



PROJECT JOURNAL 'REWILDING CITIES'

ARCHITECTURAL ENGINEERING GRADUATION STUDIO
2022-2023

Faculty of Architecture & the Built Environment
Delft University of Technology

ANNEKEE GROENINX VAN ZOELN

Exploring Opportunities for Rewilding the Built Environment through Nature-Inclusive Design

Case study Boerhaavewijk, post-war residential neighbourhood in Haarlem, the Netherlands

P R E F A C E

This project journal is the result of a collection of my research, sketches, writings, readings, findings, ideas, models, thoughts, inspirations, and reflections throughout the past year at the Architectural Engineering Graduation Studio. It serves as a visual representation of my thoughts, emotions, and observations, conveying my ideas for this graduation project.

To present my project in an organised way, I have combined various pictures, sketches, short writings, and moments of inspiration in chronological order. This allows readers to follow my thought process and understand the different choices I made, leading to the final design.

As you delve into the pages of this journal, I hope to immerse you in the depths of my creative process. It is my intention to inspire, challenge, and provoke your imagination, encouraging you to appreciate the limitless possibilities that exist within Architectural Engineering.

With great enthusiasm, I present this project journal as a tangible testament to the dedication, challenges, and personal growth I experienced throughout my journey at the Architectural Engineering Graduation Studio. I extend my heartfelt gratitude to my esteemed lecturers Anne Snijders, Nico Tillie, and Engbert van der Zaag, whose support and guidance were invaluable in elevating my project to new heights. This year has been an exceptionally enriching experience, and I reflect upon it with immense satisfaction. I take immense pride in the completion of this project, I have enjoyed every step, and I aspire to continue advocating for nature and the rewilding of our built environment in my future career!

Annekee Groeninx van Zoelen
04-07-2023



REWILDED PAVILION

I found my fascination in David Attenborough's witness statement and his vision for the future: Rewilding (Attenborough & Hughes, 2020). This green pavilion made of reused timber is a symbol of the combination of a manmade building that blends very well with nature. Nature can take its own course and humans benefit from this.



Rewilding is a wild term and we almost always tend to think of ecological rewilding. Next to ecological rewilding, which is related to biophysical nature (rewilding water/land/wildlife) and restoring/(re)creating biophysical wilderness qualities, I found out there is also human rewilding (Arts, 2022). This last term is related to personal, social, or cultural dimensions, such as rewilding cities. It is not about reinforcing the strict separation between humans and nature, but about interweaving those spheres, giving space to natural processes in the context of the current, all-pervasive human domination on Earth. And here starts my fascination for *Rewilding Cities*.

My design question up to this point is 'How can we rewild cities, while our living environment will be improved?'. According to Robbert Snel (Arts, 2022), there are two preconditions in order to rewild cities:

1. Rewilding cities is only possible if the city continues to function for people;
2. Rewilding cities is only possible if the city dwellers also accept wild nature.

So my idea for my graduation studio is to do research in the field of the reinforcement of the role of ecological processes in urban areas. Within this field, I am looking for a technical innovation that can be integrated into architectural design.

"... over the years, we lost our balance. We moved from being a part of nature to being apart from nature."

(Attenborough & Hughes, 2022)

REWILDING CITIES

1937:
World population: 2.3 billion
Carbon in atmosphere: 280 parts per million
Remaining wilderness: 66 per cent

1978:
World population: 4.3 billion
Carbon in atmosphere: 335 parts per million
Remaining wilderness: 55 per cent

2020:
World population: 7.8 billion
Carbon in atmosphere: 415 parts per million
Remaining wilderness: 35 per cent
(Attenborough & Hughes, 2020)

Rewilding:

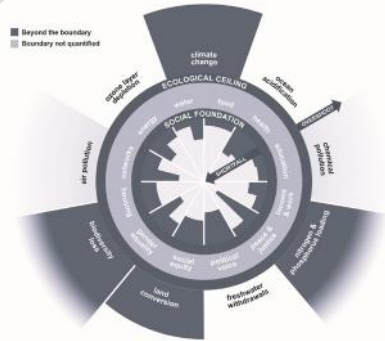
- A process to reestablish balance, that values nature, and the desire to live in greater harmony with the planet's natural systems. (Cho, A. Rewilding Cities, Future of Cities Think Tank 01)
- Restoration by letting go. Allowing nature to take the driving seat. (Tree & Schlosser, 2019)
- Progressive activity that mainly involves looking ahead. (Arts et al., 2022)

Ecological Rewilding:

Related to biophysical nature (rewilding water/land/wildlife) & restoring/(re)creating biophysical wilderness qualities. (Arts et al., 2022)

Human Rewilding:

Related to personal, social, cultural dimensions (rewilding cities). Not about reinforcing the strict separation between human and nature, but interweaving those spheres. (Arts et al., 2022)



The Doughnut Model
(Attenborough & Hughes, 2020)

How to 'rewild' cities?

How can we transform existing urban areas and/or (obsolete) industrial sites into sustainable, self-sufficient and energy-neutral areas, including a circular economy, own food production, own facilities and flexible buildings for multiple functions?

"We moved from being a part of nature to being apart from nature"

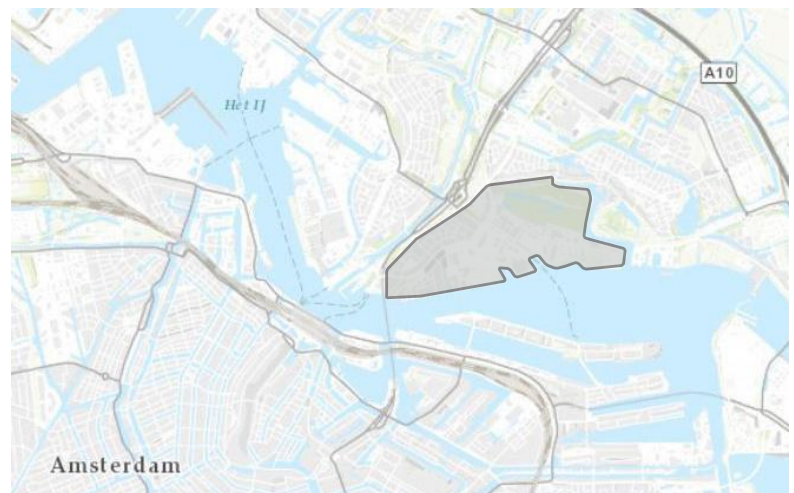
(David Attenborough)

PROGRAM



CONTEXT

The former Akzo-site (now Albemarle) in Amsterdam Noord /Hamerkwartier/IJplein-buurt/Vogelbuurt/Vogeldorp/W.H. Vliegenbos



Map of Amsterdam

(Notitie reikwijdte en detailniveau. Hamerkwartier, Amsterdam)

"Shouldn't our cities do at least as well in terms of ecosystem services as the native systems that they replace?"

(Janine Benyus, Biomimicry Institute)

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Architectural Engineering Graduation Studio
Week 2 | Research Plan Concept
AR3AE100 | 2022/2023 Q1
Anneke Groeninx van Zoelen | 4445929
Delft University of Technology

P O S T E R

On my poster, I wanted to make it clear that I am fascinated by David Attenborough's vision. I also outlined the concept of "rewilding" to make it clear that I want to look at "human rewilding" in cities.

Rewilding:

- A process to reestablish balance, that values nature, and the desire to live in greater harmony with the planet's natural systems. (Cho, A. Rewilding Cities, Future of Cities Think Tank 01)
- Restoration by letting go. Allowing nature to take the driving seat. (Tree & Schlosser, 2019)
- Progressive activity that mainly involves looking ahead. (Arts et al., 2022)

Ecological Rewilding:

Related to biophysical nature (rewilding water/land/wildlife) & restoring/(re)creating biophysical wilderness qualities. (Arts et al., 2022)

Human Rewilding:

Related to personal, social, cultural dimensions (rewilding cities). Not about reinforcing the strict separation between human and nature, but interweaving those spheres. (Arts et al., 2022)

This led to a preliminary conceptual research question:

How to 'rewild' cities?

How can we transform existing urban areas and/or (obsolete) industrial sites into sustainable, self-sufficient and energy-neutral areas, including a circular economy, own food production, own facilities and flexible buildings for multiple functions?

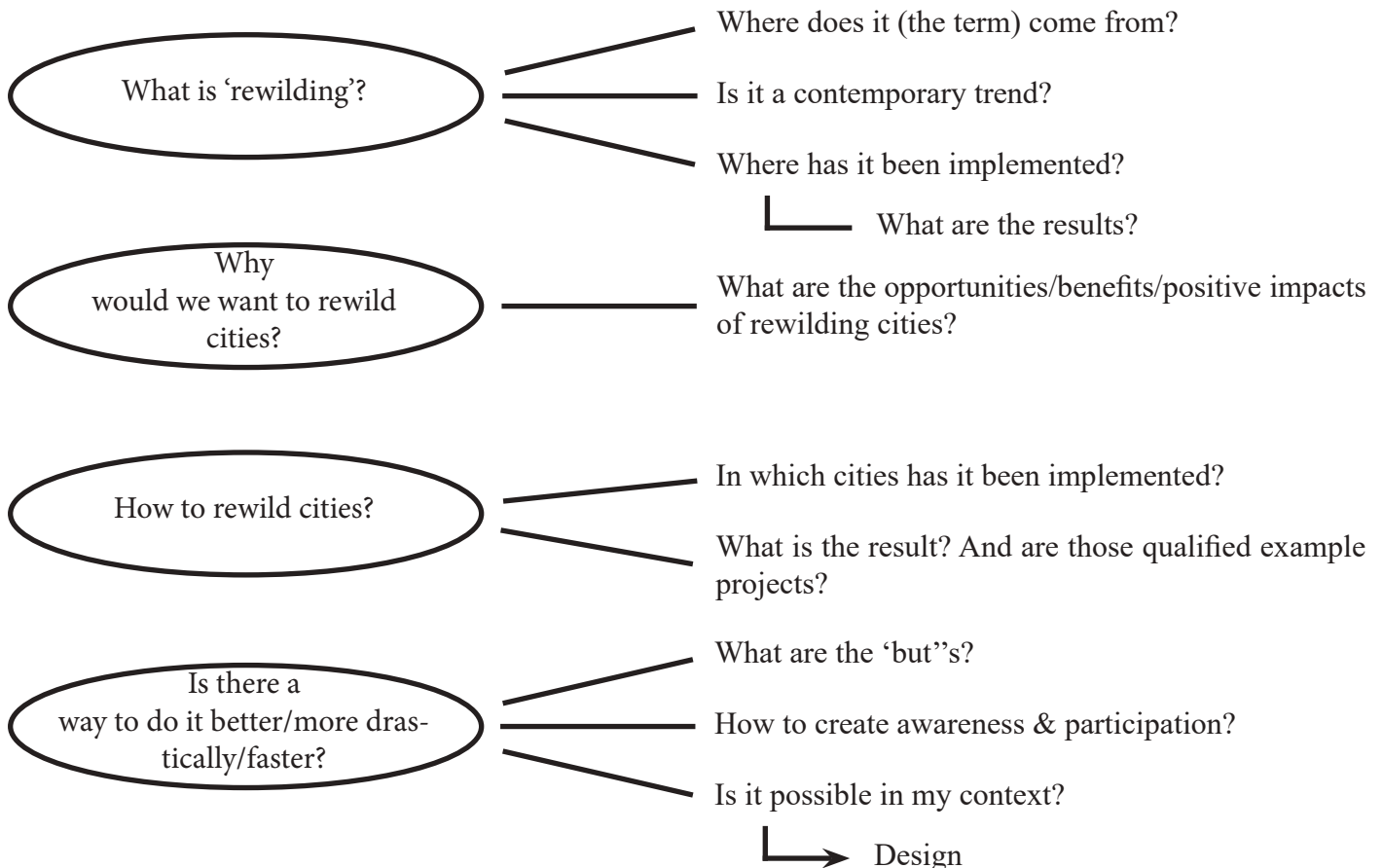
Included in my program are re-use, biodiversity, circular economy, urban farming, participation, healthy & happy life, urban parks and awareness. But I also consider energy-neutral, flexible spaces for multiple functions and food forests important.

I chose the former 'Akzo site' (now Albemarle) in Amsterdam North as the context.

This includes the Hamerkwartier, the IJplein neighborhood, the Vogelbuurt, Vogeldorp and the W.H. Vliegenbos. Because of the diversity, this seems to me a suitable context where I can apply ecological and sustainable interventions as an example project for other cities. Due to the information available about the TU Campus and the residential area in Haarlem, these are also contexts I will consider.

LITERATURE RESEARCH

This week, I read a lot of papers and started with my literature research. While doing so, I came up with some research questions (figure below) and linked the papers to those questions and at the same time, I also made some mind maps as a framework to answer those questions.



We also had a table meeting this week about the two contexts; TU Delft Campus & Boerhaavewijk in Haarlem. There was a guest speaker for the Boerhaavewijk, Jeffrey Bolhuis, who has been researching this neighbourhood with his agency AP+E together with studio dmau for a while. He shared their findings, which I found very interesting. For instance, he told me that it is almost exclusively post-war buildings and that they focus very much on spatial with social and all the big questions of our time. He thinks Schalkwijk (Boerhaavewijk is in this area) is more interesting than Haarlem-city.

He explained that they are re-evaluating; from problems to opportunities. They are doing this through six interventions:

- Connecting green spaces: parking is a big problem;
- Safe places for sports, games & meeting: value through rehabilitation, better housing, plints are a big problem with the post-war buildings;

- Diversity of housing forms: circularity (e.g. older people move to a smaller flat and a family can then move back into their home), green area around Schalkwijk, now it is divided into four zones.
- Reuse: porch flats; one typology that can be used everywhere;
- Densification: the example of garage boxes;
- Place for social capital.

They use 3 P's: Plan, (new) Process, (new) Place.

Furthermore, they work with a Living Lab: an open innovation in an ecosystem in collaboration with all in a real life environment. It is an open web and they work with live testing. With a Place and Process, they can make a Plan. And later they make things on a smaller scale and test it in the neighbourhood.

I found his story very inspiring and decided to take the Boerhaavewijk as the context for my project. There is a lot of information available from the university and it is an interesting neighbourhood because there are many similar neighbourhoods in the Netherlands, so what I implement in this neighbourhood could perhaps be applied to more locations.

“Think as a gardener, not as an architect.”

“Design beginnings,
not endings.”

(Jeffrey Bolhuis, 2022)

LECTURES & SITE VISIT

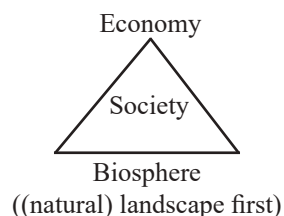
I have come up with new ideas for this project and found out that I can research an awful lot and go in many different directions. Hopefully, therefore, I will speak to my research tutor soon, for some guidance. I can make a list of the different thoughts I have about the Boerhaavewijk:

- Looking specifically at housing: doing a renovation vs new construction assesment; do you go for renovation or demolition resulting in new construction?
- Mobility aspect: how is ov? What to do with the amount of existing parking spaces? How do we make them water resistant in future heavy rain?
- 'Rewilding' in cities, do you want to let certain developments go freely or do you steer them? And if you steer developments, how do you steer them?
- Analysis into what facilities exist and what is missed.
- Look at density; is there more development potential?
- Make a section timeline of Boerhaavewijk of the future.
- Investigate what the landscape of a particular area was like before urbanisation. Find or make a map and lay it over the existing situation.
- Envision what the policies mean in the larger scale and future.

These are just some ideas and one does not exclude the other, of course. I would make a mix of the above, depending on my research.

Furthermore, I attended Green Cities Europe's Landscape-Based Urbanism lecture. A very interesting afternoon with several speakers on the subject. What I learnt from this and take away for my project:

- We face three challenges: urbanisation, climate change, biodiversity loss;
- We need to reverse the existing hierarchy:



- Cocreating knowledge
- For Landscape-based Urbanism, there is a research perspective and a design perspective. The research perspective deals with urban biodiversity and metropolitan parks & networks. The design perspective is about crossing disciplinary boundaries.
- Nature is a wild term, it is not a place. Landscape is a place. Nature is about all processes; chemical and biological processes. Landscape includes culture, both natural processes and social, political, economical processes. It is the shaping of land, people and place.
- As designers, we are not just solving problems, we are creating opportunities.
- Understand the urgency.
- Be multidimensional, multifunctional and productive, this requires thinking on different scales and an integrated approach at all levels.

I have also made a draft of my Research Plan, see the next page. I still have to work out the planning.

Finally, this week I made a first visit to the Boerhaavewijk itself, to get a first impression and ideas. What struck me during this:

- The vast majority of this neighbourhood consists of houses, both terraced houses and flats;
- There are many schools/nurseries/playgroups;
- There are lots of cars and parking spaces;
- There is only one supermarket (Lidl)
- There is quite a lot of green space already present, and potential for more green space;
- There is a lot of stone (streets and houses/buildings);
- I saw a lot of immigrants and got an impression that mostly people with lower incomes live there;
- New buildings are being built;
- I saw people and children on the streets;
- There are playgrounds present;
- There are low and high-rise buildings mixed together;
- There are many high plinths at building blocks.



Cycle route during site visit, on 30 September 2022

DRAFT RESEARCH PLAN

Rewilding Cities: a literature study on (urban) rewilding and possible implementations in cities, and research on nature-inclusive designs in a typical Dutch urban area, Boerhaavewijk, in order to increase biodiversity.

Keywords

Rewilding cities, biodiversity, nature-inclusive design, green architecture, nature-based solutions, Boerhaavewijk, Haarlem

Problem Statement

We live in a climate change-affected world where cities account for sixty to eighty percent of global greenhouse gas emissions (Lehmann, z.d.). Individuals, governments, and companies are increasingly working to reduce their nitrogen emissions. And this is much needed, as biodiversity loss continues to increase. Creating wild areas all over the earth would bring back biodiversity according to David Attenborough, and biodiversity would do what it does best: stabilize the planet (Attenborough & Hughes, 2020). In addition, urbanization continues to increase and existing buildings need to be renovated to be more sustainable or even energy neutral.

Objective

The graduation project intends to do research on how to create more biodiversity in urban area's through nature-inclusive designs and/or nature-based solutions. I also want to find a design strategy for Boerhaavewijk in Haarlem by predicting future climate change in that neighborhood and responding accordingly.

Overall design question

How to rewild an urban area (Boerhaavewijk) through nature-inclusive designs, keeping in mind a prediction for future climate change for this particular neighborhood?

Thematic Research Question

How to increase the biodiversity in Boerhaavewijk and create awareness and participation among the residents?

Methodologies

- Literature study (What is rewilding, what do scientists say about the future of this area in relation to climate change, etc.)
- Reference analysis (Where has it been implemented, etc.)
- Human subject research (Are residents willing to participate, etc.)

Planning

A scheme of the division of the workload of the graduation project in the 42-week timeframe. Compulsory in this scheme are the examinations at the middle and end of the semester; if required, the possible exams that have to be retaken. The submitted graduation contract might be rejected if the planning is unrealistic

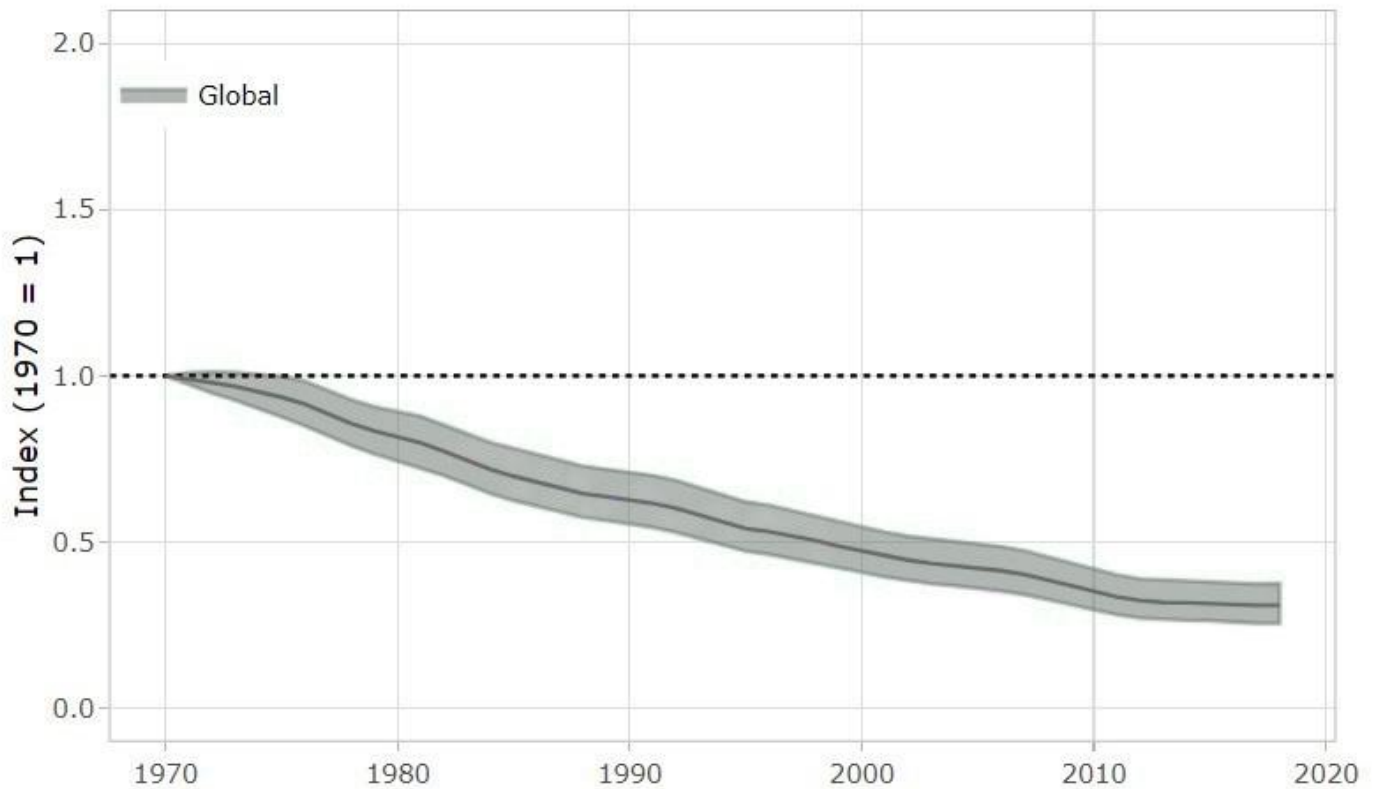
Relevance

My project is primarily a generic study of rewilding cities and then becomes specific to the Boerhaavewijk in Haarlem. The findings experienced for this neighborhood can serve as an example for many other neighborhoods in the Netherlands and around the world.

Literature

I will use existing scientific literature and academic papers for my project. Furthermore, I want to try to interact with current residents of the neighborhood and if possible, gather information through AP+E (Jeffrey Bolhuis) and their living lab.

Biodiversity Loss



Global Living Planet Index (LPI) (WWF & ZSL, 2022)

Rewilding

Ecological rewilding
biophysical nature:
rewilding of water, land
and wildlife

Human rewilding
personal/social/cultural:
urban rewilding

PROBLEM AND SOLUTION STATEMENT

There was a research seminar by Tanya about the problem and solution statement. Unfortunately, I could not physically be there, but I participated through the mural board online. Here you can see the board I created and on the next page the ‘Context/problem statement’, ‘Design vision’, and ‘Research directions’ are zoomed in.

Anneke Groeninx van Zoelen

Context / Problem statement

What is the problem you'd like to solve?

The Earth is no longer in balance: bring back biodiversity to capture CO2 and stabilise the planet

Climate change & CO2

Biodiversity loss

Buildings need energy

Where is the problem situated?

Everywhere

Boerhaavewijk Heerlem The Netherlands

Who is experiencing this problem?

All living organisms

The residents of Boerhaavewijk

REWILDING CITIES

1950:
World population: 2.3 billion
Carbon in atmosphere: 250 parts per million
Remaining wilderness: 66 per cent

1978:
World population: 4.3 billion
Carbon in atmosphere: 315 parts per million
Remaining wilderness: 55 per cent

2020:
World population: 7.8 billion
Carbon in atmosphere: 415 parts per million
Remaining wilderness: 39 per cent

Rewilding:

- A process to reestablish balance, that values nature, and the desire to live in greater harmony with the planet's natural systems.
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- Progressive activity that mainly involves looking ahead.

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The Doughnut Model

Design vision

How can the problem be solved through architecture?

Nature-inclusive designs & nature-based solutions

What architecture technology / engineering solutions are there?

Green roofs
Green facades

What architectural design solutions are there?

Green roofs
Green facades

What are the references for these solutions?

Case studies & examples from all over the world
Literature & academic papers on rewilding cities

What is your design question?

How to rewild an urban area through nature-inclusive designs?

Research directions

What is rewilding?

Why would we want to rewild cities?

How to rewild cities?

Design

Design 1800: designers would be fully integrated with other disciplines planning architectural and landscape around all scales

Design 1900: designers would be fully integrated with other disciplines planning architectural and landscape around all scales

Design 2000: designers would be fully integrated with other disciplines planning architectural and landscape around all scales

Design 2100: designers would be fully integrated with other disciplines planning architectural and landscape around all scales

Design 2200: designers would be fully integrated with other disciplines planning architectural and landscape around all scales

Design 2300: designers would be fully integrated with other disciplines planning architectural and landscape around all scales

Design 2400: designers would be fully integrated with other disciplines planning architectural and landscape around all scales

Design 2500: designers would be fully integrated with other disciplines planning architectural and landscape around all scales

Design 2600: designers would be fully integrated with other disciplines planning architectural and landscape around all scales

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Design 2900: designers would be fully integrated with other disciplines planning architectural and landscape around all scales

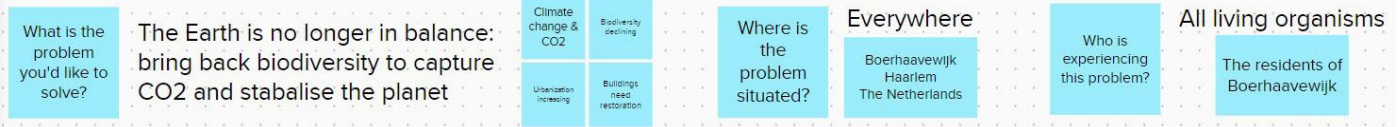
Design 3000: designers would be fully integrated with other disciplines planning architectural and landscape around all scales

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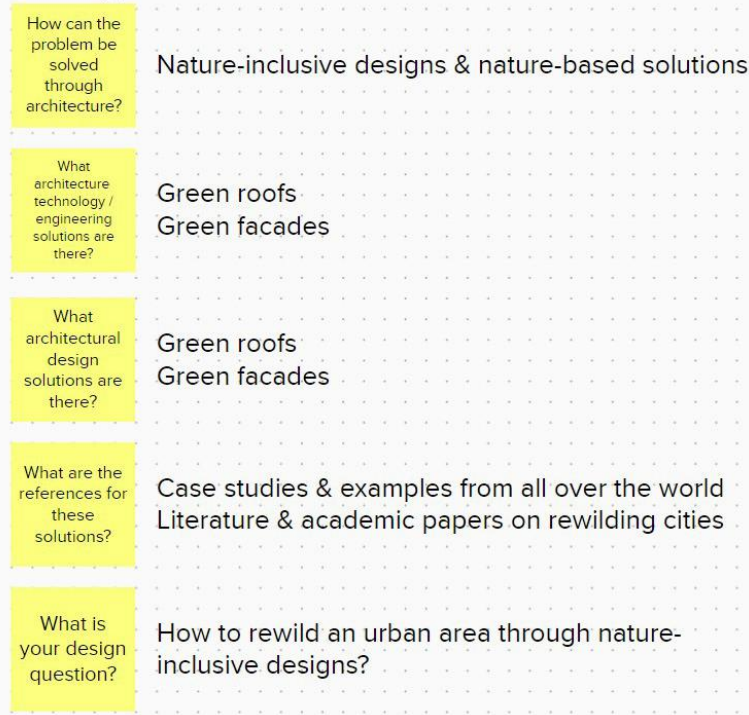
ME MSC3 A1 poster week 2 Rewilding Cities.pdf

Furthermore, I watched an interesting film/documentary about a farm in the US: The Biggest Little Farm. It was not only interesting to see how they were able to turn a lifeless place into such a dynamic farm, but also made me realise more again that biodiversity is the solution we are looking for.

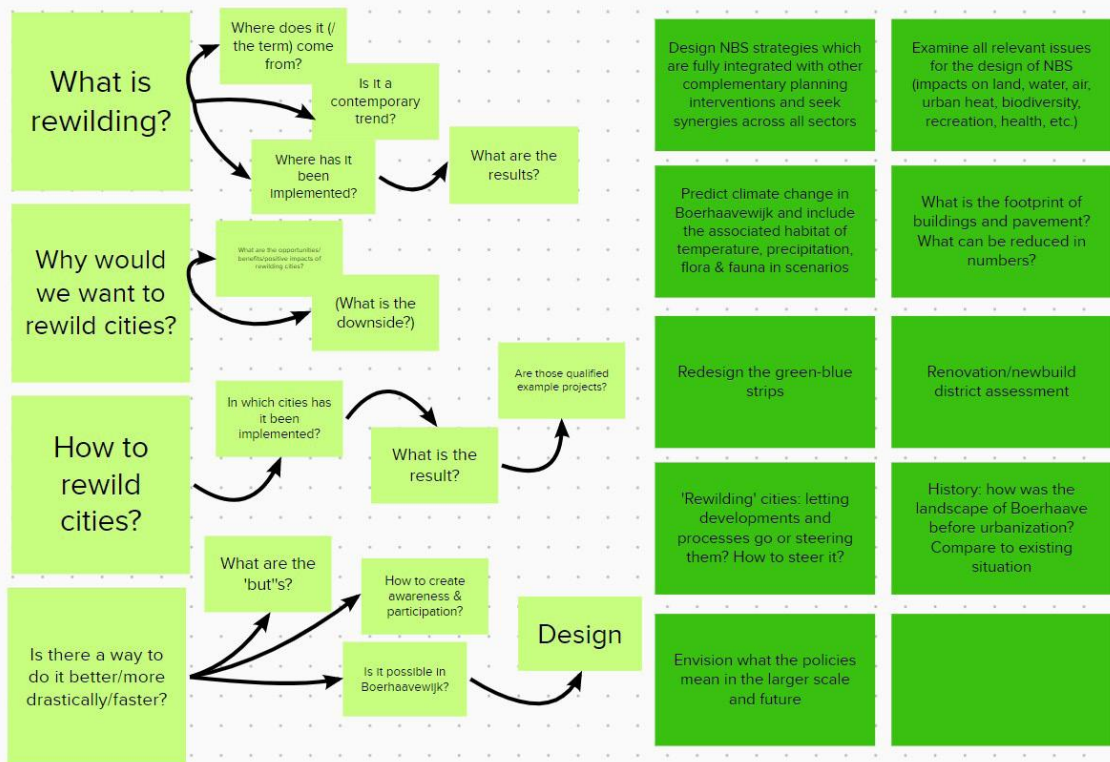
Context / Problem statement



Design vision



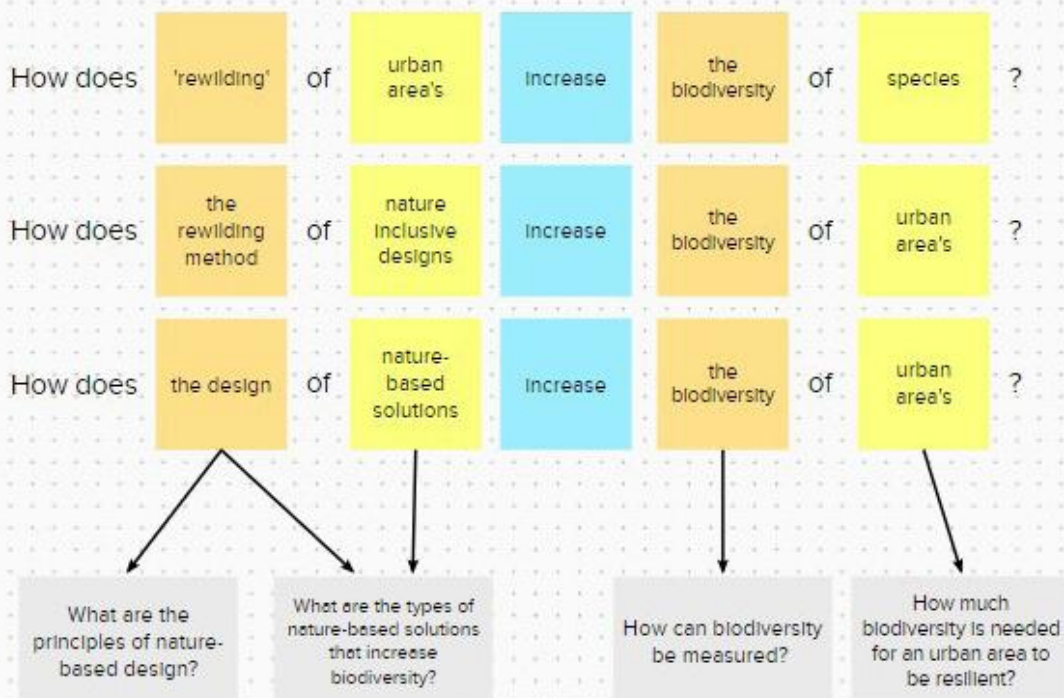
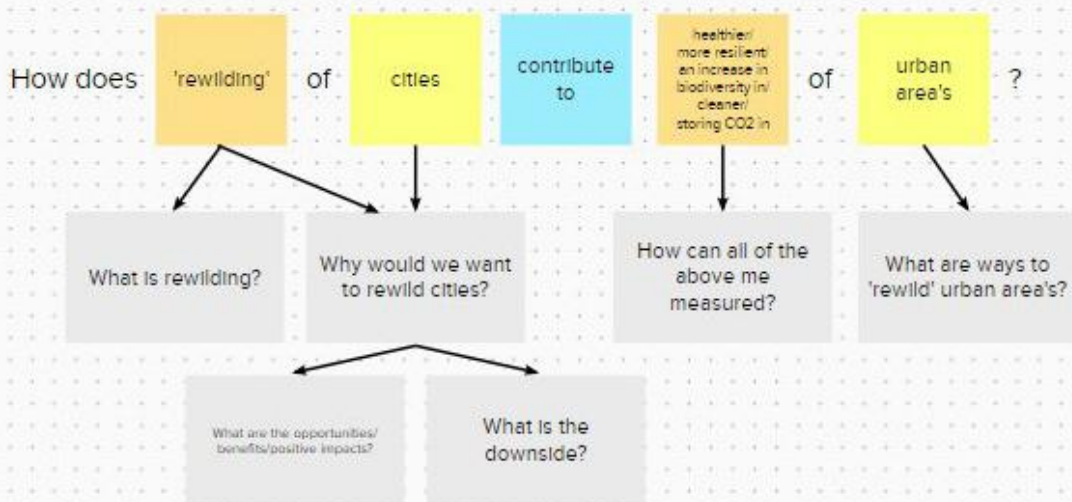
Research directions



RESEARCH QUESTION

Research question seminar Tanya

Annekee Groeninx



THINKING OUT LOUD

We (Miriam and Liam, two other students from aE, and I) have had our first talk with our research tutor Nico Tillie. It was a very interesting meeting and we have shared a lot of ideas and possibilities for our research. The bottom line is that my concept is still too broad. What do I want to do with 'Rewilding'? After this meeting, I had to process everything and think for myself. I asked myself the question that Anne has been asking me last week: what is the urgency question? Making the neighbourhood sustainable. So, tie something to that to also make the neighbourhood liveable.

After a lot of processing, thinking, reading articles and listening to podcasts on biodiversity and greening cities, I dived into 'biomimicry' or 'biomimetic architecture'. This is innovation inspired by nature, taking inspiration from nature, imitating and replicating the behaviour of biological organisms. Janine Benyus describes in her book 'Biomimicry: Innovation Inspired by Nature' three aspects that relate creation and human innovation with nature:

- Nature as model: biomimicry is a new science that studies nature's models and emulates these forms, processes, systems, strategies to solve human problems, sustainably.
- Nature as measure: biomimicry uses ecological standard to judge the sustainability of our innovations (after 3.8 billion years of evolution, nature has learned what works and what lasts).
- Nature as mentor: biomimicry as a new way of viewing and valuing nature.

Biomimetic architecture is a multidisciplinary scientific approach to sustainable design that goes beyond using nature as inspiration for aesthetics but rather deeply studying and applying construction principles that are found in natural environments and species.

As I delved more and more into this phenomenon, it occurred to me that three types of biomimetic architecture could be distinguished:

- Biomimetic architecture for people, where the biomimetics is mainly in the technique imitated from nature, resulting in aesthetics;
- Biomimetic architecture for nature, where the biomimetics are mainly in mimicking protected spots for animals, such as nests for birds;
- Biomimetic architecture for nature and people, where mainly the outside of a building is for nature and the inside is for humans.

With this distinction and the examples by category on the following pages, I came up with new questions:

How to use biomimetic architecture to build for nature?

How does the design of biomimetic architecture increase the biodiversity of residential neighbourhoods?

How can biomimetic architecture be used to both design for nature and people?

What are the types of biomimetic architecture that increase biodiversity?

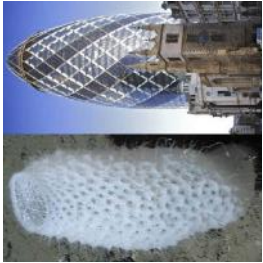
How can biodiversity be measured?

How much biodiversity is needed for a residential neighbourhood to be resilient?

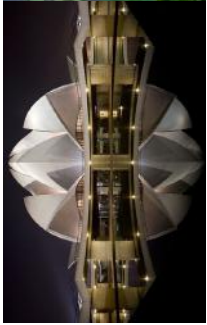
How was the landscape and the biodiversity and habitats in history in this area?

How to build in this area for nature?

What is missing in this neighbourhood (for people)?/What does Boerhaave need?



The Gherkin, London, by Norman Foster (Inspired by Venus' flower basket sea sponge)



Lotus Temple, New Delhi, by Fariborz Sahba (Inspired by the shape of the lotus flower)



The Cube Houses, Rotterdam, by Piet Blom (Inspiration from a forest of trees)



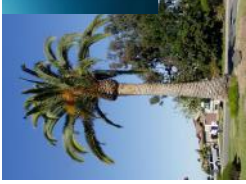
Beijing National Stadium, Beijing, by Herzog & de Meuron (Inspiration from a bird's nest)



Helix Bridge, Singapore, by Architects 61 & Cox Architecture and Arup (Inspiration from the double helix structure of a DNA molecule)



Taipei 101, Taiwan, by C.Y. Lee & Partners (Inspired by the indigenous slender bamboo)



Palm Islands, Dubai, by UAE Architecture Development (Shaped like a palm tree)



Water Cube, Beijing, by PTW Architects (Inspired by water and bubbles)



Chicago Spire, Chicago, by Santiago Calatrave (Inspired by a seashell)

BIOMIMETIC ARCHITECTURE FOR PEOPLE



The Council House 2, Melbourne, by DesignInc (HVAC system: modeled on that of a termite mound)



Aldar Headquarters Building, Abu Dhabi, by MZ Architects (Inspired by a seashell)



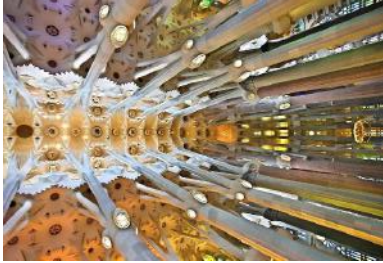
Redwoods Treehouse, New Zealand, by Pacific Environment Architects, Ltd. (Inspiration from insect cocoons)



Atomium, Brussels, by André Witterkeyn (Inspired by an iron crystal enlarged 165 billion times)



World of Chlorophyll, New York, IAMIZ Design Studio (Inspiration from trees capturing sunlight and turn it into energy)



Sagrada Familia, Barcelona, by Antoni Gaudi (Inspiration in nature: a forest with tree trunks and their branching canopies)



Cactus Project, Qatar, Aesthetics Architects Go Group (Inspired by the ability of cacti thriving in a desert)



Center for Disease Control BioLab, Taiwan, by Manfredi and Luca Nicoletti (Inspired by the shell of a nautilus)



Fake Hills, Beihei, by Mad Architects (Takes the shape of hills)



Vleermuisbrug, Monster (NL), by Next Architects

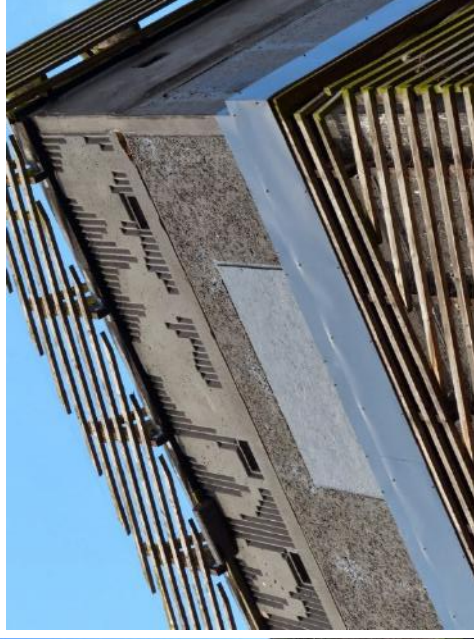


Sugarloaf Key Bat Tower, Florida, by Charles Campbell

BIOMIMETIC ARCHITECTURE FOR NATURE



Fledermausurm (Bat Tower), Meiningen (D), by Housing Association Meiningen (WBG)



Vleermuisstoren, Boekelo (NL), by The Cloud Collective & Natuurinclusief



Nature Boardwalk Lincoln Park Zoo,
Chicago, by Studio Gang
Inspired by the animal exoskeleton



Mercator Sportplaza, Amsterdam, By Venhoeven CS



Mellor Primary School, UK, by Sarah Wigglesworth Architects. The habitat wall



Library Delft University of Technology, by Mecanoo



Ecokathedraal,
Heerenvveen, by
Louis Le Roy



Common swift nests
integrated in
façade of the WNF
building, Zeist (NL),
by Rau

BIOMIMETIC ARCHITECTURE FOR NATURE & PEOPLE



M6B2 Tower of Biodiversity, Paris, by Maison
Édouard François



Edificio Santalucía, Colombia, by Exacta Proyecto
Total. World's largest vertical garden.



The Oasis of Aboukir, Paris, by Patrick
Blanc



BP building, Rotterdam, by Group A.



Mirrorcube Hotel, Sweden, by Tham & Videgard Arkitekt. Camouflaged in forest, reflecting its surrounding natural environment



The Shell Mycelium Pavilion, India, by Yassin Areddia Designs. The fungus ate the wood and merged with it. The structure then biodegraded.

THINKING OUT LOUD

I can answer the last question (what is missing in this neighbourhood and what does Boerhaavewijk need?) based on my first visit to the neighbourhood: public facilities for cultural and sports activities, meeting places and a park.

We face several problems today: besides declining biodiversity, we also have a housing shortage and a need for fine and liveable places. I want to tie these two aspects together and this is where my new idea was born: researching the use of biomimetic architecture for nature, in order to then design a building where the needs of residents in Boerhaavewijk are met. So I am moving on to the third category: biomimetic architecture for nature & people.

At this point, I think I will end up designing a building that is entirely for nature on the outside (and perhaps partly on the inside), while creating a public programme for people inside.

However, through all the prior knowledge I have gained about rewilding, I hear myself asking the question a few times: *can* you actually design a building for nature? If it is for nature, then is it not better to do nothing at all and let nature thrive? Architecture is an anthropocentric discipline, so rewild architecture and think about architecture & nature as a united whole.

I read the papers of two students from the Architectural Engineering studio who graduated last year. I got a lot out of these as one discusses biodiversity in Schalkwijk and the other shows architectural interventions that are applicable. What I took from their papers:

A design strategy for a nature inclusive building, by Ciske Buiter:

He concludes that to set up a design strategy that is nature inclusive, the location needs to be thoroughly studied with the help of experts in the field of ecology to translate nature's requirements to the design elements. He used the help of Eline Hin, she is Haarlem's urban ecologist and specialized in nature inclusive building. The biodiversity is hard to measure but together, they made a list of biotope requirements for Schalkwijk which will serve me very well and save me a lot of time. Furthermore, he concludes that Schalkwijk is an ideal connection to the outside area and that the Poelpolder is a potential spot to become an ecological hotspot. This area is a clear connection to the surrounding ecology. This is very interesting to me as I want to make a connection between nature and the residential area and increase biodiversity there.

Nature inclusive design in high-density urban development to support urban biodiversity, by Ella Wildenberg:

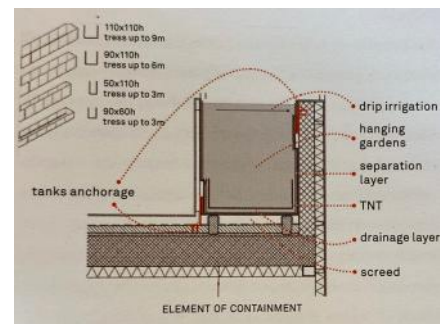
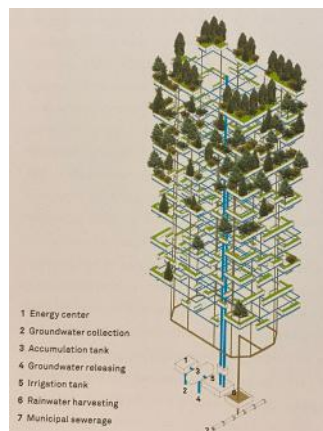
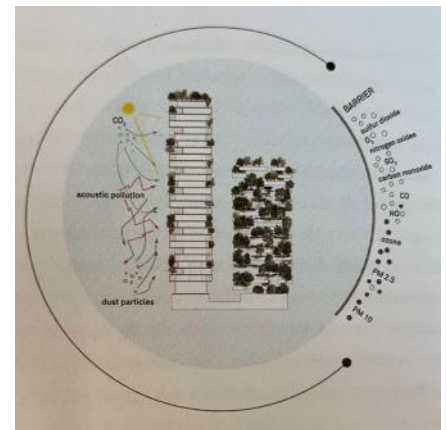
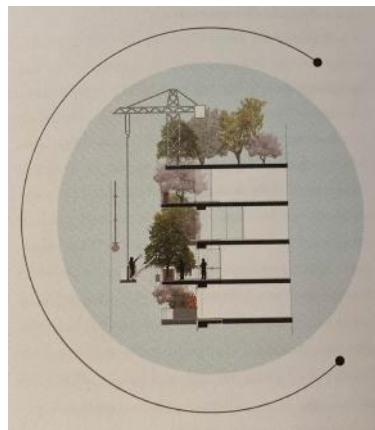
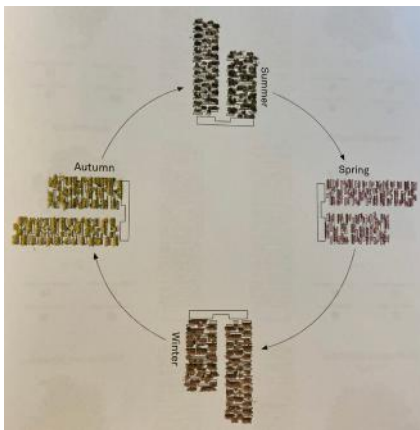
This paper concludes that the focus in nature inclusive design until now lies on how greenery can benefit humans; how to optimize the benefits for human from ecosystem services provided by the natural environment. Attracting and/or supporting animals has been a nice side issue. Nature inclusive architectural interventions can provide all three requirements (food, shelter, and a place to reproduce) for animal species to settle. Her recommendation therefore is to have central information or a data point where local biodiversity of a project (animal & plant species) can be linked to architectural interventions and spatial requirements that designers can use as tools in their design for a project.

So what I can use from Buiter's project is the current ecosystem and biodiversity in Schalkwijk and from Wildenberg's project I can apply the architectural interventions at this particular ecosystem to this.

CASE STUDY

Bosco Verticale, Stefano Boeri, Milan

To analyse the Bosco Verticale, I dug out Stefano Boeri's book 'A vertical forest/un bosco verticale'. It is an instructions booklet for the prototype of a forest city. He also calls the Bosco Verticale 'A house for trees and birds, inhabited also by humans, in the Milan sky'.



B O S C O V E R T I C A L E

Facts & Numbers	Architectural elements	How for nature?	How for people?	Biodiversity & Environment	Opportunities	Materials & Structure	Disadvantages
2 hectares of forest 4-6 annual pruning 100 cm thickness of soil substrate 94 different plant species (20.000 plants of different kinds) 325 cm total balcony depth 480 humans 1600 birds & insects 19.825 kg/year CO2 absorption 40.000 m2 built surface area 100.000 m2 expansion area of single-family homes (equivalence in terms of urban density) Tower E 111.15m (26 floors), Tower D 78m (18 floors)	Balconies: most important element from an architectural standpoint. They integrate pots that house plant species, provide the ideal environment for formation of microhabitats, constitute extension space for the lived internal areas and meeting points between human and animal and plant life. → balconies are branches of a tree. Changing landmark: changing landscape to city dwellers. Colour elements vary significantly throughout the year. Also the textures of the solids and voids formed by branches and leaves. Densification: model of densification of greenery and the built environment.	Radical non-anthropocentric vision: green is not “domesticated” by architecture. “a home for trees inhabited by people”	Residential towers. Within the complex an 11-story office building. “a home for trees <u>inhabited</u> by people” 1 person = 30 animals = 8 shrubs = 2 trees = 40 bushes	Various types of green – tree, shrub, suspended lawns, vertical green connections between the arboreal centres – give life to an environment able to support species (redstarts, kestrels, tits, goldfinches, turtledoves, bats, insects such as diptera, spiders, butterflies, beetles). Microclimates: plant filters help to reduce energy consumption of buildings (about 30% less), absorb CO2, filter out fine dust particles present in air, mitigate noise pollution, protect from direct sunlight and wind and produce oxygen and moisture. Soil: solution that minimizes the load imposed on the building: a particular soil identified that was very light but at the same time able to meet the nutritional need of the plants. Formed by a mixture of organic and inorganic materials, well drained and enriched with fertilizers. One metre of thickness of the cultivation substrate. 100 different plant species, incl. 15 species of trees, 45 shrubs and 34 types of perennials, >20 species of birds, different insect populations (some of which were released inside the vegetation in order to fight plant pests without using pesticides).	The creation of a series of Vertical Forests in an urban setting can generate a network of environmental corridors able to connect with the habitats of urban parks, green spaces, avenues and gardens, the natural vegetation of the city. It can be designed to house wind turbines on the roof, photovoltaic panels and solar panels on roof and facades. Irrigation of plants can be organized largely through filtration and purification of waste water produced from within the building. Significant reduction of energy consumption produced by artificial air-conditioning machinery by the shield formed by plants along the perimeter of each floor. → alternative to large residential towers with glass (curtain walls) which require considerable energy. Replicability: designed to be a variable and replicable model, able to form the basis of a series of interconnected interventions → due to its ability to act as an attracting element for biodiversity and as a driving force for new urban centres. Can also be adapted to different types of intervention – public buildings or private residential structures, tertiary sector, representational or public structures – and can add value to abandoned buildings or those whose construction has been interrupted.	Facade solutions based on wood paneling and exposed concrete, ceramic cladding panels. Structures/frame works in reinforced concrete cast on site. Floors: post-tensioned concrete. The post-stress technique allowed slab thickness to be limited at equal flow rates → limiting amount of cement. Max. internal span of 10m, terrace overhangs 3.25m (6m for corner terraces). 3D façade: complex system with three dimensions.	A lot of maintenance and probably very costly. It's a result of a vision that puts the concept of biodiversity before that of sustainability.

B O S C O V E R T I C A L E

Further information

Boundaries/challenges: Green is a common good which goes beyond the boundaries established by individual properties. The vertical development makes the flora and fauna of the Vertical Forest an integral part of the urban landscape, which everyone can enjoy. On the other hand, the connections in environmental terms that develop between the habitat of the Vertical Forest and the surrounding urban green areas help to diminish the sense of limits between “private building” and “public space”. This diminishing of the sense of limits can also be found within the Vertical Forest. The interplay of irregularity between balconies, necessary for upward growth of larger trees, has produced two types of potential “invasion” of the space of others: that of more developed plants, and that of the looks or glances of the inhabitants. The combination of these two aspects has blurred the perception of “limit” between one balcony and another, and between one private property and another. The resulting relativization of the sense of intimacy and the change in the dynamics of socialization of the residents constitutes a unique and experimental element of the project. Within the Vertical Forest the traditional ideas and sense of limits in terms of 20th century models of living have been completely outdated.

Implantation (criteria of): the compositional, morphological and technical criteria defining the external appearance are intertwined with similar criteria regarding the installation design of the plant system. Placement of plants established by taking into account their specific needs in terms of exposure – evergreens on the south-west side, deciduous on the northeast -, development in height in relation to the design of the balconies and of the impact on the level of comfort in the apartments. These criteria have informed and led the composition project itself, developed on the base of the ornamental and formal qualities of the plants, and taking into account the image provided by the façades both as a whole and in the areas corresponding to individual residential units.

Irrigation system: a centralized “intelligent” drip system, designed according to the needs, distribution and placement of the plant organisms present inside it. The water system does not use drinking water but recycles that resulting from other uses (e.g. water from air conditioning systems with the use of ground water). Maintenance is centralized: a single company is capable of managing the system and works according to a five-year plan.

Maintenance system: need for targeted programmes of maintenance and control of the greenery, planned right down to the smallest details. Vegetation is regularly taken care of through periodic actions (pruning, fertilizing, plant protection monitoring and anchor systems), managed directly from Porta Nuova property and entrusted to specialized companies. The maintenance programme adopted consistently delivers economies of scale compared to piecemeal management of the task. Checking health of trees, shrubs, ground conditions and root system provided by a team of agronomists which coordinates the interventions and adapts the maintenance plan to the different seasonal conditions, then operated by a team of gardeners and climbers. Outside operations conducted thanks to purpose-built cradles supported by two fixed cantilever crane supports positioned on the roofs of the towers. Maintenance programme includes the carrying out of one annual external operation for pruning and four/six annual internal operations by means of access to the apartments by a pair of specialized workers. Once a month, between May and October, a monitoring and check of the phytosanitary progress and general status conservation of the plants is also carried out. Any pest attacks are controlled biologically.

Pots: plant pots are a project-in-a-project of the Vertical Forest. Placed along the peripheral edges of all balconies, with linear development of approximately 2km, different depth levels (50 – 110 cm) and a constant height (1m10). Made of concrete, designed to ensure water resistance and drainage ability, as well as preserving the specific features of the soil.

T H I N K I N G O U T L O U D

Do I want to design one building at one specific location or look at the bigger picture? For example by adding elements to existing buildings to draw nature into the area.

An intervention which makes the transition from nature to residential area softer.

Haarlem: landscape zone vs. built zone. There I want to make a connection in relation to the architectural aspect. Will it be a building as an ecoduct? Green corridors?

If I design a general or specific building, what should I take into account? Can I make a list with requirements to nature and with the requirements to the urban part? *What is the list of requirements for a nature inclusive building in a residential area in the Netherlands with Boerhaavewijk as a case study?*

But, my interest lies on the border of different landscapes, the transition from nature to built environment. So, my new research question is:

What are the requirements for a nature inclusive design in order to be a biological/ecological connection between a landscape and a built zone in the Netherlands (with Boerhaavewijk as a case study)?

If I continue with this question, there are some words that need to be explained:

- What is a nature inclusive design?
- What is a biological/ecological connection?
- What is a landscape zone?
- What is a built zone?

I also should think of whether I want this to be a question for a specific building or a question in general.

I will tackle this question with the help of three scale levels: the building, the habitat and the system level.

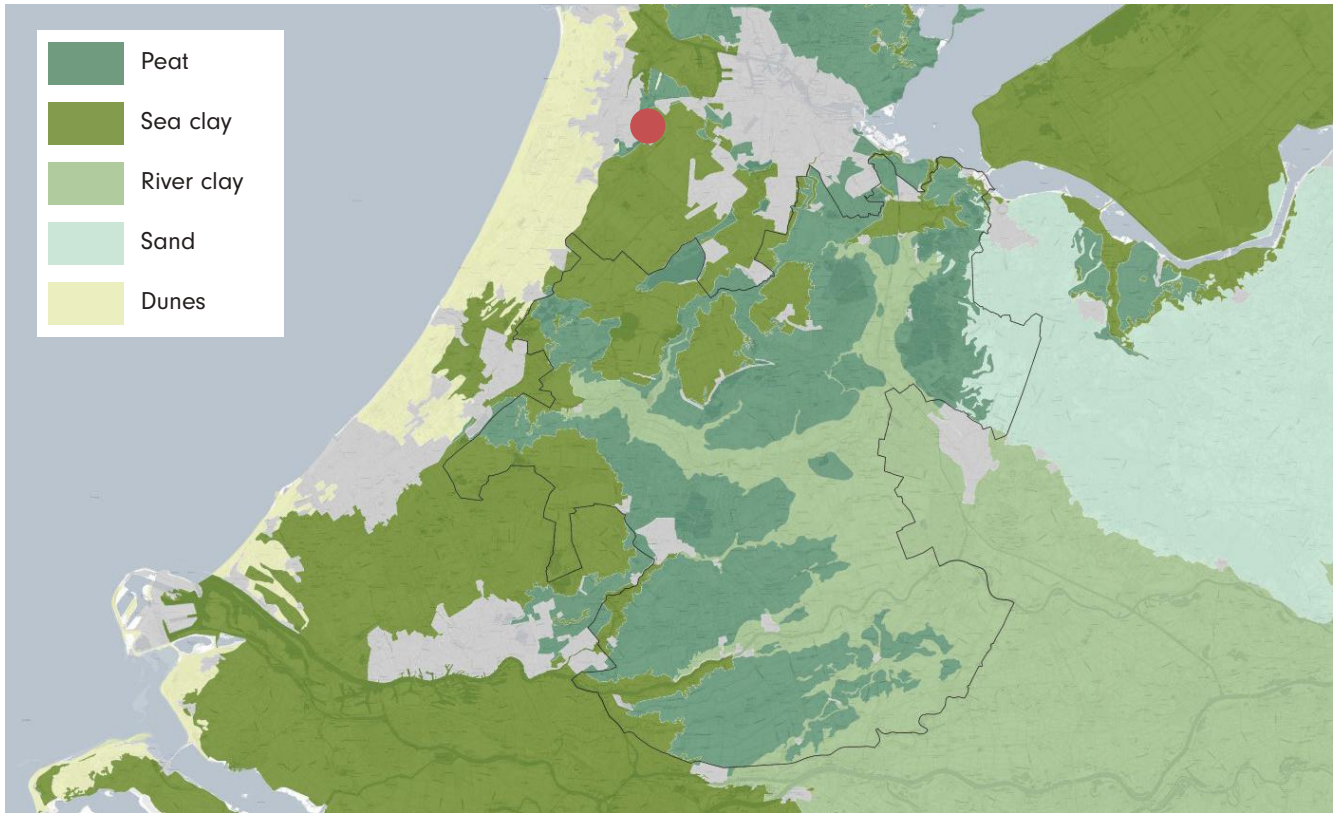
S I T E V I S I T

This week, I visited Boerhaavewijk again and this time, I focussed more on the polder. I wanted to see what potential it has and how it forms a barrier between urban and rural. As shown in the images below, the neighbourhood itself consists of a lot of stone. The only green that is there is ‘grasfalt’ and ‘kijkgroen’; it is all artificial. If I did not know about the existence of the Poelpolder, I would not get there because it is not obvious at all that there is nature on the east side of the neighbourhood. You really have to know the way and that is a real pity. But, once you are there, you see that this natural area has potential. It becomes very clear to me that a connection between the built environment and the polder is missing. Nature should be brought into the neighbourhood and the residents should have an easily accessible and obvious entrance to this nature zone to be able to enjoy it.



RESEARCH PLAN

In weeks 8 and 9, I prepared my research plan. Some of the key maps I made for that purpose I show here.



Soil map



Landscape zones Haarlem





- Forest
- Park
- Green
- Water
- Sports

Boerhaavewijk and the Poelpolder

P1, the first presentation. I presented my full research plan and received interesting feedback. Unfortunately, my research tutor Nico Tillie could not be there, but Anne Snijders, my design tutor, was there. It is clear to Anne what I want to do. But the question now is, where does my topic need our profession? Where is the architect needed? So I will ask myself the question of what we as designers can learn from my project. Anne also mentioned that the process plays a role and that zoning is important. It is good that I will do case studies and learning from those case studies will be an interesting outcome of the research. Next to it, I could draw principles for urban design and architectural design.

To link the concept of rewilding to architecture, I could develop tools and guidelines for designers to apply in the built environment. Then I should study the boundary of architecture and urban planning. Zoning and greening are important for people and the living environment. How to connect species to human beings in order to enrich the neighbourhood? I will try to find an innovative design approach there.

Right now in the neighbourhood, it is people first and not nature first. I want to design in such a way that I create a balance.

Rewilding Cities: Exploring Opportunities for Rewilding the Built Environment through Nature-Inclusive Design

With the residential neighbourhood Boerhaavewijk as a case
study in the Netherlands

Faculty of Architecture & the Built Environment,
Delft University of Technology

P1

Architectural Engineering Studio
Design Tutor: Anne Snijders
Research Tutor: Nico Tillie

Anneke Groeninx van Zoelen
4445929

EXCURSION

On the 17th of November 2023, we went on a trip with all aE students who have Boerhaavewijk as the context of their project. We visited 'De Ringvaart' and met local people. We had the opportunity to talk to people from various foundations in Boerhaavewijk which was interesting, to get to know their problems and wishes for the neighbourhood.



CONNECTING GREEN

Working towards my P2, I came to the conclusion that I want to draw the people out of Boerhaavewijk to the natural area to the east, the Poelpolder, and in the process complete the circle by drawing nature back into the neighbourhood as well. In addition, I want to connect greenery on different scales, not only the ecological main roads but also on a smaller scale, between streets and buildings.



RESEARCH BOERHAAVEWIJK

Besides the literature research I did to write my research paper, I conducted theories and approaches which i applied on Boerhaavewijk, these can be seen on the following pages.

'FOUR NATURES APPROACH'



Nature 1: Remnants of pristine landscapes

Nature 3: Designed urban greenspaces

Nature 2: Patches of agrarian landscapes

Nature 4: Novel wild urban ecosystems

Water



1815



1850



1969



0 500 1000 1500 2000

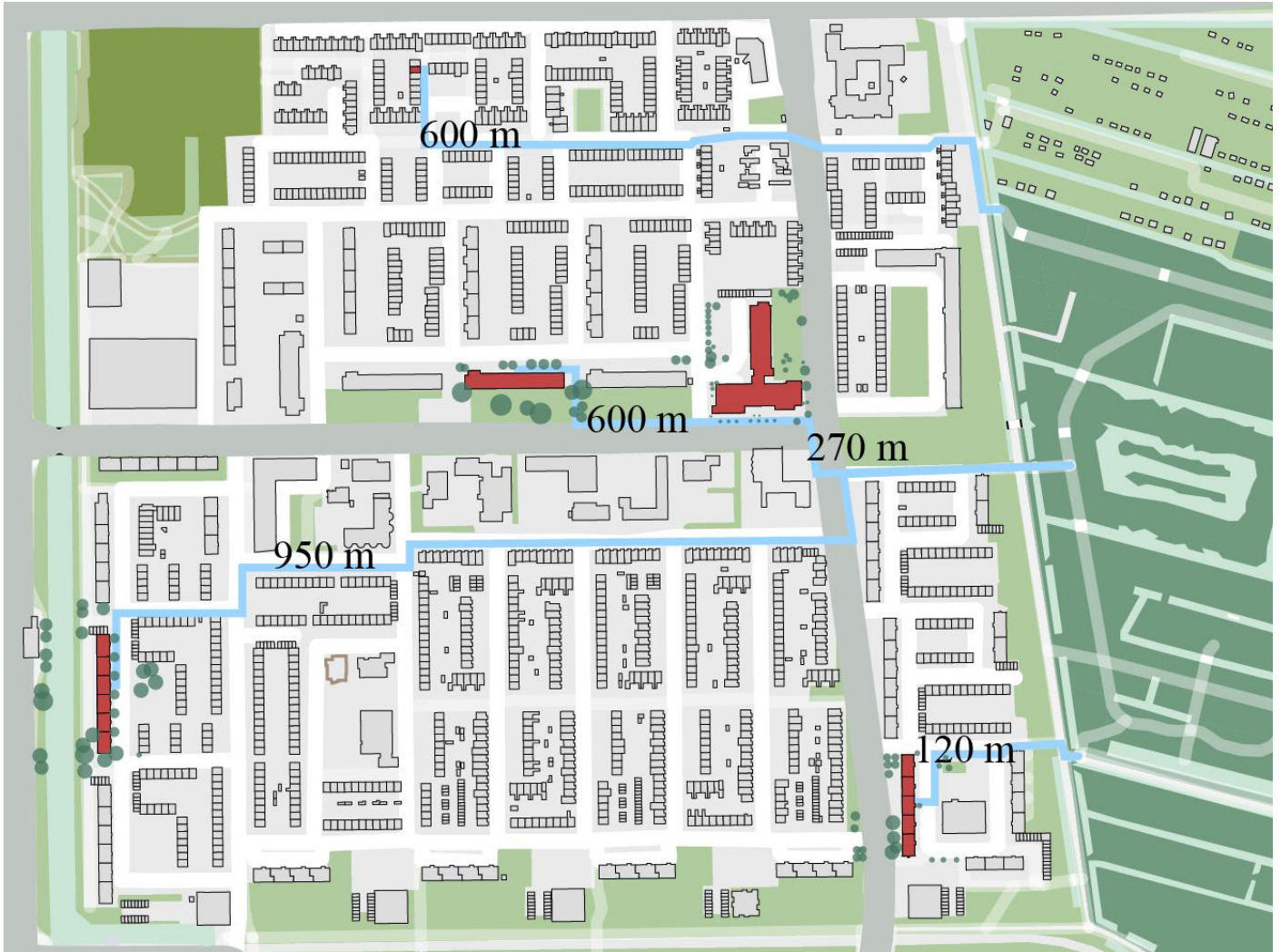
- Dunes
- Coastal plain
- Coastal ridge
- Peat meadow area
- Reclaimed land

GREEN AND WATER STRUCTURE SCHALKWIJK

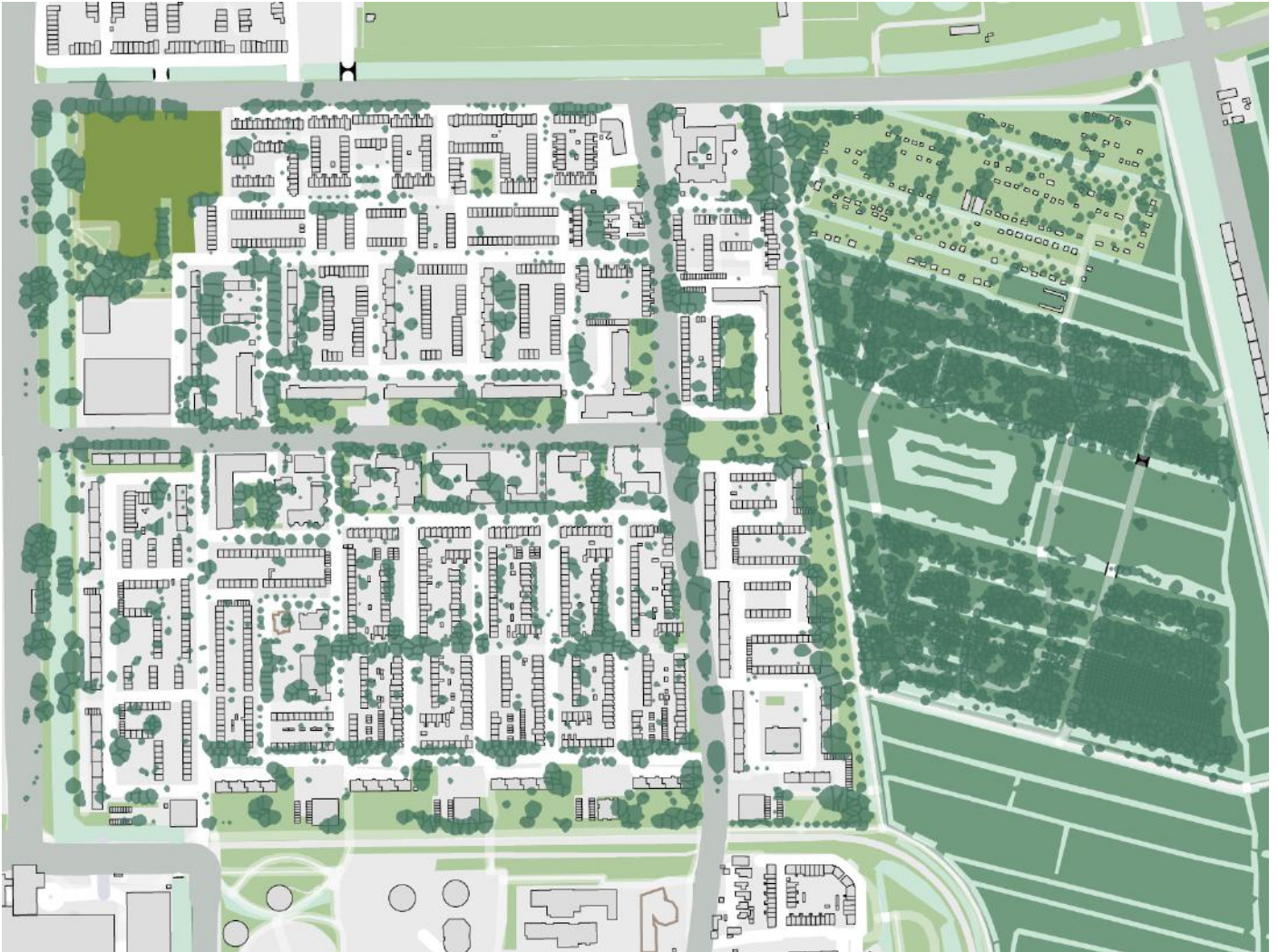


- Forest
- Park
- Green
- Water
- Sports

3-30-300 RULE



TREE CANOPY COVER: 27%



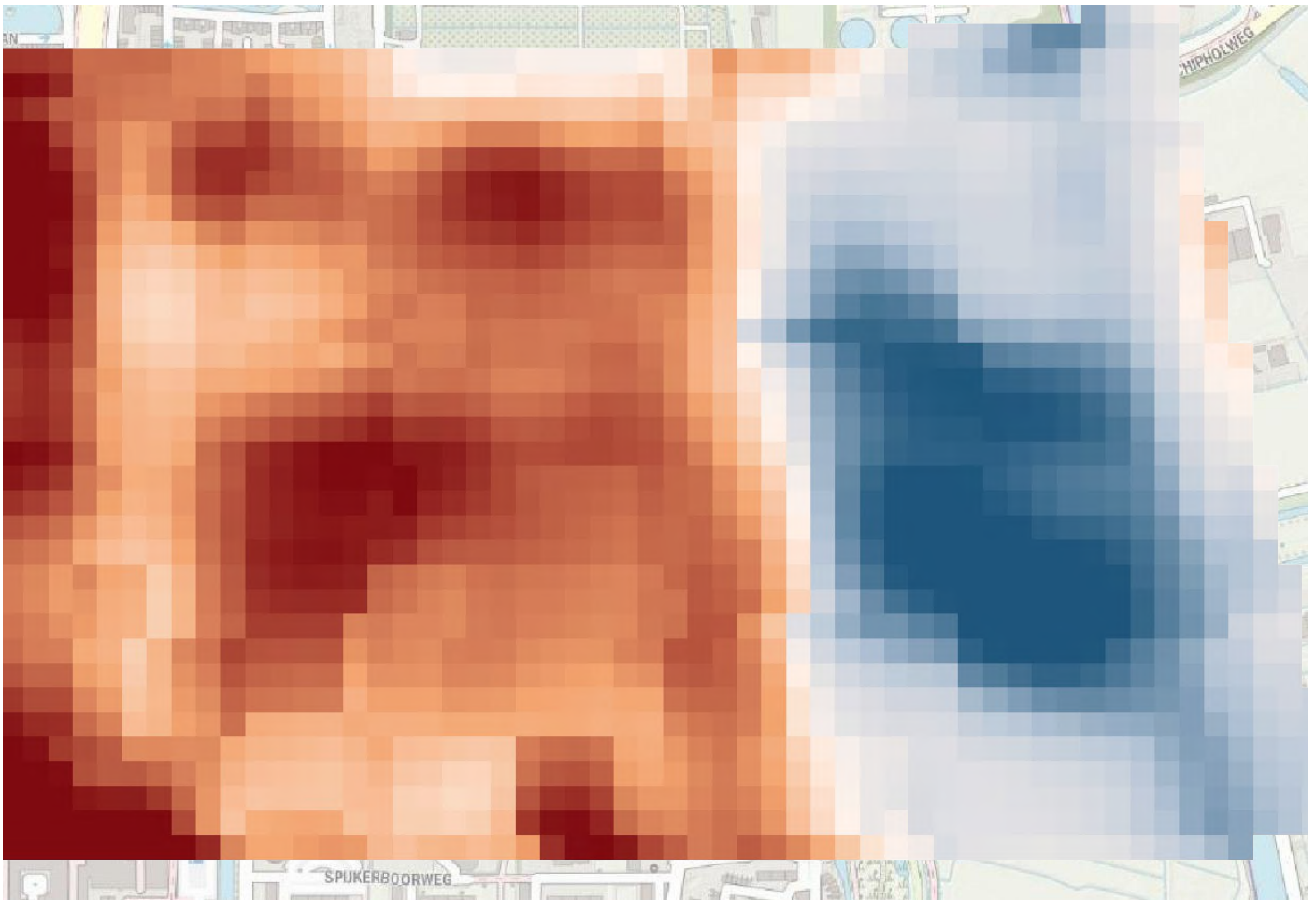
300M TO POELPOLDER



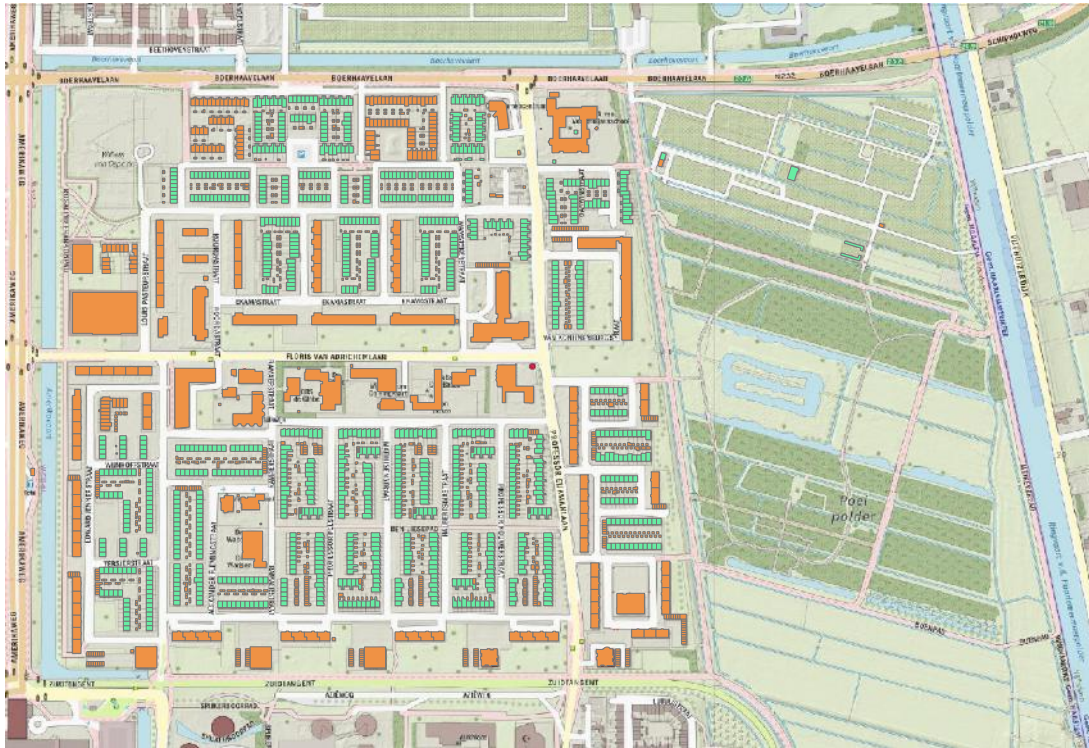
300M TO PUBLIC GREEN SPACES



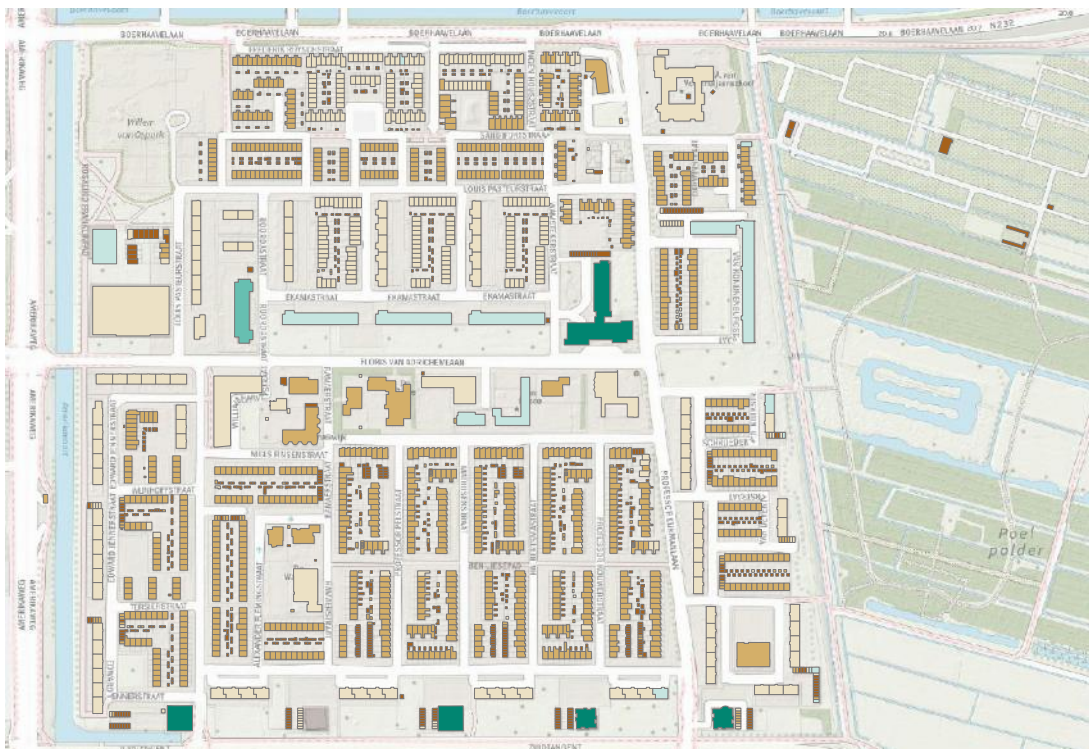
URBAN HEAT MAP



FLAT VS NON-FLAT ROOF



BUILDING HEIGHT (M)



SPECIES & REQUIREMENTS

FAUNA

Species	Nesting height (m)	Habitat info	Feeding	Water	Design elements	Comments
Dragonflies	-	Often found near water sources, preferably stationary water. Also like high and warm spaces	Flying insects such as mosquitoes, flies, hoverflies and butterflies	Near water sources	Undeep permanent water, green-brown roofing	Like all insects, they are dependent on the sun for warmth
Small Newt	-	Undeep water sources, preferably stationary water with nearby vegetation or cairns	Water fleas, small snails, worms and varied insects	Undeep water sources	Undeep permanent water, green-brown roofing	
Sand bees	0	Nests are dug underground on sand surfaces	Pollen and nectar from Butterfly bushes	Not needed	Sand paths. South oriented	Sand paths needed
Hedgehogs	0	Nests are well hidden made of leaves, moss or other material that is often located under (blackberry) bushes or fagots	Beetles, caterpillars, earthworms, earwigs and snails	Puddles that form after rain or undeep permanent water	Hiding cavities on ground level	Hedgehogs are nocturnal
Shrew Mouse	0	Sheltered places such as piles of branches or nests of dry grass and leaves. In gardens, they also often use compost heaps or man-made material	Hunts insects: spiders, larvae, woodlice, snails, worms, moths, mosquitoes and cockroaches, as well as lizards, young mice and carrion	Puddles that form after rain or undeep permanent water	Small cavities in façade, reachable through climbing or walking	Vulnerable to hard sounds. Mainly nocturnal but also active during the day
Common toad	0	Small scale varied landscape with access to deep water.	Ants, beetles and larvae	Deep water	Access to water	
Longhorn Beetles	<1	Often found in (dead) wood	Tree sap, nectar and pollen	Not needed	Small holes in wood on façade. South oriented	Ability to create housing for other insects by digging holes in wood
Natterjack toad	<1	Puddles that form after rain or undeep permanent water and sand paths. Other possibilities are openings in rock-like surfaces	Flies, ants, beetles and spiders	Puddles that form after rain or undeep permanent water	Openings in stone façade	Natterjack toads are mainly nocturnal. Hibernation in piles of leaves
Ermine	<1	A burrow, usually an old mole den or rabbit hole and usually moves along linear elements that provide cover such as hedges, walls, bank lines, etc.	Small mammals, birds and bird eggs	Puddles that form after rain or undeep permanent water	Cavities in façade resembling rabbit holes	
Martens	<1	Warm and dry spaces with soft materials	Small mammals, birds, fruit, insects and fish	Puddles that form after rain or undeep permanent water	Warm and dry cavities in façade	
Mason bees	<5	Nests are created in small holes in wood, reed or stone	Pollen and nectar	Not needed	Small holes in façade, preferably brick or wood. South oriented	Make use of artificially created holes
House sparrow	1 - 10	Nests are often made under roof tiles, in holes and cracks in buildings and in sparrow boxes. Often nest in colonies	Seeds, grains, insects, flower buds, bread, berries, peanuts and fat balls. In the breeding season mainly insects	Puddles that form after rain or undeep permanent water	Holes and cracks in façade. East oriented. Small bird that needs a lot of green in its surroundings. It thrives in messy, human environments, like older sub-urban neighbourhoods with a combination of open and more dense green patches. A complete habitat - food, shelter, nesting space - should be created on a small surface (providing just nesting places is not sufficient).	Picky birds that only come to areas where there are bushes, sand paths and grass. They nest in spring and summer, in colonies. Very social, most nests are in close proximity of another.
Serotine bat	5 - 10	Dependent on buildings for nests: cavity walls, behind the paneling, under roof moldings and roof tiles or under the lead around the chimney	Big night butterflies, beetles and mosquitoes	For hydration they skip over water surfaces while flying	Cavities in façade. West oriented	Notorious for using bat boxes. During mating season colonies are between 10 - 150 individuals.
Swift	5 - 15	Nests often build under gutters, behind a downspout, dormer window, roof tile or in a hole in the wall and also in nest stones. Often swifts tend to nest in colonies. They also live in nesting boxes	Flying insects such as mosquitoes, flies, hoverflies and butterflies	For hydration they skip over water surfaces while flying	Nest stones, rough façade, no reflective surfaces, nooks and crannies. East oriented. Dependent on crevices to nest in to survive. Providing a place for nesting is most important.	No reflective surfaces & no smooth surfaces around their nesting height. The built environment is like a mountainous landscape for the common swift: a rocky environment with crevices to nest in. They live in the air, except when breeding.

FLORA

The site is on a peat meadow area, with reclaimed land immediately adjacent to it to the east.

Residential area & business parks:

Little nature, small-scale private gardens full of shrubs and rich flowering garden plants with garden birds, butterflies and other insects.

Outside area:

Peace and space for bushes, grasslands, water and swamps with even more variety of birds, butterflies and mammals, alternating dry and wet.

Poelpolder:

Biotope: peat meadow area with wet coppice forest

Species: natterjack toad, reed orchid, swamp and riparian plants with it dependent animal life, water rail

Vegetation: grassland

Cross path through Poelpolder

Biotope: clean water biotope with embankment and flowery roadside

Species: possibly water rail, dragonfly species, hedgehog butterfly

SPECIES & REQUIREMENTS

ARCHITECTURAL INTERVENTIONS

INTERVENTIONS FOR FAUNA

- Ground-bound fauna
Approximately 80% of biodiversity lives underground. Soil fauna consists of microfauna (bacteria, fungi, nematodes), mesofauna (mites, springtails), and macrofauna (insects, spiders, millipedes, worms). Important is the absence of chemicals and pesticides, and protection from drought and frost.
- Architectural elements:
 - In a building: a well-constructed vegetated roof design can provide a steady environment for these species.
- Flying fauna
- Insects:
 - Like to seek shelter in walls that are made up of loose stones, horizontally stacked hollow reeds or bamboo, or so called insect hotels.
- Architectural elements:
 - Bricks that are perforated to accommodate insects: Placement and orientation of this element is important. Needs to be providing shelter from rain and wind, located close to flowering plants, and facing south or south-west where the element can be in full sun. Can also be on the roof of a building.

Birds:

Architectural elements:

- Nesting stones that can be fitted in with masonry or added onto a building. Per species the distance between and the height of the implementations and the size of the entrance of these stones varies.
- Roof tiles on slanted roofs (on edge of the roof) can provide a shelter that is a traditional nesting place for birds (such as House sparrow).
- Nesting stones for birds on or in walls. Should be orientated towards the north or north-east (prevents over heating in summer). The flight to the entrance of the stone should not be obstructed by trees or roadside ornaments. The stones should not be placed above windows, to prevent collisions with windows caused by confusion of the birds.

Bats:

During the day dependent on existing hollow spaces in the built environment, such as attics, cavity walls and cavities under roof tiles. Cavity needs to be at least 3 cm wide. They enter via open butt-joints of at least 1.7 cm.

Architectural elements:

- In buildings without cavity walls: bat boxes can be integrated into the masonry, in a similar way as the nesting stones for birds. Several shapes and sizes of bat boxes, for bats need four different types of roofs: one for shelter during the day, one for mating, one for nesting and one for hibernation. Boxes for nesting are larger, because bats nest in breeding colonies of hundreds of females.

INTERVENTIONS FOR FLORA

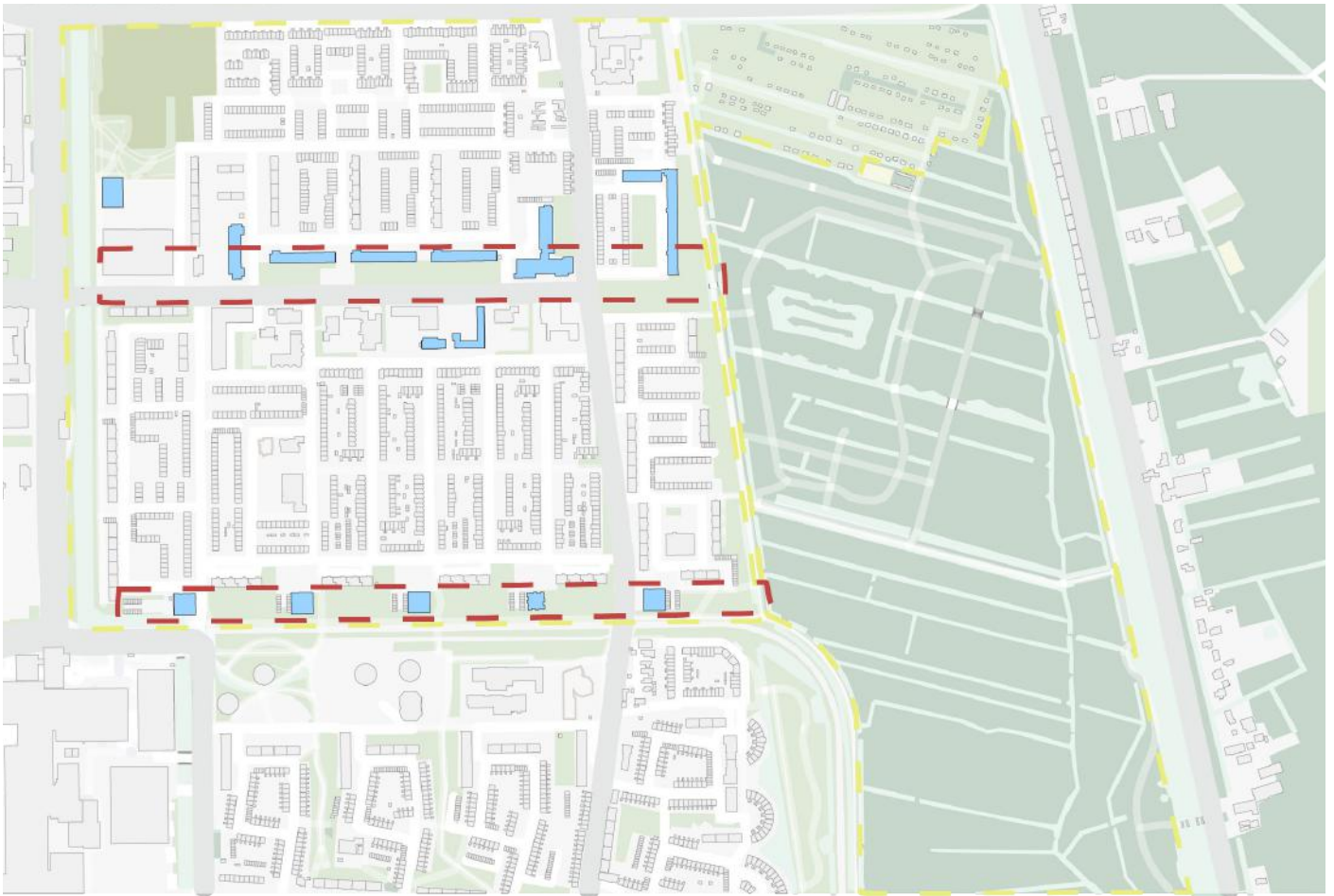
Generally, plants need soil/substrate, water and sunlight to grow, but they have requirements that are species specific, such as orientation to the sun and moisture levels. Take these specifications into account. A general level of implementation of vegetation onto the building envelope:

- Roof
- Brown roof: a literal transplant of the local soil onto the roof. No extra vegetation is added. Vegetation will come and grow naturally with the dispersion of seeds from surrounding natural areas through wind flow or animals.
- Natural roof: intensively vegetated and thus requires a thick layer (at least 150 mm, not including vegetation) of soil or substrate for the vegetation to grow in. Frequent maintenance is needed, so roof should be accessible. To support the and maintenance work, the building's structure should be of sufficient strength. Possibilities for water storage in the layered construction. Because of thick layer of substrate, there are opportunities for more diverse vegetation.
- Sedum roof: extensively vegetated; vegetation can sustain itself without frequent maintenance. Layer is maximum 150 mm thick (not including vegetation). Usually planted with sedum. However, grass and herb species are extensive species as well. The vast surfaces covered in one type of vegetation are not as appealing to animals as diverse natural roofs.
- Mixed-use or utility roof: design focuses on utilitarian function for humans. The flora and fauna will most likely be disturbed by human presence, which can lead to less biodiversity because larger animal species will not settle here. However, for humans, the presence of vegetation on this type of roof is very beneficial; ecosystem services provided by plants: improving human health, cooling the climate, mitigating precipitation and urban heat island effect, filtering CO2 and particulate matter from air, and plants can have a noise cancelling function.
- Green-blue roof: an additional system (to the green roof system where water drainage is slowed because the water first is intercepted by the vegetation and layer of substrate before it is discharged) is integrated where water can be stored temporarily or for longer periods, and where the discharge of water can be regulated.
- Façade

Vegetation on walls has greater potential than green roofs, especially in urban centres where the surface of the façade usually exceeds the footprint of the building.

- Green wall: is a green façade when the plant grows on a horizontal surface and is attaching to or growing along the façade panel. Living walls (LWS; Living Walls System) consist of a supporting structure that makes it possible for plants to grow from the façade panel. This allows rapid and higher covering, and uniform growth on the façade. Other types of LWS: modular systems such as trays, vessels, tiles and bags.
- Façade garden: a narrow strip of greenery - usually on the sidewalk - along the façade where the plants are directly rooted in the ground. The climbing plants grow directly on the façade or they are supported by structures to guide them to higher elevations.
- Balcony with planters: creating space for greenery by putting down plants in pots. Architects can already integrate planters on balconies in design, to create possibilities for natural interaction between vegetation over the whole façade.

PATCH-CORRIDOR-MATRIX



 Patch

 Corridor

 Matrix

PATCH-CORRIDOR-MATRIX



 Patch

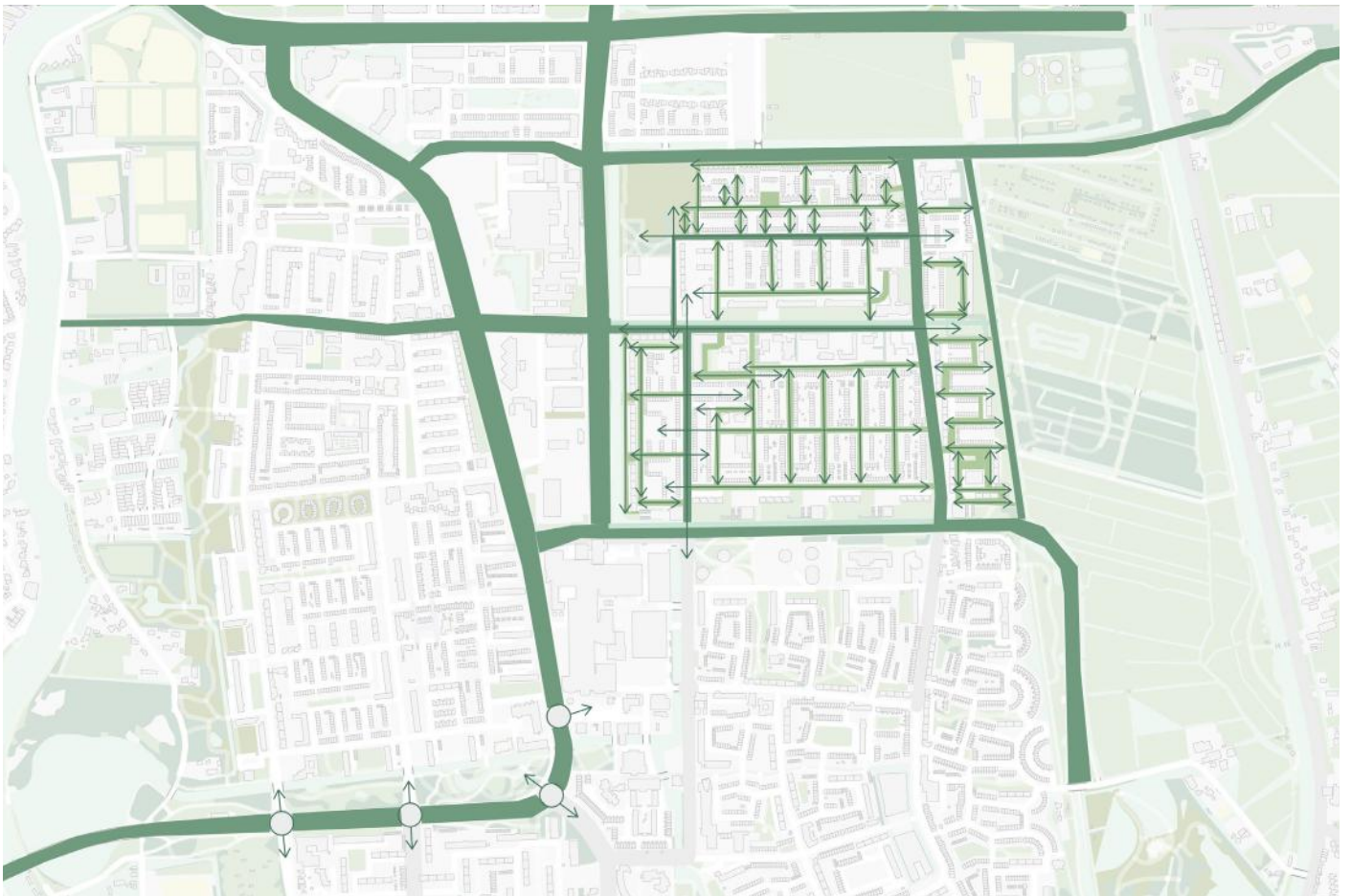
 Potential corridor

 Matrix

ECOLOGICAL ROUTES



CONNECTING GREEN

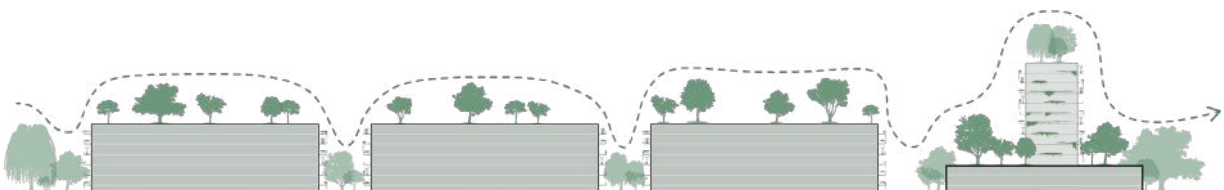


This aerial map illustrates a city block with green arrows indicating movement paths. The map includes various urban features represented by icons: trees, benches, playground equipment, and a person running. The paths are marked with green arrows, showing a network of movement across the block. A dashed yellow line highlights a specific path or boundary within the block.

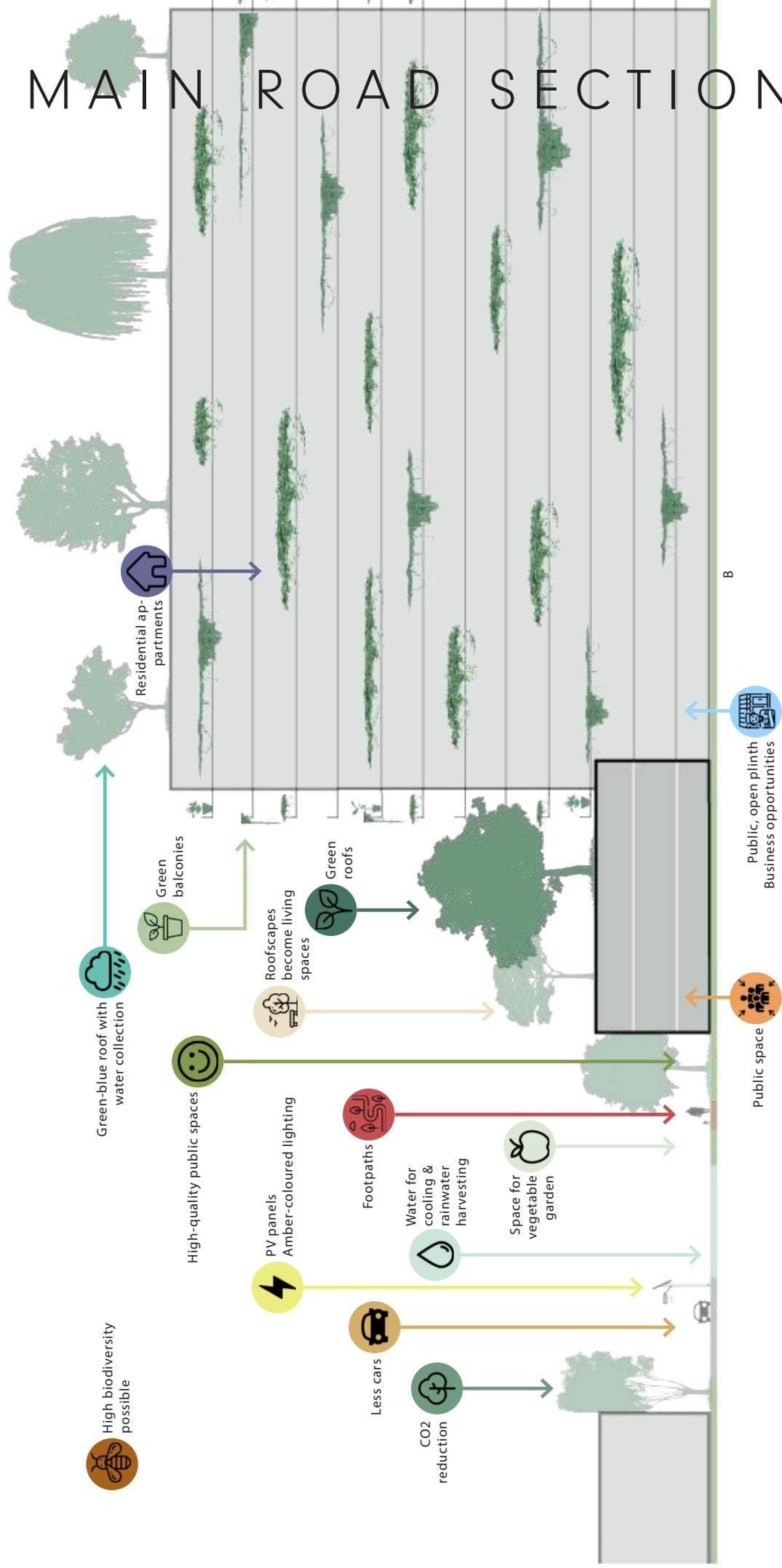
MAIN ECOLOGICAL CONNECTION



“VOORZIENINGENSTROOK”



MAIN ROAD SECTION

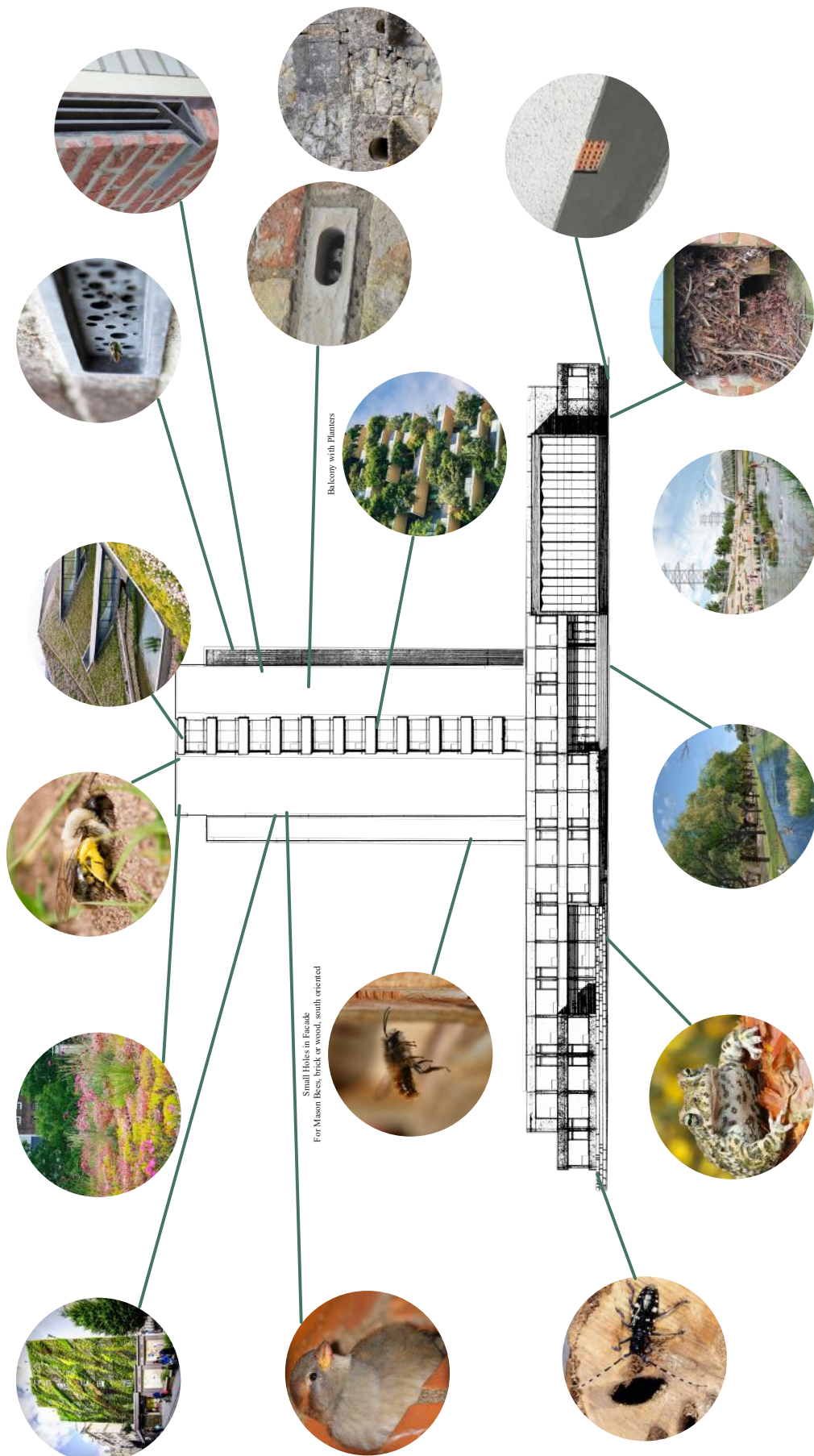


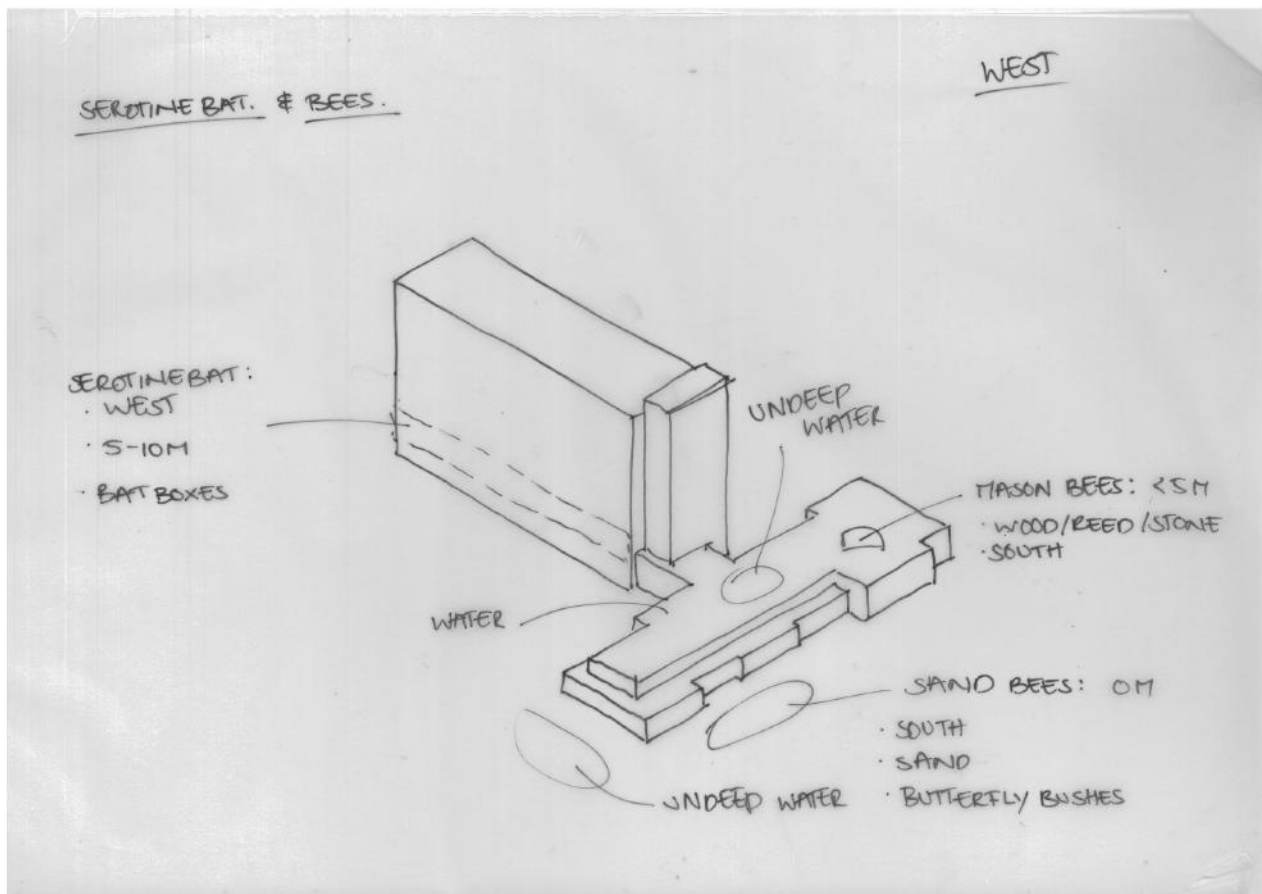
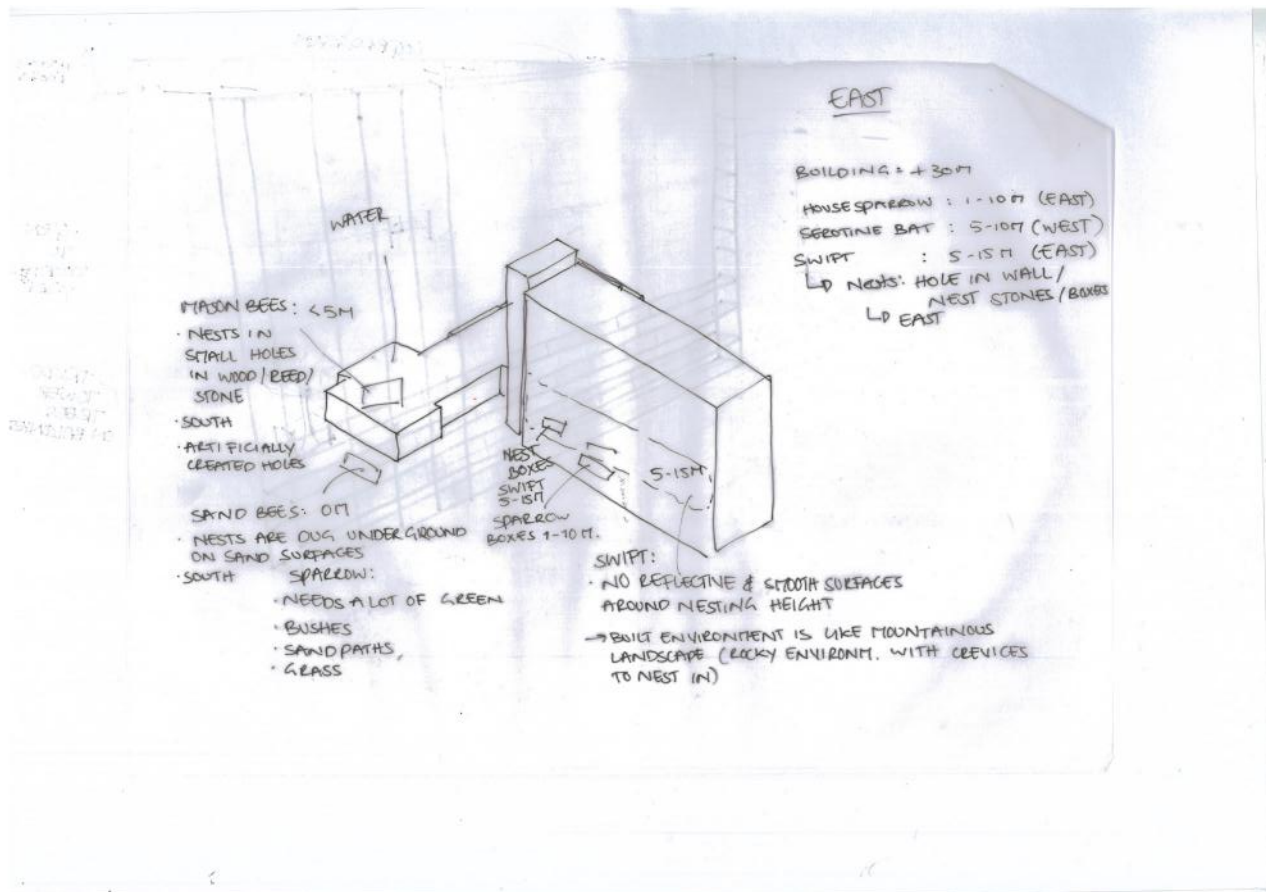


PUBLIC & RESIDENTIAL

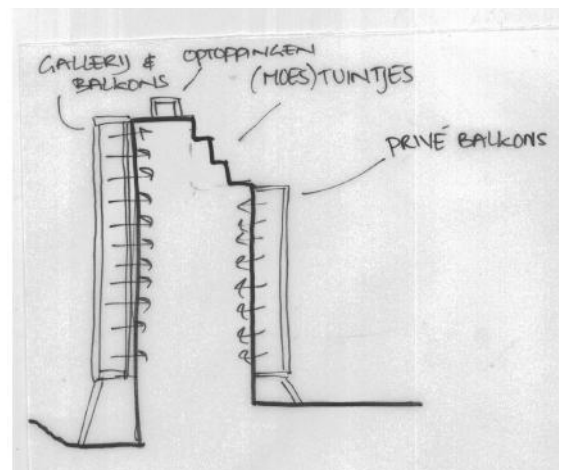
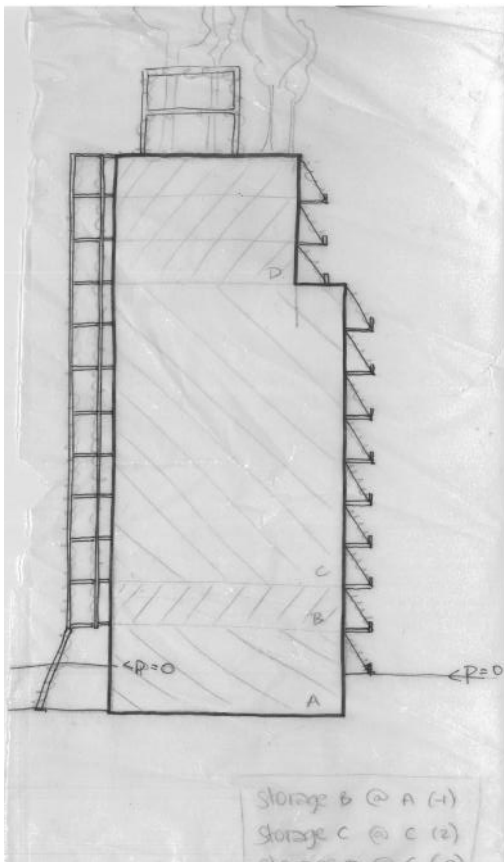
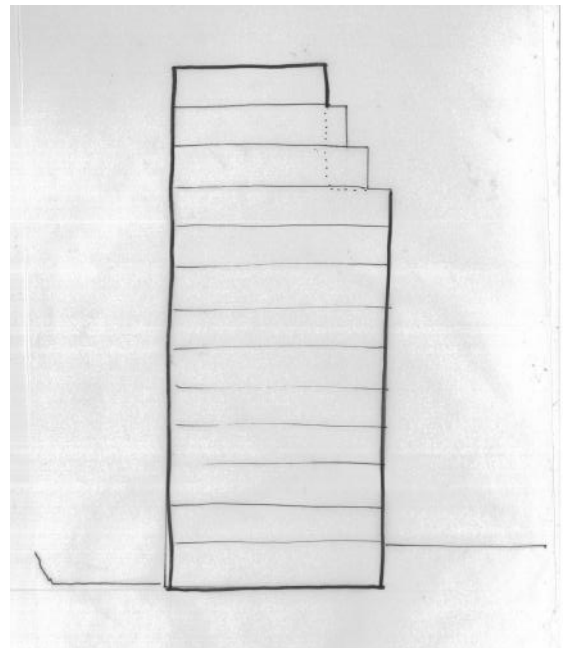
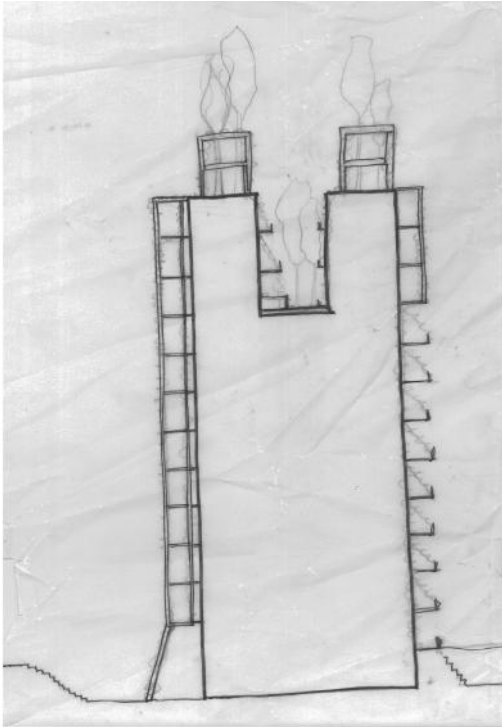


ECOLOGICAL DESIGN INTERVENTIONS

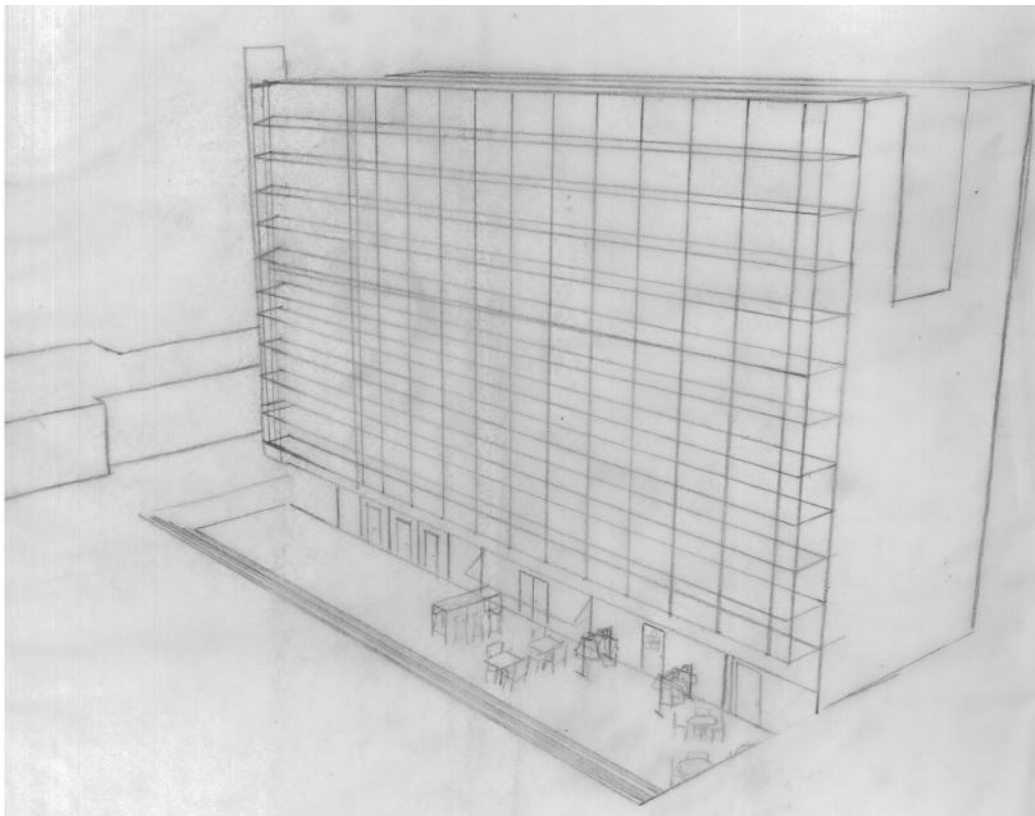
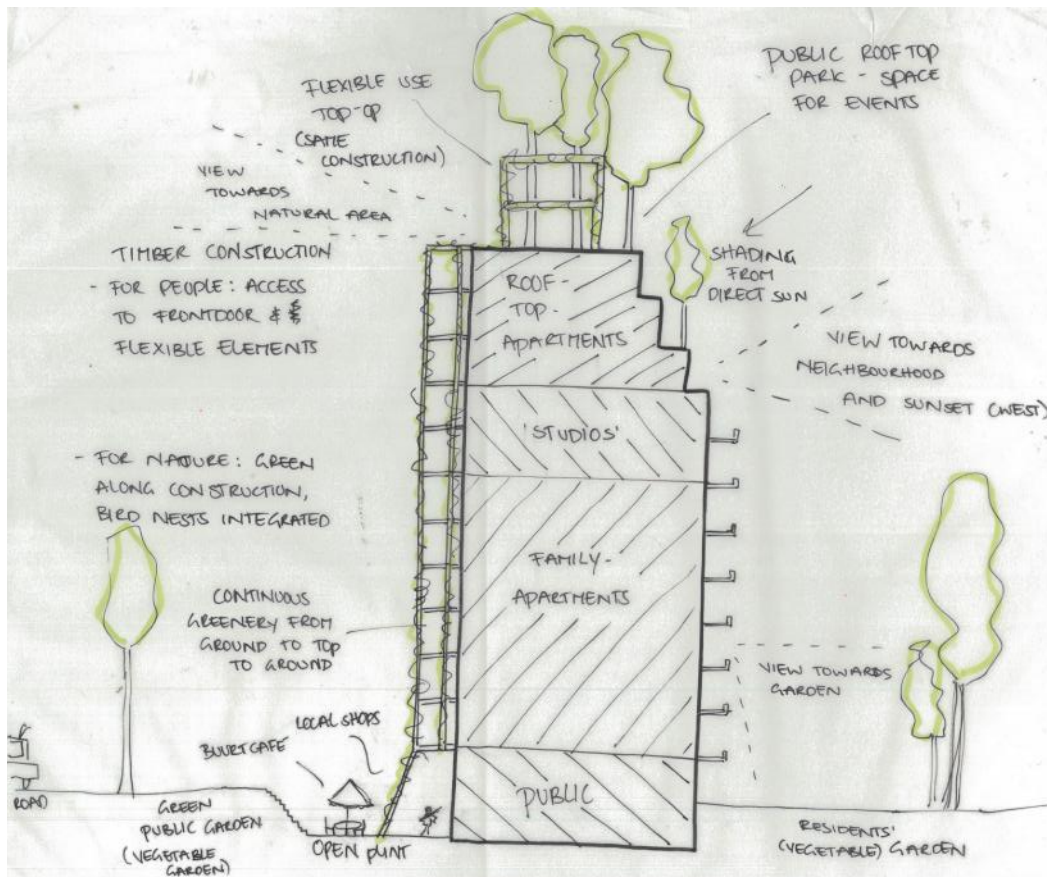




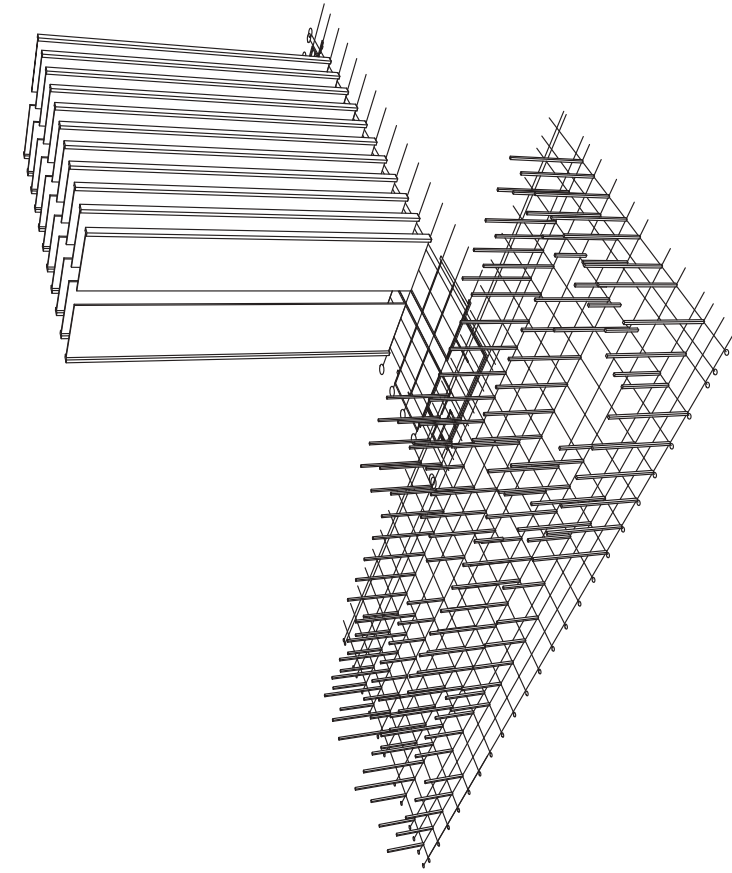
DESIGN SKETCHES



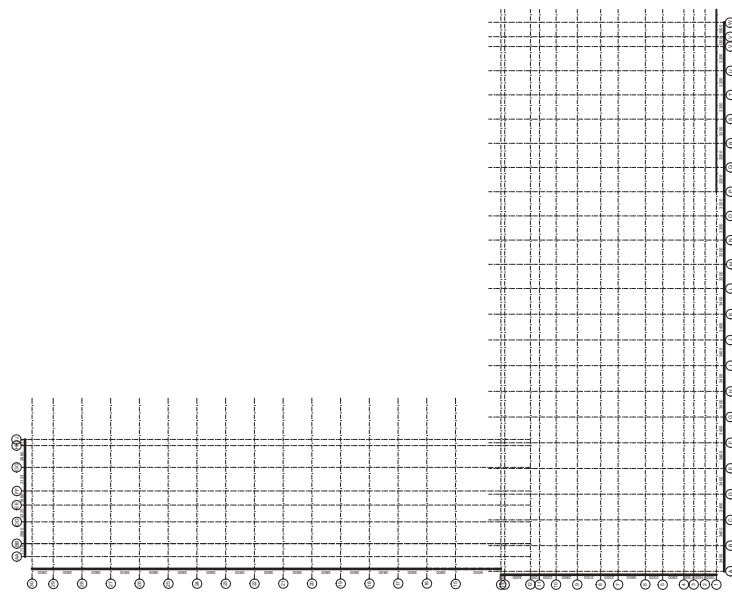
INITIAL VISION



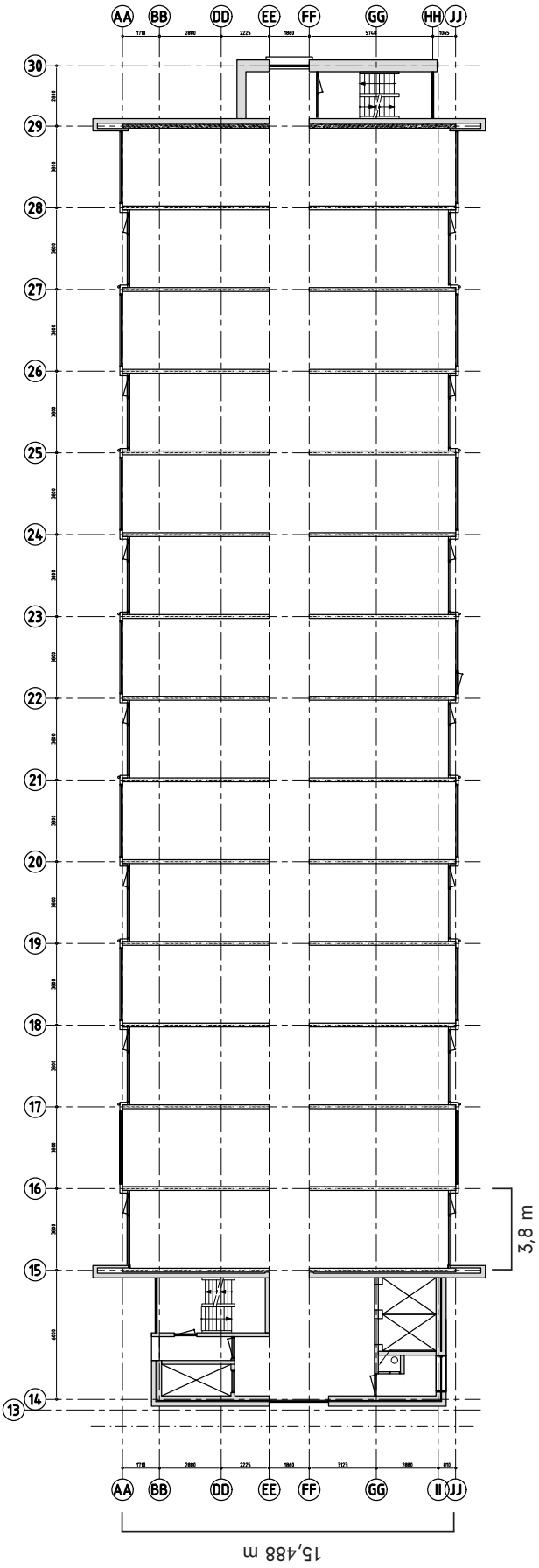
GRID & STRUCTURE



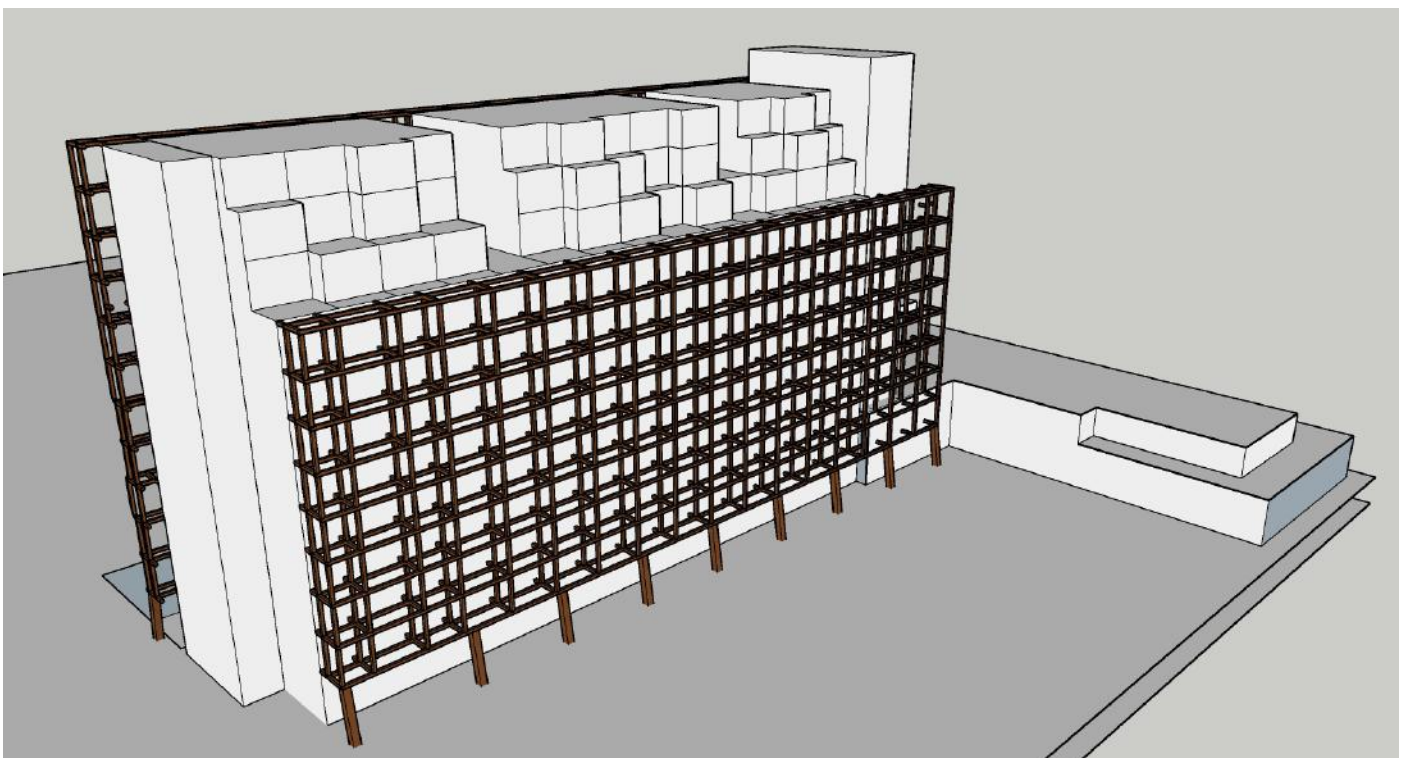
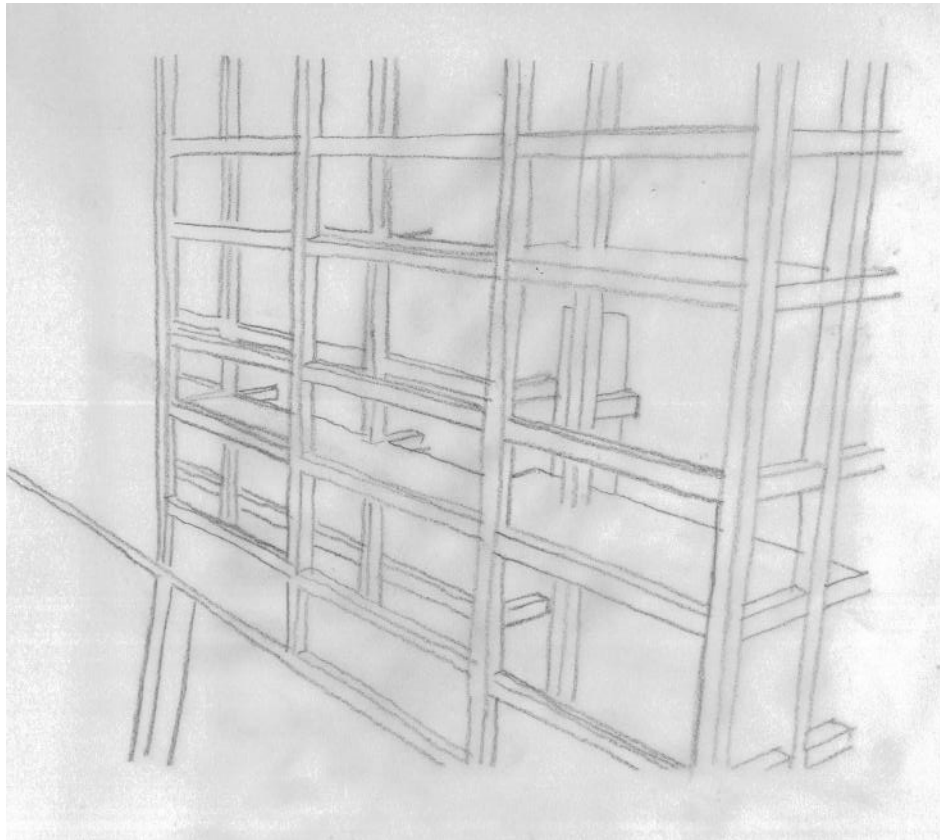
Existing structure: columns & load-bearing walls



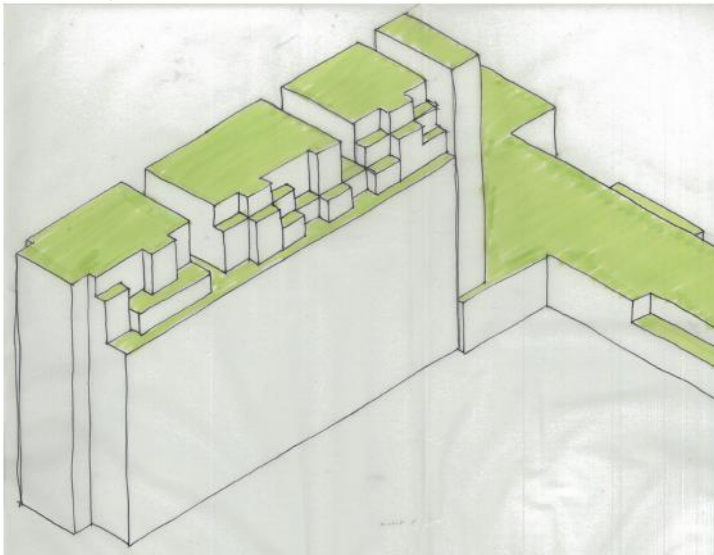
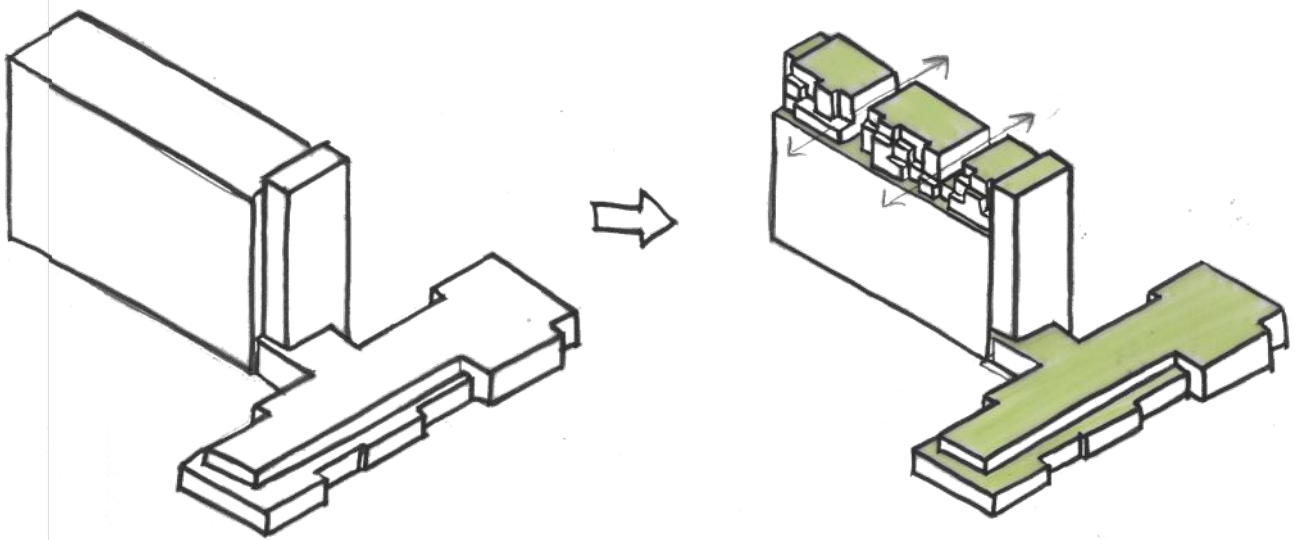
FLOORPLAN ON GRID



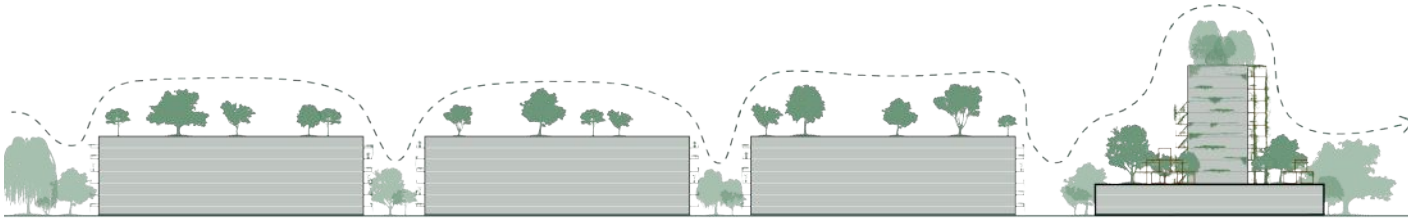
DESIGN OF TIMBER CONSTRUCTION



CREATING SPACE FOR NATURE



BUILDINGS ARE NO BORDERS FOR NATURE



REFERENCES

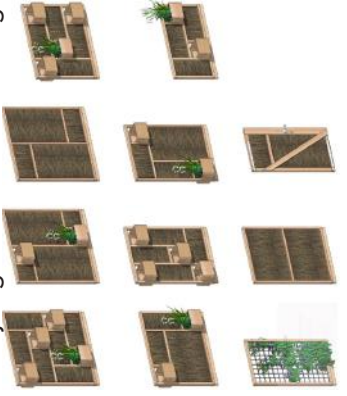
Greenhouses, Green Quayside Toronto



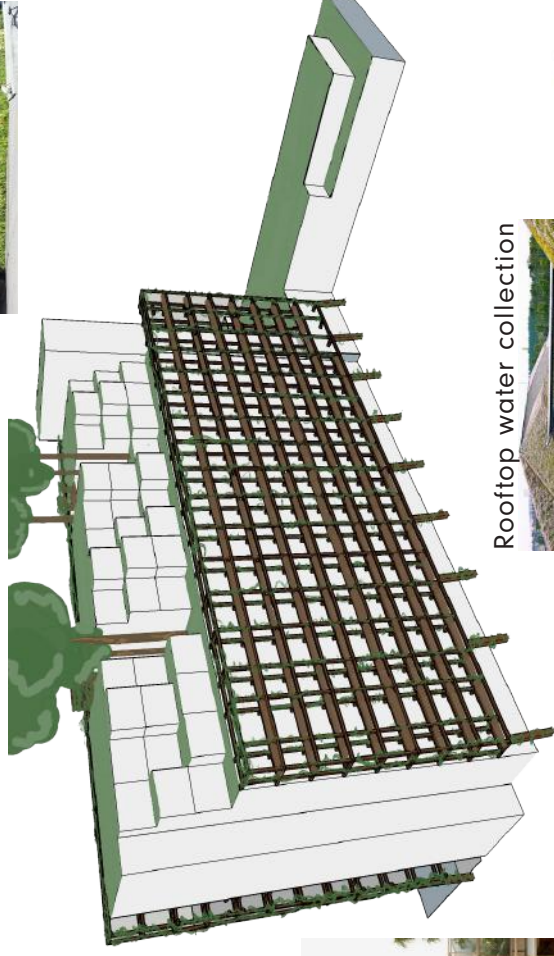
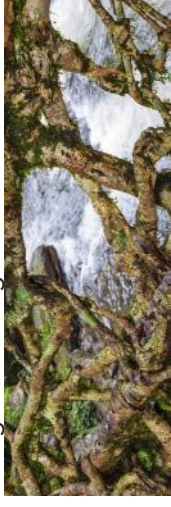
Timber construction for balconies, gardens, stairs



Buurjongens' Groenschutting



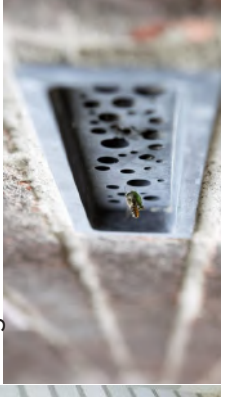
Living root bridges



Rooftop water collection



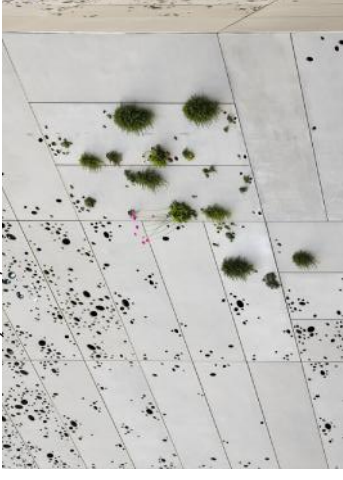
Integrated fauna nests



Living wall, Caixaforum



Porous façade, San Telmo Museum



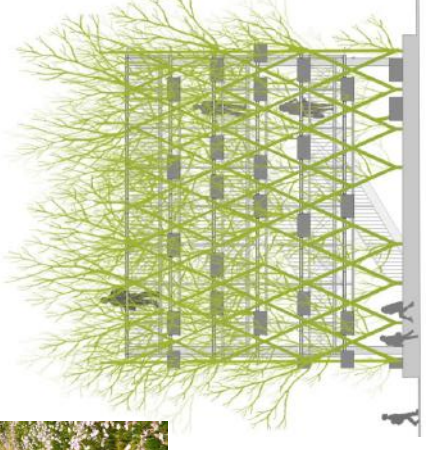
Optopping paviljoens: -MFO-park



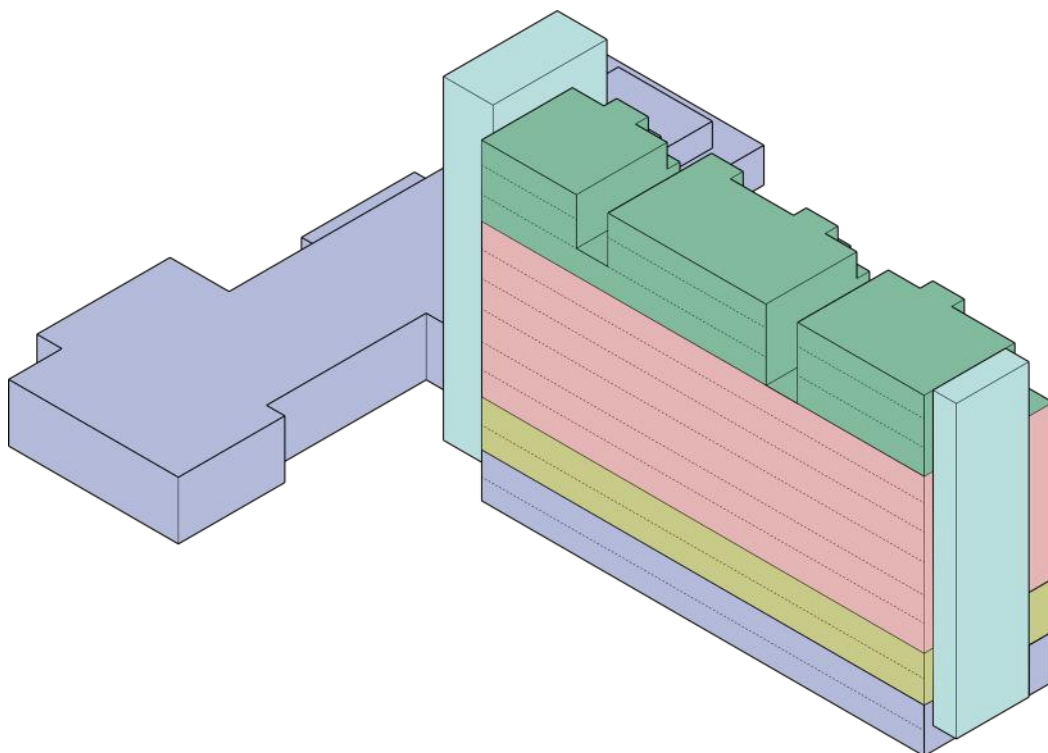
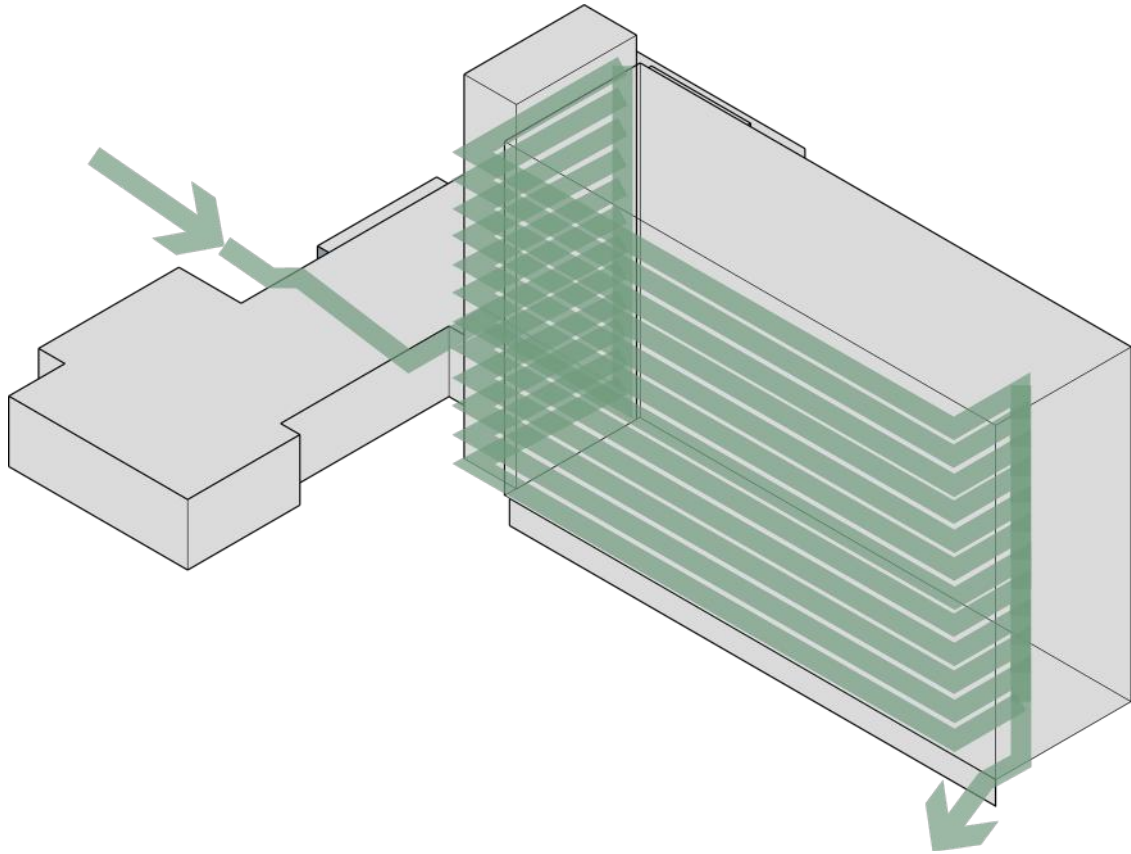
-Baubotanik Tower



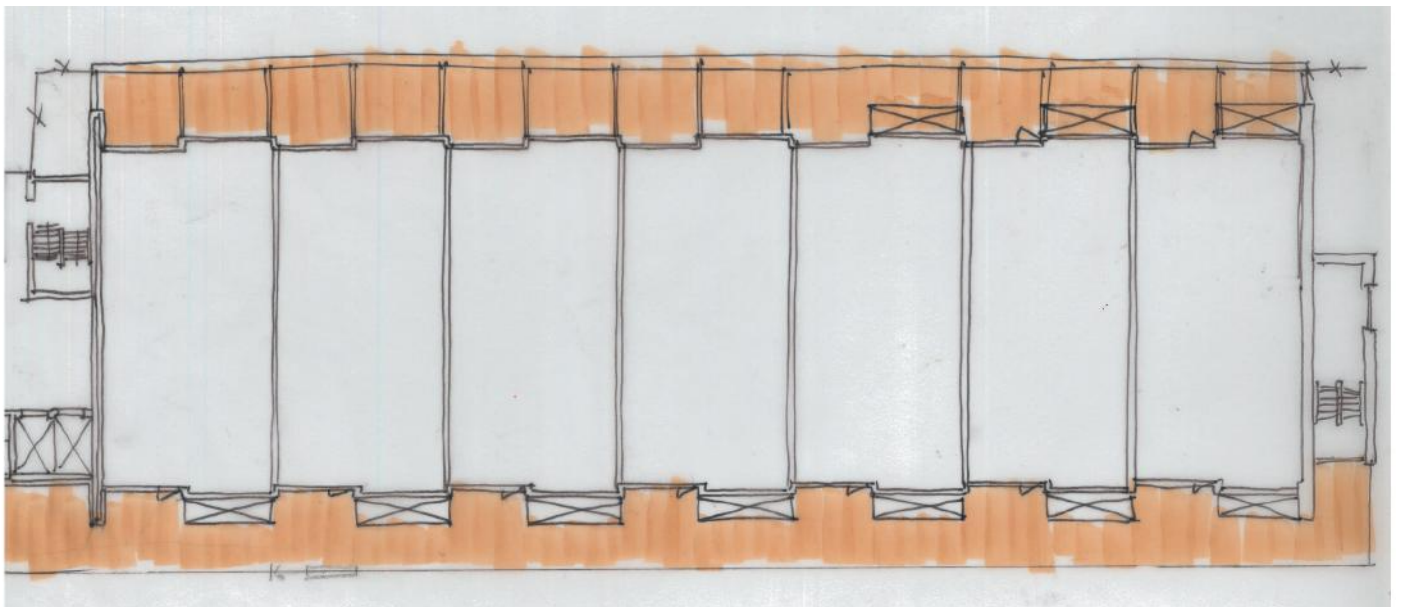
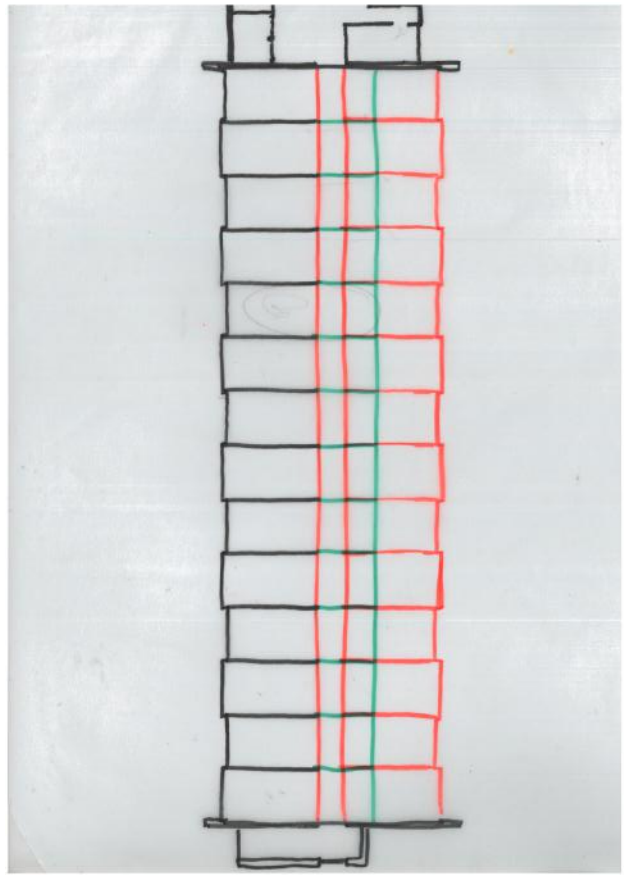
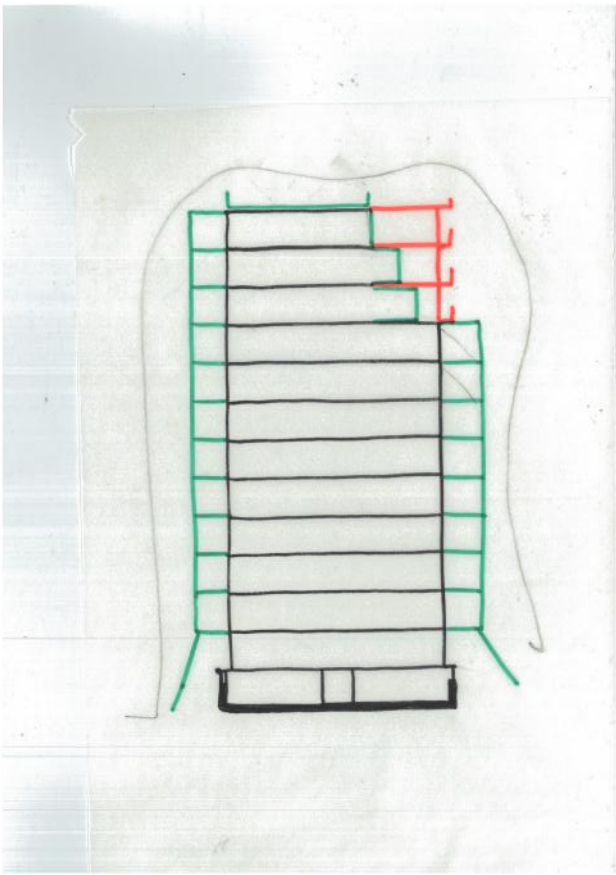
-Platanenkubus



ROUTING & PROGRAMME



Public area Stairwell Rooftop Apartments Family apartments Studios



REFERENCES

References Timber Construction & Rooftop apartments - modular elements



REFERENCES



REFERENCES



Nursing Home by Dietger Wissounig Architekten



Motorlab Architekten, Evergreen,



Scharabi Architekten & Anne Raupach, Berlin



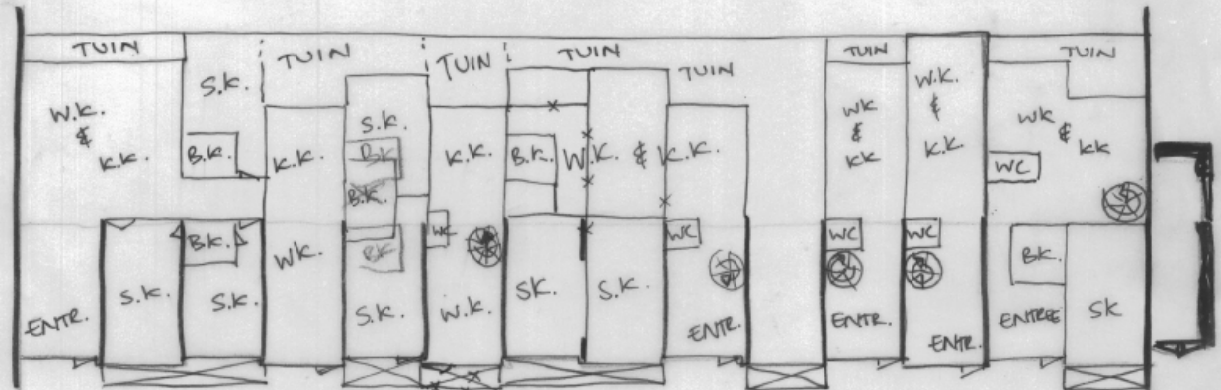
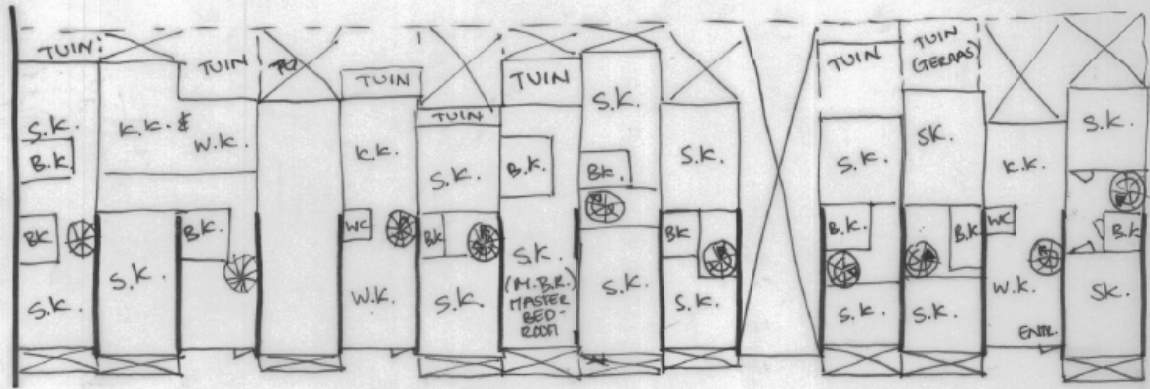
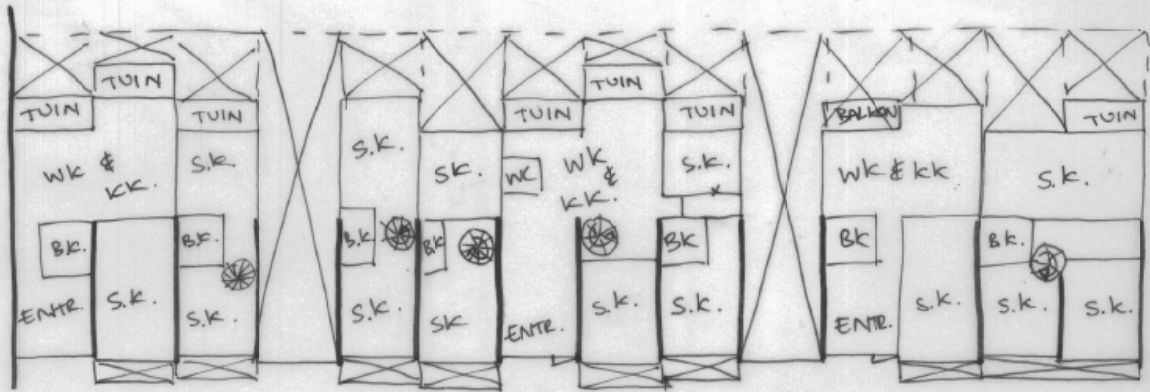
Acau Architecture SA, Collective Dwelling Centre, Geneva



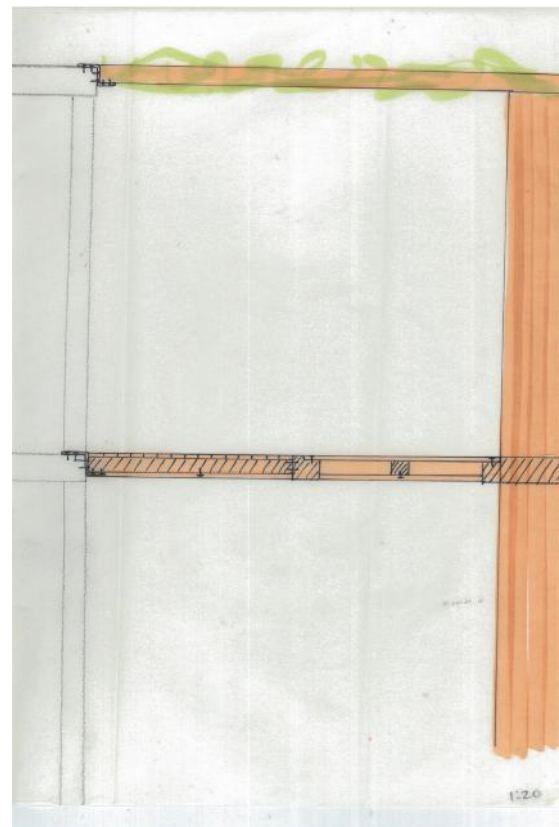
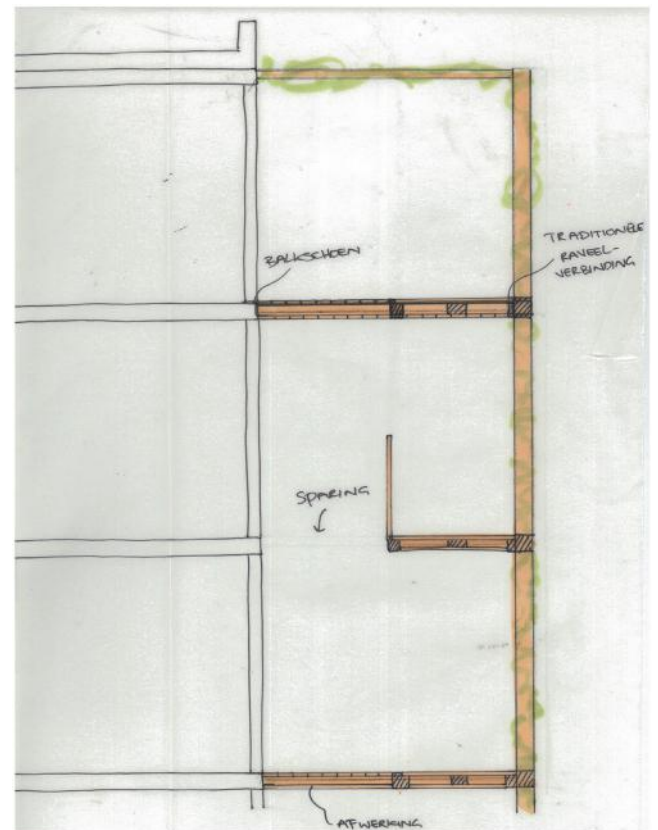
Wild Bar Heule Architects, St. Gallen, Switzerland

Prefab
façade
elements
eastside

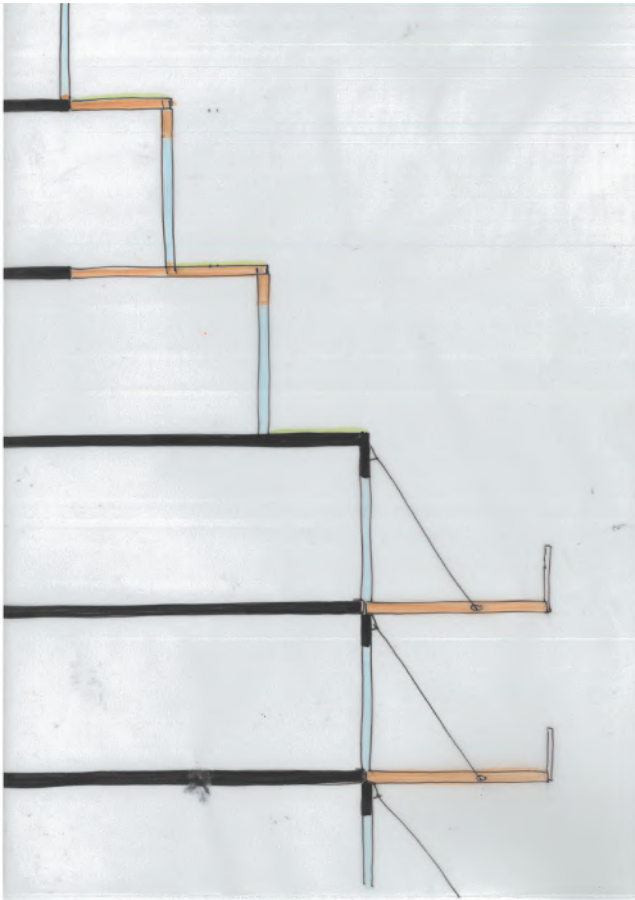
SKETCHING FLOORPLANS



SKETCHING GALLERYFLAT



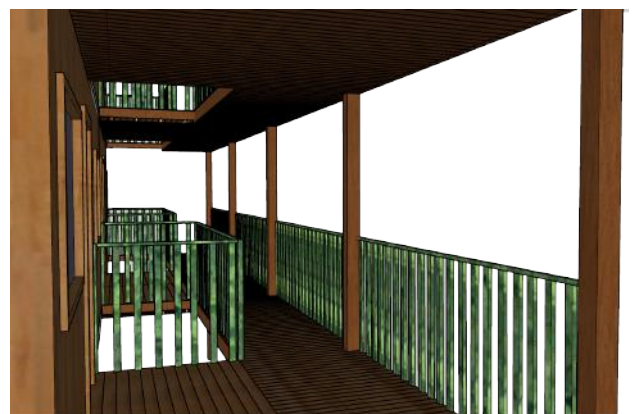
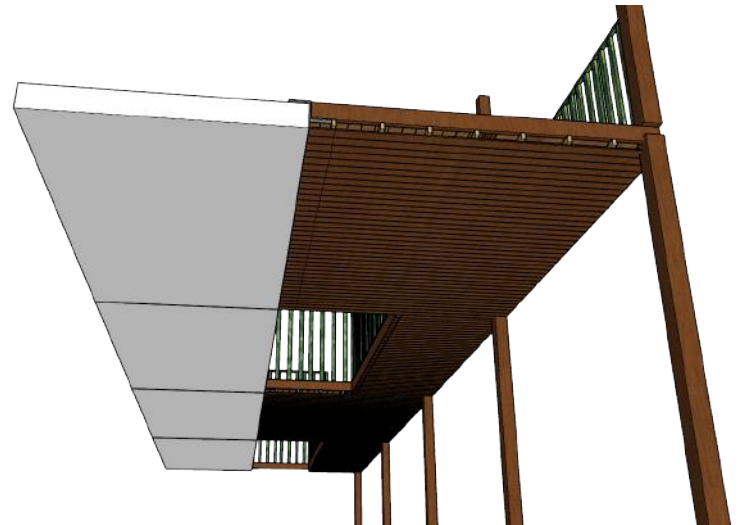
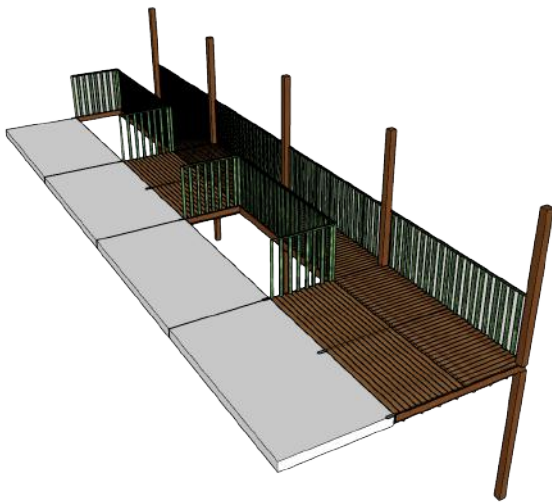
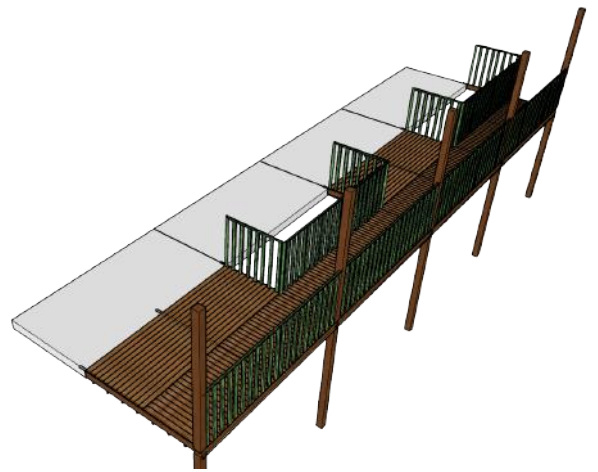
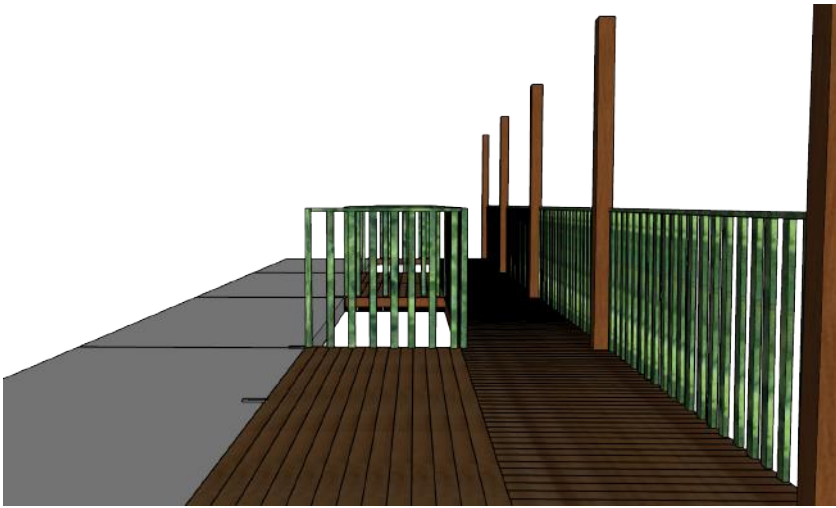
SKETCHING BALCONIES & ROOFTOP



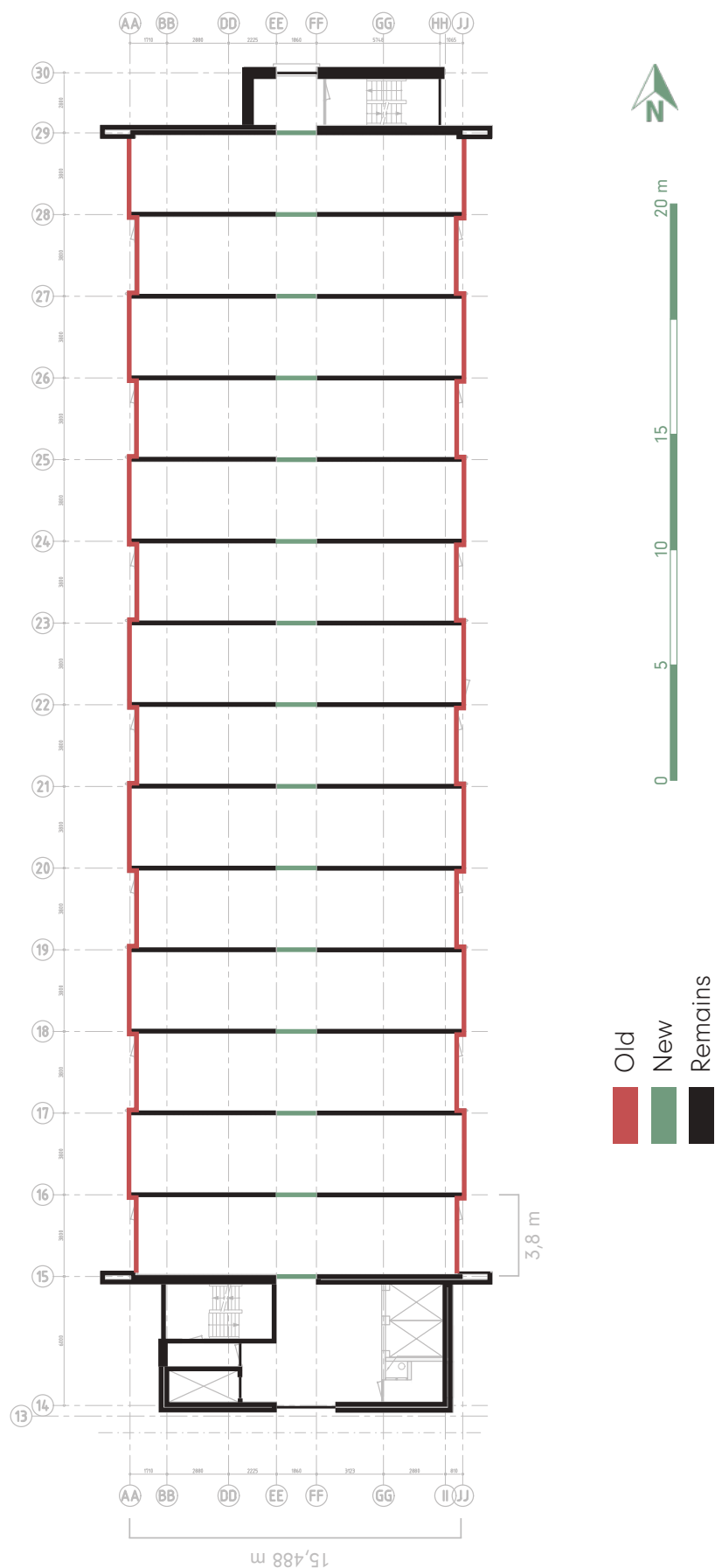
FAÇADE DESIGN



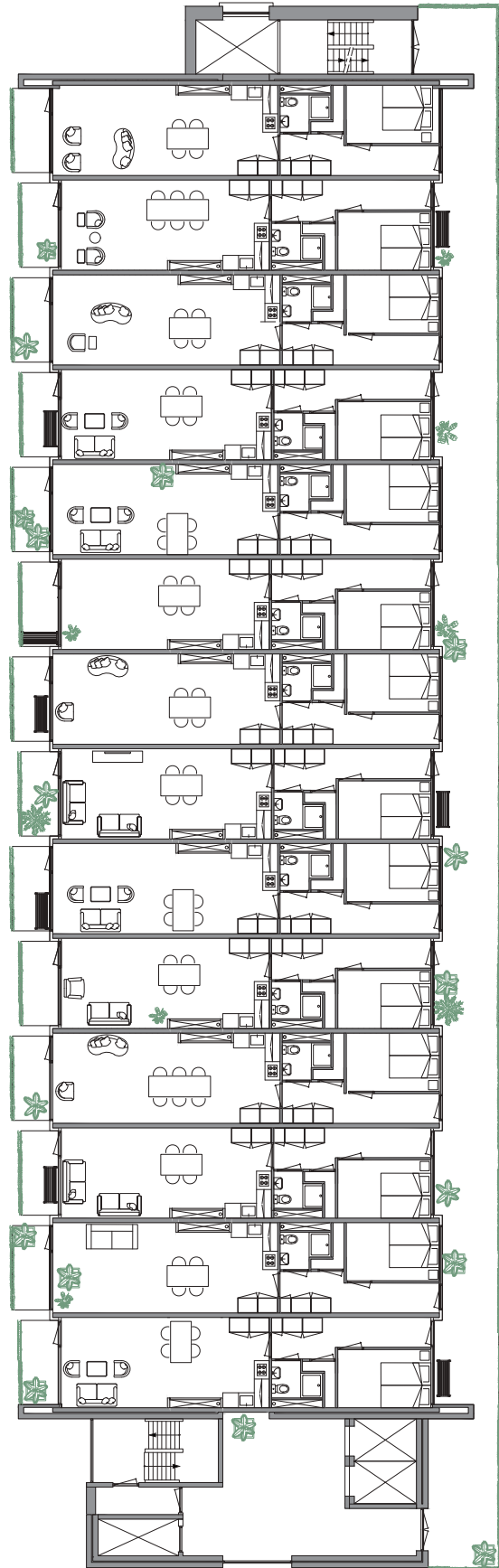
3D GALLERY DESIGN



STRATEGY FOR HOUSING: STUDIOS & FAMILY APARTMENTS



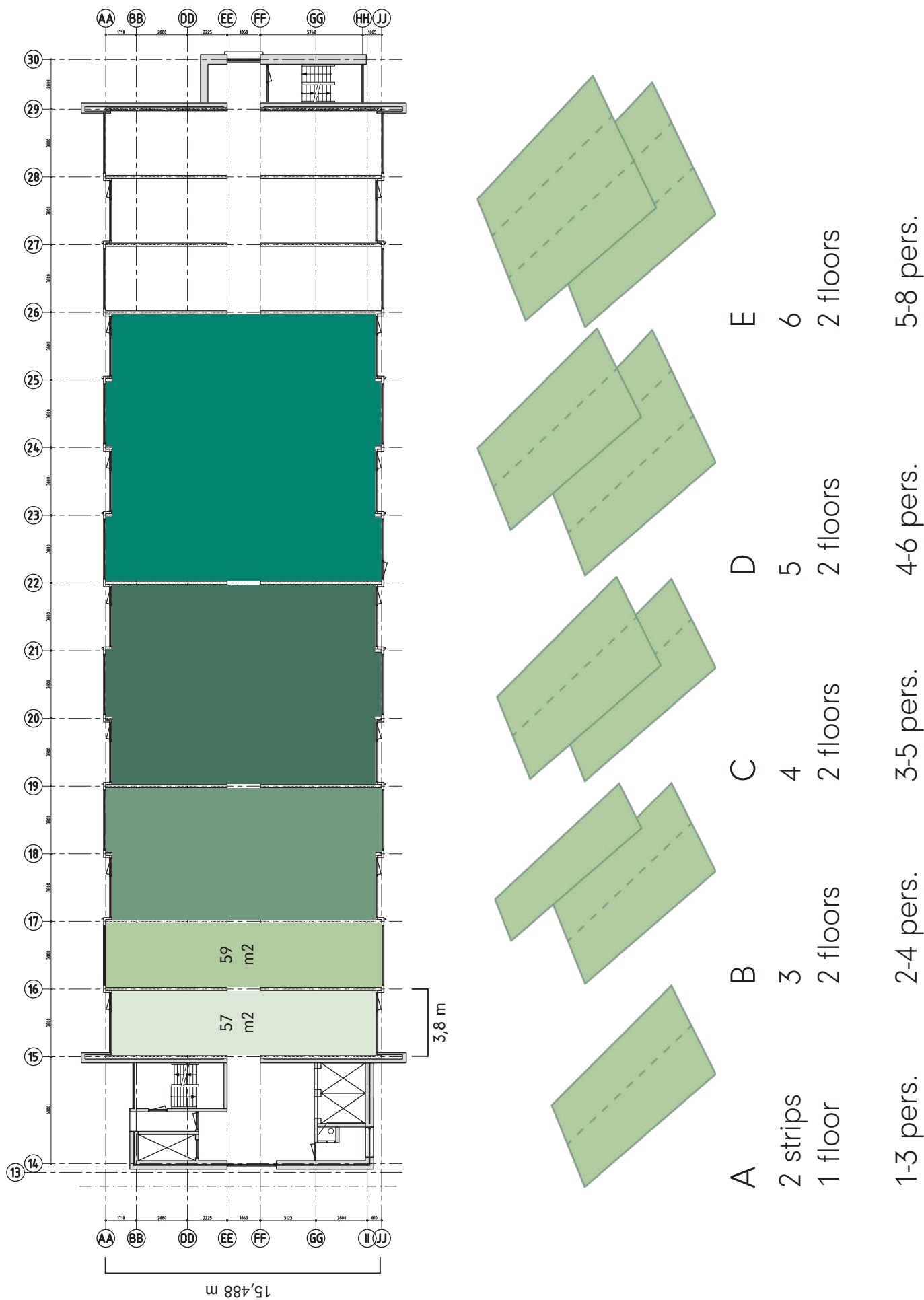
FLOORPLAN STUDIOS



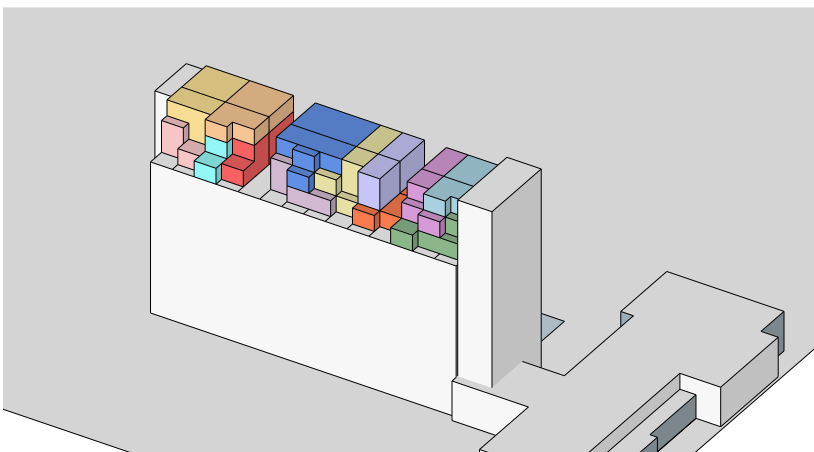
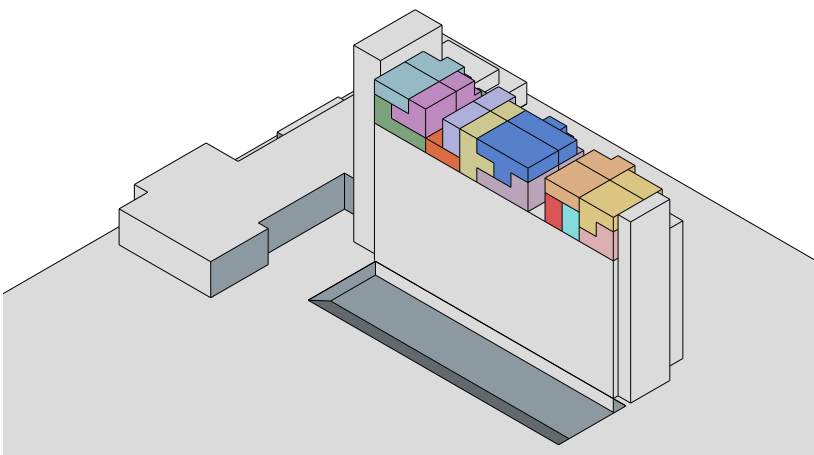
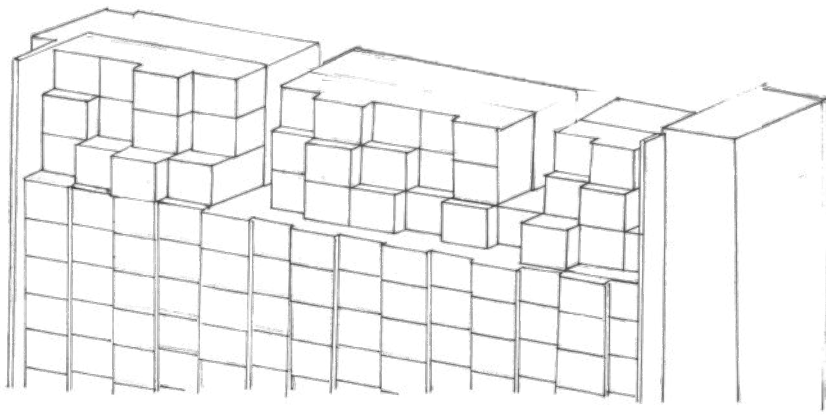
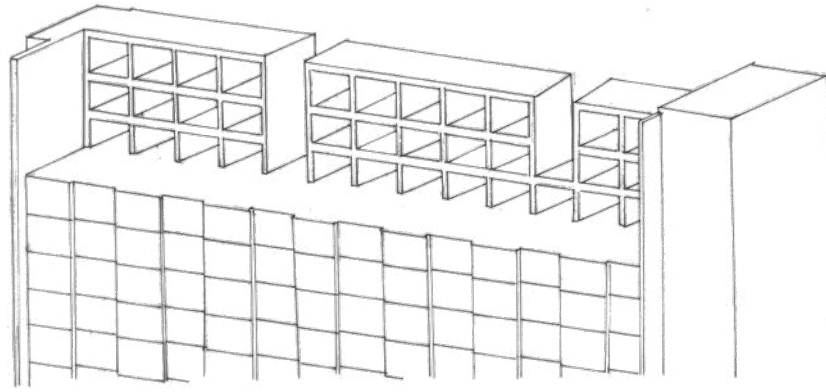
First & second floor



SMALL, MEDIUM & LARGE DWELLINGS

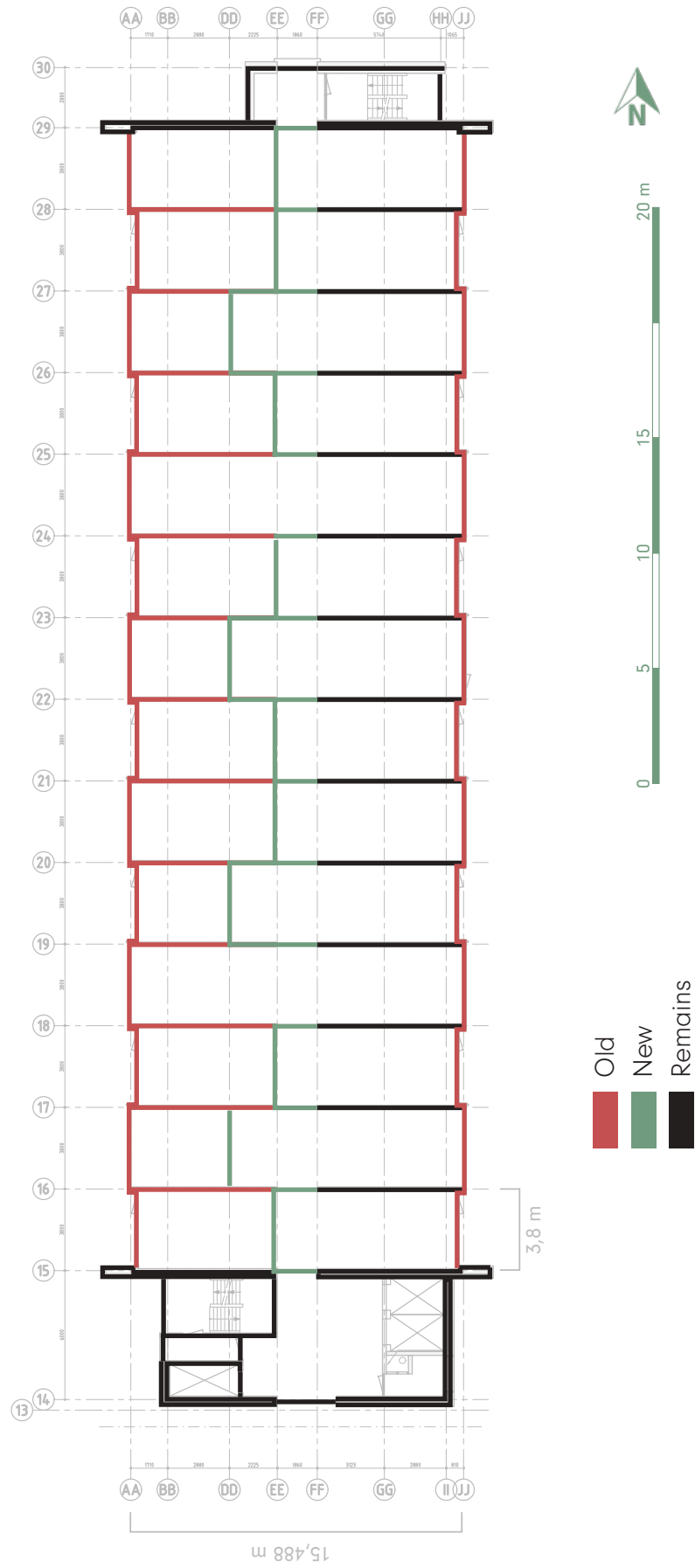


ROOFTOP APARTMENTS

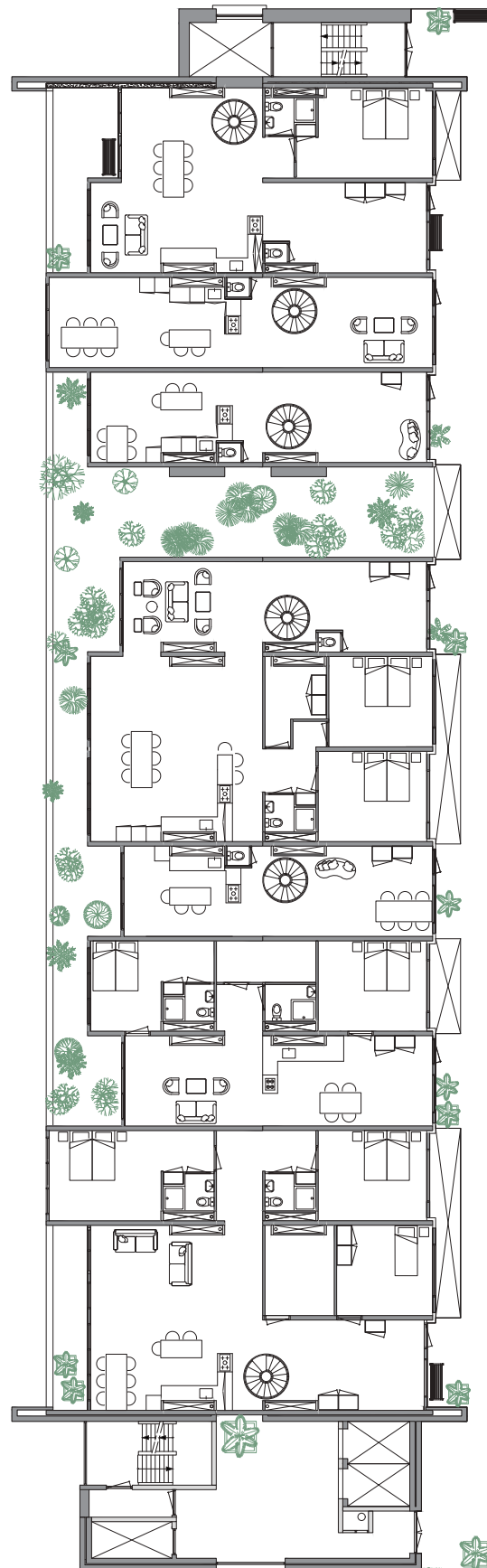


Pink:	3 bedrooms, 2 bathrooms 2 floors
Yellow:	3 bedrooms, 1 bathroom (+ wc) 2 floors
Blue:	2 bedrooms, 1 bathroom (+ wc) 2 floors
Red:	2 bedrooms, 1 bathroom (+ wc) 2 floors
Orange:	1 bedroom, 1 bathroom 1 floor
Lilac:	4 bedrooms, 2 bathrooms (+ wc) 2 floors
Purple-blue:	5 bedrooms, 2 bathrooms (+ wc) 2 floors
Yellow:	5 bedrooms, 3 bathrooms (+ wc) 3 floors (incl. masterbedroom)
Orange:	2 bedrooms, 2 bathrooms 1 floor
Lilac:	2 bedrooms, 1 bathroom (+ wc) 2 floors
Green:	5 bedrooms, 4 bathrooms 2 floors
Purple-pink:	3 bedrooms, 2 bathrooms 2 floors
Blue:	1 bedroom, 1 bathroom 1 floor

STRATEGY ROOFTOP



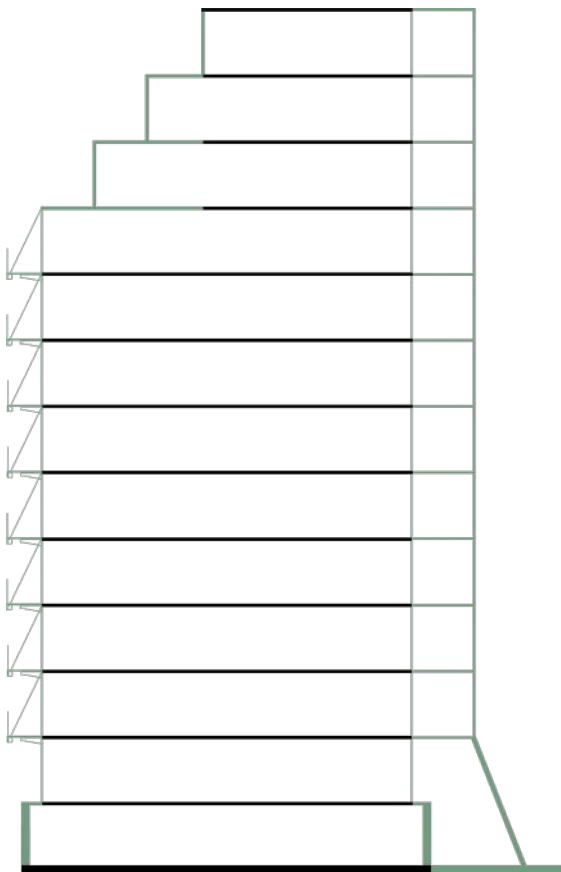
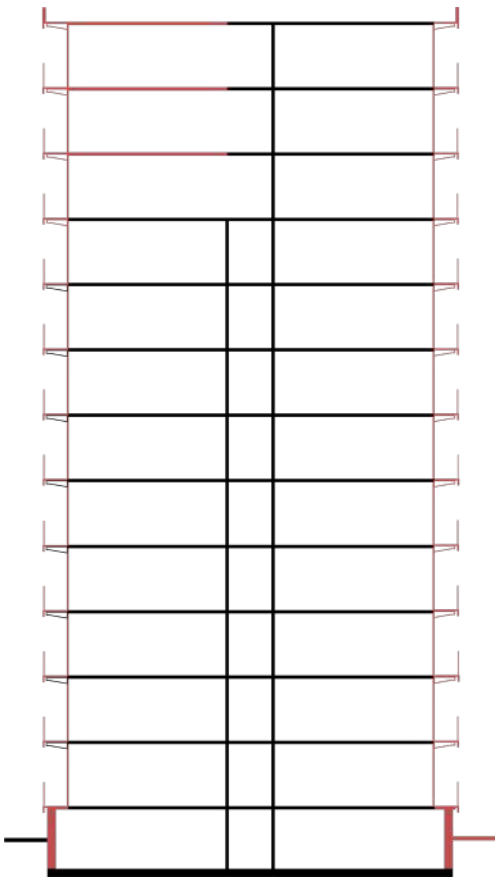
FLOORPLAN ROOFTOP



9th floor



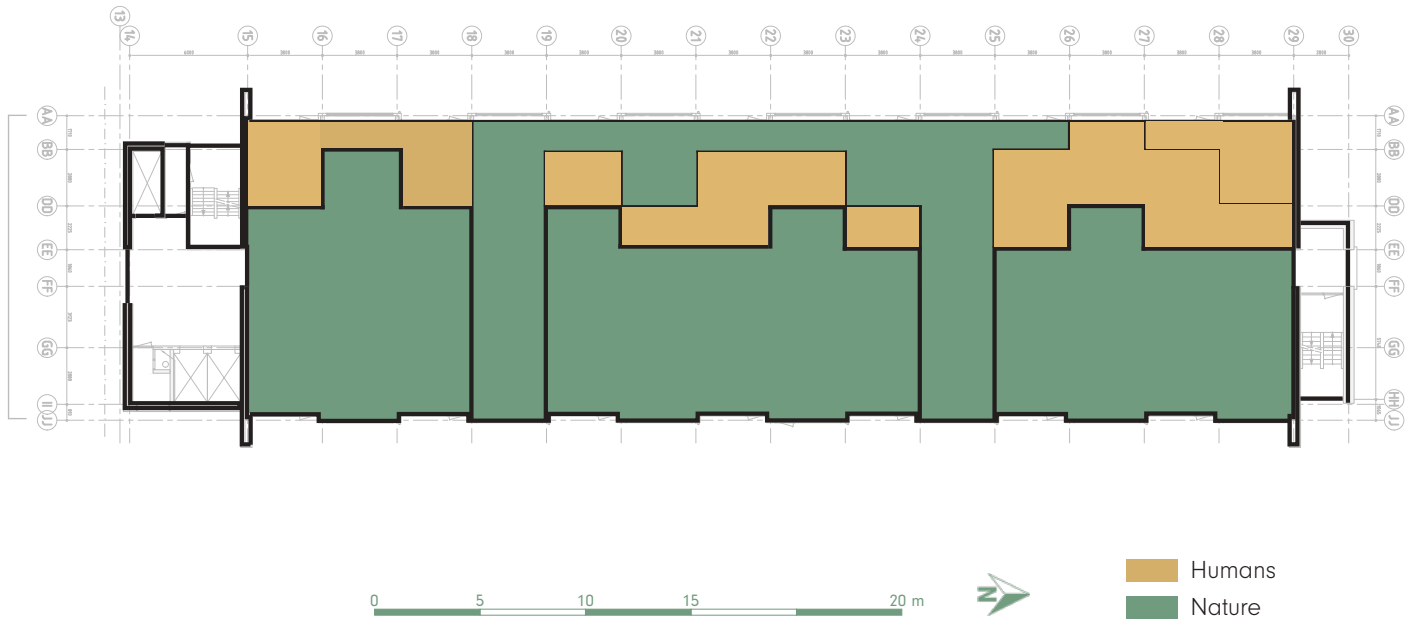
TRANSFORMATION SECTION



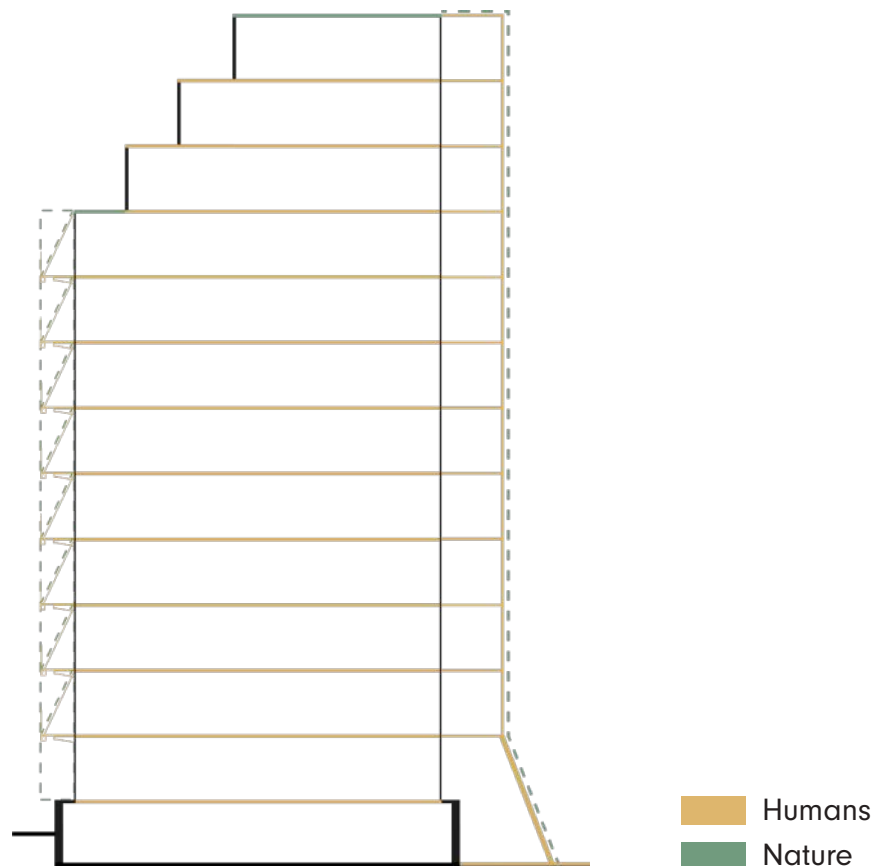
FLOORPLAN PUBLIC SPACES



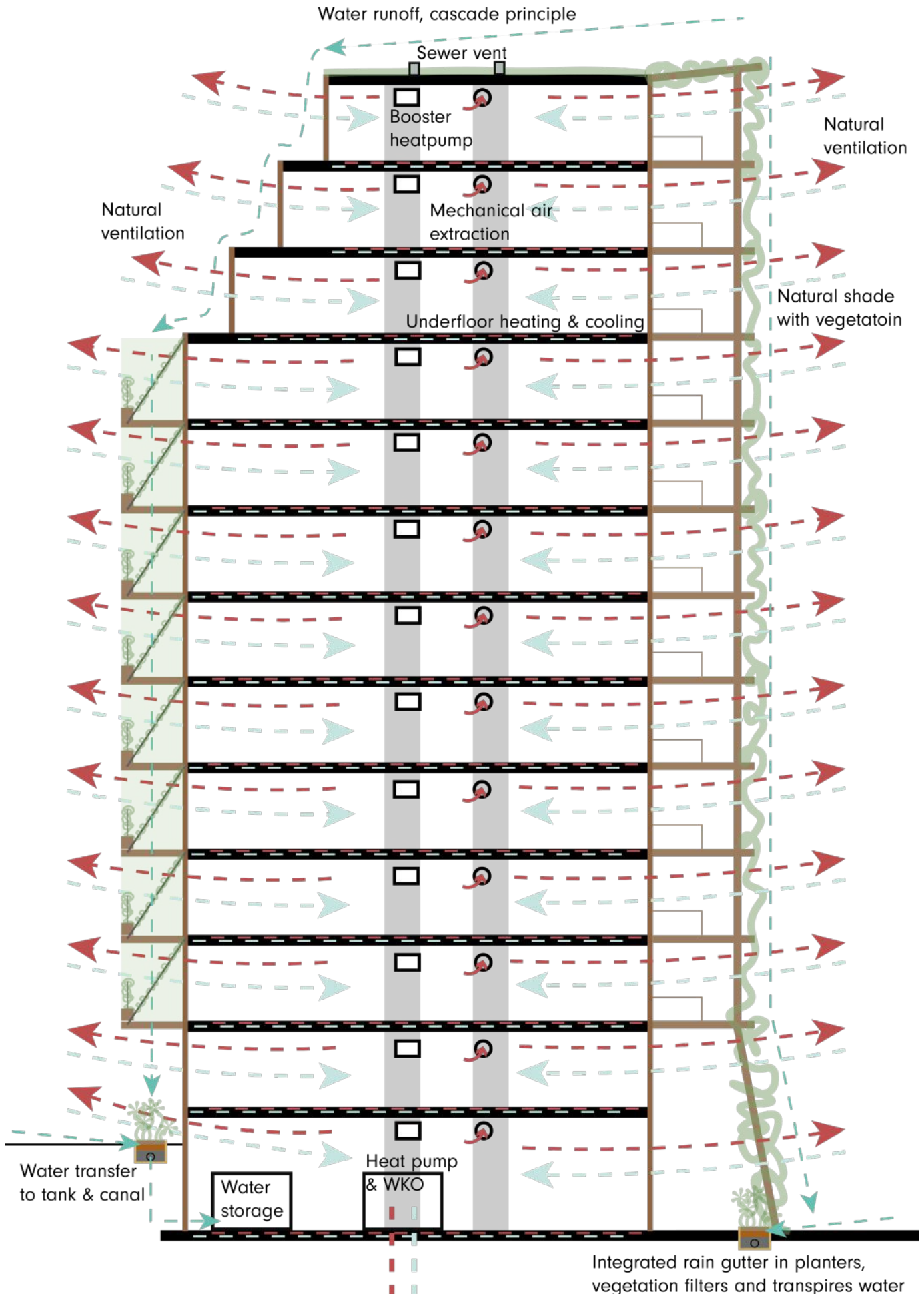
ZONING: TOPVIEW



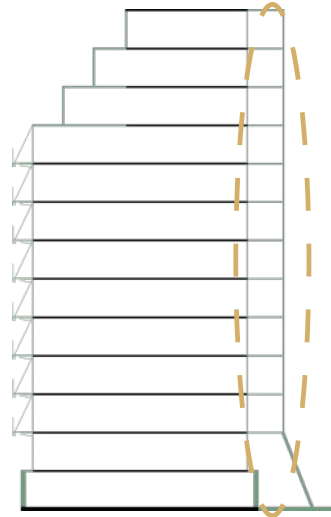
ZONING: SECTION



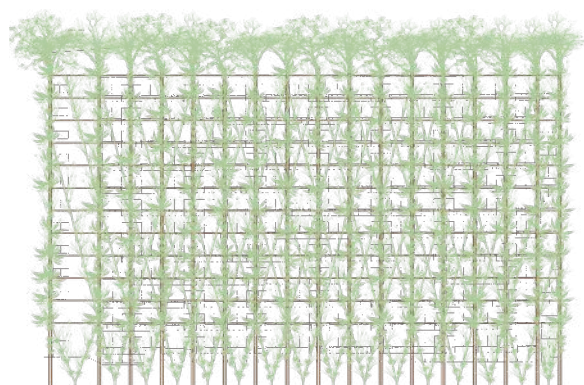
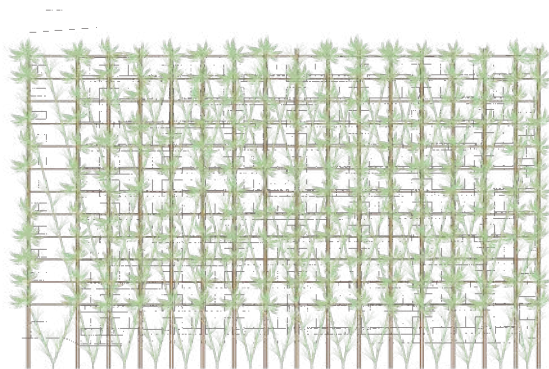
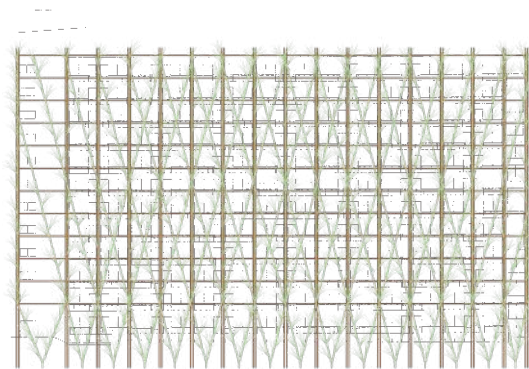
CLIMATE DESIGN



EAST FAÇADE

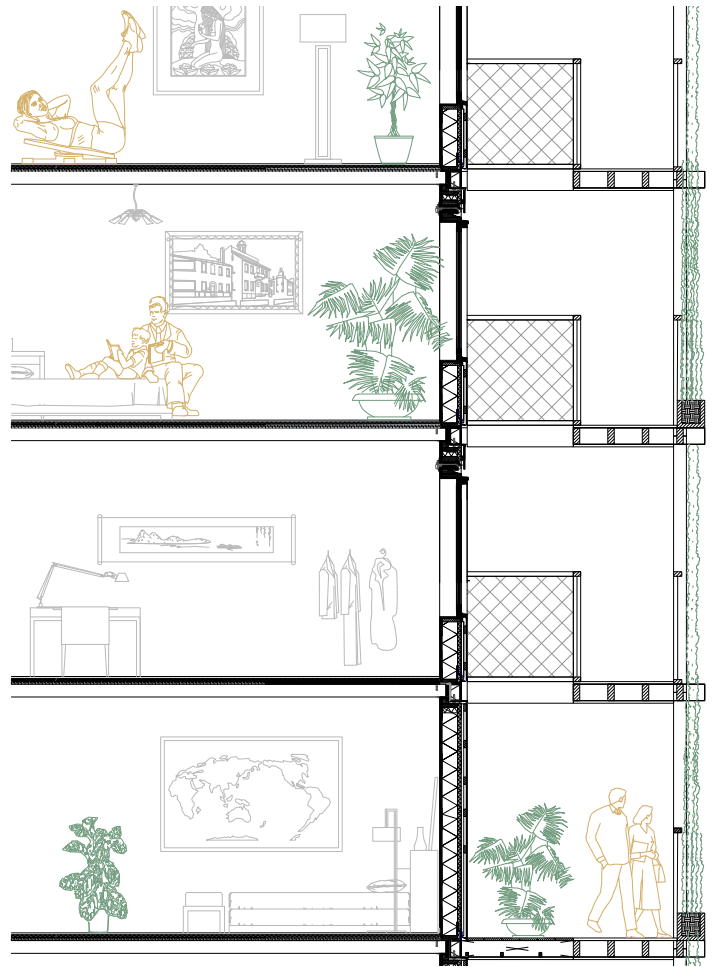


NATURAL LAYERS

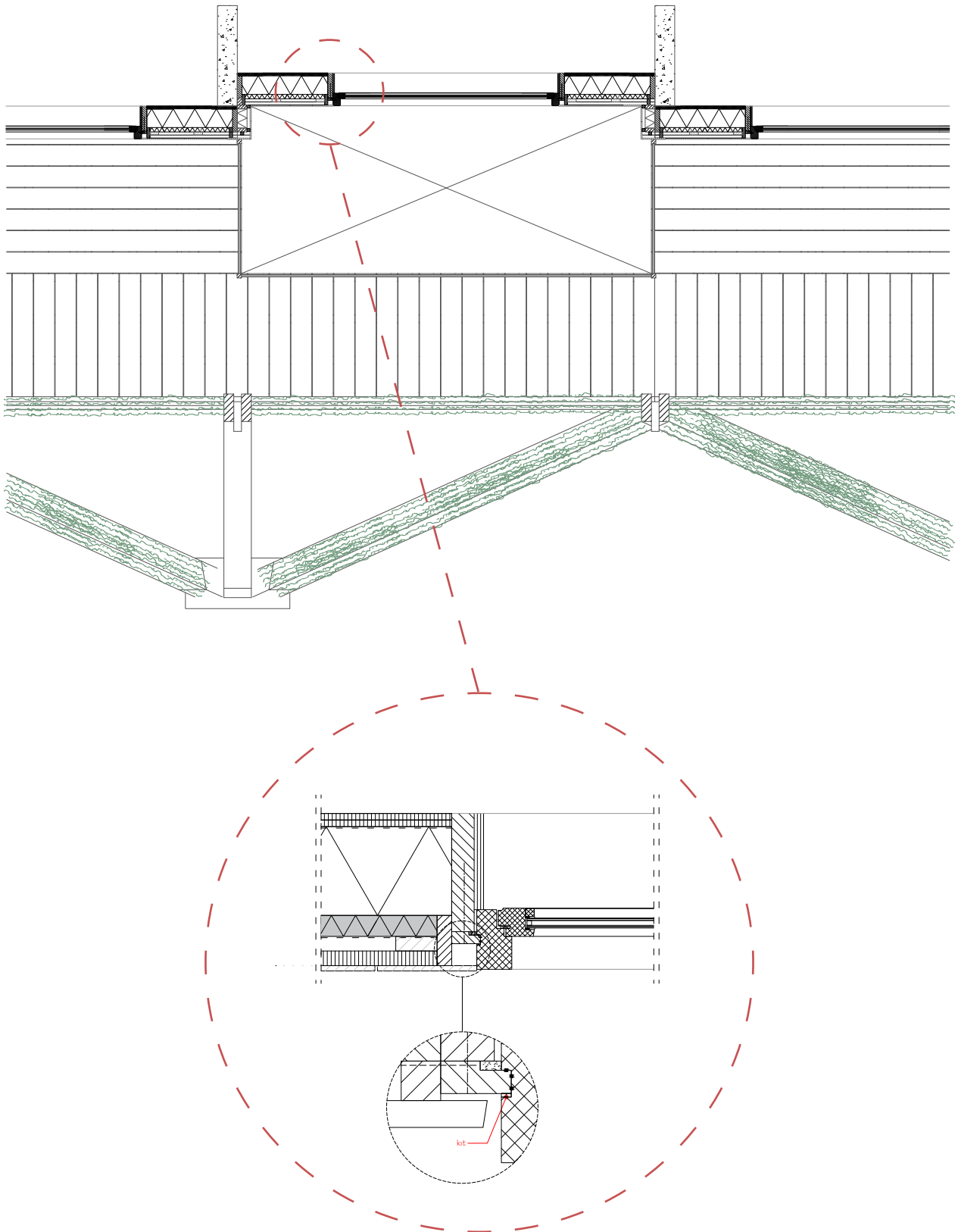


ELEVATION EAST FAÇADE

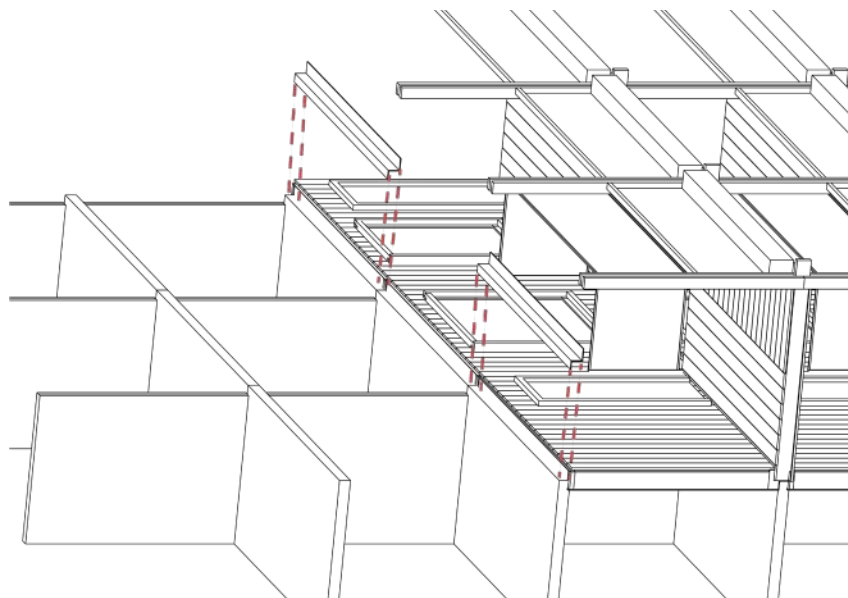
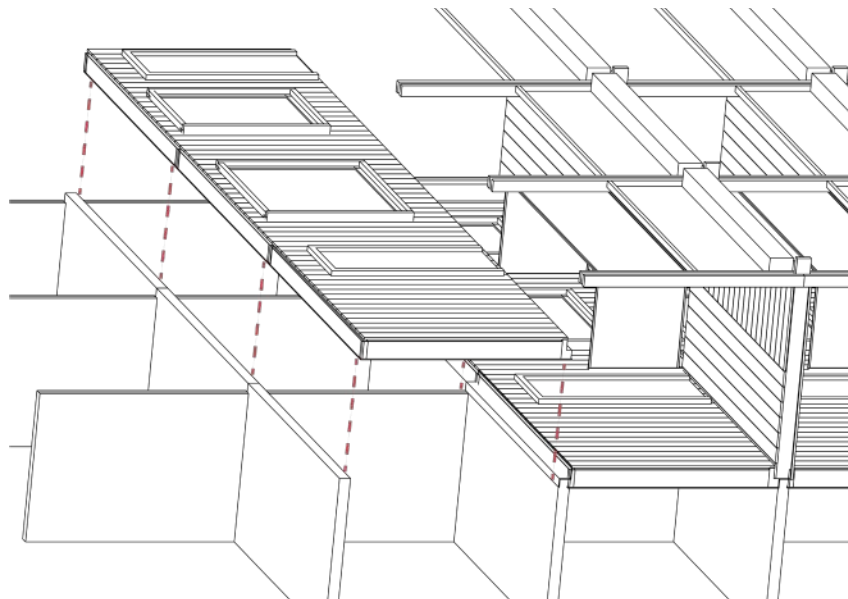
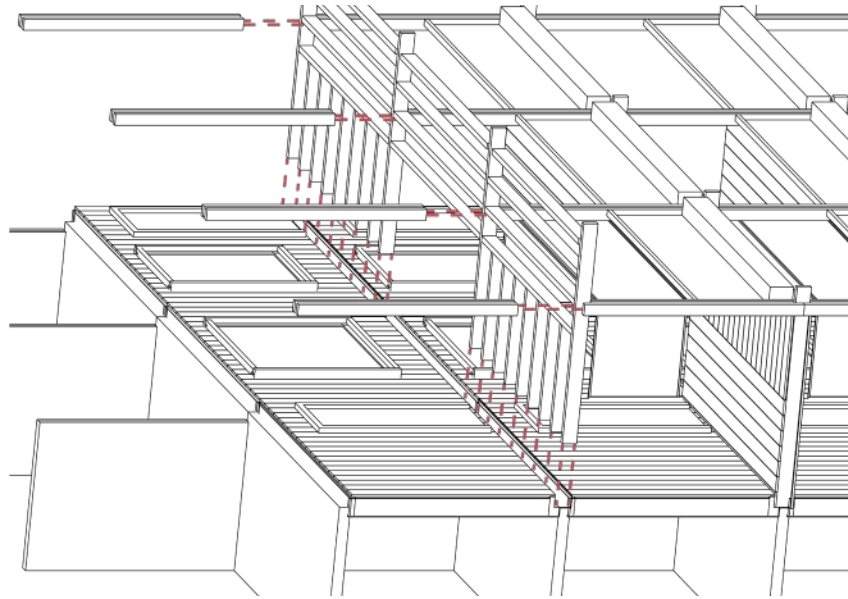
FRAGMENT EAST FAÇADE

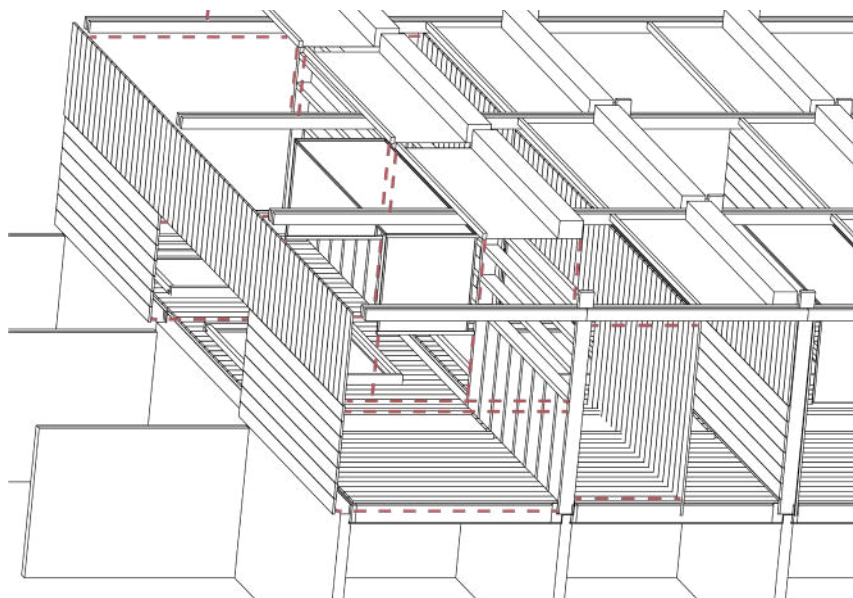
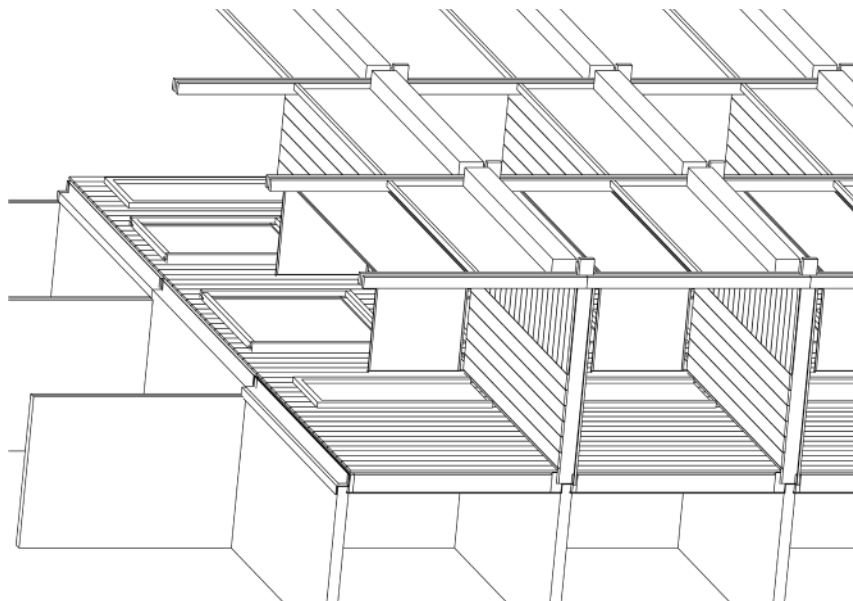
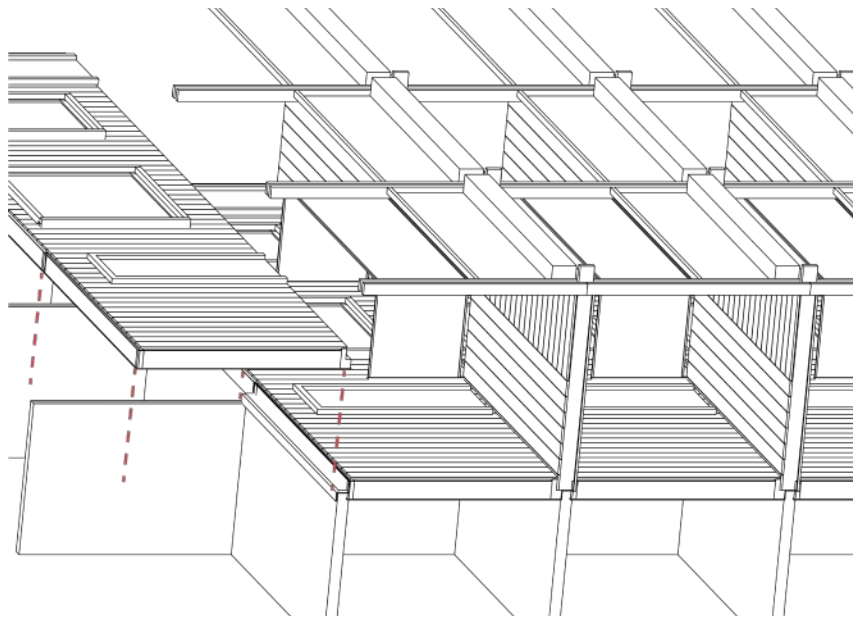


HORIZONTAL SECTION



STEP-BY-STEP GALLERY CONSTRUCTION

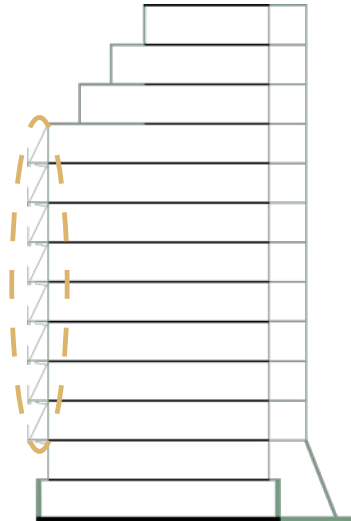




IMPRESSIONS EAST FAÇADE

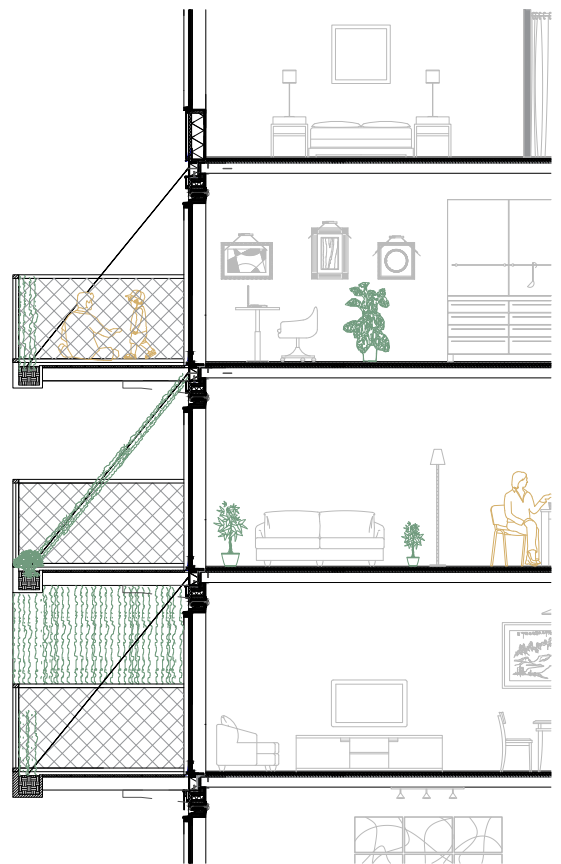


WEST FAÇADE



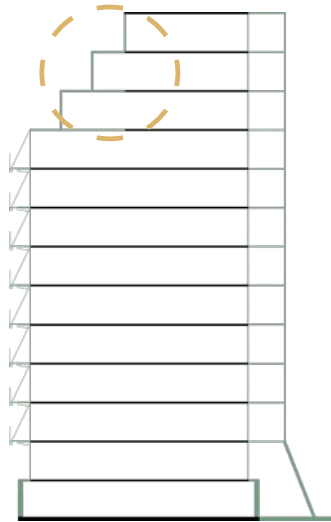
ELEVATION WEST FAÇADE

FRAGMENT WEST FAÇADE

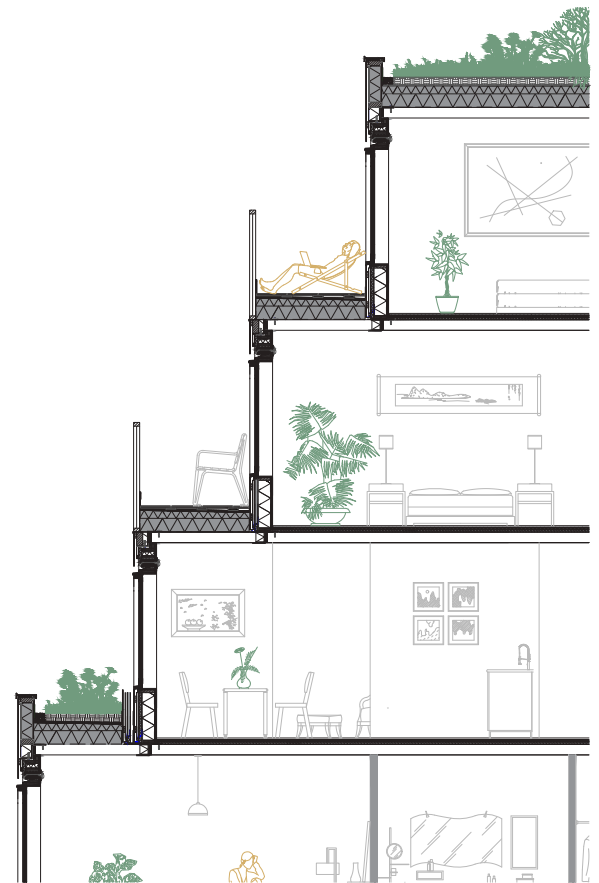


IMPRESSIONS WEST FAÇADE

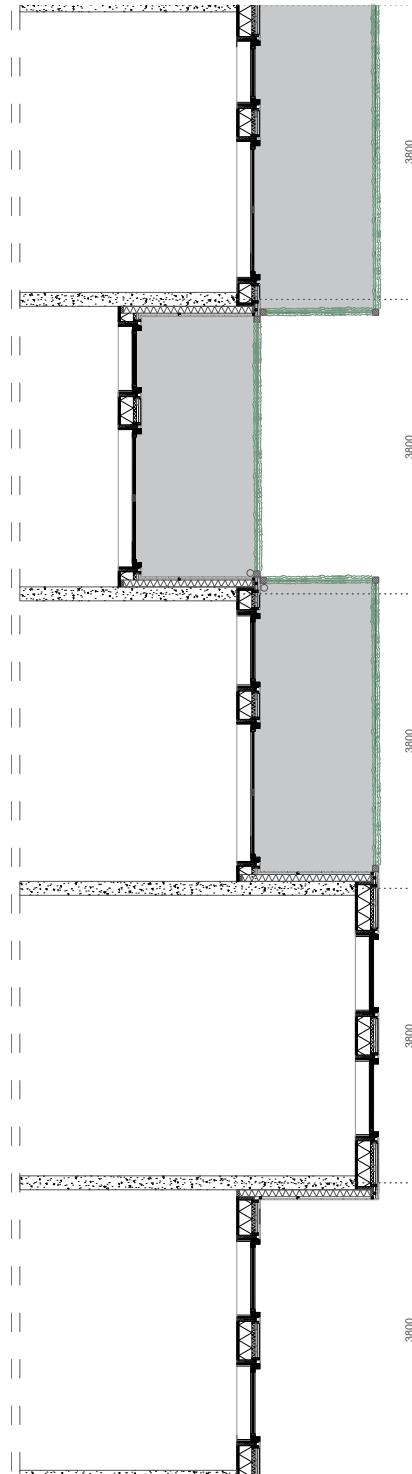
ROOFTOP



ELEVATION ROOFTOP



HORIZONTAL SECTION ROOFTOP



IMPRESSIONS ROOFTOP

SECTION

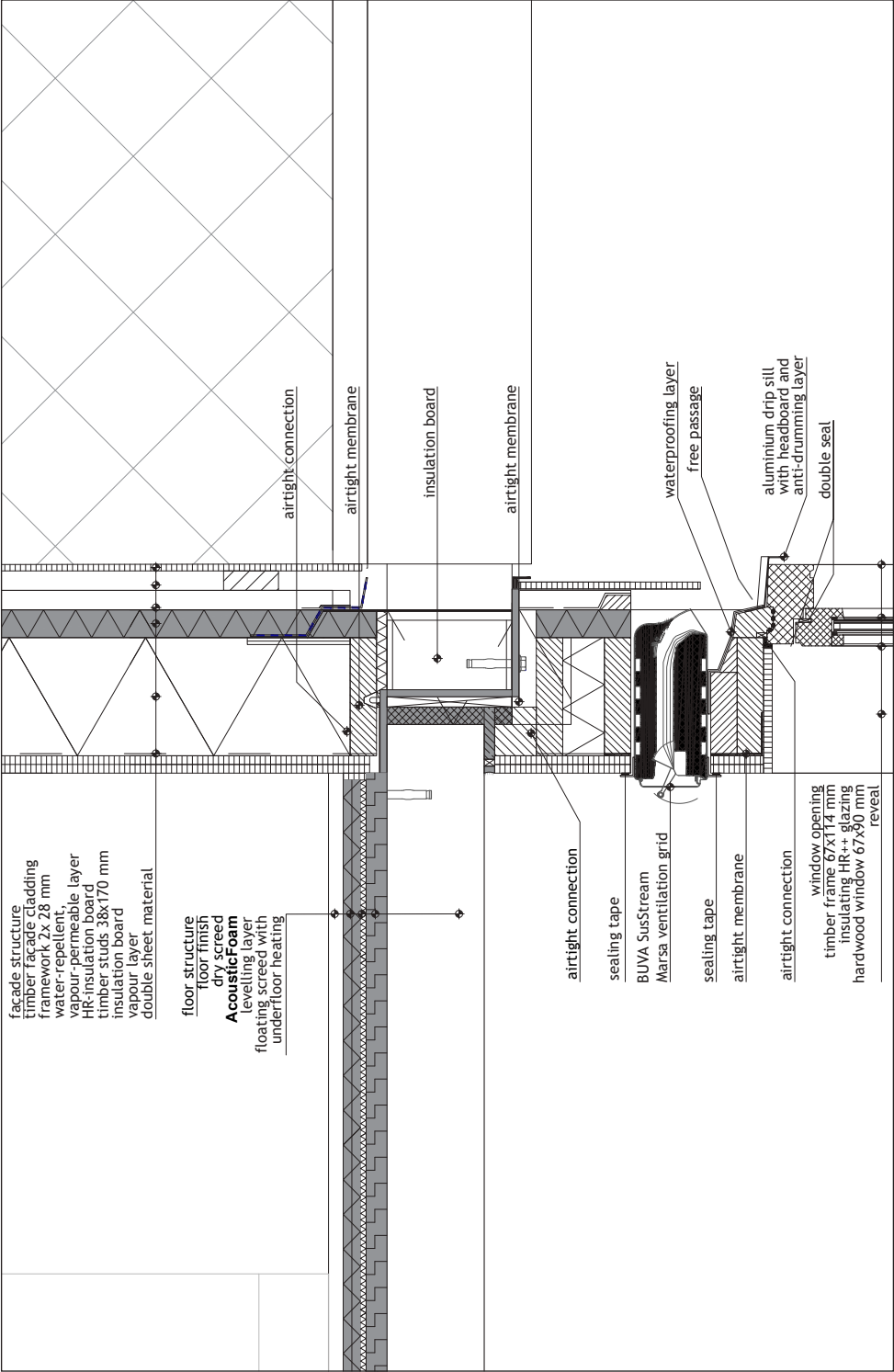


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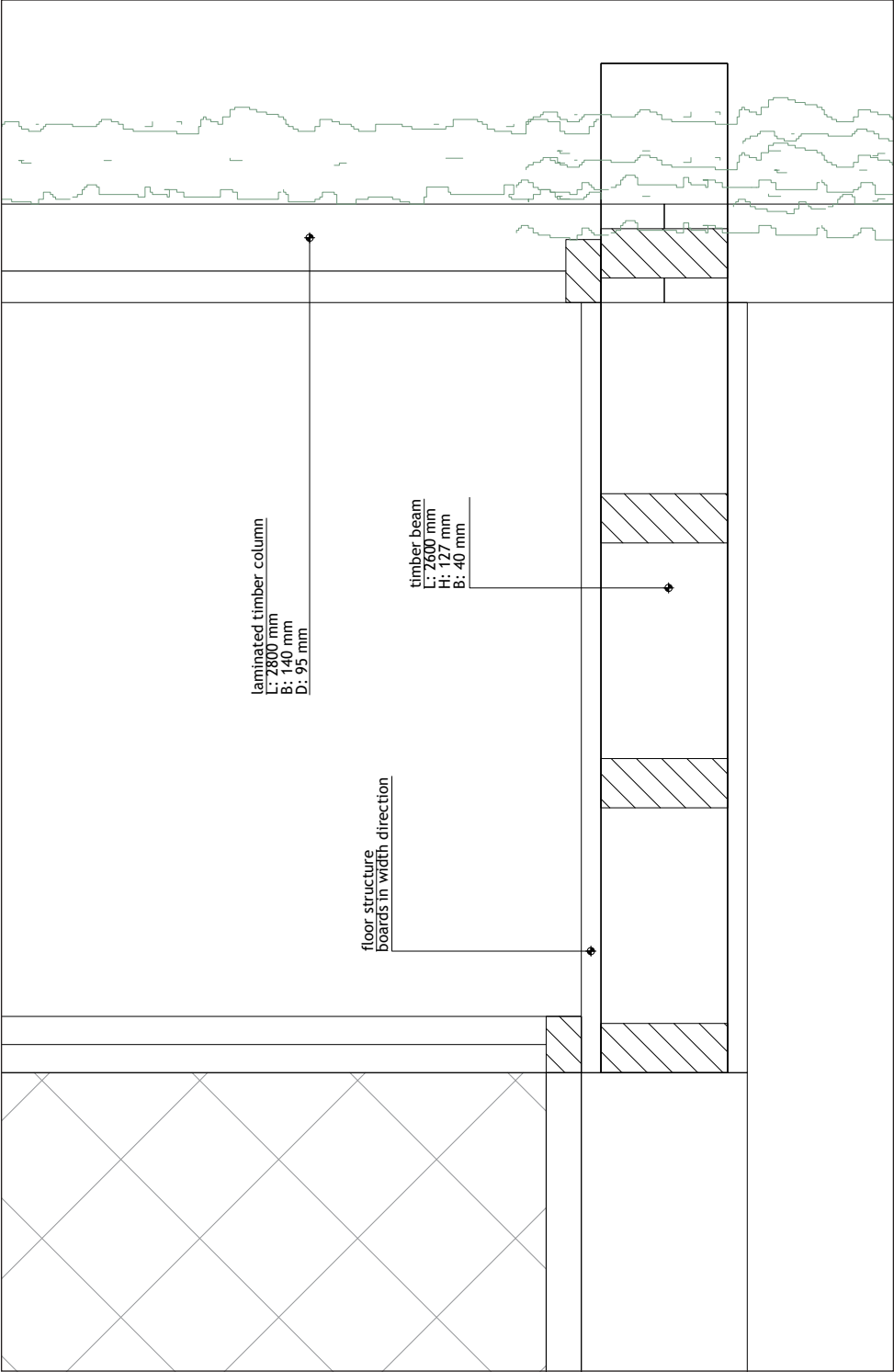
MARKING DETAILS



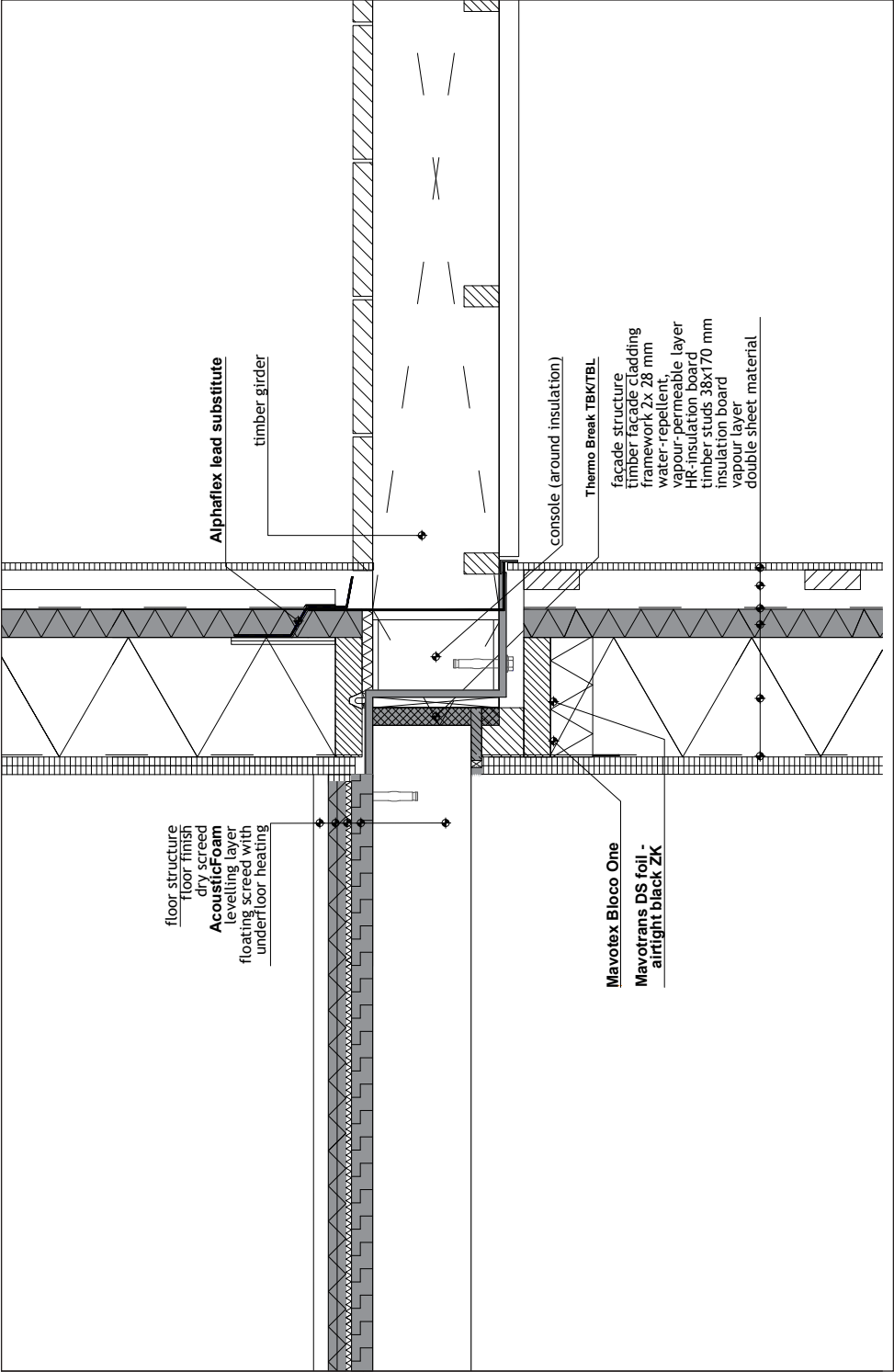
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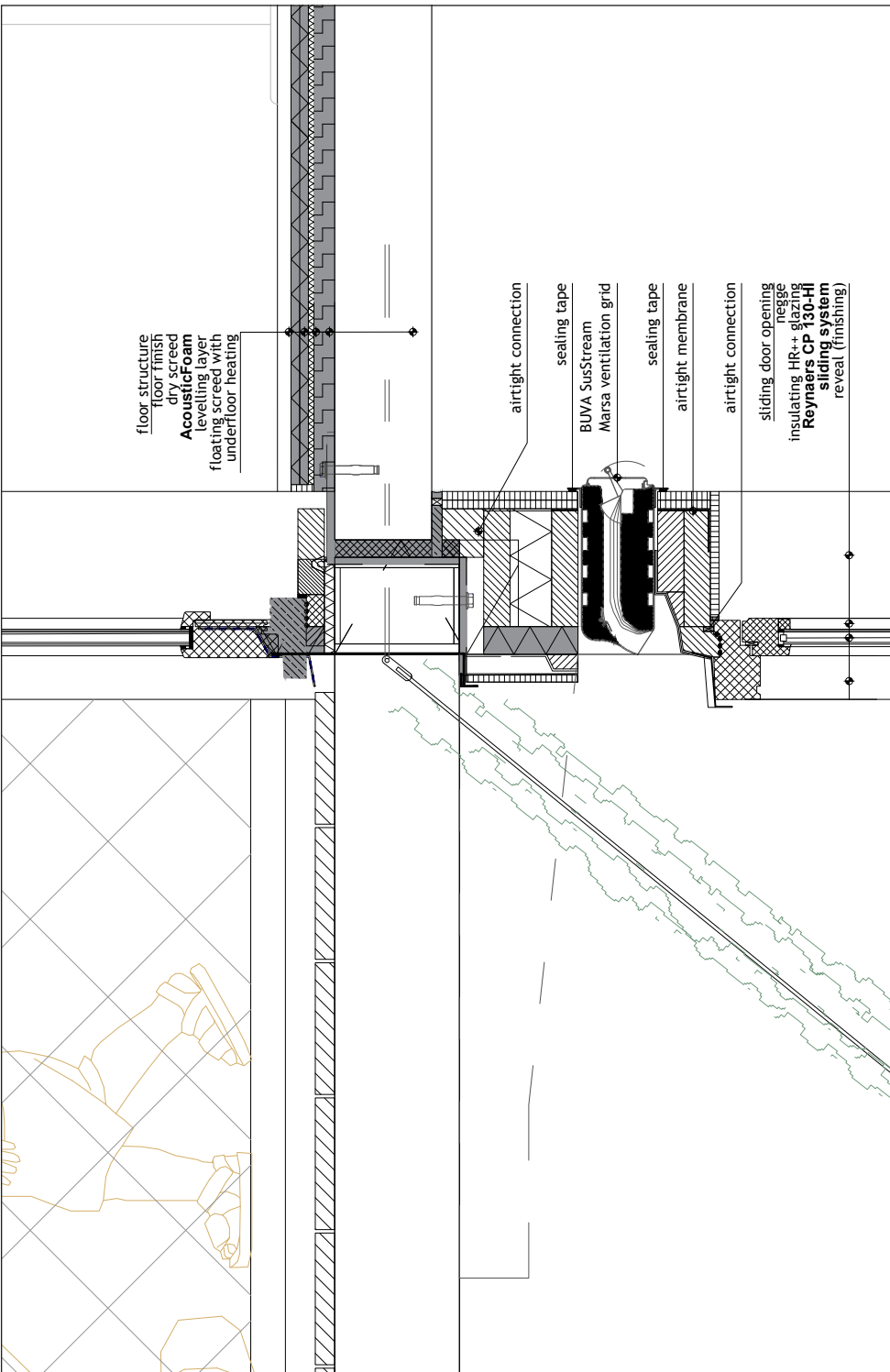
Detail 1: Gallery construction with vide & prefab façade, east façade



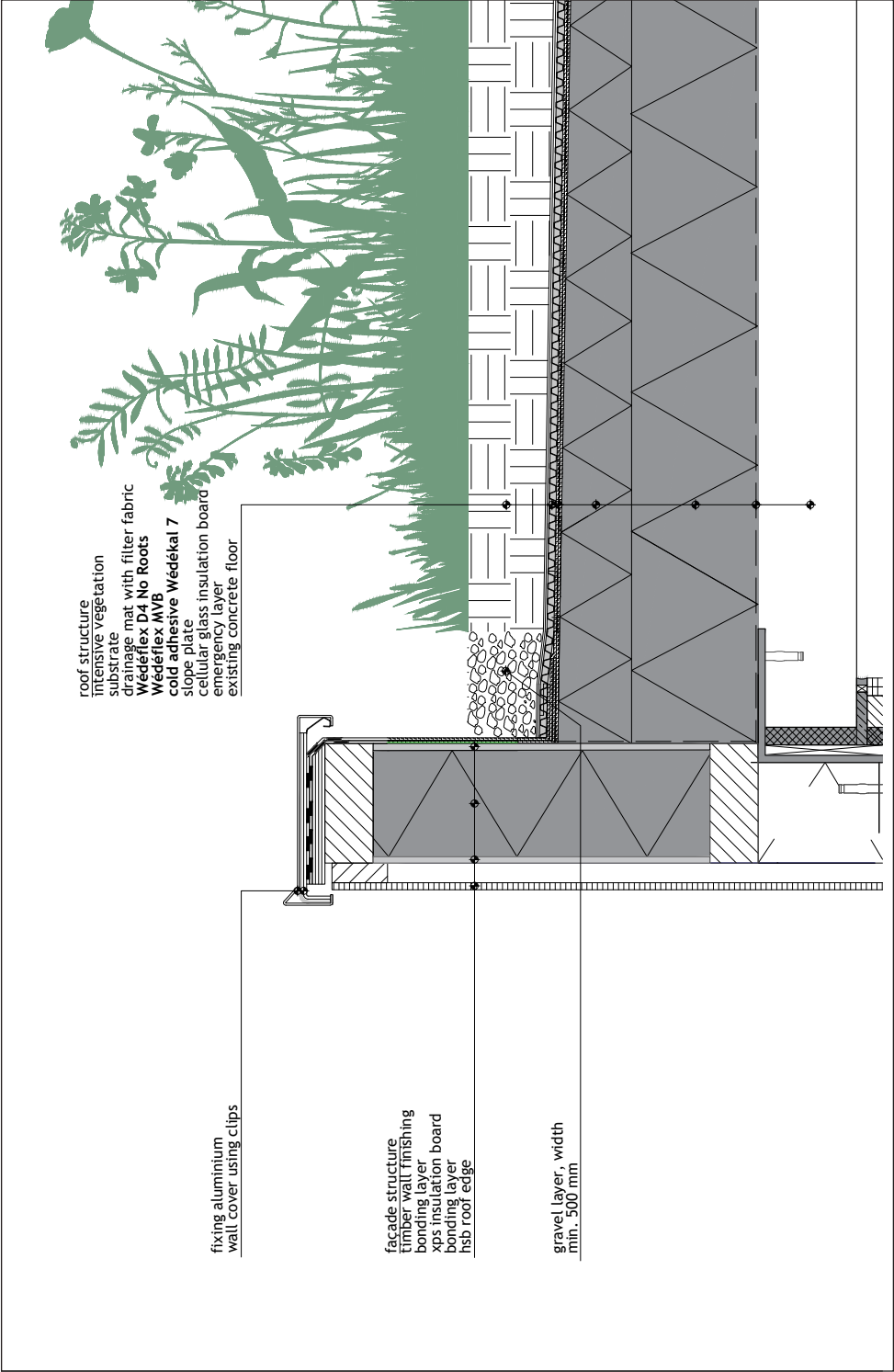
Detail 2: Gallery timber construction, east façade



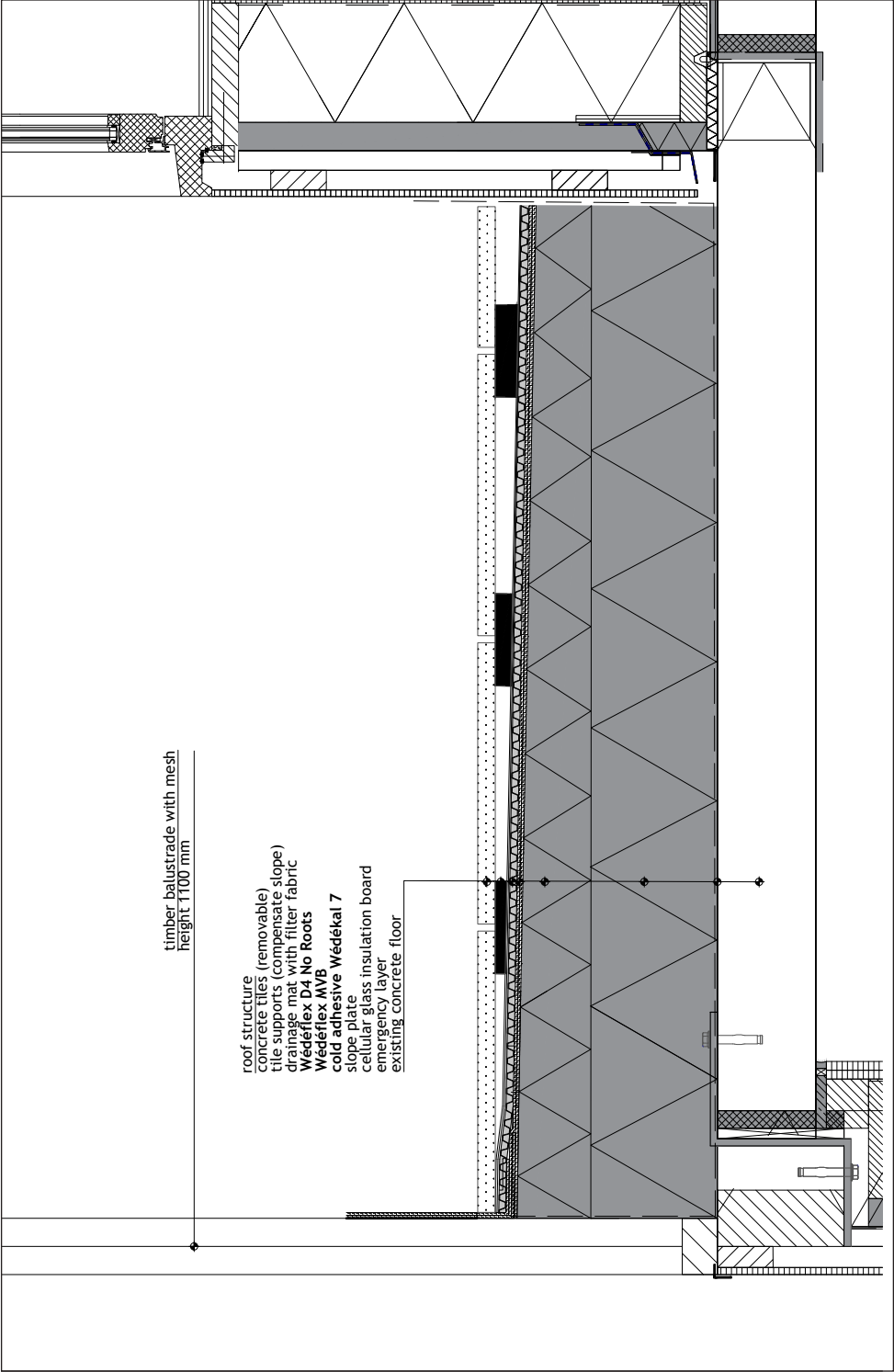
Detail 3: Closed façade with mezzanine floor, east façade



Detail 4: Façade with balcony and sliding doors, west façade



Detail 5: Roof edge with 'wild' vegetation on ninth floor, west façade



Detail 6: Terrace of rooftop apartment, tenth floor, west façade

COMMUNITY BUILDING



Participatory kitchen

Educational activities

Meeting places

Library

Dining room

Theater

Vegetable garden

Art expositions

ECOLOGY: LOCAL FAUNA



SHREW MOUSE



COMMON TOAD



LONGHORN BEETLE



HEDGEHOG



NATTERJACK TOAD



SAND BEE



ERMINE



SMALL NEWT



MARTEN



DRAGONFLY



MASON BEE



SWIFT



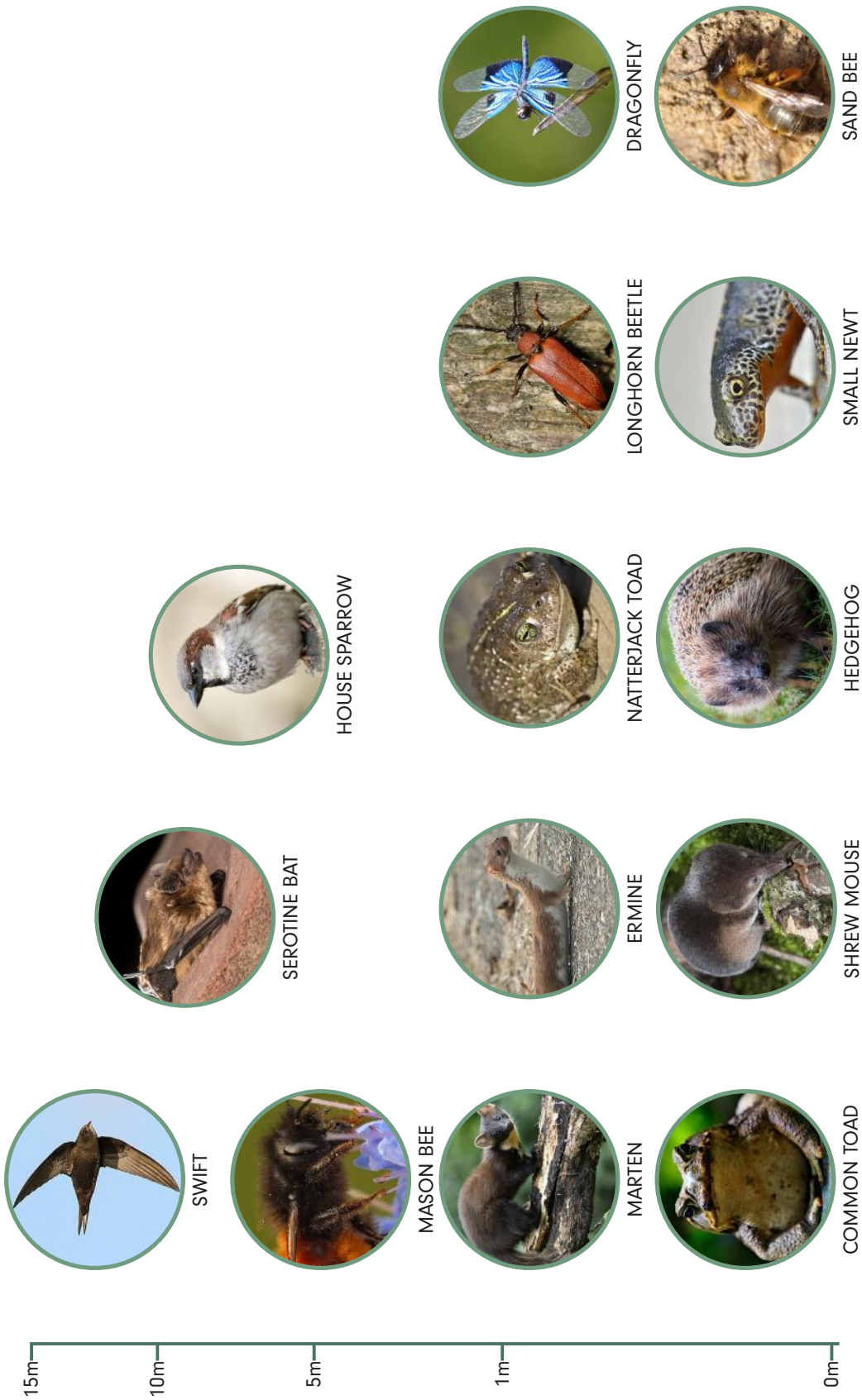
SEROTINE BAT



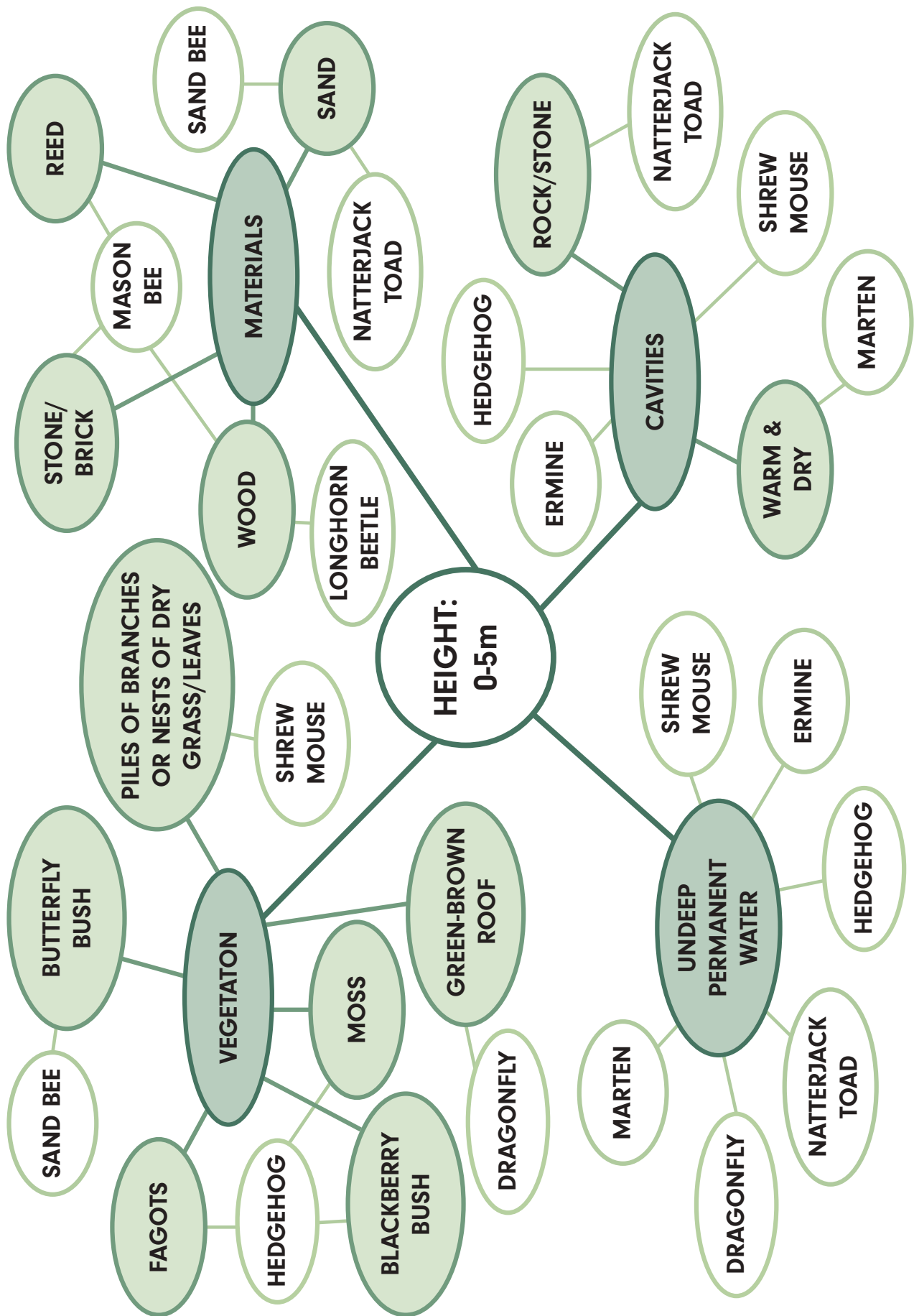
HOUSE SPARROW

**FAUNA
BOERHAAVEWIJK**

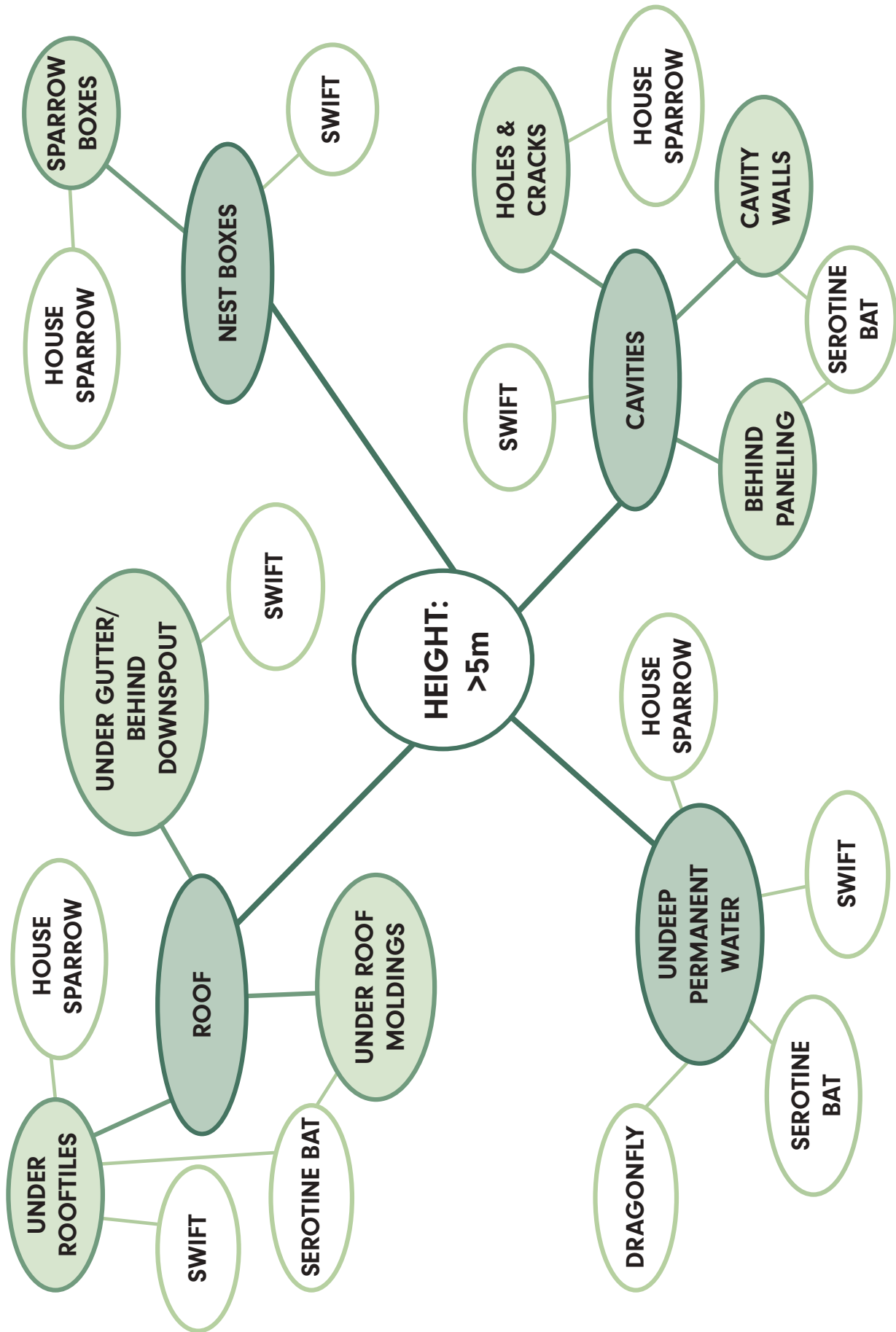
HABITAT HEIGHT FAUNA



PREFERENCES FAUNA



PREFERENCES FAUNA



ECOLOGICAL DESIGN INTERVENTIONS: FAÇADES



HOUSE SPARROW



NATTERJACK TOAD



SHREW MOUSE



SEROTINE BAT



ERMINE



HEDGEHOG



SWIFT



MARTEN



Cavities, cracks, greenery

ECOLOGICAL DESIGN INTERVENTIONS: ROOF



SWIFT



DRAGONFLY



MASON BEE



SAND BEE

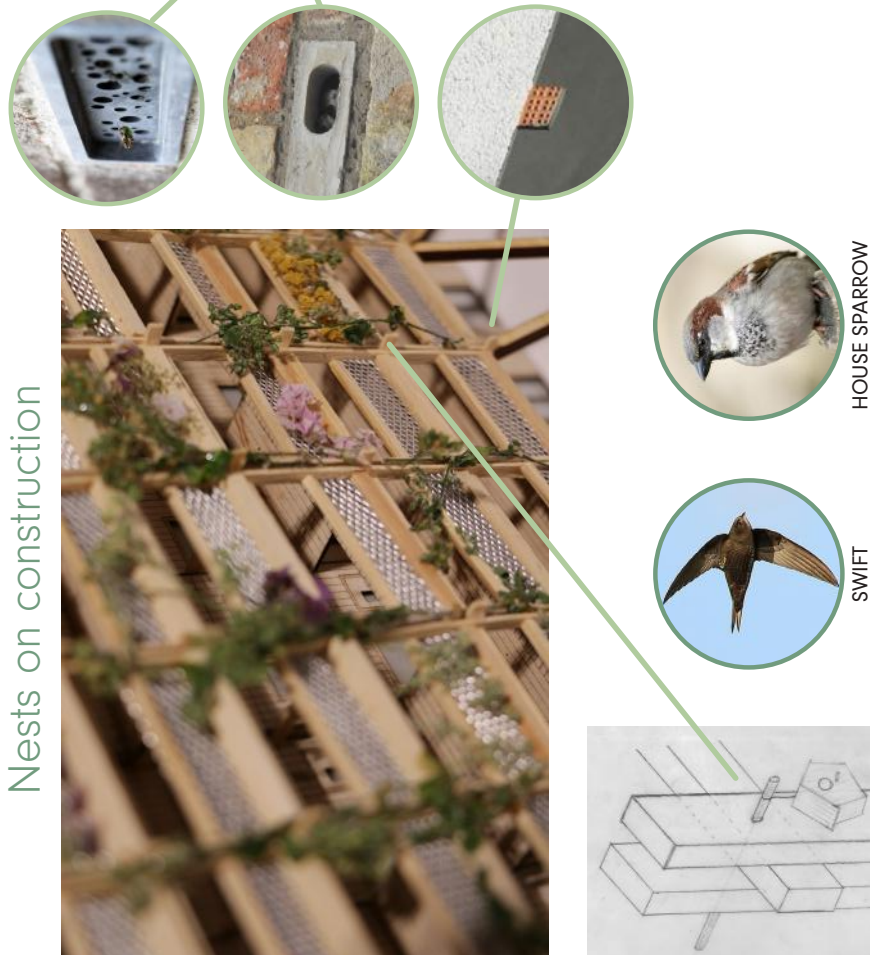
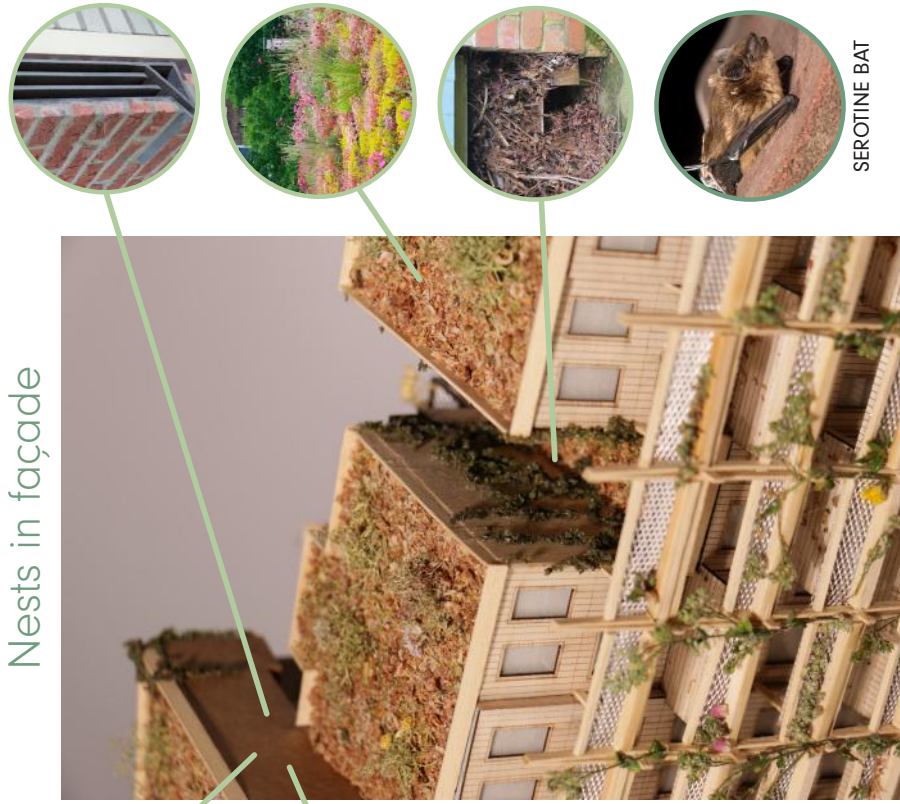


SHREW MOUSE



Different types of vegetation
Green-brown roof, sand, stones & bricks

ECOLOGICAL DESIGN INTERVENTIONS



IMPLEMENTATION ON SCALE NEIGHBOURHOOD

REFLECTION

CONCLUSION

- Site-specific & depend on characteristics
- Start at smaller scale
- Create opportunities for biodiversity
& make cities greener and more resilient
- Rewild architecture

Thank you & LETS REWILD OUR CITIES!



POSTERS

MODEL



