Jeanne Kielwasser

Fessler - Drahotova studio

Summer semester 2024

PORTFOLIO

BRIEF

We aim to engage in city planning that transcends the inherent constraints imposed by our cultural legacy, seeking to push the boundaries of what is possible. By envisioning Prague in the future, let's say 2150 for pragmatic reasons rather than merely for the sake of futurism, we can sidestep present-day political considerations and delve into the realm of boundless imagination. Assuming the population doubles and societal shifts occur, two significant themes emerge: the legacy for future generations and the inevitable evolution of housing developments, land use patterns, infrastructure, and cultural artifacts, possibly converging into a unified narrative. Architecture will be examined at a scale that is not quite building and not quite city. 5 primary categories of the city: its edge and frontier; its core and built mass; its river landscape and nature; its brownfields and greyfields; its infrastructural system and junction.

CONTENTS

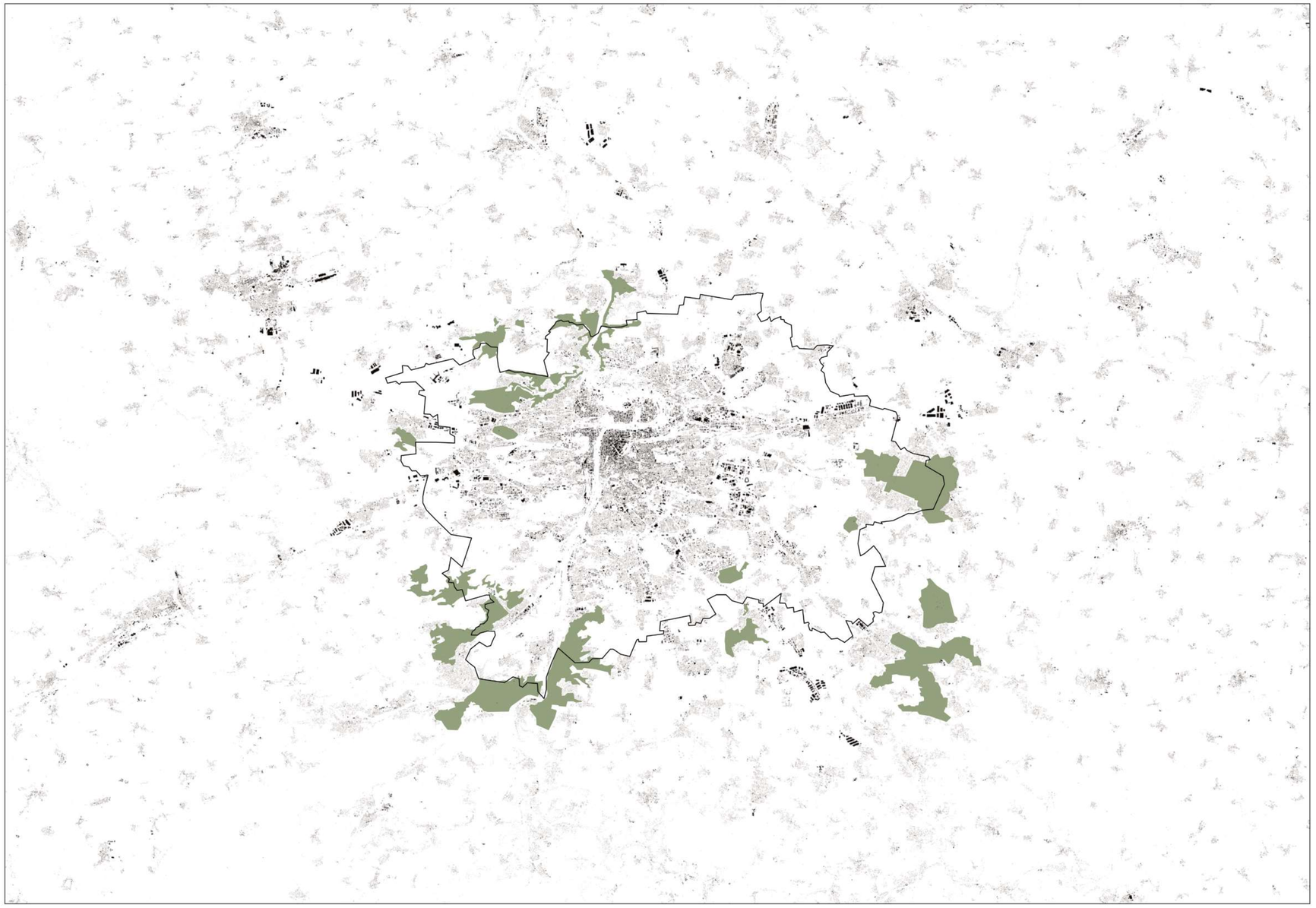
CONCEPT

At the beginning of the semester, our initial assignment was to select a piece of art. I opted for Bernini's Apollo and Daphne statue because of its captivating nature. It offers a unique experience within the confines of the Villa Borghese in Rome. As you navigate around the sculpture, Daphne seemingly disappears into the foliage, transforming into a laurel tree, only to reemerge in human form from certain view points in the room. Meanwhile, Apollo remains unchanged, his gaze unwaveringly fixed on Daphne.

The central vision for the future of Prague revolves around the integration of housing and agriculture. Similar to Daphne, the buildings will seamlessly blend into their surroundings. The synergy between the agricultural elements of these buildings and the residents allows for direct interaction with nature, enabling individuals to cultivate their own food. It fosters a lifestyle where living harmoniously with nature is prioritized, creating a green line community.

NEW PRAGUE

When I looked at the maps of Prague in 2024, the first thing that struck me was its reputation as one of the greenest cities in the world. I was determined to preserve this identity. My initial concept revolved around utilizing agricultural land and strategically placing my buildings. Drawing inspiration from the incomplete ring road encircling Prague, I envisioned the completed version by 2150. Following this route, the green line would trace the outer edge of the ring road, aligning with my vision for sustainable development.



Scale 1:200 000

0 5 000 10 000 m

N

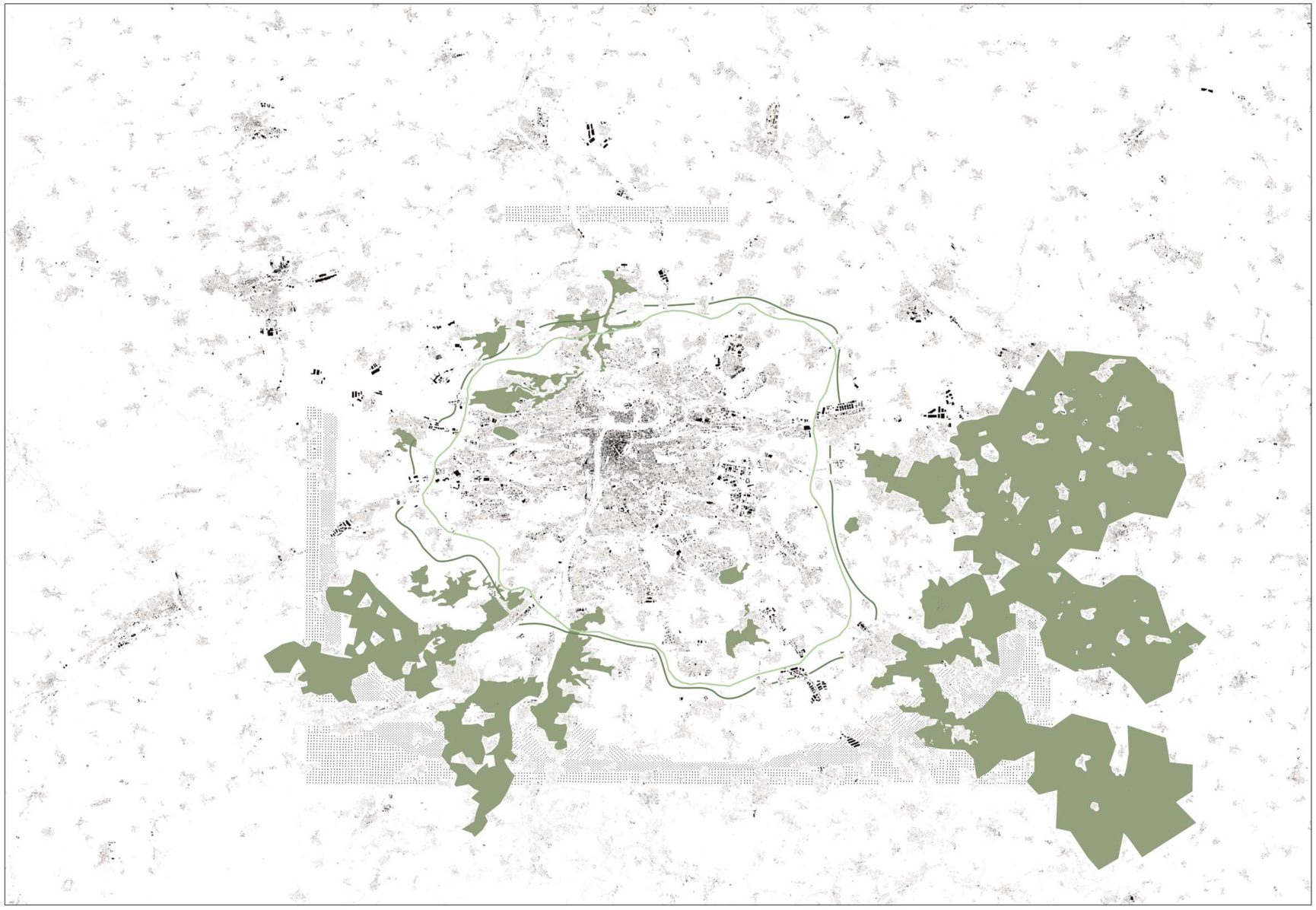
Behold the new Prague, where the city's borders are marked by towering vertical farms both to the south and north. The largest vertical farm stands at the outskirts, a 100 stories with dimensions of 28m by 28m and an expansive growth area of 200,000 sqm. Nestled between the larger and smaller structures, the medium-sized vertical farm rises to 75 stories, measuring 22m by 22m, with a growth area of 120,000 sqm. Towards the heart of Prague, the smallest vertical farms stand at 50 stories tall, spanning 14m by 14m, and offering a growth area of 40,000 sqm.

Vertical farming is absent from the north, northeast, and west areas. In the east, the soil is fertile, rendering vertical farming unnecessary. Conversely, in the west, the presence of the airport and stringent regulations make vertical farming unfeasible.

The green line is following the ring road, but sometimes the building is a bit far away from the road and sometimes it get closer, to give a sense of being more visible and less at certain view of Prague like Daphne. When it get closer to the road it will be more visible to the people and when it will more in the country side of Prague it will be less visible to the people.

The green line

The ring road



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Scale 1:200 000

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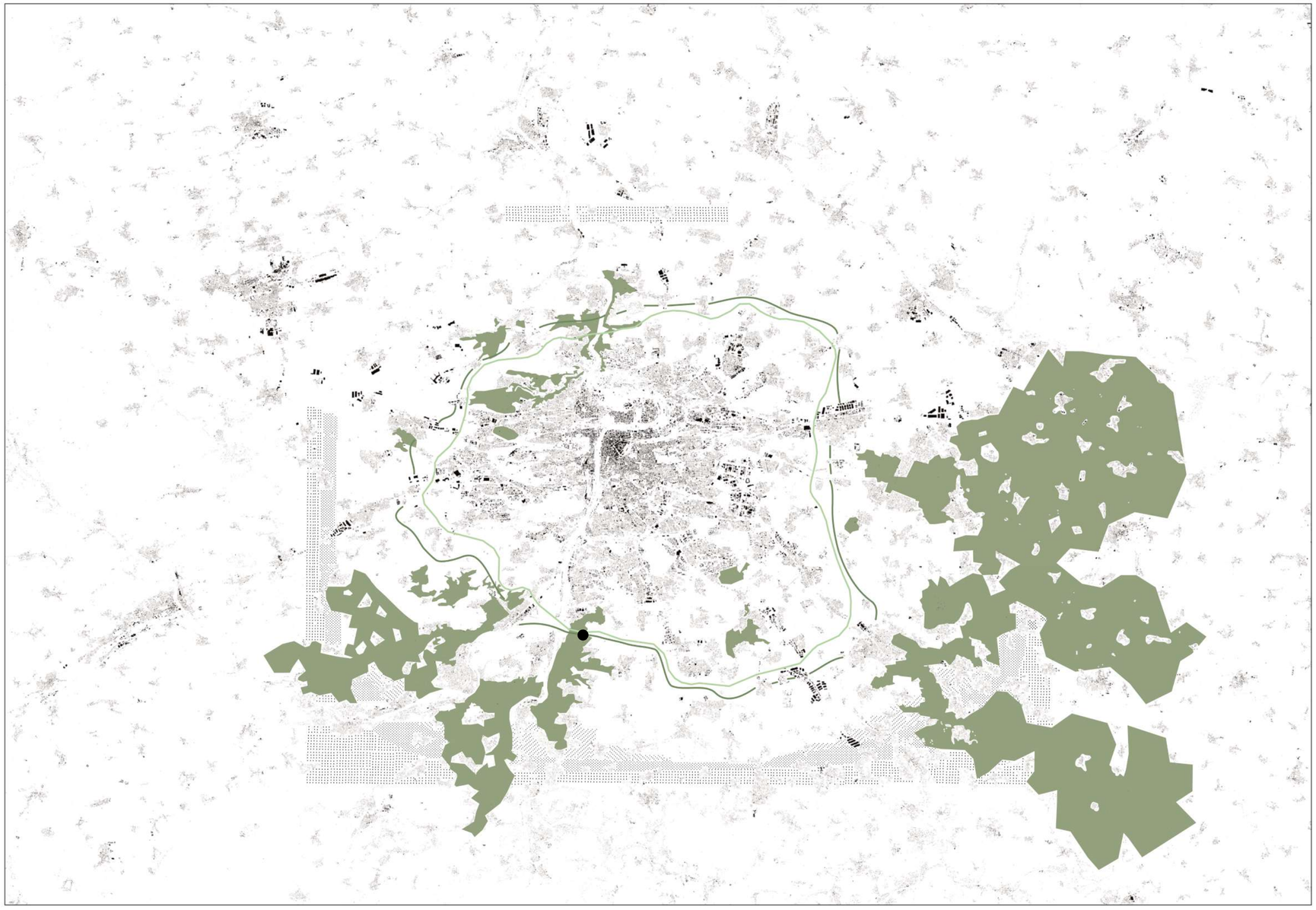
A structure stretching 70 kilometers, capable of accommodating over 13,000 units and housing a staggering 55,000 individuals. Alongside this architectural marvel, Prague will embark on an ambitious endeavor to expand its forests, creating havens for wildlife. With these initiatives, Prague aims to become the world's foremost green city. Through the integration of vertical farming within the building, Prague anticipates generating 15% to 20% of its agricultural food supply, catering to a significant portion of its population. This innovative approach to food production promises to reduce carbon emissions, further solidifying Prague's commitment to sustainability.

SITE

The location of my building is all around Prague because the brief focused on the city in 2150. However, I will be concentrating more on Zbraslav, which is a neighborhood south of Prague around the intersection of the Vltava and Berounka rivers. Zbraslav is in the southern suburbs of Prague, Czech Republic. Its proximity to the Vltava River and the wooded areas around it provides a geographic setting for investigation, mixing manufactured and natural environments. Zbraslav provides researchers with insights into the evolution of architecture, urban growth, and socio-political changes throughout centuries. Its transition from a separate town to its intake into Prague is studied by students who look at the administrative, social, and economic repercussions.



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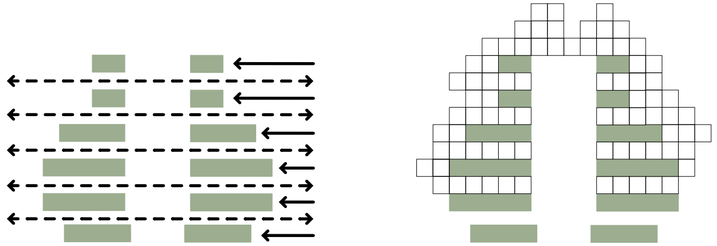
PROJECT



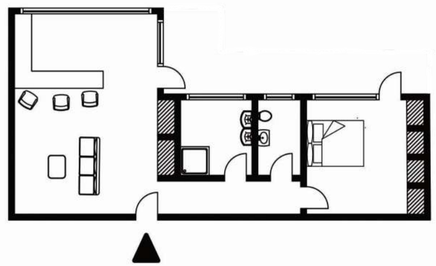
A central street runs through the heart of the building, dividing it into two sections and creating six stories. Each section serves a distinct purpose: the ground level will be walk through,the first level is dedicated to public spaces, featuring markets, workshops, restaurants, areas for both residents and visitors. Above, the next two levels are reserved for private residences, each equipped with its own gardens.

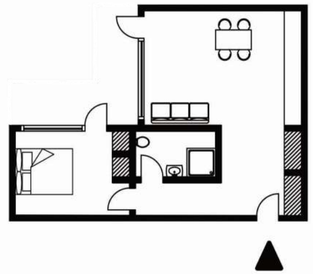
Finally, the top levels house the agricultural zone, comprising gardens and areas for agricultural production, along with storage facilities. Surrounding the living areas like a protective cloud, a grid system serves multiple functions, aiding in the cultivation of vertical crops such as tomatoes and providing shading to mitigate solar heat gain.

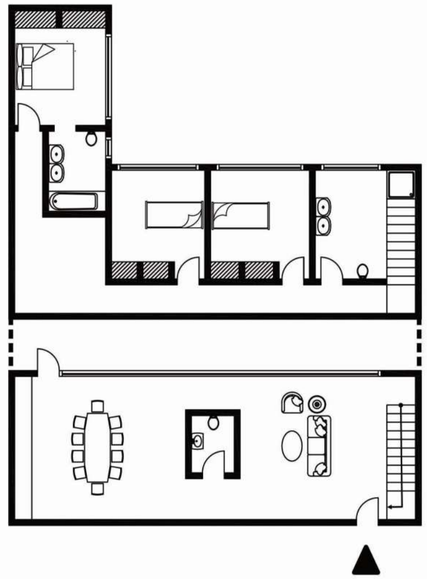
1 bedroom

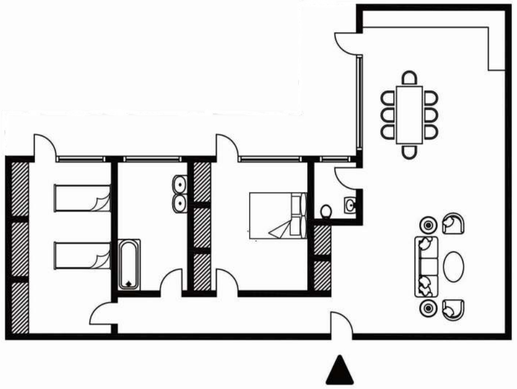
Four different apartments that go from the studio to three-bedroom apartments from 44,5 m2 to 162.5 m2 for the largest apartments.

Studio









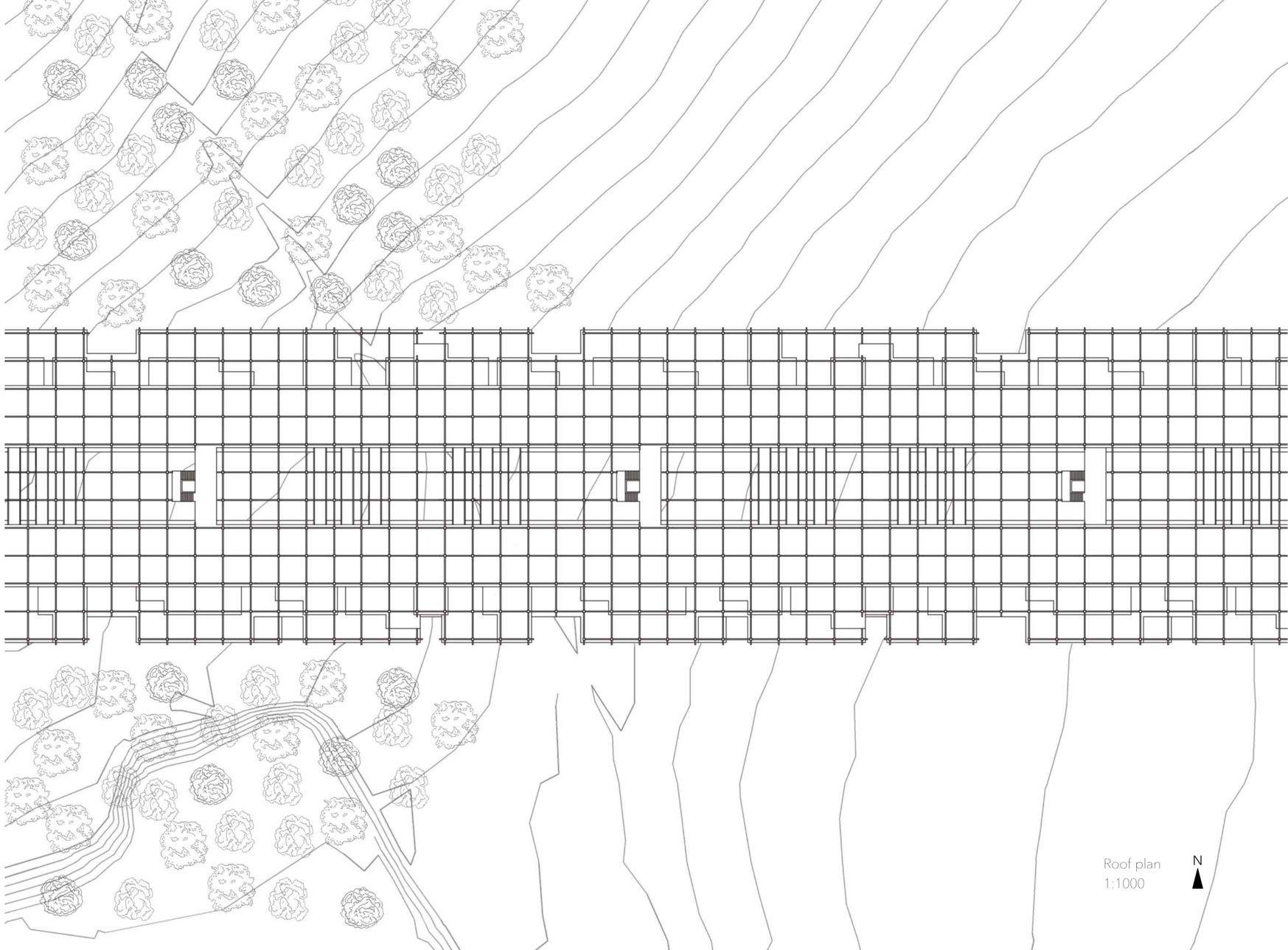
3 bedrooms

2 bedrooms

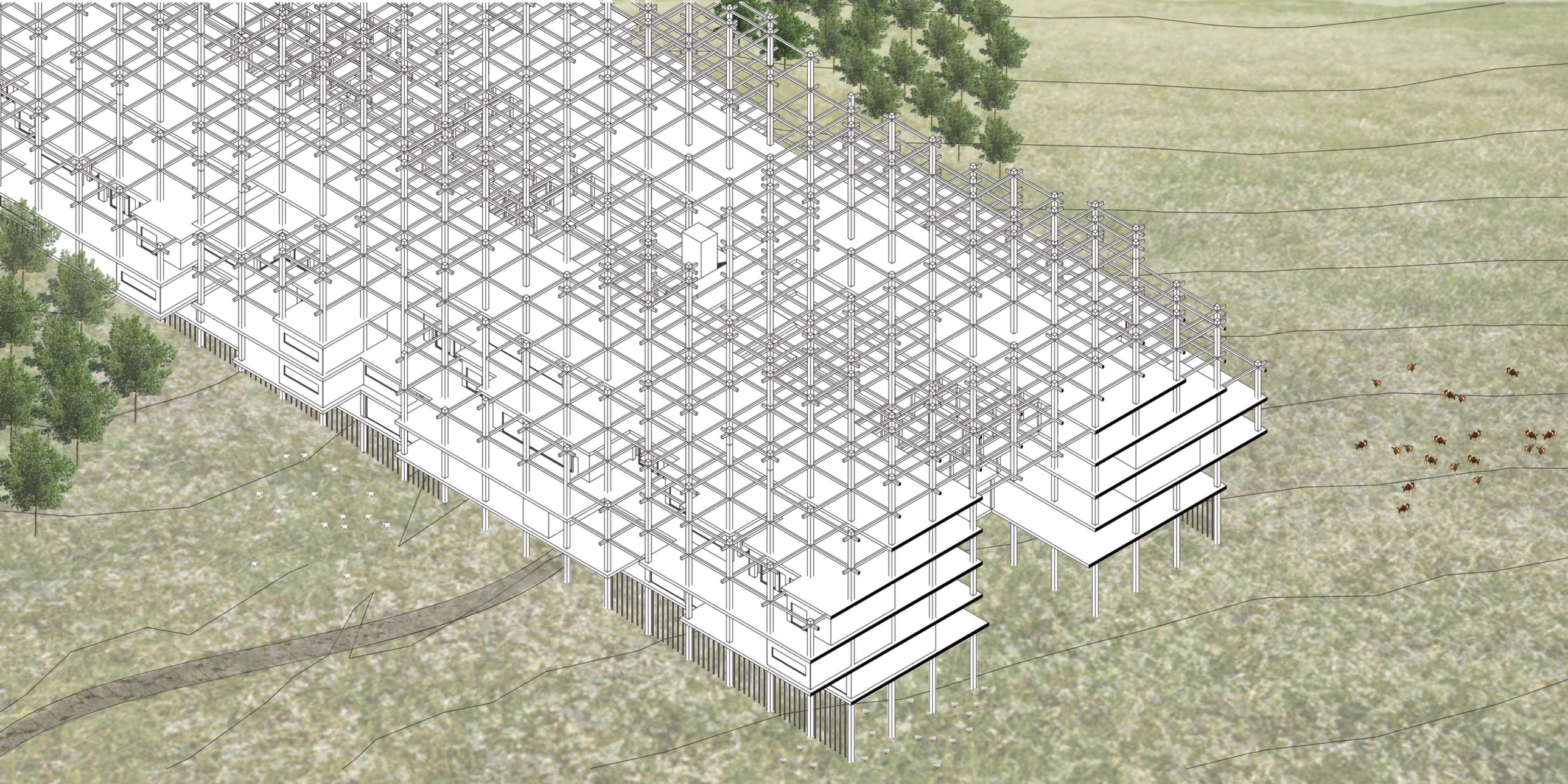
Units plans

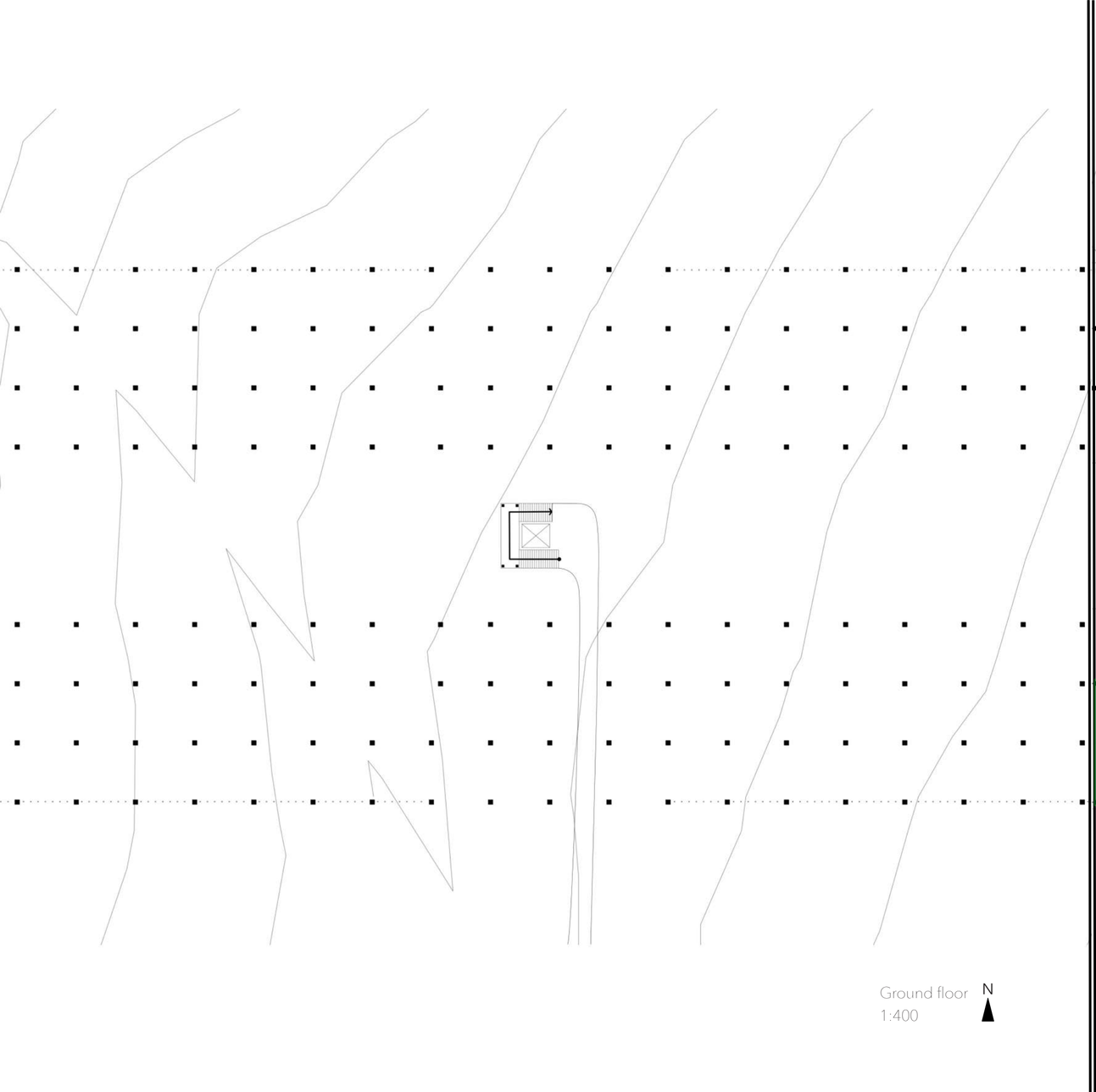
1:150

Here's an example of how the building interacts with both the forested area and open land. While the structure is currently aligned in a straight line, it can be rotated so that its facade faces south. Accessibility is ensured from both sides, with vertical connections facilitating movement between levels. The central shaft accommodates 8 to 9 people per journey, spanning from the lowest to the highest level. Staircases flank the shaft, promoting pedestrian-friendly access throughout the structure. Transitioning between levels necessitates passing through the central shaft and utilizing the adjacent staircases.



Roof plan
1:1000





Ground floor
1:400

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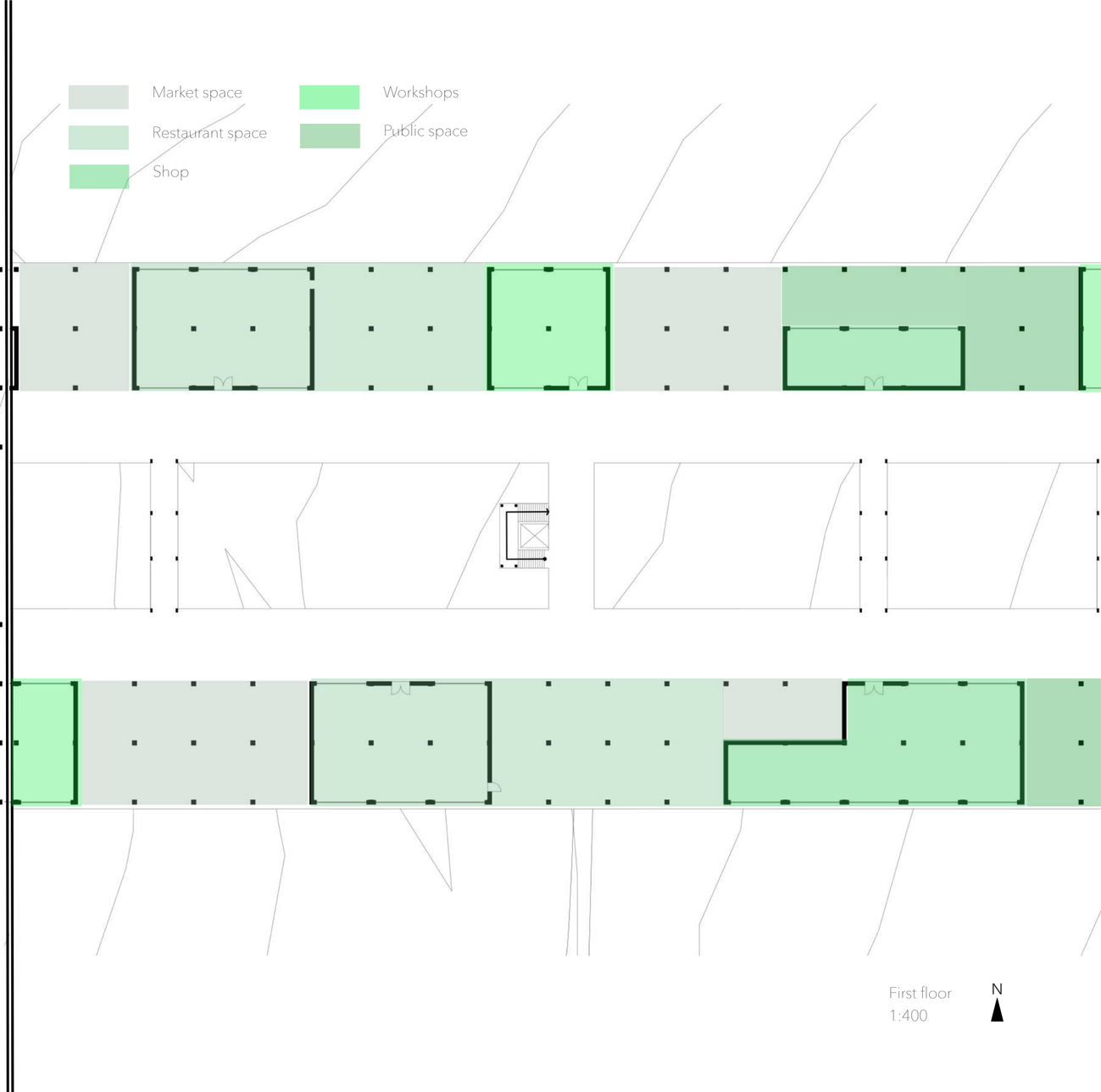

First floor
1:400

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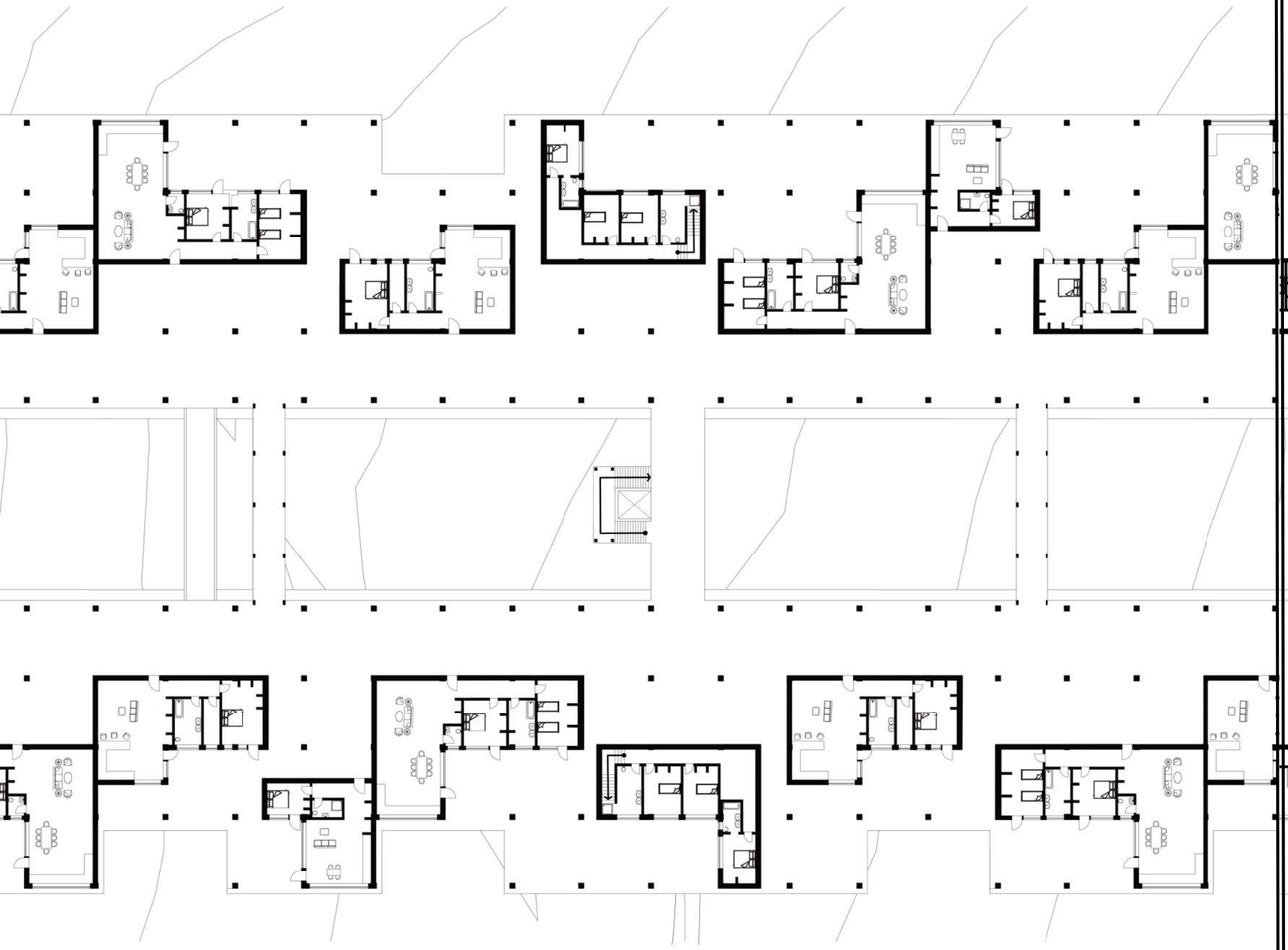

Second floor
1:400

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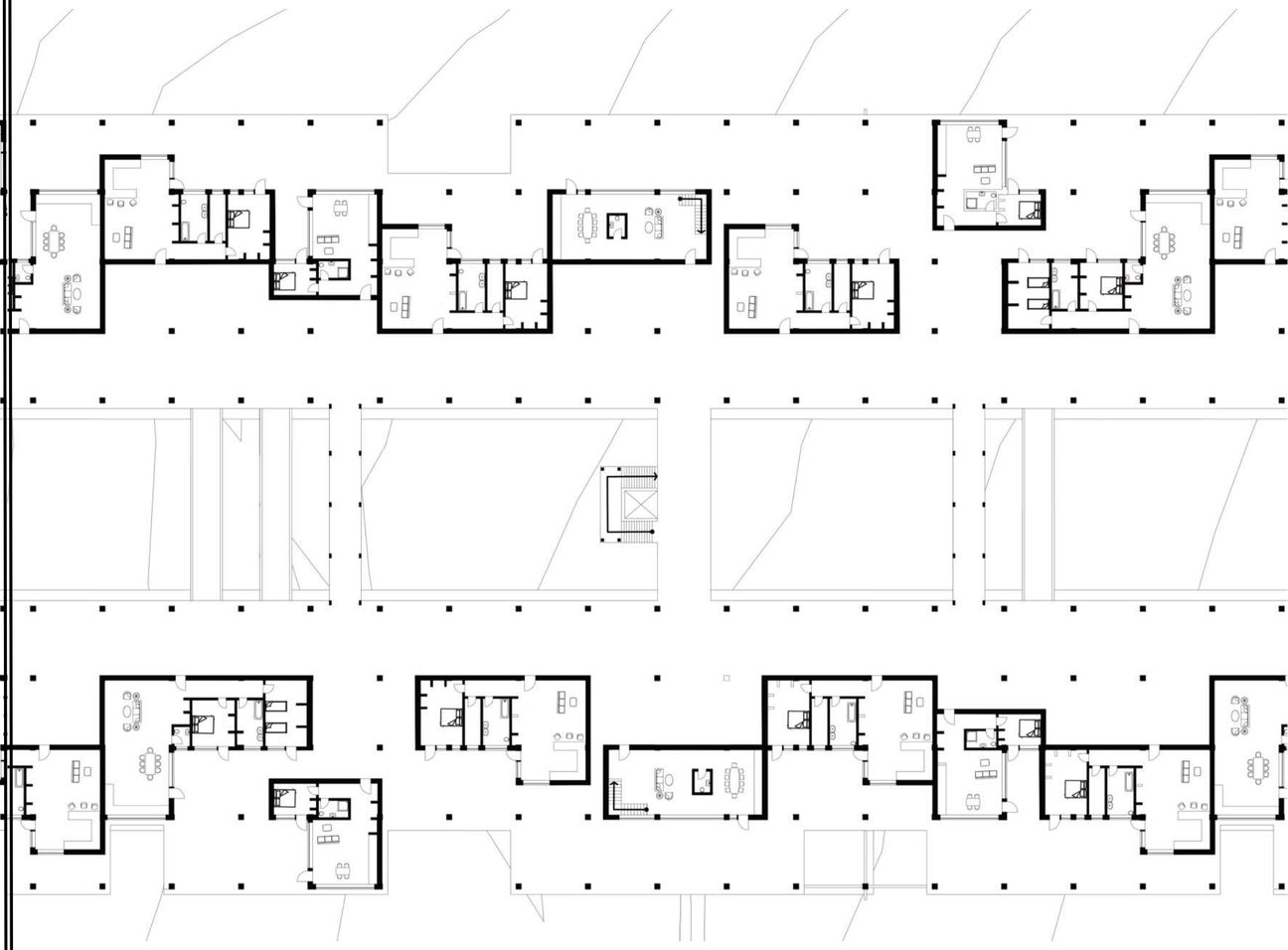

Third floor
1:400

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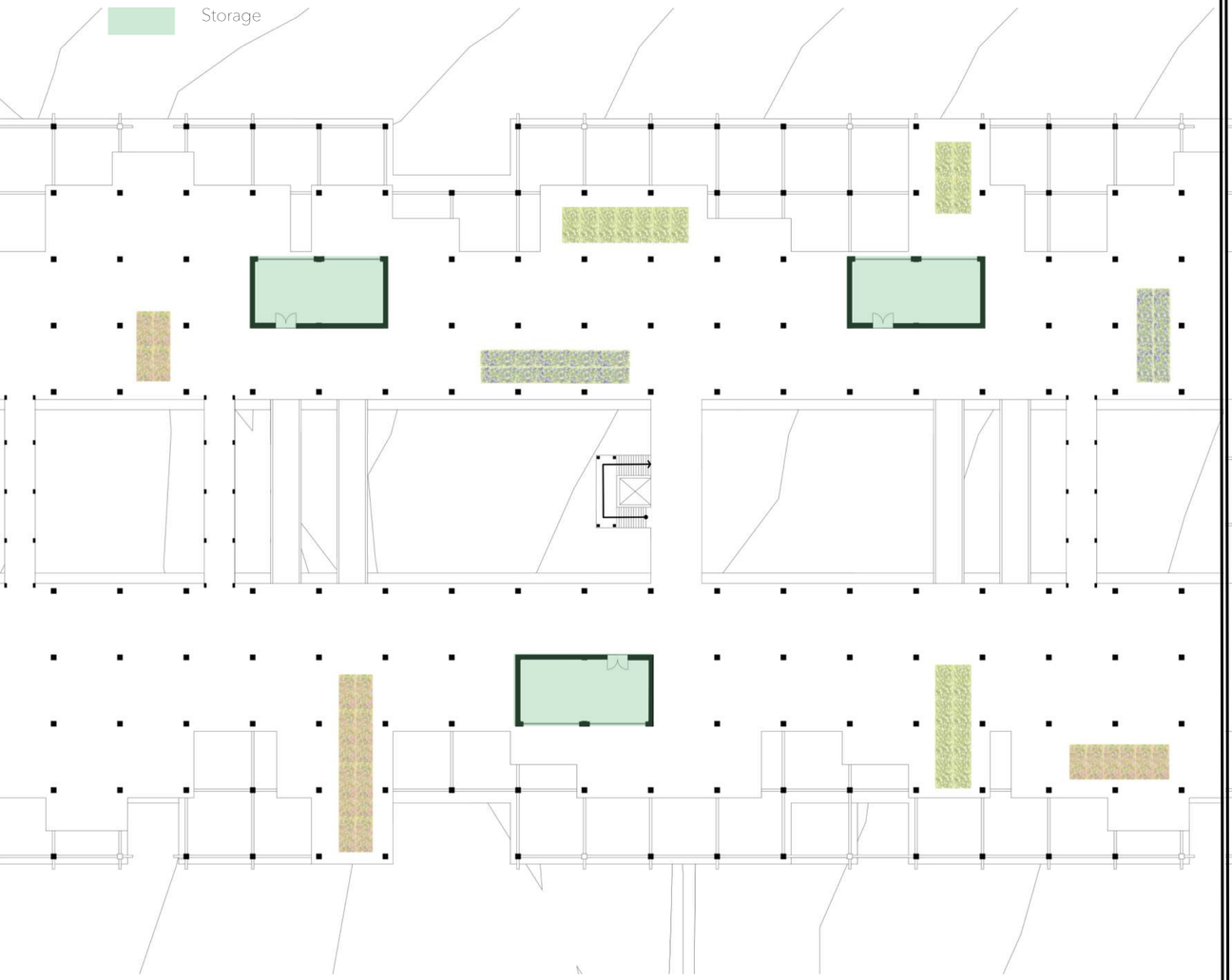

Fourth floor
1:400

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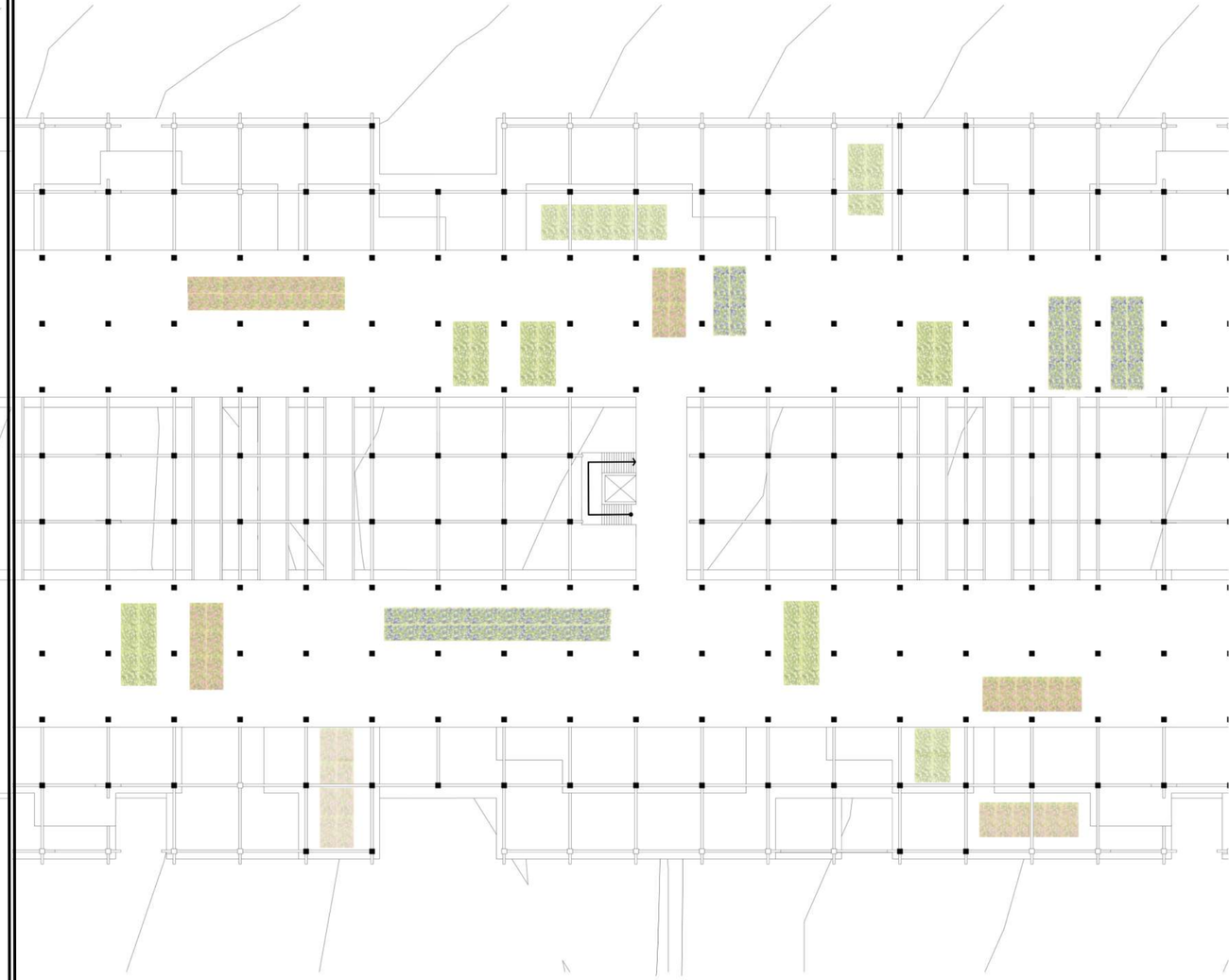

Fifth floor
1:400

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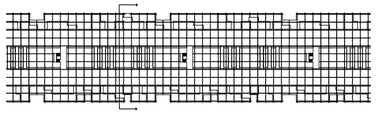
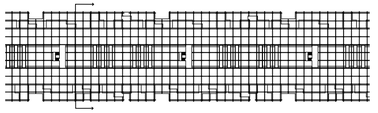
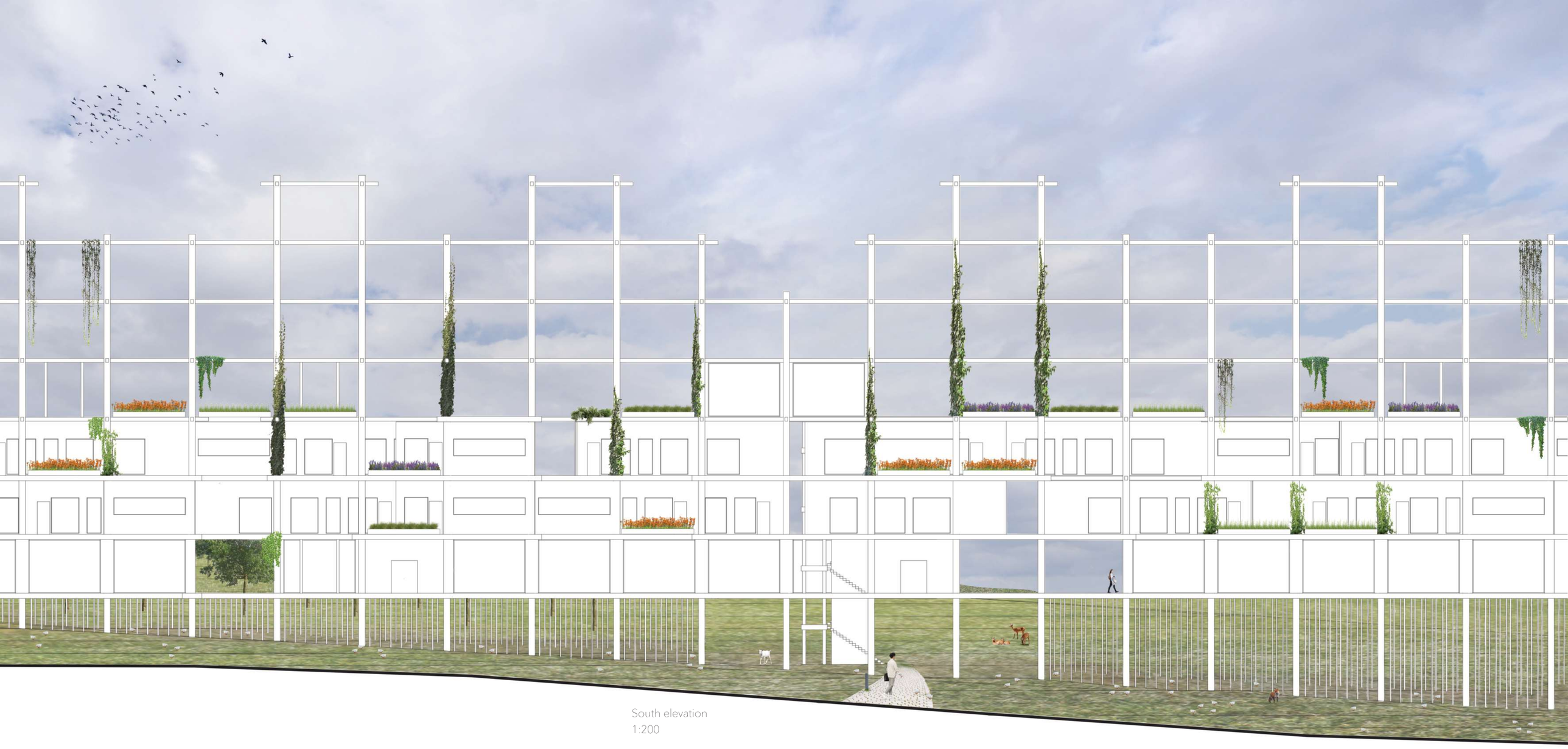


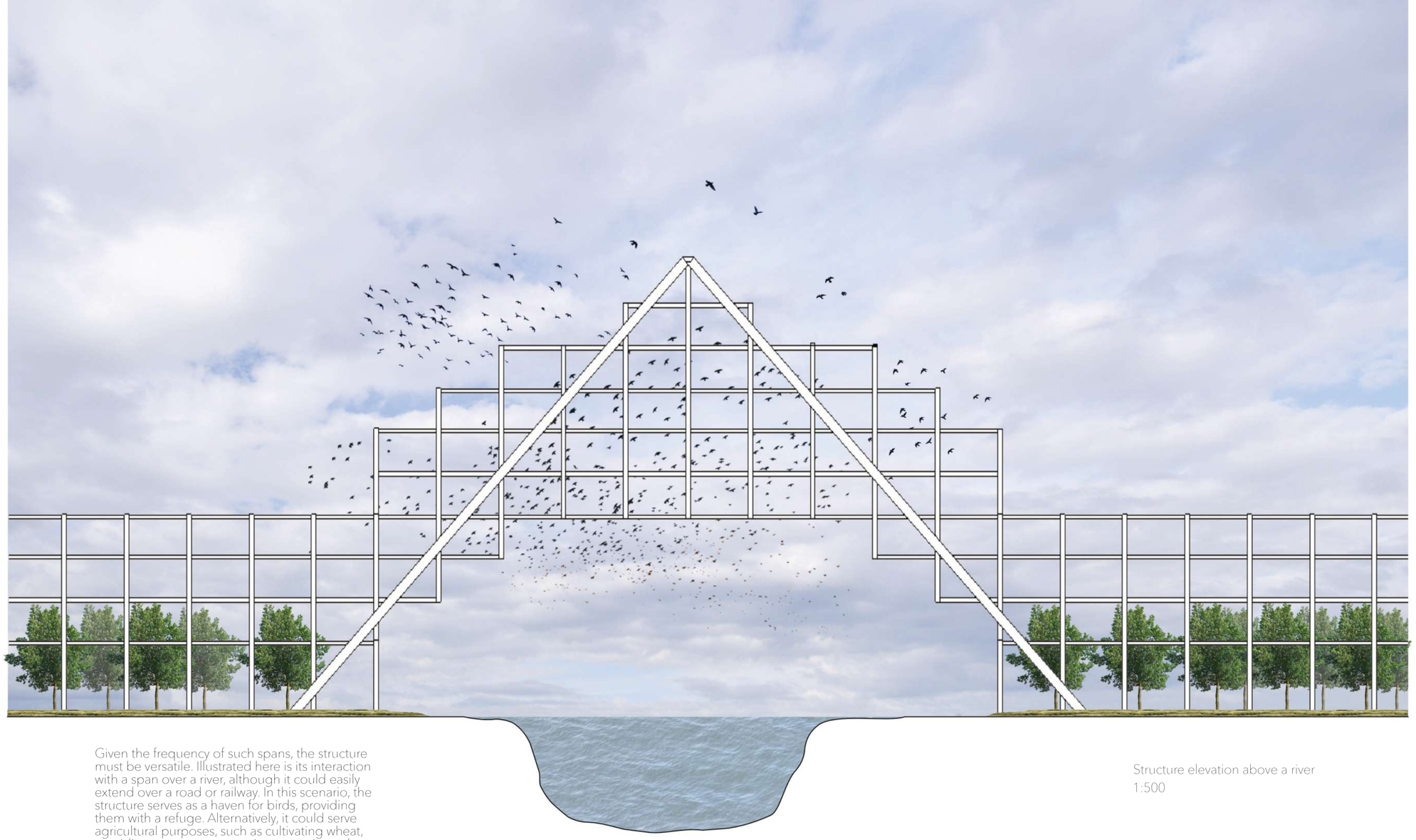
Section 1
1:300



Section 2
1:300



South elevation
1:200



Given the frequency of such spans, the structure must be versatile. Illustrated here is its interaction with a span over a river, although it could easily extend over a road or railway. In this scenario, the structure serves as a haven for birds, providing them with a refuge. Alternatively, it could serve agricultural purposes, such as cultivating wheat, providing storage space, or incorporating solar panels to generate and store additional energy.

Structure elevation above a river
1:500

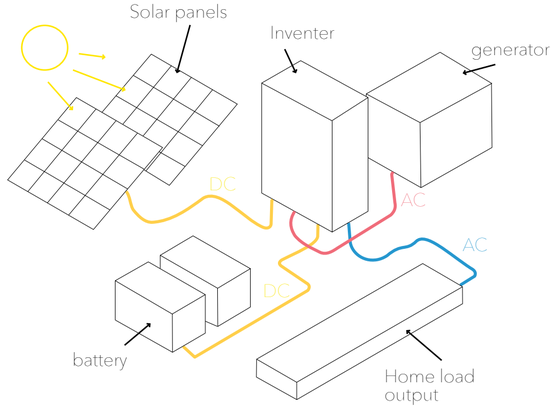
BUILDING TECHNOLOGY

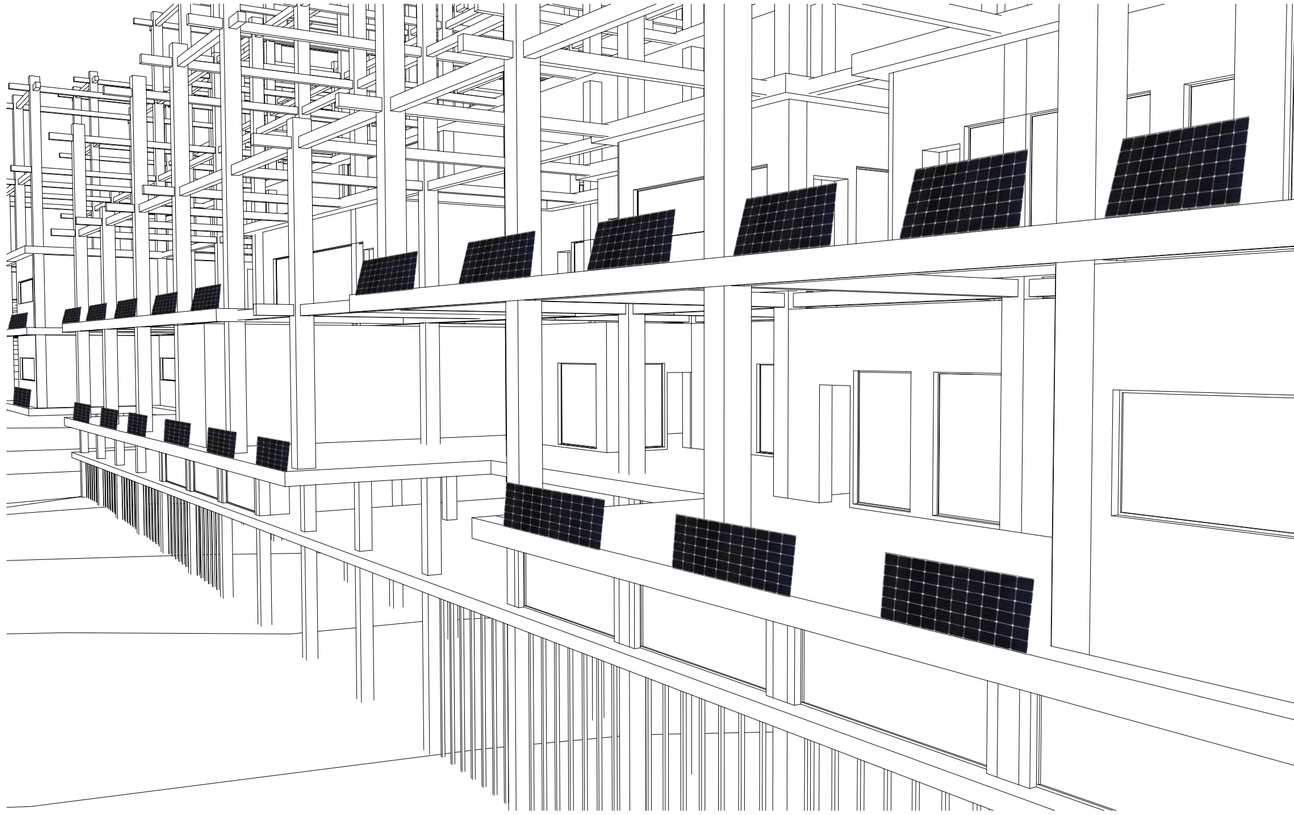
SOLAR PANELS

For my energy system i will use a off-grid solar system, oriented to the south the solar panel system will generates electricity and stored in solar batteries which will run independently from the power of the grid, a standard lithium-ion solar battery will last between 1 to 5 days. If not enough stored in the baterry, a generator will make up for any shortfall until the baterry bank recharges. If there is to much energy, some brownouts will be applied, wide areas get reduced voltage, which reduces the whole power usage but do not cut the all voltage, causses everyone's lights to dim and dinner to cook slower and the grid keeps working at the same time.

An off-grid solar panel system functions independently of the centralised power grid and is a means of producing and storing electricity.

It is made up of batteries for energy storage, photovoltaic (PV) solar panels that turn sunlight into electricity, an inverter that transforms stored DC electricity into useful AC electricity, and a charge controller that controls power flow. Energy independence is made possible by off-grid solar panel systems, which let users produce and use electricity locally without relying on outside power sources. They provide a clean, sustainable substitute for conventional fossil fuel-based energy production.



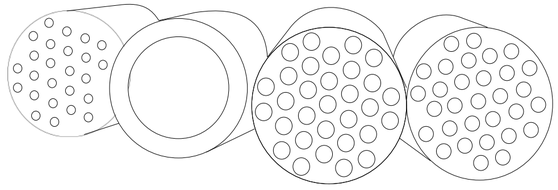


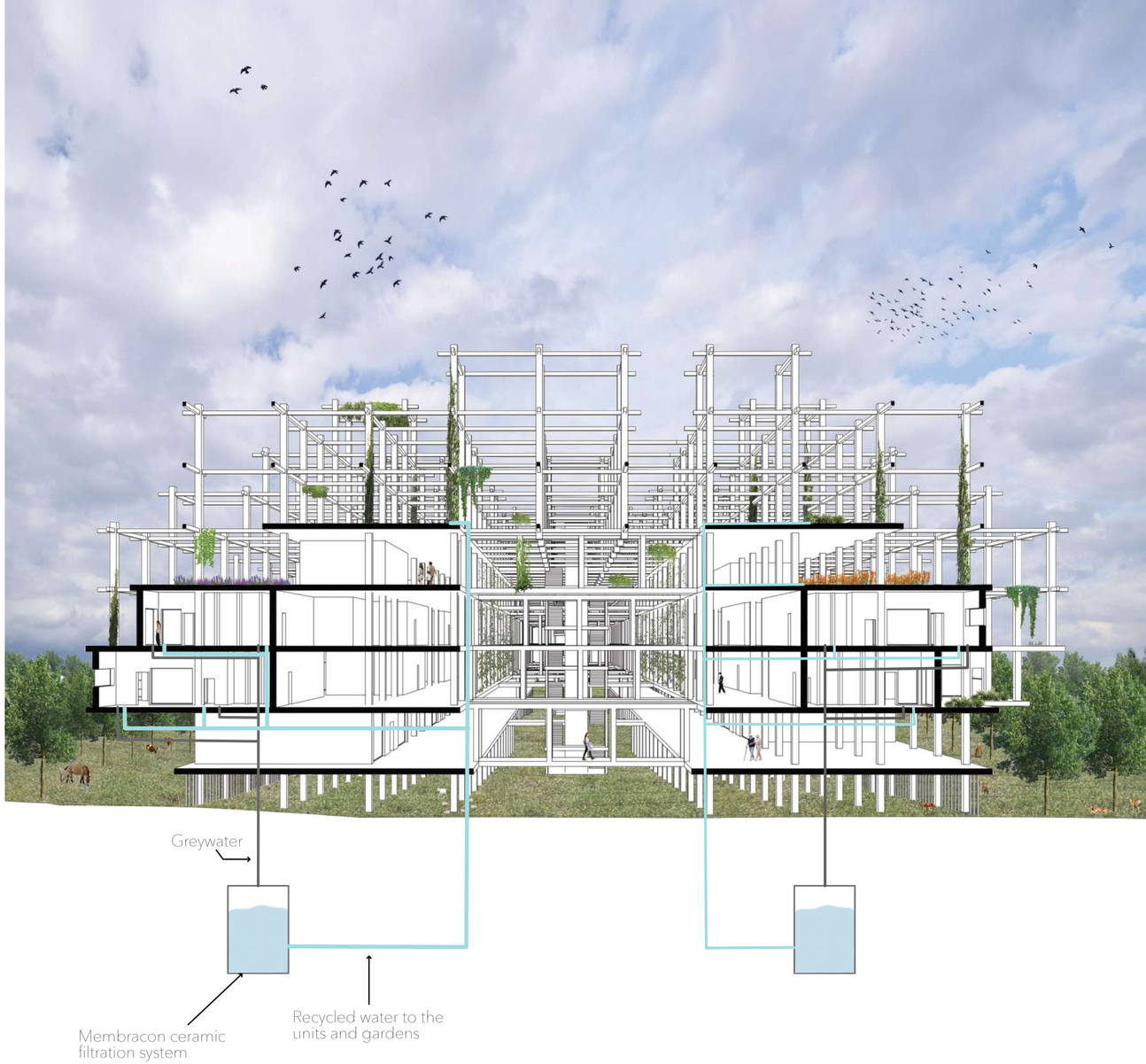
WATER MANAGEMENT

Membrane bioreactor (MBR) technology is used in wastewater treatment and recycling processes in conjunction with the Membracon ceramic filtering system. This device effectively filters and purifies wastewater by eliminating suspended particles, bacteria, and other impurities using ceramic membranes with small holes. Ceramic membranes are a good choice for challenging wastewater treatment applications because they have various advantages over typical polymeric membranes, such as increased mechanical strength, chemical resistance, and longer lifespan.

By making it possible to effectively reuse and recycle treated wastewater for a variety of uses, such as industrial processes, non-potable water applications, and irrigation, the Membracon system supports sustainable water management practices.

These membranes allow wastewater to flow through while holding onto germs and suspended particulates. The MBR system's biological treatment process, in which microorganisms further break down organic contaminants, is enhanced by this first filtration stage. Because of the ceramic membranes' long lifespan, high water quality is maintained through steady filtration performance. Through a combination of physical filtration and biological treatment, the Membracon system raises the overall efficiency of wastewater treatment. Following treatment, treated water can be recycled for a variety of uses, encouraging sustainable methods of managing water resources and lowering the need for freshwater.





Section 1
1:300

DETAILS

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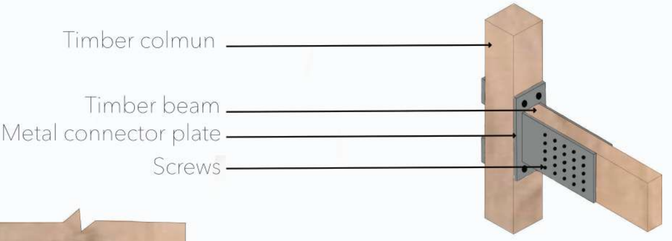
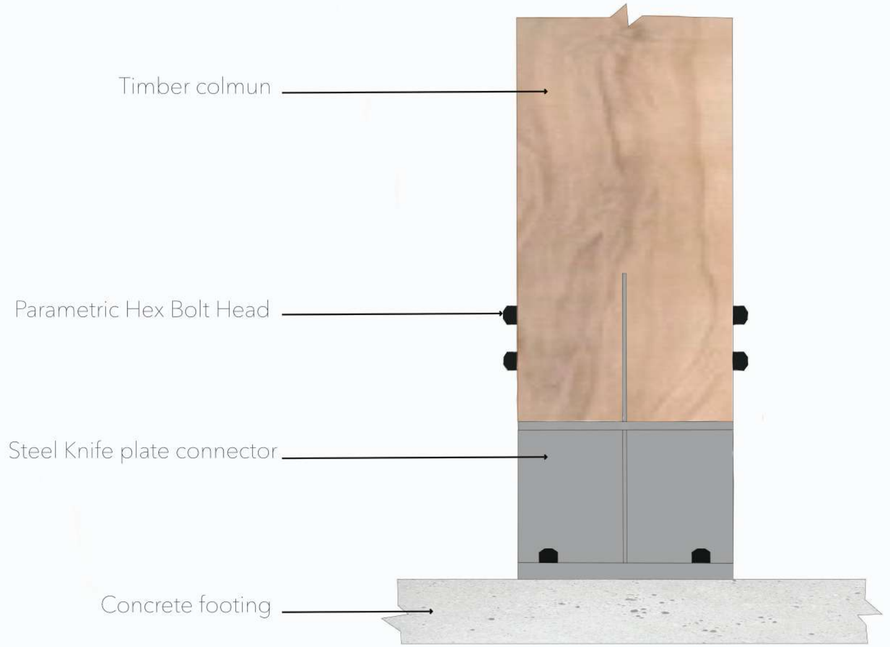
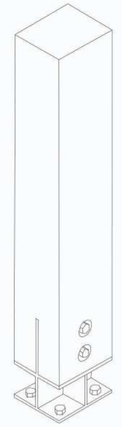
Column and beam detail

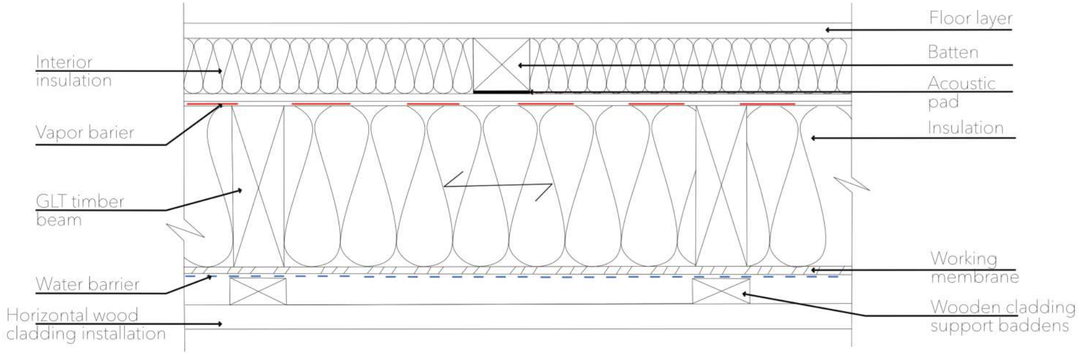




Foundation detail



Interior

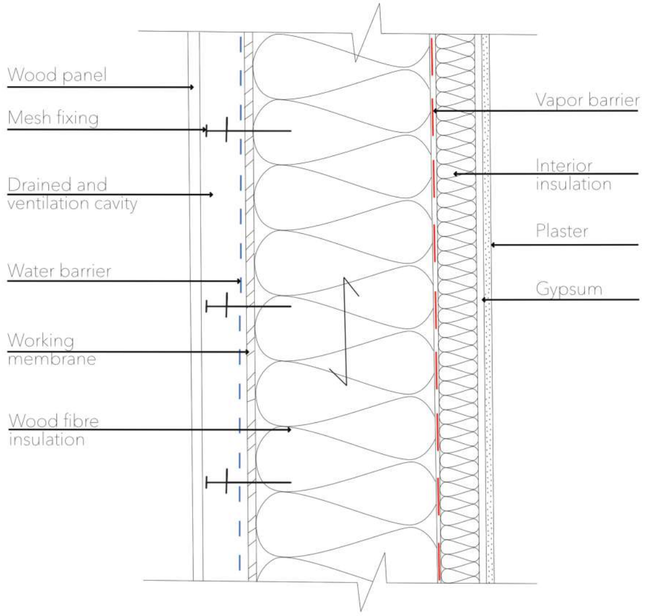


Exterior

Floor detail

Exterior

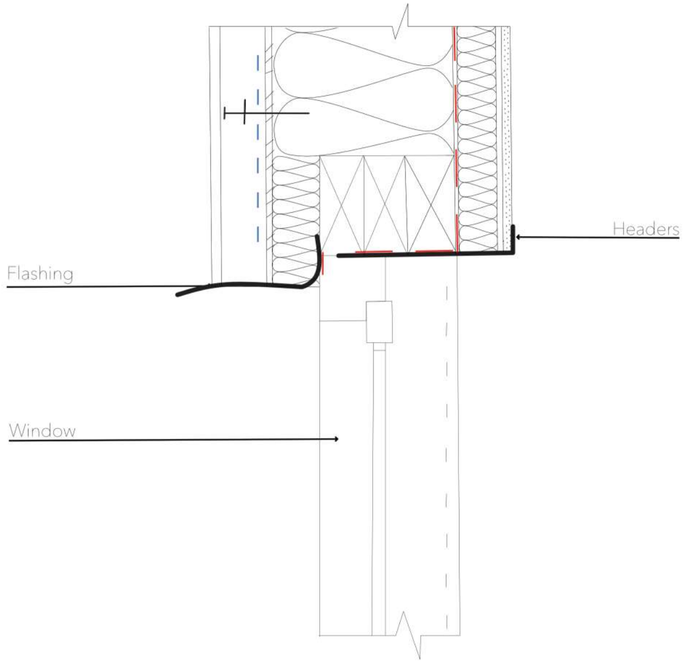
Interior



Wall detail

Exterior

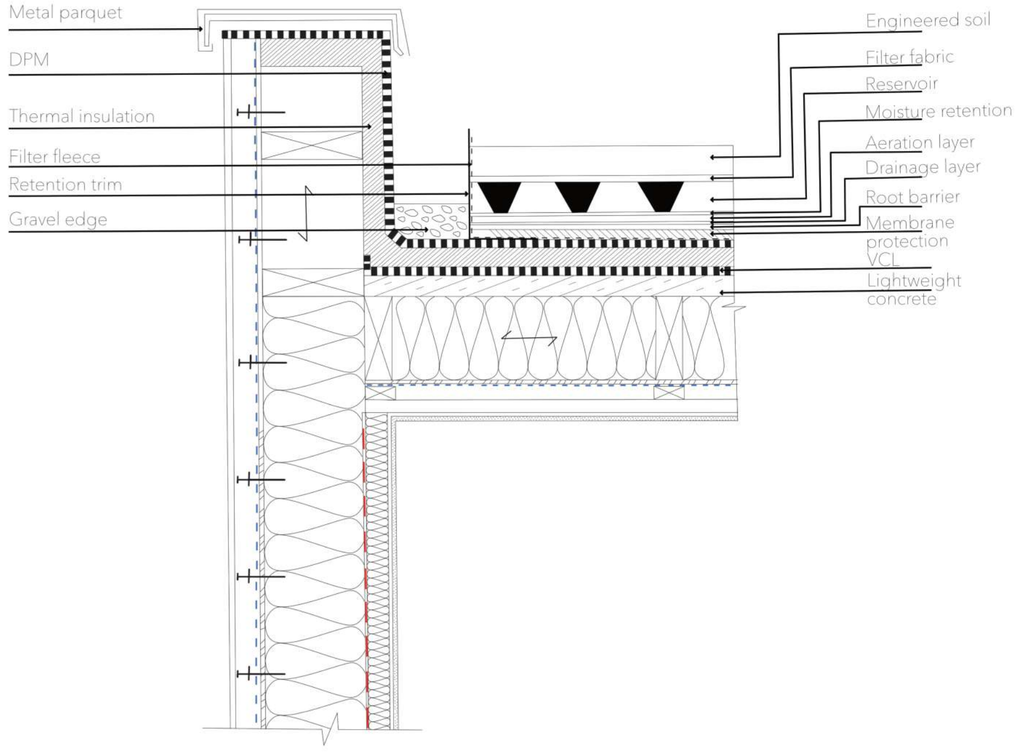
Interior



Window detail

Exterior

Interior



Roof detail

REPORT

1.INTRODUCTION

1.1. Purpose of the building

Housing and agriculture serve fundamentally different purposes in terms of society progress and human existence. Housing is the fundamental component of shelter, offering people and families a secure place to live, work, and create communities. Housing provides for more than just weather protection–it satisfies fundamental human requirements for stability, privacy, and comfort. Contrarily, agriculture is the cornerstone of food production and feeds people all over the world. To provide a steady supply of food, it includes managing natural resources, growing crops, and keeping livestock. In addition to providing physical nourishment, agriculture powers economies, sculpts landscapes, and preserves cultural traditions. But housing and agriculture work together to provide livelihoods, promote social cohesion, and the growth of the societies.

1.2. Project identification data

1.2.1. Project name

The green line

1.2.2. Location

The location of my building is all around Prague because the brief focused on the city in 2150. However, I will be concentrating more on Zbraslav, which is a neighborhood south of Prague around the intersection of the Vltava and Berounka rivers.

1.2.3. History

Zbraslav is a district in Prague, originated in the ninth century and developed under the Premyslid dynasty. In the fourteenth century, it was fortified, serving a strategic purpose. It endured conflicts, affluence, and economic expansion over the ages, particularly in the paper industry.

1.2.4. Footprint of the building

Since my idea extends 69,302 m, I will concentrate mostly on the first 100 m to demonstrate how the structure integrates with its surroundings.

1.2.5. History of the concept

I work for Prague 2150, I wanted to talk about the history of this concept. Prague is one of the greenest capitals, speaking of greenery, forests, parks, and many others, I wanted to keep this idea in mind but in a few years the society will increase in population rate. Keep Prague green but densifying to welcome the new inhabitants of this city so housing all around Prague while preserving forests and fields.

1.2.1. Traffic

A new highway that will encircle Prague in a few years will be opened. I took inspiration from this shape to develop the shape of my building, therefore my project will look like the new highway ring in broad but situated on the outside of the new road. My building will be easily accessible due to the highway of Prague location and the numerous main and side roads that either cross it or are adjacent to it. For Zbraslav, the building is adjacent to the highway, and many minor roads from the other villages will link to it.

1.2.2. Type of building

The building that is being proposed is designed to serve as both a residential and agricultural structure. It incorporates sustainable farming practices into an architecture with timber columns so that it blends in its surroundings. More than just housing, the goal is to create a setting that encourages practical involvement in farming. This building will be arranged linearly throughout Prague, with pedestrian street in the middle of the building to allow for urban exploration among both rural and urban environments.

1.2.3. Architect

The main architect is Jeanne Kielwasser with the contribution of Elan Fessler and Zuzana Drahotová studio.

1.2.9. Site

1.2.9.1. Developed area in sqm

For the site I'm working on, Zbraslav, has a developed area of 3 000 square meters.

1.2.9.2. Built volume in cbm

The built volume is 90 000 cubic meters.

1.2.9.3. Green areas in sqm

The building is surrounded by fields and forests so the exact sqm is not known precisely. However, the building will have gardens and urban farming
thus 1 000 square meters will be used for farming. There will be green space on one-third of the building.

1.3. Basic project data

1.3.1. Project location data

Zbraslav is in the southern suburbs of Prague, Czech Republic. Its proximity to the Vltava River and the wooded areas around it provides a geographic setting for investigation, mixing manufactured and natural environments.

1.3.2. Subdivision of the project

Since the building will be thin and linear, I created a grid-shaped structure with columns and beams spaced every six meters for the columns and every six meters for the beams. A street will run between the two structures, completely open to the public so they walk inside while being outside of the building. There will be four different types of apartments available, each set to be embedded like containers in the building. Depending on its surroundings, the building may be see-through or even compact in some parts. The structural framework of this building is quite adaptable. The project will be divided up into different parts.

The ground floor will be fully walkable, and there will be shafts and stairs to access the upper floors. The first level will have a market, food choices, social areas, and shops. It will be designed to resemble a narrow walkway with easy access on all sides. The two floors above, there will only be residential parts, with apartments that can accommodate six to two people each. Each apartment will include a garden. Above these three levels, there will be gardens, urban farming allowing
people to cultivate their own food or make gathering places where they can connect with nature while interacting with another at the same time.

1.4. Context

Zbraslav, is important in Prague because of its cultural legacy and historical significance. Zbraslav provides researchers with insights into the evolution of architecture, urban growth, and socio-political changes throughout centuries. Its transition from a separate town to its intake into Prague is studied by students who look at the administrative, social, and economic repercussions. Zbraslav Castle and Zbraslav Monastery are ideal places to start your studies of religious buildings, cultural patronage, and mediaeval and Renaissance architecture. Furthermore,
Zbraslav's natural surroundings offer an environment for examining how urbanization and environmental preservation interact.

2. RESULT OF CONDUCTED SURVEY

2.1. Geological survey and information on local geological conditions

Zbraslav is situated on top of the Prague Basin, which is made up of sedimentary rock like shale, limestone, and sandstone. The Vltava River has shaped its topography, which consists of fertile lowlands and hilly terrain. According to geological investigations, the region's geological composition has been shaped by volcanic activity and traces of ancient marine habitats, indicating a complicated history.

2.2. Existing site building and green

Zbraslav Castle, an important architectural building reflecting historical value, is what defines Zbraslav, a district in Prague. The neighborhood has historic structures along cobblestone roads. The region is surrounded by parks and forests. The integration of green areas and historical features improves Zbraslav's overall design and use.

2.3. Surrounding development

Zbraslav and the surrounding area have seen progressive development with an emphasis on home growth and improvement of infrastructure. The natural landscape of the area has been preserved while considering contemporary requirements. Alongside efforts to improve public facilities and transportation, residential projects have been implemented. The region's dedication to sustainable growth is shown by the balance that is established between urban expansion and environmental preservation, providing a living environment for both locals and visitors.

2.4. Existing site utilities

For their utility needs, Zbraslav and its surrounding environment use a combination of standard and renewable energy sources. Although electricity and heating are provided by traditional systems, renewable energy sources such as solar and wind power are becoming more and more important. There is constant work being done to increase the energy efficiency of infrastructure and buildings. The objective of this diverse energy strategy is to increase sustainability and minimize ecological consequences, ensuring a dependable and ecologically conscious supply of energy for the area. Zbraslav and the surrounding area are furnished with basic utilities, such as water and electricity, sewage systems, and telecommunications networks, ensuring effective operation and communication for citizens and companies.

3. AGRICULTURE AND HOUSING PROJECT

3.1. Structure

3.1.1. Foundations

To raise the structure off the ground and create a crawl space underneath, the foundations will be column spread footings with a shallow foundation. These spread footings, made of concrete, will support the building's concrete structure as well as its timber column structure.

3.1.2. Walls

The walls will be composed of wood panel on the exterior, it will be fixed with mesh fixing, wood fiber insulation, wood cladding, OSB racking, and the internal plaster.

3.1.3. Floors

The floors will be made of a DPM, insulating board, vapor control layer, floor finishing for the unit.

3.1.4. Roofs

The building will have both intensive and extensive green roof, due to the garden area and the food production area. The layers will consist of a reservoir, a moisture retention layer, moisture retention layer, aeration layer, a drainage layer, root barrier, membrane protection, a sheet DPM, thermal insulation, VCL, lightweight wooden material, wood cladding, internal plastering.

3.1.5. Doors/Windows

The windows will feature triple-glazed panes within wooden frames, accompanied by an integrated shading system. Additionally, the doors will be constructed from wood, ensuring aesthetic coherence and thermal efficiency within the architectural ensemble.

3.1.6. Façade

The exterior cladding of the building will consist of wooden panels, through which the underlying column and beam structure will be visible. The façade will be intricately linked to this structural framework, with each unit seamlessly integrated into the overall structure. Moreover, the façade will be securely affixed to the underlying structural elements, ensuring stability and cohesion throughout the building.

3.1.7. Staircases and shafts

One large shaft and 50-meter-spacing staircases are part of a suggested architectural layout that allows for vertical movement inside the building. The shaft is designed to support between 8 and 9 people on average per travel, from the lowest level to the highest level. The shaft, which stands out for being transparent, is intended to be made of glass, allowing it to blend in both naturally and with the surrounding architecture. Staircases are planned to be located next to the shaft so that the entire structure is pedestrian friendly. To get to other levels, you must go through the center shaft and the side staircases. The design of the staircases includes intermediate landings every fifteen

3.2. Energy systems

Through a network of pipes placed underground, a geothermal heating and cooling system uses the ground's consistent temperature to offer cooling in the summer and heating in the winter. My colleagues will supply the water system project. One project will oversee cleaning the water, which will then be transferred to another project that will store the water in case of flooding. The two projects will then be connected to my project, which will provide me with enough water for residents and agricultural. A system of solar panels will be installed to give enough energy for the people need and the building need. The plant production that individuals will develop will help to reduce overheating or heating loss by avoiding direct sunlight gain. Since the building will be completely open, the natural air ventilation system will function properly throughout the day and in all seasons.

3.3. Materials

The building structure will be made of timber columns and beams. The foundations which will hold the entire building will consist of concrete. The unit will have both an intensive and extensive green roof, a façade made of wooden panels.
The gardens will be made of timber but to protect the soil from falling there will a dwarf wall made from timber. The floors from each level will be with a covering layer made of timber flooring.

4. CONCLUSION

The green line will emphasize the connection between the nature and the people, while having a building well integrated into the different part of Prague, so it will be adaptable during its journey around the city. The establishment of this agricultural project will not only contribute to the city's agricultural production but also increase urban density within Prague. Moreover, it will be approached with a sustainability mindset, benefiting both the residents and the surrounding environment.

5. BIBLIOGRAPHY

I have done my research throughout the semester to prepare for my project. This required review of relevant course materials from previous semesters, like “Timber construction manual” by Thomas Herzog, “fundamentalsof buildings construction”, websites “Timber design & technology”, “Woodworks” These are the main books and websites I looked at to understand the details of my project and its architectural structure.

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