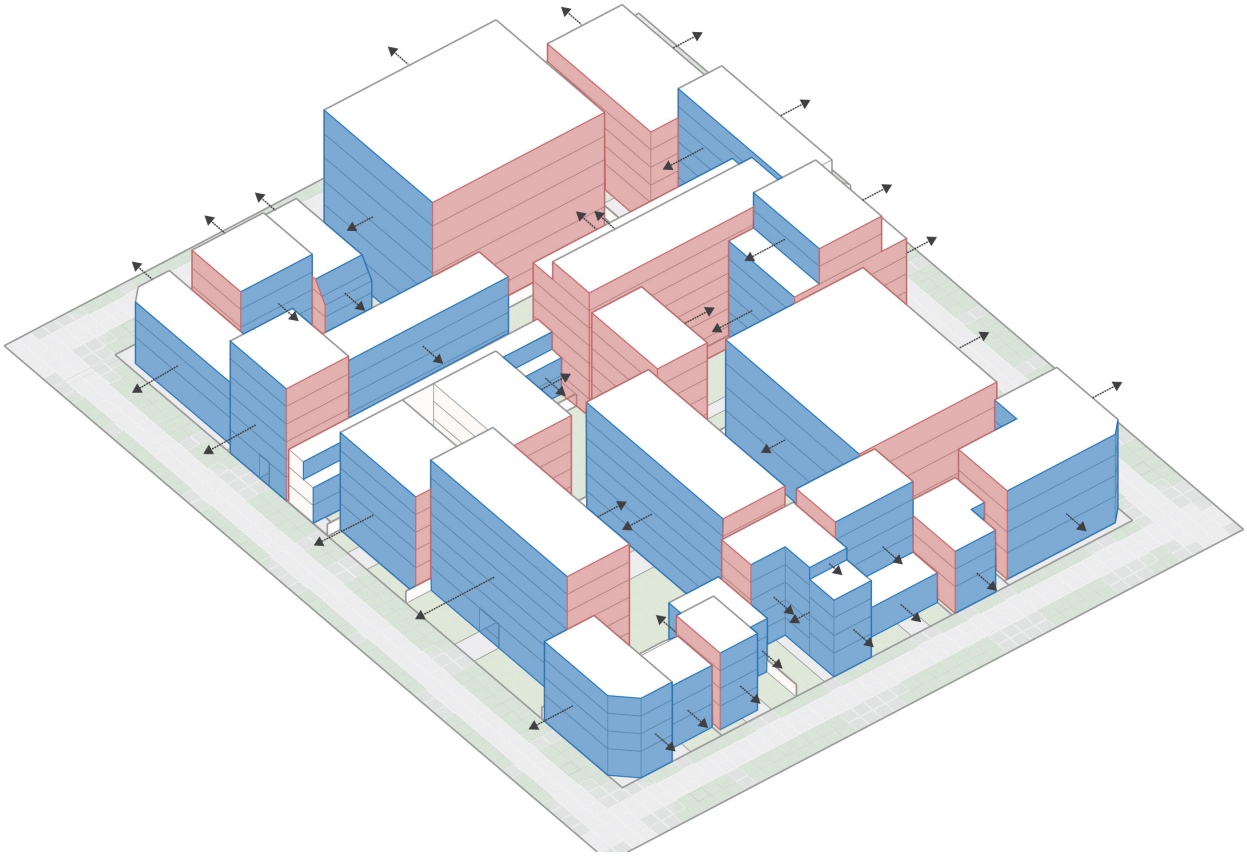






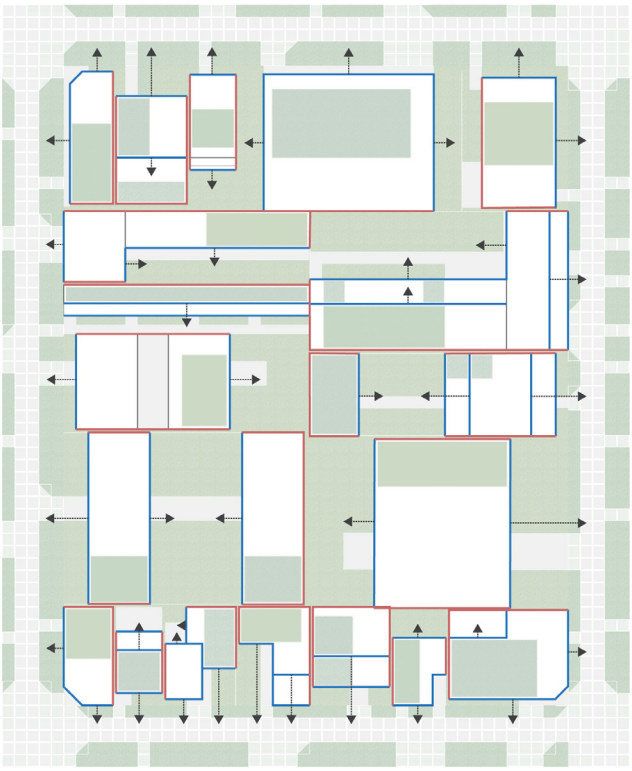
The block - entrances

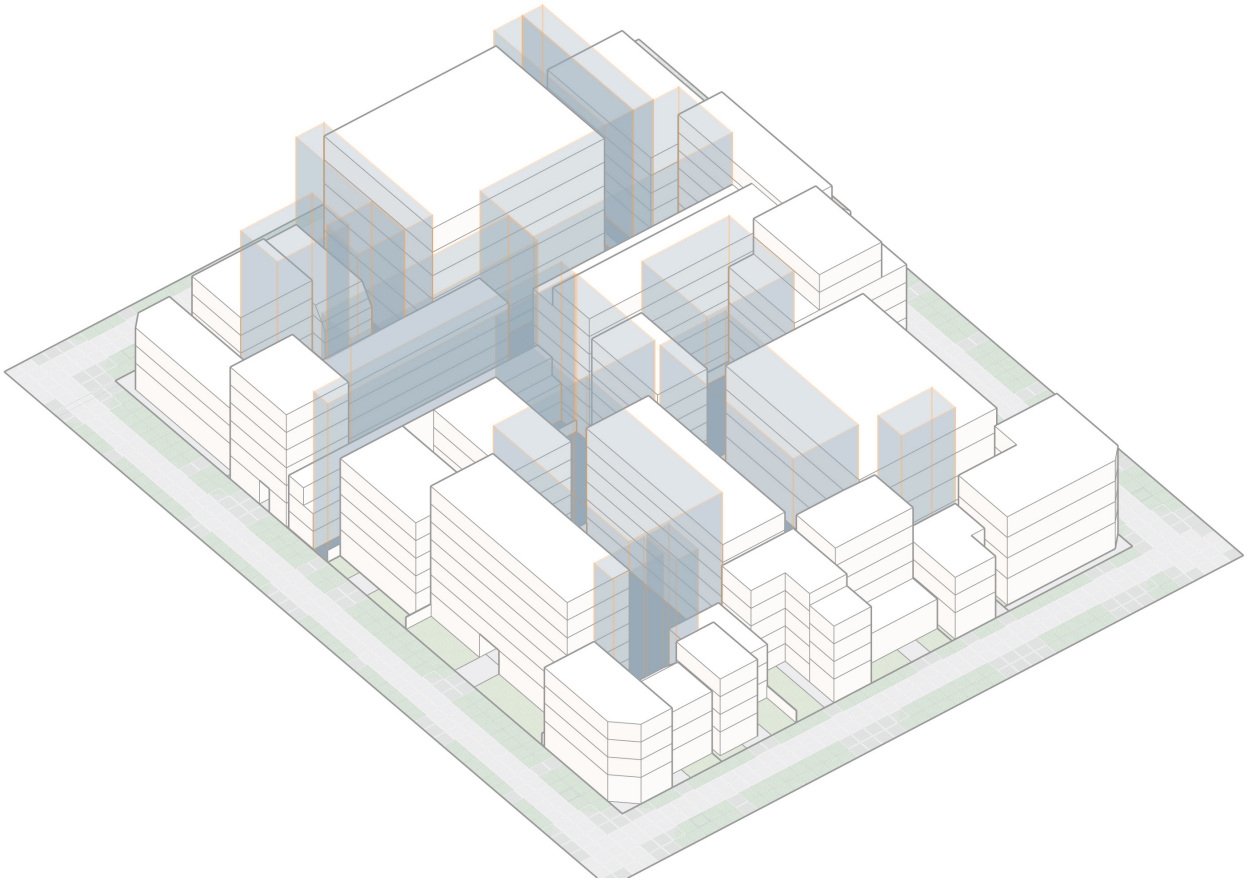
Every building has a clear main entrance (rule 3.4) as well as several sub-entrances for functions directly connected to the ground floor to facilitate appropriation (rule 3.5). It is the aim to give every function on the ground floor their own entrance. This continues within the plot, residents who live oriented inward of the plot will have a door directly leading into the enclosed space - also facilitating appropriation of the communal space for themselves. This can be done at their discretion, the only imposed demand is to not build objects larger than 1m (so as to not have a bunch of fences popping up).

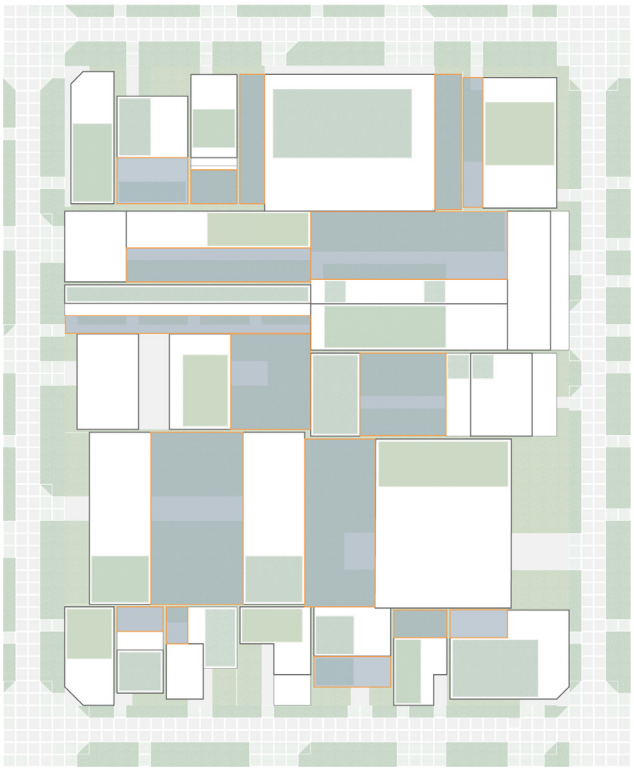


The block - orientation

Buildings are oriented towards the street or inward of the block, never towards other plots. (Rule 2.6). Most of the blocks are oriented to both sides, but due to the size of the houses, most houses will be oriented towards one side only. The orientation evokes the 30 degree rule, rule 1.1, to always guarantee enough light coming into the house.

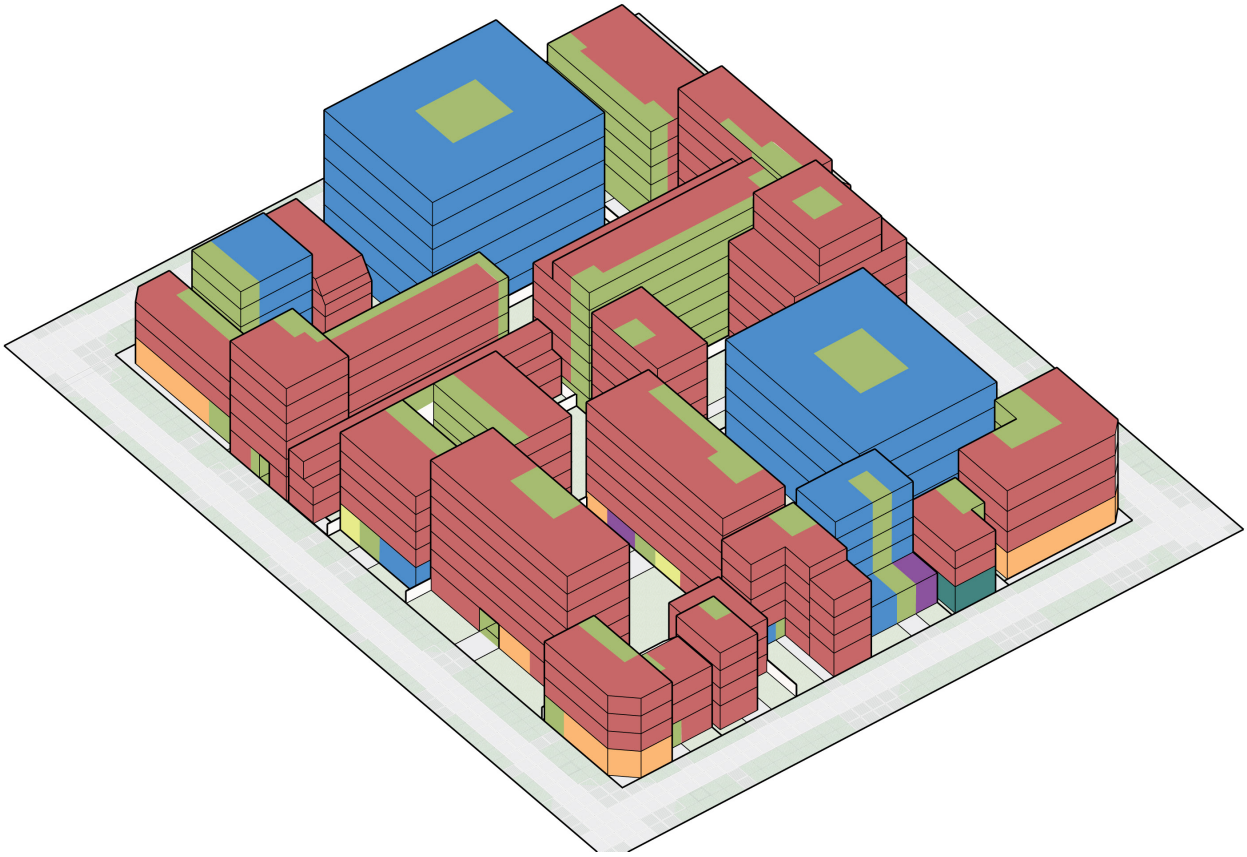






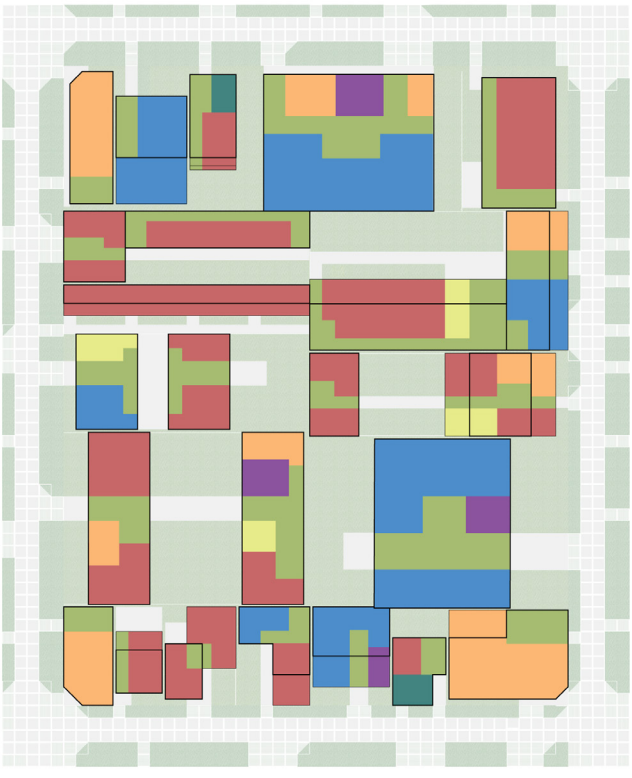
The block - enclosed spaces

The buildings create a semi-enclosed space on each plot (rule 3.3). These semi-enclosed spaces are small, but the 30 degree rule (rule 1.1) maintains enough light in these spaces. Having smaller spaces for a smaller number of people may provide more comfort and intimacy, making the space a communal backyard. This is easier to create with 20 neighbours than with 200 all sharing the same space.

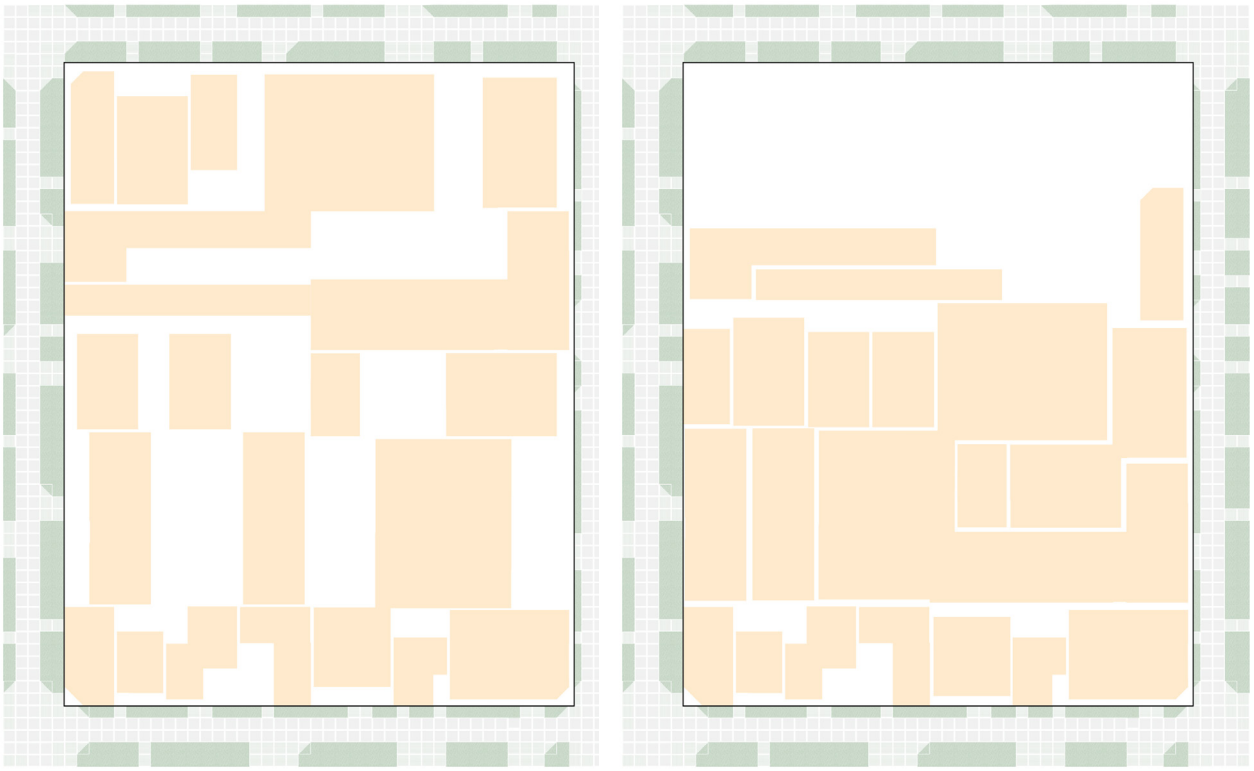


The block - functions

The plan is very function diverse (rule 2.1). There are functions practically all around the block. In this instance, the existing buildings retain their functions (office) and some new buildings provide these functions also. What is most apparent is the function richness of the plinth facilitated by rule 2.2.

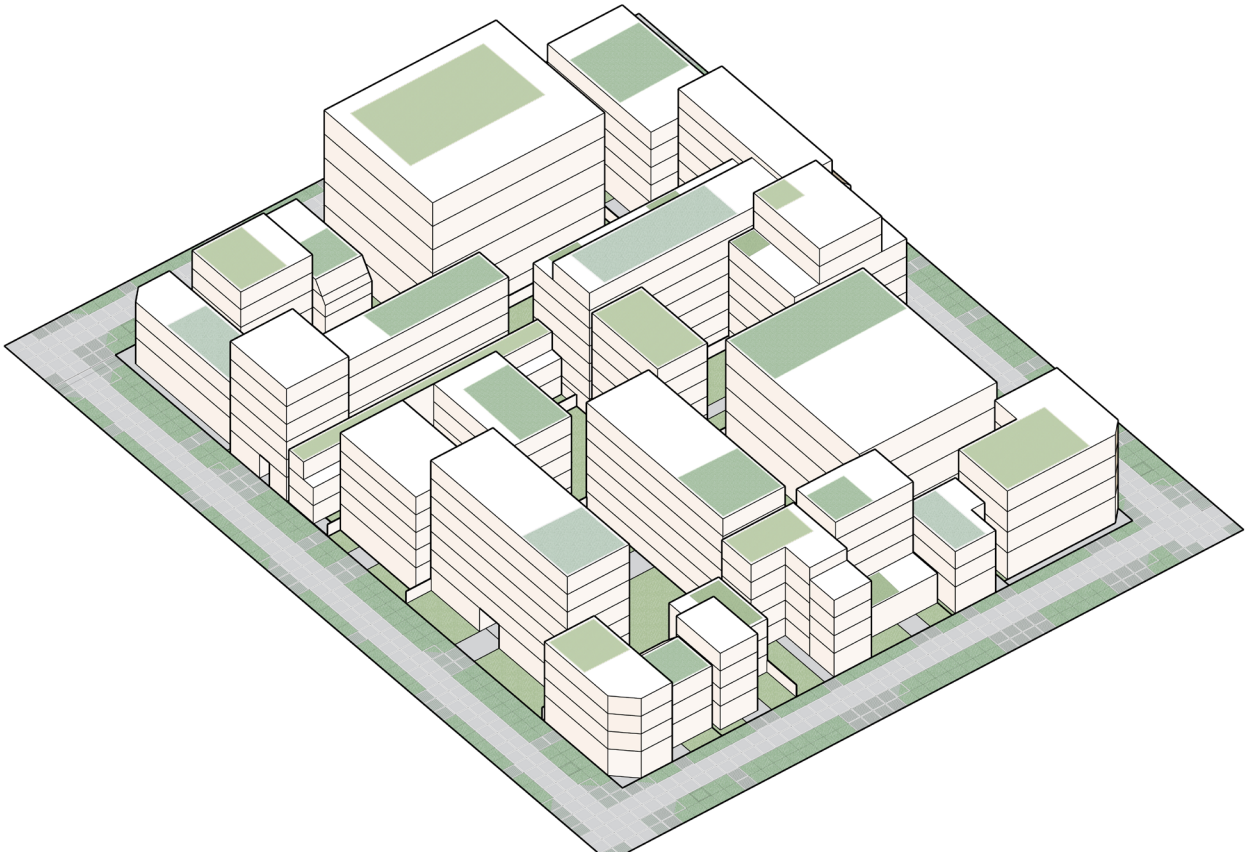


- Circulation
- Housing
- Office
- Shops
- Horeca
- Practice
- Communal



The block - built surface

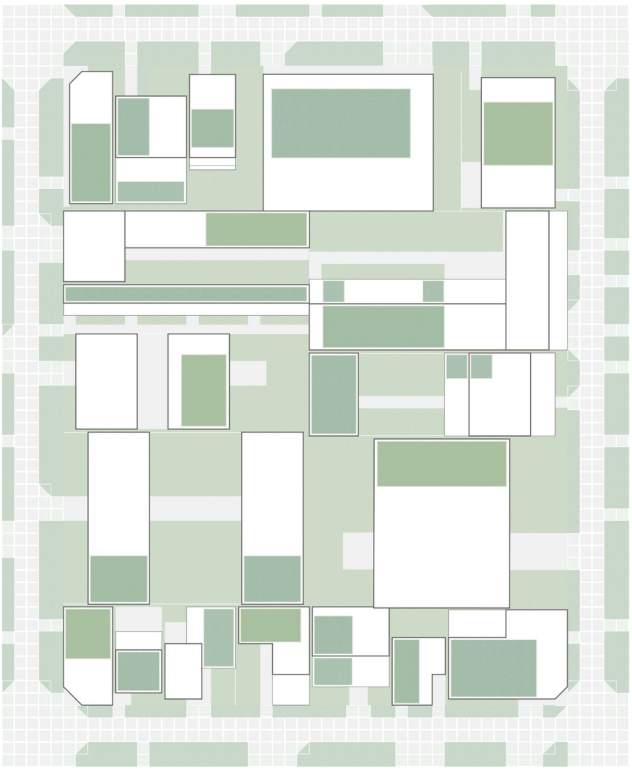
As visualised in the following image, the built area of the block reaches the minimum of 50% as indicated in rule 1.2.

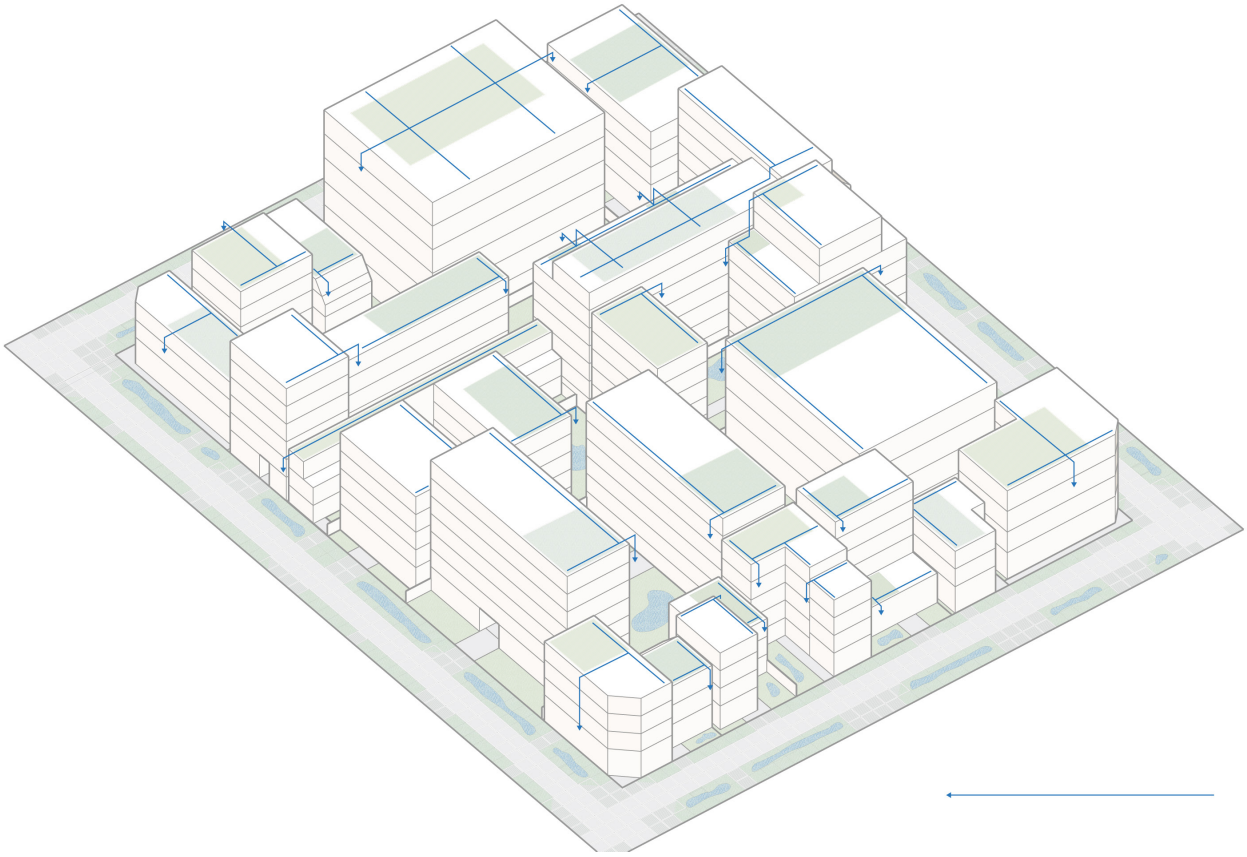


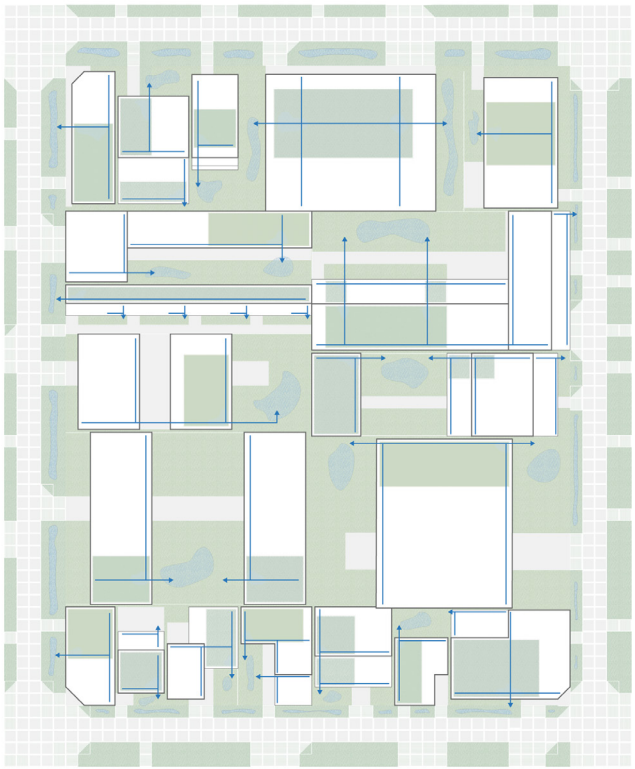
The block - green roofs

The decision was made to purposefully show only the necessary amount to reach the desired 0,5 ISR as stipulated by rule 4.2. This is to not create a disingenuously “green” view and to avoid greenwashing. The answer to the question “how much green do we need to reach ISR 0,5 on the plot” is simply answered. The amount of green roof drawn is based on the building footprint and drawn amount of hard surface on the plot. These are added to create a “hard surface” amount, where the remaining green surface on the plot consists of the “soft surface” amount. If the “soft surface” amount is lower than 50% of the plot’s total size, the remainder is considered as “to be built green roof”. The green roofs are presented in three different colours, mentioned earlier.

There is a total amount of 2118 m2 of green roof in the block.

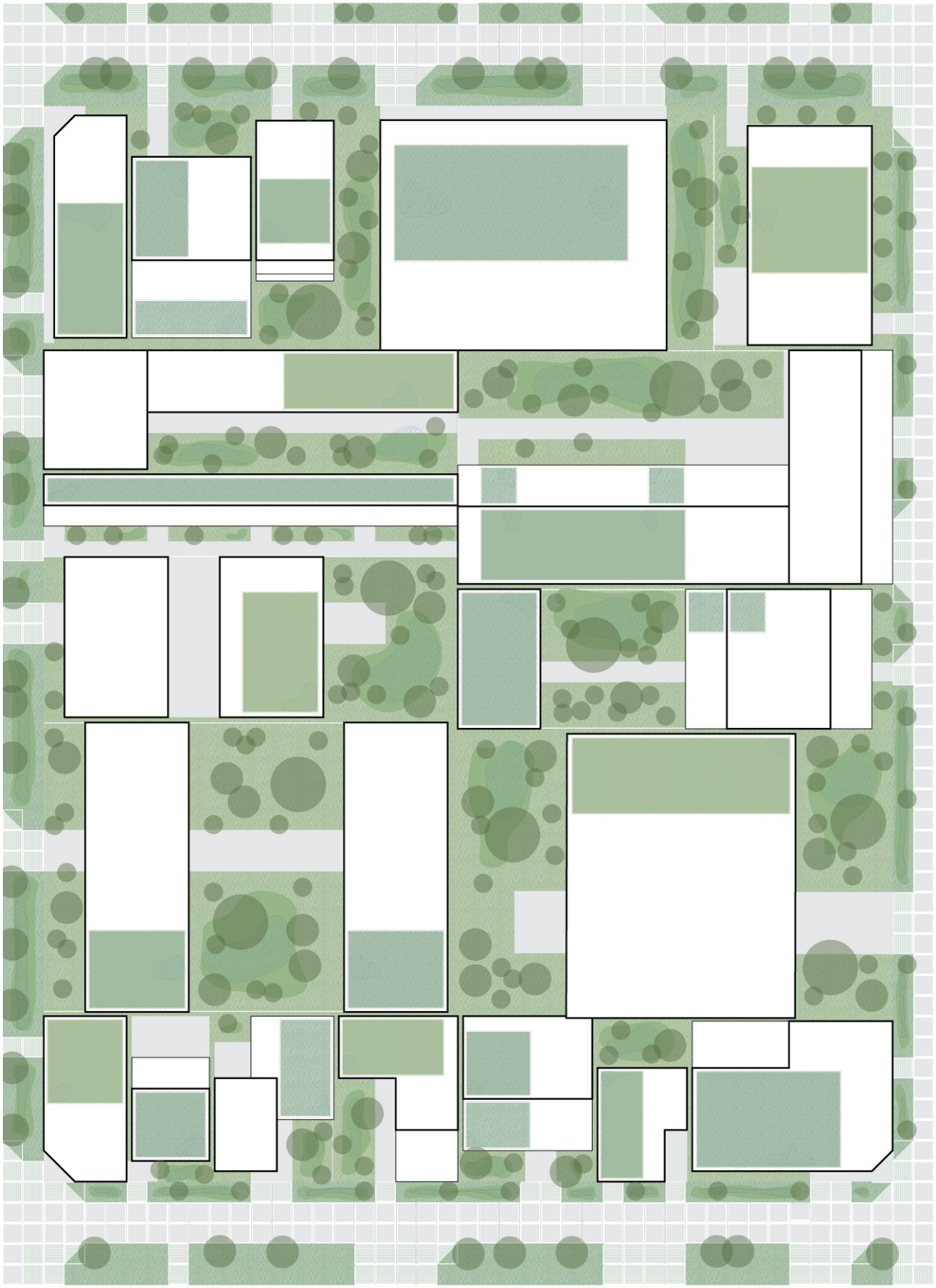


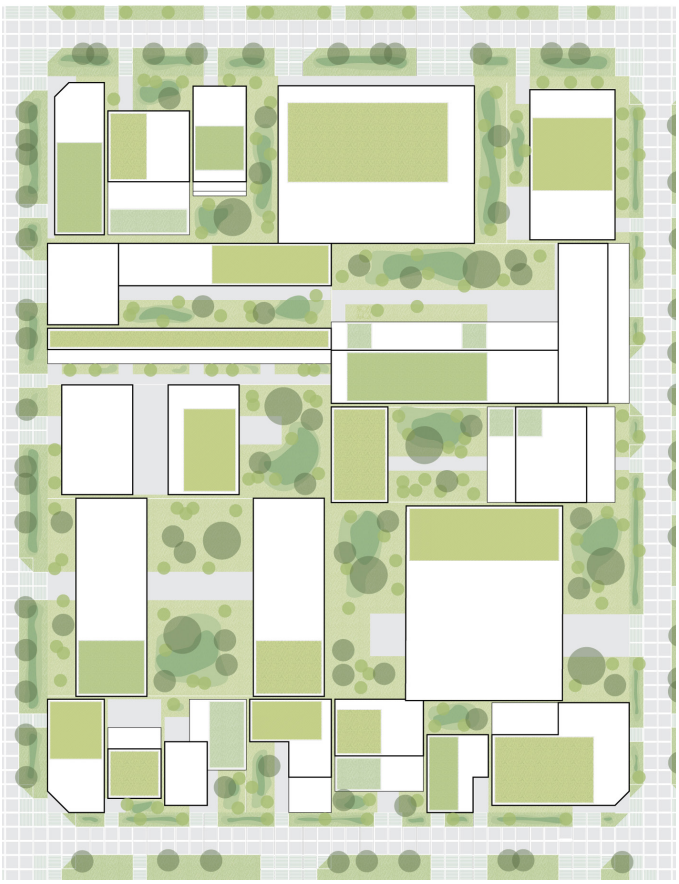


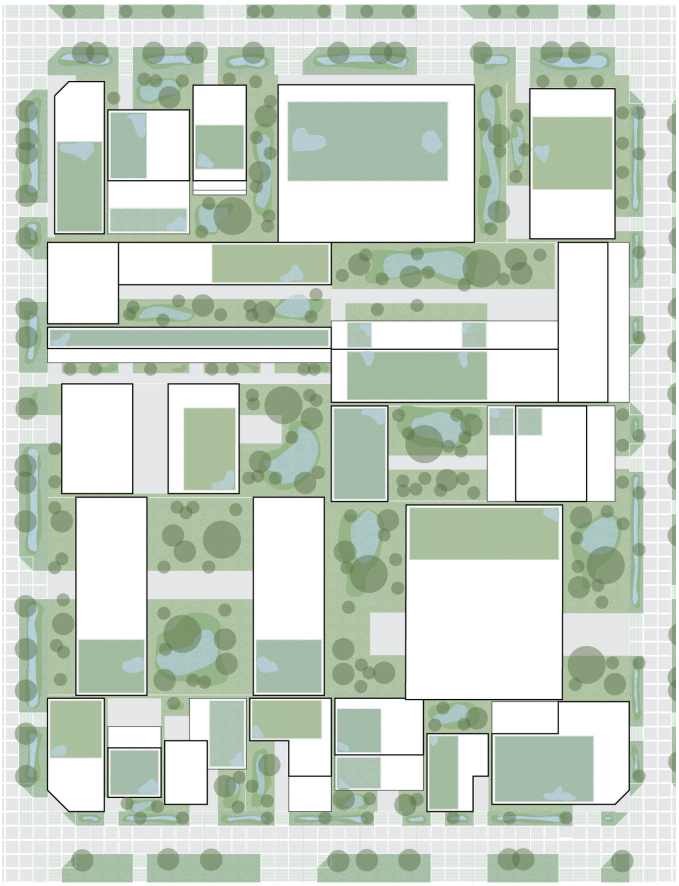


The block - retention & infiltration

The water that falls onto a plot is expected to be retained and infiltrated on the plot. This is rule 4.3. It is visible where the M and L plots send their water in their plot, and where it is expected a retaining/ infiltration option is located on the plot. These are described in the nature-based solutions. Ultimately being a landscaping solution utilising height differences. The smaller sizes may path their water to the street, as well as the water that falls onto the street itself being infiltrated in the swales on the street.







The block - wet and dry

An important part of the greenery that is being added is its capacity to take in water. The regular situation can be considered a green oasis, a lot of greenery on all levels (grass, plants, bushes, trees) and raised (green roofs). In the street and on the plots. The large amount of green spaces will make a difference in urban heat island effect. The height differences that are built into the outside space provide different microclimates on each plot and in the street. These are mostly downward, the retention/infiltration spaces, but some are also upward. Meaning a wide variety of plants can thrive in the area, water-loving ones and also ones that prefer drier soil. These height differences become doubly important when considering extremes in weather, which may happen at any time.

The dry situation will have some areas that will remain damp for longer - the areas of the swales in the street and where the water will retain/infiltrate on the plots. The amount of trees in the semi-enclosed spaces indicated in rule 3.3, surrounded by buildings, may provide some cooling effect as well as shade in a hot situation.

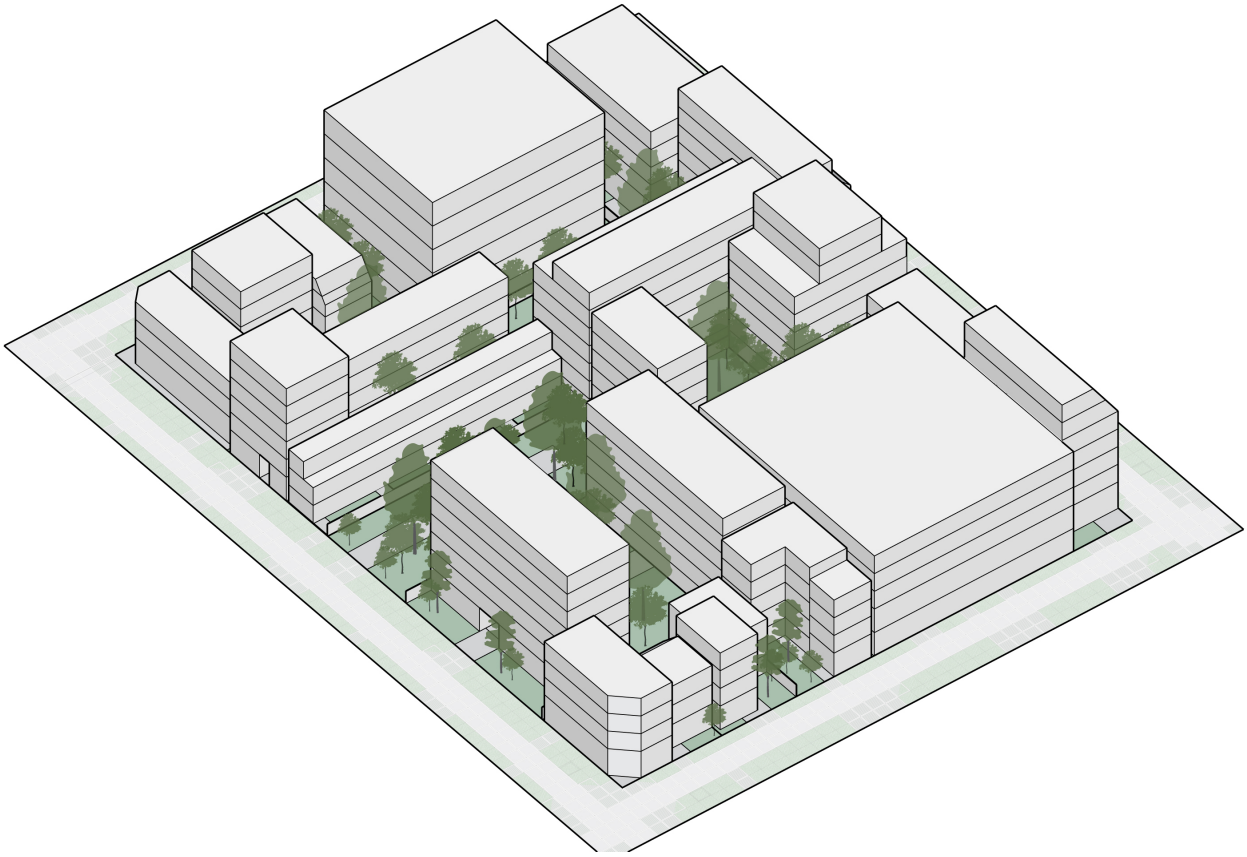
The wet situation can retain and infiltrate a lot of water. The swales in the street and retention/infiltration spaces on the plot are plentiful and will provide a direction for water to go, keeping other places from flooding. The green roofs can retain water for some time as well - preventing this from reaching the soil immediately.

To test the water retain potential of the block, a calculation was made with the following parameters (also mentioned in the street section further in the report):

All green roofs are 10cm soil roofs with a retention factor of 24,43L/m2 (Johnson, 2008).
65% of green surface is a flat loam surface with infiltration rate of 10-20 mm/hr (effective 15mm/hr)(Booher, 1974).
35% of green surface is a swale (avg. 10cm deep) with infiltration rate of 10-20mm/hr (effective 15mm/hr).
The green surf * 0.35 * 10 cm depth = xL of retention for the entire swale volume that can be filled.
A heavy rain for Dutch context is 28mm/hr, let's say 2 full hours. The total block area is 8452m2. The green surf area is 2352m2 and green roof surf is 2118m2.

56mm falls on 8452m2, a total of 473.312L (473m3) falls. The green roofs retain 51.742L (not all that falls on roof), the swales retain 82.320L (2352*0.35*0.1=82,32 m3). The green surf infiltrates 70.560L (2352*0.03 =70.56m3). 473.321-(51.742+82.320+70.560)=268.699L is unaccounted for.

Counting backwards, the model can handle rain at 16mm/hr for two hours without overflow.

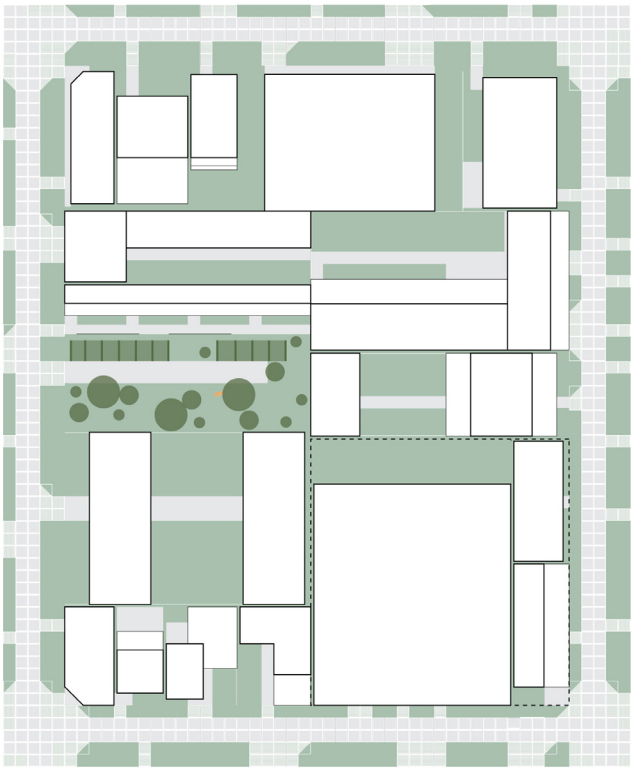


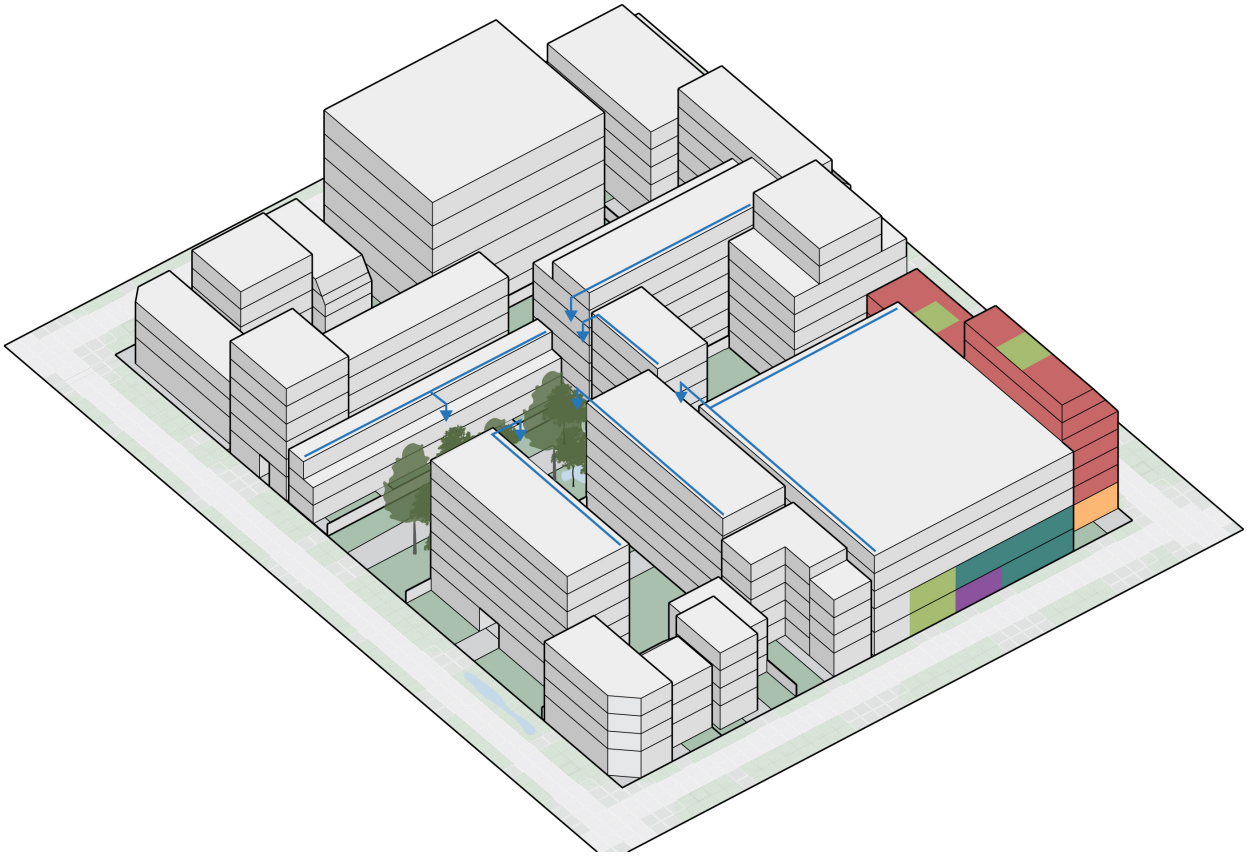
The block - indicative

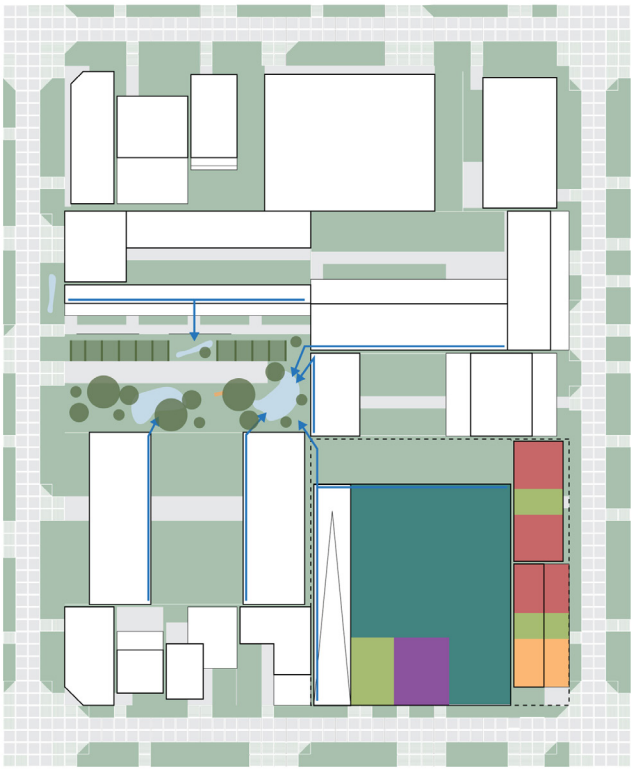
This block shows an indicative situation wherein the green anchor and collective building are displayed.

The green anchor (rule 4.3) is shown as an M-size plot in the centre of the block. This functions as the big “point” in the green network. The plot exists for water retention on a larger scale, as well as to provide a more collective green experience for the residents. In this indicative situation, green squares are drawn to represent a form of communal farming.

The collective building (rule 2.7) is also placed, the placement is slightly into the block to provide buildings with a front towards the right-side street. This building contains communal and visitor parking, as well as public functions (school, healthcare, neighbourhood centre, etc.). Along the large road (Karspeldreef), this building may also contain a supermarket or the other excluded functions described in 2.7 (such as “loud” functions).







The block - indicative details

The green anchor has a functional use for the block namely for rule 4.3. The surrounding blocks may use it (additionally) for water retention/infiltration, providing better spread of water in the block.

The collective building is shown with its function colouring. In this situation, parking is situated on the above floors, with the ramp visible (continues slightly on the 2nd story). There are two floors with functions - in this case this could be a “health centre” (combination of doctor’s office, pharmacy, perhaps dental care, etc.) with a small eating facility on the street side. The buildings towards the right-side street can generally be omitted when a function in the collective building requires more light, such as a school. However, the size of the building is somewhat out of proportion (necessary for parking), hence the addition of a front to the right-side street is preferred.

The parking garage provides parking for around 150 cars in 3 floors. Using the tool from the municipality of Rotterdam, 98 amount of parking is necessary at peak time (Gemeente Rotterdam, 2022). Further details in Appendix E.

10.

Street design

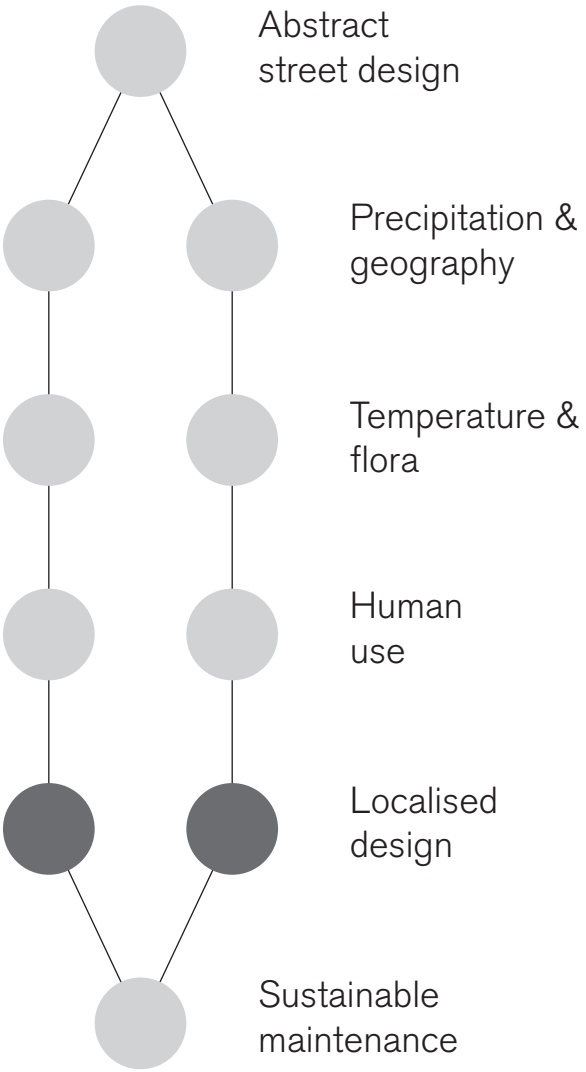
Street design schematic

The street design for the Japanese and Dutch context are based on a similar starting point and principles. In order to create the street in a similar, but localised way, a methodology was created visualised in the following scheme.

To start off, the same set of building blocks exist for each location. The street is made up of evenly sized plates. These are described as 2x2m in the Dutch context, but may be smaller in the Japanese context based on their car sizes. The same counts for the other plates. In addition, the previously mentioned wishlist items are in effect. These are, 2.8, 2.9, 2.10, 3.5, 3.6, 4.2, 4.5.

Wishlist item 4.2 (street ISR) may be different from the described ISR of 0,5, depending on what is deemed required at the specific site. The locations of the entrances impact the street design, where the space for appropriation is and where the half-filled plates will be placed for the main entrances.

After the generic design, the street design “branches off” into localisations. These exist for precipitation & geography, temperature, flora & fauna and human use. The generic design and localisation topics combine to create a localised design for the Japanese and Dutch context. Both designs come back together into a generic maintenance form based on wishlist item 4.5 (sustainable maintenance).



Street design methodology schematic
(own illus.)

10.1 Street design detailed

The street is the “line” element in greenery, connecting every part of the neighbourhood together as a network, together with the big “point” (the green anchor) and the small “points” (the retention places per plot and green roofs).

The street design is created with flexible plates, these pavement plates are the backbone of the street and carry human activity. They are 2x2m (pervious) concrete plates which are flexible - they can be lifted, removed and added as necessary. Its size differs in the Japanese situation to fit the 6-8m wide streets. Two-wide, they provide the right-of-way and underneath the centre line of plates will be the cables, etc. This creates a highly flexible paved street, which can adapt to the needs of the buildings around it. The right-of-way becomes an aorta of sorts, with the plates as cells which adapt and change to the environment (surrounding buildings) as necessary.

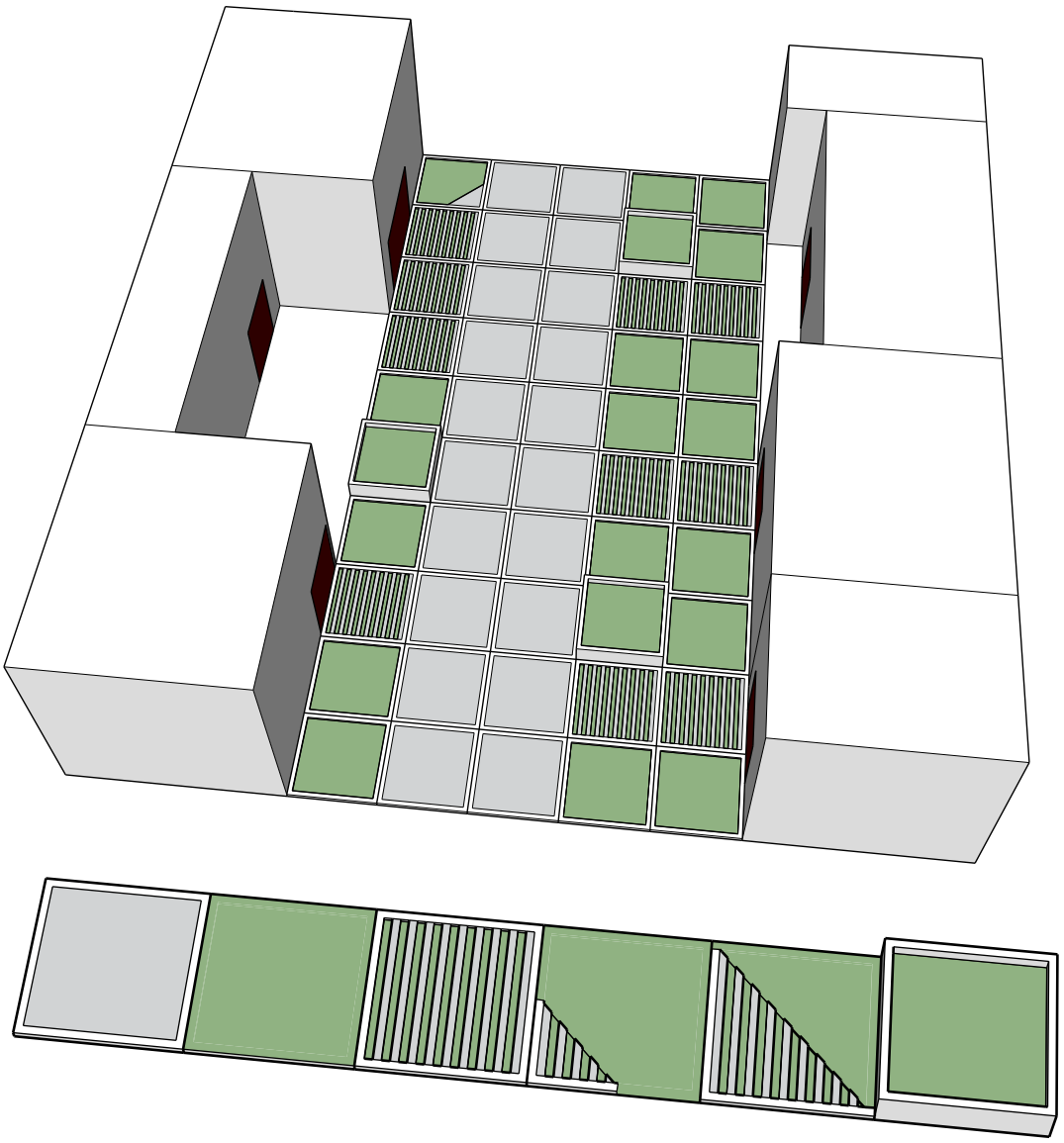
The other elements are as follows: fully green, half paved, half/quarter green and tree element.

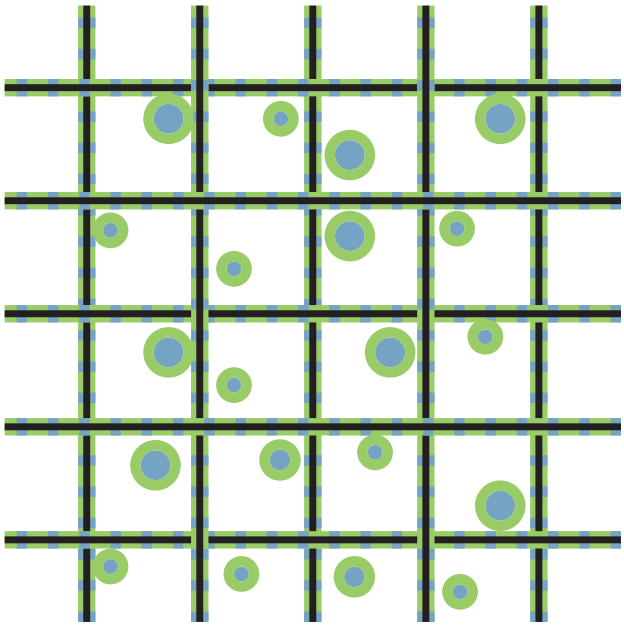
The half paved element is to provide access from the right-of-way to the plots, wherever is necessary. In front of the main entrance of the building on the plot makes sense. It is generally recommended to have only one line of these elements, so that the rest of the space between the plot and right-of-way can be fully green elements. The half paved element purposefully contains openings for water to infiltrate. Drawn as lines, these may also be hexagons or any desired bond pattern. Underneath this element also lie the cables/pipes from the right-of-way to the plot. The element is as flexibly lifted, removed and added as the pavement plates.

The fully green elements are just greenery/soft surface. Multiple together may employ a swale to provide further water retention capability.

The half/quarter green elements are similar to the half paved elements, but exist to provide a better turning circle for bikers and cars on the intersections and in/out of any parking garage along the street.

The tree element is Japan-specific. Whereas the Dutch context may simply plant trees into the street as is common, the Japanese context may prefer trees in flexible elements, to be removed if needed (without the tree needing to be cut down and dug up). This is to remain closer to the flexibility of the current street.

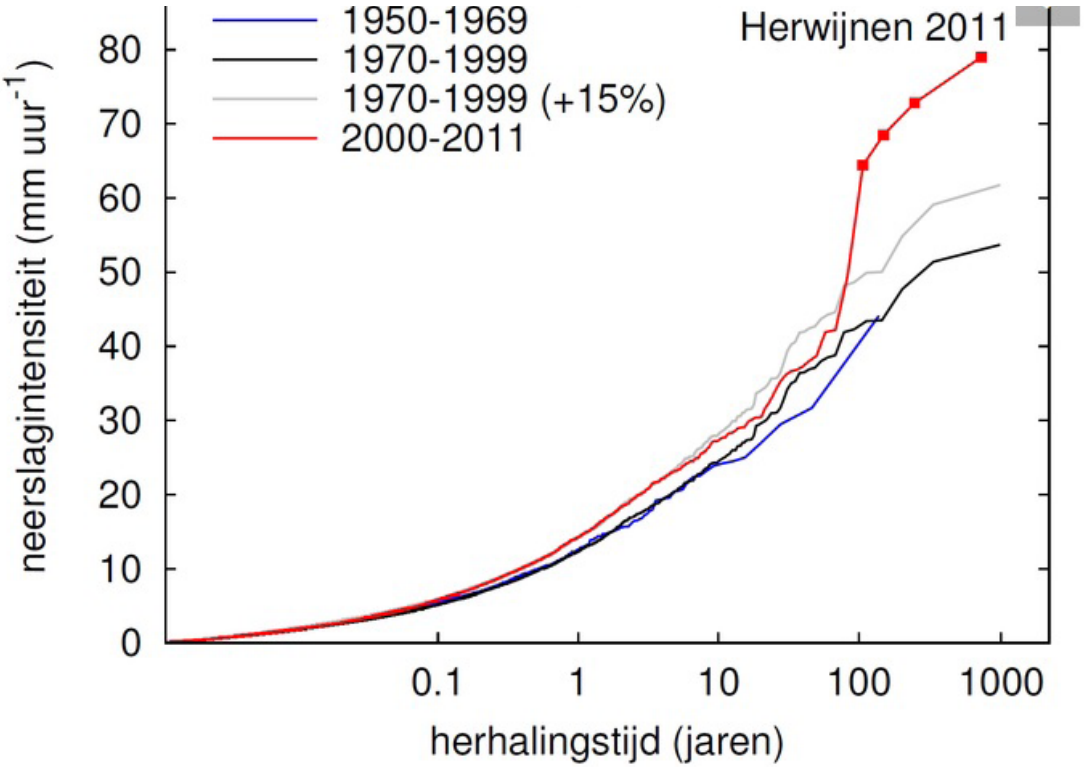




An overview of the street

An overview of the plates which make up the street

An overview of the green lines, small and large points in the green network (own illus.)



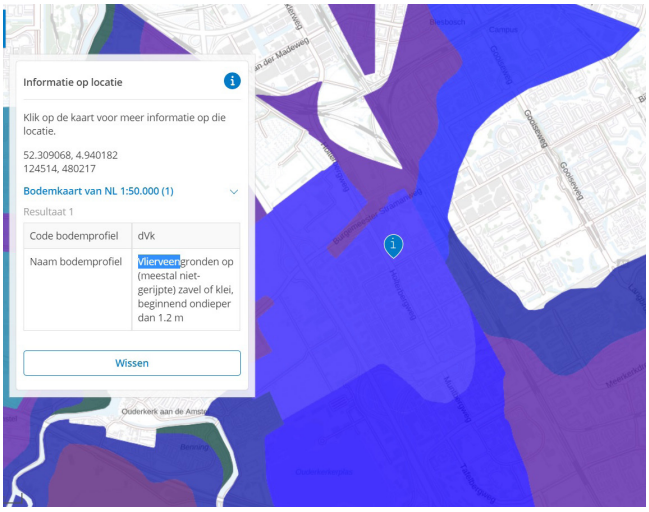
Rain intensity (mm/hr) compared to expectancy (yr)
(KNMI, 2022)

10.2 Precipitation & geography

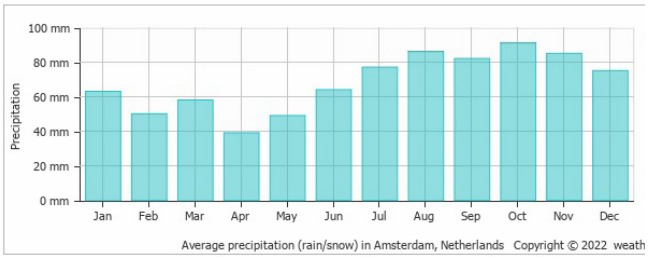
Bullewijk, Amsterdam

A wet day in Amsterdam is considered to be 10mm/day, and it is visible that the 10y max. rain intensity is at about 28mm/hr (KNMI, 2022). There does not appear to be a strict design standard for the city, however it would be good practice to take the 10y rain intensity as the base from which to design with. This would be the value to keep in mind when designing the green roofs, surface and bioswales. The carrying capacity of the green roofs, for example, could be 49 l/m2 (for a green roof with 10cm of soil), while 28mm/h would be 28 l/m2 (per hour). This would indicate that the green roof would spill over just about 2 hours into the rainstorm. By measuring the total size of the plan the total amount of water that would fall on it per hour could be calculated. Offset this amount with the amount of green roofs (and depth), amount of green "points" on the plot and their average size and depth, the bioswales average size and depth, and the carrying capacity can be calculated. The only other factor is the infiltration capacity of the ground. (Calculation made in plan section). Total yearly precipitation is 860mm, with peaks in October (90mm), drier in April (40mm) (KNMI, 2022).

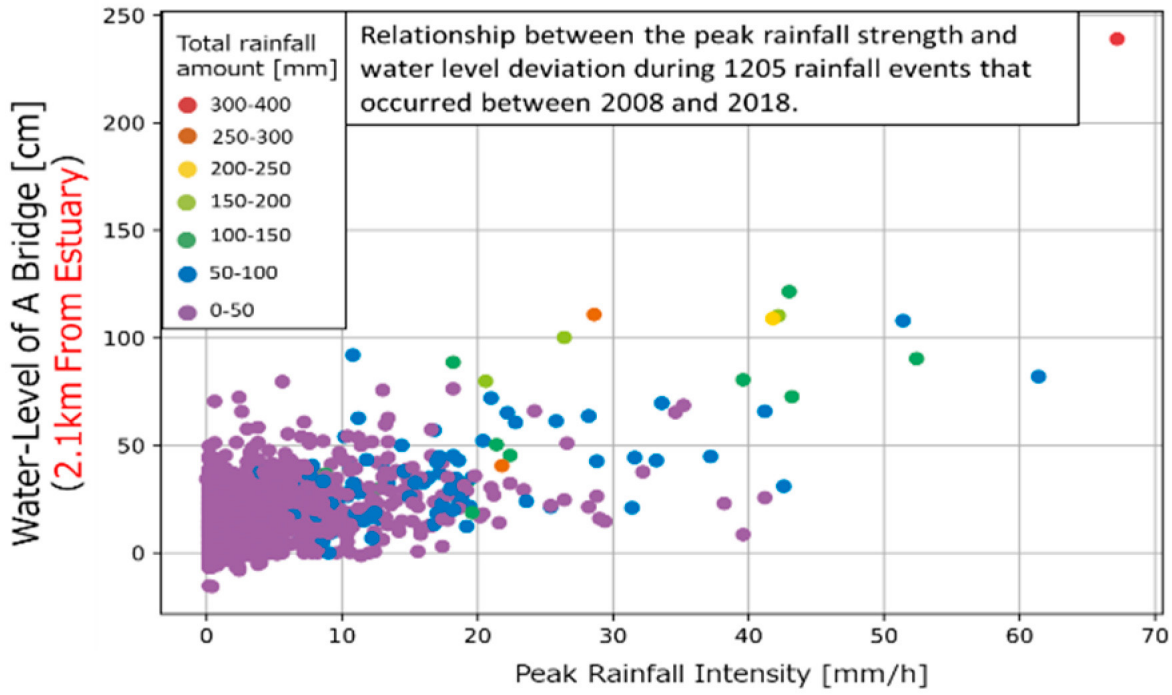
Bullewijk is a peat (vlierveen) on clay landscape which is under sea level, with high groundwater and subsidence, the amount of water that could be retained/infiltrated is essentially up to how much space is available between the surface and ground water level. As well as reliant on how hard the pumping station is pumping water.



Soil composition in Bullewijk
(Alterra, Wageningen UR, 2020)



Average precipitation in Amsterdam
(World Weather & Climate, 2022)

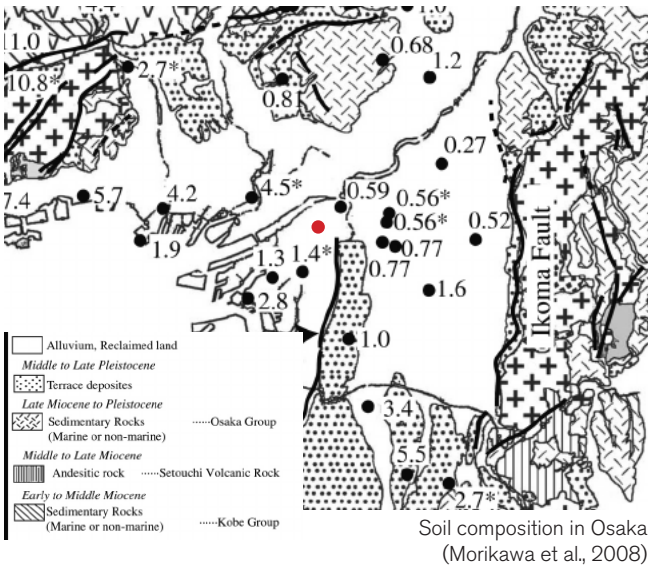


Rain intensity (mm/hr) in Osaka between 2008-2018
(Koyama & Yamada, 2020)

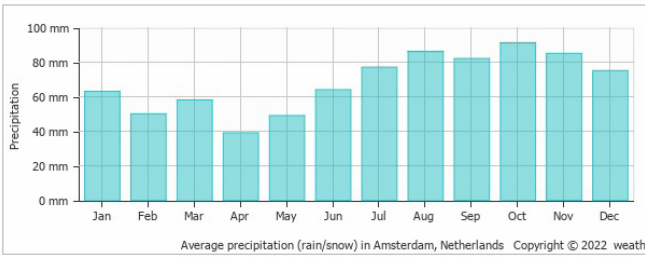
Chuo, Osaka

Osaka is a considerably more humid city than Amsterdam, with heavy urban rainfall at 25mm/h and the design standard for the city at 50mm/h (Nakano, et.al., 2015,pg.140). It is visible that peak rainfall events occur a few times above the design standard, with the 10y peak around 70mm/h (Koyama & Yamada, 2020). The design standard of 50mm/h puts the amount of water that the street would have to retain/infiltrate at over double the amount compared to the Dutch context. This has consequences for the depth of the bioswales as well as the feasibility of being able to retain/infiltrate water without mainly relying on water systems. Total yearly precipitation is 1282mm, with a peak in June (183mm), and drier in the winter (43mm) (World Weather & Climate, 2020).

The geography of Osaka is mainly two-fold, originally founded on a sandbank (terrace deposits) in a marshland. With the centre (where the project site is located) now being based on reclaimed land consisting of alluvium. Being a delta of the river Yodo. Turning a significant amount of surface from hard surface (asphalt) in combination with water system to soft surface (greenery) with infiltration may put a strain on the subsurface. Especially with the large amounts of rainfall. Sinkholes rarely occur in the city, however it is important, when transforming hard surface to soft surface, to take into account what the subsurface can handle in order to avoid sinkholes from appearing. As well as any (positive) effects on subsidence in the city.



Soil composition in Osaka
(Morikawa et al., 2008)



Average precipitation in Osaka
(World Weather & Climate, 2022)

De Gouw, Westfriesland
(Koos Leek, 2020)

10.3 Temperature, flora & fauna

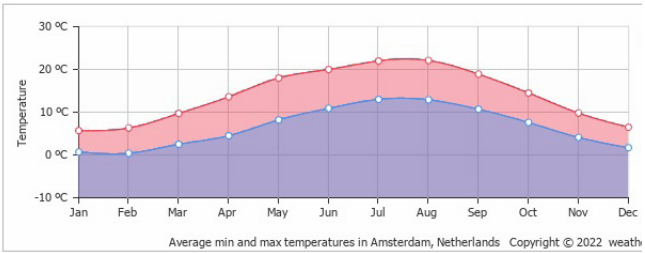
Bullewijk, Amsterdam

The created green areas are to be planted with indigenous species of plants, including grasses, flowers, trees and bushes. There are commercially available seed mixes that contain various indigenous flowers and herbs. Seeding these indigenous species will be beneficial for local insect species and when done right it's only necessary to do once, after which it's only a matter of mowing and letting it grow again (Groen Kapitaal, 2019).

The vegetation types should be adapted to a city environment and soil type, meaning more hardy types of plants that can thrive well in a high nitrogen environment, as well as plants that can deal with water fluctuations. This means a lot of grasses will grow well, *Malva sylvestris,* which is an indicator plant for high nitrogen soil, as well as species like *Chamomille and Papaver.* Indigenous species of trees include *Acer* and *Sorbus aucuparia*, and species of bushes include *Rosa sherardii* and *Viburnum opulus*. Plants bearing fruit may be beneficial as food sources for fauna (Roeleveld, et.al., 2014,pg.213).

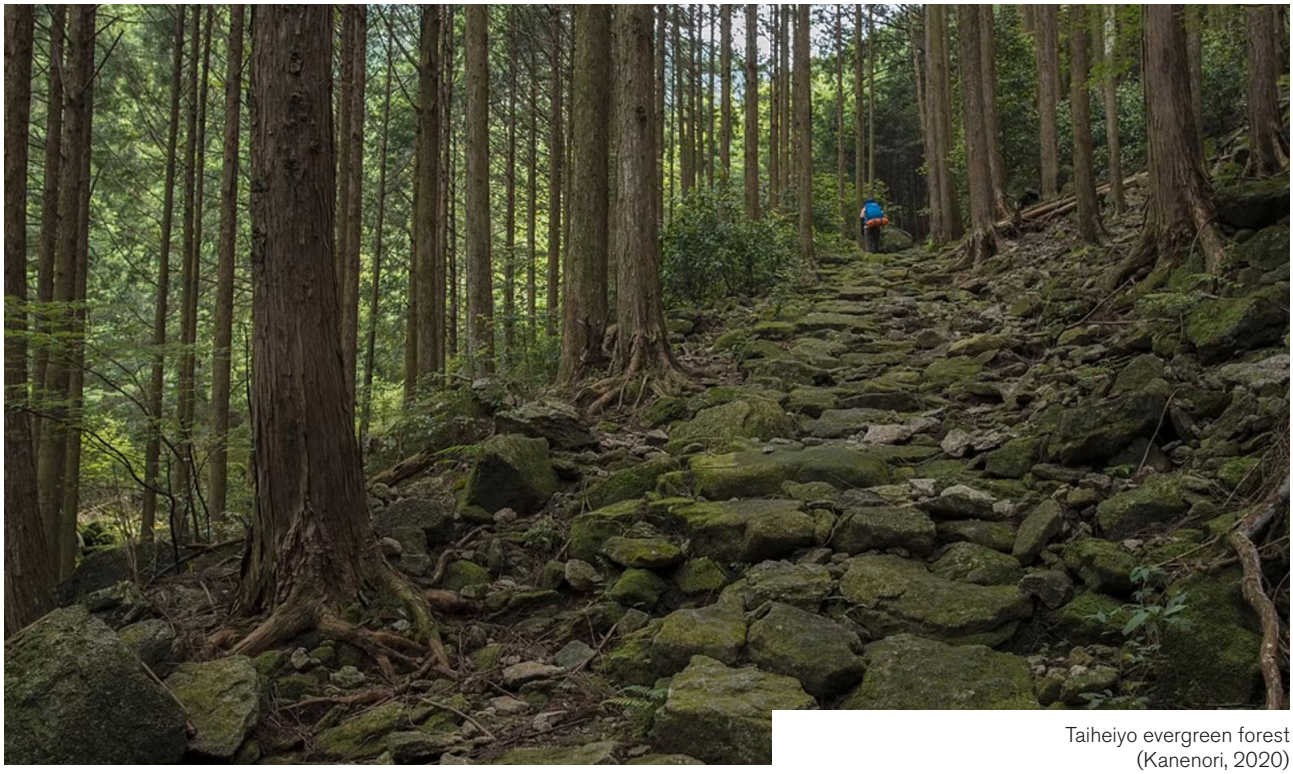
As described in rule 4.4, height differences are to be implemented in the overall green areas. This way, a larger variety of plants can exist in these areas, as the minor height difference will provide some changes in wetness.

There are four distinct seasons in the Netherlands, with winters having temperatures below freezing. This leads to a cycle of growth and decay, which will lead to vastly different looks to the city during each season.



Average temperature in Amsterdam
(World Weather & Climate, 2022)

Malva sylvestris
(Happyseeds, 2018)



Taiheiyo evergreen forest
(Kanenori, 2020)

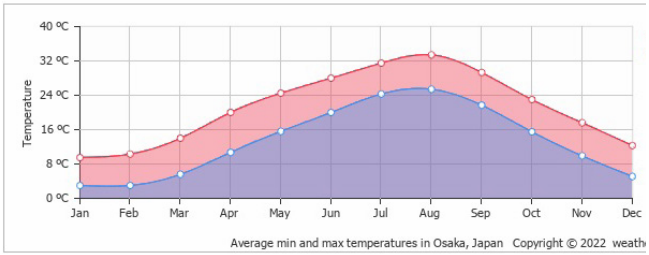
Chuo, Osaka

The same basic principles apply in Osaka as in Amsterdam, using indigenous species in the green areas, as well as the use of rule 4.4.

As Osaka is quite humid and has no frost in winter, the flora can be considered more subtropical and evergreen, although there are plenty of deciduous trees as well. This creates a distinct look and feel, as the cycle of growth and decay is not as evident as in the Dutch context. Due to the large amount of moisture and climate, it may be possible to employ specific “water absorbing” plants. *Iris ensata*, known as the Japanese Iris, also has ornamental properties. Or other plants such as: *Betula platyphylla (Japanese white birch), Lilium auratum, Cyrtomium falcatum.* How much of a difference these plants will make for water retention is questionable, but at least they will survive large downpours and a wet environment.

The area surrounding Osaka is the Taiheiyo evergreen forests, a temperate broadleaf forest region containing most of southern Japan. Native to this ecoregion are various types of laurel trees (*Machilus japonica*) as well as conifers (*Podocarpus macrophyllus*) (Haggett, 2002). While the city is now far-removed from these forests, introducing trees and shrubs from this ecoregion into the city may be fitting. Tropical plants are also possible, such as palms. And not to forget, cherry trees and Japanese red maple.

There are four distinct seasons, so there is variety to be had in plant species and their look during each season.



Average temperature in Osaka
(World Weather & Climate, 2022)

Podocarpus macrophyllus
(katorisi, Wikimedia, 2007)

Urban farming in Delft
(atelier GROENBLAUW, 2010)

10.4 Human use

Bullewijk, Amsterdam

By shedding a very inefficient part of the street (car parking) with rule 2.8, large patches of land become available for (active) use by the inhabitants of the city. Although a significant amount of this will be turned over to greenery, rule 3.5 guarantees a part of this greenery will also be available for appropriation and therefore human use. With the street becoming shared space and reduced in width, the street will be used for whatever is most needed at the time.

Shared space (woonerf) in Rijnsweerd
(Luctor, Wikimedia)

"Front garden" made up of plant pots
(tsuyatsuya, Flickr, 2008)

Chuo, Osaka

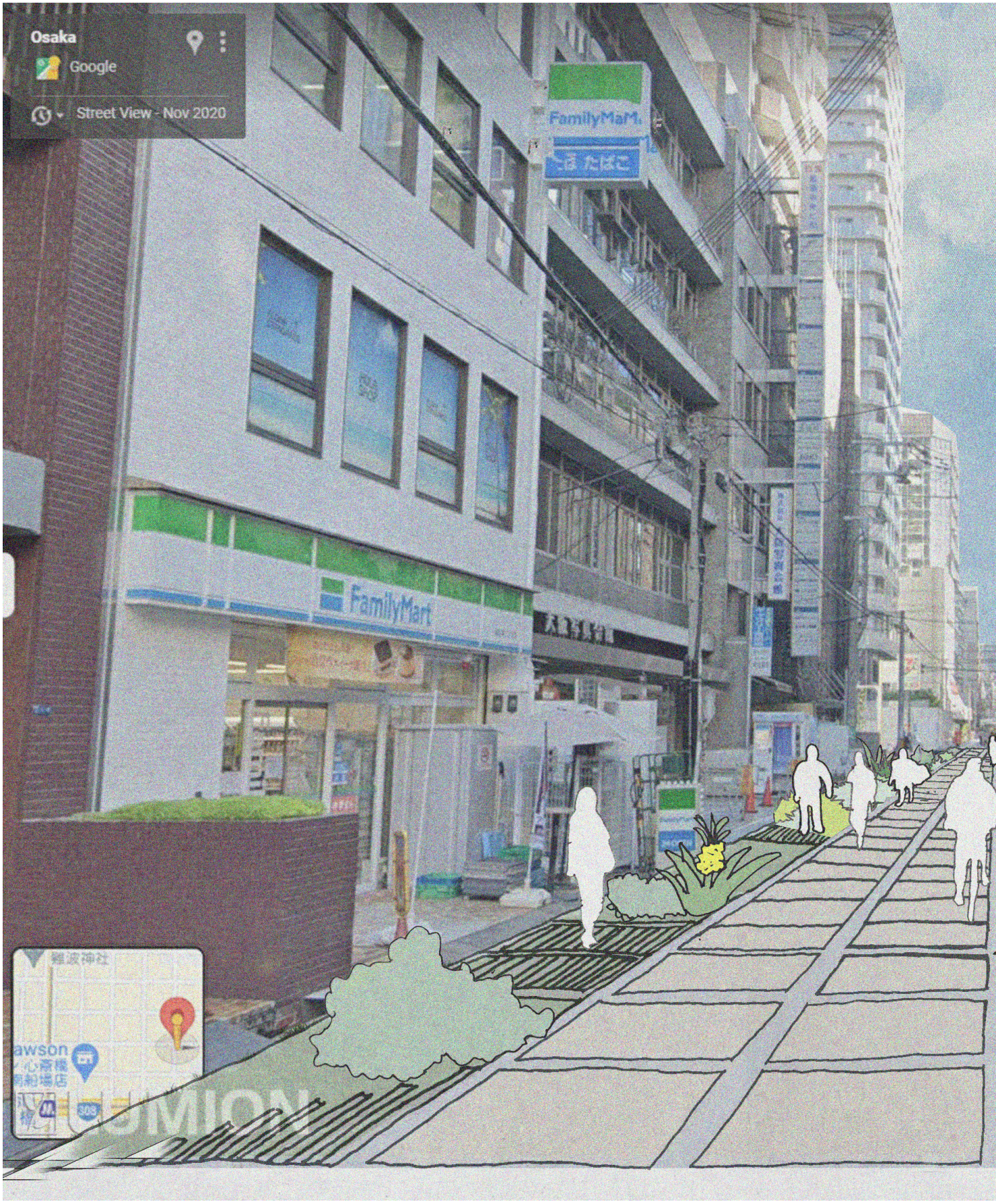
The city of Osaka (and practically every major city in Japan) is laden with (technically illegal) small urban gardens. These manifest as tens of potted plants that hug the street on the side on which a residential unit meets the street. This spatial appropriation has been seen as a cry for more green space and rule 3.5 guarantees that green space alongside ground functions can be appropriated and used for this exact purpose, with only limiting factor that it can't be used to block off vision in the street - that is, to create barriers higher than a metre.

In the city most of the electricity is provided through overhead wires that connect to each building. These wires create dense bundles of electric vines that hop through the city. However, they block the possibility of trees being in the street (as well as a tree's permanence clashing with Japanese flexibility). By bundling these wires to one side and using plates as mentioned in the generic design, trees can be added to the street.

It is noteworthy that adding a lot of green area that is meant for retention/infiltration to a humid environment with a lot of rainfall (in certain moments of the year) may lead to stagnant water in certain areas, which could bear negative effects in terms of insects, such as mosquitos. How to include the positive effects of greenery while minimising the negative effects of stagnant water/insects is beyond the scope of the project.

Electrical wires in Osaka
(own illus.)

10.5 Localised design



New street design in the Japanese context
(own illus., Google Streetview base)

10.5 Localised design

Bullewijk

New street design in the Dutch context
(own illus.)

De Gouw, Westfriesland
(Koos Leek, 2020)

10.6 Sustainable maintenance

Bullewijk, Amsterdam

There is a generic form of maintenance which will be applicable in both locations. This is mainly focused around when and how the newly added areas are to be cleared for new growth. The greenery in the street is of an entirely too large scale to be considered intensive, it is therefore expected that maintenance would happen twice/thrice a year. This would include clearing patches at the end of summer and perhaps exchanging or reseeding plants at the end of winter.

It is important when clearing that areas are not cleared en-masse. Doing so and clearing all debris means suddenly all nutrients (still flowering plants) are lost and (space for) insect eggs is demolished. As well as any microfauna residing in the plants. By utilising a timeline these things can remain, as in, there will always be a patch somewhere for insects to find sustenance or for insect eggs to hatch in the street. This is of a big benefit for the microfauna of the street (Vink, et.al., 2017, pg.270).

Perhaps more straightforward in the Dutch context, since the cycle of new growth, flowering and decay is more apparent. Maintenance can happen during these phases and there doesn't need to be differentiation in maintenance (seed and mow). Hence, the addition of phased progression in maintenance is a small change.

Well maintained water retention garden in Osaka
(own illus., 2020)

Chuo, Osaka

Osaka may distinguish itself in the fact there may be evergreen types of greenery, which will have different needs for maintenance. Some patches will naturally exist that won't need to be cleared and provide these benefits of nutrients and space for insect eggs. Not to mention the explicit space made for appropriation, which may mean people create their own garden space by appropriating the street. It would be expected that these spaces are also maintained by the residents, if not, it may simply be maintained as the rest of the greenery instead.

There are already forms of maintenance of public infrastructure done by residents in Japan, *chonaikai* (Graaf & Hooimeijer, 2008). It may make sense for all the new greenery to be maintained by the immediate residents as well, regardless whether they will start gardens or not. It is too callous to simply expect the residents to do everything - especially since the new greenery would be on public land. However, it may be possible in various places. Perhaps hybrid forms may appear, where residents who appropriate maintain their own "garden", the blocks who would want to maintain the rest of the greenery do so, and the municipality does so for any places where neither apply.

As well as Osaka being more wet, one part of the maintenance in Osaka is cleanliness, with the increased amount of greenery, there will also be more dirt. It is expected that some washing is part of the maintenance cycle.

10.7 Conclusion

Using the way of constructing neighbourhoods put forth by the guidelines and wishlist ensures a neighbourhood of high density, that still feels human scale. It provides a green environment that is so sought after, without injecting humans into the open spaces around the cities, and utilising the greenery that is created as more than just scenery. It provides a development strategy that employs flexibility to be able to respond to changing market conditions, desires of people, and new technologies. It both provides a city without enforcing function, allowing all of its inhabitants to reuse, reduce, recycle and respect the city they live in. It provides chaos within order.

And most of all, it facilitates the conditions wherein Gerrie the Grutto can enjoy his fields in peace.

Grutto in field
(It Fryske Gea, 2016)

11.

Reflection

Reflection

The reflection has been set up in three sections; the project reflection, personal reflection and theoretical reflection. The project reflection is focused on the project, and contains topics such as the progress, changes to the structure and topics that happened over time, deficiencies in the project - it's the "meta" project.

The personal reflection contains my personal thoughts on the project, how it went, what I think went well and poorly.

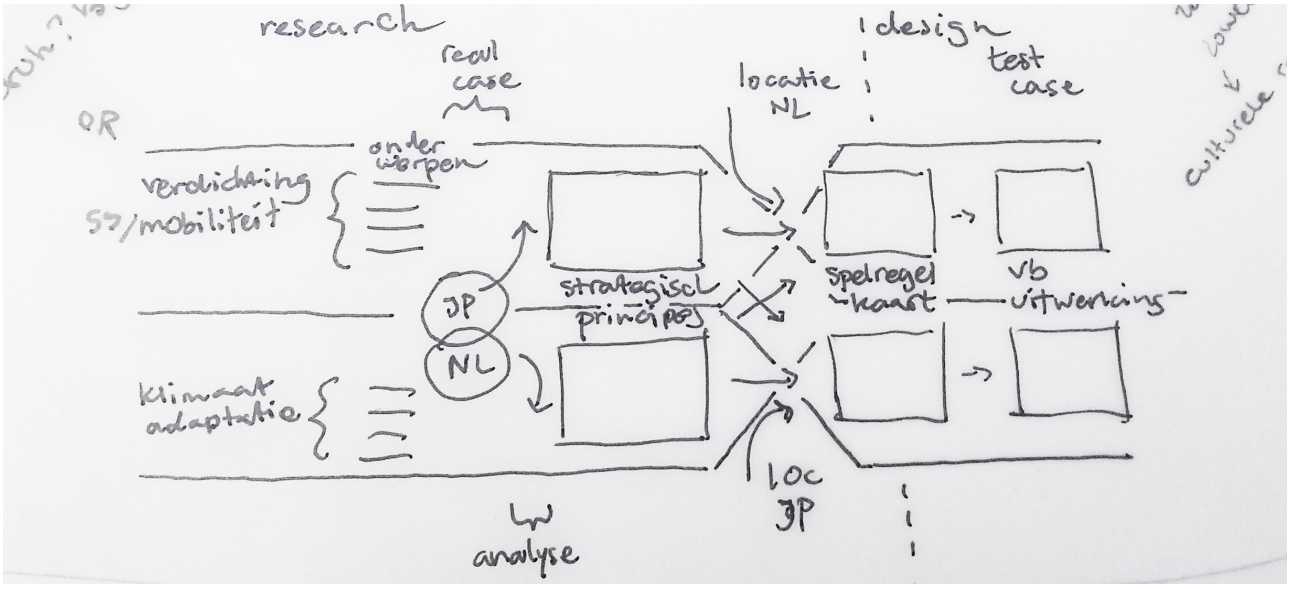
The theoretical reflection is meant to gather thoughts about the project when reflected with reality and things I've read about. Reality in this context means how realistic the plan is when compared to something that would actually be built. This partly contains many remarks already made in the project's sections, but bundles these topics.

(Parts of) this reflection can be seen as a "discussion" section of a paper. Many sections contain topics that could be delved into deeper to make the project more complete, or new questions arose during the course of the project which could be answered with further research.

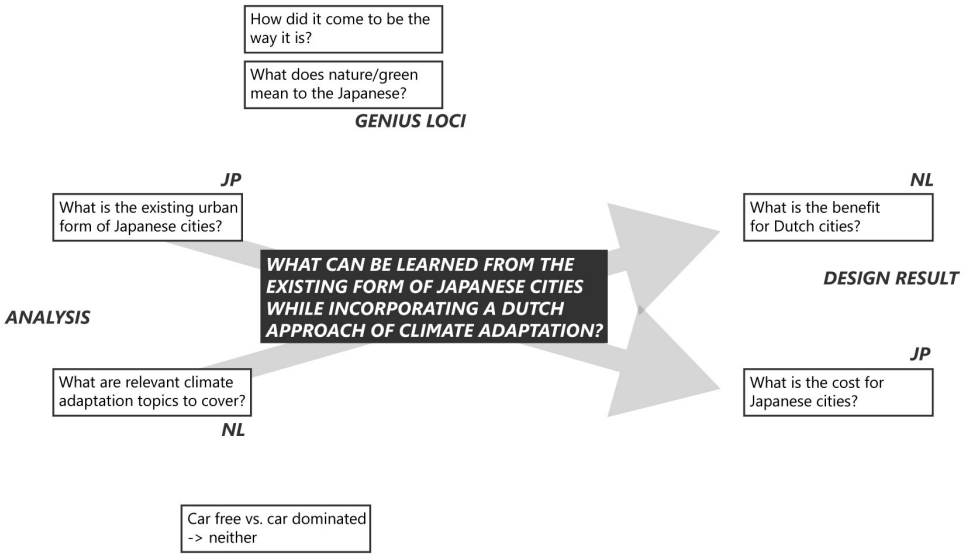
11.1 Project reflection

Over the course of the project there have been several changes when compared to the start (naturally). Going through the different versions of the project structure gives a good overview of the progression of thought which happened over the course of the project. The first version was a hand sketch; generally, the decision for doing a "knowledge exchange" was quickly made. It seemed obvious to me at the time that both countries' context had something to offer one another. The vague idea of "verdichting" (densification) and "klimaatadaptatie" (climate adaptation) existed, but specifics weren't made yet.

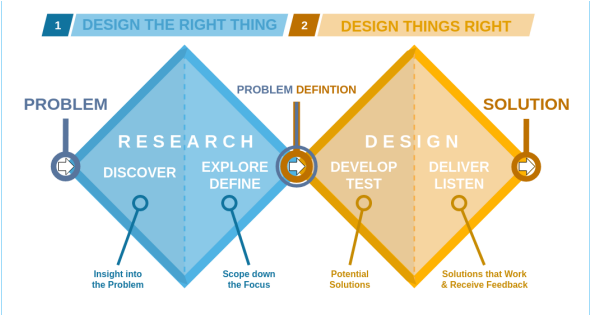
Towards the first presentation moment, a quick graphic was made to depict the general idea of the project. The knowledge exchange with a preliminary main question. The thought was to simply implement Japanese form here and Dutch climate adaptation there and see what happens, with the assumption that Dutch cities would "benefit" and Japanese cities would pay a "cost". These were not further explored. This is also the first graph where the "location-based" knowledge came up, defined as the "genius loci" in the graphic. At the time, the topic of cars was important. This is also described in the motivation. The whole ordeal of making an area car-free during a work project was still fresh in my mind. In the end this translated as an addition to the "location



First attempt at project structure (Own illus.).



Project structure pitch for P1 (Own illus.).



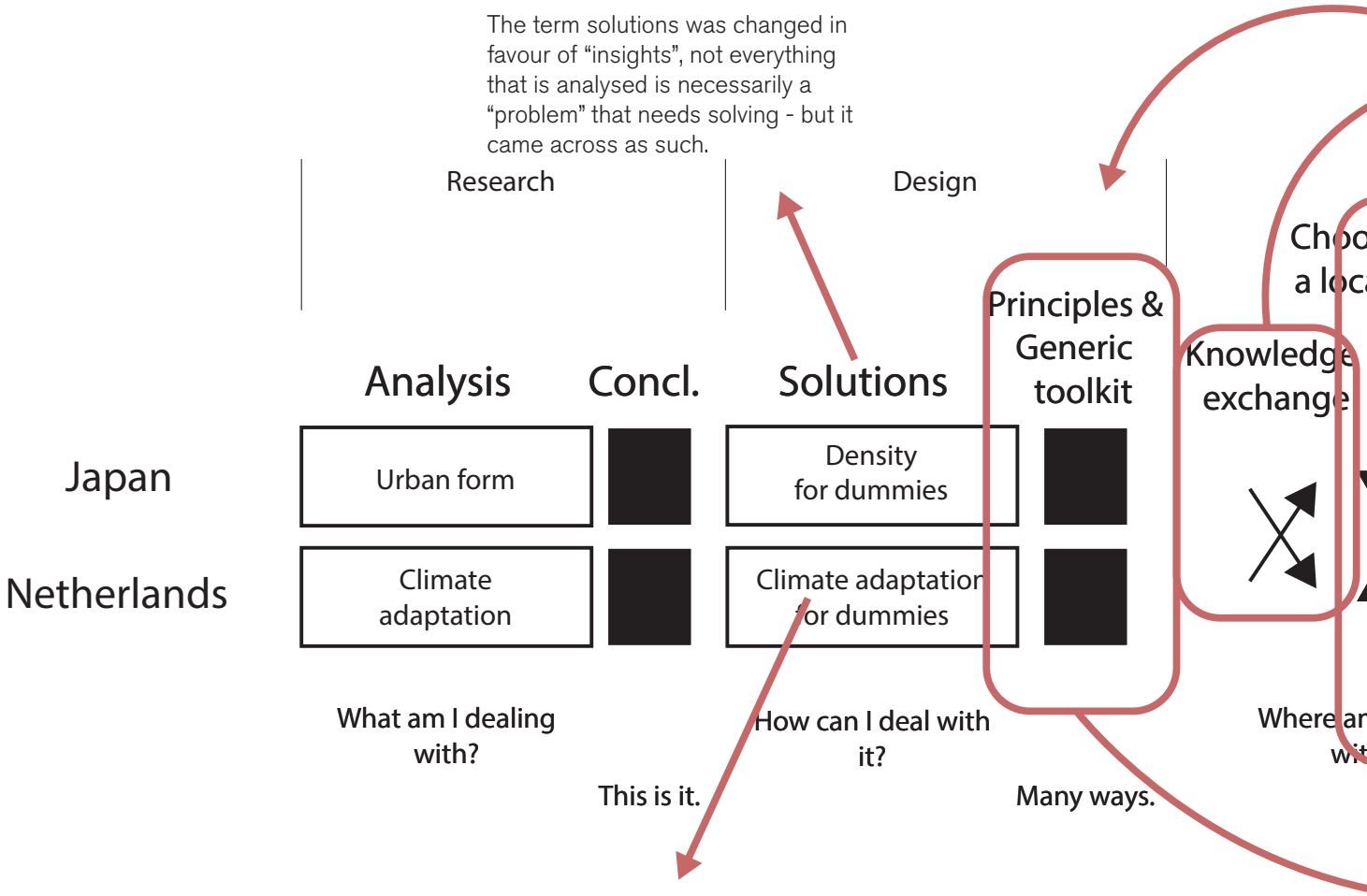
Double diamond design structure (Design Council, 2005).

specific knowledge" visible in the latest structure drawing. "Shared space in the Netherlands" would be the theory to dive into as opposed to the meaning of nature in Japan. The P2 structure graphic has been used to visualise what and how things changed progressing towards P4, while still keeping the original text legible (next page).

The project was initially put together as a double "double diamond", which is basically a research & design cycle, with diverging and converging cycles. The diverging cycle depicts ideation/creation and the converging cycle depicts conclusions. The thought was that both parts of the project (before and after the knowledge exchange) would be a double diamond that could also be its own product. Analysis of Japanese urban form and Dutch climate adaptation and its findings/solutions being some kind of abstracted knowledge. Followed by the research of the localised topics, providing specific knowledge. Using the abstract and specific knowledge together to create a plan. However, much earlier in the project I had implicitly chosen locations as they would help a lot of the abstracted knowledge "land" - so I could see what is actually necessary in a project. Essentially this led to the creation of a testmodel, based only on picking a location and "just trying things out". This was immensely helpful in breaking up my approach to see what issues would arise in a more real setting without breaking my head over the "guidelines" as they would become.

A major change: choosing a location and the location specific knowledge moved forward in the process. During the project I found out that it didn't make sense for me to exchange the abstract knowledge only, to then tack on location specific knowledge. Instead, it was much more helpful to also know about the location specific knowledge and how that influenced the supposedly abstract knowledge. Many of the loc.spec. knowledge was also interesting for the other location - seeing them in a new context, they may still be useful when tweaked rather than considering them for one location only.

The term solutions was changed in favour of "insights", not everything that is analysed is necessarily a "problem" that needs solving - but it came across as such.



At the start the idea was to make booklet-sized generic "solutions" which could be applied as guidelines anywhere. This was overall not taken so far, and the "for dummies" is now mostly just some conclusions and insights from the analysis.

It didn't make s
toolkit after the
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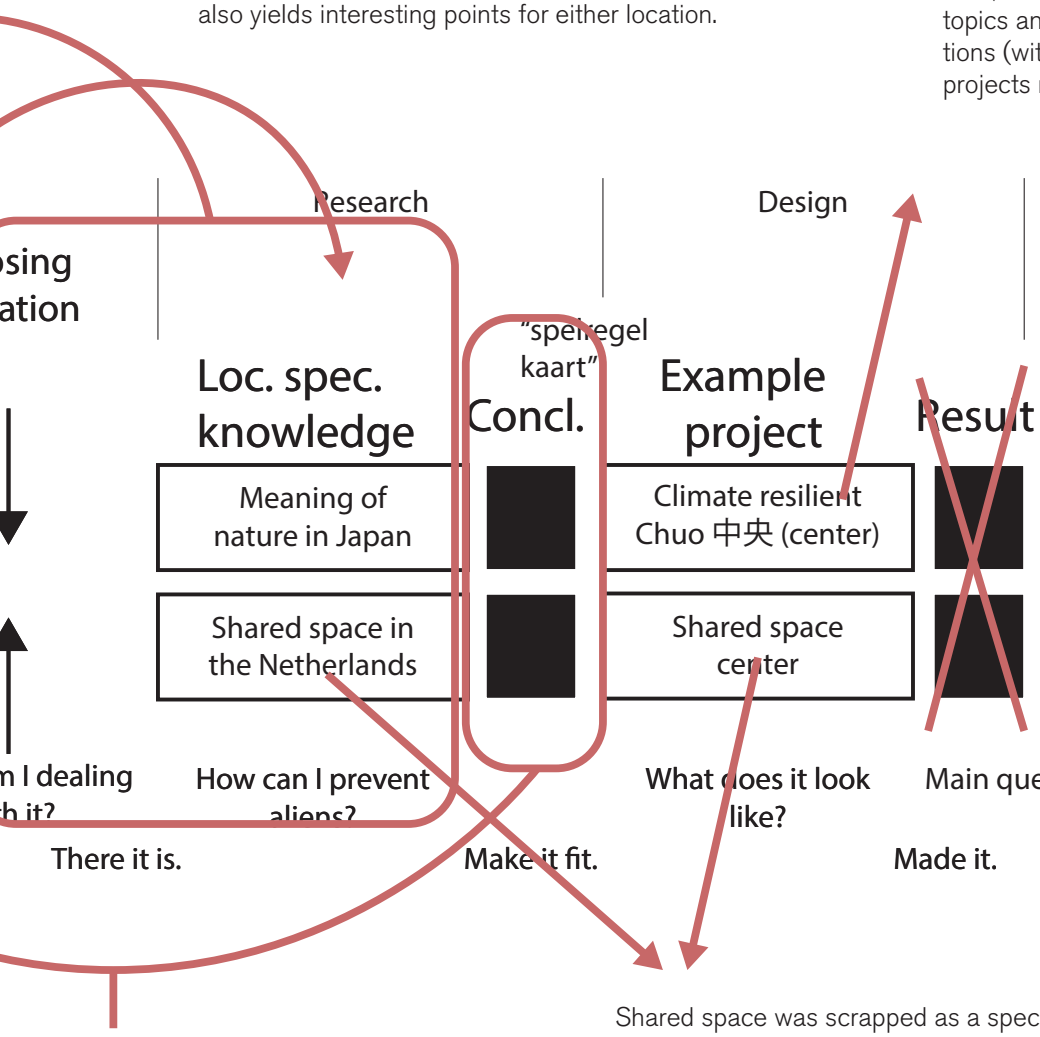
As mentioned prior, the knowledge exchange proceeded after ALL the knowledge, rather than just the abstract knowledge. At the onset it made more sense to only exchange abstract knowledge so that it's "always" applicable, but the loc.spec. knowledge also yields interesting points for either location.

The example projects aren't one-dimensional anymore (Japan+climate adaptation and Netherlands+urban form) rather they are both, both. The wish list encompasses all topics and everything is applied to both locations (with some limitations), making both projects more whole.



There isn't really a "result". The two example projects are the result of the project on their own.

two examples of high dense climate resilient urban environments in NL and JP

sense in the end to make a generic
e abstracted knowledge from solu-
also some sort of conclusion of spe-
e as well. In the end, the knowledge
moved after the loc.spec. knowledge
ines/wishlist came from there. Em-
bstracted and specific knowledge.

Shared space was scrapped as a specific research question, it's still important in the project but the favour was given towards the impervious surface and the ISR - they are more important to me and the overall project.

Project structure pitch for P2 with comments (Own illus.).

11.2 Personal reflection

This personal reflection may be too personal for a "professional reflection", but I've chosen to write as I see fit. Circumstances beyond just the final project are described as they are relevant, to me this is also partly an overall reflection on my entire Masters' (although the focus definitely still is this project).

First of all, I can not stress enough how difficult this project was to do without my parents. For the last (at least) six years, my goal was to reach and complete the MSc Urbanism at the TU Delft to make my parents proud (not the only reason, but a major one). This had been my drive with which I could withstand anything, knowing that I had a clear goal to work towards. I managed to keep everything moving forward through it, even though it was very difficult at times. The run-up to the MSc, working full-time while doing an intensive Mathematics course, doing the exam in Mathematics and then the pre-master, not to mention the profound effects of covid isolation. There were many difficult moments before even starting the MSc, and then the worst happened.

With my dad's passing right before the start of the MSc, this drive got quite a hit which I only partly recovered sometime by Y1 Q3-Q4. For me, I had put the stakes very high for the MSc degree as I knew I could do well, and it was finally time for me to show off how well I can do. My motivation was, despite or perhaps due to the previously mentioned things before the MSc, through the roof. It all came falling apart throughout the summer of 2020.

The feelings of intense anxiety started creeping in slowly, not only because of my dad's passing, they had been there prior. The thought of now working on/ finishing the goal I had set up to keep me going in life is surreal and I'm low-key freaking out. I think this played a large part in my decision of delaying the graduation to after the summer, so the thing I had been striving for would not end (although in hindsight I definitely would not have finished all of this booklet in June). These feelings put me on blast in the beginning of the graduation project, with the intensives. I was not able to manage my own time and stress during this period coming out of the calm summer period. It was too sudden, zero to one hundred, and made the start unenjoyable as I went back to coping strategies. This improved over the course of the project but it had made a large impact. Throughout the project, especially the presentation moments, these feelings of anxiety are exacerbated and make the moments more stressful than they need to be. It can best be described as an ebb and flood with the final presentation being a full moon.

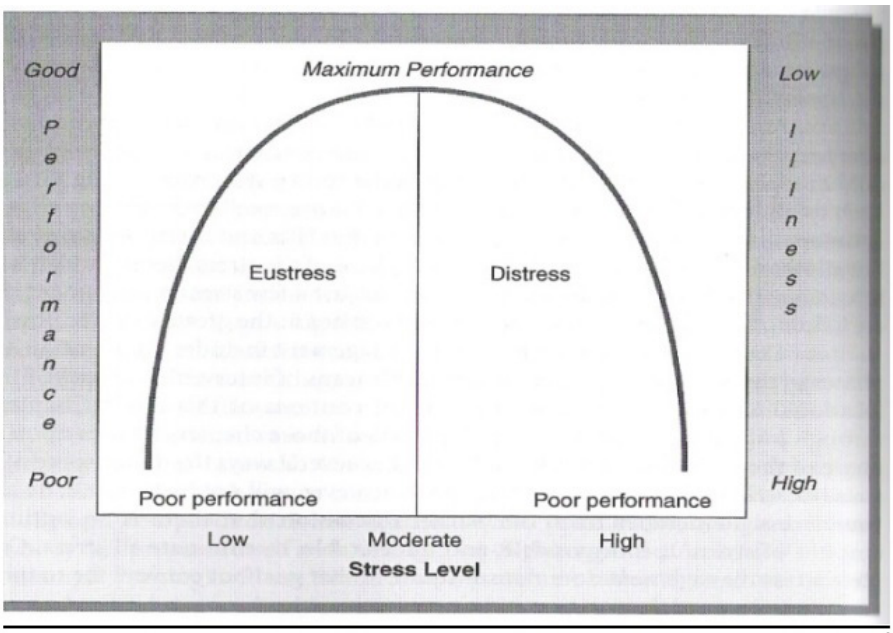
This bring me to my next point:

One of the things I had written down back in AC3 regarding my work style had been that I generally thrive under (time-induced) stress, as I tend to overthink and spend too much energy and effort thinking about every single option/possibility/outcome without coming to a conclusion with the thought that "everything is interesting/necessary". Sometimes in Urbanism that's the case, there's just so many different aspects that are important to make an area "good", and it's easy to get swamped. The stress would help in reducing this down to the immediately necessary. This would cut the superfluous but often also interfere with the detailed work-out (especially in the graphics department) as I would make the decisions at the last moment, making it difficult to work out in renderings for example.

At the time I had called this "incubationstress". Essentially, having incubation time after gathering information is important (to me) to process everything correctly. However, there is a tipping point where more time isn't useful and rather causes overthinking as mentioned prior. Once such a point is reached, "positive stress" can be employed. Not all stress is negative, and having stress induced by time when you are working may enhance your performance (Quick et al.,1997) . Essentially using time to find that optimum. Through testing, it was shown when a person is given two different kinds of tasks (a "spatial" task and a "verbal" task), after doing the second task during the incubation time of the first, the results of the first task were enhanced (Gilhooly, K. J., et al., 2013).

One way since AC3 I've gotten around this is by simply setting many things up (e.g. having my Sketchup model, Illustrator files, Photoshop resources ready) so that the decisions that are made in the last moment require some small additions and a re-export of the files, rather than having to spend time on base files.

In this project too, I've employed this way of working. But what's hampering my normal functioning is the sometimes sudden (extra) stress caused by various feelings. Whether these are the feelings of anxiety mentioned before, or just feelings of sadness. They naturally influence the general stress level, but I'm often unable to see these moments coming, hence I'm reactionary to these elements. Prior I simply knew what kind of task would cost what kind of time, so I could plan accordingly. In my attempt to find the perfect balance in stress levels for optimum performance, which I often steer to using time stress, this extra stress is hard to react to when a time crunch is already started. I've managed to lower my basic stress level through therapy, and the peaks from anxiety and sadness are lower, but

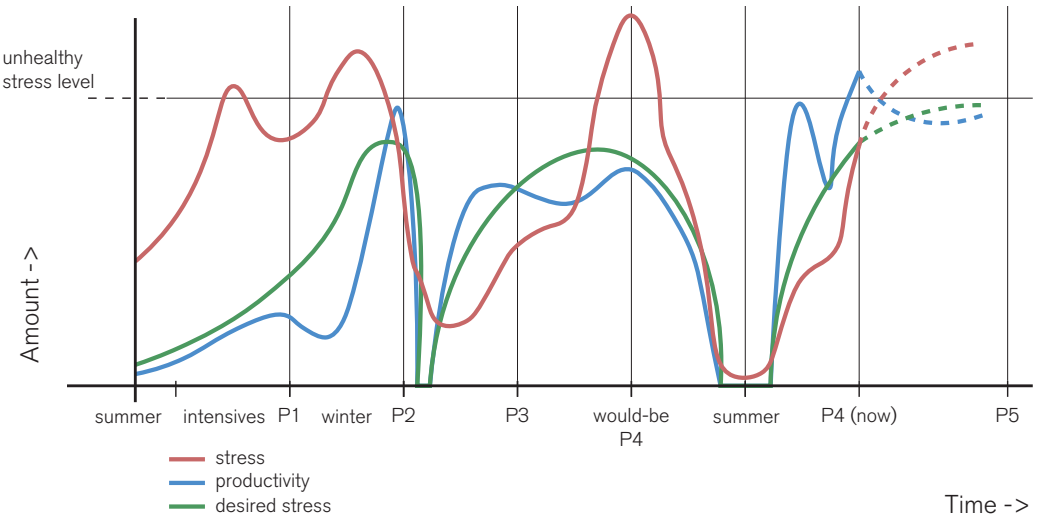


Balance between performance and stress (Quick, et al., 1997).

it still leaves an imprint on me. Especially in such a large project.

This does lead me to some major regrets. I feel that I, and therefore the project, am not reaching the potential I could have. In general, I think I have not gotten the most out of my graduation project or my Master's for that matter. I think it would have been crucial to find some Japan-based consult, but I found it difficult to reach out. This will return in the theoretical reflection, as there are many things I'm just trusting my gut feeling on.

I had the fortune of being able to visit Japan pre-pandemic and the city of Osaka simply felt so at ease to me as a pedestrian which I had never felt anywhere else. It's incomparable to anything European even with our ancient walkable old cities, and it's fascinating. I'm very glad I have had the opportunity to come up with my own project and to delve deeper into this.



Balance between performance and stress during project (own illus.).

11.3 Theoretical reflection

There are many different topics that come up when creating a design for a neighbourhood, some are addressed in detail in this project, some briefly and some not at all. A little bit of depth is given to some of these topics through the reflection.

Neo-colonialism

It had been my intention from the onset, and I quote: “Avoid neo-colonialism by incorporating location specific knowledge”. While I have tried to incorporate location specific knowledge, especially toward the Japanese side of the design result, I cannot in full confidence say that the wishlist items would be acceptable in Japan.

While there are some inroads (such as the changed perspective to bottom-up developments) to implement the plan as I have put forth in the Japanese context, in the end most of the wishlist points are heavily skewed by my Dutch view and I have not come much further than stating certain possible problems and/or stating that “this may not apply to the Japanese context”. This comes from a lack of gained knowledge from the Japanese perspective. I’m assuming, especially in the “comfort” section, certain things that I would expect in a Dutch context but which may simply not be an issue to a Japanese person. These are based on my thoughts of “but everyone would want that right?”.

To step into specifics:

Especially the implications of a wet climate on my proposed green measures (based on European climates) may fall flat. This is something heavily criticised in the “Japan: Nation Building Nature” book. The monsoon climate is given explicitly as a potential reason why there are few green spaces in the city. This is next to Hidetoshi Ohno’s quote saying that “Japanese people don’t like nature all that much”, but are partly supported by the change of perspective (pro bottom-up)suggested after the 2011 earthquake to not have everything as a constructed solution and as a starting point for more nature-based solutions in the city. Overall these are just two sources and they can’t really give a good reflection to my proposed measures.

Perhaps, simply, the cost of systems maintenance/ failure and the chance of flooding once a year are things that are accepted by Japanese people (in Osaka) in order to have a “clean and dry” environment as opposed to water retention in the street which inadvertently comes with more grime.

Land ownership implications

In general I am proposing a lot of measures which come with additional costs for developers without (most) of those measures coming with benefits for those same developers - most are societal benefits. Some of these may translate to higher value creation, as the teeb. stad tool suggests but I simply have not done enough research in the costs department to know just how much of an extra strain it puts on the feasibility of the plan for a developer.

The question that is put forth is therefore worthy of further exploration, perhaps the current wishlist would still be fine for developers to go forward with the development as envisioned. Perhaps a public-private partnership can be made to facilitate the development. Or perhaps it would only be possible as a wholly public endeavour but that may not be feasible.

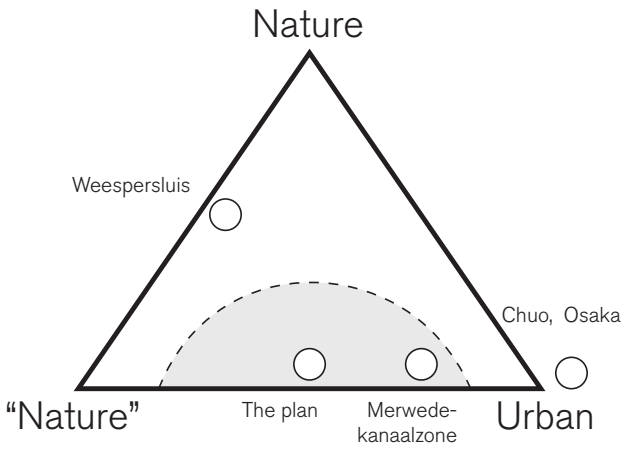
Parking

Parking is always a hot topic that people get upset about. And my plan has no parking at all (visually). While the tool of the Gemeente Rotterdam would indicate I have more parking than necessary, this is assuming a high-density neighbourhood - which still has to be realised. The nearby public transport does, however, make a big difference.

Something completely omitted, however, is bike parking. Apart from mentioning it “happens behind the first line”, no solution is shown (except very small on the Dutch context cross section of the street). The Gemeente Rotterdam tool suggests over 1130 bike parking places are needed in the plan, but whether they would all fit “behind the first line” is something I have not explored.

The trilemma

I included the nature, “nature”, urban trilemma diagram, but I didn’t do much with it. It does not merely exist to create a triangle-shaped diagram. It is meant to show, assuming two-dimensional land use, whether land is really nature (in the Gerrie sense), “nature” in the sense we would like to live in “nature” and see water and grass - it’s not really nature. To me, this includes the climate adaptation aspects as well, such as increasing the pervious surfaces. This may be contentious, as there most certainly is nature in these places (lots of flora, insects, birds, small mammals). However, for the clarity of the project I went with this distinction. Then the urban speaks for itself - anything that is paved, essentially. This would include the current Bullewijk, even though there are some canals and greenery, most of it is just parking lots. This comes with the following aspect: the optimum place to be on the diagram is not in the middle, as being closer to nature indicates encroaching its space. The optimum place would be in between “nature” and urban - providing a city with a lot of greenery. Essentially what I have aimed to do. I have included the trilemma diagram with some locations to give an indication where they are on the diagram.



Nature, "nature", urban trilemma
(own illus.)

Creation of space

The project attempts to create space in a city. However, I am not claiming to know everything. It's impossible to make a "perfect" plan. Therefore, and in the same vein as Metabolism, I'm trying to build flexibility into something rather rigid (a city). In my opinion, this has succeeded so far in that the plan is theoretical. In the process of this, I was reminded of Henri Lefebvre's conceived, perceived and lived spaces. I can not foresee how people might live in the spaces I've conceived, so apart from these spaces meeting the ISR, I don't impose much (well apart from the rule in comfort regarding smaller enclosed spaces).

My thoughts regarding this are essentially:

Let people figure out for themselves what they want, and if nobody wants it, it's flexible enough to be something else.

Japanese nature

Some interesting points are made throughout the research regarding nature. Specifically, the western view of nature versus a Japanese view. These are also what add to the "Neo-colonialism" aspect of the project, as the quotes make a lot of sense. These are three texts from the book Japan: Nation Building Nature.

"In a place such as Japan, this kind of 'paper house' uses methods of directly heating the body, such as with a *kotatsu* (brazier in a floor well) or an *irori* (sunken hearth). People can get through winter without using modern energy sources. And in the summer, when it's hot and humid, a 'paper house' is delightfully comfortable. *Can't we have a varied sustainability for varied locales?*" - Kengo Kuma.

This continues into a part about how architecture trains your behaviour. A distinction is made in these examples given, where your house is adapted to the climate and you have to perform certain actions (light the brazier, sit in a certain place that's warm) as opposed to adapting the (local) climate by looking for technical solutions (solar panel, insulation) and air conditioning so as to not have to change their own behaviour but still be "green".

A building's performance results from the user's performance of the building. Leading to customs and traditions. Can people nowadays be expected to change their way of life because the building won't perform? We tend to think of technology (incl. architecture) as objects for us, subjects, to use. Believing these tools give us freedom, but they also condition our behaviour. The Japanese house is not a person's device used in free will, but an ecosystem that demands adjustment from architecture, family and the natural environment. Subject-object dualism didn't exist in the Japanese language before the Meiji restoration (Western influence) to begin with.

Science and culture are not separate according to Kinji Imanashi. The booklet spells out a "Japanese view of nature" emphasising a holistic experience at odds with the modern reductionist conceptions of the natural environment. Deploring the cultural fragmentation flowing from the ever more specialised, censorial and constrictive nature of contemporary art, morality, religion and science. Imanashi's ultimate concern was to raise awareness for the wholeness of our cultural experience. Western science gave us a flawed view of nature in which humans are at the centre, competing with themselves and other species. Imanishi brings all living creatures on the same level with their own productive niches. Fundamentally different from Darwinism's scene of the struggle for survival.
Europe's natural science was clearly the product of the EU's meadow climate. As a lenient nature gives way to find order in nature (and meadow climate is lenient vs harsh monsoon climate) and the formulation of laws governing it. And the tech for humans to govern over it. EU's nature is docile, but the monsoon or desert area could not produce such theoria (Nijs, 2021, pg. 123).

Especially this last part puts my hamfisting of Dutch/ Western climate adaptation into a Japanese context into a different spotlight. Yet, I can not be certain of whether it would be well received or not, as this is also merely one source.

Limitations of ISR

The ISR as I have proposed and applied it in my project has several limitations which could be addressed. The ISR as I have used it is a black-grey-white ratio, to keep it workable for the project. With paved being 1, unpaved being 0 and having one in-between option. In reality, there is a whole range of factors that could go into the ISR. This includes taking into account pervious paved surfaces, by how much they should be taken into account (infiltration rate?), the soil of the subsurface, whether a green roof should count as a full 1 and if not by how much, how much the total water that can be infiltrated (there is a limit somewhere) should be taken into account, precise measurement (BIM), and likely other questions. All of these were outside of the scope of the project, while I did want to propose and apply this ratio already.

Summary of flexibility

Flexibility plays such a large part in the overall set-up of this project and its decisions, an overview was made for all the things to do with flexibility.

From the analysis of the Japanese context it becomes clear that the whole setup provides maximum flexibility. This is partly due to the way the construction sector operates, with the high frequency of building turnover in combination with the smaller plots it is inconvenient to relay the entire street every time a building changes. Therefore the most convenient way has become to just have a very neutral street (just an asphalt surface) which can facilitate anything. Whether a building changes form, gains a parking garage (entrance to the street), changes in plinth function or whatever, it doesn't matter for the street as the street is just one form. In the Netherlands we may often see a new street being made in response to a new development alongside, partly attributable to developments being of a large (whole street length) size - it just makes sense and is necessary to change the street for new development. A new parking garage entrance needs space, impacting the sidewalk and bike lane, maybe a small traffic island, or what about a store on the plinth - the street needs to add bike parking, or an unpaved area needs to be paved. etc.

This harkens back to the observation of explicit and implicit (in)flexible space in the Japanese street, the flexible space is essentially the space with a semi-permanent function (potted plants or bike parking) and the inflexible space is the centre of the street which needs to be permanently devoid of obstacles to guarantee right of way. Essentially the plan guarantees the right of way with the plates while exchanging the flexible space for greenery to reach the desired ISR. Something that is possible to do as the flexible space has shown it can be anything. Of course, turning it into greenery removes the flexibility from the part of the street, however the uses of this space (bike parking, potted plants, short-term stopping) are all compensated one way or another (bike parking in the block/Japanse stoep, potted plants become explicit appropriation space and the short-term stopping can still happen in the right of way now, as it is wide enough). And the exchange to greenery is of a big benefit to the street, its users and direct inhabitants, not just for appropriation but also against urban heat island effect, ecological quality, etc.

This street flexibility also provides flexibility in the plot - whatever gets put on the plot doesn't need to think about the street as it is easily changed to fit the needs. This gives a lot of autonomy to the plot (the plot can do (almost) anything) but also means plots shouldn't affect other plots, otherwise their own autonomy is affected. This led to the 30 degree rule (guarantee light in the plot), and thus the decision to orient inward or street-ward. The rule 4.3 is also a consequence, own plot autonomy being high means water on the plot should also be solved on the plot. Essentially, your plot has problems and you need to manage them on your plot - without affecting other plots, and in return you have high flexibility. In the Japanese situation they don't consider the other plots, they can build as high as they want, put windows wherever they want, etc. This creates a lot of weird situations which would not even be allowed in the Dutch context - hence the creation of the rules which affect it.

In the project, the street flexibility is gained by use of the flexible panels. While this is one extra step rather than just having a flat asphalt surface, it provides almost as much flexibility (the one extra step mentioned) while being able to provide an entirely different dimension to the street: greenery. In addition, changing functions around the plinth simply means exchanging a plate, or turning a piece of greenery into a plate.

Furthermore, using the plates for the right of way makes regular road maintenance a lot easier, that is cables, sewage, things like that. They are put underneath the centre plate and when they need maintenance, the plate can just be lifted up and the other plate can be used to keep the street open.

The Dutch context lacks the deep cultural ties which made this flexibility happen in the first place. The expectation of impermanence, due to earthquakes, tsunamis, the nuke. The link with the Zen buddhist term *mujo* ("nothing permanent") is very on the nose. Buildings are worthless after 20 years, they're built to be replaced, the construction sector thrives on it in Japan. However, if we are demolishing and rebuilding post-war residential buildings, flats, entire 80s office parks, is it really very different? Yes, it definitely is. But the way of building the plan puts forth can partly do away with such inefficiencies.

12.

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Appendix A

Analysis numbers - Rotterdam

351260.15

		Google	BAG 3D	20157.3
	#	h	m2	bvo
1.1	a	3	110	330
	b	3	197.1	591.3
	c	3	91.4	274.2
	d	3	90.7	272.1
	e	3	92.5	277.5
	f	3	79.7	239.1
	g	3	97.9	293.7
	h	3	155.4	466.2
	I	3	91.9	275.7
	j	3	77.4	232.2
	k	3	79	237
	l	3	67	201
	m	4	86.3	345.2
	n	4	87.7	350.8
	o	3	114.4	343.2
	p	3	98	294
	q	3	112.5	337.5
	r	4	98.5	394
	s	4	224.4	897.6
	t	4	295.5	1182
	u	4	157.1	628.4
	v	4	224.2	896.8
	w	4	84.8	339.2
	x	4	78.8	315.2
	y	4	79.8	319.2
	z	4	77.3	309.2
	aa	4	75.4	301.6
	bb	4	72.4	289.6
	cc	4	75.9	303.6
	dd	4	48.7	194.8
	ee	3	87.1	261.3
	ff	3	87.7	263.1
	gg	3	90.8	272.4
	hh	3	95.5	286.5
	ii	3	120.9	362.7
	jj	4	146.8	587.2
	kk	3	152.8	458.4
	ll	3	119.1	357.3
	mm	3	118.9	356.7
	nn	4	133.9	535.6
	oo	4	110.5	442
	pp	4	114.7	458.8
	qq	2	273.5	547
	rr	3	98.5	295.5
	ss	3	132.8	398.4
	tt	3	139.6	418.8
	uu	3	140.5	421.5
	vv	3	128.8	386.4
	ww	3	131.4	394.2
	xx	3	100.8	302.4
	yy	3	107.7	323.1
	zz	3	98.7	296.1
	aaa	3		0
			6052.7	tot surf

				14388.2
	#	h	m2	bvo
1.2	a	3	126	378
	b	3	134.2	402.6
	c	3	100.8	302.4
	d	3	99.3	297.9
	e	3	148.7	446.1
	f	3	146.4	439.2
	g	3	145	435
	h	3	153.4	460.2
	I	3	89	267
	j	3	84.4	253.2
	k	3	78.8	236.4
	l	3	120.2	360.6
	m	3	122.1	366.3
	n	3	124.9	374.7
	o	3	124.8	374.4
	p	4	201	804
	q	5	337.1	1685.5
	r	5	330.2	1651
	s	4	203.1	812.4
	t	4	194.5	778
	u	4	195.7	782.8
	v	4	134.3	537.2
	w	4	257.9	1031.6
	x	3	155.9	467.7
	y	3	73.6	220.8
	z	3	74.4	223.2
			3955.7	tot surf
				22539.45
	#	h	m2	bvo
1.6	a	6	1904.7	11428.2
	b	6	1151.1	6906.6
	c	1.5	2803.1	4204.65
			5858.9	tot surf
				94616.7
	#	h	m2	bvo
1.8	a	1	553.4	553.4
	b	7	1335.9	9351.3
	c	2	402.5	805
	d	1		12907
	e			71000
			15198.8	tot surf inacc.

				33484.9
	#	h	m2	bvo
1.3	a	4	108.1	432.4
	b	4	74.9	299.6
	c	4	69.9	279.6
	d	4	72.6	290.4
	e	2	413.5	827
	f	3	155.2	465.6
	g	3	148.2	444.6
	h	3	89.4	268.2
	I	3	88.7	266.1
	j	3	1038	3114
	k	4	123.8	495.2
	l	4	148.2	592.8
	m	4	92.2	368.8
	n	3	142.3	426.9
	o	5	252.2	1261
	p	5	209.9	1049.5
	q	5	20.9	104.5
	r	5	73	365
	s	5	73	365
	t	5	73	365
	u	5	73	365
	v	5	73	365
	w	5	73	365
	x	5	73	365
	y	5	63.7	318.5
	z	5	82.2	411
	aa	4	1030	4120
	bb	4	253	1012
	cc	4	678.3	2713.2
	dd	4	530.4	2121.6
	ee	3	136.7	410.1
	ff	3	47	141
	gg	3	48	144
	hh	3	47.7	143.1
	ii	3	47.2	141.6
	jj	3	43.5	130.5
	kk	3	43.2	129.6
	ll	2	282.1	564.2
	mm	5	312.9	1564.5
	nn	3	62.7	188.1
	oo	3	60.2	180.6
	pp	3	80.6	241.8
	qq	2.5	577.9	1444.75
	rr	5.5	493.7	2715.35
	ss	0	0	0
	tt	3	68.8	206.4
	uu	3	69.5	208.5
	vv	3	60.9	182.7
	ww	3	54.6	163.8
	xx	3	57.3	171.9
	yy	3	58.3	174.9
			9049.4	tot surf

soft surface (greenery)
zigzag left bottom to right top

m2	formfactor	total surface	comment
4248	0.9	3823.2	mauritsweg
3608	0.4	1443.2	tom mandershof
1954	0.8	1563.2	schouwburg
1071	0.4	428.4	jacobusstraat
6857	0.1	685.7	k doormanhof
5340	0.9	4806	j.evertsenplaats
4670	0.9	4203	j banckertsplaats
		18510	TOTAAL m2 soft surface + 1% totaal
		73142	TOTAAL m2 sum tot surf built area
		155718	TOTAAL m2 measured google maps
		64066	TOTAAL m2 non-soft non-surf blocks (hard surf)
41%			of total surface is hard surface
12%			of total surface is soft surface
47%			of total surface is built surface

inside outside
zigzag left bottom to right top

m2	formfactor	total surface	comment
4248	1	4248	mauritsweg
3608	1	3608	tom mandershof
850	1	850	mauritsplaats
1954	1	1954	schouwburg
1071	1	1071	jacobusstraat
6857	1	6857	k doormanhof
4342	1	4342	bijlandtplaats incl. interpark excl. s
5340	1	5340	j.evertsenplaats
4670	1	4670	j banckertsplaats
		32940	TOTAAL m2 inner block
		73142	TOTAAL m2 sum tot surf built are
		155718	TOTAAL m2 measured google ma
		49636	TOTAAL m2 "public" area
32%			of total surface is "public" area (streets) excl. open blocks
68%			of total surface is "private" area (blocks) incl. open and close
2 to 1			ratio of "public" to "private"

106082

61113

	#	h	m2	bvo
1.4	a	3	3537.7	10613.1
	b	1	6501.4	6501.4
	c	7	885.7	6199.9
	d	13	1497.3	19464.9
	e	2	124.4	248.8
	f	3	122.8	368.4
	g	3	120.2	360.6
	h	3	119.7	359.1
	I	3	120.8	362.4
	j	3	120.7	362.1
	k	3	120.7	362.1
	l	3	120.7	362.1
	m	3	120.7	362.1
	n	12	1265.5	15186
			14778.3	tot surf
	geb park	4	3207.6	12830.4
	not calcd			

40247.5

	#	h	m2	bvo
1.9	a	3	217.9	653.7
	b	10	1126.1	11261
	c	2	396.1	792.2
	d	2	196.2	392.4
	e	2	198	396
	f	2	132.9	265.8
	g	2	97.3	194.6
	h	2	98.8	197.6
	I	2	99.6	199.2
	j	2	132.3	264.6
	k	2	131.5	263
	l	2	117.7	235.4
	m	2	222.1	444.2
	n	2	296.5	593
	o	2	131.7	263.4
	p	2	131.2	262.4
	q	2	98.5	197
	r	2	98.7	197.4
	s	2	97.7	195.4
	t	2	117	234
	u	2	130.1	260.2
	v	2	282.5	565
	w	2	130.7	261.4
	x	2	100.4	200.8
	y	2	97.7	195.4
	z	2	197.1	394.2
	aa	2	102.1	204.2
	bb	14	1336.5	18711
	cc	3	220.8	662.4
	dd	3	216.9	650.7
	ee	3	213.3	639.9
			7165.9	tot surf

25036.2

	#	h	m2	bvo
1.5	a	3	81.9	245.7
	b	3	60	180
	c	3	51.8	155.4
	d	3	52.4	157.2
	e	3	48.8	146.4
	f	3	152.3	456.9
	g	4	74.9	299.6
	h	4	77.3	309.2
	I	4	74.5	298
	j	4	75.5	302
	k	4	78.8	315.2
	l	5	476.3	2381.5
	m	5	187.6	938
	n	5	179.5	897.5
	o	5	184	920
	p	5	179.7	898.5
	q	5	183.7	918.5
	r	6	324.6	1947.6
	s	6	186.5	1119
	t	6	175.4	1052.4
	u	6	185.4	1112.4
	v	6	183.7	1102.2
	w	6	281.3	1687.8
	x	4	111.1	444.4
	y	3	110.6	331.8
	z	3	439.5	1318.5
	aa	4	225	900
	bb	4	210.5	842
	cc	4	93.3	373.2
	dd	4	96.5	386
	ee	4	127.7	510.8
	ff	3	137.5	412.5
	gg	4	419	1676
			5526.6	tot surf

39676.9

	#	h	m2	bvo
1.7	a	3	221.5	664.5
	b	10	932.2	9322
	c	2	518	1036
	d	2	443.1	886.2
	e	2	132.8	265.6
	f	2	266.7	533.4
	g	2	177.2	354.4
	h	2	167.8	335.6
	I	2	166.9	333.8
	j	2	181.7	363.4
	k	14	1685.3	23594.2
	l	3	221.4	664.2
	m	3	220.3	660.9
	n	3	220.9	662.7
			5555.8	tot surf

2.2557453 fsi bruto
4.8024346 fsi netto
0.4697087 gsi

straat

a
aps

d blocks

Appendix B

Analysis numbers - Osaka

Shee

133580.91		Google	OSM	41282.61			Google	OSM	32256.3		
	#	h	m2	bvo		#	h	m2	bvo		#
3.1	a	5.5	76	418	3.2	a	2	80.1	160.2	3.3	a
	b	14	277.8	3889.2		b	2	87.6	175.2		b
	c	14	344.9	4828.6		c	6	109.1	654.6		c
	d	14	449.8	6297.2		d	6	192.8	1156.8		d
	e	1	227.9	227.9		e	10	185.8	1858		e
	f	5	30.2	151		f	8	316.7	2533.6		f
	g	3	34.5	103.5		g	6	341.1	2046.6		g
	h	4	30.4	121.6		h	10	277.4	2774		h
	I	4	42	168		I	6	178.1	1068.6		I
	j	0	0	0		j	5	123.1	615.5		j
	k	5	68.2	341		k	3	229	687		k
	l	2	53.9	107.8		l	14	426.4	5969.6		l
	m	3	58.1	174.3		m	7	245.7	1719.9		m
	n	3	48.6	145.8		n	3	135.5	406.5		n
	o	4	47.5	190		o	5	79.9	399.5		o
	p	4.5	42.2	189.9		p	7	801.2	5608.4		p
	q	6	44.6	267.6		q	3	158.7	476.1		q
	r	4	44.54	178.16		r	2	167.5	335		r
	s	3	40.6	121.8		s	6	436.7	2620.2		s
	t	2	37.6	75.2		t	0	214.5	0		t
	u	13	708.2	9206.6		u	5	198.2	991		u
	v	7	313.3	2193.1		v	0	181.9	0		v
	w	11	756.7	8323.7							w
	x	6.5	173.5	1127.75							x
	y	7	324.1	2268.7							
	z	0	0	0							
	aa	2	83.1	166.2							
		tot surf	4358.24				tot surf	5167			

soft surface (greenery)
zigzag left bottom to right top

m2	formfactor	total surface	comment
2784	1	2784	kindergarden 1 near familymart minamisenba
90	1	90	MPR building
174	1	174	minami kindergarden
150	1	150	NTT West OCB building
50	1	50	smile hotel premium

6501	TOTAAL m2 soft surface + 2% totaal
94895	TOTAAL m2 sum tot surf built area
29105	TOTAAL m2 sum hard surf in block (avg block 6200m2)
162673	TOTAAL m2 measured google maps
32172	TOTAAL m2 non-soft non-surf blocks (hard surf)
38%	of total surface is hard surface
4%	of total surface is soft surface
58%	of total surface is built surface

t1

Google	OSM	37493.6			Google	OSM	22548.4		
h	m2	bvo		#	h	m2	bvo		
7.5	579.6	4347	3.4	a	2	174.7	349.4		
8	1070.8	8566.4		b	5	147.7	738.5		
0	95.9	0		c	6	299.3	1795.8		
4	48.8	195.2		d	1	184.8	184.8		
2	65	130		e	4	160.7	642.8		
10	147.2	1472		f	10	144.9	1449		
4	291	1164		g	13	584.4	7597.2		
2	86	172		h	4	75.7	302.8		
6	205.3	1231.8		I	0	32	0		
2	54.9	109.8		j	0	49.9	0		
7	46.8	327.6		k	4	57.1	228.4		
3	46	138		l	3	25.8	77.4		
8	215.9	1727.2		m	4	44.1	176.4		
5	217.4	1087		n	4	101.9	407.6		
14	423	5922		o	5	100.3	501.5		
11	314.5	3459.5		p	5	116.1	580.5		
9	184.6	1661.4		q	3	76.8	230.4		
0	50.4	0		r	7	142.1	994.7		
2	51.2	102.4		s	0	619	0		
5	84.9	424.5		t	10	350.5	3505		
2	55.6	111.2		u	3	200	600		
8	267.7	2141.6		v	0	244.5	0		
5	116.4	582		w	3	142.9	428.7		
10	242.1	2421		x	5	252.5	1262.5		
				y	3	165	495		
tot surf	4961					4492.7		4.105814	fsi net
							94894.7	7.03838	fsi brut
								0.583346	gsi

side outside
gzag left bottom to right top

m2	formfactor	total surface	comment
2784	1	2784	kindergarden 1 near familymart minamisenba
90	1	90	MPR building
174	1	174	minami kindergarden
150	1	150	NTT West OCB building
50	1	50	smile hotel premium

	6501	TOTAAL m2 soft surface + 2% totaal in block
	94895	TOTAAL m2 sum tot surf built area
excl. built area	**29105**	TOTAAL m2 sum hard surf in block (avg block 6200m2) excl. built area
	162673	TOTAAL m2 measured google maps
	32172	TOTAAL m2 non-soft non-surf blocks (hard surf)
20%		of total surface is "public" area (streets) excl. open blocks
80%		of total surface is "private" area (blocks) incl. open and closed blocks
4 to 1		ratio of "public" to "private"
	130501	

Appendix C

Project numbers

In 8 blokken past theoretisch 221916 m2

	first block m2		L	tot		hard	groen	groendak	fp	>50% rat groen	50-90% rat beb	check	units
	a	249	5	1245		69	0	160	318	50%	78%	318	
(b)	b	607	5	3035		87	460	150	1154	53%	53%	1154	
	c	392	6.5	2548		36	160	150	588	53%	67%	588	
	d	615	7	4305		94	261	254	970	53%	63%	970	
	e	260	5	1300		37	96	130	393	58%	66%	393	
(b)	f	624	8	4992		13	205	250	842	54%	74%	842	
	g	124	4	496		4	48	50	176	56%	70%	176	
o	h	216	4	864		8	40	100	264	53%	82%	264	
	i	152	3	456		24	0	90	176	51%	86%	176	
	j	300	5	1500		40	140	100	480	50%	63%	480	
	k	200	2.5	500		72	48	120	320	53%	63%	320	
	l	320	5	1600		116	224	120	640	54%	50%	660	
	m	560	6	3360		96	464	140	1120	54%	50%	1120	
	n	123	4	492		4.5	0	70	128	55%	96%	127.5	
	o	80	3	240		6	42	40	128	64%	63%	128	
	p+q+r	124	3.5	434		24	44	54	192	51%	65%	192	
	q			0					0	#########	########	0	
	r			0					0	#########	########	0	
	s	132	5	660		15	45	60	192	55%	69%	192	
o	t	169	4	676		9	30	80	208	53%	81%	208	
	u	90	3	270		11	45		146	31%	62%	146	
		5337		28973	8452.7		10403.7						
				fsi =	3.43		fsi b =	2.78		work	9567		
	groen surf :	2352		gsi =	0.63		gsi b =	0.51		other func	1200		
	groen dak :	2118								no work	18206		
		4470								dwelling	228	a 80m2	

	second block m2		L	tot		hard	groen	groendak	fp	rat groen	rat beb	check	units
	a	179	3	537		4.5	0		184	0%	97%		
(b)	b	616	4	2464		47	385		1048	37%	59%		
	c	615	6	3690		0	161		775	21%	79%		
(b)	d	627	8	5016		60	361		1048	34%	60%		
	e	176	3	528		0	48		224	21%	79%		
	f	168	5	840		0	0		168	0%	100%		
	g	76	3	228		4	32		112	29%	68%		
	h	80	4	320		8	24		112	21%	71%		
	i	578	8	4624		0	173		751	23%	77%		
	j	320	6	1920		35	245		600	41%	53%		
	k	719	3	2157		84	355		1050	34%	68%		
	l	238	6	1428		10	198		445	44%	53%		
	m	101	4	404		5	0		106	0%	95%		
	n	58	3	174		6	42		106	40%	55%		
	o	220	5	1100		9	56		285	20%	77%		
	p	32	4	128		0	21		53	40%	60%		
	q	36	3	108		4	13		53	25%	68%		
	r	40	3	120		0	13		53	25%	75%		
	s	120	6	720		6.5	32		159	20%	75%		
		4999		26506	7806		9691						
				fsi =	3.40		fsi b =	2.74					
				gsi =	0.64		gsi b =	0.52					

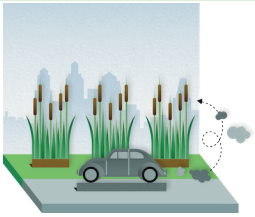
Appendix D

teeb.stad

teeb.stad

Plan: Bullewijk	Scenario: SC1	€ 36 387 902,-

1. Gezondheid — € 5 821 841,-



Baten:

- Minder zorgkosten (generiek) door een groenere woonomgeving
- Minder arbeidsverlies (generiek) door een groenere woonomgeving
- Minder gezondheidskosten door afvang van fijnstof
- Minder gezondheidskosten door afvang van stikstofdioxide.
- Minder gezondheidskosten door afvang van zwaveldioxide.
- Minder gezondheidskosten door afvang van ozon.
- Minder gezondheidskosten door vermindering van geluidsoverlast.

Baathouders:

- Bewoners
- Bedrijven (arbeidsuitval)
- Verzekering
- Overheid

2. Klimaatadaptatie — € 1 548 487,-

Baten:

- Minder energieverbruik door beschutting van bomen
- Minder energieverbruik door groene daken
- Vermeden zuiveringskosten door vergroten waterbergingscapaciteit
- Klimaatmitigatie door opslag van koolstof
- Klimaatmitigatie besparen van energie

Baathouders:

- Bewoners
- Bedrijven
- Overheid
- Waterschap

3. Vastgoed — € 28 980 000,-

Baten:

- Meer vastgoedwaarde bestaande woningen door een groenere omgeving
- Meer vastgoedwaarde nieuwe woningen door een groenere omgeving
- Meer vastgoedwaarde bestaande woningen door kwaliteitsverbetering groen
-

Baathouders:

- Vastgoedeigenaren

4. Recreatie & vrije tijd — € 37 574,-

Baten:

- Meer recreatiemogelijkheden door meer of kwaliteitsverbetering groen
- Meer winst ondernemers door groenere winkelstraten

Baathouders:

- Recreanten
- Ondernemers

Appendix E

Parking overview Gemeente Rotterdam

Wonen & leven | Werken & leren | Meedenken & doen | Bestuur & organisatie | Mijn Loket

Informatie & diensten

Rotterdam.nl | Parkeereis

Vrijstellingen

Bewerken

Kleine projecten zijn volledig vrijgesteld van de parkeereis. Geef in onderstaande tabel per functie de oppervlakte aan. De normgrondslag bij woningen is uitgedrukt in m^2 gebruiksvloeroppervlak (gbo). De normgrondslag bij hiet woningen is uitgedrukt in m^2 bruto vloeroppervlakte (bvo).

Woonfuncties (gbo totale project)	≥ 300m^2
Horecafuncties (bvo)	200 tot 600m^2
Niet-woonfuncties (bvo totaleproject)	≥ 600m^2

U bent niet vrijgesteld van minimale parkeereisen voor auto's.

U bent niet vrijgesteld van minimale parkeereisen voor fietsen.

Gebied

Bewerken

*A.***Hoogstedelijk gebied** (zoals Centrum, Provenierswijk, Middelland, Katendrecht, Afrikaanderwijk, Entrepot en Feijenoord).

Woningen

Bewerken

		Autoparkeerplaatsen		Fietsstallingsplekken	
Oppervlakte per woning (gbo)	**Aantal woningen**	**Norm**	**Eis**	**Norm**	**Eis**
< 40 m^2	40	0,1 / woning	**4,00**	2,00 / woning	**80,00**
40 tot 65 m^2	60	0,4 / woning	**24,00**	3,00 / woning	**180,00**
65 tot 85 m^2	40	0,6 / woning	**24,00**	4,00 / woning	**160,00**
85 tot 120 m^2	40	1,0 / woning	**40,00**	5,00 / woning	**200,00**
≥ 120 m^2	40	1,2 / woning	**48,00**	5,00 / woning	**200,00**
Totaal		**Auto**	**140,00**	**Fiets**	**820,00**

Zodra er geen voorschriften voor een (fietsen-)berging meer zijn opgenomen in de regeling die het Bouwbesluit 2012 opvolgt, geldt bij nieuwbouw van woningen dan wel de transformatie of herbestemming tot woningen de parkeereis, bedoeld zoals hierboven. Tot die tijd gaat het om een aanbeveling. In appartementsgebouwen moeten de fietsparkeerplaatsen in een gezamenlijke stalling uitgevoerd worden.

Niet woningen

Bewerken

Het aantal fietsstallingsplekken bedoeld voor **kort stallen** (bv. bezoek), mag in korting gebracht worden op de parkeereis voor fietsen, indien er voldoende ruimte is om deze in de openbare ruimte te realiseren.

		Autoparkeerplaatsen		Fietsstallingsplekken			
Functie	**Aantal (m^2 in bvo)**	**Norm**	**Eis**	**Norm**	**Eis**	**Kort stallen (bezoek)**	
Kantoor	7000 m^2	0,76 / 100m^2	**53,20**	1,7 / 100m^2	**119,00**	5%	**5,95**
Bedrijfsverzamelgebouw / Atelier	1567 m^2	0,72 / 100m^2	**11,28**	1,7 / 100m^2	**26,64**	5%	**1,33**
Detailhandel inclusief kringloopwinkel en apotheek	1000 m^2	0,38 / 100m^2	**3,80**	2,7 / 100m^2	**27,00**	85%	**22,95**
Gymzaal, sporthal binnen (incl squash, tennis)	200 m^2	0,08 / 100m^2	**0,16**	2,5 / 100m^2	**5,00**	95%	**4,75**
Cafetaria/snackbar (horeca I)	500 m^2	0,4 / 100m^2	**2,00**	9 / 100m^2	**45,00**	90%	**40,50**
Café / bar (horeca III)	250 m^2	0,4 / 100m^2	**1,00**	18 / 100m^2	**45,00**	90%	**40,50**
Restaurant (horeca IV)	250 m^2	1,6 / 100m^2	**4,00**	18 / 100m^2	**45,00**	80%	**36,00**
Totaal		**Auto**	**75,44**	**Fiets**	**312,64**	**Fiets kort**	**151,98**

Dubbelgebruik

De daadwerkelijke vraag naar autoparkeerplaatsen per functie is niet de hele dag hetzelfde. Overdag is maar een deel van de bewoners thuis, zodat niet alle autoparkeerplaatsen bij de woningen bezet zijn. Het omgekeerde geldt voor andere functies zoals kantoren: overdag zijn de medewerkers aanwezig en 's avonds en in het weekend zijn de autoparkeerplaatsen leeg. Om de parkeervoorzieningen optimaal in te zetten wordt gebruik gemaakt van dubbelgebruik van de aanwezige parkeervoorzieningen. De aanwezigheidspercentages worden gebruikt om de parkeerbehoefte op het maatgevende (drukste) moment te bepalen. Voorwaarde is dat de parkeervoorzieningen openbaar toegankelijk zijn zodat dubbelgebruik ook daadwerkelijk mogelijk is.

Functie	**Eis**	**Werkdag-ochtend**	**Werkdag-middag**	**Werkdag-avond**	**Koopavond**	**Zaterdag-middag**	**Zaterdag-avond**	**Nacht**
Woning bewoners	140,00	(50%) **70,00**	(50%) **70,00**	(90%) **126,00**	(80%) **112,00**	(60%) **84,00**	(80%) **112,00**	(100%) **140,00**

Dubbelgebruik

De daadwerkelijke vraag naar autoparkeerplaatsen per functie is niet de hele dag hetzelfde. Overdag is maar een deel van de bewoners thuis, zodat niet alle autoparkeerplaatsen bij de woningen bezet zijn. Het omgekeerde geldt voor andere functies zoals kantoren: overdag zijn de medewerkers aanwezig en 's avonds en in het weekend zijn de autoparkeerplaatsen leeg. Om de parkeervoorzieningen optimaal in te zetten wordt gebruik gemaakt van dubbelgebruik van de aanwezige parkeervoorzieningen. De aanwezigheidspercentages worden gebruikt om de parkeerbehoefte op het maatgevende (drukste) moment te bepalen. Voorwaarde is dat de parkeervoorzieningen openbaar toegankelijk zijn zodat dubbelgebruik ook daadwerkelijk mogelijk is.

Functie	Eis	Werkdag-ochtend		Werkdag-middag		Werkdag-avond		Koopavond		Zaterdag-middag		Zaterdag-avond		Nacht	
Woning bewoners	140,00	(50%)	**70,00**	(50%)	**70,00**	(90%)	**126,00**	(80%)	**112,00**	(60%)	**84,00**	(80%)	**112,00**	(100%)	**140,00**
Kantoor	53,20	(100%)	**53,20**	(100%)	**53,20**	(5%)	**2,66**	(5%)	**2,66**	(0%)	**0,00**	(0%)	**0,00**		
Bedrijfsverzamelgebouw / Atelier	11,28	(100%)	**11,28**	(100%)	**11,28**	(5%)	**0,56**	(5%)	**0,56**	(0%)	**0,00**	(0%)	**0,00**		
Detailhandel inclusief kringloopwinkel en apotheek	3,80	(30%)	**1,14**	(60%)	**2,28**	(10%)	**0,38**	(75%)	**2,85**	(100%)	**3,80**	(0%)	**0,00**		
Gymzaal, sporthal binnen (incl squash, tennis)	0,16	(50%)	**0,08**	(50%)	**0,08**	(100%)	**0,16**	(100%)	**0,16**	(100%)	**0,16**	(100%)	**0,16**		
Cafetaria/snackbar (horeca I)	2,00	(0%)	**0,00**	(50%)	**1,00**	(80%)	**1,60**	(80%)	**1,60**	(50%)	**1,00**	(100%)	**2,00**		
Café / bar (horeca III)	1,00	(30%)	**0,30**	(40%)	**0,40**	(90%)	**0,90**	(85%)	**0,85**	(70%)	**0,70**	(100%)	**1,00**		
Restaurant (horeca IV)	4,00	(30%)	**1,20**	(40%)	**1,60**	(90%)	**3,60**	(95%)	**3,80**	(70%)	**2,80**	(100%)	**4,00**		
Totaal			**137,20**		**139,84**		**135,86**		**124,48**		**92,46**		**119,16**		**140,00**

De parkeereis voor auto's (maximum van de parkeervraag per dagdeel): 140,00

Saldering

Bewerken

Bij een bouwontwikkeling of gebruikswijziging hoeft alleen te worden voorzien in de extra parkeerbehoefte. De parkeereis kan daarom worden verminderd met de parkeereis van het laatste legale gebruik, tenzij er sprake is van langdurige leegstand. Verondersteld wordt dat voor de oorspronkelijke functie voldoende parkeer- gelegenheid aanwezig is.

Wanneer de parkeereis voor een bestaande functie kan worden gesaldeerd moet de rekentool los worden ingevuld om de parkeereis van de bestaande functie te berekenen.

Bij transformatie, herbestemming, functiewijziging en sloop-nieuwbouw wordt een bestaande functie vervangen door een nieuwe. De bestaande functie heeft een parkeerbehoefte die aan de hand van de normen bepaald kan worden, net als de nieuwe functie. Door het salderen wordt de parkeerbehoefte van de nieuwe functie verminderd met die van de bestaande functie, waarvan dan wordt aangenomen dat daarvoor al voldoende parkeergelegenheid aanwezig was. Als er sprake is van langdurige leegstand – uitgangspunt is minimaal 5 jaar – mag niet meer gesaldeerd worden.

Bij salderen van parkeerplaatsen gelegen in de openbare ruimte moet rekening gehouden worden met aanwezigheidspercentages omdat het maatgevend moment van de nieuwe functie op een (heel) ander tijdstip kan liggen. Als dat zo is, is er feitelijk sprake van een nieuwe parkeerbehoefte die niet gesaldeerd kan worden. Een transformatie van een school naar woningen is een voorbeeld waarbij parkeerplaatsen gelegen in de openbare ruimte niet kunnen worden gesaldeerd.

Is er sprake van een langdurige leegstand (≥ 5 jaar)?	Nee
Is er sprake van een functiewijziging?	Nee

parkeereis na correctie dubbelgebruik	140,00
parkeereis laatste gebruik	0
parkeereis na aftrek laatste gebruik	**140,00**

Nabijheid OV-station/-halte

Bewerken

U krijgt een korting van 30% op de parkeereis voor auto's op basis van de door u geselecteerde afstand van 0 tot 400m tot de volgende halte(s):
Overige treinstations
Overige Randstadrail-/metrostations binnen zone A en B
Overige tramhaltes binnen zone A

Autoparkeerplaatsen	
Bruto	140,00
Korting obv OV-nabijheid	(30%) **42,00**

Deelauto's

Bewerken

Deelauto's

Bewerken

Als bij een woningontwikkeling in betaald parkeergebied deelauto's beschikbaar zijn op geoormerkte deelautoparkeerplaatsen, wordt de autoparkeereis per deelautoparkeerplaats verlaagd met 5 “gewone” autoparkeerplaatsen tot een maximale verlaging van 20%. De deelauto's mogen ook worden geplaatst in een nabijgelegen parkeervoorziening op geoormerkte deelautoparkeerplaatsen.

Extra deelautoparkeerplaatsen		0
Verlaging reguliere parkeerplaatsen		**0,00**
Verlaging totaal aantal parkeerplaatsen	**0%**	**0,00**
Maximale verlaging parkeereis	20%	**28,00**
Uiteindelijke verlaging aantal parkeerplaatsen		**0,00**

Extra fietsparkeerplaatsen

Bewerken

Als een ontwikkeling in betaald parkeergebied voorziet in extra fietsparkeervoorzieningen op eigen terrein, wordt de autoparkeereis met maximaal 10% verlaagd in de verhouding twee fietsparkeerplaatsen in plaats van één autoparkeerplaats. Deze extra fietsparkeerplaatsen moeten worden gerealiseerd op eigen terrein en zijn bedoeld voor langparkeerders (bewoners, werkers, studenten).

Extra fietsparkeerplaatsen			0
Verlaging autoparkeereis	**0%**	**0,00**	
Maximale verlaging autoparkeereis	10%	**14,00**	
Uiteindelijke verlaging autoparkeereis	**0%**	**0,00**	

Mobility as a Service (MaaS)

Bewerken

Als bij een ontwikkeling in betaald parkeergebied gebied voor alle toekomstige gebruikers Mobility as a Service structureel, dat wil zeggen voor minimaal 10 jaar, beschikbaar wordt gesteld mag de autoparkeereis tot maximaal 20% worden verlaagd.

Verlaging autoparkeerplaatsen	0%	**0,00**
Maximale verlaging autoparkeerplaatsen	**20%**	**28,00**
Uiteindelijke verlaging autoparkeerplaatsen	**0%**	**0,00**

Samenvatting van de berekening

	Auto	Fiets
Parkeereis o.b.v. woningen	140,00	820,00
Parkeereis o.b.v. niet-woningen	75,44	312,64
Totaal o.b.v. bebouwing	215,44	1.132,64
Na correctie o.b.v. dubbelgebruik	140,00	n.v.t.
Na correctie o.b.v. saldering laatst legale gebruik	140,00	n.v.t.

	Auto		Fiets
Bijzondere vrijstelling o.b.v. nabijheid OV	30%	42,00	n.v.t.
Bijzondere vrijstelling o.b.v. deelauto's (woonfunctie)	0%	0,00	n.v.t.
Bijzondere vrijstelling o.b.v. Mobility as a service	0%	0,00	n.v.t.
Bijzondere vrijstelling o.b.v. extra fietsparkeerplaatsen	0%	0,00	0,00
Totaal bijzondere vrijstellingen		42,00	0,00
Netto parkeereis		98,00	1.133,00

Parkeereis auto's

De parkeereis voor auto's ligt op 140. Bij toepassing van bijzondere vrijstellingen kan deze verlaagd worden tot 98.

Let op: toepassing van een bijzondere vrijstelling leidt tot uitsluiting van parkeervergunningen voor straatparkeren. Gebruikers van het project worden uitgesloten van verguninngen voor straatparkeren.

Parkeereis fietsen

De uiteindelijke parkeereis voor fietsen ligt op 1.133. Waarvan 981 voor lang stallen en 152 voor kort stallen zijn bedoeld.

Verlaging autoparkeereis	**0%**	**0,00**
Maximale verlaging autoparkeereis	10%	**14,00**
Uiteindelijke verlaging autoparkeereis	**0%**	**0,00**

Mobility as a Service (MaaS)

Bewerken

Als bij een ontwikkeling in betaald parkeergebied voor alle toekomstige gebruikers Mobility as a Service structureel, dat wil zeggen voor minimaal 10 jaar, beschikbaar wordt gesteld mag de autoparkeereis tot maximaal 20% worden verlaagd.

Verlaging autoparkeerplaatsen	0%	**0,00**
Maximale verlaging autoparkeerplaatsen	**20%**	**28,00**
Uiteindelijke verlaging autoparkeerplaatsen	**0%**	**0,00**

Samenvatting van de berekening

	Auto	**Fiets**
Parkeereis o.b.v. woningen	140,00	820,00
Parkeereis o.b.v. niet-woningen	75,44	312,64
Totaal o.b.v. bebouwing	215,44	1.132,64
Na correctie o.b.v. dubbelgebruik	140,00	n.v.t.
Na correctie o.b.v. saldering laatst legale gebruik	140,00	n.v.t.

	Auto		**Fiets**
Bijzondere vrijstelling o.b.v. nabijheid OV	30%	42,00	n.v.t.
Bijzondere vrijstelling o.b.v. deelauto's (woonfunctie)	0%	0,00	n.v.t.
Bijzondere vrijstelling o.b.v. Mobility as a service	0%	0,00	n.v.t.
Bijzondere vrijstelling o.b.v. extra fietsparkeerplaatsen	0%	0,00	0,00
Totaal bijzondere vrijstellingen		42,00	0,00
Netto parkeereis		98,00	1.133,00

Parkeereis auto's

De parkeereis voor auto's ligt op 140. Bij toepassing van bijzondere vrijstellingen kan deze verlaagd worden tot 98.

Let op: toepassing van een bijzondere vrijstelling leidt tot uitsluiting van parkeervergunningen voor straatparkeren. Gebruikers van het project worden uitgesloten van verguninngen voor straatparkeren.

Parkeereis fietsen

De uiteindelijke parkeereis voor fietsen ligt op 1.133. Waarvan 981 voor lang stallen en 152 voor kort stallen zijn bedoeld.

De bovenstaande berekening is slechts indicatief en er kunnen geen rechten aan verbonden worden.

Collectieve parkeervoorzieningen op eigen terrein bij nieuwbouw of transformatie moeten voorbereid zijn op het kunnen laden van elektrische voertuigen (EV Ready).

Afdrukken